

Installation, Operating and Maintenance Instructions

DRAABE Pure Water System

PerPur / AC / SoftCab 25 DR / DE3-5 / Dosing unit



DRAABE

A WMH company

DRAABE Pure Water System

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1. Introduction

1.1 Greetings!

We thank you for deciding in favour of the **DRAABE Pure Water System**.

The Pure Water System is constructed in accordance with the state of the art and recognized technical safety rules. However, incorrect use of the system can lead to certain hazards for the user or third parties and/or cause damage to material assets.

Therefore, to ensure safe, appropriate, economic operation please observe and follow all the information and safety cautions in this technical documentation.

If you have any questions which are not answered at all or not answered sufficiently by this documentation, be sure to put them to your local Nortec Systems area representative or to our service hotline (262.884.4669). We would be glad to help you personally.

1.2 Remarks on Technical Documentation

Subject of this documentation

The subject of this technical documentation is the DRAABE Pure Water System. System parts (e.g. water softener, pure water system, etc.) are only described to the extent required for proper operation. Since there is a wide variety of ways in which the system can be extended, this documentation focuses on basic systems. Various system parts are available for different applications and performance needs. Increases in required levels of water purity exert an influence on the various system parts. Some accessories are not necessarily required, whereas others belong to any standard configuration. Further information about accessory parts and individually tailored customer solutions is to be found in the customer specific diagrams or it can be obtained by contacting Nortec Systems.

The explanations in this technical documentation are restricted to the

- **Planning,**
- **Installation,**
- **Start-up,**
- **Operation and**
- **Maintenance**

of the Pure Water System.

The technical documentation is supplemented by other documentation such as brochures, ordering forms and diagrams. Where necessary, you will find references to these publications in this technical documentation.

Meanings of Symbols



This symbol points to **Safety and Hazards Comments**. As the symbol suggests, disregard of these comments can lead to damage to persons and/or material assets. Such comments are also clearly set apart by means of the word **CAUTION**.



This symbol, or the word **IMPORTANT**, points to other important remarks.

Your Documentation

Please keep this technical documentation in a safe place where it is always available when you need it. If the documentation ever gets lost, please contact Nortec Systems.

Language Versions

This technical documentation is available in a number of languages. For further information about this, please contact Nortec Systems.

2. Concerning Your Safety

Agreement on Intended Uses

The Pure Water System is intended **exclusively for the production of pure water for industrial purposes**. It must be operated within the specified conditions of operation in rooms in which there is no danger of an explosion. All other uses of the Pure Water System are not intended uses and can lead to situations in which the System is a source of danger.

Use as intended includes **observation of all the information in these instructions** (especially the comments on safety) and strict adherence to the specified operating conditions.

General Comments on Safety

- The Pure Water System may only be installed and operated by **persons** who are familiar with the product and **sufficiently qualified** for the work at hand. It is up to the customer to supplement the technical documentation with instructions internal to the company in reference to supervisory and reporting obligations, work organisation, staff qualifications, etc.
- **Before starting work** at components of the Pure Water System, you must be sure that the system has been correctly shut down as in chapter 7.2 and also secured against being started up by mistake (prevent power from being turned on, turn off the water supply and let all pressure out of the systems).
- Observe all local **safety regulations** in respect to:
 - ☐ - exposure to **electric and electronic devices** that draw on mains current
 - ☐ - design of **water and low pressure air systems**.
- Poorly maintained air humidifier systems represent a danger to human health. Therefore, the **prescribed maintenance periods** must be observed and the **maintenance work carried out correctly**.
- If there is ever reason to believe that **completely safe operations are no longer possible**, then the Pure Water System must be **shut down at once and secured**

against being started up again by mistake, and Nortec Systems should be informed. This can be the case under any of the following circumstances:

- when one or more components of the system have been damaged,
 - when the system no longer works properly
 - when connections or lines leak.
- The electrical system components (PerPur, DE 3-5) are IP00 protected. Take care that they are protected against dripping and sprayed water at their locations.



CAUTION: If the System is installed in a room that has no water drain, then water sensors with automatic cut-off valves must be installed to shut off the water supply in case of damage to the system which conducts water.

- To avoid damage from water you should not store any water sensitive materials directly under system components.
- The Clear Water System may *only* be operated with softened water (0-1°dH, 17 ppm). Well water and rain water are not suitable. The water supply must be virtually germ free.
- If the pure water (generated by water softener and pure water system) is used for an air humidification system, a greater or lesser amount of mineral deposits can accumulate in the vicinity of the aerosol mist. Sensitive materials and devices are to be taken away from this area or protected accordingly.
- Except for the work described in these instructions, no invasive operation of any kind may be carried out on the Pure Water System.
- Only use original accessories and spare parts from DRAABE.
- Except with the written permission of DRAABE, no changes may be made to the Pure Water System.
- In the event of changes to the system, an acceptance procedure is to be carried out by the Nortec Systems customer service or other person authorized by Nortec Systems before the first start-up of the changed system.

3. Product Overview

3.1 Variants of the Pure Water System

The system is very flexible. Customer specific systems are oriented to the amount of pure water needed. All systems have a water softener and a pure water system. This two stage water treatment yields very soft water (0-1°dH, 17 ppm) which is also demineralised (95-99%).

The system variants described below just illustrate the most frequent applications. It goes without saying that each system can adapt to customer needs. Each customer receives a diagram which is only applicable to the given customer system. The customer specific configuration is shown in the diagram.

3.1.1 Water Softener and Clear Water System

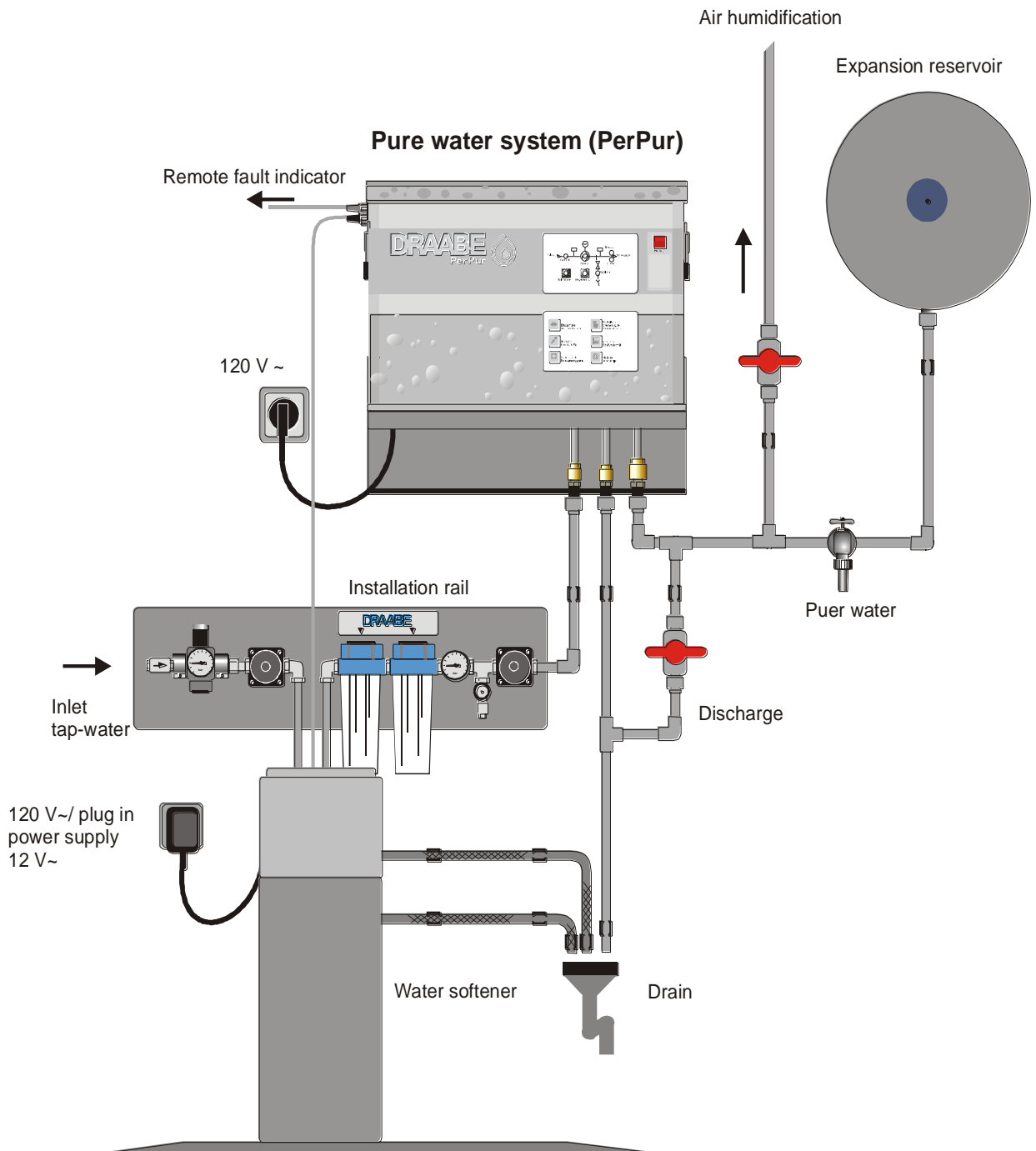
The minimum configuration (see p. 8, view of basic system) consists of a water softener, an installation rail, a pure water system and a storage tank. These system parts form the basis of all system variants. Water circulation is completely closed; this is of great importance from the point of view of hygiene. The water produced by this basic system is primarily used for **DRAABE Air Humidification** or as **process water** for printing presses.

The water fed into the system (drinking water) is softened by the water softener (0-1°dH, 17 ppm), filtered through the two stage filter combination and, in the last treatment stage, demineralised by the pure water system. The pure water system also retains organic substances.

The pure water system provides a remote fault indicator. The closer, in its closed state, signals that there is a fault. This contact can turn an optical or acoustic transmitter on or off or can be used by the building services management system (BMS). The pure water system also organises the optimum regeneration point of the water softener.

The pure water produced by the system is stored in the storage tank (mounted on wall or standing).

Figure 1: Basic PerPur System



3.1.2 Basic System with Pressure Boost

The working pressure of the basic system lies between 2 - 3 bar (29 – 44 psi). If the quantity of pure water produced when the pressure lies in this range is insufficient, it is possible to add a pressure boost. The pressure boost (DE 3-5) increases working pressure to 3 - 5 bar (44 – 72 psi). This is useful when the consumers are at a distance or require higher input pressure.

The boost in pressure yields system separation between process water and the output of the pure water system. This is especially important when the pure water is used both for printing presses and for a DRAABE air humidifier.

The pressure boost forces the pure water into a standing storage tank. There must always be a non-return valve between the pressure boost and the standing tank so that the water in the tank cannot be forced back.

This variant is used when the pure water is to be used as process water.



IMPORTANT: Further information on the performance of a pressure boost can be found in Chapter 4, "Fundamentals of Planning".

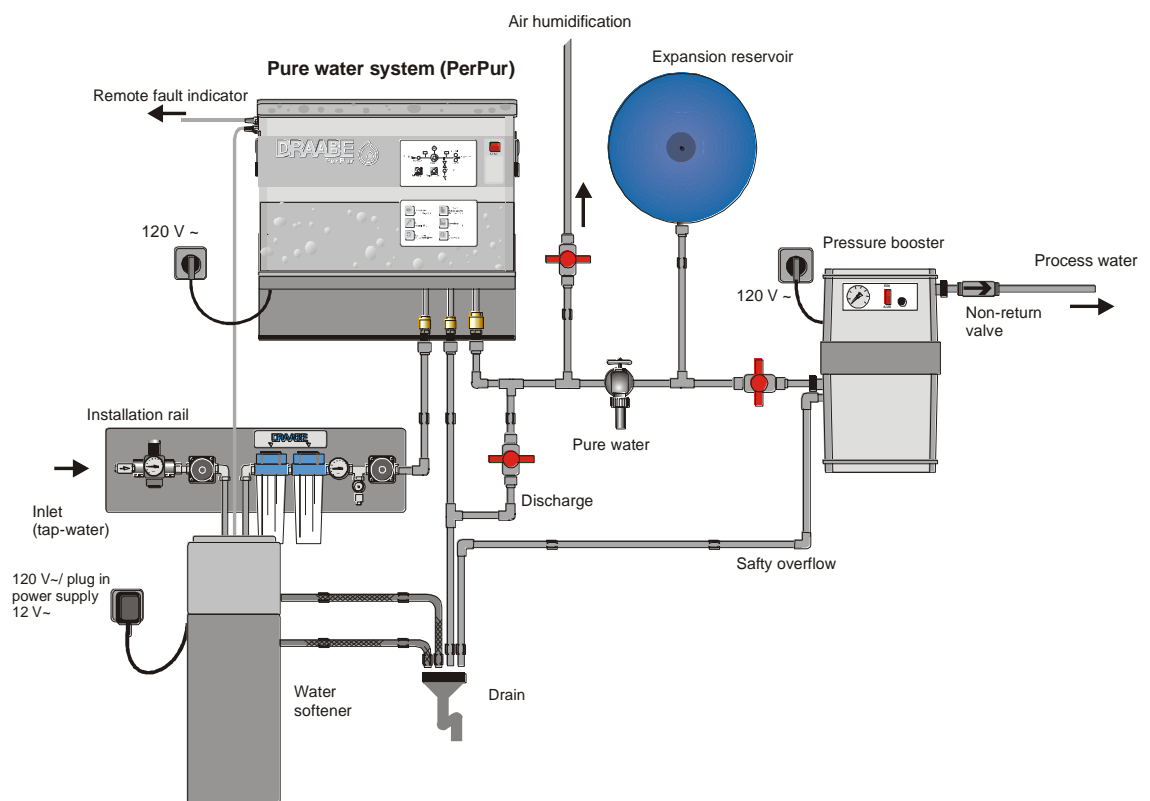


Figure 2: PerPur with Pressure Boost

3.1.3 Basic System with Dosing unit

The pure water produced has a hardness of 0-1°dH (17 ppm) and a conductance value of 7-30µS (dependent on the conductance of the water being processed, e.g. drinking water). Water with these values is not suitable for process water for printing presses. For an optimal printing result to be obtained with minimal consumption of operating materials, a hardness concentrate needs to be added. We recommend DRAABE hardness concentrate Aqua-Plus.

This task of adding this concentrate (additive) is carried out by the dosing unit. The dosage used is 0,5%. The result is a supply of optimally conditioned process water.



IMPORTANT: Further information can be found in chapters 4 "Fundamentals of Planning" and in 3.2.4 "Functional Description".

System View

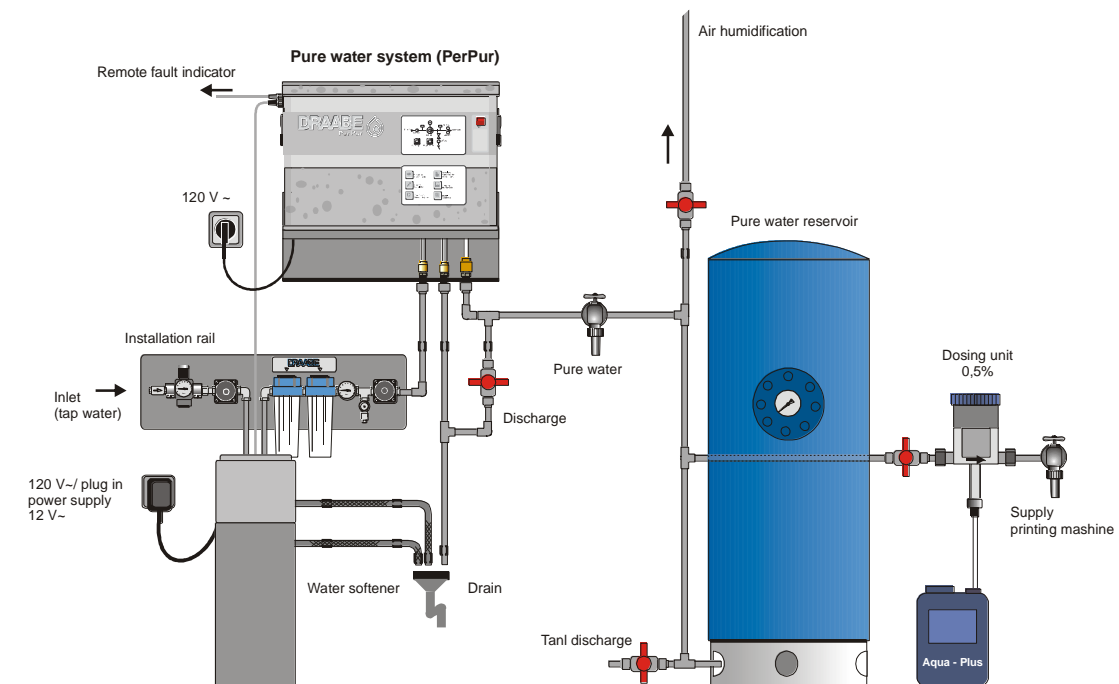


Figure 3: PerPur with Dosing unit

3.1.4 Basic System with Air Humidification

In addition to being used as process water, the pure water can also be used for humidification of the air. With humidification there is a distinction between unitary and binary nozzle systems.

The DRAABE high pressure pulsation system (HighPur) increases the pressure to about 80 bar (1232 psi) and conducts the water to the atomizers via the high pressure ring.

Binary nozzle systems need compressed air and water. The pure water produced by the basic system with a working pressure of 2-3 bar (29-44 psi) is mixed with compressed air (working pressure around 6 bar (87 psi)) and atomized.

3.2 System Description

The DRAABE Pure Water System is a modern water treatment system which provides for a maximum of comfort and economy.

The system is built in dependence on the application and performance required. For this purpose there is a variety of system components which differ primarily in their operating data (e.g. pure water output, desalination performance). Greater performance of individual components has an influence on the selection of other system components (e.g. water softener) and their installation and operation. It is possible to construct simple systems, double systems and systems with several pure water subsystems.

The following sections describe the function of the individual system components.

3.2.1 Functional Description: Installation Rail

The installation rail has several tasks. First of all, it serves as the interface between the drinking water network (company network) and the downstream water treatment system. A non-return valve makes it impossible for treated water to get back into the drinking water network.

Secondly, the water softener is bound to the installation rail (3). Various shut-off control units (2) make it possible to replace the water softener by hand (e.g. for maintenance).

A two stage filter (4, 5) protects the downstream systems. The decrease in pressure across the filters can be read from the two manometers (1, 6). Here, too, the shut-off controls make it easy to carry out a replacement if that becomes necessary (see chap. 7.2). The water pressure of the drinking water network (1) and of the filtered water (6) can be controlled continuously.

After filtration comes a hand faucet (7) via which a water sample can be drawn at any time.

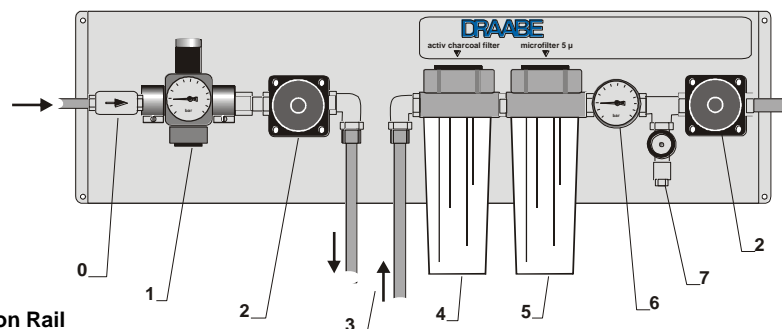


Figure 4: Installation Rail

3.2.2 Functional Description: Water Softener

The following description refers to the water softener type AC as well as to the water softener type SoftCab 25 DR. For this description see also the drawings page 13 and 14. For new installations, solely the water softener SoftCab will be used. But for the sake of completeness, the AC is described, too.

The water softener is the first stage of water treatment. It softens the water. That means that the quantity of substances in the water which are decisive in the formation of lime is very greatly reduced. A very soft water (0-1 °dH, 0-17 ppm) comes out of the exit of the water softener.



IMPORTANT: Softened water is of great importance for faultless operation of the downstream pure water system (see section 3.2.3).

The water softener carries out its task of removing liming agents by applying the principle of ion exchange. In the water softener there are resin pellets which bind magnesium and calcium ions and release salt ions into the water. When a certain fixed quantity of water is treated, the resins wear out and have to be regenerated. That means the bound ions are rinsed away and exchanged for fresh salt ions. This regeneration process is fully automatic and lasts about 2 hours.



IMPORTANT: During regeneration the water supply into the downstream system is shut off!

The time of regeneration is determined by the softener type. There are two types. By the first type the pure water system controls the regeneration of the water softener (Type AC2101). A microprocessor calculates the time for the next regeneration on the basis of water consumption. When this time is reached, the microprocessor sends a signal to the AC, which automatically controls the regeneration process. When regeneration is over, the AC informs the pure water system and that system resumes its work.

The second type (SoftCab 25 DR) can be operated time- as well as quantity-controlled. For using the time-controlled mode, day and time of the regeneration have to be pre-selected. When using the quantity-controlled mode, the SoftCab calculates the time for the regeneration independently. When reaching the point in time for the regeneration, the water softener gives a signal to the pure water system which hereupon interrupts its production. After the process is finished, the water softener gives a release signal to the pure water system and the system continues its operation.

Salt in tablet form is required for the softening process. The water softener has a supply of salt. This supply may not fall below a certain fixed level. If it does, the water softener is no longer able to work. Since this would also cause damage to the downstream pure water system, the water softener's are equipped with a salt refill sensor. This sensor detects the lack of salt and informs the pure water system. The pure water system indicates the need for more salt on the display and then shuts itself off (further details in 3.2.3).



IMPORTANT: Only residue free tablet salt which conforms to DIN 19604 or EN 973 (no broken salt, etc.) may be used!



CAUTION: If an water softener does not use up any salt, call up Nortec Systems Customer Ser-vice at once!

Meaning of Numbers in Following Illustration

- 1 salt refill sensor
- 2 go and return tubes
- 3 rinse water drain (for regeneration)
- 4 safety overflow
- 5 drain
- 6 salt container
- 7 control line (connection to the pure water system)

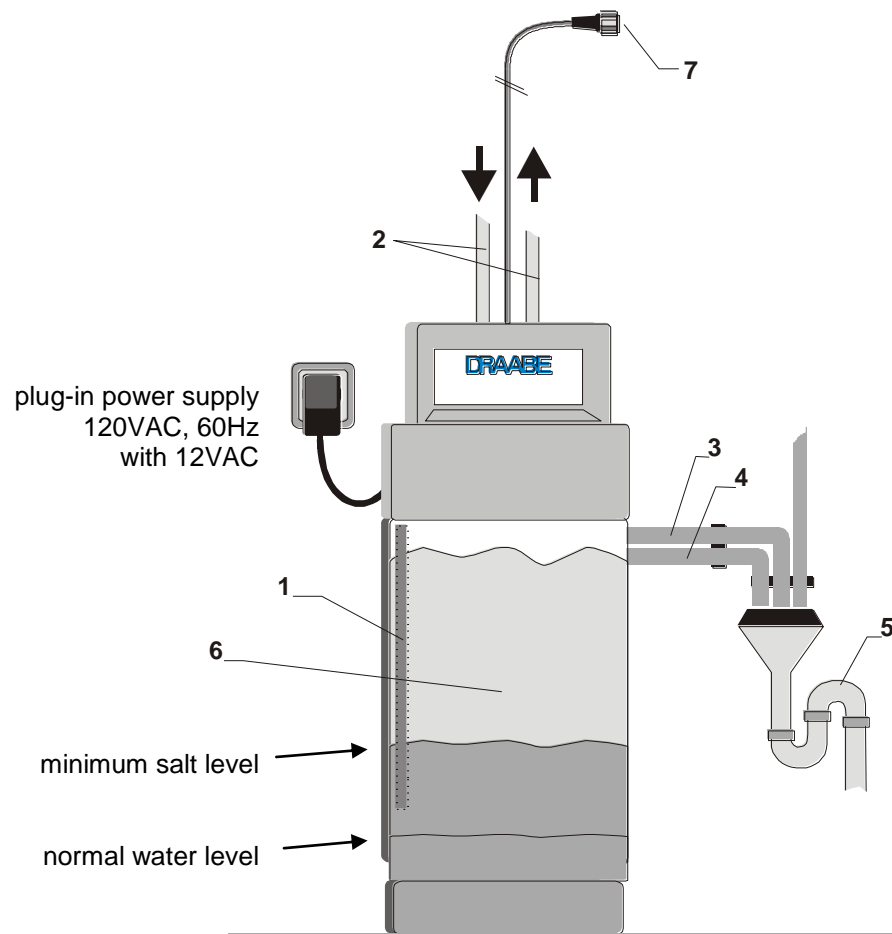


Figure 5: Water softener (AC)

Meaning of Numbers in Following Illustration

- 1 salt refill sensor
- 2 go and return tubes
- 3 rinse water drain (for regeneration)
- 4 safety overflow
- 5 drain
- 6 salt container
- 7 control line (connection to the pure water system)

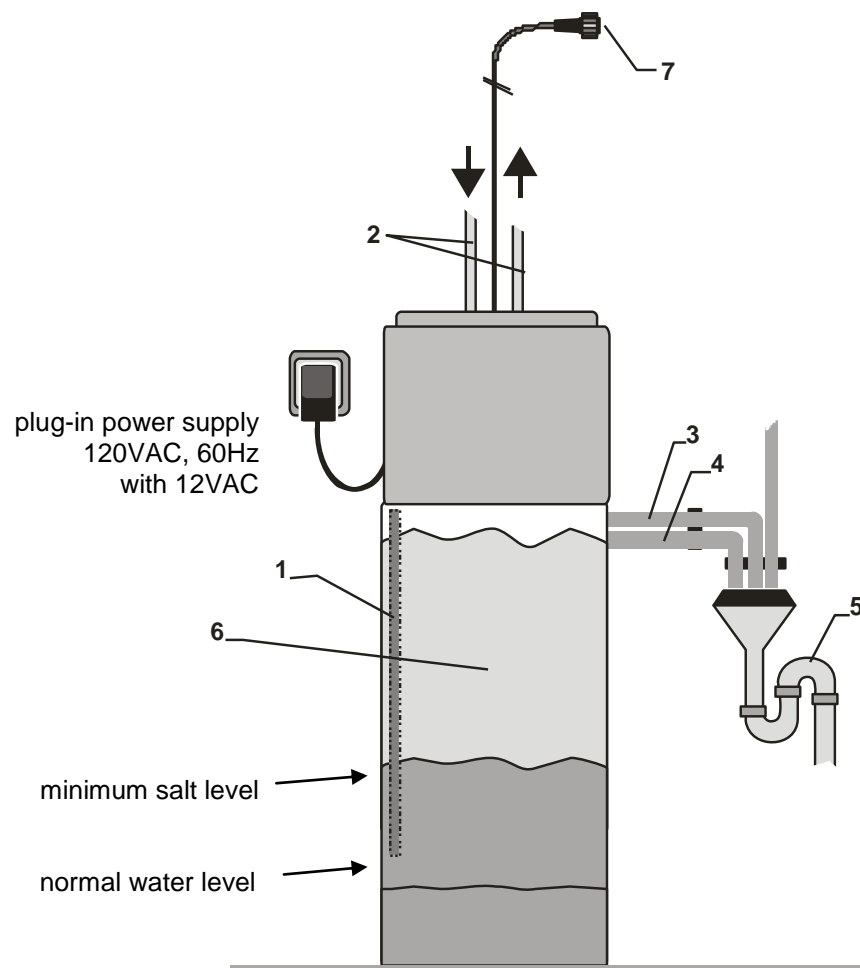


Figure 6: Water softener SoftCab 25DR

3.2.3 Functional Description: Clear Water Systems (PerPur)

The Pure Water System PerPur is the heart of the water treatment system. The pure water system works by the principle of reverse osmosis and desalinates the water which has just been softened. Its output is the desalinated product (95-99% desalinated), the so called pure water permeate. This pure water can be used as is for an air humidification system or else mixed with an additive that renders it suitable for use by printing presses.

The systems are equipped with comprehensive hygiene functions. The DRAABE BioSafe System ensures hygienically faultless operation. The demanding hygienic requirements placed on a pure water system are of especially great importance when the water being purified is destined for an air humidification system.

3.2.3.1 Service Recommendation

Regular maintenance, in addition to the Pure Water System's good concept, is of great importance for undisrupted operation which adheres to a high standard of hygiene.

Many **Professional Associations** advocates regular maintenance and service. DRAABE company agree that in view of the considerations given below, reverse osmosis systems must be **serviced regularly**.

Reverse osmosis systems work with a separating membrane. The undesirable substances in the water precipitate there and are conducted to the drain. The product (pure water) reaches the exit from the separating membrane. A separating membrane's operating properties change through erosion and deposits (minerals, iron). Consequently, each separating membrane must be cleansed thoroughly after several months of operation.

With the patented DRAABE Container System this servicing procedure is easy, low cost and can be carried out without downtime in the customer's operations. Under the rental contract the customer automatically receives an exchange container every 6 to 8 months. The used container is sent back to the producer, where it is serviced. There the membrane is cleansed as required and always disinfected. Its operating data are checked and optimised. This service operation including disinfection is confirmed in the BG Service Book.

3.2.3.2 Certificate of Hygiene

The DRAABE Pure Water Systems are examined microbiologically for their hygiene by Fresenius Institute, which is an independent institute. The examinations are carried out at regular intervals and take place under test conditions which correspond to reality. Our systems completely fulfil the requirements set by the Institute and the Professional Association for Printing and Paper Processing, which is located in Germany, Wiesbaden. Our systems work faultlessly in respect to hygiene. In an annex (section 9.3) you will find the Test Certificate issued by the Fresenius Institute.

3.2.3.3 Explanation of PerPur Display

Two additional functions of the PerPur need to be explained.



The salt consumption optimisation mechanism controlled by a micro processor sees to it that the water softener is regenerated when a certain customer dependent operating time has passed. The 5 pole **plug 1** (see illustration below) establishes a permanent connection between the water softener and the pure water system (see section 3.2.2).



The system has a remote fault indicator which is triggered by all malfunctions. If there is a malfunction, this can be passed via the 2 pole **plug 2** to an optical and/or acoustic transmitter. This signal can also be sent to a building services management system.

The remote fault indicator is implemented by a voltage free closer.

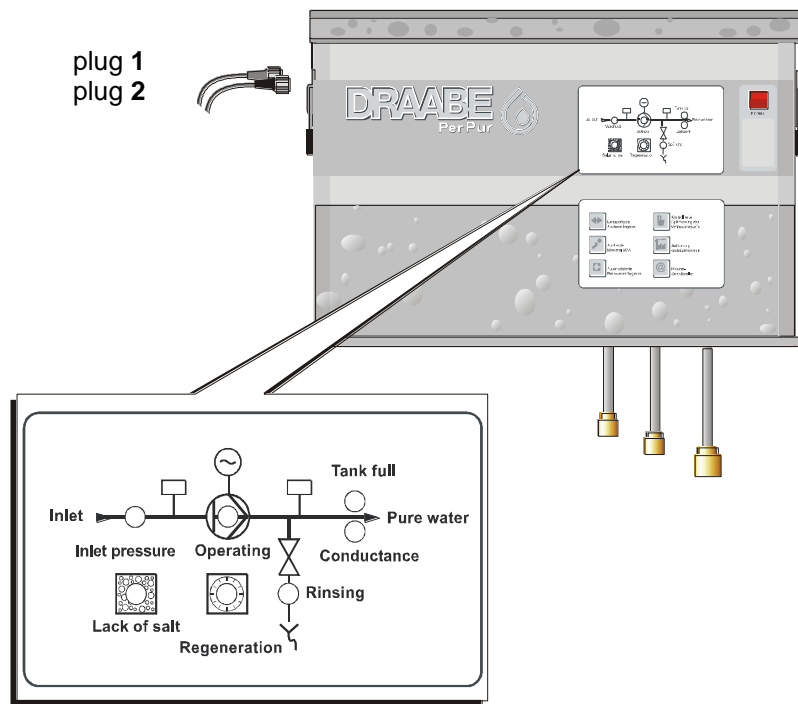


Figure 7: PerPur Display

Explanation of the LED Displays:

LED Inlet pressure: The water inlet to the Clear Water System is monitored continuously. If the water supply is disrupted, the pressure switch notices that, the system shuts itself down and the red LED lights up.



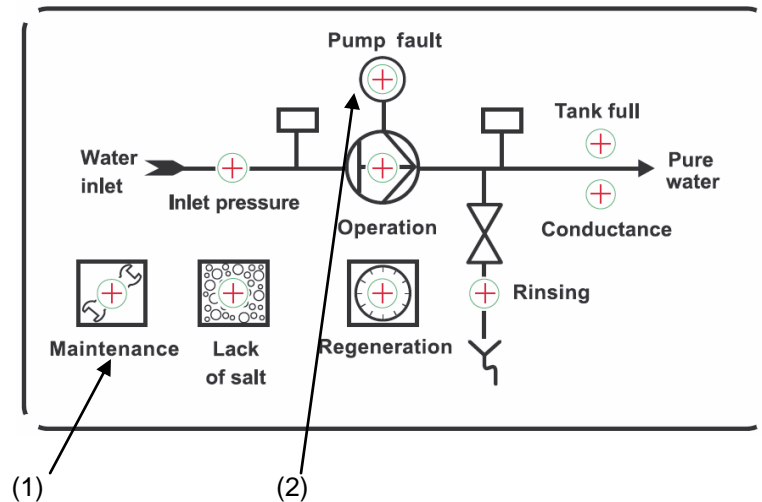
IMPORTANT: This indicator can also come on if the upstream water softener is in regeneration mode, but then there is no malfunction, for after regeneration the system turns itself on again. If the latter does not happen, then there is, in fact, a malfunction and the remote fault indicator goes on (switch closes).

- LED Operation:** This green LED is always lit when pure water is being produced.
- LED Tank full:** The system generates pure water into a closed system. The pure water tank (both wall and standing models) also follows this concept. A pressure switch at the exit of the pure water system indicates that the tank is full and the green LED lights up.
- LED Conductance:** The conductance of the pure water being produced says a lot about the functioning of the pure water system. If the conductance leaves a certain defined range, the system is no longer working properly. For this reason, the conductance of the water being produced is monitored continuously. If the boundary value is exceeded the red LED goes on and the remote fault indicator switch closes.
- LED Lack of salt:** When this red LED lights up then there is no longer enough salt in the water softener's supply container and the remote fault indicator switch closes. When the container is refilled with salt it takes about 20 minutes for the sensor to notice that there is enough salt again.
- LED Regeneration:** This red LED is lit when the water softener is in regeneration mode, and when this mode terminates the LED goes off.
- LED Rinsing:** With every restart, regardless of the reason for which the system stopped, a magnetic valve ensures that the first freshly produced pure water does not flow into the tank but is directed to the drain. During this process this yellow LED is lit.

The system is equipped with a fresh water mechanism. There is a danger that stagnant water will germinate if, after the tank has filled up (LED "Tank full" is lit), 10 hours elapse without sufficient consumption of pure water (the system has not entered operating mode). To counteract this danger, the system then goes into operating mode for a short period of time and LED "Rinsing" lights up.

3.2.3.4 Explanation PerPur 200 Display

Die pure water system PerPur 200 is equipped with an extended set of system controls. This model has all the displays and functions of the models already described. In addition it has the two additional displays and functions described below.



(1) **LED Maintenance:**

This yellow LED, when lit, demands that unplanned maintenance be carried out in addition to the regular service cycle of 6 to 8 months. This can happen because the separating membrane has been overworked and internal regulation is no longer able to set the required performance parameters.

Another possibility is that the pumping rate has fallen steeply but this was not to be expected.

When this LED lights up, the DRAABE Customer Service must definitely be informed. The system will produce for another 14 days before it shuts itself down. When the problem is solved, the LED is turned off by a reset at the network switch.

(2) **LED Pump fault:**

If pumping pressure reaches a fixed upper boundary value (excessive pressure), the system shuts itself down and this red LED lights up. Please inform the DRAABE Customer Service in such a case. The LED can be turned off through a reset at the network switch.

3.2.4 Functional Description of Pressure Boost

The pressure boost system (DE) increases the output pressure of the pure water system from the range 2-3 (29-44 psi) to the range 3-5 bar (44-73 psi).

The DE can be divided into two parts. The **lower part** is fixed to a wall and serves as an interim storage tank. A float valve controls its inlet. If the interim tank is not completely full, pure water can flow into it. When the maximum water level has been reached, the valve turns the inlet off. The interim tank is equipped with a safety overflow and a drain plug.

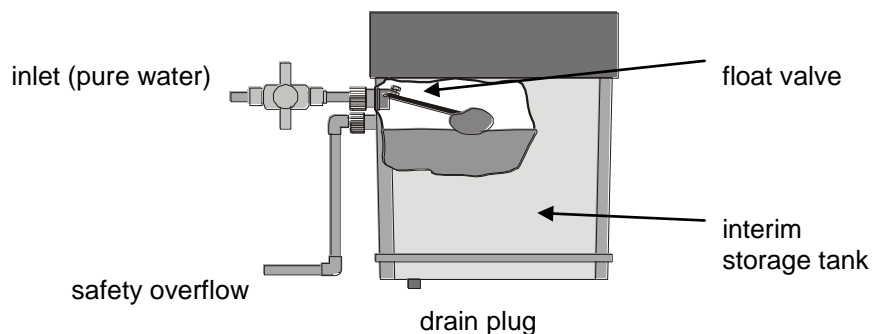


Figure 8: Pressure Boost (lower part)

The **upper part** contains all the technical components for the pressure boost such as the pump and pressure switch. This part can be exchanged for maintenance or if there is a disruption of service. The operator cannot and may not service or repair anything in or on this upper part. The upper part is serviced and repaired on the manufacturer's premises.

The upper part is correctly placed on the lower part (see section 8.4) and then it's just necessary for the plug for the voltage supply (120VAC) to be plugged into the network socket. The DE is operational as soon as its network switch (1) has been turned on. The pump, which is in the upper part, goes on when a sufficient quantity of water is present in the interim tank. The water level is monitored by two float valves (2). The pump forces the water from the interim store into a standing storage tank. The pump stops when a system pressure of 5 bar (73 psi) has been reached. The system pressure can always be read on the manometer (3). When the standing and interim tanks are full, the DE is in stand-by mode.

The system pressure goes down as water from the standing tank is used. When this pressure reaches 3 bar (44 psi) the DE starts boosting it again until it has risen to 5 bar (73 psi).

The switch on and switch off points are regulated by a pressure switch. In addition, the DE is equipped with a safety pressure switch (4). This switch is triggered at 6 bar (87 psi) and can only be reset mechanically (see section 7.1 for further details).

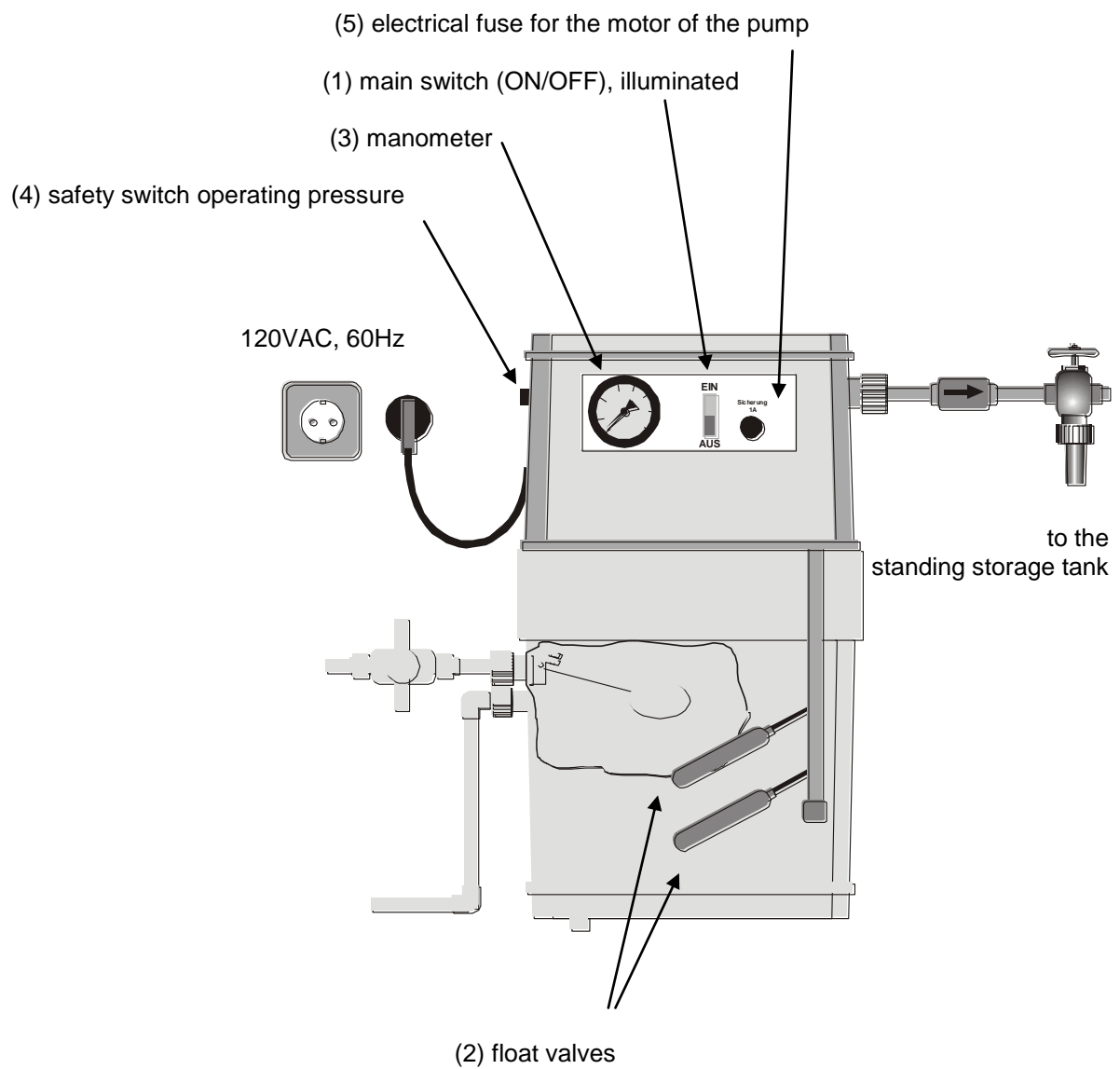


Figure 9: Pressure boost (upper part)

3.2.5 Functional Description of the Dosing unit

Process water is supplied by a fully automatic, one stage dosage facility. The pure water produced by the system is mixed with 0,5% (fixed setting) of the hardening concentrate "Aqua-Plus" so as to ensure constant water hardness in the range 8°-10° dH (138-173 ppm).



CAUTION: Only use "Aqua-Plus"! Experience has shown that with other hardening concentrates, which may not contain enough fungicides, germination of the system can set in.

The quality of the process water ought to be checked once a week. When the DRAABE hardening concentrate "Aqua-Plus" is used, this can be done with a conductance measurement (but not with a titration test or hardness test strip).

The following procedure should be followed when taking this measurement:

1. let the first 10 litres drain off
2. catch the next 10 litres in a clean container
3. stir thoroughly
4. measure the conductance with a calibrated device ($500 - 700 \mu\text{S} = 8^\circ - 10^\circ \text{dH}$ (138-173 ppm)).



IMPORTANT: If a different hardness concentrate is used, ask its manufacturer which measuring method should be applied.

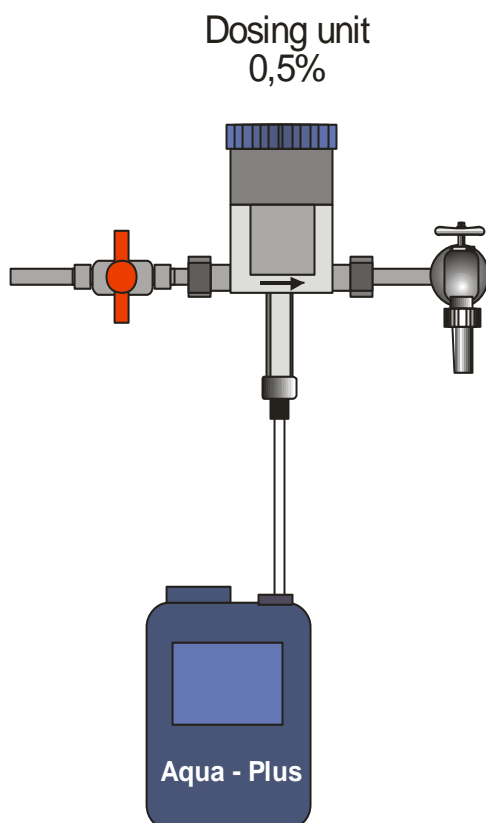


Figure 10: Dosing unit

4. Fundamentals of Planning

The fundamentals of planning described below are theoretical. In practise, the required humidification will also be influenced by parameters which cannot be identified in this documentation. In many cases the theoretical values given here must be supplemented or corrected by values from experience. Our advisors would be glad to assist you with this.

4.1 Planning a Pure Water System

Follow the procedure below when selecting or designing the system:

- determine the needs for pure water (water for humidification, process water)
- ascertain data of the water to be treated (drinking water, company network)
- decide on a pure water system (PerPur 60/120)
- determine the need for soft water
- decide which type of water softener to use (AC/SoftCab 25 DR, WSD)
- determine the need for further devices (e.g. a dosing unit)

4.1.1 Pure Water System with Water Softener of Type AC (Air Humidification)

The following sections contain all the information required for the individual planning steps. Each step is illustrated with a computational example based on the following system data.

EXAMPLE 1

A DRAABE Pure Water System is to be installed in the paper warehouse of a printing plant for use by an air humidification system. The following data are known:

<i>humidification rate:</i>	<i>57 kg/h (126 lbs/h).</i>
<i>humidifier type:</i>	<i>unitary nozzles, DRAABE TurboFog</i>
<i>raw water:</i>	<i>hardness = 16°dH</i>
	<i>conductance = 400µS</i>



IMPORTANT: The water data must be taken with calibrated measuring devices. Use of incorrect values during planning would have far reaching consequences.

For a humidification rate of 57 kg/h (126 lbs/h) a 120 litre system is required, that is, the **PerPur 120**. Here it does not matter how much of this total is to be used in which way. It could all be used for humidification or some of it could be used as process water. That does not affect the amount which passes through the water softener and wears its resins out.

To design a **water softener** one must understand that when pure water is produced by reverse osmosis (this applies to all manufacturers) waste water (concentrate) is also produced and this water was treated by the water softener too. To provide for this extra water, the required output rates are doubled. Also, a safety term is included for water hardness.

In our example:

pure water output $\times 2 = 240$ kg/h (530 lbs/h).

Here we are using an AC 2101. It has a capacity of 100,000 litres for 1°dH.

A safety term of 5°dH is added to the raw water hardness of 16°dH to yield:

total pure water output:	240 kg/h (530 lbs/h)
capacity of softener:	100000 litres / (16°dH + 5°dH) = 4760 litres
time before regeneration:	4760 litres / 240 litres/h = 19,8h

SOLUTION TO EXAMPLE 1

According to the foregoing example the resins must be regenerated after ~ 20 hours.



IMPORTANT: During the periods of regeneration (approx. 2 hours) no treated water is available for air humidification.

For questions about computation of humidification rates please contact DRAABE Ottawa.

4.1.2 Pure Water System with Water Softener Type SoftCab (Air Humidification and Process Water)

EXAMPLE 2

A DRAABE Pure Water System is to be installed in the paper warehouse of a printing plant for air humidification and for process water. The following data are known:

<i>humidification rate:</i>	<i>57 kg/h (126 lbs/h).</i>
<i>process water rate:</i>	<i>40 kg/h (89 lbs/h).</i>
<i>humidifier type:</i>	<i>unitary nozzles, DRAABE TurboFog</i>
<i>raw water:</i>	<i>hardness = 16°dH conductance = 400µS</i>

With a total rate of 97 kg/h (215 lbs/h) for humidification water and process water one needs a 120 litre system. A **PerPur 120** is selected.

In our Example 2 we use a SoftCab 25 DR. This has a capacity of 90,000 litres for 1°dH

The required output rates are doubled because of the waste water for reverse osmosis and the raw water hardness of 16°dH is increased by a safety term of 5°dH.

total pure water rate:	240 litres/h (530 lbs/h)	((= 2 x 120 litres))
capacity of softener:	90000 litres / (16°dH + 5°dH) = 4200 litres	
time before regeneration:	4200 litres / 240 litres/h = 17h	

SOLUTION TO EXAMPLE 2

According to the foregoing example the resins must be regenerated after ~ 17 hours.



IMPORTANT: During the periods of regeneration (approx. 2 hours) no treated water is available for air humidification.

For questions about computation of humidification rates please contact DRAABE Ottawa.

4.1.3 Pure Water System with Water Softener of Type WSD

Systems with double softener (WSD) use two resin cartridges. When one of them is being regenerated the other is producing softened water. The result is a continuous, uninterrupted supply of treated water.

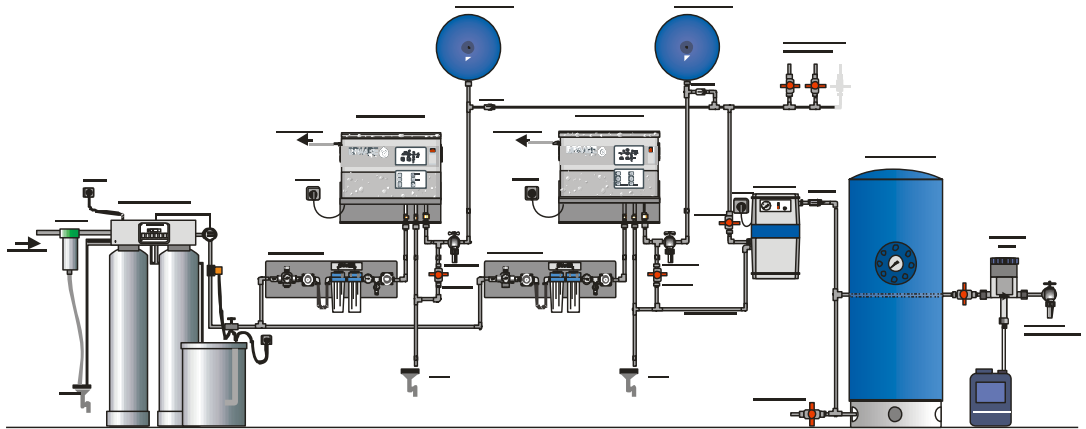


Figure 11: PerPur with double softener (WSD)

EXAMPLE 2

A DRAABE Pure Water System is to be installed in the paper warehouse of a printing plant for air humidification and for process water. The following data are known:

humidification rate:	100 kg/h (220 lbs/h)
process water rate:	150 kg/h (330 lbs/h)
humidifier type:	unitary nozzles, DRAABE TurboFog
raw water:	hardness = 16°dH conductance = 400µS

With a total rate of 250 kg/h (550 lbs/h) for humidification water and process water one needs tree 120 litre system. Tree **PerPur 120** are selected.

For uninterrupted water treatment, each resin cartridge must work for at least 8 hours before its resins wear out and have to be regenerated. This assumption is used for the following computation of the minimum capacity required of the resin cartridges. The formula is:

$$W_w = W \times (H_k + 5^\circ\text{dH}) \times 8$$

W_w :	soft water
W :	water requirement ({humidification_rate + process_water_rate} x 2)
H_k :	customer dependent water hardness
5°dH :	safety term
8:	minimum working hours for resin cartridges

SOLUTION TO EXAMPLE 2

$$W_W = 500 \text{ litres/h} \times (16^\circ\text{dH} + 5^\circ\text{dH}) \times 8\text{h} = 84000 \text{ litres}$$

To be selected: a WSD 120 with capacity of 120,000 litres per resin cartridge.

For questions about computation of humidification rates please contact DRAABE Ottawa.

4.2 Water Supply

The DRAABE Pure Water System may only be operated with soft water. This prerequisite is fulfilled if the water is pre processed with a DRAABE Water Softener. On the other hand, well water, rain water and fully desalinated water are not allowed. As a matter of principle, the water may not contain any colloids or organic substances.

The DRAABE Air Humidification System is equipped with automatic rinsing intervals and a subsystem for keeping the water fresh so that stagnant water does not become contaminated by germs. For these important hygienic functions to be carried out at all times, the System may not be turned off and its water supply may not be interrupted.

Processing water from reverse osmosis systems still contains a residue of salts between 1 and 5% of the original water. This minimal residue is discharged by the air humidification system into air in the room. Therefore, the air humidification system is not suitable for applications for which an especially high standard for lack of particles in the room's air is required (clean rooms, computing centres, etc.).

As a monopropellant jet system, the DRAABE air humidifier system places special demands on the water it is to atomise. It may only be operated with desalinated and virtually bacteria-free pure water.

Only treated water may be used. That means a three-stage treatment process must **always** be run before the water can be fed in to the HighPur.

All the following requirements in terms of water treatment are **extremely important** to ensure safe, hygienic functioning. The operator shall ensure that the following requirements are met on a permanent basis. The requirements for a water treatment are met if a DRAABE pure water system is used. Of course, such systems must also be subjected to regular checking and maintenance.

A water flow pressure of 3 - 4 bar (44-58 psi) must be maintained continuously for reliable functioning of the Pure Water System to be guaranteed. The flow pressure may not exceed 4 bar (58 psi).

The following requirements are placed on the incoming raw water (drinking water):

- The water must be free of suspended particles which are larger than 5µ.
- The water must be free of colloids and organic substances.
- Well water, rain water and fully desalinated water are not acceptable
- It must meet standards for drinking water (e.g. number of organic materials)
- The maximum germ content of 1000 germs/ml may not be exceeded.
- It must have no chemical substances/additives (e.g. chlorine, ozone, disinfectants).
- No additional devices (e.g. dosing facilities) which change the properties of the incoming raw water may be used.
- Water temperature in the range 6 – 20 °C (43-68 °F).
- Flow pressure 3 – 4 bar (44-58 psi).

If an osmosis product of some third party is used (i.e. not a DRAABE product), then the following values must be provided continuously by the operator:

- It must be three stage water preparation
- Water softening (<0.1 °dH at output)
- Filtering (aerosol removal filter 5u + activated charcoal filter)
- Demineralisation via reverse osmosis (inorganic membrane)
- Water values at output of water preparation
 - ☐ Water hardness **< 0.1 °dH (< 17 ppm)**
 - ☐ Electric conductance **5-10 µS**
 - ☐ Water temperature **6-25 °C (43-77 °F)**
 - ☐ Flow pressure **2-3 bar (29-44 psi)**
- No use may be made of water tanks with floating controls; rather, closed membranes in stainless steel or plastic for interim storage of the product are to be used (pressure control).
- Fittings and pipes must be made of materials which are allowed in the food industry (plastic, stainless steel). Do not use copper pipes or brass.
- The pure water must be free of organic substances.

5. Installation

5.1 Safety, General Comments

- Assembly and installation work may only be carried out by **properly trained technicians** (sanitary fitters, electricians). The person who commissions the installation is responsible for ascertaining that these technicians are qualified.
- All local regulations and guidelines on carrying out electric and water installations are to be observed and adhered to.
- **It is imperative that the information and regulations in this chapter on positioning system components, on assembly and on the electric installations be observed and adhered to.**

5.2 Positioning, General Comments

As a matter of principle, the positioning of a system is determined during planning and recorded in the system documents. In every case the following general comments on positioning are to be observed and adhered to.

- Take care that the construction (wall, column, ceiling construction, etc.) on which the devices and system components are to be mounted has **adequate carrying capacity and is suitable for secure mounting**.
- The system components should be mounted in such a way that sufficient room is available both for operations and for maintenance.
- No live wires may be laid or present in the area below the installation rail and consoles.

If you have questions about positioning, please contact DRAABE in Ottawa.

5.3 Assembly, General Comments

- The installation is to be carried out in accordance with the general rules of technology and the connection regulations of the local supply companies.
- Before installation begins, use the shipping note to check that the delivery is complete and intact.
- Pipe assembly may only be carried out by authorised master craftsmen who have had experience working with PVC.
- No rebuilding or other changes may be carried out on the devices on one's own authority.
- No additional fittings (e.g. valves, etc.) may be installed within the DRAABE system except as is noted in the installation diagram.
- These installation instructions are only valid for the indicated systems. The systems delivered to customers are accompanied by corresponding system diagrams with instructions for the given customer installation. The assembly instructions, diagrams and other instructions are binding for execution of the installation.
- It is imperative that you observe the specifications for materials.

5.3.1 Installation rail

- The installation location must be selected so that access to the installation rail is guaranteed at all times and so that the water softener can be connected to the installation rail. The hose length is 500mm (19.7 inches).
- Direct sunlight and heat radiation are to be avoided.

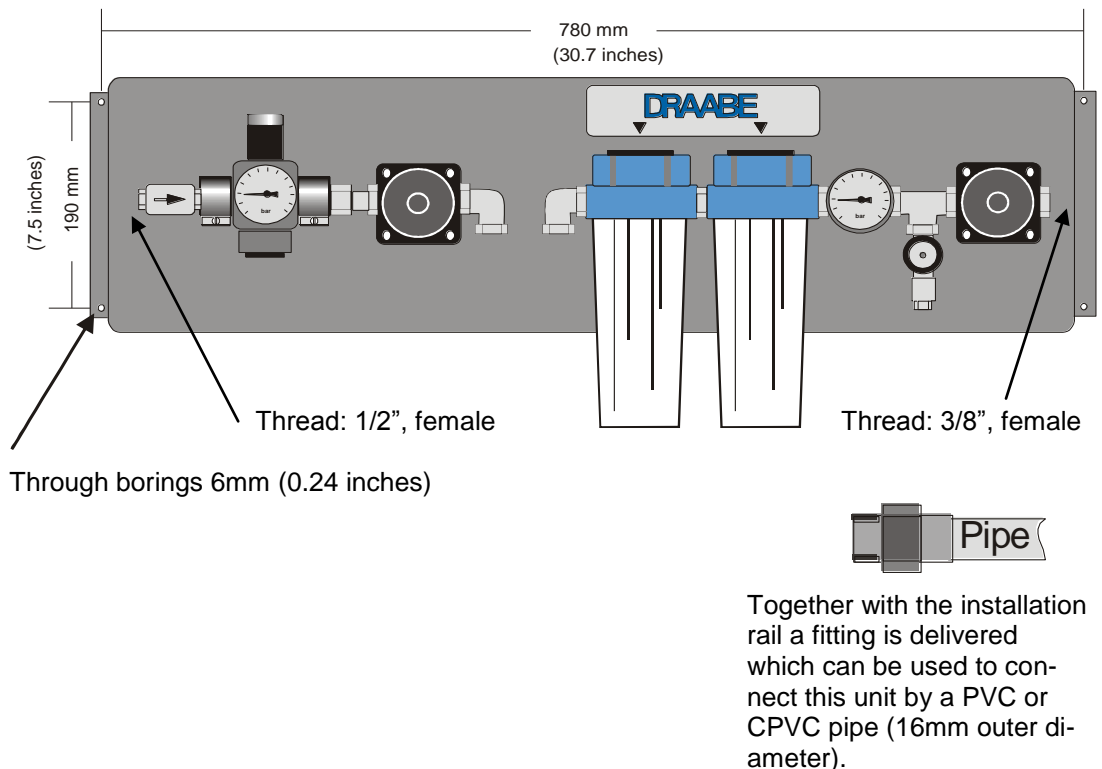


Figure 12: Installation of the Installation Rail



CAUTION:

Except as is explicitly stated in these instructions, parts which conduct electricity as well as all other goods may not ever be mounted or stored in the space under the installation rail because even slight leakage from the pure water system could result in damages.

5.3.2 Water Softener

- The water softener is to be positioned under the installation rail.
- If at all possible, this device should be installed in a room to which only a limited category of persons is granted access.
- The surrounding temperature must lie between +10°C (50°F) und +30°C (86°F) throughout the year.

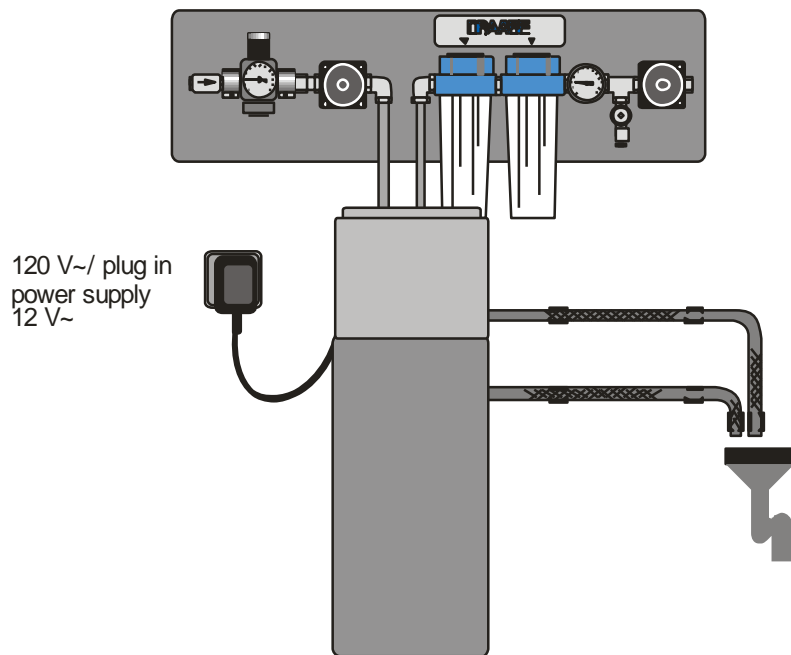


Figure 13: Installing the Water Softener



IMPORTANT:

The water softener is delivered ready to plug in with a 12V network part.

When mounting the alternating current connection be sure that the wall socket is mounted approximately 25cm to the left or right of the water softener.

5.3.3 PerPur Console

- The PerPur console (weight ~ 60 kg,), must be mounted on a wall that can bear loads.
- If at all possible, it should be installed in a room to which only a limited category of persons is granted access.
- The surrounding temperature must lie between +10°C (50°F) and +30°C (86°F) throughout the year.
- The location must be selected so that direct sunlight and heat radiation onto the console and its equipment are impossible at all times.



IMPORTANT:

The pure water system is delivered with a 120Vac plug and is ready for operation.

When mounting the alternating current connection be sure the wall socket is mounted approximately 25 cm (9.84 inches) to the left of the wall bracket and at the height of the pure water system.

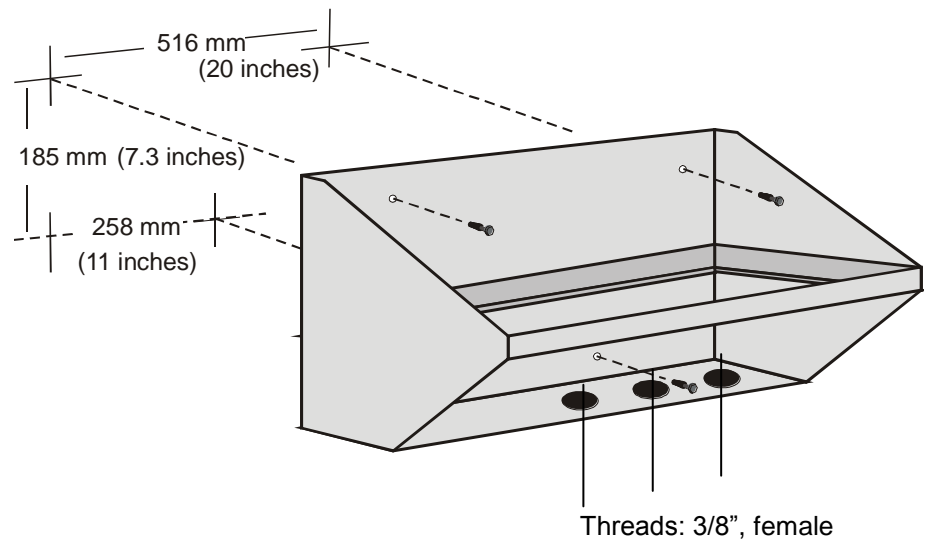


Figure 14: Mounting the PerPur Console



Together with the console three fittings are delivered which can be used to connect this unit by a PVC or CPVC pipe (16mm outer diameter).

Upward clearance of 50cm (20 inches) across the entire width of the console should be provided. The clearance to the right should be 20cm (8 inches). The distance from the lower edge to the floor should be 1.2m (47 inches).



CAUTION:

No parts which conduct electricity may be mounted under the console because leakage could cause damages.

5.3.4 Pure Water Tank (wall model)

- Mounting on a wall that can bear loads is required (weight ~ 100kg).
- If at all possible, the device should be installed in a room to which only a limited category of persons is granted access.
- The location must be selected so that direct sunlight and heat radiation onto the device is impossible at all times.

- The pure water tank DWD 80 is designed for a maximum pressure of 10 bar (145 psi). Greater pressures are not permissible!

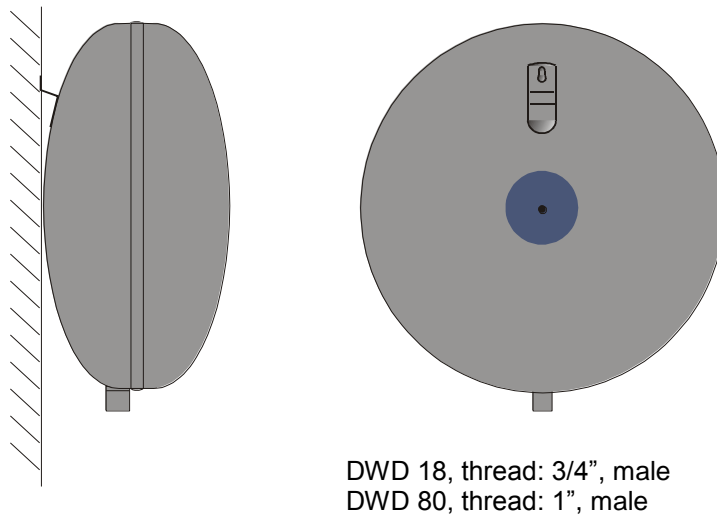


Figure 15: Mounting of storage tank to be mounted on a wall



IMPORTANT:

If a pure water tank is to be mounted downstream from the pressure boost, then it is absolutely necessary to use a DWD 18 or DWD 80.

5.3.5 Pure Water Tank (floor model)

- If at all possible, the device should be installed in a room to which only a limited category of persons is granted access.
- The location must be selected so that direct sunlight and heat radiation onto the device is impossible at all times.
- The pure water tank is designed for a maximum pressure of 3 bar (44 psi). Higher pressures are not permissible!

5.3.6 Pressure Booster

- If at all possible, the device should be installed in a room to which only a limited category of persons is granted access.
- The surrounding temperature must lie between +10°C (50°F) and +30°C (86°F) throughout the year.
- The location must be selected so that direct sunlight and heat radiation onto the device is impossible at all times.

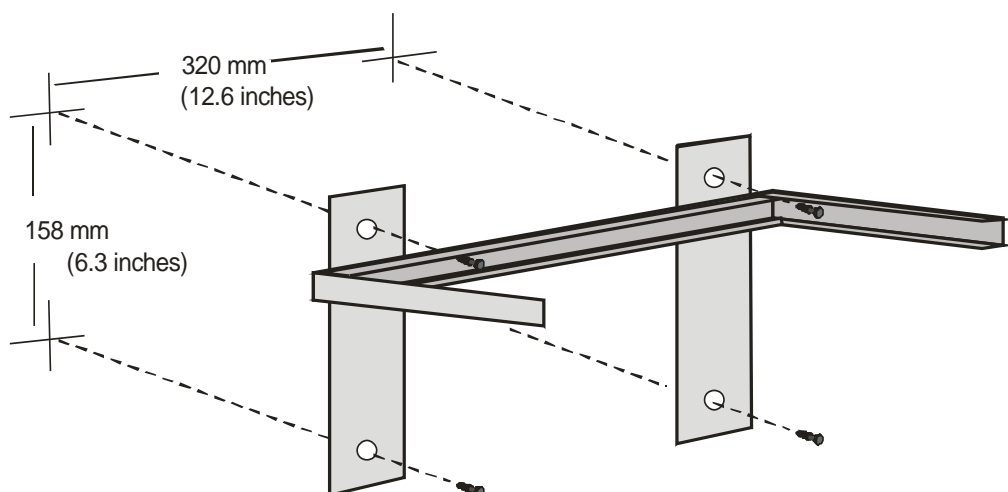
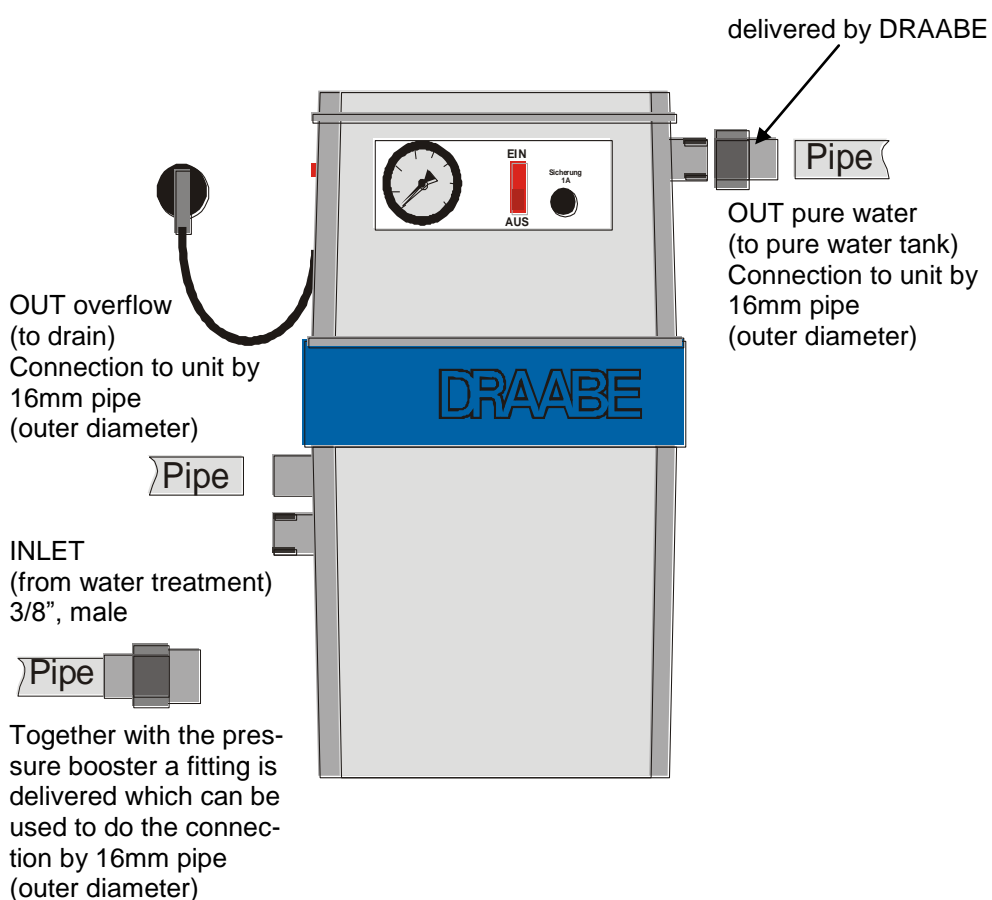


Figure 16: Mounting a Pressure Booster



CAUTION:

No parts which conduct electricity may be mounted under the pressure boost because leakage could cause damages.



5.3.7 Dosing unit

- The dosing unit must be mounted on a wall which can bear loads.
- If at all possible, the dosing unit should be installed in a room to which only a limited category of persons is granted access.
- The surrounding temperature must lie between +10°C (50°F) and +25°C (77°F) throughout the year.

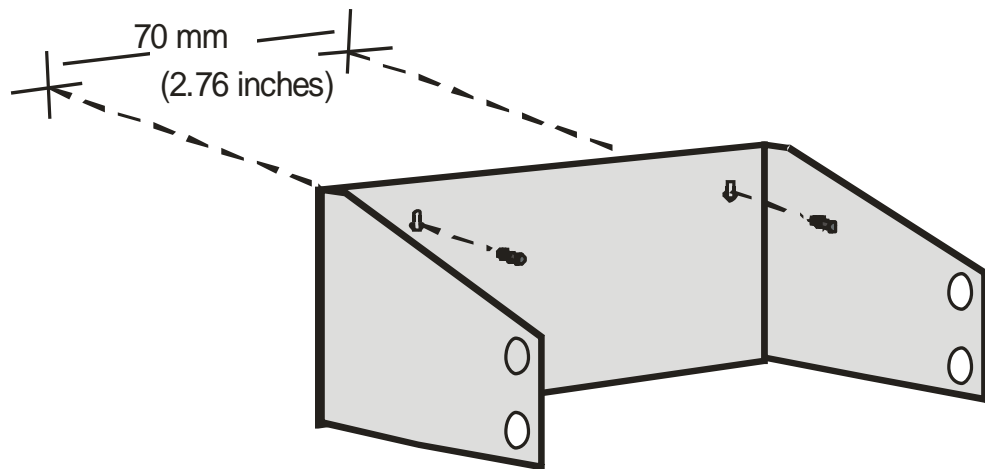
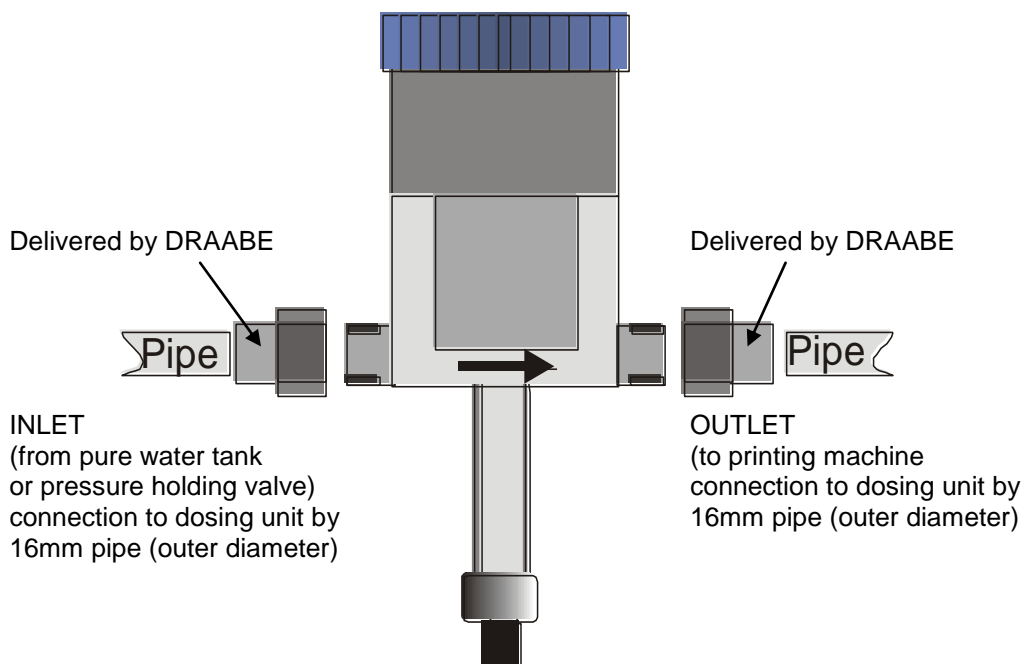


Figure 17: Mounting a Dosing unit



5.3.8 Low Pressure Circulation (Pressure Test)

- Only PVC pressure pipe, PVC threaded joints and fittings in PVC pursuant to the material specifications may be used.
- The pipes are to be laid so that they are free of stress. The clamp distance may be at most 1m.
- The pipes may not be contaminated during installation.
- The mounting height of the water drain funnel must lie below the safety overflow of the water softener (drop of at least 5%).
- When laying lines be sure direct sunlight and proximity to sources of heat are avoided.
- When assembly is complete the pipe system is to be subjected to a hydraulic pressure test of 3 bar, 44 psi (with water as medium). The console has been provided with a hose bridge and a blind plug for this purpose.

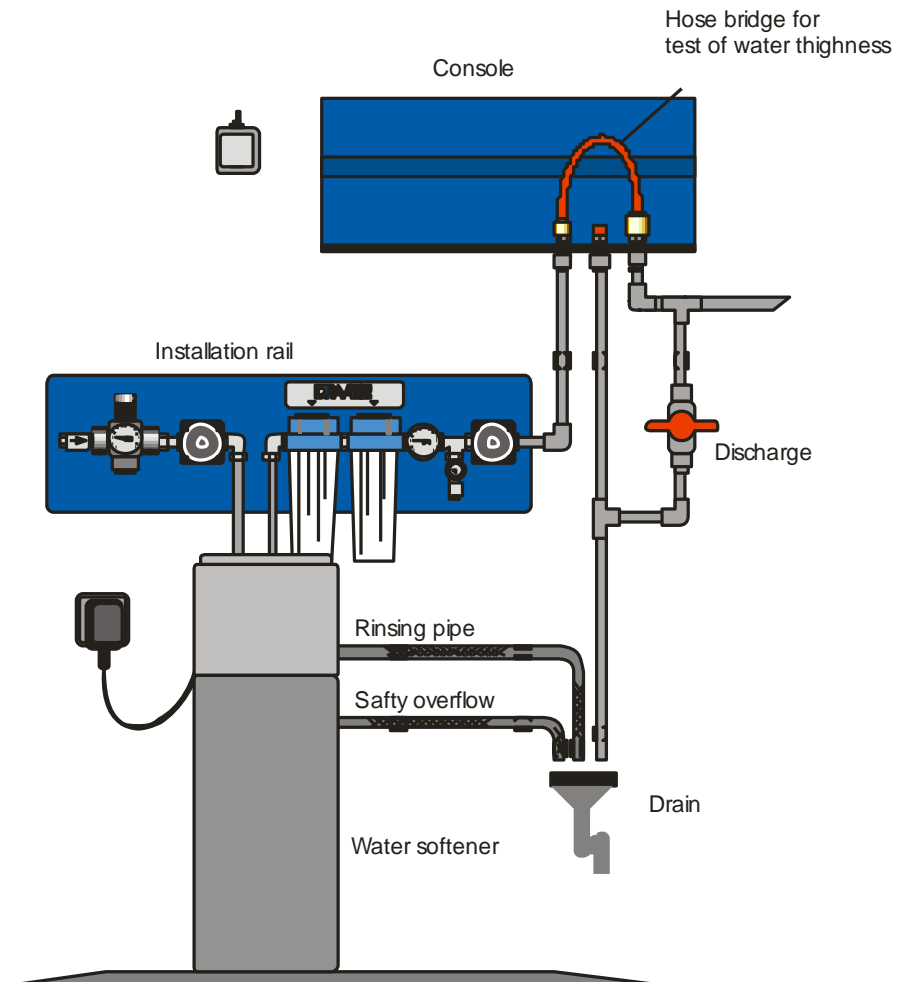


Figure 18: Low Pressure Test

**IMPORTANT:**

When the system is placed in operation, it is checked out by the DRAABE customer service technician for conformity to specifications. The technician is authorised to cancel initial operations if the installation is found to be erroneous.

5.4 Electrical Installation

The documentation does not cover the installation of the voltage supply. However, requirements placed on this supply are treated. The installation of the electric components of the pure water system is shown together with the place where the voltage supply must be applied.

**CAUTION:**

The electrical installation, including the voltage supply, must conform to all local safety regulations and standards.

**IMPORTANT:**

- Be sure to put the attachment cables through the cable run that is supplied.
- The cable ends are to be fitted with suitable cable end sleeves.
- Observe the values indicated for fuse protection.
- The installation may only be carried out in accordance with the diagrams gone into here.
- During installation the voltage supply must be turned off and secured against accidental activation.

5.4.1 Water Softener

The water softener is delivered with a 12V network part and is ready to connect. For new installations, solely the water softener SoftCab will be used. But for the sake of completeness, the AC is described, too.

5.4.1.1 Water Softener Type AC

The type AC2101 is consumption driven. This means, that the regeneration time depends on the water consumption.

consumption driven

A consumption driven water softener (AC2101) is to be connected with the clean water system by means of the 5 pole plug delivered with it. A micro processor in the clean water system calculates the times of regeneration in dependence on water consumption and when these times are reached it sends a signal to the AC.

5.4.1.2 Water Softener Type SoftCab 25 DR

The water softener has to be connected to the pure water system by using the 5-pin-lug (included in delivery). The water softener can run both time-controlled and quantity-controlled. The time-controlled mode executes the regeneration at a fixed time. When running the quantity-controlled mode, the microprocessor of the SoftCab 25 DR calculates the point in time for the regeneration subject to the water consumption. When reaching the time for the regeneration, the SoftCab gives a signal to the pure water system. The respective mode (time- or quantity-controlled) is defined ahead of delivery. When starting up the water soft-

tener, only the time has to be adjusted. Therefore the grey cover has to be removed from the water softener. Press the key “set clock” (1): now the hour display blinks. With the arrow key (2) the time can be adjusted. After pressing the key “set clock” again, the minute display blinks. Use the arrow keys to adjust the minutes. After that, press the key “set clock” again in order to leave the adjustment mode. Put the cover onto the water softener again.

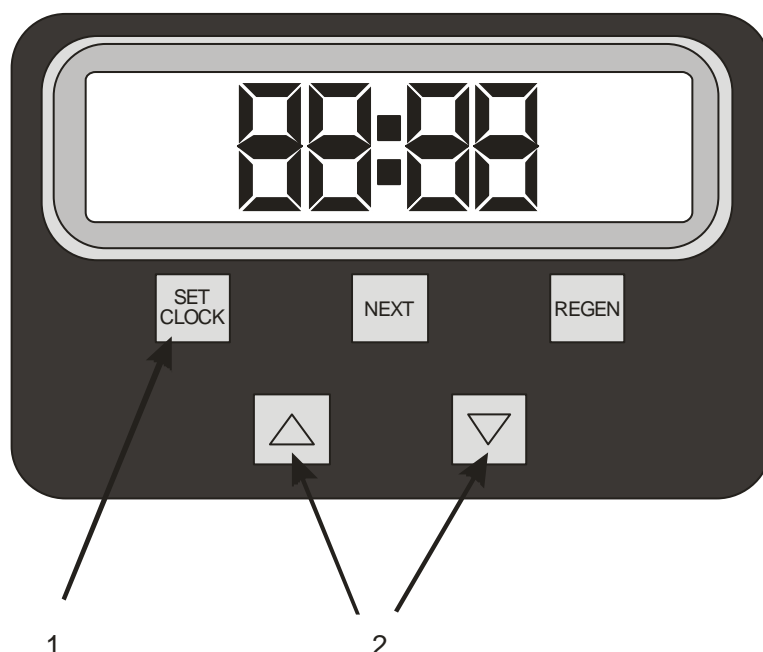


Figure 19: Display SoftCab 25DR

5.4.2 Clear Water System PerPur

The voltage supply is established via a wall socket and the connecting cable delivered with the system, which has a 3 pole shockproof plug.

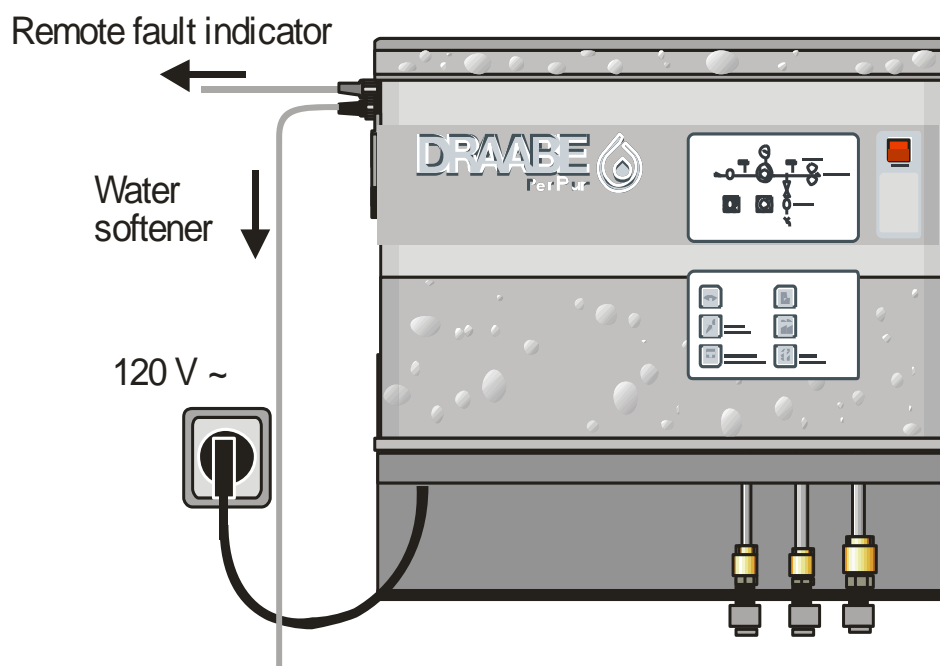


Figure 20: Connecting the PerPur

voltage supply PerPur:	120VAC, $\pm 10\%$, 1 Phase
fuse protection:	15A, surge proof
wires:	L1, N, PE
cable cross section:	1.5 mm ² (16 AWG)

The remote fault indicator can be connected by means of a 2 pole plug with an optical or acoustic transmitter or with a building services management system.

5.4.3 Pressure Booster

The voltage supply is established via a wall socket and the connecting cable at the DE 3-5, which has a 3 pole shockproof plug.

supply voltage DE 3-5:	120VAC, $\pm 10\%$, 1 Phase
fuse protection:	10A, surge proof
wires:	L1, N, PE
cable cross section:	1.5 mm ² (16 AWG)

5.5 Specifications for Materials



CAUTION:

The following specifications of materials must absolutely be adhered to in every particular. They are a part of the guarantee! Only installation materials delivered by the DRAABE company are permissible!

5.5.1 Hoses, Pipes, Fittings

Material for pipes and fittings:	PVC pipe (grey) or CPVC pipe (white), UV resistant or opaque, must fulfil the ASTM Standards D-2846 , ANSI/NSF Standard 14
designation:	PVC pipe (grey) or CPVC pipe (white)
requirements:	food safe, UV- opaque, inner diameter $\geq 13\text{mm}$ (0.51 inches)
operating pressure:	10 bar (145 psi)
temperature when used:	6-37°C (43 – 100°F)
medium:	tap water, softened water or pure water

If the outputs of two pure water systems are pooled (both work in the same tank) then the pipes and fittings from the output should have inner diameter $\geq 16\text{mm}$ (0.63 inches).

5.5.2 Electrical Components

cables

use:	from water softener to the pure water system
designation:	LIYY 5 x 0,5 mm ² (20 AWG)
party responsible:	delivered with DRAABE SMB
use:	network connection PerPur, pressure boost
designation:	H05VV-F 3 x 0,75 mm ² (18 AWG)
party responsible:	installer or operator

wall sockets

use:	pure water system, water softener, pressure boost
technical data:	120VAC 15A water protected
poles:	P, N, PE
party responsible:	installer or operator

plug in power supply

use:	water softener
technical data:	120Vac (primary), 12Vac (secondary)
party responsible:	delivered with DRAABE water softener

6. Operation

The system may not be used by the operator (customer) or some person authorised by the operator (customer) until DRAABE customer service or a person authorised by DRAABE has approved this. Also, the person operating the system must have been introduced by DRAABE to proper operation. When placing the system in operation after being instructed in its proper use, the operator (customer) is obliged to ensure that all persons who operate the system have been properly instructed. This is a condition for the DRAABE warranty.

6.1 Shutdown During Daily Operation

For maintenance work, replacement of system components which are defective or are to be serviced or in the case of malfunctioning of the system it can be necessary to turn off the system. Precisely when the system must be turned off is gone into in Chapter 8.

Complete Shutdown. Here, selected system parts or even the entire system is made voltage free and the water supply is turned off.

PerPur: Network switch OFF (AUS).
If wall socket has a switch, turn this switch off too.
Shut off water inlet valves by hand.

Water Softener: Pull network part out of wall socket.
Shut off water inlet valves by hand.

DE 3-5: Network switch OFF (AUS).
If wall socket has a switch, turn this switch off too.



CAUTION: For longer shutdowns (more than 24 hours) there is a danger of germ contamination (automatic fresh water automatic, FWA, is not active). Before any complete shutdown (or directly afterwards) please be sure to inform DRAABE customer service.

Partial Shutdown. Here it is only necessary to prevent restart of the system while a component is being replaced.

PerPur: Shut off water inlet. The absence of pressure puts the PerPur in an error status, preventing it from starting up.

Water Softener: Shut off water inlet valves by hand.

DE 3-5: Turn off water inlet. This makes it impossible for the DE 3-5 to start up again.



CAUTION: For longer shutdowns (more than 24 hours) there is a danger of germ contamination (automatic fresh water automatic, FWA, is not active). Before any complete shutdown (or directly thereafter) please be sure to inform DRAABE customer service.

6.2 Startup during Daily Operation

Depending on whether a partial or complete shutdown was carried out, the components that were turned off must be turned on again in the reverse order. As a matter of principle:

PerPur:	First turn on water inlet, then establish 120VAC supply, then turn on network switch.
Water Softener:	First turn on water inlet, then the voltage supply.
DE 3-5:	First turn on water inlet, then establish 120VAC supply, then turn on network switch.

6.3 Checks/regular service

Regular service

PerPur: Aside from the inspections described here, the container is subject to regular service. The **operational safety** as well as the **hygienically clean function** depend on regular service. The manufacturer recommends a service cycle of 6 to 8 months. Service must be performed by the manufacturer. Only the manufacturer has special test equipment at his disposal, has the required knowledge to perform the necessary work and enters into a commitment towards the user by performing the service.



Note to purchasers (buyer) of PerPur: For the duration of the 24-month warranty period, the user is obliged to comply with the above mentioned service cycle. Failure to comply may render the warranty null and void. Should a functional defect of the PerPur occur during the 24-month warranty period, warranty claims will only be accepted by Draabe, if the described service intervals for the PerPur have been complied with, i.e., if regular service has not been performed on the PerPur at max. time intervals of 8 months, the warranty of the PerPur will be rendered null and void.

Transport costs are the responsibility of the user. Service costs must be paid by the user (the user receives a report of service work performed as well as a guarantee for exchanged parts). For the time of service work (2-3 weeks) the user will receive a rental unit. The cost of the rental unit is included in the service costs.

Regular service is also recommended after the expiry of the warranty period.



Note to lessees (rental) of PerPur: The manufacturer is responsible for the above mentioned service cycle. Transport costs for the return from the user to the manufacturer are charged the responsibility of the user. Service costs are included in the lease.

Whenever inspections reveal something suspicious or any case of incorrect functioning, the DRAABE customer service are to be notified at once! Inspection work may only be carried out by properly instructed persons. The operator (customer) is responsible for checking that the inspectors are suitable for the task and are instructed properly.

Checks

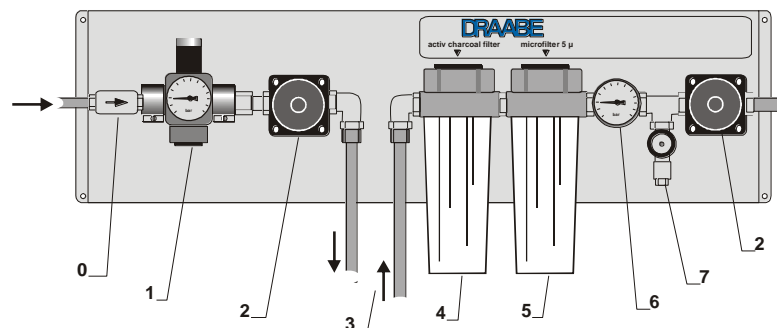
Water Softener: Check salt: Salt level should be checked regularly and the Water Softener refilled as required (see page 13).

Cycle:	every two days
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Dosing unit: Check Aqua-Plus: The Aqua-Plus level should be checked regularly and the container replaced as appropriate.

Cycle:	once a weeks
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6.3.1 Installation Rail (pressure lost, pressure reducer filters)

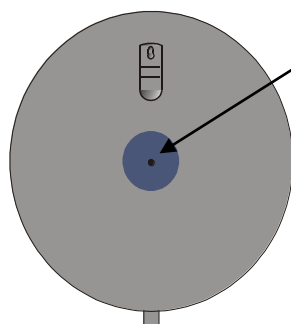


The water softener's input pressure and output pressure (i.e. PerPur input pressure) can be read at the two manometers. The difference indicates the pressure lost in the water softener, the filter of the pressure reducer and the two cartridge filters. If, as is assumed here, the water softener is working properly, then this pressure difference just indicates the condition of the filters. The more material that these filters have filtered out, the greater the loss of water pressure.

When this difference, or pressure loss, exceeds 0.9 bar (13.5psi), the filter of the pressure reducer must be cleaned (1) and/or the filters (4, 5) must be replaced. In this case please get in touch with your Nortec Systems Customer Service.

Cycle:	once a weeks
---------------	---------------------

6.3.2 Storage Tank (initial pressure)



Valve where the pressure meatering device has to be connected.

The initial pressure of the storage tank can be checked with a pressure measuring device. Then the tank must be completely empty. The pressure must be 0.7 bar (10 psi).

Cycle:	every 6 months
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6.4 Consumables

6.4.1 Salt in Water Softener

The water softening process requires salt in tablet form. If the salt supply in a Water Softener has been consumed, then salt must be refilled. For this, take off the blue covering and then the white cover underneath it. Refill with a new package of salt (25kg) and put the cover and covering back on the water softener (see page 13).



IMPORTANT:

Only residue free tablet salt as in DIN 19604 or EN 973 (no broken salt, etc.) may be used!



IMPORTANT:

If no consumption of salt is established, inform Nortec Systems Customer Service at once! This case could indicate a mal function.

6.4.2 Filter of the installation rail

For each regular servicing of the pure water system the filters of the installation rail must be replaced. These are delivered with the exchange container. If there is a severe drop in pressure or any discolouration during operation, contact Nortec Systems Customer Service.

6.4.3 Aqua-Plus

Aqua-Plus is not a hazardous substance as defined by chemicals legislation and EU Directive 67/548/EEC; however, when it is not properly handled it still constitutes a threat to human beings and the environment. In addition to the safety measures listed below the regionally applicable safety measures for handling chemicals should be observed:

- Avoid all contact with the eyes and any longer contact with the skin.
- Change any contaminated clothing immediately. Preventive skin protection is necessary. When work is over wash hands and face.
- Do not allow Aqua-Plus to get into the sewage system or the ground.
- To remove Aqua-Plus, use material that binds water. Rinse away small amounts with water.
- Aqua-Plus should be stored in an airtight, leak-proof container at 10 to 25°C (50 to 77°F).

7. Malfunctions and their Remedies

7.1 What to do if ...

PerPur			
Control lamp (LED display)	Function	Possible reasons	Possible solutions
Inlet pressure (red)	ON in case of a malfunction	<p>The internal pressure switch is indicating a malfunction if the flow pressure is below 1.3 bar (19psi).</p> <p>Note: Important is the flow pressure during start and operation of the pump (LED operation ON).</p> <ol style="list-style-type: none"> 1. Pre installed water softener is in the regeneration mode. If a connection between water softener and PerPur is installed the LED regeneration (green) is also ON. 2. Water supply is broken. 3. Pre filter blocked. 4. Internal pressure switch has a malfunction. 	<ol style="list-style-type: none"> 1. Wait until the regeneration is finished (LED regeneration OF). Normally a regeneration takes 120 minutes. If the system doesn't start after 120 minutes it could be that the water softener has a malfunction. In this case please contact the service department. 2. Check the water supply. Is a hand valve closed? 3. Check the two pressure gauges on the installation rail (see page 11). 4. Please contact the service department.
Inlet pressure (red)	BLINKING in case of a malfunction.	Internal pressure switch has indicated a too high output pressure (over 5 bar (72 psi)).	Please contact the service department.
operating (green)	BLINKING in case of a malfunction.	Internal motor protection switch has indicated a too high current.	Please contact the service department.
Lack of salt (red)	ON in case of a malfunction.	Check the salt level of the pre installed water softener.	Please fill in salt (see page 13).

Water Softener			
	Function	Possible reasons	Possible solutions
	No consumption of salt.	<ol style="list-style-type: none"> 1. Malfunction control unit of the water softener 2. Power supply of the water softener broken. 3. Connection between PerPur and water softener broken. 	<ol style="list-style-type: none"> 1. Please contact the service department. 2. Check the power supply and the plug in power supply. 3. Check the cables. <p>If you get no positive results, please contact the service department.</p>

	Consumption of salt is too high.	<ol style="list-style-type: none"> 1. Malfunction control unit of the water softener. 2. Power supply of the water softener broken. 	<ol style="list-style-type: none"> 1. Please contact the service department. 2. Check the power supply and the plug in power supply. <p>If you get no positive results, please contact the service department.</p>
	The system can not finish the regeneration mode.	<ol style="list-style-type: none"> 1. Malfunction control unit of the water softener. 2. Malfunction of the PerPur 	Please contact the service department.

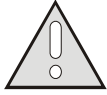
DE3-5			
	Function	Possible reasons	Possible solutions
No function. Control lamp of the main switch OFF.		Power supply broken.	Check the power supply (fuses, voltage etc.). If you get no positive results, please contact the service department.
Unit doesn't increase the inlet pressure.		<ol style="list-style-type: none"> 1. Inlet broken/interrupted. 2. Malfunction of the PerPur. 3. PerPur is in the regeneration mode. 4. Malfunction of the internal booster pump. 5. Malfunction of a internal pressure switch. 	<ol style="list-style-type: none"> 1. Check the pre installed water treatment. 2. Check the PerPur 3. Wait until the regeneration is finished. 4. Please contact the service department. 5. Please contact the service department.

Dosing unit			
	Function	Possible reasons	Possible solutions
Printing results of your printing machine is not satisfactorily.		<ol style="list-style-type: none"> 1. Not enough Aqua Plus in the reservoir. 2. Malfunction of the dosing unit. 	<ol style="list-style-type: none"> 1. Nachfüllen. 2. Check the dosing unit (see page 19). <p>If you get no positive results, please contact the service department.</p>

Please inform Nortec Systems customer service if you ever find a malfunction in the system **(262.884.4669)**.

7.2 Exchange of Defective System Components

Components may only be replaced by properly instructed, trained persons. The operator (customer) is responsible for checking that these persons are suitable and have been properly instructed and trained and is obliged to stick to the requirements from Nortec Systems, especially those in this documentation.



CAUTION:

- Indicate to the people around you that work is being carried out on the water treatment or air humidification system (as applicable).
- Make sure that it is impossible for the system to be turned on again by mistake.

7.2.1 Water Softener

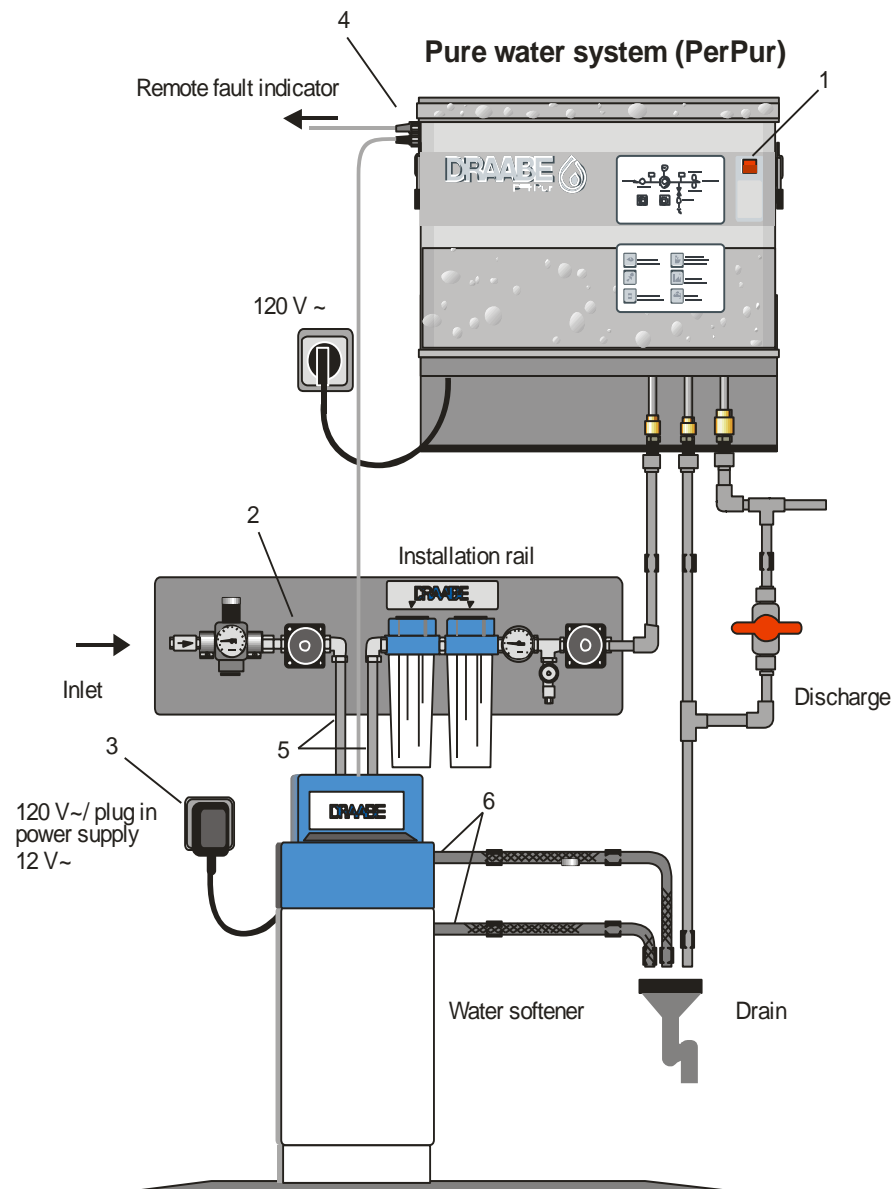


Figure 21: Replace Water Softener

- Turn off the pure water PerPur unit (1).
- Block the water supply (2) at the installation rail.
- Pull the plug-in network part (3) out of the socket.
- With 2041/2101: Disconnect 5 pole plug (4) at the PerPur unit.
- Take the hoses with steel jackets (5) away from the water softener (wrench 19).
- Take away the textile hoses (6) from the water softener and take the device away.
- Put the new water softener in place, attach hoses, be sure that all seals are present and in order.
- Connect plug to the pure water system (PerPur unit).
- Fill salt container with tablet salt and add 10 litres of water, using a pail.
- Plug network part into the socket.
- Open water supply. The pressure indicated by the manometer should rise. Check that all connections are watertight (visual inspection).
- Turn on the pure water system (PerPur unit).

The DRAABE Pure Water System (PerPur) turns on automatically in 15 minutes.

7.2.2 Clear Water System PerPur

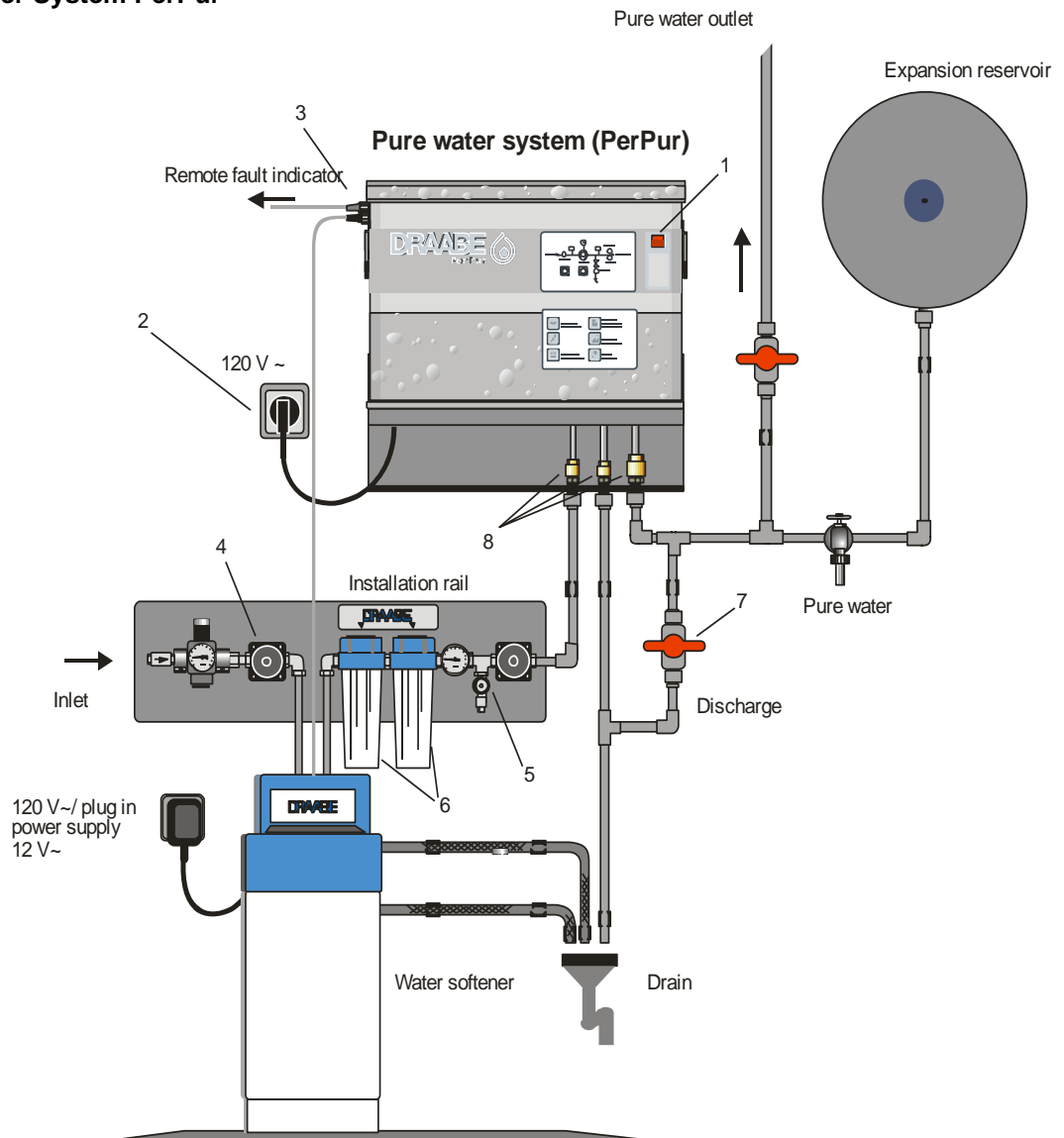


Figure 22: Replace PerPur Unit

- Turn off device at the network switch (1) and pull out the plug (2).
- Disconnect both plugs (3) from the device, detaching the knurled ring at each plug.
- Block the water supply (4) at the installation rail.
- Open the discharge faucet (5) to let the pressure out.
- Unscrew the filter housings (6) and put in new filter elements. (The old filters can be thrown away with normal trash).
- Fully empty the pure water tank via the discharge faucet (7).
- Detach self retracting hoses (8) (wrench 14/17) and let them slide into the container.
- Take the PerPur unit away from the console and put the new device in place.

- Connect by going through the above steps in reverse order.

7.2.3 Pressure Boost

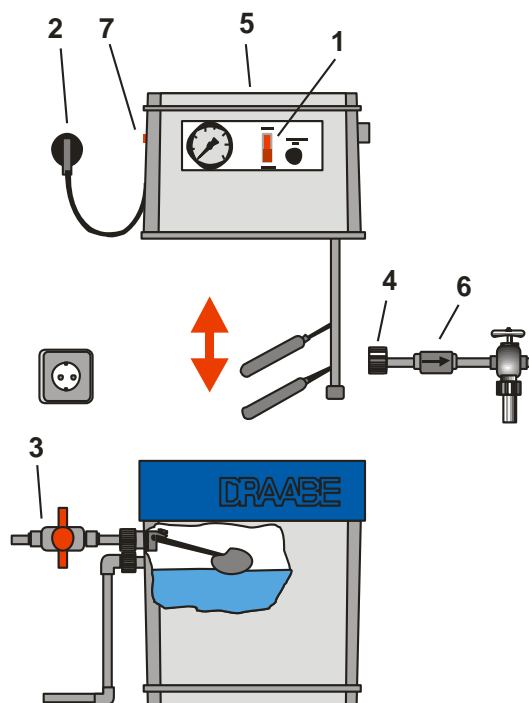


Figure 23: Replace Pressure Boost

- Turn off unit via the network switch (1) and pull out the network plug.
- Block off the water supply (3).
- Take out the screws (4).
- Take off the upper part (5) of the DE 3-5.
- Put the new device in place and connect by following above steps in reverse order.



CAUTION:

If a shut-off valve is present in the place of a non-return valve (6), then this valve must definitely be opened before the device is turned on again because otherwise the excess pressure safety device will be triggered!

7.2.4 Dosing unit

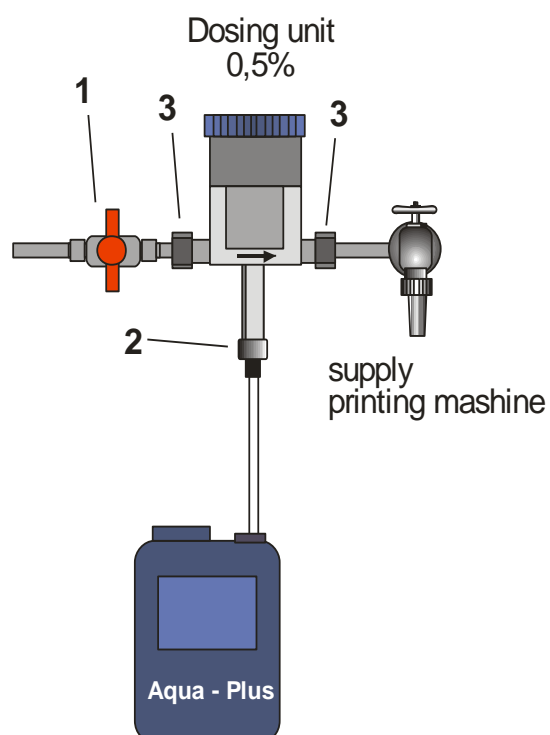


Figure 24: Replace Dosing unit

- Close faucet (1) at entrance (and at exit, if present).
- Take the dosing unit hose away from the dosing unit and detach the spigot (2).
- Unscrew the PVC screw fitting (3), having first placed a pail below to catch any water.
- Take the dosing unit from the bracket.
- Place new dosing unit in the bracket. Be sure to **observe the direction of flow!**
- Connect dosing unit hose and screw the spigot on tight.
- Open faucet slowly.
- Draw off water at the exit.

While drawing water off, observe whether the dosing unit emits a pumping noise and whether Aqua-Plus is sucked up through the dosing unit hose (transparent hose).

8. Technical Data

8.1 Water Softeners

AC2101:

desalination performance	100,000 litres
dimensions	1130 x 320 x 530mm 44.5 x 12.6 x 20.9 inches
weight (without filling)	38 kg
operating voltage	12VAC, 60Hz
power consumption	10W
operating water pressure	2 bar (30 psi), flow pressure max. 6 bar (87 psi)
pressure loss (with rated output)	1,2 bar (17.4 psi)
Installation category	II
pollution degree	2
application	only in rooms
altitude above sea level	6,670 ft
surrounding temperature	7-35°C (45-95°F)
surrounding humidity	max. 80%, prevent condensation
approval	GS, CE, cCSA _{US}

SoftCab 25 DR:

desalination performance	90,000 litres
dimensions	1220mm x 330mm x 410mm
weight (without filling)	38 kg
operating voltage	12VAC, 60Hz
power consumption	10W
operating water pressure	2 bar (30 psi), flow pressure max. 6 bar (87 psi)
pressure loss (with rated output)	1,2 bar (17.4 psi)
installation category	II
pollution degree	2
application	only in rooms
altitude above sea level	6,670 ft
surrounding temperature	7-35°C (45-95°F)
surrounding humidity	max. 80%, prevent condensation
approval	GS, CE

8.2 Water Tanks

8.2.1 Tanks (wall models)

DWD 18:

volume	18 litres
dimensions	Ø 360 mm (14.2 inches)
permissible operating pressure	10 bar (145 psi)
connection	1" (outer)
weight empty	approx. 6 kg
approval	GS, CE, cCSA _{US}

DWD 80:

volume	80 litres
dimensions	Ø 605 mm (23.5 inches)
permissible operating pressure	10 bar (145 psi)
connection	1" (outer)
weight empty	approx. 16 kg
approval	GS, CE, cCSA _{US}

8.2.2 Tanks (standing models)

WM-235:

volume	235 litres
dimensions	Ø: 610 mm (24 inches), h: 1088 mm (43 inches)
permissible operating pressure	8.6 bar (124 psi)
connection	1 1/4" (inner)
weight empty	approx. 23kg
approval	GS, CE

WM-450:

Volume	450 litres
dimensions	Ø: 610 mm (24 inches), h: 2040 mm (80 inches)
permissible operating pressure	8.6 bar (124 psi)
connection	1 1/4" (inner)
weight empty	approx. 43kg
approval	GS, CE

WM-600:

Volume	600 litres
dimensions	Ø: 770 mm (31 inches), h: 1758 mm (70 inches)
permissible operating pressure	8.6 bar (124 psi)
connection	2" (inner)
weight empty	approx. 76kg
approval	GS, CE, cCSA _{US}

WM-1000:

volume	1000 litres
dimensions	Ø: 922 mm (36.3 inches), h: 2145 mm (85 inches)
permissible operating pressure	8.6 bar (124 psi)
connection	2" (inner)
weight empty	approx. 117kg
approval	GS, CE, _c CSA _{US}

8.3 Clear Water System PerPur

PerPur 120 (types CSF2122 or CSF3122):

flow rate	120 kg/h, ± 10%
dimensions	600 x 400 x 400 mm 23.6 x 15.7 x 15.7 inches
weight	approx. 35 kg
operating voltage	120VAC, 60Hz, ± 10%
power consumption	600W
installation category	II
pollution degree	2
application	only in rooms
altitude above sea level	6,670 ft
surrounding temperature	7-35°C (45-95°F)
surrounding humidity	max. 80%, prevent condensation
approval	GS, CE, _c CSA _{US}

PerPur 200:

flow rate	200 kg/h, ± 10%
dimensions	600 x 400 x 400 mm 23.6 x 15.7 x 15.7 inches
weight	approx. 40 kg
operating voltage	120VAC, 50-60Hz, ± 10%
power consumption	600W
installation category	II
pollution degree	2
application	only in rooms
altitude above sea level	6,670 ft
surrounding temperature	7-35°C (45-95°F)
surrounding humidity	max. 80%, prevent condensation
approval	GS, CE

8.4 Pressure Booster

flow rate	200 l/h
dimensions	410 x 600 x 315mm 16.1 x 23.6 x 12.4 inches
weight	approx. 20 kg
operating voltage	120VAC, 60Hz, $\pm 10\%$
power consumption	195W
installation category	II
pollution degree	2
application	only in rooms
altitude above sea level	6,670 ft
surrounding temperature	7-35°C (45-95°F)
surrounding humidity	max. 80%, prevent condensation
approval	GS, CE

8.5 Dosing unit

operating water throughput	10 l/h – 1500 l/h
dimensions	130 x 130 x 280mm 5.1 x 5.1 x 11 inches
weight	approx. 2 kg
water temperature	5°C – 40°C (41°F – 104°F)
dosage value	0.5 %
operating water pressure	0,5 – 5 bar (7 – 70 psi)
differential pressure	0,3 – 1 bar (5.8 – 23.8 psi)
application	only in rooms
altitude above sea level	6,670 ft
surrounding temperature	10-25°C (50-77°F)
surrounding humidity	max. 80%, prevent condensation
approval	GS, CE, cCSA _{US}

9. Appendix

9.1 Replacement Parts

Position	Article No.	Article Name
1	001026	salt briquettes 25 kg
2	004039	microfilter
3	004040	activated carbon filter

9.2 Pressure Tests at the Tanks (legal requirement)

According to paragraph 10 of the German Ordinance on Pressure Vessels (DruckBehV), recurrent tests are to be carried out on pressure vessels (inner and pressure test). Type and scope of test depend on which of various groups the vessel belongs to:

Groups II and III: Recurrent tests by an expert. The time intervals between tests are determined by the operator.

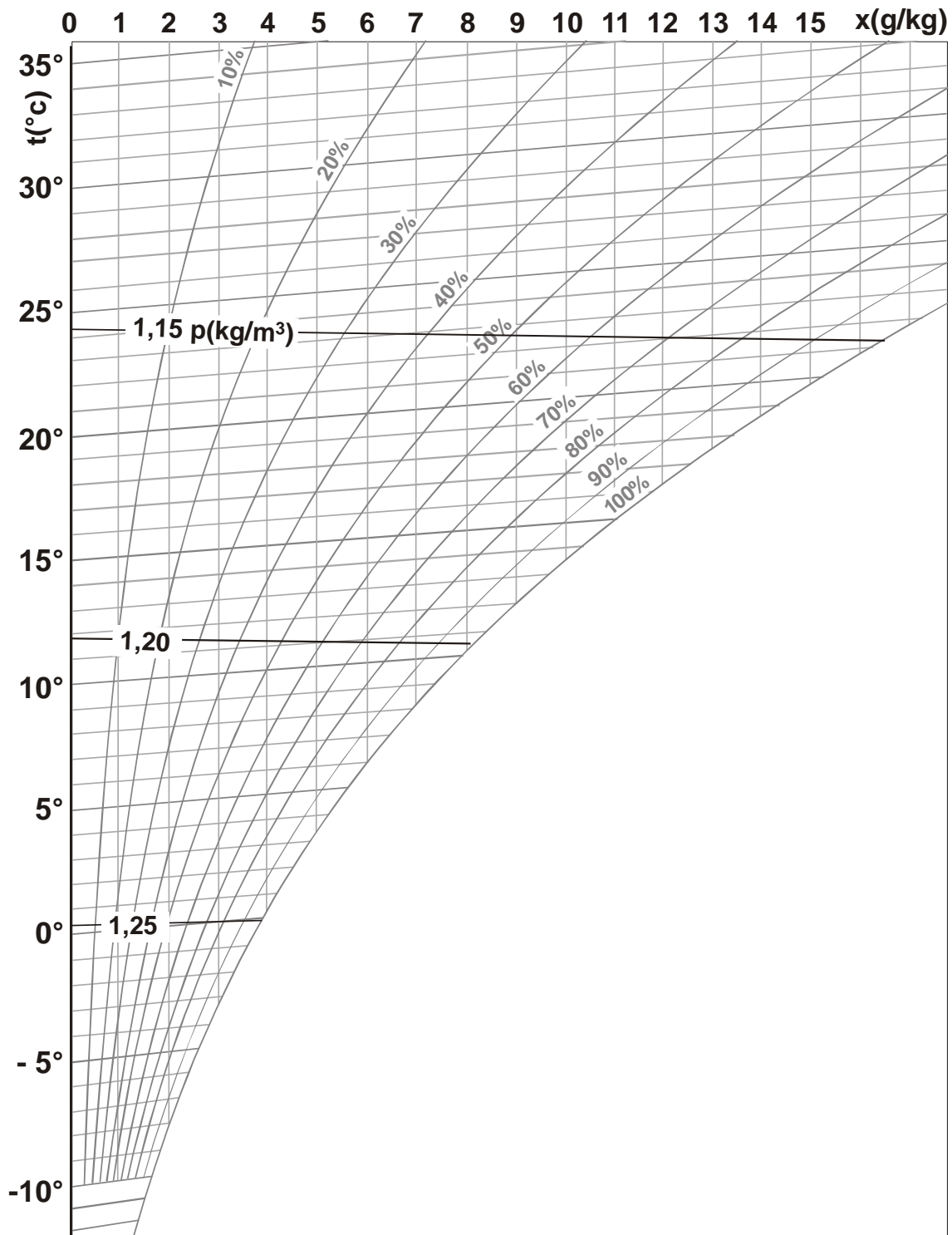
Group IV: Recurrent tests by an expert.
outer test: every 2 years
inner test: every 5 years
pressure test: every 10 years

Responsibility for ensuring that the recurrent tests are carried out lies with the operator.

The pressure vessels to be obtained from us are to be placed in the following groups:

Groups II and III	DWD 18, DWD 80
Group IV	WM-0235, WM-0450, WM-0600, WM-1000

9.3 h,x-Diagram



Test report

Order no.. 479652
 Client no. 5464400

Dr .Ansgar Ferner/Th
 Tel. +49 6128/744-266, Fax -203
 ansgar.ferner@institut-fresenius.de

Consumer Testing Services
 Meat & Food-Management systems

SGS INSTITUT FRESENIUS GmbH
 Im Maisel 14
 65232Tausenstein

9.4 Fresenius Test Certificate

Test certificate

Test objects:

Product description: Air humidification system
 Model: PUR

Appliances tested :

DRAABE pure water system	PerPur, SynPur
DRAABE high pressure system	HighPur
DRAABE air humidification system	Turbo Fog (TF4, TF16, TF32)
	DI Flex (ED/HT), BS

Test period:

The DRAABE appliances that are listed as "tested appliances" were microbiologically tested by us in 2005 over a period of 6 months. Microbiological check studies are carried out on the system at regular intervals to also confirm the results in the long term.

Test conditions and requirements:

The system must permanently prove that it permanently functions hygienically as part of this study. In this process the test conditions assume the "worst case". This is the case if:

- the entire system is in standby mode
- no air humidification is demanded
- the room air does not require any conditioning in terms of the humidity (% air humidity)

The hygiene levels must ensure the maintenance of the following requirements during the entire test period (3% humidification EIN). Procedures were not employed which cause the additional discharge of chemicals /biocides in the room air.

The system was contaminated with a germ compound three times in the course of the test. The system configuration corresponded to the maximum extension level of the DRAABE system (see above). The results shall be stated by means of a detailed analysis report.

Contents of the analysis report:

Materials tested, description of the test, test bacteria, contamination interval, germ pollution, individual results, composition and quantity of the germ compound (for the contamination process).

Results:

The DRAABE system tested by us completely fulfils the aforementioned requirements. As a result the requirements for the awarding of the INSTITUT FRESENIUS quality seal have been fulfilled. The DRAABE system that was tested works perfectly in terms of the hygiene levels and fulfils the present demands (as at: December 2005) of BG Druck und Papierverarbeitung, Wiesbaden.

The following total germ levels were not exceeded:

Admission water air humidification	150KBE*/ml
Humidifier water	150KBE*/ml

***germ forming units**

The evaluation of the test result is based on the data of a system operating in accordance with the operating instructions drafted by DRAABE and their service intervals.

Tausenstein, December 2005

SGS INSTITUT FRESENIUS GmbH

Dr. Ansgar Ferner

Franz-Josef Schäfer

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