OPA Econex Pro Technical Guide

Relevant for software v2.2.8

Revision	Date	Model Compatibility
1	June 2025	OPA Econex Pro models

Software Version	Compatibility
2.2.6	Full compatibility **except for units with Humidity control**
2.2.7	Full compatibility

Contents

1 Meet the OPA Econex Pro Series

The Econex Pro can operate with or without external intervention. Econex Pro's in-built adaptive software reacts to its environmental surroundings and changes its operation to continuously generate desired comfort outcomes. Put simply, it understands consumer' needs and reacts to prevailing conditions to meet them. And because it can follow patterns, the Econex Pro can even choose setting options that correspond to certain weather-heat load combinations.

Designed exclusively using Temperzone's in-house R&D expertise, Econex Pro represents a cutting-edge technology that strives to change the way sustainable air conditioning solutions are delivered.

Econex Pro has wide capacity ranges to easily and efficiently react to changing building heat loads as required. This makes for ideal use in a wide range of temperature and humidity-sensitive environments.

1.1 Meet the OPA 171 / 211 Econex Pro

The OPA 171 and 211 models feature an independent system, equipped with an inverter-driven compressor. This configuration allows for precise control over both the temperature and moisture content of the supplied air.

1.2 Meet the OPA 680 / 820 Econex Pro

The OPA 680 and 820 models feature two independent systems, each equipped with its own inverter-driven compressor. This dual-system design provides precise control over both the temperature and moisture content of the supplied air. Additionally, the system offers control functionality for a hot water modulating control valve. This provides full, granular control over the cooling, heating, and dehumidification processes.

1.3 Meet the OPA 970 Econex Pro

The OPA 970 features two independent systems, each with its own inverter-driven compressor. This dual-system configuration allows for precise control over both the temperature and moisture levels of the supplied air. Optionally, one of the systems can be installed with a hot gas reheat coil, complete with modulating control valves. Additionally, the system offers control functionality for a hot water modulating control valve. All options can provide full, granular control over the cooling, heating, and dehumidification processes.

1.4 Meet the OPA 1410 / 1710 / 2110 Econex Pro

The OPA1410 / 1710 / 2110 units have four independent systems, all with inverter compressors. This quad-system configuration allows for precise control over both the temperature and moisture levels of the supplied air. Optionally, two of the systems can be installed with a hot gas reheat coil, complete with modulating control valves. Additionally, the system offers control functionality for a hot water modulating control valve or spill air damper kit. All options can provide full, granular control over the cooling, heating, and dehumidification processes.

2 Notes on Multi-system Screens

As you proceed through the document, some screenshots may refer to four compressors, 4 fans etc. This number will vary depending on the product.

Examples:

Unit Model	**OPA 171 / 211**	**OPA 680 / 820**	**OPA 970**	**OPA 1410 / 1710/ 2110**
Number of Systems	1	2	2	4
Number of Compressors	1	2	2	4
Number of Compressor Inverter Drivers	1	2	2	4
Number of Indoor Fans	1	2	2	4
Number of Outdoor Fans	1	2	2	4
Number of Reheat Systems	0	0	1	2

3 Introducing Comfort Mode

The OPA Econex Pro control system has been designed specifically to improve efficiency of cooling and heating the space. This is achieved through removing moisture only when required. The OPA Econex Pro models feature cutting-edge compressor and fan technologies, enhanced by sophisticated control options that further boost the unit's efficiency.

3.1 Comfort Mode 1 (Original Modes)

The original c.pCO program had five modes of unit operation. *"Comfort Mode 1" remains in the program solely for backward compatibility and is* ***not recommended*** *for selection.*

1. **Heating**
2. **Comfort Zone** – At set point
3. **High Sensible Cooling**
4. **Heating & Dehumidification** – for special applications only
5. **High Latent Cooling**

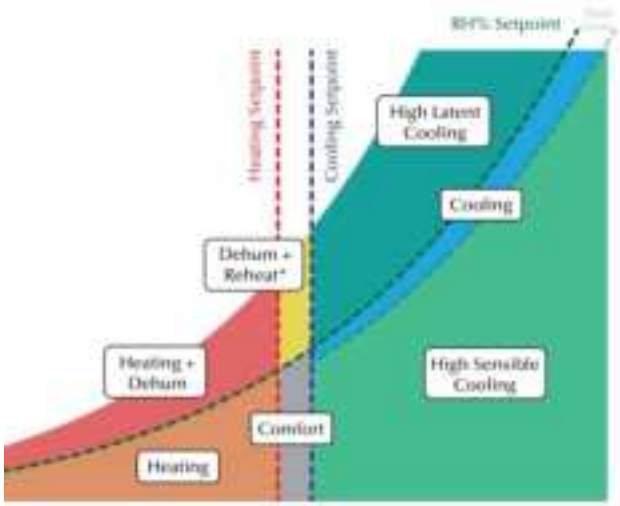
3.2 Comfort Mode 2 (Default Selection)

The controller has seven preset operational modes to suit different requirements. A manual option is also available for on-site customisation to provide high levels of moisture removal.

1. **Heating & Dehumidification**
2. **Dehumidification & Reheat**
3. **High Cooling Latent**
4. **Heating**
5. **Comfort Zone** – At set point
6. **High Sensible Cooling**
7. **Cooling**

For details on how to change the User Optimisation modes see 5.4.4 Settings – User Optimisation Modes

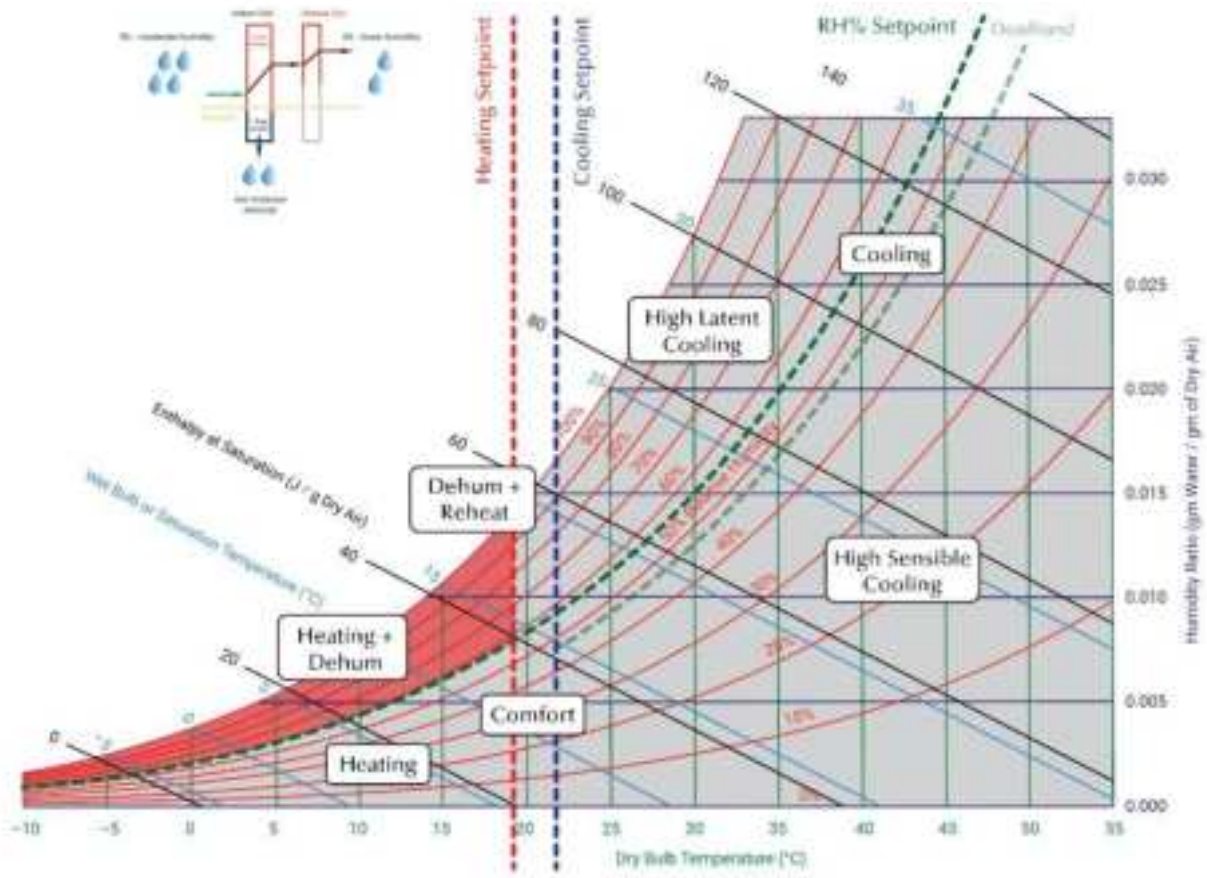
This provides a simple way for users to select the appropriate comfort mode for their needs, while also offering a manual customisation option.



The Comfort Modes Diagram above shows how the modes get applied on a psychrometric chart to represent the space air conditions they serve. The purpose of each of these modes is to allow the controller to target the condition of the air leaving the unit to achieve 'Comfort Zone' conditions quickly and efficiently.
The unit controller compares the customer setpoint for heating, cooling, and humidity control, with the current room conditions to determine which comfort mode will be used and how best to stage and run each compressor and control device (e.g., hot water coil, reheat coil) to maintain the desired temperature and humidity levels.

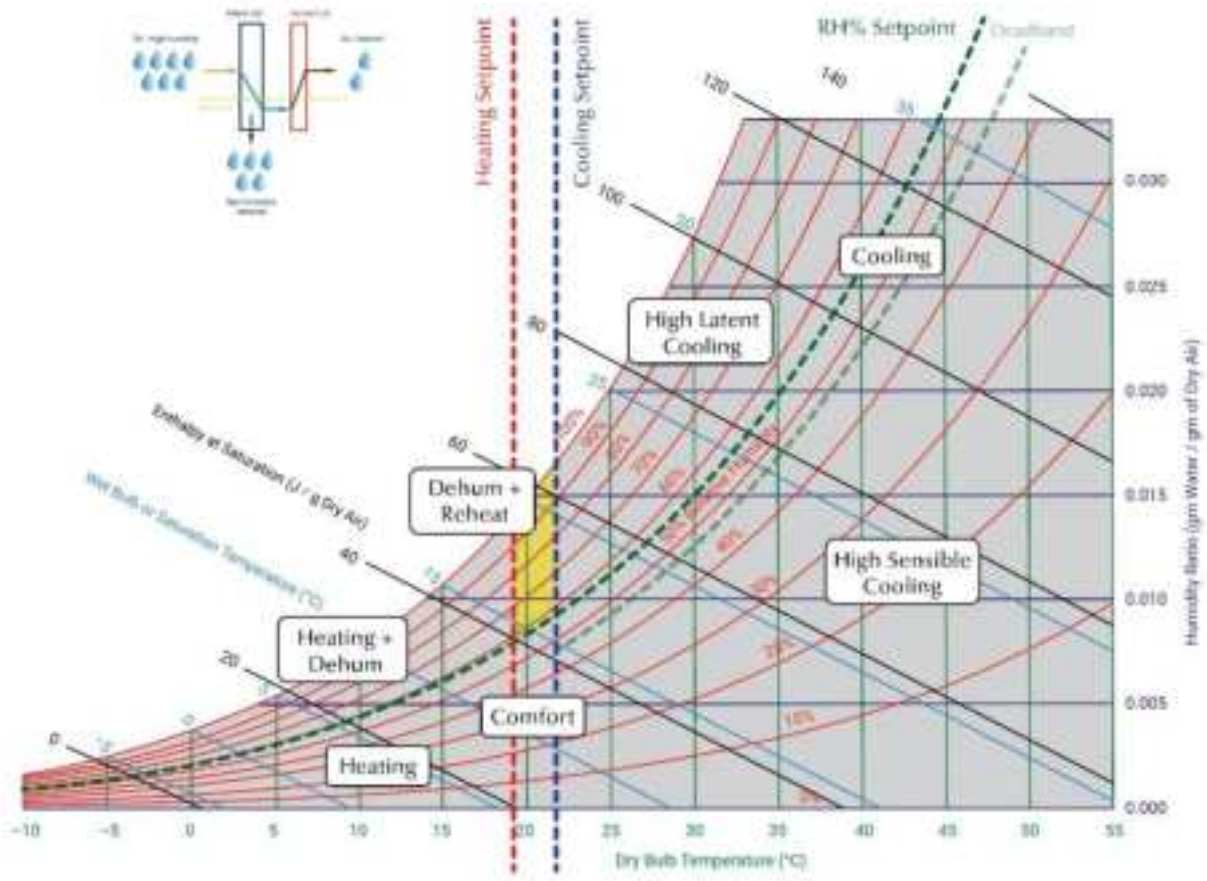
3.2.1 Heating & Dehumidification

This mode remains active when the heating and relative humidity set point is not met. It is disabled by default and should only be enabled for special projects in consultation with Temperzone. This method of control allows one stage to operate in cooling mode targeting a low coil temperature while the other stages operate in heating and target a moderate condensing temperature.



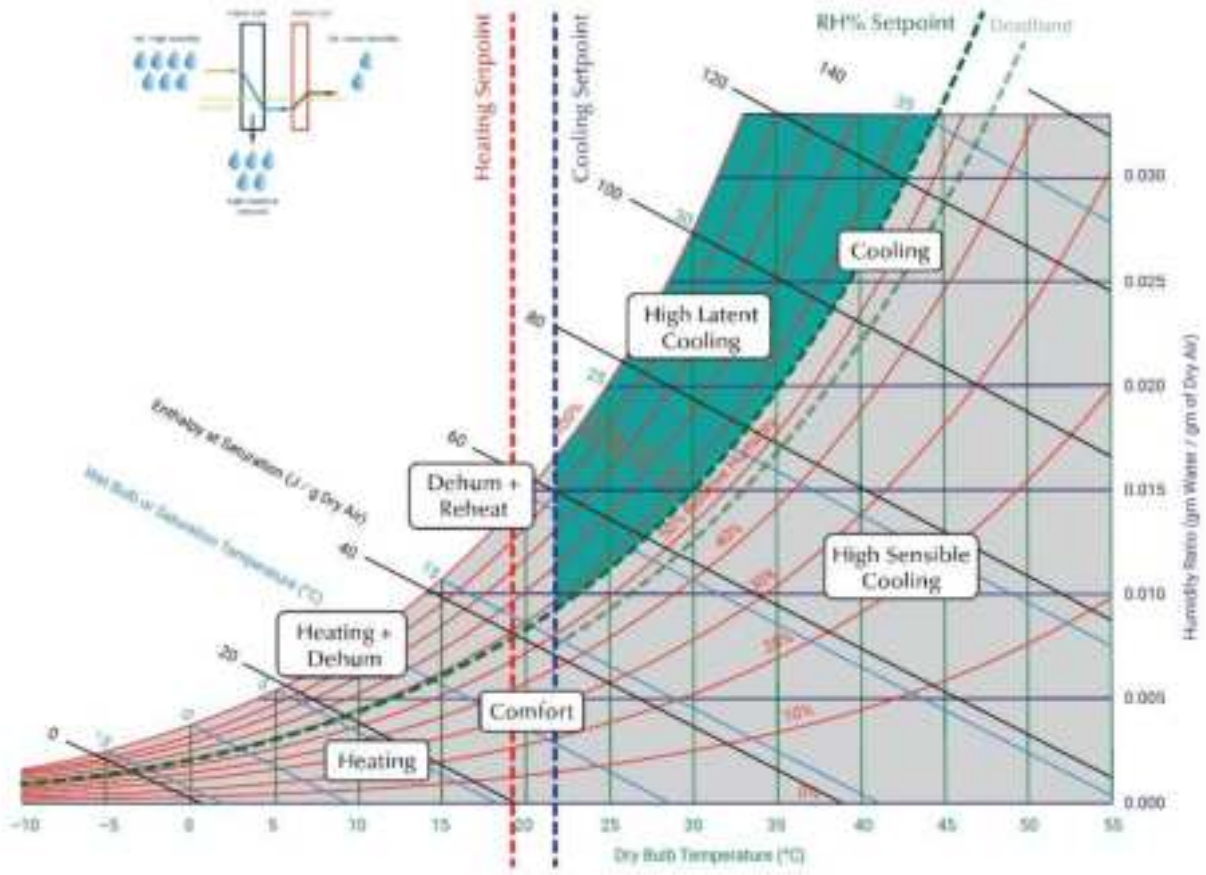
3.2.2Dehumidification + Reheat

Active when the cooling setpoint is met, but the relative humidity set point is not.
The compressor logic targets the maximum offset from the room dew point to drop the coil temperature as low as possible. The system's required capacity is calculated based on the dew point differential between the room's current dew point and the dew point setpoint.
Once the room's moisture level drops below the dew point dead band the room will have reached the comfort zone.
Enhancing the performance of comfort mode is achieved by incorporating a system reheat coil. By redirecting waste heat into the airflow ensures continuous operation while maintaining optimal comfort levels.



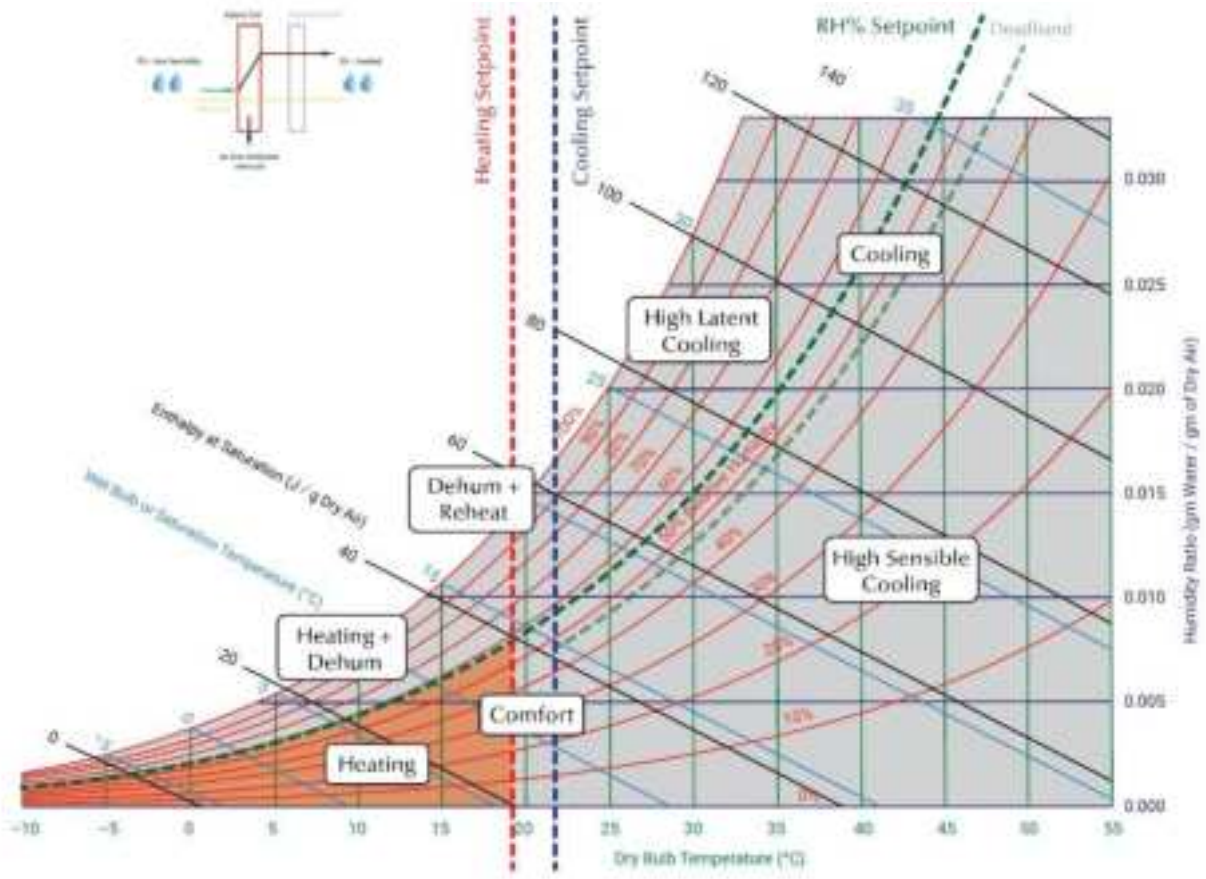
3.2.3 High Latent Cooling

Active when the dry bulb temperature cooling and relative humidity set point are not met. High latent cooling is set up to maximise moisture removal by targeting a low indoor coil temperature.
The coil temperature is achieved by driving the inverter compressor's speed to maintain a suction pressure that is offset from the room's dew point.
The indoor fan speed can also be customisation to slow down when the system is operating in this mode to boost moisture removal.



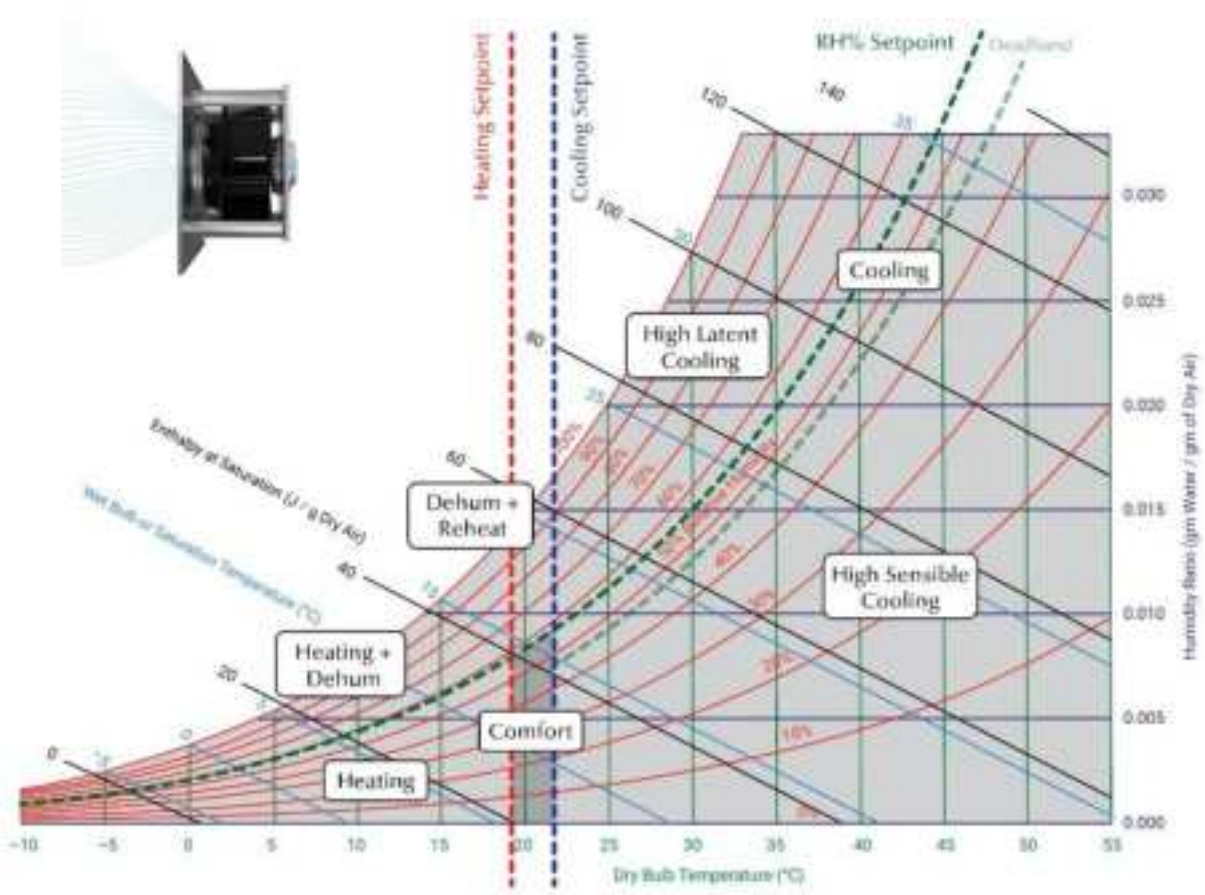
3.2.4Heating

Active when the heating set point is not met.
The inverter compressors target a moderate condensing temperature to slowly approach set conditions without overheating the space. This control strategy optimises part load efficiency.
However, during high loads, the target condensing temperature is increased to its maximum limit to quickly lift the room conditions to the comfort zone.



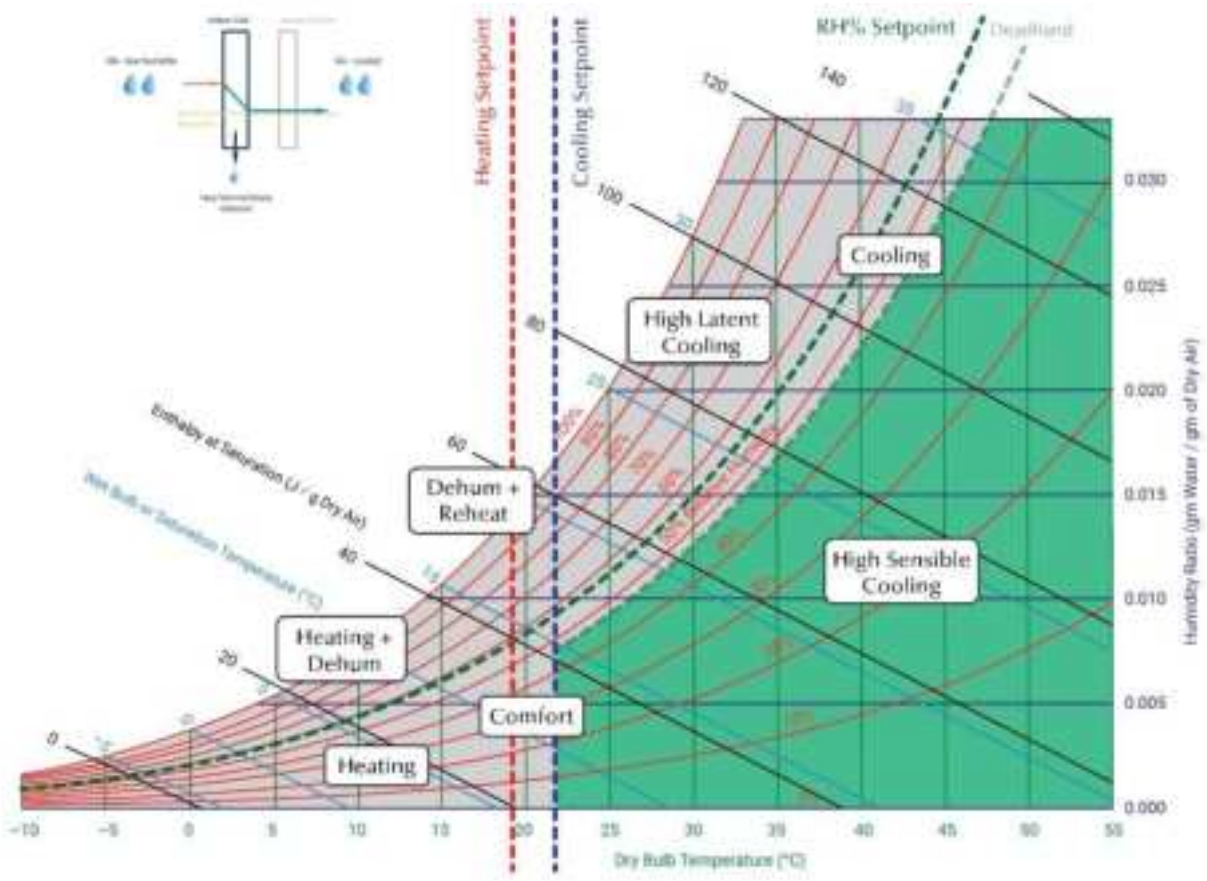
3.2.5 Comfort Zone at Setpoint

Active when heating, cooling and relative humidity set points are met and within the dead band ranges.
The target of all comfort modes is to reach this zone.
The fan speed control can change within this zone. Examples include No load fan speed, fan off while there are no capacity load requirements.



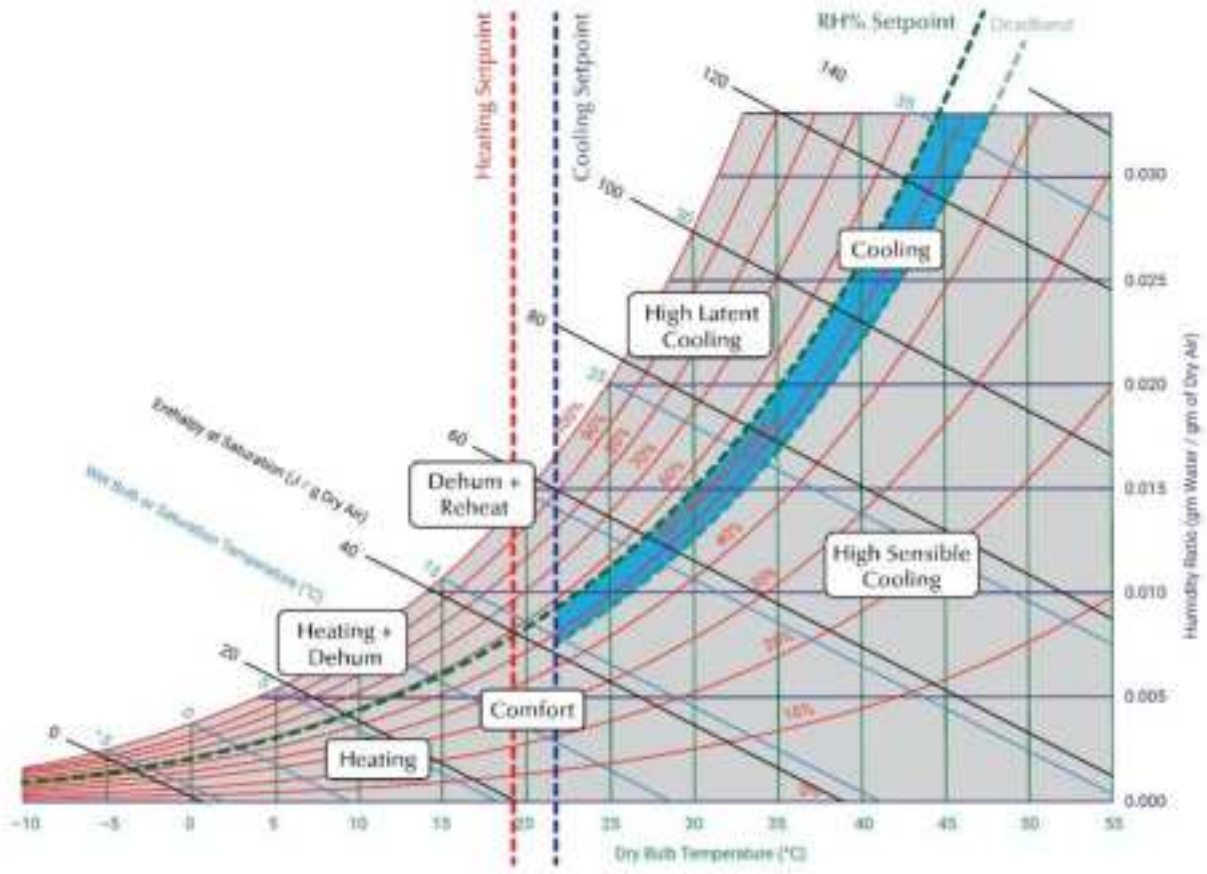
3.2.6High Sensible Cooling

Active when cooling setpoint is not met and the relative humidity value is below set point + dead band. High sensible cooling is extended for tempering air and maintaining higher room temperatures typically found in large, conditioned warehouses.
By maintaining a high indoor coil temperature, part load efficiency is maximised, and energy consumption is significantly reduced.



3.2.7 Standard Cooling

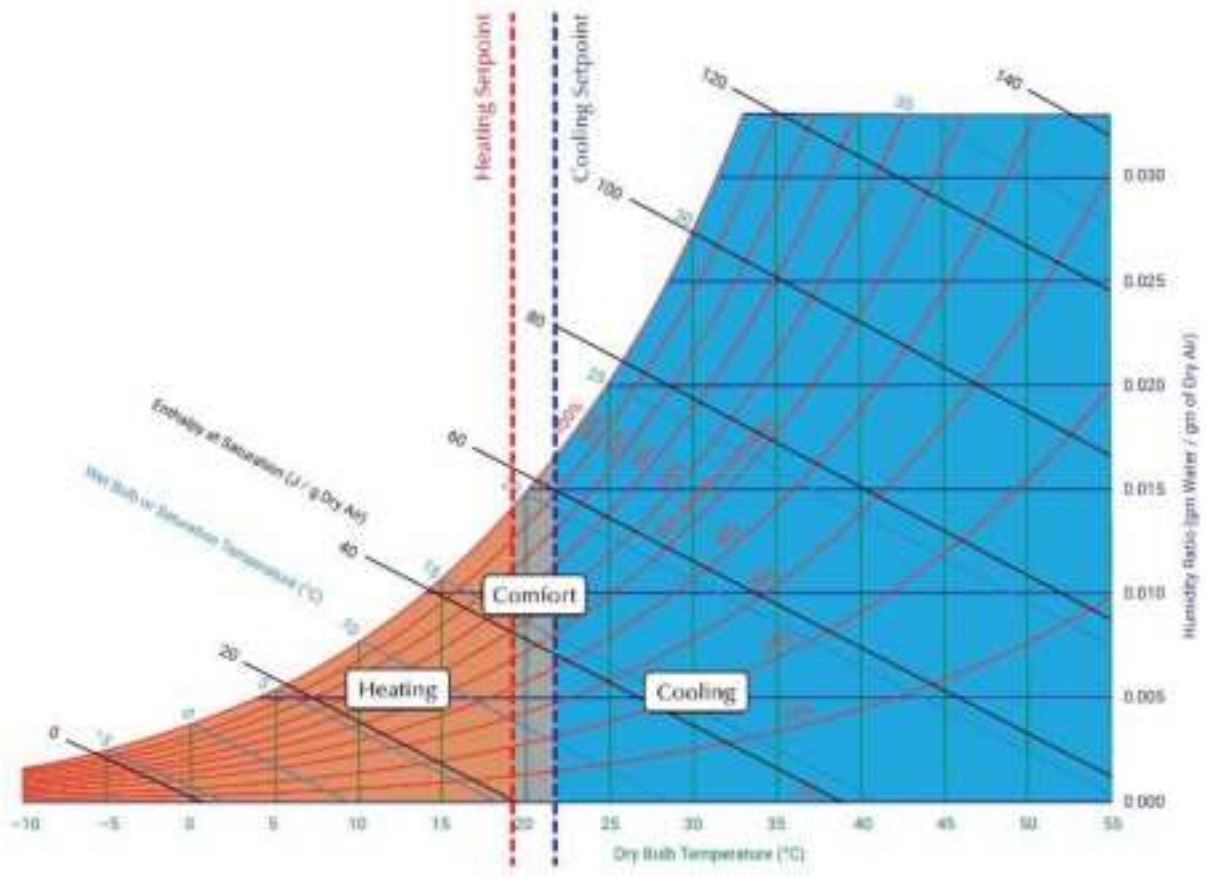
Active when the dry bulb temperature cooling setpoint is not met and the relative humidity set point is within the dead band, this mode moderately controls room conditions and attempts to prevent overcooling the space.
The indoor coil target temperature is set slightly higher than the high latent mode and is intended to remove enough moisture while not over-drying the space.



3.3 Comfort Mode 3

Comfort Mode three has 3 preset operational modes to suit different requirements. Traditional systems operate based on dry bulb temperature set points, solely providing cooling or heating to achieve the desired room conditions. They do not regulate humidity levels, as their primary function is to heat or cool the space as needed:

1. Cooling
2. Comfort Zone – At set point
3. Heating



3.4 Compressor Control

The logic used for the operation of the compressor is determined by the comfort mode strategy. The target controlling the compressor is decided by the optimisation mode.

This section details the two types of compressor control, variable evaporator temperature control and supply air temperature control.

3.4.1Compressor Control – Evaporator Temperature

Used specifically for inverter compressors, evaporator temperature control determines the speed of the compressor based on the target set point calculated in the 'User Optimisation Modes'.

The target evaporator temperature is offset from the room dew point setpoint,

For example:

- Target Room Dew Point = 12.3°C
- Optimisation Dew Point offset = -4K (Comfort Mode = Cooling Standard)

Target Evaporator Temperature = 8.3°C (12.3 – 4.0)

The compressor speed will vary to maintain 8.3 °C evaporator temperature as the room load and hence return air temperature change the compressor will automatically adjust. During transitions in load, it is likely the comfort modes will automatically change as for example the humidity in the space reduces, this then changes the dew point offset which in turn will change the evaporating temperature setpoint and therefore the compressor speed.

The target evaporator temperature can also be placed on a slide which intuitively changes as the room conditions change. The feature is set '**off**' by default. Refer to the next section 'Compressor Control – Supply Air Temperature' for more details.

3.4.2 Supply Air Temperature Control

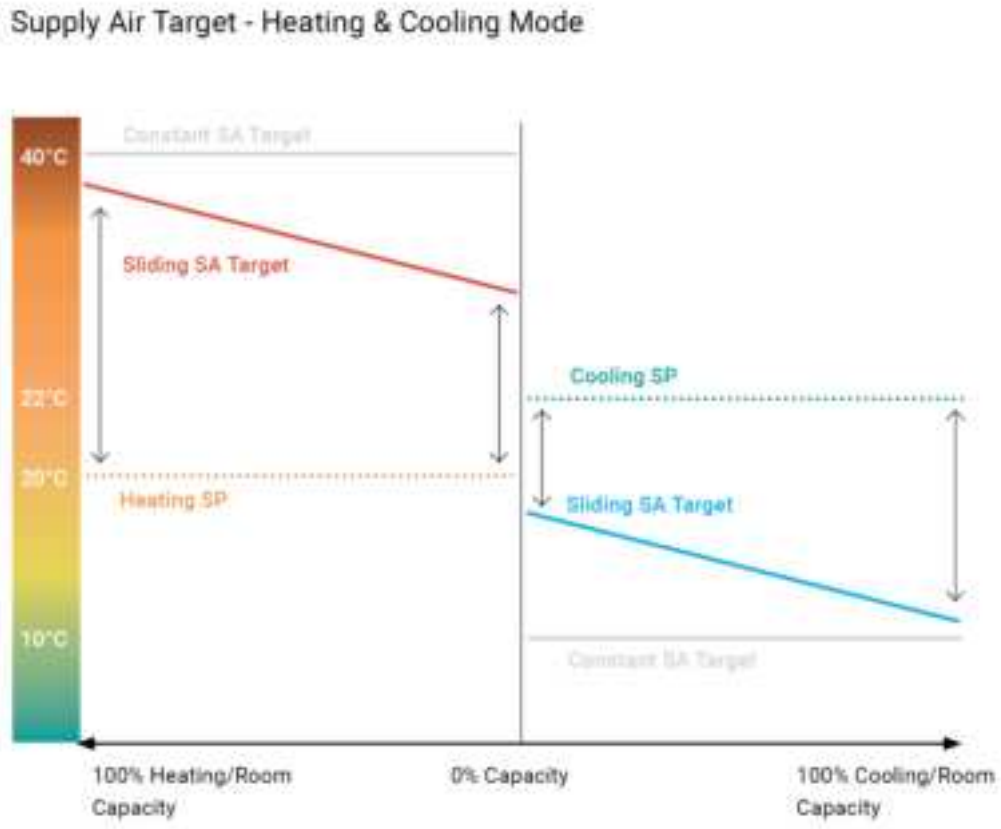
The supply air temperature control operates independently from the comfort cooling modes, working in both heating and cooling.

This feature can control the air off the indoor coil in one of two ways:

1. Constant Setpoint Control:
    - Maintains the supply air at a constant, user-defined temperature setpoint.
    - The system adjusts heating/cooling capacity to hold this steady supply air temperature.
2. Variable Setpoint Control:
    - Allows the supply air setpoint to vary between minimum and maximum values.
    - The setpoint is dynamically adjusted based on current capacity demand.
    - As demand increases, the setpoint slides towards the minimum for maximum capacity.
    - As demand decreases, the setpoint slides towards the maximum for better efficiency.

The specific min/max setpoints or constant setpoint value are configurable based on the application needs.

This independent supply air temperature control gives the system enhanced flexibility and precision in regulating the conditioned air delivery. It can be useful where tight supply air control is critical for comfort or process requirements.



3.4.3Intelligent Humidity Control

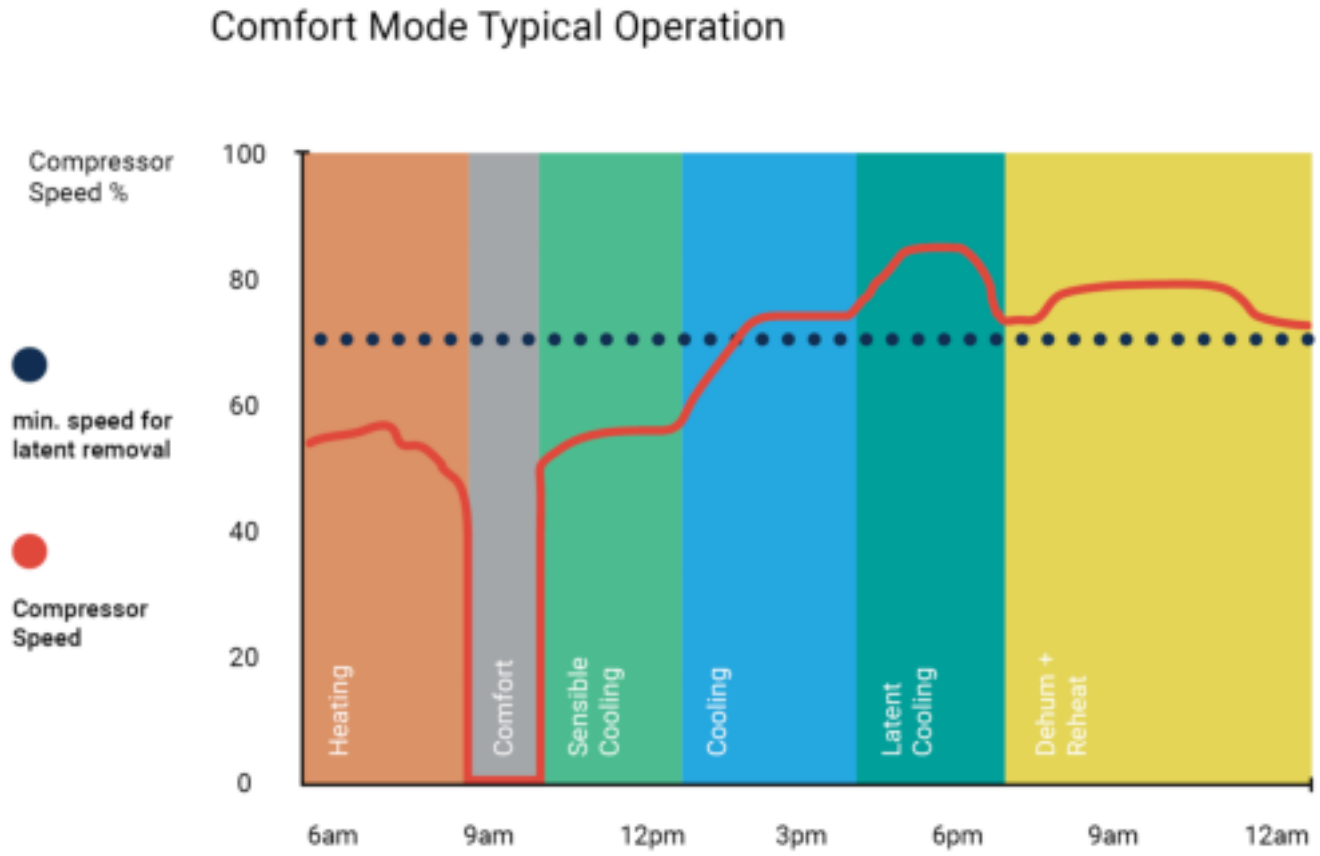
The different comfort cooling modes in the system each target a specific evaporating temperature based on the user's temperature and humidity setpoints. This allows the system to optimise its performance for the desired comfort conditions.

When moisture removal is required, the control algorithm will adjust the target compressor speed by targeting a lower evaporating temperature. This increases the rate of moisture condensation on the evaporator coil, enabling more effective dehumidification.

Conversely, when the space does not need significant dehumidification, the system can target a higher evaporating temperature. This causes the compressors to slow down, resulting in substantial power savings while still maintaining the desired temperature.

By dynamically adjusting the evaporator temperature target based on the moisture removal needs, the system can optimise its operation to prevent unnecessary overcooling. This helps maintain comfort conditions while minimising energy usage and operating costs.

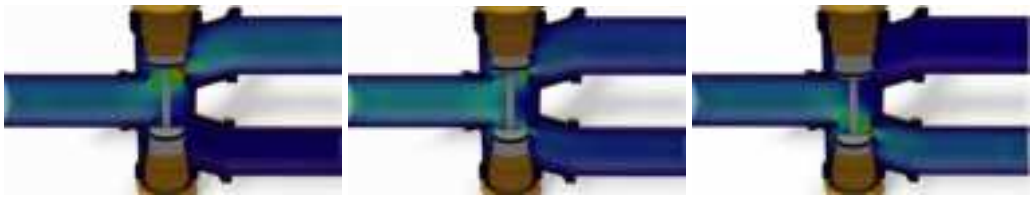
The specific evaporating temperature targets for each mode are determined by the control logic, which considers factors like temperature, humidity, cooling capacities, and compressor performance. This adaptive targeting is a key feature that allows the system to deliver efficient and effective climate control under varying load conditions.



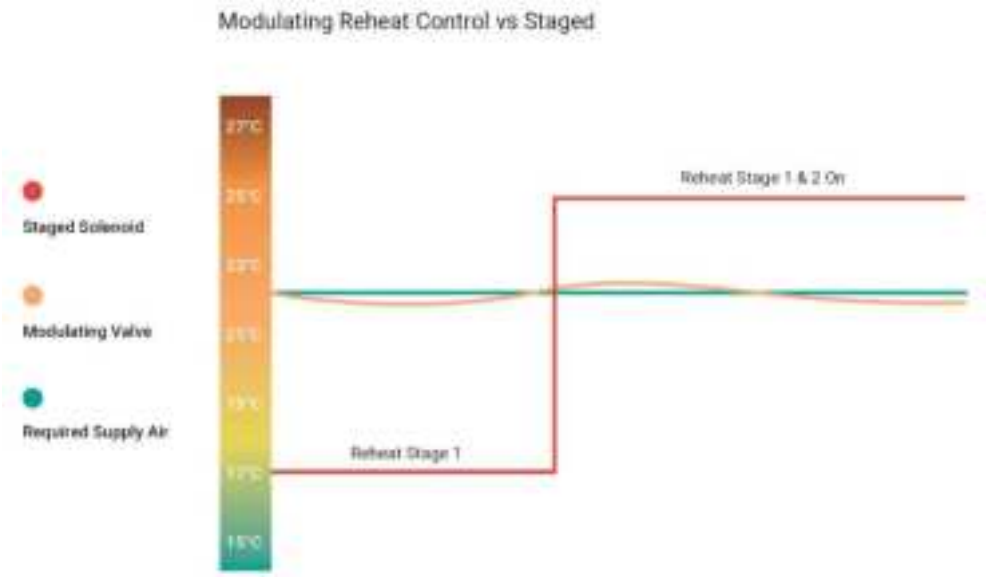
3.5 Advanced Reheat

When equipped with an optional hot water or hot gas reheat system, the supply air temperature can be precisely controlled. The reheat coil modulates accurately to maintain the desired temperature, even during dehumidification modes.

The diagram below illustrates the modulating control of the reheat valve, which can make over 6,000 small adjustments between the fully open and fully closed positions.



The graph below compares a traditional staged reheat system to the more advanced modulating reheat system. During dehumidification modes, the modulating reheat allows the space temperature to be tightly controlled while excess moisture is removed. One major advantage of the modulating reheat coil is the ability to always maintain the supply air temperature above the room dew point during cooling, eliminating the risk of condensation forming on ducts and dripping down.



This precise regulation of temperature and humidity ensures superior comfort while optimising energy efficiency.

4 Embedded Features

This section describes the function of optional modes in more detail.

4.1 Night Mode / Quiet Mode

Used on applications where noise restrictions impact the design of the site. Night mode reduces the noise output of the unit by slowing down the outdoor fans. This is achieved by floating the compressor condensing temperature targets.

A single event timeclock feature can be used to automatically control the operation without the need for external activation, see **5.4.1 Settings – Setpoints**. Otherwise, night mode can be activated depending on the 'User Optimisation Mode' selected, see **5.4.4 Settings – User Optimisation Modes**.

The effectiveness of Night mode depends on the outdoor ambient conditions and capacity demand. Limitations are:

- If the unit is heating while the outdoor ambient temperature is below +10°C, then selecting Night Mode has no effect.
- If the unit is cooling while the outdoor ambient temperature is above +35°C, then Night Mode has no effect.
- If capacity demand exceeds 95% then night mode has no effect.

4.2 Occupancy / Unoccupied Mode

Used on applications where during certain times of the day the conditioned space is considered unoccupied and larger setpoint ranges can be accommodated. Occupancy mode is an ideal solution to help minimise energy usage.

The key features in occupancy mode include:

- Independent temperature & humidity setpoint for occupied and unoccupied times.
- Independent airflow setpoints: Litre/second or % band.
- Single event timeclock.

Controlling occupancy mode can also be done via external high level (Modbus or BACnet) or low level (J5:ID6) input. If the input is 'True' then the controller will revert to preset unoccupied setpoints.

See Settings for Setpoint (Section **5.4.1 Settings – Setpoints)** & Fan Configuration to select airflow offsets and timeclock enable values.

4.3 Night Purge Mode

The Night Purge feature is a valuable energy-saving mechanism designed to take advantage of cooler outdoor air during the night. By enabling this mode, the system can pre-cool the space, effectively reducing the cooling load and energy consumption requirements during the day.

The purpose of the Night Purge is to leverage the naturally occurring temperature difference between the outdoor and indoor environments to provide free cooling. This process helps to lower the space's starting temperature in the morning, ultimately reducing the workload on the cooling systems and resulting in significant energy savings.

1. Night Purge Operation:
    - Scheduled operation: Adjustable start and end times
    - Enabled if the outside air temperature is below an adjustable setpoint (currently set to 18.0°C) and the room temperature is above the occupied cooling setpoint
2. Disable Conditions:
    - Night Purge is disabled when the rain and smoke sensors are active
3. Operation Sequence:
    - The Econex pro unit starts with the outside air damper fully open
    - The supply fan modulates to maintain the supply air static pressure setpoint
    - The DX heat pump is disabled
4. Termination Conditions:
    - The system remains in Night Purge mode until either the room temperature decreases below the cooling stop temperature setpoint (currently set to 15.0°C) or the adjustable end time is reached, whichever occurs first
5. Post-Cycle Operation:
    - Once the Night Purge cycle is complete, the PAC and return/spill fans shall return to their normal unoccupied states

The key aspect to highlight is that the Night Purge feature has adjustable temperature setpoints, allowing users to customise the operation to best suit the specific climate and requirements of the space. Refer to section Error! Reference source not found. Error! Reference source not found. for instructions on the configuration.

4.4 External Control Options

Control options available in the OPA Econex pro range units.

4.4.1Standalone - Turnkey

These units can operate without needing a Building Management System (BMS), in this case a remote screen service interface can be added to allow set point adjustment and viewing of information from within the space. There is an optional remote screen, the standard PGD style that mirrors the information on the controller - refer to I&M for additional details.

4.4.2BMS-BACnet via TCP/IP

Communication to a BMS system via BACnet protocol over IP (ethernet Cat5 cable) is included as standard through the Carel c.pCO. Refer to section Error! Reference source not found. Error! Reference source not found. for details on setup and BACnet objects.

The default IP address of the controller is **“192.168.1.10”.**

4.4.3BMS-Modbus via TCP/IP

Modbus over IP is standard (ethernet Cat5 cable). Refer to the section Error! Reference source not found. Error! Reference source not found. for details on setup and Modbus objects.

The default IP address of the controller is **“192.168.1.10”.**

4.4.4BMS-Modbus via RS-485

Modbus over RS-485 is standard (shielded twin twisted pair cable). Refer to Error! Reference source not found. Error! Reference source not found. for details of wiring, setup and Modbus objects.

The default address is **“1”**.

4.4.5BMS-BACnet via MS/TP

BACnet over RS-485 can be configured on the c.pCO Medium & Large PLC only. Refer to **Error! Reference source not found. Error! Reference source not found.** for details on setup and BACnet objects.

The default address is **“1”**.

4.4.6BMS-Low Level

The low level interface provides limited control capabilities. It only allows for basic on/off input commands, as well as control over the compressor capacity and indoor fan speed using a 0-10Vdc signal. No other control functions are permitted through this low level interface. Refer to section Error! Reference source not found. Error! Reference source not found. for installation configuration.

4.5 Optimisation Mode

The controller has five preset operational modes to suit different requirements. A manual option is also available for on-site customisation to provide high levels of moisture removal.

1. **High Performance**: Lower coil temperature to provide high levels of moisture removal.
2. **Standard**: For moderate conditions this setting is recommended.
3. **High Efficiency**: For reduced running costs.
4. **Proportional**: Stages adjust proportionally to match a targeted temperature setpoint.
5. **Custom**: Allows customised settings of the offsets in the cooling modes.

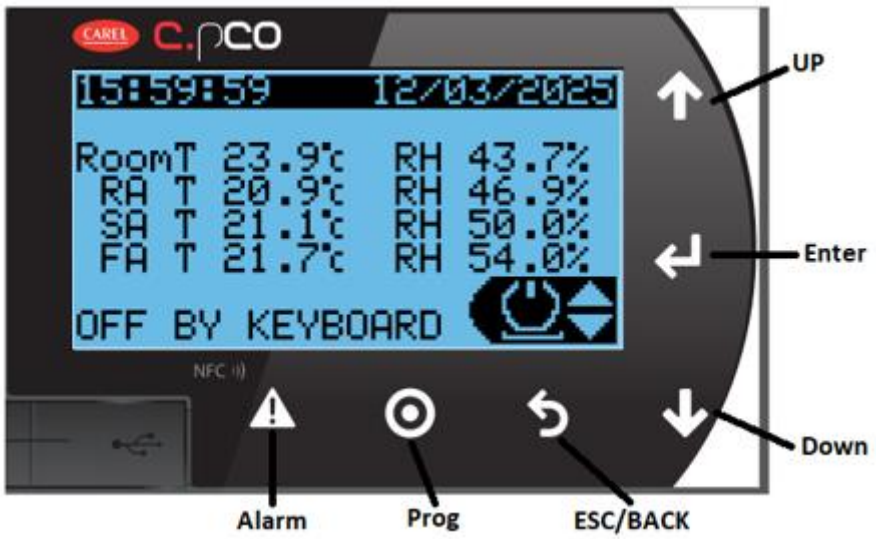
For details on how to change the User Optimisation modes see Section 5.4.4 Settings – User Optimisation Modes

5 Controller Overview

Button	Function
Alarm	System alarm indication and reset
Prog	Open main menu
Esc/Back	Return to previous page or exit menu
Up	Scroll up or increase setting parameter
Enter	Confirm the parameter settings or enter the highlighted menu
Down	Scroll down or decrease the setting parameter

The main homepage is shown below, it displays the temperature (T) and RH of the room (Room), return air (RA), supply air (SA) and fresh/outside air (FA).

It also displays the unit status (On/Off), and operation mode such as sensible cooling, heating, reheat etc.



5.1 Quick Menu - Description

The quick menu icons are located on the lower righthand corner of the main home screen. They provide quick access to the most used areas of the controller. Unit information can be accessed through these quick menus without requiring a password to view and make changes.

While on the home screen, use the up and down keys to rotate through the quick menu options. Pressing the enter key will open the selected page.

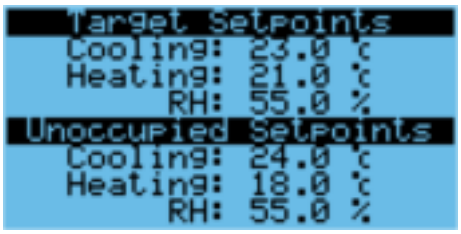
	On / Off
	Unit information
	Setpoints menu

5.1.1 Quick Menu - On/Off

To power on the unit from the controller or a remote PGD display

From the main screen, use the up and down keys to select the On/Off symbol as shown in the screen in the lower righthand corner. Press Enter.	
At the next screen use the Up/Down Key to turn the unit ON then press enter to confirm.	
To turn the unit off, follow the same instructions, setting the unit to OFF.	

5.1.2 Quick Menu – Setpoints menu

From the main menu use the up or down keys to adjust the cooling and heating setpoints. The RH setpoint is intentionally locked in this screen to prevent unnecessary changes.	

5.2 The Main Menu

The main menu can be accessed at any time by pressing the Menu/Program button  .
Here you will find seven sub menus which are explained in the following sections.

A. Information
1. UC8 Boards
2. Unit Information
3. Power kW
4. Run Hours
5. Inverters
6. Outdoor Fans
7. Indoor Fans
8. Reheat Valves
9. Controller Info
10. System Info

B. Settings Menu
Setpoints
Indoor Fan Config
Damper Config
Optimisation Modes
Date/Time

C. Communication
Indoor Fans
Outdoor Fans
Inverter Drives
UC8 Boards
Built-in Driver

F. Alarms Logs
Data Logger Record: #

G. Scheduler
Scheduler Enable
Daily Events
Holiday Period
Special Days
Scheduler Events
After Hours Run

5.3 Information

The information menu provides a breakdown of the major components of the unit. Including the current performance of the unit, and details such as power usage and operating temperatures.

One key feature is the "Flash Show" - the display will cycle through a series of screens displaying the most useful information. This is particularly handy when servicing the unit.

Note: The screens in the 'Information Menu' are all Read Only. To adjust settings, navigate to the 'Settings Menu'.

5.3.1Information - UC8 Boards

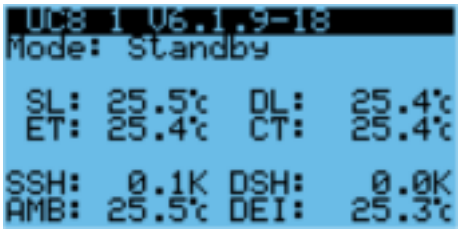
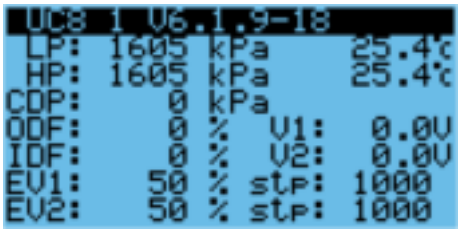
The UC8 is a control board designed by Temperzone to manage each individual refrigeration system. Scroll through the screens to view information related to the refrigeration system's operation.

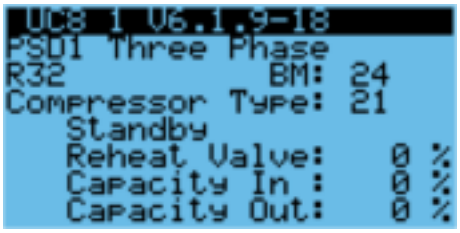
The following abbreviations are used throughout the controller screens:

Abbreviation	Description	Abbreviation	Description
AMB	Ambient temp sensor	**IN1**	UC8 dry voltage contact 1
BM	UC8 Boost mode selection	**IN2**	UC8 dry voltage contact 2
CDP	Combined differential pressure	**L**	Low or not activated
CP	UC8 Compressor relay	**LO**	Low speed fan relay activated
CT	Condenser temp	**low pressure (LP)**	Suction pressure
DEI	De-ice temp sensor	**ME**	Medium speed fan relay activated
DL	Discharge line temp sensor	**OC**	Outdoor coil temp sensor
DSH	Discharge superheat	**ODF**	Outdoor fan speed
ET	Evaporation temp	**On**	UC8 remote enable dry contact
EV1	Expansion valve 1	**SL**	Suction line temp sensor
EV2	Expansion valve 2	**SSH**	Suction superheat
H	High or activated	**Stp**	Expansion valve opening steps
HI	High speed fan relay activated	**V#.#.#-**	UC8 software version no.
high pressure (HP)	Discharge pressure	**V1**	UC8 V1 output voltage
HT	Reversing valve relay activated	**V2**	UC8 V2 output voltage
IC	Indoor coil temp sensor	**VC**	UC8 analogue input 0-10Vdc
IDF	Indoor fan speed	**VF**	UC8 analogue input 0-10Vdc

Abbreviation 1

Controller PGD Screens

	• Displays the sensor inputs of the UC8 system. • Displays UC8 fault if any found. • Displays In/Outdoor coil sensors if connected • See the table above for abbreviation descriptions.
	• Displays the pressure transducers of the UC8 system. • Displays the In/Outdoor fan speed and corresponding Voltages for the UC8 systems V1 & V2 outputs. • Displays the expansion valve percentage and steps opened. • See the table above for abbreviation descriptions.

<table>
<tr>
<td> 
</td>
<td>

Displays the basic VSD information, boost mode selection and UC8 compressor selection number.
Capacity in is the compressor request speed requested from the PLC.
Capacity out is the output capacity converted to a percentage from the VSD to compressor.

There can be differences found between the capacity in & capacity out, due to compressor envelope restrictions.
</td>
</tr>
<tr>
<td> 
</td>
<td>

Displays the status of the low level inputs of the UC8 system.
Displays the input voltage of the analogue inputs of the UC8 system.

</td>
</tr>
<tr>
<td colspan="2">This will repeat for Systems 2 through 4 where applicable.</td>
</tr>
</table>

5.3.2Information - Unit Info

The unit information screens display comprehensive operational data to allow for detailed performance monitoring. This includes the required overall system capacity, the individual compressor capacities, the measured room temperature and RH levels, the position feedback from the system dampers, as well as the temperature and RH readings for the supply and return airstreams. Reviewing this data provides a thorough assessment of the unit's real-time operating parameters, enabling engineers and technicians to closely monitor performance and identify any areas requiring adjustment or troubleshooting.

The following abbreviations are used throughout the controller screens:

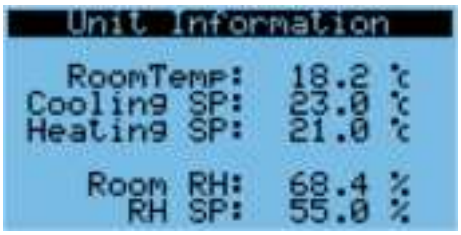
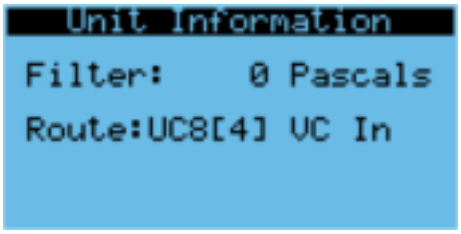
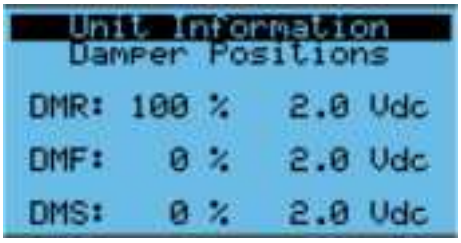
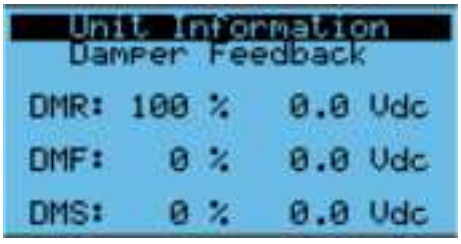
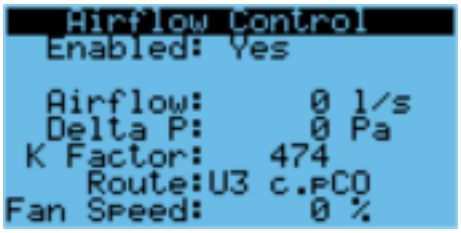
Abbreviation	Description	Abbreviation	Description
Aux	Auxiliary	**Lo**	Low
BMS	Building management systems	**Med**	Medium
Cap	Capacity	**ODF**	Outdoor fan
Comp	Compressor	**PCA**	Printed circuit assembly
Cond	Condenser	**RA**	Return air
CT	Condenser temperature	**Req**	Required
Delta P	ΔP refers to the difference in pressure between two points.	**RH**	Relative Humidity
DMF	Fresh air damper	**Rout**	Sensor location on the c.pCO.
Demand Management Response (DMR)	Return air damper	**SA**	Supply air
DMS	Spill air damper	**SAT**	Supply air temperature
Econ	Economy Mode	**Sel**	Select
Evap	Evaporator	**SP**	Set point
EXV	Electronic expansion valve	**SSR**	Solid state relay
FA	Fresh air	**Sys**	System
Hi	High	**T**	Temperature
K Factor	A constant value used to calculate the air flow volume based on measured differential pressure.		

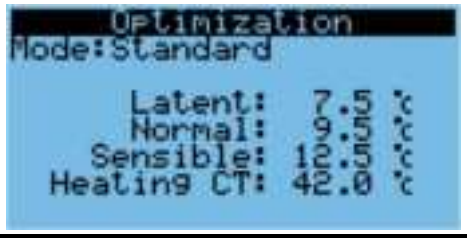
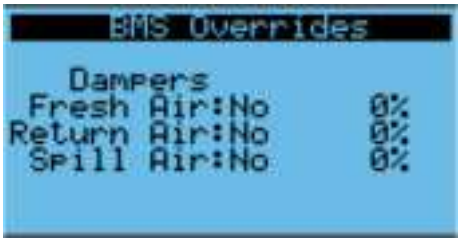
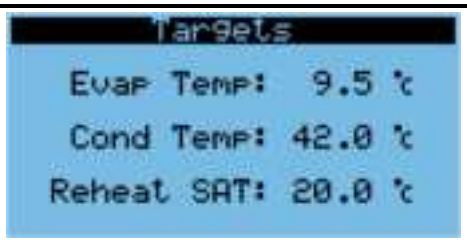
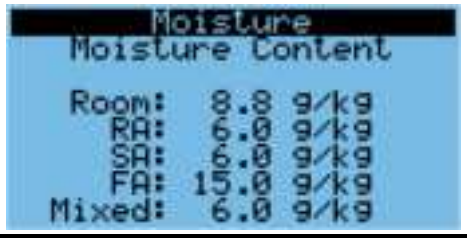
Abbreviation 2

Controller PGD Screens

Note: You will see 1, 2 or 4 Sys below dependent on the number of Systems (Sys) present in the unit. See Section **2 Notes on Multi-system Screens** for more information.

	• Unit is the capacity request from the setpoint temperature and room/return air temperature. • System capacity is the actual output capacity being produced. • Current stages currently running • Current carbon dioxide value read for an input sensor

	• Current air flow value and setpoint, if an air flow sensor has been fitted
	• Displays the systems current capacity level and current UC8 mode of operation. Refer to **Error! Reference source not found.** for the full list.
	• Displays the current room temperature, relative humidity values and the setpoints currently set.
	• Displays the current pressure differential across the air filter and the sensor input route location.
	Displays the current damper positions based on enthalpy logic and minimum and maximum settings. • **DMR** = Return Air Damper • **DMF** = Fresh Air Damper • **DMS** = Spill Air Damper
	Displays the current damper motor voltage feedback percentage and the actual voltage feedback value. • **DMR** = Return Air Damper • **DMF** = Fresh Air Damper • **DMS** = Spill Air Damper
	If Constant Air Flow Control has been selected, the following page will appear. Displays detailed information about the air flow values and sensor input locations that assist in the calculation of the air flow value in litres per second.

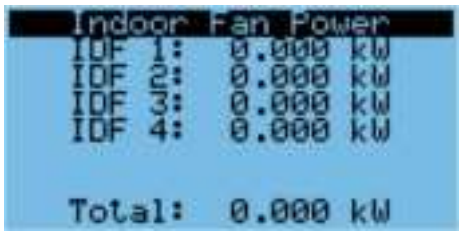
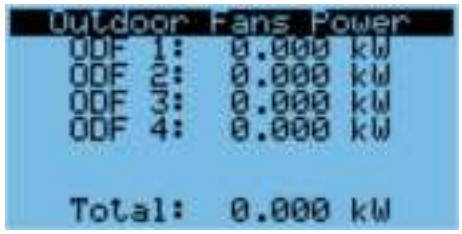
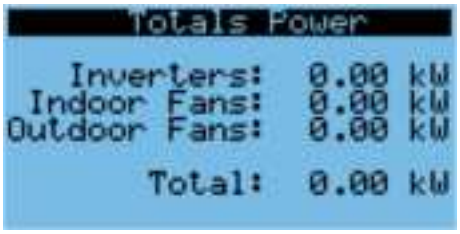
	Displays the current operation mode and the targets coil temperature values per the mode activated. Refer to section 3.3
	BMS Overrides screen displays if the external BMS is over-writing any internal sensor values and displays the last value written. • Overrides will indicate a status of 'Yes' and a value will be shown next to the override. • Temperatures & RH% values can be written over BMS.
	BMS Overrides screen two displays if the external BMS is over-writing any internal sensor values and displays the last value written. • CO_2 levels can be written over BMS allowing the controllers logic to decide the positions of dampers. • Unit capacity can be directly controlled over low and high level BMS control.
	BMS Overrides screen 3 displays if the external BMS is over-writing any of the fresh, return, spill air dampers and displays the last value written.
	Displays the PLC targeted coil temperatures when operating in the requirered modes.
	Displays the esitmated moisture content in the air from the sensor location. The mixed value is an average value read from fresh air and return air adjusted by the opening of the fresh air damper.

5.3.3 Information - Power Usage

Scroll through the screens to see information on the total power usage as well as what each individual component is using. This information can be useful when diagnosing faults

Controller PGD Screens

Note: 1, 2 or 4 Sys, Indoor Fans (IDF) & ODF shown below is dependent on the number of Systems (Sys), IDF and Outdoor Fans (ODF) present in the unit. See Section **2 Notes on Multi-system Screens** for more information.

	Displays the operating power usage readings in kilowatts. These power readings are retrieved directly from the inverter driver.
	Displays the operating power usage readings in kilowatts. These power readings are obtained directly from the indoor fan electronics.
	Displays the operating power usage readings in kilowatts. These power readings are obtained directly from the outdoor fan electronics.
	Displays the total operating power usage readings.

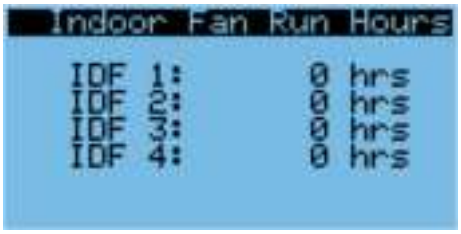
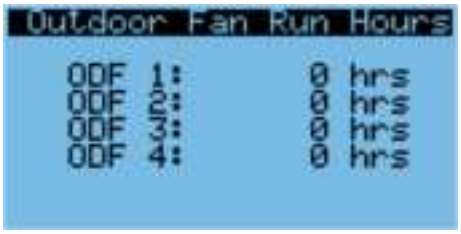
5.3.4Information - Run Hours

The run hours of both the compressors and fans are tracked on these pages for quick inspection.

The total hours are used to determine the compressor rotation sequence and ensure an even run time across all systems.

Controller PGD Screens

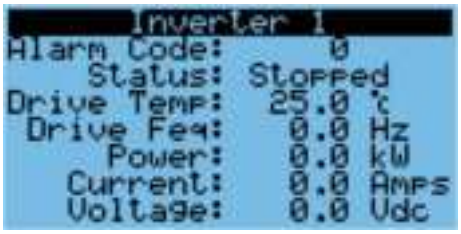
Note: 1, 2 or 4 Sys, IDF & ODF shown below, is dependent on the number of Systems (Sys), IDF and Outdoor Fans (ODF) present in the unit. See Section **2 Notes on Multi-system Screens** for more information.

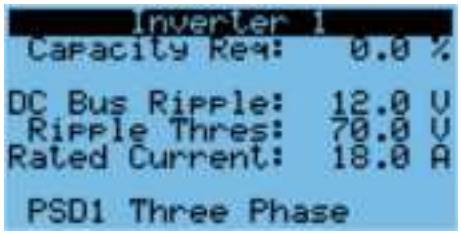
	Displays the run hours for each compressor read from the UC8.
	Displays the run hours for each indoor fan.
	Displays run hours for each outdoor fan.

5.3.5 Information – Compressors

Information relating to the operation and condition of the compressor and inverter drives. Abnormality in current draw or power consumption can be witnessed on these pages as well as communication status.

Controller PGD Screens Carel VSD Installed

<table>
<tr><td> 
</td><td>Displays the inverter fault code refer to Values 1.

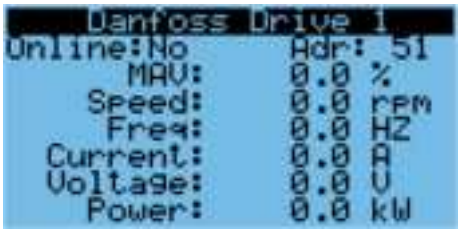
• Status displays the current mode of the VSD.
• Temperature of the VSD Internal circuits.
• Displays the VSD frequency, power, current and voltage output values.</td></tr>
<tr><td> 
</td><td>• Capacity Req is the requested capacity from the UC8 to the VSD.
• DC Bus Ripple is the unwanted periodic variation in the DC Voltage within a power supply.
• Ripple Thres is the maximum allowed DC bus ripple voltage prior to an alarm being displayed.
• Rated Current is the VSD’s rated current value.
• Displays the type of Carel VSD type.</td></tr>
<tr><td colspan="2">This will repeat for Systems 2 through 4 where applicable.</td></tr>
</table>

Note: The information can change depending on the type of VSD installed in the unit.

Value	Description	Value	Description
100	Communication Error	**117**	Compressor Phase Error
101	Compressor Over current	**118**	VSD Fan Error
102	Compressor Overload	**119**	Compressor Speed Error
103	Compressor Over Voltage	**120**	VSD PFC Circuit Error
104	Compressor Under Voltage	**121**	Mains High Voltage
105	VSD High Temperature	**122**	Mains Low Voltage
106	VSD Low Temperature	**123**	VSD Internal Error
107	VSD Overcurrent	**124**	Reserved
108	Compressor Over Heated	**125**	VSD High Earth Leakage
109	Reserved	**126**	VSD Processor Overload
110	VSD CPU Error	**127**	VSD CPU Memory Loss
111	VSD Parameters Corrupted	**128**	VSD Current Warning
112	VSD Supply Phase Error	**129**	PSD1, PSD2, UC8 Selection Error
113	VSD Communication Error	**197**	UC8, Compressor Selection Error
114	VSD Thermostat Error	**198**	UC8, Compressor Selection Error
115	VSD Tuning Fault	**199**	VSD Failed to Load Parameters
116	VSD Disabled		

Values 1

Controller PGD Screens Danfoss VSD Installed

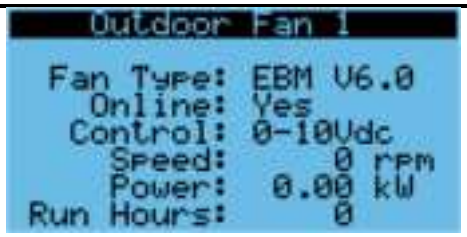
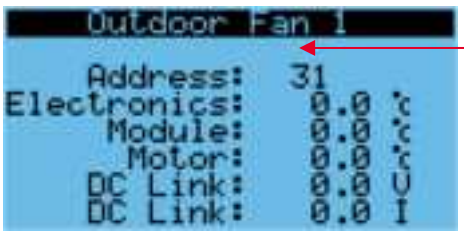
	• Shows if address 51 VSD 1 online or offline status. • **MAV** is the Actual Output Frequency % of the VSD • Displays the VSD **Frequency**, **Current**, **Voltage**, **Power** output values.
	• **Heat Sink** is the temperature value between the heat sink and pcb. • **Ctrl Card** is the temperature value of the LCD display card. • **Run Hours** is the stored value of hours the compressor has ran read from the VSD. • Displays the compressor selected in the Danfoss VSD. • **Lockout** is when the UC8 is in lockout, if so, disabling the VSD from operating.
This will repeat for Systems 2 (address 52) through 4 (address 54) where applicable.	

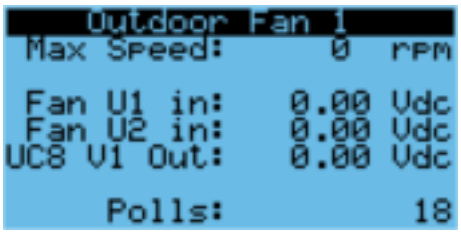
5.3.6Information - Outdoor Fans

Outdoor fan status, including control method.

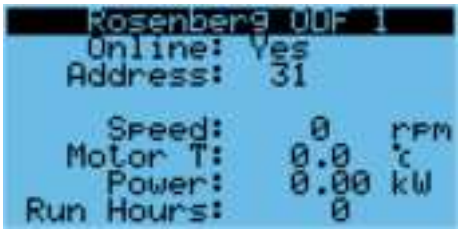
Note: Depending on the type of hardware installed in the unit, the information displayed will show a subset of the screens below and can change.

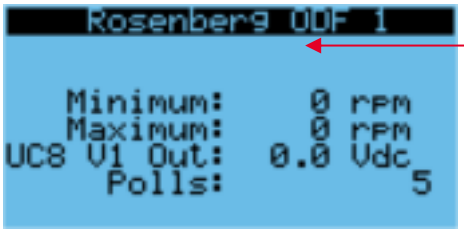
Controller PGD Screens


 
	EBM V5.0 & EBM V6.0 Outdoor Fan
	
	• If a message displayed “Inverter Drive Cooling” indicated a function to cool the VSD’s by the condenser fan.
	• **Fan Type** is brand of fan installed.
	• **Online** is the displaying if there is communication between the PLC and Fan.
	• **Control** is the type of method the fan is controlled from the PLC.
	  ○ 0-10Vdc from UC8 board
	  ○ Modbus control
	• **Speed** is the requested RPM by the controller.
	• **Power** is power (kW) that the fan is currently consuming.
	• **Run Hours** is the total hours of operation recoded in the fan motor.
	• **Address** is Modbus assigned address for communication between the PLC and fan motor.

<table>
<tr>
<td> 
</td>
<td>

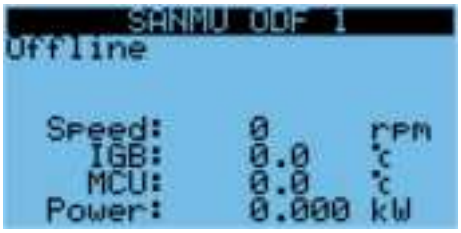
Electronics displays the temperature inside the fan motors electronics.
Module displays the body temperature of the fan motor.
Motor displays temperatures inside the fan motor.
DC-Link is the output DC voltage and current measured of the fan motor.
Max Speed displays the current maximum set RPM for the fan motor.
Fan U1 & U2 shows the current 0-10Vdc input voltage to the motor and feedback voltage of the motor.
UC8 V1 Out displays the DC voltage leaving the UC8 V1 terminal.
Polls displays the number of times the motor has been polled since power has been enabled on the PLC.

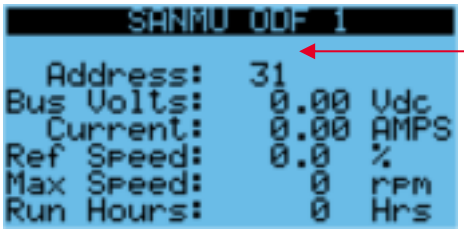
</td>
</tr>
<tr>
<td> 

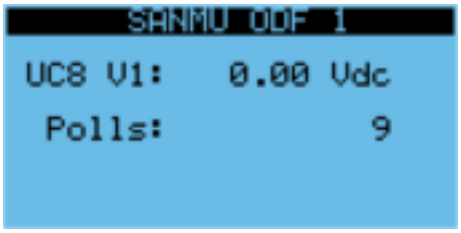

</td>
<td>Rosenberg Outdoor Fan

If a message displayed “Inverter Drive Cooling” indicated a function to cool the VSD’s by the condenser fan.
Online is the displaying if there is communication between the PLC and Fan.
Address is Modbus assigned address for communication between the PLC and fan motor.
Speed is the requested RPM by the controller.
Motor T displays temperatures inside the fan motor.
Power is power (kW) that the fan is currently consuming.
Run Hours is the total hours of operation recoded in the fan motor.
Minimum displays the current minimum set RPM for the fan motor.
Maximum displays the current maximum set RPM for the fan motor.
UC8 V1 Out displays the DC voltage leaving the UC8 V1 terminal.
Polls displays the number of times the motor has been polled since power has been enabled on the PLC.

</td>
</tr>
</table>

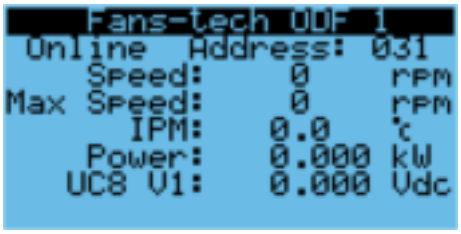






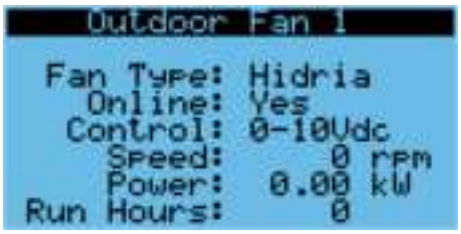
SANMU Outdoor Fan

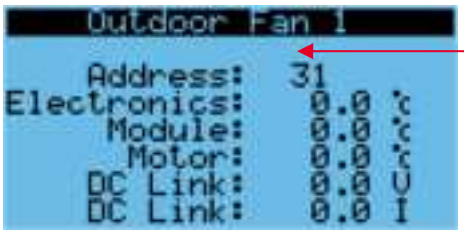
- If a message displayed “Inverter Drive Cooling” indicated a function to cool the VSD’s by the condenser fan.
- **Offline\Online** is the displaying if there is communication between the PLC and Fan.
- **Speed** is the requested RPM by the controller.
- **IGB** displays the temperature inside the fan motors electronics.
- **MCU** displays the temperature inside the fan motors electronics.
- **Power** is power (kW) that the fan is currently consuming.
- **Address** is Modbus assigned address for communication between the PLC and fan motor.
- **Bus Volts** is the output DC voltage measured from the fan motor.
- **Current** is the output current measured from the fan motor.
- **Ref Speed** is the requested RPM displayed as a %.
- **Max Speed** displays the current maximum set RPM for the fan motor.
- **Run Hours** is the total hours of operation recoded in the fan motor.
- **UC8 V1** displays the DC voltage leaving the UC8 V1 terminal.
- **Polls** displays the number of times the motor has been polled since power has been enabled on the PLC.

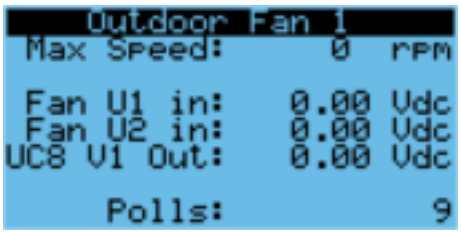


Fanstech Outdoor Fan

- **Online** is the displaying if there is communication between the PLC and Fan.
- **Address** is Modbus assigned address for communication between the PLC and fan motor.
- **Speed** is the requested RPM by the controller.
- **Max Speed** displays the current maximum set RPM for the fan motor.
- **IPM** displays the temperature inside the fan motors electronics.
- **Power** is power (kW) that the fan is currently consuming.
- **UC8 V1** displays the DC voltage leaving the UC8 V1 terminal.







Hidria Outdoor Fan

- If a message displayed “Inverter Drive Cooling” indicated a function to cool the VSD’s by the condenser fan.
- **Fan Type** is brand of fan installed.
- **Online** is the displaying if there is communication between the PLC and Fan.
- **Control** is the type of method the fan is controlled from the PLC.
  - 0-10Vdc from UC8 board
  - Modbus control
- **Speed** is the requested RPM by the controller.
- **Power** is power (kW) that the fan is currently consuming.
- **Run Hours** is the total hours of operation recoded in the fan motor.
- **Address** is Modbus assigned address for communication between the PLC and fan motor.
- **Electronics** displays the temperature inside the fan motors electronics.
- **Module** displays the body temperature of the fan motor.
- **Motor** displays temperatures inside the fan motor.
- **DC-Link** is the output DC voltage and current measured of the fan motor.
- **Max Speed** displays the current maximum set RPM for the fan motor.
- **Fan U1** & **U2** shows the current 0-10Vdc input voltage to the motor and feedback voltage of the motor.
- **UC8 V1 Out** displays the DC voltage leaving the UC8 V1 terminal.
- **Polls** displays the number of times the motor has been polled since power has been enabled on the PLC.

0-10V Outdoor Fan

There is no display information when a 0-10V outdoor fan has been selected.

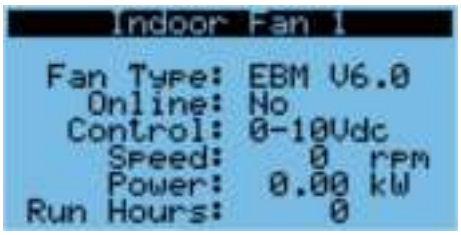
This will repeat for outdoor fans 2 through 4 where applicable.

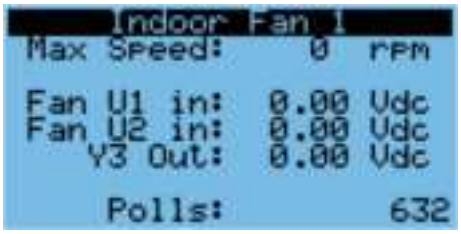
5.3.7 Information - Indoor Fans

Indoor fan status, including control method.

Note: Depending on the type of hardware installed in the unit, the information displayed will show a subset of the screens below and can change.

Controller PGD Screens

<table>
<tr>
<td>


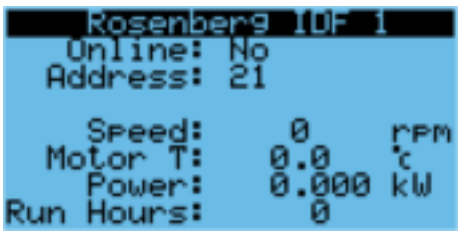


</td>
<td>

EBM V5.0 & EBM V6.0 Indoor Fan

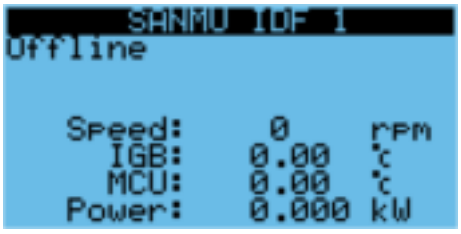
- **Fan Type** is brand of fan installed.
- **Online** is the displaying if there is communication between the PLC and Fan.
- **Control** is the type of method the fan is controlled from the PLC.
  - 0-10Vdc from UC8 board
  - Modbus control
- **Speed** is the requested RPM by the controller.
- **Power** is power (kW) that the fan is currently consuming.
- **Run Hours** is the total hours of operation recoded in the fan motor.
- **Address** is Modbus assigned address for communication between the PLC and fan motor.
- **Electronics** displays the temperature inside the fan motors electronics.
- **Module** displays the body temperature of the fan motor.
- **Motor** displays temperatures inside the fan motor.
- **DC-Link** is the output DC voltage and current measured of the fan motor.
- **Max Speed** displays the current maximum set RPM for the fan motor.
- **Fan U1** & **U2** shows the current 0-10Vdc input voltage to the motor and feedback voltage of the motor.
- **Y3 Out** displays the DC voltage leaving the c.pCO Y3 or UC8 V2 terminal.
- **Polls** displays the number of times the motor has been polled since power has been enabled on the PLC.

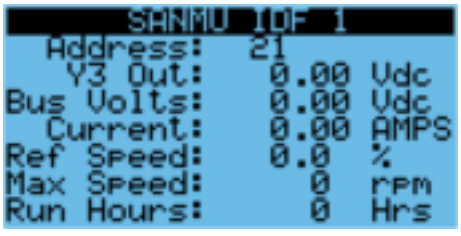
</td>
</tr>
</table>

<table>
<tr>
<td>


</td>
<td>
Rosenberg Indoor Fan

Online is the displaying if there is communication between the PLC and Fan.
Address is Modbus assigned address for communication between the PLC and fan motor.
Speed is the requested RPM by the controller.
Motor T displays temperatures inside the fan motor.
Power is power (kW) that the fan is currently consuming.
Run Hours is the total hours of operation recoded in the fan motor.
Minimum displays the current minimum set RPM for the fan motor.
Maximum displays the current maximum set RPM for the fan motor.
Y3 Out displays the DC voltage leaving the c.pCO Y3 or UC8 V2 terminal.
Polls displays the number of times the motor has been polled since power has been enabled on the PLC.

</td>
</tr>
<tr>
<td>




</td>
<td>
SANMU Indoor Fan

Offline\Online is the displaying if there is communication between the PLC and Fan.
Speed is the requested RPM by the controller.
IGB displays the temperature inside the fan motors electronics.
MCU displays the temperature inside the fan motors electronics.
Power is power (kW) that the fan is currently consuming.
Address is Modbus assigned address for communication between the PLC and fan motor.
Y3 Out displays the DC voltage leaving the c.pCO Y3 or UC8 V2 terminal.
Bus Volts is the output DC voltage measured from the fan motor.
Current is the output current measured from the fan motor.
Ref Speed is the requested RPM displayed as a %.
Max Speed displays the current maximum set RPM for the fan motor.
Run Hours is the total hours of operation recoded in the fan motor.

</td>
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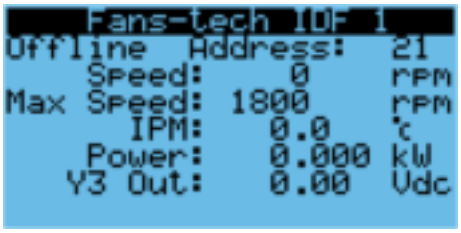
</table>

<table>
<tr>
<td> 
</td>
<td>Fanstech Indoor Fan

• Online is the displaying if there is communication between the PLC and Fan.
• Address is Modbus assigned address for communication between the PLC and fan motor.
• Speed is the requested RPM by the controller.
• Max Speed displays the current maximum set RPM for the fan motor.
• IPM displays the temperature inside the fan motors electronics.
• Power is power (kW) that the fan is currently consuming.
• Y3 Out displays the DC voltage leaving the c.pCO Y3 or UC8 V2 terminal.</td>
</tr>
<tr>
<td></td>
<td>0-10V Indoor Fan

There is no display information when a 0-10V indoor fan has been selected.</td>
</tr>
<tr>
<td colspan="2">This will repeat for Indoor fans 2 through 4 where applicable.</td>
</tr>
</table>

Information - Reheat Modulating Valve (Optional)

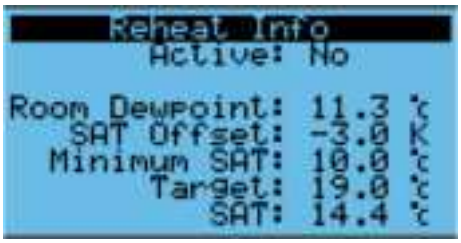
Modulating valve status and position.

Controller PGD Screens

<table>
<tr>
<td>

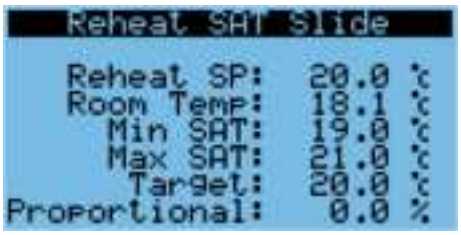

</td>
<td>
Depending on if the unit is a single or dual reheat system the page will change. First picture is a single stage reheat system and the second picture are a dual stage reheat system.

Valve, Valve A & Valve B is displaying the current position of the three way reheat valve in % and steps.
CT Displays the current condenser temperature.
System & Sys [1..4] displays the current mode the reheat stage is in.
Active is advising if the unit is currently using the reheat expansion valve

</td>
</tr>
<tr>
<td>


</td>
<td>

Room Dewpoint is the current dew point temperature measured from the room sensor inputs.
SAT Offset is the supply air temperature target when reheat mode is in operation.
Minimum SAT is the lowest value the system will control to before slowing the compressor speed.
Target is the supply air temperature target when the reheat mode is active.
SAT is the current supply air temperature.

</td>
</tr>
<tr>
<td>


</td>
<td>

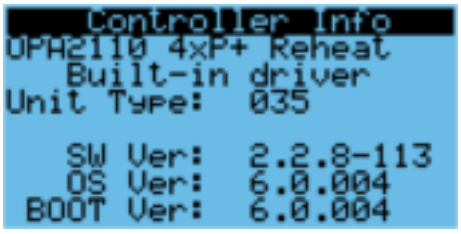
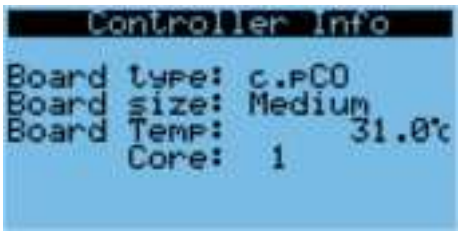
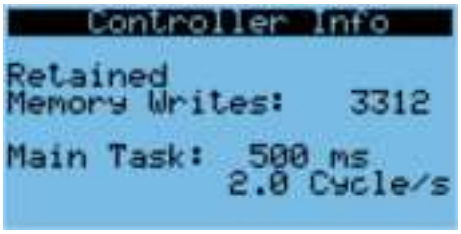
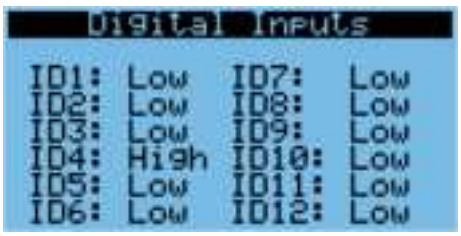
Reheat SP is shown here as a target supply air temperature.
Room Temp is the current dry bulb room temperature.
Min SAT is the lowest the supply air temperature can fall to before additional reheat is added to air stream.
Max SAT is the highest the supply air temperature can rise to before the reheat valve is closed more.
Target is the supply air targeted value to maintain in between the min & max.
Proportional is the ratio between the room temperature and the set points.

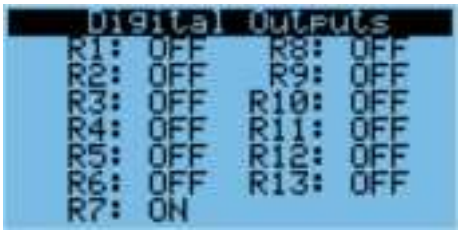
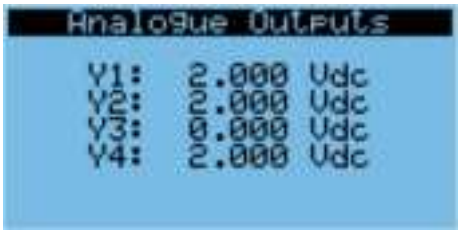
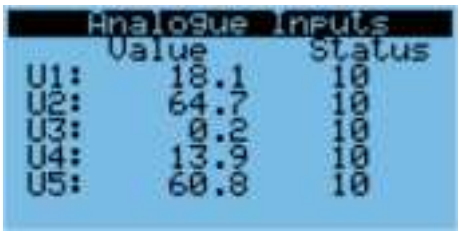
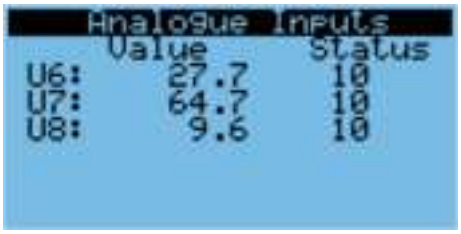
</td>
</tr>
</table>

5.3.8Information – Controller Information

Information relating to the controller such as software version, operation system version, Input & output status etc.

Controller PGD Screens

	Displaying the model number selecting from the configuration file. • **Unit Type** is the unit selection number. A full list is available in **Error! Reference source not found.** • **SW Ver** displays the current Temperzone software loaded into the PLC with build number. • **OS Ver** Operating system version of Carel controller. • **BOOT Ver** is the boot version of Carel controller should always be the same as the operating system.
	• **Board Type** is type of Carel product used. • **Board Size** display the c.pCO size i.e., Mini High End, Medium or Large. • **Board Temperature** shows the current temperature inside the c.pCO PLC. • **Core** is the value or cores in the c.pCO PLC, very important when updating software to not install a program with a different core operating system.
	• **Retained Memory Write** shows the current number of retained memory write values currently written to the PLC. • **Main Task** is the current communication speed in both milli seconds and cycles.
	• If power supply is lost to controller, blackout information details the last timed event.
	• **Digital Inputs** screen displays the current status of the digital inputs feed into the PLC. For a description list of the inputs refer to section **Error! Reference source not found. Error! Reference source not found.**. These are 24V inputs only. o Low indicates open circuit o High Indicates closed circuit

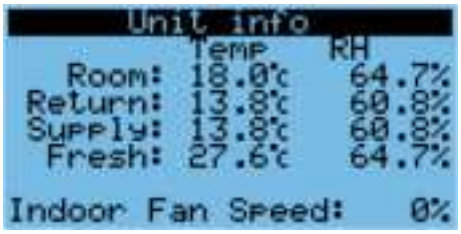
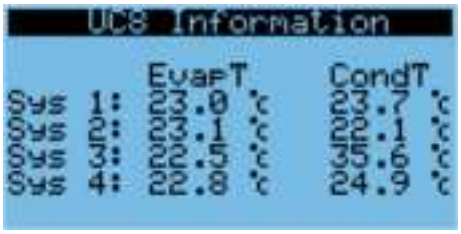
	• **Digital Outputs** screen displays the status of the digital outputs feed from the PLC. For a description list of the inputs refer to section **Error! Reference source not found. Error! Reference source not found.**. o Off indicates open circuit o On Indicates closed circuit
	• **Analogue Outputs** screen displays the status of the analogue outputs feed from the PLC. For a description list of the inputs refer to section **Error! Reference source not found.** Mini, **Error! Reference source not found.** Medium, **Error! Reference source not found.** Large c.pCO PLC. o 0-10Vdc output value
	• **Analogue Input** values are displayed as per their sensor selection. • Status will show 10 when normal, otherwise will display a fault code or Err, refer to the below **Error! Reference source not found.** for possible error codes.
	• **Analogue Input** values are displayed as per their sensor selection. • Status will show 10 when normal, otherwise will display a fault code.

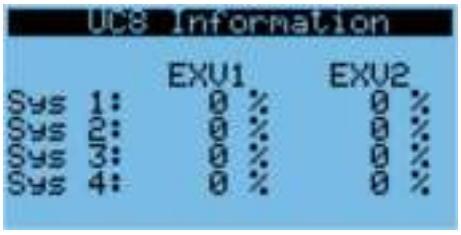
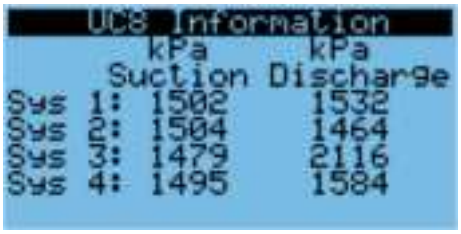
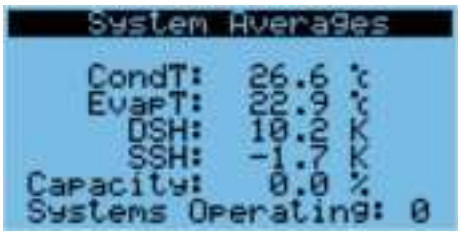
5.3.9Information – System Info

These pages are designed for cross analysis of the refrigeration systems within the unit to ensure uniform system performance. These pages are also useful to track trends in averages and see recorded anomalies.

Controller PGD Screens

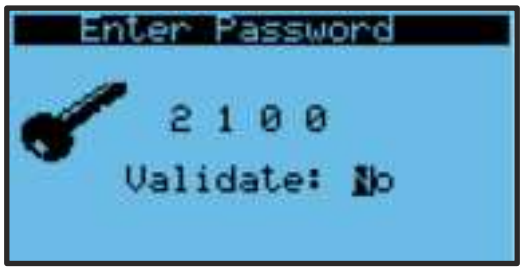
Note: You will see 1, 2 or 4 Sys, IDF & ODF below dependent on the number of Systems (Sys), IDF and Outdoor Fans (ODF) present in the unit. See Section **2 Notes on Multi-system Screens** for more information.

	Displaying the basic temperature information from the sensors installed • **Room Temp & RH Sensor** normally supplied separate and installed on-site, customers can use their own sensors or use BMS control of the sensor. • **Return Air Temp & RH Sensor** supplied inside the unit, it is always a NTC & 0-5Vdc sensor type. • **Supply Air Temp & RH Sensor** supplied inside the unit, it is always a NTC & 0-5Vdc sensor type. • **Fresh Air Temp & RH Sensor** normally only supplied when economy dampers are installed, if there is no economy dampers and no fresh air sensor installed, the program will use the ambient sensor of UC8 *1.
	Displaying the evaporator and condenser temperatures of all available systems.
	Displaying the suction superheat and discharge superheat K values of all available systems.

	Displaying the current expansion valve 1 & 2 percentage position of all available systems.
	Displaying the current suction pressure & discharge pressure's in kPa of all available systems.
	Displaying the average values of the Condenser, Evaporator, discharge superheat & suction superheat values. Shows the capacity and the total stages running.

5.4 Settings

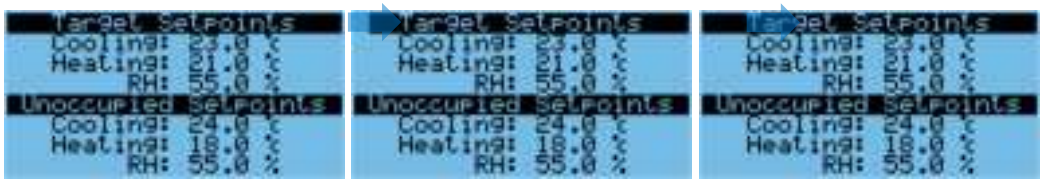
All settings relating to the control, communication sensor configuration and customisation to the program are found in this section. Settings that are visible but not editable are protected by the manufacturer. Contact Temperzone technical support for requests to change manufacturer locked settings.



The settings menu is password protected: the below screen will pop up before you can access this menu. **The default password is 2100**, this can be changed by the user in the Settings menu. See Section Error! Reference source not found. Error! Reference source not found. for more detail.

Scroll the numbers to set the password and then on “Validate: No”, scroll this value to “Yes” and select to unlock.

To highlight a variable, use the **Enter button**, to adjust the variable use the **Up** and **Down buttons**. Once complete use the Enter button until the top left corner begins flashing. This is referred as **“Page Scroll”**.



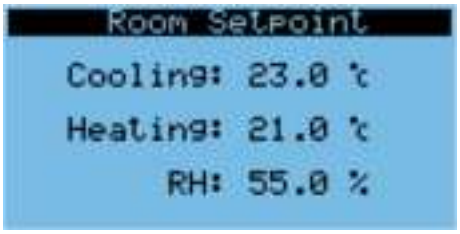
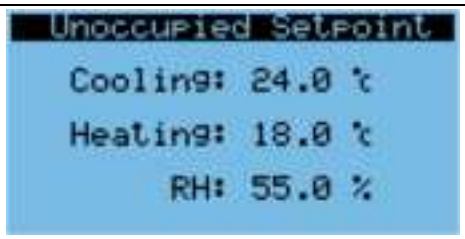
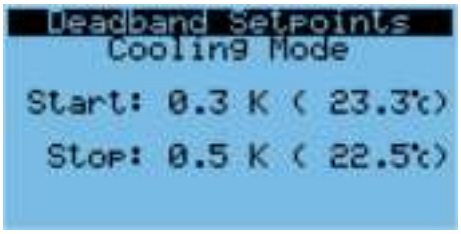
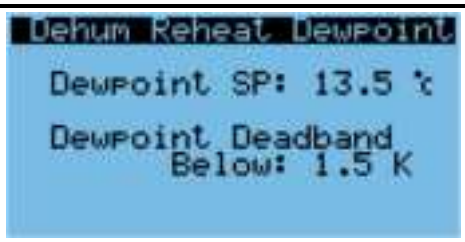
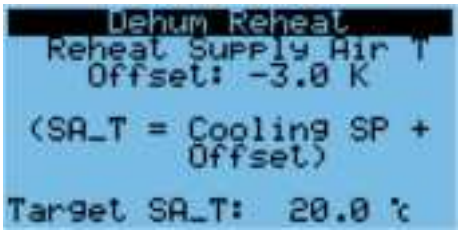
5.4.1 Settings – Setpoints

Setpoint adjustments are made in this menu including temperature and RH as well as specific dehumidification settings outlined in the page descriptions below.

Manual timeclocks for both unoccupied mode and night mode are enabled and set in this menu. These values are otherwise set by default depending on the 'User Optimisation Mode' selected upon commissioning. See Sections **5.4.4 Settings – User Optimisation Modes**

Controller PGD Screens

	Set the control mode to be: • Auto Heat / Cool (Default) • Fan only • Heating only • Cooling only To prevent setpoints from being altered from the home screen shortcut, tick Lock Main Screen Setpoints section 5.1.2

	• Set the required conditioned space temperature for both cooling and heating. • Set the required RH value for use in dehumidification control.
	• If utilised, set the required unoccupied conditioned space temperature for both cooling and heating. • If utilised, set the required unoccupied RH% value for use in dehumidification control.
 	• The start and stop cooling & heating dead band values can be adjusted if required. The numbers in the brackets represent the temperature values based on the current cooling set point.
	• Dewpoint SP displays the resultant dew point set point based on the current set point. • The Dead band value is adjustable.
	• The offset value is adjustable. The target value will show the resultant target supply air temperature based on the current set point.
	Night Mode Clock is Disabled by default • Specify start and stop time which will activate every day. • Force control of night mode manually (generally used for test only). • Status of Night Mode operation.

	Unoccupied Time Clock is Disabled by default • Specify start and stop time. • Activation days can be manually selected. • Status of Unoccupied operation.
	The Delay Start feature determines the time delay between powering on the unit and the activation of the indoor fans and compressor capacity control logic.

5.4.2 Settings – Fan Configuration

The fan speed is set to a fixed value that can be adjusted in the settings menu / indoor configuration page. There are three modes of fan speed control selection: Constant Air Flow, Speed Controlled, and 0-10Vdc input. For installation instructions refer to section Error! Reference source not found. Error! Reference source not found.

Fan Constant Airflow (Airflow l/s) – Air Transducer input (default)

In this mode a differential pressure sensor measures a port on the inlet cone of the plug fan along with a port located before the inlet cone, the read value is used in a calculation to determine the airflow. The controller adjusts the speed of the fan to achieve a set airflow.

Note 1: Airflow is limited by minimum and maximum settings on the screen titled IDF Speed Config as shown below.

Note 2: During normal operation the fan speed may vary operating speeds due to intuitive logic that maintains the output and keeps the unit running within safety limitations.

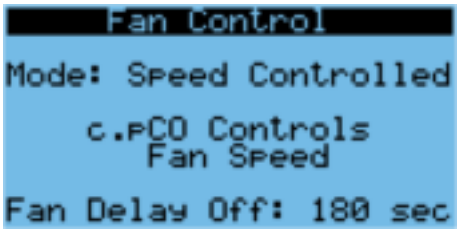
Controller PGD Screens

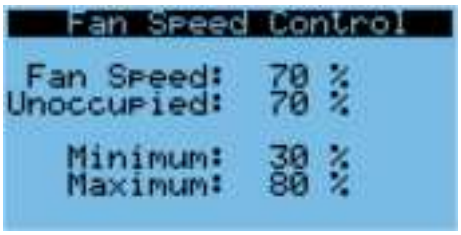
	"Speed Controlled" mode is selected. • The Fan Delay Off setting determines the amount of time it takes for the indoor fans to turn off after the unit has been powered off.
	• Selection of constant airflow setpoint in litres/second. • Unoccupied setpoints located here too. • Minimum and maximum setpoint limits made on this page. Ensure these are updated after air balancing unit.

Fan Speed (Speed Controlled) – Controller setting

The fans will operate at a fixed speed setting, as determined by the user, during both normal operation and unoccupied modes.

Controller PGD Screens

	"Speed Controlled" mode is selected. • The Fan Delay Off setting determines the amount of time it takes for the indoor fans to turn off after the unit has been powered off.

	• Sets the fixed speeds for operation in normal and unoccupied operation modes. • Set the minimum and maximum fan speed *Note: Caution is advised when increasing the maximum fan speed setting, as excessively high speeds may potentially cause damage to the unit's frame.*

Fan Speed (0-10Vdc Input) – 0-10Vdc Analogue input

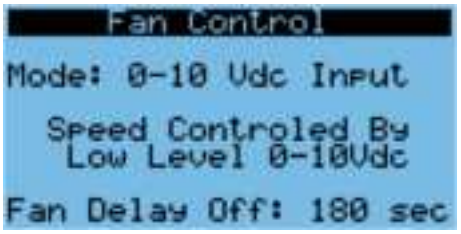
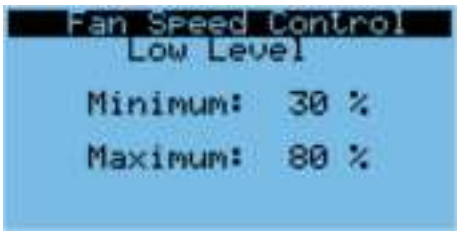
The fan speed is controlled by a 0-10Vdc input signal. A 10V input corresponds to a request for full speed, 5V corresponds to 50% speed, and 0V turns the fan off. However, the fan has a defined minimum and maximum speed range. For example, if the maximum fan speed is set to 80%, even with a 10Vdc input signal, the fan will only operate up to 80% of its full capacity, not 100%.

The fan can operate based on a 0-10Vdc input signal connected to the U3 terminal. To use this mode, the user must either:

- Disable the Air Flow Sensor to prevent the display of inaccurate values, or
- Re-route the connection of the Air Flow Sensor or the Fan Speed input.

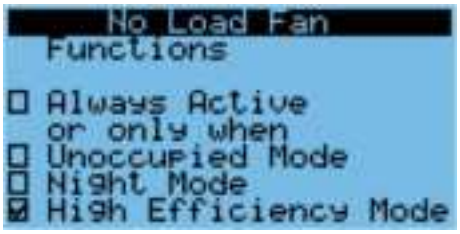
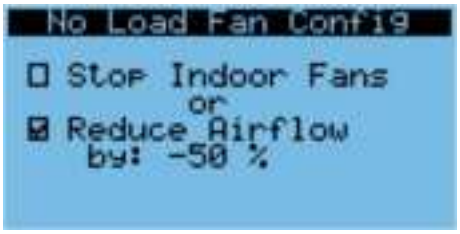
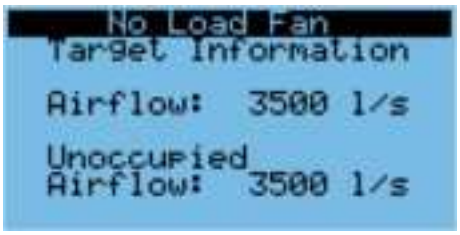
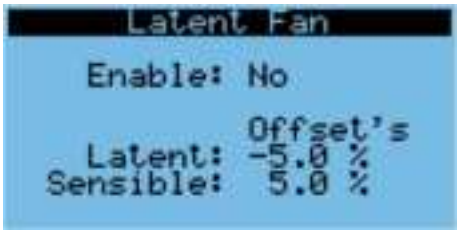
For wiring connections see sheet two of electrical schematic located in 'Specifications' document.

Controller PGD Screens

	"0-10Vdc input" mode is selected. • The Fan Delay Off setting determines the amount of time it takes for the indoor fans to turn off after the unit has been powered off.
	Screen available when "0-10Vdc input" mode is selected. • Sets the minimum and maximum values the controller will accept.

Additional Fan Settings (Airflow & Speed Control Modes Only)

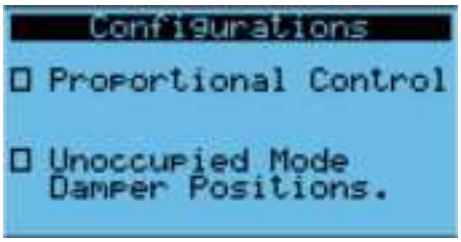
Controller PGD Screens

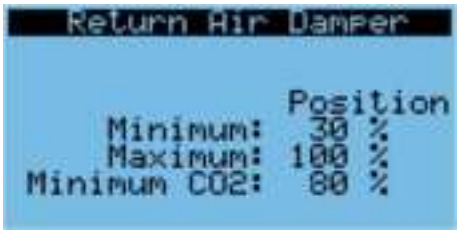
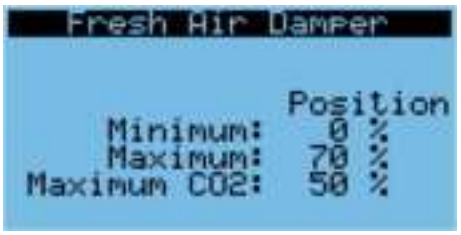
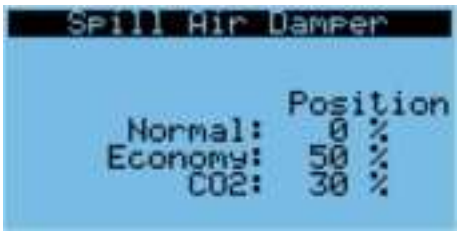
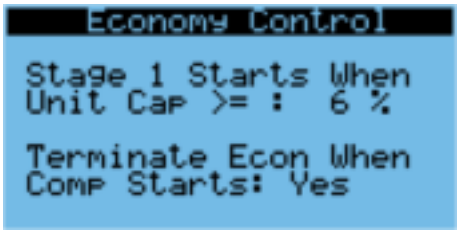
	'No Load Fan Speed' is available for selection. This feature is used to turn off or reduce fan speed (as below) to reduce energy consumption when all compressors have cycled off during unit operation and still allow air to circulate in the room space. • Select the operation mode relevant to when "no load" is operational (multi-select is available).
	Two available settings for the indoor fans: • Indoor fans will stop once compressors have cycled off. • Indoor fans will reduce airflow by xx% based on the input value used. • xx% can be adjusted anywhere from 0 to 100%.
	Read Only information on: • Airflow: "No Load Fan" airflow in operational mode. • Unoccupied Airflow: Target "No Load Fan" airflow in Unoccupied Mode. Note: this only shows the value of reduction % as set above.
	• If 'Latent Fan' is enabled, then this feature will adjust the fan speed when the operation mode is in latent or sensible cooling modes. • The % reduction amount when in latent or sensible cooling is adjustable. • Latent can be adjusted between zero and -15%. • Sensible can be adjusted between zero and +10%.

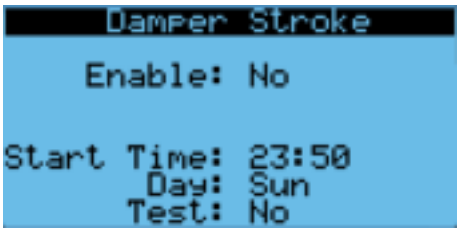
5.4.3Settings – Damper Configuration

A range of settings and options are found within the damper menus that are associated with damper control – for example, minimum and maximum opening / closing limitations, CO_2 control (if fitted), preventative maintenance functions (i.e., Damper stroking) etc.

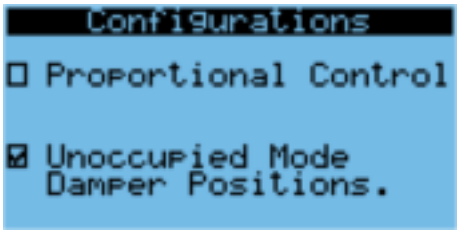
Ensure consideration is given to the damper setup during the commissioning phase. It is recommended that the minimum return air damper limit should not drop below 25% to allow a minimum permissible airflow over the return air and room air sensors.

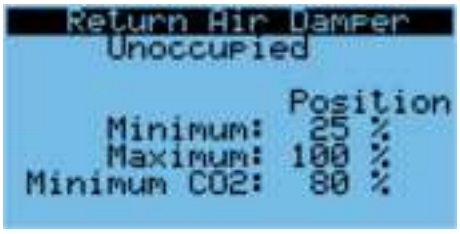
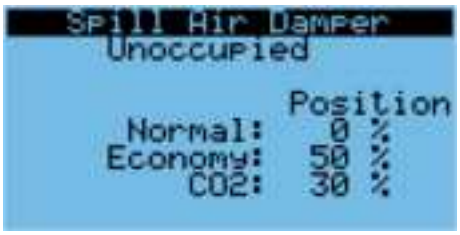
	• **Enable Economy Mode** allows the use of both the return air damper and the fresh air dampers. • **CO2 Control** mode requires the installation of a CO_2 sensors and provides additional control features to regulate the fresh air damper.
	• **Proportional Control** is a mode where the return air and fresh air dampers operate in an inverse percentage relationship. For instance, if the return air damper is at 60% position, the fresh air damper will be at 40% position. • **Unoccupied Mode Damper Positions** allows for selection of different damper positions when in unoccupied mode.
	CO2 Setpoint screen is only operational with the inclusion of a CO_2 sensor from the Temperzone options list. • CO_2 range is adjustable in parts per million. • **CO2 Minimum** is the condition under which the FA Damper will revert to normal set position. • **CO2 Maximum** is the condition where the fresh air damper will change to the CO_2 Maximum % set position. • **Alarm** is the setting specifies the CO_2 parts per million (ppm) value that triggers an alarm to be displayed via the screen or BMS to alert the operator. • **Alarm** is the setting to determine the duration for which the CO_2 value must exceed the set point before the alarm is activated. • **Regulate Indoor Fan** if active while adjust the indoor fan to help reduce the amount of CO_2 in the room.

	• **Minimum** is to set the minimum return air damper position. • **Maximum** is to set the maximum return air damper position. • If CO_2 Control is enabled, **Minimum CO2** is to set the minimum damper position while in CO_2 mode.
	• **Minimum** is to set the minimum fresh air damper position. • **Maximum** is to set the maximum fresh air damper position. • If CO_2 Control is enabled, **Maximum CO2** is to set the maximum damper position while in CO_2 mode.
	• **Normal** is to set the spill air damper position while the room pressure is low. • **Economy** is to set the spill air damper position while the unit is in economy mode. • If CO2 Control is enabled, **CO2** is to set the spill air damper position while in CO_2 mode.
	• Disable economy mode when certain fresh air conditions are reached. • Default is if fresh air RH exceeds 80% humidity, adjustable if required. • **Enth >** Enthalpy greater than 55 kJ/kg, adjustable if required. • **Temp > & Temp <** Will disable economy mode if the fresh air damper is greater than 30'c or lower than 15'c, adjustable if required. • **Moist >** Will disabled economy mode if the fresh air moisture content is greater than 15 g/kg, adjustable if required.
	• **Stage 1 Starts When Unit Cap >=** value can be adjusted to set when the unit either begins economy mode or initialising the compressor to begin operation. • **Terminate Econ When Comp Starts** is a selectable option that can disable economy mode once the compressors start, default is Yes, can be disabled for specific building requirements.

<table>
<tr>
<td> 
</td>
<td>Damper Stroke Calibration screen when enabled, this feature will automatically recalibrate the damper positions. This is a beneficial function if the dampers are not operated frequently, as it helps prevent the actuators from seizing up. By periodically recalibrating the damper stroke, the system ensures the dampers can move freely and respond accurately to control signals.

• Enable will allow the dampers to be calibrated at the set time.
• Start Time, choose a time best suited to calibrate the dampers.
• Day, multiple selections such as a certain day, weekend, Monday to Friday or every day.
• Test when enabled, the Test option will initiate a one-time calibration of the damper positions to ensure they are functioning properly.</td>
</tr>
<tr>
<td> 
</td>
<td>The damper input polarity can be adjusted if required. As default the Return air damper works in reverse. These values can be changed if required.

• Return Air: Reversed will operate the return air damper in reverse. 0Vdc = 100% open & 10Vdc = 0% open.
• Fresh Air: Positive will operate the fresh air damper normal operation. 0Vdc = 0% open & 10Vdc = 100% open.
• Spill Air: Positive will operate the spill air damper normal operation. 0Vdc = 0% open & 10Vdc = 100% open.
• Zero Vdc At Minimum can be deactivated if the damper does not begin to open until a set minimum voltage has been supplied.</td>
</tr>
<tr>
<td colspan="2">The following screens are only available when Unoccupied Mode Damper Positions has been selected.
 
</td>
</tr>
</table>

	• **Minimum** is to set the minimum return air damper position. • **Maximum** is to set the maximum return air damper position. • If CO_2 Control is enabled, **Minimum CO2** is to set the minimum damper position while in CO_2 mode.
	• **Minimum** is to set the minimum fresh air damper position. • **Maximum** is to set the maximum fresh air damper position. • If CO_2 Control is enabled, **Maximum CO2** is to set the maximum damper position while in CO_2 mode.
	• **Normal** is to set the spill air damper position while the room pressure is low. • **Economy** is to set the spill air damper position while the unit is in economy mode. • If CO2 Control is enabled, **CO2** is to set the spill air damper position while in CO_2 mode.

5.4.4Settings – User Optimisation Modes

The user optimisation mode selection is made from the following options listed below. Once selected the unit is set to intuitively run based off the programmed strategy's intent. See Section for comprehensive detail. **3 Introducing Comfort Mode**

All climates and applications listed below are examples of scenarios where these may be used, all sites will have their own specific requirements.

<table>
<tr>
<td> 
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<td>

- **Optimisation selection default** = Standard
- Using the Down button will display the target coil temperatures in the current operation mode.
- These EvapT & CondT targets are not adjustable unless Custom Mode has been selected, in which can only be adjusted from Manufacturers Menu.

</td>
</tr>
</table>

High Performance – Maximum output capacity
For applications where the maximum output capacity is often essential, and unit efficiency is less of a concern.

Climates: Tropical, Sub Tropical, Arid
Applications: Large open spaces, Mines, Processing plants

High Efficiency – Optimised energy efficiency
For applications where energy efficiency is the main concern, performance may be affected at more extreme conditions.

Climates: Temperate, Sub Tropical, Dry, Arid
Applications: Office space, retail space, Halls, Gymnasiums, Processing plants

Standard – Conservative strategy, balanced
A balance between maximum performance and energy efficiency. Suitable for most applications.

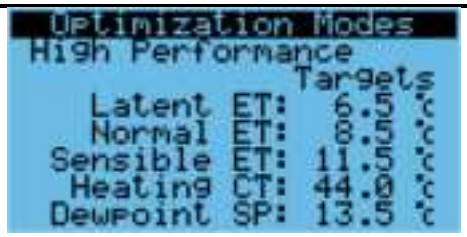
Climates: Temperate, Tropical, Sub Tropical, Dry, Arid
Applications: Office space, retail space, Halls, Gymnasiums, Processing plants

Customised – Adjustable settings
Where the above pre-configured options do not suit a certain site, settings can be adjusted to suit a specific application.
Note: Although care is taken to provide a feasible range of values, adjustment of these values could cause the unit to run sub optimally.

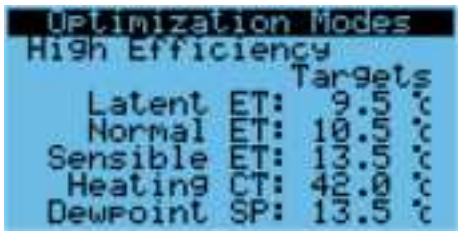
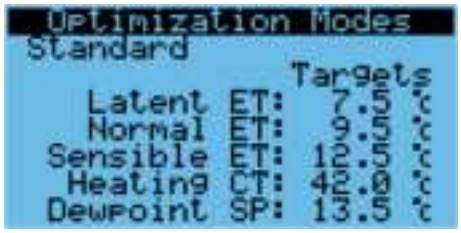
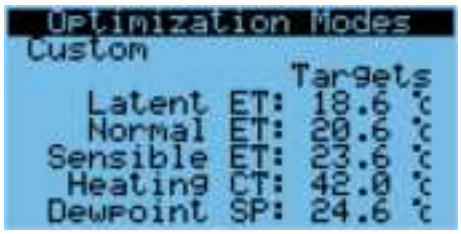
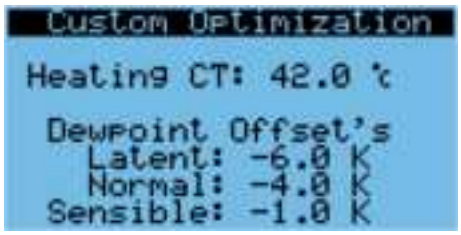
Proportional – Maximum output capacity, balanced
A balance between maximum performance and energy efficiency. Suitable for most applications.

Climates: Temperate, Tropical, Sub Tropical, Dry, Arid
Applications: Office space, retail space, Halls, Gymnasiums, Processing plants

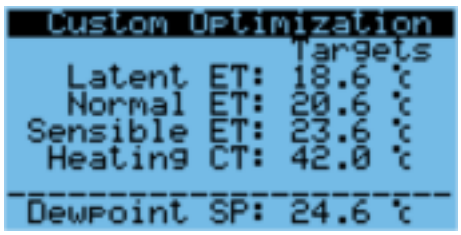
Controller PGD Screens

<table>
<tr>
<td> 
</td>
<td rowspan="4">

Optimisation set selection = Custom.
Latent ET value is the targeted evaporator temperature the system will target when in Latent Cooling Mode.
Normal ET value is the targeted evaporator temperature the system will target when in Cooling Mode.
Sensible ET value is the targeted evaporator temperature the system will target when in Sensible Cooling Mode.
Heating CT value is the targeted condenser temperature the system will target when in all Heating Modes.
Dewpoint SP value is the calculated target value for the dew point temperature, which is derived by applying pre-configured comfort mode offsets to the base dew point setpoint.

</td>
</tr>
<tr>
<td> 
</td>
</tr>
<tr>
<td> 
</td>
</tr>
<tr>
<td> 
</td>
</tr>
<tr>
<td> 
</td>
<td>

Optimisation set selection = Custom.
Heating CT value is the targeted condenser temperature the system will target when in all Heating Modes.
Dewpoint Offset's adjusting the Latent, Normal, Sensible 'K' values will adjust the custom Latent ET, Normal ET & Sensible ET targeted values.

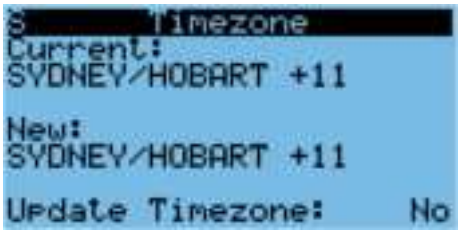
</td>
</tr>
<tr>
<td> 
</td>
<td>

Target evaporator temperatures are the equated value after the offset has been applied.
Dewpoint setpoint is equated from the room and RH setpoints.

</td>
</tr>
</table>

5.4.5 Settings – Date/Time

Controller PGD Screens

	To adjust the date and time settings, use the following screen. • **Format** allows the day / month / year display to be changed in another order. • **Date** allows the date to be changed. • **Hour** allows the time to be adjusted. • **Day** displays the current day from the date entered in Date.
	To adjust the time zone settings, use the following screen. • **Current** displays the currently set time zone location. • **New** if required to change, press the Enter button followed by the Up or Down button to the new time zone location. • **Update Timezone**, if the time zone has been adjusted change the No variable to Yes using the Down button and press the Enter button.

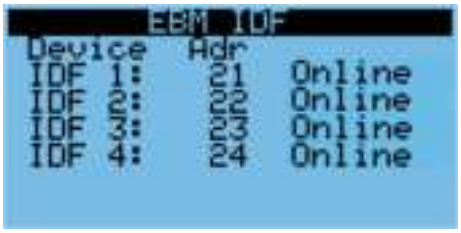
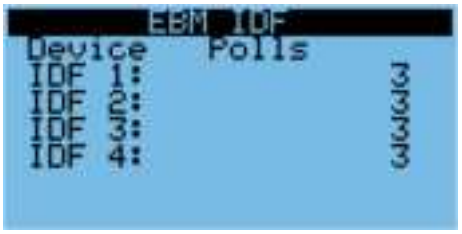
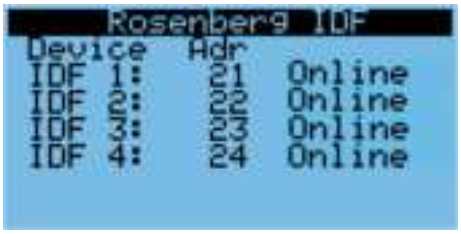
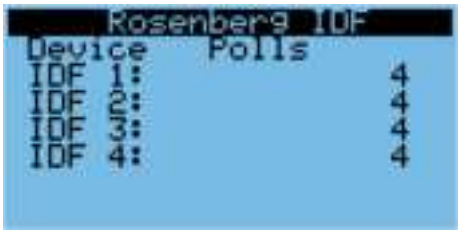
5.5 Communications

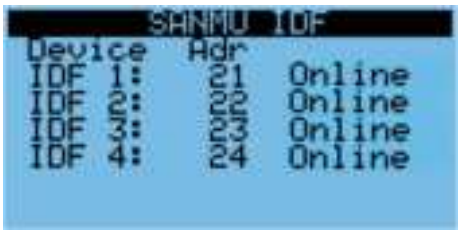
Communications between the c.pCO controller and the main hardware components (e.g., fans, and compressors) is done via Modbus over RS-485 protocol. The following table shows each of the screens and the Modbus addresses associated with these components along whether communications currently are online.

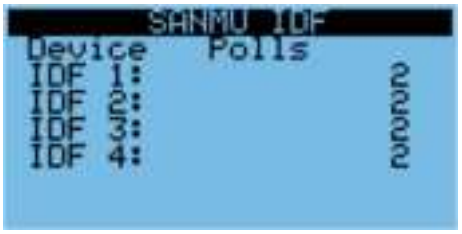
Note: You will see 1, 2 or 4 IDF, ODF & UC8 below dependent on the number of IDF, Outdoor Fans (ODF) and Unit Control Boards (UC8) present in the unit. See Section **2 Notes on Multi-system Screens2** for more information.

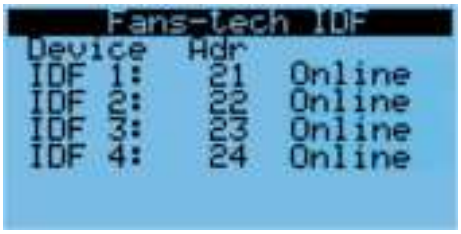
Depending on the type of hardware installed in the unit, the information displayed will show a subset of the screens below and can change.

Controller PGD Screens

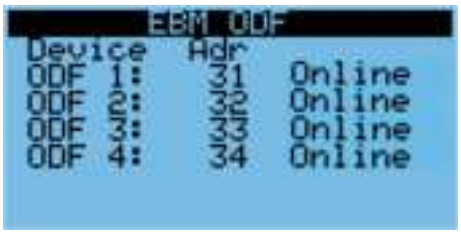
Indoor Fans	
	
	

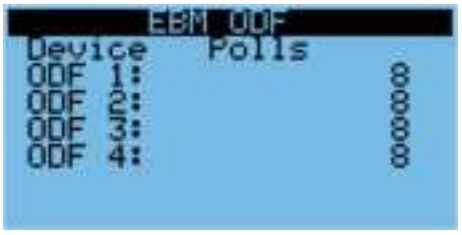


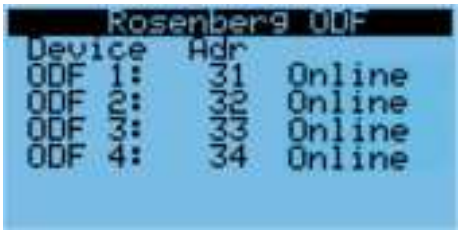


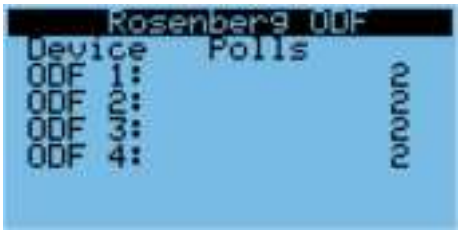


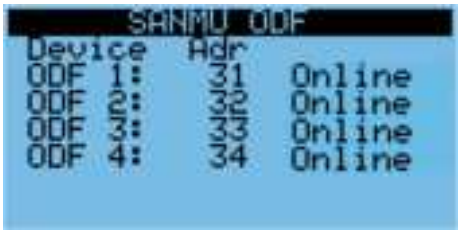
Outdoor Fans

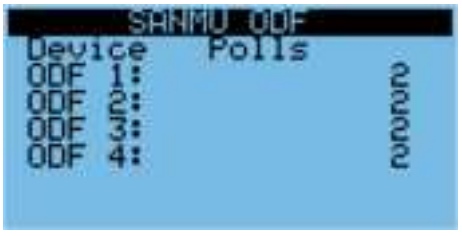


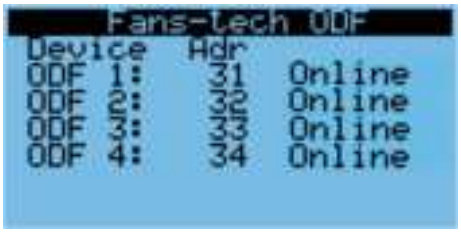


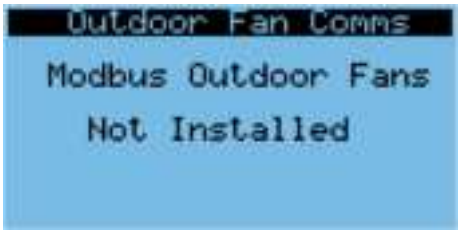


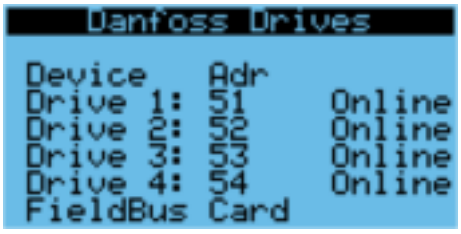


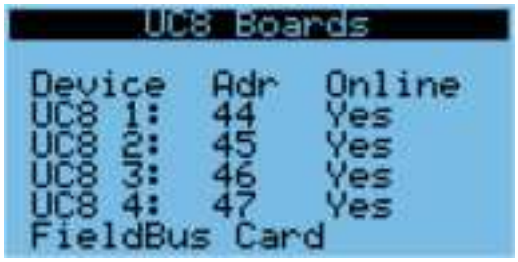
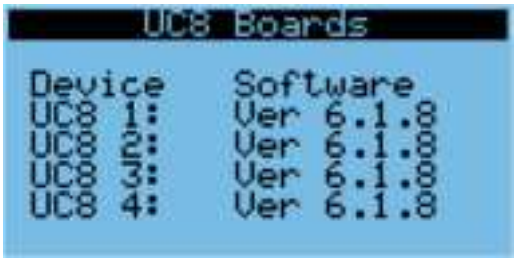
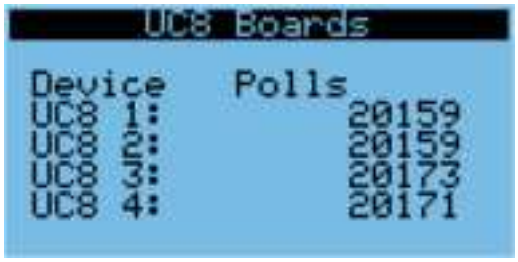


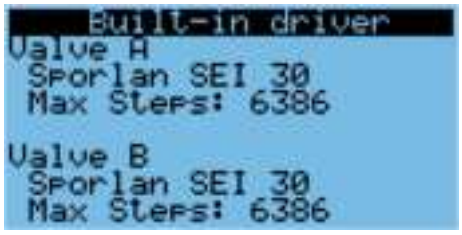
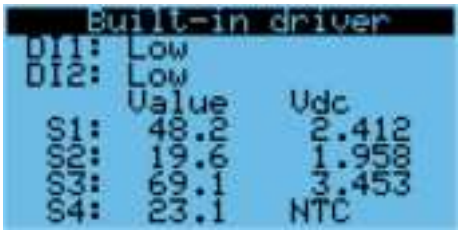




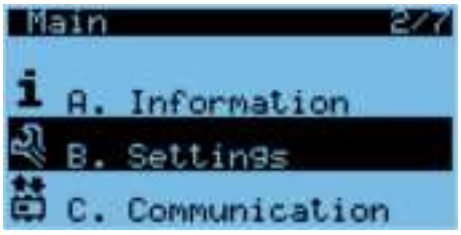
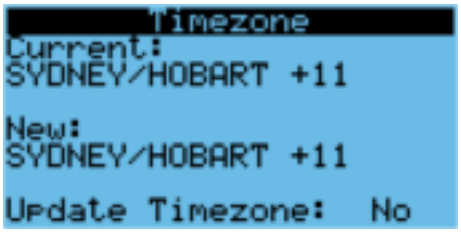


Inverter Drives – Only applicable when Danfoss compressors have been selected.	
	

UC8 Boards	
	
	

Built-in driver	
	
	Note: This feature is only available if a c.pCO Medium unit has been installed. If the system is operating on a Mini HE or Large c.pCO, these screens will not be accessible.

6 Set Date and Time

	1) On the home page press the **Prog button**, highlight the **"B. Settings"** and press the **Enter button**. 1) Enter the Service password and change **"Validate: No"** to **"Yes"**.
	2) Highlight **"5. Imp/Exp Params"** and press the **Enter button**.
	3) Use the **Enter button** to highlight the **"Date"** variables & **"Hour"** variables and use the **Up** and **Down button** to adjust. 4) When completed use the **Enter button** to return to the "**Scroll Page**" and press the **Down button**.
	5) Use the **Enter button** to highlight **"New:"** and then press the **Up** or **Down button** to change to the correct time zone. 6) Once completed press the **Enter button** and use the **Back button** to return to the home page.