

Aerofoil Axial - Flow Fan



Safety, Installation, Operation and Maintenance Instructions

Part No.416421

FläktWoods

CONTENTS

	Paragraphs
Safety	-
Introduction And Purpose	1
General	1.1
Storage and handling	1.2
Mechanical Installation	2
General	2.1
Electrical Installation and Operation	3
General	3.1
Capacitors	3.2
Overheat protection	3.3
Bearing temperature, vibration and level monitoring sensors	3.4
Anti-condensation heater	3.5
Emergency-use fans	3.6
Fans with flameproof motors	3.7
Switch-on	3.8
Maintenance	4
General	4.1
Infrequent use	4.2
Overhaul/Extended Maintenance	5
Fault Finding	6
Electrical	6.1
Mechanical	6.2
Disposal	7

Routine Maintenance Procedures	Table 1
Wiring Detail (Single-Phase Direct-Drive BT/CT Type Motor, Standard Temperature S-Type Fan)	Figures 1
Wiring Detail (Single-Phase Direct-Drive BT/CT Type Motor, Standard Temperature L-Type Fan, High Temperature L and S-Type Fans)	1
Wiring Detail (Single-Phase Direct-Drive Motor with Speed Controller)	2
Wiring Detail (Single-Phase Belt-Drive Motor with Isolator Fitted)	2
Wiring Detail (Three-Phase Direct-Drive BT/CT Type Motor, Standard Temperature L-Type Fan, High Temperature L and S-Type Fans)	3
Wiring Detail (Three-Phase Direct-Drive BT/CT Type Motor, Standard Temperature S-Type Fan)	4
Wiring Detail (Three-Phase Direct-Drive Motor with Transformer Type Speed Controller)	4
Wiring Detail (Three-Phase Direct-Drive Motor with Change-Over Switch)	4
Wiring Detail (Three-Phase Direct-Drive Motor with Electronic Type Speed Controller)	5
Wiring Detail (Three-Phase Motor with Isolator Fitted)	5
Fixing Arrangement of Terminal Block (Drawing No: D258302 F)	6
Drawing of Torque Settings for Fixings (Drawing No: D248284 K)	7

SAFETY

WARNING: ONLY APPROVED, QUALIFIED PERSONNEL FAMILIAR WITH THE ASSESSMENT OF HAZARDS AND RISKS ASSOCIATED WITH FANS, AND WITH THE USE OF TOOLS AND TEST EQUIPMENT REQUIRED TO SERVICE SUCH FANS, SHOULD INSTALL, OPERATE AND MAINTAIN THE PRODUCT.

IF THE INSTALLER OR USER IS UNABLE TO UNDERSTAND THE INFORMATION IN THIS MANUAL, OR HAS ANY DOUBT THAT A SAFE AND RELIABLE INSTALLATION, OPERATION AND MAINTENANCE OF THE EQUIPMENT CAN BE ASSURED, FLÄKT WOODS LIMITED OR THEIR REPRESENTATIVE SHOULD BE CONTACTED FOR ADVICE.

WARNINGS AND SAFETY INFORMATION RELEVANT TO SPECIFIC OPERATIONS ARE CONTAINED AT THE START OF THE SECTIONS TO WHICH THEY APPLY.

WHEN FANS ARE RETAINED IN STORAGE, ACCESS BY UNAUTHORISED PERSONS MUST BE PREVENTED WITH THE USE OF GUARDS, BARRIERS OR SECURE PREMISES SUCH THAT FAN IMPELLERS WHICH MAY BE ROTATING DO NOT PRESENT A HAZARD.

1 INTRODUCTION AND PURPOSE

1.1 General

- 1.1.1 The Aerofoil Axial-Flow Fan is a highly efficient air movement product, designed to operate between a temperature range of -40° to +50°C (-20°C on starting). When operating at low temperatures, ice formation on the fan assembly must be prevented. Some fans have a specification, which calls for operation in high temperature emergency conditions, this will be identified on a special label on the fan casing (see also Paragraph 3.6).
- 1.1.2 The fan assembly is manufactured and aligned specifically to fulfil the requirement of the installation for which it was designed. No deviation from the original requirement should be implemented without referring to Fläkt Woods Limited head office in Colchester. Any queries regarding safety or operating problems should be referred to the local Fläkt Woods office, sales centre or representative, together with full fan/motor nameplate details. Should a fan failure occur whilst the product is under warranty, the Fläkt Woods service centre in Colchester should be contacted before any repair work is undertaken.
- 1.1.3 A frequency inverter type speed controller should only be used to control the fan if the inverter complies with Product Information Specification C22a.02. A copy of the specification is available from Fläkt Woods Limited.

1.2 Storage and handling

WARNING: WHEN FAN ASSEMBLIES ARE RETAINED IN STORAGE, ACCESS BY UNAUTHORISED PERSONS MUST BE PREVENTED WITH THE USE OF GUARDS, BARRIERS OR SECURE PREMISES SUCH THAT FAN IMPELLERS THAT MAY BE ROTATING (WINDMILLING) DO NOT PRESENT A HAZARD.

- 1.2.1 If the fan assembly is to be stored; check immediately on receipt that it is as ordered, and that it has not been damaged in transit. Where the fan is delivered in a crate (or similar), the crate should be considered as a protective device only. The crate must not have equipment stacked on it, and it must not be stacked on other equipment. The crate structure must not be used as a lifting aid unless otherwise indicated. A fork-lift truck or similar should be used for moving the crate. The fan should be stored in a safe, clean, dry, vibration free, location. If such storage conditions are not available the motor anti-condensation heater (if fitted), should be connected to an appropriate electrical power supply to prevent motor condensation forming, and the fan should be stored in an appropriate container. A regular monthly rapid spin of the impeller is recommended to prevent grease hardening and possible brinelling of the bearings; the impeller should not be in the same angular position after rotation.
- 1.2.2 When dismantling the crate to gain access to the fan assembly care should be taken to avoid injury from sharp edges, nails, staples, splinters, etc.
- 1.2.3 If the fan is to be stored for 12 months or more, an inspection by Fläkt Woods Limited service centre in Colchester before commissioning is advised.

2 MECHANICAL INSTALLATION

WARNING: IT IS RECOMMENDED THAT SUITABLE SAFETY GUARDS FORM PART OF THE INSTALLATION. SUCH DEVICES, AND ADVICE ON SAFETY DEVICES, ARE AVAILABLE FROM FLAKT WOODS LIMITED.

WHERE THE FAN IS DELIVERED IN A CRATE (OR SIMILAR), THE CRATE MUST BE CONSIDERED AS A PROTECTIVE DEVICE ONLY, AND MUST NOT BE USED AS A LIFTING AID UNLESS OTHERWISE INDICATED.

ALL LIFTING AIDS USED DURING INSTALLATION SHOULD BE ADEQUATELY CERTIFIED TO CARRY THE WEIGHT OF THE EQUIPMENT BEING LIFTED. (SEE PARAGRAPH 2.1.1).

ALWAYS WEAR APPROPRIATE PROTECTIVE CLOTHING (INCLUDING HARD HATS, EYE PROTECTORS AND EAR DEFENDERS) WHEN WORKING IN THE VICINITY OF THE FAN ASSEMBLY.

DURING LIFTING OF THE FAN ALL PERSONNEL MUST BE CLEAR OF THE AREA BELOW THE SUSPENDED FAN.

NOTE: Before installing the fan assembly, check that it has not been damaged in transit, that there is no deformation of the fan casing, that the impeller rotates freely, and that the fan and motor nameplate data complies with the requirement of its use. If the fan assembly has been stored the resistance of the motor windings to earth should be measured (at 500V d.c). If any reading is less than ten megohms the motor should be dried and re-checked before it is switched on.

2.1 General

- 2.1.1 The fan assemblies can be heavy (between 270 kg and 8000 kg, depending on fan and motor size, with ancillary equipment such as silencers, guards, bellmouths, adding to the weight), are sometimes unwieldy, and should be lifted slowly to prevent damage and distortion. Proper precautions must be taken, and certified lifting aids used, to ensure the fan is well supported and stable before lifting into position. Flange holes or mounting feet holes can be used for lifting but more than one hole must be used to spread the load. If special lifting points are provided they must be used. The fan must be installed such that it is correctly positioned in accordance with the required airflow direction. An airflow indication arrow is shown on the fan nameplate. Sharp bends in the ductwork close to the fan must be avoided. Adequate room must be allowed round the fan for inspection and maintenance.

- 2.1.2 The component parts of the fan assembly, including (if fitted) anti-vibration mounts, silencers, bellmouths, flexible connectors (and their clips), purlin boxes, weather proofing, platforms, supports, chains and harnesses, etc. must be fully aligned before being bolted together so that no distortion or stress is placed on the equipment. Appropriate fixings, with the correct torque applied, must be used to secure the fan into position. If in doubt about the torque of a particular fixing, contact Fläkt Woods Limited for advice. The final position of the fan must be strong and rigid enough to take the weight of the fan and any other weight applied during installation. Vibration isolators, appropriate for the weight of the fan, are recommended in order that any vibration of the fan is isolated so that no resonant frequencies are generated in surrounding fixtures. If vibration isolators are used, flexible connectors and flexible electrical conduit should also be used. The vibration isolators and flexible connectors must not be used to align fixing points that are clearly misaligned. If any component parts do not easily fit together the cause must be investigated and rectified.
- 2.1.3 Motors are fitted with a drain hole in each end cover, and in the terminal box. The motor drain hole should be at the lowest point of the motor when it is installed. Plugs that cover the drain holes should either be removed entirely if condensation is liable to occur due to large variations in operating temperature, or removed periodically to allow any general build-up of condensation to drain away. The frequency of plug removal will be dictated by environmental conditions, a record should thus be kept.
- 2.1.4 Bifurcated fans when mounted on their horizontally axis should have the 'tunnel opening' facing downwards between 3 o'clock and 9 o'clock.
- 2.1.5 After installation all packing materials must be disposed of in accordance with Paragraph 7.

3 ELECTRICAL INSTALLATION AND OPERATION

WARNING: NO WORK SHOULD BE ATTEMPTED BEFORE COMPLETELY ISOLATING THE FAN ASSEMBLY, ITS ANTI-CONDENSATION HEATER (IF FITTED), AND ITS CONTROLS FROM ALL ELECTRICAL SUPPLIES, AND ALLOWING THE ROTATING PARTS OF THE FAN TO COME TO REST.

BEFORE ENTERING THE AREA ENSURE THAT ALL FUMES, DUST, TOXIC EMISSION, HEAT ETC., HAVE DISPERSED FROM THE LOCAL ENVIRONMENT, AND THE FAN BLADES ARE NOT LIKELY TO WINDMILL.

THE FAN ASSEMBLY CONTAINS ROTATING PARTS AND ELECTRICAL CONNECTIONS WHICH CAN BE A DANGER AND CAUSE INJURY. IF THERE IS ANY DOUBT THAT A SAFE AND RELIABLE INSTALLATION OF THE FAN CAN BE ASSURED; FLäkt Woods Limited OR THEIR REPRESENTATIVE SHOULD BE CONTACTED FOR ADVICE.

IF THE FAN ASSEMBLY IS DESIGNED FOR HIGH-TEMPERATURE EMERGENCY-USE; IT IS IMPERATIVE THAT THE WIRING USED IS HIGH TEMPERATURE RATED, AND THAT ALL SWITCHES AND CONTROLS ARE OVERRIDDEN DURING THE EMERGENCY OPERATION.

IF THE FAN STOPS DUE TO AN OVERHEAT SITUATION, THE OVERHEAT PROTECTION THERMOSTAT (IF FITTED - SEE PARAGRAPH 3.3.1) MAY RESET AS THE TEMPERATURE COOLS AND AUTOMATICALLY RESTART THE FAN IF POWER IS STILL APPLIED.

ALWAYS WEAR APPROPRIATE PROTECTIVE CLOTHING (INCLUDING HARD HATS, EYE PROTECTORS AND EAR DEFENDERS) WHEN WORKING IN THE VICINITY OF THE FAN ASSEMBLY.

3.1 General

- 3.1.1 The fan assembly is fitted with either a terminal box on the motor or a terminal box on the fan duct. The electrical supply to the fan assembly should be connected to the terminal box by an appropriately qualified electrician. It is good practice to fit a clearly marked isolator switch close to the fan, and have a clearly marked and accessible push button starter switch remote from the fan. The two switches allow safe control of the fan and provide a means of safely isolating the fan during maintenance. A suitable earth must also be connected. Sufficient cable length should be provided to allow for the flexibility of the fan on its vibration isolators (if fitted). A connection diagram providing wiring details is supplied with larger fan assemblies. Figures 1 to 5 show details of the wiring to the terminals of smaller fans. Figure 6 shows the correct assembly sequence of terminal box parts, and the torque to be applied. It is essential that no lockwashers or nuts are placed between the motor lead eyelet, connecting link or customer's supply lead eyelet (when fitted).
- 3.1.2 Fuses in the fan electrical control circuit must be sufficiently rated to carry the starting current as indicated on the motor nameplate, but they should be regarded as only protecting the wiring against the effects of short circuits or earth faults. The fuses are not suitable for overload protection. To provide full protection for the motor, a starter panel with overload protection should be used, and an isolator switch must be incorporated into the circuitry. The isolator switch should be a lockable type that will allow the operator/maintainer to isolate the fan from the electrical supply before working on the assembly.
- 3.1.3 If a speed controller, or other controlling equipment, forms part of the system it should be able to control the fan within safe limits. Sufficient fan speed must be maintained to open any shutters that may be in the air-flow. The controlling equipment should be securely located, and should not be, or cause, a radiation hazard. Three-wire control is preferable to two-wire control. Two-wire control can be used on motors up to a full load current of 3 amps, but above 3 amps three-wire control is recommended to avoid increased temperature rises in the motor windings. Care should be taken to ensure that the fan is able to be controlled by a speed controller. Fläkt Woods Limited can be contacted for advice on all forms of speed controllers and other control equipment supplied by the Company.
- 3.1.4 Speed controllers should not be used without prior agreement with Fläkt Woods Limited.
- 3.1.5 Fans with a duct-mounted terminal box must have their electrical supply fed through an entry point in the side of the box. Unused entry points must be sealed with weatherproofed plugs or grommets.
- 3.1.6 Fans with a motor-mounted terminal box also have the electrical supply fed through an entry point in the side of the box. The cable must be threaded through a gland assembly, and the gland assembly should be tightened sufficiently to hold the cable and provide a weatherproof seal.

3.2 Capacitors (single-phase motors only)

- 3.2.1. Low rated capacitors are mounted on the motor during manufacture. Larger rated capacitors, are supplied separately and must be fitted externally from the motor. Capacitors for flameproof motors must be located outside the hazardous area.

3.3 Overheat protection

- 3.3.1. Motor overheat protection (if fitted) can be fitted on all single-phase and three-phase motors. Overheat protection is achieved by the use of either thermostats or thermistors. The protection devices are wired in either of the following two ways:

- 3.3.1.1 on single-phase and 3-phase motors with a full load current of up to and including 6.3A:

thermostats are wired in series with the motor winding; they operate by opening and closing with temperature to automatically open circuit the winding and stop the fan in an overheat situation (see Section 3 Warning). On cooling, the motor will automatically re-start, however on single-phase motors of this type, manual re-start can be achieved by removing the link between terminals K and UZ and wiring terminals K – K directly to the motor start contactor, thermistors are wired to separate terminals (S –S) within the terminal box; they change their resistive value with temperature and must be wired to control the motor start contactor via a suitable relay.

3.3.1.2 on single-phase and three-phase motors with a full load current above 6.3A:

thermostats are wired to separate terminals (K – K) within the terminal box; they operate by opening and closing with temperature and must be wired to directly control the motor start contactor,

thermistors are wired to separate terminals (S –S) within the terminal box; they operate by changing their resistive value with temperature and must be wired to control the motor start contactor via a suitable relay.

Note that when the motor cools the thermostat will reset; the motor however must not be able to start until the motor start contactor is manually reset.

3.4 Bearing temperatures, vibration and level monitoring sensors

3.4.1 Monitoring sensors (if fitted) in the fan system should be wired to automatically switch off the fan if a fault occurs, or provide an indication of a fault. If the fan is automatically switched-off by a monitoring sensor the wiring must ensure that it is fully isolated and will not automatically reset. If the fan is designed for emergency use the circuit must be wired to allow the emergency use system to override all monitoring devices and immediately switch on the fan in the case of such an emergency situation (see Section 3.6).

3.5 Anti-condensation heater

3.5.1 Anti-condensation heaters are terminated in a terminal box on the fan and must be externally wired to automatically receive the appropriate supply when the motor is switched to off. When the motor is switched on the anti-condensation heater is not required and thus must be automatically switched out of circuit.

3.6 Emergency-use fans

3.6.1 Where the fan assembly is designed for emergency-use smoke-extraction at high temperature, the temperature/time capability will be shown on a special label adjacent to the main nameplate. An automatic control system, or a clearly marked remotely sited emergency-use switch, must be fitted to override all other switches and controls and immediately switch on the fan in the case of such an emergency situation. High temperature cable must be used between the remote switch and the fan, and the electrical supply must be from a guaranteed or separately maintained source to enable the unit to continue running during the emergency condition. After such an emergency the fan must be removed, refurbished or safely disposed of (see Paragraph 7), and replaced as necessary.

3.7 Fans with flameproof motors

3.7.1 Fans with flameproof motors are designed for use in locations where there are liable to be fumes, dust or flammable/explosive gases. Installation should be carried out by qualified personnel. Special care must be exercised when electrically connecting such units to ensure that a secure flameproof connection is achieved. Great care must be taken to ensure that the thread of cable glands, or conduit, matches its corresponding thread so that the entire installation achieves the flameproof barrier required. A stopper barrier box, where fitted, must be filled with a barrier compound when the connections have been made. The long cased, fully ducted, fans fitted with an ENV89 motor have their terminal box mounted on the motor. The supply cable to the motor terminal box must be fed through the conduit hole in the fan duct and connected into the terminal box before the fan is fully installed (i.e. before the inlet and outlet ducts are fitted). Any electrical control gear (including the capacitor in the case of single-phase motors) must be located outside the hazardous area if they are not of a flameproof type. The motor should not be allowed to become coated with dirt/dust, etc. which could restrict surface cooling and consequently raise the temperature of the motor carcass. If in doubt about the achievement of a flameproof barrier, contact Fläkt Woods Limited for advice.

3.8 Switch-on

- 3.8.1. Before switching confirm that the electrical supply is fully compliant with the requirement of the motor as detailed on the motor nameplate, that the fan is correctly installed, all component parts and fixings are secure, safety guards are in place and no loose articles are present in the vicinity.
- 3.8.2. Immediately on switch-on check the assembly for smooth, low-vibration running, and check that the current consumption is within the full load current specified on the nameplate. A trial connection of the three-phase supply should be made to check that the fan rotates in the required direction. If the rotation is incorrect interchange any two phases of the incoming supply at the motor terminal block. If after correctly connecting the single-phase supply the fan is found to be rotating in the wrong direction, the motor winding leads U1 and U2 should be interchanged at the motor terminal block. The fan must not be switched on and off in a manner that could cause overheating of the motor or its wiring.
- 3.8.3. On belt-driven motors allow the fan to run for two hours after initial installation and then check the belt tension in accordance with Table 1 Item 8.

4 MAINTENANCE

NOTE: The maintenance procedures are designed to keep the roof unit safe, operational and fault-free.

WARNING: NO MAINTENANCE WORK SHOULD BE ATTEMPTED BEFORE SWITCHING OFF AND COMPLETELY ISOLATING THE FAN ASSEMBLY, ITS ANTI-CONDENSATION HEATER (IF FITTED), AND ITS CONTROLS, FROM ALL ELECTRICAL SUPPLIES AND ALLOWING THE ROTATING PARTS OF THE FAN TO COME TO REST.

BEFORE ENTERING THE AREA ENSURE THAT ALL FUMES, DUST, TOXIC EMISSION, HEAT ETC., HAVE DISPERSED FROM THE LOCAL ENVIRONMENT, AND THE FAN BLADES ARE NOT LIKELY TO WINDMILL.

ALL LIFTING AIDS USED DURING MAINTENANCE, AND ALL LIFTING POINTS UTILISED, SHOULD BE ADEQUATELY CERTIFIED TO CARRY THE WEIGHT OF THE EQUIPMENT BEING LIFTED. (SEE PARAGRAPH 2.1.1).

ALWAYS WEAR APPROPRIATE PROTECTIVE CLOTHING (INCLUDING HARD HATS, EYE PROTECTORS AND EAR DEFENDERS) WHEN WORKING IN THE VICINITY OF THE FAN ASSEMBLY.

4.1 General

- 4.1.1 Maintenance must be carried out on the fan assembly by appropriately qualified personnel using the correct tools and equipment. A regular routine maintenance schedule should be established, and a record kept. A list of suggested intervals are given in Table 1. Where the environment is particularly dirty, a reduction in the intervals may be necessary. Internal and external fan surfaces may be cleaned with low pressure clean water and non-abrasive additives. Direct application of water from any direction to the motor drain plugs must be avoided.
- 4.1.2 It is essential to ensure that all fixings on the fan assembly are secure. When examining and checking the security of fixings during routine maintenance (see Table 1 Items 11 and 12), those fixings that have locking devices fitted or are painted over, need not be disturbed if they can be seen to be secure. Any locking devices that are disturbed during maintenance must be discarded and replaced with new identical devices. Thread forming screws must have locking compound applied when being reused. Those fixings that have no locking devices fitted and are not painted over, should be checked at 95% of their original setting to ensure no unnecessary disturbance of the fixing. See Figures 6 and 7 for torque setting details. If in doubt about the torque of a particular fixing contact Fläkt Woods Limited for advice.

- 4.1.3 In addition to routine maintenance motor bearings will in the longer term require attention. If the motor bearings are greased through extended lubricators, the grease should be periodically applied in accordance with the instructions on the fan or motor nameplate. A compatible grease type must be used and it is essential that every trace of water and dirt is removed from around the grease points and that a clean grease gun is used. Only low pressure should be needed to inject the specified quantity of grease. If a high pressure is required, the cause should be investigated. Grease points are generally located in the region of the duct terminal box.
- 4.1.4 After maintenance ensure that no loose articles are present in the vicinity of the fan, that all safety guards, chains or steel ropes, etc., are properly secured into their original location, and that any temporary device used to stop the fan blades windmilling has been removed.

4.2 Infrequent Use

- 4.2.1 If the fan assembly is to be used less frequently than once a month, or for emergency-use only, the following additional maintenance procedures should be carried out, and a record kept:
- 4.2.1.1 the resistance of the motor windings to earth, should be measured (at 500V d.c) each month. If the reading is less than ten megohms, the motor should be dried in a warm airflow (typically 40°C) and re-checked before running the motor,
 - 4.2.1.2 the fan should be operated for at least two hours each month to ensure correct lubricant conditions in the bearings,
 - 4.2.1.3 the 'emergency-use' system should be run continuously for a minimum of fifteen minutes each month, the test should ensure that the emergency use control system overrides all other controls and switches (see Paragraph 3.6),
 - 4.2.1.4 if an anti-condensation heater is fitted, check each month that it is automatically switched on (drawing current) when the motor is switched to off.

5 OVERHAUL/EXTENDED MAINTENANCE

- 5.1 Advice on motor overhaul procedures, bearing/seal replacement, motor replacement, motor rewinding, spare parts, condition monitoring, vibration analysis, refurbishment, etc. is available from Fläkt Woods Limited service centre in Colchester. It is recommended that the motor shaft seals and bearings are replaced after 20,000 hours or 5 years of normal operation whichever ever comes sooner, and that the motor is rewound to its original specification after 40,000 hours of normal operation to ensure that adequate insulation life is available should the fan be required for emergency operation. The motor manufacturer's specification sheets are available through Fläkt Woods Limited.
- 5.2 After overhaul/extended maintenance the fan assembly must be correctly installed back into its original position in accordance Paragraphs 1, 2 and 3 of this document. Before switching on the motor confirm that the electrical supply is fully compliant with the requirement of the motor as detailed on the motor nameplate, that the fan is correctly installed, that all component parts and fixings are secure, safety guards are in place and no loose articles are present in the vicinity. Immediately on switch-on check the assembly for smooth, low-vibration running, and check that the current consumption is within the full load current specified on the nameplate. A trial connection of the three-phase supply should be made to check that the fan rotates in the required direction. If the rotation is incorrect interchange any two phases of the incoming supply at the fan terminal block. If after correctly connecting the single-phase supply the fan is found to be rotating in the wrong direction, the motor winding leads U1 and U2 should be interchanged at the motor terminal block.

6 FAULT FINDING

NOTE: The routine maintenance procedures detailed in Paragraph 4, and Table 1, of this document are designed to keep the fan operational and fault free.

6.1 Electrical

- 6.1.1 Check that the electrical connections to the unit are secure.
- 6.1.2 Check that the voltage applied to the unit is as specified on the motor nameplate, and is balanced.
- 6.1.3 Connect an ammeter in line with each phase (one phase in the case of single-phase motors) of the motor in turn and check that the current consumption is within the full load current specified on the motor nameplate. Check that the supply voltage at the fan terminals is as expected and is balanced.
- 6.1.4 Measure each motor winding to earth, and between each winding, using a 500V d.c insulation tester. If the reading is less than ten megohms the reason is liable to be dampness in the motor. To dry the motor place it in a warm (typically 40 degrees centigrade) dry airstream and regularly monitor the motor until the insulation reading is restored to ten megohms or greater. If the reading remains less than ten megohms a break-down in the motor winding insulation could be the reason, and a motor rewind/overhaul may be necessary.
- 6.1.5 Ensure that there is no smell of burnt insulation in the vicinity of the motor.

6.2 Mechanical

- 6.2.1 Check that there is no obstruction to the motor impeller blade, that the blade is clean, and no loose articles or debris in the vicinity.
- 6.2.2 Rotate the motor shaft by hand. Investigate any sound of internal chaffing, rubbing or stiffness. Any stiffness may indicate that the bearings require lubrication or replacing.
- 6.2.3 Ensure that all fixings are secure.
- 6.2.4 On belt driven units check that the belt is not broken or slipping.

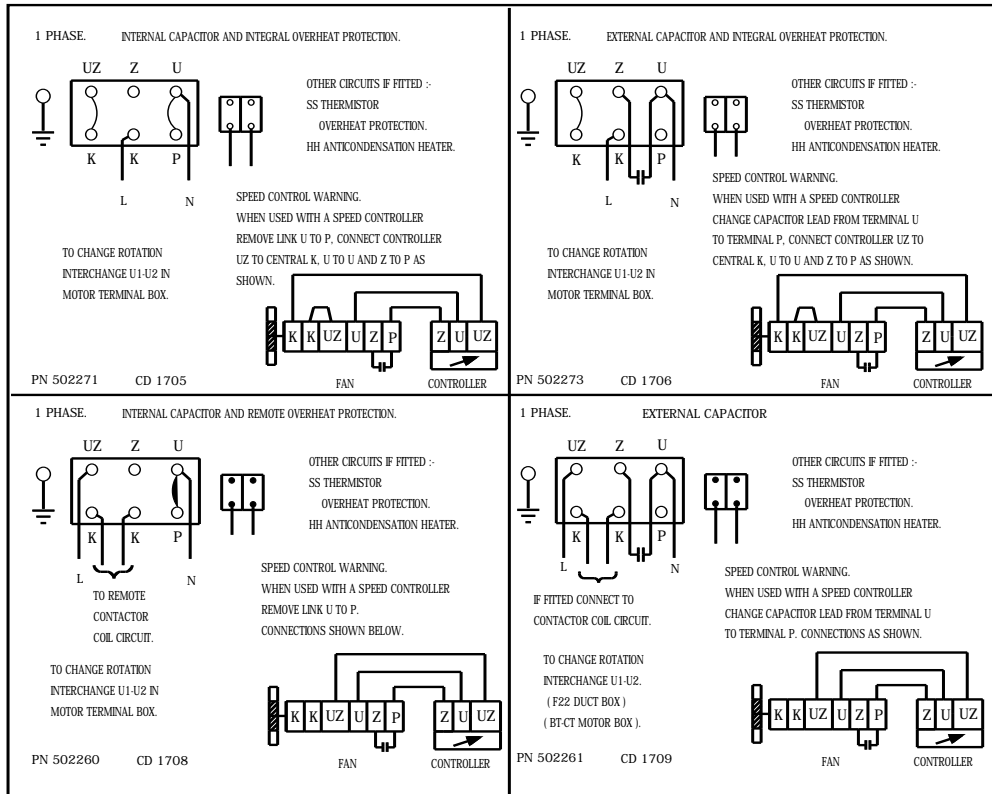
7 DISPOSAL

The metal components of the fan/motor should be segregated and separately recycled. The following items of material should be safely disposed of in accordance with local health and safety regulations:

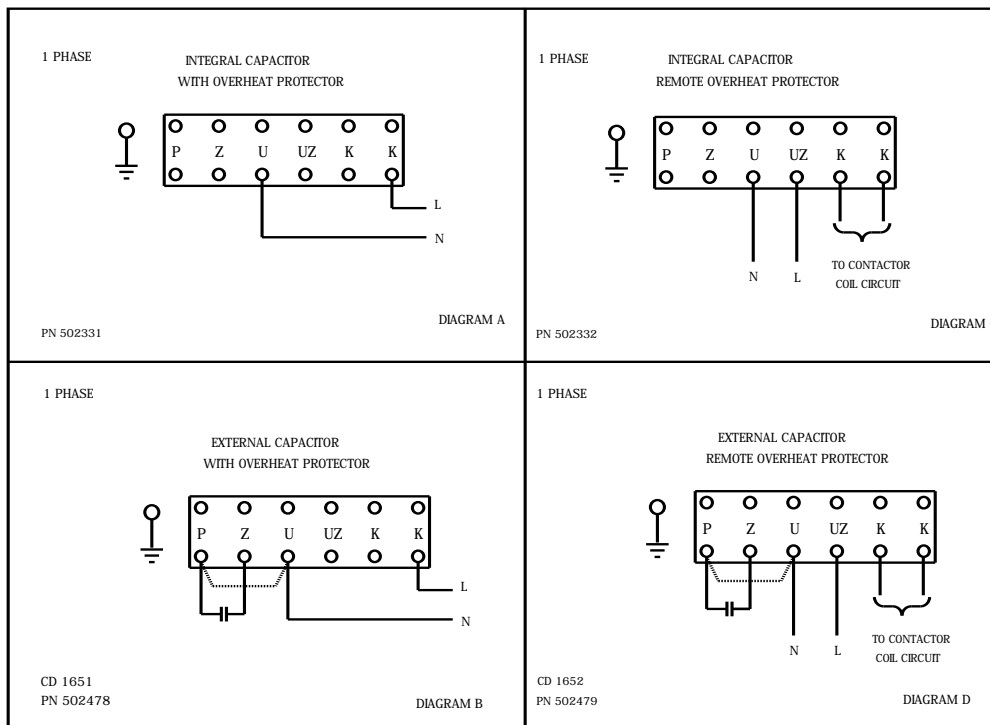
- electrical lead coverings,
- motor winding insulation materials,
- bearing lubricant,
- motor/fan terminal block,
- paintwork,
- plastic parts,
- packing materials,
- silencer infill (Note that a face mask and gloves should be worn when handling the infill. If the infill is particularly dry or is damaged it should be damped-down before disposal).

ROUTINE MAINTENANCE SCHEDULE	EVERY 6 MONTHS	EVERY 12 MONTHS	COMMENTS																		
1. Examine the air ways into the fan guards (if fitted).	*		Remove any debris that may have accumulated round the guards.																		
2. Examine motor cooling fins .	*		Remove any material/ dirt build-up between the motor fins.																		
3. Examine impeller for dirt build-up and for any physical damage.	*		Remove any build-up of dirt. Ensure impeller is secure . Replace impeller if it is damaged.																		
4. Check condition and tautness of fan safety support chains/ harnesses/ropes (if fitted).	*		Clean safety supports . Replace them if there is any deterioration/corrosion.																		
5. Examine and operate vibration sensors (if fitted), level switches (if fitted), and temperature sensors (if fitted).	*		Check operation using built-in sensor test features or dummy signals. Check that the fan is automatically switched off, or a warning indication is provided, when the sensors/ switches indicates a fault.																		
6. Examine condition of safety guards (if fitted) and their fixings.	*		Clean safety guards . Replace them if there are any signs of damage .																		
7. Check operation of anti-condensation heaters (if fitted).	*		Switch off the power to the motor Check that the anti-condensation heater is energised (drawing current).																		
8. On 'belt-drive' motors inspect the belt and its mechanism.	*		Ensure that the area is clean. Set the belt tension for deflection (at the middle point of the belt) of 16mmper metre of span as follows: <table border="0" style="margin-left: 40px;"> <tr> <td>Belt section:</td> <td>Diameter of smaller pulley (mm)</td> <td>Force for deflection (kg):</td> </tr> <tr> <td>SPZ</td> <td>67 - 95</td> <td>1.0 to 1.5</td> </tr> <tr> <td>SPZ</td> <td>100 - 140</td> <td>1.5 to 2.0</td> </tr> <tr> <td>SPA</td> <td>100 - 132</td> <td>2.0 to 2.7</td> </tr> <tr> <td>SPA</td> <td>140 - 200</td> <td>2.8 to 3.5</td> </tr> <tr> <td>Z</td> <td>56 - 100</td> <td>0.5 to 0.8</td> </tr> </table> Belt and guard replacement information is available from Fläkt Woods Limited.	Belt section:	Diameter of smaller pulley (mm)	Force for deflection (kg):	SPZ	67 - 95	1.0 to 1.5	SPZ	100 - 140	1.5 to 2.0	SPA	100 - 132	2.0 to 2.7	SPA	140 - 200	2.8 to 3.5	Z	56 - 100	0.5 to 0.8
Belt section:	Diameter of smaller pulley (mm)	Force for deflection (kg):																			
SPZ	67 - 95	1.0 to 1.5																			
SPZ	100 - 140	1.5 to 2.0																			
SPA	100 - 132	2.0 to 2.7																			
SPA	140 - 200	2.8 to 3.5																			
Z	56 - 100	0.5 to 0.8																			
9. On 'bifurcated' motors remove the impeller and inspect the packing located behind the motor shaft-seal retaining plate.	*		Replace the 130mm Duramid seal if it is damaged.																		
10. Examine the clearance between the fan impeller blade tips and the fan duct. Check the angle, and the security of the impeller blades .		*	Ensure that the gap between the impeller blade ends and the fan duct is even and adequate . If in doubt about the gap contact Fläkt Woods Limited for advice . Ensure that the impeller blade is secure . The blade angle must not be changed before contacting Fläkt Woods Limited for advice .																		
11. Check torque of fan-to-support fixings .		*	It is essential to confirm that all fixings are properly fitted, are tight, and are fully driven home (see Paragraph 4.1.2). If in doubt about the torque of a fixing contact Fläkt Woods Limited for advice .																		
12. Examine motor, fan and ancillary equipment fixings .		*	It is essential to confirm that all fixings are properly fitted, are tight, and are fully driven home (see Paragraph 4.1.2). If in doubt about the torque of a fixing contact Fläkt Woods Limited for advice.																		
13. Check movement of vibration isolators (if fitted).		*	Check freedom of movement. Tighten fixings if necessary.																		
14. Check motor voltage and current consumption.		*	Ensure voltage and full load current are as specified on the motor nameplate.																		
15. Inspect paintwork/ galvanising.		*	Treat any areas of damage with suitable anti-corrosion paint.																		
16. Grease motor bearings.		*	Check requirement in accordance with paragraph 4.1.3.																		
17. Check fan assembly wiring.		*	Check security, and condition, of all wiring (including the earth).																		

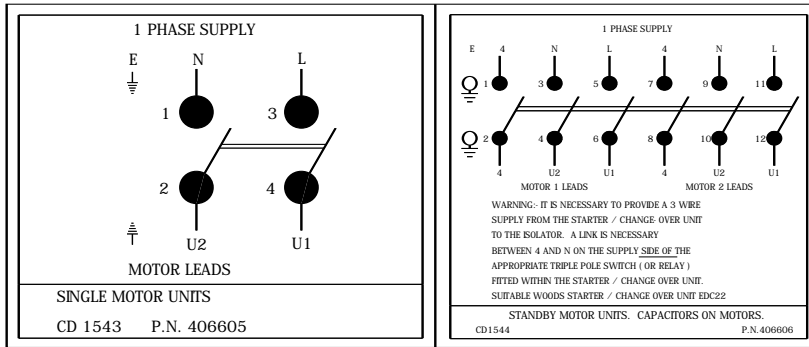
TABLE 1: ROUTINE MAINTENANCE PROCEDURES



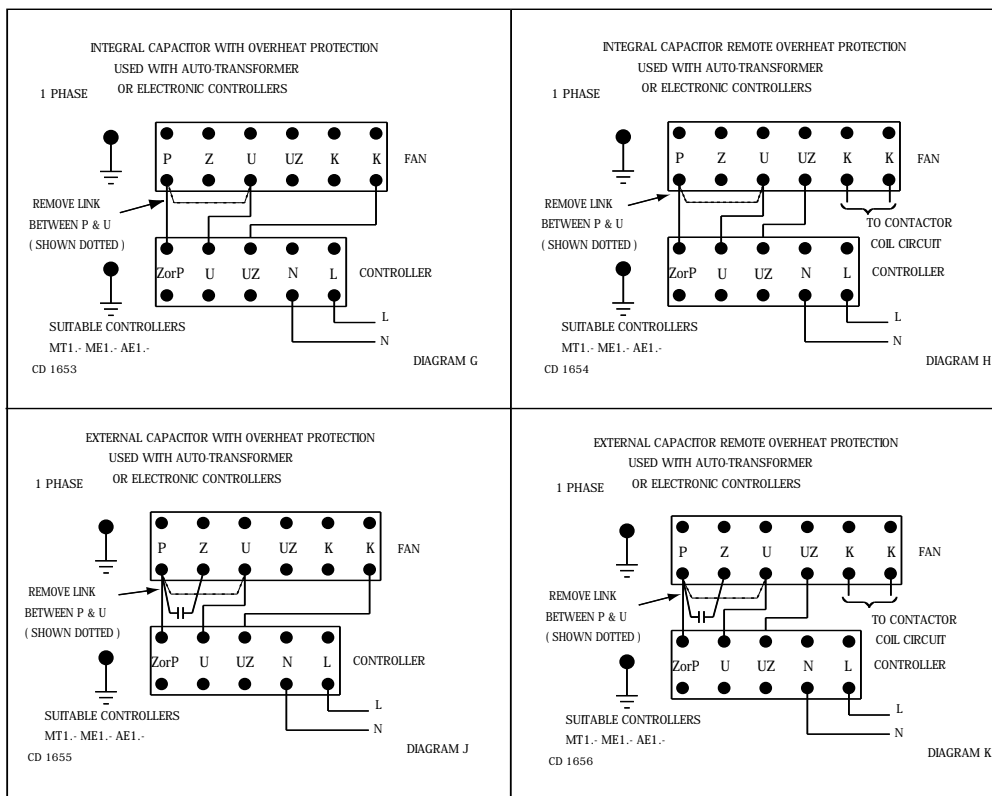
WIRING DETAIL (SINGLE-PHASE DIRECT-DRIVE BT/CT TYPE MOTOR, STANDARD TEMPERATURE L-TYPE FAN, HIGH TEMPERATURE L AND S-TYPE FANS)



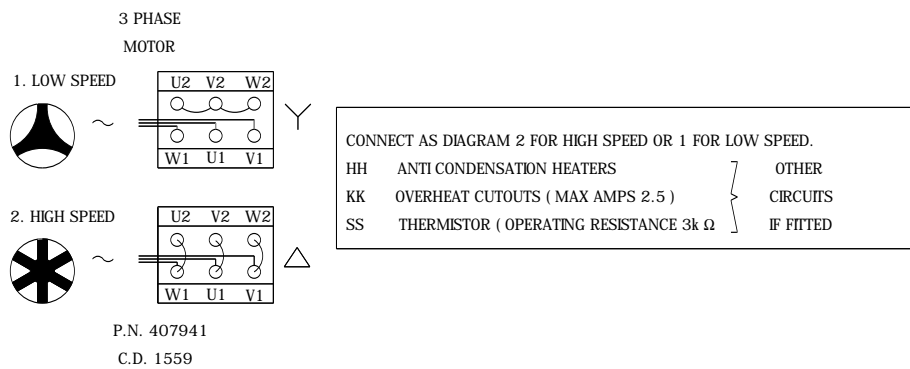
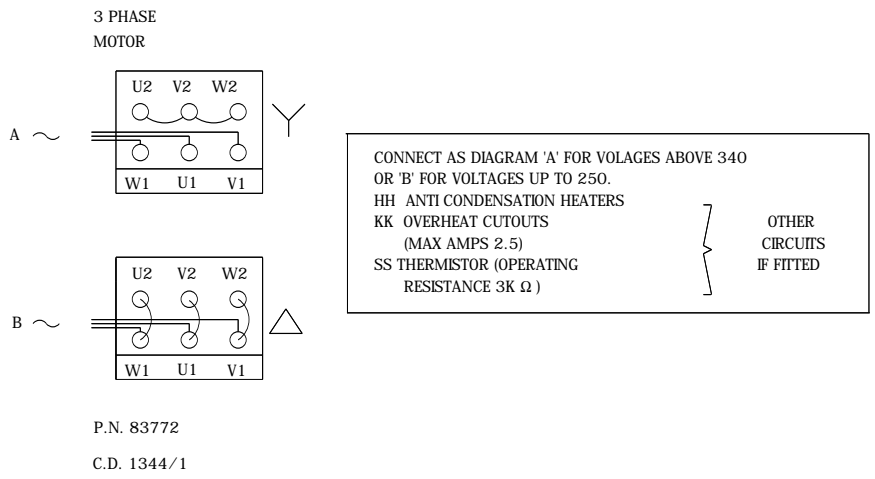
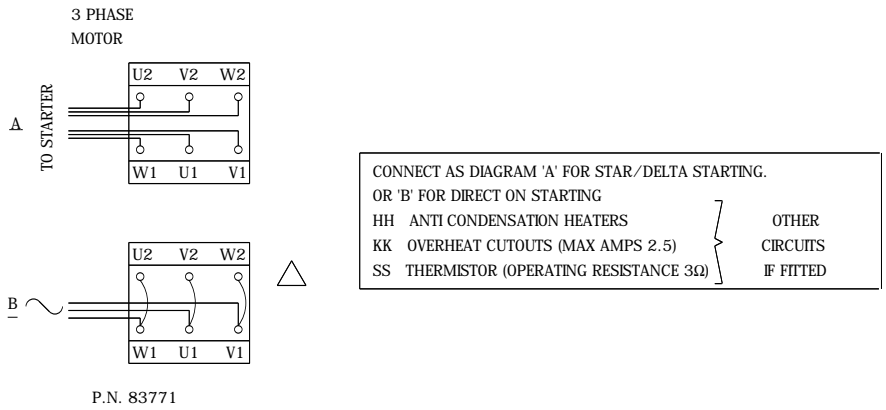
WIRING DETAIL (SINGLE-PHASE DIRECT-DRIVE BT/CT TYPE MOTOR, STANDARD TEMPERATURE S-TYPE FAN)



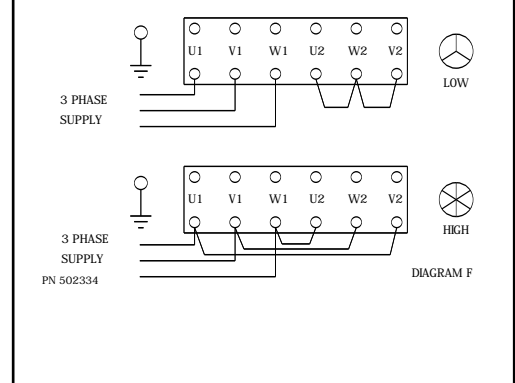
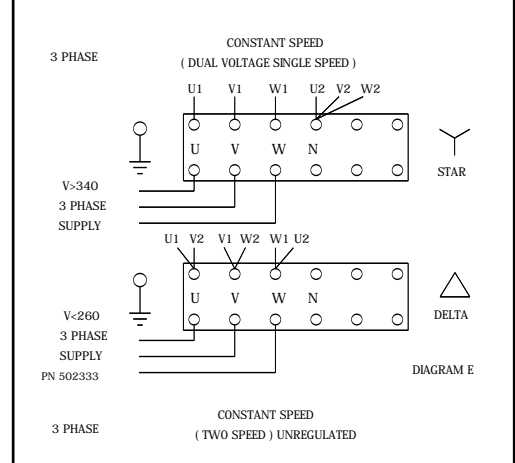
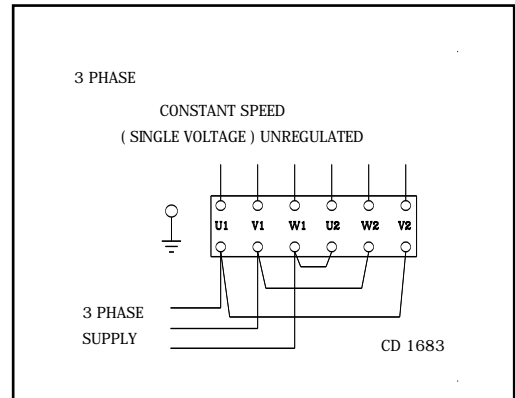
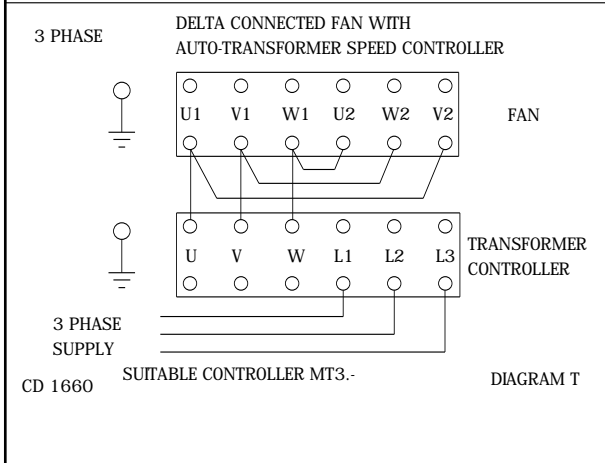
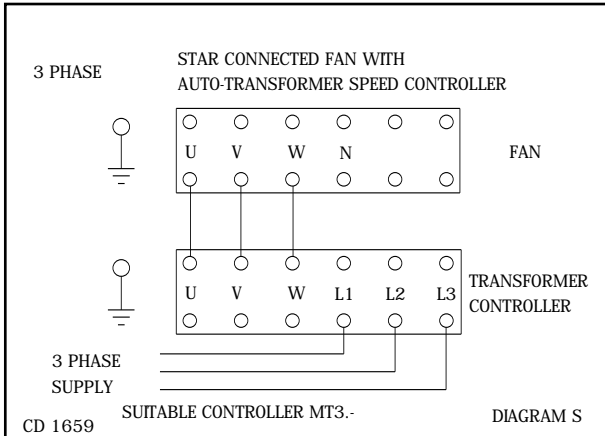
WIRING DETAIL (SINGLE-PHASE BELT-DRIVE MOTOR WITH ISOLATOR FITTED)



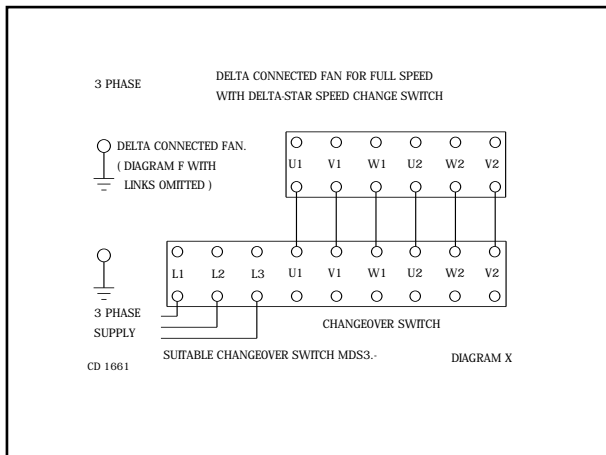
WIRING DETAIL (SINGLE-PHASE DIRECT-DRIVE MOTOR WITH SPEED CONTROLLER)



WIRING DETAIL (THREE-PHASE DIRECT-DRIVE BT/CT TYPE MOTOR, STANDARD TEMPERATURE L-TYPE FAN, HIGH TEMPERATURE L AND S-TYPE FANS)

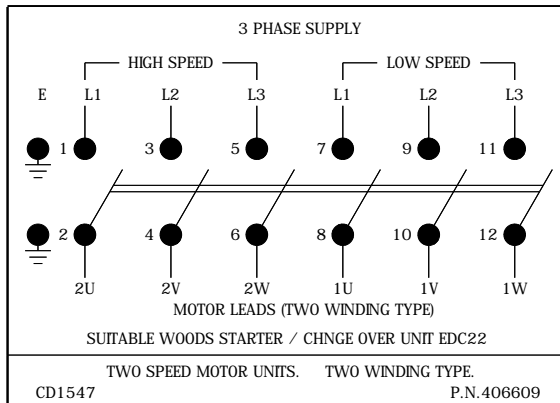
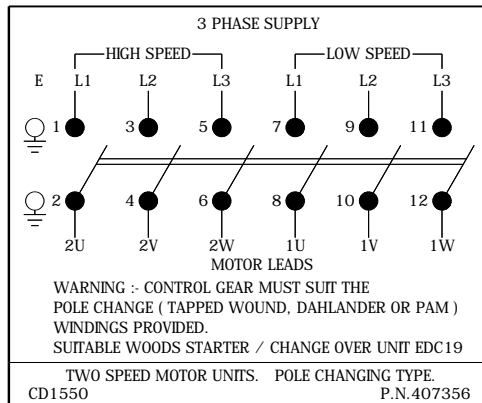
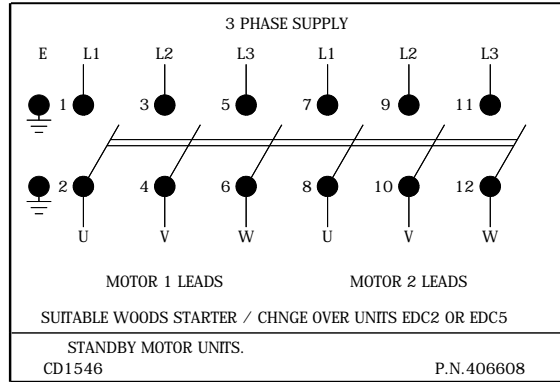
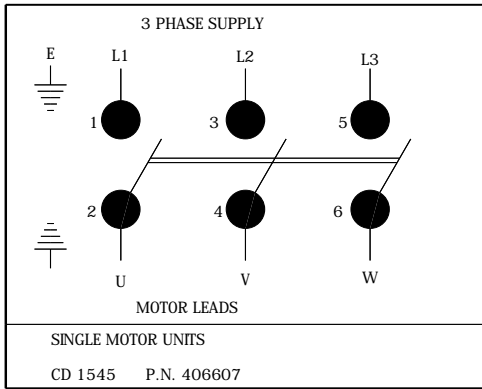


**WIRING DETAIL
(THREE-PHASE DIRECT-DRIVE
MOTOR WITH TRANSFORMER TYPE
SPEED CONTROLLER)**

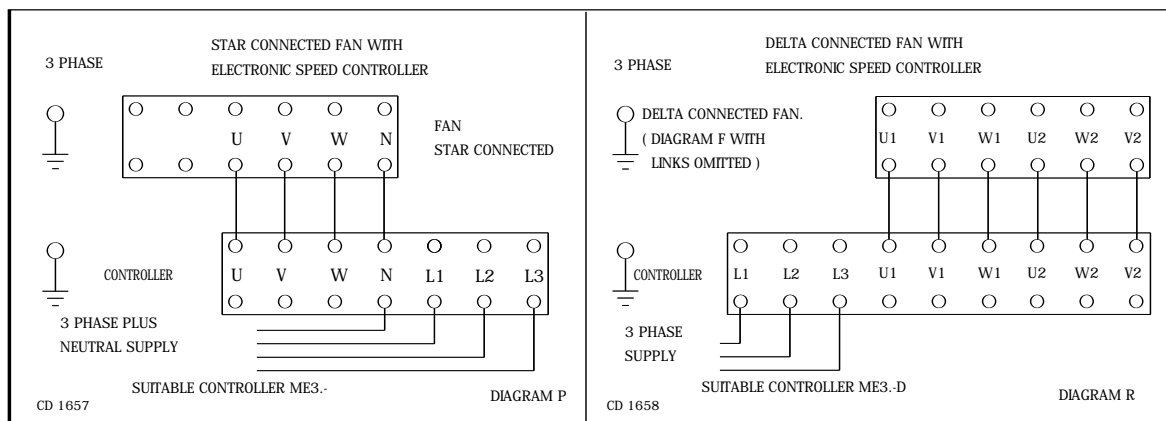


**WIRING DETAIL
(THREE-PHASE DIRECT-DRIVE
BT/CT TYPE MOTOR, STANDARD
TEMPERATURE S-TYPE FAN)**

**WIRING DETAIL (THREE-PHASE
DIRECT-DRIVE MOTOR WITH
CHANGE-OVER SWITCH)**



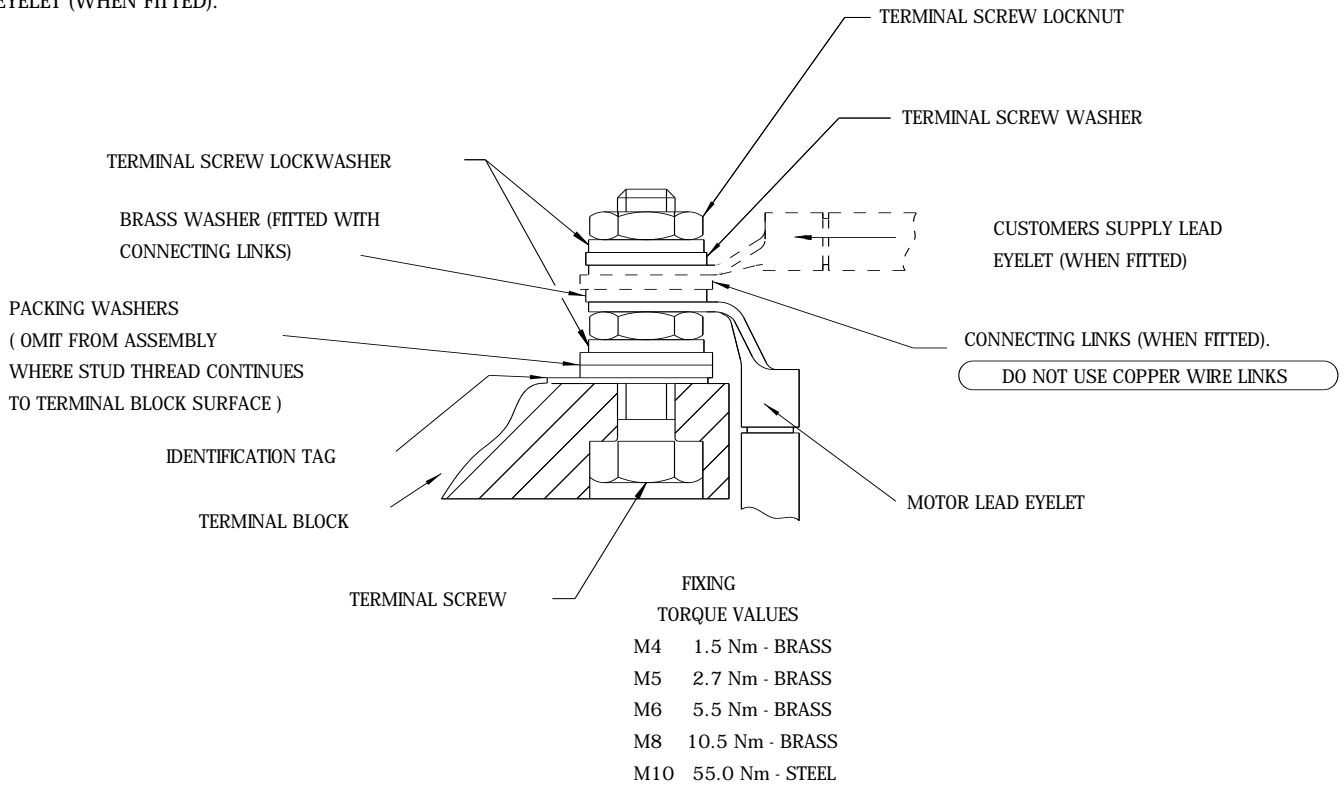
WIRING DETAIL (THREE-PHASE MOTOR, WITH ISOLATOR FITTED)



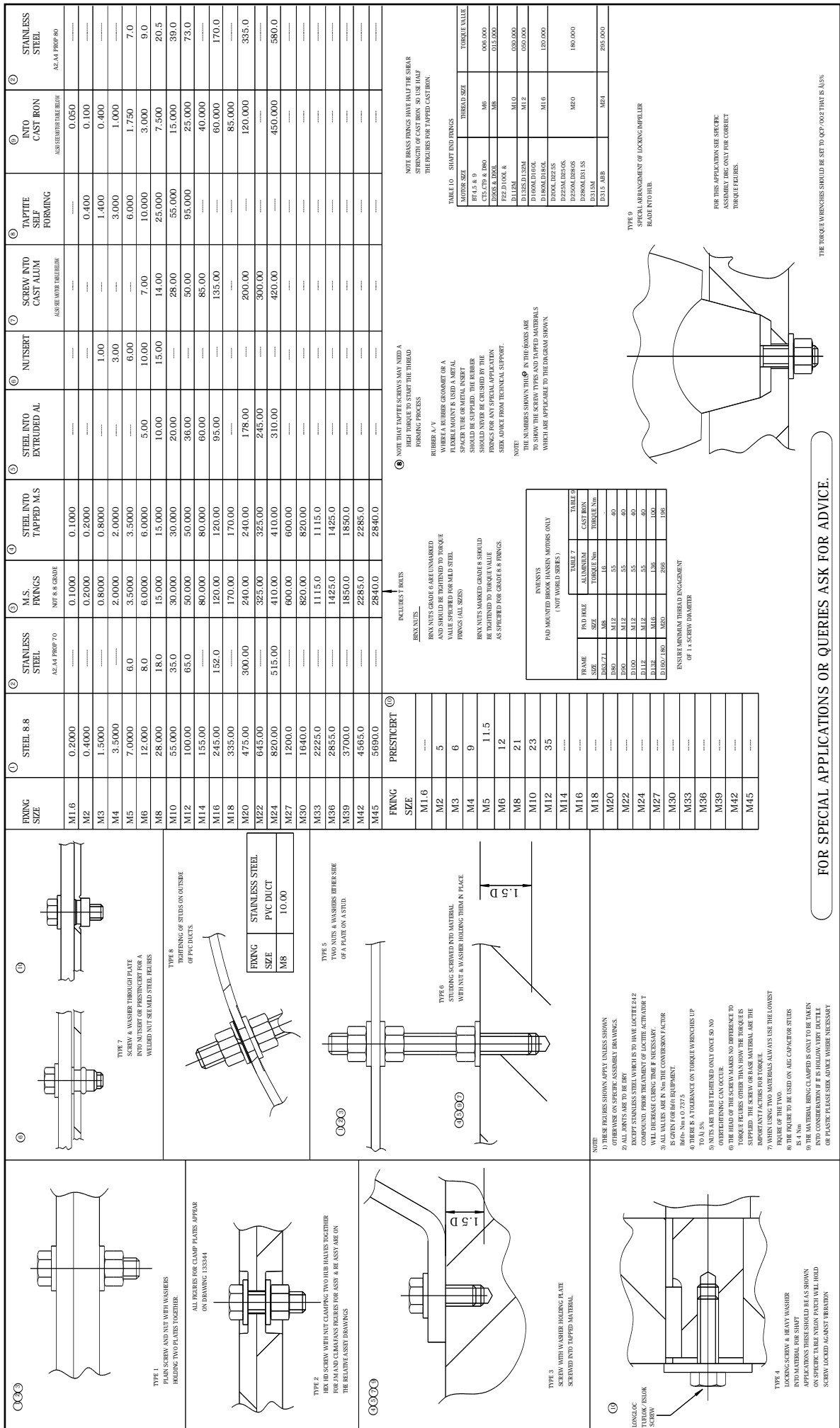
WIRING DETAIL (THREE-PHASE DIRECT-DRIVE MOTOR WITH ELECTRONIC TYPE SPEED CONTROLLER)

IMPORTANT NOTE:

THIS DRAWING SHOWS THE CORRECT ASSEMBLY SEQUENCE OF TERMINAL PARTS. IT IS ESSENTIAL THAT NO LOCKWASHERS OR NUTS ARE PLACED BETWEEN THE MOTOR LEAD EYELET, CONNECTING LINK OR CUSTOMERS SUPPLY LEAD EYELET (WHEN FITTED).

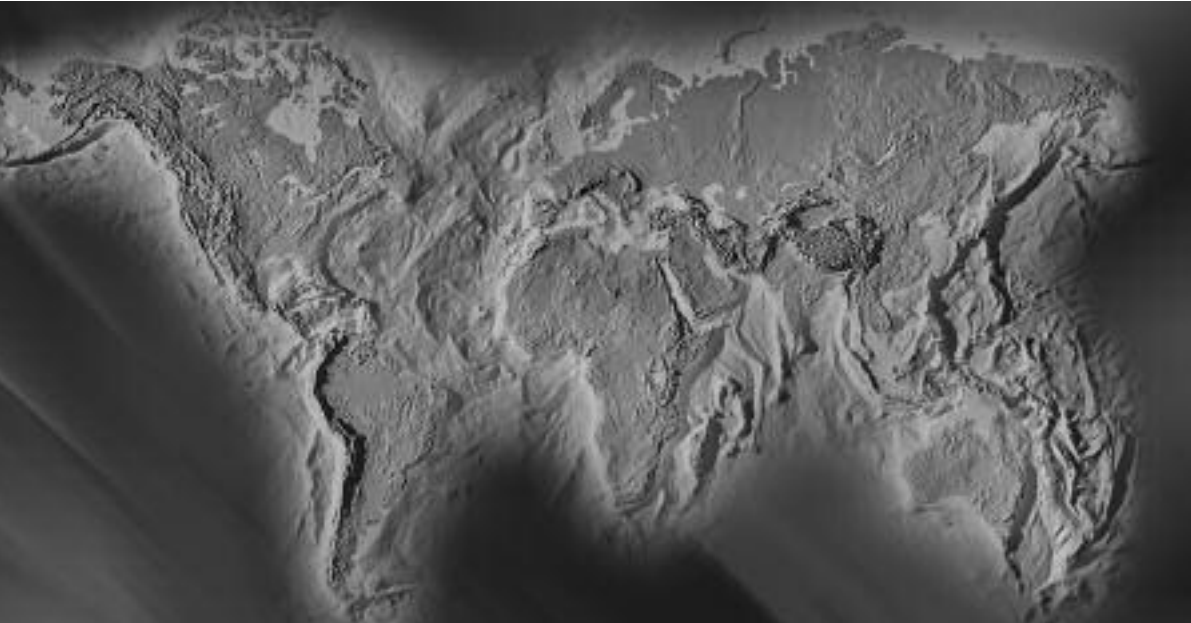


FIXING ARRANGEMENT OF TERMINAL BLOCK



DRAWING OF TORQUE SETTINGS FOR FIXINGS

We Bring Air to Life



Fläkt Woods Group provides a full range of products and solutions for buildings ventilation, air treatment and industrial air movement

Sales Office

Fläkt Woods Ltd

Unit 6240, Bishops Court
Solihull Parkway
Birmingham
B37 7YB

Tel: +44 (0)121 717 4680
Fax: +44 (0)121 717 4699

Sales Office

Fläkt Woods Ltd

First Floor, Entrance 6,
Crossford Court
Dane Road, Sale, Cheshire
M33 7BZ

Tel: +44 (0)161 969 1992
Fax: +44 (0)161 969 4612

Head Office

Fläkt Woods Ltd

Axial Way
Colchester
Essex
CO4 5ZD

Tel: +44 (0)1206 222 555
Fax: +44 (0)1206 222 777

Sales Offices available World Wide - See our website for details

www.flaktwoods.com/uk

Due to a policy of continuous development and improvement the right is reserved to supply products which may differ from those illustrated and described in this publication. Certified dimensions will be supplied on request on receipt of order.

Copyright, Fläkt Woods Ltd, 2006.

All rights reserved. No part of this publication may be produced in any material form by any means without the written permission of Fläkt Woods Ltd. Any unauthorised use of this data may result in legal proceedings.