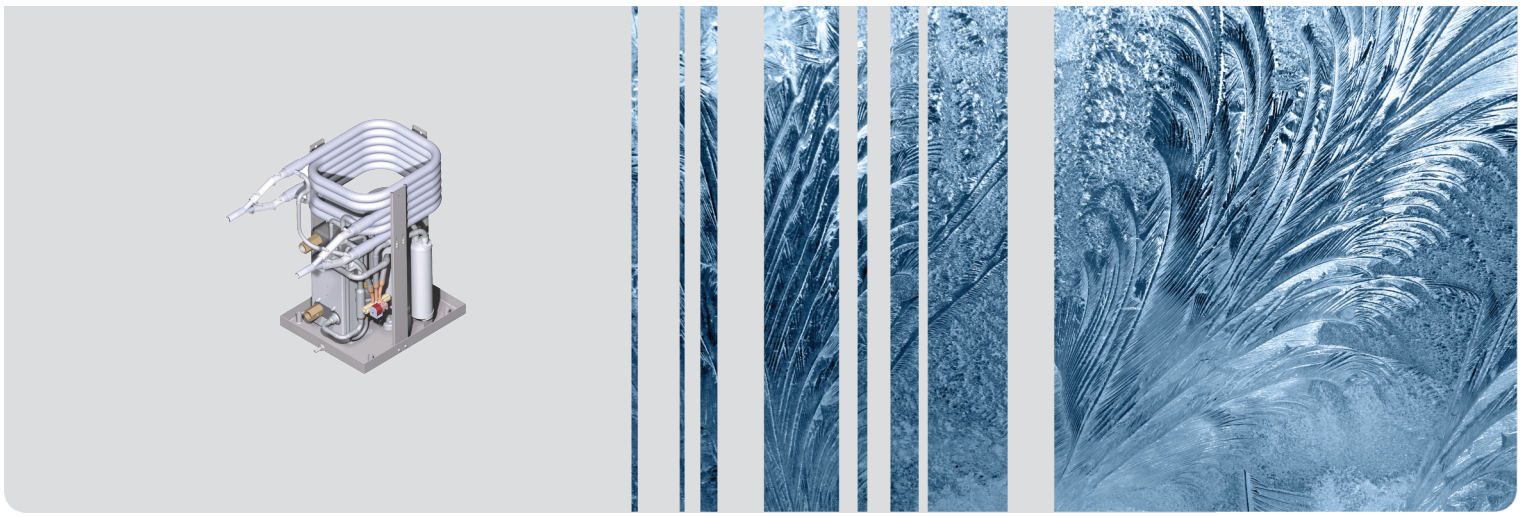
Installation Instructions

Ti22 ProX

Chilled Water Marine Air-Conditioning Systems



English

Table of Contents

1 About this document

1.1 Purpose of this document

This document is an integral part of the product and contains the information required to ensure correct and safe installation and operation.

1.2 Using this document

- ▶ Read these Installation Instructions (II) carefully before operating or installing the unit.
- ● Please pass this document on to the next owner or user of the unit.

1.3 Use of symbols and highlighting

This document uses warning labels and colours for hazard classification in accordance with ISO 3864:

See also https://www.iso.org/standard/55814.html.

DANGER
This signal word denotes a hazard with a high degree of risk which, if not avoided, will lead to death or serious injury.

WARNING
This signal word denotes a hazard with a moderate degree of risk which, if not avoided, may lead to minor or moderate injury.

CAUTION
This signal word denotes a hazard with a low degree of risk which, if not avoided, will lead to minor or moderate injury.

NOTE
This signal word denotes a Special Technical Feature or (if not observed) potential damage to the product.

Refers to separate documents which are enclosed or can be requested from Webasto.

✓	Requirements for the following necessary action

1.4 Warranty and liability

Webasto shall not assume liability for defects or damage that are the result of the Installation Instructions / Operating Instructions and the instructions contained therein being disregarded.

This liability exclusion particularly applies to:

- ● Installation by untrained personnel.
- ● Improper use.
- ● Repairs not carried out by a Webasto service workshop.
- ● Use of non-genuine parts.
- ● Conversion of the unit without permission from Webasto.

1.5 Measurements

NOTE
All measurements are in mm, unless stated otherwise.

2 Safety

2.1 Intended use

The purpose of Ti22 ProX is to provide heating and cooling on ships.

The Ti22 ProX meets the current state of technology and recognized safety rules.

WARNING
Improper or inappropriate use may result in danger to life and limb of the user and others, as well as impairment of the unit and other property.
Any other use of this product is not permissible.
Any other use of or changes to the product, including as part of assembly and installation, will result in any and all warranty claims being voided.

WARNING
Moving parts
Risk of injury, damage to air handlers.
You must only operate the Ti22 ProX and its connected air handlers in their final installed position.

WARNING
Ignition of surrounding gases or highly flammable liquids by sparking of the Ti22 ProX.
You must always switch off the air-conditioning system when refuelling, or while in a petrol station area.

NOTE
Follow these instructions carefully when installing the electric wiring and cold-water pipes, the electrical boxes and the air ducts.

2.2 Qualifications of installation personnel

Installation personnel must have the following qualifications:

- ● Successful completion of the relevant Webasto training.
- ● Qualification applicable to working on technical systems.

2.3 Safety on installation

Danger posed by live parts:

- ● Disconnect the power supply before installation.
- ● Make sure the electrical system is earthed correctly.
- ● Always comply with all legal requirements.
- ● Observe the data on the type label.

Risk of fire or toxic gases by incorrect installation:

- ● Protect components in the vicinity of the Ti22 ProX from impermissible overheating by implementing the following measures:
  - – Maintain minimum safety clearance. See also chapter 13, "Technical data" on page 31 and chapter 13.1, "Dimensions and minimum clearance" on page 32.
  - – Ensure adequate ventilation.
  - – Use fire-resistant materials or heat shields.

2.4 Safety information for frequency-controlled equipment

Before carrying out maintenance:

- Disconnect the frequency converter and external control current circuits from the power supply, turn the main system switch to **OFF** and wait at least 5 minutes.
- Using a suitable multimeter, always make sure that no voltage is present at the terminals.
- Always make sure that the drive motor of the compressor has come to a complete standstill. Motors that are still turning freely can produce dangerous voltages at the frequency converter terminal connections, even when disconnected from the power supply.
- Take great care when checking the temperature of the heat sink; touching the heat sink may cause burns.
- Even when the drive motor of the compressor is not running, the motor terminals **U**, **V** and **W** are live when the frequency converter is connected to the power supply.
- Do not measure the insulation resistance or dielectric strength directly at the frequency converter or on the lines connected to the frequency converter.
- Even though the control connections are disconnected from the system voltage, the relay outputs can produce a dangerous control voltage. This applies even when the chiller unit is not connected to the power supply system.
- In certain configurations, only disconnecting the power supply at the (Power+) input is not enough to prevent damage to the system and ensure personal protection. Further appropriate safety measures must be implemented for all configurations where malfunctions may cause injuries or damage to the system.
- Observe all applicable EU, national and local safety standards for high-voltage systems as well as all requirements governing correct use of personal protective equipment.
- Use this product only for the purposes specified by the manufacturer. Never modify or replace any components unless approved by the manufacturer. Disregarding these requirements may result in fire, electric shock, or other damage.

3 Scope of delivery

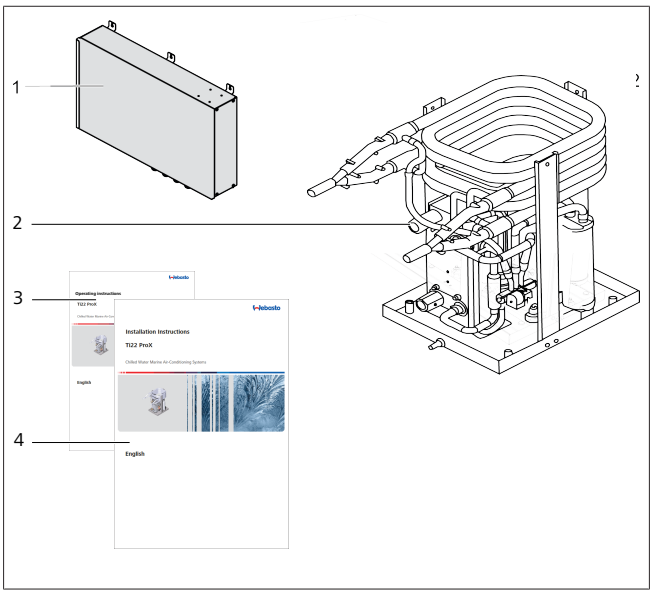


Fig. 1

Number	Description
1	Electrical box
2	Chiller unit Ti22 ProX
3	Operating instructions
4	Technical documentation supplied on a USB memory stick

4 Information on the unit

4.1 Conformity

Webasto herewith declares that this product conforms with the basic directives for marketing in the EU:

- 2014/68/EU Pressure Equipment Directive in accordance with DIN EN 387
  See also: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32014L0068
- 2014/30/EU Electromagnetic compatibility (EMC)
  See also: https://eur-lex.europa.eu/
- 2011/65/EU RoHS
  See also: https://eur-lex.europa.eu/
- 2006/42/EU: Directive on machinery, amending directive 95/16/EC
  See also: https://eur-lex.europa.eu/

EU-Konformitätserklärung
EC-Declaration of Conformity

Webasto

Hersteller **Webasto Thermo & Comfort SE**
Manufacturer Friedrichshafener Straße 9
82205 Gilching

Für die Verwendung des Webasto Klimaanlagensystems
For the use of the Webasto air-conditioning system

Ti22 ProX Chiller
ProXx-xV-xPh-x-407c

Richtlinie Directive	Harmonisierte Normen Harmonised Standards
2006/42/EG Maschinenrichtlinie 2006/42/EG machinery directive	EN ISO 12100:2010 EN 61310-2:2008 EN 60335-1:2012/A13:2017 EN 60335-2-40:2003/A13:2012/AC:2013
2014/30/EU EMV 2014/30/EU EMC	EN 60945:2003-07 EN 61000-3-2:2014 EN 61000-3-3:2013
2014/68/EU Druckgeräterichtlinie 2014/68/EU PED	gemäß Kat. I, Modul A / according cat. I, module A EN 378-2:2008+A2:2012
2011/65/EU RoHS	

Befolgen Sie die Einbauanweisung und die Bedienungsanweisung
Follow the installation instruction and operating instruction 2112898_ 2112899_

Ort und Datum der Ausstellung Gilching, den 18.06.2021
Place and Date of issue

i.V. i.A.
J. Hornung J. Belz
VP Business Line Thermo Mgmt. Thermo Management (TM) Product Conformity & Regul. Mgr.
Webasto Thermo & Comfort SE Webasto Roof & Components SE

Original in deutscher Fassung.
Original in German version.

Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller.
This declaration of conformity is issued under the sole responsibility of the manufacturer.

Fig. 2

4.2 Variants

Chiller units :

- ProX36-230V-1Ph-REV-R407C
- ProX36-208V-3Ph-REV-R407C
- ProX48-230V-1Ph-REV-R407C
- ProX48-208V-3Ph-REV-R407C
- ProX60-230V-1Ph-REV-R407C
- ProX60-208V-3Ph-REV-R407C
- ProX72-230V-3Ph-REV-R407C

To read variant names, such as the ProX36 – 230 V – Ph –REV-R407C, see below:

Name	Description
ProX	Ti22 ProX chiller unit
36	Cooling capacity in kBTU/h
1Ph	Single phase compressor
230V	Rated voltage
REV	Reverse-Cycle cooling and heating (COOL: cooling only)
R407C	Refrigerant

4.3 Type label

The type label location is on the front of the evaporator. The type label details the output, serial number and registration data. See chapter , "Type label" on page 5.

Webasto Thermo & Comfort France S.A.S.
Rue du Camp d'Aviation
44320 Saint Viaud, FRANCE

Webasto 30/2021

Type	**Ti22 ProX Chiller** **PROX60-230V-1Ph-REV-R407C**
Serial Number	111222333444
Refr. Capacity	60000BTU/h - 17,58Kw
Refrigerant / Charge	R407C / 1250g
CO2 equiv / GWP	2217,5 Kg/1774
Design Pressure PS	25 bar(g)
Voltage	~ 230V-50/60Hz
Rated Current Draw	max. 17A

Part no. **2119999A**
Read instructions first
Read operator's manual
Made in France

Fig. 3

4.4 Unit description

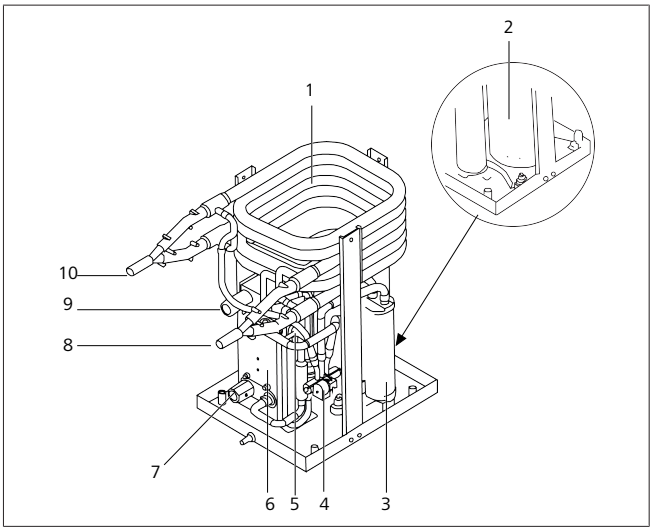


Fig. 4

1	Condenser	6	Plate heat exchanger
2	Compressor	7	Cold-water outlet
3	Accumulator	8	Seawater inlet
4	Reversing valve	9	Cold-water inlet
5	Expansion valve	10	Seawater outlet

4.4.1 General

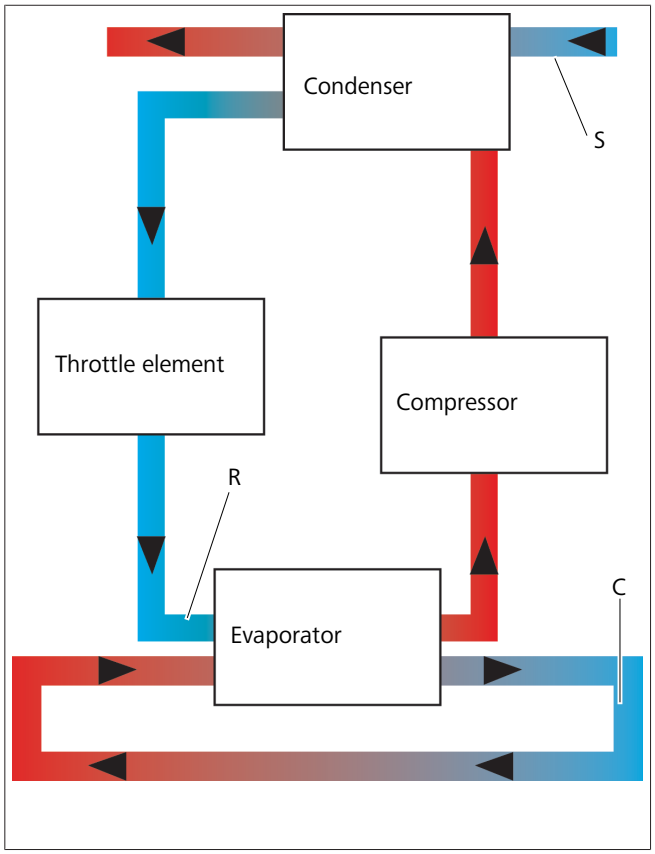


Fig. 5

S	Seawater line
R	Refrigerating circuit
C	Cold-water circuit

The Ti22 ProX is an air-conditioning system with four basic components:

- Evaporator (liquid heat exchanger): Refrigerant vaporises at low pressure and a temperature below the cold-water temperature. The refrigerant absorbs heat from the cold-water circuit in the process.
- Compressor (refrigerant compressor): The refrigerant vapour extracted from the evaporator at low pressure is compressed to a higher pressure. This process raises the temperature. The refrigerant absorbs additional heat.
- Condenser (seawater heat exchanger): Made of titanium. The refrigerant vapour condenses at a temperature above the seawater temperature. In the process, the entire absorbed heat is transferred to the seawater.
- Throttle element (thermostatic expansion valve): The pressure in the refrigerant (which is subjected to condensing pressure) is relieved and transferred to the evaporator.

4.4.2 Cooling-operation mode

Heat transfer in Webasto Ti22 ProX air-conditioning systems takes place in a two-stage process. Circulating cold water (a water/glycol mixture) serves as the heat transfer medium.

In cooling mode, the cold water flows in a closed circuit from the Ti22 ProX air-conditioning system to a series of air handlers located in various cabins. The cold water absorbs heat from the room air. The air handler distributes the cooled air into the room with a fan. The room air is cooled by approximately 59 °F (15 K). The heated cold-water is routed to the Ti22 ProX chiller unit. The heat exchanger transfers the heat from the cold-water circuit to the refrigerant circuit. The heat causes the refrigerant to evaporate. The compressor compresses the refrigerant vapour, which condenses to a liquid when flowing through the condenser cooled with seawater. The seawater absorbs the released heat. The condensed refrigerant passes through the throttle element and the pressure is relieved to form wet vapour on entering the evaporator. The refrigerant is evaporated and superheated again, thus absorbing heat from the cold water. The cooled cold water flows to the air handler again. The cooling circuit is closed.

NOTE

This kind of air-conditioning system allows seawater to flow through the condenser, by sucking seawater in via a pump to ensure the cooling process.

Ti22 ProX air-conditioning systems are designed for maximum seawater temperatures of 95 °F (35 °C).

4.4.3 Heating operation mode

Ti22 ProX air-conditioning systems are designed as reverse cycle systems and can also produce heat. A 4/2-way reversing valve is installed in the system for this purpose. The condenser becomes an evaporator and vice versa. The seawater heat exchanger (now evaporator) takes available heat from the seawater. The refrigerant now transfers heat to the cold-water circuit. The evaporator now becomes the condenser and heats the cold water up to 104 °F (40 °C).

NOTE

Reverse cycle heating becomes inefficient when the seawater temperature drops to below 43 °F (6 °C) because there is not enough heat available in the seawater. The fresh air then cannot be heated sufficiently. In this case, Webasto recommends to use diesel-operated Webasto water heaters that can be easily integrated into the cold-water circuit. Refer to Webasto BlueComfort Premium systems for more details. These will make the heating mode completely independent of adverse ambient conditions.

See also https://www.webasto.com/en-us.html

5 Installation

5.1 General

NOTE

To ensure proper operation, all components must be positioned and installed in accordance with their installation instructions.

5.2 Installation location

WARNING

Danger of fire and explosion.

Do not install the Ti22 ProX in areas with highly flammable liquids or gases.

You can install the Ti22 ProX chiller units in any suitable location. Usual installation locations:

- the engine room.
- other technical areas.

Insulation of the area around the chiller unit reduces the noise. Ventilation is not necessary, because the Ti22 ProX chiller unit is internally cooled.

5.2.1 Requirements for the installation location

- Make sure that there is enough space to access to the cold-water connections, condensed-water drain and electrical connections.
- Make sure the system is accessible for service and maintenance purposes.
- Make sure to mount the Ti22 ProX on an even, horizontal surface.
- Because operation of the Ti22 ProX leads to condensation, two drain lines must be provided on the condensed-water tray.
- Do not directly expose the chiller unit to splash water or overwash.
- The Ti22 ProX chiller units are approved for a maximum ambient temperature of 140 °F (60 °C).
- To avoid local ambient temperatures in excess of 140 °F (60 °C), the chiller unit and the electrical box must not be installed in the immediate vicinity of heat sources.

5.3 Installation example

The illustration below shows an example of a typical installation of a Ti22 ProX air-conditioning system. In addition to the Ti22 ProX, a further 3 air handlers are shown in this installation example for heating and cooling the respective cabins.

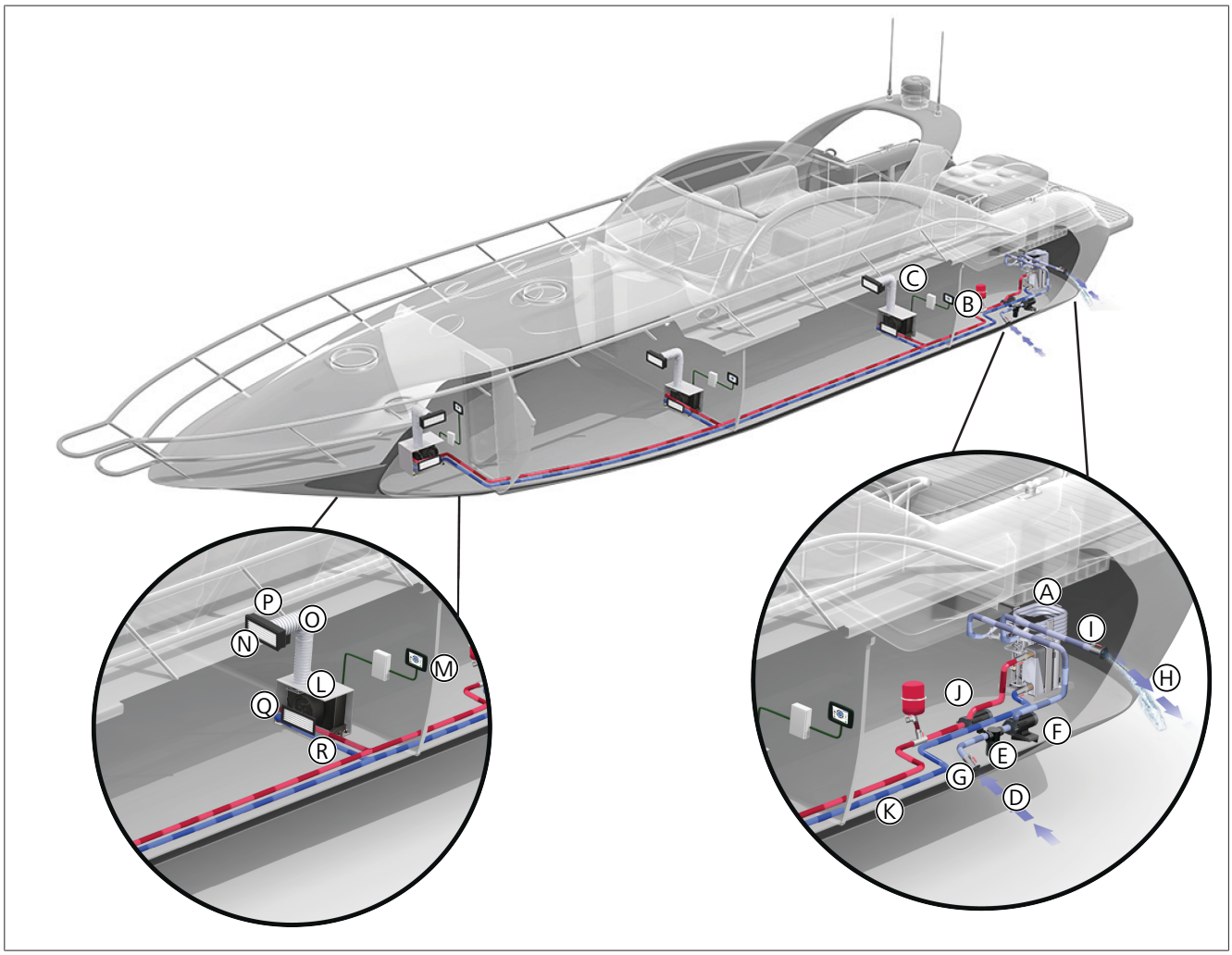


Fig. 6

A	Ti22 ProX chiller	J	Cold-water pump
B	Control element (BlueCool MyTouch)	K	Insulated cold-water line
C	Control-element connection cable	L	Air handler
D	Seawater inlet	M	Cabin control-panel with connection cable, temperature sensor and electrical box
E	Seawater strainer	N	Air-outlet grille
F	Seawater pump	O	Flexible air duct
G	Seawater valve	P	Transition box
H	Seawater outlet	Q	Air-inlet grille
I	Seawater line	R	Condensed-water drain line

5.4 Transporting the unit

WARNING

Risk of injury if the unit is dropped or carried incorrectly.

The unit is heavy and must not be carried incorrectly.

For correct carrying of the Ti22 ProX, make sure to:

- Lift the unit only at the lifting eyes on the stainless steel frame or the condensed-water tray.
- Only use lifting gear with a lifting tackle for heavy systems.

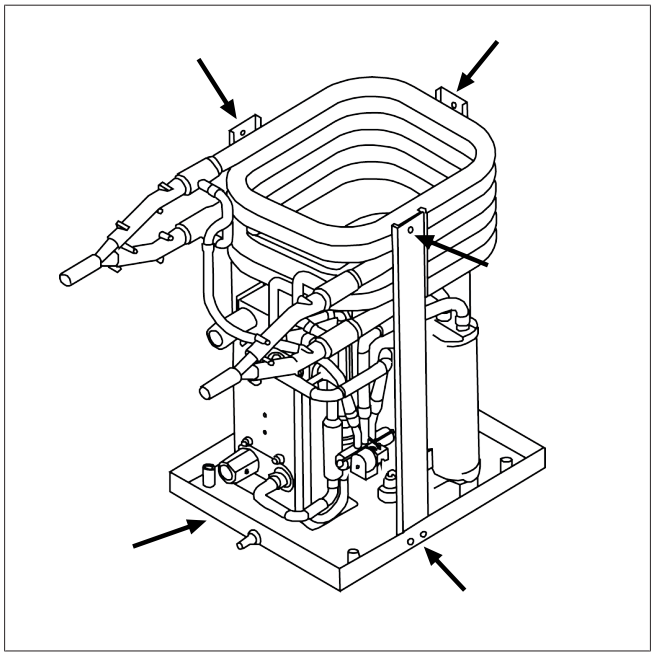


Fig. 7

5.5 Installing the unit

CAUTION

Danger of damage to the electrical components and refrigerant loss.

Do not remove covers, caps or fittings used to protect the electrical wiring or to seal off the refrigerant.

CAUTION

Danger of water damage to installations, equipment, etc.

The cold condensation water in the condensed-water tray can also cool down the condensed-water tray and thus forming condensation on the outside or underside of the condensed-water tray.

- ▶ Do not place the chiller unit on a moisture-sensitive surface.

5.5.1 Mounting

NOTE

- ▶ Make sure the unit is mounted securely.
- ▶ Fasten the unit in such way that it is seated securely. If necessary you can remove the unit for maintenance purposes.

1. Lift the unit and position it at the installation location.
2. Secure the unit on the condensed-water tray to the mounting surface.

NOTE

If vibration dampers are used, install them between the condensed-water tray and the mounting surface. This will increase the installation height of the system.

5.6 Installing the condensed-water drain line

CAUTION

Do not connect the condensed-water drain line to the seawater line of the air-conditioning system. Risk of water damage to furniture, devices, etc.

- ▶ Prevent damage caused by condensation backing up. Make sure that the condensed-water tray drains off properly.
- ▶ Ensure sufficient emptying of the condensed-water tray. Route the condensed-water drain line with a downhill slope and without water pockets.

NOTE

- ▶ Make sure the unit is mounted stably.
- ▶ Install condensed-water drain lines on a downward slope and without water pockets.
- ▶ The diameter of the condensed-water drain line must match the condensed water drain fitting on the condensed-water tray.
- ▶ Connect the condensed-water tray via the condensed-water drain line to the bilge or other condensation/water points.
- ▶ There must be no backpressure in the condensed-water line.
- ▶ If necessary, make a new water collection point complete with pump, level switch and drain line.

- Secure the condensed-water drain line to the connection socket of the condensed water tray.
- Ensure a leakproof fit.

5.7 Installing the seawater circuit

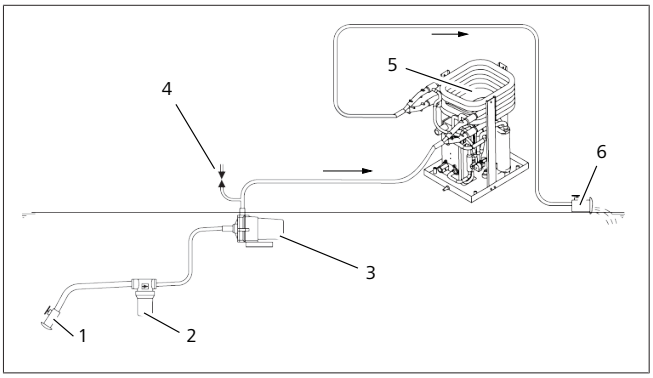


Fig. 8

Nr.	Description
1	Through-hull fitting with sea valve
2	Seawater strainer
3	Seawater pump
4	Bleeding
5	Chiller unit
6	Seawater outlet

NOTE

Seawater components are installed in a continuous ascend from the through-hull fitting, via the strainer and pump up to the chiller unit. This ensures that bubbles, which would otherwise cause the pump to malfunction, cannot collect in the seawater circuit but escape upward instead.

5.7.1 Installing through-hull fitting for the seawater inlet

CAUTION

Seawater will enter the boat if not installed correctly.

Boat can sink; danger of drowning.

You must take appropriate measures to install the through-hull fitting properly in order to prevent uncontrolled entry of seawater.

NOTE

Install the seawater inlet at the lowest possible point below the water line and below the seawater pump.

Install the through-hull fitting for the seawater inlet with the opening facing in the direction of travel in order to create a boosting backpressure in the intake line.

Sailing boats: install the through-hull fitting near the centre of the hull.

Fast motorboats: install the through-hull fitting in rear section of the hull.

The sea valve on the through-hull fitting is used for safety and maintenance purposes.

Install the through-hull fitting, seal it with sealant and verify the fitting is leak-tight.

5.7.2 Installing a seawater pump

NOTE

Webasto recommends installing the seawater pump minimally 0.8 ft (0.25 m) below the water line.

If installation below the water line is not possible, you must use a self-priming pump.

Selecting a seawater pump

To increase the operating safety, Webasto recommends using self-priming pumps. These are significantly less susceptible to air accumulation. Air can enter the system during reverse travel or when in a tilted position.

Webasto recommends that each Ti22 ProX chiller unit is supplied by its own individual seawater pump. This to achieve the minimum required seawater flow rate.

If multiple chiller units are connected to form one overall system, each chiller unit must have its own seawater outlet, to check the minimum flow rate of each unit. If necessary, use throttles that reduce the cross section to adjust the flow rates.

Self-priming seawater pumps

If you install a self-priming pump above the water line, you must pre-fill the pump head during initial startup or after longer times at standstill to enable self-priming.

Pump characteristics

Pump characteristics enable the selection and dimensioning of the seawater pump depending on expected pressure losses in the entire system.

Operating the pumps outside the pump characteristic may damage the pumps. Damage due to improper operation is excluded from the warranty.

The delivery head of a pump is specified in MLC (metres of liquid column) and represents the pressure drop between the pump inlet and outlet. This pressure drop corresponds to the total pressure differential in the seawater system from the seawater inlet up to the seawater outlet. Do not confuse this with the position of the pump below the water line.

The effective water flow through the pump and therefore through the seawater system changes considerably depending on the pressure drop.

The minimum seawater flow rate through the air-conditioning system must be maintained at all times. This should be checked every time the system is put into operation.

NOTE

Make sure that the pump is accessible for maintenance work.

Webasto strongly recommends installing a vent directly behind the outlet opening of the seawater pump. This allows collected air bubbles to escape when the system is started up.

Install the seawater pump as instructed above.

5.7.3 Installing a seawater strainer

NOTE

Match the size of the seawater strainer to the seawater quality. If a large amount of dirt is expected, then select a strainer of a corresponding size.

You must install the seawater strainer between the through-hull fitting and the seawater pump.

Comply with specified flow direction.

Make sure that the seawater strainer is accessible for maintenance work.

Install the seawater strainer in accordance with the manufacturer's specifications.

5.7.4 Installing a seawater outlet

NOTE

You must install the seawater outlet around 0.33 ft (0.10 m) above the water line.

Do not install the seawater outlet in the bow area of the ship in order to prevent back flow.

You must not mount the seawater outlet below the waterline. Although this reduces the operating noise of the seawater outlet, it increases the counter pressure in the system. This significantly lowers the flow rate and therefore the system capacity. It will no longer be possible to easily check the flow rate.

Each Ti22 ProX chiller unit requires a separate seawater outlet to be able to check and secure the minimum required seawater flow rate.

5.7.5 Installing seawater lines

WARNING

Boat may sink; danger of drowning

Seawater will enter if installed incorrectly.

Install double hose clamps on the seawater lines. Install the two hose clamps mirror-inverted.

NOTE

Take note of the minimally required diameter of the seawater lines.

Only use reducers when this serves the specific distribution of the volume flows where several systems are connected to one pump.

The seawater lines must be installed as follows:

— as short as possible.

— kink-free.

— without water pockets.

— protected against rubbing.

Avoid 90° fittings wherever possible as these create a considerable pressure loss, therefore unnecessarily reducing the seawater flow. It is preferable to install the line in a kink-free bend.

On the intake side of the pump, Webasto advise to use a line with an over-dimensioned cross-section, as pollution can most frequently occur here, resulting in an unintentional reduction of the flow rate.

- Install intake line(s) so that there is a slight upward incline from the seawater inlet to the chiller unit.
- Install pressure line(s) to the chiller unit and to the seawater outlet.

5.7.6 Equipotential bonding on the condenser

The Ti22 ProX chillers come with a bonding clamp fixed on the titanium condenser. You must attach the titanium condenser to the galvanic cathodic protection system with an 8 AWG (10 mm²) wire.

5.8 Installing the cold-water circuit

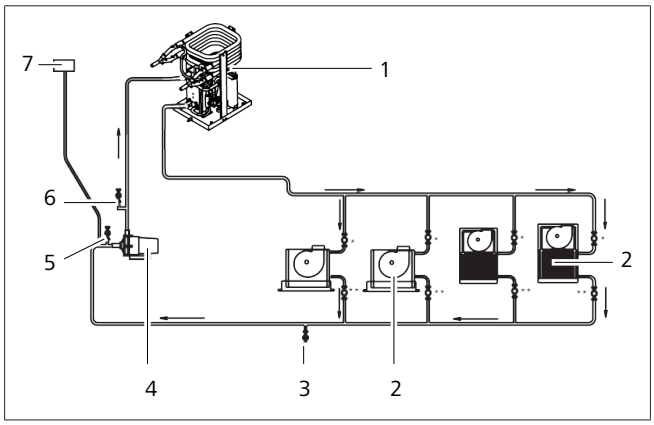


Fig. 9

1	Chiller unit	5	Filler connection (T-piece with shut-off valve)
2	Air handler	6	Bleeding
3	Drain valve	7	Expansion tank
4	Cold-water pump		

For maintenance purposes Webasto recommends the installation of a shut-off valve at the inlet (*) and outlet (**) of each air handler.

The line leading to the expansion tank can be used to fill the circuit if it rises over its entire length (no downward section at any point). Otherwise, use the filler connection and temporarily fit a filler hose with filler reservoir (the filler reservoir must be positioned at the highest point and above the highest air handler).

Use a transparent filler hose with a minimum inside diameter of 0.59 in. (15 mm).

A drain valve at the lowest point in the cold-water circuit allows the circuit to be completely emptied after an initial pressure test has been conducted or when it is uncertain whether the cold water contains the necessary percentage of glycol (antifreeze).

5.8.1 Open or closed system

The cold-water circuit can be designed as an open system with a non-pressurised expansion tank or as a closed, pressurized system with a diaphragm expansion tank.

NOTE

Webasto recommends using a pressurised system wherever possible. The advantage of this system is a lower air intake during operation, resulting in fewer air bubbles. This has a positive effect on the overall performance. It also makes the use of an expansion tank unnecessary.

In an open system, the expansion tank must be at the highest point in the circuit. You must take into account the possible angle of heel while sailing. Expansion tanks must always be connected on the intake side of the cold-water pump.

5.8.2 Antifreeze

Make sure that there is sufficient antifreeze in the cold-water circuit. Antifreeze prevents the system from freezing during operation. Antifreeze also makes your vessel winterproof without having to drain the cold-water circuit.

NOTE

The water/glycol mix ratio should be 25% to 40% glycol and 75% to 60% fresh water. A lower glycol percentage will result in the evaporator freezing and breaking down in cooling mode, voiding any product warranty claims with Webasto.

If there are leaks in the cold-water system, you must not top up the system with fresh water only. This will dilute the mix ratio and frost protection will no longer be guaranteed. At particularly low ambient temperatures in winter, you must increase the glycol level in order to prevent the lines from freezing. You can use commercially available glycol, as used in motor vehicles, for this purpose.

5.8.3 Flow rates

The cold-water circuit of the Ti22 ProX operates with an average temperature difference between inflow and return of approx. 41 °F (4 K) (e.g. inflow temperature 45 °F (7 °C) and return temperature 54 °F (12 °C)). However, the actual temperature difference depends on further influencing factors such as seawater temperature for example.

Due to this minimal temperature difference a considerably higher flow rate is required than in domestic heating applications for instance.

To check the flow rate it is recommended to install pressure gauges on the intake and pressure side of the pump. The effective flow rate can then be determined based on the derived pressure difference and the pump characteristic.

NOTE

To achieve the full cooling-capacity and trouble-free operation, you must maintain the specified minimum flow rates. See chapter 13, "Technical data" on page 31.

5.8.4 Cold-water pump selection

The cold-water pump characteristics facilitate the selection and sizing of the cold-water pump, based on the pressure losses to be expected in the entire system.

Operating the cold-water pumps outside the cold-water pump characteristics may result in damage to the cold-water pumps. Damage which occurs due to improper operation is excluded from the warranty.

The delivery head of a cold-water pump is specified in MLC (metres of liquid column) and represents the pressure drop between the cold-water pump inlet and outlet. This drop corresponds to the entire pressure loss in the cold-water system. Do not confuse the MLC with the height difference between the pump and the highest air handler.

The minimum volumetric cold-water flow rate through the air-conditioning system must be maintained at all times. A temperature difference of 41 °F (5 K) between the colder-water inlet and outlet of the chiller unit in cooling mode indicates that the volumetric cold-water flow rate is adequate. Greater temperature differences are an indication that the volumetric cold-water flow rate it too low.

5.8.5 Cold-water pump installation

Complete the following steps:

1. Install the cold-water pump, making sure that the pump is accessible for maintenance work.
2. Fit a T-piece to the inlet of the pump for filling purposes.
3. Install a vent directly after the pump outlet. This particularly applies to the pumps WB1500 and 2000. The pumps from model WB2500 upward do not require a vent to maintain smooth operation.
4. Fit pressure-gauges or pressure-gauge connections on the intake and the pressure side of the pump.

5.8.6 Installing cold-water lines

NOTE

Ensure that, for each branch, the sum of the nominal cross-sections of the branches is not less than the nominal cross-section of the cold-water supply.

Only use reducers when this serves the specific distribution of the cold-water flow.

The cold-water lines must be installed as follows:

— as short as possible

— kink-free

— protected against rubbing

Avoid 90^0 fittings wherever possible. These create a considerable pressure loss and reduce the cold-water flow. You must install the line in a kink-free bend.

Use fittings with a generous radius, if necessary. These have a lower pressure loss. The pressure loss is considerably higher in 90° fittings with a tight radius. If pipe bends with a wide radius are not available, then use two 45° bends with a tight radius fitted one after the other.

In addition to the pump output, the effective flow rate in the cold-water circuit greatly depends on the resistance to flow in the entire system. All components present resistance to flow. To maintain the minimum required flow rate it is essential to keep resistance to flow, or pressure loss, as low as possible in the entire system.

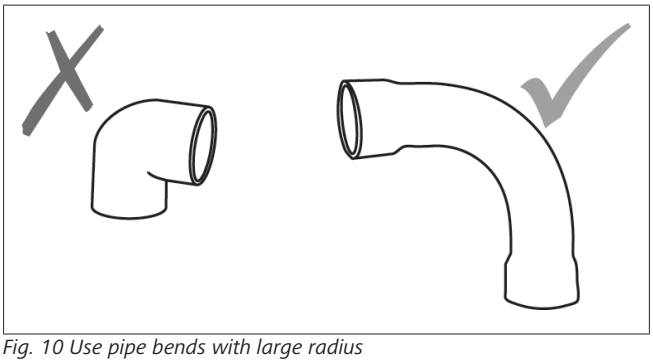


Fig. 10 Use pipe bends with large radius

You can use rigid plastic pipes and/or flexible, reinforced hoses as cold-water lines.

	Pipes	Hoses
Inner diameter	1 in.	1 in.
Pressure	5 bar / 72 PSI	5 bar / 72 PSI
Material	Acrylonitrile butadiene styrene (ABS) or polyethylene (PE)	Ethylene propylene diene monomer (EPDM)
Reinforcement		Spiral, braided or helical

Primary lines should at least have the same diameter as the connections of the Ti22 ProX unit. Secondary lines used as branches to air handlers must have the same diameter as the connections of the air handlers. To add a secondary branch, preferably use Y-pieces.

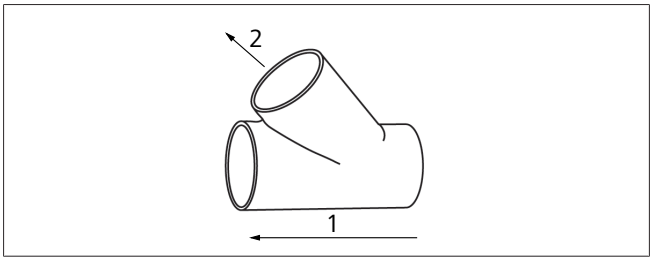


Fig. 11 Y-junction

1	Cold-water flow, main line
2	Cold-water flow, secondary line

If no Y-pieces are available, make sure that the diameter of the secondary line is reduced only after the T-branch in order to keep the inlet diameter as large as possible.

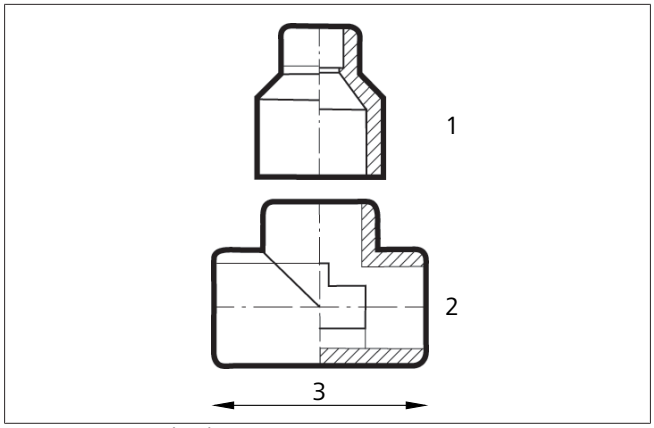


Fig. 12 T-piece and reducer pipe

1	Reducer pipe
2	T-piece
3	Cold-water flow, main line

Install the cold-water lines as shown in chapter , "Installing the cold-water circuit" on page 11 or in chapter , "Filling and flushing a pressurised cold-water circuit" on page 22.

5.8.7 Insulation

CAUTION

Water damage may occur.

Danger of water damage to furniture, units, etc. as a result of condensation.

Adequately insulate air duct lines.

Condensation forms on the lines of the cold-water circuit as their temperature in normal operation is far below the dew point temperature of the ambient air.

Condensation may settle unchecked and cause damage to furniture, installed equipment etc.

Make sure that all the cold-water circuit lines are adequately insulated to prevent condensation forming.

- For insulation purposes, only use closed-cell foam materials that are suitable for low-temperature applications.
- Foam material insulation should be at least 0.35 in. (9 mm) thick.
- Do not use material with an adhered longitudinal joint. This may detach over time.
- When fitting insulated pipes, make sure that insulation is not obstructed.

5.8.8 Cold-water temperature sensors

NOTE

To make sure that the system operates satisfactorily, you must leave the factory-fitted cold-water temperature sensors in their installed positions. These sensors help control the cold-water circuit and prevent the evaporator from freezing. Tampering with the factory-fitted cold-water temperature sensors will render any product warranty claims with Webasto null and void.

5.8.9 Installing the air handlers

The selection, installation and setting of the air handlers must be carried out in accordance with the separate Installation Instructions enclosed with the air handlers.

5.9 Installation with module configuration

You can install the Ti22 ProX chillers in module configuration. In this configuration, only one electrical box controls up to six modules. For the wiring diagram of the standard electrical box see chapter 14.3, "Wiring diagrams" on page 36. Consult the Webasto engineering team to control five or six modules as this requires a specific electrical box.

Cold-water and seawater manifolds connect all the modules together.

For installation in module configuration, remove the original casings from all the pre-installed cold-water temperature sensors. Only one temperature sensor is used to give the cold-water temperature information to the electrical box. The sensor must be installed on the outlet of the cold-water manifold in a position where flow coming from all modules is equal.

Connect the sensor to the electrical box that controls all the modules.

NOTE

Damage to Ti22 ProX chiller.

Not following the instructions above may lead to faults and to evaporator freezing. This will also render any product warranty claims with Webasto null and void.

6 Electrical connections

6.1 General

ATTENTION

Connection to your 230 V electrical system

Danger of injuries or fatal accidents and damage to the air-conditioning system or other electrical devices.

Installation must only be carried out by persons who are certified to carry out work on 230 V electrical systems.

Before working on the electrical system, the system must be disconnected from the power supply.

NOTE

Operation and temperature sensing:

The BlueCool MyTouch, display cable and cabin temperature sensor do not form part of the scope of delivery and should be ordered separately.

You must protect the entire air-conditioning system with external circuit breakers.

In addition to the power supply for the PC-board, a separate power supply must be provided for each compressor, the seawater pump and the cold-water pump. This means, for example, a total of 7 power-supply lines, which must be individually protected by circuit breakers, is required for a Ti22 ProX system with 4 compressors.

6.1.1 Minimum wire cross-sections

Minimum wire cross-sections must be taken into account. Information on determining the minimum wire cross-sections for each device in the Ti22 ProX can be found in chapter 14.3, "Wiring diagrams" on page 36.

NOTE

Earth conductors are not specified.

Pay attention to the following requirements:

- Line length
- Power consumption
- Maximum temperatures in the vicinity of the cables

6.1.2 Installing line fuse protection

1. Line fuse protection must be selected corresponding to the data in chapter 14.3.2, "Circuit breakers" on page 36. These fuses must also be selected in accordance with the national and local standards.
2. Fuses of class gG for IEC and UL-type T with a tripping time of less than 0.5 s are generally required; if a magnetic circuit breaker (MCB) is used the MCB must be at least of type B, as specified in the data in chapter 14.3, "Wiring diagrams" on page 36.
3. Make sure that the voltage, frequency and number of phases match the data of the type used.

6.2 Installing the electrical box

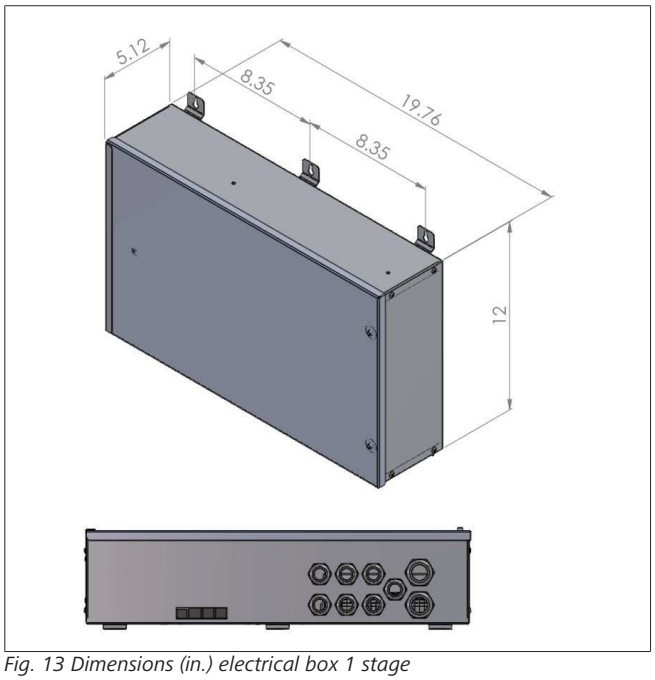


Fig. 13 Dimensions (in.) electrical box 1 stage

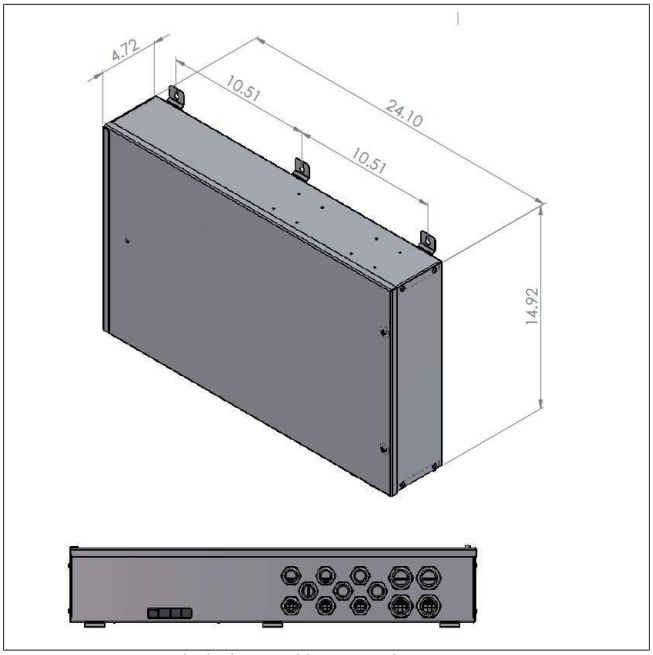


Fig. 14 Dimensions (in.) electrical box 2 and 4 stages

If the air handler is connected to the electrical box for the chiller unit, no additional electrical box is needed for the air handler.

An additional electrical box is required when the air handler is installed remotely. Refer to the BlueCool A-Series air handler installation instructions.

NOTE

Make sure that the fastening screws are accessible for opening and removal.

The designated installation position is with the connections facing downwards. This requirement complies with protection class IP21.

If no specific requirements relating to the IP class need to be met, the electrical box of the Control Kit Ti22 ProX can be installed in any position.

For protection class IP21, the electrical box must be installed vertically upright with the connections facing downward.

NOTE

Make sure that the maximum permissible ambient temperature of 140 °F (60 °C) is not exceeded.

See chapter 13, "Technical data" on page 31.

6.3 Connecting the chiller unit

NOTE

Always refer to the wiring diagrams when connecting your device.

See chapter 14.3, "Wiring diagrams" on page 36.

The Ti22 ProX has a number of pre-installed electrical connections.

6.4 Installing the BlueCool Soft Start

It is possible to retrofit the Webasto BlueCool Soft Start (230 V) in the electrical box. Refer to the wiring diagrams in chapter 14.3, "Wiring diagrams" on page 36. Make sure that the phase and neutral conductors, respectively L1 and L2, are installed correctly.

6.5 Installing the BlueCool MyTouch

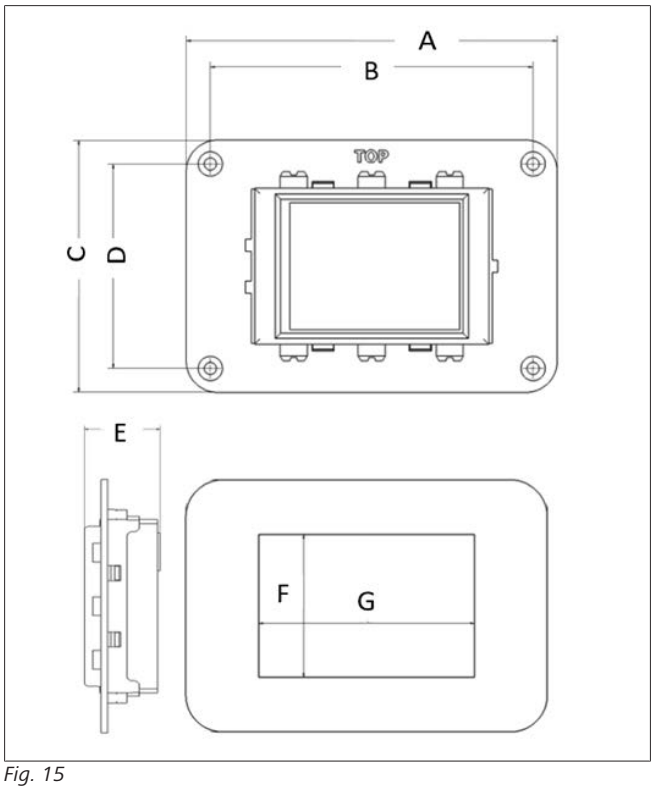


Fig. 15

Letter	Size
A	4.2 in. (107 mm)
B	3.7 in. (93 mm)
C	2.9 in. (73 mm)
D	2.3 in. (59 mm)
E	1.1 in. (28 mm)
F	1.4 in. (36.7 mm)
G	1.9 in. (49 mm)

Use the supplied connection cable to connect the control element. You can also use a commercially available 8-pin cable with RJ45 connector.

The connection cables previously used by Webasto for the control element with a membrane keypad are no longer suitable, because their polarity has been changed.

1. Make the cut-out for the control element in the required position. See Fig. 15 for the cut-out dimensions.
2. Connect the connection cable for the control element to the back of the control panel.
3. Connect the connection cable for the control element to the junction box from the outside.
4. Secure the control element with screws.
5. Fit the trim cover.

6.6 Installation cabin temperature sensor

The cabin temperature sensor is required to register the cabin temperature.

To ensure trouble-free operation make sure the cabin temperature sensor is positioned correctly.

NOTE

Direct sunlight and other heat sources can impair the operation of the system.

- ▶ Do NOT position the cabin temperature sensor for the chiller unit in the immediate vicinity of an outlet air grill.
- ▶ If you plan not to operate the chiller in automatic mode, you do not need to connect a cabin temperature sensor to the chiller unit pc-board.
- ▶ Set the screen settings to “Chiller unit with cabin control (No)”, see chapter 7.6, "Setting level 2" on page 19. The fault message “A09 Cabin temperature sensor” is then suppressed and the standard Home screen is replaced by the Home screen for the chiller unit without cabin control. The Operating Modes menu will then no longer display the options “Automatic toggling between cooling and heating F3” (via reverse heating operation) and “Automatic toggling between cooling and heating F4” (via external diesel heater).

Select an installation location which is free from external influences if possible. Avoid the following external influences:

- Radiators
- Kitchen cookers
- Light sources

Webasto advises to mount the cabin temperature sensor in the area of the return flow from the air handler in the cabin, for example on the back of the air inlet grille:

1. Fit the cabin temperature sensor in the required location.
2. Connect the sensor cable to the electrical box from the outside:
   For 1 stage: See Fig. 13.
   For 2 to 4 stages: See Fig. 14.

6.7 Accessories

6.7.1 BlueCool Expert Tool

The BlueCool Expert tool enables you to configure, actuate and diagnose the Ti22 ProX. Refer to the corresponding documentation for additional information. Authorized users can download the tool free of charge from the Webasto Dealer Portal at:

http://dealers.webasto.com

6.8 Installing a Variable Frequency Drive (VFD)

Variable frequency drives (also known as VFD) primarily eliminate the sudden current inrush when a compressor turns on. Frequency drives also convert single phase power to 3-phase.

The chiller must have a 3-phase connector. The VFD runs on either single phase or 3-phase input power. The control panel must match the ship’s power, whether single phase or 3-phase.

To work with a VFD, you must change the internal wiring of the supplied control box. Refer to the wiring diagram with VFD, see chapter 14.3.7, "Ti22 ProX, 1-stage, 3-phase with VFD" on page 41. The power supply for the compressor is routed via the VFD and the control box. The VFD functions as the contactor/starter. You must protect the VFD with a dedicated device. The control box provides a dry contact for the VFD to control when the VFD turns on/off.

WARNING
You must set the acceleration and deceleration time of the variable frequency drive below 1 second. Higher values will lead to damaging the compressor and will void your warranty.

WARNING
Hazard from fire or electrical shock.
Install a dedicated circuit breaker or fuse for the VFD's power supply. Look for the specifications in the VFD's installation manual.

Mount the VFD close to the compressor on a vertical surface (±10°) in an accessible location.

- Install with at least 2.0 in. (5.1 cm) clearance at all sides.
- Remove the protective sticker. This allows heat dissipation.
- The VFD is IP20. Install in a dry place.

NOTE
For more information, refer to the manual that comes with the VFD. The VFD manual itself takes precedence over these general VFD guidelines.

CAUTION
VFDs are approved for ambient temperatures from 14 °F (-10 °C) to 122 °F (+50 °C).

- ▶ To avoid local ambient temperatures in excess of 122 °F (+50 °C), the VFD must not be installed in the immediate vicinity of heat sources.
- ▶ Make sure that the maximum permissible ambient temperature for the VFD is not exceeded.

7 Operation

7.1 General

The BlueCool MyTouch is the standard control element for the Ti22 ProX and enables easy operation and setting of the connected system. The screen is a touch screen. System operation is described below.

ATTENTION
Damage to BlueCool MyTouch
The display must not come in contact with any other electrical devices. The electrostatic discharge could cause malfunctions.
Do not use pointed or sharp objects to operate the screen. Do not exert excessive pressure.

NOTE
Webasto recommends operating the screen using your fingers only. The touch sensitivity of the screen is optimized to fingertip contact. The screen may not respond if gloves are worn.
Tapping at the very edge of the screen may not be recognized.

7.2 Home screen and icons

There is a choice of 3 different designs of the Home screen with temperature and fan setting. The functions are the same.

To change the design (in Passenger menu) see chapter 7.5, "Setting level 1" on page 18.

Example: Air handlers are connected to the chiller unit.

If air handlers are connected to the chiller unit, you must select "Chiller unit with cabin control - Yes".

See chapter 7.6, "Setting level 2" on page 19.

In such cases, using the MyTouch control element, the chiller unit and the temperature in the cabin can be controlled.

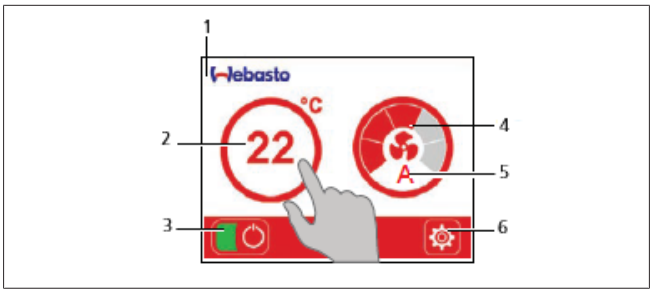


Fig. 16 Design 1

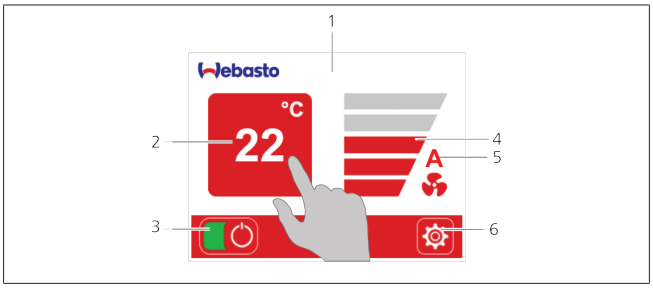


Fig. 17 Design 2

Fig. 18 Design 3

Fig. 16, Fig. 17 and Fig. 18 show examples of design 1 to 3.

Nr	Description
1	Home screen (Tap Webasto select crew / parameter menu)
2	Temperature setting
3	ON / OFF
4	Fan display
5	Automatic air handler control display
6	Settings (passenger menu)

The icons on the Home screen provide information about the system status.

Icon	Function
	On / Off
	Temperature
	Fan
	Settings
Webasto	Crew menu
	Notification
	Increase values
	Decrease values
AUTO	Automatic fan control
	Previous
22	Set-point temperature
	Previous
	Next
2	Parameter value
	Select
	Home screen
	Scroll up
	Scroll down
-- 1 2 3 4 5 6 7 8 9 0 clear	Keypad
	Display selection

7.2.1 Standby

The screen will go to Standby mode after 5 minutes if the screen remains untouched. Tap anywhere on the screen to bring up the Home screen.

7.2.2 Notification

The notification icon appears on the bottom status line to draw your attention to the current status of the system. Tap the icon to show the current status.

7.2.3 ON / OFF

When the screen is switched off:

- Tap the screen.

The screen is switched on.

When the screen is switched on:

- Tap .

The colour of the ON/OFF symbol indicates the operating status (green = switched on, grey = switched off).

7.2.4 Operation

After switching on, the control system starts up the chiller unit and the connected air handler in steps and then assumes normal operation. The control element now shows the current temperature where the temperature sensor of the chiller unit is installed.

Depending on the installation location, this may also be the temperature of another cabin.

After approx. 20 seconds, the base colour of the control element changes to indicate the operating mode (cooling or heating) in which the chiller unit was started. Blue indicates cooling mode, red indicates heating mode. The selection depends on:

- the selected setpoint temperature and
- the room temperature, which is measured by the cabin temperature sensor.

The system will go into standby mode when the cabin temperature and the setpoint temperature are the same.

NOTE

The system only cools under the following conditions:
cabin temperature > 59 °F (15 °C).
Setpoint temperature < cabin temperature.

The system only heats under the following conditions:
cabin temperature < 84 °F (29 °C).
Setpoint temperature > cabin temperature.

In automatic mode the fan remains set to speed 1 until the cold-water temperature is lower (cooling) or higher (heating) than the cabin temperature.

In cooling mode, the cold-water temperature is significantly below 59 °F (15 °C) and above 104 °F (40 °C) in heating mode. The current cold-water temperature at the outlet of the Ti22 ProX can be requested in setting level 2 (crew menu).

See chapter 7.6, "Setting level 2" on page 19.

7.2.5 Selecting the setpoint temperature

To set the required cabin temperature:

1. Tap the temperature or the icon on the home screen. The setpoint temperature appears to the right.
2. Tap the Plus icon or Minus icon to increase or decrease the setpoint temperature. The Settings menu closes automatically after 30 seconds.
3. Or tap previous to safe and exit menu immediately.

7.2.6 Setting the fan speed

To set the required fan speed:

- Tap on the home screen.

With automatic fan control mode selected, the A appears on the home screen. The control system of the fan automatically adapts the fan speed.

To adapt the fan speed manually:

1. Tap the fan icon .
2. Tap the Plus icon or the Minus icon to change the fan speed, or tap AUTO to return to automatic fan mode. After 30 seconds the Settings menu automatically saves the last value and closes.
3. Tap previous to save and exit the menu immediately.

7.3 Chiller unit Home screen without cabin control

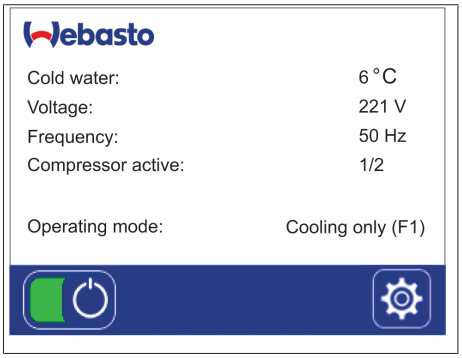


Fig. 19

If you operate the Ti22 ProX chiller unit without any connected air handlers, then you can select an alternative Home screen, which displays the current operating values for the chiller unit.

- Set level 2 (crew menu) to select “Chiller unit with cabin control (No)”.

See chapter 7.6, "Setting level 2" on page 19.

NOTE

The following actions are not possible with My-Touch on chiller units without cabin control:

- ▶ Setting the fan speed.
- ▶ Setting the setpoint temperature.
- ▶ Operating modes with automatic changeover between cooling and heating.

NOTE

If no air handlers are connected to the chiller unit, there is no need to connect a cabin temperature sensor.

7.4 System settings

The explanation of the Timer function is an example for the operating logic. The explanation also applies to other setting levels or functions.

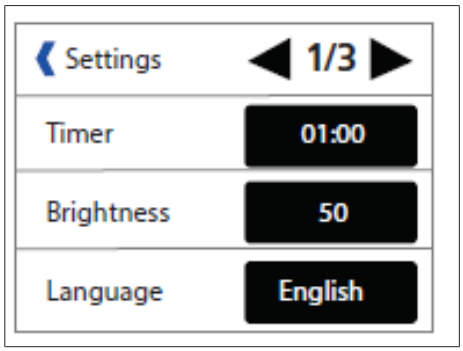


Fig. 20

To adjust the timer settings:

1. Tap the Settings icon ⚙. Setting level 1 (Passenger menu) is displayed.
2. Tap ◀ or ▶ to scroll between the various pages.

Fig. 21

3. Tap **Timer**. The setting window for this function opens up.

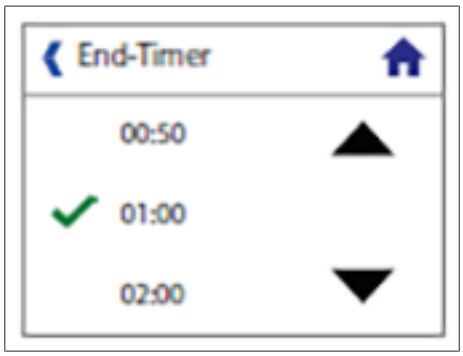


Fig. 22

4. Tap ▲ or ▼ to reduce or increase the time interval. The ✓ icon marks the current selection.
5. Tap the required time to set the time interval.
6. Tap the Previous icon ❮ to return to the previous level. The system adopts the selected settings.
7. Or tap the Home screen icon ⌂ to return to the Home screen. The system adopts the selected settings.

7.5 Setting level 1

To select setting level 1 from the Home menu:

- Tap the Settings icon ⚙.

This displays setting level 1 with the following functions described below:

7.5.1 Timer

Adjust the pre-set Start or Stop on the chiller unit.

With the system already switched on:

The timer acts as a remaining time counter. The air-conditioning system switches off automatically after the set time runs down.

With the system switched off:

The timer acts as a start timer. The system starts up automatically after the set time has elapsed.

It is not possible to program a switch-on and switch-off time at the same time.

7.5.2 Brightness

Adapts the screen brightness to the ambient light levels.

7.5.3 Language

Sets the operating language.

7.5.4 Design

Changes the screen design.

7.5.5 Colour

Adapts the background colour.

7.5.6 Standby

Sets the BlueCool MyTouch display to Standby mode.

In Standby mode, the available functions are:

- **Webasto Logo**
  - Shows the Webasto logo.
- **Customer logo**
  - Shows an individual file in .BMP (bitmap) format, that you can load onto the BlueCool MyTouch using the BlueCool Expert tool.
- **Cabin temperature - bright**
  - Shows the current cabin supply air temperature at high brightness levels in areas with bright ambient light.
- **Cabin temperature - dim**
  - Shows the current cabin supply air temperature at low brightness levels in areas with little ambient light.
- **Display off**
  - No display in Standby mode.
- **Operating indicator**
  - An illuminated dot indicates that the system is ready for operation.
- **Standby off**
  - The Home screen remains active.

7.5.7 Key tone

Sets whether the control element makes a sound when you touch the screen surface.

7.5.8 °C / °F

Sets the temperature display in degrees Celsius (°C) or degrees Fahrenheit (°F).

7.5.9 Cleaning

Disables the touch screen functions for 30 seconds to enable you to clean the surface without inadvertently changing the settings.

7.6 Setting level 2

Access to setting level 2 (Crew menu) is intentionally not intuitive, because it contains setting options that are intended only for authorised person only (crew).

To access setting level 2, tap and hold the Webasto logo.

This provides access to the following functions:

7.6.1 Operation modes

Cooling only:	F1
Heating only:	F2 (via reverse heating operation.)
Automatic toggling between cooling and heating:	F3 (via reverse heating operation.)
Automatic toggling between cooling and heating:	F4 (with external diesel heater.)
Heating only:	F5 (with external diesel heater.)
Dehumidification:	F7

NOTE

You can only select operating modes F3 and F4 if “Chiller unit with cabin control” is selected as the standard display (see chapter 7.6.6, "Screen settings" on page 19) and a cabin temperature sensor is connected.

7.6.2 Dehumidification cycle

NOTE

The dehumidification function requires synchronisation with the air handlers; for more information see chapter 8, "Dehumidification" on page 21.

Number of cycles / day:	Sets the number of dehumidification cycles / day.
Heating time in minutes:	Sets heating time during a dehumidification cycle.
Cooling time in minutes:	Sets cooling time during a dehumidification cycle.

7.6.3 Fault protocol

- **Event counter**
  - Shows the total number of events
- **Fault code**
  - Shows the fault code
- **Fault counter**
  - Shows the number of faults
- **Operating time**
  - Shows the operating time in hours

7.6.4 Operating values

Cold water:	Shows the cold-water temperature in °C or °F.
Frequency:	Shows the supply frequency of the power supply.
Voltage:	Shows the voltage of the power supply.

7.6.5 Firmware

Display of current firmware version.

7.6.6 Screen settings

Chiller unit with cabin control:

- Chiller unit with cabin control (Yes):
  Control of the cabin temperature and fan speed is possible; the automatic operating modes (F3 and F4) for toggling between cooling and heating are available.
- Chiller unit with cabin control (No):
  Control of the cabin temperature and fan speed is not possible; the automatic operating modes (F3 and F4) for toggling between cooling and heating are no longer shown. (See chapter 7.3, "Chiller unit Home screen without cabin control" on page 17 and chapter 7.6, "Setting level 2" on page 19).

Safe: Safes the current screen settings.

Reset: Resets the screen settings to the status last saved.

7.7 Setting level 3 (parameter menu)

To access Setting level 3 (Parameter menu):

1. Tap and hold the Webasto logo. You are now at setting level 2.
2. Select **System settings**.
3. Enter a code (factory setting: 64) to access Settings level 3.

7.7.1 Relay functions

You have access to the following functions:

Relay functions

Setting the relay functions for relay 1, relay 2 and relay 3

Selection	Setting
0	External heater
1	Alarm: Relay switches with fault code
2	Load shedding: Other electrical loads are switched off for a defined period during compressor start-up.
3	Valve Air handler: Switches the bypass valve for the cold water circuit to the air handler when there is no demand for cold or warm air in the cabin.
4	Valve heater: Switches the 3-way valve for integration of an external heater
5	Heating indicator

7.7.2 Compressor switching point

Setting the temperature switching points for the compressor selection:

- **Switch-off temperature for cooling:**
  Lower target value for the cold-water temperature in cooling mode, at which the compressor switches off.
- **Switch-on temperature for cooling:**
  Upper target value for the cold-water temperature in cooling mode at which the compressor switches on again.
- **Switch-off temperature for heating:**
  Upper target value for the cold-water temperature in heating mode, at which the compressor switches off.
- **Switch-on temperature for heating:**
  Lower target value for the cold-water temperature in heating mode, at which the compressor switches on again.

- **Interval for compressor start:**
  Setting the interval between starting for the compressors in a system. This avoids extreme power peaks caused by all compressors starting at the same time.
- **Initial start-up delay:**
  Staggered start for multiple chiller units when switching on the AC power supply after a shut-down.

7.7.3 Thermostatic advance

CAUTION

Impairment to the function of the air-conditioning system

Analyse the cooling loads and their cyclic distribution precisely, before changing the factory settings.

Setting the Thermostatic Advance function.

Selection:

- Offset compressor 1-6: Setting a thermostatically staggered start and stop for the compressors. As a result, the compressors cut in and out depending on the cooling load. For systems with multiple compressors, significant fluctuation in the cold-water temperature and frequent on/off cycles of the compressors can be avoided.

Factory setting:

	x 0.1 K	x 0.1 °F
o1	0	0
o2	10	18
o3	20	36
o4	30	54
o5	40	72
o6	50	90

- Hysteresis: Setting the hysteresis of the cold-water temperature in “Thermostatic Advance” mode at which the compressor is switched on.

NOTE

If all parameters (o1 – o6) are set to 0, the hysteresis H is deactivated.

Factory setting:

	x 0.1 K	x 0.1 °F
H	20	36

Calculation example for the switching thresholds in cooling mode:

Switch-off temperature for compressor X = switch-off temperature for cooling + offset for compressor X.

Switch-on temperature for compressor X = switch-off temperature for cooling + offset for compressor X + hysteresis.

Example temperatures:

Switch-off temperature for cooling = 39.2 F (4 °C)

Offset for compressor 1 = 0 °F (0 K)

Offset for compressor 2 = 1.8 °F (1 K)

Hysteresis = 3.6 °F (2 K)

Switch-off temperature for compressor 1 = 39.2 °F + 0 °F = 39.2 °F

Switch-on temperature for compressor 1 = 39.2 °F + 0 °F + 3.6 °F = 42.8 °F

Switch-off temperature for compressor 2 = 39.2 °F + 1.8 °F + 41 °F

Switch-on temperature for compressor 2 = 39.2 °F + 1.8 °F + 3.6 °F = 44.6 °F

7.7.4 Fan settings

Setting the fan type and fan speed with connected air handler.
Selection:

- Fan type:
  - AC: Standard AC fan motor
  - EC: Electronically commutated (EC) fan motor with 0-10V speed requirement.
  - Electronic silencer: when using the additional electronic silencer module.
- Continuous fan operation.

NOTE

A permanently running fan is only expedient in combination with a 3/2-way bypass valve mounted on the air handler to stop the flow of water through the handler when the setpoint temperature in the cabin is reached.

- Blower levels 1 – 5:
  Setting the fan speed for the individual fan speeds 1 - 5.

7.7.5 Deactivating the components

Selection:

- Compressor 1, 2, 3, 4, 5, 6:
  Manually switching on and off compressors 1 to 6.
- Flow monitor (if installed):
  To activate or deactivate a flow monitor and select whether this is normally open or closed (i.e. cold-water flow or no cold-water flow).

7.7.6 Further settings

- **Access code:**
  This setting changes the access code for setting level 3.
- **Undervoltage trip:**
  The undervoltage trip for a supply voltage is 230V. If the supply falls below the undervoltage threshold for more than 5 seconds, the system will shut down.
- **Correction cabin-temperature sensor:**
  Correction of the cabin-temperature display when the display deviates from the actual cabin temperature due to unfavourable positioning of the sensor or external influence.
- **CAN-bus address:**
  Selection of CAN-bus address of the chiller unit.
- **Valve air handler:**
  The 3/2-way bypass valve opens and remains open for 4 hours until it is operated again.

NOTE

The 3/2-way bypass valve can be individually activated with this function to allow water to flow through the air handler in order to bleed the system.

- **Factory settings:**
  All parameters are reset to the factory settings.

8 Dehumidification

In the dehumidification mode F7, the Ti22 ProX automatically controls heating, cooling and removes humidity from the cabin in the absence of the crew. The system switches between heating and cooling mode after a set period of time. In cooling mode condensation forms on the air handler, thus drying the cabin air. The heating/cooling cycles activate up to 3 times in 24 hours. There must be sufficient power available for the air-conditioning system. Dehumidification mode cannot run simultaneously with regular air-conditioning; simultaneous temperature control is not possible. Dehumidification does however take place in regular cooling mode.

Settings

During the installation or commissioning phase, the system settings for dehumidification mode are set. To select or adjust the settings for dehumidification mode, open Setting level 3. See chapter 7.7, "Setting level 3 (parameter menu)" on page 19.

For an efficient dehumidification cycle, all system components must have the same settings.

Selecting the dehumidification profile

You can set the system such that it starts dehumidification mode once, twice or three times in a 24-hour period. You can also select no dehumidification at all. To change the cycles you must set the number of cycles per day in setting level 3 under the parameter “Dehumidification cycle”. See chapter 8, "Dehumidification" on page 21.

Synchronising all installed BlueCool air-conditioning system components

For an optimal dehumidification of the entire boat, you must switch off the control elements for all the components of the air-conditioning system in succession, within a few seconds of each other, using On/Off. All components of the air-conditioning system switch on simultaneously when the dehumidification cycle selected previously begins, and switch off again automatically following the cycle. If all control elements are not switched off simultaneously, the individual components in the air-conditioning system will start the dehumidification cycle at different times. This will restrict the dehumidification efficiency.

Operating restrictions - extreme climatic conditions

The dehumidification cycle is designed for use in temperate climatic regions where extreme weather conditions are not expected. In the dehumidification cycle, the air-conditioning system runs in both heating as well as cooling mode. Therefore the dehumidification cycle may not function correctly at too high or too low seawater temperatures. At low seawater temperatures, the system operates inefficiently in heating mode. The seawater might freeze in the condenser. As a precautionary measure, the air-conditioning system switches off at low water temperatures (at approx. 43 °F (6 °C) and below) (Fault message A01 - low pressure). Heating mode may switch off (Fault message A02 - high pressure) at high seawater temperatures (above 77 °F (25 °C)) as the air-conditioning system is designed to produce heat under cold climatic conditions with seawater temperatures below 77 °F (25 °C).

9 Commissioning

9.1 Checking connections

You must check all connections:

- Check the electrical connections for firm seating.
- Check that the seawater piping is firmly mounted and not leaking.
- Check that the cold-water lines are firmly fitted and not leaking.

9.2 Checking operation of condensed-water-drain

- Pour water into the condensed-water tray and ensure correct drainage:
  - The drain must be clear.
  - Connections must be sealed.

9.3 Filling seawater pump head

Self-priming seawater pumps:

- You must fill the pump head with water.

9.4 Filling cold-water circuit

9.4.1 Filling and flushing an open cold-water circuit

The cold-water circuit can be filled with a water/glycol mixture using the following procedure. Carry out each step in the specified order:

1. Fit a filler connection to the intake side of the cold-water pump.

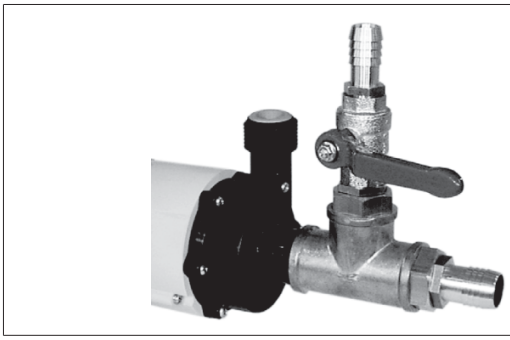


Fig. 23

NOTE

The filler connection must be suitable for temporary connection of a filling hose with an inside diameter of at least 0.59 in. (15 mm).

The filler opening must point upwards.

Fit a shut-off valve to be able to quickly shut off the access point on completion of this procedure.

2. Fit a reservoir with a prepared water/glycol mixture such that it forms the highest point in the circuit and the tube leading from the filler connection (access point) to the reservoir is constantly rising.

NOTE

Use a transparent tube from the filler connection to the reservoir; no air bubbles should be present.

3. Open all air vents on the air handlers.

4. If the air handler has a bypass valve, temporarily open the valve using the air handler valve function in MyTouch to enable flow through the heat exchanger. See chapter 7.7.6, "Further settings" on page 20.
5. Fill the reservoir with pre-treated water/glycol mixture.
6. Open the filler connection and fill the circuit with the water/glycol mixture.

NOTE

Observe the vents at all air handlers. Close all vents as soon as bubble-free liquid flows out.

It is not necessary to bleed the air handlers again later.

Top up the water/glycol mixture in the reservoir as required to make sure it never runs out.

7. Connect the power supply to the cold-water pump and to the electrical box to enable manually switching the cold-water pump on and off.

NOTE

The easiest way to do this is by using the Webasto BlueCool Expert Tool. You can download this tool from the Webasto dealer portal. The tool enables you to activate the pump relay from a laptop or similar handheld device. To do so, the reservoir must be at least half full at this point.

Run the cold-water pump for approximately 15 seconds and then switch it off again. Large air bubbles can be seen to rise in the filler hose. Repeat this procedure until the air bubbles are small enough to run the pump continuously without cavitation.

8. Run the pump for at least 45 minutes without interruption.

NOTE

An uninterrupted flow of small bubbles drifts upwards and a clear liquid flows downward.

9. Flush the circuit by closing the shut-off valves at the air handlers or the fresh-air unit such that the flow of liquid is routed through the other one.

NOTE

This will flush out all remaining air that may have collected in the form of air inclusions in one of the air handlers or the fresh air unit.

10. Stop the-cold water pump when there are no more air bubbles in the system.
11. Close the shut-off valve at the filler connection and disconnect the filler reservoir.

9.4.2 Filling and flushing a closed system

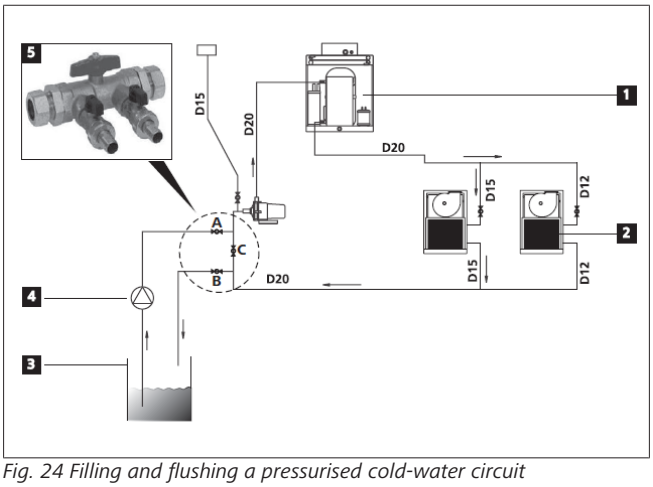


Fig. 24 Filling and flushing a pressurised cold-water circuit

1	Chiller unit	4	Self-priming filler pump
2	Air handler	5	Filler valve (with 3 shut-off valves A, B, C)
3	Water/glycol mixture tank		

To fill and bleed a pressurised cold-water circuit fit a special filler valve 5 in the cold-water circuit or alternatively install three shutoff valves (A, B, C). This will achieve the same effect.

Use a filler station, consisting of:

- A water/glycol mixture tank
- A self-priming filler pump (impeller pump)
- Two (transparent) water hoses.

Fig. 25 Filler station

- Connect the components above to filler valve 5.

To fill and bleed the system:

1. Fill the tank of the filler station with a known quantity of water. For example, the volume of entire system plus 50%).

NOTE

Do not add any water/glycol mixture at this point, because if there is a leak this will make the boat dirty.

2. Connect the filler station to the filler valve 5, shut-off valves A and B.
3. Filler valve 5: close C and open A and B.

4. Start the filler pump and fill the entire cold-water circuit with water until clear water without bubbles flows back into the tank.

NOTE
Make sure that the liquid level in the tank is not too low.

5. Bleed all air handlers, one after the other.

NOTE
Leave the filler pump running.

6. Check the entire cold-water circuit for leaks. Repair any leaks.
7. Add glycol into the tank.

NOTE
Add a sufficient amount of glycol to get a water/glycol mix ratio of 25 % to 40 % glycol.

NOTE
Leave the filler pump running.

8. Close shut-off valve B and A at filler valve 5. First closing shut-off valve B and waiting until the required pressure is built up.
9. Stop the filler pump.
10. Disconnect the filler station from the cold-water circuit.
11. Open shut-off valve C at filler valve (5). See chapter , "Filling and flushing a pressurised cold-water circuit" on page 22.
12. The system is completely filled and ready to start.

9.5 Test run

1. Connect the power supply as shown in the wiring diagram.
2. Switch on the generator if necessary.
3. Switch on the air-conditioning system in the cooling mode. See chapter 7, "Operation" on page 16.

9.5.1 Checking the seawater-flow rate

Determine the flow rate of the outflowing seawater using a receptacle and a stopwatch or a flow meter.

NOTE
The actual flow rate must be above the required minimum flow rate (see chapter 13, "Technical data" on page 31) to ensure fault-free operation at high seawater temperatures.

If the minimum value is not reached, reduce the pressure losses in the seawater system. To do so:

- Use larger cross-sections.
- Install fewer bends.
- Install shorter lines.
- Use a more powerful seawater pump.

9.5.2 Check the flow rate of the cold-water circuit

1. Connect the pressure gauge to the connection on the suction and pressure side of the cold-water pump and determine the pressure difference.
2. Determine the effective flow rate based on the pump characteristic of the cold-water pump used. If the minimum value is not reached, there may still be air bubbles in the cold-water circuit.
3. Bleed the system completely.

If the cold-water flow rate is still too low, the pressure losses in the cold-water circuit should be reduced using the following measures:

- Use larger cross-sections.
- Install fewer bends.
- Install larger water manifolds.
- Install shorter lines.
- Use a more powerful cold-water pump.

10 Inspection and maintenance

Webasto recommends a series of routine checks at regular intervals to make sure that the system functions well over the long-term and retains its capacity.

You must check the air-conditioning system's functioning minimally once a month. To do so, switch on the system and run it for at least 10 minutes.

10.1 Seawater circuit

The operation of the seawater circuit must always be checked, especially after a longer absence.

- Check if seawater flows out of the seawater outlet immediately every time you switch on the air-conditioning system. The minimum flow rates should be complied with.
- Switch off the air-conditioning system immediately if no seawater flows out after the compressor starts up.
- Check the seawater strainer for contaminants at least once a week. Clean if necessary.
- Check the entire seawater circuit from the through-hull fitting to the seawater outlet for leaks at least once a month.
- Clean the seawater circuit including the condenser of the chiller unit at least once a year. The time interval may need to be increased, depending on the degree of biological fouling (by shellfish etc.).

Soiling of the seawater circuit reduces the seawater flow rate, which decreases the heat dissipation and can result in high-pressure switch-offs.

If the condenser is soiled, the cooling or heating capacity of the system decreases.

The seawater circuit must be cleaned by an expert (such as the installer or your Webasto Service Centre).

10.2 Cold-water circuit

The operation of the cold-water circuit must always be checked, especially after a longer absence.

- In open systems, check the liquid level in the expansion tank at least once a month, and top up with water / glycol mixture if necessary.
- In closed systems, check the static pre-pressure in the system at least once a month. In the event of a pressure drop, repair leaks and top up with water / glycol mixture.
- Check the entire cold-water circuit for leaks at least once a month; from the chiller unit through the cold-water pump to the air handlers and the Fresh Air unit.
- Manually bleed the system at least once a year. To do so, open the bleeder valves at the air handlers and bleed off air until bubble-free liquid flows out.

- Check the water / glycol mixture for adequate mixing ratio (25 % to max. 40 % glycol) at least once a year and rectify if necessary.

10.3 Electrical wiring

At least once a year, the electrical connections must be checked for corrosion of the contacts and firm seating. Also check the mechanical strain relief of the lines.

See chapter , "Electrical wiring" on page 24.

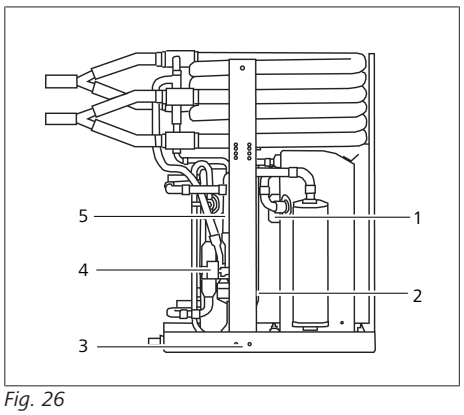


Fig. 26

1	Compressor connection cable with earth	2	High-pressure switch
3	Low-pressure switch	4	Coil 4/2-way reverse valve
5	Condensed-water tray earthing cable		

10.4 Checklist for inspection and maintenance

	Maintenance task	Date					
1	Check the flow rate of the seawater circuit at the seawater outlet. (See chapter 10.1, "Seawater circuit" on page 23 and chapter , "Installing the seawater circuit" on page 9, No. 6)						
2	Check and clean the seawater strainer. Refer to the filter manufacturer's specifications. (See chapter 10.1, "Seawater circuit" on page 23 and chapter , "Installing the seawater circuit" on page 9, No.2)						
3	Check the entire seawater circuit for leaks. (See chapter 10.1, "Seawater circuit" on page 23 and chapter , "Installing the seawater circuit" on page 9)						
4	Cold-water circuit (See chapter 10.2, "Cold-water circuit" on page 23)						
	Open system: Check the liquid level in expansion tank and correct if necessary.						
	Closed system: Check the static prepressure. In the event of a pressure drop, repair leaks.						
	Check the entire cold-water circuit for leaks.						
	Manually bleed the cold-water circuit.						
	Check mix ratio of water/glycol mixture.						
5	Check the condensate outflow from the condensed-water tray and the condensed-water drain line for free passage and leaks. (See chapter 10.1, "Seawater circuit" on page 23)						
6	Clean the seawater circuit. (See chapter 10.1, "Seawater circuit" on page 23)						
7	Check the electrical connections for corrosion to the contacts and firm seating. (See chapter 10.3, "Electrical wiring" on page 24)						
8	Check shaft seal of the pumps (seawater, cold water) and replace it if necessary (does not apply to pumps with magnetic coupling).						

11 Decommissioning

To decommission the air-conditioning system, during the winter for example, you must follow this procedure:

1. Switch off the system with BlueCool MyTouch.
2. Disconnect the power supply.
3. Completely empty the seawater circuit, i.e. seawater lines, seawater strainer, seawater pump and condenser or fill with antifreeze.
4. Check adequate mix ratio of water / glycol mixture in the cold-water circuit and correct if necessary.

12 Malfunctions

12.1 Troubleshooting

ATTENTION

Troubleshooting is restricted to professionals

Troubleshooting requires comprehensive knowledge on the design and operation of the individual components of the air-conditioning system and may only be carried out by authorized professionals trained by Webasto for this purpose.

NOTE

Only use genuine Webasto spare parts to ensure fault-free operation of the air-conditioning system.

12.2 Fault display

The Ti22 ProX can display malfunctions in different ways:

- On the BlueCool MyTouch screen, in the form of a code (e.g. A02) and a text message.
- Directly on the PC-board of the chiller as an LED flash code.

Every time a fault code occurs, the chiller unit will stop for approximately 60 seconds and then attempt to restart.

If the same fault occurs more often than 6 times consecutively within 30 minutes, the system is completely shut down and the fault code is displayed continuously. No further restarts are attempted.

The Ti22 ProX can be reset when the cause of the error has been eliminated.

To reset the Ti22 ProX unit:

- Switch the air handler off and on via BlueCool MyTouch.
- Alternatively: Disconnect and reconnect the power supply.

12.3 Fault indication on the PC-board (LED display)

See chapter 12.3.1, "Status / Error message table" on page 27 for description of the fault codes.

- LED 12 V: This LED lights up as soon as the +12 V supply is applied.
- "Alive" LED: This LED indicates the operating and fault status by various flash sequences.

LED flashes briefly every 7 seconds: normal operation, no malfunction.

LED flashes once or several times at short intervals, then goes out and flashes again once or several times: indicates a fault; see chapter 12.3.1, "Status / Error message table" on page 27.

12.3.1 Status / Error message table

Screen	LED “Alive”	Possible cause	Correction
AAA - Undervoltage	1x flashing, pause...	Switch-off in case of undervoltage. Power supply below the set undervoltage value for longer than 5 seconds. The cause is probably an excessively long power cable for the on-shore connection, small cable cross sections, overloading or low power generator output.	Check setting (default setting: 195 V). Do not set below 195 V to prevent damage to the compressor and subsequently voiding of the warranty. Ensure a better power supply. If necessary, retrofit ‘soft starts’ to lower the start-up current, thereby reducing the voltage drop.
A01 - Low pressure compressor 1	2x flashing, pause...	Pressure switch defective or power circuit interruption / short circuit.	Check electrical wiring. Replace the pressure switch on Schrader valve.
		COOLING MODE: Cold-water flow rate too low.	Check cold-water flow rate and increase this by changing the system layout if necessary. Difference between the evaporator inlet and outlet temperature must be approximately 41 °F (5 °K).
		HEATING MODE: - Seawater flow rate insufficient or seawater too cold (temperature below 43 °F (6 °C)). - Seawater strainer blocked or no intake.	Check the flow rate of the seawater circuit at the seawater outlet. Difference between the evaporator inlet and outlettemperature must be approximately 41 °F (5 °K). At seawater temperature < 43 °F (6 °C): no heating is possible in reverse heating operation. Clean the seawater strainer and bleed the seawater circuit.
		Refrigerant shortage.	Check whether refrigerant is leaking.
A02 - High pressure compressor 1	3x flashing, pause...	Pressure switch defective or power circuit interruption / short circuit.	Check the electrical wiring. Replace the pressure switch on the Schrader valve.
		COOLING MODE: - Seawater cooling insufficient. - Seawater strainer soiled or no intake.	Check the flow rate of the seawater circuit at the sea water outlet. The minimum flow rates must be complied with. Clean the seawater strainer and bleed the seawater circuit.
		HEATING MODE: Cold water flow rate too low.	Check the cold water flow rate and if necessary, increase this by changing the system layout. The difference between evaporator inlet and outlet temperature must be approximately 41 °F (5 °K).
A03 - Low pressure compressor 2	4x flashing, pause...	See A01	See A01
A04 - High pressure compressor 2	5x flashing, pause...	See A02	See A02
A05 - Low pressure compressor 3	6x flashing, pause...	See A01	See A01
A06 - High pressure compressor 3	7x flashing, pause...	See A02	See A02
A07 - Low pressure compressor 4	8x flashing, pause...	See A02	See A02
A08 - High pressure compressor 4	9x flashing, pause...	See A02	See A02
A09 - Cabin temperature sensor	10x flashing, pause...	Cabin temperature sensor defective, break / short-circuit in electrical circuit, cabin temperature sensor not connected.	Connect or replace the cabin temperature sensor.

Screen	LED “Alive”	Possible cause	Correction
A10 - Cold water temperature sensor	11x flashing, pause...	Cold water temperature sensor defective or break / short-circuit in electrical circuit.	Check the electrical wiring or the replace sensor.
A11 - Low pressure compressor 5	12x flashing, pause...	See A01	See A01
A12 - High pressure compressor 5	13x flashing, pause...	See A02	See A02
A13 - Low pressure compressor 6	14x flashing, pause...	See A01	See A01
A14 - High pressure compressor 6	15x flashing, pause...	See A02	See A02
A15 - Cold water flow	16x flashing, pause...	The flow monitor identifies insufficient cold water flow 5 seconds after the cold water pump is switched on. Cold water circuit is blocked or wire break at flow monitor if the parameter "flow monitor" in the Deactivation menu is set to Normally open (NO).	Check cold water circuit and wiring. If a flow monitor is not installed, you must deactivate the flow monitor parameter using the control element. See chapter 7.7, "Setting level 3 (parameter menu)" on page 19.
CA11 - compressors deactivated	n.a.	Set compressor(s) in the control setting are not active.	Check settings on the control element. At least one compressor must be set as active. See chapter 7.7, "Setting level 3 (parameter menu)" on page 19
Init - data communication	17x flashing, pause...	Data communication: Electrical wiring defective. Power circuit interruption/short circuit.	Check cables and connections of pc-board and of control element. Replace defective connection cable, control element or pc-board.
No display on screen; compressor and seawater pump not running.	n.a.	Fuse faulty or break / short-circuit in this electrical circuit.	Repair or replace fuse, rectify break / short-circuit in electrical circuit or replace pc-board.
		Pc-board damaged by high voltage.	Replace pc-board.
		Electronic relay (TRIAC) defective.	Replace defective pc-board.
Compressor not running.	n.a.	Compressor defective or break / short-circuit in compressor wiring.	Check electrical wiring or replace defective compressor.
		Compressor overload or overload protection element on top of compressor defective.	Allow the compressor to cool down for some time or replace the defective overload protection element.
		Incorrect compressor settings.	Check settings. At least one compressor must be set as active.
Seawater pump(s) start up directly after the control is switched on.	n.a.	Wiring of seawater pump and cold water pump interchanged.	Check electrical wiring.
Compressor keeps cutting in and out.	n.a.	Too little cold water.	Check cold water system for leaks.
No or insufficient cooling or heating capacity.	n.a.	Poor air or water flow, soiled or circulation blocked.	Secure adequate air or water flow.
		Refrigerant shortage.	A low refrigerant level is generally indicated by low static pressure before start-up as well as non-fluctuating low pressure in connection with a low high pressure reading. Check for coolant leaks, repair if necessary and refill the system.
		Oil block.	Leave air-conditioning system running in heating mode. Call out a refrigerant specialist if necessary. Technical datasheet available.
		Refrigerant circuit blocked (drier, capillary lines or expansion valve).	Have checked by refrigerant specialist. Technical datasheet available.
		Compressor fault.	Have checked by refrigerant specialist.

Screen	LED “Alive”	Possible cause	Correction
Incorrect cabin/ambient temperature or water temperature displayed.	n.a.	Temperature sensor positioned incorrectly, subject to interference or display values falsified.	Check whether the temperature sensor is subject to direct fault sources such as direct sunlight or devices radiating heat. Replace defective sensor.
The automatic operating modes cannot be selected.	n.a.	Screen settings are not selected correctly.	Select the setting “Chiller unit with cabin control (Yes)” in setting menu 2, screen settings; see chapter , "Screen settings" on page 19
Chiller unit in cooling mode (or heating mode) required despite cabin temperatures needing heating mode (or cooling mode).	n.a.	Wrong position selected for the cabin temperature sensor.	Check position of cabin temperature sensor. Select screen settings “Chiller unit with cabin control (Yes)”. Now select automatic mode (F3/F4, see chapter , "Screen settings" on page 19)

12.4 Faults not shown on the control element

If the system does not respond after switching on:

- Check the power supply,
- Check the fuses in the supply lines,
- Check the fuses on the PC-board, etc.

The compressor starts up, however no seawater exits from the seawater outlet.

If the seawater pump is running:

- Check whether the shut-off valves are opened.
- Check whether the seawater strainer is blocked.
- There could be air in the pump head causing the pump to malfunction. Bleed the air out of the seawater line, for example with a bleeder valve downstream of the pump.

If the seawater pump is not running:

- Check the power supply to the seawater pump.
- The pump rotor may be blocked by dirt. If possible and accessible, turn the pump rotor from the motor side until it moves freely.

If the compressor and the seawater pump are running, but neither the heating mode nor the cooling mode function satisfactorily:

- Check whether the cold water pump is running.
- If necessary, check the power supply to the pump.
- Check whether the shut-off valves in the cold water circuit are opened.
- Allow the fan to run in the automatic fan mode.
- Check the air ducts of the air handlers.
- If the seawater flow rate is too low, the seawater in the condenser may freeze in heating mode. This may block and damage the system.
- Check the voltage level. Do not operate the system continually with insufficient voltage (under 195 V).
- Heating mode takes a long time to start up. This is normal when the seawater is very cold. When the temperature of the seawater drops below approx. 43 °F (6 °C), the heating efficiency decreases and the air-conditioning system takes a long time before producing the expected heat.
- If the performance of the system is still unsatisfactory after checking all of the above points, you should check the refrigerant filling.

If the compressor runs, but switches off continually before the selected setpoint temperature has been reached. (At excessively high or low working pressure the high-pressure switch and low-pressure switch automatically switch off the compressor):

- Check the minimum flow rate in the cold water circuit.
- Check the minimum flow rate in the seawater circuit.

If an incorrect cabin temperature is displayed:

- Check whether the cabin temperature sensor is installed in the cabin (and not, for example, in the chiller unit installation space).
- Check whether the cabin temperature sensor is subject to direct fault sources, like direct sunlight or devices radiating heat.
- Calibrate the sensor, or replace the defective sensor.

13 Technical data

NOTE
The values in the table only refer to operation at 60 Hz; data for 50 Hz are available on request.

Type	ProX36	ProX48	ProX60	ProX72
Cooling capacity* [BTU / h]	36,000	48,000	60,000	72,000
Cooling capacity* [kW]	10.5	14	17.6	21.1
Operating frequency [Hz]	50 / 60	50 / 60	50 / 60	50 / 60

Type	ProX36		ProX48		ProX60		ProX72
Input Power	Single phase	Three phases	Single phase	Three phases	Single phase	Three phases	Three phases

Type	ProX36		ProX48		ProX60		ProX72	
Rated Voltage [V]	230	208	230	208	230	208	230	208

Type	ProX36		ProX48		ProX60		ProX72
Current draw running**	11	9	16.7	13.2	19.3	15	18.2
Rated Load Amperage (RLA) *** [A]	14.5	12	18.4	15.4	21.3	19.7	23.3
Current draw Start [A]	97.25	84.9	140.2	119.4	183.1	123.3	133
Locked Rotor Amperage (LRA) for compressor [A]	72.5	63	104	88	137	91	128

Type	ProX36	ProX48	ProX60	ProX72
Chilled water connection	1 in. F NPT	1 in. F NPT	1 in F NPT	1 in. F NPT
Minimum chilled water flow [l / min.] / [GPM]****	30 l / min. 8 GPM	38 l / min. 10 GPM	50 l / min. 14 GPM	60 l / min. 16 GPM
Chiller pressure drop at minimum chilled water flow	0.2 bar 2.9 PSI	0.3 bar 4.4 PSI	0.3 bar 4.4 PSI	0.3 bar 4.4 PSI
Minimum seawater flow [l / min.] / [GPM]	38 l / min. 10 GPM	53 l / min. 14 GPM	64 l / min. 17 GPM	76 l / min. 20 GPM
Chiller pressure drop at minimum seawater flow	0.6 bar 9.5 PSI	0.4 bar 5.8 PSI	0.7 bar 10.2 PSI	0.9 bar 13 PSI
Seawater connection hose barb	1″ O.D.	1″ O.D.	1″ O.D.	1″ O.D.
Recommended seawater pump +	WB1500	WB1500 WB2000	WB2000	WB2000
Refrigerant type	R407C	R407C	R407C	R407C
Refrigerant charge [kg / lbs]	0.85 / 1.87	1 / 2.2	1.25 / 2.76	1.6 / 3.5
Weight [kg / lbs]	55 / 121	61 / 134	70 / 155	76 / 167
Maximum main circuit breaker	25	25	25	25
Dimensions (L x W x H) mm (in) Prior to 9/2023	537 x 390 x 584 (21.1 x 15.4 x 23)	734 x 390 x 611 (28.9 x 15.4 x 24)	734 x 390 x 654 (28.9 x 15.4 x 25.7)	734 x 390 x 674 (28.9 x 15.4 x 26.5)
Dimensions (L x W x H) mm (in) After 9/2023	537 x 390 x 584 (21.1 x 15.4 x 23)	740 x 390 x 675 (29 x 15.4 x 26.6)	734 x 390 x 654 (28.9 x 15.4 x 25.7)	734 x 390 x 674 (28.9 x 15.4 x 26.5)
Shipping dimensions for 1 chiller and control box (L x W x H) [mm / inches]	800 x 600 x 700 31.5 x 24 x 27.6	800 x 600 x 700 31.5 x 24 x 27.6	800 x 600 x 700 31.5 x 24 x 27.6	800 x 600 x 700 31.5 x 24 x 27.6

Type	ProX36	ProX48	ProX60	ProX72
Shipping weight for one chiller and its control box [kg / lbs]	75 / 165	81 / 179	90 / 198	96 / 211

* At nominal conditions: 45 °F (7 °C) evaporating temperature on the low-pressure side of the refrigerant circuit and 100 °F (38 °C) condensing temperature on the high-pressure side of the refrigerant circuit.

** Amperage values for chiller with pumps at nominal conditions at 60 Hz.

*** RLA is the Amperage of the circuit breaker at 60 Hz.

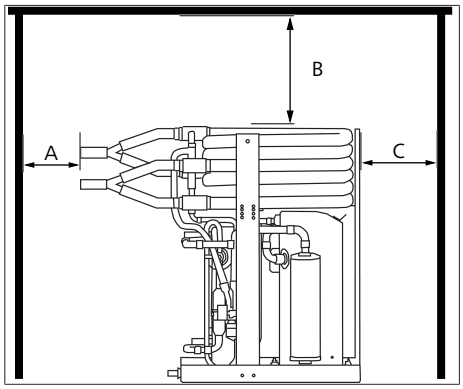
**** GPM in US Gallons

\+ Recommendations only. You must adapt the pump size to the application to ensure the minimum flow of seawater at all times.

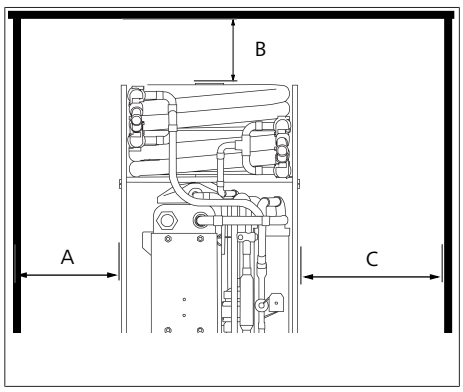
13.1 Dimensions and minimum clearance

NOTE

For the dimensions and minimum clearances by type, see the tables in chapter 13, "Technical data" on page 31 and the graphics in Ti22 ProX 2 and 4 stages.



	Recommended Clearance	Minimum Clearance
A	> 3.94 in. (100 mm)	> 2.36 in. (60 mm)
B	> 7.87 in. (200 mm)	> 5.91 in. (150 mm)
C	> 3.94 in. (100 mm)	> 2.36 in. (60 mm)



	Recommended Clearance	Minimum Clearance
A	> 3.94 in. (100 mm)	> 2.36 in. (60 mm)
B	> 7.87 in. (200 mm)	> 5.91 in. (150 mm)
C	> 3.94 in. (100 mm)	> 2.36 in. (60 mm)

> xx *Where xx is the minimum clearance.*

(yy) *Where yy is the recommended clearance.*

The Ti22 ProX 60 is shown as an example, the same values apply to all Ti22 ProX systems.

For L x W x H of the chiller units, see the tables in chapter 13, "Technical data" on page 31.

14 Annex

14.1 Overview of controls and settings

Operating level			=>	System settings		
Home screen	ON / OFF			Setting level 3 (Parameter menu)	Relay functions	Relay 1
	Temp.					Relay 2
	Fan					Relay 3
	Settings level 1 (Passengers menu)	Timer			Compressor switching points	Switch-off temperature cooling
		Brightness				Switch-on temperature cooling
		Language				Switch-off temperature heating
		Design				Switch-on temperature heating
		Colour				Interval compressor starts
		Standby				First switch-on delay
		Key tone			Thermostatic Advance	Offset compressor 1
		°C / °F				Offset compressor 2
		Cleaning				Offset compressor 3
	Settings level 2 (Crew menu)	Operating mode				Offset compressor 4
		Dehumidification cycle				Offset compressor 5
		Operating values				Offset compressor 6
		Firm ware				Hysteresis
		Screen settings			Fan settings	Fan type
		System settings =>				Continuous fan operation
						Fan speed 1
						Fan speed 2
						Fan speed 3
						Fan speed 4
						Fan speed 5
					Deactivation components	Compressor 1
						Compressor 2
						Compressor 3
						Compressor 4
						Compressor 5
						Compressor 6
						Flow monitor
					Further settings	Access code
						Undervoltage switch-off
						Correction cabin temperature sensor
						CAN-bus address
						Valve Air handle
						Factory settings

14.2 Parameter Settings

14.2.1 Parameter list Setting level 1

Parameter	Meaning	Unit / parameter	Value range	Factory setting	See page
Timer	Sets the time interval after which the chiller unit is switched on or switched off.	Hours:minutes	off, 00:10 – 24:00	1:00	chapter 7.5, "Setting level 1" on page 18
Brightness	Sets the screen brightness	Percentage	5-100%	100%	
Language	Sets the operating language	Language	Deutsch, English, Francais, Espanol, Italiano, Nederlands, Polski, Русский, Turkce , Slovenščina	English	
Design	Sets the Home screen design	-	1, 2, 3	1	
Colour	Background colour	-	white, black	White	
Standby	Selects the standby mode display	-	Webasto logo, customer logo, cabin temperature bright, cabin temperature dim, display off, operating indicator, standby off	Webasto logo	
Key tone	-	-	On, Off	On	
°C, °F	-	Temperature display	°C, °F	°C	
Cleaning	Disables the touch screen for 30 seconds	-	-	-	

14.2.2 Parameter list Setting level 2

Parameter	Meaning	Unit / parameter	Value range	Factory setting	See Page
Operating mode	Changes the operating mode	-	- Cooling range (F1) - Heating only (F2) - Auto cooling / heating (F3) - Auto cooling / heating with ext. heater (F4) - Heating only with ext. heater (F5) - Dehumidification (F7)	Auto cooling / heating (F3)	chapter 7.6, "Setting level 2" on page 19
Dehumidification cycle	- Number of cycles per day. - Heating time. - Cooling time.	- Number - Min. - Min.	- 0, 1, 2, 3 - 0 to 99 - 0 to 99	-	
Fault protocol	- Event counter. - Fault code. - Fault counter. - Operating time	Number	Example: 1 – 9999, A1 – A54, 1-9999, 1-9999	-	
Operating values	- Cold water - Frequency	- °C, °F - Hz	- 50 or 60	-	
Firmware	Firmware version	-	Example: 3.2		
Screen settings	Chiller unit cabin control	-	Yes / No	Yes	
	Save	-	-	-	
	Reset	-	-	-	
System settings	Access to setting level 3 with code entry. Code entry is not required if code=00	-	-	-	

NOTE
You can only select operating modes F3 and F4 if "Chiller unit with cabin control" is selected as the standard display (see chapter 7.6.6, "Screen settings" on page 19) and a cabin temperature sensor is connected.

14.2.3 Parameterlist Setting level 3

Parameter	Meaning	Unit / parameter	Value range	Factory setting	See page
Relay functions	- Relay 1 - Relay 2 - Relay 3	-	- External heater (0 - Alarm indicator (1) - Load shedding (2) - Valve air handler (3) - Valve heater (4) - Heating mode indicator (5)	- Relay 1: external heater (0) - Relay 2: Valve air handler (3) - Relay 3:Valve hater (4)	chapter 7.7.1, "Relay functions" on page 19
Compressor switching points	- Switch-off temperature cooling - Switch-on temperature cooling - Switch-off temperature heating - Switch-on temperature heating - Interval compressor starts - First switch-on delay	- °C (°F) - °C (°F) - °C (°F) - °C (°F) - sec. - sec.	0 to 15 (32 to 59) 2 to 18 (36 to 64) 27 to 40 (81 to 104) 30 to 45 (86 to 113) - 01 to 60 - 01 to 200	4 °C / 39 °F 7 °C / 45 °F 37 °C / 99 °F 40 °C / 104°F -09 -10	chapter 7.7.2, "Compressor switching point" on page 19
Thermostatic Advance	- Offset compressor 1 - Offset compressor 2 - Offset compressor 3 - Offset compressor 4 - Offset compressor 5 - Offset compressor 6 -Hysteresis	- °C (°F) - °C (°F) - °C (°F) - °C (°F) - °C (°F) - °C (°F) - (K, °F)	0.0 to 5.5 or 0.0 to 9.9 0.0 to 5.5 or 0.0 to 9.9 0.0 to 5.5 or 0.0 to 9.9 0.0 to 5.5 or 0.0 to 9.9 0.0 to 5.5 or 0.0 to 9.9 0.0 to 5.5 or 0.0 to 9.9 0.0 to 9.9 or 0.0 to 17.8	0 °C / 0 °F 10 °C / 18 °F 20 °C / 36 °F 30 °C / 54 °F 40 °C / 72 °F 50 °C / 90 °F 2 K / 3.6 °F	chapter 7.7.3, "Thermostatic advance" on page 20
Fan Settings	- Fan settings - Continuous fan operation - Fan speed 5 - Fan speed 4 - Fan speed 3 - Fan speed 2 - Fan speed 1	- - - - - - -	- AC, EC, electronic silencer - 30 – 100 - 30 – 100 - 30 – 100 - 30 - 100	- AC - Off - 50 / 60 Hz: 100 - 50 Hz: 58 60 Hz: 69 - 50 Hz: 49 60 Hz: 60 - 50 Hz: 41 60 Hz: 53 - 50 Hz: 35 60 Hz: 45	chapter 7.7.4, "Fan settings" on page 20
Deactivation components	- Compressor 1 - Compressor 2 - Compressor 3 - Compressor 4 - Compressor 5 - Compressor 6 - Flow monitor	- - - - - - -	On, Off On, Off On, Off On, Off On, Off On, Off Off normally open (NO) normally closed (NC)	On On On On On On Off	chapter 7.7.5, "Deactivating the components" on page 20
Further settings	Access code	-	00 = entry of access code not necessary to access setting level 3. 01 to 99 = access code activated.	- 64	chapter 7.7.6, "Further settings" on page 20
	Undervoltage switch-off	V	210	- 195	
	Correction cabin temperature sensor K or °F		-5.5 to 5.5 / -9.9 to 9.9	- 0	
	CAN-bus address		1 to 239	-	

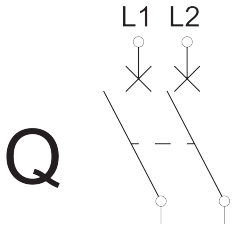
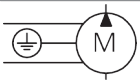
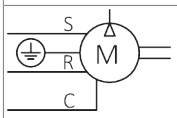
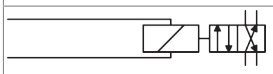
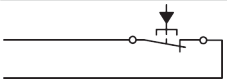
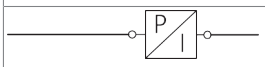
Parameter	Meaning	Unit / parameter	Value range	Factory setting	See page
	Valve		Opens to 4 hours	-	
	Factory settings		Reset	-	

NOTE
Compressors that are present, are ON. Compressors that are not present, are OFF.

Webasto shall not accept liability for faults caused by operating the compressors below the recommended voltage level. Do not select any settings that are lower than the factory settings.

14.3 Wiring diagrams

14.3.1 Overview of symbols

Symbol	Description
	Circuit breaker
	Fan
	Cold water / seawater pump
	Compressor
	4/2-way reversing valve
	Pressure-switch
	Sensor

14.3.2 Circuit breakers

Q	Main circuit breaker for Ti22 ProX 1 stage, 1-phase and 3-phase.	Max. 25 A*
Q1	PC board for Ti22 ProX 2 to 4 stages, 1-phase and 3-phase.	Max. 16 A
Q2	Compressor for Ti22 ProX 2 to 4 stages, 1-phase and 3-phase.	Max. 25 A*
Q3		
Q4		
Q5		
Q6	Seawater pump for Ti22 ProX 2 to 4 stages, 1-phase and 3-phase.	Max. 16 A
Q7	Chilled water pump for Ti22 ProX 2 to 4 stages, 1-phase and 3-phase.	

NOTE
*: The circuit breaker must conform to IEC 60898-1. Use a Type K or a Type C.

NOTE
The BlueCool MyTouch control element is compatible with the Ti22 ProX if the following conditions are met:
- ▶ PC-board with part number WBCL000842H or later is installed.
- ▶ Firmware versions for Ti22 ProX are used.

14.3.3 PC-board layout diagram

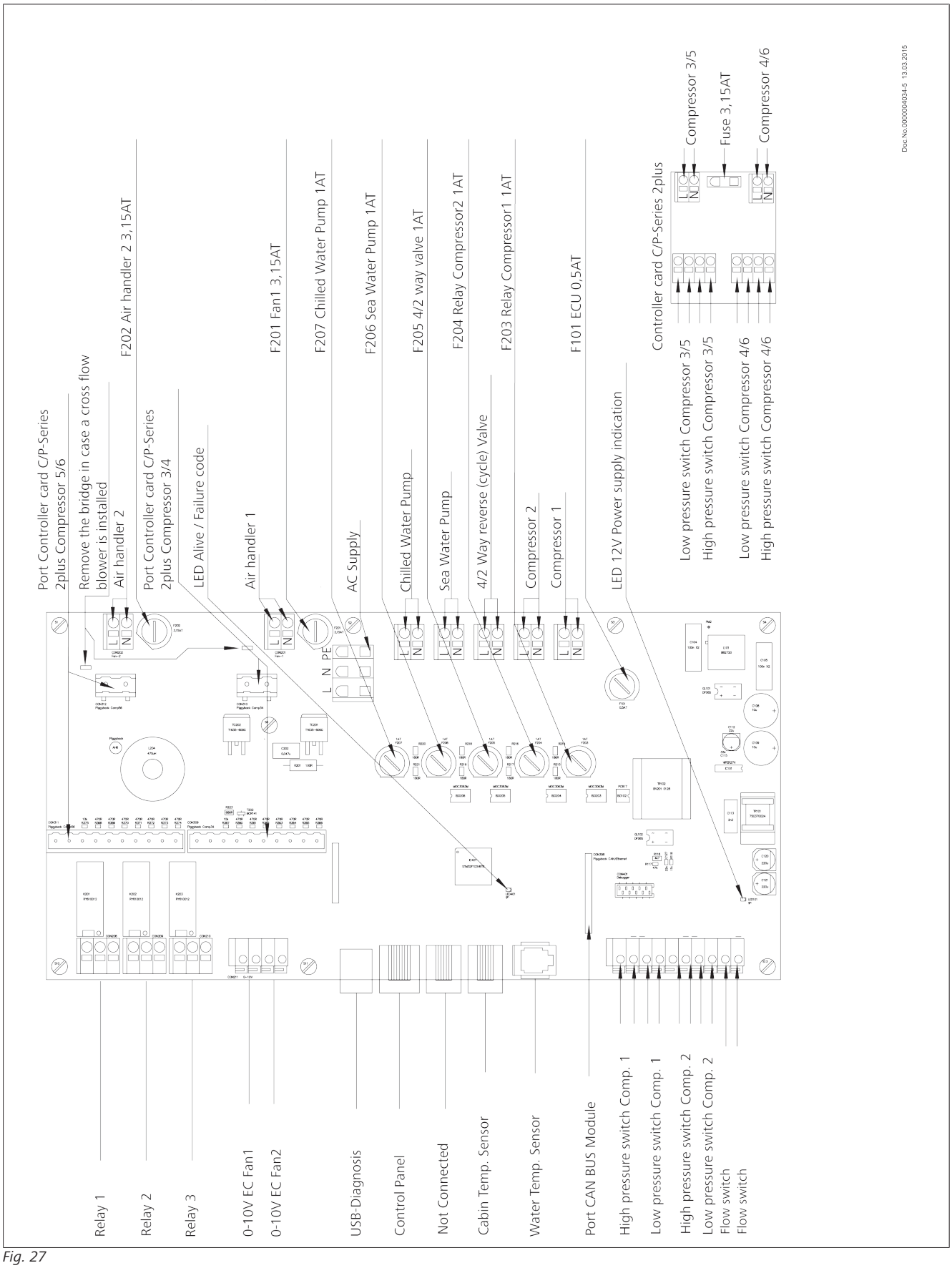


Fig. 27

14.3.4 Ti22 ProX, 1-stage, 1-phase

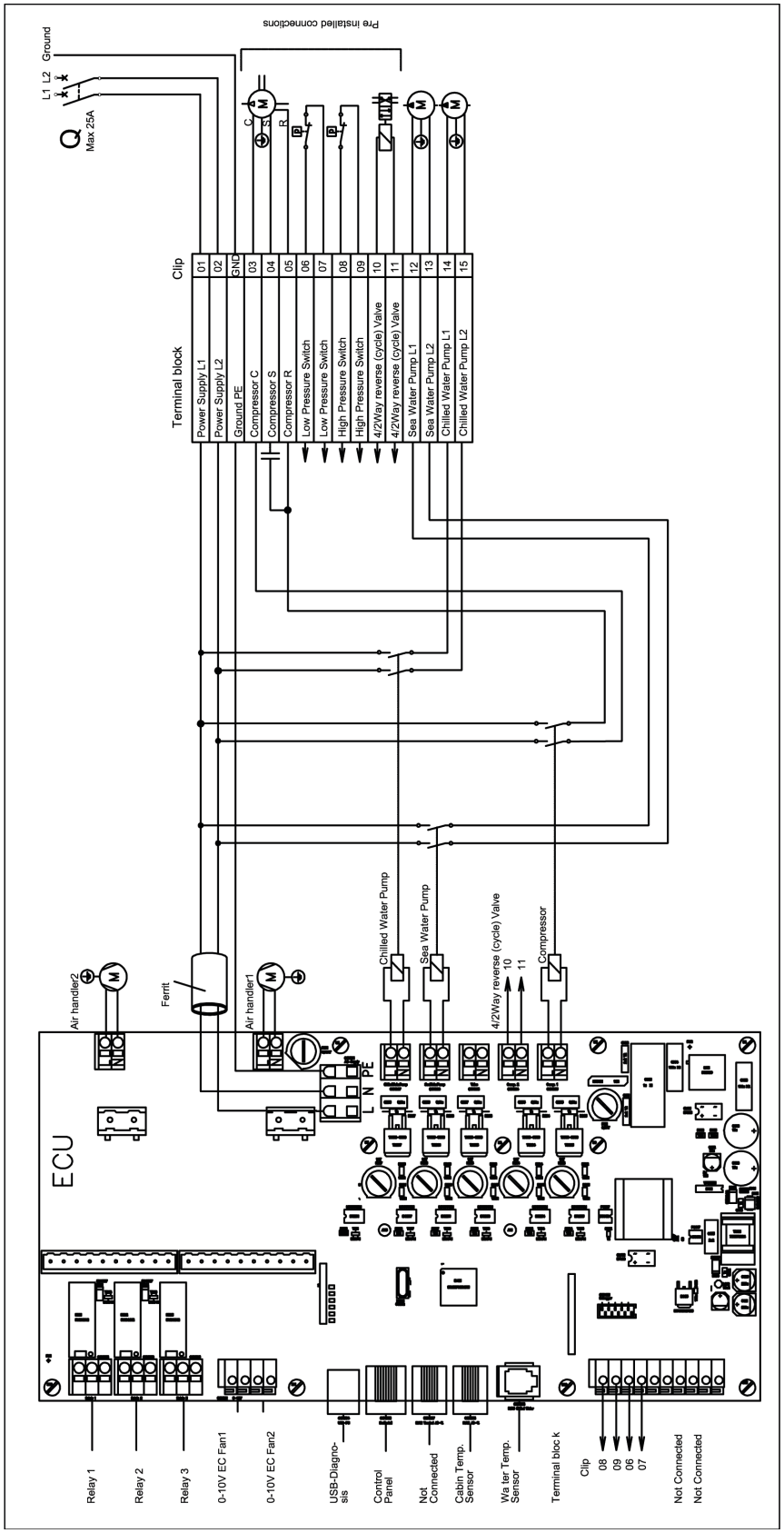


Fig. 28

14.3.5 Ti22 ProX, 1-stage, 1-phase with Soft-Start

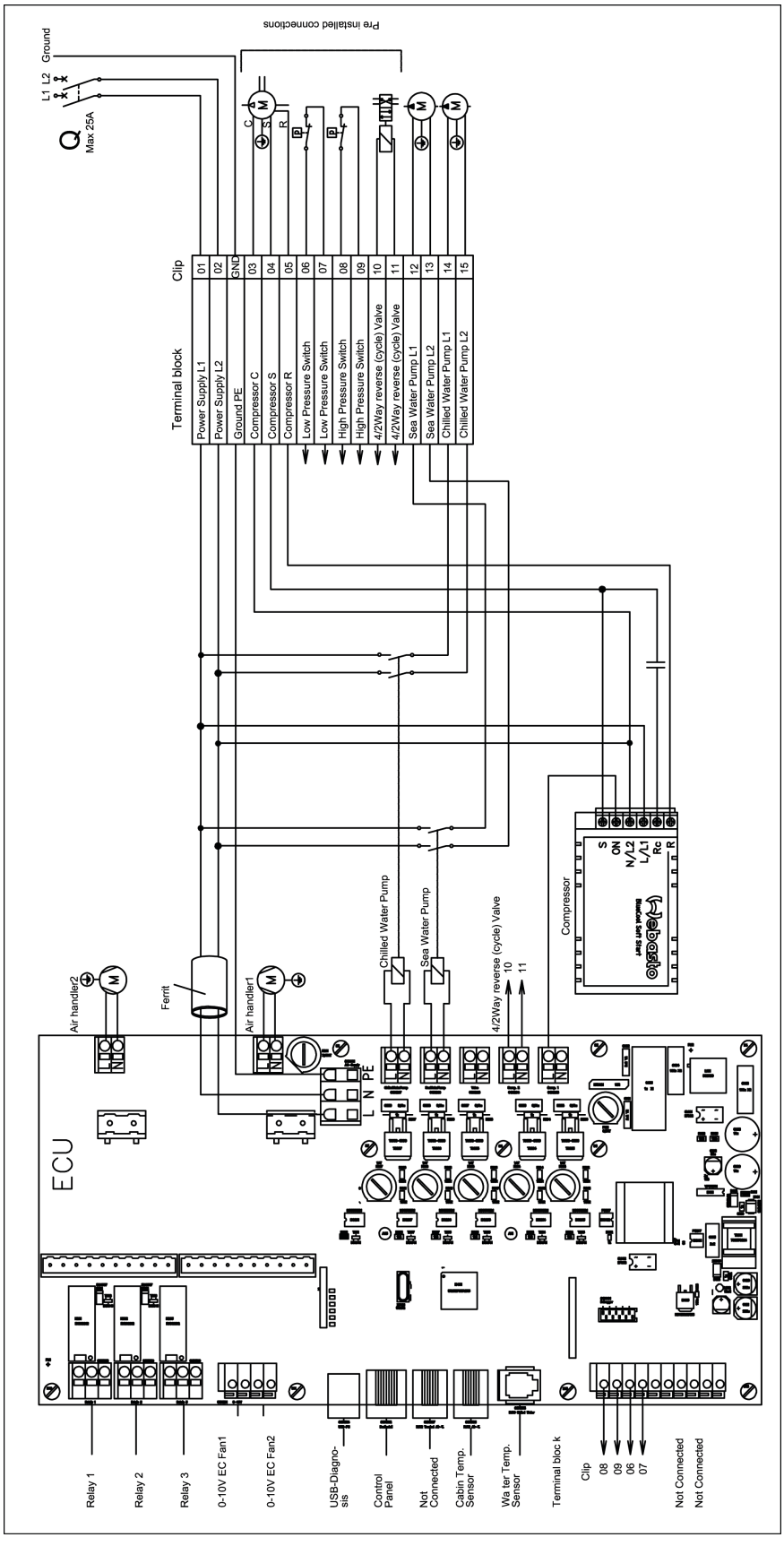


Fig. 29

14.3.6 Ti22 ProX, 1-stage, 3-phase

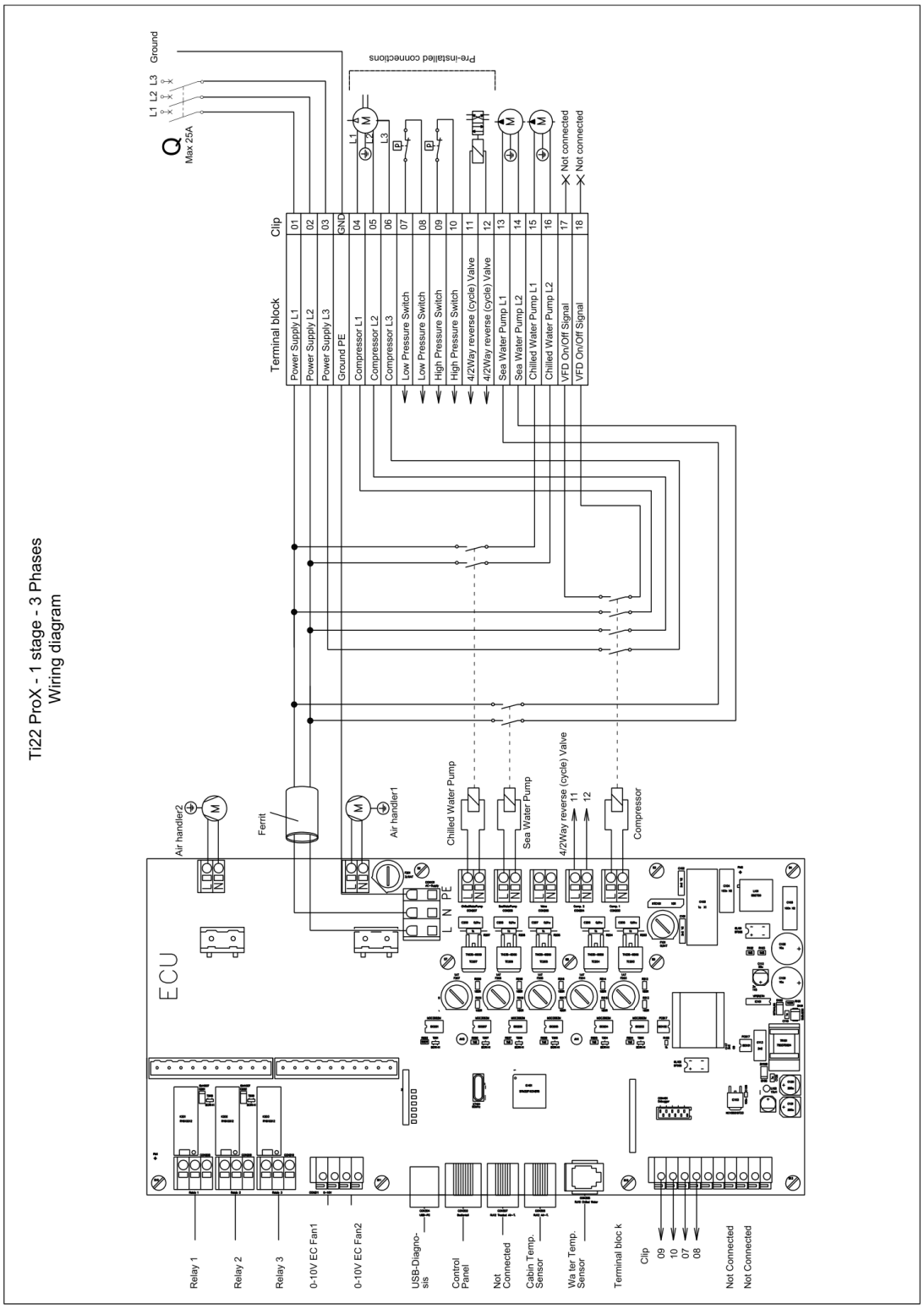


Fig. 30

14.3.7 Ti22 ProX, 1-stage, 3-phase with VFD

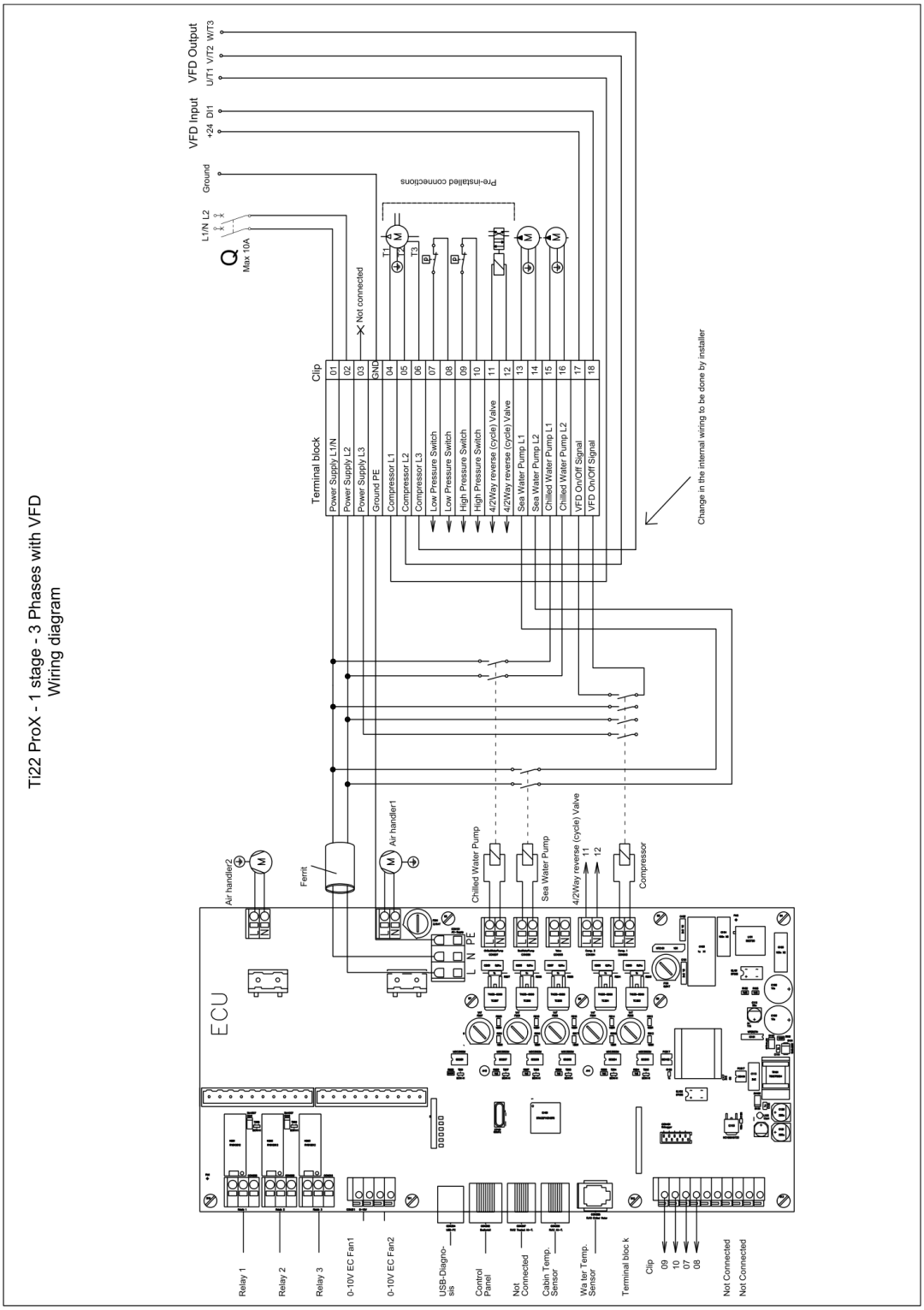


Fig. 31

14.3.8 Ti22 ProX, 2 to 4 stages, 1-phase

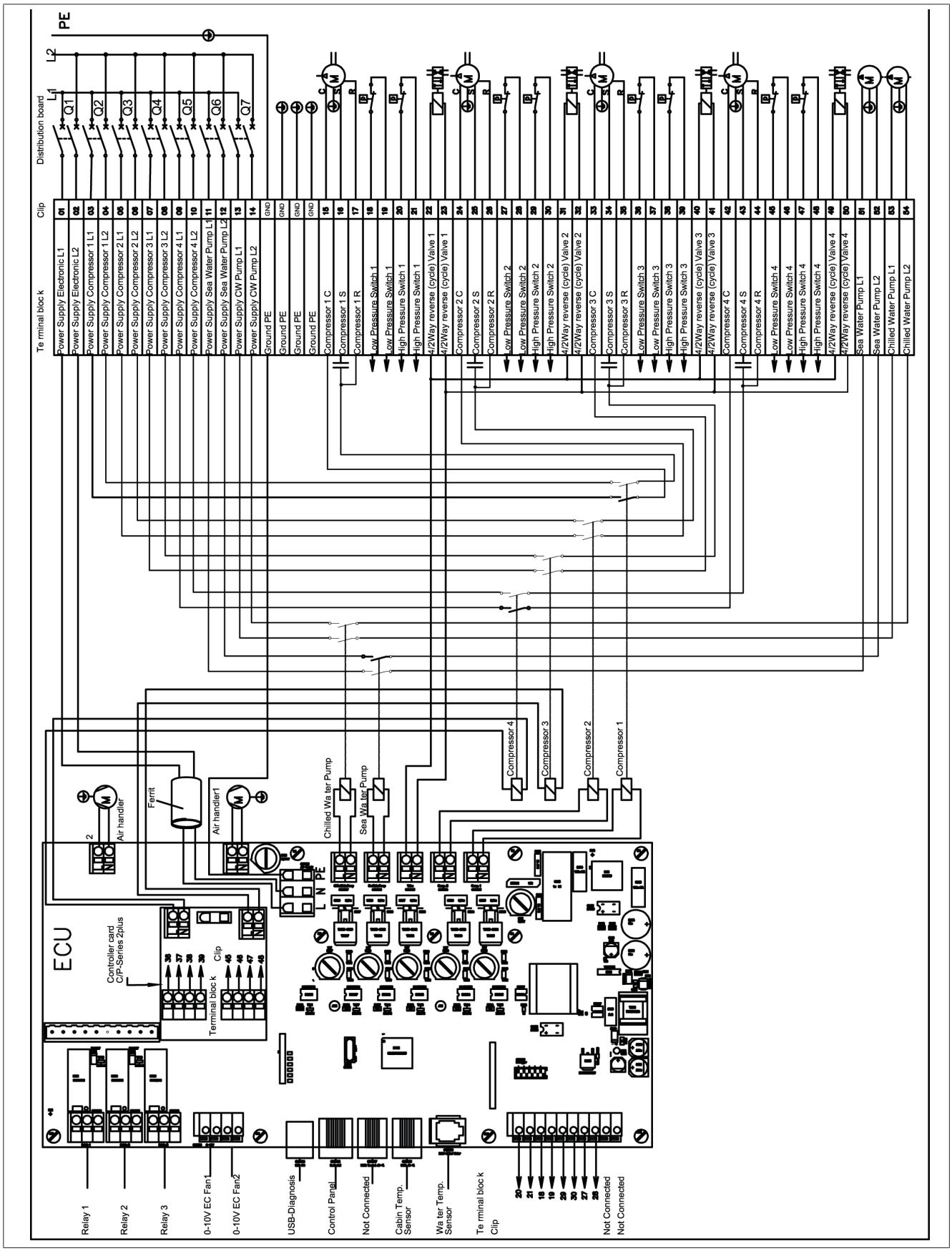


Fig. 32

14.3.9 Ti22 ProX, 2 to 4 stages, 3-phase

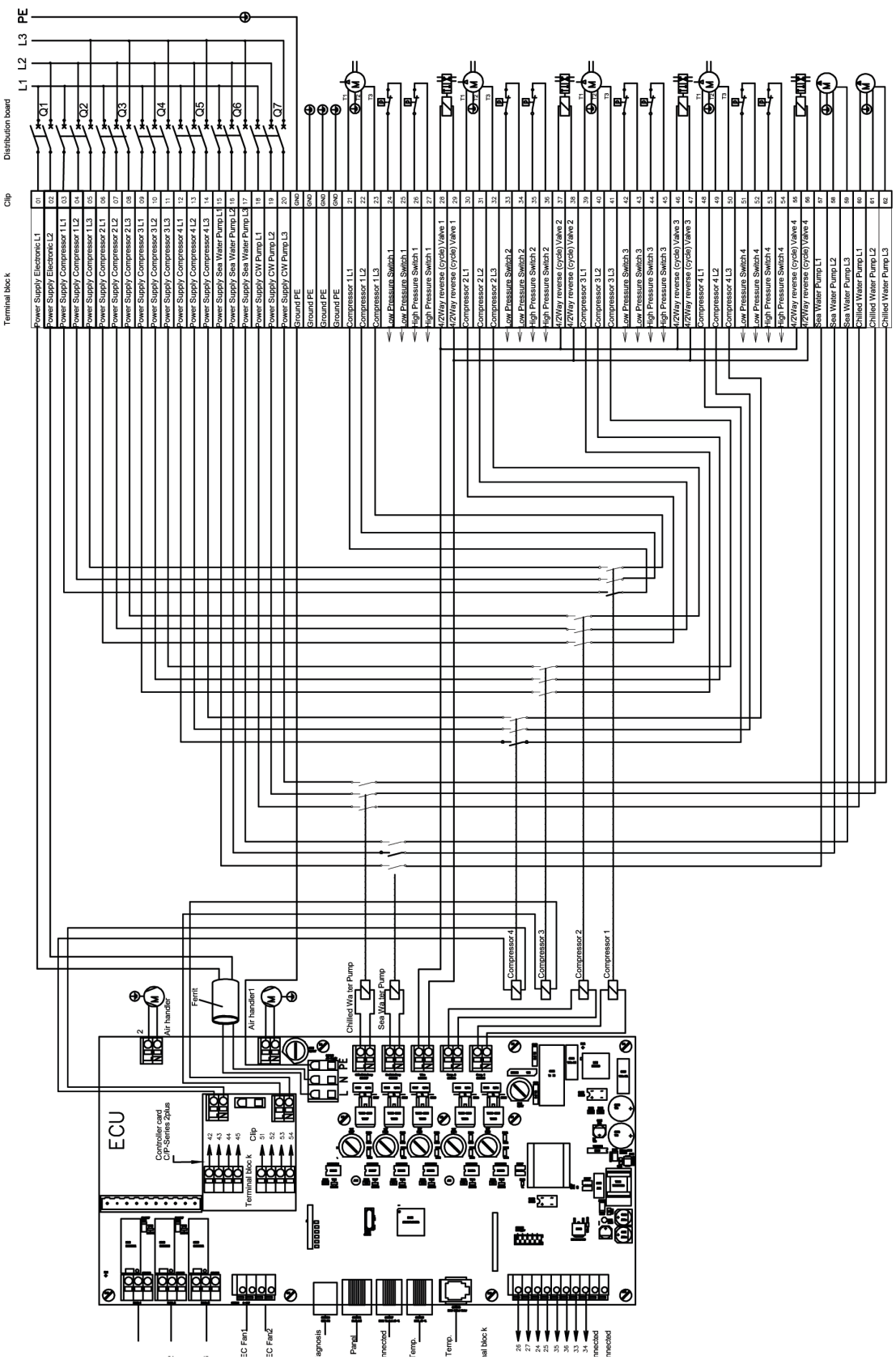


Fig. 33

14.4 Used abbreviations

Abbr.	Description
ABS	Acrylonitrile butadiene styrene
AWG	American wire gauge
BTU	British Thermal Units
CAN (bus)	Controller Area Network (bus)
EPDM	Ethylene propylene diene monomer
GPM	Gallons per minute
MCB	Magnetic circuit breaker
MLC	Meters of liquid column
PE	Polyethylene
PSI	Unit to determine pressure. The abbreviation stands for *'Pound per square inch'*.
RLA	Rated Load Amperage
VFD	Variable frequency drive

To request this Installation Documentation in another language, please locate and contact your local Webasto dealer.
You can find your nearest dealer at: https://dealerlocator.webasto.com/en-int.
To provide feedback (in English or German) on this document, please email the Tech Doc and Translation team: feedback2tdt@webasto.com

Europe, Asia Pacific

Webasto Thermo & Comfort SE
Postfach 1410
82199 Gilching
Germany

Company address:
Friedrichshafener Str. 9
82205 Gilching
Germany

UK only

Webasto Thermo & Comfort UK Ltd
Webasto House
White Rose Way
Doncaster Carr
South Yorkshire
DN4 5JH
United Kingdom

Webasto Thermo & Comfort North America, Inc
15083 North Rd.
Fenton, MI 48430
USA

2112898A

www.webasto.com