Humidity Controls Air Conditioner
Hydronic Ceiling Type FCU

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

Design for household, office building, factory, or where humidity is important.

°C + %RH

With ENERCOV's temperature & humidity process controller

FRTX Series
Cooling capacity range 3.6 - 17.6 kW
DC Motor

FRTX Series

◼◼ ENERCOV air conditioner for humidity control

FRTX series, Air conditioner system for special function room application to maintain environment such as temperature and humidity at desirably range. Chilled water fan coil unit (FCU) is ceiling 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.

◼◼ Micro-processor controls

Intelligent temperture & humidity controller with completed adaptive PID algorithm or FUZZY algorthm 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.
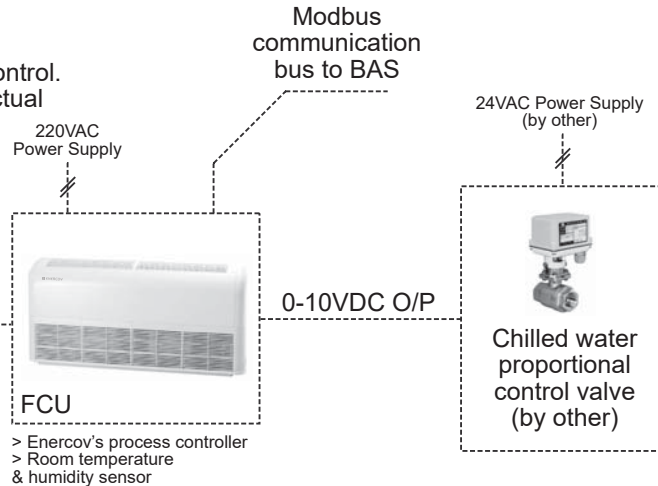
◼◼ Display unit functions

Dim : 87Wx87Hx20D mm.
Wall mount

Icon	Description
♨	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

Modbus communication bus to BAS

220VAC Power Supply

24VAC Power Supply (by other)

Commu. bus

0-10VDC O/P

FCU
> Enercov's process controller
> Room temperature & humidity sensor

Chilled water proportional control valve (by other)
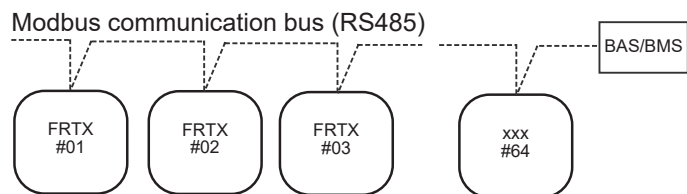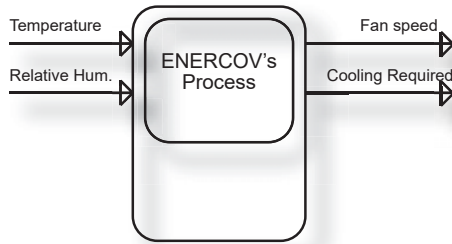
◼◼ Control Functions

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 by automatically.
6. Room sensors faulty alarm codes.
7. Room temperature & humidity sensors calibration is 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 FRTXs/loop)

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

Modbus communication bus (RS485)

| FRTX #01 | FRTX #02 | FRTX #03 | xxx #64 | BAS/BMS |

◼◼ ENERCOV™

Temperature

Relative Hum.

ENERCOV's
Process

Fan speed

Cooling Required

Very accurate
temperature & humidity
controls.

+/-5%RH

Very accurate
room humidity result
(Based on sensible load 20 - 100% variation.)

■ ■ 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.

■■ Technical specification (DC Motor)

Fan Coil Model		Unit	FRTX400	FRTX600	FRTX800	FRTX1000	FRTX1200	FRTX1600	FRTX1800	FRTX2000
Nominal Air Flow	Max Speed	CMH	680	1019	1359	1699	2039	2718	3058	3398
	Max Speed	CFM	400	600	800	1000	1200	1600	1800	2000
Cooling mode / High Speed	Total Cooling Capacity	kW	3.62	5.30	7.10	8.83	10.75	13.61	15.63	17.59
		BTU/H	12338	18101	24233	30148	36678	46455	53339	60048
	Water Flow Rate	GPM	2.47	3.62	4.85	6.03	7.34	9.29	10.67	12.01
		l/s	0.16	0.23	0.31	0.38	0.46	0.59	0.67	0.76
	Pressure Drop	PSI	4.79	3.71	8.30	6.26	7.10	4.46	4.46	6.90
		kPa	33.03	25.59	57.24	43.17	48.96	30.76	30.76	47.59
Noise / Sound Pressure Levels	Max Speed	dB(A)	36	48	52	55	55	55	60	60
	Low Speed	dB(A)	28	32	40	41	41	41	44	44
Motor	Type	-	BLDC Motor							
	Q'ty	-	1				2			
	Rated Power — Total	W	110	110	120	150	220	240	300	300
	Rated Load Amp — RLA	A	0.40	0.60	0.70	0.90	1.20	1.20	1.44	1.44
	Power — Supply	-	220-240 V / 1 / 50 Hz							
Blower	Type	-	Centrifugal Fan Duoble Inlet							
Aux. Electric Heater (Option)	Total Heating Capacity	W	300	300	300	500	500	750	1000	1000
	Power Supply	-	220-240 V / 1 / 50 Hz							
	Current	A	1.36	1.36	1.36	2.27	2.27	3.41	4.55	4.55
Cooling Coil	Fin Type/Fin Pitch	-	Corrugated Fins							
	Tube Diameter	mm.	3/8"							
Water Pipe Connection	Water Conn Diameter	In.	1/2"	3/4"			1"			
	Copper No Connection	In.	1/2"	5/8"			7/8"			
Drain Pipe	Diameter	In.	7/8"							
Unit Dimensions	Height	mm.	640							
	Width	mm.	1010		1310		1610		1910	
	Depth	mm.	210	240						
Net Weight	Main Unit	Kg.	29	30	40	42	60	62	75	75

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