

# MARK TEN

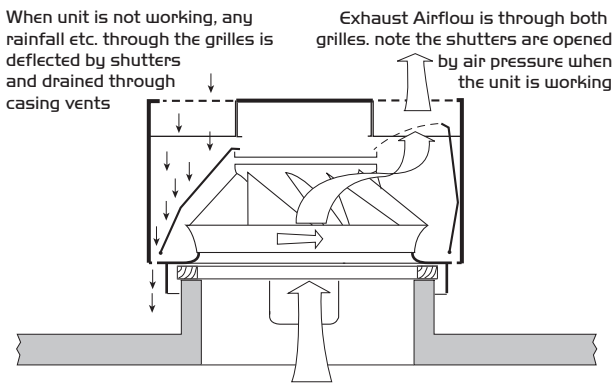
## Direct Drive Roof Mounted Extract Fans Installation and Maintenance

CE The EMC Directive 2014/30/EU  
The Low Voltage directive 2014/35/EU

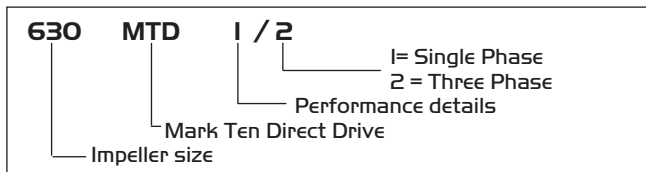
### Introduction

The Mark Ten Direct Drive unit housing is a monocoque manufactured in aluminium alloy. The impeller and shutters are also aluminium. A service panel is provided on larger units for inspection purposes and easy access to the internal parts. The unit incorporates a single inlet high performance mixed flow impeller with asymmetrical blade spacing, dynamically balanced and directly driven by the motor. The motor has sealed for life bearings and is manufactured to B55000. Rotating parts are isolated from the unit case by resilient mountings. Units 1000 & 1250 have provision for the fitting of an optional special hoist to facilitate removal and replacement of the motor from below.

Figure 1. Section view of unit



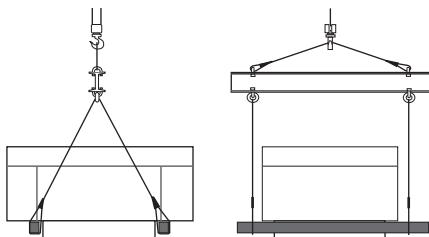
### Typical Coding



### Handling

Care must be taken at all times when handling the unit. A protective covering has been fitted prior to despatch to avoid damage in transport and storage. Do not remove this until the unit is ready to be installed.

Figure 2. Lift using spreaders positioned under each side of the units weather skirt.



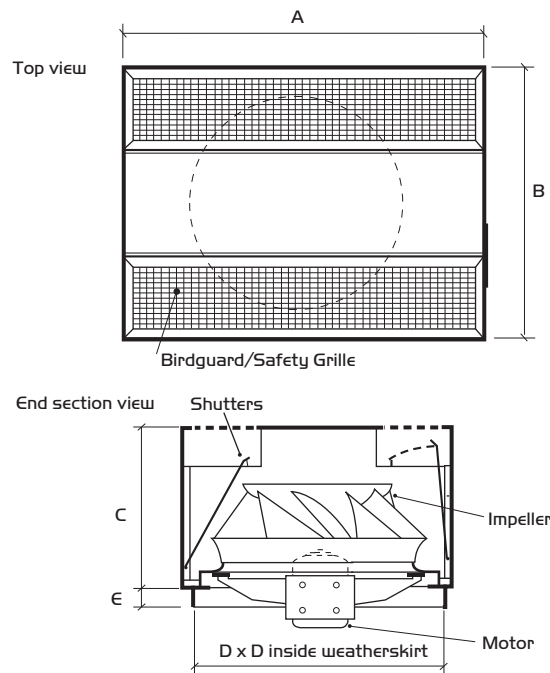
Larger units which cannot be carried must be lifted on spreaders positioned on each side of the weather skirt. Ensure the unit is evenly balanced on the spreaders before lifting and that any slings or webbing etc being used do not come into contact with the casing. **CAUTION. Units must not be stacked.**

### Transit bolts (sizes 1000 & 1250)

To prevent unnecessary strain during transit, transit bolts have been fitted to the unit prior to despatch. These bolts are painted red and are located one under each end under the unit, outside the weather skirt. Only remove these bolts when the unit has been secured to the roof curb.

**Under no circumstances test or run the unit until the transit bolts have been removed.**

### Unit Dimensions Figure 3.



### Dimensions and weights

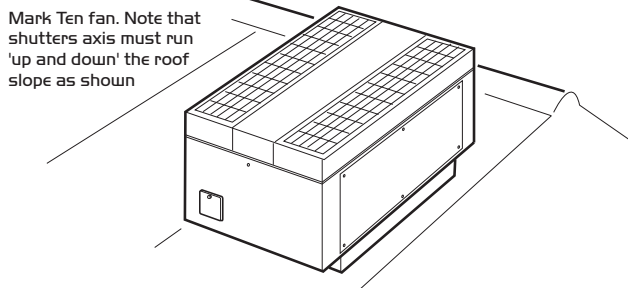
Unit size	A	B	C	D	E	Weight kg excl. motor
160/224 MTD	362	292	149	265	50	4*
280/315 MTD	499	419	210	390	50	8*
400 MTD	647	549	320	490	50	10
500 MTD	749	649	397	590	50	19
630 MTD	853	756	498	690	75	29
800 MTD	1150	1038	593	790	75	48
1000 MTD	1402	1102	731	1040	75	80
1250 MTD	1800	1500	926	1240	75	160

\* This weight includes motor

## Installation

The installation must be carried out by competent personnel in accordance with good industry practice and the appropriate authority and should conform to all statutory and governing regulations i.e. CIBSE, HVCA, IEE, COSHE etc.

Figure 4. General view of typical unit



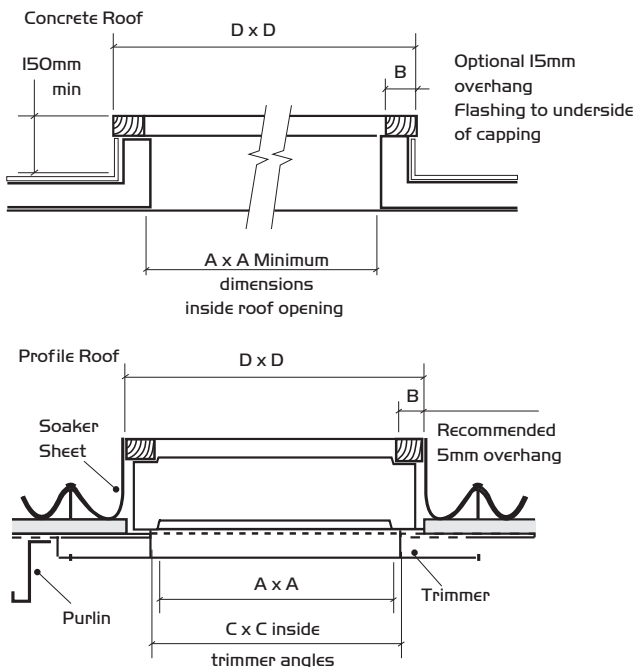
## Pitched Roof Mounting

Units can be installed up to an angle of 80° from the horizontal except for units 1000 and 1250 when the angle must not be more than 10°. Units must be mounted with the longer case dimension running up and down the roof slope to ensure satisfactory shutter operation.

## Fixing

The unit must be securely fixed to its curb/upstand to prevent vibration and wind damage. Two fixing holes are provided on each side of the weather skirt to allow direct contact with the timber capping (supplied and fitted by installer) of curb/upstand. Use non corrosive fixings. **Ensure the red packing pieces are removed from the fan base when installation is complete.**

Figure 5. Curb Dimensions



Curb dimensions

Unit size	A	B	C	D
160/224 MTD	125	50	175	225
280/315 MTD	250	50	300	350
400 MTD	300	75	375	480
500 MTD	400	75	475	580
630 MTD	500	75	575	680
800 MTD	600	75	675	780
1000 MTD	800	100	900	1030
1250 MTD	1000	100	1100	1230

## Prefabricated Curb

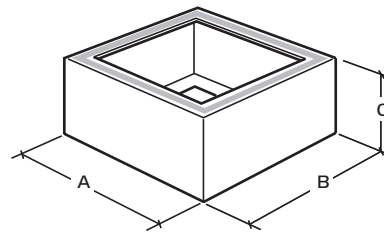
Prefabricated Curbs are available matched to each unit. The curbs are manufactured in aluminium alloy.

When installed the curb must be securely bolted to the trimmer angles.

The timber capping (supplied and fitted by installer) should be set at the maximum overhang of 15mm. With the capping set at this position the roof flashing can be run up the sides of the curb finishing neatly beneath the timber overhang. This will ensure that when installed the unit base is a close fit on the curb and cannot be distorted by over-tightening the fixing screws.

Alternatively the flashing can be run over the capping. Slacken the capping fasteners and, depending on the thickness of the flashing, relocate the capping in the appropriate position to ensure a close fit inside the units weather skirt when installed on the curb. Re-tighten the fasteners.

Figure 6. Prefabricated Curb



Prefabricated Curb Dimensions

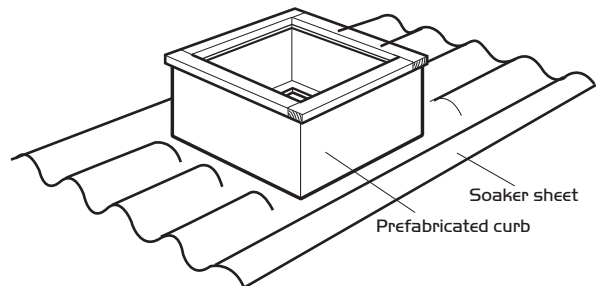
Unit size	P.F. Curb	X	Y	Z
280 MTD	280 PFC/1	350	350	238
400 MTD	400 PFC/1	450	450	238
500 MTD	500 PFC/1	550	550	238
630 MTD	630 PFC/1	650	650	250
800 MTD	800 PFC/1	750	750	250
1000 MTD	1000 PFC/1	1000	1000	250
1250 MTD	1250 PFC/1	1200	1200	250

## Soaker Sheet

Soaker Sheets are available manufactured in GRP. Each sheet is 1950mm long and can be supplied to match most roof profiles. The Soaker Sheet is placed over the Prefabricated Curb, trimmed to height and built into the roof in accordance with standard building practice.

When installing a Soaker Sheet over a Nuair Prefabricated Curb the timber capping overhang must be reduced from 15mm to 5mm. Do this by slackening the timber capping fasteners and moving the timber capping inwards as required. Re-tighten the fasteners.

Figure 7. Soaker sheet



### IMPORTANT

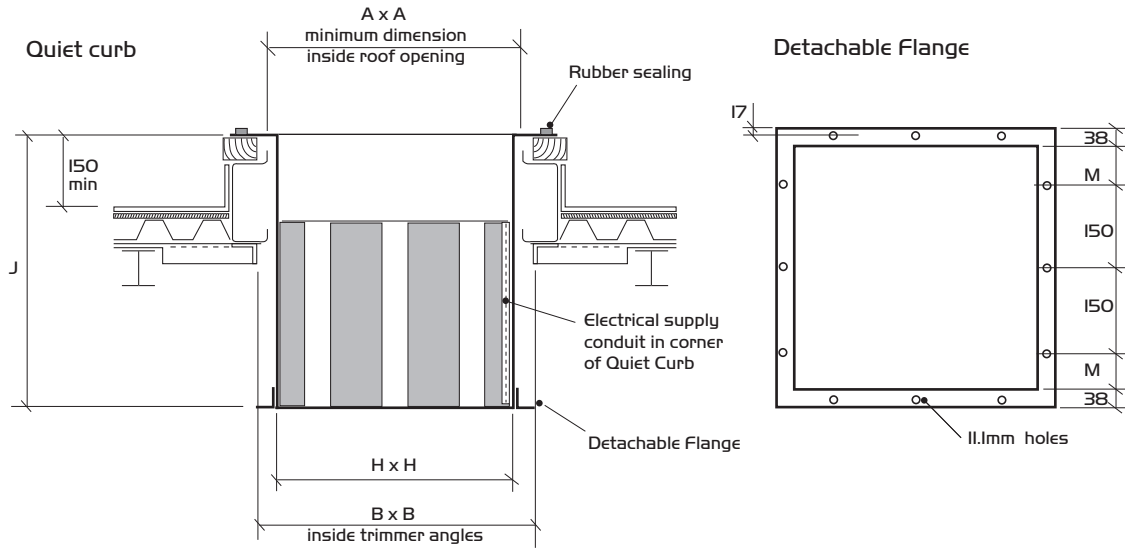
Note: All wooden curbs and capping to be hardwood or treated softwood of minimum 50mm thickness. (supplied and fitted by others).

**Quiet Curbs (Attenuators)**

Matched attenuators, manufactured in galvanised steel incorporate a detachable flange to ease installation and

connection to extension attenuators and ducting.  
**Do not lift by passing slings or ropes through the attenuator airways.**

Figure 8. Quiet Curb Dimensions



Dimensions and weights for quiet curb (short and long versions)

Mark Ten size code	A	B	Quiet Curb SHORT			Weight kg	Quiet Curb LONG			Weight kg	Detachabale Flange	
			code	H	J		code	H	J		M	No. holes
280/315	250	300	QC285	230	500	8.3	QC28L	230	950	12.3	51	8
400	300	375	QC405	280	600	10.5	QC40L	280	1050	14.0	66	8
500	400	475	QC505	380	670	30	QC50L	380	1120	40	41	12
630	500	575	QC635	480	825	46	QC63L	480	1275	74	16	16
800	600	675	QC805	580	720	53	QC80L	580	1170	85	68	16
1000	800	900	QC1005	780	720	66	QC100L	780	1170	104	17	24
1250	1000	1100	QC1255	980	720	118	QC125L	980	1170	198	42	28
-	1200	1300	QC1405	1180	800	170	QC140L	1180	1250	281	68	32

**Quiet Curb Extension Sections**

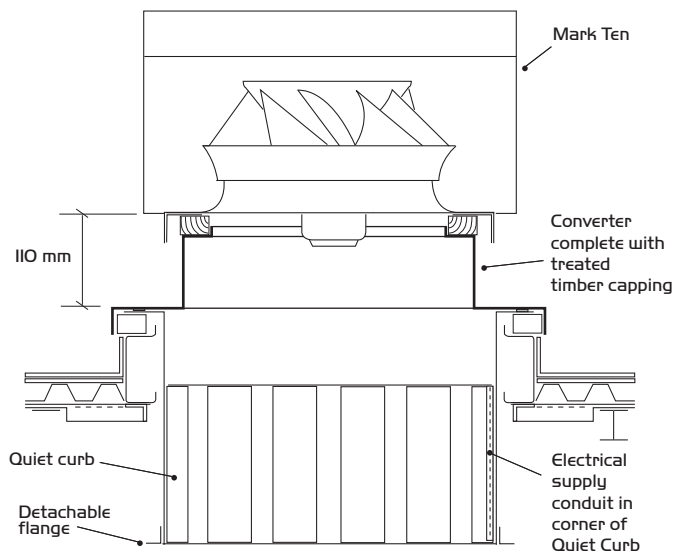
Two or more modules can be joined together to increase the attenuation. These extensions are available in two lengths, 450 and 900mm long. They are complete with flanges to facilitate straight forward connection of ductwork.

**Converters**

The Nuaire Mark Ten unit can be fitted on a larger size Quiet Curb if desired by using a converter. This arrangement produces a similar attenuation but at a lower aerodynamic resistance than would be obtained from a standard sized Quiet Curb.

To install, place the converter over the curb and firmly secure to the timber capping with non corrodible wood screws through the holes provided in the weather skirt.

Figure 9. Converter installation



Mark Ten Code	Converter Model	Quiet Curb
400MTD	CA	QC63
500MTD	CB	QC63
630MTD	CC	QC100
800MTD	CD	QC100
1000MTD	CE	QC125
1250MTD	CG	QC140

## Electrical Details

### IMPORTANT

Isolation - Before commencing work make sure that the unit, switched live and Nuair control are electrically isolated from the mains supply.

### Isolators

The unit must be fitted with a means of isolation for maintenance purposes etc. Isolators are not supplied as standard with the Mark Ten range. Isolator to be supplied by others. An isolator is available as an optional extra if required from Nuair.

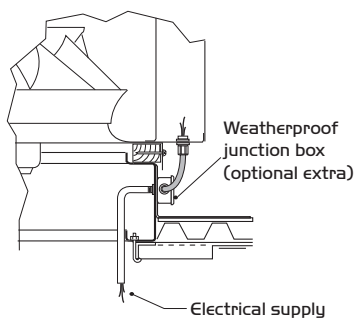
## Connecting the electrical supply

### Units up to and including size 315

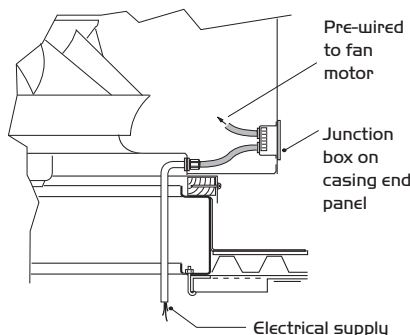
To simplify connection the routing of electrical cables to the smaller Mark Ten units, Nuair supply as an optional extra, a weatherproof junction box and a short length of flexible conduit to link between the units upstand and a matching conduit adaptor beneath the overhang on the Mark Ten (see figure 10). When fitting the junction box, sufficient clearance should be given to prevent the Mark Ten's weather skirt from fouling the junction box after it has been 'weathered in' to the side of the upstand. The wiring may then be routed to the unit from the ductwork via the junction box and conduit.

Figure 10. Connecting the supply

Sizes 160 to 315



Sizes 400 to 1250



### Units size 400 to 1250

The electrical supply enters the Mark Ten via the ductwork / curb opening through a 20mm conduit adaptor in the baseplate of the unit and a flexible conduit terminating in the junction box located behind a small access panel on the end of the casing.

### Quiet Curb

When using a Mark Ten in conjunction with a Quiet Curb, a conduit is set in one corner of the attenuator to facilitate easy routing of the electrical supply from ductwork to the fan.

### Switching Details

Check that voltage on the motor rating plate is suitable for your supply.

For single phase motors, the switching mechanism should be rated at not less than three times the full load motor current.

For three phase motors, the switching mechanism should be rated in accordance with the test certificate issued with the unit.

Single phase and three phase direct on line start units are supplied pre-wired from the motor to a junction box located behind a small access panel on the end of the casing.

Size 160/224 should be provided with a two pole isolator. All others require a three pole isolator.

Two speed three phase motors and motors rated at 4kw and above require a six pole isolator to provide for 'High Low' speed running and star/delta starting.

### Fan Rotation

Looking from above, the fan rotates in an anti-clockwise direction. This is indicated by an arrow on the chassis.

Single phase motors are despatched pre-wired from the factory to give the correct rotation.

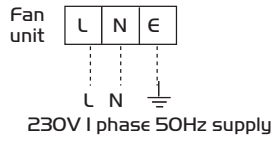
Units with three phase motors should be given a trial run.

If the impeller revolves in the wrong direction, interchange any two of the supply phases to reverse rotation.

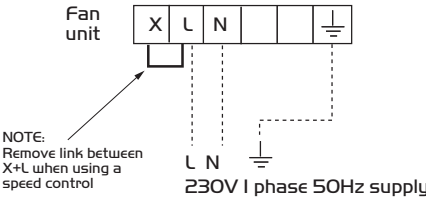
Wiring Details

Figure II.

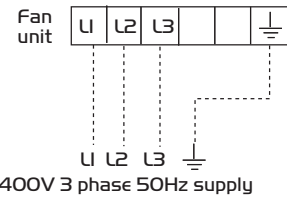
Single Speed 1 phase  
224 MTD only



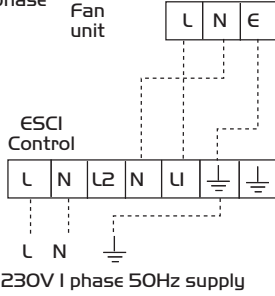
Single Speed 1 phase



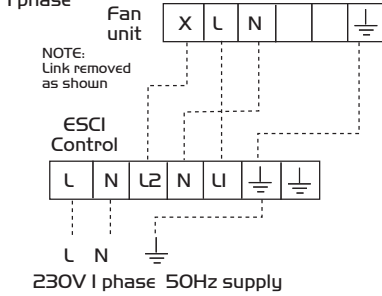
Single Speed 3 phase (below 4kW))



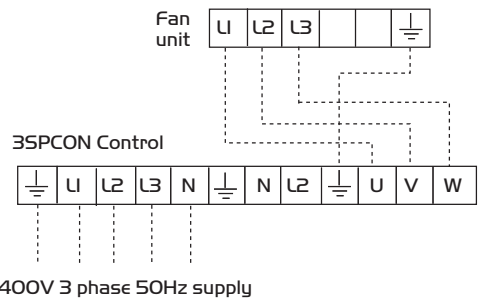
ELECTRONIC Speed Control  
1 phase



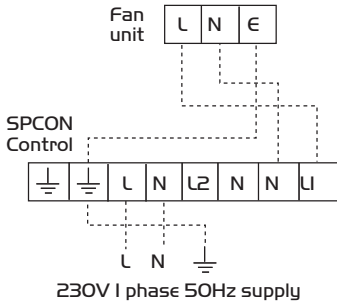
ELECTRONIC Speed Control  
1 phase



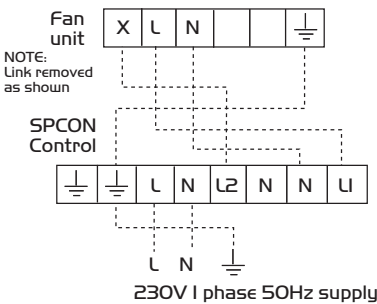
TRANSFORMER Speed Control 3 phase



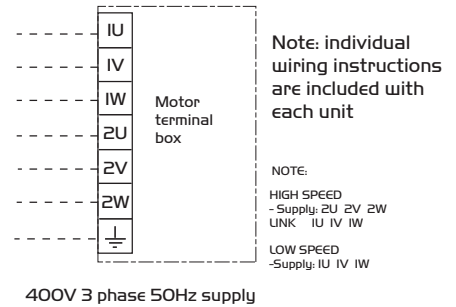
TRANSFORMER Speed Control  
1 phase



TRANSFORMER Speed Control  
1 phase

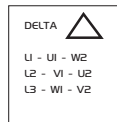
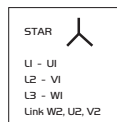


2 SPEED MOTORS  
(D.O.L. starting both speeds)



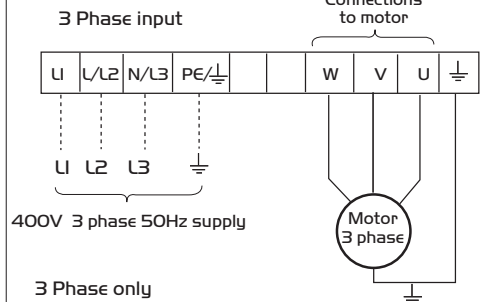
3 phase for STAR /DELTA STARTING  
(4kW and above)

Note:  
For D.O.L (Direct On Line) operation or  
Inverter type Speed Control, wire in DELTA (Δ)



400V 3 phase 50Hz supply

Matched NuAire INVERTER Speed Control



3 Phase only  
INVERTER SPEED CONTROL

Notes:  
Total length of motor leads should not exceed 50 metres.  
If a screened motor cable is used, maximum length should be 25 metres. Consult our Technical Department if you wish to use longer leads.  
Inverters are configured to suit specific fans and control applications as described on the Customer Order free of charge.

## Maintenance

### IMPORTANT

Isolation - Before commencing work make sure that the unit, switched live and Nuair control are electrically isolated from the mains supply.

### Routine Maintenance

It is essential that maintenance on the Mark Ten Direct Drive unit is carried out on a regular basis.

1. First inspection three months after the unit has been commissioned.
2. Thereafter once every twelve months.

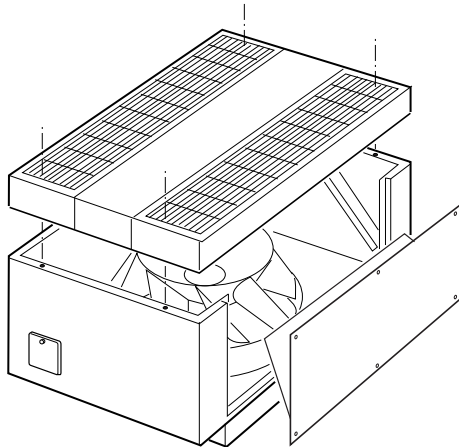
### Points to check

- i) Check that the birdguard / safety grilles are free of obstruction.
- ii) Check that the movement of both shutters is full and free.
- iii) Check that the impeller is clean and does not foul the casing.
- iv) Give the unit a good visual check for any loose bolts, fasteners, worn anti vibration mountings or anything else that might impair the Mark Ten units efficiency.

### Access

On all units the top cover/outlet grille assembly is a single unit secured to the top of the casing by four screws set in keyhole slots. To remove, slacken the four screws located on the lip inside the safety grille a couple of turns, slide the cover sideways and lift off (figure 12).

Figure 12.



### Side Panel Removal

On units size 630 and above, the side panel and shutter assembly is easily removed by releasing the captive screws around the edge of the panel and lifting it out (figure 12).

On units size 500 and below, the side panel and shutter assembly is part of the case.

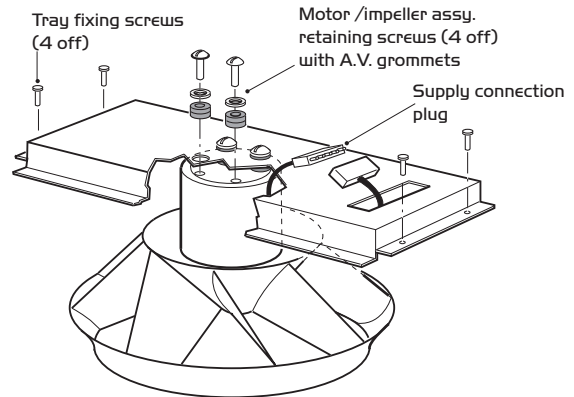
### Lubrication

Standard motors are fitted with sealed for life bearings and do not require any lubrication. In the unlikely event of a unit being supplied with a motor that requires lubrication, all grease points will have been tubed back to a central grease nipple located on the base tray of the unit. These motors must be lubricated in accordance with the individual makers requirements.

### Impeller/Motor Bridge Assembly - sizes 160 to 315

On these smaller units the motor and impeller are suspended from a bridge. The entire assembly can be removed by releasing the four captive screws, two each side of the bridge, and unplugging the motor supply (figure 13).

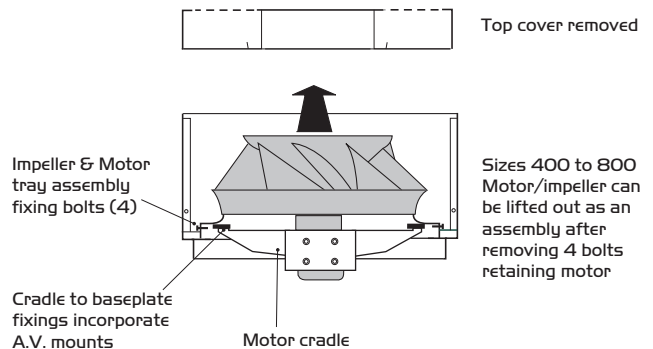
Figure 13. Size 160 to 315 sub assembly



### Impeller/Motor Assembly - sizes 400 to 800

The motor and impeller assembly can be lifted out of the housing as a complete unit. The motor is mounted into a square frame with four arms supported on AV's beneath the venturi tray. Disconnect the electrical supply, unclip the flexible conduit to the motor and loosen the four bolts, two each side of the tray, then lift the complete assembly out (figure 14).

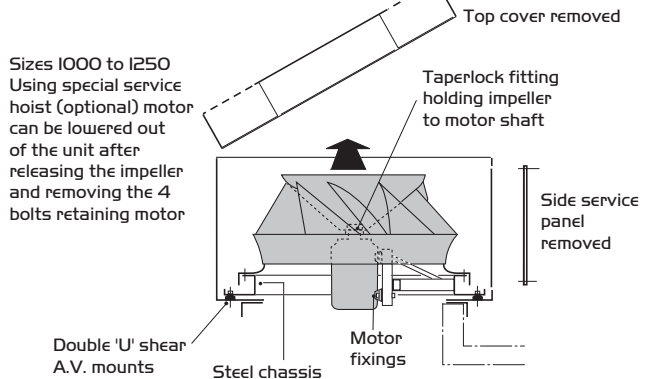
Figure 14. Size 400 to 800 sub assembly



### Impeller/Motor Assembly sizes - 1000 and 1250

On these two larger sized units an integral steel chassis supports the motor and impeller. First remove the impeller as described in 'Impeller size 400 and above', disconnect the electrical supply to the motor and taking care to support the motor, remove the motor mounting bolts. The motor can now be lifted free from the unit. To assist removal of larger motors a special hoist can be supplied which locates onto the chassis and allows the motor, when unbolted, to be lowered to the floor below. (figure 15).

Figure 15. Size 1000 to 1250



**Note:** before removing the impeller from the motor shaft, please note or mark the position of the impeller in relation to the shaft so that it can be re-assembled in the same position.

### Impeller sizes 160 to 315

The impeller on the 160 size unit is integral with the motor and should not be removed.

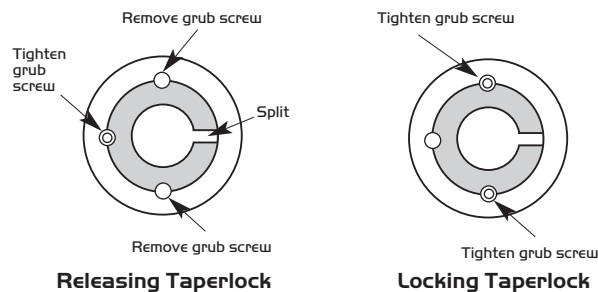
On size 224, 280 and 315 size units the impeller is secured by two grub screws acting directly on the motor shaft.

By loosening these two screws the impeller can be removed (see figure 15).

### Impeller sizes 400 to 1250

The impeller is secured to the motor shaft by means of a taperlock. To release, remove the two grub screws each side of the split. Oil the thread of one grub screw and replace it in the hole opposite the split. When it is tightened the grub screw will force apart the taperlock allowing it to be removed from the shaft along with the impeller (figure 15).

Figure 16. Taperlock fitting



### Anti-Vibration Mountings

#### Units 160 to 315

The motor is isolated mechanically from the bridge by grommet type anti-vibration mountings through which the motor mounting bolts pass (figure 13).

#### Units 400 to 800

The motor is rigidly bolted to a frame with four arms. The end of each arm locates under a steel cover isolated by a pocket type anti-vibration mounting. By releasing the bolts on each side of the steel cover a worn AV can be replaced without dismantling the unit (figure 14).

#### Units 1000 and 1250

The motor frame and tray assembly is supported by anti-vibration mountings of the double U shear type. The exact number is determined by the size and speed of the motor. All AVM's are located around the edge of the tray assembly, bolted through to the base of the unit (figure 15).

### Impeller Maintenance

The impeller itself needs no special maintenance apart from cleaning. Any build up of dust or grease etc. can be best removed with hot soapy water. On no account must the unit come into contact with caustic fluids.

### Replacing the impeller

To achieve optimum performance when re assembled, the impeller should overhang the inlet venturi by the following dimensions.

#### Unit size A

160	4
224	4
280	4
315	5
400	6
500	8
630	10
800	12
1000	15
1250	20

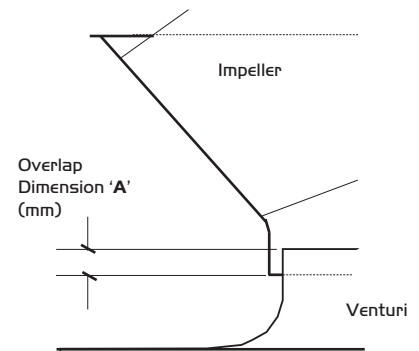


Figure 17. Impeller overhang setting

### Replacement of Parts

Should any component need replacing, Nuair keep extensive stocks for quick delivery. Ensure that the unit is electrically isolated, before carrying out any work.

When ordering spare parts, please quote the serial number of the unit and the ARC number of the purchase if possible.

### 3 Year Warranty

The 3 year warranty starts from the day of delivery and includes parts and labour for the first year. The remaining 2 years covers replacement parts only.

This warranty is void if the equipment is modified without authorisation, is incorrectly applied, misused, disassembled, or not installed, commissioned and maintained in accordance with the details contained in this manual and general good practice.

The product warranty applies to the UK mainland and in accordance with Clause 14 of our Conditions of Sale. Customers purchasing from outside of the UK should contact Nuair International Sales office for further details.

### After Sales Enquiries

For technical assistance or further product information, including spare parts and replacement components, please contact the After Sales Department.

**Telephone 02920 858 400**



Technical or commercial considerations may, from time to time, make it necessary to alter the design, performance and dimensions of equipment and the right is reserved to make such changes without prior notice.

## DECLARATION OF INCORPORATION AND INFORMATION FOR SAFE INSTALLATION, OPERATION AND MAINTENANCE

We declare that the machinery named below is intended to be assembled with other components to constitute a system of machinery. The machinery shall not be put into service until the system has been declared to be in conformity with the provisions of the EC Machinery Directive.

**Designation of machinery:** Direct Drive Roof Mounted Extract Fan  
**Machinery Types:** MARK TEN  
**Relevant EC Council Directives:** 2006/42/EC (Machinery Directive)  
**Applied Harmonised Standards:** BS EN ISO 12100-1, BS EN ISO 12100-2, EN294, EN60204-1, BS EN ISO 9001  
**Applied National Standards:** BS848 Parts One, Two and Five  
 Note: All standards used were current and valid at the date of signature.

### Signature of manufacture representatives:

Name:	Position:	Date:
1) C. Biggs 	Technical Director	20. 07. 07
2) A. Jones 	Manufacturing Director	20. 07. 07

## INFORMATION FOR SAFE INSTALLATION, OPERATION AND MAINTENANCE OF NUAIRE VENTILATION EQUIPMENT

To comply with EC Council Directives 2006/42/EC Machinery Directive and 2014/30/EU (EMC).

To be read in conjunction with the relevant Product Documentation (see 2.1)

### 1.0 GENERAL

1.1 The equipment referred to in this Declaration of Incorporation is supplied by Nuaire to be assembled into a ventilation system which may or may not include additional components.

The entire system must be considered for safety purposes and it is the responsibility of the installer to ensure that all of the equipment is installed in compliance with the manufacturers recommendations and with due regard to current legislation and codes of practice.

### 2.0 INFORMATION SUPPLIED WITH THE EQUIPMENT

2.1 Each item of equipment is supplied with a set of documentation which provides the information required for the safe installation and maintenance of the equipment. This may be in the form of a Data sheet and/or Installation and Maintenance instruction.

2.2 Each unit has a rating plate attached to its outer casing. The rating plate provides essential data relating to the equipment such as serial number, unit code and electrical data. Any further data that may be required will be found in the documentation. If any item is unclear or more information is required, contact Nuaire.

2.3 Where warning labels or notices are attached to the unit the instructions given must be adhered to.

### 3.0 TRANSPORTATION, HANDLING AND STORAGE

3.1 Care must be taken at all times to prevent damage to the equipment. Note that shock to the unit may result in the balance of the impeller being affected.

3.2 When handling the equipment, care should be taken with corners and edges and that the weight distribution within the unit is considered. Lifting gear such as slings or ropes must be arranged so as not to bear on the casing.

3.3 Equipment stored on site prior to installation should be protected from the weather and steps taken to prevent ingress of contaminants.

### 4.0 OPERATIONAL LIMITS

4.1 It is important that the specified operational limits for the equipment are adhered to e.g. operational air temperature, air borne contaminants and unit orientation.

4.2 Where installation accessories are supplied with the specified equipment eg. wall mounting brackets. They are to be used to support the equipment only. Other system components must have separate provision for support.

4.3 Flanges and connection spigots are provided for the purpose of joining to duct work systems. They must not be used to support the ductwork.

### 5.0 INSTALLATION REQUIREMENTS

In addition to the particular requirements given for the individual product, the following general requirements should be noted.

5.1 Where access to any part of equipment which moves, or can become electrically live are not prevented by the equipment panels or by fixed installation detail (eg ducting), then guarding to the appropriate standard must be fitted.

5.2 The electrical installation of the equipment must comply with the requirements of the relevant local electrical safety regulations.

5.3 For EMC all control and sensor cables should not be placed within 50mm or on the same metal cable tray as 230V switched live, lighting or power cables and any cables not intended for use with this product.

### 6.0 COMMISSIONING REQUIREMENTS

6.1 General pre-commissioning checks relevant to safe operation consist of the following:

Ensure that no foreign bodies are present within the fan or casing.

Check electrical safety. e.g. Insulation and earthing.

Check guarding of system.

Check operation of Isolators/Controls.

Check fastenings for security.

6.2 Other commissioning requirements are given in the relevant product documentation.

### 7.0 OPERATIONAL REQUIREMENTS

7.1 Equipment access panels must be in place at all times during operation of the unit, and must be secured with the original fastenings.

7.2 If failure of the equipment occurs or is suspected then it should be taken out of service until a competent person can effect repair or examination. (Note that certain ranges of equipment are designed to detect and compensate for fan failure).

### 8.0 MAINTENANCE REQUIREMENTS

8.1 Specific maintenance requirements are given in the relevant product documentation.

8.2 It is important that the correct tools are used for the various tasks required.

8.3 If the access panels are to be removed for any reason the electrical supply to the unit must be isolated.

8.4 A minimum period of two minutes should be allowed after electrical disconnection before access panels are removed. This will allow the impeller to come to rest.

**NB: Care should still be taken however since airflow generated at some other point in the system can cause the impeller to "windmill" even when power is not present.**

8.5 Care should be taken when removing and storing access panels in windy conditions.