

## *Comfort Climate on Board*



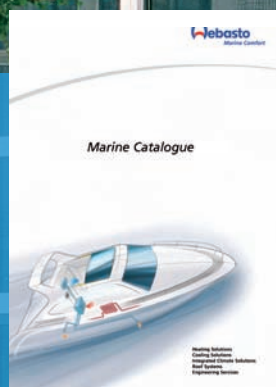
Perfect climate on board – wherever, whenever!

[www.webasto-marine.com](http://www.webasto-marine.com)





*Please consult  
our Webasto  
Marine  
Catalogue for  
more detailed  
product  
information.*



## *Webasto – A long tradition of quality climate solutions*

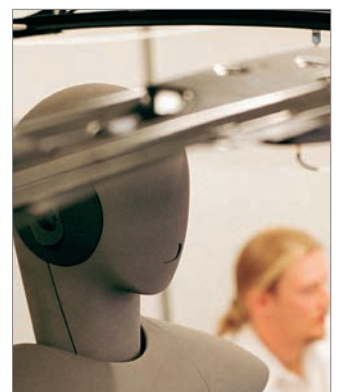
Webasto is **one of the leading suppliers of comfort solutions** for vessels and vehicles of all kinds. Established in 1901 and head-quartered in Stockdorf near Munich, Webasto is still owned by its founding family. With the experience and know-how of a long company history, Webasto has developed into one of the leading suppliers for comfort solutions on any vehicle or vessel. Since 1950 Webasto has also been specialising in the Marine market segment. Over this period, Webasto has continuously enlarged its product portfolio and has reached the unique position of being able to deliver **complete climate control solutions (heating, cooling, fresh air)**. This product offering turns out to be a decisive competitive advantage in the market.



Webasto heater advertisement in the 1950's

### **Outstanding quality ...**

... is our commitment by tradition. Through constant testing, we ensure the best comfort for our customers. Webasto is specialised in testing its solutions using the latest instruments from the automotive industry.



Acoustics laboratory at Webasto

# Innovative Comfort Solutions

## Heaters: Webasto BlueHeat



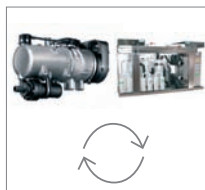
Popular Webasto heaters already used in marine applications

## Air conditioners: Webasto BlueCool



Product range enlargement with air conditioners

## Integrated climate solutions: Webasto BlueComfort



Combining product benefits into intelligent climate control solutions

## Roofs: Webasto Marine Roofs

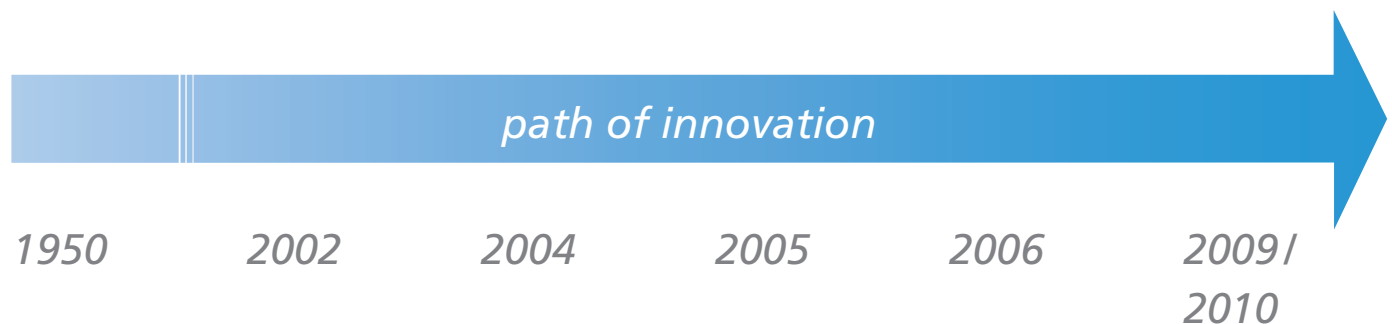


Webasto presents roof platforms where size, curvature and design can be customized

## Controls: Webasto BlueComfort



Intuitive touch screen panel for the central control of climate solutions



# Webasto Marine Comfort Product Offer

## *Heaters: Webasto BlueHeat*



### **High-performance air and water heaters for perfect comfort on board!**

Webasto has a long tradition in the heating business for vehicles and vessels. Proven heaters such as the Air Top or Thermo Top are popular worldwide and are used in many different boat applications.

With heating outputs ranging from 2 kW up to 35 kW, Webasto offers one of the widest product ranges in the Marine Industry.

► See pages 6–9

## *Air Conditioners: Webasto BlueCool*



### **Compact solutions for on-board air conditioning!**

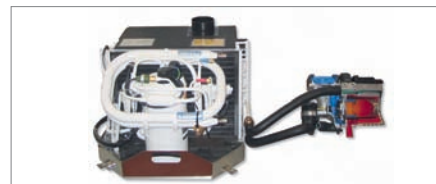
Our BlueCool air conditioner range leaves it up to the customer to decide which technology is the best for each application.

With the BlueCool Classic models, Webasto offers a self-contained air conditioner; perfectly suitable for vessels with up to three cabins.

The BlueCool Premium chiller range offers a large power range to fit any size of boat or superyacht and provides the required amount of cooling wherever it is needed.

► See pages 10–13

## *Integrated Climate Solutions: Webasto BlueComfort*



### **Perfect climate control in any weather!**

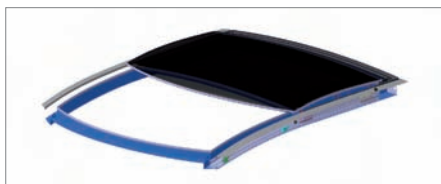
Most air conditioning systems have a reverse cycle function to enable heating with the AC system. However, this requires mild sea water temperatures for efficient heating. To gain total independence from external temperatures, Webasto offers the BlueComfort systems.

It consists of a water heater and a BlueCool air conditioning unit integrated in one system. These unique solutions are cost efficient, space-saving and deliver the perfect climate out of one central system.

► See pages 14–17



## *Roof Platform Solutions: Webasto Marine Roofs*



**There is a Webasto roof solution for every boat!**

Webasto offers its customers a wide range of roof solutions. With the customisable Marine Roof platforms, the customer profits from robust, pre-developed platforms benefitting from Webasto's worldwide technological leadership in automotive sunroofs.

Webasto Engineering Services even go one step further; Webasto helps shipyards to develop unique and exclusive roof systems to match their exact specifications.

► See pages 20–22



# CHOOSE YOUR HEATER!



## **BlueHeat air heaters**

- Short heating-up times thanks to efficient heat performance
- Available as a complete installation kit for quick and simple retrofitting
- Dehumidification of cabins
- Quiet-running
- Ideal for sailing and motor boats up to 40 feet

*OR ...*



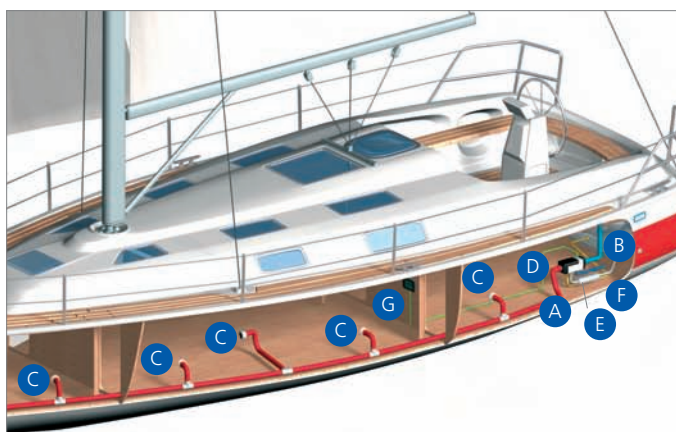
## **BlueHeat water heaters**

- Even distribution of warmth by means of radiators or fan heaters
- Hot water for the galley and showers
- Quiet-running
- Space-saving installation in the engine room
- Excellent possibilities for combining with Webasto BlueCool air conditioning systems



# Webasto BlueHeat Air Heaters

## Installation Example:



- A** Space-saving and inconspicuous installation
- B** Intake for fresh air from outside
- C** Outlets for even distribution of warm air
- D** Safe and clean: the fuel system
- E** Combustion-air intake
- F** Stainless steel exhaust
- G** Controls – simple and logical to use



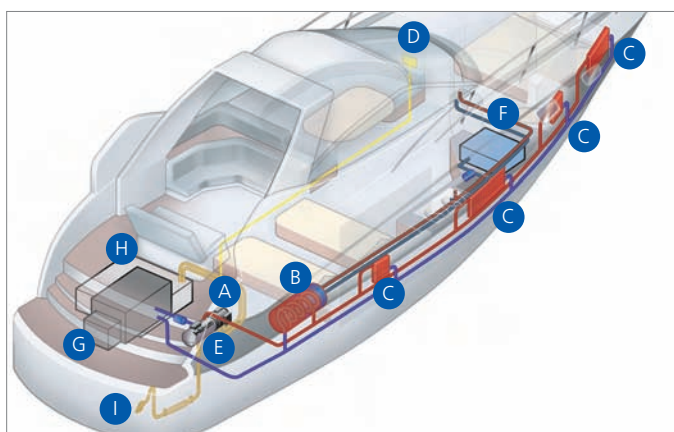
## 3 Heaters in 1 with the Air Top Evo M control!

- Available as an upgrade on all Webasto Air Top Evo heaters
- Multi mode operation to match your individual heating power demands:
  - ⌋ ECO mode for reduced electrical power consumption
  - ⌋ PLUS mode for +10 % more heating power  
(from 3,500 W to 3,900 W and from 5,000 W to 5,500 W)
  - ⌋ Ventilation mode to provide fresh and cool air to your cabins on a hot day
- Easy connection of Webasto Telestart and Thermo Call possible
- Elegant design and easy operation

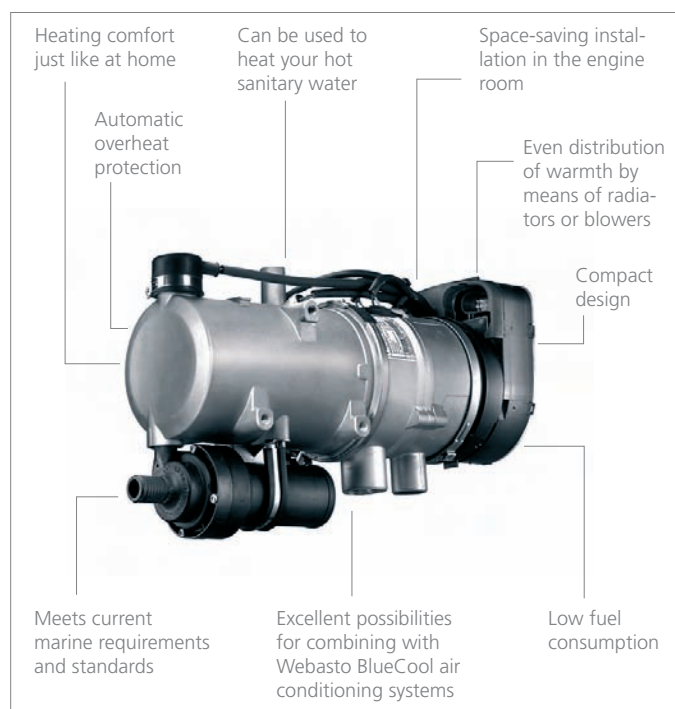


# Webasto BlueHeat Water Heaters

## Installation Example:



- A** Space-saving and inconspicuous installation in the engine room
- B** Boiler for heating hot water – for extra comfort
- C** One radiator for each cabin allows an individual temperature control
- D** Controls – simple and logical to use
- E** Circulating pump
- F** Fresh water tank
- G** Engine
- H** Fuel tank
- I** Stainless steel exhaust





# Technical Data Heaters

## Technical specifications BlueHeat air heaters:

Type	Air Top 2000 ST	Air Top Evo 3900	Air Top Evo 5500	HL 90
EC approval mark	e1*2001/56*0022*_	E1*2007/56*2006/119*0219*_	E1*2007/56*2006/119*0220*_	e1*2001/56*0017*_
Heat output	0.9 - 2.0 kW	1.5 - 3.5 (3.9) kW	1.5 - 5.0 (5.5) kW	6.5 - 9.0 kW
Fuel, Fuel consumption	Diesel, 0.12-0.24 l/h	Diesel, 0.17-0.42 (0.47) l/h	Diesel, 0.17-0.60 (0.66) l/h	Diesel, 0.86-1.20 l/h
Rated voltage	12 V	12 V / 24 V	12 V / 24 V	12 V / 24 V
Rated power consumption	14 - 29 W	15 - 40 (50) W	15 - 95 (116) W	80 - 110 W
Rated current (for 12 V)	1.2 - 2.4 A	1.3 - 3.3 (4.2) A	1.3 - 7.9 (9.7) A	6.7 - 9.2 A
Rated current (for 24 V)	–	0.6 - 1.7 (2.1) A	0.6 - 4.0 (4.8) A	3.3 - 4.6 A
Air Flow (against 0.5 bar)	78 m³/h	140 (155) m³/h	200 (220) m³/h	310 m³/h
Dimensions (L x W x H)	311 x 120 x 121 mm	423 x 148 x 162 mm	423 x 148 x 162 mm	650 x 235 x 260 mm
Weight	2.6 kg	5.6 kg	5.6 kg	13.3 kg
Diameter air outlet	60 mm	90 mm	90 mm	100 mm
Diameter exhaust	22 mm	24 mm	24 mm	38 mm

## Technical specifications BlueHeat water heaters:

Type	Thermo Top E Marine	Thermo 50 Marine	Thermo Top C Marine	Thermo 90 ST Marine	DBW 2010	DBW 2016	Thermo 230	Thermo 300	Thermo 350
EC approval mark	e1*2001/56*0003*_	e1*2001/56*0004*_	e1*2001/56*0002*_	e1*2001/56*0019*_	e1*2001/56*2004/78*0006_	e1*2001/56*2004/78*0006_	e1*2001/56*0007*_	e1*2001/56*0008*_	e1*2001/56*0009*_
Heat output	4.2 kW	5.0 kW	5.2 kW	9.1 kW	11.6 kW	16.0 kW	23.0 kW	30.0 kW	35.0 kW
Fuel, Fuel consumption	Diesel, 0.29-0.47 l/h	Diesel, 0.28-0.63 l/h	Diesel, 0.29-0.59 l/h	Diesel, 0.19-0.9 l/h	Diesel, 1.5 l/h	Diesel, 1.9 l/h	Diesel, 2.5 l/h	Diesel, 3.3 l/h	Diesel, 3.7 l/h
Rated voltage	12 V	24 V	12 V	12 V/24 V	12 V/24 V	12 V/24 V	24 V	24 V	24 V
Rated power consumption	26 W	50 W	32 W	90 W	60 W	90 W	65 W	110 W	140 W
Flow rate of circulating pump	500 l/h against 0.14 bar	500 l/h against 0.14 bar 900 l/h against 0.10 bar	500 l/h against 0.14 bar	700 l/h against 0.3 bar	1600 l/h against 0.15 bar	1600 l/h against 0.15 bar	5200 l/h against 0.15 bar	5200 l/h against 0.15 bar	5200 l/h against 0.15 bar
Dimensions (L x W x H)	214 x 106 x 168 mm	237 x 106 x 193 mm	214 x 106 x 168 mm	314 (352*) x 133 x 232 mm	584 x 205 x 228 mm	584 x 205 x 228 mm	610 x 246 x 220 mm	610 x 246 x 220 mm	610 x 246 x 220 mm
Weight	2.9 kg	3.2 kg	3.2 kg	4.8 kg	14.5 kg	14.5 kg	19.0 kg	19.0 kg	19.0 kg

# CHOOSE YOUR AIR CONDITIONER!



## **Webasto BlueCool Classic**

- Perfect solution for vessels with up to three cabins
- Very compact and efficient
- Easy to retrofit

*OR ...*



## **Webasto BlueCool Premium**

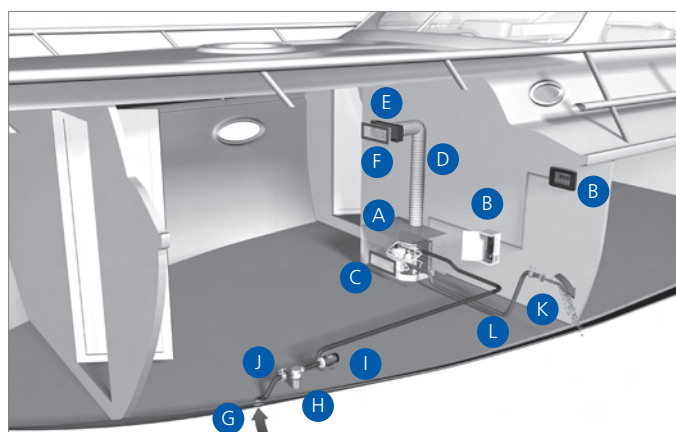
- Large power range to fit any size of boat or superyacht
- Best in marine A/C: Ability to provide the required amount of cooling wherever needed
- Ideal basis for our integrated BlueComfort systems



# Webasto BlueCool Classic

## Self-contained air conditioners

### Installation Example:



- A** Air conditioning unit
- B** Air Control (control unit)
- C** Return air grille
- D** Air ducting
- E** Transition box
- F** Supply air grille
- G** Sea water inlet
- H** Sea water strainer
- I** Sea water pump
- J** Closing valve
- K** Overboard discharge
- L** Water hose



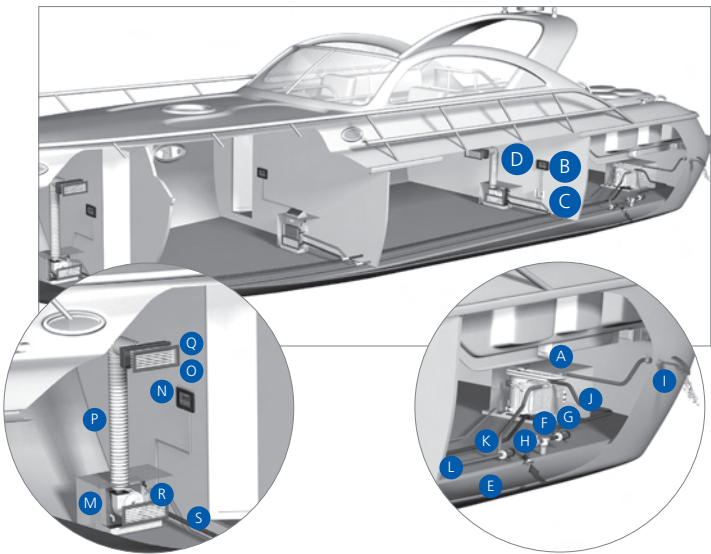
### Technical specifications Webasto BlueCool Classic conditioners:

Type	WBCC5	WBCC6.5	WBCC7	WBCC9	WBCC12	WBCC16	WBCC20	WBCC24	WBCC30
Performance in (BTU / h) / kW	5,000 / 1.5	6,500 / 1.9	7,000 / 2.0	9,000 / 2.6	12,000 / 3.5	16,000 / 4.7	20,000 / 5.8	24,000 / 7	30,000 / 8.8
Voltage	230 V / 115 V 50-60 Hz / 60 Hz	115 V 60 Hz	230 V 50-60 Hz	230 V / 115 V 50-60 Hz / 60 Hz	230 V / 115 V 50-60 Hz / 60 Hz	230 V / 115 V 50-60 Hz / 60 Hz	230 V / 50-60 Hz	230 V / 50-60 Hz	230 V / 50-60 Hz
Power consumption (running/start*)	2.1 / 5 A	2.8 / 6 A	2.8 / 6 A	3.2 / 7.5 A	4.3 / 9 A	5.5 / 12 A	6.5 / 14 A	8 / 18 A	9.5 / 22 A
Net weight	21 kg	21 kg	23 kg	26 kg	29 kg	36 kg	38 kg	47 kg	51 kg
Dimensions (L x D x H)	424 x 285 x 278 mm	444 x 285 x 278 mm	434 x 285 x 301 mm	459 x 382 x 312 mm	467 x 451 x 315 mm	491 x 451 x 346 mm	486 x 451 x 386 mm	504 x 508 x 387 mm	509 x 609 x 392 mm

\* needs to be doubled for the 115 V versions.

# Webasto BlueCool Premium Chilled Water air conditioners

## Installation Example:



- A

Air conditioning unit
- B

Display chiller control (Master control unit)
- C

Display cable
- D

Remote air temperature sensor 3 m
- E

Sea water inlet
- F

Sea water strainer
- G

Sea water pump
- H

Closing valve
- I

Overboard discharge
- J

Water hose
- K

Circulation pump
- L

Piping or hosing system with insulation
- M

Air handler
- N

Cabin Control (Air control, display cable, temperature sensor and control box)
- O

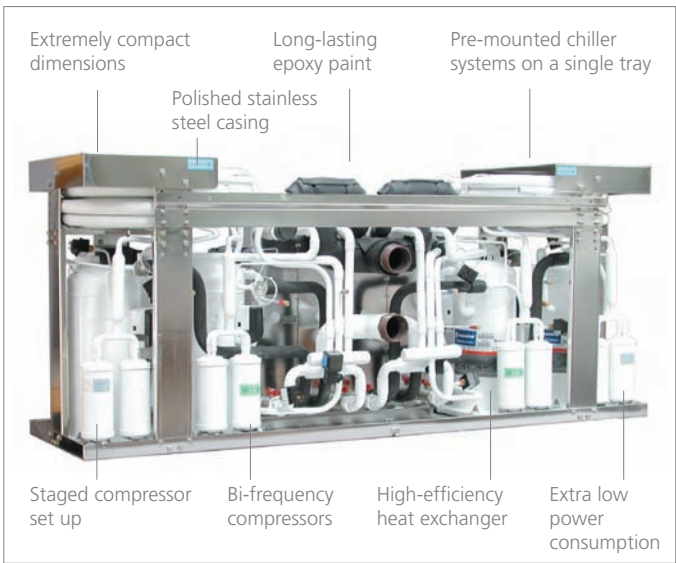
Supply air grille
- P

Air ducting
- Q

Transition box
- R

Return air grille
- S

Water hoses for condensation drain



### Technical specifications Webasto BlueCool Premium

Type	WBCP12-WBCP60	WB-CP24Tw-WBCP96Tw	WBCP72Tri-WBCP252Tri	WB-CP100Qtr-WBCP572Qtr
Performance in BTU / h	12,000 to 60,000	24,000 to 96,000	72,000 to 252,000	100,000 to 572,000
Voltage	115 V / 230 V / 400 V	115 V / 230 V / 400 V	230 V / 400 V	230 V / 400 V
Power consumption (running/start) in Watt	1,000 (2,500) to 4,400 (9,800)	2,070 (3,750) to 6,900 (12,850)	5,175 (7,550) to 18,900 (29,100)	6,900 (9,300) to 3,800 (53,500)
Net weight	29 to 75 kg	70 to 130 kg	130 to 260 kg	175 to 725 kg



# Widest range of air handlers to fit any demand

## Compact air handler:



Compact

available from  
4,500 BTU up to  
48,000 BTU

## SlimLine air handler / vertical:



SlimLine/V

available from  
4,500 BTU up to  
24,000 BTU

## Cross flow air handler / horizontal:



TAN/H

available from  
4,000 BTU up to  
12,000 BTU

## SlimLine air handler / horizontal:



SlimLine/H

available from  
4,500 BTU up to  
24,000 BTU

## Cross flow air handler / vertical:



TAN/V

available from  
4,000 BTU up to  
12,000 BTU



## The electronic silencer

- Significant reduction of blower noise, making the air handler whisper quiet
- Works with all our air handler models due to a simple integration into the power supply
- Easy to install and to retrofit as an upgrade
- Allows fine-tuning of installed applications only where necessary
- Further noise reduction can be obtained by using our new extra-silent air ducting



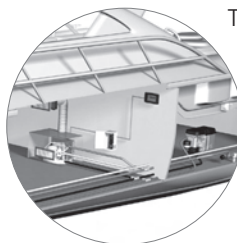
CAD data available on the  
Webasto Marine Navigator  
or on request:  
[www.webasto-marine.com](http://www.webasto-marine.com)



# INTEGRATED CLIMATE SOLUTIONS

## Webasto BlueComfort Classic

- Super quick heating of the cabin, independent of sea water temperature
- Opportunity to have heating on board while sailing (no need for a running generator)
- Unrivalled dehumidification power in "reheat" mode
- Individual temperature control for each cabin



The benefits of a self-contained A/C unit complemented by a compact, high efficient diesel heater.

*OR ...*

## Webasto BlueComfort Premium

- Flexible control system operation
- Comfort like at home in any weather condition
- Modular concept allowing multiple configurations
- Full range of solutions for any size of boat



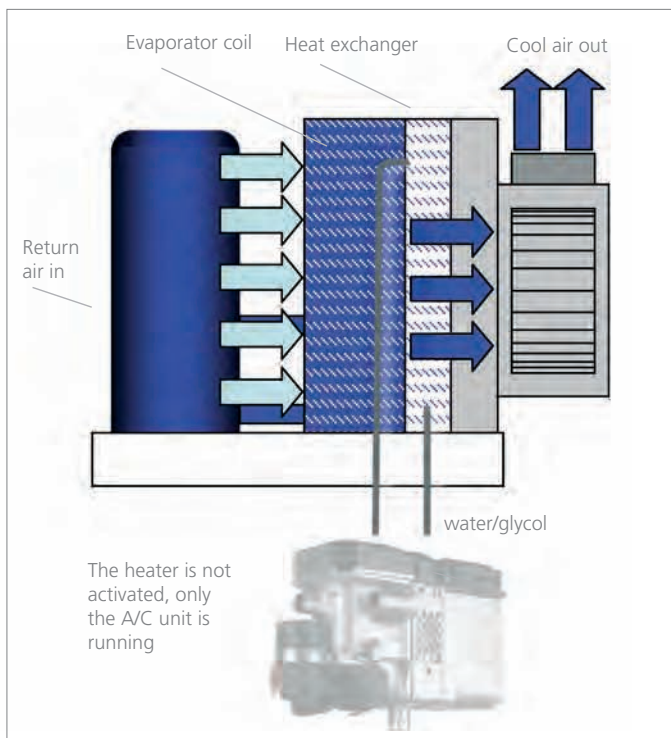
When it comes to complete cabin comfort, the Chiller A/C unit and a powerful water heater are Best in Class.



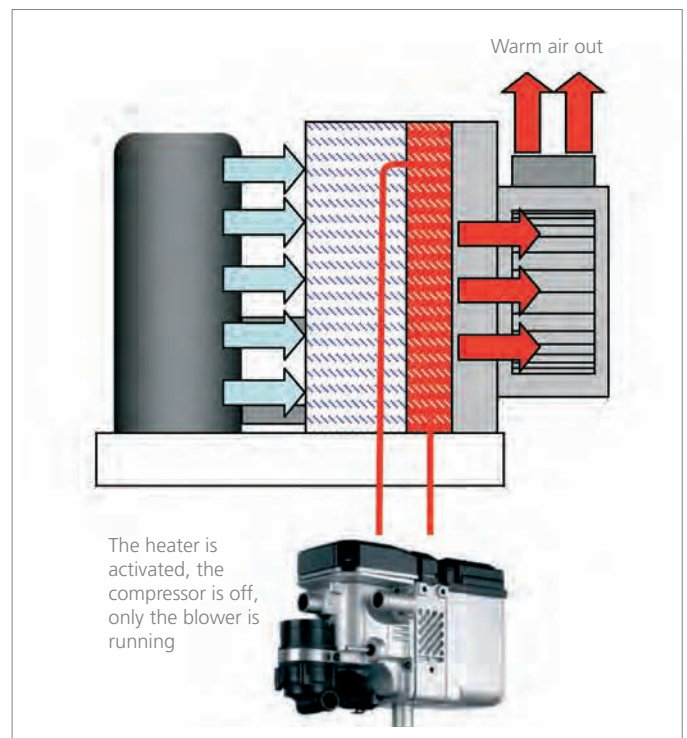
# Webasto BlueComfort Classic Integrated Climate Solutions

In a **BlueComfort Classic** system, an **A/C system** and a **water heater** are **integrated into one system**. The BlueComfort Classic units are equipped with a second heat exchanger which is connected to a diesel fired water heater. In cooling mode, the water heater is off and only the A/C circuit is running. In heating mode, the water heater operates, heating up the heat exchanger and forcing the air to pass through. In the "reheat" mode, the air is first cooled down, then heated up again, thus being dehumidified. The de-humidifying process prevents damp and mold.

## Cooling mode



## Heating mode

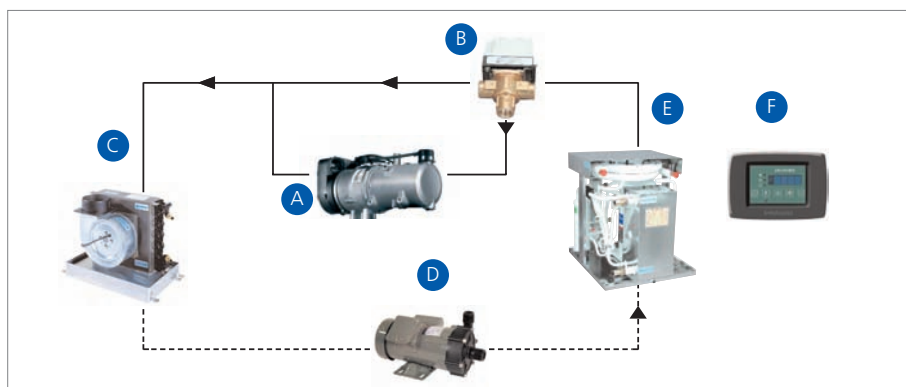


# Webasto BlueComfort Premium Integrated Climate Solutions

The BlueComfort Premium system integrates a chilled water air conditioner unit and a diesel fired heater into one system. The use of a water heater ensures full heating performance, even at low temperatures of the sea water, when the reverse cycle of air conditioners do not produce sufficient warmth. In this integrated system the same water piping, air handlers, air ducting and cabin temperature control modules are used for both heating and A/C operation. For user friendliness, the main system is controlled via one control panel while each cabin has an individual temperature and blower speed control.

## Basic Integration

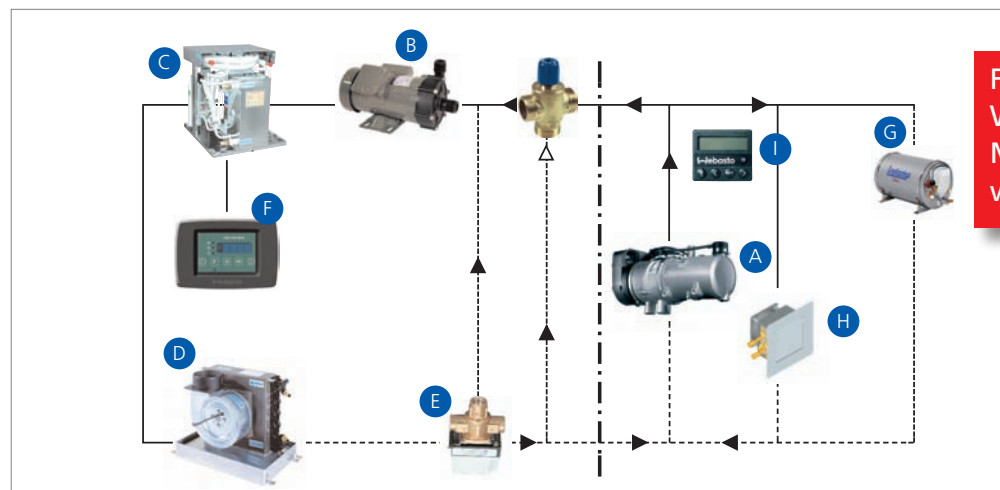
The Basic Integration is simply integrating a water heater with a 3 way valve into the chilled water system. The valve ensures that no cold water is running through the heater which would cause condensation. Both the heater and the 3 way motor valve are controlled by the A/C electronic control. A special heater with a lower temperature setting or additional thermostats are needed in order to limit the water temperature to 60 °C.



- A** Water heater produces hot (60 °C) water when system switches to heating
- B** 3 way valve switches between cooling or heating loop
- C** Air handler warms up or cools down returning air
- D** Water pump circulates the water
- E** A/C chiller unit cools down the water when system switches to cooling
- F** Chiller control controls the complete A/C system and the water heater; starts the compressor when cooling is necessary; Starts the heater when heating is necessary

### DeLuxe Integration

The DeLuxe has all the features of the Basic Integration but additionally allows integration of a water boiler as well as further fan blowers or radiators into the system. It therefore provides the highest comfort in heating and sanitary water supply. The mixing valve limits the water temperature in the A/C loop to 60 °C. A summer/winter switch allows the boiler to produce hot water in summer while the A/C system is cooling the cabins at the same time.



For a perfect integration,  
Webasto recommends Isotemp  
Marine boilers.  
[www.indelwebastomarine.com](http://www.indelwebastomarine.com)

- A** Water heater produces hot (approx. 80 °C) water when system switches to heating
- B** Water pump circulates the water
- C** A/C chiller unit cools down the water when system switches to cooling
- D** Air handler warms up or cools down returning air
- E** 3 way valve switches between cooling or heating loop
- F** Chiller control regulates the complete A/C system and the water heater; starts the compressor when cooling is necessary. It also starts the heater when heating is required
- G** Water boiler heats up the sanitary water
- H** Blowers or radiators can optionally be used in areas with extra high heating demand (e.g. windscreen for demisting)
- I** Summer/winter switch allows separate boiler operation in summer mode



# ADDED VALUE ACCESSORIES

## *Full Control: Webasto BlueComfort ControlPad*

This stand-alone comfort control system provides a central interface for the complete Webasto climate system. Operation and service of comfort systems has never been easier.

Integration of the software into the overall central control system of the boat is also possible with minor adjustments.

- Comfort of all cabins can be controlled centrally
- User-friendly interface with intuitive touch-screen panel
- Easy access to all system information for quick and easy service
- Log of incidents for remote diagnosis

### **Technical Specifications**

- 5,7" TFT color display\*
- VGA (640 x 480 pixel) resolution
- Sunlight-readable (350 cd / m<sup>2</sup>)
- IP water protection values: IP 67 Front and IP 66 Rear
- CE and RINA certification

\* Other display sizes available on request

**NEW**



## Webasto EasyPipe

The solution to reduce installation time and save costs.

### Benefits:

- Easy assembly process, reliable application
- Pipes have pre-mounted insulation that provide significant saving on installation time for boat builders
- Huge range of compatible quick-fitting components



## ABS tubes and accessories

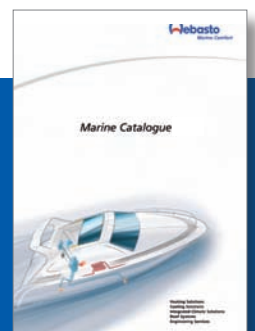
- Easy and quick assembly
- No special tools needed
- Excellent insulation characteristics
- Can be used in the temperature range between -30° and +50°
- Approved by Lloyds Register, German Lloyds, DNV, Bureau Veritas and others
- No toxic elements such as chlorine, fluorine or other metals



## Soft start-up option

- Reduce compressor starting current by up to 40%
- Eliminate the damaging effects of high starting torque surges
- Fast and reliable start – pressure equalization not necessary

For the complete range of Webasto quality accessories, please use our Marine catalogue.





# WEBASTO MARINE ROOFS

## *There is a Webasto Roof Solution for every boat!*

### **Webasto Marine Roofs – our customisable platforms:**


- Robust, pre-developed platforms designed using Webasto's worldwide technological leadership in automotive sunroofs
- Customization possibilities in size, curvature, material and colour to fit your special needs.
- Two platforms (flush integrated or top mounted) for unlimited design possibilities

	Design Options/Image	**
	Low Development Costs	***
	Short Project Leadtime	****

**OR ...**

### **Webasto Engineering Services – add value to your boats and your brand image by developing your own roof system with us:**

- Unique, exclusive roof systems to match your exact specifications
- Phased project approach
- Opportunity to use Webasto engineering skills and manufacturing capabilities for high quality results

	Design Options/Image	*****
	Development Costs/Leadtime	Project Specific
	Short Project Leadtime	***

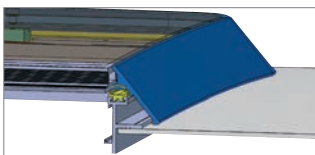
# Webasto Roof Platforms The 60 Series

## The 60 Series: the ready-to-be-mounted solution.

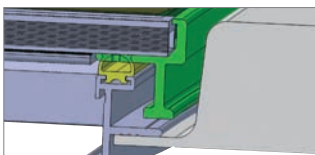
With the 60 Series, Webasto offers shipyards a customisable platform for roof systems. Customers can choose top mount or flush integration, size and curvature as well as the panel and the frame design. The 60 series is fully pre-assembled and tested when it arrives at the shipyard. The ready to be mounted delivery offers significant cost savings in the boat builder's assembly line.

### 1 Top mount or flush integration:

#### ■ Top Mount



#### ■ Flush Integration



### 3 Size and curvature:

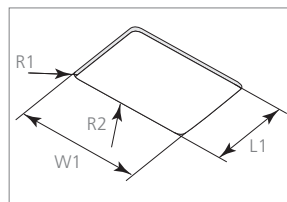


Figure 1

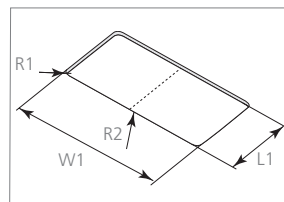


Figure 2

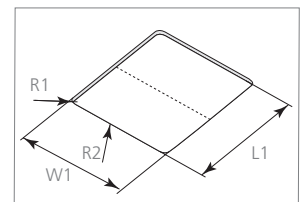


Figure 3

Maximum Cut-Out size dimensions for our customised roofs		max. length (L1)	max. width (W1)	corner curvature (R1)	min. cross curvature (R2)
Figure 1	roof without cross beam	1,100	1,100	80	10,000
Figure 2	roof with cross beam in sliding direction	1,100	1,800	80	10,000
Figure 3	roof with cross beam perpendicular to sliding direction	1,500	1,100	80	10,000

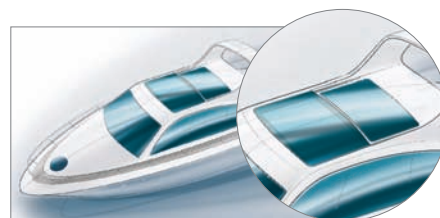
Remark: All dimensions are in mm.

### 2 Design selection:

Panel Design	Frame Design
PMMA / Acrylic	Anodised
Glass	Coated (Available in all RAL colours)
Non transparent	
Teak	

### 4 Additional options:

- Fixed panel
- Sunblind / Flyscreen



### Note:

For the flush integrated version, the front edge shape can also be customised on special request.



# Marine Roofs

## The 80 Series and the 150 Series

### *Customisable, Integrated Roof Design: the 80 Series*

With the 80 Series, Webasto offers shipyards a completely dedicated frame design fitting the shipyard's panel design. The frame construction is supplied as a kit which facilitates the installation on board. This innovative roof development approach requires application engineering and a close cooperation between the shipyard and Webasto.

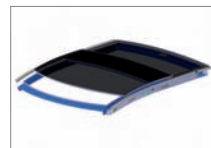
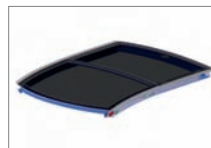
- Frame design is dedicated to the yacht
- Panel design to be defined by shipyard, limited only by the maximum panel weight of 80 kg
- Supplied as a kit, including the frame, mechanism and seal, as well as rear rails
- Fully water tight seal system
- Tilting at front side (ventilation) and sliding to the rear
- 12 V DC drive system
- Cross curvature is possible (starboard to port side)
- Several possibilities for panel material (acrylic, glass or sandwich)
- Upgrade to panorama roof possible



### *Customised Double Curvature Roof Models: the 150 Series*

The 150 Series by Webasto is the perfect solution for demanding roof projects. The fully integrated roof consists of a moving panel as well as of a fixed panel. The double curvature allows extraordinary design possibilities. The 150 series is supplied as a complete system. Application engineering and a close cooperation between the shipyard and Webasto is required.

- Maximum weight of the moving panel is 150 kg
- Frame design dedicated to each yacht
- Supplied as complete functional system
- Fully water tight seal system
- Tilting at rear side (ventilation) and sliding to rear
- 24 V DC drive system
- Integrated roof design
- Double curvature (front to aft, starboard to port side)
- Panel material can be acrylic, glass or sandwich
- Application engineering required
- Fixed panel optional



# Some references



Jeanneau Prestige 50'  
Webasto BlueHeat Air, Air Top Evo 5500 heater



Passenger Boat 121'  
Webasto BlueCool Premium, 252,000 BTU chiller air conditioner



Wauquiez PS 55'  
Webasto BlueHeat Water, Thermo 90 S heater

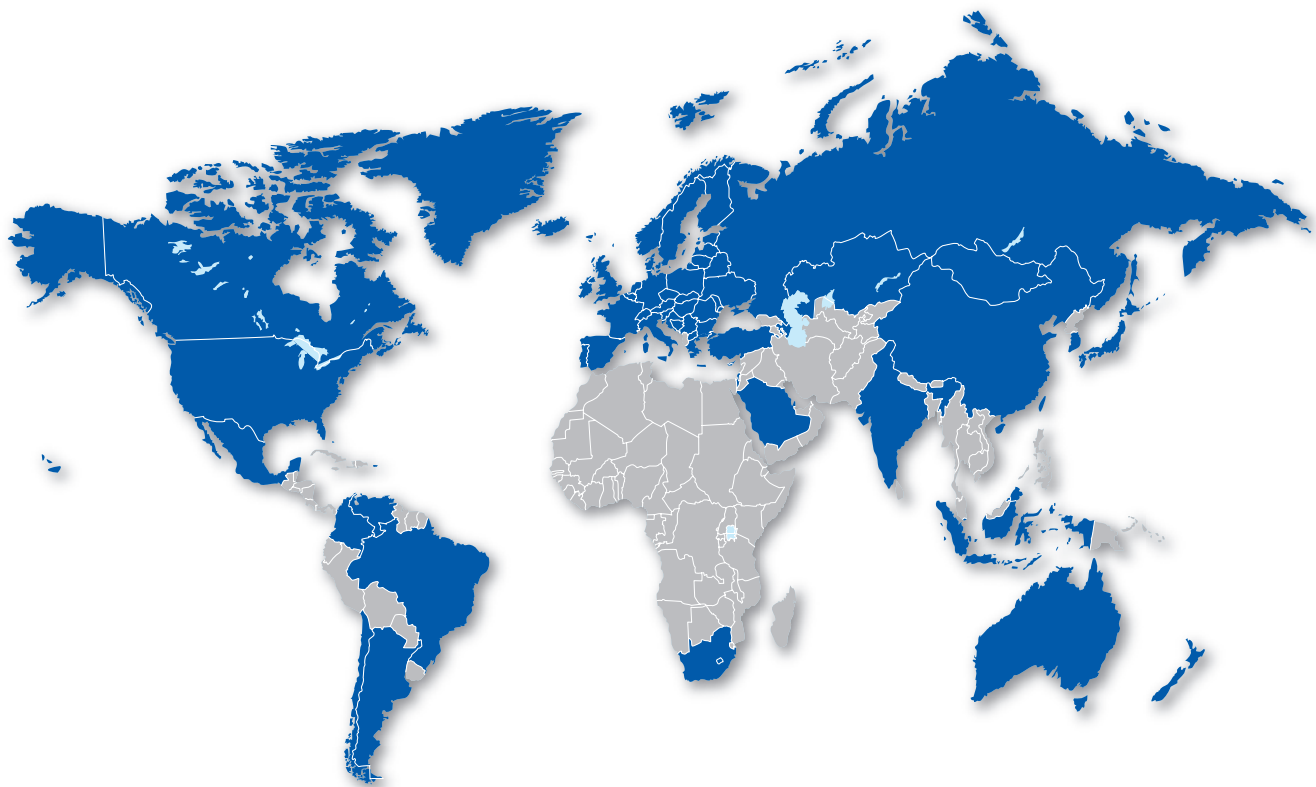


Moonen 84'  
Webasto BlueCool Premium, 126.000 BTU Chiller air conditioner

\*Picture at the top: Maritimo Yachts  
Webasto Marine Roof, 60 Series



# *Webasto, a feel good climate – worldwide*



Whether OEM or aftermarket: our products improve the comfort in vehicles. The name Webasto stands for innovative, economic and environmentally sound heating, cooling and ventilation systems for cars, commercial vehicles, motorhomes and boats. Our success is based on our wide range of products and high quality standard. An outstanding network of dealers guarantees top quality fitting and services around the globe.

We have been setting standards in technology for over one hundred years and are now amongst the 100 biggest suppliers to the automotive industry world-wide. Webasto operates in two business units: Convertible, Roof & Body (CRB) systems as well as Global Comfort Solutions (GCS) for heating, cooling and ventilation systems.