OZEFRIDGE

Ozefridge Refrigeration Systems.

With A490 & AW490 DC Condensing units.

Trouble Shooting / Technical Service Guide .

12VDC (24VDC or 115/240VAC with optional converter

Manufactured in Australia by:
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Cruiser Services

Supplying the gear that lets you Go Cruising, Not Camping

OZEFRIDGE-USA
Marine Refrigeration

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First check: 'FRIDGE ASSIST' page at www.ozefridge.com

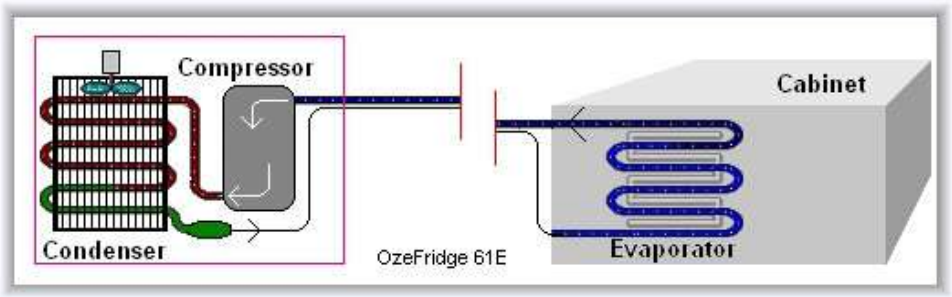
SERVICE & REPAIR.. SUPPLEMENT P 1a

NOTE: Ozefridge systems are used world-wide and often in extremely remote areas where tradespersons may not be knowledgeable of the product or unavailable.
We have restructured our products to make them as user serviceable as possible, addressing the following and assisted with phone and email support.

1: Diagnosis of refrigeration system. (Gas charge etc)
2: Remedy for refrigeration problems.
3: Diagnosis of electrical system.
4: Remedy for electrical problems.
5: Performance expectation from correctly set-up system.
6: How to replace a faulty fan.
7: How to replace a faulty motor driver.
8: How to replace a faulty power converter.
9: How to replace a faulty remote controller with ECO2.

1: REFRIGERATION DIAGNOSIS

The refrigeration system extracts heat from the eutectic tank (evaporator) and disposes of it via the condenser.



Assuming the power supply and other components are working correctly, then generally there are three refrigeration reasons why the system is not functioning.
They are: **A:** Loss of gas. **B:** Compressor failure. **C:** Refrigerant gas blockage.

POINTER: *(**A** is the most likely with **B & C** being quite rare)*

A: Loss of R134a gas. Gas is only lost if the system has a gas leak. The Ozefridge system is entirely welded except for the brass coupling area; therefore, gas leaks are most likely in this area and often are indicated by oil wetting. The most likely signs of lost gas are slow cooling with the lower portion of the eutectic tank not frosting, low power consumption rate, low condenser temperature.
B: Faulty compressor. Compressor is mechanically stuck and requires replacing.
C: System can become blocked by contaminants due to unclean procedures during access since manufacture, or a gas leak has occurred.

2: REFRIGERATION REMEDY

A refrigeration mechanic would be required to confirm and repair the fault.
Initially the mechanic should only connect gauge / manifold hose to the suction (Upper blue) Schroder valve. The condenser temperature (therefore high side pressure) can be read by press & hold the "UP" button for 4sec on the controller.
The mechanic then should be able to identify the problem.
If repair and re-gas is needed then the system must be evacuated via both Schroder valves, then have a small amount of R134a (ONLY R134a) added to bring the system to positive pressure. The liquid line gauge hose must then be removed and the system run and charged via the suction line. Expect a suction of 15+ PSI (one+ bar) until the eutectic tank is well below zero when the suction pressure will also lower respectively. Expect just above zero PSI when at -22°c.

POINTER: If gas has been lost, it is most likely that a leak has occurred because the coupling ¼ flare nuts are either not tight or over tightened to the extreme, or one of the cover nuts with 'O' rings has been over- tightened with a wrench.

3: ELECTRICAL DIAGNOSIS

The electrical supply system is where most problems occur, the most common of these being a bad power supply. Check voltage at the terminals on the A490 /AW490 both before and while running. A difference greater than half a volt before and after indicates a power supply line or battery problem.
The fault LED will indicate fault status as described on page 8 in this manual.
The Ozefridge controller panel has a manual bypass switch which eliminates the 'Sure-Thaw' digital temperature, ECO2 power management and speed control, allowing the system to run manually until switched back to "AUTO".
The other electronic components are fan, motor driver and power converter.
Using the bypass can often help identify if the problem is in the controller.
Likewise, if the system runs on 12VDC but not on the optional 115/240VAC then the power converter could be the problem.
If the faint sound of the motor attempting to start can be heard, then the motor driver may be faulty. Note the compressor is very quiet.
The fan and water pump should be running once the condenser temperature reaches <30°c/86°f. (off as it lowers to >20°c/28°f. Press/hold up button to read condensing temperature).

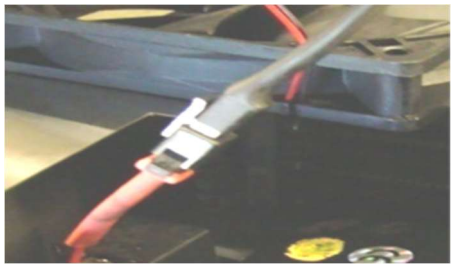
POINTER: When changing power supplies or the unit is switched off then on again and the system is within its start- stop parameters, the system will not restart until it warms to the cut-in temperature which is the SET temperature plus 8°c. The soft start also has a delay of up to one minute.

4: ELECTRICAL REMEDY

CAUTION: **Disconnect all power supplies BEFORE attempting any remedy.**

6: Replacing a fan:

Remove the four 5mm stainless steel screws holding the top of the fans and grills. Remove the four 4mm SS screws from the canopy. Lift off canopy. Remove the lower four 5mm screws from the faulty fan(s) and replace. Plug fans into connectors and reassemble. Check that the fan label is outward and that nothing will foul the fan blades. Fans are type 240-25- 12VDC 4w (3 to 5w is ok)



8: Install / Replace the optional 240 VAC to 12 VDC power converter:

<< IMPORTANT:
With optional AC-DC converter.

12VDC battery power **MUST** only be connected to the terminals on the black relay box.
NOT to terminals 8.
(Positive + to RHS.)

The red and black wires from the black relay box connect to terminals 8.

Usually, the 240VAC converter is pre-installed otherwise fit as above or in a safe remote location. Leave both 240VAC and 12VDC supplies connected and the converter will automatically use the higher voltage whenever available.

POINTER:

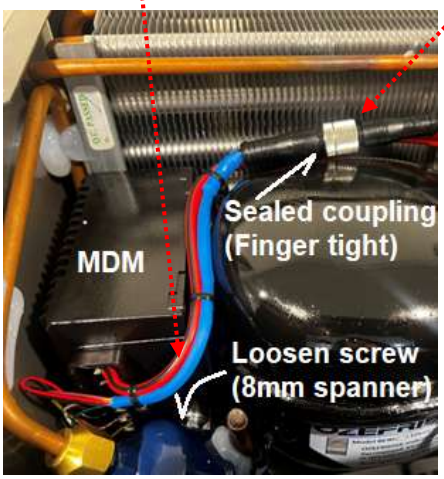
This sealed converter has been reconstructed to suit the Ozefridge system **and must not** be connected in any other way or to any other equipment.

Replacing the Motor Driver Module: DISCONNECT POWER SUPPLY FIRST

Remove the eight screws (4 top & 4 fan top rows). This frees up the cover from the fans. Then remove fans by removing the bottom screws. The fans and cover have enough cable to allow them to be drawn away from the unit for access.

Loosen the screw securing the MDM by 2 urns Anti-Clockwise. (don't remove) With the wall pushed over to the left on an angle, pivot the driver clockwise to 'un-lug' it from the rear. Ease the MDM plug squarely off from the compressor.

To refit, press the compressor plug on firmly then with the driver at an angle to its final position, locate the rear of the driver then hinge counterclockwise into position and tighten holding screw. Refit coupling to the new driver. Refit fans and cover and test run. Terminals are connected by a sealed coupling. See below



Electrical connection to the MDM and Control panel is via water proof screw together sockets and plugs.

No spade connecters are used or recommended

POINTER: Make sure the rear of the MDM is properly 'lugged'. It should not feel lose when the locating screw is tightened.

Odd readings on LED!

Displaying **LL** or **44** indicates an open temperature probe circuit. The temp probe circuit runs from the A490 /AW490 terminals 12, along inside the black insulation then to a sensor located in the *eutectic tank. (*Where 3mm Diameter black wire enters). Use a multi-meter to read the resistance of the disconnected wires. If it is between 5kΩ and 50kΩ the circuit to the eutectic plate and sensor is OK.

If **HH** appears the unit is overheating. Check fans and water cooling.

The unit has auto shut down if the temperature reaches 55C (And auto resetting)

TECHNICIAN PLEASE READ because Micro Systems can be easily damaged

- We know that refrigeration technicians are expected to service and repair a vast range of different equipment from micro systems like this tiny Ozefridge through to massive multi -ton installations, and it is near impossible to be up to date with them all.
- At Ozefridge, as refrigeration manufacturers whose staff are all from the service industry also, we understand this and are available seven days a week for support. As simple as making a phone call if you need us.
- We are lucky, we designed, engineered and manufacture the Ozefridge systems only, so we focus on this one product only and know it well.

Tips for the Technician:

- Air in these tiny systems is critical. If in doubt replace the 032 flared filter dryer, evacuate and re-gas. ONLY use pure R134a nothing else!
- Only liquid charge via suction but not exceeding 15-20 psi. Too much liquid at once or over charge can destroy the compressor
- Any gas leak will most likely be either the flare nuts not tight enough or one of the four O rings is either missing or has been over tightened
- Always open valves hard against their outer seats then fit cover nut.
- Expect the system to operate similar to a domestic fridge or freezer. Expect a suction of approx. 15 psi after starting up reducing to 6-8 psi at -10° readout and near zero as you near -22°c (freezer)
- Avoid fitting a gauge hose to the liquid line valve (red) as removing it later will alter the charge as some liquid refrigerant will be lost.
- To read the high side press and hold the up button. This will give the condenser temperature and can be related to high side pressure.
- Note, the 2X fans (and pump AW490 model) will only come on once the condenser temperature reads <30°c, one drops off if it reduces to >20°c.
- Operating normally expects a power consumption rate of 5.5 to 7.0 Amps with a 'just warm feel to the red liquid coupling and cool for the suction.
- The blue patch on the suction line at the top of the eutectic plate is a good point to check for evaporation and therefore adequate gas.
- The red LED in the top middle of the controller indicates: Flashing=start delay, solid= cooling cycle, off= thawing cycle. (Ignore others)
- **NEVER.. use any sealants or seal tapes etc., on this system.**
- **NEVER.. connect dry nitrogen for testing unless properly regulated.**

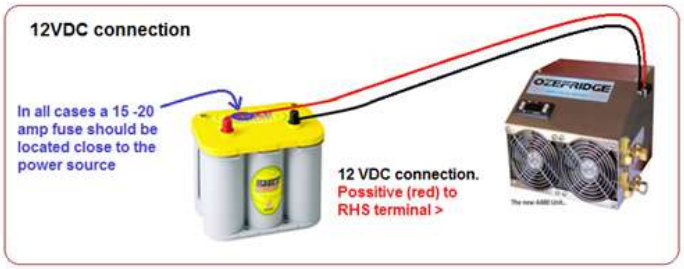
***Important note:** Some countries including Australia, require that R134a gas should only handled by licensed tradespersons.

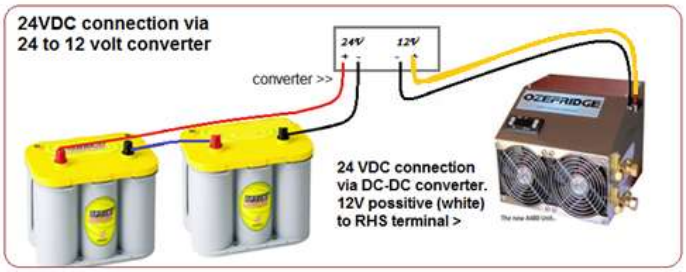
1: SYSTEM SPECIFICATIONS: (Please read, micro systems are easily damaged)

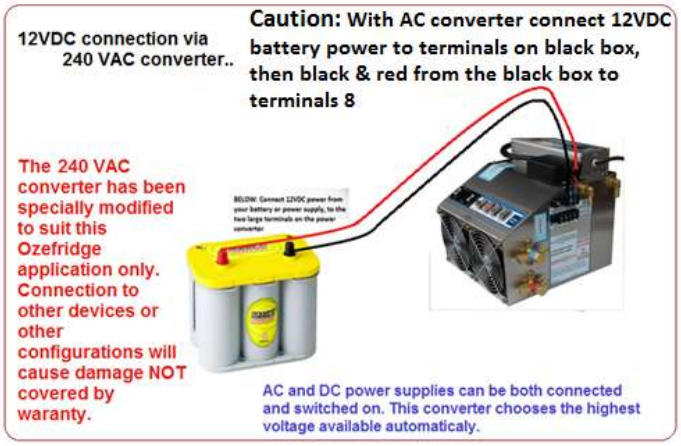
- **Refrigerant:** Pure R134a ONLY. Do not use substitutes or additives.
- **Refrigerant charge:** From evacuation add 160 grams for single eutectic plate systems and 200 for twins.
- **Evacuation:** If evacuating the system, a two stage vacuum pump coupled to BOTH high and low side Schroeder valves must be used.
- **Recharging:** When re-gassing refrigerant should be added slowly as liquid via the suction Schroeder valve until the system pressure is just above zero. Remove high side gauge hose from system. Start system. Next with the system now running, slowly bleed in R134a liquid but do not exceed a suction pressure of one bar (approx. 15 PSI). Continue until the measured amount has been charged or until 15 PSI suction pressure is constant without further refrigerant being added.
- **Compressor oil:** The system contains 140 cc of POE oil.
- **Compressor:** Ozefridge Model BE90. Three phase 12VDC motor with six stage soft start and built-in failsafe protection.
- **Compressor Performance Data:** (At preset speed)
  Capacity (CECOMAF) 87.4 Watt (-20c)
  Power Consumption: 82.2 Watt. COP (CECOMAF) 1.07
- **Condenser:** A490: Ozefridge 18-18-3 Triple pass refrigerant.
- **Condenser:** AW490: Ozefridge 18-18-3w Triple-pass refrigerant & water.
- **Condenser fans:** Type 120-120-25 0.38a 12VDC. (0.25a to 0.4a is ok)
- **Controller:** SF-102s sealed digital 12VDC. Twin relay/ sensor
- **Controller sensor:** Thermistor with resistance between 5K & 50k ohms.
- **Control sensor location:** One inside eutectic plate, other on condenser.
- **Control Panel:** SS with Ozefridge PCB16 loaded.
- **Capillary:** 0.8mm ID (key ind)
- **Capillary locale:** From ¼" liquid line to ¼" evaporator line. Both external.
- **Filter-**dryer: Type 032 solid core ¼" flared (Mounted behind fans)
- **Accumulator:** None
- **ECO2:** Ozefridge integrated voltage monitor to PCB.
- **Couplings:** Brass 3 way ¼" with Schroeder fitting & 5mm Allan key closer.
- **Eutectic Plate:** Ozefridge fabricated 318 ss with 4mm ss bolts.
- **Eutectic evaporator:** Continuous 3/8" copper top entry cascading down.
- **Water pump:** (AW490) Topsflo 12VDC centrifugal. 8 & 10mm nipples.
- **Control Circuit Fuse (not DC supply fuse):** Type 20-5 rated at 5.0amp.

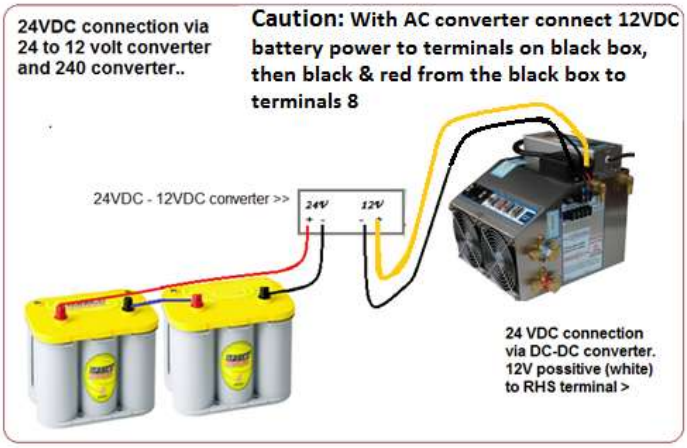
Power connections.

Left: Connecting to 12vdc power supply. (Top left)
And below with optional 240VAC converter.



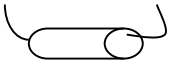






Right: Connect to 24VDC supply. (Top right)
And below right with optional 115/240VAC converter.

A spike arrester is fitted to the 12VDC power in terminals to protect the system. >>



For further assistance with technical issues, check our 'Fridge Assist' page at our website: https://www.ozefridge.com/technical-data

Added Information:

As a manufacturer of DC refrigeration systems, we and others in the industry have known for a long time that the vast majority of service issues are power supply related and not a fault of the refrigerator or refrigeration system.
This power supply failure is often difficult to convey - the voltage on the ship's voltage meter may indicate that all is well.

It is ONLY the voltage at the fridge unit and ONLY while it is running, or attempting to start, that the voltage is relevant.

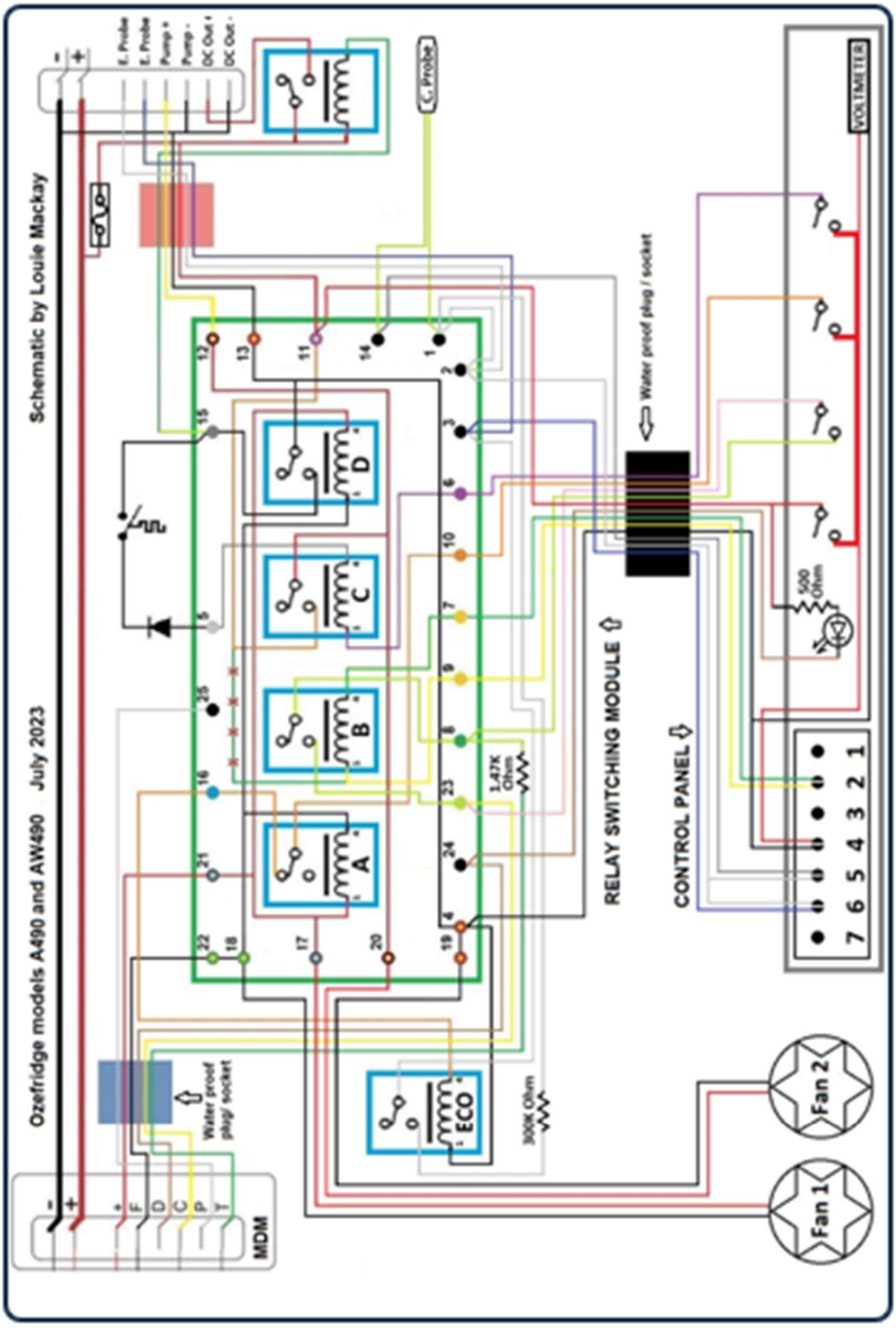
Voltage without load is not an accurate measure.

Something new!

Modern technology has now provided us with a tiny, digital voltmeter that can read voltage at the unit where it matters! This meter will now be fitted standard to all Ozefridge systems as shown below.

Testing for voltage drop causing compressor to fail at start-up may be identified by this meter but will still need to be confirmed as described at our 'Fridge Assist' page using a digital multi meter.

https://www.ozefridge.com/technical-data



Note: Diagram above is subject to change.