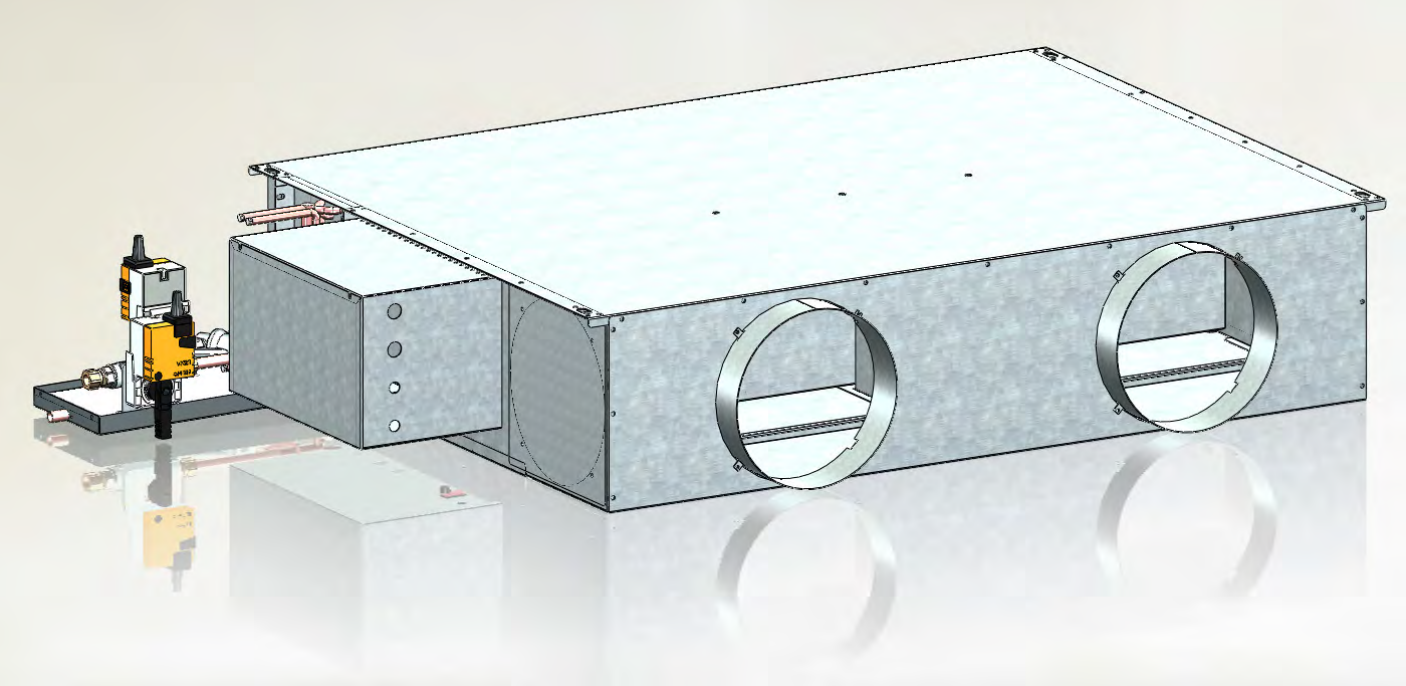
Ability projects ltd

selection guide

MATRIX

ultimate fan coil system

Product Specification



Casings

Chassis panels all 'In House' manufactured from nominally 1.2mm Galvanised steel. Where at all possible, flanges are formed inward facing to prevent exposure to bare metal edges. Sufficient forms and folds are incorporated to provide a vibration free, robust structure. The panel work is jointed throughout using 3/16" 'Polygrip' self adjusting and 'air tight' rivets.

Access

Access is generally provided through a single panel. This covers the fan and motor assemblies, the coil and the condensate tray. The access panel hooks in place on a front lip and swings closed and is then retained by machine screws into captive "Nutserts". The coil / condensate tray assembly is retained again by Machine Screws into 'Nutserts'.

Fans

Fans are direct drive, forward curved, double inlet centrifugal type. Both the impellers & impeller housings are of galvanised steel. Fan & motor assemblies are mounted separately to the fan deck assembly using M6 Machine screws into captive "Nutserts" and can be removed individually for non routine servicing or replacement. Each fan is connected to the fan wiring loom by a 'quick connector'. Motor & impeller assemblies are statically and dynamically balanced in twin planes.

Coils

Coils are manufactured from seamless 3/8" copper tube, mechanically expanded onto aluminium fins. Fins are punched with die formed collars to afford maximum heat transfer surface area with the tubes. All coils are circuited for maximum output and from bottom to top ensuring free venting and draining. Vents and drains are slotted type. Coils are handed. Handing is notated against direction of airflow. Coil terminations are 15mm dia' plain copper at 40mm centres through a copper support plate for rigidity. Every coil is leak tested using dry air under water to 15 bar.

Condensate Tray

The condensate tray covers the entire coil and valve assembly area and has a positive fall to the 15mm drain point. The pan is manufactured from galvanised steel and insulated externally with 'faced' insulation, the corners are brazed and the termination is silver soldered into position. Each pan additionally incorporates a pressure normalising external cover greatly assisting flow. Stainless steel pans are available as an option.

Insulation

Insulation is used throughout for both thermal and acoustic damping. Insulation is open cell, class 'O', CFC and HFC free expanded foam. Foam complies with CAA airport and London Borough flammability and toxicity requirements. Adhesive has light, ageing and temperature tolerance.

Spigots

Spigots as standard, are circular and manufactured from galvanised steel. These are screw fixed to the front of the fan coil unit in the positions indicated. Unused spigot positions are blanked off but remain available for use if layout changes occur. Matrix generally uses one spigot per duct run / grille.

Controls Enclosure

All controls are, as standard, fitted to a controls back plate which is located on the side of the fan coil. An electrical cover then encloses the controls but gives full access from both the side and below. The whole electrical assembly, including switches, is mounted on the side of the fan coil unit alongside the coil terminations and valve assembly.

Filter

Filters are EU2 or EU3 media secured to a wire metal frame, easily removable for routine maintenance, cleaning or replacement.

Ancillaries

Inlet plenums, electric heating, alternative spigot sizes, condensate pumps, fresh air connections and many other options are all available on request.

Packing and Shipping

As standard, all Matrix units are individually shrink wrapped and then wrapped again in stacks of between 4 and 6 units. These stacks are then double strapped to pallets. For an overseas project, pallets will be loaded into containers and braced. We can accommodate special packing requirements, including specially sourced pallets, on request. Ability retains 'cargo in transit' insurance.

As part of our continuous improvement initiative we have to reserve the right to alter the specifications and or dimensions without notice. Therefore, please check your selections and any recent updates by calling the Ability internal sales office.

Matrix Selection Data

Matrix Performance Based Upon

- Cooling duties are based on an Entering Air condition of 23 °C dB - 50 % RH
- Heating duties are based on an Entering Air condition of 21 °C
- Leaving air and coil pressure drop constraints may limit kW outputs
- Performance data is calculated assuming an external static resistance of 30 Pa

The external static pressures we quote refer only to the discharge ducts, plenums and grilles - the whole unit including filters are already factored into our performance figures and do not need to be included in your calculations.

Remember, with Matrix there are no volume control devices required and so no static allowance is required for these items.

The minimum water flow rate for performances stated is 0.02 l/s. Lower flow rates can lead to laminar flow conditions and become unmeasurable with conventional measuring technology.

Matrix 235 Coil Pressure Drops

Cooling Coil	Known Flow l/s	Known Press Drop kPa
SIZE 100	0.10	15.9
SIZE 200 & 250	0.15	17.6
SIZE 300	0.20	19.2
SIZE 400	0.20	13.5
SIZE 500 & 550	0.25	14.9
SIZE 600 & 650	0.25	13.5

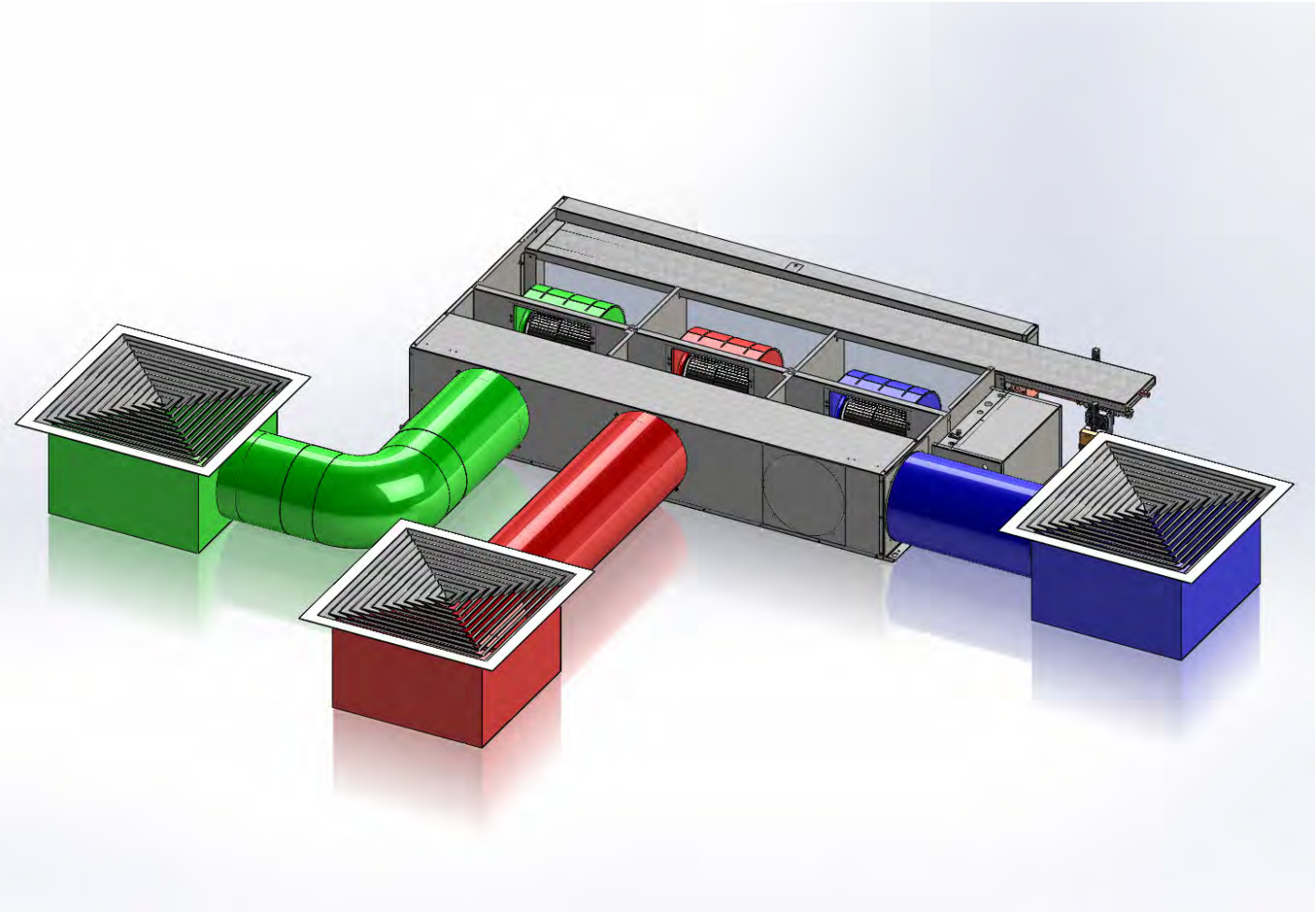
Heating Coil	Known Flow l/s	Known Press Drop kPa
SIZE 100	0.05	4.3
SIZE 200 & 250	0.05	4.6
SIZE 300	0.05	5.9
SIZE 400	0.05	8.6
SIZE 500 & 550	0.10	6.3
SIZE 600 & 650	0.10	7.2

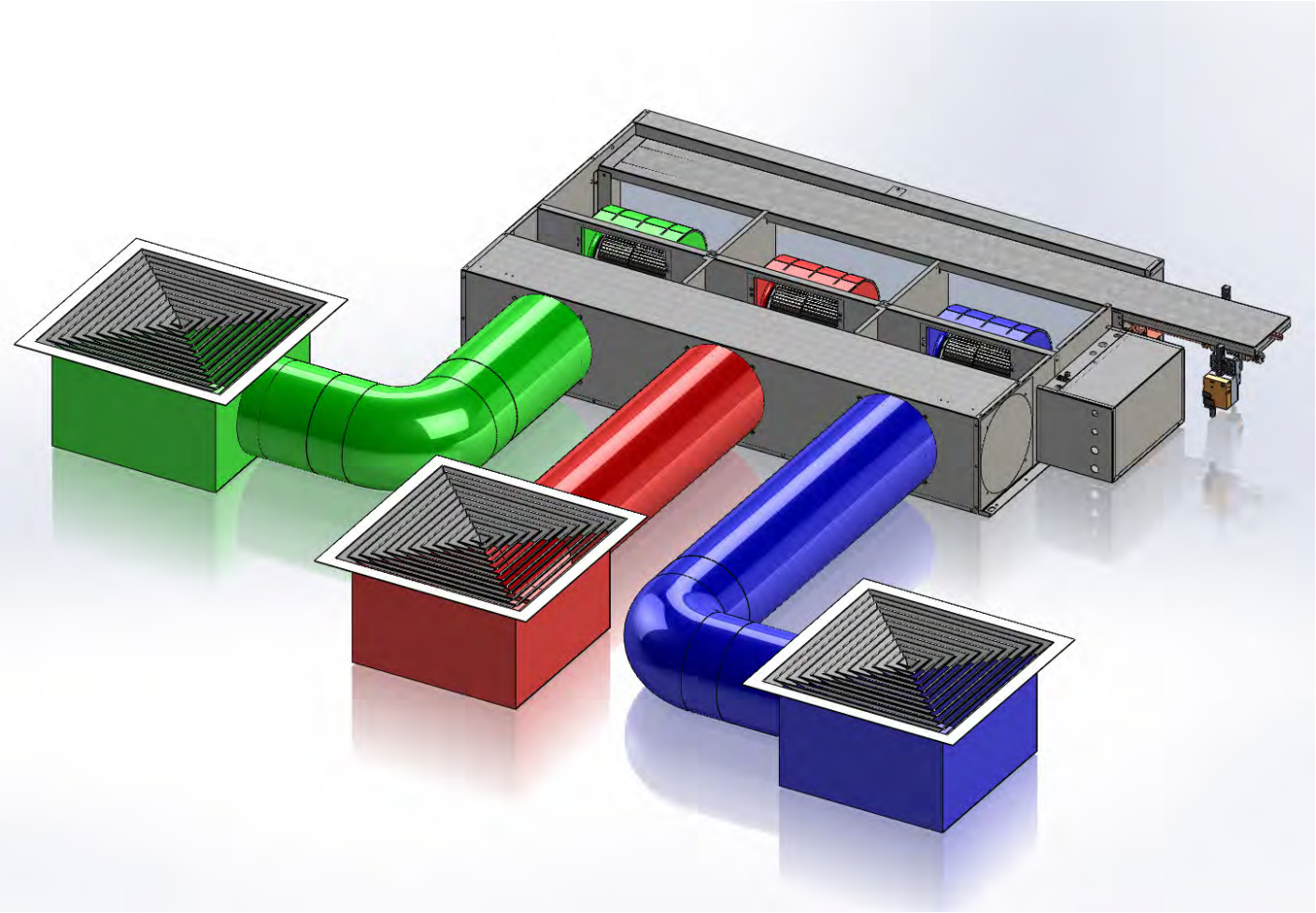
Matrix 270 Coil Pressure Drops

Cooling Coil	Known Flow l/s	Known Press Drop kPa
SIZE 100	0.10	15.5
SIZE 200 & 250	0.15	16.1
SIZE 300	0.20	18.6
SIZE 400	0.25	19.2
SIZE 500 & 550	0.25	15.7
SIZE 600 & 650	0.25	16.3

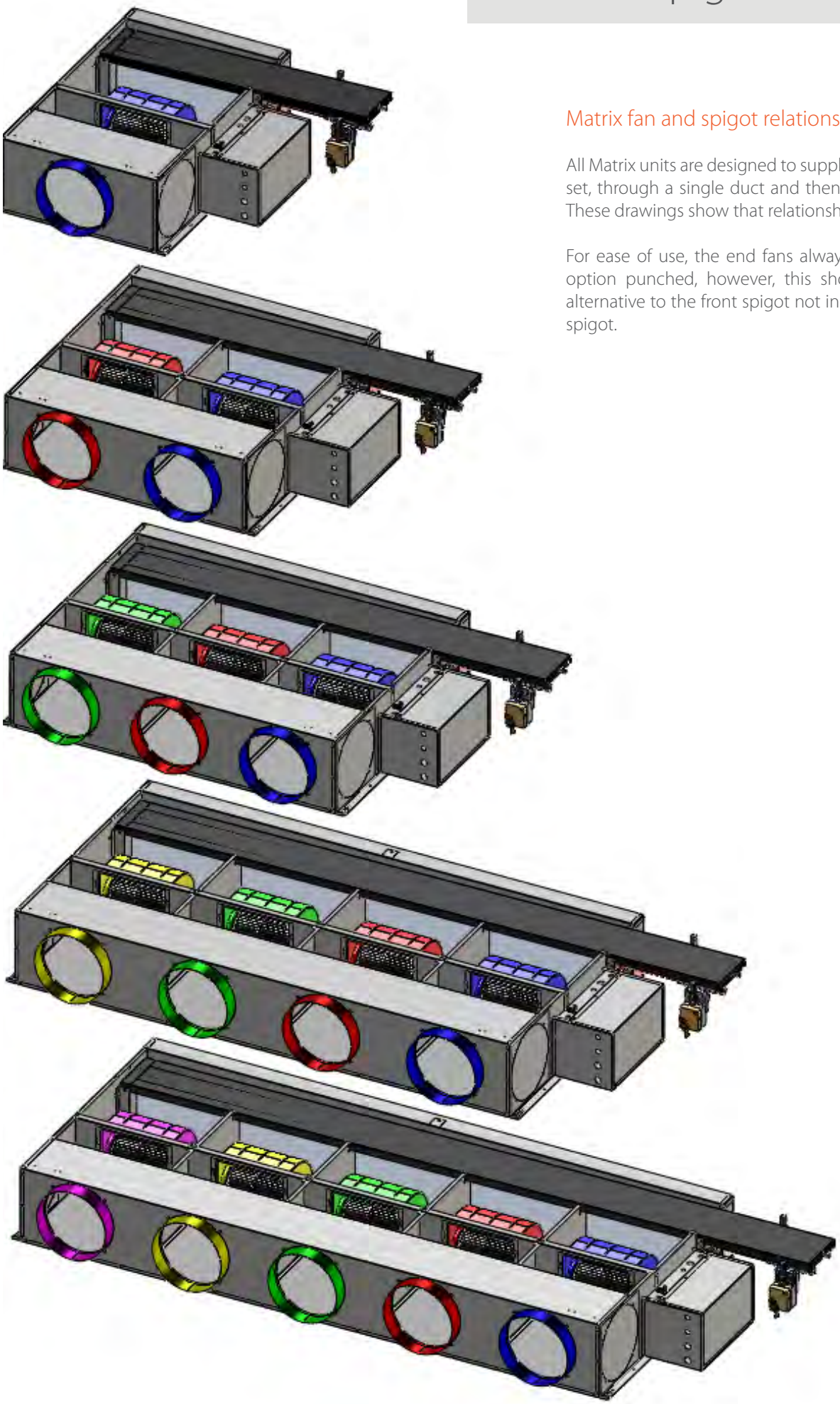
Heating Coil	Known Flow l/s	Known Press Drop kPa
SIZE 100	0.05	4.3
SIZE 200 & 250	0.05	4.6
SIZE 300	0.05	5.9
SIZE 400	0.05	8.6
SIZE 500 & 550	0.10	6.3
SIZE 600 & 650	0.10	7.2

$$\text{New Press Drop} = \left(\frac{\text{New Flow}}{\text{Known Flow}}\right)^2 \times \text{Known Press Drop}$$





Fan and Spigot Relationship

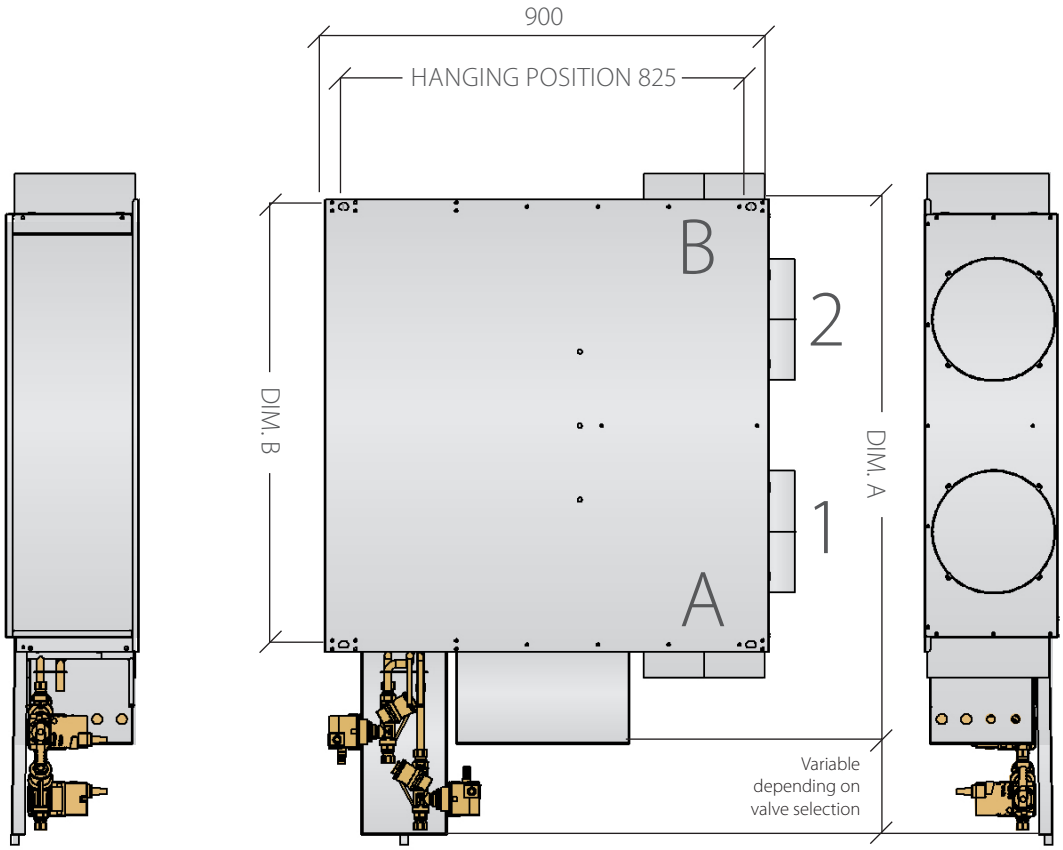


Matrix fan and spigot relationship.

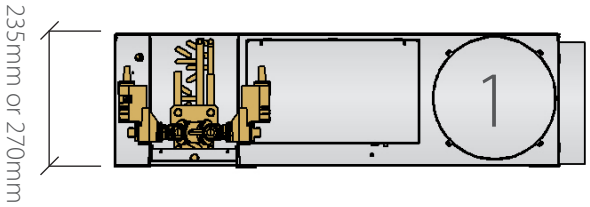
All Matrix units are designed to supply air from a single fan set, through a single duct and then on to a single grille. These drawings show that relationship.

For ease of use, the end fans always have a side spigot option punched, however, this should be used as an alternative to the front spigot not in addition to the front spigot.

Matrix 270 and 235 Dimensions



Left Hand Shown



Size	Weight in Kg	Dimension A Overall Unit	Dimension B Hanging Position
100	41	803	587
200	52	1103	887
250	56	1103	887
300	66	1403	1187
350	70	1403	1187
400	82	1703	1487
500	93	2003	1787
550	97	2003	1787
600	105	2303	2087
650	105	2303	2087

When you require more detail, please call your local agent, or the Ability sales office for an up to date, general arrangement

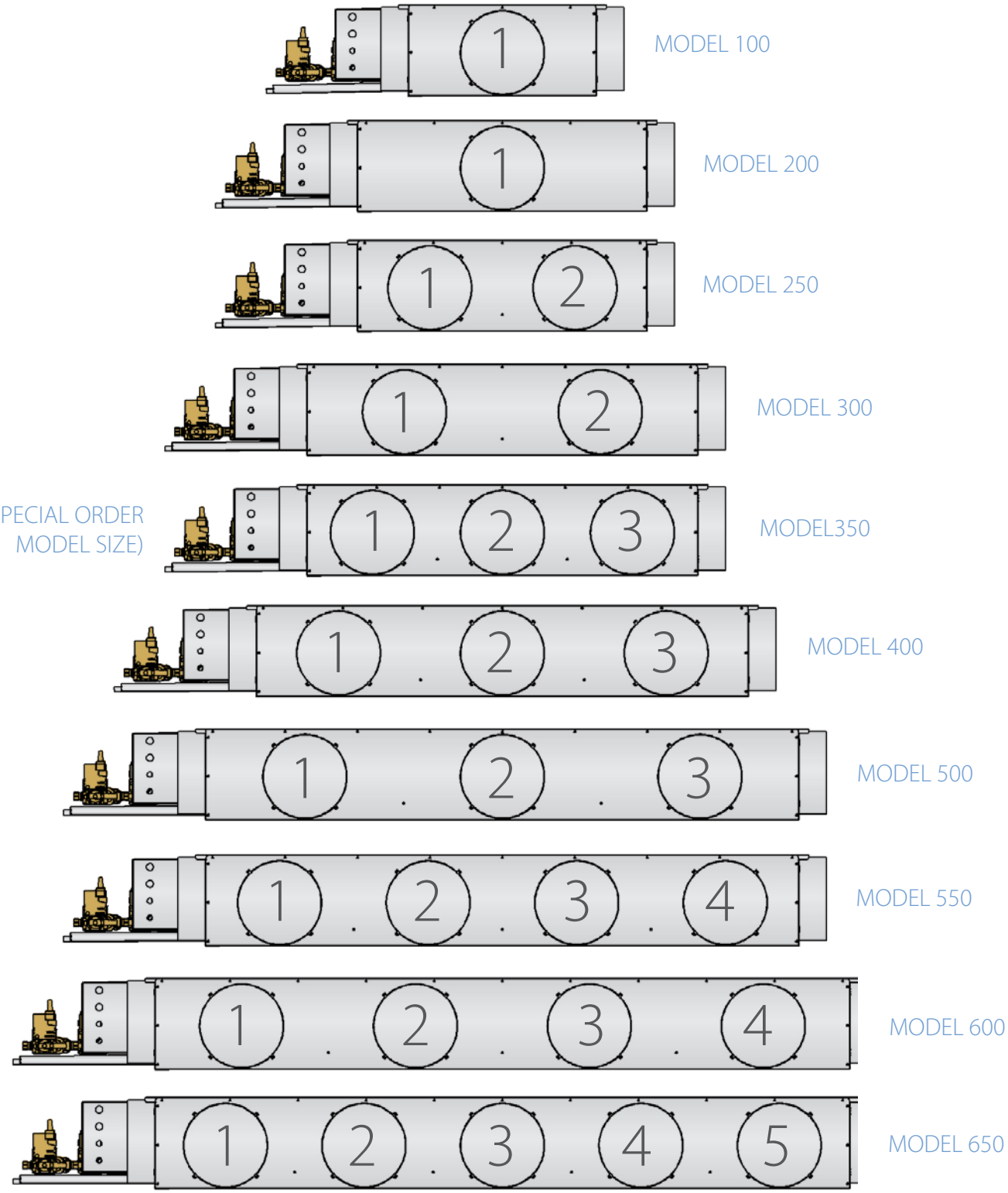
Important Notes

Heating & Cooling Valve connections are reversed on opposite handling of the unit.

Spigot Sizes

Standard spigot connection sizes are 200mm on Matrix 235 and 250mm diameter on Matrix 270.

Spigot numbering is as shown irespective of unit handing



Acoustic Guide

> NR Guides

Ability NR Levels should only be used as guides. Only you will have sufficient room data for all areas of your project upon which to base project specific calculations. We have however, conducted numerous tests within our own facilities and on completed projects so, providing your building is similar to the descriptions below, our NR guides will be reasonably accurate and useful.

If your site differs from the descriptions we have provided, it is in your best interests to either ask us for our view on the differences or seek independent advice.

Our NR levels are based upon the following room criteria:

- A reverberation time of 0.7 seconds or less
- A Fan Coil installation density of 110W/m^2 Sensible cooling
- At least 2.6m from Finished floor level to suspended ceiling
- No allowance for any contribution from background noise sources, including other plant / equipment
- Units are hung and the ductwork installed in accordance with our Installation Instructions, the latest CIBSE guide lines and general good practice.
- Ceilings have a Noise Reduction Coefficient (NRC) of 0.6 and a Noise Reduction Performance D_{ncw} = 35dB or better

Based upon these conditions, the following adjustments are made across the SPL spectrum.

	63	125	250	500	1K	2K	4K	8K
Ceiling tile loss	-6	-4	-7	-10	-12	-12	-13	-8
Room Volume/Reverb	-2	-2	-2	-2	-2	-2	-2	-2
Distance to Listener	-14	-14	-14	-14	-14	-14	-14	-14
Directivity Factor	+9	+9	+9	+9	+9	+9	+9	+9

NR / NC Adjustments

If any of the following conditions apply to your project then the NR levels quoted may need to be adjusted as shown. If more than one of the following conditions apply, or you are concerned in any way, then you should consult with the Ability Technical Team.

Installed Condition	Potential Acoustic Additions
Contract quality carpet, standard fibrous tile ceiling system, glass area no more than 50% of wall surface area. Units installed using solid ductwork, insulated acoustic flex, insulated plenum and linear grille.	0
Solid floors - wood	+1
Tiled floor, marble or similar	+2
Full height glass	+2
Perforated steel tile ceiling system with 16 - 18mm acoustic pads installed into all tiles.	0
Perforated steel tile ceiling system with acoustic pads but where the return air path is through punched holes or slots in the ceiling tile system. The acoustic impact will vary so please advise.	Please provide details
Perforated steel tile ceiling system with no acoustic pads in some or all tiles	Potentially +6
Discharge grille plenums with no internal insulation material	+1 / +2
Short rectangular ducts straight to discharge grille. The acoustic impact will depend greatly on the length of the duct and any insulation.	Please ask
Any other condition of concern. These might be units in very close proximity to each other, very small cellular offices or a particularly high thermal requirement W/m^2 etc.	Please ask

Acoustic Recommendations

Matrix Units do not need volume control devices, if they have been inadvertently installed, make sure they are locked fully open.

Acoustic Flexible Ductwork is highly recommended on all installations. Even a short length of 500mm after a length of solid duct will greatly assist in keeping the discharge sound pressure levels in check.

Duct velocities to the grilles/diffusers should be equal to or lower than 2.5 m/s to reduce the potential of regenerated noise from ductwork surfaces and/or the grille plenum.

Do not position the ceiling return air grilles immediately beneath the FCU inlet as you will locally lose any acoustic benefit the ceiling gave.

Ability projects ltd

The Fulcrum, 2-3 Vantage Way,
Poole, Dorset, United Kingdom
BH12 4NU

T - 01202 305800
F - 01202 734470

sales@abilityprojects.com

BSRIA Member

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www.abilityprojects.com