AoFrio

USER MANUAL

ECR01 & ECR82/ECR92 Installation & operation

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Accuracy of information and disclaimer of warranties

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General Safety

- Only install or maintain electric motors and fans if you are suitably qualified and trained.
- Wear suitable safety clothing and use appropriate equipment to avoid injury.
- Inspect the motor, housing, and other mechanical parts such as cables and connections for damage and defects before installing. Do not install the motor if it is damaged or if it has been dropped.
- Check electrical cables and connections for damage at regular intervals. Remove defective motors.
- Do not install cables in a way that will allow them to come into contact with a fan.
- As the motor does not contain any serviceable parts, please return, or responsibly dispose of, damaged or malfunctioning motors.
- After a fan has been attached to the motor, take care to avoid injury from spinning fan blades. Avoid wearing loose clothing and jewellery and use a hair net.
- Do not work on the machine while the fan is still spinning.
- Install a suitable guard over the fan to avoid accidental contact with spinning fan blades.
- As the motor can start automatically and unexpectedly when power is applied, do not assume that a non-rotating motor is not powered. Always check that power is disconnected before you work on the motor or fan.
- After a period of operation, some motor surfaces may be hot. Ensure there is protection from accidental contact to avoid burn injuries.

Wires and cords

Ensure all wires and cords are routed and supported to reduce the risk of damage from:

- Sharp edges
- Surfaces and parts that operate at temperatures higher than the wire insulation's specified range
- Moving parts
- Motors, motor compressors, refrigerant lines, and similar parts that are likely to vibrate
- Clamps without smooth, rounded surfaces
- Metal parts contacting single insulated wiring

Transport and Handling

- Storage – Store motors in clean, dry conditions.
- Motor handling – Take care to protect motors from damage caused by impact or dropping during transport.
- Disposal – Follow the regulations for disposal of electrical equipment in the country of use.

Zone 2 Flammable Gas Environments

- If you are installing a motor in a Zone 2 Flammable Gas Environment, check that it is suitably certified. Only motors carrying the  mark are certified for use in zone 2 flammable gas environments.
- Check that all electrical connections to the motor and electrical cable conform to the ATEX Directive 2014/34/EU and IEC 60079-0.
- Enclose any fan attached to the motor with fan hood, or enclosure, to provide IP20 on the air inlet side and IP10 at the air outlet side.
- Check the clearances between the fan and its hood or walls of the enclosure are at least 1/100 of the maximum diameter of the fan, or 2mm (whichever is greater). Clearances must not exceed 5 mm.
- If the installed fan is made of light alloy, the content of Mg and Ti must be less than 7.5%.
- Check that the fan complies with EN 14986, EN 13463-1, EN 13463-5 (or EN 80079-36, EN 80079-37) for the EU market. Installation must comply with IEC 60079-0 and IEC 60079-15.

Proper use

The ECR motor range is designed to be used exclusively as fan motors in commercial refrigeration applications. This means:

- Motors must be properly matched to the required fan load. See AoFrio's product range for performance data.
- The rated load of the motor shall not be exceeded.
- Motors must only be used in environments that are within the specified permitted temperature limits.
- Motors must only be used within the limits of their respective IP ratings.
- Motors shall not be used in situations where they will be partially or wholly submerged in water.
- In order to maintain the motor IP rating (IP55) the motor connectors should be IP55 rated, or the connectors appropriately located or protected so that they are not subject to moisture or humidity.

Cleaning

- WARNING – Electrical shock or burn hazard. Unplug the unit or turn off the power supply before proceeding.
- DO NOT clean motor with a pressure washer or hose.

Installation

The following general requirements must be met for any installation of the motor:

- Install the motor in such a way as to protect it from any impact sources.
- Do not remove or loosen the nuts for the 'through bolts' as this can damage the seal between the motor housings. Use additional spring washers and nuts to fasten the motor to its mounting.
- Secure cables and wiring to avoid contact with moving parts and fan blades.
- Install cables in a way that does not put excessive strain on the cable gland.
- Mount motors in an orientation that allows cable entry from underneath or below the motor. If cable orientation is from the side of the motor, you should apply a downward bend to the cable as close to the cable gland as possible to avoid water tracking into the motor. Cable entry from above is not recommended.

Mounting

Motors can be mounted in the following ways:

a) Basket or Ring Mounting

Figure 1 (below) shows the correct installation of the motor into a fan basket or ring mount. The motor shall be secured to the fan basket with four flanged nuts or nuts and spring washers with a required torque setting of 1.0 - 1.5Nm.

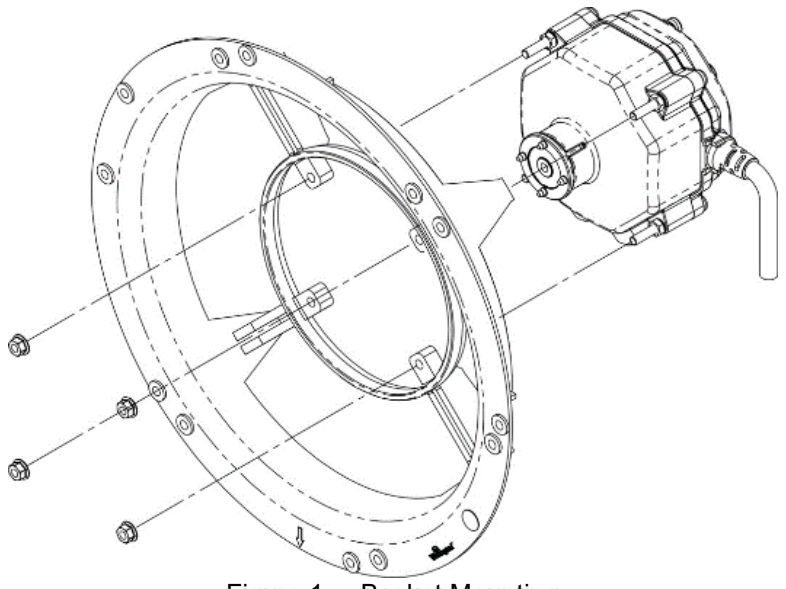


Figure 1. – Basket Mounting

b) Bracket Mount

The motor shall be secured to the bracket with two screws which are part of the Foot Mount Kit. Figure 2 shows the correct insertion of the rectangular washers and screws into the foot mount feature on the housing. The screws should be pushed all the way to the end of the groove. Figure 3 shows the correct assembly of the motor to a foot mount bracket. The required torque setting for the two hex nuts is 2.0 – 2.2Nm.

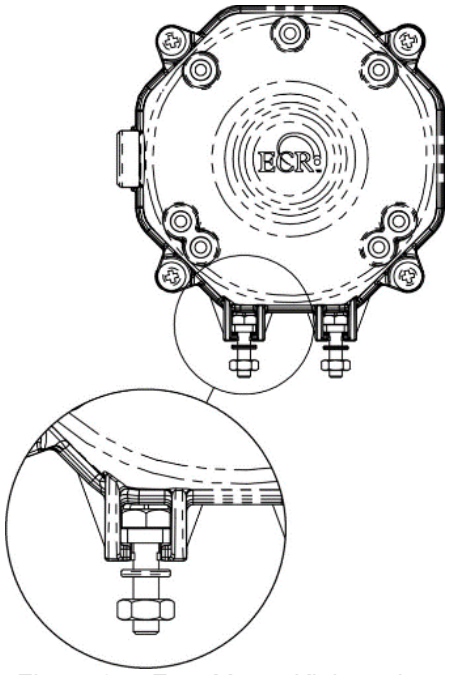


Figure 2. – Foot Mount Kit insertion

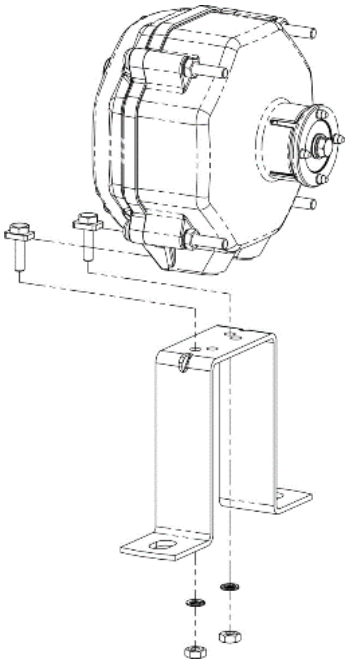


Figure 3. – Bracket assembly

c) Rear Mounting
Motors with threaded inserts can be mounted to bulkheads or sheet metal brackets by securing them with either 3 or 4 screws. As shown in Figure 4, below, screws may not have a penetration of more than 6mm. The required torque setting for the rear mount screws is 2.0 –2.2Nm.

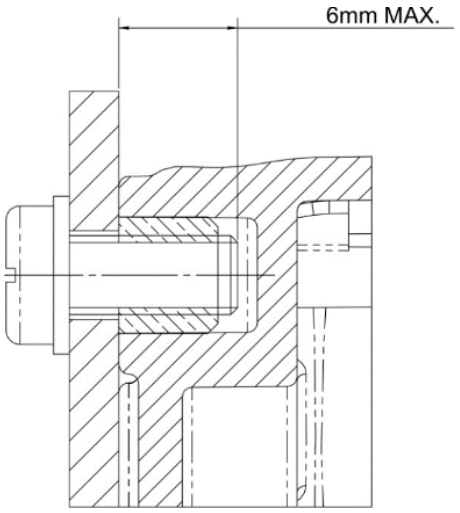


Figure 4. – Rear Mounting Screw

Figure 5 shows the correct assembly of a fan to the motor. A flat washer or conical washer is recommended between the fan and the serrated flange screw. The required torque setting for the screw is 1.5 – 1.7Nm.

NOTE : Only Wellington supplied washers & screws must be used for installation of the axial impeller.

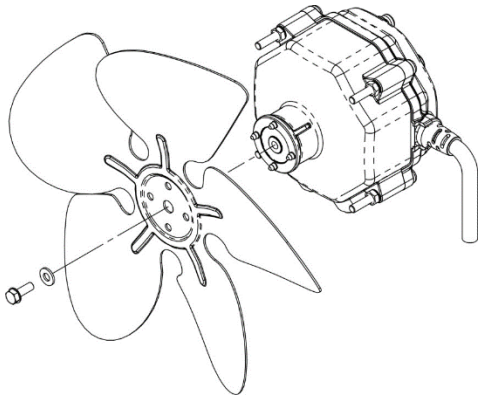


Figure 5. – Fan Assembly

Electrical connections

To connect the motor to an electrical circuit, the conductors need to be connected in the following way:

Brown – Phase (Live)
Blue – Neutral
Black – (Optional) Used for speed and direction control. See Firmware Operation, below.

- Cable must be secured to ensure it does not make contact with the fan or any other moving parts.
- If the motor is being used in a potentially explosive environment, electrical connections must be made and protected in accordance with relevant ATEX/IECEx standards.
- Cable must be free from any excessive strain after connection has been made.
- The supply cord and its connector is specific to the end product installation and needs to be reviewed and addressed as part of the end product assessment.
- In order to maintain the motor IP rating (IP55) the motor connectors should be IP55 rated or the connectors appropriately located or protected so that they are not subject to moisture or humidity.

Firmware operation

Motors with three core cables can be speed or direction controlled. The direction of rotation, clockwise (CW) or counterclockwise (CCW), is referenced with respect to the shaft end of the motor. It can be changed by connecting the black control wire to either phase (live), neutral or left unconnected. Leaving the control wire unconnected will give the same operation as connecting it to neutral.

Alternative configurations are possible with different, pre-programmed firmware, the most common being:

- Continuous CCW and CW operation.
- Timed reverse; continuous CCW and time limited CW operation. (described below)

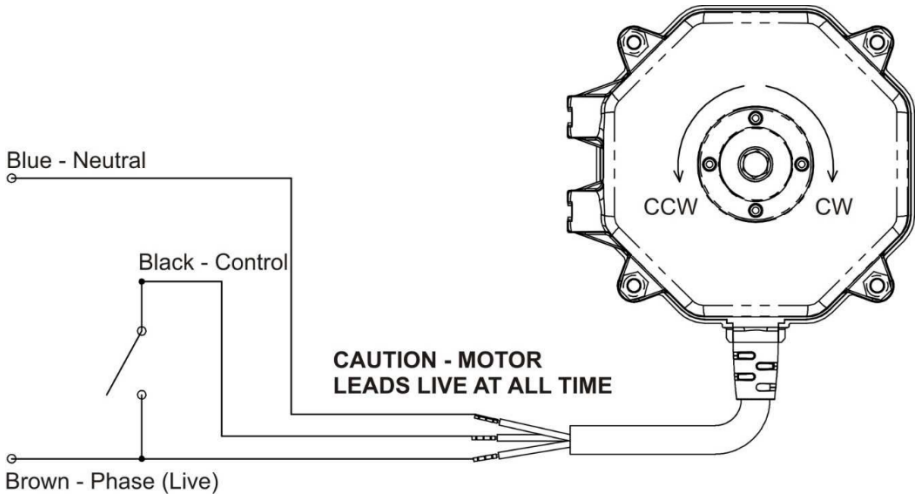


Figure 6. – Electrical Connection for Direction Control

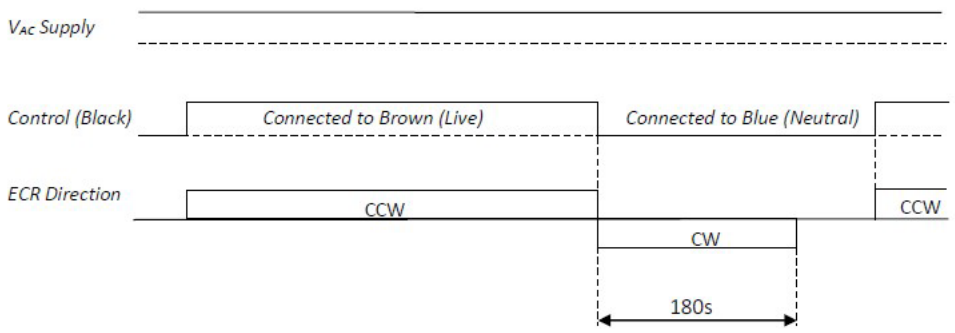
Timed reverse operation

If the motor is programmed with Timed Reverse Code, the motor will behave in the following way:

- Brown connected to Phase (Live), Blue connected to Neutral, Black connected to Phase (Live) – The motor spins continuously in CCW direction.

- If Black is then disconnected or connected to Neutral – The motor will change direction to CW for 180 seconds, then stop.

If the power is turned off and on again, the timer is restarted, and the motor will operate in the CW direction for 180 seconds. The motor will not restart in the CCW direction, until the black wire is reconnected to Phase (Live).



Troubleshooting

NOTE: Motor Starting Behaviour - Motors may pause momentarily during starting and may reverse a number of times before a stable operating speed and direction is achieved. This is normal behaviour for this type of motor and is not a fault condition.

Problem	Possible cause	Action
Motor does not turn	No mains power	Check mains power supply
	Faulty connection	Check power cable connection
	Reverse function timed out	Allow motor to reset to CCW mode
	Thermal protection activated	Allow motor to cool down and Thermal Protector to reset
Motor fails to start after multiple attempts or stops and starts often.	Fan diameter or pitch too large	Reduce load on motor
Motor runs in wrong or opposite direction	Black control wire not connected properly	Check the connection of the black control wire connection

Maintenance and cleaning

Regular Inspections
The following items need to be included in a regular maintenance schedule for the machine (at least every 6 months):

- Check cable for signs of breakage or wear.
- Check for loose or damaged fan.
- Check that fan guard is still in place.
- Check that motor is still securely mounted.

Motor Maintenance

- The motor does not contain any user serviceable parts and cannot be repaired. The motor bearings are selected for the rated duty of the motor and are expected to last for the life of the motor.
- If the motors ceased to function properly, it should be disposed of as per section 3.3, above.

Cleaning

- When cleaning the motor and fan, we recommend using a soft cloth and non-abrasive cleaning fluid to remove dirt, dust, and other matter from the exterior. Avoid using sharp objects and alkali, acid, and solvent-based fluids that may damage the device.
- Never open the device to clean inside.
- Never clean using high-pressure water blasting or jetting as this can damage sensitive components.

Service / Technical Support
For servicing or technical support, please contact your local AoFrio Sales Office or find your nearest contact by visiting www.aofrio.com.

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