

Installation and operating instructions

Central Heating System 11.6 - 40 kW



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General

Congratulations on the purchase of a Webasto central heating system. Webasto central heating systems are available in several versions and with various capacities for a wide range of applications in vessels and vehicles. This manual describes the installation, the working and the operation.

1. Instructions with the documentation

This operating and installation manual is part of the scope of delivery. ALWAYS follow Webasto's installation and service instructions and take all warnings into consideration. Webasto cannot be held liable for any damage caused by not observing these manuals.

1.1 Keeping the documents

Keep this operation and installation manual and all the additional applicable documents for use later. Pass on the documents to the next owner when the appliance is sold.

1.2 Symbols used

Take the safety instructions into consideration when operating this appliance. The symbols used in the text are defined below:



Danger!
Immediate risk of physical injury!



Danger!
Risk of burning!



Attention!
Potentially dangerous situation for product and surroundings!



Note!
Recommendation for application.

1.3 Type plate

The type plate identifying the central heating system must be applied on a clean, easily visible place.

2. Safety



Danger! Risk of poisoning and explosion from defects!

When unusual odours and vapours are noticed:

- Open windows and doors
- Turn off the appliance
- Warn fellow residents
- Leave the ship
- Call out an authorised installer



Danger! Danger of explosion from inflammable mixtures of gas and air! Do not use or store explosives or highly inflammable substances (e.g. petrol, paint etc.) in the vicinity of the appliance. Switch off the appliance when refuelling.

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Danger! Risk of poisoning and explosion from defects! The safety devices must never be turned off and they must never be tampered with in such a way that they no longer work properly.

Therefore modifications must not be carried out:

- to the appliance
- in the vicinity of the appliance
- to the supply lines for fuel, central heating water, tap water and electricity
- to the lines supplying combustion air and the outlet pipes for the fuel gas

This also includes constructions in the vicinity of the appliance which could influence the operation, such as a cabinet or housing.

You must always contact an installer authorised by Webasto for modifications to the appliance or in the vicinity because he is permitted to do this work.



Attention! Risk of damage from unskilled modifications! Never carry out modifications or manipulations to the central heating system or to other components in the installation. Never carry out maintenance work or repairs to the appliance yourself.

Do not remove or destroy the seals on the components. Only installers authorised by Webasto and the Webasto service department are permitted to alter sealed components.



Danger! Risk of scalding. The water coming out of the hot water tap could be hot.



You must be aware that, if the central heating system is also used for heating tap water by means of a boiler or tap water module, the water coming out of the tap could reach temperatures higher than 70 °C.

Danger from frost

The tap water must be drained off if the system is to remain unused in an unheated space for a long period (i.e. winter holidays).

Setting-up and adjustment

The appliance may only be installed by an installer authorised by Webasto. In addition he is responsible for professional installation and commissioning. He is also authorised to carry out inspection and maintenance work and repairs to the appliance.



Danger! Danger to health from Legionella bacteria! Legionella bacteria could be present in the tap water system if water has not been drawn off for a long time.

If the water in the water system has not been used for a week or longer, you must empty the whole water system and rinse thoroughly before refilling it.

Disinfect the water system if water has stood still in the tap water coil / boiler for longer than two weeks.

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3. Description of appliance

The Webasto central heating system is a complete and compact heating system that is intended for heating fluid in the heating systems of mobile applications.

3.1 Type overview

Systems	DBW2010 (11.6 kW)	DBW2016 (16 kW)	Thermo230 (23 kW)	Thermo300 (30 kW)	Thermo350 (35 kW)	Thermo400 (40 kW)
Central heating (CH)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Central heating with boiler control (BC)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				
Central heating with tap water unit (T)		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
Central heating for integration with air-conditioning (C)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

CH: The CH unit heats the interiors of vessels or vehicles by means of radiators, convectors and/or heat exchangers with ventilator.

BC: Besides the interior, the Webasto also heats the tap water via the coil in the boiler; this boiler must have a thermostat which can switch the heater on and off when required.

T: this version is suitable for heating the interior, tap water is heated by means of the built-in plate-to-plate heat exchanger.

C this version is for direct integration in the fluid circuit of a Chiller air-conditioning installation whereby the AC circulation pump is also used.

3.2 Use in accordance with the requirements

The Webasto central heating systems are built according to the latest state of art and the recognised safety rules. But still there is a risk of physical injury to the user or third parties or damage to the appliance and other objects if the appliance is not used competently.



Attention! Only use a cooling agent with sufficient frost protection in the appliance. Damage to the appliance cannot be ruled out if the cooling agent is not sufficiently protected against frost.

The central heating systems are intended to heat water in a central heating system and/or to supply hot tap water in mobile applications. The dimensions of the rooms to be heated must be taken into consideration when choosing a central heating system (heat requirement).



Attention! Misuse is forbidden. Other uses or deviations are not in accordance with the instructions. The manufacturer/supplier cannot be held liable for any damage resulting from this sort of use. The user is responsible.

The Webasto central heating systems must be installed by an installer authorised and trained by Webasto, who is responsible for observing the existing instructions, rules and guidelines.

The type approval of the heater and also the legal liability of Webasto elapse for an installation that differs from this general description. Observation of the operating instructions is also part of the use according to the instructions.



3.3 Overview of the main components



1. plate-to-plate heat exchanger with bleeding screws (model T)
2. three-way tap 230 volt (model T and BC)
3. flow switch, model T
4. circulation pump 230 volt
5. electronic control assembly with service switch and control LED
6. fuel connection, standard with return connection
7. diesel heater 12/24 volt, depending on model 11.640.0 kW
8. inverter 12/24 volt to 230 volt
9. assembly frame, also available as wall assembly frame (both are options)



Control panel CH



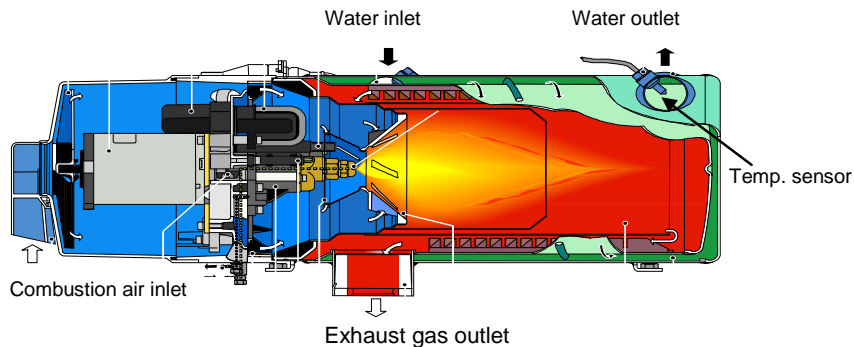
Control panel BC and T



Buffer tank with integrated electrical heating element 230 volt, 750 watt.
Tank also has a thermostat for switching the Webasto heater on and off, is supplied with models CH, BT and T

3.4 General operation

The most important component is the water heater (Thermo 230/300/350 series shown)



The Webasto water heaters used in these CH systems work according to the atomizer principle. Fuel is atomized with high pressure. This spray is then blended with a constant supply of fresh air. Spark ignition starts the combustion process.

The temperature of the heated water is controlled by a temperature sensor: in a Thermo 230/300/350/400 the adjustment range is 70 °C – 85 °C and 65 °C – 80 °C in a DBW2010/2016.

The heating capacity in the DBW2010 is 11.6 kW, in the DBW2016 16 kW and in the Thermo 230/300/350/400 respectively 23/30/35/40 kW.

When the maximum water temperature has been reached during combustion, the Webasto water heater switches off with a run-on period. The circulation pump remains turning during the control pause.

The combustion process will start up again automatically when the heating circuit has cooled off sufficiently.

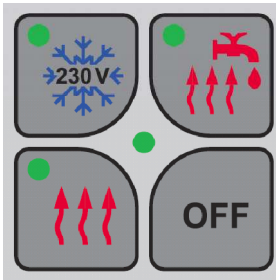
The combustion ends and the run-on period start when the appliance is switched off. The combustion air fan and circulation pump are switched off after about 90 seconds. The heater may be switched on again during the run-on period; when the run-on period is finished the heater will switch on again.

A 20 litre insulated buffer tank has been included in the system. This guarantees longer run-times resulting in the combustion being self-cleaning. A thermostatically adjustable electrical heating element has also been installed in the system, capacity 850 watts at 230 volt.

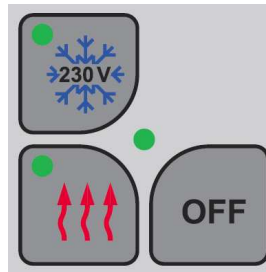
3.5 Control

Watch out: service switch on electronic control assembly must be switched on (see also page 21)

The control panel has 3 or 4 buttons, depending on the model, and is standardly supplied with a white glossy outer rim. (Bticino Light series)



Control panel for BC and T



Control panel for model CH

The buttons have the following functions:

Stand-by on shore voltage



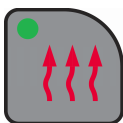
To keep the vessel or vehicle free from frost and condensation. The electrical heating element in the buffer tank is switched on by pushing the button, at the same time the circulation pump will start to turn. The heat will be given off by the radiators/convectors in the areas to be heated. (Only for a 230 V connection with sufficient capacity) Green LED lights up.

Automatic



Both the tap water and the central heating functions (model T) are activated by pushing this button. During this function the supply of heat to the heating circuit is interrupted as soon as hot tap water is required (the priority lies with the provision of hot water). Priority is also given to the hot water circuit during the heating up of the boiler (model BC). Green LED lights up. The central LED lights up when the heater is working.

Interior heating



Switches on the central heating system directly (model CH, T and BC) the supply to the boiler/tap water circuit is interrupted. Green LED lights up. The central LED lights up when the heater is working.

Off



Button for switching off the appliance

On appliances that are switched on, the circulation pump turns even when the heater is in the control pause. The middle lamp lights up when the appliance is operational and, on the Thermo versions, blinks when there is a fault.

A comprehensive description of the functions is given in chapter 5.1

3.6 Technical data

Central heating system model		DBW2010	DBW2016	Thermo230
Capacity max.	kW	11.6	16	23

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Voltage	V	12/24	12/24	24
Power consumption, including circulation pump	W	185	215	190
Fuel		diesel	diesel	diesel
Dimensions (lxwxh)	mm	800x520x270	800x520x270	800x520x270
Weight	Kg	38	38 (Tap:42)	44 (Tap:48)
Outlet connection	mm	38	38	70
CH water connection		1" inner 1¼" outer	1" inner 1¼" outer	1" inner 1¼" outer
Water temperature	°C	65-80	65-80	70-85
Max. operational pressure of cold water circuit	P bar	1.2	1.2	1.2
Medium		Coolant	Coolant	Coolant
Tap water capacity 50°C increase	l/min.		4.5	6.5

Central heating system model		Thermo 300	Thermo350	Thermo400
Capacity max.	kW	30	35	40
Voltage	V	24	24	24
Power consumption, including circulation pump	W	235	265	As yet unknown
Fuel		diesel	diesel	diesel
Dimensions (lxwxh)	mm	800x520x270	800x520x270	800x520x270
Weight	Kg	44 (Tap:48)	44	44
Outlet connection	mm	70	70	70
CH water connection		1" inner 1¼" outer	1" inner 1¼" outer	1" inner 1¼" outer
Water temperature	°C	70-85	70-85	70-85
Max. operational pressure of cold water circuit	P bar	1.2	1.2	1.2
Medium		Coolant	Coolant	Coolant
Tap water capacity 50°C increase	l/min.	8.5	-	-

3.7 Faults

In the unlikely event of a fault the appliance will automatically switch off. The run-on procedure will also start.

The operational indication LED (central LED on control panel) on the **Webasto DBW 2010 and DBW 2016** central heating systems will go out when there is a fault.

The heater will switch off if one of the faults below is identified.

- About 10 - 25 seconds after the voltage has fallen below the switching threshold.
- If combustion does not start within 30 seconds of the heating system being switched on.
- If the fuel supply is interrupted for longer than 10 seconds during the heating process,
- When the heating system overheats due to the temperature protection respectively the temperature limiter. Subsequently a similar temperature protection must be used as a replacement (taking into consideration colour properties) and the knob of the temperature limiter reset (after cooling to below 60°C).

Webasto Thermo 230, 300, 350 and 400 central heating systems are manufactured with a self-testing fault diagnosis system. A diagnosis can be made quickly and easily aided by the blinking code on the control panel (central LED on the control panel).

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After five short signals the long signals have to be counted: the number of impulses corresponds to the number in the table below.

Fault code	Description
01	No start
02	Flame interruption
03	Under or over voltage
04	Premature flame recognition
05	Flame detector defect
06	Temperature sensor defect
07	Solenoid valve defect
08	Motor combustion air fan defect
09	Circulation pump defect
10	Overheating / temperature limiter defect
11	Ignition coil defect
12	Heater locked *

***Reset heater lock:**

The heater can be unlocked by switching it on and interrupting the power supply for 10 seconds during the start up. After which the heater can be used again.

If there is a fault and definitely when there is a regularly repeated fault, you may appeal to a Webasto service station who are able to read out the fault with diagnosis equipment.

3.8 Maintenance

The appliance must be switched on at least once a month for at least 10 minutes outside the heating season. This avoids problems when the winter season begins.

Regular checks

- Check fuel and water lines for leaks.
- Check electrical connections for corrosion
- Check exhaust lines for blockages (dirt, grease, oil or soot).
- Check the water pressure in the CH installation regularly.

Annual check/maintenance

The following checks and maintenance work are required before every cold spell:

- Webasto PC diagnosis
- Replace fuel filter in supply line
- Inspect and clean the combustion chamber and replace atomizer if necessary
- Test run appliance (min. 10 minutes), check CO₂ and adjust if necessary.

A damp cloth, with perhaps a soap solution, is sufficient to clean the outside of the cover. Never use rough or solvent cleaning agents (abrasives, petrol, etc.) as they may damage the cover.

3.9 Decommissioning

If the appliance is to be decommissioned, for dismantling for instance, the following actions must be taken:

- Switch off the appliance (OFF button)
- Disconnect from voltage source
- Shut off fuel supply
- Close the stop cocks on the CH installation.
- Close the stop cocks on the tap water system

Note! The stop cocks are not included in the delivery of the appliance. They are installed separately by the installer. Ask him for information about the position and maintenance of these components.





Attention! Risk of damage! (if winter position is not used)
If the appliance is switched off, damage by frost to some parts of the CH installation cannot be avoided.

3.10 Removal and recycling

When removing the appliance the following actions are important for safety reasons and from an environmental point of view:

- Tap off the fuel and dispose of as chemical waste with the fuel filter.
- Tap off the CH water (coolant) and dispose of as chemical waste
- Separate the plastic and rubber parts from the metal and dispose of separately
- Put this manual with the old paper

4. Installation



Attention! Risk of damage! Installation may only be carried out by an installer authorised by Webasto!

4.1 Legal requirements for installation

The stipulations in Annex VII of directive 2001/56/EC and part 2 resp. Annex 7 of directive ECE R122 must in the first place be taken into consideration before installation.



Note! The stipulations in these directives are binding within the validity range of EC directive 70/156/EEC and must also be adhered to in countries where no special requirements exist!

See "Extract from the 2001/56/EC directive, annex VII" and "Extract from the 2001/56/EC directive, appendix IX". (Annex 1 and 2)



Attention! Not complying to the installation instructions and the directions contained in them will lead to exclusion from Webasto's liability. The same applies for unskilled repairs or repairs made without using original spare parts. This will result in invalidation of the type approval of the heater and therefore of its homologation/EC type approval.



Note! A note in accordance with § 19 paragraph 4 of annex VIII b of the Road Traffic Regulations relating to the technical requirements (StVZO) [German Road Traffic Licensing Regulations] is not necessary for vehicles with an EC type approval.

4.2 Installation location

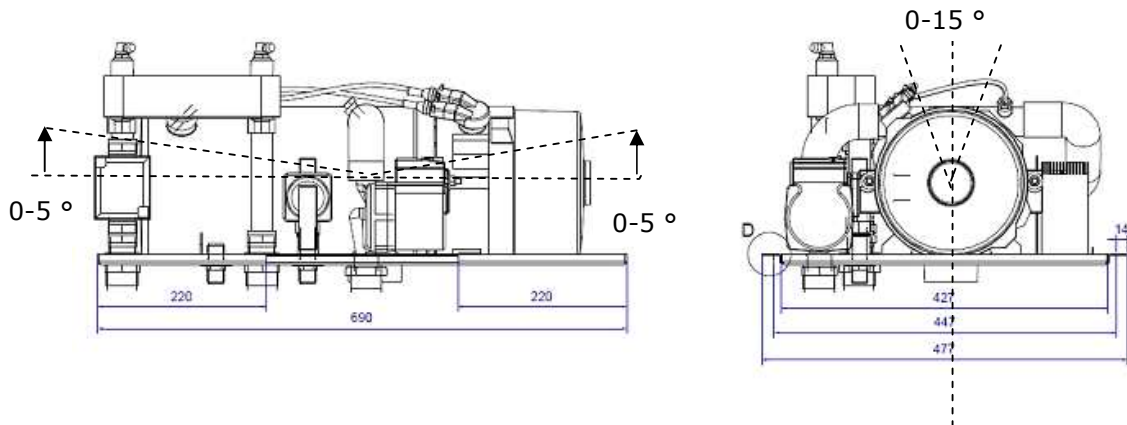
The Webasto central heating system can be fixed to the optional mounting bracket. The installation location should be as low down as possible to ensure natural bleeding of appliance and pump.

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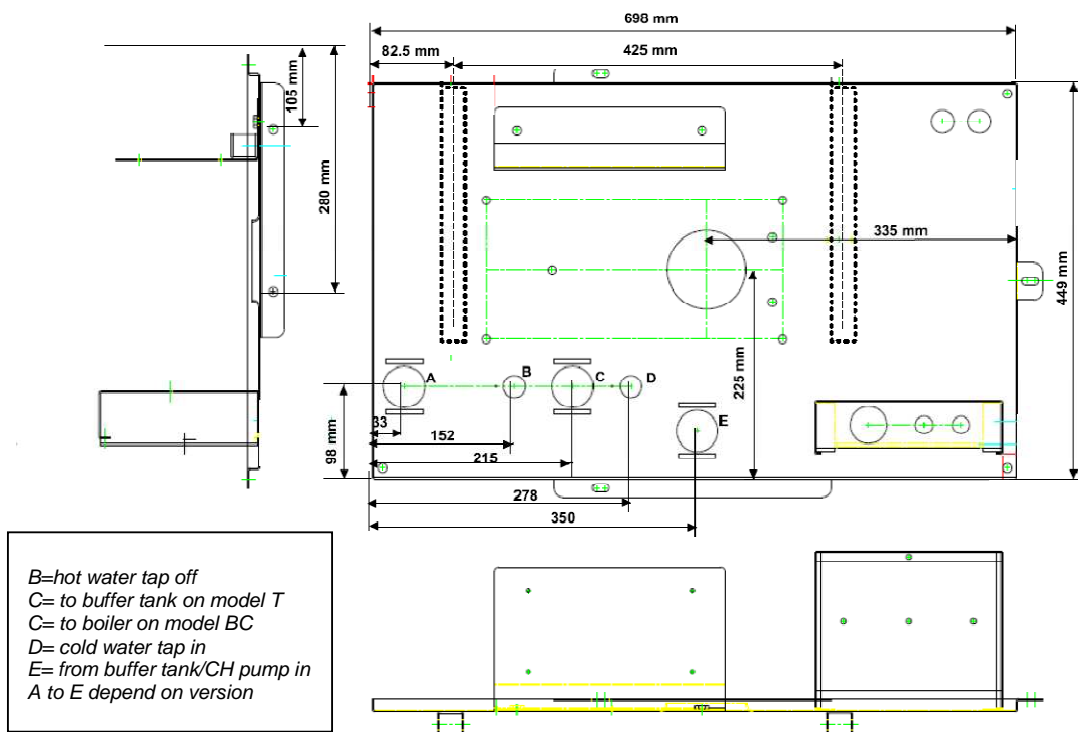
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If it cannot be placed in the engine room, the Webasto water heater can be installed elsewhere as long as it is protected from dirt and moisture. The installation must have no influence on other systems present in the vehicle or vessel.



Note! When choosing the location take accessibility for maintenance and service work into consideration.



See also the detailed description of the heater installed in the system

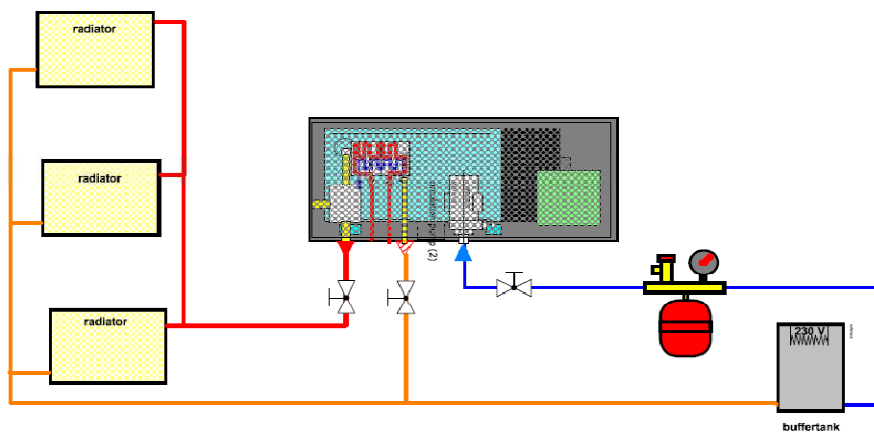
4.3 The heating water system

The central heating system can be connected in two ways, to a closed system or to an open system.



Note! We advise the installation of a closed heating circuit in vessels less than 15 metres long for the system to work optimally.

Schematic representation of "closed" system, expansion tank with pressure meter and filling/emptying tap



Closed system

A higher system pressure is used in closed systems making bleeding is easier; automatic bleeding devices can also be included in the system. Automatic bleeding devices only work on straight lines if the flow speed is reduced and air bells have the chance to separate and escape upwards.

This pressure system must be expanded with an expansion tank with pre-pressure "Pmax = 1bar cold"

The size of this expansion tank depends on the content of the total heating circuit. Use the following principle: 1 litre content in the expansion tank per 19 litres cooling agent.

The system is brought up to a pre-pressure of maximum 1 bar through the filling tap.

The advantage of a closed system is the greatly decreased risk of vapour locks in the water circuit.

Open system

An open system with a buffer/expansion tank is easy to maintain for filling and automatic bleeding. However the first bleeding of the farthest points could be difficult due to the limited pre-pressure. Large air bells are stubborn because of the limited movement of water by the circulation pumps; the system can be completely bled by opening the heating circuits one by one.

10 litres ensures an adequate buffer during heating (read expansion) of the coolant.

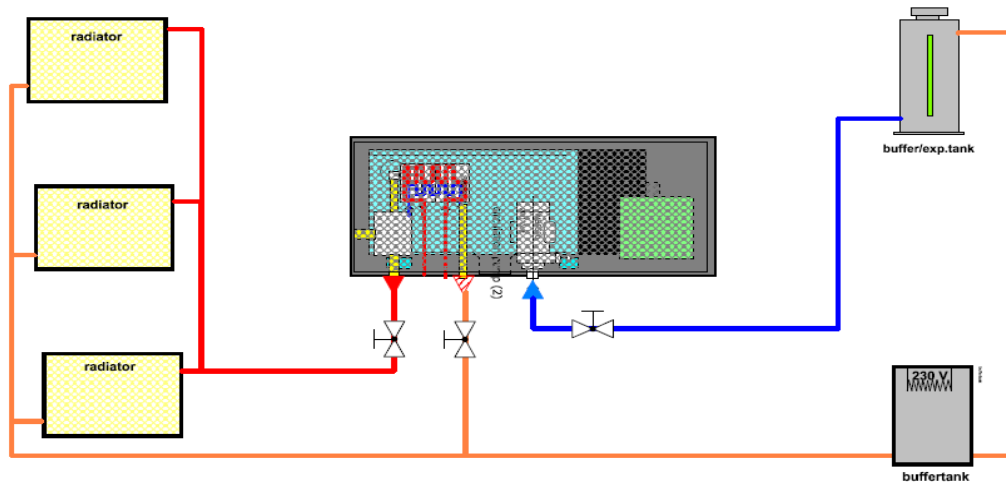
The filler cap has a pressure regulator which bleeds at an overpressure in the system of 0.4 bar.

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Schematic representation of "open" system,
buffer/expansion tank as highest point



The buffer or **expansion** tank must be placed at the highest point and parallel to the line supplying the central heating system.



Attention! Risk of damage! Fill the systems only with an anti-freeze mix or coolant.

The stainless steel buffer tank supplied has 2 functions:

1. Increasing the content of the heating circuit which ensures sufficiently long operating periods.
2. Includes the electrical 230 volt 750 W heating element which can be switched on separately to protect the system from frost/ for additional electrical heat.

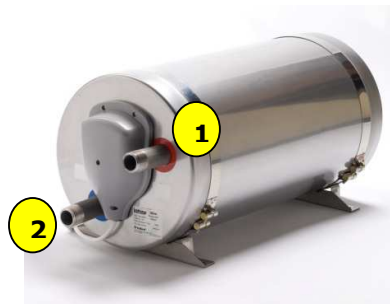
Two thermostats under the connection cover are included (adjusted ex-factory):

1. To switch off the electric element at approx. 35 °C
2. To switch off the central heating system in the stand-by function at 65 °C

Installation: in series in the return line to the heating system. The tank can be installed vertically and horizontally, watch out for the inlet and outlet, see picture. The connection must point upwards when installing vertically.

1. Supply from the system

2. Return to the CH system



The earthed plug may be put into a sufficiently protected 230 volts plug socket, capacity electrical element 230 volt 750 watt, when the system has been filled up.

The separate two-pole AMP plug for the buffer tank thermostat is connected to the electronic control assembly.

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Hoses and pipelines

An installation that is installed with copper or plastic lines (Hep2O) could be chosen. Webasto can also supply pre-insulated Hep2O lines.

If hoses are used they must comply with DIN73411 at least.

The hoses must be kink-free and be installed on a rise for automatic bleeding where possible.

Hose connections must be fixed with hose clamps.



Note! Always use lines/hoses with sufficient internal diameters.

This limits flow resistance in the system to a minimum. Use the following pipe diameters:

Webasto Marine Central heating system DBW series minimal 22mm.

Webasto Marine Central heating system Thermo series minimal 28 mm.

Including an automatic bleeding device in the system is recommended.

It is not part of the scope of delivery.

Water distribution blocks

Make sure that a system can be synchronised, in other words that the resistance of a circuit can be adjusted by means of a tap. This prevents too little hot water reaching certain parts of the system.

Distribution blocks could be used to distribute the various circulation circuits. Good distribution is possible due to the installed adjusting taps so that all elements/circuits heat up simultaneously.



Example of a distribution block with adjustable taps.



Attention! Risk of damage! There must always be sufficient circulation, even when the thermostat taps are closed.

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The proper working of a water system depends on several basic principles which apply to every installation:

- The temperature difference “coolant in – coolant out” must be no more than 15°C, measured at the heat exchanger, a larger temperature difference indicates too little circulation caused by too much resistance in the heating circuit; this could result in overheating or even in the heat exchanger being damaged.
- There must always be circulation; this means that if several ring lines lead to the heating circuit from the appliance, one must always stay open. Make sure that the heat exchangers cannot all be switched off, so do not install thermostatic taps on **all** the circuits, regulate the main circuit with an interior thermostat (electric) which switches the whole system off when the set value has been reached.
- The heating circuit can be connected as follows:
 - 1 – foreship with radiator/convector regulated by thermostat tap
 - 2 – salon with synchronisable radiator/convector (regulated by interior thermostat)
 - 3 – stern with radiator/convector regulated by thermostat tap

Heat exchangers

Place a heat exchanger in or as close as possible to the area to be heated. It is recommended that when several heat exchangers are installed they are connected parallel to each other. Ensure, if applicable, that air hoses are short with as few bends as possible and make sure there is a sufficient supply of air to be heated.

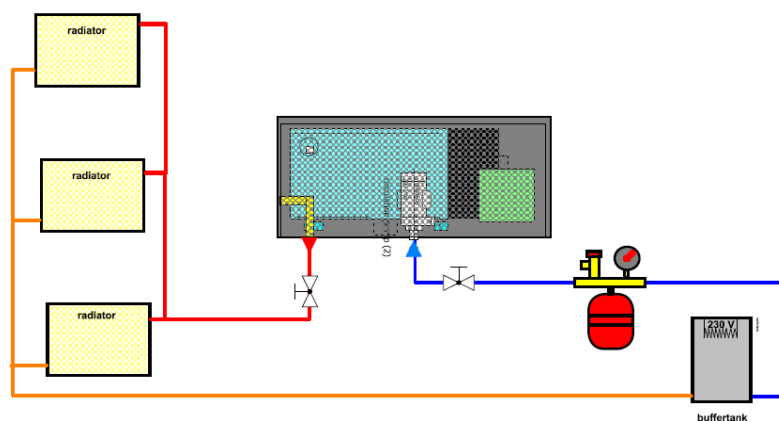
Take into account the fact that heat exchangers, used with fans (interior heaters) in a system with a tap water unit, will blow out cold air when hot water is drawn off and are better switched off. This could of course be done by means of an additional electrical switch.

Connections

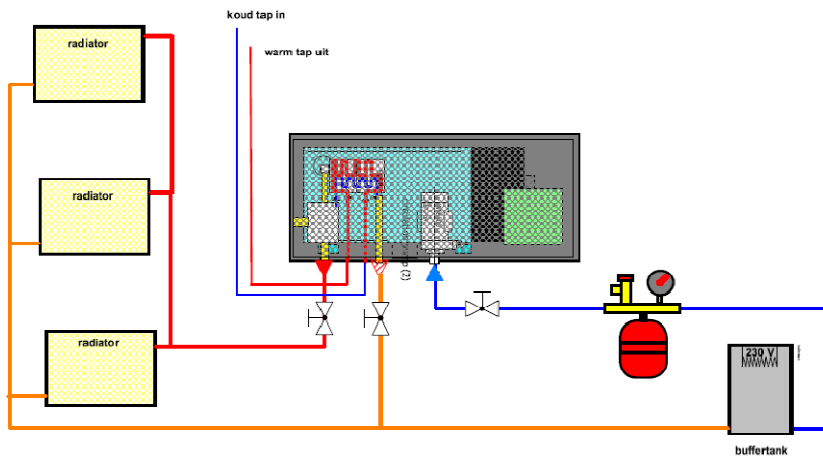


The screw thread connections on the central heating system measure 1" internally and 1¼" externally.

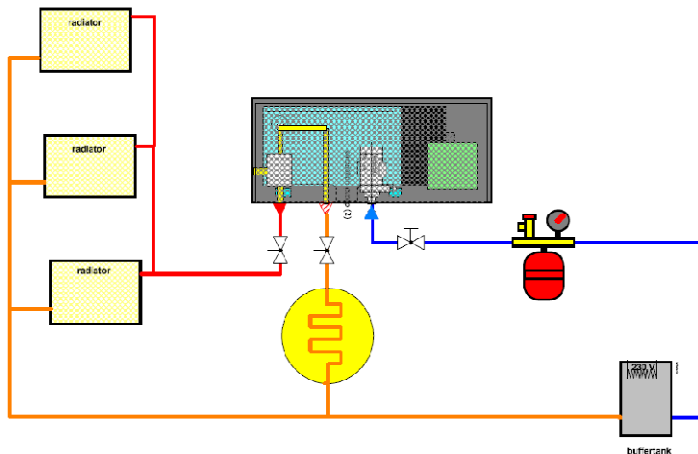
4.4 Principle water diagrams



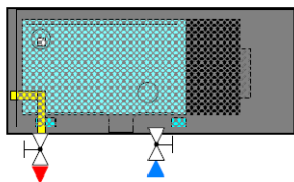
Circuit diagram of
central heating
Model CH



Circuit diagram of central heating with tap water model T



Circuit diagram of central heating with boiler control model BC



Circuit diagram of chiller integration model C

4.5 Fuel system

The fuel is taken from the vessel's fuel tank or from a separate fuel tank. If possible fuel lines must be installed on an incline to avoid air becoming trapped. If compression fittings have not been used, connections in the line must be made with hose clamps. If fuel lines are used, they must be hoses delivered or supplied by Webasto. If this is not possible, the hoses must comply at least to ISO 7840 (requirement for maritime applications!). The fuel hoses may not have kinks and not be twisted and must be attached with clamps every 25 cm. The usual materials used when building vehicles, such as steel and copper lines, may also be used as fuel lines. Plastic

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pipes made from soft composite, light and temperature stabilising PA 11 or PA 12 (e.g. Mecanyl RWTL) in accordance with DIN 73378 may also be used for non-maritime applications, together with the relevant connection techniques. The following must always be observed when installing the fuel lines:



Attention! The water jacket can reach the ignition temperature of diesel oil if coolant is not used when operations begin!



- Lines must be protected from mechanical and heat influences
- Leaking fuel must not collect nor may hot parts or electrical installations ignite

An information sticker must be applied in a highly visible place when a valve in the fuel line is installed.



Attention! Switching on with the fuel line closed could damage the fuel pumps! Fuel may explode. Risk of fire!



Trailing fuel lines must be attached to avoid sagging. Permissible dimensions of the fuel lines:

- Inner diameter of the suction and return lines: 6 mm
- Maximum permissible line length of suction and return line: 10 m
- Maximum permissible suction height: 2 m (installation of a foot valve is recommended at maximum suction height)
- Maximum permissible pre-pressure: 0.3 bar.

A fuel filter supplied or signed-off by Webasto must be installed (watch out for the flow direction). The filter must be changed at the beginning of each heating period to avoid faults.

4.6 Combustion air supply

The system draws in combustion air via slits on the underside of the plastic protective cover. These slits must therefore never become blocked in any way.

The combustion air must never be taken from areas where persons are situated. The installation space must be adequately ventilated by outside air, a free inlet/ventilation opening of 20cm² for the DBW2010-2016 and the Thermo 230 version. This opening must be at least 30 cm² for the Thermo 300 and at least 35 cm² for the Thermo 350. Under-pressure is not permitted in the installation location.

4.7 Exhaust outlet

The exhaust pipe opening must be placed so that it cannot become blocked by external influences. Rigid steel pipes of a minimum steel thickness of 1.0 mm or flexible pipes made from alloyed steel must be used as exhaust gas pipes. The outlet pipe is fixed to the heating system with a reliable exhaust clamp.

Permissible dimensions of the exhaust gas pipe:

- Inner diameter DBW2010-2016: 38 mm. Thermo 230-400: 70 mm
- Maximum permissible pipe length: 5 m without combustion air intake extension
- Maximum permissible number of bends: 270°



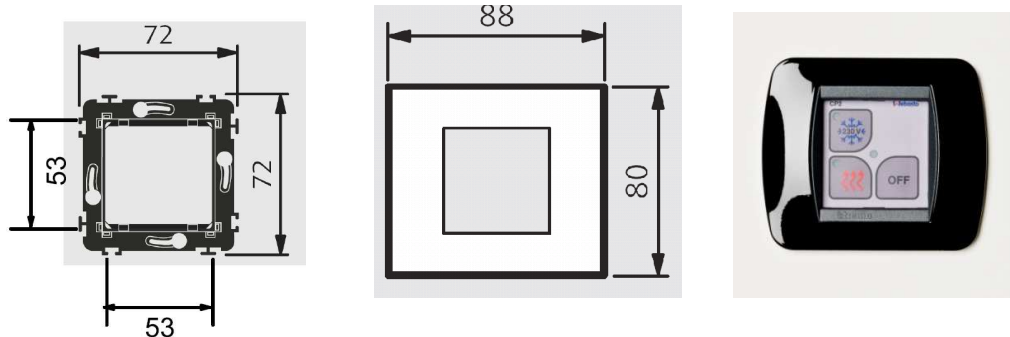
Note! The exhaust lines become extremely hot during operations and must not come into contact with flammable parts, the hose should be insulated if necessary!

It must be impossible for the exhaust gasses to penetrate the vehicle or vessel or be taken in by the ventilation system.

When installing the heater on board ships care must be taken that transit through the skin does not allow water to get into the appliance (by making a goose-neck in the outlet hose for instance).

4.8 Control panel

The control panel is suitable for building in. Make a 53 x 53 mm hole at the required place.



4.9 Circuit drawings

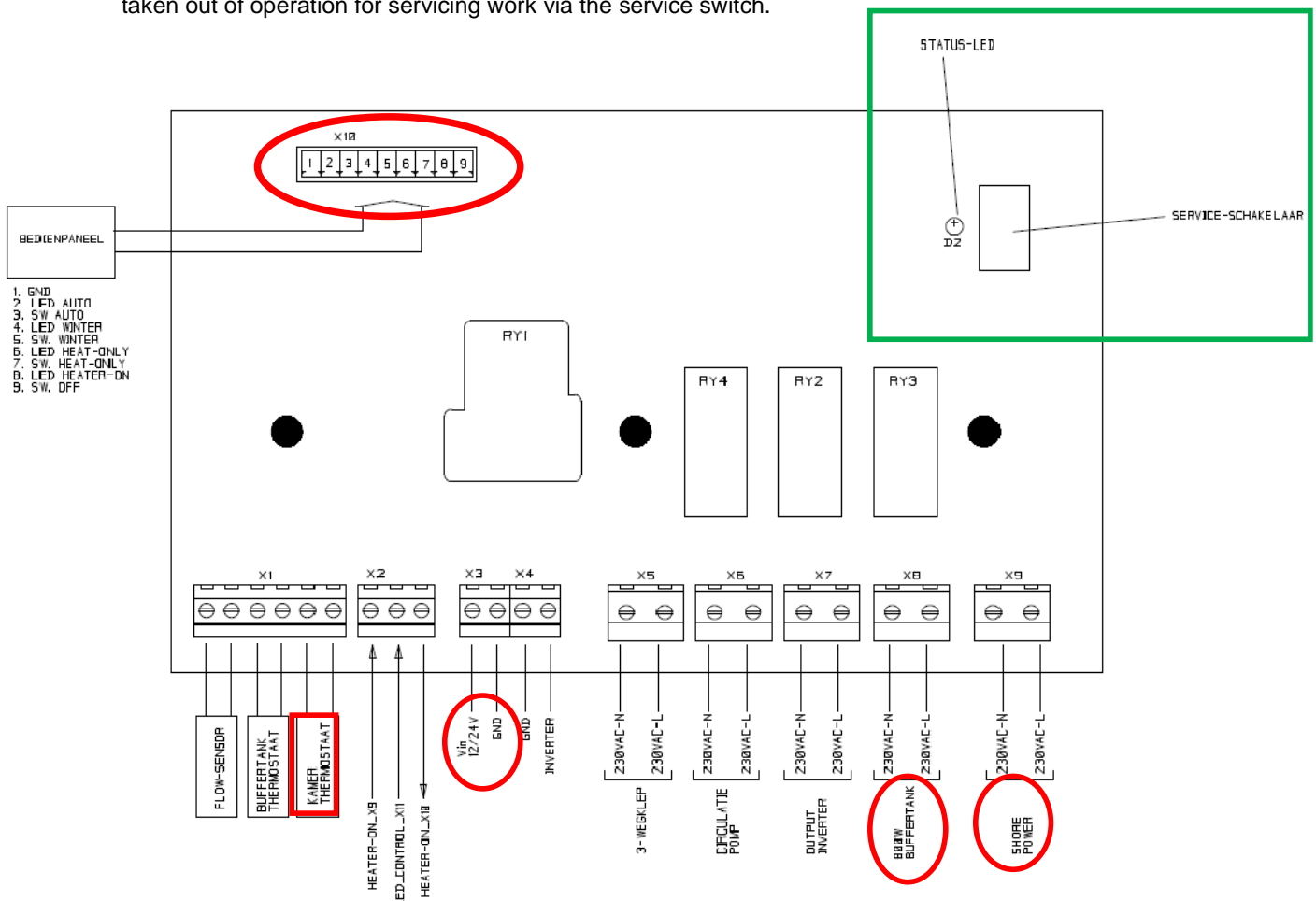
The installation must be connected according to the applicable circuit diagram:

- 4.10.1 DBW 2010-2016 central heating22
- 4.10.2 DBW 2010-2016 boiler23
- 4.10.3 DBW 2010-2016 tap24
- 4.10.4 DBW 2010-2016 chiller integration25
- 4.10.5 Thermo 230-400 central heating26
- 4.10.6 Thermo 230-300 tap27
- 4.10.7 Thermo 230-400 chiller integration28

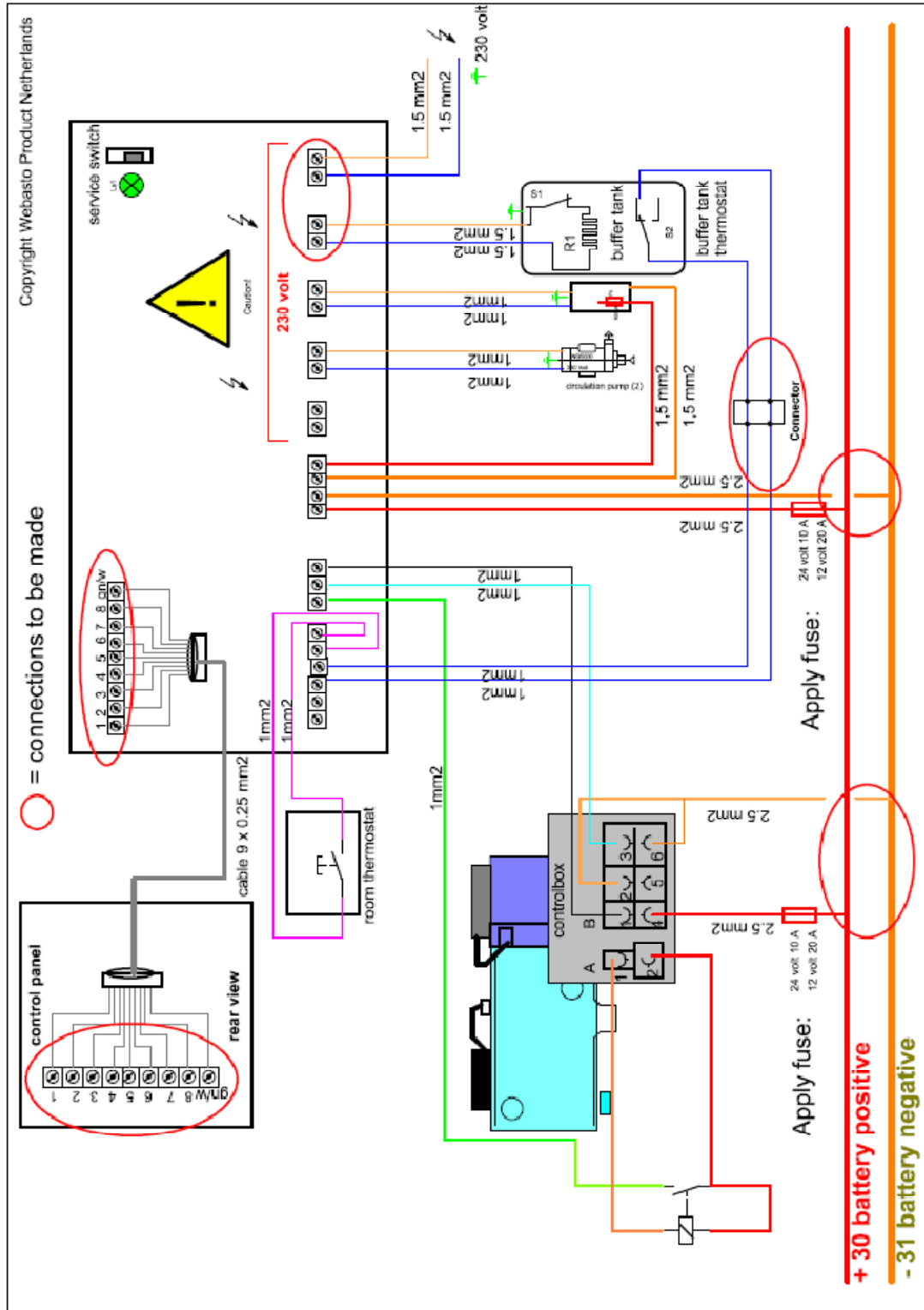
- The connections to be made by the installer on both the circuit diagrams and the following diagrams **are circled in red.**
 - 1) 12/24 volt: power supply and mass of heating system and power supply of electronic control panel, value of fuses are shown on the diagram.
 - 2) 230 volt power supply (for electrical heating element in buffer tank)
 - 3) 230 volt power supply to this element
 - 4) Room thermostat (not part of the scope of delivery)
 - 5) 9-core cable for control panel
 - 6) 2-core cable for thermostat in buffer tank
- A 9-core cable should be used for connecting the controls. This is not supplied. Minimum cable thickness 9 x 0.5 mm²
- The control cable can be fed through the rubber socket.
- Both the incoming 230 Volt connection and for the outgoing cable for the buffer tank element have their own separate feed throughs, use 3 x 1.5 mm² cable.
- Main feed DC 12/24 volt to 7.5 meter 4 mm², from 7.5 to 15 meter 6 mm².

4.10 Electronic control assembly

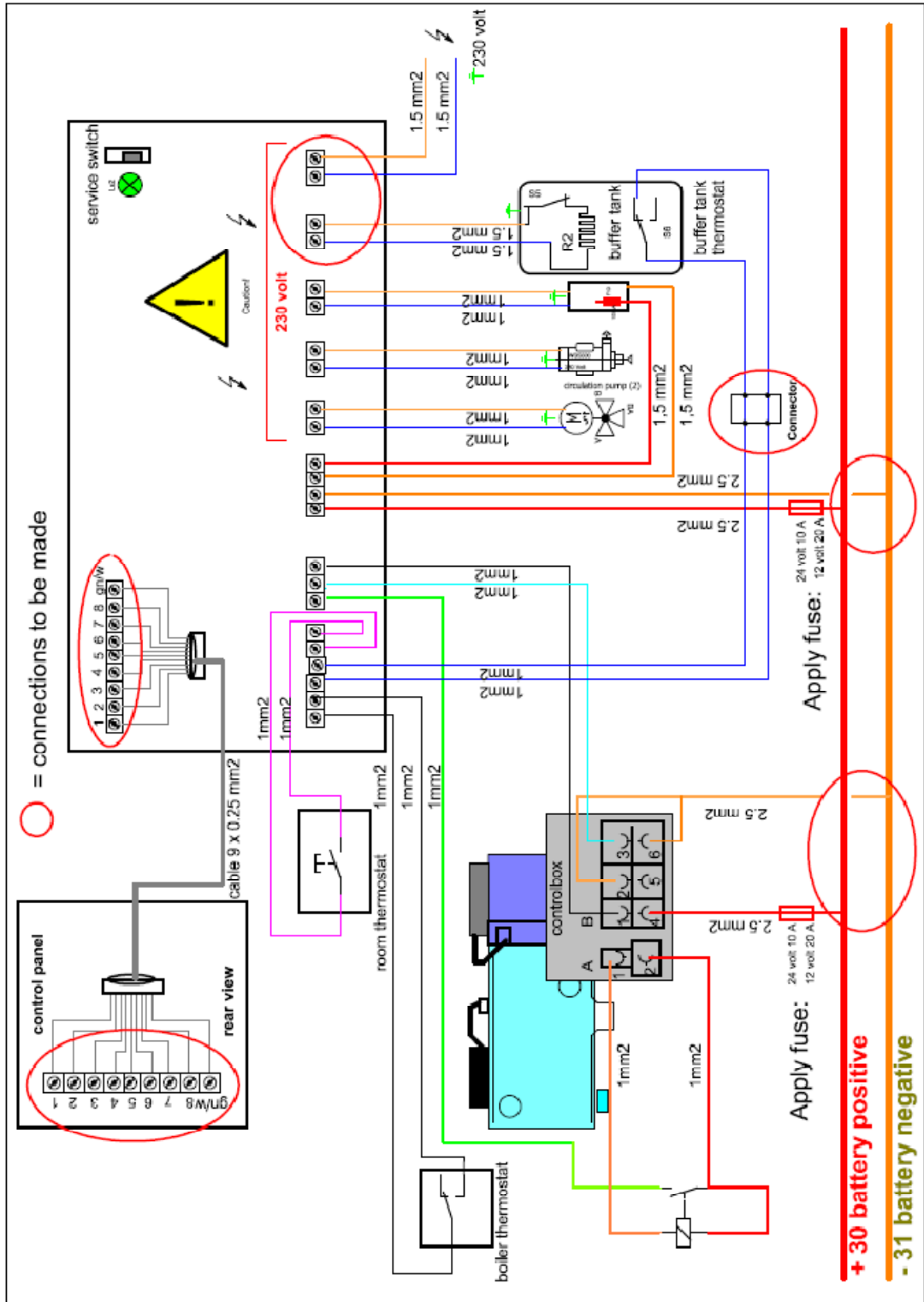
The electronic control assembly has a service switch and a control LED; faults are shown by means of a blinking code via the LED on the models from 23 kW upwards. The appliance can be taken out of operation for servicing work via the service switch.



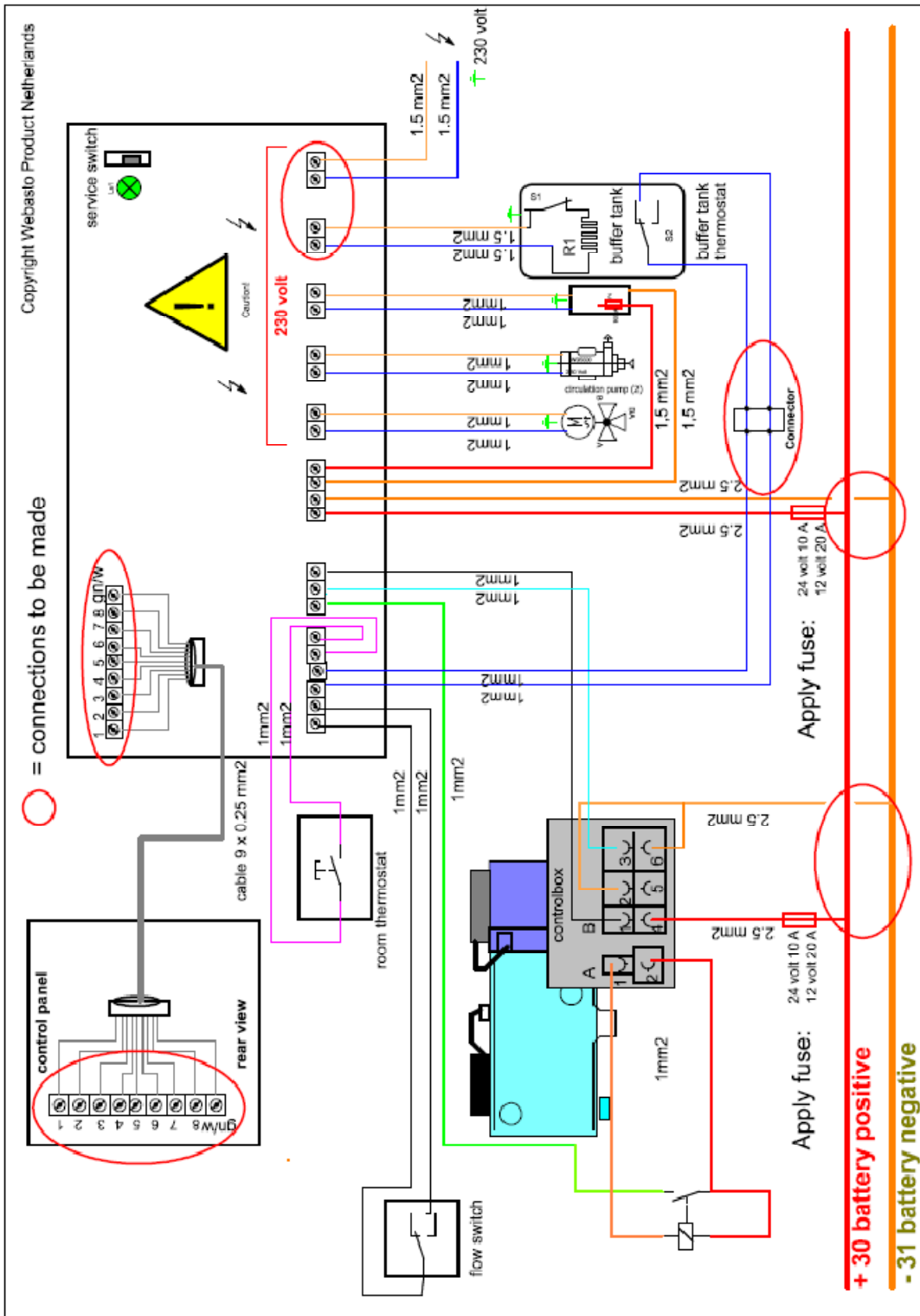
4.10.1 DBW 2010-2016 Central heating



4.10.2 DBW 2010-2016 boiler



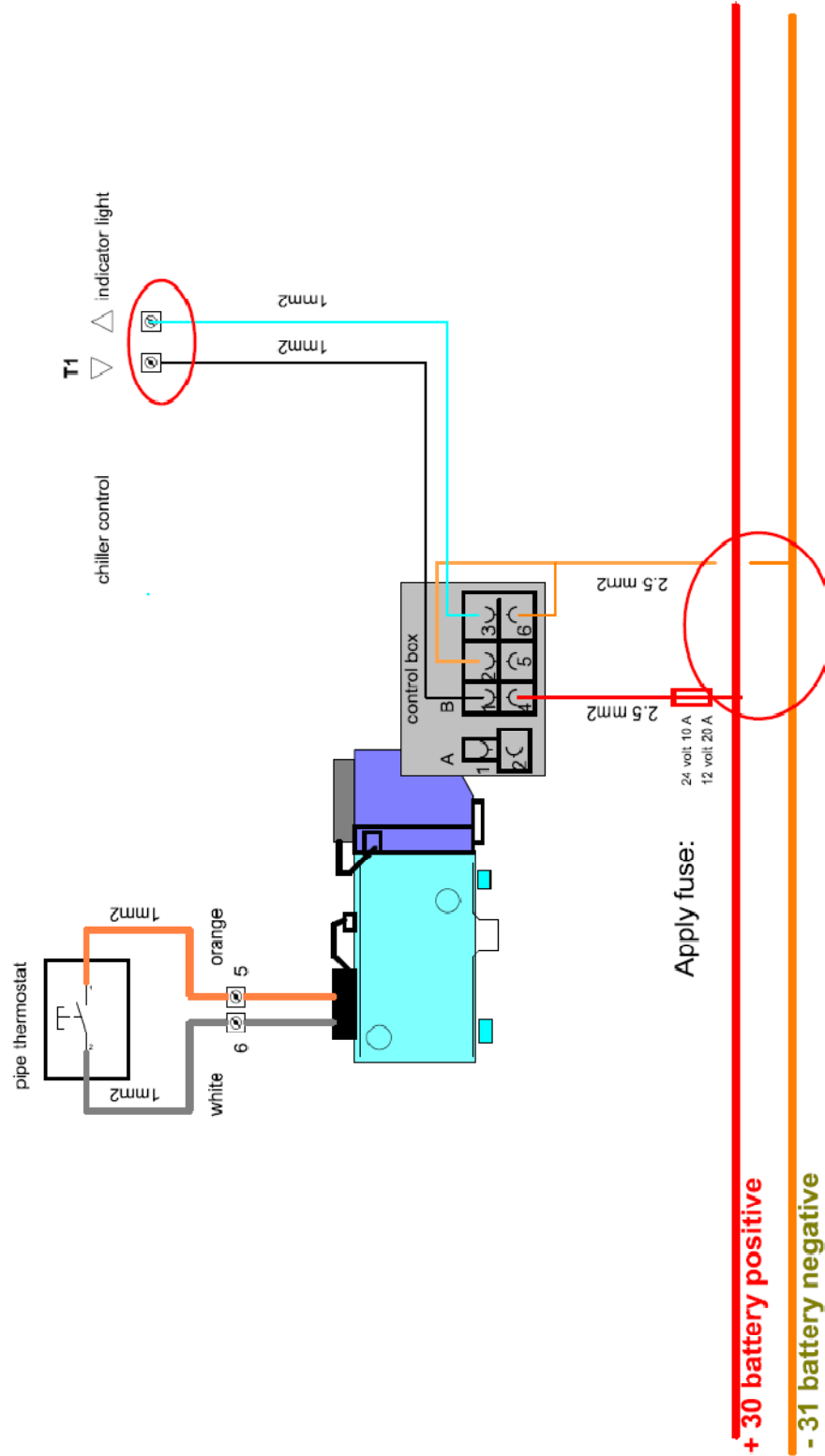
4.10.3 DBW 2010-2016 tap



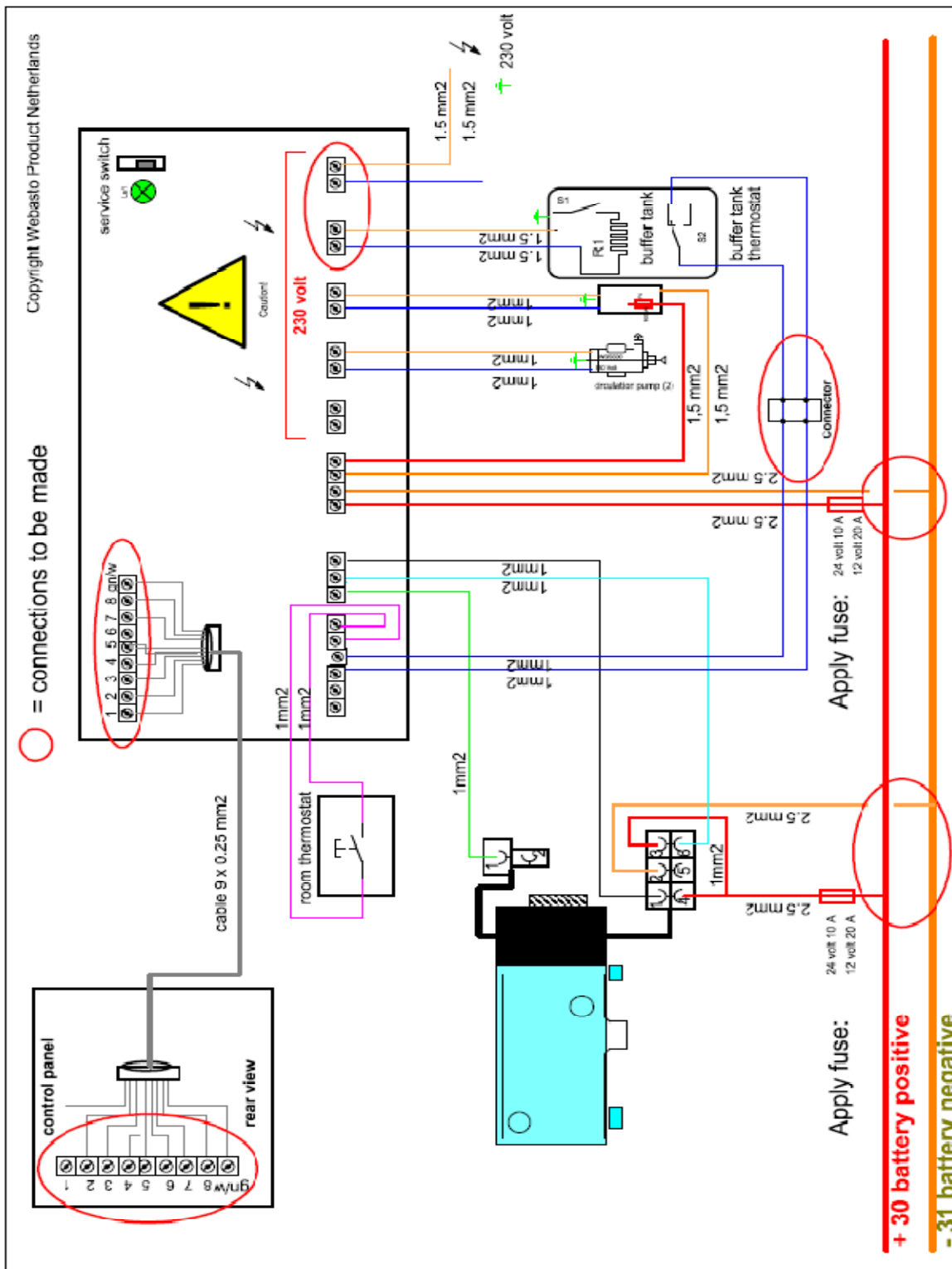
4.10.4 DBW 2010-2016 chiller integration

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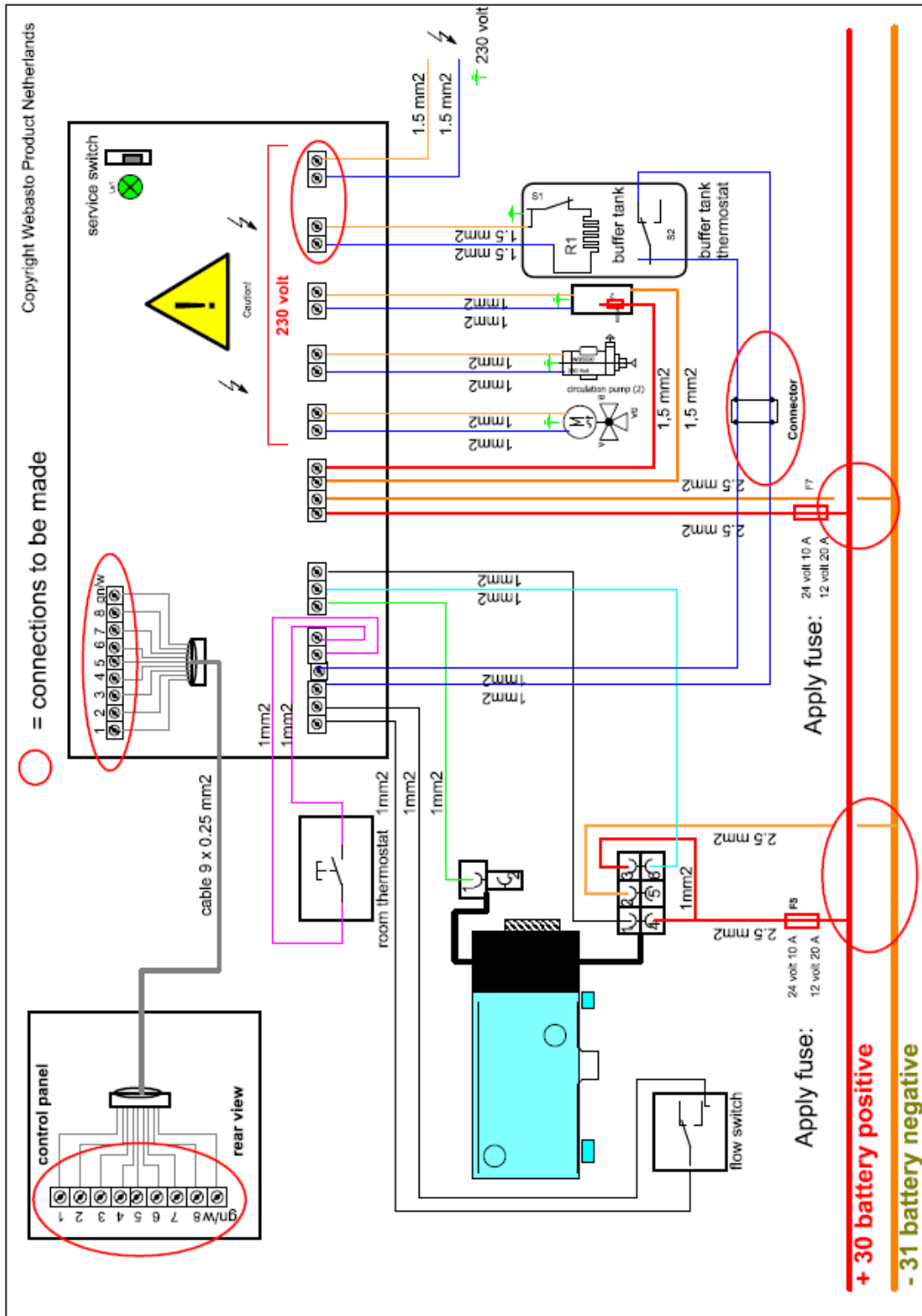
○ = connections to be made



4.10.5 Thermo 230-400 central heating



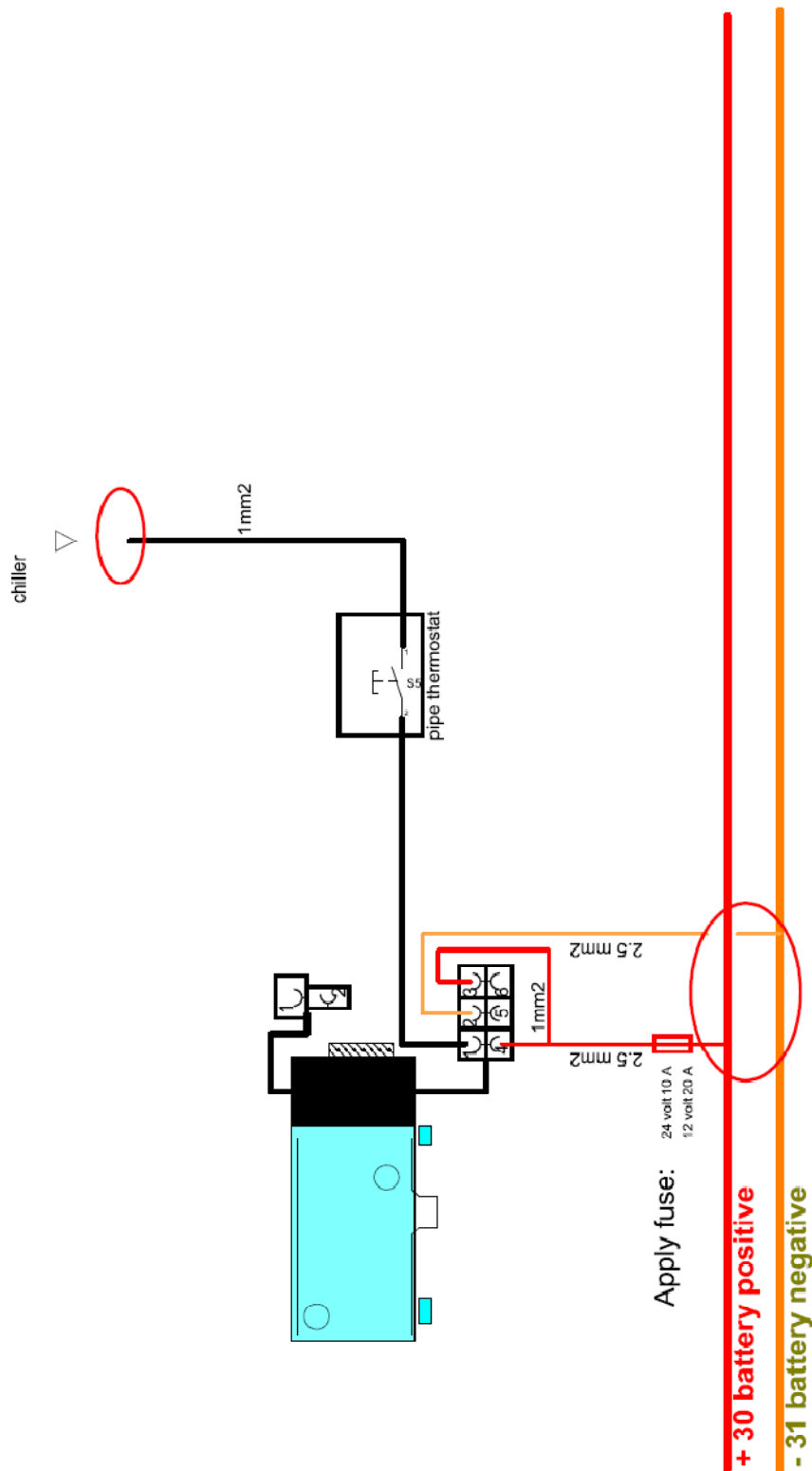
.10.6 Thermo 230-300 tap



4.10.7 Thermo 230-400 chiller integration

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○ = connections to be made



5.1 First start-up

After installation of the heating system the water circuit and fuel circuit must be carefully bled.

- Fill up the water circuit and perform a static bleed. If necessary top-up the system and bring it to the correct pressure.
- The two line fuel circuit is self-bleeding, method of work: switch on heater, turn room thermostat to requested temperature, appliance will switch on, switch appliance off again after approx. 12 seconds. Appliance starts run-on mode, during this period the fuel system will bleed itself, repeat this if necessary.
- Now switch on the heater, appliance will start to heat up and gradually reach the chosen temperature.
- Check all the connections for leaks.

6.1 Operation sequence of CH version (model CH)



- push button
- LED lights up, installation ready to start
- interior thermostat (not included in delivery) closes (heat requested)
- heater starts up
- central operation control LED lights up
- heat is emitted to interior by heat exchanger
- maximum CH water temperature is reached
- combustion stops, circulation pump continues to turn
- CH water cools down, burner is switched on again
- Interior thermostat reaches required value
- Heater is switched off, central control LED goes out
- The circulation pump is also switched off at the end of the cooling off period
- If area cools down again, switch off interior thermostat and heater will start to heat up again



- Push button, LED goes out
- Installation is turned off completely

6.2 Operation sequence of TAP version (model T)



- push button
- LED lights up, installation ready to start
- Buffer tank temperature lower than 65°C
- central operation control LED lights up
- Heater starts to heat up, circulation pump starts to turn, combustion until value of heater thermostat in buffer tank is reached (65°C)
- Heater in run-on mode, circulation pump is also out afterwards
- Hot water is requested (shower/tap)
- Circulation pump is switched on
- Heat is taken from the buffer tank and emitted to tap water via heat exchanger plates
- If this period takes longer than 15 sec the heater is also switched on and heats this up to max. 85°C
- interior thermostat (not included in delivery) closes (heat requested)
- the appliance remains in this function for as long as the hot water is being used
- the CH function stops only when the hot water is no longer requested
- three-way tap turns to CH position
- heater starts up
- heat is emitted to interior through radiators etc.
- maximum CH water temperature is reached
- combustion stops, circulation pump continues to turn
- CH water cools down, burner is switched on again
- Interior thermostat reaches required value
- Heater is switched off, central operating indication LED goes out

- The circulation pump is also switched off at the end of the cooling off period
- If area cools down again, switch off interior thermostat and heater will start to heat up again
- If hot water is requested during the CH phase, the three-way tap turns to the tap position, heating of the interior is interrupted.
 - Push button, LED goes out
 - Installation is turned off completely



6.3 Operation sequence of Boiler Control version (model BC)



- push button
- LED lights up, installation is ready
- Buffer tank temperature lower than 65°C
- central operation control LED lights up
- Heater starts to heat up, circulation pump starts to turn, combustion until value of heater thermostat in buffer tank is reached (65°C)
- Heater in run-on mode, circulation pump is also out afterwards
- Boiler thermostat closes (boiler cold)
- Heater is switched on and heats up to max. 85°C
- interior thermostat (not included in delivery) closes (heat requested)
- the installation remains in the boiler position as long as boiler thermostat is not opened (boiler warm).
- Boiler at requested temperature
- three-way tap turns to CH position
- heater starts up
- heat is emitted to interior through radiators etc.
- maximum CH water temperature is reached
- combustion stops, circulation pump continues to turn
- CH water cools down, burner is switched on again
- Interior thermostat reaches required value
- Heater is switched off, central operating control LED goes out
- The circulation pump is also switched off at the end of the cooling off period
- If area cools down again, switch off interior thermostat and heater will start to heat up again
- If the boiler cools down during the CH phase, the three-way tap will turn to the boiler position again, heating of the interior will be interrupted.
 - Push button, LED goes out
 - Installation is turned off completely



6.1 Operation of Chiller version (model C)

In this combination the whole control is done by the electronics in the Webasto air-conditioner and there is no separate control panel for the heater. The buffer tank also becomes invalid in this situation.

The temperature of the air handlers must not be higher than 55°C in a Webasto Marine air-conditioning system; the clip-on thermostat on the heater ensures this setting.

7 Appendix 1- Extract from the directive 2001/56/EC Annex VII

Start of extract.

ANNEX VII

REQUIREMENTS FOR COMBUSTION HEATERS AND THEIR INSTALLATION

1. GENERAL REQUIREMENTS

1.7.1. A clearly visible tell-tale in the operator's field of view shall inform when the combustion heater is switched on or off.

2. VEHICLE INSTALLATION REQUIREMENTS

2.1. Scope

2.1.1. Subject to point 2.1.2, fuel-fired heating systems must be installed in accordance with the directions in this appendix.

2.1.2. Category O vehicles with heating systems which run on liquid fuel are expected to comply with the directions in this appendix.

2.2. Positioning of heater

2.2.1. Body sections and any other components in the vicinity of the heater must be protected from excessive heat and the possibility of fuel or oil contamination.

2.2.2. The combustion heater shall not constitute a risk of fire, even in the case of overheating. This requirement shall be deemed to be fulfilled if the installation ensures an adequate distance to all parts and suitable ventilation, by the use of fire resistant materials or by the use of heat shields.

2.2.3. In the case of M2 and M3 vehicles, the heater must not be positioned in the passenger compartment. However, an installation in an effectively sealed envelope which also complies with the conditions in paragraph 2.2.2 may be used.

2.2.4. The label referred to in paragraph 1.4, or a duplicate, must be positioned so that it can be easily read when the heater is installed in the vehicle.

2.2.5. Every reasonable precaution should be taken in positioning the heater to minimise the risk of injury and damage to personal property.

2.3. Fuel supply

2.3.1. The fuel filler must not be situated in the passenger compartment and must be provided with an effective cap to prevent fuel spillage.

2.3.2. In the case of liquid fuel heaters, where a supply separate to that of the vehicle is provided, the type of fuel and its filler point must be clearly labelled.

2.3.3. A notice, indicating that the heater must be shut down before refuelling, must be affixed to the fuelling point. In addition a suitable instruction must be included in the manufacturer's operating manual.

2.4. Exhaust system

2.4.1. The exhaust outlet must be located so as to prevent emissions from entering the vehicle through ventilators, heated air inlets or opening windows.

2.5. Combustion air inlet

2.5.1. The air for the combustion chamber of the heater must not be drawn from the passenger compartment of the vehicle.

2.5.2. The air inlet must be so positioned or guarded that blocking by rubbish or luggage is unlikely.

2.6. Heating air inlet

2.6.1. The heating air supply may be fresh or recirculated air and must be drawn from a clean area not likely to be contaminated by exhaust fumes emitted either by the propulsion engine, the combustion heater or any other vehicle source.

2.6.2. The inlet duct must be protected by mesh or other suitable means.

2.7. Heating air outlet

2.7.1. Any ducting used to route the hot air through the vehicle must be so positioned or protected that no injury or damage could be caused if it were to be touched.

2.7.2. The air outlet must be so positioned or guarded that blocking by rubbish or luggage is unlikely.

2.8. Automatic control of the heating system

End of extract

7 Appendix 2 – Extract from the directive 2001/56/EC Annex IX

Start of extract.

ANNEX IX/3. Technical specifications for heater units for installation in dangerous goods transporters

3.1. General (EX/II, EX/III, AT, FL and OX vehicles)

3.1.1. The combustion heaters and their exhaust gas routing shall be designed, located, protected or covered so as to prevent any unacceptable risk of heating or ignition of the load. This requirement shall be considered as fulfilled if the fuel tank and the exhaust system of the appliance conform to the provisions set out in the points 3.1.1.1 and 3.1.1.2. Compliance with those provisions shall be verified on the completed vehicle.

3.1.1.1. Any fuel tanks for supplying the appliance shall meet the following requirements:

(a) in the event of any leakage, the fuel shall drain to the ground without coming into contact with hot parts of the vehicle or the load;

(b) fuel tanks containing petrol shall be equipped with an effective flame trap at the filler opening or with a closure enabling the opening to be kept hermetically sealed.

3.1.1.2. The exhaust system as well as the exhaust pipes shall be so directed or protected to avoid any danger to the load through heating or ignition. Parts of the exhaust system situated directly below the fuel tank (diesel) shall have a clearance of at least 100 mm or be protected by a thermal shield.

3.1.2. The combustion heater shall be switched on manually. Programming devices shall be prohibited.

3.2. EX/II and EX/III vehicles

Combustion heaters using gaseous fuels are not permitted.

3.3. FL vehicles

3.3.1. The combustion heaters shall be put out of operation by at least the following methods:

(a) intentional manual switching off from the driver's cab;

(b) stopping of the vehicle engine; in this case the heating device may be restarted manually by the driver;

(c) start-up of a feed pump on the motor vehicle for the dangerous goods carried.

End of extract.

7 Annex 3 - Warranty stipulations

LIMITED WARRANTY

Installation / Validation & Authorisation

All Thermo products must be installed by authorised installers or the installation must be reviewed and approved by an authorised installer.

To be considered for worldwide warranty cover, an authorisation should be issued for each installation/application sign-off in accordance with the Marine Commissioning & Validation (MCV) report and they should be completely documented. This applies only to the first signed-off, representative applications in the case of OEM installations.

The complete authorisation and validation procedure is explained in Webasto's Thermo Intercompany Warranty Manual.

Limitations and Exclusions

This warranty is limited to repair and replacement. The warranty does not cover:

- Incidental damage and or consequential damage resulting from faults in the Webasto Thermo system
- Failure of the system due to normal wear and tear, accident, misuse, abuse, lack of reasonable and necessary maintenance, unauthorised installation or repair by the end-user, alterations, civil disturbances or acts of God.
- Transportation damages. This should be claimed directly from the forwarding company.
- Repair costs due to faults in the Thermo appliance caused by negligence, improper installation or no respect for the installation guidelines (installer's fault) will be funded by country of repair to repair dealer and charged to country of origin / original installer upon evidence collected/documented during repair (pictures highly recommended).
- The limited warranty is extended only to the original application and is not transferable.
- Any intervention by a third person or company not specifically and authorised to carry out repair work by Webasto beforehand will void the Webasto warranty and Webasto will not pay out compensation.

Responsibilities of the owner

- 1) Perform Webasto recommended maintenance procedures as described in this document.
- 2) Proof of purchase is required for all units.
- 3) Ask the installer of your Webasto Thermo system or your Webasto subsidiary for a copy of the Validation Report. Always keep a copy of the report together with the system.

THE WARRANTY DESCRIBED IN THIS POLICY SHALL BE IN LIEU OF ANY OTHER WARRANTY, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

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