Standard program for µPC3 chilled water unit

Computer Room Air Conditioning – Chilled Water Unit

ENG User manual

阅读并保存这些用法说明

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Integrated Control Solutions & Energy Savings

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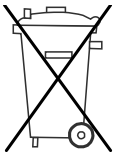


INFORMATION FOR USERS ON THE CORRECT HANDLING OF WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE)

In reference to European Union directive 2002/96/EC issued on 27 January 2003 and related national legislation, please note that:

1. WEEE cannot be disposed of as municipal waste and such waste must be collected and disposed of separately.
2. The public or private waste collection systems defined by local legislation must be used. In addition, the equipment can be returned to the distributor at the end of its working life when buying new equipment.
3. The equipment may contain hazardous substances: the improper use or incorrect disposal of such may have negative effects on human health and on the environment.
4. The symbol (crossed-out wheeled bin) shown on the product or on the packaging and on the instruction sheet indicates that the equipment has been introduced onto the market after 13 August 2005 and that it must be disposed of separately.
5. In the event of illegal disposal of electrical and electronic waste, the penalties are specified by local waste disposal legislation.

Icon types and explanation

	Note: Pay attention to important matters; specifically, about the application of various functions of the product.
	Important: Provide users with relevant information about the use of this product.
	Guideline: Provide users with simple examples based on the most common setup.

Content

1. INTRODUCTION

1.1 Functional Overview

This program is an application software for constant temperature and humidity chilled water units, which is mainly used in CITEC µPC3 series controllers.

CRAC (Computer Room Air Conditioning – Chilled eWater Unit)

Main functions:

- Room temperature/humidity control; supports supply air, return air or supply air + return air temperature control;
- Up to two electric heaters. For electric heaters with different power rating, binary system allows for 3-stages management.
- Time zone rotation;
- Dehumidification reheat;
- Heating power adjustment;
- Integrated control of CITEC humidifier, CPY and 0~10V direct output;
- Low supply air temperature prevention;
- Chilled water valve control 0~10V;
- Active alarm, alarm log, automatic reset management of common alarms;
- I/O information display and configuration management;
- Cumulative working hours of the units;
- Sequencing of up to 16 units in a network;
- Supervisory: Modbus, BACnet;
- Display supported (pGD1, pGDx);
- Other functions (ON/OFF operation, manual control, power-down memory, multi-level password protection, etc.);

1.2 Network Architecture

Figure 1.2.1 shows the configuration of using µPC3 with Ethernet port as a controller. Unit rotation, switching of duty units and standby units are communicated through the Ethernet port. Each unit can be connected to CPY through Fieldbus1, while the display port is connected to pGD1 or pGDx. Either BMS2 port or Ethernet port (Modbus TCP) of each unit can be used for BMS master.

Unit type \ Communication	CPY	Unit rotation	Master Supervisory	pGDx
Master	Fieldbus1	Ethernet	BMS2 or Ethernet	pLAN
Slave	Fieldbus1	Ethernet	BMS2 or Ethernet	pLAN

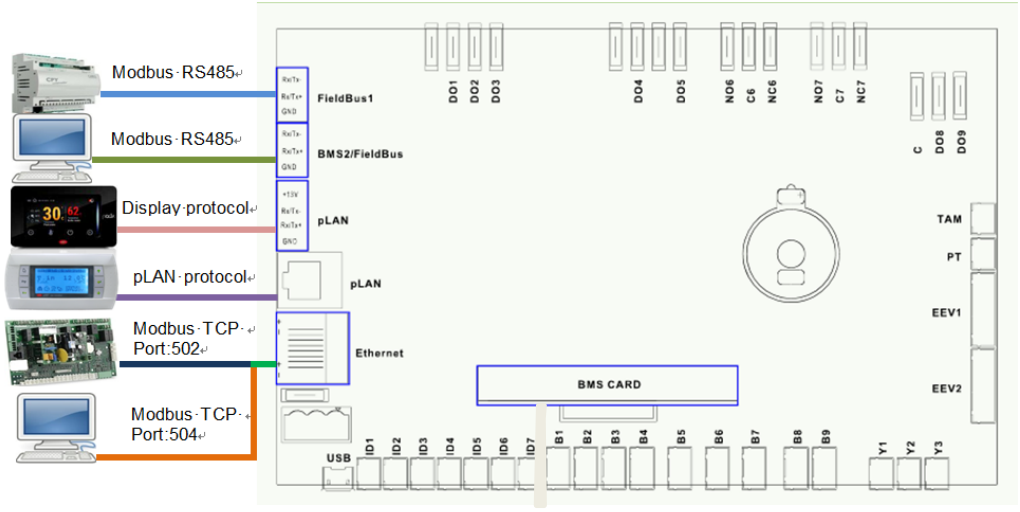


Figure 1.2.1

Please take note that this controller is connected to high voltage 230V. When servicing, extreme care should be taken to protect against shock.

2. I/O CONFIGURATION

Note: Default configuration is shown as below.

2.1 µPC3 – I/O Configuration (Return air humidity probe 0-5V)

Digital Input		Analog Input		Digital Output		Analog Output	
ID1	Air flow switch	**B4**	Return temperature (NTC)	**DO1**	Supply fan	**Y1**	Supply fan
ID2	Air pressure filter	**B5**	Supply temperature (NTC)	**DO2**	Heater step 1	**Y2**	Buzzer
ID3	Heater 1 overload	**B6**	Return humidity (0-5V)	**DO3**	Heater step 2	**Y3**	Water valve
ID4	Heater 2 overload	**B7**	Supply humidity (0-5V)	**DO4**	Humidify		
ID5	Power failure	**B8**	Water inlet temperature (Optional NTC)	**DO5**	-------		
ID6	Smoke/fire alarm or Flood detector	**B9**	Water outlet temperature (Optional NTC)	**DO6**	Dehumidification valve (Optional)		
ID7	Drip tray water or Fan overload	**B1**	Valve position (2-10V)	**DO7**	Global alarm		
B2	Water flooding switch						
B3	Remote on/off						

3. PGDX USER INTERFACE

3.1 Main screen

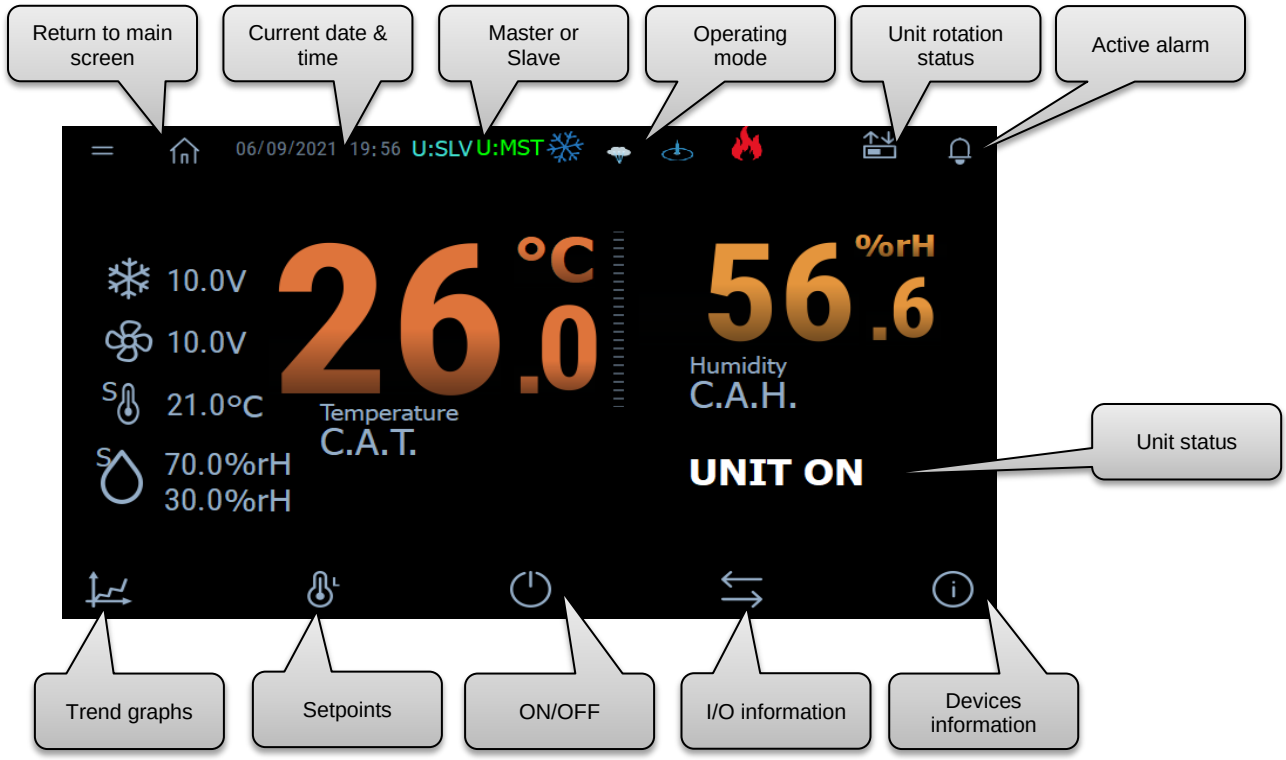


Figure 3.1.1

Note: pGDx mainly displays parameters for general users only. If need to configure factory and service parameters, please switch to pGD1.

3.2 Unit ON/OFF

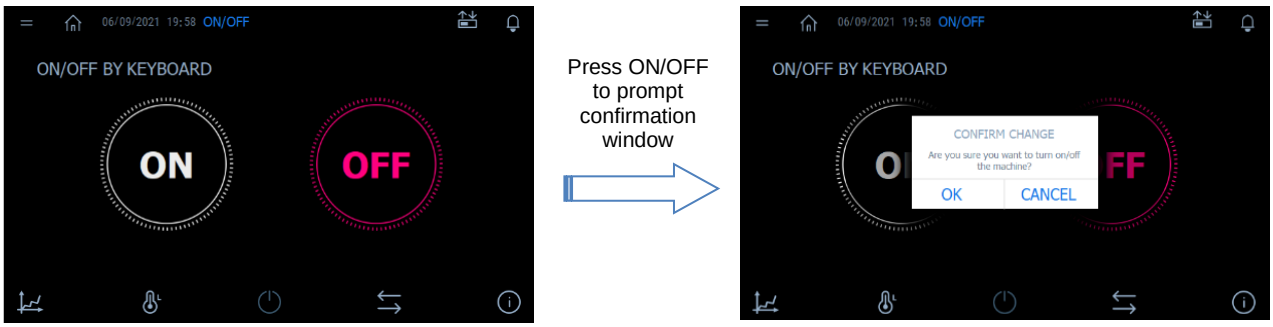


Figure 3.2.1

3.3 I/O information

I/O INFO ------ Analog inputs

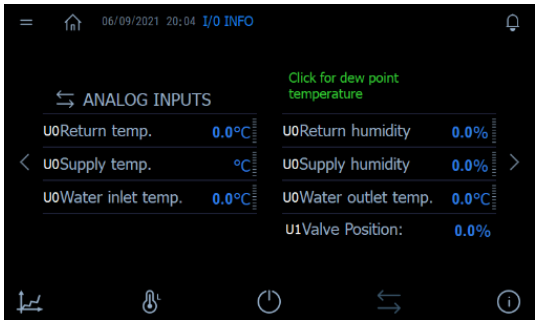


Figure 3.3.1

I/O INFO ------ Analog outputs

Figure 3.3.2

I/O INFO ------ Digital inputs

Figure 3.3.3, Figure 3.3.4

I/O INFO ------ Digital outputs

Figure 3.3.5

3.4 Setpoints

SETPOINTS ------ Current setpoint

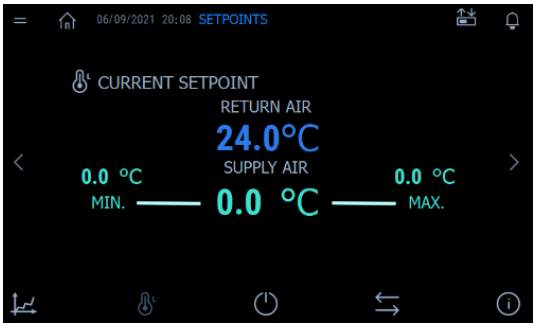


Figure 3.4.1

SETPOINTS ------ Air temperature

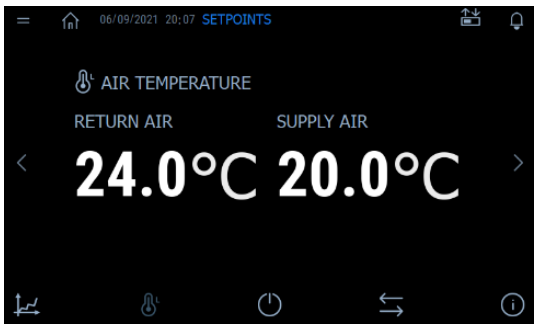


Figure 3.4.2

SETPOINTS ------ Humidity setpoints

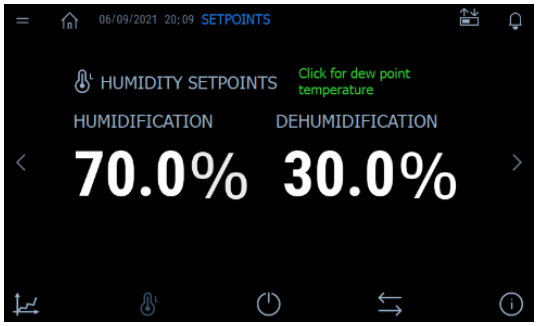


Figure 3.4.3

3.5 Devices information

DEVICES INFO ------ Water valve

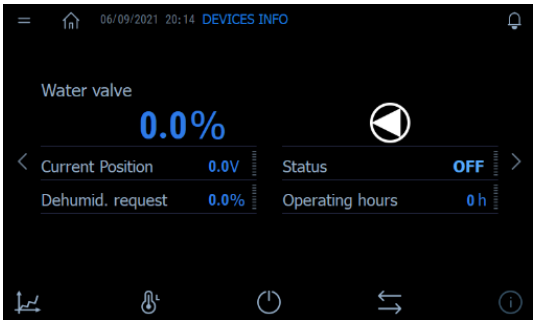


Figure 3.5.1

DEVICES INFO ------ Supply fan

Figure 3.5.2

DEVICES INFO ------ Working hours

Figure 3.5.3

DEVICES INFO ------ Change language

Figure 3.5.4

DEVICES INFO ------ Version information

Figure 3.5.5

3.6 Trend graphs

TREND GRAPH ------ Live trend

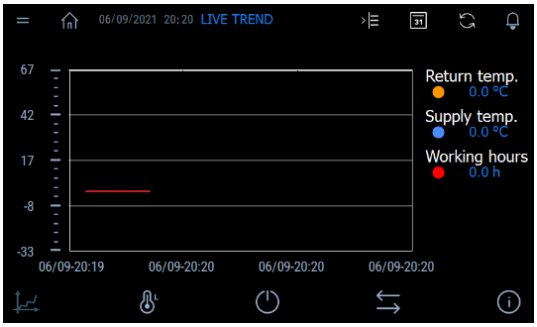


Figure 3.6.1

TREND GRAPH ------ History trend

Figure 3.6.2

3.7 Active & history alarms

ALARMS ------ Active alarms

Figure 3.7.1

ALARMS ------ History alarms

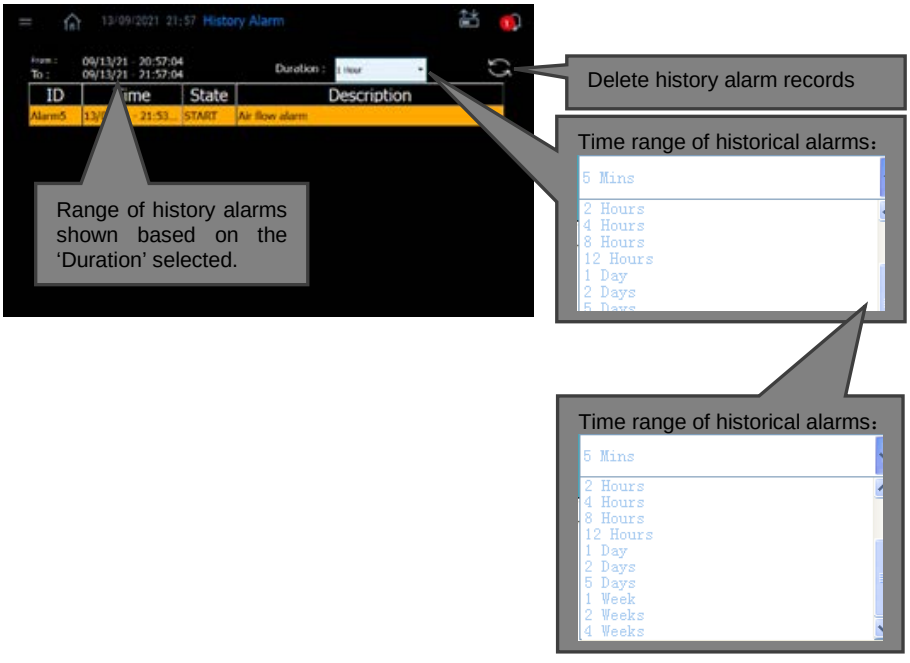


Figure 3.7.2

3.8 Network rotation

Rotation ------ Unit rotation

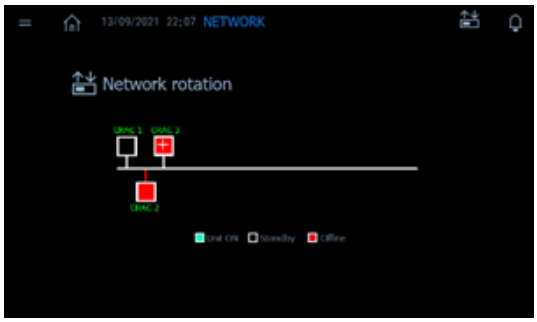


Figure 3.8.1

3.9 pGD1 switching

To switch from pGDx to pGD1 display, go to main menu and select “pgD1 Emulator” as shown in Figure 3.9.1 below.

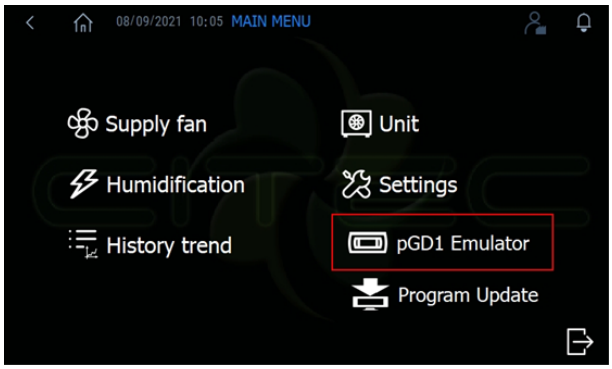


Figure 3.9.1

pGD1 display example:

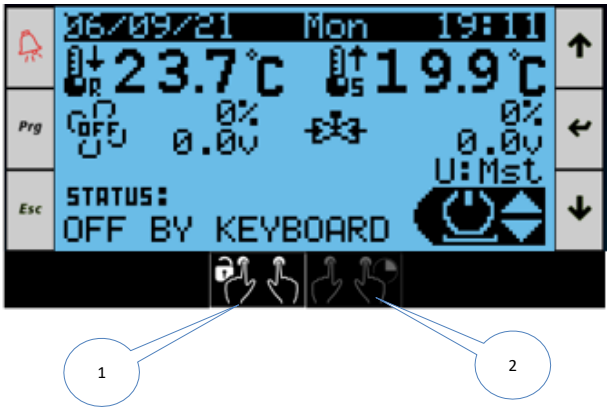


Figure 3.9.2

Note: To operate a combination key, first click 1, then select the desired combination key. Finally, click 2 or long press 2 (delayed entry) to enter the desired interface.

4. PGD1 USER INTERFACE

4.1 Terminal graphic

This program supports both pGD1 and pGDx. The following is an introduction to the pGD1 terminal.

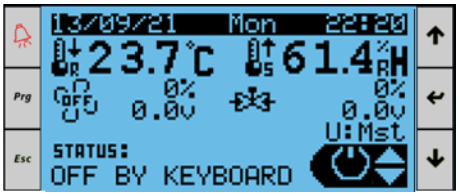


Figure 4.1.1

As shown in figure above, the terminal has 6 keys whose meanings are described below:

- Alarm	Display list of activated alarms
Prg *- Prg*	Access main menu
Esc *- Esc*	Return to previous screen
- Up	Navigate between display screens or increase/decrease value
- Down	
- Enter	Enter selected sub-menu or confirm set value

4.2 Display screen

Figure below shows an example of main screen:

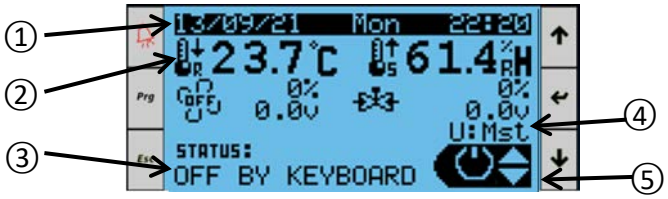


Figure 4.2.1

1- Date and time;

2- Current temperature and humidity;

3- Unit status;

Unit ON
OFF BY ALARM
OFF BY BMS
OFF BY DI
OFF BY KEYBOARD
MANUAL MODE
Rot. Standby
Cooling
Dehumidification

4- Unit address (Master Mst or Slave address 1..15);

5- Press *Down* key to view the contents of frequently used menus；

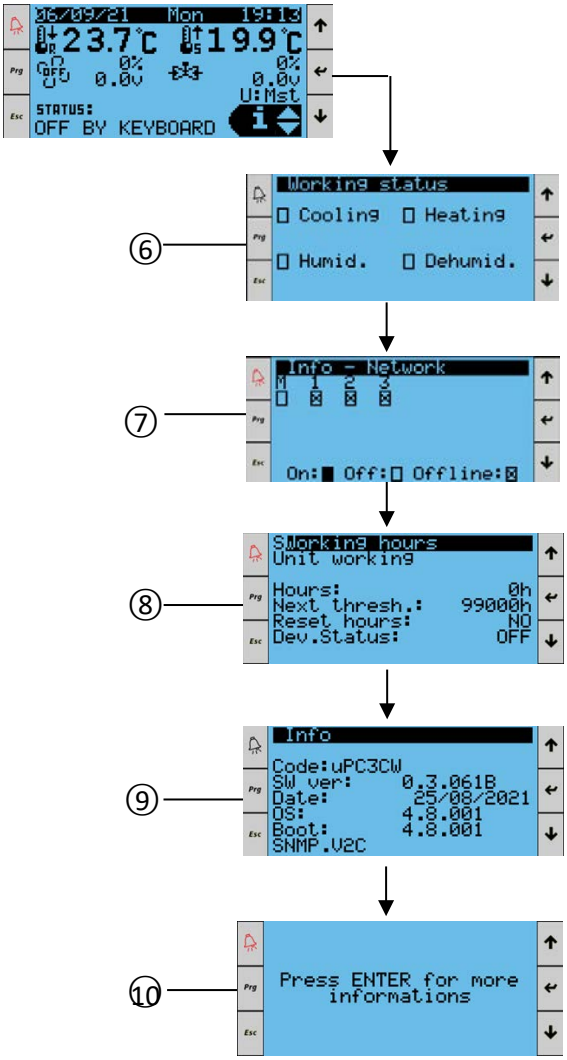


Figure 4.2.2

6- Display operating state of the unit:

Cooling	Unit is in cooling state
Heating	Unit is in heating state
Humidification	Unit is in humidification state and the humidifier is on
Dehumidification	Unit is in dehumidification state

7- Current network status of the unit (only visible to master unit);

8- Unit working hours;

9- Version information;

10- View unit I/O information.

5. PGD1 MENU DESCRIPTION

Main menu – Function tree

Regardless of the screen displayed, pressing the *Prg* key accesses to the main menu shown below.

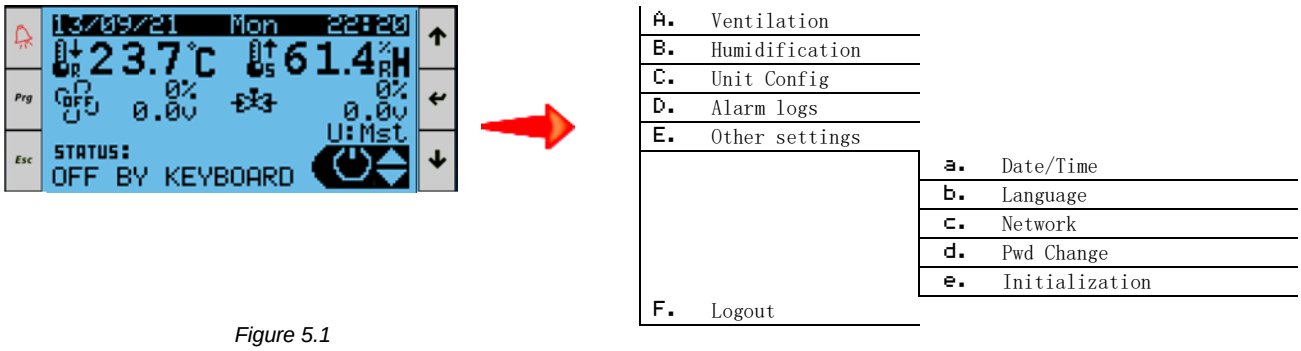


Figure 5.1

Note: In order to ensure safe operation of the unit, there is a three-level password protection.

1. User: Read access to all parameters. Able to switch the unit on/off, modify cooling/heating mode and setpoints.
2. Service: Read access to all parameters. Can modify parameters except for initialization related ones.
3. Factory: Read/modify access to all parameters.

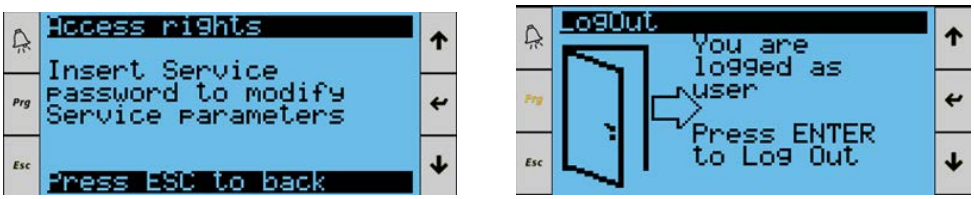


Figure 5.2

Default passwords

User: 1234 (default value)
Service: 5123 (default value)
Factory: 8328 (default value)

6. FUNCTIONS

6.1 Unit ON/OFF

Unit can be switched ON/OFF through the user interface with operation logic as below:

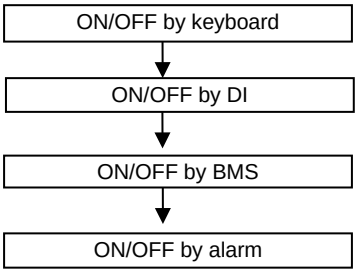


Figure 6.1.1

Therefore, alarm has the highest priority.

1: Unit ON

2: OFF by alarm

3: OFF by BMS

4: OFF by DI

5: OFF by keyboard

Figure 6.1.2

As shown in the main screen in Figure 6.1.2, press *Up* or *Down* key to turn to the switch icon, then press *Enter* key to enter the following screen, and then press *Up* or *Down* key to switch the unit on or off.

Figure 6.1.3

6.2 Temperature and humidity setpoints

The unit uses temperature and humidity setpoints for control. If dehumidification reheat function is enabled, dehumidification reheat setpoints will be added to control electric heating. Setpoints can be configured in the setpoint menu.

Figure 6.2.1

Press *Up* or *Down* key to find setpoint icon on the main screen as shown in Figure 6.2.1, then press *Enter* key to access the screen as shown in Figure 6.2.2.

Figure 6.2.2

Temperature setpoints shown in Figure 6.2.3:

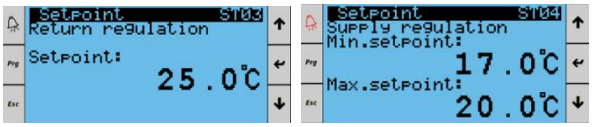


Figure 6.2.3

Humidification and dehumidification setpoints shown in Figure 6.2.4:

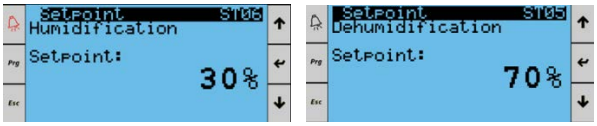


Figure 6.2.4

6.3 Temperature regulation

There are 3 different temperature regulation strategies in this program:

- Return air control;
- Supply air control.
- Supply air + return air control (default option);

Users can select temperature regulation strategy according to their own needs in unit configuration menu as shown in Figure 6.3.1.

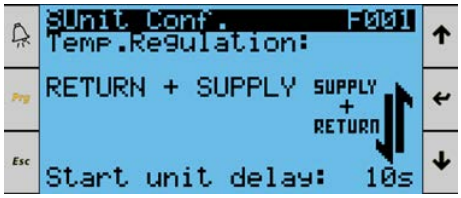


Figure 6.3.1

1. **Return air OR supply air control:**

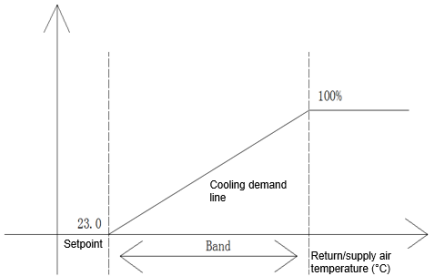


Figure 6.3.2

0%-100% line in Figure 6.3.2 indicates cooling demand of unit. PID regulation of the cooling equipment as shown in Figure 6.3.2 is based on the comparison between return/supply air temperature and setpoint, as shown in Figure 6.3.3.

Figure 6.3.3

2. **Supply air + return air control (default):**

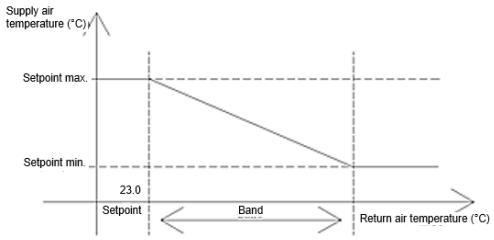


Figure 6.3.4

PID regulation of the cooling equipment as shown in Figure 6.3.4 is first based on the comparison between return air temperature and setpoint to calculate the corresponding supply air temperature setpoint. Then, comparison is made with actual supply air temperature for PID regulation.

Figure 6.3.5 shows adjustable setpoint parameters of supply air.

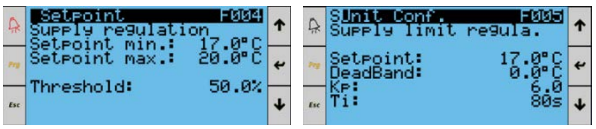


Figure 6.3.5

Figure 6.3.6 shows water valve control parameters. When return air temperature is greater than return air setpoint + opening deviation, water valve PID management is enabled; when return air temperature is less than return air setpoint - closing deviation, water valve PID management is disabled.

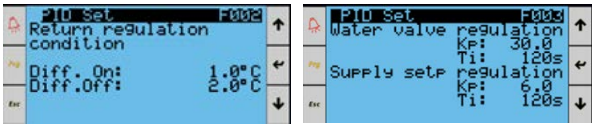


Figure 6.3.6

6.4 Low supply air or return air temperature prevention

Under cooling mode, it is sufficient to consider low supply air temperature prevention only. Under dehumidification mode, low return air temperature prevention needs to be considered too in addition to low supply air temperature prevention. The larger value of the two will be used to limit the cooling demand of water valve.

Under dehumidification mode, return air regulation has different setpoints from supply air regulation but with similar control logic. Room temperature will drop when chilled water valve dehumidifies, hence low return air temperature prevention is considered. In this case, temperature is given priority and this function is also called the prevention of low temperature during dehumidification.

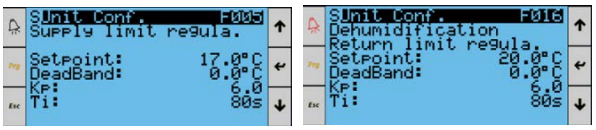


Figure 6.4.1

Figure 6.4.2 shows the restriction of supply air. As seen, if supply air temperature is lower than limit setpoint, the cooling equipment will be partially restricted. The lower the temperature, the more the restrictions.

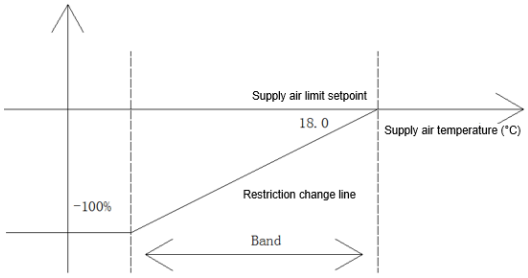


Figure 6.4.2

6.5 Humidification regulation

Humidification equipment performs PID regulation based on the comparison between indoor humidity and setpoint.

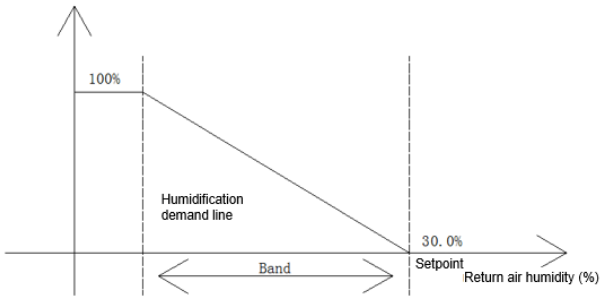


Figure 6.5.1

Types of humidification methods (configurable):

- CAREL integrated humidifier (CPY module);
- 0-10V humidification output;
- Switching on/off auxiliary humidifier (water curtain humidifier).

As shown in Figure 6.5.2, users can choose humidification method according to their needs via the humidification menu:

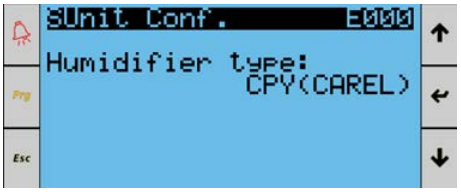


Figure 6.5.2

Figure 6.5.3

6.6 Dehumidification regulation

Dehumidification equipment performs PID regulation based on the comparison between indoor humidity and setpoint.

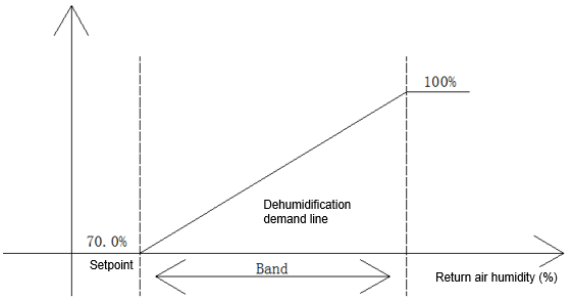


Figure 6.6.1

Types of dehumidification methods (configurable):

- Switching on/off auxiliary humidifier (use dehumidification valve);
- Reduce wind speed to dehumidify.

As shown in figure below, there are options to enable dehumidification heater or dehumidification valve according to different needs. PID calculation will determine the number of heaters to be switched on or the degree of opening for the water valves.

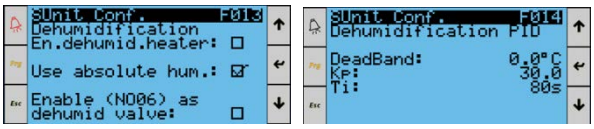


Figure 6.6.2

During dehumidification process, heaters are allowed to operate and compensate for temperature difference caused by the opening of chilled water valve. When dehumidification valve is selected, there is an ON/OFF output and it will reduce the rotation speed of a 0-10V supply fan.

Figure 6.6.3

Note: There are two scenarios for dehumidification. One is based on the demand for dehumidification; and the other is based on the configurable degree of opening of dehumidification valve. (By default, the chilled water valve is fully open during dehumidification)

6.7 Reheating regulation

Reheating in this program is mainly used for two operations: 1. Unit heating operation; 2. Auxiliary heating to prevent indoor temperature from dropping too low when the unit is in cooling and dehumidification mode. Number of heaters can be 0/1/2/binary based on unit configuration. When the number is set to 0, it means that reheating regulation is disabled; and the three other numbers represent 3 different levels of regulation methods in reheating. Figure 6.7.1 shows examples of ON/OFF management under 3 different levels of reheating regulation methods and analog output control of heaters for a unit under heating operation.

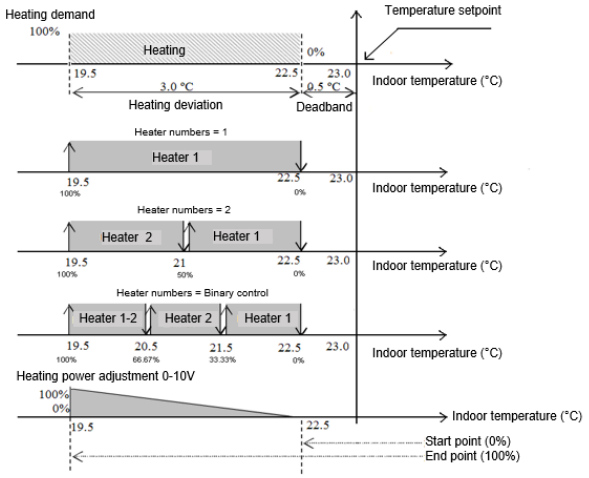


Figure 6.7.1

Figure 6.7.2 shows reheating parameters setting:

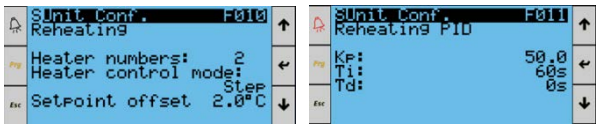


Figure 6.7.2

Under cooling and dehumidification mode, if dehumidification reheat function is enabled, the reheating regulation is similar to the figure above. The difference is shown in Figure 6.7.3 with temperature setpoint replaced by dehumidification reheat temperature setpoint. PID will calculate reheating demand and control heaters output.

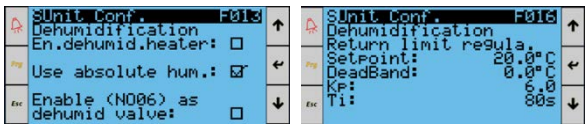


Figure 6.7.3

6.8 Supply fan regulation

When unit is turned on, the supply fan will be turned on with a delay of 10s and remains on. When unit is turned off, the supply fan is turned off with a delay of 30s. Both the delay timers are configurable. Besides ON/OFF output, the supply fan can use 0-10V analog output as well. When using 0-10V analog output, either temperature difference control or return air temperature control can be selected (return air temperature control as default). The unit can be configured to automatically shut down if related alarms such as *fan overload* and *air flow failed* are triggered. The following figure shows 0-10V analog output of supply fan and take note that during dehumidification mode, fan speed is reduced to 5.0V (configurable).

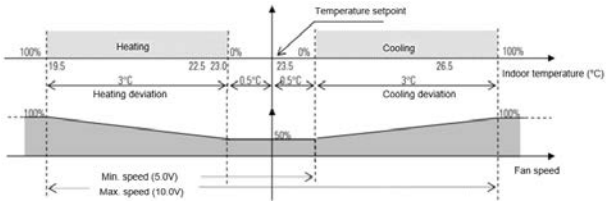


Figure 6.8.1

Supply fan parameters such as regulation mode, maximum and minimum speed can be configured in the menu as shown in Figure 6.8.2.

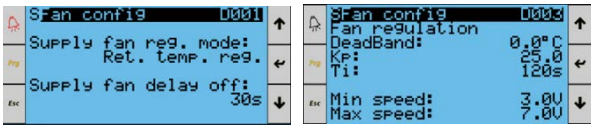


Figure 6.8.2

6.9 Network rotation

This program supports centralized control of up to 16 units within the local area network, and contains three functions:

- Unit rotation: Each unit can be individually configured to enable rotation.

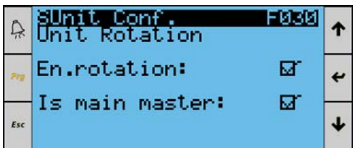


Figure 6.9.1

- Master control: When master control is enabled, the cooling, heating, humidification and dehumidification operations of slave units will follow master unit (optional).

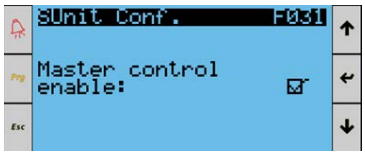


Figure 6.9.2

- Force unit on by temperature: Supports switching on standby units if temperature and humidity exceed limits (optional).

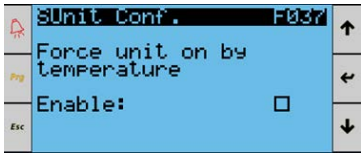


Figure 6.9.3

The following explains:

1. Unit rotation

In this program, unit rotation is communicated through Modbus TCP protocol. Use a RJ45 switch hub to connect all the controllers via Ethernet ports and configure the master & slave units as below:

a. Master unit configuration (including slave IP address):

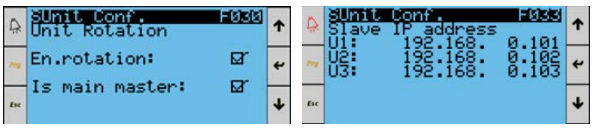


Figure 6.9.4

Set the slave IP addresses as 192.168.0.101, 192.168.0.102, 192.168.0.103 … (up until 192.168.0.115 for 15 slave units). This needs to be configured in master unit.

b. Slave unit configuration:

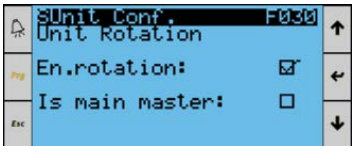


Figure 6.9.5

2. Number of backup units

The number of backup units among the units participating in unit rotation.

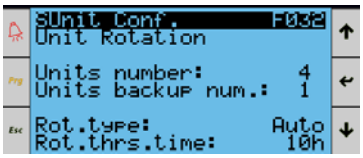


Figure 6.9.6

3. Rotation type

There are three types of rotation: automatic rotation, rotation according to working hours, and time zone rotation;
Rotation period: once every x hours;

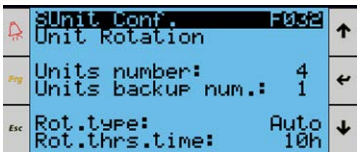


Figure 6.9.7

Note:

1) Minimum of 2 units participating in unit rotation;
2) The number of backup units must be greater than 0;
3) Units participating in unit rotation shall be switched on using the terminal;

o **Automatic rotation**

In this mode, for the units participating in the network rotation,
Number of units turned on = Total number of units participating in the rotation – number of backup units;
At intervals of a rotation period, the first unit will enter standby, and the subsequent backup unit will be turned on.
For example: There are 5 units participating in the network rotation, the backup number is 2, and the rotation period is 3 hours. The sequencing is as follows:
The first units to run will be 1, 2, 3; Units 4 and 5 are on standby;
After 3 hours of operation, the rotation is triggered, Units 2, 3, and 4 are running, and Units 5 and 1 are on standby;
After another 3 hours, Units 3, 4, and 5 are running, and Units 1 and 2 are on standby;
After another 3 hours, Units 4, 5, and 1 are running, Units 2, and 3 are on standby, and so on...

o **Rotation according to working hours**

In this mode, unit rotation is similar to automatic rotation mode. The difference is that the sequence of turning on the unit will be calculated according to unit working hours (main fan working hours). During every unit rotation, the unit with shorter working hours will be turned on. Only when working hours of the duty unit exceeds the one of backup unit, and the rotation period is up, rotation process will take place.

o **Time zone rotation**

When this mode is selected, additional time zone rotation parameters need to be set under unit configuration of factory menu:

Figure 6.9.8

In this mode, the network will perform rotation at a fixed time (configurable) of a certain day, and the sequencing is the same as in the automatic rotation mode.

As shown in figure above: it is set to perform a rotation every Tuesday at 12:12.

Note: Besides the above fixed hours or fixed days configuration that will trigger rotation, the following situations will trigger rotation too:

1) Unit in operation failed and shut down;
2) Slave unit in operation is powered off or disconnected;
3) Duty unit in shut down by terminal;
4) Once the above conditions are removed, the unit will resume its previous operating conditions.
5) When master unit is powered off or disconnected, backup units from slave will be turned on until the master unit reconnects to the network.
6) When unit rotation is enabled for the first time and master and slave addresses are set, the controller needs to be restarted.

6.10 Probe configuration

To make full use the versatility and scalability of this program, all input and output points can be configured to suit different user configurations. When unit is off, access to unit configuration screen under factory menu:

1. Return air humidity probe configuration

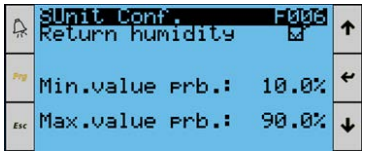


Figure 6.10.1

As shown in Figure 6.10.1, users can select the relevant probe type according to configuration of the unit.

2. Supply air humidity probe configuration

Figure 6.10.2

As shown in Figure 6.10.2, if user has configured supply air humidity probe, it needs to be enabled in the unit configuration screen under factory menu.

3. Water inlet and outlet temperature probe configuration

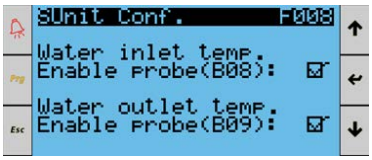


Figure 6.10.3

As shown in Figure 6.10.3, if user has configured the water inlet/outlet temperature probe, it needs to be enabled in the unit configuration screen under factory menu.

6.11 Restore default parameter values

There are three ways to install CITEC default values on µPC3:

1. Access the initialization menu and insert default values:

Figure 6.11.1

2. Upload this program to the controller for the first time;
3. Update the version of this program.

Note: The controller will automatically restart after restoring the default parameters values.

7. ALARM

7.1 View and reset active alarm

7.1.1 ALARM key and LED indicator

Regardless of the screen displayed, pressing the *Alarm* key will display the active alarms. There are three different situations: no alarm is activated, or at least one alarm is activated, or at least one alarm has been activated and the alarm has been automatically reset.

1- If no alarm is activated, the following screen will be displayed:

Figure 7.1.1

Press *Esc* key to return to previous screen.
Press *Enter* key to view the alarm log.

2- If at least one alarm is activated, pressing the *Alarm* key will first mute the buzzer and then display the latest activated alarm screen. Press the *Up* or *Down* key to scroll through other alarms; holding *Alarm* key for more than 3 seconds will attempt to clear the alarm and return to main screen. If the alarm is not successfully cleared, the alarms loop continues.

3- At least one alarm has been activated and the alarm has been automatically reset. At this time, pressing the *Alarm* key will automatically display the alarm log screen to facilitate users to check history alarms.

The red LED indicator of the *Alarm* key can be:
- Off: No activated alarm;
- Flashing: At least one alarm is activated, or at least one alarm that has not been checked and has been reset automatically.

7.1.2 Reset alarm

The alarms can be reset manually, automatically or semi-automatically:

- Manual reset: If the alarm condition no longer exists, press and hold the *Alarm* key for 3 seconds to clear the alarm.
- Automatic reset: When the alarm condition ends, the buzzer is automatically muted and the alarm is reset.
- Semi-automatic reset: The number of alarm activations per hour is calculated. If that number is less than the set maximum, the alarm is on automatic reset, once the limit is exceeded it becomes manual reset.

7.2 Alarm log

From the main screen, entering the Alarm Log menu allows access to the alarm log screen.

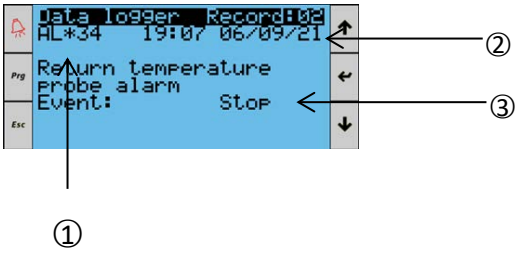


Figure 7.2.1

Information displayed on the screen: alarm events (indicating how "old" the alarm is: AL*01 is the oldest alarm); the time and date when the alarm occurred; a brief description of the recorded alarm.
The alarm log can be cleared via initialization menu, the screen is as below:

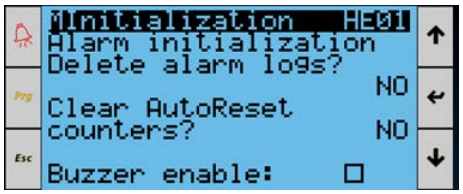


Figure 7.2.2

Note:

1) A maximum of 64 alarms can be recorded. If more than 64 alarms, the most recent alarm will overwrite the oldest one;

2) Refer to Appendix 1 for list of alarms.

8. MASTER SUPERVISORY

This program can be connected with various types of supervisory systems using Modbus protocol. Supervisory by master unit can be enabled via unit configuration menu as shown in Figure 8.1.

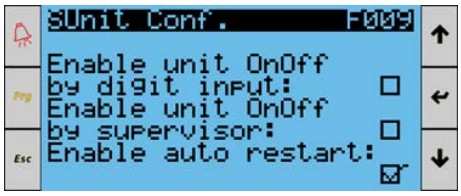


Figure 8.1

Parameters such as communication protocol, address etc. can be configured under (E. Other Settings – Communication Management). Users can establish communication with BMS master via BMS2 port or Ethernet port for each unit individually.

As shown in Figure 8.2, BMS2 port is used to establish communication with BMS master through Modbus protocol for each unit individually;

Figure 8.2

As shown in Figure 8.3, users can use Ethernet port to establish communication with the BMS master through Modbus

TCP protocol for each unit individually;

Figure 8.3

8.1 Modbus protocol address list

Following table shows a list of Modbus protocol parameters and addresses. For µPC3 controller with Ethernet port, communication address of BMS master is U1. In this case, each unit will individually send communication addresses to BMS master.

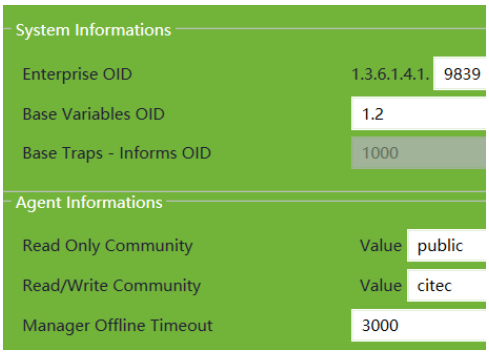
U1 protocol address list

Address	Description	Types	Access
2	Unit On/Off by BMS	Coil	ReadWrite
3	Alarm reset by BMS	Coil	ReadWrite

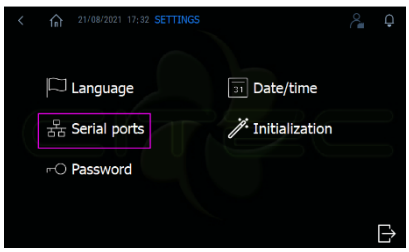
Address	Description	Types	Access
1	Return air temperature	HoldingRegister	Read
2	Return air humidity	HoldingRegister	Read
3	Supply air temperature	HoldingRegister	Read
4	Supply air humidity	HoldingRegister	Read
5	Water inlet temperature	HoldingRegister	Read
6	Water outlet temperature	HoldingRegister	Read
7	Water valve signal - Value	HoldingRegister	Read
8	Supply fan - Value	HoldingRegister	Read
9	Humidifier - Value	HoldingRegister	Read
10	D_input Status / 0=closed / 1= Open (Refer to Note 1)	HoldingRegister	Read
11	D-output status /0= Inactived /1=Actived (Refer to Note 1)	HoldingRegister	Read
12	Return air setpoint	HoldingRegister	ReadWrite
13	Supply air setpoint	HoldingRegister	ReadWrite
14	Humidification setpoint	HoldingRegister	ReadWrite
15	Dehumidification setpoint	HoldingRegister	ReadWrite
16	Supurvisor.Alarm_Word1 (Refer to Note 1)	HoldingRegister	Read
17	Supurvisor.Alarm_Word2 (Refer to Note 1)	HoldingRegister	Read
18	Supurvisor.Alarm_Word3 (Refer to Note 1)	HoldingRegister	Read
19	Supurvisor.Alarm_Word4 (Refer to Note 1)	HoldingRegister	Read
20	Working_Status (Refer to Note 1)	HoldingRegister	Read

SNMP V2C Protocol

SNMP OID defined in the CITECµPC3 CW 3.61 program:



Operation mode of TRAP Receiver IP address for pGDx 7 has been modified under CITECµPC3 CW 3.61 program.



Note 1: Refer to table below and read according to bits.

Unit status (digital input)	Description
Integer 0	Air flow switch
Integer 1	Air pressure filter
Integer 2	Heater 1 overload
Integer 3	Heater 2 overload
Integer 4	Power failure
Integer 5	Smoke/fire alarm
Integer 6	Water flooding switch
Integer 7	Humidifier alarm
Integer 8	Fan overload
Integer 9	Remote on/off
Integer 10	Power failure + Fan overload
Integer 11	Flood detector + Smoke/fire alarm

Alarm code 1 to 4

Alarm code 1	Description
Integer 0	Air flow alarm
Integer 1	Air filter clogged
Integer 2	Unit - Overload heater2 alarm
Integer 3	Unit - Overload heater1 alarm
Integer 4	Unit -Power failure alarm
Integer 5	Smoke/fire alarm
Integer 6	Water leakage
Integer 7	Unit -Humidifier alarm
Integer 8	Unit -Fan overload alarm
Integer 9	Unit - Return temperature probe alarm
Integer 10	Unit - Return humidity probe alarm
Integer 11	Unit - Supply temperature probe alarm
Integer 12	Unit - Supply humidity probe alarm
Integer 13	Unit - Water inlet temperature probe alarm
Integer 14	Unit - Water Outlet temperature probe alarm
Integer 15	High return air temperature
Alarm code 2	**Description**
Integer 0	Low return air temperature
Integer 1	High supply air temperature
Integer 2	Low supply air temperature
Integer 3	Hours counter alarm for heater 1
Integer 4	Hours counter alarm for heater 2
Integer 5	Hours counter alarm for supply fan
Integer 6	Hours counter alarm for unit
Integer 7	Hours counter alarm for water valve
Integer 8	Retain variable to much overwritten alarm
Integer 9	Retain memory write error
Integer 10	Unit -Fan overload or Power failure alarm
Integer 11	Unit -Water leakage or Smoke/fire alarm

Unit status (digital output)	Description
Integer 0	Supply fan
Integer 1	Heater step 1
Integer 2	Heater step 2
Integer 3	Humidify
Integer 4	Global alarm
Integer 5	Dehumidification valve

Unit operating status	Description
Integer 0	Cooling
Integer 1	Heating
Integer 2	Humidification
Integer 3	Dehumidification

Alarm code 3	Description
Integer 0	CPY offline
Integer 1	Mn alarm
Integer 2	EC alarm
Integer 3	E1 alarm
Integer 4	E0 alarm
Integer 5	EH alarm
Integer 6	Ep alarm
Integer 7	EU alarm
Integer 8	E3 alarm
Integer 9	EF alarm
Integer 10	Ed alarm
Integer 11	Eh1 alarm
Integer 12	Eh2 alarm
Integer 13	SU alarm
Integer 14	CY warn
Integer 15	EA warn
Alarm code 4	**Description**
Integer 0	CP warn
Integer 1	CL warn
Integer 2	E2 warn
Integer 3	High return air humidity
Integer 4	Low return air humidity
Integer 5	High supply air humidity
Integer 6	Low supply air humidity
Integer 7	Master offline
Integer 8	Slave offline
Integer 9	YDT protocol master offline

APPENDIX 1: ALARM LIST

The following list provides related information about the alarms in this program, including alarm code, description, action plan, reset method, and delay:

Alarm code	Description	Action plan	Reset method	Delay
AL01	Retain variable to much overwritten alarm	Off all units	User reset	No delay
AL02	Retain memory write error	Information only	User reset	No delay
AL03	Smoke/fire alarm	Off all units	User reset	No delay
AL04	Water leakage	Off all units	User reset	No delay
AL05	Air flow alarm	Start delay, run delay, alarm triggered then off all units	User reset	Start delay 30s, Run delay 3s (configurable)
AL06	Air filter clogged	Information only	Auto reset	Start delay 30s, Run delay 3s (configurable)
AL07	High return air temperature	Information only	Auto reset	Delay 600s
AL08	Low return air temperature	Information only	Auto reset	Delay 600s
AL09	CPY offline	Off humidifier	Auto reset	No delay
AL10	Mn alarm	Stop humidification	Refer to CPY manual	Refer to CPY manual
AL11	EC alarm	Stop humidification	Refer to CPY manual	Refer to CPY manual
AL12	E1 alarm	Stop humidification	Refer to CPY manual	Refer to CPY manual
AL13	E0 alarm	Stop humidification	Refer to CPY manual	Refer to CPY manual
AL14	EH alarm	Stop humidification	Refer to CPY manual	Refer to CPY manual
AL15	Ep alarm	Stop humidification	Refer to CPY manual	Refer to CPY manual
AL16	EU alarm	Information only	Refer to CPY manual	Refer to CPY manual
AL17	E3 alarm	Stop humidification	Refer to CPY manual	Refer to CPY manual
AL18	EF alarm	Stop humidification for 10min	Refer to CPY manual	Refer to CPY manual
AL19	Ed alarm	Stop humidification	Refer to CPY manual	Refer to CPY manual
AL20	Eh1 alarm	Information only	Refer to CPY manual	Refer to CPY manual
AL21	Eh2 alarm	Information only	Refer to CPY manual	Refer to CPY manual
AL22	SU alarm	Stop humidification	Refer to CPY manual	Refer to CPY manual
AL23	CY warn	Information only	Refer to CPY manual	Refer to CPY manual
AL24	EA warn	Information only	Refer to CPY manual	Refer to CPY manual
AL25	CP warn	Information only	Refer to CPY manual	Refer to CPY manual
AL26	CL warn	Information only	Refer to CPY manual	Refer to CPY manual
AL27	E2 warn	Stop humidification	Refer to CPY manual	Refer to CPY manual
AL28	Low supply air temperature	Information only	Auto reset	Delay 600s
AL29	High supply air temperature	Information only	Auto reset	Delay 600s
AL30	Hours counter alarm for heater 1	Information only	Auto reset	No delay
AL31	Hours counter alarm for heater 2	Information only	Auto reset	No delay
AL32	Hours counter alarm for unit	Information only	Auto reset	No delay
AL33	Hours counter alarm for water valve	Information only	Auto reset	No delay
AL34	Unit - Return temperature probe alarm	Off the unit if temperature control is based on either supply air + return air or return air only	Auto reset	Delay 10s
AL35	Unit - Return humidity probe alarm	Off humidifier and dehumidifier	Auto reset	Delay 10s
AL36	Unit - Supply temperature probe alarm	Off the unit if temperature control is based on either supply air + return air or supply air only	Auto reset	Delay 10s

AL37	Unit - Supply humidity probe alarm	Information only	Auto reset	Delay 10s
AL38	Unit - Water inlet temperature probe alarm	Information only	Auto reset	Delay 10s
AL39	Unit - Water Outlet temperature probe alarm	Information only	Auto reset	Delay 10s
AL40	Unit - Overload heater2 alarm	Off electric heater 2	User reset	No delay
AL41	Unit - Overload heater1 alarm	Off electric heater 1	User reset	No delay
AL42	Unit -Power failure alarm	Off unit	User reset	No delay
AL43	Unit -Fan overload alarm	Off unit	User reset	No delay
AL44	Unit -Humidifier alarm	Close humidifier cylinder	Auto reset	No delay
AL45	Hours counter alarm for supply fan	Information only	Auto reset	No delay
AL46	Unit -Fan overload or Power failure alarm	Off unit	User reset	No delay
AL47	Unit -Water leakage or Smoke/fire alarm	Off unit	User reset	No delay
AL48	High return air humidity	Information only	Auto reset	Delay 600s
AL49	Low return air humidity	Information only	Auto reset	Delay 600s
AL50	High supply air humidity	Information only	Auto reset	Delay 600s
AL51	Low supply air humidity	Information only	Auto reset	Delay 600s
AL52	Master offline	Information only	Auto reset	Delay 30s
AL53	Slave offline	Information only	Auto reset	Delay 30s
AL54	YDT protocol master offline	Information only	Auto reset	Delay 500ms

APPENDIX 2: PROGRAM DOWNLOAD

Program download for controller

1. Connect controller to a PC using Micro USB data cable to read controller's storage disk. Double-click to access storage disk and three folders will be shown as Figure 9.1.1 below; (Note: controller in powered on state)

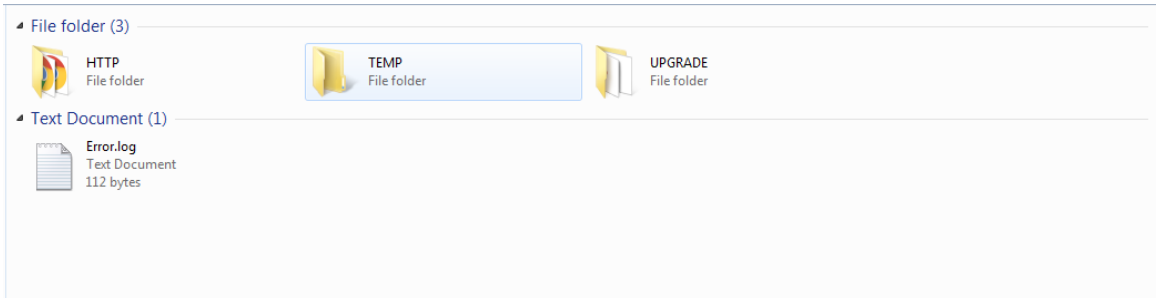


Figure 9.1.1

2. Double-click UPGRADE folder and place .ap1 file compiled by OS and program into this folder, as shown in Figure 9.1.2 below;

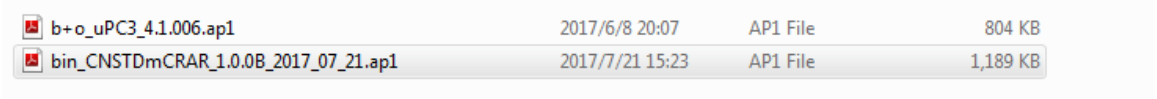


Figure 9.1.2

3. Disconnect the controller and the PC, then access to system menu through pGD1 terminal. Long press *Alarm* + *Enter* keys to enter the screen as shown in Figure 9.1.3. Select UPGRADE and press *Enter* key to choose the program to be updated;

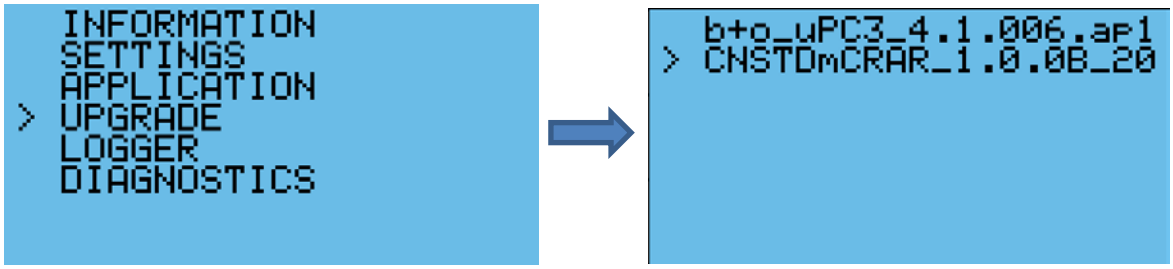


Figure 9.1.3

4. After selecting the program that needs to be updated, press *Enter* key to confirm. Upon successful update, the terminal will prompt messages as shown in Figure 9.1.4 below. Pressing *Enter* key again will restart the controller.

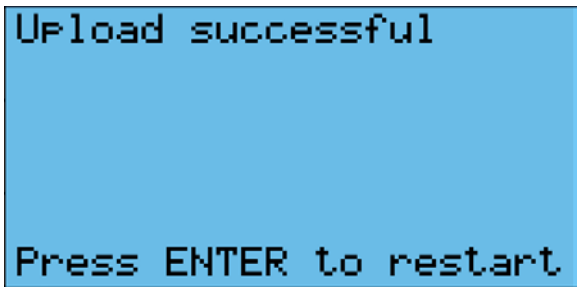


Figure 9.1.4

Important: **Procedures to update OS are the same as procedures to update program. Follow the same steps and select OS file that needs to be updated.**

Program download for pGDx

1. Save compressed file into the root directory of a USB flash drive, then insert the USB flash drive into the USB port of pGDx. Long press anywhere on the pGDx and a drop-down menu list will appear (as shown on the left figure below). Click "Update" and it will prompt a dialog box (as shown on the right figure below).

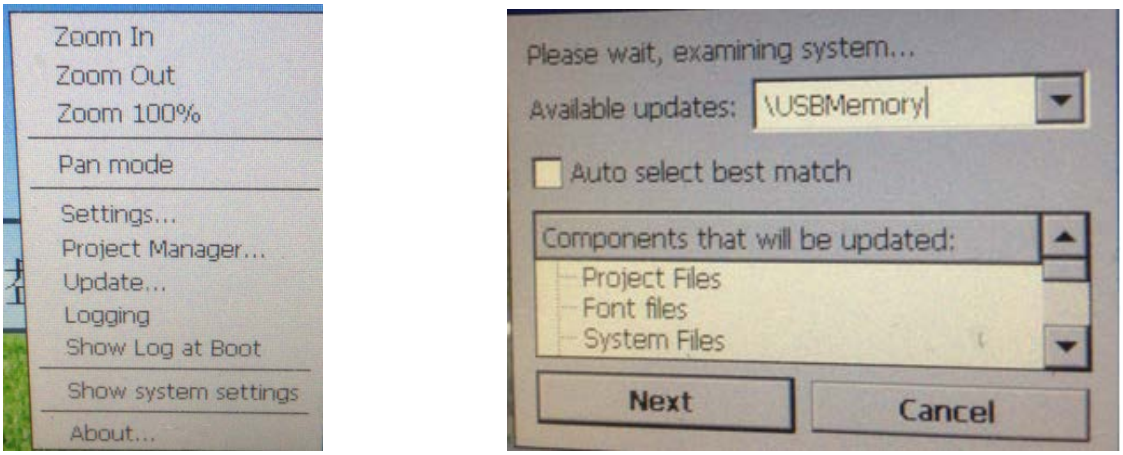


Figure 9.2.1

2. Select "Auto select best match" and then click "Next" for automatic installation. Once completed, pGDx will restart.

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