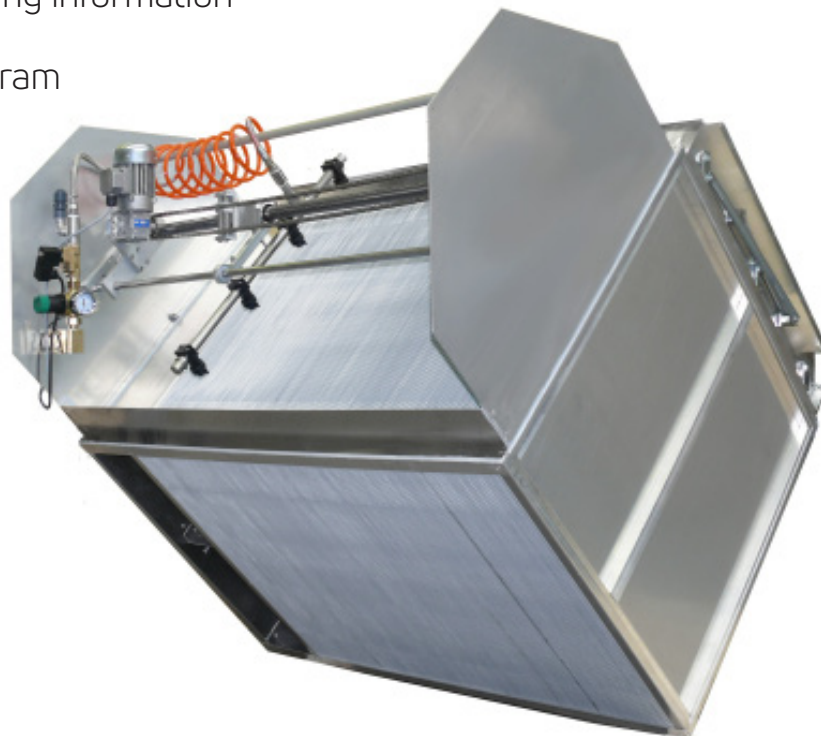


# Softcool® indirect evaporative cooling

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## Indirect adiabatic cooling Softcool®



Softcool® is an environmentally friendly alternative to traditional cooling systems. Without any refrigerant the supply air can be cooled up to 12 K. In addition to this the integrated plate heat exchanger is used for heat recovery in winter.

**Softcool®'s optimised moistening of the heat exchanger in the exhaust air cools the supply air very effectively. 2 l of water results in 1 kW cooling power without humidification of the supply air.**

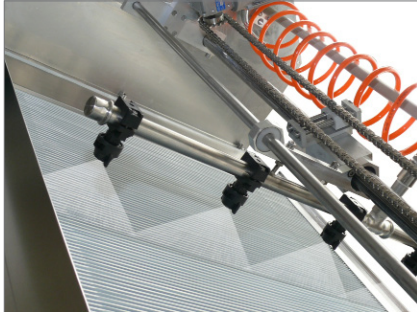
The adiabatic (indirect evaporative) cooling works by spraying a fine water film on the exhaust air side onto the hydrophilic coated surface of the heat exchanger. When this evaporates in the heat exchanger, the supply air is cooled (see psychrometric chart).

### The main advantages:

- Significant energy savings in summer and winter
- Reduction of supply air temperature by 10 K or more without refrigerants
- The electrical consumption is only a fraction of the consumption in conventional cooling systems
- Low investment costs due to double function (cooling and heat recovery)
- Low maintenance costs: the automatic cleaning function keeps the surface of the PHE clean, which means the highest efficiency is always maintained
- No humidity increase on supply air side
- Minimal water consumption; because only the exact amount of water, which then evaporates, is sprayed onto the surface. This means no sumps, no filtering, no recirculating water, no hygienic problems and therefore no intensive cleaning necessary



## Design and function



### Function

The return air side of the exchanger surface is sprayed with a very small quantity of water. In the case of full load, i.e. with 10 K cooling of 10,000 m<sup>3</sup>/h at an outside temperature of 32°C and an return air temperature of 26°C, this water volume is just 67 litres per hour. Through an optional water saving device, this maximum water volume can also be matched to the current partial load situation. As there is no nozzle small enough to apply such a small amount of water to the entire heat exchanger surface so that it is fully wetted, a system of a few moveable flat-spray nozzles is used. There is no or only very little excess water.

The water is evaporated on the return air side. The energy for evaporation comes through the heat exchanger wall from the outdoor air side. This is then cooled. No water comes into contact with the supply air.

The Softcool® system works with the existing mains pressure of 2-3 bar. This means that no recirculation tank or recirculation pump is required. The growth of harmful microorganisms is prevented and the operator has no unnecessary electricity or maintenance costs (circulation pumps often require more than 1 kW of electrical power).

The time-selectable, fully automatic washing process stops the exchanger surface getting dirty. A specially developed biodegradable cleaning agent is used in a very low concentration. The efficiency of the heat exchanger is not impaired by a layer of dirt, even after an extended operating period. This eliminates the need for manual cleaning of the heat exchanger, which would otherwise be necessary from time to time.

A single highly effective POLYBLOC cross-flow plate heat exchanger is used. Even without a second downstream heat exchanger connected in series, optimum heat recovery is achieved in winter during heat recovery. The pressure drop and consequently also the electricity required for the fans, as well as the space required, are low compared to systems with dual plate heat exchangers.



## Design and function



### Design

The Softcool® system comprises a POLYBLOC plate heat exchanger made of pure aluminum with a hydrophilic coating, which is also used for heat recovery in winter, and a moveable wetting and washing unit fitted on the return air intake side as a fully plumbed and wired compact unit. The aluminum bypass damper are fitted on the outdoor air intake side. The bypass is a sheet steel cavity at the side of the heat exchanger. The entire structure is made up primarily of largely corrosion-resistant materials, such as stainless steel, aluminum and plastic.

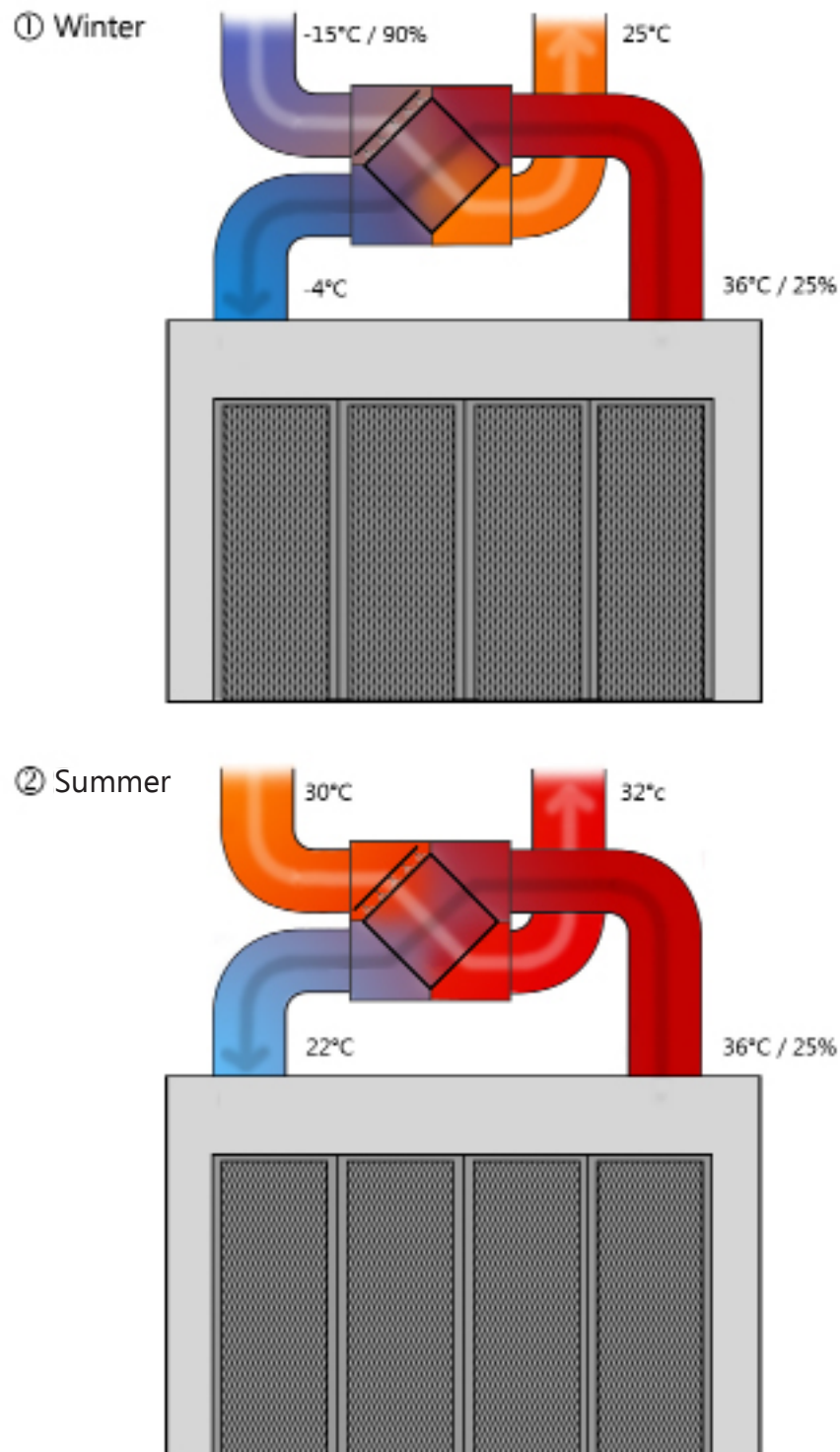
Softcool® is supplied as a fully pre-assembled module for ventilation units.

Normally, the control unit and the reservoir for the cleaning agent, with a fitted dosing pump, are supplied fully plumbed and wired separately rather than together.

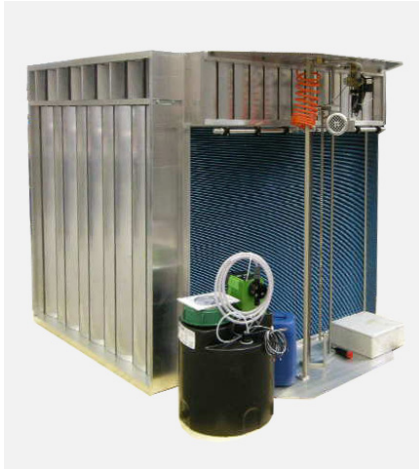


## Specification Softcool®-DC

### Indirect adiabatic cooling system for datacenter



## Design



### Softcool® -DC contains

**1 pc Plateheatexchanger:**

- High efficient plate heat exchanger made in aluminum with special hydrophilic coating for excellent evaporation surface.
- Corrugated wave structure for high differential pressure resistance up to 10'000 pa for high flexibility in regards of different airstreams used for optimized cooling
- Performance data certified by Eurovent

**1 pc Movable spray arbor:**

Motordriven spray arbor with special flat-nozzles. Driven over corrosion resistant chain by 400 V AC Motor. Internal connection of all water and electrical elements included.

Function: Minimum water consumption by spraying a thin layer of water over the hydrophilic coated surface. Cooling is optimized by nearly complete evaporation of thin water film before next interval.

Automatic cleaning function keeps the surface of the PHE clean.

**1 pc Washing agent container 40 l, with dosing pump.**

To be positioned near AHU and connected by enforced hose. Including 10 l of Softwash special washing agent.

**1 pc Softcool-Control unit**

Control of cooling. Input: On/Off, variable cooling 0...10 V.  
Output: Error messages

**1 pc Water treatment system (Ion exchanger)**

Required 0°dH

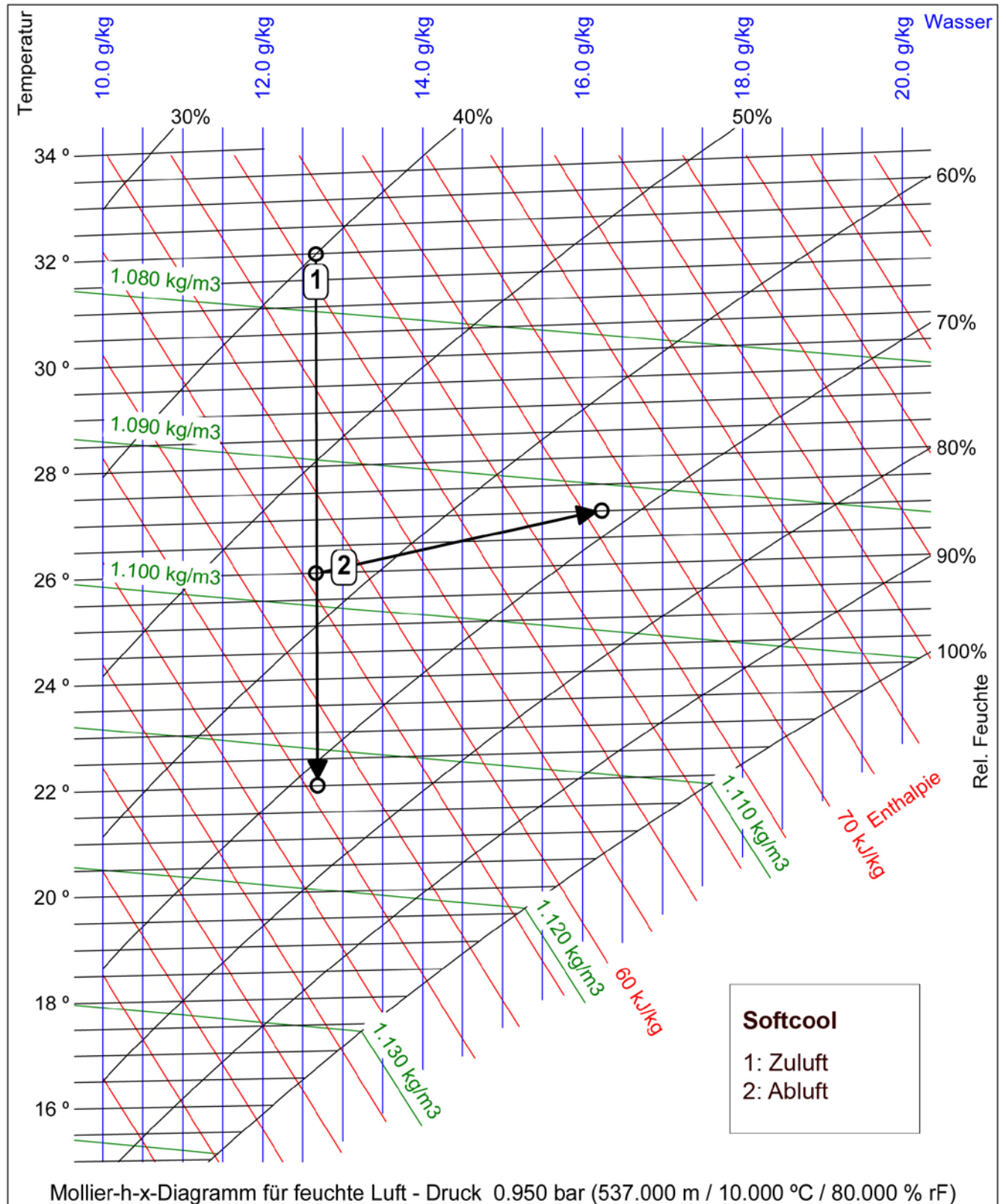
**1 pc Option**

Start up by Polybloc





## hx diagram



## Use of rainwater for the Softcool® system

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The Softcool® system can be operated easily with filtered rainwater as evaporation water. Due to the below-neutral pH of the rainwater, aluminum is, in principle, less at risk of corrosion if a number of recommendations are taken into consideration.

### POLYBLOC recommends:

1. Always use roof run-off water, but **no copper guttering or downpipes!** Never use rainwater from roads or public areas.
2. Filter rainwater and store it in plastic containers **without letting light in** to prevent algae growth. If storing large volumes of water for a long time, use an anti-algae agent in accordance with the recommendations of the rainwater system manufacturer.

**Caution: This chemical additive must not come into contact with aluminum.**

If the stored rainwater volume is not sufficient to maintain cooling operation, water that has been softened to 0 °dH must be supplied from an ion exchanger.

This water treatment unit is operated by opening a solenoid valve subject to the level in the rainwater container. The float switch is set up so that treated water is supplied with a reserve volume of one day's consumption of rainwater. To minimize the volume of treated water supplied, the volume of treated water should be just one day's consumption. This means that the volume for no more than two days' consumption is stored. If it rains in the meantime, only a minimum of treated water has been used. Generally, cooling is only carried out in the daytime. This means that the water treatment unit can be very small, as topping off can be carried out throughout the night and part of the day.

3. The pump supplying the Softcool® system with rainwater must overcome the height differential between the container and the nozzles, and must achieve a maximum nozzle pressure of 2.0 to 3.0 bar. If the pump is combined with an air vessel, this can be pressure controlled.
4. All pipes must be plastic or stainless steel, **no copper pipes.** This includes the rainwater guttering and collectors, as well as the supply lines to the water treatment unit.

For more information about rainwater harvesting, visit:

[www.fbr.de](http://www.fbr.de) (Fachvereinigung Betriebs- und Regenwassernutzung e.V.)





## Engineering information

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### Engineering information

1. Water quality must be 0 ° (no hardness increase)
2. Plastic or stainless steel water pipes, **no copper pipes**
3. Provide a water filter in the untreated water
4. Untreated water pressure at softener min. 3 bar, max. 6 bar
5. Return air guide diagonally from top to bottom through the plate heat exchanger
6. Position of the wetting unit must be at the top of the return air intake
7. Provide a drop eliminator on the exhaust air side
8. Accessibility through service doors to the wetting unit must be guaranteed for monitoring and maintenance work.
9. Accessibility to the exhaust air side of the exchanger is highly recommended. No service opening is possible in the exchanger and Softcool® area
10. Full length stainless steel drain pan
11. Capacity of the drain pan on the exhaust air side of at least one wash cycle (we recommend a minimum rim height of 80 mm)
12. Drain pan on the exhaust air side at least 1½ inches
13. Size the trap according to the underpressure/overpressure
14. Ensure separate drains for softener (backwash/overflow). Drain into open drain
15. Wall conduit for the electrical cables and water pipes at the control panel (not prepared at the factory)

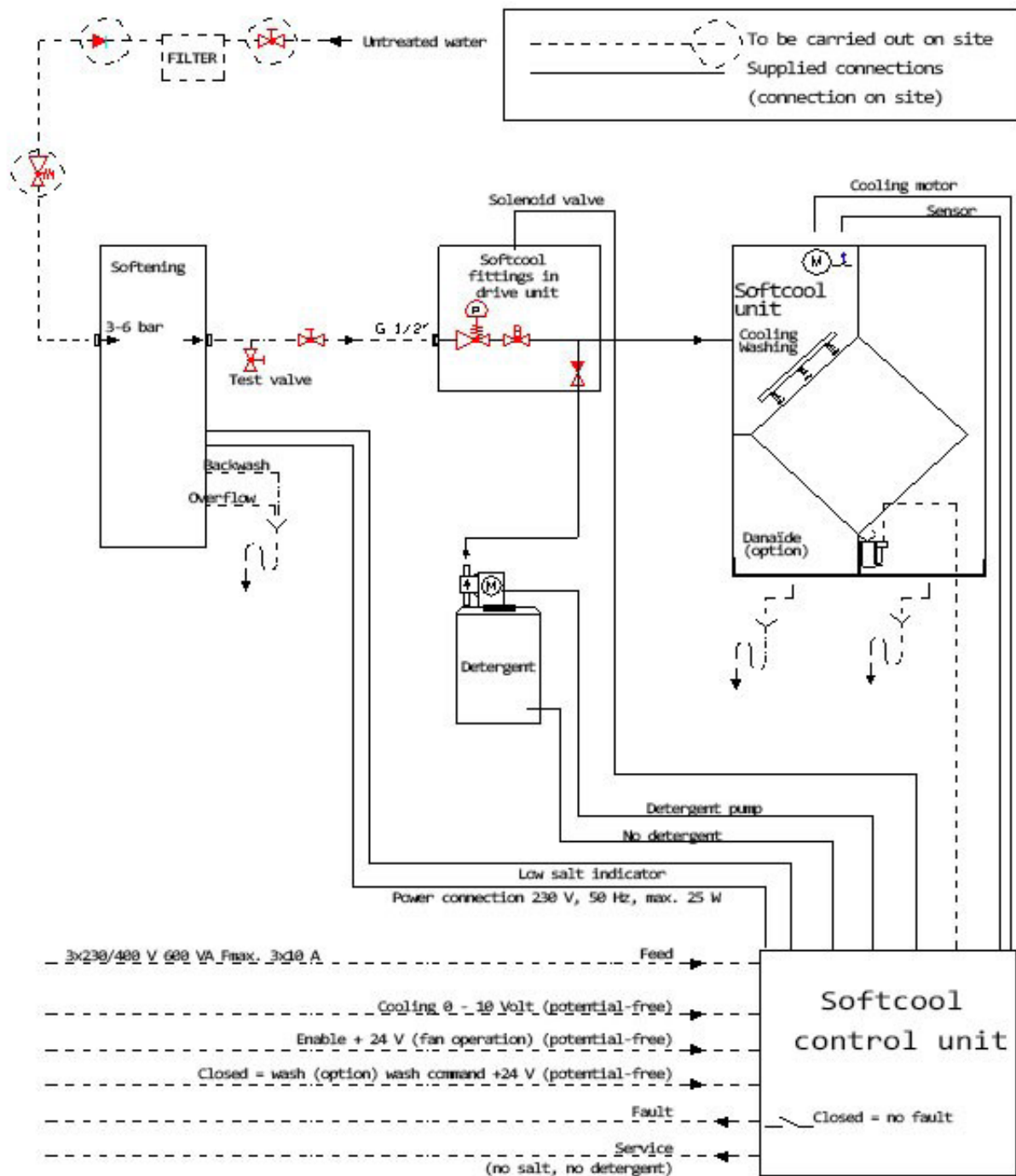
### Installation information

1. Softcool® is generally supplied as a module for ventilation units.
2. The heat exchanger is watertight. The plate heat exchanger should therefore be carefully sealed with PU sealant (e.g. SIKAflex 221) to the casing, particularly at the return air/supply air joint (never use silicone due to inadequate adhesion).
3. Where there are connections, pay attention to the flow direction at the solenoid valve and pressure reducer (arrow on fitting).



### Block diagram

Softcool version 2003



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