ENERCOV™

ISO-9001:2015

New innovation product

Humidity Controls Air Conditioner
1 Way Cassette Hydronic Type Fan Coil Unit

The first humidity control air conditioner without additional electric heater and humidifier.

Design for patient room, hospital, commercial building or where humidity control is required.

With ENERCOV's temperature & humidity controller

TUV NORD (Thailand) Ltd. NSC-TISI-TIS 17021 QMS 005

DAkkS Deutsche Akkreditierungsstelle D-ZM-12007-01-01

FCO Series

DC Motor

Cooling capacity range 3.5 - 17.6 kW

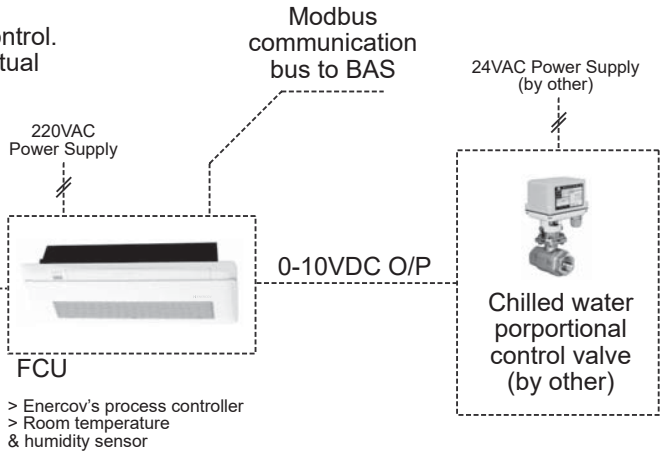
FCO Series

System capability of humidity control +/-5%RH

FCO series, Air conditioner system for special function room application to maintain environment such as temperature and humidity at desirable range. Chilled water fan coil unit (FCU) is 1 way cassette type installation and connected with proportional type control valve (0-10Vdc). Chilled water supply temperature shall be provided 7.2 deg C or below which is suitable within air conditioning comfort range of human being. This system can maintain very precise of room humidity at 50%RH +/-5%RH according to cooling load required.

System controller

Intelligent temperture & humidity controller with completed adaptive PID algorithm or FUZZY algorithm provide very precise room parameters. It consists of display unit, temperature & relative humidity sensor, controller and fan motor speed control. LCD display on the display unit shows real time actual temperature and relative humidity.



Display unit functions

Dim : 87Wx87Hx20D mm.
Wall mount

- Heating Element On/Off
- Temperature and Humidity Control Mode
- Cooling Control Mode
- FILTER — Filter Clog Indicator (if applied)
- ALARM — Unit Alarm Indicator
- FAN AUTO — Fan Automatic Control Status Indicator
- PROGM — Programmable Mode
- 25.°C — Actual Room Temperature or Setpoint Indicator
- 50 %RH — Actual Room Humidity or Setpoint Indicator
- Fan Speed Running Indicator

Function Keypads

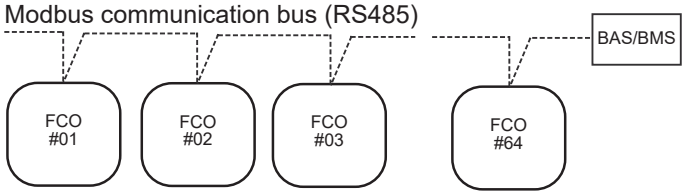
Wireless Remote Control

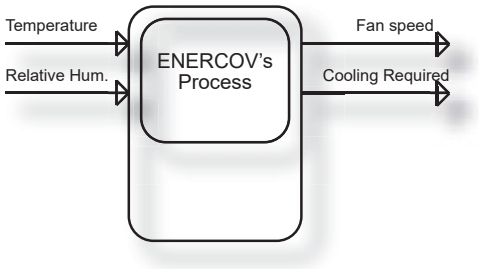
Control Functions

1. Room temp. & humidity are controlled by adaptive PID algorithm.
2. Cooling mode and temperature/humidity control mode selectable.
3. Aux HEATER lights up means hot gas reheat coil energized.
4. Room temperature and relative humidity real time display
5. Supply air fan can config to vary speed to maintain room condition automatically.
6. Room sensors faulty alarm codes.
7. Room temperature & humidity sensors calibration are also available.
8. Proportional, integral gain and calculation time are configurable.
9. FCU fan minimum speed is configurable.
10. Alarm display codes.
11. Electrical heater protection cut off system. (option)
12. Pre configuration programmable software.
13. Modbus interface port for BAS communication (option).

Network Management (option, max 64 CSHs/loop)

FCO's controller can communicate with BAS or BMS by modbus protocal, max 64 nodes per loop and 300 meters length.





Very accurate
temperature & humidity
controls.

+/-5%RH

Very accurate
room humidity result

Cooling coil characteristic

When adjusting chilled water cooling coil flow rate and fan speed together, we can get cooling capacity in term of sensible capacity and latent capacity changing according to percent openning of chilled water control valve and airflow rate of cooling coil. From that relationhsip, we can conclude the feature of parameters responding upon adjust water flow and air flow rate thruogh cooling coil as followings;

> Increase fan speed -> T drops, H increases
> Reduce fan speed -> T increases, H drops
> Increase % valve -> T drops, H drops
> Reduce % valve -> T increases, H increases

T is temperature and H is humidity. Room temperature is standing for sensible heat load. Room humidity is standing for latent load. That means if we regulate air flow rate and water flow rate at proper quantities according room sensible and latent load, we can control room temperature and humidity at desired setpoint without additional heating element or humidifier. This is ENERCOV's process to maintain room temperature and humidity very constantly.

There are two factors to reducing lower room humidity or dewpoint temperature by reduce supply chilled water temperature or increasing chilled water flow rate. However, if chilled water supply temperature is 7.2 C, we can get room temperature 23.0 - 25.0 C at humidity below 60%RH approximately depending on room heat load and fresh air intake quantity.

Conventional controls algorithm

Controls algorithm of general feedback control is called proportion, integral and differential (PID) loop. The PID control loop is very common used for various HVAC or others application. However, PID loop is a single input and single output parameter. It is not suitable for multiple inputs/outputs parameters. In this case, room temperature and relative humidity are changed when adjusting fan speed. In the same way, room temperature and relative humidity are also changed when adjusts water flow rate. This system has multiple inputs (room temperature and relative humidity) and multiple outputs (fan speed and %valve opening). Normal PID control loop can not support this application.

ENERCOV's process algorithm

It is higher level of control loop which is developed from single PID control loop. ENERCOV's process algorithm shall has dual PID control loops to minimize an error of temperature and humidity. Some time is called adaptive PID optimization control system or FUZZY algorithm which is suitable for multiple inputs/outputs system. The ENERCOV's process algorithm is developed to control room temperature and relative humidity by varing supply air fan and chilled water flow rate. The result of this control algorithm is very precise of room condition as required without additional waste energy devices such as electric heater or humidifier.

With this smart algorithm, energy saving is higher than 50% when compared to conventional humidity control air conditioner. Further, room condition will always maintain within human being comfort zone.

New innovation of temperature and humidity controls system.

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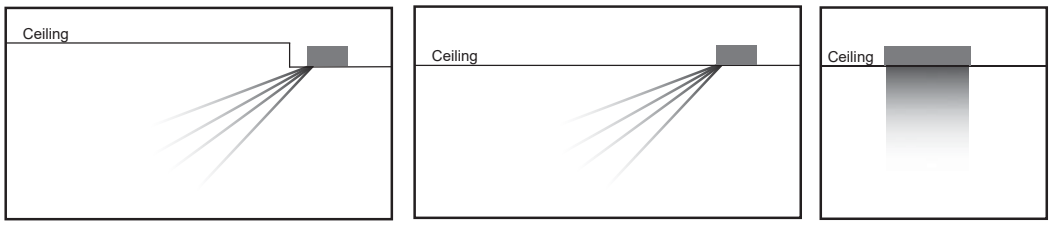
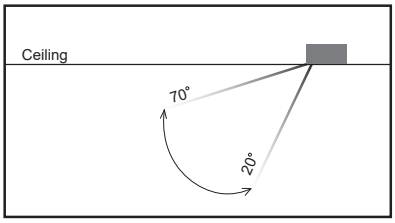
Features

1. One way air flow, which is easy to be installed in the side of ceiling.

2. Slim body can be installed in limited space above ceiling.



3. Auto swing, wide air flowing range, air delivery angle up to 50 Deg.

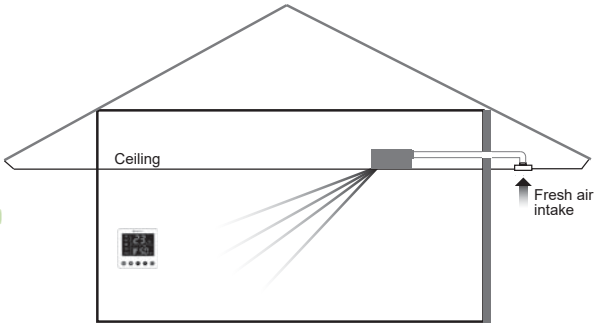


4. Quiet running.

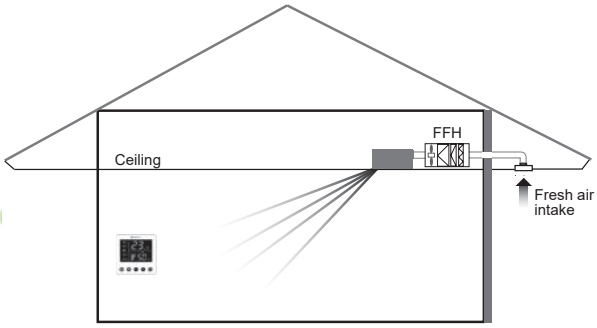
5. High lift water drained pump (750 mm.), easy to plan the condensed water drain pipe.

6. Water level switch inside to keep away leakage. After the water raising to a certain position, the float switch will act and alarm, then the unit will cut off the water valve and stop the fan motor.

7. Fresh air intake can be input from outside. Fresh air inlet can intake some fresh air from outside and ensure indoor air quality (IAQ). The user can share the fresh and clean air to lesson illness caused by air conditioner.



Direct fresh air intake



Fresh air intake with fan filter housing (FFH) to eliminate PM 2.5 (option).

8. The water inlet/outlet connection direction (left or right) can be selected.

9. Temerature and humidity control with fresh air intake system. 5-10%.

10. Wire and wireless remote control.

FCO Series

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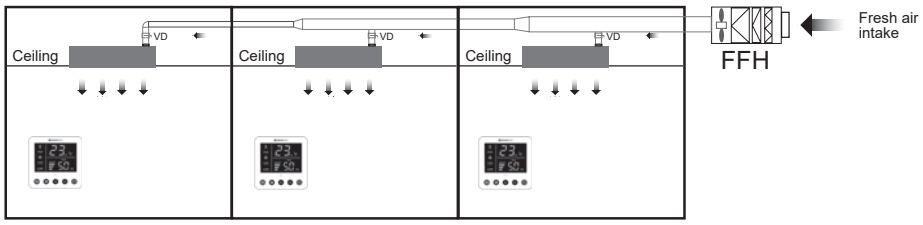
Features

11. Multiple fresh air intake system.
Fresh air intake can be input from outside by single fan filter housing (FFH) unit. The enercov's FFH has multi filter element such as pre-filter (G4), bag filter (F8) and HEPA filter (H13) with booster fan. It can supply fresh air up to 1200 CMH at external static pressure 200 pa for multiple rooms such as patient rooms. Each room should provide ducting header with individual volume damper for fresh air flow balancing.

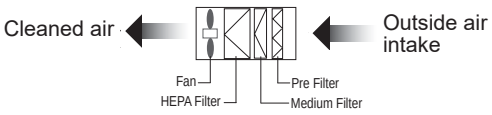


Enercov's model FFH-1200 can be supplied up to 30 patient rooms (for hospital application).

Benefits

1. Ultimate comfortable
Temperature and humidity are controlled within comfortable range as your required

2. Fresh air is treated by fan filter housing (FFH) unit, supply air is a cleaned air.



3. Reduced CO2, VOCs, and other toxic gas.
4. PM 2.5 is eliminated
5. Room pressure is slightly positive and protect your room from worst outside air
6. Very quiet of operation at steady state
7. Eliminates all germs such a virus, bacteria, mold, fungi, dust mites by humidity
8. More healthy breathing

Organisms	Optimum Zone								
Bacteria									
Viruses									
Fungi									
Dust Mites									
Allergic Rhinitis and Asthma									
Respiratory Infections*									
Ozone Production									
Chemical Interactions									
Relative Humidity	10	20	30	40	50	60	70	80	90

*Insufficient Data Above 50%RH.

From "Criteria for Human Exposure to Humidity in Occupied Buildings". Dr. Elia Sterling, in ASHRAE Transactions 1985 Vol. 91 Part 1.

FCO Series

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Technical specification

Model Number			FCO-400-W	FCO-600-W	FCO-800-W	FCO-1000-W	FCO-1200-W	FCO-1600-W	FCO-2000-W
Performance Data	Nominal cooling capacity	Btu/h	12500	18500	25500	30000	36000	48000	60000
	Noise level (H / M / L)	dB(A)	28-36	32-48	40-52	41-55	42-56	50-60	55-62
	Nominal air flow rate	cfm	350	500	700	900	1100	1600	2000
Electrical Data	Power supply	V/Ph/Hz	220 / 1 / 50						
	Motor	Type	DC MOTOR						
	Drive	Type	DIRECT						
	No. of motors	-	1	1	1	1	2	2	2
	Running current	A	0.83	0.83	0.83	0.83	1.66	1.66	1.66
	Motor power	HP	1/7	1/7	1/7	1/7	1/7	1/7	1/7
	Motor speed (Max)	rpm	1200	1200	1200	1250	1200	1200	1300
Coil Data	Face area	Ft^2	1.94	2.08	2.78	2.92	3.72	4.17	4.13
	Pre-filter / Air filter	Type	ALUMINUIM						
	Fin type	Type	SLIT FIN						
	Fins per inch	n	16	14	14	14	14	14	14
	Tube size	inch	3/8						
	Tube high	inch	10	10	10	10	10	10	10
	Tube length	inch	28	30	40	42	53.5	60	59.5
	Number of rows	-	2	3	3	3	3	3	4
	Number of Circuits	-	2	3	3	5	5	7	10
	Number of tubes	-	10	10	10	6	6	4	4
Blower	Type	Type	DOUBLE INLET						
	Diameter x Length	inch	6 x 7	5 x 9	6 x 9	6.5 x 7.5	6 x 7	6 x 9	6 x 9
	Qty	-	2	2	2	2	4	4	4
Piping Connection	Pipe connection	Type	Thread						
	Water input size	inch	1/2	3/4	3/4	3/4	1	1	1
	Water output size	inch	1/2	3/4	3/4	3/4	1	1	1
	Drain connection size	inch	7/8						
Dimensions	Height	cm	25.0	25.0	25.0	25.0	25.0	25.0	25.0
	Length	cm	95.2	95.2	125.2	125.2	155.2	185.2	185.2
	Depth	cm	61.5	61.5	61.5	61.5	61.5	61.5	61.5

Note : - Technical specifications are subject to change without prior notice.
- Cooling capacity based on chilled water temperature 7°C/12°C and air on coil 27CDB/19CWB.

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