

Air Handling Units MAX/E

1.1. General

- A. Provide an air handling unit to meet the performance and configuration as indicated in the schedule and detail drawings. The air handling unit shall be tested to BS848 Part 1 and shall be of the MAX/E type as manufactured by VES Andover Ltd a company accredited with BS EN ISO 9001:2008.
- B. The unit shall conform to the schedule regarding case construction, component layout & finish. The detail drawings shall be supplied for approval where indicated in the schedule.

1.2. Unit Construction

- A. The unit shall be provided pre-assembled comprising of a rigidly constructed 25mm tubular aluminium case & double skinned galvanised sheet steel panels. The unit shall have a maximum width of 1900mm, and a maximum height of 1500mm. Units above this size shall be of MAX/L construction.
- B. The unit shall be supplied in multiple sections for transporting & site installation as indicated in the schedule & detail drawings. The unit shall be pre-drilled & gusseted for sectional re-assembly on-site by others as indicated in the detail drawings and O&M documentation.
- C. The unit shall be available in a partially disassembled 'flat pack' form for ease of installation with awkward on-site access. Flat pack units shall be reassembled on-site by VES technical personnel as indicated in the schedule.
- D. The unit shall be available in plantroom or weatherproof construction as indicated in the schedule and detail drawings. Weatherproof units shall have an extended pitched lid supplied fitted as standard.
- E. The unit shall have component arrangement as indicated in the schedule & detail drawings.
- F. The unit shall have plain rectangular duct spigots as standard. Flanges shall be fitted as indicated in the schedule & detail drawings.
- G. The unit casework shall incorporate high quality leak resistant neoprene gasket seals on service doors and panels.
- H. The unit casework shall be available with optional double-glazed inspection portholes supplied fitted as indicated in the schedule & detail drawings.
- I. The case panels shall be filled with inert mineral wool infill as standard. The panels shall be available with optional heavyweight plasterboard infill as indicated in the schedule & detail drawings.
- J. The case tubes shall be unfilled as standard. The tubes shall be available with optional heavy weight lead bead infill as indicated in the schedule & detail drawings.
- J. Units shall be have access as indicted in the schedule & detail drawings. Where unit access details are not supplied, the unit shall be handed LHS looking in direction of supply airflow as standard, to be confirmed by drawing approval.
- K. Plantroom unit casework & spigots shall be supplied naturally finished in high quality galvanised steel as standard. Optional powdercoated colour as indicated in the schedule.
- L. Weatherproof units shall be supplied powdercoated signal grey RAL7004 as standard. Alternative colour according to schedule.



M. The casework shall be available with internal epoxy powder coating suitable for coastal or corrosive environments as indicated in the schedule & detail drawings.

N. The unit shall be designed to be secured to a suitable base or support frame, ensuring the use of correct fixings for the application and taking into account individual section & overall unit weight as indicated in the schedule and detail drawings.

1.3. Unit Base Frame

A. The unit shall be supplied as standard on a galvanised sheet steel channel base. The unit shall be available with optional drop rod mounting feet as indicated in the schedule & detail drawing.

B. The frame shall be 100mm high as standard, height as indicated in the schedule & detail drawings.

C. The frame shall be available with optional lifting slots, suitable for use with strops or fork lifts. The frame with slots shall be a minimum of 125mm high.

D. The frame shall be finished to match the unit casework.

E. The frame shall be available with optional drop rod mounting holes on units up to MAX 5.

1.4. Inlet/Outlet Cowls

A. Weatherproof unit casework shall be supplied with fresh air inlet & exhaust discharge cowls/ louvers where indicated in the schedule & detail drawing.

B. Cowls shall be single skinned galvanised sheet steel, finished to match the unit casework.

C. Cowls shall be available with optional flame retardant acoustic internal lining to ensure maximum thermal insulation and reduced noise transmission.

1.5. Fan Sections

A. The unit shall be available with belt driven or direct drive fan & motor assemblies as indicated in the schedule.

B. All fan impellers shall be mated with aerodynamic bell inlet eyes for high efficiency and low noise generation.

C. All motors shall be heavy-duty ball bearing type suitable for inverter speed control and supplied at the specified voltage & phase as indicated in the schedule and detail drawings.

D. All motors shall be mounted within the airstream.

E. All motors shall be to insulation class F, IP44 environmental protection rating & shall be supplied with thermal protection cut-out as standard.

F. All fan & motor assemblies shall be mounted on rigid galvanised steel angle and channel support frames, fully AV & flexible connection isolated from the unit casework.

G. Fan section access doors shall be available with optional mesh access guards mounted inside the unit for safe inspection during operation.



1.5.1. Belt Driven Fans

- A. Belt driven fans shall be of forward or backward curved blade construction as indicated in the schedule. The fan shall be of double inlet, double width casework type with angular support frame.
- C. Belt driven fan casework & impellers shall be supplied in natural galvanised finish as standard. The casework & impellers shall be available with optional epoxy coating as indicated in the schedule.
- D. Belt driven fans shall be connected to the motor drive via cast steel machined pulleys, fixed to the fan & drive shafts via keyway taper lock bushes, and multi Vee belts.
- E. Belt drive connected motors shall be mounted on an adjustable rail mounted plate to allow full belt tensioning.
- F. Belt drive fan & motor assemblies shall be available with an optional mesh drive guard.

1.5.2. Direct Drive Fans

- A. Direct drive fans shall be of high efficiency centrifugal backward curved fans without scroll type.
- B. Direct drive fan impellers are supplied as standard epoxy coated blue to RAL5002.
- C. All fan impellers shall be statically and dynamically balanced to G 2.5 / 6.3 according to ISO1940 part 1.

1.6. Panel Filter Section

- A. The unit shall incorporate a panel filter bank as standard to ensure internal component protection. The panel filters may be omitted as indicated in the unit schedule.
- B. Panel filters shall be 98mm pleated filter media as standard, with rigid wax treated cardboard moisture resistant frame & light gauge metal fascia grid. Panel filters shall be available with optional rigid pleated media where indicated in the schedule & detail drawing.
- C. Panel filters shall be mounted in a flat bank, rigidly constructed slide in support bulkhead as standard. Panel filters shall be available mounted on an optional clip-in bulkhead as indicated in the schedule.
- D. Panel Filters shall be to BS EN 779 Classification Grade G4 as standard, grade as indicated in the schedule and detail drawings. Panel filters shall be standard pleated type for grades G3, G4, F5 & F6, and rigid pleated type for grades F7, F8 & F9.
- E. Access for filter removal shall be to the side, top or bottom as standard, as indicated in the schedule & detail drawings. Access for optional clip-in filters shall be via front or back withdrawal as indicated in the unit schedule.
- E. Filters shall be suitable for use with optional Manometer fluid pressure gauges, supplied loose by VES Andover Ltd as indicated in the schedule & detail drawing.
- F. Filters shall be suitable for use with Magnahelic or Minihelic mechanical pressure dials, supplied fitted by VES Andover Ltd as indicated in the schedule & detail drawings.



1.7. Bag Filter Section

- A. The unit shall incorporate a multi-pocket and/or rigid frame bag filter bank as indicated in the unit schedule.
- B. Filter grades shall be to BS EN 779 Classification, grade as indicated in the schedule and detail drawings.
- C. Bag filters shall be suitable for use with optional Manometer fluid pressure gauges, supplied loose by VES Andover Ltd as indicated in the schedule.
- D. Bag filters shall be suitable for use with Magnahelic or Minihelic mechanical pressure dials, supplied fitted by VES Andover Ltd as indicated in the schedule & detail drawings.

1.7.1. Multi-Pocket Bag Filter Section

- A. Multi-Pocket Bag filters shall be synthetic pocketed filter media as standard, with corrosion resistant metal frame. Pocket length shall be as indicated in the schedule.
- B. Multi-pocket bag filters shall be mounted in a flat bank, rigidly constructed clip-in support bulkhead as standard. Filters below grade F5 shall be suitable for mounting in an optional slide in side access support bulkhead.
- C. Access for filter removal shall be to the side, top or bottom, after the support bulkhead as standard, as indicated in the schedule & detail drawings. Access shall be to the front of the support bulkhead as indicated in the schedule, or where filters are grade F7 or above.

1.7.2. Rigid Frame Bag Filter Section

- A. Rigid frame filters shall be glass fibre paper filter media, mounted in a rigidly constructed plastic support frame. Rigid frame filters shall be 292mm long. Rigid frame filters shall be available in grades F6 to F9 as standard.
- B. Rigid frame filters shall be mounted in a flat bank, rigidly constructed clip-in support bulkhead as standard.
- C. Access for removal of rigid frame filters shall be to the front of the filter bulkhead as standard.

1.8. Grease Filter Section

- A. The unit shall incorporate a grease filter bank as indicated in the unit schedule.
- B. Grease filters shall be available with baffle or mesh type construction.
- C. Baffle type filters shall be mounted in a side access slide-in filter bank with drain holes & removable stainless steel grease collection tray as standard.
- D. Mesh type filters shall be mounted in a flat bank, rigidly constructed slide in support bulkhead as standard.
- E. Mesh filters shall be designed for frequent removal from the unit for cleaning.



1.9. Dampers

A. The unit shall include dampers as indicated in the unit schedule. Dampers shall be externally mounted on units suitable for internal/plantroom locations, and internally mounted for units suitable for external/weatherproof locations as standard.

B. Dampers shall incorporate an aluminium extruded channel frame & aluminium damper blades, mounted on nylon cogs with nylon bearing inserts. Blade operation shall be via a 12mm sq. spindle mounted to one side of the damper.

C. Dampers shall be of opposed blade type, incorporating gasket seals between blades and sealed angles on the frame to ensure maximum sealing efficiency when the blades are closed.

D. Dampers shall be suitable for use with optional 230V or 24V open/close or modulating motors as supplied by VES Andover Ltd.

E. Dampers shall be suitable for optional hand operation where indicated in the schedule.

2.0. Electric Heater Battery Section

A. The unit shall be supplied with an electric element heater battery where indicated in the unit schedule.

B. The electric heater battery shall be suitable for single or three phase supply with thyristor or stepped control as indicated in the schedule and detail drawings.

C. The electric heater battery shall consist of an element array sized to suit the steps and phases as indicated in the schedule and detail drawings. The elements shall consist of a tubular incolloy shroud containing compressed magnesium oxide powder packed around a Nickel Chromium resistance wire. The element array shall be evenly spread across the open area of the duct.

D. Where multiple elements are required to achieve the steps and phases as indicated in the schedule, elements shall be linked by copper busbar or terminated with electrical connectors.

E. The electric heater battery shall be fitted as standard with a 130°C non-adjustable thermal safety cutout, with manual reset.

F. All electric heaters shall be 1500V flash tested, and resistance tested for correct component assembly. Test certificates shall be available on request.

2.1. Hot Water Heater Battery Section

A. The unit shall be supplied with a hot water heater battery where indicated in the unit schedule.

B. The hot water heater battery shall be of copper tube, aluminium fin block construction, with galvanised sheet steel casework. The flow & return pipe connections shall be handed as indicated in the schedule and detail drawings.

C. The hot water heater battery shall be high-pressure leak tested in water.



D. The hot water heater battery shall be available with alternative fin materials & coatings by special order, as indicated in the schedule.

E. The hot water heater shall be available suitable for use with steam supply where indicated in the schedule.

2.2. Gas Burner Section

A. The unit shall be supplied with a Gas Burner where indicated in the unit schedule.

B. Gas burners shall be of the indirect tubular coil type, with independent combustion section isolated from the air stream. Gas burners shall be CE marked & fully compliant with 90/396/EEC & BS EN 1020.

C. Plantroom gas burner sections shall be designed with fresh air & exhaust gas flue connections for ducting on-site by the mechanical contractor.

D. Weatherproof gas burner sections shall be designed with fresh air inlet cowls & exhaust air flue to atmosphere. The exhaust flue shall be fitted with a wire mesh guard as standard.

E. Access to the controls compartment shall be via a hinged access door.

F. Gas burners shall be connected to the on-site gas supply by a correctly certified third party. Gas burner commissioning after installation shall be provided by VES Andover Ltd at additional cost.

2.3. Cooling Coil Section

A. The unit shall be supplied with a cooling coil where indicated in the unit schedule.

B. Cooling coils shall be of the direct expansion (DX) or chilled water (CW) type as indicated in the schedule.

C. Cooling coil connections shall be handed as indicated in the schedule & detail drawings. Connection sizes shall be as indicated in the schedule & detail drawings.

D. Cooling coils shall be constructed of continuous aluminium fins mechanically bonded to seamless copper tubes. The coil casework shall be of galvanized sheet steel construction with natural finish as standard.

E. The hot water heater battery shall be high-pressure leak tested in water.

F. Cooling coils shall incorporate a non-removable galvanised sheet steel drain pan as standard. Drain connection size shall be as indicated in the schedule & detail drawings.

G. Cooling coils shall be fitted with plastic blade moisture eliminators as standard. Blades shall be designed so any moisture carry over shall be collected in the drain pan.

H. Cooling coils shall be available with optional fin coatings as indicated in the schedule.



2.4. Humidifier Section

- A. The unit shall be supplied with a humidifier where indicated in the unit schedule.
- B. The humidifier shall be of mains steam or evaporative type as indicated in the schedule. The humidifier shall conform to 89/392/EEC & BS EN 292 Parts 1 & 3, and be WRAS certified.
- C. Steam humidifier casework shall have a fitted non-removable galvanised sheet steel drain tray as standard, with powdercoated finish. The drain tray shall incorporate a 15mm plain PVC pipe drain connection as standard.
- D. Humidifier section casework shall be internally powder coated to RAL7004 as standard for moisture protection. Alternative colour as indicated in schedule.
- E. The humidifier section panels & drain tray shall be available in natural finish stainless steel where indicated in the schedule.

2.5. Mixing Box Section

- A. The unit shall include a mixing box where indicated in the schedule. Mixing boxes shall be available as 2 or 3 way.
- B. Plantroom mixing boxes shall have externally mounted inlet & outlet dampers, and internally mounted recirculation damper where indicated in the schedule.
- C. Weatherproof mixing boxes shall have internally mounted dampers as standard.
- D. The dampers shall be constructed & finished as indicated in section 1.9. Dampers.

2.6. Plate Heat Exchanger Section

- A. The unit shall be supplied with a full PVC plate heat exchanger where indicated in the unit schedule.
- B. The plate heat exchanger shall be selected with a minimum efficiency of 50%
- C. The plate heat exchanger shall incorporate a 100% recycled exchange matrix and heavy gauge PVC framework as standard.
- D. The plate heat exchanger matrix shall be aerodynamically designed, with built-in spacers ensuring a constant plate separation.
- E. The plate heat exchanger shall be available with optional virgin plastic exchange matrix for corrosive environments as indicated in the schedule.
- F. The unit shall be fitted with a heat exchanger bypass duct, incorporating a face & bypass damper as standard. This may be omitted where indicated in the schedule.
- G. The face & bypass damper shall be suitable for use with optional 230V or 24V open/close or modulating motors as supplied by VES Andover Ltd.



H. The heat exchanger section shall be fitted with an extract air off drain pan as standard. The drain pan shall be manufactured in galvanized sheet steel and have a natural finish as standard. The drain pan shall be fitted with a plain PVC pipe drain connection, sized & handed as indicated in the schedule & detail drawing.

I. The drain pan shall be available with optional powder coated finish for environmental protection where indicated in the schedule. The drain pan shall be available in natural finish stainless steel where indicated in the schedule.

2.7. Thermal Wheel Section

A. The unit shall be supplied with a thermal wheel where indicated in the unit schedule.

B. The thermal wheel shall consist of a galvanised sheet steel case and aluminium wave matrix wheel. Access for drive motor wiring shall be via service panels with tool-free twist fasteners. The wheel shall be fitted with wear resistant brush seals between the air streams as standard.

C. The wheel is available with single or three phase, constant or variable speed drive as indicated in the schedule.

D. The wheel is available as standard (non absorbing) or moisture absorbing matrix types as standard. Alternative finishes, including epoxy-coated matrix, are available as indicated in the schedule.

2.8. Operational Environment

A. The unit shall be designed to operate in ambient temperatures from -20°C up to 60°C, and can run continuously at up to 80% humidity level.

B. The fan impellers shall be available with optional epoxy paint finish suitable for coastal or corrosive environments as indicated in the schedule.

C. Coils shall be available with optional alternative fin materials & finishes to suit harsh environments as indicated in the schedule.

D. Thermal wheels shall be available with an epoxy-coated matrix to suit coastal or corrosive environments as indicated in the schedule.

E. Plate heat exchangers shall be available with optional virgin plastic exchange matrix for corrosive environments as indicated in the schedule.

F. The casework shall be available with internal powder coating suitable for coastal or corrosive environments as indicated in the schedule & detail drawings.

2.9. Controls

A. The unit shall be available with optional electrical component isolation as fitted by VES Andover Ltd where indicated in the schedule.

B. The unit shall be available with optional inverter fan controllers as supplied by VES Andover Ltd.

C. The inverters shall be available supplied loose, or fitted & pre-wired incorporating quick-change plug connectors.



- D. The unit shall be available with optional fitted or remote mounted CPC control panel as manufactured by VES Andover Ltd. to suit electric or hot water heating.
- E. Fitted controls shall be positioned as indicated in the schedule & detail drawings.
- F. Controls shall be supplied with internally mounted circuit breakers, run, trip & panel live indication & lockable door isolation switch.
- G. Control panels shall have individual circuit breakers for Supply, Extract, Control & Electric Heater Battery where indicated in the schedule & detail drawings.
- H. Fitted controls shall be supplied with a supply air duct sensor & 10m of cable, to be fitted on-site by others as indicated in the schedule.
- I. Fitted controls shall be supplied with a wired touch screen remote controller.
- J. Fitted controls shall be fully pre-wired to internal components. Hot water controls shall be pre wired to optional four port valve & optional frost stat supplied by VES Andover Ltd as indicated in the schedule.
- K. The unit shall be available with fitted & pre-wired airflow pressure switches, allowing 0-10V remote BMS feedback. Type & positions of pressure switches shall be as indicated in the schedule.
- L. The unit shall be available with optional 230V internal bulkhead illumination, pre wired to an external isolator as standard. Location of bulkhead lights shall be as indicated in the schedule & detail drawings.

3.0. Ancillaries

- A. The unit shall be fully compatible with a standard range of spigot mounted silencers. The silencers shall be supplied loose, and sized for direct mounting to the unit where indicated in the schedule.
- B. The silencer shall be a rigidly constructed single skinned galvanised sheet steel case lining incorporating internal splitting vanes lined with resin bonded mineral wool as standard. The silencers shall be available with optional polythene-lined splitters for contaminated air. The splitters shall be available as full-length, pointed & set-back arrangement as indicated in the schedule & detail drawings.
- C. The silencer casework shall be provided naturally finished in high quality galvanised steel as standard. Internal & External powder coat available as indicated in the schedule. Alternative colour to be in accordance with schedule.
- D. The unit shall be available with loose cowls, suitable for direct mounting to unit where indicated in the schedule & detail drawings.

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