

User Manual & Operating Instructions



DC190L

CARAVAN – MARINE – RV - OFFGRID



Congratulations on your purchase of a Bushman DC190L. Please read these instructions carefully before installation and use.

Please be safe and use common sense and caution when installing, operating and cleaning this appliance. If you are unsure about any of these instructions, contact your local dealer before proceeding.

IMPORTANT INFORMATION

Do not lay your fridge on its back, top or sides or at any angle exceeding 30°. If your fridge has been incorrectly handled, ensure that the fridge is placed in a level upright position for 12 hours to allow the internal fluids to redistribute evenly.

Never operate your fridge directly from a 240 V or AC power supply.

Do not use a modified sine wave inverter to operate your fridge.

PRIOR TO INSTALLATION

DELIVERY

At delivery, please check that the fridge is complete and is not damaged in any way. Remove all packaging and securing tapes from the fridge. To avoid injury and causing damage to the appliance, be extremely cautious when using sharp or pointed tools to complete this task.

Do not connect an appliance that has been damaged, contact your local stockist immediately.

INSTALLATION

Installation of the DC190L must be completed by a suitably trained professional only.

POWER SUPPLY

Your fridge must be connected to a stable and regulated 12 V or 24 V DC power supply only. The compressor will automatically detect which voltage is present adjust accordingly.

If you are using a generator or other power supply, the output must be a pure sine wave. Any fluctuations in generator current may damage the compressor.

WIRING

Wire your fridge directly to your battery bank, without going via a buss bar, battery management system or shared circuit. For optimum results, you will need the correct sized wire depending on the distance from your power supply to the fridge. Please also ensure the earth is wired directly to your battery, not to a chassis. If your wiring is insufficient, your fridge may not perform correctly or may be damaged.

CROSS SECTION IN MM2	MAXIMUM LENGTH OF WIRE IN METRES	
	12 V	24 V
2.5	2.5	5
4	4	8
6	6	12
10	10	20

ISOLATION SWITCH

Install an isolation switch or breaker for the fridge circuit as close to your battery bank as possible. Any switches must have a breaking load not less than 20 A on 12 V or 10 A on 24 volts.

Ensure the wiring polarity is correct. Connect the red wire to the positive terminal (+) and the black wire to the negative terminal (-).

Never connect bare electric wires. Use only connections of a size suitable for the cross section of the wire being used.

INSTALLATION IN A CAVITY WITH THE MOUNTING KIT

For cavity installation we recommend allowing a minimum 5mm gap in width and height for ease of installation. A minimum gap of 50mm is recommended for the rear. Refer to the following table for the recommended cut-out dimensions.

MODEL	CUT-OUT CAVITY DIMENSIONS (MM)		
	WIDTH	DEPTH	HEIGHT
DC190L	605	575	1385

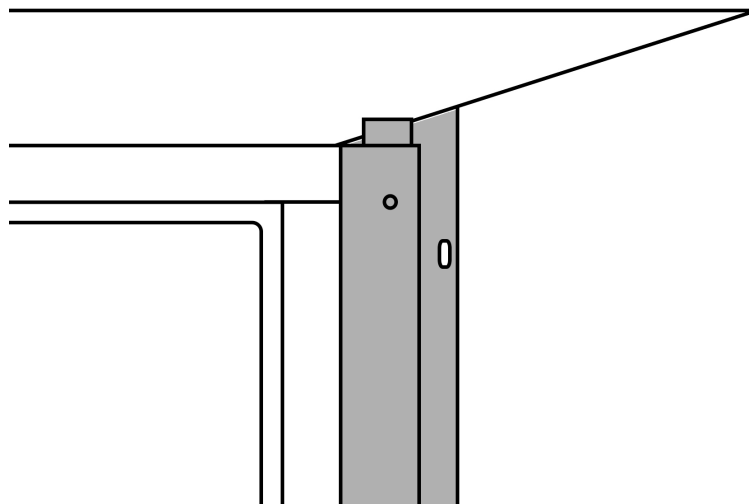
VENTILATION

Two vents need to be provided from the rear of the fridge cavity to the outside environment, or to the general area where the fridge is located. The vents should be located at the bottom and top of the fridge cavity and have a free cross section of approximately 600cm² each. Please note a 500cm x 250cm vent provides approximately 600cm² of free air flow (not 1250cm²)

MOUNTING KIT

The mounting kit is affixed to the sides and top of the fridge cabinet using the screws provided.

1. There are 2 x side pieces. Each piece is slightly different. Position the side pieces so they are flush with the front edge of the fridge cabinet, and so that the small tab is located at the top, as follows:

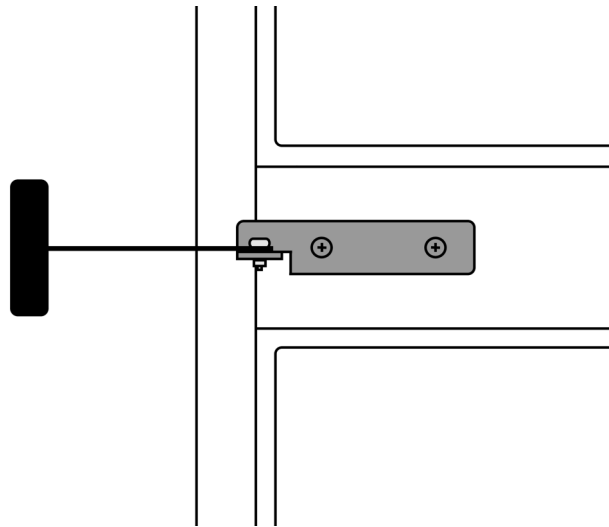


2. Carefully mark the position of each of the 4 holes in the mounting kit on the side of the fridge cabinet.
3. Remove the side pieces.
4. Drill 2mm pilot holes 5mm deep through the sheetmetal where marked.
5. Reposition the side pieces and screw to the fridge cabinet using the 8 screws provided. Do not over tighten.
6. There are 2 x top pieces. Each piece has a slightly bigger cut-out on one side. The larger cut-out goes over your top hinge plastic cap. Choose which piece you need depending on which side you have your hinges and discard the other.
7. Position the top piece so it is flush with the front edge of the fridge cabinet and carefully mark the position of the holes.
8. Remove the top piece and drill 2mm pilot hole 5mm deep through the sheetmetal where marked.
9. Reposition the top piece and screw to the fridge cabinet using the 2 screws provided. Do not over tighten.
10. Your fridge is now ready to be moved into your cavity.
11. We do not supply screws for affixing the mounting kit to your cavity, please choose screws of the correct type for the material your cavity is made from.

DOOR T-LATCH

The T latch is located inside the crisper tub. The T latch must be used when the fridge is installed in anything mobile like a caravan, boat or RV.

1. There are 2 screws already affixed in the front of the fridge cabinet, in between the freezer and fridge doors, on the opposite side to the hinges. Each screw has a small plastic cover which you can pry off.
2. Remove the 2 screws.
3. Position the T latch on the fridge and insert the 2 screws. Fasten the screws only finger tight.
4. Check that the freezer and fridge doors close without hitting the main arm of the T latch. Move the T latch into a good position.
5. Tighten the 2 screws.



OPERATING THE FRIDGE

THERMOSTAT SETTING

- The cooling level can be set between 1 and 7. (7 is the coldest setting and 1 is the warmest)
- We recommend starting the thermostat on 3 and let the fridge run for 2 – 3 days. Only turn the thermostat up from there if the fridge is not reaching 4°C. Always use the lowest number possible.
- Do not use setting 7.

EQUALISING THE FRIDGE

During the first 24 hours of operation, your compressor will operate for longer than usual. This process allows the internal air temperature, food, drinks, condenser and insulation to equalise.

ENERGY SAVING TIPS

- Have a much ventilation as possible – the more the better.
- Keep the fridge out of direct sunlight whenever possible
- Only open the fridge or freezer door when necessary
- Allow hot food to cool down before placing inside the fridge
- Defrost the fridge as soon as a thick (10mm) layer of ice forms
- Set the fridge to be only as cold as necessary

CLEANING

Wash the inside of your fridge with warm water and a mild soap. Never use abrasive or corrosive cleaning agents, steel wool or scouring sponges. A soft sponge, towel, or soft brush is recommended.

Always keep the inside of the fridge clean and dry. Keep the doors of the fridge ajar when the fridge is not in use, to allow fresh air to circulate inside the fridge compartment.

DEFROSTING

Defrosting needs to be carried out when the ice layer reaches a thickness of 5mm - 10mm.

1. Turn the fridge power off and move your food and beverages to another cool place. Do not use any objects to remove the ice or frost, it must be allowed to melt naturally. Once the ice has melted, dry the inside of the fridge and freezer compartment thoroughly.
2. Set the thermostat to a lower number (start on 3). Monitor & adjust after 48 hours

MOVING THE DOOR HINGES FROM ONE SIDE TO THE OTHER

Please follow these instructions carefully. It is imperative that the doors are aligned correctly when the hinges are moved from one side to the other. Incorrectly aligned the doors will cause significant ice build-up and failure of the door latch while underway.

In our experience this is a 2-person job.

If you are unsure at any stage, please call Bushman head office on (03) 8080 9990 for assistance.

REVERSING THE FRONT DOOR HINGES

The door hinges from the right side. To change the hinge side, simply unscrew the door hinges from the fridge cabinet, move to the other side and re-affix using the same screws. Detailed instructions as follows:

1. Carefully remove the top, middle and bottom hinges and both doors. Ensure any washers on each hinge are kept in place.
2. Affix bottom hinge to the preferred side of fridge cabinet. Only tighten screws finger tight.
3. Move the bottom hinge pin to the other side of the hinge.
4. Locate main door onto the bottom hinge.
5. Affix middle hinge to fridge cabinet. Only tighten screws finger tight.
6. Locate freezer door onto the middle hinge.
7. Affix top hinge to fridge cabinet. Only tighten screws finger tight.
8. Align the freezer door until it is square with the fridge cabinet, by twisting the door into position and manipulating the position of the top and middle hinges.
9. Tighten top hinge screws fully.
10. Align the main door until it is square with the fridge cabinet, also by twisting the door into position and manipulating the position of the bottom and middle hinges.
11. Tighten bottom hinge screws fully.
12. Tighten the middle hinge screws fully.
13. Double check that both doors open and close freely without rubbing on anything.
14. With the doors closed, carefully apply moderate heat with a heat gun or hair dryer to the rubber seals one section at a time. Once warm and softened, the rubber will pull in towards the fridge cabinet and create a flush seal.
15. If you are unsure at any stage, please call Bushman head office on (03) 8080 9990 for assistance.

RESETTING THE RUBBER DOOR SEALS

When the doors are closed, visually inspect the rubber seals to make sure they are making a smooth line of contact all the way around each door. Even a small bump or gap will let air get inside the fridge and ice will build up quickly. This issue is most prominent when the door has been removed at some stage (often during installation, or when the hinges have been swapped to the LHS).

- To rectify this issue, warm the rubber seals up gently with a heat gun (with the door closed)
- Do this one door at a time and be sure to do the top, bottom and both sides.
- As the rubber warms and softens, you will be able to see it move and suck towards the metal fridge cabinet (as there are magnets throughout the rubber seal). The seal is capable of closing even a 15mm gap.
- Let the seal cool in this position with the door closed for about 10 minutes and repeat for each door.

TROUBLE SHOOTING

Check:

- Correct power supply and the polarity of the connections are correct (**page 2**)
- There is correct ventilation to the rear of the fridge (**page 3 and page 9**)
- The fuse is not blown
- You have given the fridge enough time to cool down (24 hours)
- The red LED error light (**page 7**)

VOLTAGE (Start / stop or compressor doesn't run long enough / fridge not cold enough)

Danfoss compressors are sensitive to voltage. When the compressor starts it will draw approximately 8A for 1/2 second to turn the compressor over. When this 8A load is applied to the power source, the voltage can drop considerably, causing the compressor to turn off again.

This often happens:

- a) at night-time when the battery gets a bit lower (no solar input), or
- b) when the car alternator hasn't been started for a while (no alternator input), or
- c) there is a weak spot between the battery and the fridge (weak join, solder, undersized wire), or
- d) when the fridge is not wired directly to the battery terminals (via BMS, buss bar, shared circuit).

1. To identify this issue, use a different, stand-alone power supply and wire directly. Or, get an auto electrician to test the fridge circuit under a 10 A load:

Connect the red and black power wires from the compressor directly to the terminals of a stand-alone, fully charged deep cycle 12V battery. It is important to run these two wires directly to the battery terminals, without any battery management, shunt, power distribution or buss bars. Let the fridge run for a couple of days. If the fridge now runs correctly, there was a power supply issue somewhere.

EXCESSIVE ICE BUILD UP (Ice builds up in a few days or the fridge is not getting very cold)

Ice will build up slowly over time on the back of the fridge. This is a normal part of the operation of a low-power cooling system. However, it should build up slowly over many weeks.

Excessive ice build-up is a problem as the ice eventually insulates the cooling element and hinders the fridge's ability to cool. In this instance, turning the thermostat up to flat out (7) will cause ice to build up even faster. Therefore, slowing the ice build-up from the start is the key. Here are the top 5 things to check:

1. The rubber seals from the doors are making contact all the way around the fridge cabinet. When the doors are closed, visually inspect the rubber seals to make sure they are making a smooth line of contact all the way around each door. Even a small bump or gap will let air get inside the fridge and ice will build up quickly. This issue is most prominent when the door has been removed at some stage (often during installation, or when the hinges have been swapped to the LHS). See Resetting the door seals (**page 5**)
2. Rubber seals are clean
 - Check the rubber seals are clean and free from dust or grime. If not, clean the rubber seals and the front edge of the fridge cabinet with warm, soapy water.
3. Thermostat set correctly
 - The thermostat should be set on the lowest number to keep your fridge cold. Do not use setting 7 as this causes very quick ice build-up. See Thermostat Setting (**page 4**)
4. Warm / damp items kept out of the fridge
 - Try and keep hot or wet items out of the fridge cabinet as they are a prime source of moisture.
5. Keep some space in-between items, especially on the top shelf
 - It's helpful to keep some space between your items in the fridge so that the cold air can circulate, especially on the top shelf. This will also help you to use a lower thermostat number.

Once you have checked these items, we recommend defrosting the fridge and starting again with the thermostat on a lower number. See Defrosting (**page 5**)

Battery Protection Settings

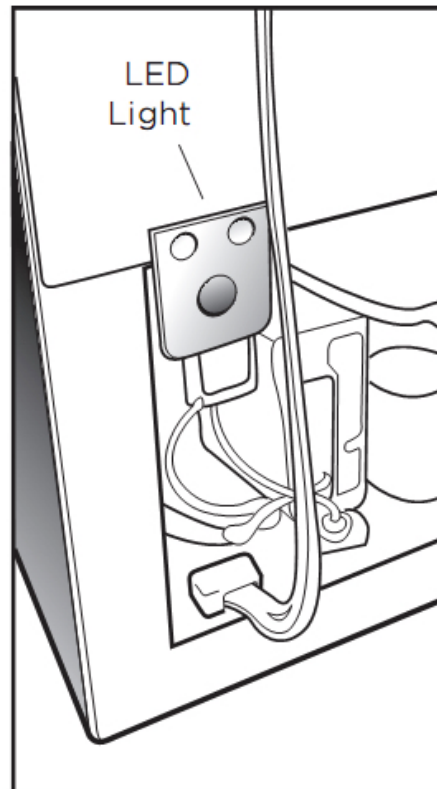
VOLTAGE	CUT OUT	CUT IN
12 V	9.6 V	10.9 V
24 V	21.3 V	22.7 V

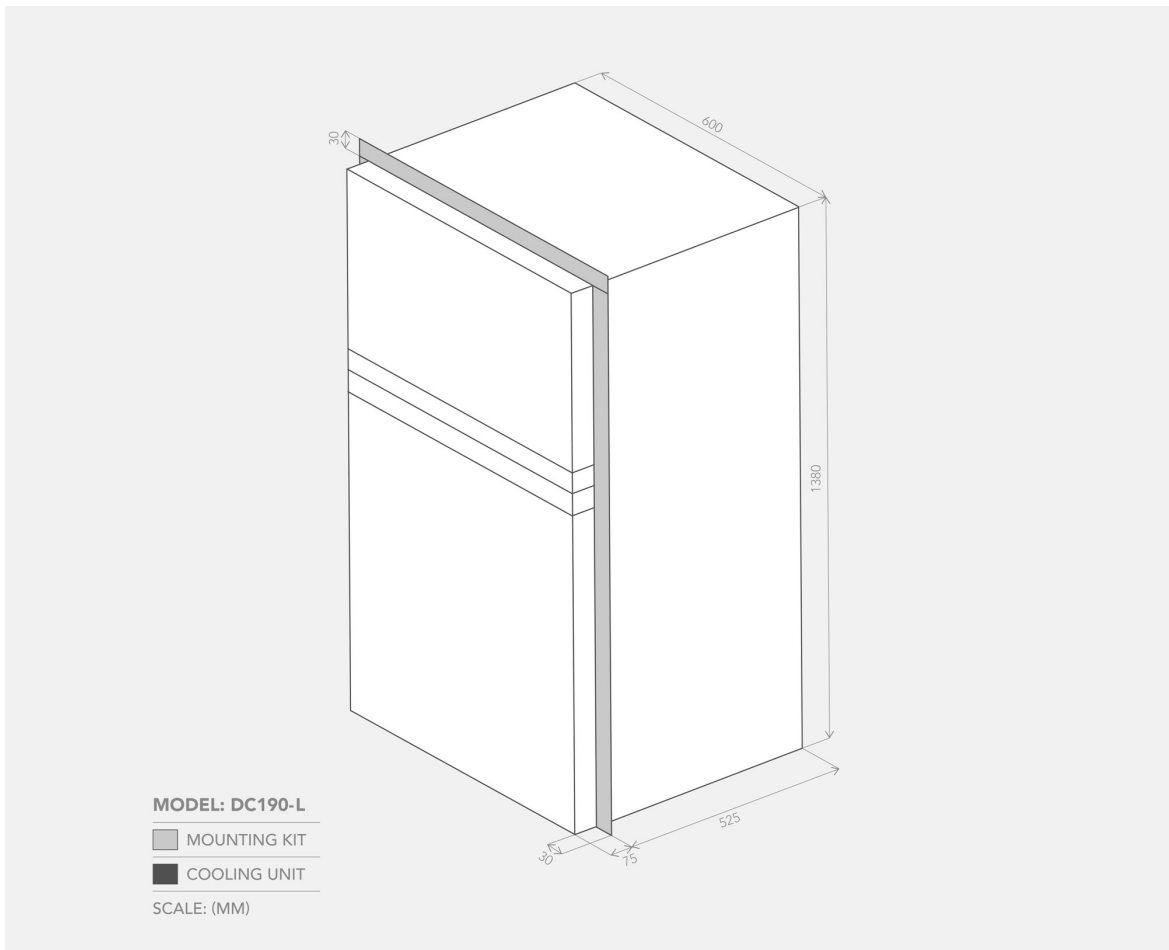
RED ERROR LIGHT

There is a red LED light just to the LHS of the compressor. If you are experiencing any problems with your fridge, first check to see if the LED is blinking. The number of blinks corresponds to the following error codes.

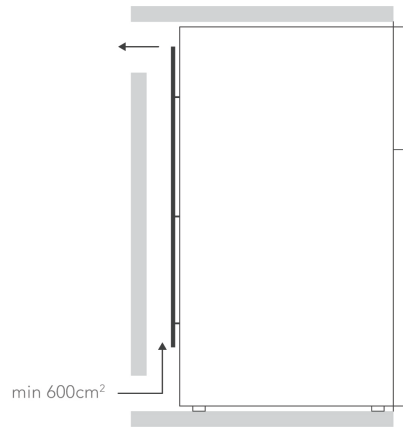
Operational errors

Error code or LED flashes	Error type
	Can be read out in the software TOOL4COOL®
6	Thermostat failure (If the NTC thermistor is short-circuit or has no connection).
5	Thermal cut-out of electronic unit (If the refrigeration system has been too heavily loaded, or if the ambient temperature is high, the electronic unit will run too hot).
4	Minimum motor speed error (If the refrigeration system is too heavily loaded, the motor cannot maintain minimum speed at approximately 1,850 rpm).
3	Motor start error (The rotor is blocked or the differential pressure in the refrigeration system is too high (>5 bar)).
2	Too many start attempts or fan over current (Too many compressor or fan starts in short time or fan current higher than $0.5A_{avg}$).
1	Battery protection cut-out (The voltage is outside the cut-out setting).

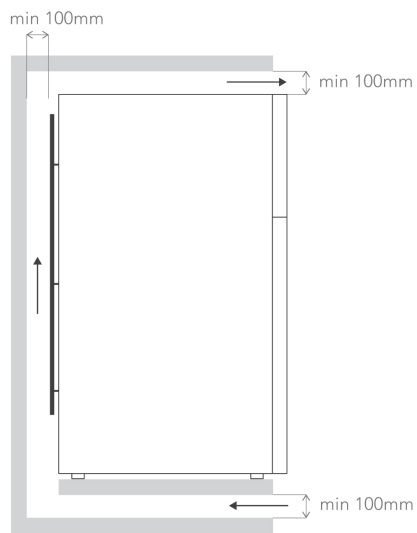




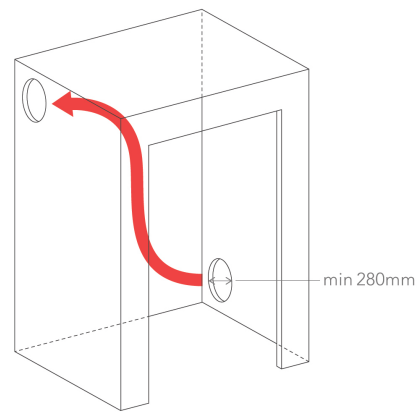
**VENTILATION
OPTIONS DC-L**



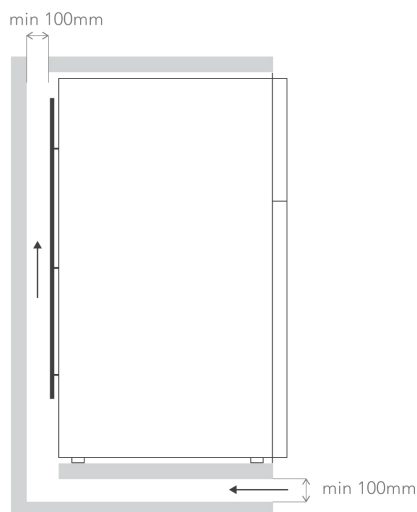
▲ Exterior Ventilation



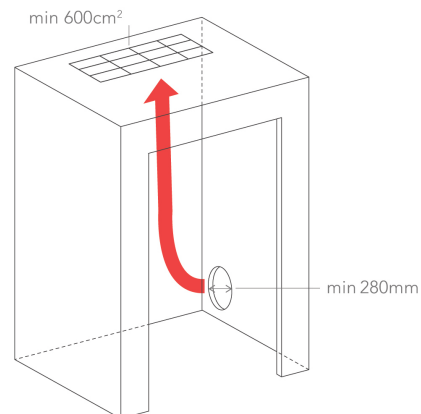
▲ Interior Ventilation Option 1



▲ Interior Ventilation Option 2



▲ Interior Ventilation Option 3



▲ Interior Ventilation Option 4

TECHNICAL SPECIFICATIONS

	DC190L
COMPRESSOR	Secop BD50
VOLTAGE	12 V / 24 V DC
REFRIGERANT	170g R134a
EXTERNAL DIMENSIONS (mm)	W 600 D 600 H 1380
NET WEIGHT	50 kg

WARRANTY

DP Refrigeration Pty Ltd trading as Bushman Fridges ABN 94 615 295 255 (Bushman) warrants, to the original owner, that this product is free from defects in workmanship and material for a period of three (3) years from the purchase date. This warranty shall be limited to repairing or replacing, at Bushman's option and without charge to the purchaser, defective components. All warranty work shall be performed at a Bushman approved facility. Shipping charges related to returning the product to the Bushman facility are not covered under this warranty. However, this warranty covers shipping charges related to returning the repaired product to the customer. This warranty does not apply to damage or wear to the product caused by accident, abuse, misuse, neglect, unauthorized alteration or repair, or if the product was not used in accordance with Bushman printed installation and operating instructions. To obtain service under this warranty, the defective product must be returned to Bushman together with a copy of the original purchase receipt. Any product repaired or replaced under this warranty will be warranted for the balance of the warranty period with respect to the original purchased product. Bushman is not liable for any incidental or consequential loss or damages whatsoever as a result of use or misuse of this product. Any statutory warranty also applies.



NOTES

NOTES

For after sales service and enquiries, please contact:

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