

## This document provides an overview of the UC6, plus an introduction to interpreting or configuring its operation via the pGD Service Tool.

The UC6 operates as a standalone Air Conditioning system controller. It can be configured as:

- A Split System Outdoor Unit Controller
- An Indoor Unit controller
- A Package Unit controller.

In each case, a single UC6 can be configured to control one or two separate refrigeration systems.

It can "communicate" with

- A Wall Controller such as the TZT-100 (via Modbus)
- A BMS (via a variety of communication protocols).

It can be configured to control a unit with:

- Fixed Expansion device(s)
- Up to two "Uni-polar" Electronic Expansion Valves"

Currently we are using the UC6 as an Outdoor Unit Controller, **OR** as a Package Unit Controller. In both cases the UC6 works in conjunction with a "Thermostat" / "BMS" of the Installer / Client's choice. This is the status quo at the moment although additional functionality is being developed through the addition of a "Control Sensor" connected to the "CS" terminals which will allow the UC6 to handle the room temperature control once it has been told the "Set Point Temperature".

So at this point in time the Thermostat takes responsibility for:

- Room Temperature control
- Cycle selection
- Indoor Fan Speed control
- Programmed Start and Stop times

In other words, during normal operation the UC6 receives "On/Off" requests from the switched contacts within the Thermostat to start or stop the compressor(s) in either Cool or Heat cycle.

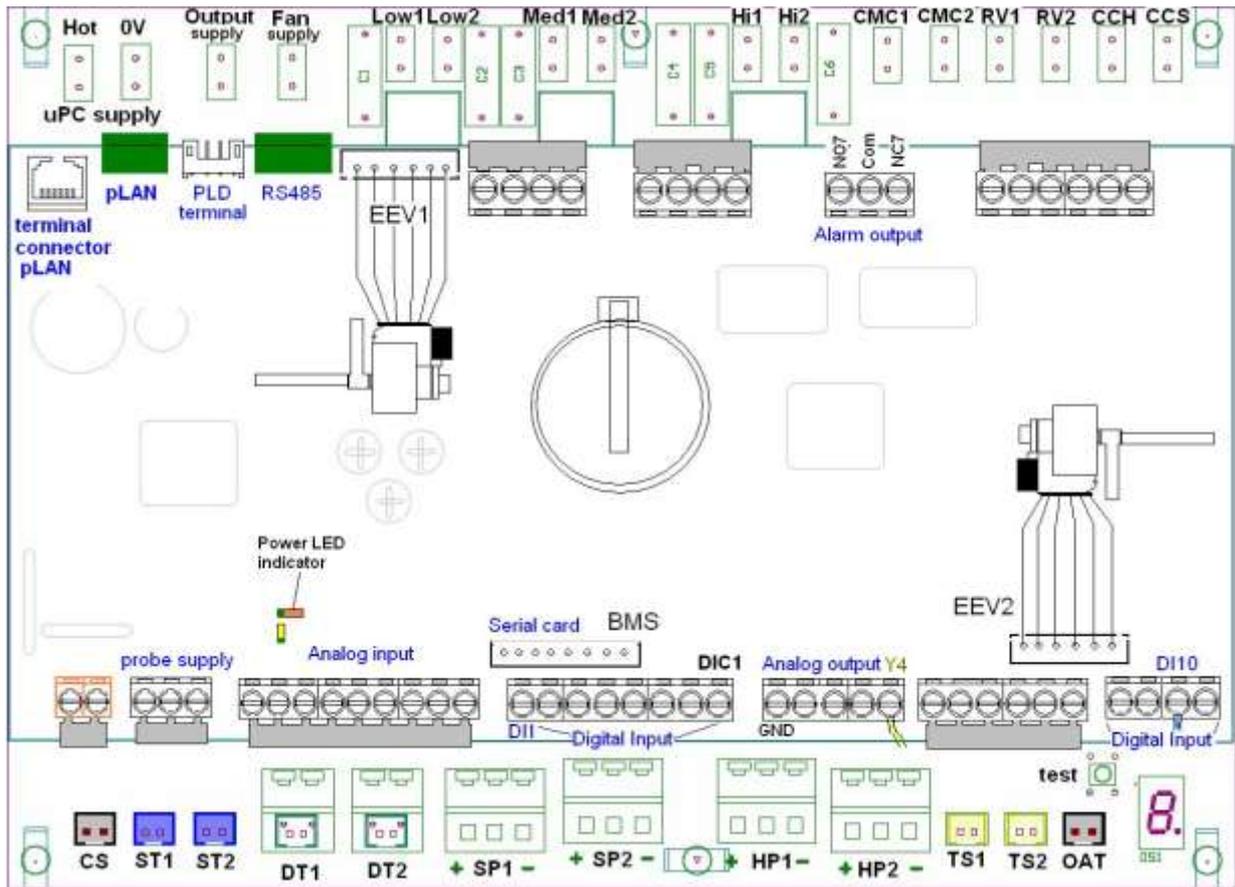
The UC6 will then intelligently manage all other functions associated with optimising the safe running of the Air Conditioner, including such things as:

- Outdoor unit Head Pressure Control or Floating Head Pressure
- Monitoring of system temperatures and pressures.
- Electronic Expansion Valve control
- Crankcase Heater switching
- Compressor Capacity (e.g. Copeland Digital Scroll)

The UC6 applies "Safety" functions which may be absent from the Thermostat, but which are relevant to the reliable operation of the Air Conditioner, such as:

- Anti-Rapid Cycle Time
- Minimum Run Time
- Start to Start Time
- Frost Protection
- De-Ice Control
- Suction and Discharge temperature and pressure limitation or tripping etc.
- Superheat regulation (when an EEV is fitted)

The diagram below shows a "Plan View" of the UC6. (Note the UC6 is a two layer construction.)



When installed in a unit at our factory the UC6 is configured to suit the unit it is controlling.

Providing access to all of the configurable functions via a simple Display and a small set of DIP switches on the PCB is difficult. There is a single-digit, 7-segment display which indicates the major points of operation or faults. (See later in this document for a tabulated list of what each displayed digit represents.) However for a full analysis of what a UC6 is doing, or to configure it for a particular mode of operation it is necessary to connect a "pGD" to the RJ45 connector (labelled "terminal connector pLAN" in the diagram above) in the top left hand corner of the UC6 top board.

**Note:- The pGD is a Display Terminal. It does not form any part of the UC6 "control" function.**

Therefore once the UC6 is configured the pGD is normally removed. A pGD can be reconnected for field service "diagnostic" purposes. The settings that can be adjusted and the information displayed on the various "Pages" or "Screens" (referred to as "Masks" by Carel) that can be scrolled through, vary depending on the program in the controller that the pGD is connected to. In this case; the UC6. The information is not stored within the pGD. So when the pGD is connected to another temperzone controller which performs a different control function, the information on the pGD is likely to vary.

Following is a overview of the significant pGD pages that relate to the UC6. It should be noted that there is more than one type of pGD available from Carel. temperzone only sells the *pGD*<sup>1</sup> as a Service Terminal. Accordingly the following information relates specifically to it.

After connecting a correctly addressed pGD to the RJ45 connector and then powering up the UC6, after a short delay the temperzone logo will appear on the display. It will take approximately 30 seconds for the UC6 to complete self tests and proceed to display "system specific" information.

This is the first "functional" page you will see on your pGD<sup>1</sup> when the UC6 comes on line.



There are six buttons on the pGD<sup>1</sup>. The function of each is described below:

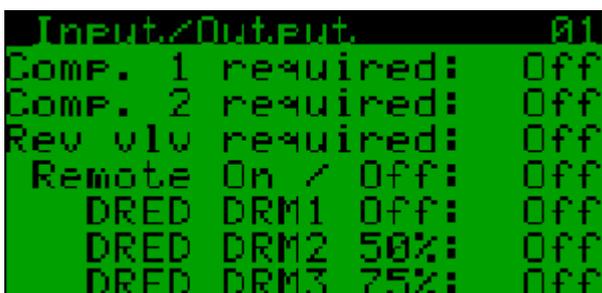
1. Alarm: Press Alarm button to access "alarm" information:
  - a. View the active alarm
  - b. Logger alarm data
2. Prg. Press program button enter to main menu
3. Esc. Return to menu's previous level
4. ←Enter. Press the "Enter" key to confirm a particular operation
5. ↑↓ Press UP or DOWN key scroll through the various pages. It is also possible to increase or decrease "settable" values using these keys during the configuration.

Following are the Main "operational" pages viewable via the pGD<sup>1</sup>. There is more detailed information in other documents from temperzone which detail the UC6 operation and the configuration options available when using the pGD. However this detail goes beyond this overview document.

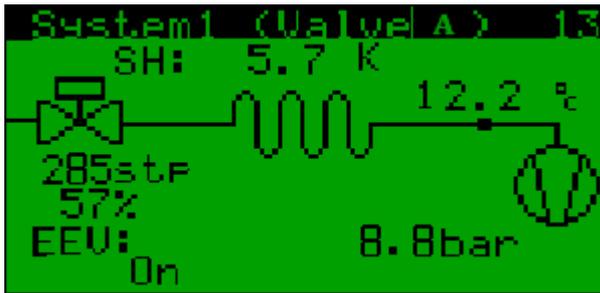
Main: System Summary:



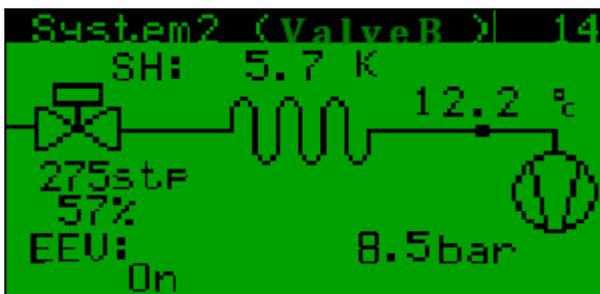
Input/output 01



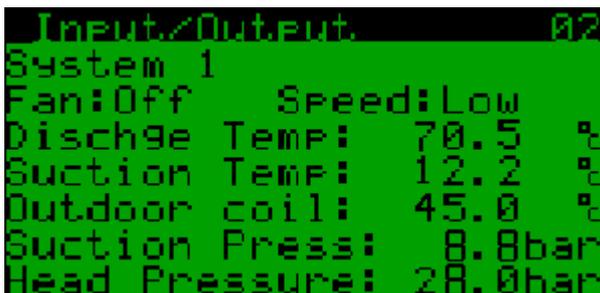
Input/output 02



Input/output 03



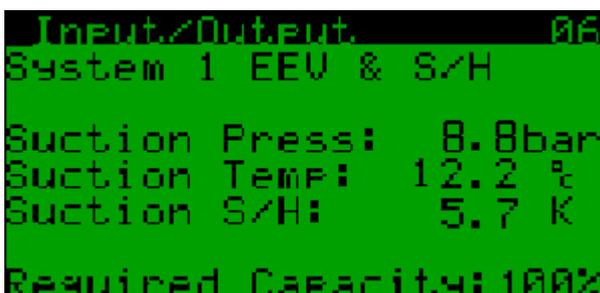
Input/output 04



Input/output 05



Input/output 08



Input/output 09

```
Input/Output. 09
System 2 EEV & S/H
Suction Press: 8.8bar
Suction Temp: 12.2 %
Suction S/H: 5.7 K
Required Capacity:100%
```

Input/output 10

```
Input/Output. 10
Sys1 EEV Control Input
Evaporation Pressure:
(S1) 8.8bar
Converted Temp. 6.7 K
Evaporation Temp.
(S2) 12.2 %
```

Input/output 11

```
Input/Output. 11
Sys2 EEV Control Input
Evaporation Pressure:
(S3) 8.8bar
Converted Temp. 6.7 K
Evaporation Temp.
(S4) 12.2 %
```

Input/output 96

```
Input/Output. 96
The type of unit is
undefined(chk PLAN)
```

This I/O page number 96 should display "Outdoor" / "Indoor" / "Package" unit depending on the configured operation mode.

The Table below shows the "Status" information that can be derived from the single-digit 7-segment display on the UC6 base-board.

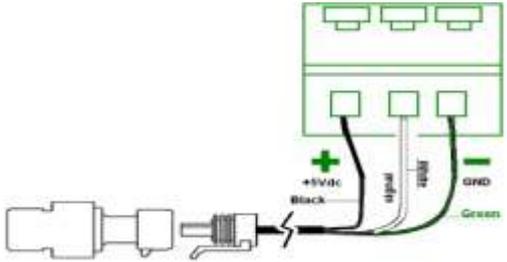
DS1 LED digit	Description	NOTE
<b>1</b>	Anti-Rapid cycle timer (ARCT) inhibiting operation.	The ARCT is activated when the compressor stops. It then inhibits the restart according to any of the following time limits: 1. minimum off time (Min_Time_OFF_ON) 2. minimum time between starts of the same compressor (Min_Time_ON_ON_Same) 3. minimum time between starts of different compressors (Min_Time_ON_ON_Diff)
<b>2</b>	Minimum run timer preventing compressor from stopping	Minimum on time (Min_time_ON_OFF)
<b>3</b>	Loss of refrigerant or low reading from transducer LED digit will blinking	Ref_comp1/2
<b>4</b>	High pressure fault, blinking LED	HP_fault_comp1/2
<b>5</b>	A temperature sensor is returning a out of range signal, Blinking Led	Probes 1,2,3,4,5,8,9,10
<b>6</b>	A pressure transducer is returning an out or range signal. Blinking LED	Probes 6,7,11,12
<b>7</b>	Indoor Coil Frost Protection cycle.	Frost_comp1/2
<b>8</b>	De-Ice mode or timing out after de-ice	De_Ice_mode
<b>9</b>	High discharge temperature alarm, Blinking LED	HT_comp1/2
<b>A</b>		N/A
<b>b</b>	DRM2 and DRM3 active(Reduced capacity operation)	DRED_limit_1
<b>c</b>	DRM1 active(Compressor cannot run)	DRED_limit
<b>d</b>	Unit be turned off by supervisor (BMS)	Unit_status=4
<b>E</b>		N/A
<b>F</b>	Lock out (A repetitive fault has caused shut down)	Any below events will trigger the Alarm lockout LED digit 1.Frost_lockout_comp1/2 2.HP_lockout_comp1/2 3.HT_lockout_comp1/2 4.REF_lockout_comp1/2

The following tabulated information describes the function of each UC6 Input / Output connection:

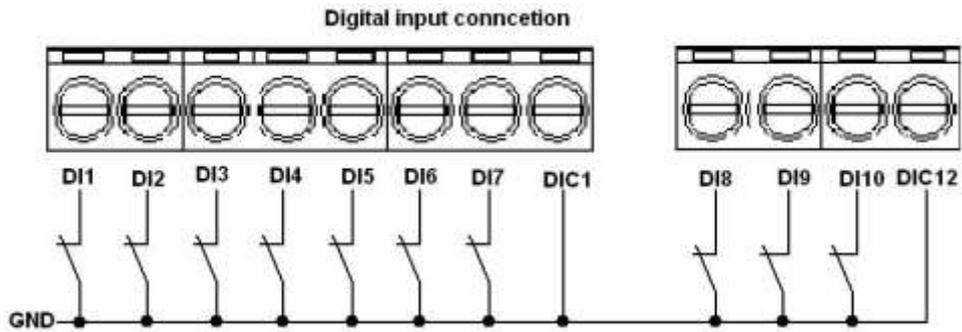
**Power supply and output terminals:**

Terminal	Signal	Notes
HOT(power supply)	24V AC	<b>Note:</b> Do not inadvertently connect 230V AC to these pins!
0V(power supply)	24V AC	
Output supply	Power supply for relays digital output control signal CMC1, CMC2, RV1, RV2, CCH, CCS. Relay common	This power supply could be 230V AC <b>Phase</b> or 24V
Fan supply	Power supply for fan control terminals.	The remaining fan wire must connect to 230V AC mains <b>neutral</b> if Fan Supply is connected to 230V AC mains <b>Phase</b>
Low1	System1 Condenser fan On	
Low2	Or Off	
Med1	System2 Condenser fan On	The remaining fan wire must connect to 230V AC mains <b>neutral</b> if Fan Supply is connected to 230V AC mains <b>Phase</b>
Med2	Or Off	
Hi1	Condenser fan1/2 (high/Low)	The remaining fan wire must connect to 230V AC mains <b>neutral</b> if Fan Supply is connected to 230V AC mains <b>Phase</b>
Hi2		
CMC1	Compressor 1 CMC1	Switch to Output supply
CMC2	Compressor 2 CMC2	Switch to Output supply
RV1	reversing valve1	Switch to Output supply
RV2	reversing valve2	Switch to Output supply
CCH	<i>CrankCase Heater</i>	Activate when EITHER compressor is NOT running AND the Outdoor ambient is 7° or below
CCS	Compressor solenoid	Solid state relay output Capacity control

**Input terminals:**

Terminal	Signal	Notes
CS	Control Sensor	Used to measure remote air temperature in PAC unit
ST1	Suction temperature 1	NTC 
ST2	Suction temperature 2	
DT1	Compressor1 discharge temperature	Hi NTC/10k NTC
DT2	Compressor2 discharge temperature	The two NTC probe wires are equivalent, as there is no polarity, therefore no special order needs to be followed when connecting to the terminal block 
SP1	Evaporator1 Pressure	0-5V transducer 
SP2	Evaporator2 Pressure	
HP1	High pressure1	
HP2	High pressure2	
TS1	Compressor1 Outdoor(mid) coil temperature sensor	NTC 
TS2	Compressor2 outdoor(mid) coil temperature sensor	
OAT	Outside air temperature	10K NTC

**"μPC" board (This is the "Top" board of the UC6)**



The digital input port common pins DIC1 and DIC2 are internal connected to the GND in μPC, details function please refer below table:

**Digital inputs**

DIN	Signal	NOTE
1	DRED (Demand Response Enabled Device) DRM3	Manage the capacity of the total unit @75% for 30 min rolling average
2	DRED DRM2	Manage the capacity of the total unit @ 50%for 30 min rolling average
3	DRED DRM1	Manage the capacity, so the compressors can't run, fan only can run
4	Req. reverse valve	"Heat" cycle input signal
5	Req. Compressor 1	Run "Comp1" input signal
6	Req. Compressor 2	Run "Comp2" input signal
7	Remote on/off	If this Input is Open Circuit the whole unit will stop
8		
9		
10	Test button	Cycle each output for (5-10s), one at a time. The input will be an impulse of 1s more or less. When the cycle completes stop the test. Can only be activated when compressor(s) are NOT already running.

**"Fault" output**

DOUT		NOTE
NO7	Normal Open	Alarm output relay
C3	Common	
NC7	Normal close	

**Analogue output**

<b>AOUT</b>		<b>NOTE</b>
<b>1</b>	Capacity signal	For compressor speed control (if inverter used)
<b>2</b>	Outdoor fan speed 1	For connection to EC fan on Outdoor unit (if used)
<b>3</b>	Outdoor fan speed 2	For connection to EC fan on Outdoor unit (if used)
<b>4</b>	Alarm LED	Flashes a 7 segment LED in response to the alarm code