BUILDING EFFICIENCY
Energy Efficient Variable Speed EC Motor Modular Air Handling Units Model YECAM
YECAM Product Features

**Superior Performance**
YECA is developed based on YAM casing design platform. YAM patented casing design meets the EN1886 Class (D1, L1, T2, TB2, F9). The unit casing consists of foam injected, cold bridge free, aluminium alloy profiles and high density polymerized polyurethane foam injected panel, which are joined together with strong composite tri-axial corner pieces.

The casing boasts a strong frame that is a complete metal complex of Aluminium composite tri-axial angle lug and foam injected Aluminium profile. Panels are a rigid 90mm double skin sandwich construction with an airtight seal and a durable, corrosion resistant, smooth galvanised steel inner and outer casing.

**High Rigidity**
 YECA's extremely rigid design is designed to meet the high EN1886:2008 standards of casing performance. Air leakage is virtually eliminated by double gasketed doors and high strength panels and door locking mechanisms. AHU sections that ship separately are fully gasketed at the joint and clamped together with easy to install fasteners.

**Cold Bridge Free Design**
The foam panel and profile skins are injected with Zero ODP & Zero GWP PU foam of 45kg/m³, providing a thermal conductivity coefficient lower than 0.02W/m·k.

AL profile employs nylon insulation strips design and the skin is filled with PU foam. The damper and drain pan are fixed with strips to isolate the cold bridge.

**Low Air Leakage**
The foam panel and profile skins are injected with Zero ODP & Zero GWP PU foam of 45kg/m³, providing a thermal conductivity coefficient lower than 0.02W/m·k.

**High Performance EC Fan**
Energy saving. Direct drive EC plug fans are significantly more efficient than equivalent AC motor belt drive fans. Over the full and part load operating spectrum, the ECM fan is up to 20% more efficient than a standard induction motor, variable speed, belt driven fan.

Lower sound level. Commutation and stator design make for low-noise magnetisation of the exciter field. This results in a acoustically imperceptible high cycle frequency.

Wide fan speed. EC fan can be operated on 0-100% capacity using a 0-10V dc control signal, whereby the fan speed can be continuously variable.
The European Union has undertaken to reduce CO2 emissions by adopting the ErP (energy related products) directive identifying minimum efficiency levels for fans regardless of whether they operate as individual units or as components in a device or system.

Both the fan and motor are impacted. This includes external rotor designs where fan and motor come as a complete assembly as well as separate impeller and motor combinations. The YECAM range or Air Handling Units has been designed to exceed the stringent ErP 2015 minimum efficiency levels.

The fan impeller is directly mounted onto the motor rotor. The design eliminates belt drive losses and minimizes bearing losses. The high efficiency permanent magnet motor and variable speed drive are designed as matched components. This eliminates the inefficiencies (and compensation factors) when combining multiple separate components from different vendors.

As fans in variable volume air conditioning systems spend considerable run hours at part load operation, corresponding to reduced airflows and static pressures, the YECAM Air Handling unit can deliver typical energy savings of up to 20% when compared to today’s conventional and non-optimized induction motor, belt and pulley driven fan, and 3rd party supplied VSD technologies.

YECAM Product Features

ASHRAE, EKROVENT and other regulatory organizations are actively addressing indoor air quality and energy efficiency by setting performance standards for Air Handling Units.

YECAM Provides Engineered Lifting Lugs for Ease and Safety of Lifting

YECAM is Completely Packaged

The YECAM is an integrated packaged design that is complete and includes discharge plenum, fan section, coil section, filter section and mixing box section.

This makes installation easy and cost effective. Eliminating the need for custom fabrication and on-site labor.

Filter frames are a standard inclusion. The discharge plenum is designed to allow the installing contractor flexibility of choice as to discharge opening size, location and quantity.

Alternately, a standard sized and located discharge outlet can be factory provided, either on the front or top, with trimmed cutout or with flange.

The mixing box is designed to allow the installing contractor flexibility of choice as to air inlet size and location for both O/A and R/A.

Alternately, a standard sized and located air inlet can be factory provided, either on the front, top, or both, with trimmed cutout or inclusive of manual or motorized high grade gasketed aluminium damper assembly. On some models an optional side air inlet can be provided.

Flexibility is assured as the mixing box only, or mixing box and filter section,

are both delete options allowing the contractor to match YECAM with customized filtration or mixing plenum specifications.

Integrated Electronics Provide Ease of Power and Control Connection

Benefits:
- No cabinet space required
- No shielded wires
- Programmable
- Easy wiring

EASE OF INSTALLATION

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YECAM Product Overview

Johnson Controls YORK® YECAM series air handling units are typically applied to a central air-conditioning system. They have been designed incorporating variable speed EC motor technology to meet the needs of today’s sustainable building designs and to exceed the stringent European ErP 2015 energy standard.

The EC plug fans operate with a wide RPM range, can satisfy variable airflow and pressure from a 0 – 10 vdc control signal. A MODBUS high level data connection is provided as standard.

They are the ideal HVAC solution for both new construction and renovation projects for commercial and clean room application: Pharmaceutical, Educational, Retail Shopping mall, Industrial processes, Data centers, Hospitals and Health care, and commercial office buildings etc.

YECAM air handling units are available in 13 models with integral EC fans incorporate fully variable 0-10v speed control, with and are suitable for a wide range of chilled water and hot water flow rates, including wide delta T applications to maximize pump energy savings. YECAM air handling units are available with multiple coil options for each model. The air flow ranges from nominal 1300 L/s to 27,000 L/s, whilst the design incorporates both standard and high external static pressure design ranges of 500 Pa and 700 Pa. YECAM module sizes are designed for ease of containerization and shipping. Each YECAM model comprises only two (2) sections that require joining together on the job site. This facilitates quick and easy installation.

NOMENCLATURE

DISTINGUISHING THE UNIT HAND

Three Standard Types

Horizontal Standard Unit (H1)
Mixing Box + Bag Filter + Coil + EC Supply Fan + Air Outlet

Horizontal Standard Unit (H2)
Bag Filter + Coil + EC Supply Fan + Air Outlet

Horizontal Standard Unit (H3)
Coil + EC Supply Fan + Air Outlet

The YECAM range comes in 3 configurations. H1 is a complete unit comprising discharge plenum, fan section, coil section, filter section, and mixing box section. With arrangement H1 only, optional factory standard size R/A and O/A openings can be provided. Optional standard aluminium damper assemblies can also be provided.

Note: Where optional dampers are provided, due to container dimensional limitations, they may ship loose for jobsite installation by the mechanical contractor.

Note: YECAM model numbers are based on a 6 row cooling + 1 row heating configuration. YECAM unit lengths may change for different coil row configurations. Refer to table SECTION B LENGTH DATA FOR DIFFERENT COIL ROW COMBINATIONS.

CALCULATION OF THE OVERALL DIMENSION

1. Module Design: 2M=95mm
2. Length of the unit = Sum of lengths of all delivery sections.
Length of delivery section = length module +95+96(mm)
Example: Length of 28M-long delivery section = 28×95 + 96 = 2756 (mm)

Note: YECAM model numbers are based on a 6 row cooling + 1 row heating configuration. YECAM unit lengths may change for different coil row configurations. Refer to table SECTION B LENGTH DATA FOR DIFFERENT COIL ROW COMBINATIONS.
YECAM Fan Array

YECAM Models 0911, 0915, 1314 incorporate a single EC fan assembly. All other YECAM models include multiple EC fan assemblies arranged in a fan array. Fan arrays provide the following advantages.

- Increased redundancy in the event of fan failure
- More homogeneous flow pattern through the coils and better flow distribution
- Better sound spectrum that is lower with conventional induction ductwork
- Less AHU unit length and footprint than units incorporating large single fan/motor designs

Standardization of components reduces inventory requirements, facilitates prompt identification and replacement, and provides for ease of service.

Reduced maintenance scope and cost as components are smaller and easier to handle and transport in the event replacement is required. All fans incorporate sealed for life bearings and eliminate maintenance and alignment issues associated with belt and pulley drive systems.

Great for retrofit applications.

Note: Low velocity airflow range @ coil face velocity 1.5m/s to nominal airflow. 2) High velocity airflow range @ nominal airflow to face velocity 3.5m/s.

### Technical Specifications

<table>
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<tr>
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Note: 1) Low velocity airflow range @ coil face velocity 1.5m/s to nominal airflow. 2) High velocity airflow range @ nominal airflow to face velocity 3.5m/s.

YECAM air handling units are sized on a nominal 2.0 m/s coil velocity for increased energy efficiency.

This considerably reduces both coil and terminal air pressure drop when compared to units sized on a nominal 2.5 m/s.

Reduced internal pressure drop ensures greater external static capacity for a given airflow.

When air flow requirements are selected below the nominal 2 m/s coil velocity, YECAM external static capability increases.

When air flow requirements are selected above the nominal 2 m/s coil velocity, YECAM external static capability decreases.
INDIVIDUAL SECTION WEIGHT AND LENGTH DATA

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ALL COIL ROW COMBINATIONS MAXIMUM WEIGHT DATA

- Heating Coil APD at dry condition.
- Standard mixed air heating conditions: air inlet at 15°C DB; 73°C WX; chilled water inlet at 16°C CW.
- Standard fresh air cooling conditions: air inlet at 30°C DB/ 24°C WB; chilled water inlet at 16°C CW.
- Standard return air heating conditions: air inlet at 30°C DB; 73°C WX; chilled water inlet at 16°C CW.
- Standard return air heating conditions: air inlet at 30°C DB; chilled water inlet at 16°C CW.
- Chilled coil APD at wet condition.
- Fan coil APD at dry condition.
- Operating coil APD at wet condition.
- The weight listed in the slate is the shipping weight. The operating weight of unit is about 20% more than the shipping weight.
YECAM Inclusions and Options

**STANDARD**
- Designed to EN 1886: 2008 classification D1,L1,T2,TB2,F9
- EC fan / fan array with discharge plenum
- Cold bridge free design
- Nominal 500pa external static pressure
- Fan guards to EC plug fan air inlet
- 415v EC variable speed motors with integral VSD
- Aluminium pentapost frame with 50 mm galvanised Zero ODP, Zero GWP PU foam injected panels
- 0.6mm thick galvanised steel foam injected panels
- Left handing unit
- Discharge panels with no discharge opening
- Mixing box panels with no air inlet openings
- Stainless steel positively V sloped drain tray
- Stainless steel positively sloped drain intermediate tray (where two vertically stacked coils are used)
- Selectable as 4, 6, 8, or 10 row chilled water cooling coil
- Selectable as none, 1 or 2 row hot water coil or alternately an additional 4 row cc (where two cooling coils are required)
- Lockable access doors – open outward [-VE pa sections] and open inward [+ve pa section]
- Filter section for 305mm deep bed filters (not supplied) with gi filter frames
- Mixing box section

**CASING DESIGN CRITERIA**
- In accordance with EN 1886
- Casing Strength D1
- Casing Air Leakage L1
- Filter Bypass Leakage F9
- Thermal bridging TB2
- Thermal Transmittance T2
- The YECAM is designed to provide exceptional levels of indoor air quality.

**OPTIONAL**
- Right handing unit
- Horizontal discharge cutout
- Horizontal discharge cutout with flange
- Vertical discharge cutout
- Vertical discharge cutout with flange
- Front air inlet with cutout
- Front air inlet with manual damper
- Front inlet with motorized damper (24vac)
- Front and top inlet with cutout
- Front and top inlet with motorized damper (24vac)
- High (nominal 700pa external) static EC fans
- 0.8 mm thick steel foam injected panels
- Painted panel finish (YORK white)
- Stainless steel coil frames
- Hydrophilic coil fins
- 240v marine style lights with external switches (discharge plenum, coil section plenum, mixing box plenum)
- Door viewports (discharge plenum door, coil section plenum door, mixing box plenum door)
- Stainless steel filter frames
- Aluminium opposed blade manual r/a and o/a dampers
- Aluminium opposed blade motorized r/a and o/a dampers (24vac)
- Single point power with circuit breakers (multiple fan units only)
- Fan backdraft dampers
- Delete mixing box (H2)
- Delete mixing box and filter section (H3)
### Acoustics

**FAN ARRAY SOUND POWER LEVEL-PRESSURE SIDE, ESP 500 Pa**

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<th>Model</th>
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**HORIZONTAL STANDARD UNIT (H)**

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**Dimension data with discharge plenum and mixing box options**

**FAN ARRAY SOUND POWER LEVEL-PRESSURE SIDE, ESP 700 Pa**

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<th>Model</th>
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**Note:** Fan array sound data is extrapolated from IBM single fan sound published data.

**Energy Efficient EC Motor Modular Air Handling Units Model YECAM**

- Fan array sound power level-Pressure side, ESP 500 Pa
- HORIZONTAL STANDARD UNIT (H)
- Dimension data with discharge plenum and mixing box options
### HORIZONTAL STANDARD UNIT (H2)

<table>
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<tr>
<th>Model</th>
<th>Airflow  (l/s)</th>
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#### Horizontal unit YECAM0921-2444

- **Dimensions**: Based on the standard unit with 6 row cooling and 1 row heating coil.  
- **Coil segment length**: May vary with the coil rows and coil selection.

#### Side by side unit YECAM2262-2472

- **Dimensions**: Based on the standard unit with 6 row cooling and 1 row heating coil.  
- **Coil segment length**: May vary with the coil rows and coil selection.

#### Stacked unit YECAM4432-4836

- **Dimensions**: Based on the standard unit with 6 row cooling and 1 row heating coil.  
- **Coil segment length**: May vary with the coil rows and coil selection.

---

### HORIZONTAL STANDARD UNIT (H3)

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<th>Airflow  (l/s)</th>
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<th>L1 mm</th>
<th>Rear AO</th>
<th>Top AO</th>
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</table>

#### Horizontal unit YECAM0921-2444

- **Dimensions**: Based on the standard unit with 6 row cooling and 1 row heating coil.  
- **Coil segment length**: May vary with the coil rows and coil selection.

#### Side by side unit YECAM2262-2472

- **Dimensions**: Based on the standard unit with 6 row cooling and 1 row heating coil.  
- **Coil segment length**: May vary with the coil rows and coil selection.

#### Stacked unit YECAM4432-4836

- **Dimensions**: Based on the standard unit with 6 row cooling and 1 row heating coil.  
- **Coil segment length**: May vary with the coil rows and coil selection.
**Wiring Requirements**

**EC FAN MOTOR TERMINAL LAYOUT**

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<th>No.</th>
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<th>Function / assignment</th>
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<td>KL 2 5</td>
<td>Un 1</td>
<td>digital input 1 enabling of electronics; enabling: open pin or applied voltage 5~50 VDC; disabling: bridge to GND or applied voltage ≤1 VDC; reset function: triggers software reset after a level change to ≤1 V; SELV</td>
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<td>KL 2 6</td>
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<td>fixed voltage output 10 VDC, ±3%, max. 10 mA, short-circuit-proof, power supply of external devices (e.g. potentiometer); SELV</td>
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<tr>
<td>KL 2 7</td>
<td>Ain 1 U</td>
<td>analogue input 1 (set value) 0~10 V, Ri = 100 KΩ, parametrisable curve, only usable as alternative to input Ain 1; SELV</td>
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<tr>
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<td>NC</td>
<td>status relay, floating status contact; break for failure</td>
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---

**YECAM Guide Specification**

The air handling units shall be YORK YECAM manufactured by Johnson Controls complete with direct drive EC motor fan technology with integral variable speed drives.

Units shall be supplied complete comprising:-

- Discharge supply air plenum with hinged access door
- Fan section with EC direct drive plenum (plug fan or multiple fan array)
- Coil section with cooling & heating coil with hinged access door
- Filter section with filter frame array
- Return air plenum (mixing box) with hinged access door

Units shall be installed in strict accordance with the manufacturers Installation, Operation and Maintenance manual (IOM).

Units shall be shipped with a protective plastic wrapping to protect the unit from contact rating 250 VAC / 2 A (AC1) damage during transport. They shall be virtually eliminated by composite tri-axial angle lugs, aluminium penta-post construction with double wall construction. Insulating foam shall ship separately shall be cold bridge free complete with thermal break.

Units shall be extremely rigid to meet the high EN 1886:2008 standards of casing performance. Air leakage shall be virtually eliminated by double gasketed doors, high strength panels, and door locking mechanisms. All sections that ship separately shall be fully gasketed at the joint and clamped together with easy to install fasteners.

Sections shall be joined together on site by the mechanical contractor using the joining connectors provided. Units with a casing height of < 1.3 m shall have external joiners. Units with a casing height > 1.3 m shall have internal joiners.

The casing shall meet European standard EN 1886:2008. Specification shall be as follows:-

- Casing Strength: D1
- Casing Air leakage: L1
- Filter Bypass Leakage: F9
- Thermal Bridging: TB2
- Thermal Transmittance: T2

All cooling coil sections shall be provided with an externally insulated drain pan made of stainless steel.
multiple coils are stacked vertically, an intermediate drain tray made of stainless steel shall be provided.

Coils shall be installed such that the coil headers are enclosed by the unit casing, and all condensate is removed by the primary drain pan. Where stacked coils are provided, the intermediate drain tray outlet shall be factory piped into the primary drain pan.

All drain pans shall be positively sloped towards the drain outlet to eliminate any stagnant water pooling.

The cooling coil section shall be readily accessed by an access door to facilitate coil cleaning and drain tray inspection. Coil support members shall be of the same material as the coil casing.

Coils shall have 12mm copper tubes and coil coating for additional corrosion protection and safety devices. (Where multiple EC motors are incorporated into a fan array, an optional single point power connection shall be provided). The single point power junction box shall include a 415v circuit breaker for each fan motor and a common earth bar. Optional factory power wiring from the single point power junction box to the multiple fan motors shall be internally run via factory provided metal cable trays.

The light switches shall be located on the unit handing side. Hinged access doors shall be of 50mm double wall construction similar to the casing panels. Double gaskets shall be provided around the full perimeter of the doors to prevent air leakage. Access doors shall have a minimum of two (2) lockable handles. (Access doors shall be provided with optional perspex viewports capable of withstanding unit operating pressures).

Access doors to fan discharge plenum and mixing box plenum shall be 515 mm wide to permit service personnel entry. Access doors to inspect the drain pan and coil section shall be 515 mm wide for units with a casing height > 1.3 m high and shall be 325 mm wide for units with a casing height < 1.3 m.

Each accessible section shall be fitted with a marine style light. An optional factory mounted marine style light fixture shall be provided to facilitate maintenance and service visibility. Each internal light fitting shall be wired to an external 240v switch. The electrical contractor shall be responsible to provide a 240v supply to each light switch in accordance with local codes.

The light switches shall be located on the unit handing side. Fans shall be IP54 integral EC motor direct drive, backward curved, single inlet type selected for stable operation and optimum energy efficiency in accordance with the scheduled performance requirements. Combined EC fan & motor efficiency shall comply with European efficiency directive ERP 2015. Fans shall be EBM Papst K3G series or approved equivalent.

Fans shall be statically and dynamically balanced by the fan manufacturer. Each fan shall be a single width, single inlet multi blade backward curved type and be directly driven. The fan assembly shall include an integral high efficiency permanent magnet electrically commutated motor complete with control electronics and variable speed drive. The fan speed shall be modulated from a 0-10v control signal. Fans shall also be provided with a MOBUS high level data connection providing access to scheduled fan operating parameters by a Building Automation System. Fan sections containing an array of multiple fans shall be controlled from a common control signal. The integral EC fan & motor assembly shall incorporate sealed for life bearings and all necessary motor

protection and safety devices. (Where multiple EC motors are incorporated into a fan array, an optional single point power connection shall be provided). The single point power junction box shall include a 415v circuit breaker for each fan motor and a common earth bar. Optional factory power wiring from the single point power junction box to the multiple fan motors shall be internally run via factory provided metal cable trays.

Fans shall be provided with a powder coated galvanized steel mesh safety guard fitted to the suction side of each fan. As an option, each fan can be provided with a factory installed backdraft damper in lieu of a mesh guard. The backdraft damper shall close when the fan is disabled.

The positively pressurized fan discharge plenum shall incorporate a lockable inward opening door that provides service access to the fans and motors. Access to the plenum section shall be restricted by the plenum internal pressure when the unit is operational. A fan plenum door switch shall be provided and installed by the mechanical contractor and electrically interlocked to the AHU control circuit.

A filter section shall be factory provided and shall include an array of galvanized filter frames using a maximum of four (4) industry standard filter sizes. Filter frames are designed to accept 305mm deep bag filters as standard or 305mm deep bag filters with a 50 mm pleated panel pre-filter as an option. The filter section shall be designed to accept filters of AAF manufacture or approved equal. Filters shall be provided and installed by the mechanical contractor.

The array of filter frames shall include the necessary mounting clips and shall include block-off panels around the filter array to prevent air bypass.

Fans shall be EBM Papst K3G series or European efficiency directive ERP 2015. Fan & motor efficiency shall comply with the scheduled performance requirements. Combined EC fan & motor efficiency shall be factory piped into the discharge plenum. As a factory supplied option, a standard sized return air and a standard sized outside air opening can be provided. Optional factory supplied standard sized openings shall be trimmed and capped to prevent any exposed insulation and panel edges.

For the optional factory provided discharge opening, an optional 40mm flange shall be provided.

For the optional factory supplied discharge opening and return air openings, optional factory fitted dampers can be provided to control the volume of outside air and return air. Optional dampers shall be of aluminium aerofoil construction with blade edge seals on all blades. Blades shall rotate on a 12.5mm diameter shaft with sleeve bearings and shall be arranged in an opposed blade configuration. The drive shaft shall extend 65mm beyond the damper frame. As a factory supplied option, a standard sized supply air opening can be provided in the discharge plenum. As a factory supplied option, a standard sized return air and a standard sized outside air opening can be provided. Optional factory provided standard sized openings shall be trimmed and capped to prevent any exposed insulation and panel edges.

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