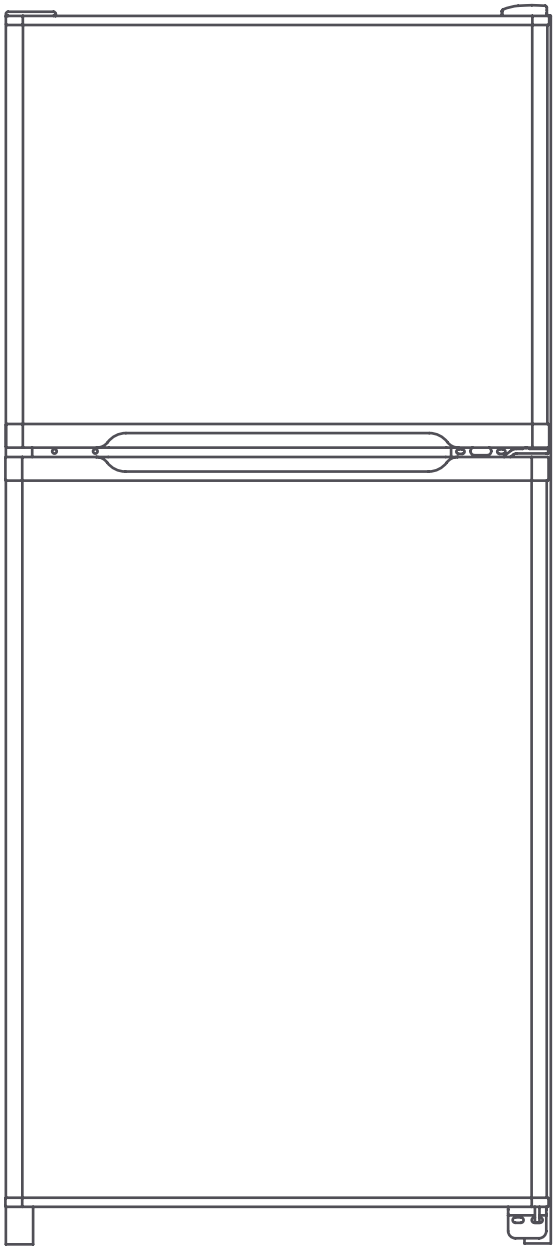
DC190L-HD
DC225L-HD

Caravan, Marine, RV, Off-Grid

Owners Manual & Operating Instructions



Please read carefully before use and installation

BUSHMAN

100% AUSSIE OWNED FAMILY COMPANY | EST 1982

Congratulations on your purchase of a Bushman fridge.

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 30º. 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 your fridge 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

Our preferred method for wiring your fridge is to run a dedicated circuit (positive and negative wires) directly from the fridge all the way to your battery bank. This always ensures the best possible power supply to your fridge. If you have another device running from the same circuit, this can cause power spikes or dips and cause the compressor to stop.

If you are using a battery management system or shunt to keep track of your fridges power consumption, ensure the fridge circuit is connected on the shunt terminal closest to your battery. In most cases this setup will be ok, but if you ever experience stop / start issues with your fridge, or intermittent defrosting – try bypassing your BMS or shunt and wiring the fridge circuit directly to your battery bank, as you might have a conflicting device in your electrical system causing a power spike or drop as it cycles on or off. Sometimes these conflicts are hard to pinpoint, but wiring your fridge directly to your battery bank will eliminate any possibility of a conflict.

CROSS SECTION IN MM2	AWG (AMERICAN WIRE GAUGE)	MAXIMUM LENGTH OF WIRE IN METRES	
		12 V	24 V
2.5	14	2.5	5
4	12	4	8
6	10	6	12
10	8	10	20

Isolation switch and fuse

We recommend installing an isolation switch 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 V. The power supply wiring must also be protected with a 15 A fuse.

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 together. 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-HD	605	570	1385
DC225L-HD	605	555	1555

Mounting option 1 – Internal sleeves

There are 6 internal sleeves on the inside of your fridge cabinet (2 on each side in the fridge and one on each side in the freezer). You can screw or bolt through these sleeves, from the inside of your fridge out into your cabinetwork.

Only use M5 screws or bolts with the thread type to suit your application.

Drill 4mm pilot holes through the plastic sleeve from inside of your fridge cabinet, and continue to drill all the way through the fridge cabinet sheet metal sides. The fridge is now ready to go into your cavity.

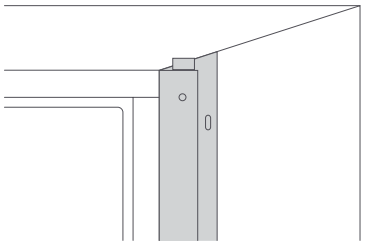
Before you insert the screws or bolts, ensure that the exterior of the fridge cabinet is flush with your cavity. If there is a gap on either side, be sure to pack it out with timber.

Mounting option 2 – Mounting kit

The mounting kit is affixed to the sides and top of the fridge cabinet using the M5 bolts provided.

a. Remove the M5 screws from the sides and top of the fridge cabinet. There are 4 screws on each side and 2 screws on the top.

b. 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, and tighten the screws, as follows:



c. 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.

d. Position the top piece so it is flush with the front edge of the fridge cabinet and affix using the screws provided.

e. Your fridge is now ready to be moved into your cavity.

f. 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.

Mounting support – Rear chassis bolts

There are 2 holes drill into the rear chassis (where the compressor is mounted). You can bolt down through these holes for extra support in any installation.

Do not screw into other areas on the fridge cabinet!

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 600cm^2 each. Please note a 500mm x 250mm fluted vent provides approximately 600cm2 of free air flow (not 1250cm^2).

Wire shelves

For safety compliance, your wire shelves are affixed in place with a bracket and screw. When you move the position of a wire shelf, you must re-affix the bracket and screw.

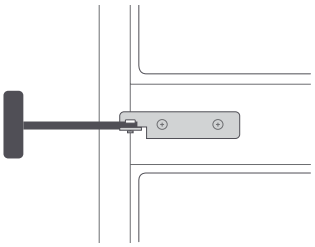
Internal fan

Your fridge has a small internal fan to help with cold air flow. The fan only operates when the fridge door is closed.

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.

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. 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

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

a. Carefully remove the top, middle and bottom hinges and both doors. Ensure any washers on each hinge pin are kept in place.

b. Affix the bottom hinge to the preferred side of the fridge cabinet. Only tighten screws finger tight.

c. Move the bottom hinge pin to the other side of the hinge.

d. Locate main door onto the bottom hinge.

e. Affix the middle hinge to the fridge cabinet. Only tighten screws finger tight.

f. Locate the freezer door onto the middle hinge.

g. Affix the top hinge to the fridge cabinet. Only tighten screws finger tight.

Now that the doors and hinges are in place you will need to correctly align both doors before tightening up the bolts:

Aligning the doors

h. Align the freezer door first until it is square with the fridge cabinet, by twisting the door into position and manipulating the position of the top and middle hinges.

i. Tighten top hinge screws fully.

j. 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.

k. Tighten the bottom hinge screws fully.

l. Tighten the middle hinge screws fully.

m. Double check that both doors open and close freely without rubbing on anything, especially in the last few centimetres. Both doors should close freely without any extra force.

n. Proceed to resetting the rubber door seals below.

Now that the doors and hinges are in place you will need to reset the rubber door seals with a heat gun to ensure a perfect seal:

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 double check your door seals, put a bright torch inside the fridge at night, and check where the rubber seals are touching the fridge cabinet for any slither of light.

a. To rectify this issue, you will need to heat the rubber seals up gently with a heat gun (with the door closed).

b. Do this one door at a time, and be sure to do the top, bottom and both sides.

c. We recommend starting in one corner, and working your way around the door.

d. As you heat up the rubber it will soften, and 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.

e. Once you have gone all the way around the door, let the seal cool in this position with the door closed for about 15 minutes and repeat for each door.

Troubleshooting

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 7).
- The fuse is not blown.
- You have given the fridge enough time to cool down (24 hours).
- The red LED error light (page 6).

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 10A for 1/2 second to turn the compressor over. When this 10A 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).

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 4).
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 3).
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 4).

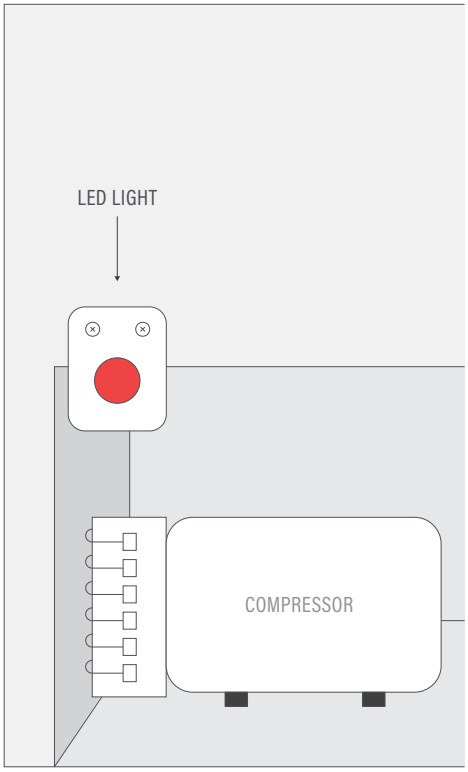
Battery protection settings

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

Red light error

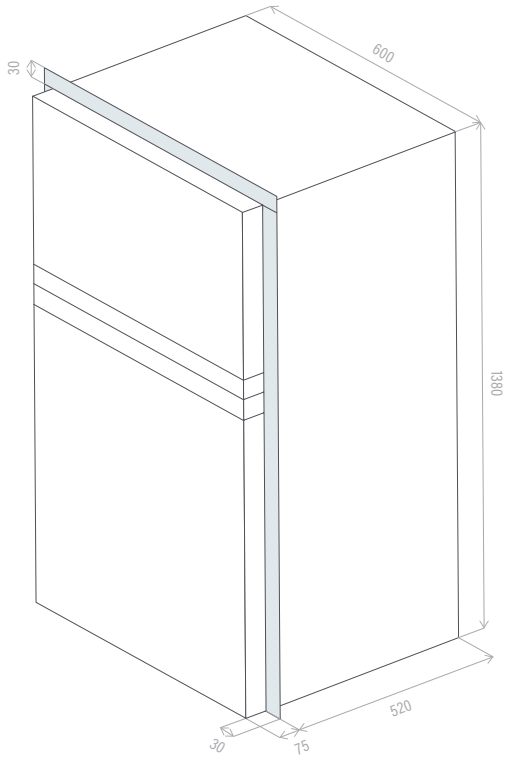
There is a red LED light just to the LHS of the compressor. If you are experiencing any problems with your fridge, first check to see if the LED is blinking. The number of blinks corresponds to the following error codes.

ERROR CODE OR LED FLASHES	ERROR TYPE Can be read out in the software T00L4C00L
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 to heavily loaded, or if the ambient temperature is high, the electronic until will run too hot)
4	**Minimum motor speed error** (If the refrigeration system is too heavily loaded, the motor cannot maintain minimum speed at the approximately 1,850rpm)
3	**Motor start error** (The rotor is blocked or the differential pressure in the refrigeration system is too high (>5bar))
2	**Too many start attempts or fan over current** (Too many compressor or fan starts in short time or fan current higher than 0.5Aavg)
1	**Battery protection cut-out** (The voltage is outside the cut-out setting)

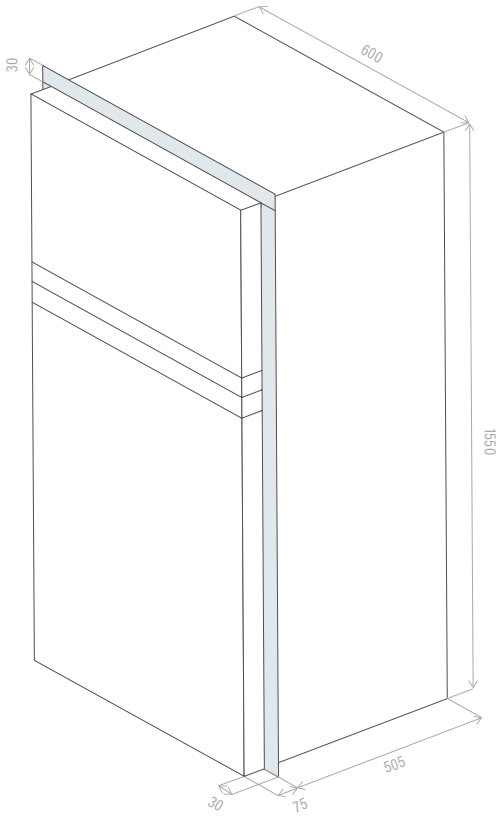


Measurements

MOUNTING KIT SCALE: (MM)

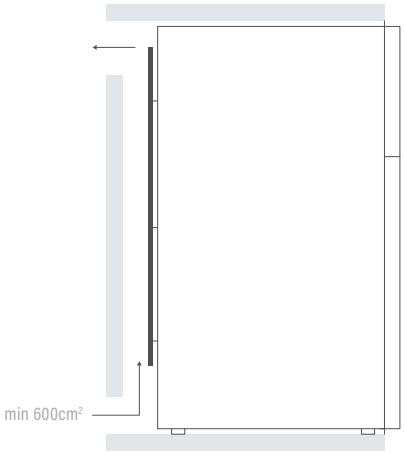


DC190L-HD

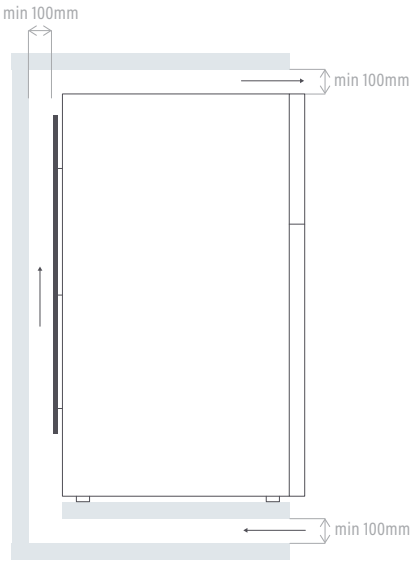


DC225L-HD

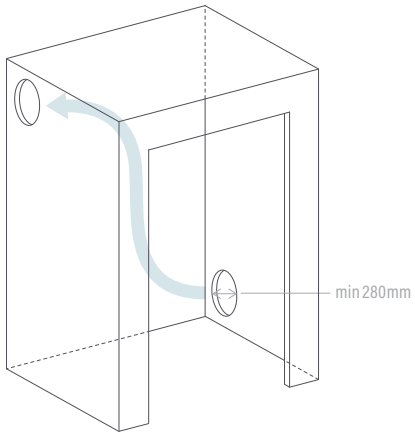
Ventilation options DC-L



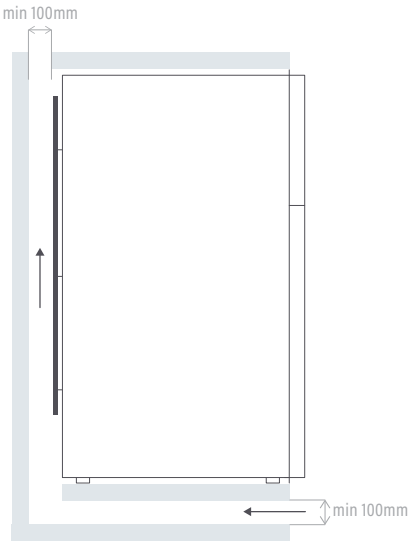
Exterior ventilation



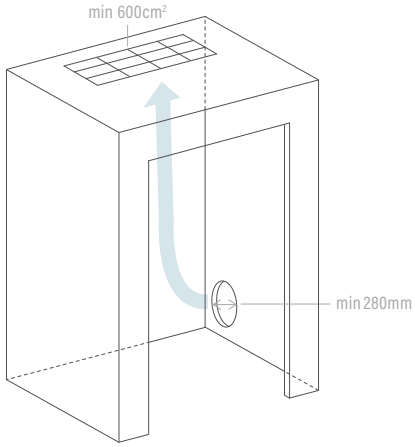
Interior ventilation option 1



Interior ventilation option 2



Interior ventilation option 3



Interior ventilation option 4

Technical specifications

DC190L-HD	
COMPRESSOR	SECOP BD80CN
VOLTAGE	12 V / 24 V DC
REFRIGERANT	R290 / 50G
EXTERNAL DIMENSIONS (MM)	W 600 D 595 H 1380
NET WEIGHT	53 KG

DC225L-HD	
COMPRESSOR	SECOP BD80CN
VOLTAGE	12 V / 24 V DC
REFRIGERANT	R290 / 56G
EXTERNAL DIMENSIONS (MM)	W 600 D 580 H 1550
NET WEIGHT	57 KG

Warning

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

Children should be supervised to ensure that they do not play with the appliance.

This appliance is intended to be used in household and similar applications such as

- staff kitchen areas in shops, offices and other working environments;
- farm houses and by clients in hotels, motels and other residential type environments;
- bed and breakfast type environments;
- catering and similar non-retail applications.

WARNING: Keep ventilation openings, in the appliance enclosure or in the built-in structure, clear of obstruction.

WARNING: Do not use mechanical devices or other means to accelerate the defrosting process, other than those recommended by the manufacturer.

WARNING: Do not damage the refrigerant circuit.

WARNING: Do not use electrical appliances inside the food storage compartments of the appliance, unless they are of the type recommended by the manufacturer.

WARNING: When positioning the appliance, ensure the supply cord is not trapped or damaged.

WARNING: Do not locate multiple portable socket-outlets or portable power supplies at the rear of the appliance.

Do not store explosive substances such as aerosol cans with a flammable propellant in this appliance.

The appliance must only be supplied at safety extra low voltage.

Suitable for camping use.

The appliance shall not be exposed to rain.

The lamps can only be replaced by the manufacturer or its service agent.



WARNING: Risk of fire / Flammable materials

Please according to local regulations regarding disposal of the appliance for its flammable refrigerant and blowing gas. Before you scrap the appliance, please take off the doors to prevent children trapped.

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, (7 years for the compressor). 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.