

# Webasto marine air conditioning

## QUICK TECHNICAL ANALYSIS BEFORE RETURNING TO THE FACTORY

### DISTRIBUTOR/IMPORTER FIRST AID FOR AFTERSALES

Hardware first after sales interventions at distributor/importer level.

There are an increasing number of units that are returned for aftersales problems where in fact repairs necessary were of minor importance and did not really warrant a physical return.

To avoid this in future we have resumed here-after a certain number of simple tests to carry out before returning any hardware to out factory.

These tests verify the electrical functioning of the hardware (compressors, blowers, etc)

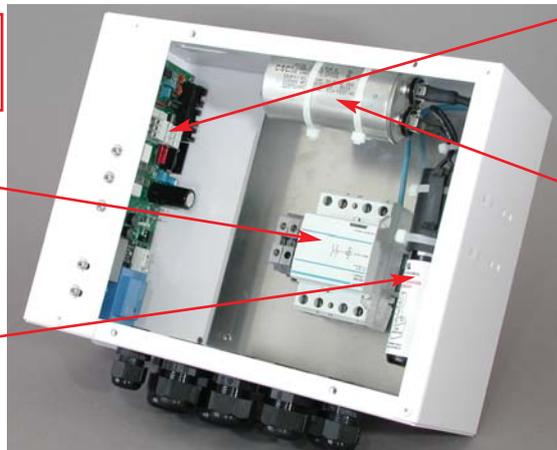
Before the technical details first a list of small parts and components each distributor/importer should carry in stock to be able to carry out quick repairs on minor breakdowns :

1) Running Capacitors (silver/grey or white capacitor which offset the third (start) winding of the electrical motor + also HardStarts (when appropriate) :

How to distinguish between running capacitors and Hard-Starts

POWER Relay for compressor (1Ph or 3Ph)

Hard-Start (Start-assist) device DST5 or DST6 - Black



TECC (Chiller) controller card

Running Capacitor - silver-grey or white

Compressor	230V	Running Capacitor	Start - Assist	Units	P/N	1 Compr.	Suggested
						Amps	Breaker
MB	RM5460HNE	25 mF	N/A	CPAC5		2.1	8A
LG	NK125P	25 mF	N/A	CPAC7		2.8	10A
LG	NK164P	30 mF	N/A	CPAC9		3.2	12A
LG	NK185P	35 mF	DST5	CPAC12-HCSC12-HCSC24Tw	WBCL500142	4.4	16A
LG	NK236P	30 mF	DST5	CPAC16-HCSC16-HCSC35Tw	WBCL500142	5.6	20A
LG	NJ282P	35 mF	DST5	CPAC20-HCSC20-HCSC40Tw	WBCL500142	6,5	20A
LG	NJ362P	45 mF	DST5	CPAC24-HCSC24-HCSC50Tw	WBCL500142	7.5	25A
LG	NO407P	55 mF	DST5	CPAC30-HCSC30-HCSC60Tw	WBCL500142	9.0	25A
SCROLL	ZR28	45 mF	DST5	HCSC30Scr-HCSC60TwScr	WBCL500142	10	32A
SCROLL	ZR34	50 mF	DST6	HCSC36Scr-HCSC72Tw-HCSC108Tri	WBCL500143	11.5	32A
SCROLL	ZR40	55 mF	DST6	HCSC42Scr-HCSC84Tw-HCSC126Tri	WBCL500143	13.5	40A
SCROLL	ZR48	60 mF	DST6	HCSC48Scr-HCSC96Tw-HCSC144Tri	WBCL500143	15.0	40A

Compressor 115V	Running Capacit.	Start Assist	Units	1 Compr. Amps	Sugg. Breaker
MB RM460GQ84	40 mF	N/A	CPAC5	4.2	16A
MB RM465GQ84	40 mF	N/A	CPAC6.5	5.5	16A
LG QK125C	45 mF	N/A	CPAC9	6.5	20A
LG QK164C	50 mF	DST5	CPAC12-HCSC12-HCSC24Tw	9.0	25A
LG QK191C	60 mF	DST5	CPAC16-HCSC16-HCSC32Tw	11.0	32A
Blowers 230V					
Ecofit 2GRE15 120x62R	2 mF		CPAC5/7-Compact 4500/6000	0.35	2A
Ecofit 2GRE25 140x59R	2.5 mF		CPAC9-Compact 9000	0.57	3A
Ecofit 2GRE35 140x59R	4 mF		CPAC12/24-Compact 12/24000	0.65	3A
Ecofit 2GRE45 180x75R	6 mF		CPAC16/20-Compact 16/20000	0.87	4A
Ecofit 2GRE45 160x62R	6 mF		CPAC30-Compact30000-FrAir24	0.85	4A
Ecofit 2GFR65 180x70R	12 mF		FreshAir48-Special24	1.25	6A
Blowers 115V					
Ecofit 2GRE15 120x62R	6 mF		CPAC5/6.5-Compact4500/6000	0.7	3A
Ecofit 2GRE25 140x59R	8 mF		CPAC9-Compact 9000	1.15	6A
Ecofit 2GRE35 140x59R	18 mF		CPAC12/24-Compact 12/24000	1.3	6A
Ecofit 2GRE45 180x75R	24 mF		CPAC16-Compact 16/20000	1.75	8A

#### PRIMARY FAULT ANALYSIS :

Peripherals electrical components.

The above small electrical components such as running capacitors, start-assists can all provoke disfunctioning but in general a quick intervention and replacement will cure this problem at minimal costs.

Hereafter a short explanation concerning the role of these components.

Running capacitors - the capacitors are mostly silver-grey or white. Their role is to offset the 3rd electrical winding of the compressor motor (also called "start winding").

As a matter of fact all single phase motors and the capacitor is there to offset the wave signal so that the 3 phases work in harmony. If a running capacitor fails the electrical motor will block on LRA (locked rotor amperage) and the compressor will refuse to start.

If this default is ignored the compressor will start to cut-out on its overload protection. Repeated failed starts and overload cut-out will eventually lead to internal winding failure which in turn will necessitate complete compressor replacement instead of a simple capacitor replacement.

The same is true for the start-assist devices (if fitted) : DST5 and DST6.

What can cause capacitor or start-assist failures : most likely cause : excessive voltage drop on start-up and/or while running.

How to test to find out what is wrong with the compressor :

1) First if the compressor is fitted with a start-assist device (DST5 or DST6) - disable this device by disconnecting 1 of the wires.

2) Try to start the compressor again - if same amperage blockage move to step 3)

3) replace the running capacitor by a new one - try to start again. If the compressor now accepts to start and run apparently normally measure the running amps to see if no damage was done to the internal windings. If running amps are far above the average figures as given here-above, the internal windings have been damaged and the compressor needs to be replaced.

4) Re-connect the start-assist device and test again to see if starting+running is normal. If start-assist device is faulty replace with a new one.

**BLOWERS :**

Similar procedure - if a running capacitor is out, the blower may block or turn slowly with a distinct grinding noise. Replace running capacitor with a new one and try again. If blower now runs OK, the fault was with the running capacitor.

**BLOWER RUNNING CAPACITOR IN CPAC ELEC. BOX**

**RUNNING CAPACITOR ECOFIT BL.**



**RUNNING CAPACITOR ROTARY COMPRESSOR**

**BLOWER RUNNING CAPACITOR AIRHANDLER MOUNTING**

**RUNNING CAPACITOR ECOFIT BLOWER**



**AC REHEAT COVER (OPTIONAL EXTRA)**

**ELECTRONIC CONTROLLER CARDS :**

TECC for chiller systems / TCC for self-contained systems

Cabin Controllers cards for Digital and Mechanical thermostat + 3 speed control

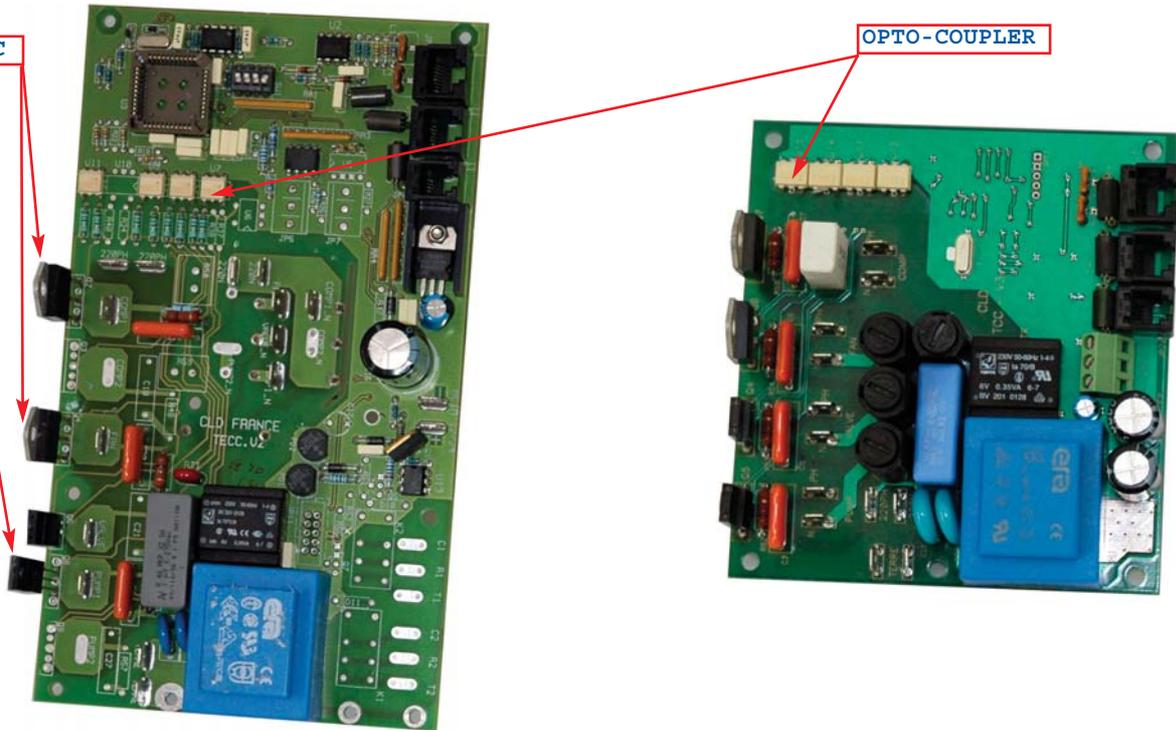
The main AC out functions of the controller cards are done through elec-

(Self-Contained) TCC CONTROLLER PRIOR 2004

(Self-Contained) TCC CONTROLLER 2004 AND AFTER

TRIAC

OPTO-COUPLER



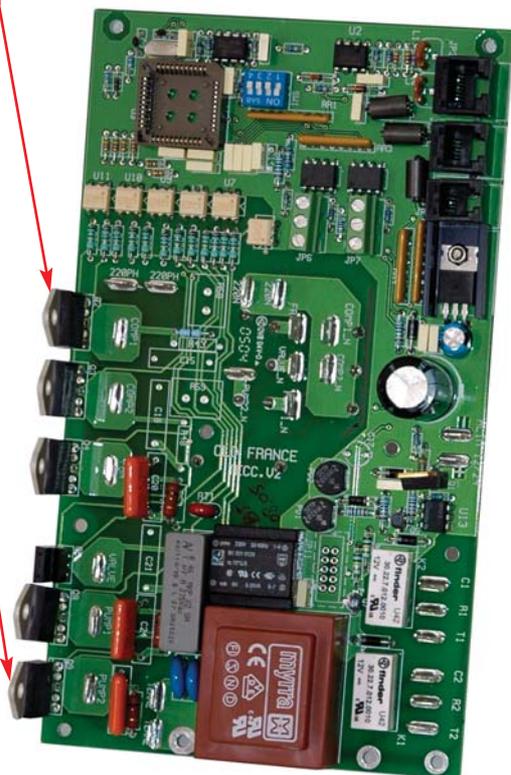
tronic relays also called "TRIACS". These triacs are mounted against an aluminium heat-sink for cooling purposes. (see also photos).

All triacs are protected by slow blow fuses except the main Compressor outlets (COMP1 and COMP2).

Triacs can fail - in that case 2 possibilities :

(Chillers) TECC V2 Controller 2000 - 2005

TRIAC



a) the triacs remains open i.e. the AC current does not become active on the outlet connectors.

b) the Triac remains closed i.e. AC is continuously present on the output connectors even when normally it should not be present.

If you suspect a Triac failure, first check if the protective fuses are OK. If that is the case then it is most probably a triac failure - less likely a opto-coupler failure (i.e. the electronic device that interfaces the micro-processor with the power Triac) - for opto-coupler failures it is wiser to send back the controller card to the factory for repair and testing.

Triacs can be easily unwelded and replaced and their costs is minimal. So it may be a good idea to have a small stock of Triacs available (they

(Cabin Blower Ctrl) CAB V2 Controller &lt; 2005

(Cabin Blower Ctrl) CAB V3 Controller 2005 +



are all the same model : BTA26 and can be ordered from our warehouse).

How to check the functioning of a controller card before deciding to replace the card with a new one.

For this purpose the best is to have 1 or several (approx) 40 watt light bulbs available with a short run of wire and fast-on connectors to hook the lamp up to the card outlet(s) that are suspect.

An electronic volt-meter is not the adequate device to test as the "discrete" components around the Triac generally allow enough current leakage to fool a digital voltmeter.

With the light bulb attached run the card through its cycles to test if the outlet is working properly. If this is the case then the card is functioning normally and the problem lies somewhere else.

If necessary replace the complete controller card. Before replacing a card make sure that the amperage draw of the main electrical motor is on par with the figures in the list hereabove.

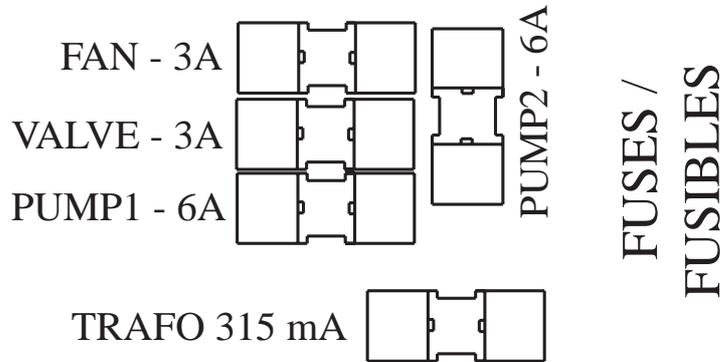
FUSES :

Only use slow-blow fuses as replacement.

Hereafter fuses to be used for the 230V and 115V controllers :

	230V	115V
Electronic Supply fuse	315 mA	630 mA
FAN fuse	3.15 A	6.3 A
Pump1 Fuse	6.3 A	10 A
Pump2 Fuse	6.3 A	10 A
Reversing Valve fuse	3.15 A	3.15 A

Check that spring load clamps around fuses are properly tightened.



**RESUME OF PARTS ALL IMPORTER/DISTRIBUTORS SHOULD HAVE READILY AVAILABLE :**

- 1) COMPRESSOR RUNNING CAPACITORS :  
20 , 25 , 30 , 35 , 40 , 45 , 50, 55 and 60 mF
- 2) HARDSTARTS : Model DST5 and DST6 (1Ph Scroll units from 36 to 48000 BTU)
- 3) BLOWER RUNNING CAPACITORS :  
230V : 2, 2.5, 4, 6 and 12 mF  
115V : 6, 8, 18 and 24 mF
- 3) TRIACS : Model BTA26 (can replace all models even smaller model BT12/16)
- 4) CONTROLLER CARDS :  
230V : TECC 2 compr + 4 compr, TCC, CABIN CONTROL, 3 SPEED CABIN CONTROL  
115V : TECC 2 compr. , TCC, CABIN CONTROL, 3 SPEED CABIN CONTROL
- 5) SLOW BLOW FUSES : 615 mA, 3.15 A, 6 A, 10 A
- \* ) Only stock those items which are relevant to your market (230V, 115V, etc)
- 6) Display Cables (4,6 and 12m)
- 7) Temperature sensor cables (4, 6 and 12m)