Air Control Industries

# ACI/EV Radial Bladed Blowers

**Installation, Operation & Maintenance Instruction Manual**

Air Control Industries
Ref: ACI/EV 2014/Iss1

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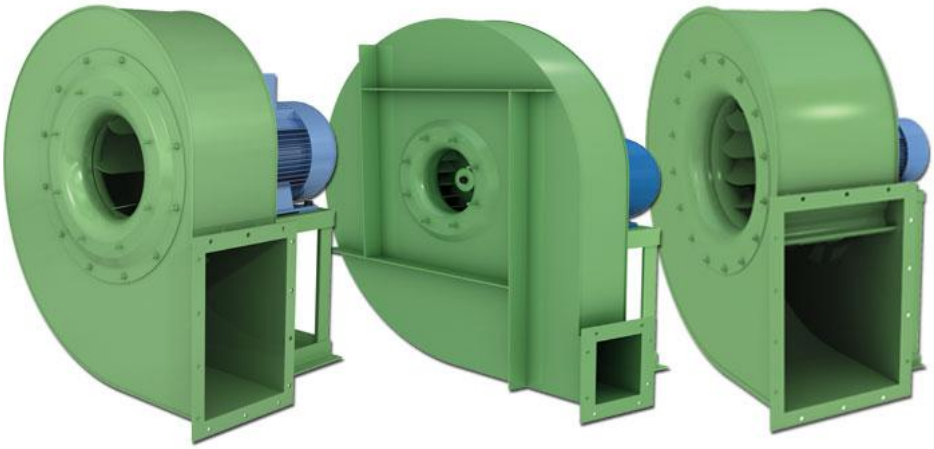
1. 

## 1. KEY MAINTENANCE POINTS FOR ACI/EV BLOWERS:

**HEALTH AND SAFETY**

- Never operate the blower without a finger guard fitted or without the inlet filter / ducting fitted to the blower inlet.
- The blower incorporates high speed moving parts that can cause injury.

**ELECTRICAL**

- Ensure that any ducting and equipment fitted to the inlet and/or discharge has a suitable resistance to ensure the motor does not draw too much current.
- Observe star/delta voltages on the motor to ensure correct supply is connected.
- Only use a suitable starter with overload protection.
- Star Delta / soft starters or inverters are recommended.
- Check the direction of rotation.

**PLEASE NOTE**: If the rotation is incorrect, air will continue to flow out of the discharge, but at approximately 60% of normal performance.

**CONTROL**

- The units are designed to run continuously. Avoid frequent stop starts – ACI recommend no more than 6 per hour.
- If the blower control is linked to other equipment then ensure that this does not go above the recommended number of starts and stops, if so then use a timer delay in the control to avoid frequent switching.

**SITING**

- Mounting – ensure the blower is isolated from vibration. Use suitable AV mounts if necessary.
- Ensure adequate ventilation of motor. If the blower is fitted into an acoustic enclosure, adequate ventilation must be provided to ensure the internal enclosure temperature does not exceed 40 degrees Celsius. Ensure the motor cannot draw from an external heat source.
- Ensure the cooling fan (if fitted) to the rear of the motor is no less than 1 (cooling) fan diameter away from obstruction.

**CRITICAL MAINTENANCE**

- Keep filter clean – ACI recommend cleaning every month depending on the working environment. The maximum filter element life is 12 months.
- Filters, guards and belts can be supplied by ACI or its distributors and should be fitted to the Blower where required.
- Keep the motor clean (once per month) and free from dust build up. Refer to motor maintenance documentation for schedule.
- Check regularly for excessive noise and vibration

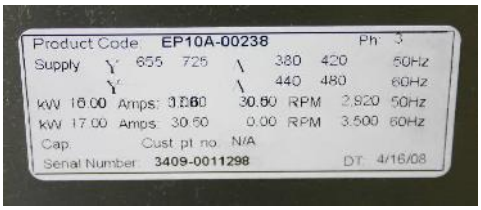
## 2. GENERAL BLOWER INFORMATION:

All service procedures and electrical work should only be performed by trained personnel. Please read the following installation, operation and maintenance instructions carefully.

**Description and model identification**

ACI/EV fans and blowers are industrial type centrifugal, radial bladed and axial units capable of producing high velocity air. ACI labels each blower unit on the motor cowl label (See below). The serial number can be located on this label.

***Figure 1: Example of Motor Label***




- **Important information:**
  Please read the following installation, operation and maintenance instruction carefully. Always ensure that the power is isolated before commencing any maintenance on the unit. This manual is also available from the download section of our website: www.aircontrolindustries.com

- **Equipment arrival/inspection:**
  If there are any shortages, discrepancies or damage to your product upon delivery, please immediately contact ACI or alternatively ACI's Distributor. ACI and Distributor contact details can be also be found on our website: www.aircontrolindustries.com

## 3. OPERATING CONDITIONS:

- Do not operate the fan unit in an explosive atmosphere except for certified fans.
- Each unit has a wiring diagram fitted as close to the connection area as possible. For example if the component machine is fitted with a terminal box, the diagram will be inside the box. If flying leads are fitted the diagram will be on the lead or on the motor itself. Protective circuitry is the customer's responsibility.
- All our motors are continuously rated; therefore frequent stop starts should be avoided. Start and stop control is dependent on customer installation. If the unit has been fitted with a speed controller please refer to the appropriate instructions that will be included.
- If the fan is supplied with an inverter please read the appropriate instructions that will be included.
- The fan should not be operated until it is connected to the system it will be operating in. Some motors will draw over the maximum current rating when in "free air".
- All fan units are run to the correct supply voltage prior to them being despatched.

## 4. TRANSPORT, STORAGE:

- ACI fans are packaged at the factory to comply with requirements for the agreed mode of transport.
- Transport of the fan(s) either in the original packaging or using the transport fixtures provided. Use suitable lifting equipment.
- Do not lift the fan by the connecting cable, fan impeller, or motor lifting eye.
- When transporting manually, please refer to the EC guidelines for recommended maximum weight.
- Avoid excessive vibration and shock-loads.
- Check for damage to the packaging or the fan.
- Store the fan in the original packaging in a dry area protected from the weather or protect it from dirt or weather until final installation.
- Avoid exposure to extreme heat and cold.
- Avoid excessive storage periods (we recommend one year max.) and inspect the motor bearings for proper operation prior to installation. If the fan, upon delivery, is not installed and used for a long time, it is necessary to store it in a safe place, provided with proper temperature and humidity, as well as to protect it against dust. In detail cover bearings, shafts and motor. Check periodically the fan and, in case of roll bearings, make it roll by hand every week. **Do not store it near machines producing vibrations.**

## 5. INSTALLATION:

Installation, electrical connection and commissioning are only to be performed by trained service personnel. Adhere to

all machinery-related requirements and specifications supplied by the system manufacturer or machine builder. Failure to comply will invalidate the guarantee on our fans and accessories.

The following applies for all ACI fans:

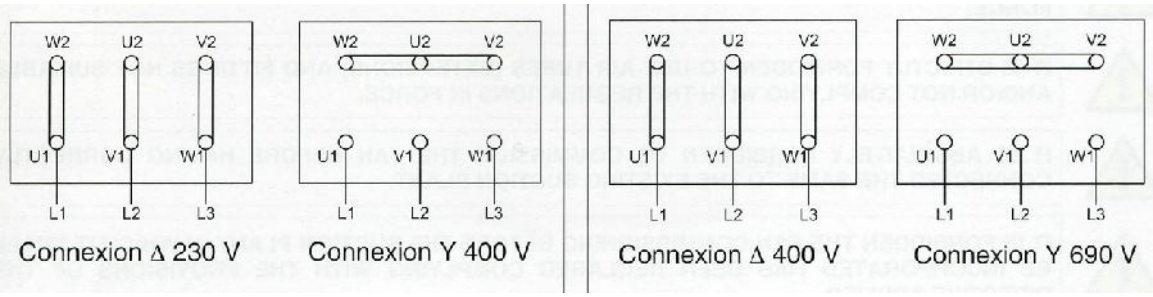
- Do not install without adequate support
- Flange and mounting brackets must be fixed flat on a level surface.
- Do not apply excessive force
- Secure all connection points with a suitable fastener.
- Secure bolted connections with a locking compound.
- Do not use metal compression-gland fittings with plastic terminal boxes.
- For operation under extreme conditions use pre-installed sealing elements.
- For control equipment, follow the safety instructions supplied with the equipment.

**6. LIMITATIONS IN USE:**

The fan was designed and produced exclusively for the intended use described in the site therefore any other use and operation is therefore absolutely forbidden in order to assure the safety of the authorized operators, as well as the efficiency of the fan itself at any time.

**7. ELECTRICAL CONNECTIONS:**

***Figure 2: Motor Terminal Electrical Connections***




**8. OPERATION:**

Before starting the fan check that there are no foreign bodies inside it otherwise these could be ejected at high speed with considerable force.

- Mounting
  The inlet must be placed in a clean and dry area well away from possible sources of liquid contamination. If the fan is to be placed in an enclosure adequate ventilation should be provided for the motor. If the fan is to be mounted on / within machinery that transmits vibration, anti-vibration mounts should be used.

- Location
  Ambient temperature conditions should range from -10 to +40 degrees centigrade and adequate ventilation provided for the motor (unless specified differently on the motor rating plate). In factory locations subject to high-pressure water or caustic wash-down cycles, protect or relocate the blower to prevent damage.

- Blower Connections
  Both the inlet and discharge can be fitted with wire mesh guards, filters and/or spigots to aid connection to different ducting depending on your requirements.
  Flexible hose can introduce a high-pressure drop and lengths should therefore be kept to a minimum.

- Drive Motor
  Units are typically driven by induction type electric motors. If alternative motors are supplied, reference to the motor rating plate is required for all electrical details. The fan is designed to be continuously run at its designated speed, any inverter drive program giving speed control and/or speed changes must be approved by ACI.

- Shaft Rotation
  Check that the rotation of the blower is in accordance with the arrow on the unit. Note: If the fan rotates backwards, it will still operate but with a reduced performance of around 60% max.

- Filters
  The standard inlet filters have a filtration rate of 5-7 microns. ACI recommend that the filters are inspected at least once a month and washed at six month intervals with warm soapy water and thoroughly dried before being refitted. Filters should be replaced annually (Time scales will depend on the environment.). Different grade filters can be purchased through ACI.

**9. START/STOP:**

- **Checks before switching on**

| | |
|---|---|
| **1** | Make sure that there are not any non-authorized personnel close to the machine. |
| **2** | Make sure that the safety devices are integral, properly installed and working |
| **3** | Make sure that the fan is properly positioned |
| **4** | Make sure that the bearings are lubricated |
| **5** | Make sure that the bolts of the wheel, supports and command motor are blocked. |
| **6** | Make sure that all parts are freely turning by turning the shaft by hand |
| **7** | Make sure that you have read and understood the 'Use and Maintenance Instructions' in all its parts |

- **Fan start-up**
  THE AUTHORIZED OPERATORS CAN SWITCH ON THE FAN ONLY AFTER HAVING FORCEDLY PERFORMED THE CHECKS IN THE PREVIOUS POINT.
  TO AVOID OVERLOAD WE SUGGEST STARTING THE FANS WITH SHUTTER OR DELIVERY ADJUSTER CLOSED, WHILE FOR THE AXIAL ONES IT MUST BE OPEN.
  SWITCH ON THE FAN ACCORDING TO THE INSTRUCTIONS OF THE MAIN ELECTRIC SWITCH INSTALLED

- **Checks after start-up**

| | |
|---|---|
| **1** | Make sure the fan does not show vibrations. |
| **2** | Make sure the temperature of the bearings under full operation of the fan is regular. |
| **3** | After some hours of work make sure the bolts are correctly tightened. |
| **4** | Check the tension belts (if applicable) |
| **5** | Check the absorption through ammeter, detecting on one of the three mains conductors (L1, L2, L3) before the commuter and, if this is not possible, on any conductor of the terminal board by multiplying the valve by 1.73 ($\sqrt{3}$) |

**10. MAINTENANCE:**

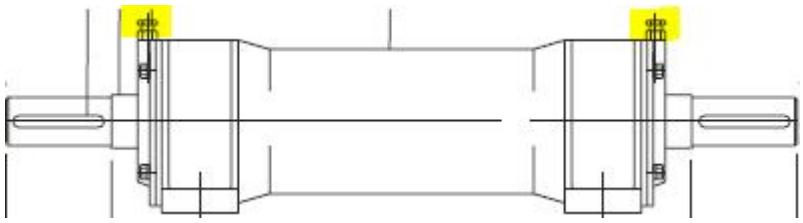
**a. Routine Maintenance**

| FREQUENCY | Item | Maintenance |
|---|---|---|
| Depends on the use of the fan, place of installation and material transported.<br><br>Ask the technical office of the manufacturer | Case – Inlet Ring | Clean all parts of fancase in contact with induced air. Removal, of eventual encrustations and/or deposit of material through compressed air from the inlet ring or the inspection door with the fan disconnected from supply. |
| | Impeller | Visual check of all welding (where applicable). |
| | | Visual check of wear mostly for impellers conveying abrasive dusts (due to fan vibrations) and eventual replacement (because it compromises good operation).<br>N.B. Avoid separating the hub from the impeller. The operation is unnecessary and the balance will be compromised. |
| | Pulleys | Clean the grooves with a dry cloth and check alignment. Adjust accordingly. |
| | Belts | Clean each face of the belts with a dry cloth, check the tension. |
| | Coupling joint | Visual check and eventual alignment and centering |
| | Rubber plugs of the coupling joint | Check wear if necessary replace. |
| | Supports | Check the quantity and layer of grease and eventually grease |
| | Machine bolts | Check correct tightening of all bolts. |

**b. Greasing the support bearings (extended shafts – pipe supports):**

According to the type of bearing and its diameter, width of the ring and the number of rev/min of the motor it is possible to calculate the quantity of grease SHELL ALBIDA 2 through which lubricate the support and the frequency of greasing. Avoid overfilling the bearings as this can result in the bearings overheating, leading to premature failure. Under normal conditions, the bearings are rated for 20,000 to 30,000 hours.

**See fig 3 below for the greasing point locations**



To calculate the greasing frequencies see the table in Fig 4

***Figure 4: Support greasing interval***

| Pipe support | Impeller side bearing | RPM 1000 | 2000 | 3000 | 4000 | Grease quantity (g) | Pipe support | Pulley side bearing | RPM 1000 | 2000 | 3000 | 4000 | Grease quantity (g) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Greasing frequency (hours) | | | | | | | Greasing frequency (hours) | | | | |
| 20 A AL 14 | | | | | | 3.9 | 20 A AL 14 | | | | | | 3.9 |
| 20 B 14 | 6304 Z | 11000 | 8000 | 5000 | 4000 | | 20 B 14 | 6304 Z | 14000 | 8000 | 5000 | 4000 | |
| 20 A-AL 19 | | | | | | 4 | 20 A-AL 19 | | | | | | 4 |
| 20 B 19 | | | | | | | 20 B 19 | | | | | | |
| 25 A AL 21 | 6305 Z | 12500 | 6200 | 4000 | 3100 | 5.3 | 25 A AL 21 | 6305 Z | 12500 | 6200 | 4000 | 3100 | 5.3 |
| 25 B 24 | | | | | | | 25 B 24 | | | | | | |
| 35 A-AL 28 | 6307 Z | 11000 | 5500 | 3500 | 2750 | 8 | 35 A-AL 28 | 6307 Z | 11000 | 5500 | 3500 | 2750 | 8 |
| 35 B 28 | | | | | | | 35 B 28 | | | | | | |
| 40 A AL 38 | 6308 Z | 9900 | 5000 | 3100 | 2450 | 10 | 40 A AL 38 | 6308 Z | 9900 | 5000 | 3100 | 2450 | 10 |
| 40 B 38 | | | | | | | 40 B 38 | | | | | | |
| 45 A-AL 42 | 6309 Z | 8800 | 4100 | 2800 | 2200 | 12 | 45 A-AL 42 | 6309 Z | 8800 | 4100 | 2800 | 2200 | 12 |
| 45 B 42 | | | | | | | 45 B 42 | | | | | | |
| 50 A-AL 48 | | | | | | | 50 A-AL 48 | 6310 Z | 7800 | 4000 | 2500 | 2000 | |
| 50 B 48 | 6310 Z | 7800 | 4000 | 2500 | 2000 | 15 | 50 B 48 | | | | | | 15 |
| 50 AR-ALR 48 | | | | | | | 50 AR-ALR 48 | NU 310 ECP | 3900 | 2000 | 1250 | 1000 | |
| 50 BR 48 | | | | | | | 50 BR 48 | | | | | | |
| 55 A-AL 48 | | | | | | | 55 A-AL 48 | 6311 Z | 7000 | 3500 | 2200 | 1750 | |
| 55 B 48 | 6311 Z | 7000 | 3500 | 2200 | 1750 | 17.5 | 55 B 48 | | | | | | 17.5 |
| 55 AR-ALR 48 | | | | | | | 55 AR-ALR 48 | NU 311 ECP | 3500 | 1750 | 1100 | | |
| 55 BR 48 | | | | | | | 55 BR 48 | | | | | | |
| 60 A-AL 55 | | | | | | | 60 A-AL 55 | 6312 Z | 6200 | 3100 | 2000 | / | |
| 60 B 55 | 6312 Z | 6200 | 3100 | 2000 | / | 20.5 | 60 B 55 | | | | | | 20.5 |
| 60 AR ALR 55 | | | | | | | 60 AR ALR 55 | NU 312 ECP | 3100 | 1550 | 1000 | | |
| 60 BR 55 | | | | | | | 60 BR 55 | | | | | | |

**c. Greasing detached shaft bearings (bearings are not enclosed and joined in a cast casing):**

See notes in previous section for grease type and calculation formula.

**See fig 5 below for the greasing point locations:**

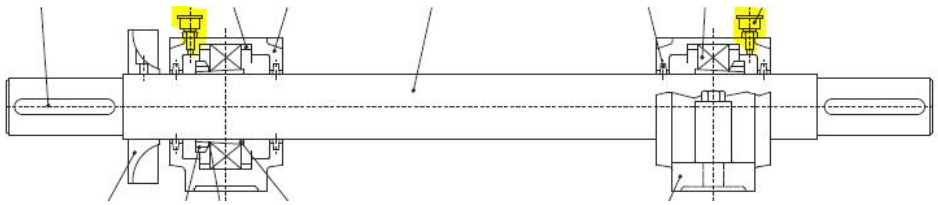


***Figure 6: Support greasing interval:***

| Detached support | Impeller side bearing | RPM | | | | Grease quantity (g) | Detached support | Pulley side bearing | RPM | | | | Grease quantity (g) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1000 | 2000 | 3000 | 4000 | | | | 1000 | 2000 | 3000 | 4000 | |
| | | Greasing frequency (hours) | | | | | | | Greasing frequency (hours) | | | | |
| SN 513 | 22213 EK | 3100 | 1250 | 850 | 680 | 19 | SN 513 | 22213 EK | 3100 | 1250 | 850 | 680 | 19 |
| SN 515 | 22215 EK | 2900 | 1180 | 780 | 560 | 20 | SN 515 | 22215 EK | 2900 | 1180 | 780 | 560 | 20 |
| SN 516 | 22216 EK | 2750 | 1100 | 750 | 480 | 23 | SN 516 | 22216 EK | 2750 | 1100 | 750 | 480 | 23 |
| SN 517 | 22217 EK | 2600 | 1050 | 700 | 300 | 27 | SN 517 | 22217 EK | 2600 | 1050 | 700 | 300 | 27 |
| SN 518 | 22218 EK | 2450 | 1000 | 600 | / | 32 | SN 518 | 22218 EK | 2450 | 1000 | 600 | / | 32 |
| SN 520 | 22220 EK | 2200 | 900 | 350 | | 41 | SN 520 | 22220 EK | 2200 | 900 | 350 | / | 41 |
| SN 522 | 22222 EK | 2000 | 800 | / | | 52 | SN 522 | 22222 EK | 2000 | 800 | | | 52 |
| SN 524 | 22224 EK | 1700 | 650 | | | 62 | SN 524 | 22224 EK | 1700 | 650 | | | 62 |

**d. Motor bearing lubrication:**

Most motors up to metric 160 frame size have bearings that are greased for life. For motors above this size, refer to motor manufacturer service manual for greasing interval recommendations.

**e. Wash down**

Care must be taken to avoid soaking the blower/filter or allowing wash down liquid to enter any slots or nozzles that may allow fluid to pass back down through the supply hoses to the blower itself.

**f. Filters**

If required, filters will be directly fitted to the blower inlet, and in the case of the acoustic enclosure, additional filtration will be provided by the built in cover filters.
The standard inlet filters have a filtration rate of 5-7 microns. We recommend that the filters are inspected at least every month and replaced every 6 months. Actual timescales depend on the working environment.

<u>If a breakdown occurs after a 12 month period, only qualified engineers should attempt to resolve any work required:</u>

**g. Fan spare parts**

If you require any spare parts for this fan type, please contact ACI or your nearest Distributor.

## 11. TROUBLE SHOOTING:

(This section is not intended as an exhaustive guide to fault diagnosis, but outlines the most common faults that may be encountered.)

| Condition | Possible Cause | Action |
|---|---|---|
| **Fan stopped** | Motor fuse blown | Replace with correct size fuses and investigate the reason for fuses blowing. |
| | Motor tripped on overload | Reset the overload and check overload setting and investigate the reason for the trip. |
| | Blockage between blades and casing | Find and remove blockage, inspect for damage and replace damaged parts. |
| **Fan pressure high** | Blockage downstream of fan | Remove blockage, dismantle if necessary. |
| | Supply frequency increased. | Check against motor specification. |
| **Fan pressure low** | Fan rotating backwards | Briefly apply power to the blower and check the rotation of the motor by looking at the motor cooling fan. The direction should be as per the arrow. |
| | Fan not running | Ensure that the power is switched on and selected to automatic, and protection has not been operated. |
| | Blocked inlet filter/guard and silencer | Check intake for cleanliness, clean or change filter. |
| | Fan blades damaged | Repair damage and rebalance or fit |

| | | |
|---|---|---|
| | | new impeller. |
| | Ductwork leakage. | Repair ductwork. |
| **Fan Vibrating** | Fan blade damaged. | Repair damage and rebalance or fit new impeller. |
| | Debris drawn into fan and attached to a blade. | Remove debris, repair blade and rebalance, or fit a new impeller. |
| **Noisy fan** | Debris in fan. | Remove and inspect for damage, repair as necessary. |
| | Motor bearing wear. | Check and fit new bearings ensuring lubrication. |
| | Fan impeller loose. | Tighten or re-weld, test for vibration. |
| **Fan drawing high current** | Discharge area too large. | Check for ducting leaks. Check total discharge area is as per system design. |
| | Motor bearing wear. | Check and fit new bearings ensuring lubrication. |
| | Increase in motor speed. | Check that the supply frequency is correct. |

**12. ACOUSTIC ENCLOSURES:**

This unit has been designed for ease of handling and installation. Being modular in construction it can handle the following blower discharge angle. Downward discharge access requires access through the floor.

**Positioning:**

It is essential that the blower is mounted within the enclosure in the orientation shown opposite with the motor facing the inlet filters to enable cool air entering the enclosure to pass over the motor before entering the blower inlet.
If both the inlet and discharge are ducted, an acoustic enclosure with an ambient air –duct can be used, this will still allow air to pass over the motor keeping it cool. Consideration should be given to the positioning of the blower and panels for access purposes. Inlets should be clear of obstruction and sited at least 0.5M away from any wall.
Both the blower and enclosure are free-standing and should be located on a level floor capable of taking the combined weight.

**Electrical Cable Entry:**

The electrical cable can enter the enclosure through one of the two pre-drilled holes in the inlet panel or a cable entry can be drilled in any of the panels as required.

Stage 1

Place the radial bladed blower in the position required. Ensure that there is sufficient space for the enclosure and future access. Secure the blower to the floor using the fixings holes provided.

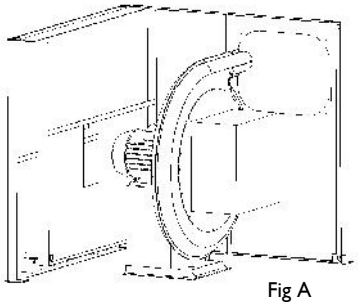


Fig A

Stage 2

Place the inlet filter panel at the motor end as shown Fig. A. Insert the two joiners (floor). Ensure that the filter is in place and any protective packing is removed. When the blower inlet has ducting fitted this panel is replaced with one that has a cooling inlet for the motor.

Stage 3

Take the discharge panel and overlap the filter panel on the side of the blower discharge engaging the lower joiner. Ensure that the blower discharge sits near the centre of the break-through panel, also shown in Fig. A.

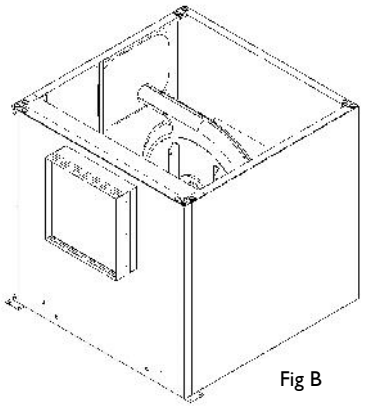


Fig B

Stage 4

Whilst supporting the two panels place the baffle panel in position and join the two panels using the joiner provided. Note – take care to ensure that the motor cowl is directly in front of the rectangular cut-out as shown. Also note that this is not required or supplied when ducting is fitted to the blower inlet.

Stage 5

Take a plain panel and attach to the inside of the inlet panel engaging in the lower joiner. Then use a joiner through the baffle plate to secure.

Stage 6

With the enclosure in this condition connect the power supply to the blower through one of the cable entry points provided in the inlet panel using a suitable cable gland.

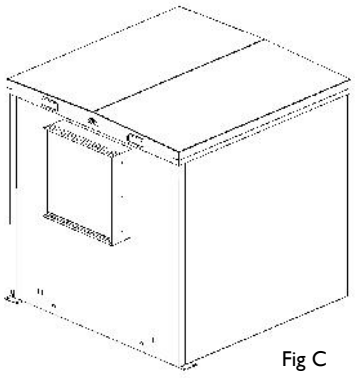


Fig C

Stage 7

Connect the ducting to the blower. Cut a clearance hole in the break-through panel and fit this over the ducting to suit.

Stage 8

Fit the last panel and secure using the joiner and check that a minimum gap of 75mm is achieved between the blower inlet and inside surface of the panel as seen in Fig.B.

Stage 9

Ensure the enclosure is square and then fit the two lid halves, as seen in Fig.C.

Stage 10

Secure the joiners to the floor through the holes provided.

**13. WARRANTY & SERVICE EXCHANGE:**

Air Control Industries Limited (ACI) warrants all products manufactured by ACI to be free of defects in material and workmanship for twelve (12) months from the date of shipment. The warranty does not apply to drive belts, filter elements or connecting hose, unless authorised by an officer of ACI. Also, not covered under the warranty is normal wear and tear, neglect or misuse of the equipment, operation in an application not approved by ACI, and alterations not performed by ACI.

All items supplied by ACI that are manufactured by others shall be warranted under the respective manufacturer's policy. Motors and other items, for which a national service network is in place, should be sent directly to that manufacturer's representative for the most prompt service. ACI will provide any support required ensuring that warranty service by others in handled in a prompt and professional manner.

The ACI warranty is limited to the repair or replacement of items shipped by ACI. At no time will ACI be liable for any of the costs to the buyer for labour, transportation or down-time resulting from defective equipment furnished by ACI, or our suppliers.

To comply with the Warranty the complete fan unit must be returned to ACI. Disassembly of the fan will invalidate the warranty.

**14. Manufacturer Service Address:**

Our products are manufactured in compliance with applicable international standards and regulations. If you have any queries regarding the use of our products, or if you are planning a special application, please contact the nearest ACI distributor or their main office:

**Air Control Industries Ltd**
Weycroft Avenue, Millwey Rise Industrial Est.
Axminster, EX13 5HU, UK
**Tel:** +44 (0)1297 529 242
**Fax:** +44 (0)1297 529 241
**Email:** sales@aircontrolindustries.com
**Web:** www.aircontrolindustries.com