ENERCOV™

ISO-9001:2015

Energy saving product

Humidity Controls FCU Hydronic 4 Ways Cassette Type

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

Design for household and 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

CSH Series

DC Motor

Cooling capacity range 4.2 - 11.7 kW

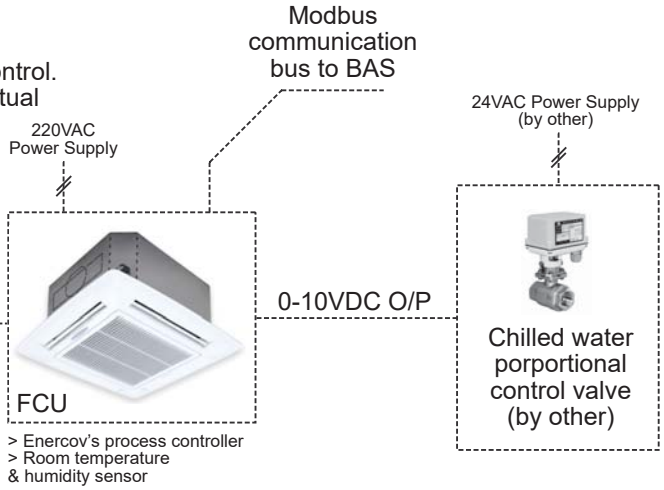
CSH Series

ENERCOV air conditioner for humidity control

CSH 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 4 ways 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.

Micro-processor controls

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
- Actual Room Temperature or Setpoint Indicator
- Actual Room Humidity or Setpoint Indicator
- Fan Speed Running Indicator

Function Keypads

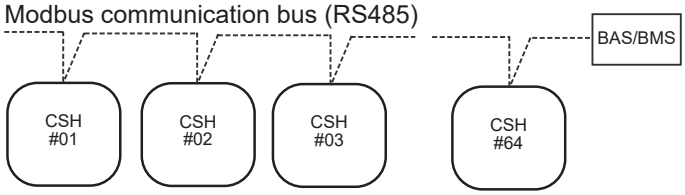
Wireless Remote Control

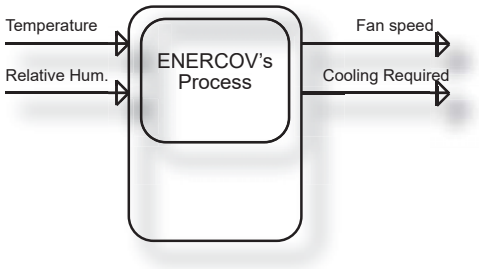
Control Functions

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)

CSH'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
(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

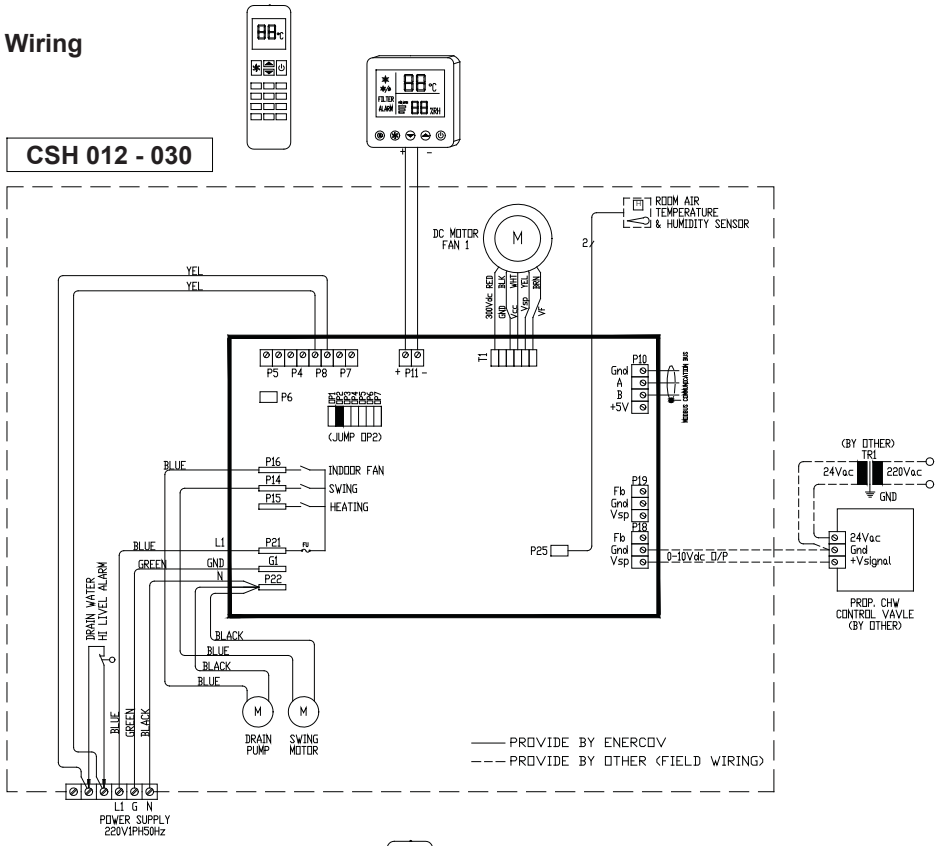
It is higher level of control loop which is developed from single PID control loop. ENERCOV's process algorithm shall has dual PID control loops to minimize an error of temperature and humidity. Some time is called adaptive PID optimization control system or FUZZY algorithm which is suitable for multiple 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.

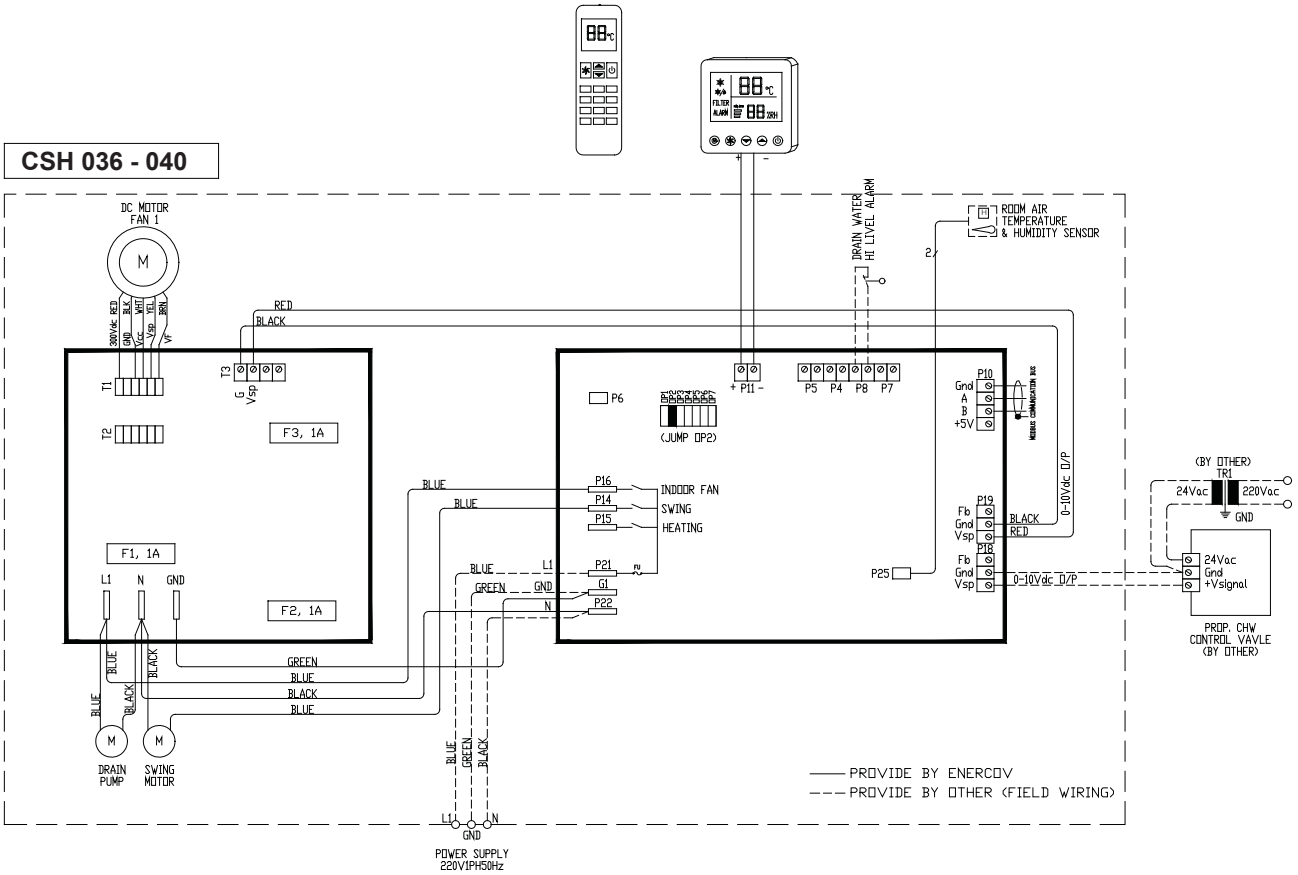
New innovation of temperature and humidity controls system.

Electrical Wiring

CSH 012 - 030



CSH 036 - 040



CSH Series

ENERCOV™

Technical specification

Fan Coil Model			Unit	CSH012	CSH024	CSH030	CSH036	CSH040
Air Flow		Turbo Speed	CMH	774	1296	1656	1728	1764
		High Speed	CMH	**756**	**1044**	**1440**	**1620**	**1692**
		Turbo Speed	CFM	456	763	975	1017	1038
		High Speed	CFM	**445**	**614**	**848**	**954**	**996**
		Minimum Speed	CMH	155	259	331	346	353
Cooling mode	Turbo Speed	**Total Cooling Capacity**	**kW**	**4.25**	**7.63**	**9.25**	**11.40**	**11.73**
			BTU/H	***14505***	***26041***	***31570***	***38908***	***40034***
		Sensible Cooling Capacity	kW	3.15	5.60	7.00	8.10	8.26
		Water Flow Rate	**l/s**	**0.203**	**0.364**	**0.44**	**0.544**	**0.554**
		Pressure Drop	kPa	17.00	20.00	27.20	29.50	30.00
	High Speed	**Total Cooling Capacity**	**kW**	**4.18**	**6.36**	**8.45**	**10.60**	**11.20**
		Sensible Cooling Capacity	kW	30.60	4.52	6.30	7.55	8.00
		Water Flow Rate	l/s	0.20	0.303	0.403	0.505	0.535
		Pressure Drop	kPa	16.50	15.80	23.00	25.00	28.20
Noise	Sound Pressure Levels	Turbo Speed	dB(A)	47	40	45	45	45
		High Speed	**dB(A)**	**45**	**35**	**42**	**43**	**44**
		Medium Speed	dB(A)	43	31	39	40	42
		Low Speed	**dB(A)**	**39**	**28**	**34**	**38**	**39**
		Quiet	dB(A)	35	22	28	33	36
Electricity	Power Input	**Turbo Speed**	**W**	**75**	**54**	**90**	**116**	**120**
		High Speed	W	69	34	70	98	112
	Current Input	**Turbo Speed**	**A**	**0.63**	**0.51**	**0.8**	**0.92**	**0.96**
		High Speed	A	0.59	0.35	0.6	0.77	0.87
	Power	**Supply**	**-**	**220-240 V / 1 / 50 Hz**				
Aux. Electric Heater (Option)		Total Heating Capacity	W	300	500	750	750	900
		Power Supply	**-**	**220-240 V / 1 / 50 Hz**				
		Current	A	1.36	2.27	3.41	3.41	4.09
Water Pipe Connection		**Diameter**	**In.**	**3/4 (Nominal)**	**1 (Nominal)**			
Drain Pipe		Diameter (OD)	mm.	24	26			
Dimensions without Packing (HxWxD)		**Main Unit**	**mm.**	**280x574x574**	**320x844x844**	**320x844x844**	**320x844x844**	**320x844x844**
		Panel	mm.	65x720x720	67x950x950	67x950x950	67x950x950	67x950x950
Dimensions with Packing (HxWxD)		**Main Unit**	**mm.**	**394x790x675**	**400x910x910x**	**400x910x910**	**400x910x910**	**400x910x910**
		Panel	mm.	126x790x800	156x1030x1035	156x1030x1035	156x1030x1035	156x1030x1035
Net Weight		**Main Unit**	**Kg.**	**19**	**32**	**32**	**35**	**35**
		Panel	Kg.		5	5	5	5
Gross Weight		**Kg**	**Kg.**	**23**	**37**	**37**	**40**	**40**
		Panel	Kg.	5	8	8	8	8

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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