



Pi Cubes Communication Thermostat provides professional look solution for your room.

Configurable to provide specific solution for chosen HVAC system. It may only act as a room temperature sensor, room thermostat with set point, it may show actual time, weather icon, HVAC mode icon, occupancy icon and the fan icon.

Up to four thermostats may be connected to one Pi Cubes Main board through RJ45 Cable, providing power and communication through one cable.

### Features

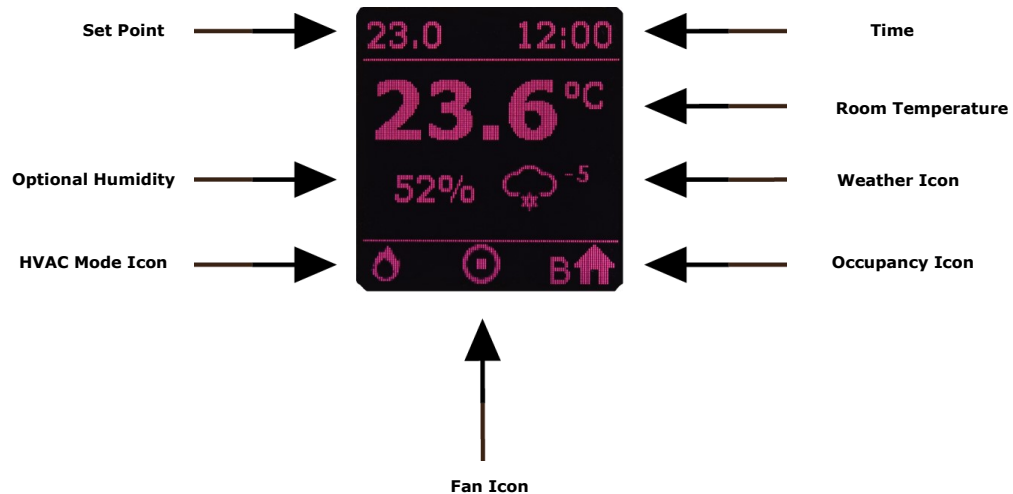
Main features are :

- Power and communication of the thermostat through single RJ45 Cable.
- Dial button to operate thermostat.
- 128 x 128 TFT Color Screen.
- Modbus RTU Communication through RS485 to up to four thermostats.
- Optional version with a humidity sensor.
- Thermostat may be used with any board that supports RS485/Modbus RTU with RJ45A Adapter board, one example is Arduino.

### Technical Specifications

<b>Power consumption:</b>	30mA on 15VDC Power
<b>Temperature Sensor:</b>	10K NTC Thermistor connected to 12 bit A/D
<b>MCU :</b>	Cypress PSoC5LP CY8C5467LTI
<b>Communication:</b>	RS485, Modbus RTU , 38400kbps
<b>Optional Humidity Sensor:</b>	Honeywell Humidity Sensor 3% HIH8130
<b>Dimension:</b>	W 78mm (3.0") x H 85 mm (3.3") x D 20mm (0.8")
<b>Housing Material:</b>	ABS
<b>Operating Parameters:</b>	0°C(32°F) to 50°C (122°F) : 0-90% RH Non Condensing
<b>CC Part Number:</b>	CC-PI-CUBES-CTA

## Main Display Features



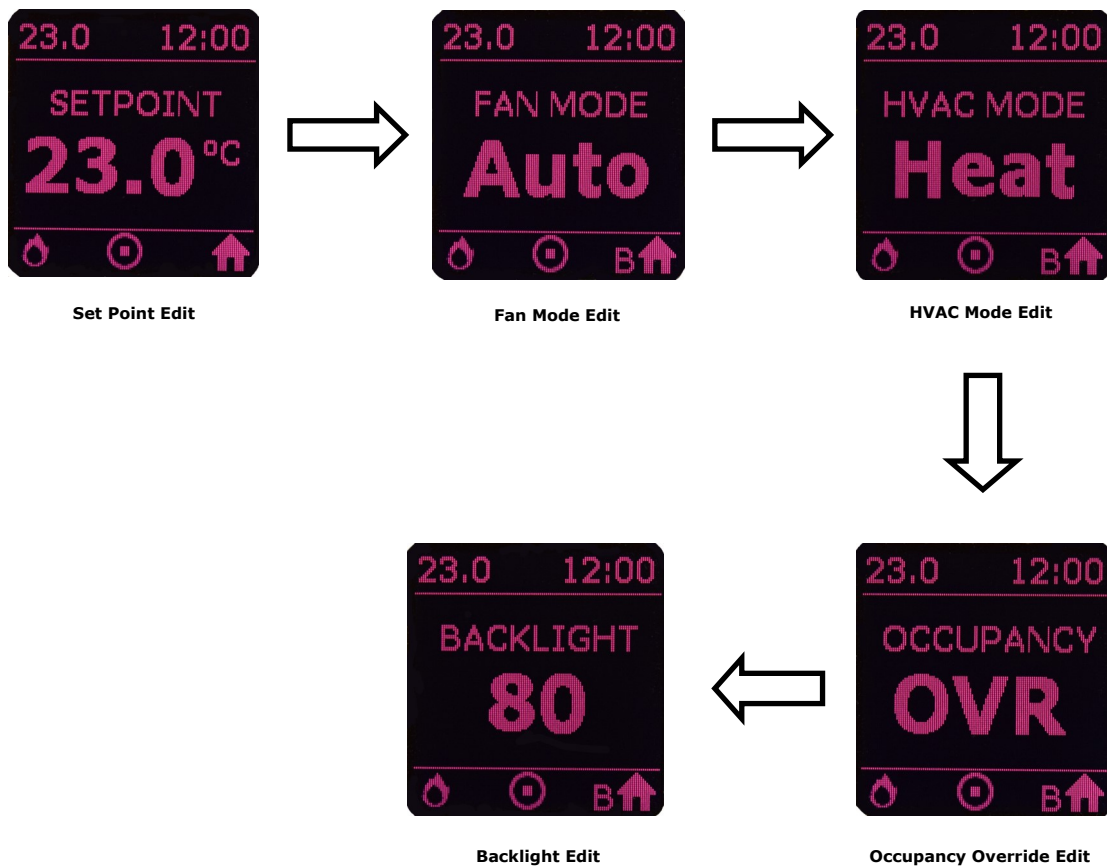
## Main Display Color

Main Display will change color depended on the HVAC Mode and if system is actually running. When system is running display will change color to Blue for cooling mode and Red for heating mode.



## Edit Mode Display Features

If middle click button is pressed on the dial, thermostat will go in to Edit Mode, though Edit mode different parameters may be set and changed. Which parameters are available is setup up through Modbus communication using Modbus registers. If there is no activity in the Edit mode for 5 seconds thermostat will switch back to the main screen.



















## Modbus Holding Registers


















Address	Description	Function
0	Room Temperature (Scale 0.1) in Celsius	Read
1	Optional Room Humidity	Read
2	Temperature Unit (0-Celsius, 1-Fahrenheit )	Read/Write
3	Backlight Level (0-100%)	Read/Write
4	Actual System HVAC Mode (0-Cool, 1-Heat)	Read/Write
5	Actual System Run Status (0-Off, 1-Running in Heat or Cool)	Read/Write
10	Enable Clock (0-Disabled, 1-Enabled)	Read/Write
11	Hours Register	Read/Write
12	Minutes Register	Read/Write
15	Enable Fan Icon on Main Screen (0-Disabled, 1-Enabled)	Read/Write
16	Fan Status for Icon (0-Fan Off, 1-Fan On)	Read/Write
20	Enable Occupancy Icon on Main Screen (0-Disabled, 1-Enabled)	Read/Write
21	Occupancy Status for Icon (0-Unoccupied, 1-Occupied)	Read/Write
25	Enable Weather Icon on Main Screen (0-Disabled, 1-Enabled)	Read/Write
26	Weather Icon Code (See Weather Icons Table)	Read/Write
27	Outside Air Temperature (Signed Integer)	Read/Write
30	Enable Set Point Edit Mode (0-Disabled, 1-Enabled)	Read/Write
31	Room Set Point (Scale 0.1)	Read/Write
32	Maximum Room Set Point (Scale 0.1)	Read/Write
33	Minimum Room Set Point (Scale 0.1)	Read/Write
35	Enable Fan Mode Edit Mode (0-Disabled, 1-Enabled)	Read/Write
36	Actual Fan Mode (0-Off, 1-On, 2-Auto)	Read/Write










## Modbus Holding Registers

Address	Description	Function
40	Enable HVAC Mode Edit Mode (0-Disabled, 1-Enabled)	Read/Write
41	Actual HVAC Mode (0-Cool, 1-Heat, 2-Auto)	Read/Write
45	Enable Occupancy Override Edit Mode (0-Disabled, 1-Enabled)	Read/Write
46	Actual Occupancy (0-Unoccupied, 1-Overridden to Occupied)	Read/Write

## Weather Icons

Icon	Code	Description
	99	Wind Rain
	100	Wind Cloud
	101	Wind Rain Black
	103	Sunrise
	104	Sun
	105	Sun Half
	106	Sun Black
	107	Snow 1
	108	Snow Black 2
	109	Snow Black 1
	110	Snow 4
	111	Snow 3
	112	Snow 2
	113	Rain Black 2
	114	Rain 2
	115	Rain 1
N/A	116	N/A

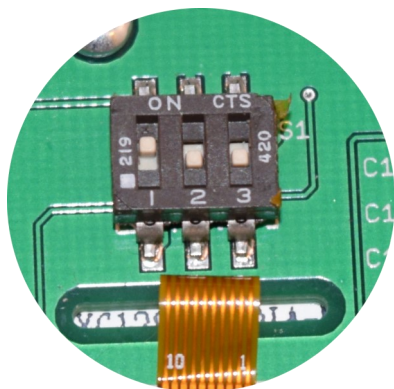
Icon	Code	Description
	117	Moon Black
	118	Moon
	119	Lighting Black 2
	120	Lighting Black 1
	121	Lighting 4
	122	Lighting 3
	65	Lighting 2
	66	Lighting 1
	67	Hail Black
	68	Fog
	69	Fog Sunrise
	70	Fog Sun
	71	Fog Moon
	72	Fog Cloud
	74	Cloud Sun Black
	75	Cloud Sun
	76	Cloud Moon

Icon	Code	Description
	77	Moon Black
	78	Cloud Black 2
	79	Cloud Black 1
	80	Cloud 2
	83	Wind Black
	84	Rain Black
	85	Cloud 1
	86	Hail
	88	Home

## Modbus Addressing and End of Line Resistor Switch

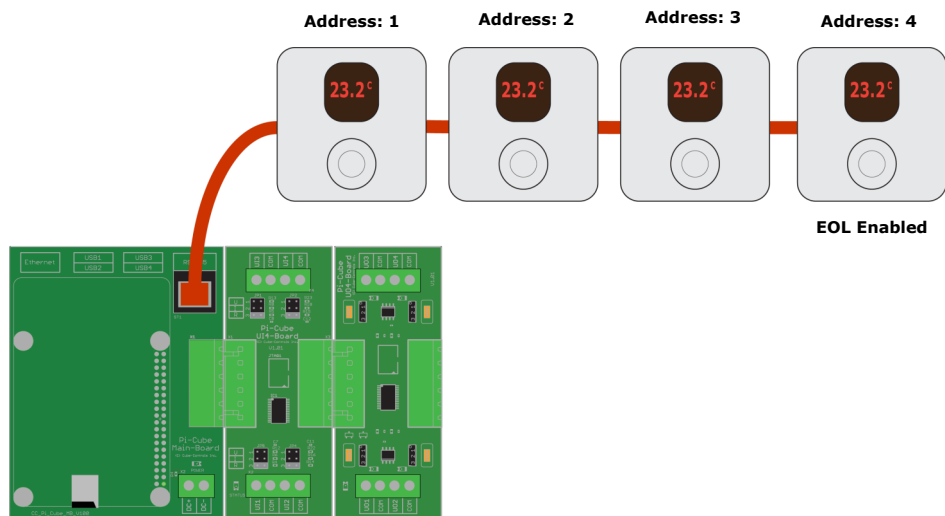
To address each thermostat, DIP switches are provided on the back of thermostat, there is possibility to address up to four thermostats , as well there is DIP switch to enable end of line resistor on the last thermostat.

Note : New version of the board has S1-4 switch that is not supported by software at this moment.



<b>S1-1 ON</b>	<b>End of Line Enabled</b>
<b>S1-1 OFF</b>	<b>End of Line Disabled</b>

Modbus Address	S1-2	S1-3
1	OFF	OFF
2	ON	OFF
3	OFF	ON
4	ON	ON

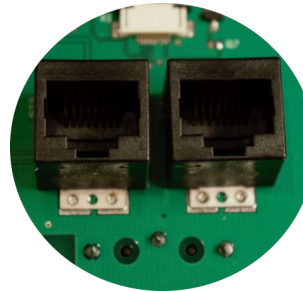


## Installation and Wiring

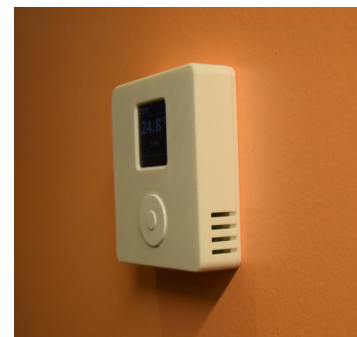
In order to install thermostat to the wall, remove base of thermostat by unlocking bottom part of thermostat with a screwdriver.



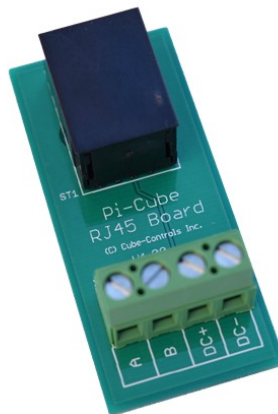
Thermostat has two RJ45 plugs on the back that are used to connect thermostats back to Main Pi Cubes board as well to daisy chain them using CAT5 cables.



Base of the Thermostat has four mounting holes as well arrow that points up for correct installation. Thermostat juts snaps on the base, attaching first top of the thermostat and then just pushing bottom until snaps in.



## RJ45 Adapter Installation



RJ-45A Adapter provides easy way to transfer from CAT5 cable to regular twisted wire shielded cable. We recommend to use 18AWG Twisted Pair Cables for Communication and Power.

Adapter provides a simple solution to connect CTA Thermostat to another embedded platform using RS-485 Modbus RTU communication.

Connectors have functions as per next table:

Connector	Function
A	RS-485 A+
B	RS-485 B-
DC+	6-15VDC Input
DC -	0 VDC Input



## Humidity Sensor Installation

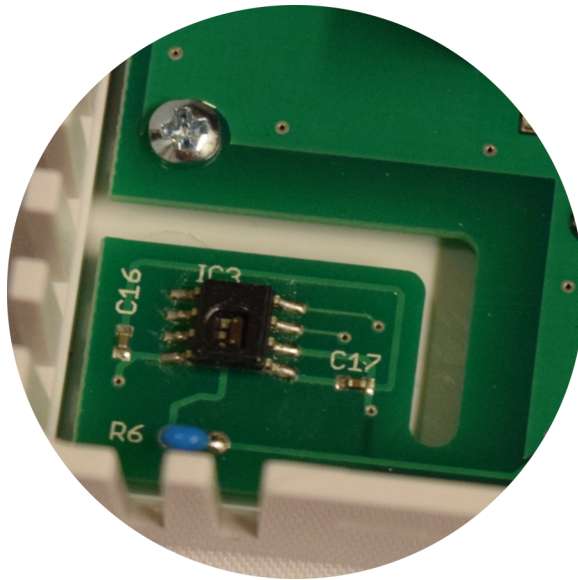
Communication Thermostat has option to be ordered with Humidity Sensor.

If sensors was not ordered with Humidity sensor it can be installed/soldered after fact.

Order Honeywell Sensor HIH8130-021-001S from an Electronic Supplier or Cube-Controls Inc.

Solder sensor as per image below , best is to remove PCB from the housing for installation.

Once sensor is installed and Thermostat powered up , software will automatically recognize sensor and it will show Humidity on the Display.





## **Pi-Cubes Installation Terms & Conditions**

**Pi-Cubes is FCC 15/ICES-003 Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures:**

- **Use all grounded shield cables.**
- **Install Pi-Cubes Main Board in to grounded control panel.**
- **Use adequate Ferrites on the cables if needed.**

**Pi-Cubes will be subassemblies of your final product and you have full and exclusive responsibility to assure safety and compliance of your product based on the Pi-Cubes with all Federal, State and local regulatory requirements and other applicable regulatory requirements.**

### **NO LIABILITY**

**TO THE MAXIMUM EXTENT PERMITTED UNDER APPLICABLE LAW, CUBE-CONTROLS INC., SHALL NOT BE LIABLE TO YOU, OR ANY THIRD PARTY, FOR ANY INDIRECT, EXEMPLARY, SPECIAL, CONSEQUENTIAL OR INCIDENTAL DAMAGES OF ANY KIND ARISING IN ANY WAY OUT OF USE OF THE PRODUCTS, INCLUDING, WITHOUT LIMITATION, LOSS OF PROFITS, REVENUES OR DATA, OR COSTS OF REPLACEMENT GOODS, EVEN IF CUBE-CONTROLS INC. HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES AND NOTWITHSTANDING THE FAILURE OF ANY LIMITED REMEDY OF ITS ESSENTIAL PURPOSE.**

### **Limited Product Warranty**

**We warrant Cube-Controls Products will be free from manufacturing defects for a period of thirty (30) days following the date of delivery to you. We will replace, repair or credit you for any confirmed defective product at our option. Please contact [info@cube-controls.com](mailto:info@cube-controls.com) with any issues.**