Installation Instructions

BlueCool S-Series



English

Valid for BlueCool S-Series (2023 ->):

230 V versions:
S6-R-230V-REV-R410a - WBCL120000C
S8-R-230V-REV-R410a - WBCL120001F
S10-R-230V-REV-R410a - WBCL120002F
S13-R-230V-REV-R410a - WBCL120003F
S16-R-230V-REV-R410a - WBCL120004G
S20-R-230V-REV-R410a - WBCL120005F
S27-R-230V-REV-R410a - WBCL120006G

115 V versions:
S6-R-115V-REV-R410a - 2510139C
S8-R-115V-REV-R410a - 2510140C
S10-R-115V-REV-R410a - 2510141C
S13-R-115V-REV-R410a - 2510142C
S16-R-115V-REV-R410a - 2510143C

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1 About this document

1.1 Purpose of this document

These Installation Instructions (II) are an integral part of the product and contain the information required to ensure correct and safe installation.

1.2 Using this document

Before installing the unit, read the installation instructions and the supplementary information "Important Information on Operating and Installation Instructions".

Technical documentation for BlueCool S-Series is also available at http://dealers.webasto.com

For the operator:

- Operating instructions

For the installer (password-protected):

- Maintenance instructions
- Troubleshooting Guide
- Validation Report

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 Webasto Service App

The type label of the (see --- MISSING LINK ---) contains a QR code that can be used to call up further additional technical documentation in various languages. For this purpose, please use the Webasto Service App, which is available as a download for iOS (Apple) and Android (Google). For more information regarding the app, visit:

https://dealers.webasto.com

2 Safety

2.1 Intended use

The BlueCool S-Series is used for heating and cooling on boats and ships.

The BlueCool S-Series has been built according to the current state of technology and the recognised safety rules.

DANGER

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 the product.

The BlueCool S-Series must only be operated in their final installed position.

WARNING

Ignition of surrounding gases or highly flammable liquids by sparking of the BlueCool S-Series.

You must always switch off the air-conditioning system when refuelling, or while in a petrol station area.

WARNING

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the unit by a person responsible for their safety.

- ▶ Children should be supervised to ensure that they do not play with the unit.
- ▶ Cleaning and user maintenance must not be carried out by children.
- ▶ This unit should not be accessible to the public.
- ▶ Non-observance of these precautionary measures may lead to severe or mortal injuries.

NOTE

Follow these instructions carefully when installing the electric wiring and 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 Regulations and legal requirements

Regulations on the supplementary sheet “Important Information on Operating and Installation Instructions” must be observed.

2.4 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 type label.

Risk of fire or toxic gases by incorrect installation:

- Protect components in the vicinity of the BlueCool S-Series from impermissible overheating by implementing the following measures:
  - Maintain minimum safety clearance'. See also Technical Data and Dimensions and minimum distances.
  - Ensure adequate ventilation.
  - Use fire-resistant materials or heat shields.

3 Scope of delivery

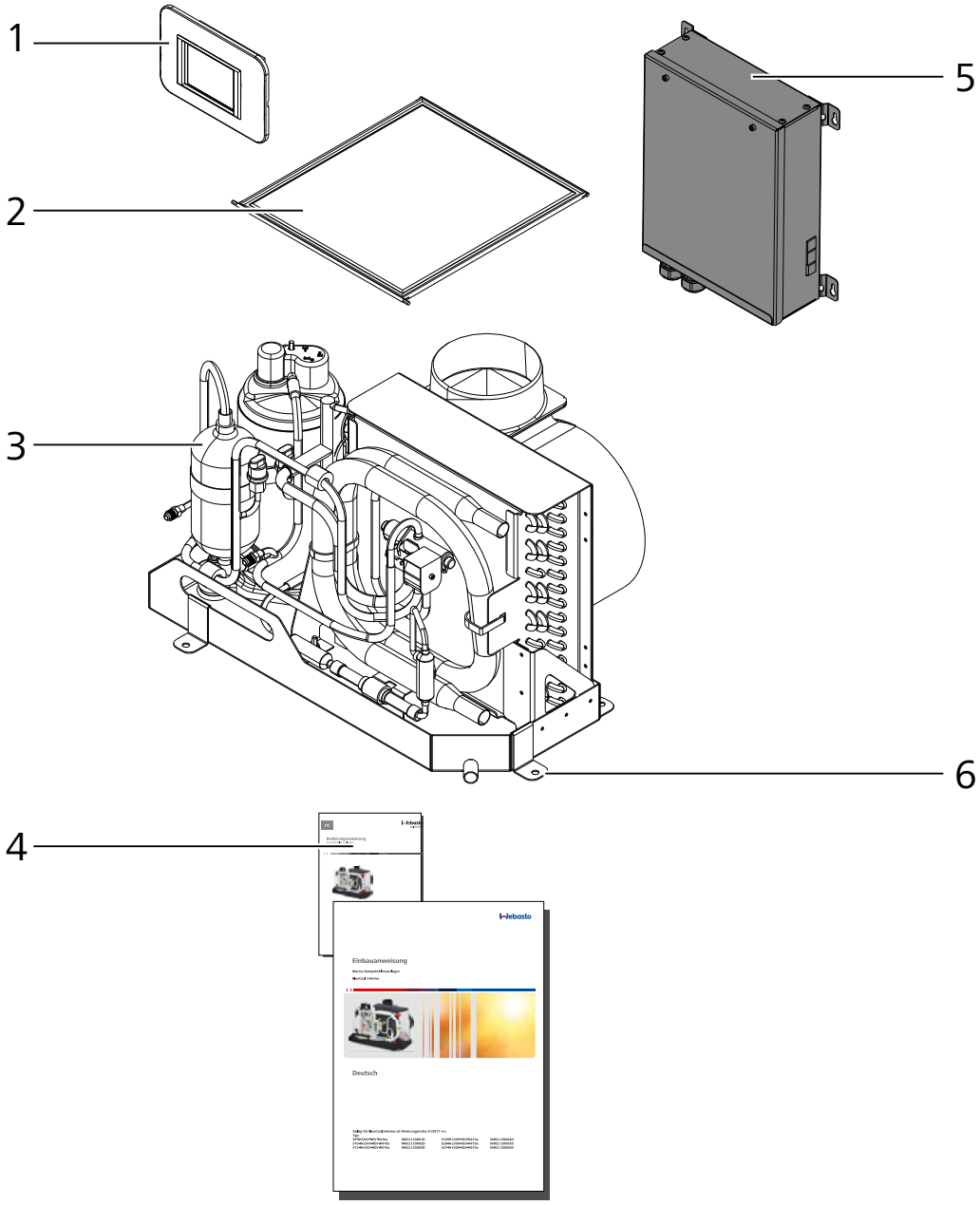


Fig. 1 Scope of delivery, example of BlueCool S-Series air conditioning system

1	Control element with cover
2	Air filter (already installed)
3	air conditioning unit
4	Installation instructions / Operating instructions
5	Electrical box
6	Fixation bracket/L clamp (4x)
7	Cabin temperature sensor (without illustration)
8	Cable for control element (without illustration)

4 Information on 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
- 2006/42/EC Machine directive
  See also: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32006L0042&qid=1678353600345
- 2014/30/EU Electromagnetic compatibility (EMC)
  See also: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32014L0030&qid=1678353923671
- 2011/65/EU RoHS
  See also: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32011L0065&qid=1678353780822



Webasto

EG-Konformitätserklärung
EC-Declaration of Conformity

Hersteller / Manufacturer: Webasto Thermo & Comfort SE, Friedrichshafener Straße 9, 82205 Gilching

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

BlueCool S-Series
Kältemittel / refrigerant: R410a

Richtlinie Directive	Harmonisierte Normen Harmonised Standards
2006/95/EG Niederspannungsrichtlinie 2006/95/EC Low Voltage Directive	EN 60335-1:2011 EN 60335-2-40:2009 EN 60335-2-34:2009 EN 60335-2-80:2009
2004/108/EG EMV 2004/108/EC EMC	EN 60945:2002 EN 61000-3-2:2009 EN 61000-3-3:2008
97/23/EG Druckgeräterichtlinie 97/23/EC Pressure Equipment Directive	gemäß Kat. I, Modul A / according cat. I, module A EN 378-1:2012 EN 378-2:2012 EN 378-3:2012
2011/65/EU RoHS	

Befolgen Sie die Einbauanweisung (WBCL010502) und die Bedienungsanweisung (WBCL010550).
Follow the installation description (WBCL010502) and operating instructions (WBCL010550).

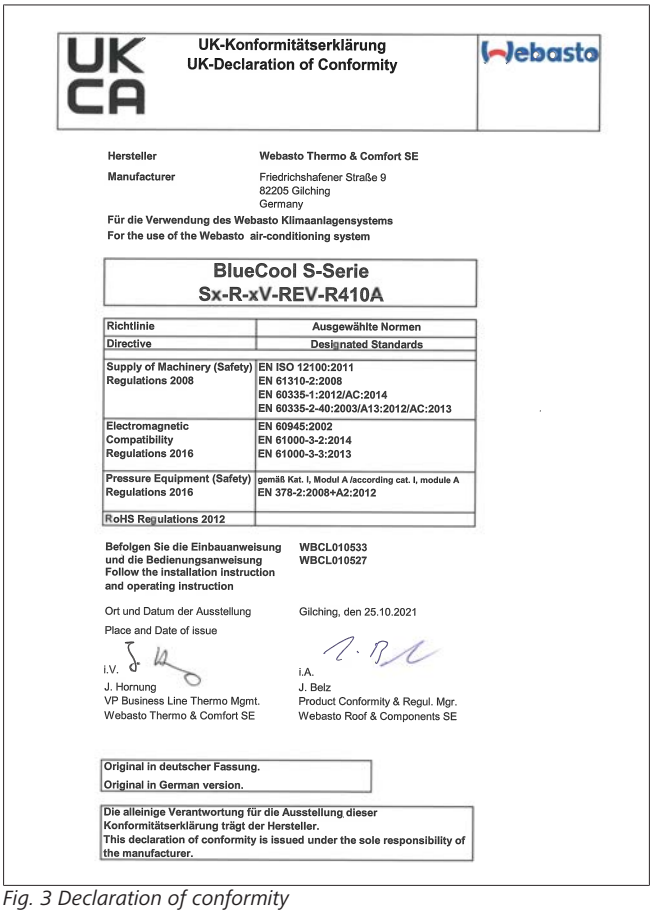
Ort und Datum der Ausstellung / Place and Date of issue: Gilching, 13.11.2012

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Fig. 2 Declaration of conformity



UK CA

UK-Konformitätserklärung
UK-Declaration of Conformity

Webasto

Hersteller / Manufacturer: Webasto Thermo & Comfort SE, Friedrichshafener Straße 9, 82205 Gilching, Germany

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

BlueCool S-Serie
Sx-R-xV-REV-R410A

Richtlinie Directive	Ausgewählte Normen Designated Standards
Supply of Machinery (Safety) Regulations 2008	EN ISO 12100:2011 EN 61310-2:2008 EN 60335-1:2012/AC:2014 EN 60335-2-40:2003/A13:2012/AC:2013
Electromagnetic Compatibility Regulations 2016	EN 60945:2002 EN 61000-3-2:2014 EN 61000-3-3:2013
Pressure Equipment (Safety) Regulations 2016	gemäß Kat. I, Modul A /according cat. I, module A EN 378-2:2008+A2:2012
RoHS Regulations 2012	

Befolgen Sie die Einbauanweisung und die Bedienungsanweisung / Follow the installation instruction and operating instruction: WBCL010533, WBCL010527

Ort und Datum der Ausstellung / Place and Date of issue: Gilching, den 25.10.2021

i.V. J. Hornung, VP Business Line Thermo Mgmt., Webasto Thermo & Comfort SE

i.A. J. Belz, Product Conformity & Regul. Mgr., 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. 3 Declaration of conformity

4.2 Variants

Self-contained air-conditioning units 115 V:

S6-R-115V-REV-R410a
S8-R-115V-REV-R410a
S10-R-115V-REV-R410a
S13-R-115V-REV-R410a
S16-R-115V-REV-R410a

Self-contained air-conditioning units 230 V:

S6-R-230V-REV-R410a
S8-R-230V-REV-R410a
S10-R-230V-REV-R410a
S13-R-230V-REV-R410a
S16-R-230V-REV-R410a
S20-R-230V-REV-R410a
S27-R-230V-REV-R410a

Example: S20-R-230V-REV-R410a

S:	Self-contained air-conditioning unit
20	Cooling capacity in kBTU/h
R:	Rotary compressor (S: Scroll compressor)
230 V:	Rated voltage
REV:	Reverse Cycle cooling and heating (COOL: cooling only)
R410a:	Refrigerant

4.3 Type label

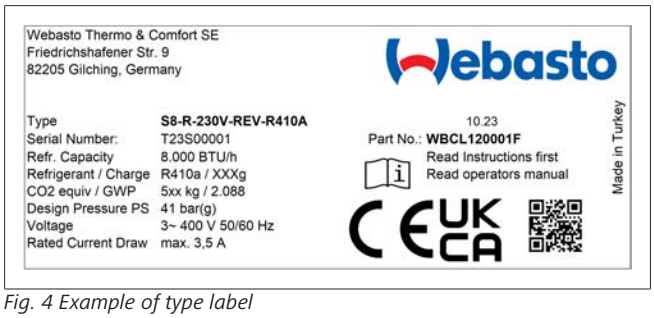


Fig. 4 Example of type label

The type label is located on the evaporator of the unit. You will find the output, serial number and registration data there.

4.4 Unit description

4.4.1 BlueCool S-Series

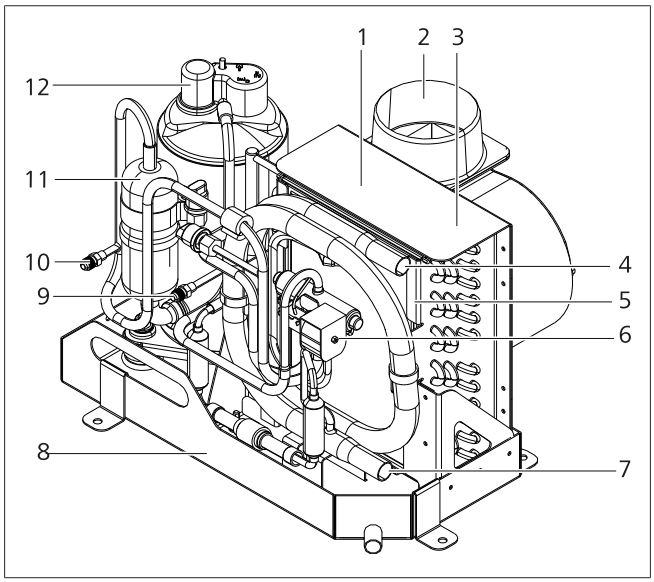


Fig. 5 BlueCool S-Series self-contained air-conditioning unit

1	Evaporator	7	Sea water inlet
2	Fan outlet	8	Condensed-water tray
3	Type label	9	High pressure service port
4	Sea water outlet	10	Service port, Low pressure
5	Air filter	11	Refrigerant collector
6	4/2-way reverse valve (cooling / heating)	12	Compressor unit

4.4.2 General

The BlueCool S-Series is an air-conditioning system with its four basic components, i.e. compressor, condenser, evaporator and throttle element.

- Evaporator (air heat exchanger)
  Refrigerant vaporises at low pressure and a temperature below the ambient temperature of the evaporator. It absorbs heat from the ambient air in the process.
- Compressor (refrigerant compressor)
  The refrigerant vapour extracted from the evaporator at low pressure is compressed to a higher pressure, and therefore to a higher temperature. In the process, additional heat is fed to the refrigerant.
- Condenser (sea water heat exchanger)
  The compressed, heated refrigerant vapour is condensed at a temperature which is above the sea water temperature. In the process, the entire heat absorbed in the evaporator and compressor is given off to the sea water.
- Throttle element (capillary tube)
  The pressure in the refrigerant subjected to condensing pressure is relieved and transferred to the evaporator.

4.4.3 Cooling operation mode

The BlueCool S-Series air conditioning system absorbs heat form the cabin air in the evaporator and cools it down by approx. 15°K. The cooled air is blown into the cabin with the fan. The compressor now compresses the refrigerant vapour, which is then condensed to a liquid when flowing through a condenser cooled with sea water. The heat released is emitted to the sea water. The condensed refrigerant passes through the throttle element and the pressure is relieved to form wet vapour on entering the evaporator. The liquid component of the refrigerant is now evaporated and again takes up heat from the cabin air. As a result, the refrigerant circuit is closed.

NOTE

With these air-conditioning systems, sea water flows through the condenser, which is sucked in via a pump. This ensures the cooling process. BlueCool S-Series air-conditioning systems are designed for maximum sea water temperatures of 35 °C.

4.4.4 Heating operation mode

Heat can also be generated with the BlueCool S-Series air-conditioning system. A 4-way reversing valve is installed in the system for this purpose. As a result, the condenser becomes an evaporator and vice versa. The sea water heat exchanger (now evaporator) takes available heat away from the sea water which is then transferred to the refrigerant. The air heat exchanger becomes the condenser and gives off the condensation heat to the cabin air and heats it up to 45 – 50 °C.

CAUTION

Danger of water damage to installations, equipment, etc.

Do not damage the insulation of the condensed-water tray to avoid condensed-water from forming on the outside of the condensed-water tray.

NOTE

Heating mode becomes inefficient when the sea water temperature drops to below 6 °C as sufficient heat can no longer be taken from the cold sea water. The interior air then cannot be heated sufficiently.

5 Installation

5.1 General

NOTE

To ensure proper operation, the following must be observed:

- ▶ All components must be positioned and installed in accordance with their installation instructions.

5.2 Installation location

DANGER

Danger of ship exploding

- ▶ Do not install BlueCool S-Series air conditioning systems in rooms with highly flammable liquids or gases.

BlueCool S-Series air-conditioning systems are generally installed in the living area.

5.2.1 Installation location requirements

- Sufficient space must be available to ensure access to the condensed-water drains and electrical connections.
- See chapter 13, "Technical data" on page 27 and chapter 13.3, "Dimensions and minimum distances Type S6 - S20" on page 29 or chapter 13.4, "Dimensions and minimum distances Type S27" on page 30 .
- The air conditioning system must be accessible for service and maintenance purposes.
- The air conditioning system must be mounted on an even, horizontal surface.
- Since operation of the air conditioning system leads to condensation, two drain lines must be provided on the condensed-water tray.
- Do not directly expose the air conditioning system to splash water or overwash.
- The air conditioning system is approved for a maximum ambient temperature of 40 °C.
- To avoid local ambient temperatures in excess of 40 °C, the air conditioning system and the electrical box must not be installed in the immediate vicinity of heat sources.

5.3 Installation example

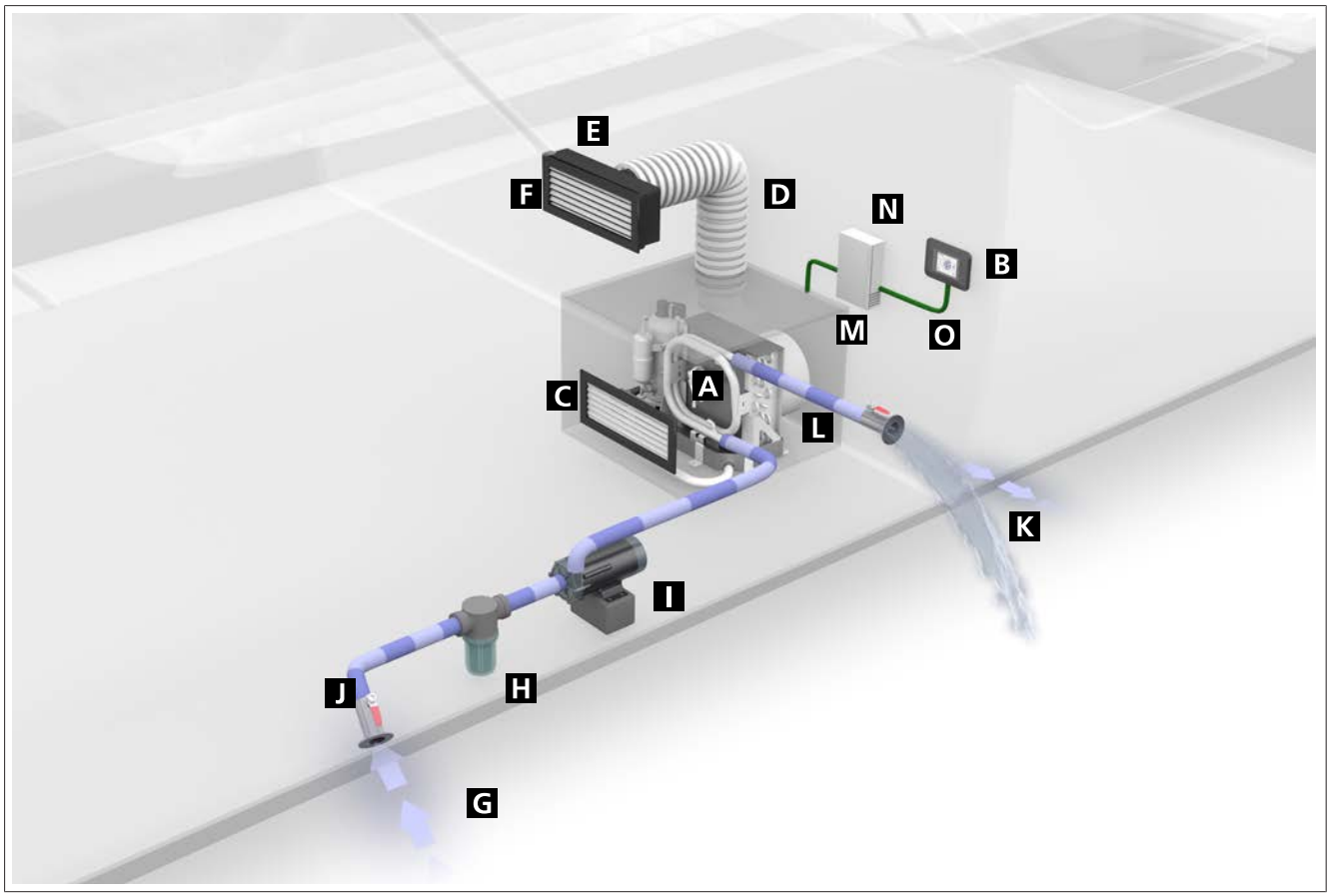


Fig. 6 Installation example

A	BlueCool S-SeriesA/C	I	Sea water pump
B	Control element (BlueCool MyTouch)	J	Sea valve
C	Air inlet grille	K	Sea water outlet
D	Flexible air duct	L	Sea water hose
E	Transition box	M	Electrical box
F	Outlet air grille	N	Power supply
G	Sea water inlet	O	Cable for control element
H	Sea water strainer		

5.4 Transport the unit

WARNING

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

The unit is heavy and must not be carried incorrectly.

WARNING

Danger of injuries

Never lift and transport the BlueCool S-Series by the refrigerant lines.

- Only carry the unit by the condensed-water tray, by the fan or by the upper pipe elbows of the condenser. Never grasp and carry the unit by other pipes. See Fig. 7.
- The evaporator fins can be easily bent. When installing, make sure that bent fins are correctly aligned again to ensure proper air feed.

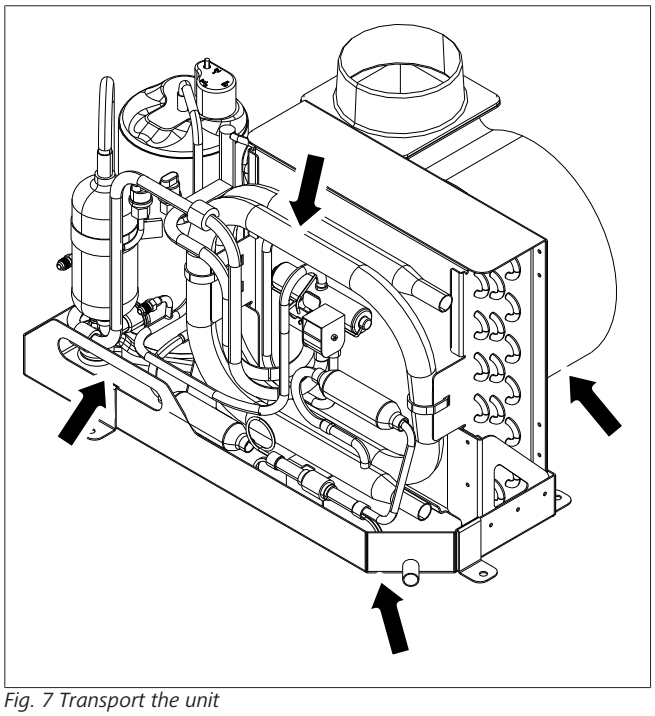


Fig. 7 Transport the unit

5.5 Installing the unit

CAUTION

Danger of damage to the electrical components and refrigerant loss.

Do not remove covers, caps or fittings.

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.

Do not damage the insulation of the condensed-water tray to avoid condensed-water from forming on the outside of the condensed-water tray.

5.5.1 Mounting

NOTE

- Ensure the unit is mounted stably.
- Fasten the unit so that secure seating is ensured, however the unit can be removed again later for maintenance purposes if necessary.
- Use the retaining brackets supplied for mounting the air conditioning system.

1. Lift unit and position it at the installation location.

NOTE

- If vibration absorbers are used, they are installed between the condensed-water tray and the mounting surface. This will increase the installation height of the system. Refer to the information provided in the installation instructions for the BlueCool Vibration Absorber Kit.
- A noise reduction can be achieved if desired by insulating the area around the system.

The sea water outlet may not be mounted below the waterline. Although this leads to a reduction in the operating noise of the sea water outlet, it increases the counterpressure in the system and significantly lowers the flow rate and thus the system capacity. Then a simple test of the flow rate is no longer possible.

Each air conditioning system requires a separate sea water outlet to be able to check and secure the minimum required sea water flow rate.

5.6 Installing the condensed-water drain line

CAUTION

The air conditioning system can intake and distribute escaping carbon monoxide and other gases.

- Condensed-water drain lines must not merge in the engine room.
- To prevent carbon monoxide or other harmful gases from potentially getting in, a siphon should be installed in the drain line, which is closed by the condensate during normal drainage.
- Condensed-water drains that lead outwards through the hull must not be installed closer than 915 mm to exhaust gas outlets from combustion engines.

CAUTION

Water damage to furniture, devices, etc..

- Do not connect the condensed-water drain line to the sea water line of the air conditioning system.
- Ensure the condensed-water tray drains off properly to prevent damage caused by condensation backing up.

NOTE

- ▶ Ensure 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 collection points.
- ▶ There must be no backpressure in the condensed-water drain line.
- ▶ If necessary, make a new water collection point complete with pump, level switch and drain line.

1. Secure hose connector to connection socket of condensed-water tray.
2. Ensure leak-proof fit.

5.7 Installing the sea water circuit

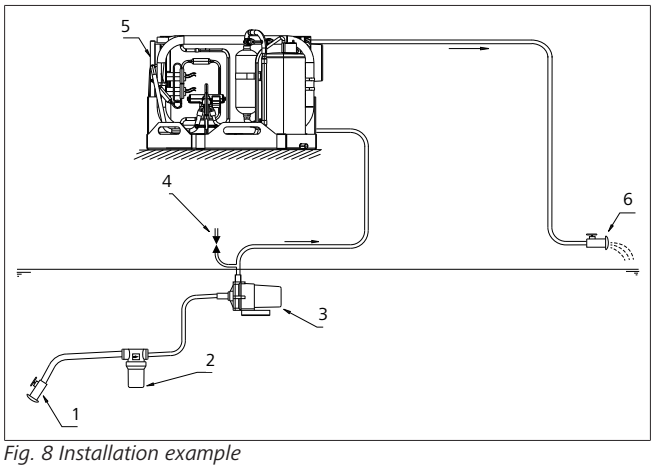


Fig. 8 Installation example

1	Hull bushing with sea valve
2	Sea water strainer
3	Sea water pump
4	Bleeding
5	BlueCool S-SeriesA/C
6	Sea water outlet

NOTE

The sea water components are installed continuously ascending from the through-hull fitting via the strainer and pump up to the BlueCool S-Series air conditioning system. This arrangement ensures that bubbles, which would otherwise cause the pump to malfunction, cannot collect in the sea water circuit.

5.7.1 Installing through-hull fitting for the sea water inlet

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

Install through-hull fittings, seal off with sealant and check for leak-tight seating.

DANGER

Sea water enters when installed incorrectly.

Boat can sink; danger of drowning.

Suitable measures must be taken to install the through-hull fitting in order to prevent an unchecked entry of sea water.

NOTE

The sea water inlet must be arranged at the lowest possible point below the water line and below the sea water pump. The through-hull fitting for the sea water inlet must be installed with the opening facing in direction of travel in order to create a boosting backpressure in the intake line.

- ▶ Sailboats: install the through-hull fitting near the centre of the hull.
- ▶ Fast motor boats: install through-hull fitting in rear section of hull.

5.7.2 Installing sea water pump

NOTE

Webasto recommends installing the sea water pump at least 0.25 m below the water line. If installation below the water line is not possible, a self-priming pump must be used.

Selecting sea water pump

To increase the operating safety, Webasto recommends the use of self-priming pumps. These are significantly less susceptible to air accumulations, which can enter the system during reverse travel or when in a tilted position, for example.

Parallel connection of several BlueCool S-Series air conditioning systems supplied via one sea water pump and one sea water inlet is possible. However, the maximum number should be limited to four BlueCool S-Series air conditioning systems.

Each system requires a separate sea water outlet to check the respective minimum flow rate and to enable an operating check of the systems.

If necessary, throttles that reduce the cross section should be used to adjust the flow rates.

A water manifold and pump relay must be fitted if one sea water pump is supplying several BlueCool S-Series air conditioning systems. For information on this topic, see chapter 14.3.7, "Wiring diagram BlueCool S Series, several systems with one sea water pump " on page 39.

A shutoff valve must also be installed for each BlueCool S-Series air conditioning system.

Self-priming sea water pumps

If a self-priming pump is installed above the water line, the pump head must be pre-filled during initial start-up or after longer times at standstill to enable self-priming.

Pump characteristics

- The pump characteristics enable the selection and dimensioning of the sea water pump depending on expected pressure losses in the entire system.
- Operating the pumps outside the pump characteristic can damage the pumps due to motor overloading or cavitation.
- Damage which occurs due to improper operation is excluded from the warranty.
- The delivery head of a pump is often specified in metres water column and represents the pressure drop between the pump inlet and outlet. This pressure drop corresponds to the total pressure differential in the sea water system from the sea water inlet up to the sea water 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 sea water system changes considerably depending on the pressure drop.

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

Installation

NOTE

Make sure that the pump is accessible for maintenance work. It is urgently recommended that a vent be installed directly behind the outlet opening of the sea water pump to allow the collected air bubble to escape when the system is started up.

1. Install the sea water pump (see Fig. 8).

5.7.3 Installing sea water strainer

NOTE

Match the size of the sea water strainer to the sea water quality. If a great deal of dirt is to be expected, then a strainer of the corresponding size should be chosen. The sea water strainer must be installed between the through-hull fitting and the sea water pump. Comply with specified direction of flow. Make sure that the sea water strainer is accessible for maintenance work.

Install the sea water strainer in accordance with the manufacturer's specifications.

5.7.4 Installing sea water outlet

NOTE

The sea water outlet must be installed approx. 0.10 m above the water line. At least the first 150 mm of the sea water outlet line within the interior of the boat should be self-emptying to prevent breakage caused by freezing. Do not install the sea water outlet in the bow area of the ship to prevent back flow.

The sea water outlet may not be mounted below the waterline. Although this leads to a reduction in the operating noise of the sea water outlet, it increases the counterpressure in the system and significantly lowers the flow rate and thus the system capacity. Then a simple test of the flow rate is no longer possible.

Each air conditioning system requires a separate sea water outlet to be able to check and secure the minimum required sea water flow rate.

5.7.5 Installing sea water lines

DANGER

The boat may sink; risk of drowning as sea water enters when installed incorrectly

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

NOTE

Pay attention to the minimum required diameter of the sea water lines. Only use reducers when this serves the specific distribution of the volume flows when several systems are connected to one pump.

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

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

The sea water lines must be installed as follows:

- ▶ as short as possible,
- ▶ kink-free,
- ▶ without water pockets,
- ▶ protected against rubbing.

1. Install intake line(s) so that there is a slight upward incline from the sea water inlet to the air conditioning system.
2. Install pressure line(s) to the air conditioning system and to the sea water outlet.

5.8 Installing the air ducts

CAUTION

Danger of water damage.

Completely insulate the air ducts, as otherwise condensed water will result on the outside of the air duct and drip water will form.

CAUTION

Risk of damage to furniture, equipment, lines, etc.

Bear in mind there may be objects behind the point where openings for air inlet grille and supply air grille are to be made.

5.8.1 Mounting

NOTE

- ▶ Prevent a restriction of the air supply due to excessively tight bending radii of the air ducts or due to accidental deformations.
- ▶ Keep the air ducts as short as possible (<2.5 m). Excessively long air ducts result in a reduction in the air quantities, and therefore in a decrease in the cooling/heating capacity of the system.
- ▶ The air inlet grille should be mounted offset so that the air flowing in does not flow directly into the evaporator inlet. This enables the intake noises from the fan to be considerably reduced (see Fig. 9).
- ▶ Avoid a cold air short-circuit between the air outlet and air inlet. These must be mounted with a sufficient distance from each other.
- ▶ Air outlets must be installed above below the ceiling to ensure sufficient mixing and cooling or heating of the cabin air.

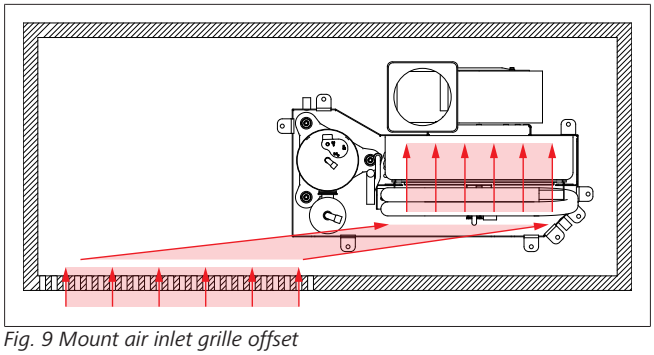


Fig. 9 Mount air inlet grille offset

Minimum cross section of air inlet and supply air grilles

The minimum cross-sections of the return air and supply air grille and the air ducts must be taken into account for a satisfactory functionality of the air conditioning system.

Requirements for air duct

BlueCool S-Series	Outlet air grille cross-section	Air inlet grille cross-section	Air duct< 2 m length diameter	Air duct< 5 m length diameter
[BTU/h]	[cm²]	[cm²]	[mm]	[mm]
6,000	150	325	100	125
8,000	235	490	100	125
10,000	235	490	100	125
13,000	250	550	125	150
16,000	390	800	125	150
20,000	390	800	125	150
27,000	650	1,600	2x125	2 x 150

Type of duct

If flexible air ducts are used they must be high quality and adequately reinforced with steel or plastic spirals to avoid them being dented.

Flexible air ducts should be extended to their maximum length to ensure the inner surface is as smooth as possible.

For extremely long air duct sections, rigid ducts (e.g. made of PVC) should be given preference. These ducts are much smoother than flexible air ducts, and therefore also have a considerably lower inside resistance.

Fan outlet

Flexible air ducts mounted directly on the fan outlet and then bent at right angles must be avoided, as they considerably restrict the air flow. All Webasto fans can be mounted in several positions to enable a straight outlet out of the fan. An example of proper installation is shown in Fig. 10.

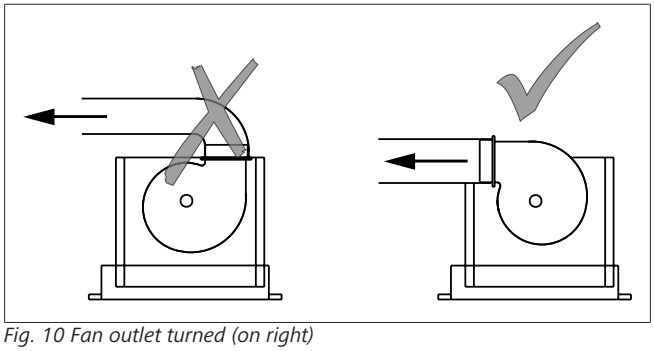


Fig. 10 Fan outlet turned (on right)

Turning fan

The fan must be removed to turn it:

1. Remove the black insulation off the fastening screws of the fan motor on the back of the fan.
2. Screw out the screws of the fan motor and carefully remove the fan without bending the fan wheel. The power cable to the fan can remain connected when doing so.
3. The fastening screws of the fan housing are now accessible through the opening of the fan motor. Undo the mounting screws, detach the fan housing and reinstall in the required position.
4. Remount the fan motor.

Transition boxes

The transition boxes behind the supply air grilles serve as an equalisation volume for the air flow and thus reduce the noise level of the air flowing through the grille fins. The depth of the transition box therefore has a considerable effect on the distribution of the air flow.

1. Install air inlet grille.
2. Install transition boxes and supply air grille.
3. Install insulated air ducts from the air conditioning unit to the transition box.
4. Secure air ducts to ensure they do not move at high fan speeds.

6 Electrical connections

6.1 General

DANGER

Connection to your 115 V/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 115 V/230 V electrical systems.

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

In addition to the power supply for the system, a separate power supply must be provided for the sea water pump and the cold water pump.

NOTE

The entire air-conditioning system must be protected by external circuit breaker.

With the BlueCool S-Series S8-S16 (115V) and S16-S27 (230 V), not only the power supply of the PCB, but also a separate power supply for the compressor must be provided, which must also be protected externally.

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 BlueCool S-Series can be found in chapter 13, "Technical data" on page 27 and chapter 14.3, "Wiring diagrams" on page 34.

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, "Line fuses " on page 34. The 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 34.
3. Make sure that the voltage, frequency and number of phases match the data of the type used.

6.2 Installing the electrical box

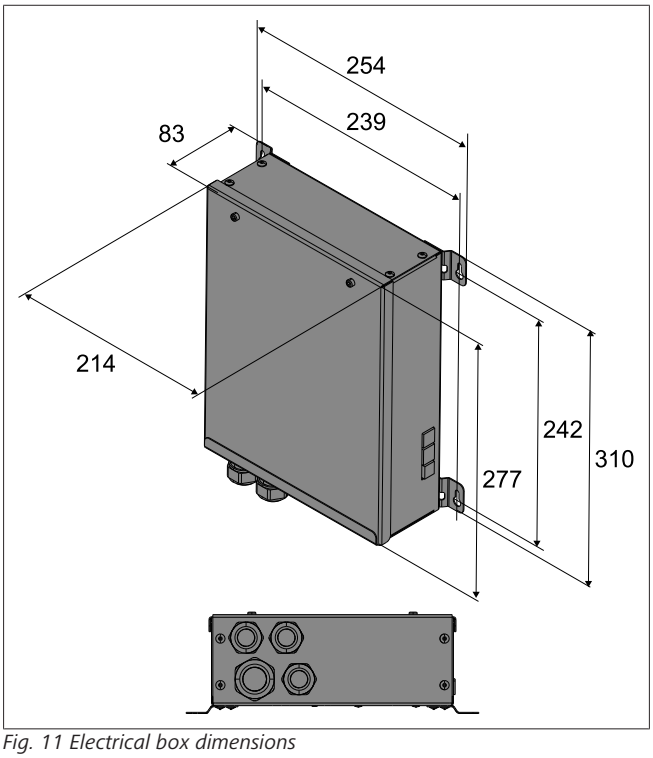


Fig. 11 Electrical box dimensions

NOTE

- ▶ For Protection Class IP21 and higher, the connections for the control element and cabin temperature sensor and the USB connection must be directed downward.
- ▶ Make sure that the maximum permissible ambient temperature of 40 °C is not exceeded.

Any desired installation position may be chosen for the electrical box if no requirements are placed on the IP protection class. For protection class IP21 and higher, the electrical box must be installed either horizontally reclined with the cover facing upward or vertically upright with the connections facing downward.

1. Install the electrical box. Make sure that the fastening screws are accessible for opening and removal.

6.3 Connect the BlueCool S-Series

NOTE

Always refer to the wiring diagrams (see chapter 14.3, "Wiring diagrams" on page 34).

The BlueCool S-Series air conditioning system has a number of pre-installed electrical connections.

1. Connect the sea water pump. Pass connection cable through a PG cable gland and connect to the cable terminal (see Fig. 22). When operating several BlueCool S-Series air conditioning systems with one sea water pump, observe Fig. 26.
2. Produce the mains connection. Guide the mains cable through the PG cable gland. Slide the ferrite over the mains cable in the electrical box and secure it with cable ties. Connect the phase and neutral (PEN) conductor of the power supply cable to the cable terminal (see Fig. 22) on the pc-board.

3. Secure the earthing cable for the sea water pump and power supply at the marked earthing terminal in the electrical box next to the pc-board.

Additionally for S8-S16 (115V) and S16-S27 (230V):

1. Guide the mains cable for the compressor through the PG cable gland and connect the phase and neutral conductor to the external relay.
2. The mains connection for the compressor must be produced via a separate supply line (fusing 16 A with S20, 20 A with S27).

6.4 Installing soft start (230 V)

It is possible to retrofit the Webasto BlueCool Soft Start in the electrical box. Refer to the wiring diagrams in chapter 14.3, "Wiring diagrams" on page 34. Make sure that the phase and zero conductors are installed correctly.

6.5 Installing the BlueCool MyTouch control unit

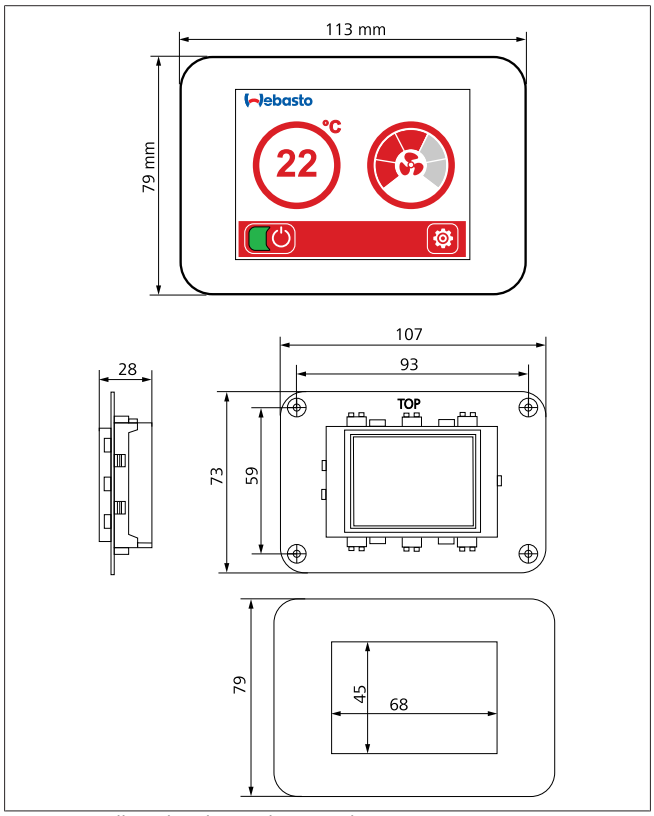


Fig. 12 Installing the BlueCool MyTouch

NOTE

Use the supplied connection cable to connect the control element. A commercially available 8-pin cable with RJ45 connector (e.g. same as the power cable) can also be used. The connection cables formerly used by Webasto for the control element with a membrane keypad are no longer suitable as their polarity has been changed.

1. Make the cutout for the control element in the required position. For cutout dimensions see Fig. 12.
2. Plug in the connector of the connection cable for the control element at the back of the control panel.
3. Connect the connection cable for the control element to the electrical box from the outside.
4. Attach the control element with screws.
5. Fit trim cover.

6.6 Installing the 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

Positioning the cabin temperature sensor

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

Do NOT install the cabin temperature sensor in the immediate vicinity of a supply air grille.

Select an installation location which is free from external influences if possible. Among other things, the following external influences should be avoided:

- Radiator
- Kitchen cooker
- Light sources

It is advisable to mount the cabin temperature sensor in the area of the return flow, e.g. on the back of the air inlet grille.

1. Fit cabin temperature sensor in required location.
2. Connect the sensor cable to the electrical box from the outside.

6.7 Accessories

6.7.1 BlueCool Expert Tool

The BlueCool Expert tool enables you to configure, actuate and diagnose the BlueCool S-Series. Please 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

7 Operation

7.1 Description

The BlueCool MyTouch is the standard control element for the BlueCool S-Series and enables easy operation and setting of the connected system. The screen is designed as a touch screen. System operation is described in the following.

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 symbols

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 7.4, "Setting level 1 (Passenger menu)" on page 17.

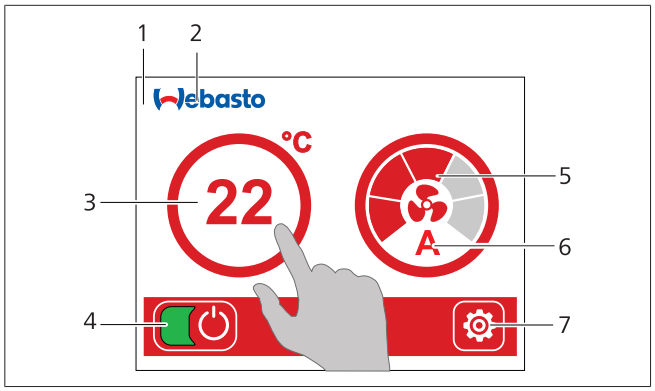


Fig. 13 Design 1

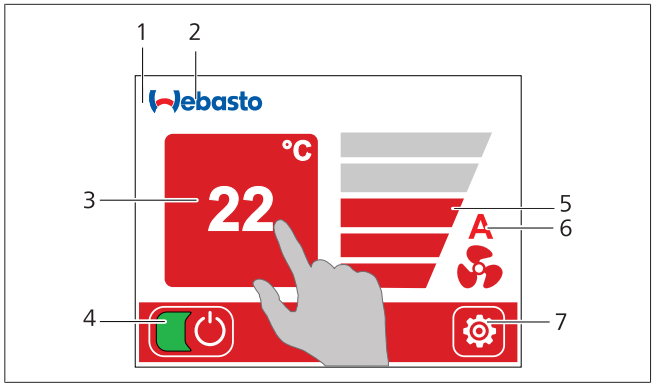


Fig. 14 Design 2

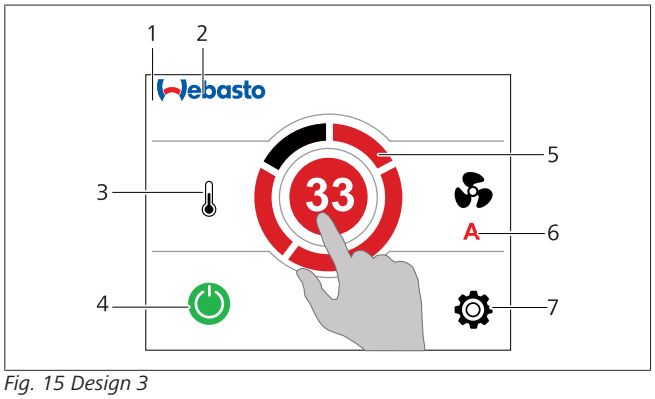


Fig. 15 Design 3

The illustrations show examples of design 1 to 3.

1 Home screen
2 Select Crew menu (and Parameter menu)
3 Temperature setting
4 ON/OFF
5 Fan display
6 Display of automatic air handler control
7 Settings (Passenger menu)

The symbols on the Home screen provide information on the system status. The symbols are explained in the table below:

Symbol	Meaning
	On/Off
	temperature
	Fan

Symbol	Meaning
	Settings
	Crew menu
	Notification
	Increase values
	Decrease values
AUTO	Automatic fan control
	previous
22	Setpoint temperature
	previous
	Forward
2	Parameter value
	Select
	Home screen
	Scroll up
	Scroll down
	Keypad
	Display selection

7.2.1 Standby

The screen will go to Standby mode after 5 minutes if the screen remains untouched and will show an idle screen that can be selected in the settings. Tap anywhere on the screen to call 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 switches on.

When the screen is switched on:

- Tap the green / grey field
  - The colour of the ON/OFF symbol indicates the operating status of the BlueCool (green = switched on).

7.2.4 Operation

After switching on, the control system starts up the air conditioning system in steps and then assumes normal operation. The control element now shows the current temperature where the temperature sensor of the air conditioning system is installed. Depending on the installation location, this may also be the temperature of another cabin for example.

After approx. 20 seconds, the base colour of the control element changes to indicate the operating mode (cooling or heating) in which the air conditioning system was started. Blue indicates cooling mode, red heating mode. The selection is dependent on the set setpoint temperature and the room temperature measured by the cabin temperature sensor. The system will assume standby mode if the cabin temperature and the setpoint temperature are the same.

NOTE

The system only cools under the following conditions:
Cabin temperature > 15 °C. Setpoint temperature < cabin temperature.

NOTE

The system only heats under the following conditions:
Cabin temperature < 29 °C. Setpoint temperature > cabin temperature.

7.2.5 Setting setpoint temperature

To set the required cabin temperature:

1. Tap on the temperature or
on the Home screen. The setpoint temperature appears to the right.
2. Tap Plus ⊕ or Minus ⊖ to increase or decrease the setpoint temperature.
The Settings menu is automatically exited after 30 seconds and the value last set is adopted.

NOTE

Alternatively:
Save and exit menu immediately:
Tap Previous ❮.

7.2.6 Setting fan speed

To set the required fan speed tap on Fan on the Home screen.

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

To manually adapt the fan speed:

1. Tap the Fan symbol (design 1, 2) or .
2. You can now change the displayed fan speed by tapping Plus ⊕ or Minus ⊖.

Tap **AUTO** when you wish to return to automatic fan mode.

The Settings menu is automatically exited after 30 seconds and the value last set is adopted.

NOTE

Alternatively:
Save and exit menu immediately:
Tap Previous ❮.

7.3 System settings

The operating logic is explained based on the Timer function. The explanation also applies to other setting levels or functions.

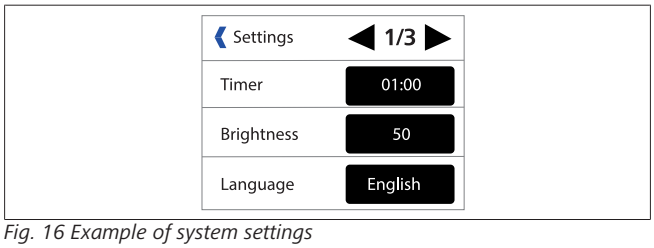
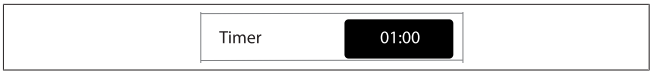


Fig. 16 Example of system settings

Select setting level 1 (Passenger menu):

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



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

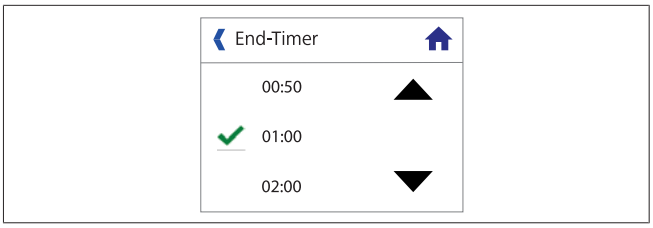


Fig. 17 Timer

4. Tap ▲ to reduce the time interval or tap ▼ to increase the time interval.
The ✔ symbol marks the current selection.
5. Tap on the required time to set the time interval.
6. Tap the Previous ❮ symbol to go to the previous level.
The selected settings are then adopted.

or:

Tap the Home screen symbol to return to the Home screen.

The selected settings are then adopted.

7.4 Setting level 1 (Passenger menu)

You can access the passenger menu (setting level 1) by tapping the Settings icon from the home screen⚙.

Setting level 1 (Passenger menu) is displayed. The available functions are:

7.4.1 Timer

Adjust the preset Start or Stop on the air conditioning system.

- 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.

7.4.2 Brightness

Adapts the screen brightness to the ambient light levels.

7.4.3 Language

Sets the operating language.

7.4.4 Design

Changes the screen design.

7.4.5 Colour

Adapts the background colour.

7.4.6 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 temperature at high brightness levels in areas with bright ambient light.

- **Cabin temperature - dim**
  - Shows the current cabin 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.

7.4.7 Key tone

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

7.4.8 °C / °F

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

7.4.9 Cleaning

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

7.5 Setting level 2 (Crew menu)

NOTE
Access to setting level 2 (Crew menu) is purposefully not intuitive as it contains access to the parameters menu. This contains setting options that are intended only for authorised persons (crew).

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

This provides access to the following functions:

7.5.1 Operating mode

To change the operating mode, select one of the following:

- **Cooling only**
  - F1
- **Heating only**
  - F2 (reverse heating operation)
- **Automatic toggling between cooling and heating**
  - F3 (recommended operating mode)
- **Dehumidification**
  - F7

7.5.2 Dehumidification cycle

- Number of cycles per day
  - Sets the number of dehumidification cycles per day.
- Heating time in minutes
  - Selection of heating time during a dehumidification cycle.
- Cooling time in minutes
  - Selection of cooling time during a dehumidification cycle.

7.5.3 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

7.5.4 Operating values

- **Evaporator**
  - Display of evaporator temperature in °C or °F
- **Supply frequency**
  - Shows the supply frequency of the power supply.
- **Operating voltage**
  - Display of operating voltage.

7.5.5 Firmware

Display of current firmware version.

7.5.6 Screen settings

- **Save**
  - Saves the current screen settings.
- **Reset**
  - Resets the screen settings to the status last saved.

7.5.7 System settings

To access setting level 3 (Parameter menu) you must enter an access code. (Default: 64).

7.6 Setting level 3 (Parameter menu)

To access setting level 3, tap and hold the Webasto logo. Then select System settings from the menu and enter your access code (default: 64).

This provides access to the following functions:

7.6.1 Compressor switching points

Setting the temperature switching points for the compressor.

Selection:

- **Min. switch-off temperature cooling**
  - This parameter is used to set the minimum evaporator temperature.
- **Switch-off temperature cooling**
  - Lower target value of evaporator temperature
- **Switch-on temperature cooling**
  - Setting of the evaporator temperature at which the compressor is to be switched on again.
- **Switch-off temperature heating**
  - Setting of the maximum condenser temperature at which the compressor is switched off.
- **Switch-on temperature heating**
  - Setting of the condenser temperature at which the compressor is to be switched on again.
- **Hysteresis**
  - Setting for the switch-on hysteresis of the setpoint temperature at which the compressor is switched on.
- **First switch-on delay**
  - Staggered start for multiple air conditioning systems when switching on the AC power supply after a shutdown.
- **Max. duration shortfall**
  - Setting the time (in seconds) in which the compressor still remains switched on, although the evaporator has already reached the "Switch-off temperature, compressor cooling".

7.6.2 Fan settings

Fan type and speed settings.

Selection:

- Fan type
- Continuous fan operation.

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

7.6.3 Further settings

- **Access code**
  - Sets the access code for setting level 3.
    00 = entry of access code not necessary
    01 to 99 = Access code activated.
- **Undervoltage switch-off**
  - Sets the undervoltage value for a supply voltage of 115 V / 230 V. If the supply voltage 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 influences.
- **CAN-bus address**
  - Selection of the CAN-bus address for the air conditioning system.
- **Factory setting**
  - Resets all parameters to factory setting.

8 Dehumidification

In the dehumidification operating mode F7, the BlueCool S-Series air conditioning system can control the heating and cooling on the boat in the absence of the crew, removing humidity from the cabin air in the process. For this purpose, the air-conditioning system runs in heating mode for a set period of time and then in cooling mode. In cooling mode condensation forms on the heat exchanger, thus drying the cabin air. The heat/cooling cycles can be activated 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

It may be necessary to enter further system settings before dehumidification can run. The is generally already done during the installation/commissioning phase. Setting level 3 must be called up if the system parameters need to be changed, see chapter 7.6, "Setting level 3 (Parameter menu)" on page 18.

To achieve efficient operation of the dehumidification cycle throughout the boat, the same settings should be chosen for all components of the air conditioning system.

Selecting the dehumidification profile

The system can be set such that it starts dehumidification mode once, twice or three times in a 24-hour period or there is no dehumidification at all. To change the cycles you need to set the number of cycles per day in setting level 2 under the parameter “Dehumidification cycle”. See chapter 7.5.2, "7.5.2 Dehumidification cycle on page 20" on page 18.

Synchronising all installed BlueCool BlueCool S-Series**air conditioning system components**

If the entire boat is to be optimally dehumidified, it is expedient to switch off all the BlueCool S-Series air conditioning systems in succession at the control elements, within a few seconds of each other, using On/Off. All BlueCool S-Series air conditioning plants switch on simultaneously when the previously selected dehumidification cycle starts and then switch off again automatically. If all control elements are not switched off simultaneously, the BlueCool S-Series air-conditioning systems 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 and may therefore not function correctly if the temperature of the sea water is either too high or too low. At low sea water temperatures, the system operates inefficiently in heating mode and there is a danger that the sea water could freeze in the condenser. As a precautionary measure, the air conditioning system may therefore switch off at low water temperatures (at approx. 6 °C and below) (Fault message A01 - low pressure compressor). Heating mode may switch off (Fault message A02 - high pressure compressor) at high sea water temperatures (above 25 °C) as the air conditioning system is designed to produce heat under cold climatic conditions where sea water temperatures in excess of 25 °C are unlikely.

9 Commissioning

9.1 Check connections

Check all connections:

- Check the electrical connections for firm seating.
- Check that the sea water piping is firmly mounted and not leaking.
- Check that the air ducts are firmly mounted and not leaking.
- The air inlet and outlet air grilles must not be blocked.

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 sealed.

9.3 Filling sea water pump head

Self-priming sea water pumps:

- Fill pump head with water.

9.4 Test run

1. Connect the power supply as shown in the wiring diagram. Switch on the generator if necessary.
2. Switch on the air-conditioning system in the cooling mode. See chapter 7, "Operation" on page 15.
3. Check the sea water flow rate.
   Determine the flow rate of the exiting sea water with catch containers and a stop watch.

NOTE

The actual flow rate must be above the required minimum flow rate (see chapter 13, "Technical data" on page 27) to ensure fault-free operation at high sea water temperatures.

If the minimum value is not reached, the pressure losses in the sea water system should be reduced using the following measures:

- ▶ Use larger cross-sections
- ▶ fewer bends
- ▶ shorter lines
- ▶ use a more powerful pump

10 Inspection and Maintenance

WARNING

Evaporator fins can be damaged.

The evaporator fins can be easily bent. When installing, make sure that bent fins are correctly aligned again to ensure proper air feed.

It is recommended that a number of routine checks be carried out at regular intervals and when switching on the air-conditioning system so that the system continues to function properly and maintains its performance level for many years.

At least once a month, the function of the air conditioning system must be checked.

- Switch on the air conditioning system.
  The air conditioning system must run for at least 10 minutes.

10.1 Air filter

At least once per year:

Check the air filter on the evaporator of the air conditioning system and clean if necessary:

1. Pull the air filter upward out of the guide rails.
2. Clean the air filter with a vacuum cleaner and use water to flush it if necessary.
3. Reinsert air filter in the air conditioning system.

10.2 Sea water circuit

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

Every time it is switched on, immediately

- Check whether sea water flows out of the sea water outlet.

At least once per week

- Check the sea water strainer for cleanliness.
- Clean if necessary.

At least once per month

- Check the entire sea water circuit from the through-hull fitting to the sea water outlet for leaks.

At least once per month

- Check the condensate outflow from the condensed-water tray for free passage and leaks.
- Check the condensed-water drain line for free passage and leaks.

Once per year

NOTE

The sea water circuit is only to be cleaned by an expert (installer or Webasto Service Centre).

- Clean the sea water circuit, including the condenser of the air conditioning system.

The time interval depends on the degree of biological fouling (by shellfish etc.).

Soiling of the sea water circuit reduces the sea water 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.

10.3 Important information on cleaning the sea water heat exchanger (condenser)

Please note the following important information before starting to clean the sea water heat exchanger (condenser).

Using cleaning agents

Excessive contact with acidic or corrosive cleaning agents can significantly shorten the service life of the condenser. In particular, this applies if this cleaning agent is used frequently, over a longer period of time or if it is highly concentrated. Bear in mind that excessive cleaning without sufficient reason to do so may result in the warranty being void.

No regular cleaning

Cleaning of the condenser is not part of routine maintenance and must only be carried out if there is a sound reason for doing so.

Indications for cleaning

Cleaning of the condenser is only necessary if various parameters such as the refrigerant pressure, power consumption and cooling capacity of the unit over longer periods of time differ considerably from typical values.

Forbidden cleaning agents

Never use hydrochloric acid, bleach, chlorine or chlorine tablets to clean the condenser. These can cause serious damage.

Disposal of cleaning solutions

Make sure that all local regulations and legal requirements are observed when disposing of cleaning solutions.

WARNING

Webasto will not bear any responsibility for the effectiveness of external cleaning agents. Never exceed the recommended concentration or exposure time of cleaning agents. Following these regulations is of the utmost importance to ensure ideal performance and the longest possible service life of your sea water heat exchanger.

10.4 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.

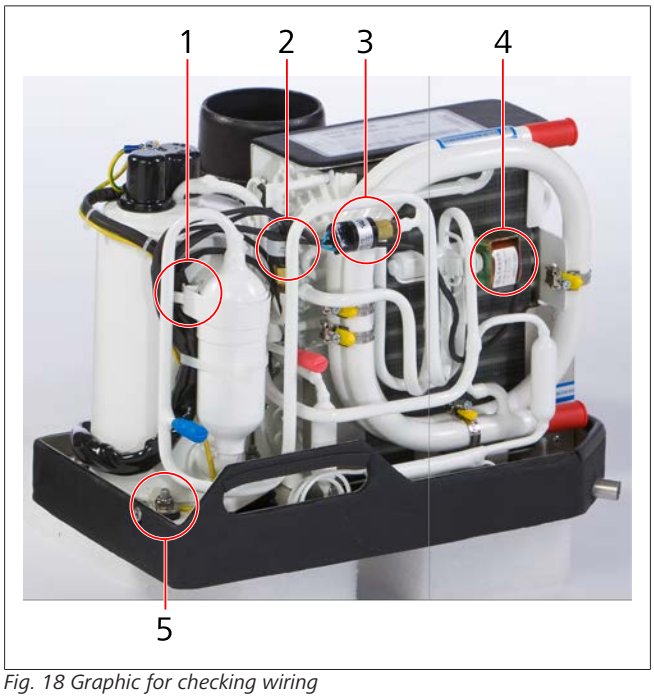


Fig. 18 Graphic for checking wiring

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

10.5 Checklist for inspection and maintenance

Maintenance task		Date							
1	Check the air filter on the evaporator and clean if necessary. See chapter 10.1, "Air filter" on page 20 and Fig. 5, no. 5								
2	Check the flow rate of the sea water circuit at the sea water outlet. See chapter 10.2, "Sea water circuit " on page 20 and Fig. 8, no. 6								
3	Check and clean the sea water strainer. Refer to the filter manufacturer's specifications. See chapter 10.2, "Sea water circuit " on page 20 and Fig. 8, no. 2								
4	Check the entire sea water circuit for leaks. See chapter 10.2, "Sea water circuit " on page 20 and Fig. 8.								
5	Check the condensate outflow from the condensed-water tray and the condensed-water drain line for free passage and leaks. See chapter 9.2, "Checking operation of condensed-water drain" on page 19.								
6	Clean the sea water circuit. See chapter 10.2, "Sea water circuit " on page 20.								
7	Check the electrical connections for corrosion to the contacts and firm seating. See chapter 10.4, "Electrical wiring " on page 21 and Fig. 18.								
8	Check the shaft seal of the sea water pump and replace it if necessary (does not apply to magnetically coupled pumps).								

11 Decommissioning

If the air conditioning system is to be decommissioned, for example during winter, you must proceed as follows:

1. Switch off the system with BlueCool MyTouch.
2. Disconnect the power supply.
3. Close all sea water valves.
4. Completely empty sea water circuit, i.e. sea water lines, sea water strainer, sea water pump and condenser or fill with antifreeze.

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.

If faults occur, the system must be switched off immediately.

12.2 Faults that are displayed

The BlueCool S-Series can display malfunctions in the following ways:

- On the BlueCool MyTouch screen, in the form of a code (e.g. E101) and a text message.
- As an LED flash code, directly in the electrical box of the air conditioning system.

Every time a fault code occurs, the unit stops for approx. 60 seconds and then attempts to restart. If the same malfunction occurs more than six times consecutively within 30 minutes, then the system is completely shut down and a fault code is displayed continuously. No further restarts are attempted. The BlueCool S-Series can only be reset after the cause of the error has been eliminated.

To reset the BlueCool S-Series, switch the S-Series off and on via BlueCool MyTouch. Alternatively you can disconnect and reconnect the power supply to reset the BlueCool S-Series.

12.3 LED display on the BlueCool S-Series pc-board

- **LED 12 V**
  This LED lights up as soon as the +12 V supply is connected.
- **"Alive" LED**
  This LED indicates the operating and fault status by various flash sequences.
  - LED briefly flashes 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: a fault is indicated. See chapter 12.3.1, "Status / Error message table" on page 24 for description of the fault codes.

12.3.1 Status / Error message table

Status / Error message	"Alive" LED	Possible cause	Correction
AAA - Undervoltage	1x flashing, pause	Switch-off in case of undervoltage. Power supply below set undervoltage value for longer than 5 seconds. Cause is probably excessively long cable, overloading or an insufficiently high power generator output.	Check setting (default setting 195 V (230 V) or 97 V (115 V)). Do not set below 195 V (230 V) or 90 V (115 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 and therefore reduce the voltage drop.
A01 – Low pressure compressor	2x flashing, pause	Compressor switches off due to low pressure. Pressure switch defective or power circuit interruption/ short circuit.	Check electrical wiring. Replace pressure switch on Schrader valve.
		Cooling mode: Air supply insufficient.	Check air supply. Difference between air inlet/ air outlet temperature of evaporator at least 4 K.
		Heating mode: Sea water flow rate insufficient or sea water too cold (Temperature below 6 °C). Sea water strainer blocked or no intake.	Check the flow rate of the sea water circuit at the sea water outlet. Difference between condenser inlet/outlet temperature approx. 5 K. At sea water temperature <6 °C: Heating not possible in reverse heating operation. Clean sea water strainer and bleed sea water circuit.
		Refrigerant shortage	Check whether refrigerant is leaking.
A02 - High pressure compressor	3x flashing, pause	Compressor switches off due to high pressure. Pressure switch defective or power circuit interruption/ short circuit.	Check electrical wiring. Replace pressure switch on Schrader valve.
		Compressor switches off due to high pressure. Pressure switch defective or power circuit interruption/ short circuit.	Check the flow rate of the sea water circuit at the sea water outlet. The minimum flow rates must be complied with. Clean sea water strainer and bleed sea water circuit.
		In heating mode: Air supply insufficient	Check air supply. Difference between air inlet/ air outlet temperature of evaporator at least 4 K.
A09 - Cabin temperature sensor	4x flashing, pause	Cabin temperature sensor defective, break/short-circuit in electrical circuit, cabin temperature sensor not connected.	Connect or replace cabin temperature sensor.
A10 - Evaporator temperature sensor	5x flashing, pause	Temperature sensor of evaporator defective or power circuit interruption/short circuit.	Check electrical wiring or replace sensor.
TA11 – Evaporator temperature value exceeded [1)]	n.a.	Evaporator temperature too low in cooling mode or too high in heating mode	No corrective measures necessary. The compressor switches off and switches on again as soon as the cut-in temperature is reached.
INIT	6x flashing, pause	Initialisation procedure or system blocked. Electrical wiring defective, interruption in power circuit/short circuit.	Check cables and connections of pc-board and of control element. Replace defective cable, control element or pc-board.
n.a.	n/a	No pc-board output. 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 (RT1 blown)	Replace pc-board.
		Electronic relay (TRIAC) defective.	Replace defective TRIAC or defective pc-board.
		Compressor not running. Compressor defective or break/short-circuit in compressor wiring.	Check electrical wiring or replace defective compressor.
		Compressor not running. Compressor overload or overload protection element on top of compressor defective.	Allow to cool down for some time or replace defective overload protection element.
		No or insufficient cooling or heating capacity. Poor air or sea water flow, soiled or circulation blocked.	Secure adequate air or sea water flow (see A01 and/or A02).
		No or insufficient cooling or heating capacity: 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 low high pressure reading. Check for refrigerant leaks, repair if necessary and top up required quantity of refrigerant.
		No or insufficient cooling or heating capacity: Oil block.	Leave air-conditioning system running in heating mode. Call out a refrigerant specialist if necessary. Technical datasheet available.

Status / Error message	"Alive" LED	Possible cause	Correction
		No or insufficient cooling or heating capacity: Refrigerant circuit blocked. (capillary lines).	Have checked by refrigerant specialist. Technical datasheet available.
		No or insufficient cooling or heating capacity: Compressor fault.	Have checked by refrigerant specialist.
		Incorrect cabin/ambient temperature or water temperature displayed. Temperature sensor positioned incorrectly, subject to interference or displayed values are not correct.	Check whether the sensor is subject to direct fault sources such as direct sunlight or devices radiating heat. Calibrate sensor. Replace defective sensor.

Table 1: Status / Error message

1)

NOTE

Fault code TA11 – Evaporator temperature value exceeded

This code is a system information and not a fault which must be eliminated. The status indicator will go out automatically on reaching the cut-in temperature.

12.4 Faults not displayed on control element

	Symptom		
1	After switching on, the system does not react.	Check:	power supply,
			fuses in supply lines,
			fuses on pc-board, etc.
2	The compressor starts up, however no sea water exits from the sea water outlet:	If the sea water pump is running:	Check whether the shut-off valves are opened.
			Check whether the sea water strainer is blocked.
			There could be air in the pump head causing the pump to malfunction. Bleed the air out of the sea water line, e.g. with a bleeder valve downstream of the pump.
		If the sea water pump is not running:	Check the power supply to the sea water pump.
			The pump rotor may be blocked by dirt. If possible and accessible, using a tool turn the pump rotor from the motor side until it moves freely.
3	The compressor and the sea water pump are running, but neither the heating mode nor the cooling mode function satisfactorily.		Allow the fan to run in the automatic fan mode.
			Check the air ducts.
			If the air flow is interrupted with the compressor running, the evaporator can completely freeze, causing the entire air stream to be blocked.
			If the sea water flow rate is too low, the sea water in the condenser can freeze in heating mode, blocking and damaging the system.
			Check the fan speed setting, correct if necessary.
			Check the voltage level. Do not operate the system continually with insufficient voltage (under 195 V (230 V) or 97 V (115 V)).
			Heating mode takes a long time to start up. This is normal when the sea water is very cold. When the temperature of the sea water drops below approx. 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.
			Check the fan speed setting, correct if necessary.
4	The compressor does run, however it switches off continually before the set set-point temperature has been reached. The high-pressure and low-pressure switch switch off the compressor due to an excessively high or excessively low working pressure.		Check the minimum flow rate in the sea water circuit.
5	An incorrect cabin temperature is displayed.	Cabin temperature sensor positioned incorrectly, fault sources are present or display values are falsified.	Check whether the cabin temperature sensor is subject to direct fault sources, like direct sunlight or devices radiating heat.
			Calibrate sensor or replace defective sensor.

Table 2: Faults not displayed on control element

13 Technical data

13.1 BlueCool S-Series self-contained air-conditioning unit 230 V

Type	S6-R-230V-REV-R410a	S8-R-230V-REV-R410a	S10-R-230V-REV-R410a	S13-R-230V-REV-R410a	S16-R-230V-REV-R410a	S20-R-230V-REV-R410a	S27-R-230V-REV-R410a
Cooling capacity [BTU/h] [1]	6,000	8,000	10,000	13,000	16,000	20,000	27,000
Cooling capacity [kW] [1]	1.8	2.4	2.9	3.8	4.7	5.9	7.9
Rated voltage [V]	230						
Frequency [Hz]	50/60						
Current consumption, operation [A] 50 Hz [2]	2.0 - 2.4	2.4 - 3.5	2.6 - 4.0	3.6 - 7.1	4.9 - 7.1	5.9 - 8.9	7.0 - 10.5
Max. starting current intake, current peak [A] 50 Hz	14	28	27	37	54	60	77
Starting current intake RMS40 [A] 50 Hz [3]	5	17	17	22	35	39	49
Starting current intake RMS300 [A] 50 Hz [4]	3	9	9	11	19	20	32
Max. starting current intake, current peak with soft start [A] 50 Hz	11	12	11	13	22	23	34
Current consumption RMS40 with soft start [A] 50 Hz [3]	4	7	7	7	12	14	19
Current consumption RMS300 with soft start [A] 50 Hz [4]	3	5	5	5	9	10	17
Current consumption with blocked rotor LRA [A]	12	19	19	24	37	43	62
Current consumption, operation [2] [A] 60 Hz	2.4 - 2.9	3.5 - 4.9	3.5 - 5.2	4.5 - 7.7	6 - 8.7	6.5 - 10.8	8.5 - 13.7
Max. starting current intake, current peak [A] 60 Hz	15	25	25	34	47	54	69
Starting current intake RMS40 [A] 60 Hz [3]	5	16	15	21	30	35	44
Starting current intake RMS300 [A] 60 Hz [4]	4	10	10	12	20	22	41
Max. starting current intake, current peak with soft start [A] 60 Hz	13	14	14	15	26	28	40
Current consumption RMS40 with soft start [A] 60 Hz [3]	5	8	8	9	15	17	23
Current consumption RMS300 with soft start [A] 60 Hz [4]	4	6	6	7	12	13	20
Fan output, free-blowing [m³/h] (cfm)	275 (162)	275 (162)	400 (235)	500 (294)	625 (368)	625 (368)	2x550 (2x324)
Supply air grille [cm²]	150	235	235	250	390	390	650
Air inlet grille [cm²]	325	490	490	550	800	800	1600
Minimum thickness insulation air duct [mm] (inch)	5mm (13/64'')						
Recommended line fuse protection [A]	16						20 [5]
Fan connection [mm] (inch)	100 (4)			125 (5)			2x125 (2x5)
ø Sea water connection [mm] (inch)	19 (3/4'')	19 (3/4'')	19 (3/4'')	19 (3/4'')	19 (3/4'')	19 (3/4'')	19 (3/4'')
Minimum sea-water flow rate [l/min] 50 Hz	6	8	10	12	14	17	21
Minimum sea-water flow rate [l/min] 60 Hz	7.5	10	12	14	17	20	25
Recommended sea water pump 50Hz [6]	WB250	WB350		WB350 / WB500G	WB500 / WB500G	WB500 / WB500G"	WB1000 / WB1000G
Recommended sea water pump 60Hz [6]						WB500 / WB1000G	WB1000 / WB1000G
max. permissible ambient temperature [°C]	+40°C						
Net weight [kg]	20	20	22	27	31	34	46
Dimensions (LxDxH) [mm] (inch). See also Fig. 19 and Fig. 20	400x320x305 (15.7 x 12.6 x 12.0)	400 x 320 x 305 (15.7 x 12.6 x 12.0)	475 x 310 x 310 (18.7 x 12.2 x 12.2)	500 x 350 x 320 (19.7 x 13.8 x 12.6)	540 x 350 x 370 (21.3 x 13.8 x 14.6)	590 x 340 x 370 (23.2 x 13.4 x 14.6)	570 x 510 x 410 (22.4 x 20.1 x 16.1)
Refrigerant quantity R410a [g]	450	250	280	420	550	520	670

Type	S6-R-230V-REV-R410a	S8-R-230V-REV-R410a	S10-R-230V-REV-R410a	S13-R-230V-REV-R410a	S16-R-230V-REV-R410a	S20-R-230V-REV-R410a	S27-R-230V-REV-R410a
Min. sea water temperature in heating mode [°C]	6						
Max. sea water temperature in cooling mode [°C]	35						

[1] BTU/h and electrical data are based on 7 °C evaporation temperature and 38 °C condensation temperature.

[2] Current consumption of air conditioning system is dependent on compressor output. Maximum values under tropical conditions.

[3] Effective value of current consumption (RMS) for the air conditioning system for the first 40 ms.

[4] Effective value of current consumption (RMS) for the air conditioning system for the first 300 ms.

[5] Compressor only.

[6] Only a recommendation. The pump size must be adjusted to the application so that the minimum flow rate is ensured.

13.2 BlueCool S-Series self-contained air-conditioning unit 115 V

Type	S6-R-115V-REV-R410a	S8-R-115V-REV-R410a	S10-R-115V-REV-R410a	S13-R-115V-REV-R410a	S16-R-115V-REV-R410a
Cooling capacity [BTU/h] [1]	6,000	8,000	10,000	13,000	16,000
Cooling capacity [kW] [1]	1.8	2.4	2.9	3.8	4.7
Rated voltage [V]	115				
Frequency [Hz]	60				
Current consumption, operation [A] 60 Hz [2]	3.6 – 5.5	4.5 – 6.1	5.6 – 7.9	7.6 - 11	8.0 – 15.7
Max. starting current intake, current peak [A] 60 Hz	39	54	55	70	89
Starting current intake RMS40 [A] 60 Hz [3]	25	35	36	47	59
Starting current intake RMS300 [A] 60 Hz [4]	19	20	21	30	35
Current consumption with blocked rotor LRA [A]	27	34	37	57	70
Fan output, free-blowing [m³/h] (cfm)	275 (162)	275 (162)	350 (206)	430 (253)	650 (382)
Supply air grille [cm²]	150	235	235	250	390
Air inlet grille [cm²]	325	490	490	550	800
Minimum thickness insulation air duct [mm] (inch)	4 (5/32'')				
Recommended line fuse protection [A]	16				25 [5]
Fan connection [mm] (inch)	100 (4)			125 (5)	
ø Sea water connection [mm] (inch)	19 (3/4'')	19 (3/4'')	19 (3/4'')	19 (3/4'')	19 (3/4'')
Minimum sea-water flow rate [l/min] 60 Hz	6	8	10	12	14
Recommended sea water pump 60Hz [6]	WB250	WB350		WB350 / WB500G	WB500 / WB500G
max. permissible ambient temperature [°C]	+40				
Net weight [kg]	18	18	20	25	28
Dimensions (LxDxH) [mm] (inch). See also Fig. 19.	400x320x305 (15.7 x 12.6 x 12.0)	400 x 320 x 310 (15.7 x 12.6 x 12.2)	475 x 330 x 320 (18.7 x 13.0 x 12.6)	500 x 350 x 325 (19.7 x 13.8 x 12.8)	540 x 350 x 380 (21.3 x 13.8 x 15.0)
Refrigerant quantity R410a [g]	440	260	240	420	400
Min. sea water temperature in heating mode [°C]	6				
Max. sea water temperature in cooling mode [°C]	35				

[1] BTU/h and electrical data are based on 7 °C evaporation temperature and 38 °C condensation temperature.

[2] Current consumption of air conditioning system is dependent on compressor output. Maximum values under tropical conditions.

[3] Effective value of current consumption (RMS) for the air conditioning system for the first 40 ms.

[4] Effective value of current consumption (RMS) for the air conditioning system for the first 300 ms.

[5] Compressor only.

[6] Only a recommendation. The pump size must be adjusted to the application so that the minimum flow rate is ensured.

13.3 Dimensions and minimum distances Type S6 - S20

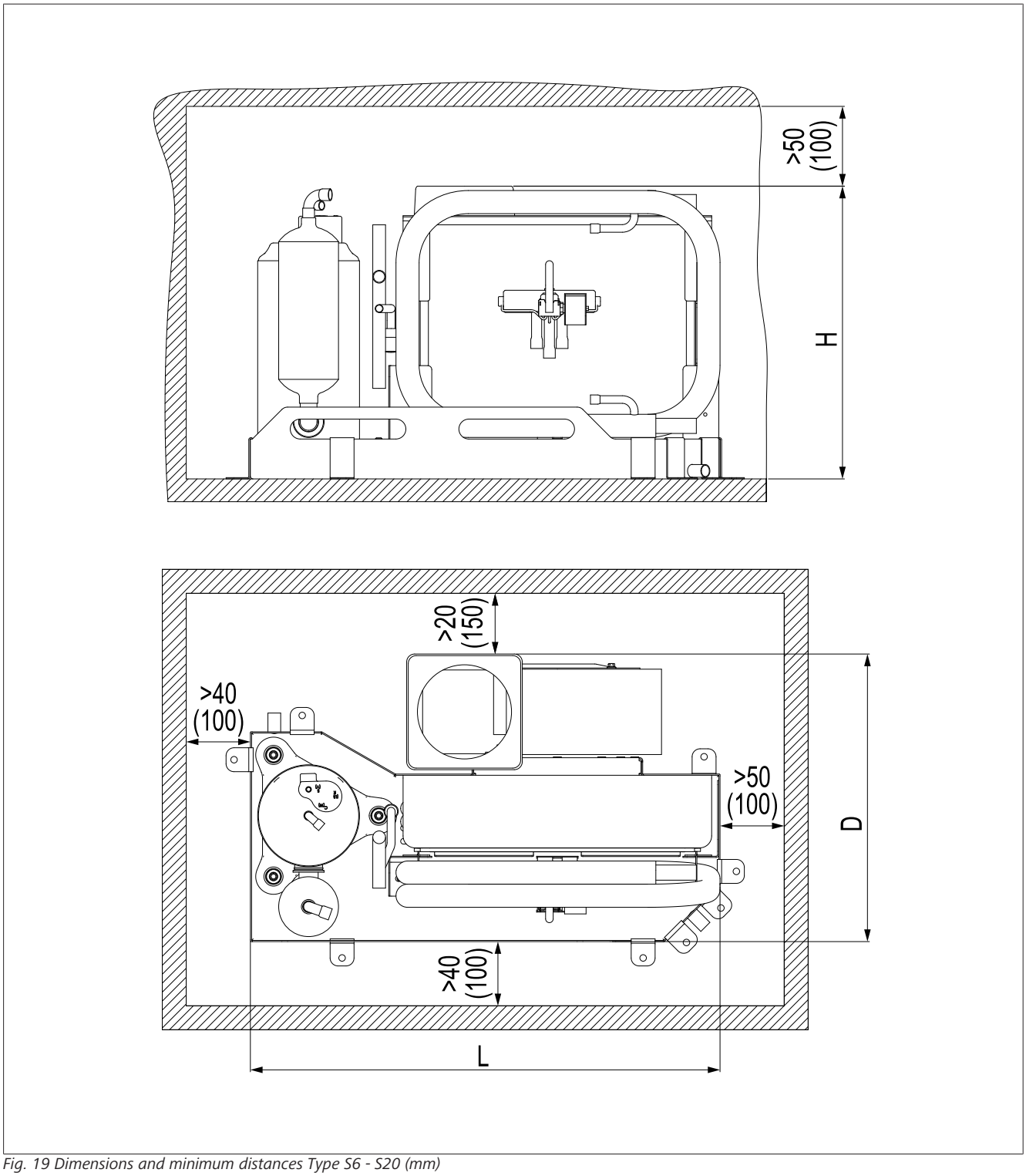


Fig. 19 Dimensions and minimum distances Type S6 - S20 (mm)

For dimensions L, D and H by type see chapter 13.2, "BlueCool S-Series self-contained air-conditioning unit 115 V" on page 28 or chapter 13.1, "BlueCool S-Series self-contained air-conditioning unit 230 V" on page 27.

> xx Minimum distance (mm)

>(xx) Recommended distance (mm)

NOTE

If the cover plate cannot be removed, a distance of >100 mm should be maintained above the system to allow the air filter to be removed and cleaned.

13.4 Dimensions and minimum distances Type S27

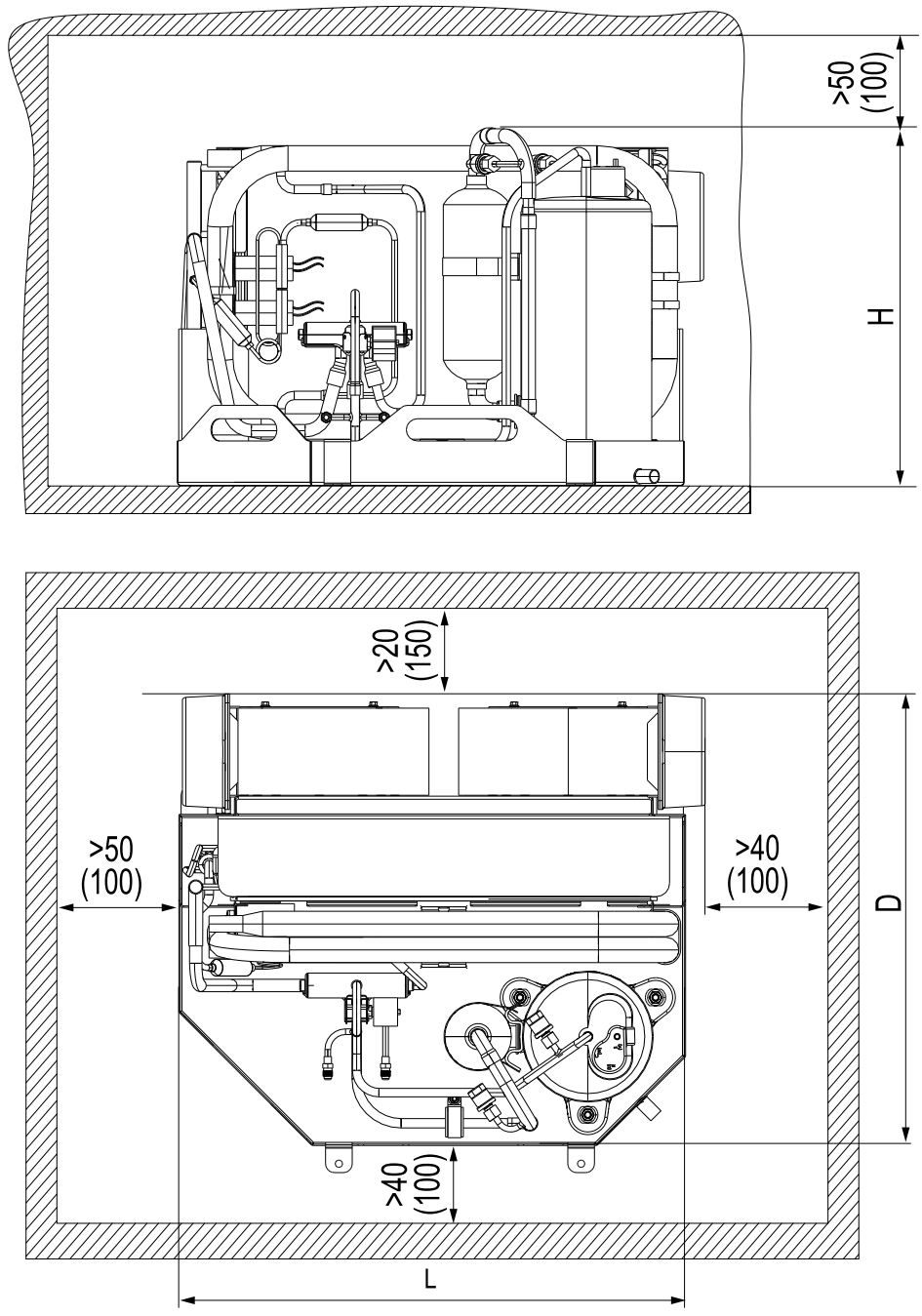


Fig. 20 Dimensions and minimum distances Type S27 (mm)

For dimensions L, D and H by Typs see chapter 13.1, "BlueCool S-Series self-contained air-conditioning unit 230 V" on page 27.

> xx Minimum distance (mm)

>(xx) Recommended distance (mm)

NOTE

If the cover plate cannot be removed, a distance of >100 mm should be maintained above the system to allow the air filter to be removed and cleaned.

14 Annex

14.1 Overview of control and setting levels

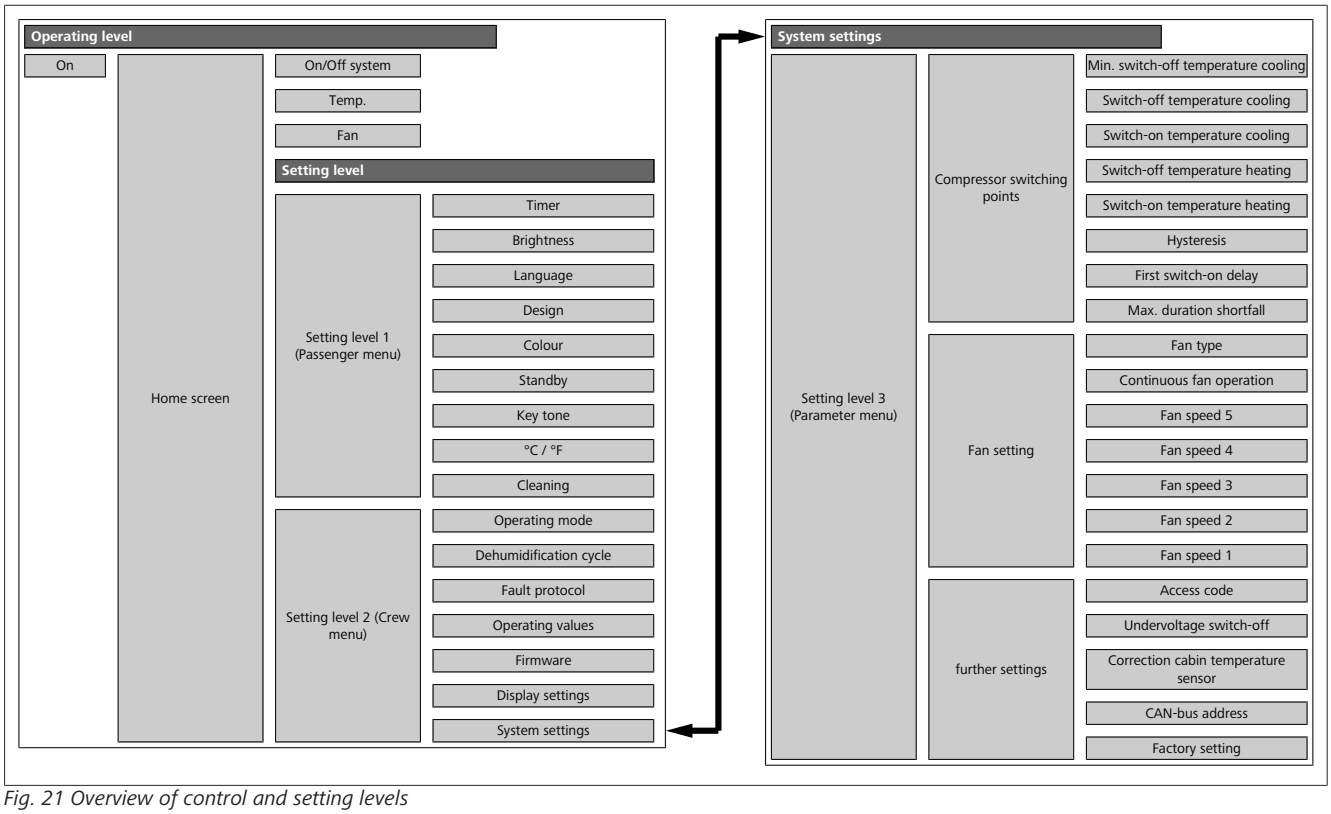


Fig. 21 Overview of control and setting levels

14.2 Parameter settings

14.2.1 Parameter list, setting level 1 (Passenger menu)

Parameter	Meaning	Unit / parameter	Value range	Factory setting
Timer	Sets the time interval after which the air conditioning system is switched on or switched off.	Hours:minutes	off, 00:10 – 24:00	1:00
Brightness	Sets the screen brightness	Percentage	5-100%	100%
Language	Sets the operating language	Language	Deutsch, English, Français, Español, Italiano, Nederlands, Polski, Русский, Türkçe , 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	-	-	-

See also chapter 7.4, "Setting level 1 (Passenger menu)" on page 17.

14.2.2 Parameter list, setting level 2 (Crew menu)

Parameter	Meaning	Unit / parameter	Value range	Factory setting
Operating mode	Changes the operating mode	-	Cooling Only (F1) Heating Only (F2) Auto Cooling/Heating (F3) Dehumidify (F7)	Auto Cooling/Heating (F3)
Dehumidification cycle	Cycles per day	Number	0, 1, 2, 3	1
	Heating time	min.	0 to 99	1
	Cooling time	min.	0 to 99	1
Fault protocol	Event counter	Number	1 - 99999	-
	Error code		A1-A54	
	Fault counter		1-99999	
	Operating time		1-99999	
Operating values	Evaporator	°C, °F	-	-
	Supply frequency	Hz	50 or 60	
	Operating voltage	V		
Firmware	Firmware version	-	Example: 3.2	-
Display settings	Save	-	-	-
	reset	-	-	-
System settings	Access to setting level 3 with code entry. Code entry is not required if code = 00	-	-	-

See also chapter 7.5, "Setting level 2 (Crew menu)" on page 18.

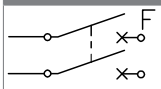
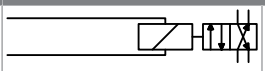
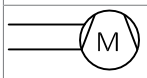
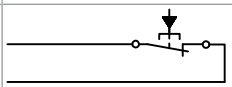
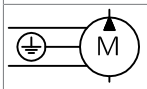
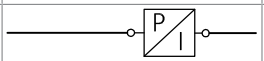
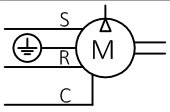
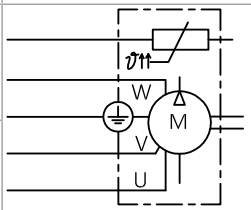
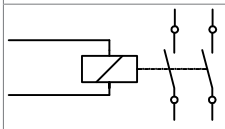
14.2.3 Parameter list, setting level 3 (Parameter menu)

Parameter	Meaning	Unit / parameter	Value range	Factory setting
Compressor switching points	Min. switch-off temperature cooling	°C (°F)	-4 to 15 (24 to 59)	-4 °C / 25 °F
	Switch-off temperature cooling	°C (°F)	-4 to 15 (24 to 59)	-2 °C / 28 °F
	Switch-on temperature cooling	°C (°F)	2 to 18 (36 to 64)	4 °C / 39 °F
	Switch-off temperature heating	°C (°F)	30 to 55 (86 to 131)	52 °C / 126 °F
	Switch-on temperature heating	°C (°F)	27 to 50 (81 to 122)	48 °C / 118 °F
	Hysteresis	°C (°F)	0.1 to 0.8 (0.2 to 1.4)	0.8 °C / 1.4 °F
	First switch-on delay	sec.	01 to 200	10
	Max. duration shortfall	sec.	000 to 999	600
Fan settings	Fan type	-	AC, EC, electronic silencer	AC
	Continuous fan operation	-	On/Off	Off
	Fan speed 5	-	30 - 100	100 (50Hz) 100 (60Hz)
	Fan speed 4	-	30 - 100	58 (50Hz) 69 (60Hz)
	Fan speed 3	-	30 - 100	49 (50Hz) 60 (60Hz)
	Fan speed 2	-	30 - 100	41 (50Hz) 53 (60Hz)
	Fan speed 1	-	30 - 100	35 (50Hz) 45 (60Hz)
Further settings	Access code		00 = entry of access code not necessary to access setting level 3. 01 to 99 = Access code activated.	64
	Undervoltage switch-off	V	180 - 210 (230 V)	195 (230 V)
			90 - 105 (115 V)	97 (115 V)
	Correction cabin temperature sensor	°C (°F)	-5.5 to 5.5 (-9.9 to 9.9)	0
	CAN-bus address	-	1 to 239	-
	Factory setting	-	Reset	-

See also chapter 7.6, "Setting level 3 (Parameter menu)" on page 18.

14.3 Wiring diagrams

14.3.1 Wiring diagram, overview of symbols

Symbol	Description	Symbol	Description
	Line fuse protection		4/2-way reversing valve
	Fan		Pressure switch
	Sea water pump		sensor
	Compressor		Compressor with temperature sensor
	Relay		

14.3.2 Line fuses

	Line fuse protection	Values
F1	Compressor	Max. 25 A
F2	Power supply	Max. 16 A

NOTE

*: Use Type K or C circuit breaker conforming to EN IEC 60898-1.

NOTE

The BlueCool MyTouch control element is compatible with the BlueCool S-Series if the following two conditions are met:

- ▶ Pc-board with part number WBCL050930B or higher installed.
- ▶ Firmware version for BlueCool S-Series 3.0 or higher used.

14.3.3 Layout diagram - pc-board BlueCool S-Series

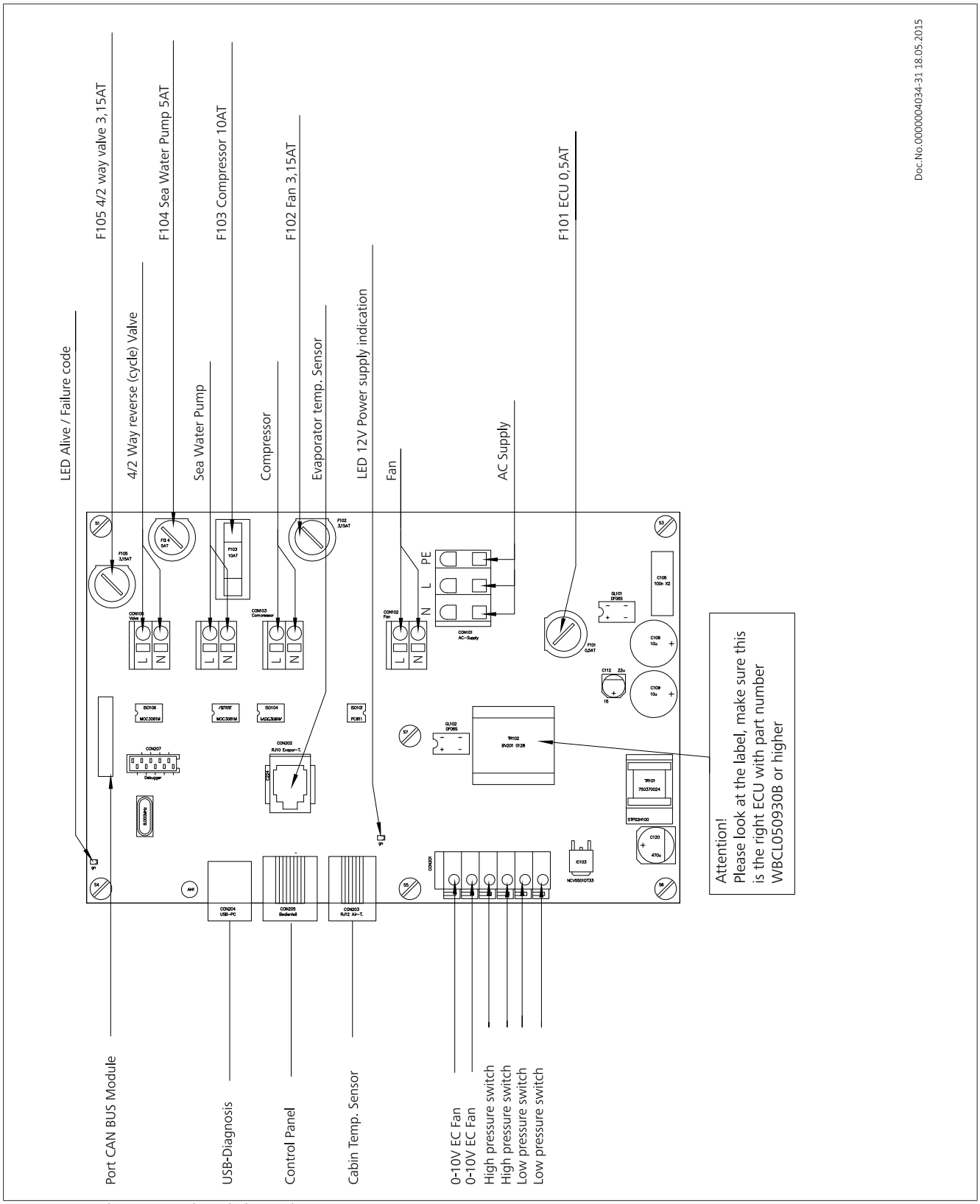


Fig. 22 Layout diagram - pc-board BlueCool S-Series

14.3.4 Wiring diagram BlueCool S-Series, without soft start

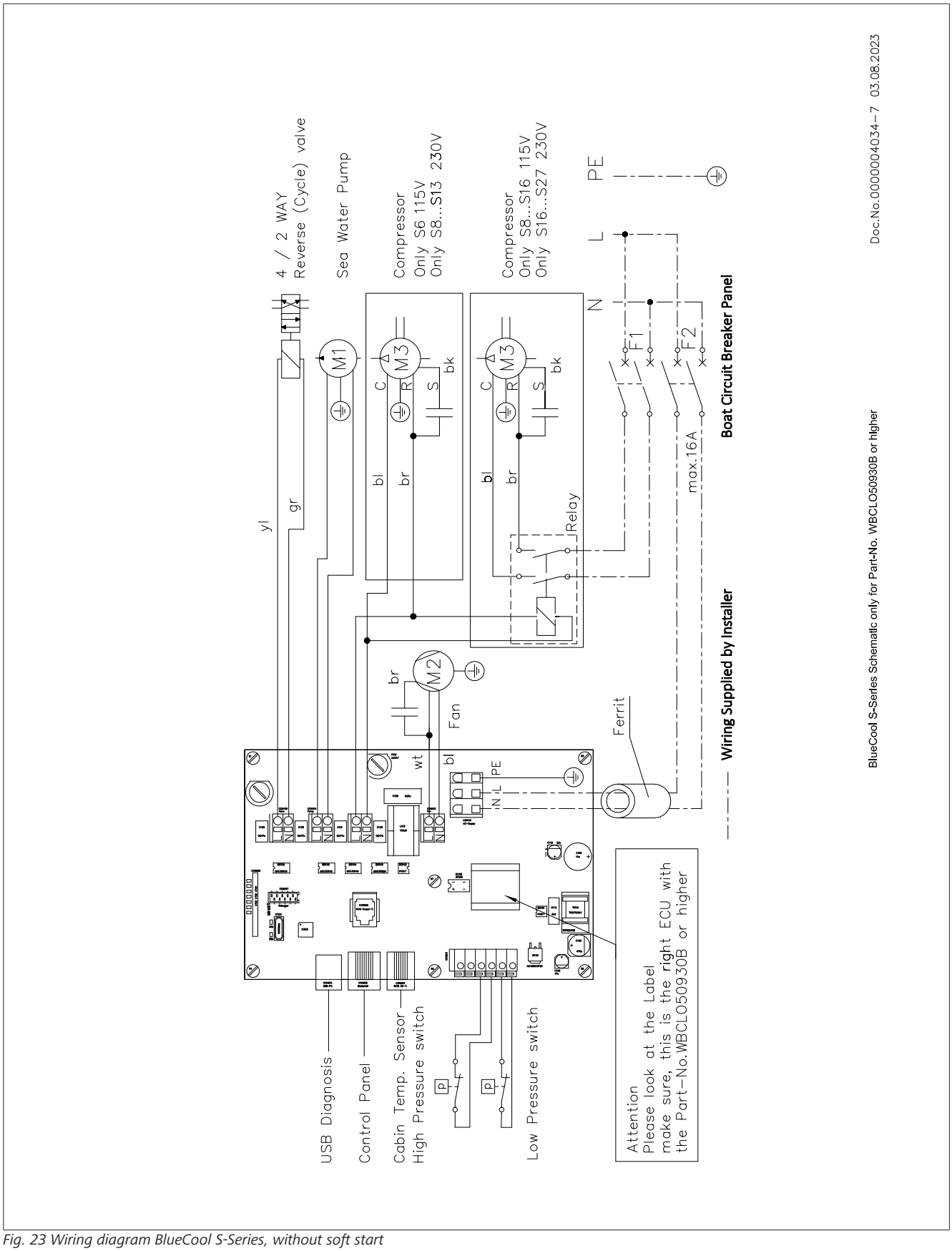


Fig. 23 Wiring diagram BlueCool S-Series, without soft start

14.3.5 Wiring diagram BlueCool S-Series, S6 to S16 with soft start (230 V systems only)

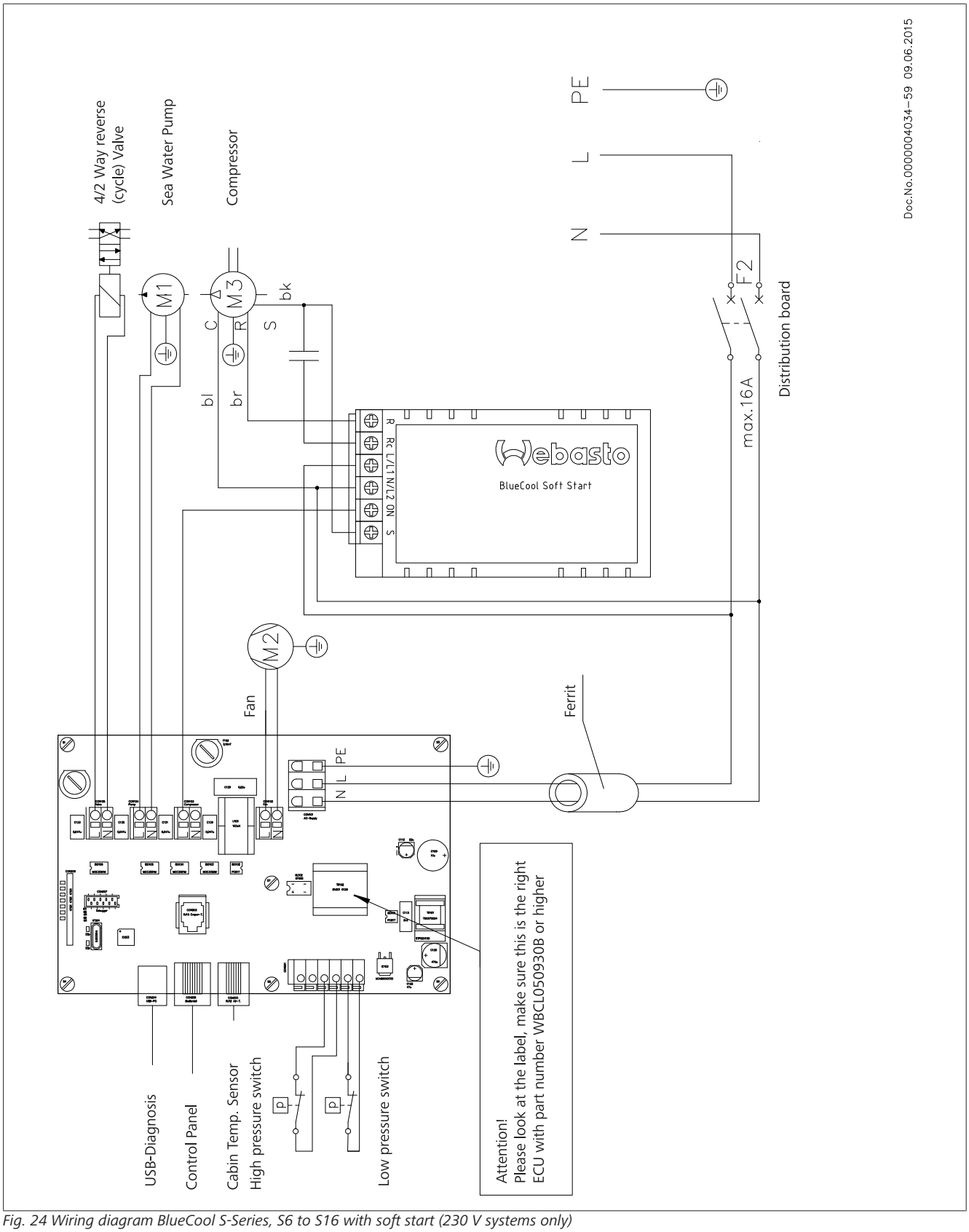


Fig. 24 Wiring diagram BlueCool S-Series, S6 to S16 with soft start (230 V systems only)

WARNING

Evaporator fins can be damaged.

The evaporator fins can be easily bent. When installing, make sure that bent fins are correctly aligned again to ensure proper air feed.

14.3.6 Wiring diagram BlueCool S-Series, S20 and S27 with soft start (230 V systems only)

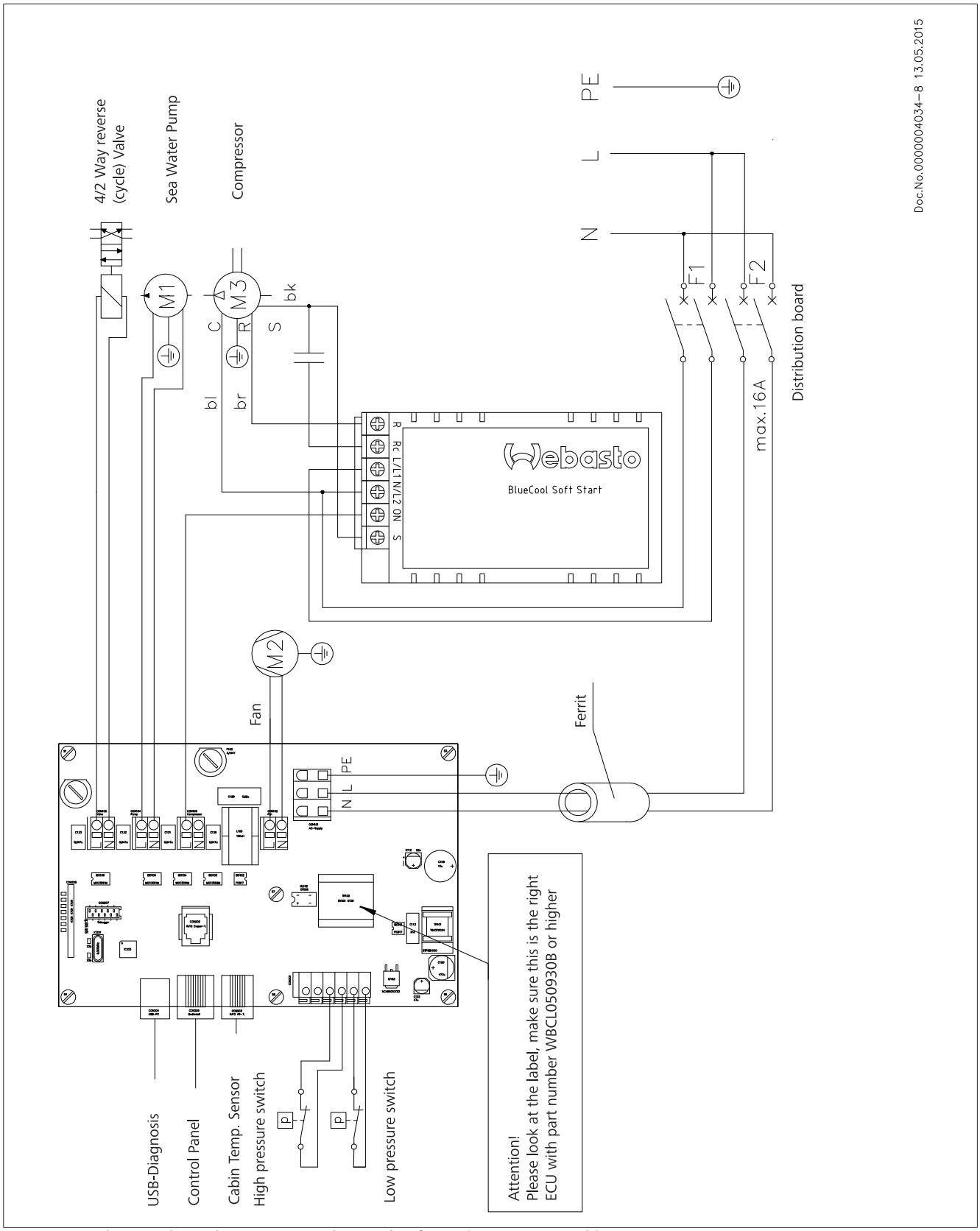


Fig. 25 Wiring diagram BlueCool S-Series, S20 and S27 with soft start (230 V systems only)

14.3.7 Wiring diagram BlueCool S Series, several systems with one sea water pump

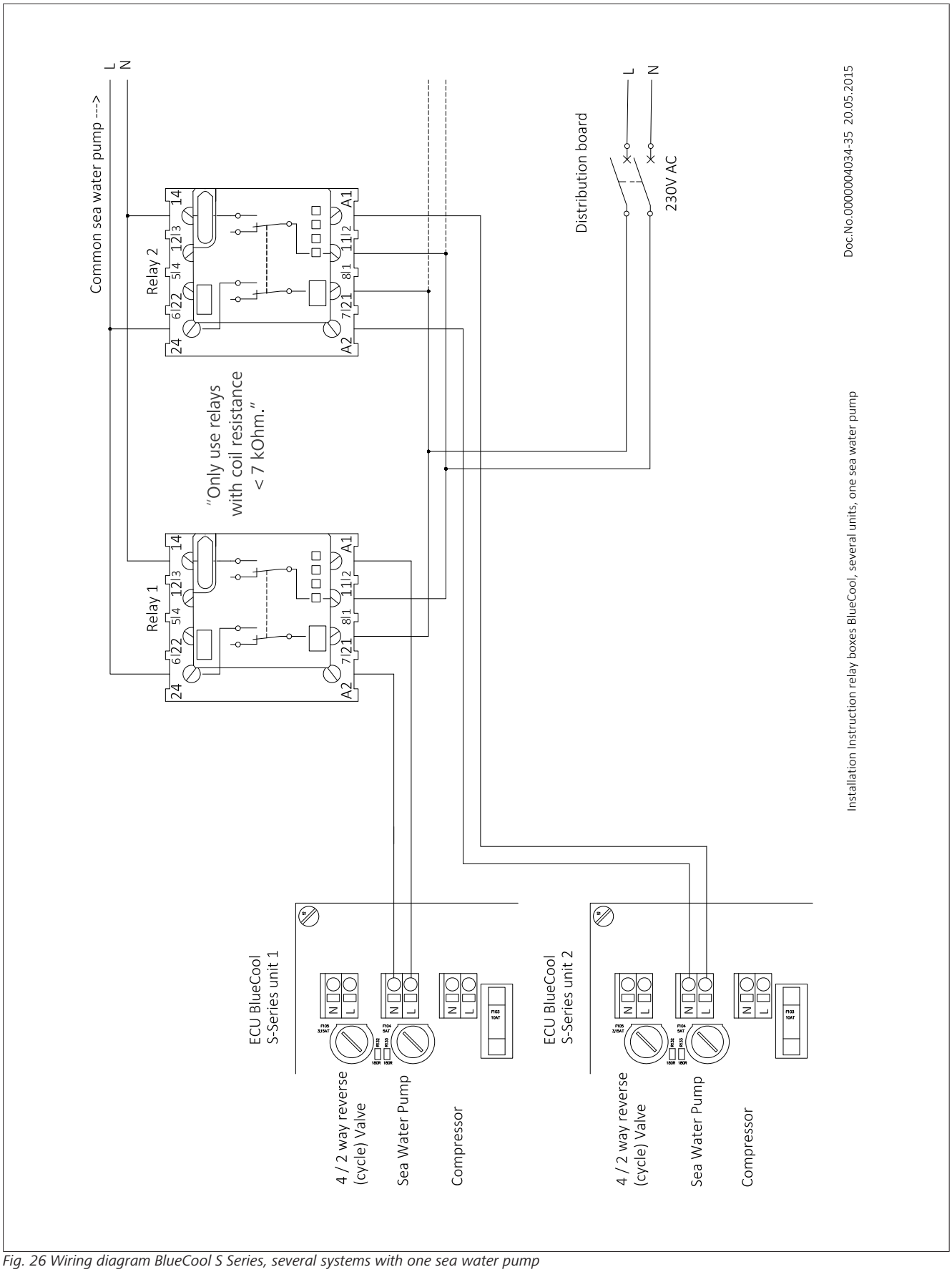


Fig. 26 Wiring diagram BlueCool S Series, several systems with one sea water pump

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