ELTA

INSTALLATION, MAINTENANCE & TROUBLESHOOTING

INSTALLATION & MAINTENANCE

General Instructions

Off-Loading

During off-loading inspect fans for damage. If the casings, cowls or impellers are damaged, notify your local Elta distributor immediately.

Elta cannot be held responsible for any loss or damage incurred to goods during transport, off-loading or on site.

Site Storage

The fans must be stored in a clean, dry, protected and vibration-free area. The fan impellers should be rotated daily to prevent bearing damage. Failing to follow these instructions may void the warranty.

Maintenance

Install fans and accessories to allow service access for maintenance and for the replacement of assemblies and component parts, without disturbance of other items of plant and building elements.

Most motors are fitted with sealed for life bearings which are maintenance-free. It is recommended that fans be inspected initially at 3-monthly intervals, to clean the blades and motor and to check for tightness of fastenings.

Where fans are used for kitchen exhaust or other applications where the air contains high amounts of dust, residue and other contaminants, fans should be cleaned and maintained at more frequent intervals appropriate for the application.

Motor overloads/contactors should also be inspected to ensure correct operation.

Should external lubricators be fitted, please refer to **LUBRICATION INSTRUCTIONS** in the 'Installation and Maintenance' instructions included with each fan.

If the fans are belt driven, check pulley alignment and belt tension before starting the fan. Belt tension must be checked 2 - 4 weeks after start-up.

Motors

All standard motors are suitable for operation in air temperatures between -20°C and +40°C. If higher temperatures are required, contact your local Elta supplier.

Standard motors are **not** suitable for handling saturated air containing water droplets or for some corrosive fumes. For severe applications, special motors and finishes may be required. Customers are requested to discuss these applications with our sales engineers to ensure a fan suitable for the application is selected.
WARNING - Failure to do so could void warranty.

Electrical

Wiring With Variable Speed Drives

Fans to be connected to Variable Speed Drives (VSD) or equivalent electronically controlled power supply, must be wired according to the VSD wiring instructions. This is to ensure conformance to legislated EMC requirements as well as protection against premature product failure. The wiring will typically require EMC shielded cable between the VSD and motor, terminated so that there is good 360° contact between the sheath and both the EMC motor gland at one end and at the VSD at the other end.

Motors supplied by Elta are typically not supplied with an EMC gland, and these glands should be purchased at the same time as the supply lead to ensure the grommet fits the cable correctly.

Not all products supplied by Elta are suitable for VSD drives. Clarification of what products are suitable can be found in our online catalogue at www.elta.asia
The list below covers some of the products that are not suitable.

- EC motor products.
- Single phase products.
- External rotor motor products require "ALL POLE" sinusoidal filters.

Supply

Read the fan data label to determine the number of phases and amperage drawn by the unit. Check that the available supply is suitable.

Earthing

All fans must be earthed in accordance with AS/NZS3000 and local supply regulations.

Wiring

Wiring must be in accordance with AS/NZS3000 and local supply regulations. Wiring diagrams are provided with all fans. Wiring diagrams are shown on pages N-6/9.

Protection

Fuses in the circuit should be regarded as protecting the wiring only against short circuit, they are not suitable for overload protection. Fuses must be able to carry starting loads and these can be taken as a minimum of six times the running current for 25 seconds.

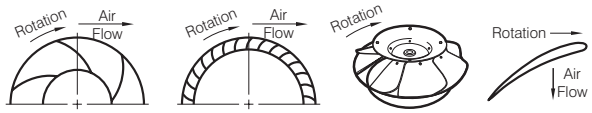
All three-phase motors must be provided with differential action, single-phasing

protection and overload current protection. Failure to provide single-phasing protection will void warranty.

Motors fitted with thermistor or thermostatic protection should have these wired into the starting contactors' control circuit to interrupt motor power supply on winding temperature rise.

Wires marked 'TK' are for internal thermal contacts which can be wired directly into the contactor controller circuit. Alternatively, thermal protection devices can be installed into the control circuit therefore negating the need to use the 'TK' contacts. Failure to connect thermal protection devices will void warranty.

Direction Of Rotation



Backward Curved Impeller, 6-12 Blades | *Forward Curved Impeller, 30-60 Blades* | *Multiflow Impeller* | *Axial Flow Impeller*

The correct rotation and direction of airflow is shown on each individual fan. If backward-curved centrifugal fans rotate in the wrong direction, the motor may overload and the motor warranty will be void.

To change the direction of rotation on three-phase motors, interchange any two supply leads. All single-phase motors will rotate in the correct direction when correctly connected.

Starting

All fans are suitable for direct-on-line starting by switch or automatically by contactor up to and including 5.5kW. The number of starts should be limited to no more than four per hour or, in the case of motors of less than 1kW, no more than eight starts per hour. This would be subject to local supply regulations.

Check List

- Check power supply
- Check fan is free to rotate
- Check overloads are fitted
- Ensure ductwork is free of debris
- Check rotation of fan
- Check the motor amperage draw does not exceed nameplate rating

Safety

Rotating fan impellers can be a danger to personnel.
The following precautions must be taken-

- Electrically isolate the fan motor prior to undertaking any work.
- Regularly check impeller fasteners for tightness.
- Where fans are accessible to personnel or directly exposed to habitable areas, it is the responsibility of the installers to ensure that fans will have guards which comply with the latest Australian standard as4024.1 Safeguarding of machinery.
- Prior to fan start-up, ensure loose debris will not be sucked into the fan. All ductwork should be clean.

Installation Instructions

Important Notes:

With all horizontally mounted axial fans it is preferable that the fan is installed with the motor mounted on top of the motor plate. ie. not suspended under the motor plate.

Vertical Mounting - Consideration is needed for PowerLine and Axial Duct or Square Plate Fans where the motor is to be vertically mounted.

Motors which are to be mounted with the shaft vertically down and the impeller at the base of the Fan, the motor must be air stream rated or be provided with a suitable cover (available on request) to ensure foreign bodies are prevented from entering the motor.

Special care is needed when fitting protective covers to motors to ensure airflow is not impeded.

To maintain IP rating, special additional measures may be required to protect the motor against the ingress of water or foreign bodies.

Please contact Elta or motor manufacturer for further information.

For outside installations, IP66 rated conduit and fittings must be used.

To obtain rated performance, the following recommendations should be followed-

Duct Mounted Fans - General

INSTALLATION & MAINTENANCE

- Inlet and outlet ductwork should be free from obstructions.
- Duct transitions should be a maximum of 15°.
- Avoid sharp bends on inlet or outlet.
- Do not use ductwork smaller in area than the fan.
- Flexible duct connections should be taut.
- Ductwork connections should be well aligned.
- Inlet cones must be fitted to free inlet applications.
- Ensure that the fan orientation is correct for the required airflow direction.

Belt-Driven Product

- Pulleys must be correctly aligned.
- Belts must be correctly aligned and tensioned.
- Tension must be checked 2-4 weeks after start-up.

Roof Ventilators

- Ensure that upstands are flat and true.
- Maximum angle of upstand or curb 30°
- Fix a sealing strip of neoprene to the top of the upstand to prevent air leakage.
- Fit an electrical compression gland to the roof cowl in an appropriate location and pass the electric cable through as the roof cowl is fitted.
- Ensure the electric cable is not pinched prior to securing the cowl to the upstand
- The roof cowl should be secured with roofing screws through the side skirt midway through the skirt.
- Inlet ductwork should be free from obstructions.
- Avoid sharp bends at the inlet.
- **Vertical discharge axial roof units: ensure the damper flap hinge points down the slope of the roof.**

Lubrication Instructions

Most Elta products are fitted with sealed-for-life pre-lubricated bearings which do not require maintenance for the life of the fan.

Should your fan be fitted with grease nipples, the following instructions should be followed-

Recommended Lubrication Intervals

	Working Hours			
Motor Frame	**48 rev/sec**	**24 rev/sec**	**16 rev/sec**	**12 rev/sec**
160	4000	8000	12000	20000
180-200	3000	7000	12000	16000
225-250	2000	6000	10000	13000
280	1000	5000	8000	13000
315	1000	3500	8000	10000

Maximum interval 12 months.

These times are a guide only and will depend on the motor manufacturer and actual running conditions.

Recommended Greases

Wherever possible the grease used should be identical to the original. When different greases are mixed, even if they are both suitable for the conditions, incompatibility can occur and result in rapid bearing failure.

In the absence of specific instructions supplied with the fan the following greases should be used. STANDARD FANS Shell Alvania R3 or compatible lithium-based grease suitable for 130°C continuous operation. SMOKE SPILL and high temp motors must use the grease stated on the motor to maintain the Smoke Spill approval.

Procedure

If the grease lines are not extended to the outside of the case the fan must be electrically isolated for safety before work commences.

Clean the grease nipples with a clean cloth.

Introduce the new grease to all points while the fan is rotating until the old grease is purged from the grease relief port normally located at the bottom of the bearing housing. If it is required to manually rotate the impeller, the fan must be electrically isolated to prevent accidental startup.

WARRANTY

Warning

INCOMPATIBLE GREASE, EXCESSIVE GREASE OR INCORRECT GREASE RELIEF CAN CAUSE DAMAGE TO THE MOTOR.

1. Subject to the conditions and limitation below, the Company warrants products of its manufacture to be free of defects in workmanship and/or materials at the time of delivery to the Buyer.

2. Any part, assembly or portion thereof found to be defective within one year from the date of commissioning or eighteen (18) months from date of shipment from our factory, whichever is the sooner, unless expressly stated otherwise in the Company's Publications or Literature, will be repaired or exchanged F.O.B factory.

3. The Company reserves the right to replace defective parts of the goods with parts and components of similar quality, grade and composition where an identical component is not available.

4. Goods presented for repair may be replaced by refurbished goods of the same type rather than being repaired. Refurbished parts may be used to repair the goods.

5. Goods or parts that have been returned for repair or warranty assessment are deemed to have been abandoned by the Buyer if not collected within 30 days after the Company has notified the Buyer in writing of the warranty assessment outcome or the completed repair.

6. The Company reserves the right to dispose or otherwise deal with an abandoned product or part at its discretion.

7. This warranty does not apply if:

   (i) the goods have not been paid for by the Buyer as per the credit terms provided; or
   (ii) the goods have not been installed or
   (iii) the goods have been misused or neglected.

8. The Company assumes no responsibility under this warranty for the labour costs involved in the removal of defective parts, installation of new parts or service charges related thereto.

9. If a fault covered by this warranty occurs, the Buyer must first contact the Company at the contact address on pages ii to v.

10. Any warranty claim must be accompanied by:

    (i) proof of purchase;
    (ii) written details of the alleged defect; and
    (iii) appropriate documentation (such as installation and maintenance records etc).

11. The Company shall have the option of requiring the return of the defective part (transportation prepaid by the Buyer) to establish the claim.

12. The Company makes no warranties or representations other than set out in this clause 7.

13. The repair or exchange of the goods or part of the goods, is the absolute limit of the Company's liability under this express warranty.

INSTALLATION & MAINTENANCE

Installation Instructions For Hazardous Environment

- All equipment must be installed and maintained in accordance with AS/NZS 60079.14 – Electrical
- Equipment for Explosive Atmospheres and AS/NZS 3000 – Wiring Rules.
- Where fans are accessible to personnel or installed adjacent to occupied or habitable areas, it is the responsibility of the installer to ensure that suitable guarding is fitted. Guards must comply with the requirements of AS 4024.1 – Safety of Machinery or the applicable local equivalent.
- Each hazardous area fan is supplied with the relevant motor Certificate of Approval, including the associated serial number.
- Motors must be inspected and cleaned at regular intervals to prevent the accumulation of dust between cooling fins. Excessive dust build-up may create a hazardous condition, including the risk of spontaneous combustion. When cleaning motor surfaces, a damp cloth should be used to minimise the risk of electrostatic discharge.
- Where a motor is controlled via a Variable Speed Drive (VSD), the controller must be installed outside the hazardous area, and motor thermistors must be correctly connected to the VSD in accordance with the manufacturer's instructions.
- As the manufacturer cannot determine whether conditions external to the fan installation are hazardous, no external junction box is supplied. It is the responsibility of the installer to assess site conditions and provide a suitable, compliant junction box where required.
- The motor ventilation fan cowl should not be obstructed at any time, as this may restrict airflow and lead to motor overheating.
- Any modification, repair, or alteration to the fan or motor must only be carried out by appropriately qualified personnel operating within a suitably accredited workshop. Failure to comply will invalidate all hazardous area classifications and associated responsibilities.

WIRING DIAGRAMS – STANDARD MOTORS

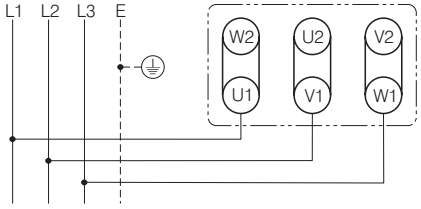
These diagrams apply to **STANDARD FRAME INDUCTION MOTORS** and to be used as a guide only.

3Ø WIRING DIAGRAMS

Diagram DD1

SINGLE SPEED MOTORS
refer to the name plate data for correct connection

For delta (Δ) wired motors



For star (Y) wired motors

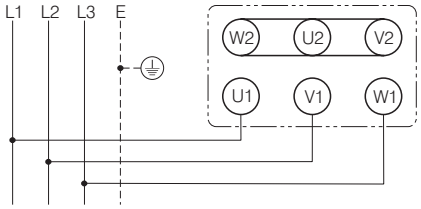
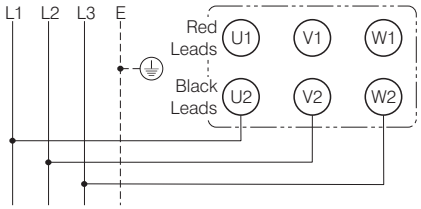


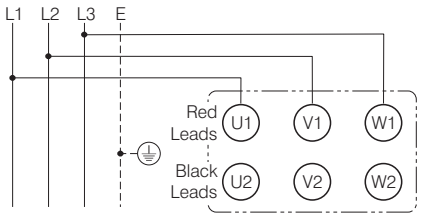
Diagram DD2

TWO-SPEED MOTORS
with 2 separate windings (dual winding)

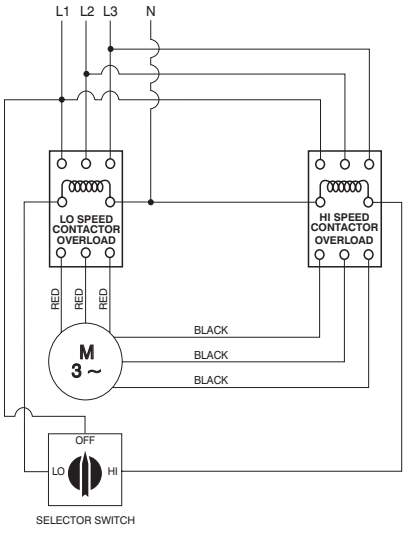
High speed



Low speed



Suggested wiring arrangement

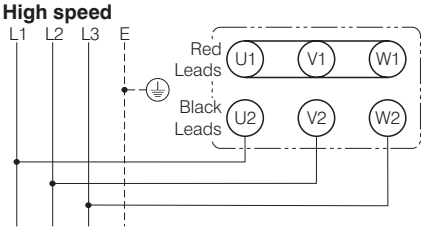


3Ø WIRING DIAGRAMS

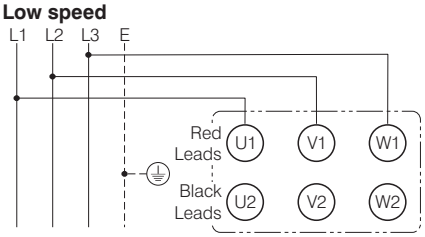
Diagram DD3

TWO-SPEED MOTORS
in Dahlander connection (tapped winding)

High speed



Low speed



Suggested wiring arrangement

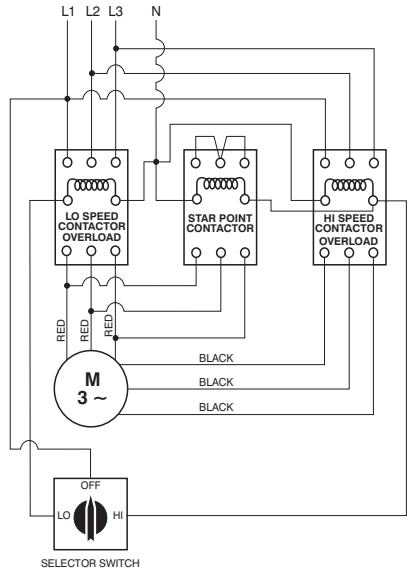
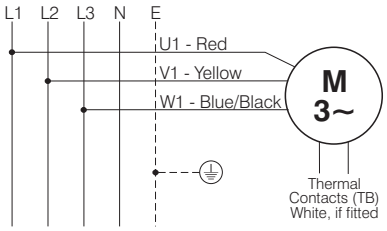


Diagram DD4

Single speed only
Codes: ..31. and ..35.



***Additional Information:** Refer to the motor manufacturer's data on the motor for wiring diagrams on standard frame Ex e, Ex d etc. motors.

These diagrams are current at the time of publication, check the wiring diagram supplied with the motor.

WIRING DIAGRAMS – STANDARD MOTORS

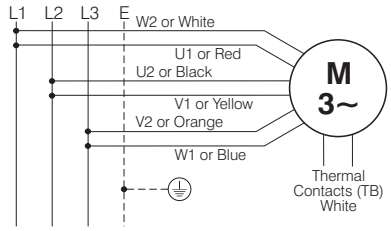
3Ø WIRING DIAGRAMS

Diagram DD5

TWO-SPEED MOTORS

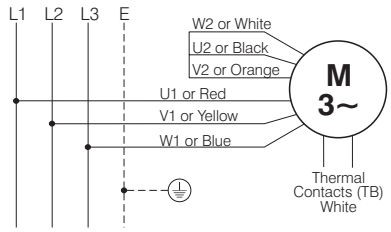
High speed delta (Δ) connection

Codes: ..40. to 63.



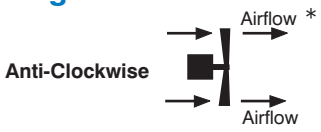
Low speed star (Y) connection

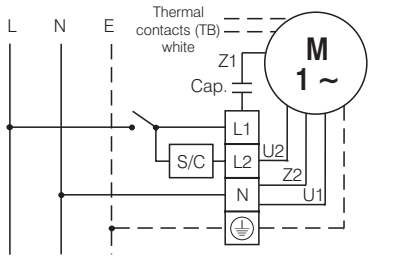
Codes: ..40. and upwards



1Ø WIRING DIAGRAMS (Form A)

Diagram DD6





Z1 - Blue (AUX)
U2 - Black (MAIN)
Z2 - Yellow
U1 - Red
(COM)

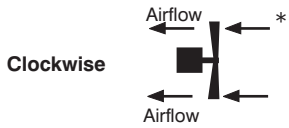
Bridge L1 and L2 if speed controller (S/C) is not required

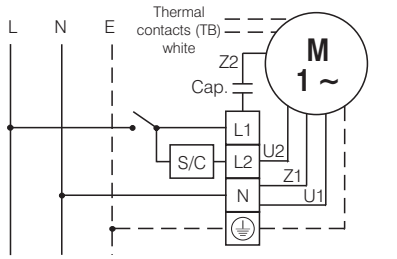
Note:
This diagram suits speed controllers, VA2.0 and VA2.8 only. When using the AVA5.0, VA5.0 and VA8.0 speed controllers, use the AUX, MAIN and COM connections.

* Airflow direction base on left-hand blade installation.

(Form B)

Diagram DD7





Z2 - Yellow (AUX)
U2 - Black (MAIN)
Z1 - Blue
U1 - Red
(COM)

Bridge L1 and L2 if speed controller (S/C) is not required

Note:
This diagram suits speed controllers, VA2.0 and VA2.8 only. When using the AVA5.0, VA5.0 and VA8.0 speed controllers, use the AUX, MAIN and COM connections.

* Airflow direction base on left-hand blade installation.

1Ø WIRING DIAGRAMS

Diagram DD8

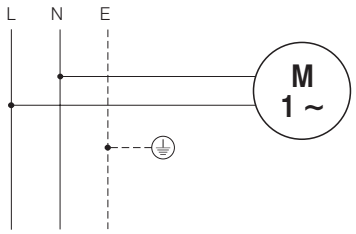
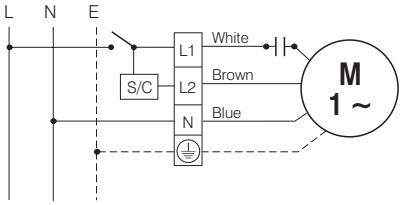


Diagram DD9



Bridge L1 and L2 if speed controller (S/C) is not required

For all other SINGLE-PHASE wiring diagrams refer to the manufacturers data on the motor.

These diagrams are current at the time of publication, check the wiring diagram supplied with the motor.

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WIRING DIAGRAMS – EXTERNAL ROTOR MOTORS

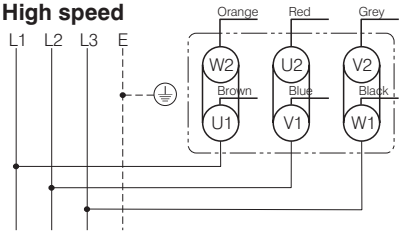
These diagrams mainly apply to **EXTERNAL ROTOR MOTORS** but some standard frame induction motor diagrams have been included for ease of presentation.

3Ø WIRING DIAGRAMS

Diagram ER1

TWO-SPEED MOTORS

High speed



Low speed

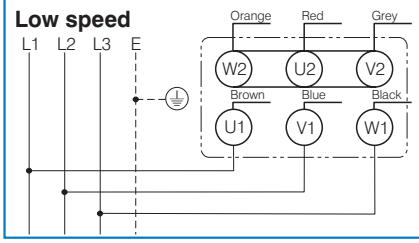
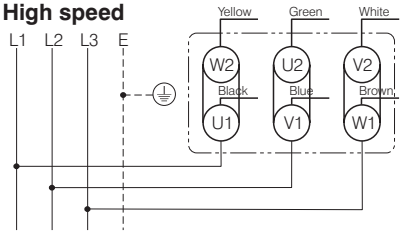


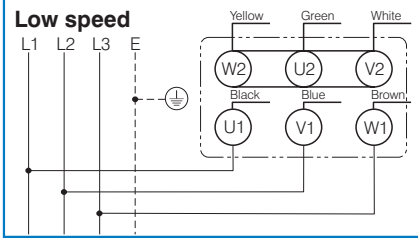
Diagram ER2

TWO-SPEED MOTORS

High speed

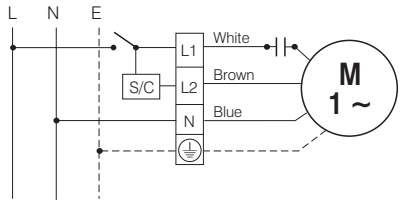


Low speed



1Ø WIRING DIAGRAM

Diagram ER3

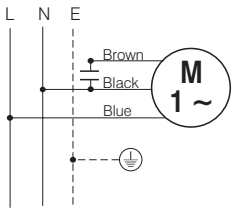


Bridge L1 and L2 if speed controller (S/C) is not required

1Ø WIRING DIAGRAMS

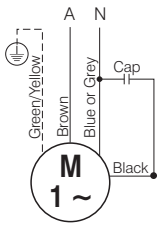
Diagram ER4

3 active wires plus auto-reset thermal contacts



Codes: CE19.. to CE28.. + other fans as shown

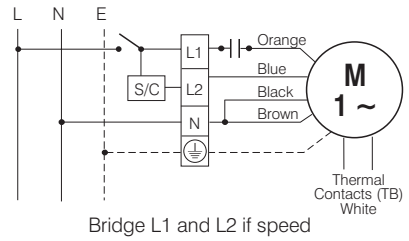
Single phase AC motor with capacitor



CE31 only

Diagram ER5

4 active wires plus manual-reset thermal contacts



Bridge L1 and L2 if speed controller (S/C) is not required

Codes: CE35.. and over + other fans as shown

Diagram ER6

Codes: EDM..S & ..C; HV-150AE; MT132; MV112 & MV132 SILDES

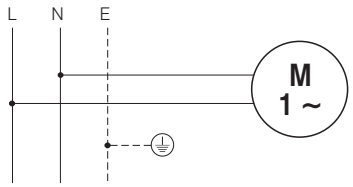


Diagram ER7

Codes: EDM..CT & ..CR

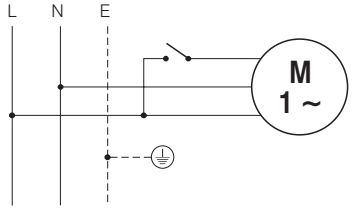
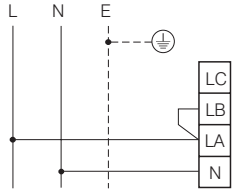


Diagram ER8

Codes: HV-230AE & HV-300AE

Exhaust air mode. For supply air mode bridge LA & LC do not bridge LA & LB.



These diagrams are current at the time of publication, check the wiring diagram supplied with the motor.

WIRING DIAGRAMS – EXTERNAL ROTOR MOTORS

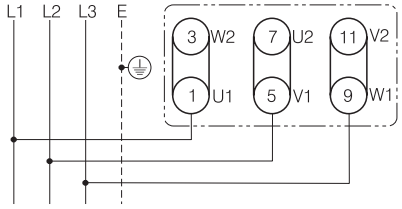
These diagrams apply to **EXTERNAL ROTOR MOTORS** and to be used as a guide only.

3Ø WIRING DIAGRAMS

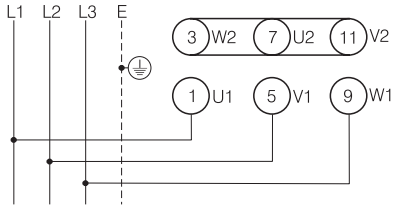
Diagram ER9

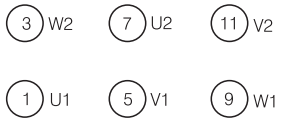
2 speed Star/Delta motor with 6 pole isolator

High speed Delta (△)



Low speed star (Y)





1Ø WIRING DIAGRAMS

Diagram ER10

Codes: EIE150

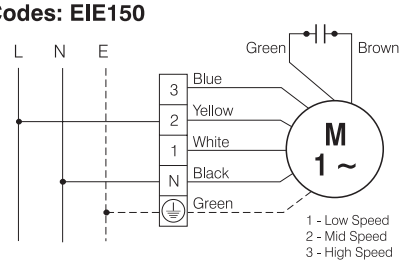
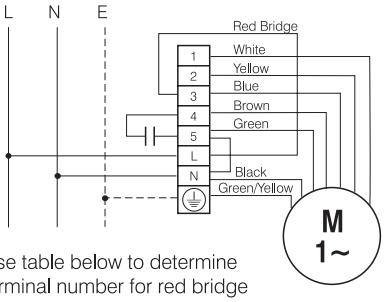


Diagram ER11

Codes: FSU146-4-A1



Use table below to determine terminal number for red bridge

Air Flow, L/sec	109	166	199
Speed	Low	Med	High
Terminal	1	2	3

These diagrams are current at the time of publication, check the wiring diagram supplied with the motor.

FAN TROUBLESHOOTING

1.0 General

Problem	Possible Cause	Recommended Action
1.1 Motor noise	Firstly determine if the noise is electrical or mechanical.	If the noise doesn't stop instantly, but runs down with the motor, the problem is more likely to be mechanical, generally the bearings; see Mechanical section below: If the motor is switched off and the noise stops instantly the problem is more likely to be electrical; see Electrical section pages *N-12/14*.

2.0 Mechanical

Problem	Possible Cause	Recommended Action
2.1 General Fan Noise	The fan could be running in stall.	Check the actual fan performance against the fan curve to determine where on the curve it is operating. If it is to the left of the peak pressure point the fan is generally in stall. If in stall see if the ductwork can be modified to eliminate high pressure loss sections. Low amps could indicate the fan is in stall. Reduce the pitch angle.
2.2 Bearing Noise Varying From A 'Dry' Rumble To A Squeal	Improper greasing.	Check the bearings are packed with the correct grade and amount of grease. If the bearings are of the sealed-for-life type replace them.
	The bearings may be loose on the shaft or bearing support.	Tighten the adaptor sleeve or collar.
	The bearings have not been properly tensioned	Re-tension as required
2.3 Rough Lumpy Sound	The bearings may have brinelled. Brinelling occurs when the fan is vibrated during transit or through ground vibration when stored. This causes the bearing to vibrate at a single point and therefore indenting the bearing race. Problems with brinelling usually occur shortly after a fan is installed.	Replace the bearings. To avoid brinelling the fan impeller should be rotated frequently, at least daily.
	Excessive belt tension.	Check and adjust the belt tension.
2.4 Shaft Seal Squeal	The seals may have dried out.	The seals may require lubrication or may be misaligned.
2.5 Air Noise	Air noise can be generated from a number of sources such as grilles, bends, badly designed duct fittings, excessive duct velocities etc.	Check the duct design is such it does not generate turbulence and therefore noise. An attenuator may be needed to resolve the problem.
2.6 Vibration	The impeller may be out of balance.	Site balancing may be practical but, if not, remove the impeller and balance.
	The shaft may be bent.	The shaft will have to be replaced.
	Impeller may be worn as a result of handling abrasive or corrosive materials.	The impeller will have to be replaced.
	Material such as dust or grease could be sticking to the fan blades.	Clean the impeller blades. This should be done on a regular basis if dust and/or grease is constantly present in the air being handled.
	The impeller may have been damaged by loose material in the duct system.	Depending on the level of damage the impeller may have to be replaced

FAN TROUBLESHOOTING

2.0 Mechanical (Cont.)

Problem	Possible Cause	Recommended Action
2.6 Vibration (Cont.)	Vibration being transmitted through the building structure.	Check vibration isolators have been fitted and, if fitted, check they are correctly positioned.
		Vibration isolators are fitted but not strong enough. If bottoming, adjust if possible or replace with more suitable mounts. Fit flexible connectors between the fan and ductwork.

3.0 Impellers

Additional Information: If there is any doubt about the impeller contact the supplier, do not run the fan. Refer to Do's and Don'ts section of this catalogue for design advice.

Centrifugal

Problem	Possible Cause	Recommended Action
3.1 Impeller Excessively Noisy	The impeller may be striking the fan casing or inlet cone, check for the following causes-	
	Impeller may be loose on the motor or drive shaft.	Tighten the fixings.
	Impeller incorrectly mounted onto the shaft	Re-install the impeller onto the shaft with the key installed correctly
	Impeller not centred in the casing	Adjust to the correct position.
	Casing inlet cone may be damaged	Repair the damage.
	Bent motor or drive shaft	Replace the shaft
	Impeller not centred on the inlet cone.	Check and re-align as required.
	The inlet cone has been damaged	Repair or replace.
	Shaft loose in bearings.	Tighten the bearing rings.
	Bearing loose on its support.	Tighten the fixing bolts.
	The cut-off in the fan discharge has been damaged.	Repair or replace.
	Cut-off is insecure.	Refit securely.
3.2 Damaged Impeller	Impeller bulging. This could be caused by the impeller being built from lighter than specified materials or the fan is running above its recommended speed.	Replace the impeller but also check the fan speed. Advise supplier of the problem.

Axial Flow

Problem	Possible Cause	Recommended Action
3.3 Impeller Excessively Noisy	Impeller blades may be loose and could be striking the fan casing.	Contact the supplier.
	The motor may have moved.	Check the alignment of the motor, relative to the casing, and tighten the fixing bolts. Contact the supplier.
	The blade tip clearance may be insufficient.	Trim the blades to suit, check with the supplier for advice.
3.4 Bent Blades	The blades may have been damaged during transit or by loose material in the duct system.	Check the condition of the fan and impeller on receipt and for debris in the duct. Replace the impeller if damaged.
	Bent blades can be caused by the fan running in stall or the air entry/discharge conditions to the fan creating excessive vibration.	Check the air entry conditions to the impeller do not generate excessive turbulence. Replace the impeller.

FAN TROUBLESHOOTING

Axial Flow (Cont.)

Problem	Possible Cause	Recommended Action
3.5 Disintegrated Impeller	Possibly caused by the blades being struck by loose material in the duct system.	Ensure the ducts are clear of all debris. Replace the impeller.
	Excessive impeller speed.	Check the motor speed and, if belt-driven, the pulley ratios. Replace the impeller.

4.0 Belt-Drives

Problem	Possible Cause	Recommended Action
4.1 Various Problems	The belts are loose and striking the belt-guard.	Adjust the belts to the correct tension.
	Belts are wearing out too quickly and/or the belts are too tight.	Adjust the belts to the correct tension. Also check the belts are a matched set, if they are not replace the complete set.
	The pulleys are worn.	Replace both the pulleys and belts.
	The belt may be the wrong cross-section for the pulley.	Check and replace the belts as necessary.
	The pulleys may be incorrectly aligned.	Check the pulleys and realign as necessary.
	The drive selection may be incorrect.	Check and change as necessary.
	The fan, motor or its base may not be securely fastened.	Check and secure as necessary.

5.0 Electrical

Problem	Possible Cause	Recommended Action
5.1 Fan Running The Wrong Way	Incorrect wiring.	To reverse the rotation of a three-phase motor interchange any two supply leads. To reverse the rotation of a single-phase motor interchange leads on the start winding. Refer to the directions in the motor junction box. This note applies to single-speed motors only. For 2-speed motors refer to the supplier.
5.2 Fan Won't Run	Wrong electrical supply.	Check the electrical supply matches the motor nameplate.
	Electrical connections in the motor terminal box or starter are not tight.	Check and tighten as necessary.
	For single-phase motors the capacitor is not wired in or is faulty.	If a capacitor is fitted check with a multimeter or replace.
	Fuses are blown	Before replacing fuses check the motor circuit for any faults.
	Belts on belt-driven units have broken.	Replace the belts and re-align the drive.
	Overloads have tripped out.	Check the motor before resetting the overloads.
	If a variable speed drive (VSD) has been fitted incorrect installation can cause an electrical 'spike' causing the motor windings to fail.	Check the motor windings and if failed replace the motor. Check the installation is in accordance with the VSD supplier's recommendations.
5.3 Fan Runs In Alternate Direction	The capacitor is not in circuit or it could be faulty.	Check with multimeter or replace.
	Alternatively, the connections could be poor or incorrect.	Check all connections and ensure there are no loose terminals.

FAN TROUBLESHOOTING

5.0 Electrical (Cont.)

Problem	Possible Cause	Recommended Action
5.4 Electrical Hum	Electronic speed-controllers can generate an electrical hum.	If the electronic controller is not faulty explore using a SSC single-phase 2-speed switch in its place. Alternatively, use an auto-tranformer speed controller.
	If a variable speed drive (VSD) is fitted incorrectly it can cause a high level of harmonics in the supply.	Check the installation conforms to the VSD supplier's recommendations.
	Phase imbalance on three-phase motor.	Check and correct the supply.
	Motor is not designed for the electric supply ie. wrong voltage or frequency.	Check the electrical supply matches the motor nameplate.
	Motor is overloaded and drawing greater than the nameplate amps.	Check the correct motor is fitted. If correct check the pitch-angle if an axial fan or the belt-drive details if a belt-driven fan. If these are correct contact the supplier.
	Motor has excessive clearance between stator and rotor. In this situation the motor will run slower than the normal speed. ie. have excessive slip.	Check motor speed, if slow contact the supplier.
5.5 Motor Overheating Or High Current Draw	Faulty instruments.	Ensure all instruments are accurate and calibrated where necessary.
	Incorrect power supply	Check the electrical supply matches the motor nameplate.
	Three-phase motor running with one phase disconnected. This is called single-phasing. When single-phasing, the motor will draw uneven current on each phase and will generally not start from standstill.	If single-phasing, check if it is the power supply or the motor windings. If a winding has failed the motor may need to be replaced. Fitting correct overloads or phase protection will prevent this problem.
	Impeller has too much inertia for the motor power and does not achieve full speed.	Check the inertia of the load and reduce as necessary. Alternatively, fit a larger motor.
	Excessive dirt on the motor cooling fins so the heat is not able to dissipate.	Remove the dirt and dust on the motor body and between the cooling fins. Increase the maintenance frequency.
	If the motor is out of the airstream either the cooling fan is not fitted or the air inlet to the motor cooling fan is obstructed.	Fit the motor cooling fan if not fitted and remove any obstructions from the air inlet to the motor.
	Excessive stopping or starting - 10 starts/ hour is generally acceptable.	Check the control system and reduce the number of starts/hour as recommended.
	A conventional three-phase motor is connected in Delta when it should be in Star, or vice-versa.	Check the motor nameplate and re-wire correctly.
	The fan impeller is jammed resulting in a locked rotor situation. The motor will draw 6-10 times the rated current in this situation.	Check to ensure the impeller can rotate freely.
	A 2-speed motor, when switching from high to low speed, can generate heat if the supply is not switched off.	Switch off the power first and allow the motor to run down before engaging low speed. Alternatively, use a time delay interlock.
	Backward-curved centrifugal impellers may be running in the wrong direction. When running in the wrong direction they will tend to overload the motor. Airflow capacity will be down to approximately 30-40% of full flow.	Check and correct the direction of rotation of the impeller if necessary.

FAN TROUBLESHOOTING

5.0 Electrical (Cont.)

Problem	Possible Cause	Recommended Action
5.5 Motor Overheating Or High Current Draw (Cont.)	If the fan is a forward-curved centrifugal there may be insufficient system resistance.	Ensure the duct system is installed correctly and, if necessary, lower the fan speed. Alternatively, increase the system resistance by fitting perforated metal on the fan inlet but note that this is inefficient.
	Axial fan impeller overpitched.	Re-pitch to the correct angle.
	Error in the motor selection for the required duty.	Check the motor nameplate and change as necessary.
	With belt-drive units incorrect pulley selection or pulleys on the wrong shafts	Check the pulley ratio and that the pulleys are on the correct shafts.
	Gas density greater than design.	Increase the motor size to suit.

6.0 Dual & Tap Wound Motors

Problem	Possible Cause	Recommended Action
6.1 High Current Draw And/Or 'Growling' Bearings	Tap-wound motors can create problems if the 'star point' contactor is not connected. The motor will be fine in low speed but in high speed will have a high current draw and a severe electrical noise that sounds like noisy bearings. The motor will not last long when run in this condition. Dual-wound motors are rarely a problem.	Faulty wiring in the switchboard, check the correct contactor is connected.

7.0 Performance

Additional Information: Refer to Do's and Don'ts section of this catalogue for design advice.

Problem	Possible Cause	Recommended Action
7.1 Low Airflow	Faulty instruments	Ensure instruments are accurate and calibrated where necessary.
	The wrong size fan has been installed.	Check the fan specifications are correct for the particular system.
	The fan is running backwards.	Check rotation of the impeller. If the rotation is wrong refer to the 'Electrical' section above.
	Pitch-angle of an axial fan may be wrong.	Check the pitch-angle against the schedule, if wrong contact the supplier. Site adjustment may be practical.
	Fan speed is too slow.	Check the motor speed and, if belt-driven, the pulley ratios. If wrong change to suit.
	The ductwork is undersized.	Check the ductwork and grilles are the correct size. If smaller than design this will increase the system resistance.
	If a centrifugal fan check the cut-off position.	Contact the supplier.
	Bad installation.	Check the entry and discharge conditions to the fan are of a good design. If the fan is mounted close to bends on the intake or discharge this will impact on the fans' performance. Check there are no duct obstructions on the intake or discharge of the fan. Internal duct lining may have come loose, check and repair.

FAN TROUBLESHOOTING

7.0 Performance (Cont.)

Problem	Possible Cause	Recommended Action
7.1 Low Airflow (Cont.)	The ductwork is undersized.	Check the ductwork and grilles are the correct size. If smaller than design this will increase the system resistance.
	Fan speed is too low.	Check the motor speed and, if belt-driven, the pulley ratios. If wrong change to suit.
7.2 High Airflow	Faulty instruments	Ensure instruments are accurate and calibrated where necessary.
	The wrong size fan has been installed.	Check the fan specifications are correct for the particular system. If an axial fan check the pitch angle and, if wrong, adjust.
	The ductwork is oversized.	Check the ductwork and grilles are the correct size. If larger than design this will decrease the system resistance.
	Fan speed is too high.	Check the motor speed and, if belt-driven, the pulley ratios. If wrong change to suit.
7.3 System Resistance Is Greater Than Estimated	The ducting and/or the grilles, coils etc. may be smaller than design, which will increase the system resistance.	Check that the ductwork and system components are the correct size. Check that all dampers are open. Check that all registers and grilles are open. Check the ducting is clear of rubbish. Check flexible connectors are installed correctly. Check if filters are dirty, clean or replace as necessary. Check if coils are dirty and clean them if necessary. Check duct take-offs and general duct fittings are correctly installed and of good design.
7.4 System Resistance Is Lower Than Estimated	If the duct system and associated components are larger than design this will reduce the system resistance.	Check the ductwork and associated components are the correct size. Check for leaks around flexible connections.
	There may be leakage from the ductwork.	Check the ductwork for leakage and rectify as necessary.
	Leakage around the base of Roof Ventilators.	Ensure there is a proper seal between the unit base and the up-stand. If there is no seal then install one.

8.0 Motor Protection

It is important to note the following regulations that form part of the Australian & New Zealand Wiring Rules (AS/NZS 3000:2007). Failure to comply with these regulations would void warranty.

8.1 Section 4.3.4.1

Protection against overload
'Each electric motor having a rating exceeding 0.37 kW shall be provided with control equipment incorporating means of protection against overload of the motor'.

8.2 Section 4.3.4.2

Protection against over-temperature
'Any unattended single-phase motor having a current draw greater than 1.0 Amp, or any unattended three-phase motor having a current draw greater than 0.578 Amps, shall be fitted with an over-temperature protection device'.

8.3 Section 4.3.4.2.3

Over-temperature protection devices
Protection of motor windings against excessive temperatures shall be provided by thermal-overload protective devices complying with AS1023.1 or by a device which affords an equivalent degree of protection'.

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