



DDC Controller Guide

MANUAL – INSTALLATION, OPERATION AND MAINTENANCE

DIGITAL CONTROLLER

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IMPORTANT ▼

The SolutionAir Control System is subject to periodic updates in the Control Program, Controller OS and the DDC Controller Guide itself. Please consult **SolutionAirGroup.com** or call **(204) 633 4808** to determine if the latest Guide, OS, and program are being used.

WARNING ▼

Improper adjustment of unit parameters and set points may result in the unit operating inefficiently. Only Trained and Authorized personnel are allowed to access the Solution Air DDC Controller.

WARNING ▼

This Guide describes and explains all possible configurations available in our SolutionAir units. Please note that not all options and control screens mentioned in this document will be displayed in every unit. The Control Modules available are configured specific to each unit only will be displayed in the controller. For example, if a particular unit is not configured for Heating module, the control options specific to Heating modules will not be displayed.

NOTE: This Guide is intended only for the following Digital Controllers/Modules installed in SolutionAir units. Refer to electrical drawings for hardware I/O and communication (BMS) wiring. For assistance and support regarding other electronic devices installed in the unit, please contact SolutionAir.

MANUFACTURED BY ▼

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ANSI Z83.8-2009
Commercial Industrial
Gas Heating Equipment

CSA 2.6-2009
Industrial Package Gas Fired Package Furnaces



DIGITAL CONTROLLER

General Operating Instruction










Summary

All SolutionAir products come equipped with a digital controller. The following guide will help familiarize the user with the controller interface and important operations.

NOTE: This guide does not replace a products installation/operation manual (IOM). Please refer to the relevant IOM for instructions and safety precautions before operating or servicing on the equipment.

1 Keypad Description

All products come with a DDC controller mounted to the unit, which can also be controlled remotely through a web-based virtual network interface or a Remote Terminal Module (optional). Refer to the following table for a description of each button and their typical keys on each type of keypad.

| Controller Physical Keypad | Web based Keypad | Description |
|---|--|---|
|  |  | Alarm This key will flash if an alarm is tripped. Pressing the Alarm key will bring up the alarm screen to view the current alarms that have been tripped |
|  |  | Program From the Home Screen, the Program key advances the controller to the Program Configurations |
|  |  | Escape The Back/Escape key returns the user to the previous menu. |
|  | Up/Down The Up and Down keys allow users to scroll through menus and screens or to adjust input fields. When adjusting an input field, the keys can be held down to advance or decline quickly. | |
|  | | |
|  | Enter Pressing the Enter key moves the cursor through input fields on the screen. If an input field has been altered, pressing the Enter key will save the change and then move to the next field. | |

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General Operating Instructions

2 Homescreen

The Home Screen indicates the unit's status and current operating mode and is the starting point that allows the user to navigate to other sub-menus. Pressing Up or Down will toggle the Home Screen Sub-menu list. Press Enter to bring up the selected sub-menu.

FIGURE # -DESCRIPTION ▼



2.1 Unit Status

The unit Status Displays the Unit ON/OFF condition. The following table describes the 10 different unit status possibilities:


| | |
|-------------------------|---|
| ON/AUTO | The Unit is ON and in AUTO, can be Turned ON from the Display Screen/ BMS /Schedule. |
| OFF BY ALARM | The Unit is Disabled/Turned Down by Critical Alarm. Refer Alarm Summary for Interlocks. |
| OFF BY BMS | Turned OFF from BMS via BACnet/Modbus. Refer BMS Points List. |
| OFF BY SCHED | Turned OFF By Occupancy Schedule. |
| OFF BY DI | Disabled by Digital Input -Physical Switch (Kill switch in the unit or from the customer- Refer Electrical Drawing) |
| OFF BY KEYBOARD | When the Unit is Turned OFF from the Display Screen POWER Menu. |
| OFF BY INTERLOCK | Unit is Disabled by any of the following: Fire Interlock, Exhaust Fan Interlock, General Interlock from the customer. Refer Alarm Summary for Interlocks. |
| IN MANUAL MODE | When the unit is overridden MANUALLY to any of the Operating Modes. Refer Overrides. |
| SYSTEM STARTUP | When the Unit has been Turned ON, goes to System Startup. |
| DAMPERS OPENING | Indicating the Dampers are opening at Startup |

DIGITAL CONTROLLER

General Operating Instruction

2.2 Operating Mode

The operating mode describes the unit's current operating mode. The following table describes the 7 different operating modes in the unit.










| | | |
|---|-------------------------|---|
| | OFF | The Supply Fan is OFF. (Note: If the unit status shows ON/AUTO, but the operating mode shows OFF, this indicates the fan has not started yet or it failed to start) |
|  | Dehumidification | The unit is operating in Dehumidification (Dehum) Mode. The Dehumidification Mode has the highest priority over all other Operating Modes. |
|  | Economy | The unit is operating in Economy Mode (Free Cooling Mode) |
|  | Heating | The unit is operating in Heating Mode |
|  | Cooling | The unit is operating in Cooling Mode. |
|  | Warmup | Burner Warmup Mode before Startup |
|  | Cool Down | Burner Cooldown Mode after shutdown. |
|  | Opening Damper | Indicates the Dampers are Opening at Startup. |

DIGITAL CONTROLLER

General Operating Instructions

3 Home Screen Sub-Menu

The below table lists the nine possible fields within the sub-menu list, with a brief description of each field.

| | | |
|---|-------------------------------------|--|
|  | Power | Brings up the Power screen, which allows the user to turn the Unit ON / OFF. |
|  | User Settings | Brings up the User Settings screen. The user can change the unit's standalone set points from this screen. |
|  | Unit Information | Brings up the Info Screen and displays unit-specific model, system, and operating information. |
|  | Heating | Brings up the unit Heating section. The user can see what the Heating component of the unit is doing at any given time in real time. |
|  | Cooling | Brings up the unit Cooling section. The user can see what the cooling component of the unit is doing at any given time in real time. |
|  | Dehumidification | Brings up the Unit Dehumidification section. The user can see what the Dehum component of the unit is doing at any given time in real time. |
|  | AHU-Embedded Energy Recovery | Brings up the AHU Energy Recovery section. The User can see how the Heat Recovery wheel, or the CUBE Core plates are performing at any given time. |
|  | Fan control | Brings up the Fan control screen. The user see can see the fan speed, airflow and duct static readings at any given time. |
|  | Regencore Units | Brings up the Regencore Heat Recovery unit configuration and information. |

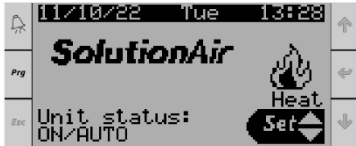
DIGITAL CONTROLLER

General Operating Instruction

3.1 Power

The Power sub-menu field allows you to turn the unit ON and OFF.

If the screen is not already at the home screen, press the **Escape** button until the home screen is displayed.



Press the **Up** button until the sub-menu option shows the power symbol, then press **Enter** to enter the selected power menu.



To turn the unit ON or OFF press the **Up** button until the desired option is displayed on the screen, then press **Enter** to initiate the selected function.

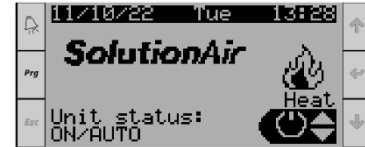


WARNING ▼

Once the unit has been turned off, allow at least 1 minute for VFD's to fully discharge and fans to ramp down before turning the unit back on. Failure to do so may cause damage to the equipment.

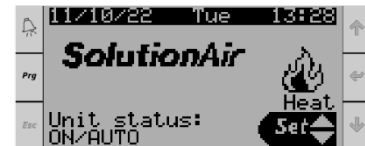
3.2 User Settings

The User Settings sub-menu field allows the user to ADJUST and SAVE the units standalone SET POINTS . To scroll through pages within the menu, ensure the cursor is at the top of the page, then press **Up** or **Down** to scroll through the pages.



If the screen is not already at the home screen, press the **Escape** button until the home screen is displayed.

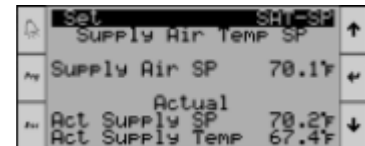
Press the **Up** button until the sub-menu option shows the set icon, then press **Enter** to enter the User Settings Menu.



3.2.1 Supply Air Temperature Set Point

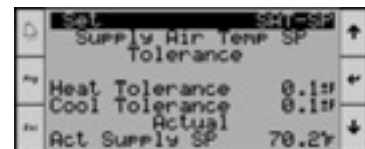
Displays the Default supply air temperature set point (SAT-SP) and the actual Supply air temperature reading and The Actual Supply SP (SP from BMS or set point Reset)

To change the supply air temperature set point, press **Enter** to move the cursor onto the set point reading, then press **Up** or **Down** to adjust the setting, then press **Enter** to save setting.



3.2.2 Supply Air Temperature Tolerance

Displays the supply air temperature set point tolerance to enable HEATING/COOLING Module based on the Outside/ Mixed Air Temperature. To change the tolerance set point press **Enter** to move the cursor onto the set point reading then press **Up** or **Down** to adjust the setting, then press **Enter** to save the setting.



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General Operating Instructions

Heating Enable

Heating Module is Enabled When the Outside/Mixed Air Temp is below the Supply Air Temperature setpoint minus the Heating Tolerance.

$$OAT/MAT < (SAT\ SP - (Heat\ Tolerance + 1^{\circ}C))$$

Cooling Enable

Cooling Module is Enabled When the Outside/Mixed Air Temp is above the Supply Air Temperature setpoint plus the Cooling Tolerance.

$$OAT/MAT > (SAT\ SP + (Heat\ Tolerance + 1^{\circ}C))$$

3.2.3 Supply Air Dewpoint Setpoint

Displays the supply air Dewpoint Setpoint. To change the setpoint press **Enter** to move the cursor onto the setpoint reading, then press **Up** or **Down** to adjust the setting, then press **Enter** to save the setting.



3.2.4 Room Temp/Dewpoint -SAT SP Reset

To Enable/Disable Supply Air Setpoint Reset based on room demand.

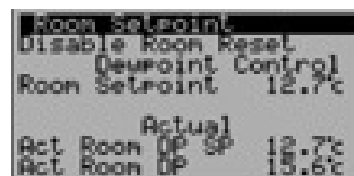
Room Temperature Demand- Supply Air Temp setpoint Reset



Allows the user to Enable/Disable the Supply Air Temperature Setpoint Reset based on Room Temperature (either shared via BMS or actual room temperature probe). The setpoint can be adjusted on the screen or can be shared from the BMS.

3.2.4.2 Room Humidity Demand- Supply Air Dewpoint setpoint Reset

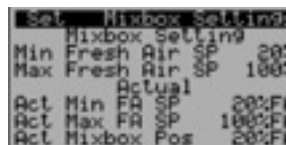
Allows the user to Enable/Disable the Supply Air Dewpoint setpoint Reset based on room humidity (either shared via BMS or actual room humidity probe installed). The setpoint can be adjusted on the screen or can be shared from the BMS.



3.2.5 Damper Settings

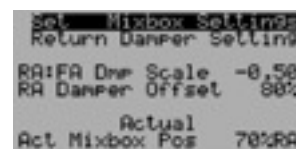
Allows the user to adjust the Fresh Air Damper and Return Air Damper minimum and maximum position.

This setting is to be adjusted by the air balancer for the unit airflow rate and ventilation rate.



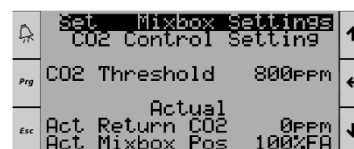
3.2.5.1 Return Air Damper Scaling

Allows the user to scale and adjust the Return Air Damper position with respect to Fresh Air Damper position.



3.2.6 CO2 Demand Control Ventilation (DCV)

Allows the user to adjust and change the Room or Return CO2 set point. The dampers will modulate to maintain the CO2 setpoint. The Min/Max damper positions can be adjusted here.



DIGITAL CONTROLLER

General Operating Instruction

3.2.7 Fan Control



Airflow settings should not be changed by anyone other than a qualified technician. Unnecessary changes to this field can cause damage to the equipment.

Displays the Airflow Settings for the unit. Here the fan control method, fan speed, duct static pressure and airflow setpoint can be adjusted. To change the set point press **Enter** to move the cursor onto the set point reading, then press **Up** or **Down** to adjust the setting, then press **Enter** to save the setting.

| | | |
|--------------------|-----------------|---|
| Set | Airflow Setting | ↑ |
| Supply Fan Control | | |
| Control Method | Fixed | |
| Fixed FanSpeed | 70% | ← |
| Duct Static SP | 1.00"W | |
| Airflow SP | 20000CFM | ↓ |
| Act Fan Speed | 70% | |

Supply Fan – Speed Control

The Supply Fan can be controlled in three different ways as follows:

- **Fixed** – This is for constant air volume (CAV) applications. Adjust the fixed fan speed to get the desired airflow (disregard all other variables)

| | | |
|--------------------|-----------------|---|
| Set | Airflow Setting | ↑ |
| Supply Fan Control | | |
| Control Method | Fixed | |
| Fixed FanSpeed | 70% | ← |
| Duct Static SP | 1.00"W | |
| Airflow SP | 20000CFM | ↓ |
| Act Fan Speed | 70% | |

- **CFM** (Flow Control)
For this control method, the unit should be equipped with a Differential Pressure Transducer or an Airflow station.

| | | |
|-------------------|-----------------|---|
| Set | Airflow Setting | ↑ |
| Supply Airflow SP | | |
| Airflow SP | 20000CFM | |
| Control Method | CFM | ← |
| Act AF SP | 20000CFM | |
| Act Airflow | 0CFM | ↓ |
| Act Fan Speed | 70% | |

- **DSP** (Duct Static Pressure Control)
For this control method, the unit should be equipped with a Duct Static Pressure Transducer.

| | | |
|-------------------|-----------------|---|
| Set | Airflow Setting | ↑ |
| Supply Airflow SP | | |
| Airflow SP | 20000CFM | |
| Control Method | CFM | ← |
| Act AF SP | 20000CFM | |
| Act Airflow | 0CFM | ↓ |
| Act Fan Speed | 70% | |

Return/Exhaust Fan – Airflow/Static Control

The Return Fans can be controlled in Five different ways

- **Fixed** – This is for constant air volume applications. Adjust the fixed fan speed to get the desired airflow (disregard all other variables)

| | | |
|--------------------|-----------------|---|
| Set | Airflow Setting | ↑ |
| Return Fan Control | | |
| Control Method | Fixed | |
| Fixed FanSpeed | 66% | ← |
| Duct Static SP | 1.00"W | |
| Airflow SP | 20000CFM | ↓ |
| Exh:Sup Ratio | 1.500:1 | |
| Exh Balance | 0CFM | |

- **DSP** (Return/Exhaust Duct Static Pressure Control)

For this control method, the unit should be equipped with a duct static pressure transducer.

| | | |
|-----------------------|-----------------|---|
| Set | Airflow Setting | ↑ |
| Return Duct Static SP | | |
| Duct Static SP | 1.00"W | |
| Control Method | DSP | ← |
| Act DS Setpoint | 1.00"W | |
| Act Duct Static | 0.50"W | ↓ |
| Act Fan Speed | 66% | |

- **CFM** (Return/ Exhaust Air Flow Control)

For this control method, the unit should be equipped with a Differential Pressure Transducer or an Air Flow station.

| | | |
|-------------------|-----------------|---|
| Set | Airflow Setting | ↑ |
| Return Airflow SP | | |
| Airflow SP | 20000CFM | |
| Control Method | CFM | ← |
| Act AF SP | 20000CFM | |
| Act Airflow | 0CFM | ↓ |
| Act Fan Speed | 66% | |

- **Ratio**

Adjust the **Exh: Sup Ratio** to have the return fans track the supply fan speed. The below example illustrates return fan tracking the supply fan at 1.5 times the supply fan speed. This will maintain negative pressure inside the space.

| | | |
|----------------------|-----------------|---|
| Set | Airflow Setting | ↑ |
| Return Ratio Control | | |
| Control Method | Ratio | |
| SA FanSpeed SP | 65% | ← |
| Act SupFan Speed | 65% | |
| Exh:Sup Ratio | 1.500:1 | ↓ |
| UseFADamper% | FALSE | |
| Act RetFan Speed | 98% | |

- **Bal FA** (Balance Outside Airflow)

Setting the return fan to this control method enables the return fan to Track the Outside Airflow and maintain the Balance Airflow setpoint in the unit.

NOTE: Reach out to SolutionAir before adjusting this.

| | | |
|----------------------|-----------------|---|
| Set | Airflow Setting | ↑ |
| Return Ratio Control | | |
| Control Method | Bal FA | |
| SA FanSpeed SP | 65% | ← |
| Act SupFan Speed | 65% | |
| Exh:Sup Ratio | 1.500:1 | ↓ |
| UseFADamper% | FALSE | |
| Act RetFan Speed | 66% | |

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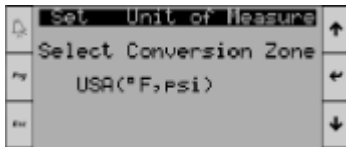
General Operating Instructions

3.2.8 Unit Of Measure

User can change the Unit of Measure for all menu fields.

To change the Unit of Measure, press **Enter** to move the cursor onto the field to be changed, then press **Up** or **Down** to select either USA (°F, PSI), SI (°C, kPa), SI (°C, bar), CAN (°C, PSI), UK (°F, PSI).

Press **Enter** on the desired Unit of Measure to save.

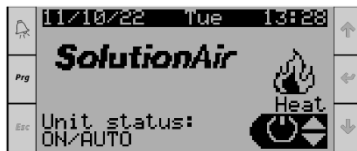


3.3 Unit Information

The Unit Information sub-menu displays the specific unit model information along with system and operating information. To scroll through pages within the menu, ensure the cursor is at the top of the page, then press **Up** or **Down** to scroll pages.

If the screen is not already at the home screen press the **Escape** button until the home screen is displayed.

Press the **Up** button until the sub-menu option shows **Unit**

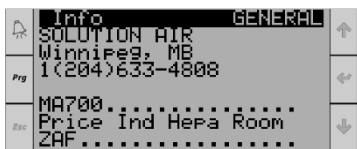


Information, then press **Enter** to enter the Unit Information sub-menu.



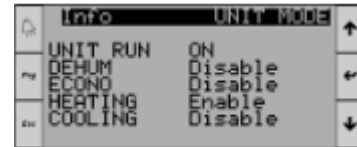
General

Displays the name of the manufacturer, technical support phone number, job number, and job name.



Unit Mode

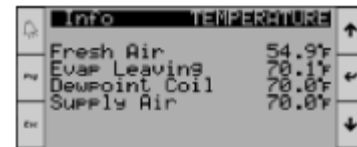
Displays the mode the unit is currently running in.¹



¹**NOTE:** The Unit Information Tabs are READ Only information, to change or override any variables refer to User Settings.

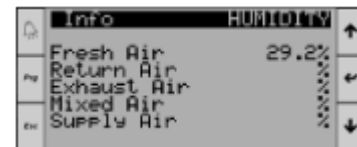
Temperature

Displays real time temperature readouts of multiple sensors located within the unit.



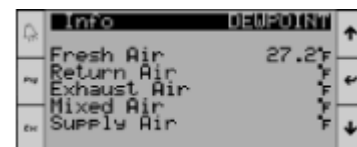
Humidity

Displays real time humidity readouts of multiple sensors located within the unit.



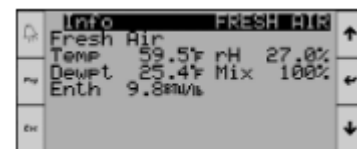
Dew Point

Displays real time dewpoint readouts of multiple sensors located within the unit.



Fresh Air

Displays the temperature, relative humidity, dew point, air mixture percentage, and enthalpy of the fresh air inside the unit's cabinet.



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General Operating Instruction

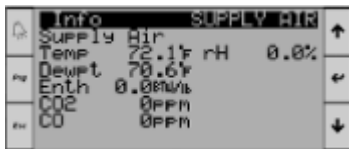
Evaporator Air

Displays the leaving air temperature, dewpoint and incoming air temperature of the evaporator coil.



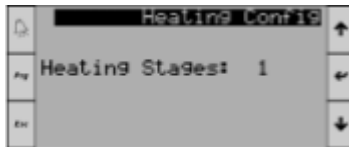
Supply Air

Displays the temperature and dew point of the supply air being discharged to the building from the unit. 127



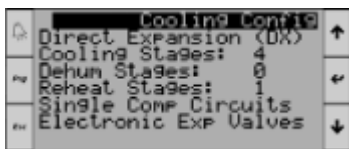
Heating Configuration

Displays the number of heating stages that are configured to this specific unit.



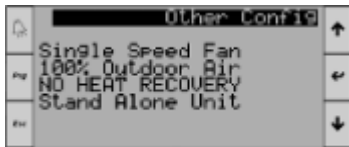
Cooling Configuration

Displays the number of cooling stages, dehumidification stages, and reheat stages along with the type of expansion valves and compressors.



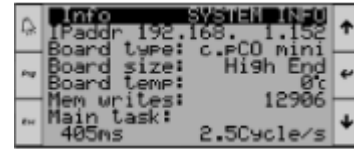
Other Configurations

Displays any additional functions that this specific unit has installed or is set up for outside of the standard unit configuration.



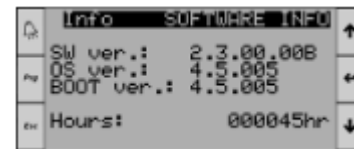
System Information

Displays the type of controller along with the memory writes and IP Address of that specific controller.



Software Information

Displays the version of software that specific controller is operating on.



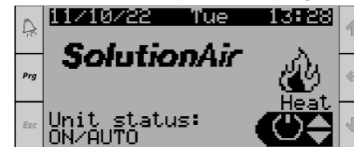
Blackout Information

Displays the current date and time along with the length and time that the power had been lost to the controller.

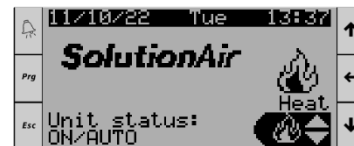


3.4 Heating

The Heating sub-menu field allows the user to see what the heating component of the unit is doing at any given time in real time. To scroll through pages within the menu, ensure the cursor is at the top of the page, then press **Up**



or **Down** to scroll through the pages. If the screen is not already at the home screen, press the **Escape** button until the home screen is displayed.



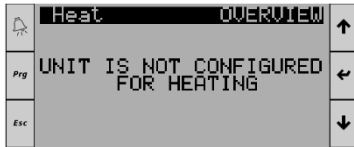
Press the **Up** button until the sub-menu option shows Heating, then press **Enter** to enter the Unit Information sub-menu.

DIGITAL CONTROLLER

General Operating Instructions

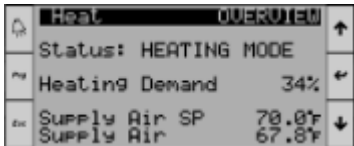
No Heating

If the unit is not configured for Heating, the above screen will be displayed. If the unit is configured for heating, the following screens will be displayed in sequential order.



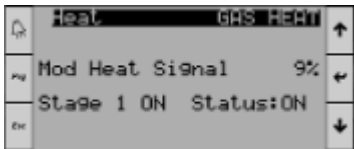
Overview

Displays the unit's mode status and the heating demand, along with the heating supply air set point and actual supply air temperature.



Gas Heat

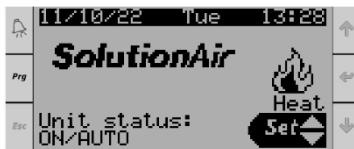
Displays the heating modulation signal in a percentage along with how many stages of heat are active.



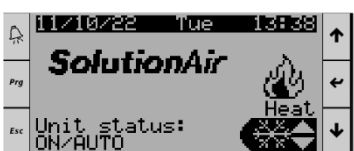
3.5 Cooling

The cooling sub-menu field allows the user to see what the cooling component of the unit is doing at any given time in real time. To scroll through pages within the menu, ensure the cursor is at the top of the page, then press **Up** or **Down** to scroll the pages.

If the screen is not already at the home screen, press the **Escape** button until the home screen is displayed.

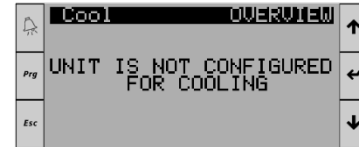


Press the **Up** button until the sub-menu option shows **Cooling**, then press **Enter** to enter the Unit Information sub-menu



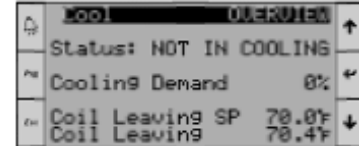
No Cooling

If the unit is not configured for Cooling, the above screen will be displayed. If the unit is configured for Cooling, the following screens will be displayed in sequential order



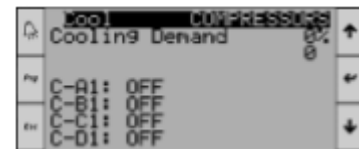
Overview

Displays the unit's mode status and the cooling demand, along with the air temperature leaving the coil's setpoint and actual temperature.



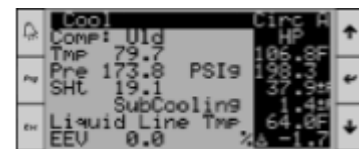
Compressors

Displays the current cooling demand as well as the operational state each individual compressor is currently in.



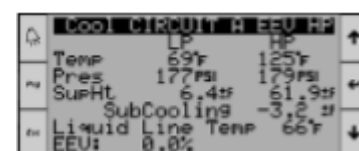
Cooling Circuit Info

Displays the current operational state of the chosen compressor. To select the desired compressor press **Enter** until the cursor is flashing on the "C" of Circ, then press **Up** until it shows the desired circuit then press **Enter** to show the circuits readings. Press **Enter** to move the cursor back to the top of page to continue to scroll through the pages.



Circuit EEV 1 Info

Displays the pressures and temperatures, along with the superheat and sub-cooling of the circuit. Each circuit has its own page.

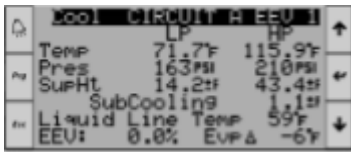


DIGITAL CONTROLLER

General Operating Instruction

Circuit EEV HP Info

Displays the pressures and temperatures, along with the superheat and sub-cooling of the circuit. Each circuit has its own page.



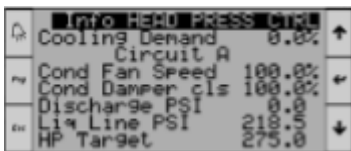
EVD Raw Data

Displays the raw data received by the controller inputs from the attached components. i.e. sensors, EEV's, etc. Each circuit has its own page.



Head Pressure Control Info

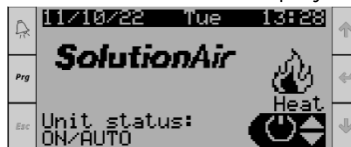
Displays all relevant information regarding the units head pressure control. Each circuit has its own page.



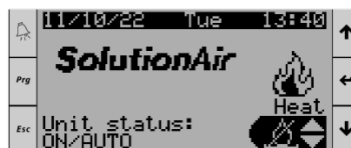
3.6 Dehumidification

The dehumidification sub-menu field allows the user to see what the Dehum component of the unit is doing at any given time in real time. To scroll through pages within the menu ensure the cursor is at the top of the page, then press **Up** or **Down** to scroll the pages.

If the screen is not already at the home screen, press the **Up** button until the home screen is displayed.

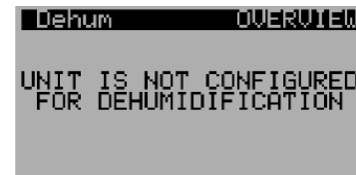


Press the **Up** button until the sub-menu option shows **Dehumidification**, then press **Enter** to enter the Unit Information sub-menu.



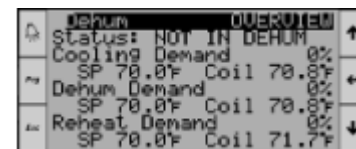
No Dehumidification

If the unit is not configured for Dehumidification, the above screen will be displayed. If the unit is configured for Dehumidification, the following screens will be displayed in sequential order.



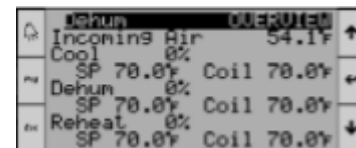
Overview

Displays the unit's mode status and the cooling, Dehum, reheat demand, along with the air temperature leaving the coil's setpoint and actual temperature.



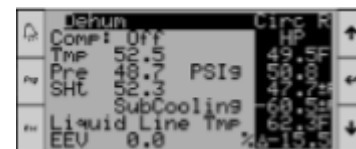
Overview continued.

Displays the incoming air temperature along with the cooling, dehumidification, and reheat capacity percentage.



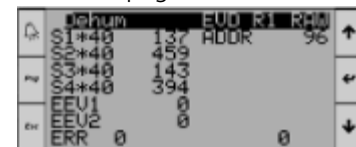
Dehumidification Circuit Info

Displays the current operational state of the chosen compressor. To select the desired compressor, press **Enter** until the cursor is flashing on the "C" of Circ, then press **Up** until it shows the desired circuit then press **Enter** to show the circuits readings. Press **Enter** to move the cursor back to the top of page to continue to scroll through the pages.



EVD Raw Data

Displays the raw data received by the controller inputs from the attached components. i.e. sensors, EEV's, etc. Each circuit has its own page.

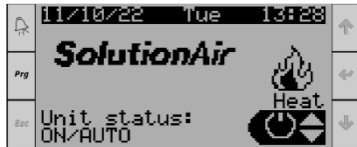


DIGITAL CONTROLLER

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3.7 Fan Control

The Fan Control sub-menu field allows the user to see what the fans in the unit are doing at any given time in real time. To scroll through pages within the menu, ensure the cursor is at the top of the page, then press **Up** or **Down** to scroll the pages.

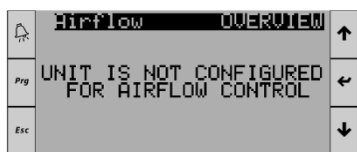


If the screen is not already at the home screen, press the **Escape** button until the home screen is displayed.

Press the **Up** button until the sub-menu option shows **Fan Control**, then press **Enter** to enter the Unit Information sub-menu.



Constant Volume



If the unit is configured as Constant Air Volume, the above screen will be displayed. If the unit is configured for variable air volume (VAV - fan speed control), the following screens will be displayed in sequential order:

Airflow Overview

Displays the Supply and Return fan airflow and current fan

| Info | Airflow |
|-----------------|---------|
| SUPPLY Air | 0CFM |
| SUPPLY Fan Spd | 0% |
| Ret/Exh Air | 0CFM |
| Ret/Exh Fan Spd | 0% |
| Fresh Air | 0CFM |

speed and fresh air CFM.

Supply Air Flow

Displays the supply fan control method, airflow setpoint, current supply airflow and supply fan speed.

| Info | Airflow |
|----------------|----------|
| SUPPLY Airflow | |
| Control Method | Fixed |
| Airflow SP | 20000CFM |
| Airflow | 0CFM |
| SUPPLY Fan Spd | 0% |

Return Air Flow

Displays the return fan control method, airflow setpoint, current return airflow and return fan speed.

| Info | Airflow |
|-----------------|----------|
| Ret/Exh Airflow | |
| Control Method | Fixed |
| Airflow SP | 20000CFM |
| Airflow | 0CFM |
| Ret/Exh Fan Spd | 0% |

DSP (Duct Static Pressure) Overview

| Info | Airflow |
|-----------------|---------|
| SUPPLY DSP | -0.50"W |
| SUPPLY Fan Spd | 0% |
| Return DSP | -0.50"W |
| Ret/Exh Fan Spd | 0% |

DSP Supply

Displays the control method, the supply duct static pressure setpoint, the actual supply duct static pressure reading, and the supply fan speed percentage.

| Info | Airflow |
|--------------------|---------|
| SUPPLY Duct Static | |
| Control Method | Fixed |
| Duct Static SP | 1.00"W |
| Duct Static | -0.50"W |
| SUPPLY Fan Spd | 0% |

DSP Return

Displays the control method, the return duct static pressure setpoint, the actual return duct static pressure reading, and the return/exhaust fan speed percentage.

| Info | Airflow |
|--------------------|---------|
| Return Duct Static | |
| Control Method | Fixed |
| Duct Static SP | 1.00"W |
| Duct Static | -0.50"W |
| Ret/Exh Fan Spd | 0% |

3.8 AHU –Energy Recovery

NOTE: This mode is applicable and available only for AHU units that have mixing boxes, heat exchanger plates, or heat recovery wheels. This is different from our dedicated REGENCORE energy recovery units.

The AHU- Energy Recovery sub-menu field allows the user to see what the Energy Recovery component of the unit is doing at any given time in real time. To scroll through pages within the menu ensure the cursor is at the top of the page, then press **Up** or **Down** to scroll the pages.

DIGITAL CONTROLLER

General Operating Instruction

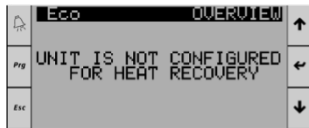
If the screen is not already at the home screen, press the **Escape** button until the home screen is displayed.



Press the **Up** button until the sub-menu option shows **Economy**, then press **Enter** to enter the Unit Information sub-menu.



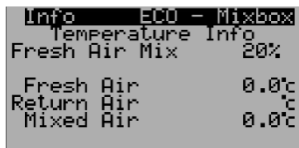
No AHU- Energy Recovery



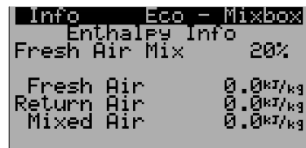
If the unit is not configured for AHU - Energy Recovery (mixing box economizer/plate heat exchanger in AHU/heat recovery wheel in AHU), the above screen will be displayed. If the unit is configured for AHU - Energy Recovery, the following screens will be displayed in sequential order:

3.8.1 Mix Box

Displays the Mix Box temperature & enthalpy (only if the unit has relative humidity – RH – readings) information.



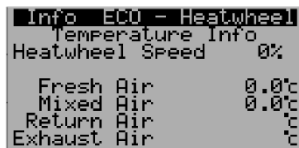
| Info ECO - Mixbox | |
|-------------------|-------|
| Temperature Info | |
| Fresh Air Mix | 20% |
| Fresh Air | 0.0°C |
| Return Air | 0.0°C |
| Mixed Air | 0.0°C |



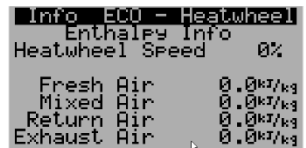
| Info ECO - Mixbox | |
|-------------------|----------|
| Enthalpy Info | |
| Fresh Air Mix | 20% |
| Fresh Air | 0.0kJ/kg |
| Return Air | 0.0kJ/kg |
| Mixed Air | 0.0kJ/kg |

3.8.2 Heat Recovery Wheel

Displays the Heat Recovery Wheel speed, temperature, and enthalpy (if the unit has RH sensors) information.



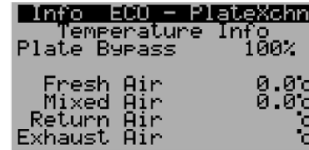
| Info ECO - Heatwheel | |
|----------------------|-------|
| Temperature Info | |
| Heatwheel Speed | 0% |
| Fresh Air | 0.0°C |
| Mixed Air | 0.0°C |
| Return Air | 0.0°C |
| Exhaust Air | 0.0°C |



| Info ECO - Heatwheel | |
|----------------------|----------|
| Enthalpy Info | |
| Heatwheel Speed | 0% |
| Fresh Air | 0.0kJ/kg |
| Mixed Air | 0.0kJ/kg |
| Return Air | 0.0kJ/kg |
| Exhaust Air | 0.0kJ/kg |

3.8.3 Heat Recovery Plates (CUBE)

Displays the Heat Recovery Plates (CUBE) bypass damper position and temperature readings.



| Info ECO - PlateXchn | |
|----------------------|-------|
| Temperature Info | |
| Plate Bypass | 100% |
| Fresh Air | 0.0°C |
| Mixed Air | 0.0°C |
| Return Air | 0.0°C |
| Exhaust Air | 0.0°C |

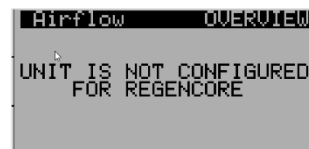
3.8.4 Unit Enthalpy

Displays the Enthalpy of all airflow sections.



| Info | Enthalpy |
|-------------|----------|
| Fresh Air | 0.0kJ/kg |
| Return Air | 0.0kJ/kg |
| Exhaust Air | 0.0kJ/kg |
| Mixed Air | 0.0kJ/kg |
| Reheat Air | 0.0kJ/kg |
| Supply Air | 0.0kJ/kg |

3.9 Regencore



If the Unit is not configured for Regencore, the above screen will be displayed. If the unit is configured for Regencore, the following screens will be displayed in sequential order:

3.9.1 Overview

The following screen displays the damper cycling delay for heat recovery and free cooling modes. The values are factory set; please consult SolutionAir before changing any of these variables.

The dampers are closed when the unit is OFF; it can be changed to open in the same screen.



| Configure | |
|-----------------------|----------|
| RegenCore Cycle Times | |
| Heat Rec | 140sec |
| Free Cool | 120.0min |
| Open When Off | |
| H1 & H2 | = Close |
| B1 & B2 | = Close |

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3.9.2 Free Cooling

The Free Cooling mode is enabled when the outdoor air temperature is within the supply air temperature setpoint range. The range can be adjusted in the below screen.

The default value is as follows:

```
RegenCore Configure
FreeCool Enables On:
OAT is less than
SAT Setpoint + 1.0°C
OA Temp Read 0.0°C
OAT is greater than
SAT Setpoint - 3.0°C
SAT Setpoint = 21.0°C
```

((SAT SP -3°C < OAT < SATSP +1°C))

3.9.3 Smoke Purge

This screen is visible only when the unit has a smoke detector. The dampers can be configured to open or close during Smoke Purge and the supply fan smoke purge speed can be configured.

```
Configure
RegenCore Smoke Purge
Currently Active NO
Supply Fan %
Smoke Purge Positions
A1 & A2 = Close
B1 & B2 = Close
```

3.9.4 Warmup Mode

The Warmup Mode is factory enabled by default and it can be disabled if not required. The Warmup Mode is activated at startup when the OAT is less than the enable setpoint. The Warmup mode will be deactivated after the warmup delay. During this mode, all the internal dampers are opened, and the return fan is turned ON warming up the cores. Once the mode is deactivated, the supply fan is turned ON. Consult SolutionAir before adjusting any of these parameters.

```
Configure
RegenCore Warmup
Warmup En/dis Enable
WarmupDelay 240.0sec
OAT En SP 4.0 °C
OAT 0.0 °C
Warmup Mode Sts OFF
```

3.9.5 Damper Testing

To move the dampers manually, override the test mode to YES, wait for the unit to shut down (OFF delay- 60 Seconds) and dampers to HOME (20 seconds) and then override the desired dampers to be tested to OPEN/CLOSE. Once testing/troubleshooting is done, change the dampers back to Close position and test mode to NO.

```
Configure
Enabling test mode
will stop unit!
Test mode NO
(Wait for OFF A1=Close
Delay(60S)and A2=Close
Homing to B1=Close
Complete) B2=Close
```

3.9.6 Operating Mode- Override

The Regencore Unit can be manually overridden to the following operating modes.

| AUTO | Regencore in AUTO Mode |
|--------------|------------------------------|
| FORCE OFF | Unit Forced to OFF |
| FORCE RECIRC | Forced to Recirculation Mode |
| FORCE FC | Forced to Free Cooling Mode |
| FORCE ER | Forced to Heat Recovery Mode |



WARNING ▾

If the Controller is Configured for BMS Integration, BMS has higher priority over Display Screen. Overriding the Operating Mode here will have no effect on the unit. To Disable BMS network momentarily, Refer override Network.

NOTE: Recirculation Mode can only be enabled through manual override, **there is no auto-enable sequence for recirculation mode.**

When the Unit is in AUTO Mode:

```
Configure
Override Mode:
AUTO
Current Mode:
UNIT OFF
AUTO
```

When the Unit is overridden to Recirculation Mode:

```
Configure
Override Mode:
FORCE RECIRC
Current Mode:
Recirc
FORCED
```













DIGITAL CONTROLLER

General Operating Instruction

4 Program Screen Sub-Menu

The Program Screen allows the user to adjust and set all the main configurations for the unit. To access the Program screen from the Home Page, press **Program**. The available options in the Program sub-menu are listed below:

Program Screen Sub-Menu List

| | | |
|---|---------------------------|---|
|  | PID's- Tuning | Allows the user to change the PID parameters (Tuning) |
|  | Auto Tune | PID tune manager |
|  | Lockout's | Allows users to lockout certain modes/modules. |
|  | Overrides | Allows users to turn on certain modes/modules |
|  | I/O's | Raw list of INPUTS and OUTPUTS |
|  | Unit Configuration | Allows users to set limit values |
|  | Schedule | Allows user to configure occupancy schedule, vacation, and special days |
|  | Alarm Logs | Displays list of active and inactive alarms |
|  | Settings | Displays list of controller settings |
|  | Commissioning | Allows user to initiate the commissioning wizard |
|  | Runtime Hours | Displays component runtime hours |
|  | Logout | Allows user to log out of program settings. |

5 Program Screen Sub-Menu

The Program Screen Sub-Menu field allows the user to adjust and save the units main configurations. To scroll through pages within the menu ensure the cursor is at the top of the page, then press **Up** or **Down** to scroll the pages.

DIGITAL CONTROLLER

General Operating Instructions

Home Screen

If the screen is not already at the home screen, press the **Escape** button until the home screen is displayed.



Program Sub menu

To access the Program Sub menu, press **Program** once.



5.1 Password

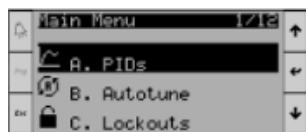
Use the **Up** and **Down** keys to change the numbers. Once the desired number has been reached, press **Enter** to move to the next digit field. When the desired 4-digit password is entered, press **Enter** and the program sub menu appears.

Password: 0100



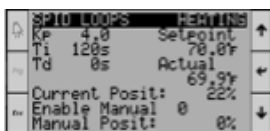
5.2 PIDs - Tuning

To access the PID parameters press **Enter** until the cursor is on the PID menu then press **Enter** again.



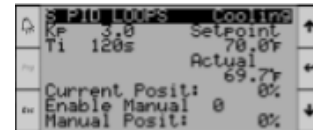
PID Loops - Heating

Displays the Kp, Ti, Td, current position and allows for manual manipulation once enabled. To adjust any parameter, press **Enter** until the cursor is on the desired field, and then use the **Up** and/or the **Down** button to make the change. Once the parameter is adjusted, press **Enter** to save it.



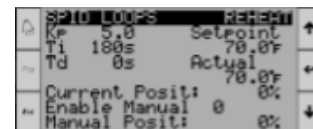
PID Loops -Cooling

Displays the Kp, Ti, current position and allows for manual manipulation once enabled. To adjust any parameter press **Enter** until the cursor is on the desired field, and **Enter** then use the **Up** and/or the **Down** button to make the change. Once the parameter is adjusted, press **Enter** to save it.



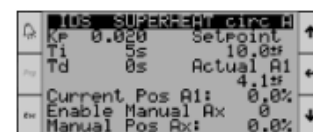
PID Loops- Reheat

Displays the Kp, Ti, Td, current position and allows for manual manipulation once enabled. To adjust any parameter, press **Enter** until the cursor is on the desired field, and then use the **Up** and/or the **Down** button to make the change. Once the parameter is adjusted, press **Enter** to save it.



PIDS -Superheat Circuit

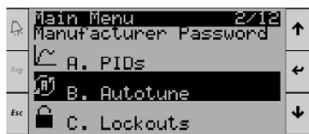
Displays the Kp, Ti, Td, current position and allows for manual manipulation once enabled. To adjust any parameter, press **Enter** until the cursor is on the desired field, and then use the **Up** and/or the **Down** button to make the change. Once the parameter is adjusted, press **Enter** to save it.



DIGITAL CONTROLLER

General Operating Instruction

5.3 PID-Auto Tune



Requirements to do PID auto-tune

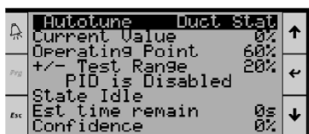
- The PID to be tuned must currently be enabled and in control.
- The entire operation must be able to run within bounds of safeties (or unit will shut down or output will be overridden, invalidating results of auto-tuning).
- If the building is occupied, the resulting supply air temperature, humidity, pressure, or airflow during the test must be acceptable to the occupants or processes within the building.

The PID must not cross non-linearities such as:

- Safeties and real-world realities such as valve extremes (such as 0% and 100%).
- Regions where further stages are called or canceled.
- Regions of systems that have an atypical response (such as the initial cracking or dead area in the center of an oversized valve).
- Regions where the time delay changes considerably (such as hot or cold-water heat with the valve almost closed).

Steps to Auto Tune

Go to the menu for the Autotune of the function to be tuned:



1. Ensure "PID is Disabled" message is not displayed
2. Press **Enter** to move cursor to different fields on the page
3. Accept default values for operating point and test range. If these values do not work, it may be necessary to adjust these using the **Up**, **Down**, and **Enter** buttons.

The operating point is the center of the actuator output during the test and the test range is the amount the test deviates from this point. The test outputs will be:

$$\begin{aligned} \text{[Soak Output]} &= \text{[operating point]} \\ \text{[High Output]} &= \text{[operating point]} + \text{[test range]} \\ \text{[Low Output]} &= \text{[operating point]} - \text{[test range]} \end{aligned}$$

For example, if operating point = 50% and test range = 10%, the test values of 50%, 60% and 40% will be used.



WARNING ▾

The use of values that produce test points above 100% or below 0% (or -100% for the room reset) will produce unstable tunings.

Saving and reloading settings

4. If it is possible the user will need to return to the current tuning if autotuning fails, it is suggested to save the current values.
 - Select the state by pressing the enter button and change it from "Idle" to "Save Values"
 - State will return automatically to "Idle"

Starting the autotune function

5. Select the state by pressing the enter button and change it from "Idle" to "Start". The state will immediately update as it begins the test sequence.
6. The "Est time remain" field should give a reasonable idea of how long to expect the tuning to take. If the testing needs to be aborted or restarted for any reason, simply select the state and change it to "Idle" and then back to "Start" to restart the test.
7. The test will stop, and display "State Done" after 3 peak and valley detections if an 90% confidence is achieved. Failing this, it will keep re-running the last peak and valley stages until the confidence is satisfactory. The confidence target decreases by 5% each time the last 2 steps are rerun to ensure it eventually stops. The confidence is determined by the variance in the metrics gathered in the last 3 peak and valley test cycles.

DIGITAL CONTROLLER

General Operating Instructions

Selecting calculated tunings

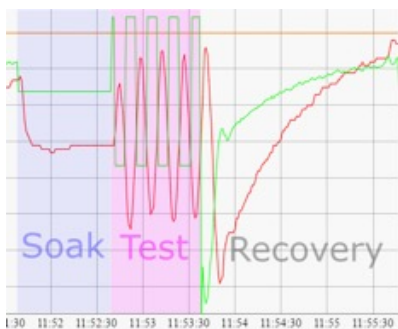
- If the test was successful, select the state and change it to "Set Normal", "Set Slow and Stable", or "Soft and Stable". It is suggested that "Set barely stable" option only be used when necessary to prevent low limits on extremely cold heating start-ups.

NOTE: As long as the unit has not been shut off, this menu can be returned to and another option can be chosen later without rerunning the test if performance is not satisfactory.

- Press the **Escape** button twice to return to the main menu

Suggestions for improved success

Connecting to the controller and displaying the live data during the test will allow experienced users to monitor the test. A typical test looks like this:



Consider re-running test if:

- A disturbance occurred during the test such as:
 - Cabinet door opening
 - Change or disturbance in airflow or static pressure
 - Test was run during atypical airflow or building static pressures
 - A change in unit inlet air occurred during the test
- The test confidence is low or lower than expected
- Graphical monitoring of the test shows anomalous behavior:
 - Last 3 peaks or valleys during test are not of similar height
 - The time taken for the last 6 stages are not similar

- Significant distortion of the output. Peak and Valley stages should resemble sine waves
- A gradual trending during the test (repeat with manual pre-soak beforehand)

For best stability, it is recommended that tuning is done using conditions that generate the most system gain. These conditions are typically the least stable. This will ensure that the system will always be stable in all conditions (although it may be sluggish). If it is not possible to replicate the conditions that generate the highest gain (lowest stability), then it is recommended that the less aggressive settings such as "Set Soft and Stable" or "Set Slow and Stable" be used. Conditions that produce higher system gain (recommended during test) are:

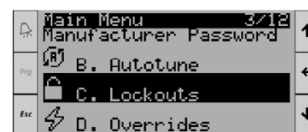
- Dirty filters
- Lower airflow/higher building static pressure
- Lowest VFD setting
- Dry, non-condensing air (when tuning cooling PID)

Conditions that produce low system gain (Not recommended due to false stability):

- Open doors or windows, heavy door traffic (increases damping of room reset oscillations)
- Unpopulated filters gives false stability
- Duct leaks (when testing duct static pressure or airflow)

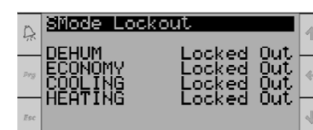
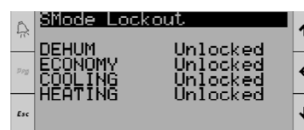
5.4 Lockouts

The Lockouts can be used to DISABLE/LOCKOUT specific modules/components in the unit.



5.4.1 Operating Modes Lockout

The Lockout mode allows the user to disable certain modules in the unit. The below examples show all the modules in the unit are locked out manually:

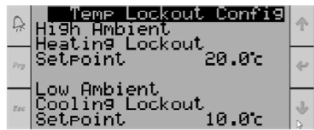


DIGITAL CONTROLLER

General Operating Instruction

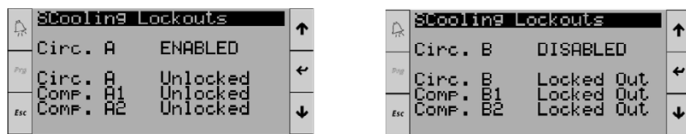
5.4.2 Heating/Cooling Ambient Lockout

Heating will be disabled upon High Ambient Lockout and cooling will be disabled upon Low Ambient Lockout. Please consult SolutionAir before changing these setpoints.



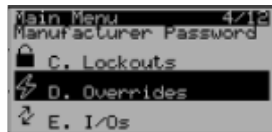
5.4.3 Cooling Lockout

The Cooling Lockout allows the user to disable cooling circuits or specific compressors in the unit.



5.5 Operating Modes Overrides

The Overrides Menu will let the user manually override the unit to a specific operating mode.

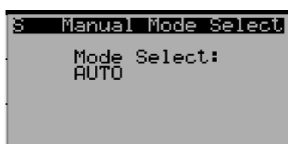


By default, the mode will be in AUTO and the user can switch to any of the below modes.

NOTE: Ensure the unit is configured and is capable of specific mode to be in operation.

- AUTO
- FORCE OFF
- COOLING
- HEATING
- ECONOMY
- DEHUM

Once the mode has been Overridden, ensure the **Unit status** in the **Home Screen** displays in manual mode and **Operating Mode** displays the correct mode.



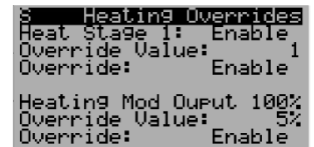
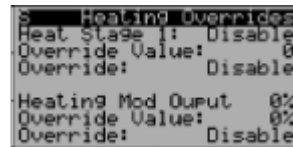
The above example shows the unit overridden to Force Off.

5.5.1.1 Heating Overrides:

This Screen lets the user override the heating enable and modulating signal. To enable the heating override, set the **override Value** to 1 and change the **override** to Enable. Once this is done, the Heat stage 1 will change to Enable.

To override the modulating signal, change the **Override Value** to the desired value and set the **Override** to Enable.

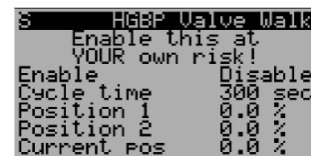
NOTE: The Heating Mod Output is the actual control value in the program.



5.5.1.2 HGBP Valve Override

This screen lets the hot gas bypass (HGBP) valve to cycle between Position 1 and Position 2 when it is overridden to Enable. Ensure to change it back to disable once complete.

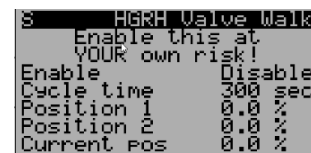
NOTE: To set the valve to be at a desired position, set Position 1 and Position 2 to the same value.



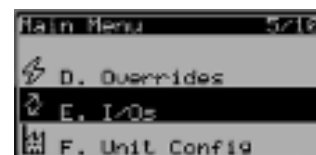
5.5.1.3 HGRH Valve Override

This screen lets the hot has reheat (HGRH) valve to cycle between Position 1 and Position 2 when it is overridden to Enable. Ensure to change it back to disable once complete.

NOTE: To set the valve to be at a desired position, set Position 1 and Position 2 to the same value.



5.6 I/O's.



The I/O's tab lists all of the I/O's wired to the controller. It will list all of the terminals in the main controller, I/O expanders, and DX cooling circuit EVDs that are installed in the unit.

DIGITAL CONTROLLER

General Operating Instructions

If a terminal slot shows empty, no device is connected to that terminal.

Refer to the electrical drawings for I/O terminal assignment. Some of the I/O screens are shown below:

NOTE: If a value is displayed as "####", it indicates the value is more than 4 digits.

Main Controller

```

S105 MAIN
U1 ReturnDuctPress 0
U2 SA_Temp_Prb....####
U3 SA_RA_Prb.....-25
U4 SmokePurge_Din. 100
U5 SF_VFD_Aout....0
U6 MA_Temp_Prb....####
U7 SupplyDuctPress 0
    
```

Expander

```

S105 EXP1-ADD5
U6 DischargeTemp_B 0
U7
U8
U9
U10ScrollUnload_B_ 0
    
```

EVD

```

S105 EVD-A11
U1 Suction_Press_A 0
U2 Suction_Temp_A1 0
U3 LiqLine_Press_A 0
U4 LiqLine_Temp_A1 0
EEV1 0 EEV2 0
NO-A 0 NO-B 0
DI-1 0 DI-2 0
    
```

5.6.1 I/O Configuration

```

SGeneric IO Config 230
Value 1 YES 2 -0.5
Input 3 YES 4 -0.5
Man 5 NO M/Val 6 0
Max 7 2.0 Min 8 0.0
Inv 9 NO Offset 10 0.0
Type 11 4-20mA Set 12 NO
    
```

The I/O's in the controller can be configured and modified for various troubleshooting and testing. It is important to understand the I/O configuration menu.

Each I/O has its own configuration menu; go to any desired I/O and press **Enter**, the following screen appears

| SI, No | Config | AI | DI | AO | DO | R/W |
|--------|----------------------|-----|-----|-----|-----|-----|
| 1 | Binary Program Value | N/A | ✓ | N/A | ✓ | R |
| 2 | Analog Program Value | ✓ | N/A | ✓ | N/A | R |
| 3 | Binary Actual Value | N/A | ✓ | N/A | ✓ | R |
| 4 | Analog Actual Value | ✓ | N/A | ✓ | N/A | R |
| 5 | Manual override | ✓ | ✓ | ✓ | ✓ | W |

| SI, No | Config | AI | DI | AO | DO | R/W |
|--------|-----------------------|----|-----|-----|-----|-----|
| 6 | Manual override Value | ✓ | ✓ | ✓ | ✓ | W |
| 7 | I/O Range Max Value | ✓ | N/A | ✓ | N/A | R/W |
| 8 | I/O Range Min. Value | ✓ | N/A | ✓ | N/A | R/W |
| 9 | Invert Signal | ✓ | ✓ | ✓ | ✓ | R/W |
| 10 | Offset Value | ✓ | N/A | ✓ | N/A | R/W |
| 11 | I/O Type | ✓ | N/A | N/A | N/A | R/W |
| 12 | SET | ✓ | ✓ | ✓ | ✓ | W |

Program Value- Control Program Value from the controller or the manual over-riden value

Actual Value- The value reading/writing from or to the actual end device

- Binary Program Value-** READ only, applicable for Digital Input/Digital Output (DI/DO).
- Analog Program Value-** - READ only, applicable for Analog Input/Analog Output (AI/AO).
- Binary Actual Value-** READ only, applicable for DI/DO.
- Analog Actual Value-** READ only, applicable for AI/AO.
- Manual override** – Enables manual override
- Manual override Value** – Enter the manual value
- I/O Range Max. Value-** Sensor (AI) or Signal (AO) maximum range
- I/O Range Min. Value-** Sensor (AI) or Signal (AO) minimum range
- Invert Signal-** Inverts the signal
- Offset Value (Calibration)-** Any offset value in the I/O Signal – Applicable for AI and AO. This can be used to calibrate the end device.
- I/O Type- Sensor Type,** Applicable for AI only.
NOTE: If the I/O is Analog or Digital OUTPUT, the Type will display as **NTC**, disregard that.
- SET** – Change to **YES** after any change in the configuration, it resets back to **NO**.

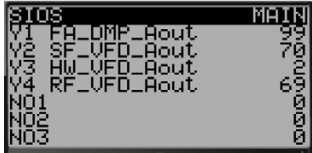
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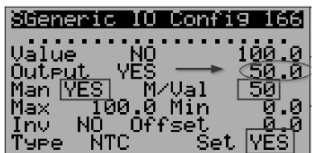
5.6.2 Override an I/O

To override an I/O manually, follow the below steps

1. Go to the desired I/O that is to be overridden.



2. Press **Enter** to select Y1 or any desired I/O (up and down keys allow the user to move and select inputs/ outputs other than Y1).
3. Once the I/O configuration for the selected I/O appears
 - Set "Man" to **Yes**
 - Set "M/Val" to the desired value

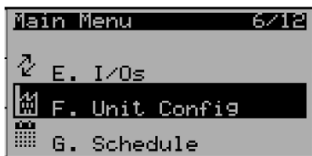


- Set "Set" to **Yes** (this will reset back to **NO** on its own)
 - The user should notice the actual I/O value changed to the overridden value
4. Press **Escape** until the main menu is displayed.

5.7 Unit Configuration

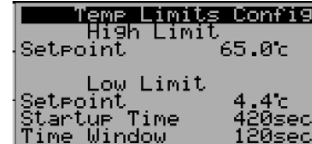
5.7.1 Unit Configuration Summary

The Unit Configuration tab displays the parameters and the different screens in Unit Configuration tab are displayed below in sequential order.



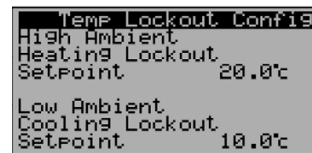
5.7.2 Supply Air Temp Alarm Limits

The High/Low alarm limits and alarm delays for the supply air temperature can be adjusted in this screen. There is a startup delay of 420 Seconds and an alarm delay of 120 Seconds for the alarm to trigger. The Heating will be disabled upon high supply temp alarm and the unit will shut down on low supply temp alarm. Both of these require **Manual Reset** on the controller.



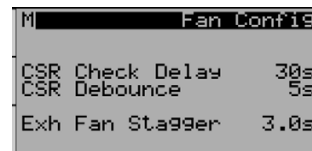
5.7.3 Outside Air Temp High/Low Lockouts

Heating will be disabled upon high ambient lockout and cooling will be disabled upon low ambient lockout. Please consult SolutionAir before changing these setpoints.



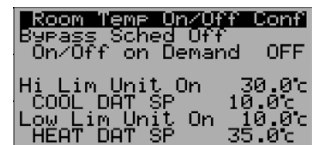
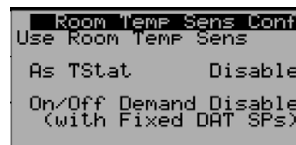
5.7.4 Supply Fan Alarm Delay

The CSR Check Delay is the alarm delay between fan command and current sensor status. The CSR debounce delay is for the current sensor.



5.7.5 Room Temp Configurations

The room temp probe configurations and the alarm limits can be configured in the following screens. The Room Temp Sensor – supply air temp setpoint reset can be enabled or disabled.



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General Operating Instructions

5.7.6 Burner Configurations

Burner Warmup

Burner warmup is enabled by default; this will run the burner for the specified warmup time when the outside temperature is below the ambient enable setpoint.

```
M Burner Warmup Conf
Warmup Disable NO
Ambient Enable 0.0°C
SkipIfRunning 200s
Warmup Time 120s
Fire Min 5% Max 60%
SP-DA gain 1.2 %/C
SP-SA gain 0.6 %/C
```

Burner Cool Down

Burner cooldown is in automatic operation when the unit is running on heat and the heat was stopped. An anti-cycle timer prevents the burner from running again until the minimum OFF time is satisfied.

```
S Burner Cooldown Conf
Min Time 25s
Max Time 60s
Target Heatrise 15.0°C
Anticyle Times
Min OFF Time 180s
Min ON Time 1s
```

General Configurations

```
S Burner Conf
General
Anti-windup delay 30s
Anti-windup fact 3.0
Burner Alm Tout 180s
LowPID Sat Time 420s
Economite Delay 60s
```

Burner Alarm Timeout – Burner Alarm Delay in case of Burner Failure

Low PID Sat Time- Burner Shut off Delay after the Heating Demand goes to 0%

Economite Delay – This is used for a rare type of Burner

Anti Wind Delay- To ensure Burner is cycling shortly.

```
M Burner AirFlowSw Config
FlowSw StartUpDly 30s
FlowSw Almdly 10s
```

Air Flow Switch

Burner airflow switch startup delay and alarm delay

5.7.7 Cooling Configurations

```
DX Cooling Conf
Min Stage On 60s
Min Stage Off 300s
All Circuits:
Digi Cycle Time 15.0s
Min load 20.0%
Min Unload 0.0s
```

5.7.8 AHU Heat Recovery Config

This section is Visible only if the AHU has a heat recovery wheel or a CUBE Core.

The Below set points are used to prevent Frosting on Heat Wheel/Plates. The Heat Wheel/ Core Bypass Dampers starts modulating when The Exhaust Air Temperature drops below the following respective set points.

```
Configure
Heat Recovery Settings
Frost Prevention Min
Exhaust Temperature
HeatWheel: 1.0°C
PlateXchn: 4.4°C
```

5.7.9 Airflow Configurations

The airflow stations can be configured in the following screens. Consult SolutionAir before making any changes. The end device (airflow/pressure transducer) must be configured and should be in sync with configurations in the CAREL controller.

```
Configure
Fresh Airflow
Sensor Type: AIRFLOW
Sensor Ranges:
Airflow 100CFM
Press 0.00to 100.00"wg
K Factor: 00000001
Linearity: 0.00
```

```
Configure
Supply Airflow
Sensor Type: AIRFLOW
Sensor Ranges:
Airflow 100CFM
Press 0.00to 100.00"wg
K Factor: 00000001
Linearity: 0.00
```

```
Configure
Return Airflow
Sensor Type: AIRFLOW
Sensor Ranges:
Airflow 100CFM
Press 0.00to 100.00"wg
K Factor: 00000001
Linearity: 0.00
```

Sensor Type: Airflow/Pressure

Sensor Ranges:

AIRFLOW: Please refer to the airflow station/differential pressure probe submittal and the fan submittal to determine the range. If this is being configured for airflow, leave the pressure range as it is and vice versa.

PRESSURE: Please refer the differential pressure probe submittal and the fan submittal to determine the range, leave the airflow range as it is and vice versa.

K FACTOR: Refer to the fan submittal to determine the K factor(applicable only if the sensor type is pressure).

Linearity: Leave the linearity at 0.00 (unless specified in airflow/pressure probe submittal (applicable only if the sensor type is pressure).

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5.7.10 Duct Static Pressure Ranges

The supply and return duct static pressure ranges can be adjusted here. 228

5.7.11 Alarm Export

The alarm export option is used to export current active alarms for troubleshooting and diagnostic purposes.

This can be exported to USB or to the controller's internal memory (internal flash memory), which can be accessed via PC.

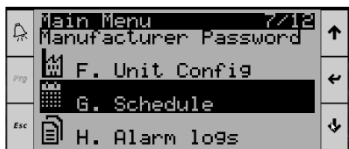
Modify the file number and change to **YES** to confirm.

Once exported, the following message appears.

5.7.12 Parameters Export

Follow the same procedure as Alarm Export to export the parameters list.

5.8 Schedule



Unit Operation

The unit schedule has 4 operating modes show below:

1. **OFF (UNIT OFF)**
2. **--- (Not Applicable)**
3. **UNOCC (UNOCCUPIED MODE)**
4. **OCC (OCCUPIED MODE)**

The unit will turn on only in the OCC mode and will shut down on all other modes.

All 3 schedules (**Daily, Vacation, Special days**) can be configured for the above operating modes.



WARNING

Before Configuring the Schedule, ensure the **Controller Clock setting** are right and precise, to have proper working of the schedule as per the controller's clock setting.

To adjust the clock setting in the controller, please refer to **Clock Settings**

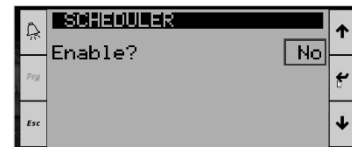
Schedule General operations

The scheduler is used for calendar scheduling management. To customize the device operating mode, it allows the following tasks:

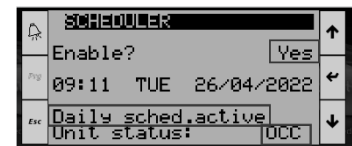
- **Daily Schedule** (4 events per day)
- **Vacation periods** (3 Vacation Periods)
- **Special Days** (6 Special Days)

When the schedule is disabled, the screen looks like what is shown below in Figure;The scheduler home screen is empty.

NOTE: When the schedule is disabled, it will be in OCC mode by default.



When the schedule is enabled, the screen looks like what is shown below



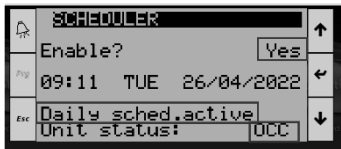
It displays the following information on the scheduler home screen:

- Time
- Day
- Date
- Active Running Schedule (Daily Sched, Vacation Sched, Special Day Sched)
- Schedule Status (OFF, ---, UNOCC, OCC)

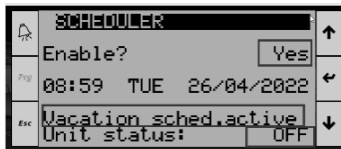
DIGITAL CONTROLLER

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When the daily scheduler is active, the screen looks like as show below:



When the vacation schedule is active, the screen looks like as shown below:



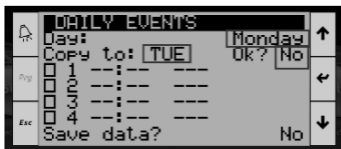
5.8.1 Daily Schedule

It is possible to set up to four daily events with weekly repetition. Every event requires to be enabled and correctly filled with the information regarding its starting hour and the device mode desired, choosing between OFF, ---, UNOCC, OCC modes.

The scheduler also offers the possibility to copy the configuration of a day in other days of the week, to avoid manually inserting the same configuration on different days.

NOTE: When the data are saved a coherence check is performed: if the user has enabled the event without setting a correct time (for example, the user has enabled the event but skipped to fill hours parameter which remains at zero), the incorrect event and all the next ones are disabled.

To copy a day schedule to other weekdays, set the '**Copy to**' to the desired day (**TUE, WED, THURS, FRI, SAT, SUN** or **ALL**) and select '**OK?**' to '**YES**' and press '**ENTER**'

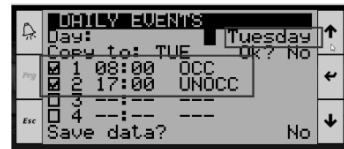
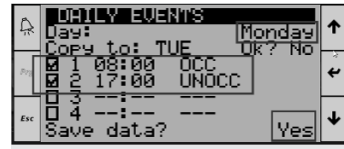


Once enter has been pressed, the following message appears "**DATA Correctly Copied**"



Follow the same method for the rest of the weekdays or manually enter for each weekday.

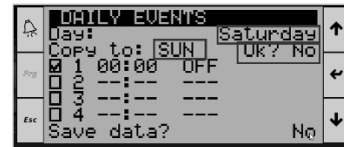
The following example shows the Monday schedule copied to Tuesday.



All Weekdays: If the same schedule for all weekdays is desired, selecting ALL will copy the schedule to all weekdays.

5.8.2 Weekend Schedule (SAT, SUN)

If the jobsite has a different schedule for the weekends, the user can manually change the schedule for Saturday and Sunday as highlighted below or the user can enter the schedule for Saturday and copy it to Sunday as described above.



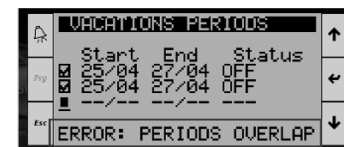
5.8.3 Vacation periods

- It is possible to set up to three vacation periods by specifying the starting and the ending dates. For each period, it is necessary to set the device operating mode (OFF, ---, UNOCC, OCC).

NOTE: When the user is filling the parameters of the vacation period a coherence check is performed: if the starting and the ending dates are inconsistent OR if two periods are overlapped, the incorrect event/s and all the next ones are disabled, and an error message is shown as below

Vacation periods overlapped:

The vacation period should be identical and not overlapping with each other.

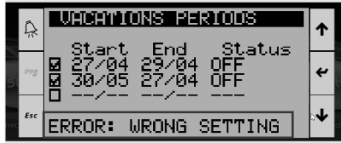


DIGITAL CONTROLLER

General Operating Instruction

Vacation period with inconsistent parameters:

The start date of the vacation period should always be lower than the end date.



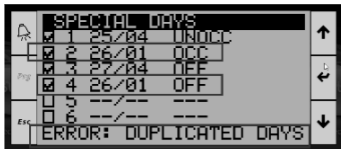
5.8.4 Special days

- It is possible to set up to six special days with the priority on the normal daily configuration. For each special day it is necessary to set the date and the device operating mode (OFF, ---, UNOCC, OCC).

NOTE: When the user is filling the parameters of a special day a coherence check is performed: if two periods are overlapped an error message is shown.

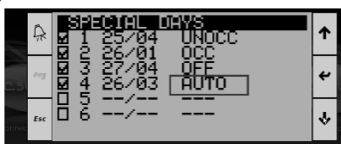
Special days duplicated:

The special days should be identical to each other and not duplicated.



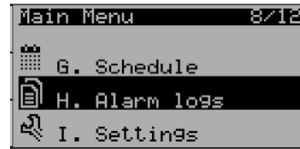
Important Warnings

- Each start time of the 4 events must be higher than the previous. If an event is set to 23:59 then all the following events are forced disabled.
- It is not allowed to set a vacation period that straddles years. This means that the days and the months must be referred to the current year.
- If a vacation period is set, all the daily events related to those days are overwritten.
- If a special day is set, all the daily events and the days included in vacations periods related to that day are overwritten.
- AUTO:**
When the special day is set to **AUTO**, it will follow the weekly day schedule on that date.



5.9 Alarm Logs

The alarm logs display the current active alarms in the unit. It displays the same **Alarm screens** that are displayed on pressing the alarm icon on the controller.



5.10 Settings

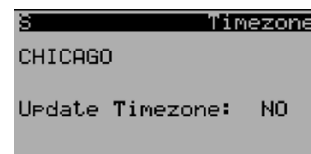
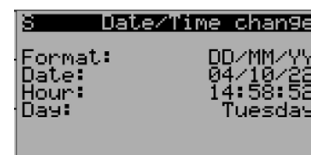
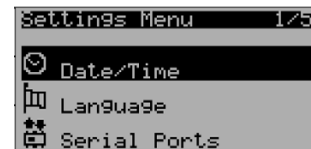
The settings tab displays the following sub-menu's configurations in the controller.

- Date/Time
- Language
- Serial Ports (MSTP-BACnet/MODBus)



5.10.1 Date/Time

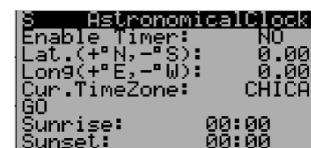
The Date/Time menu allows the user to change the clock settings and the time zone.



5.10.2 Astronomical Timer

In Development, to be updated in Future releases.

(Allows the unit to enable and disable the unit based on sunrise and sunset timings)



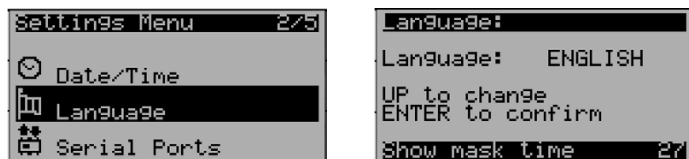
DIGITAL CONTROLLER

General Operating Instructions

5.10.3 Language

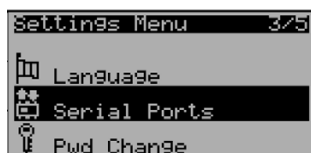
Allows the user to change the language.

English is the default language.



5.10.4 BMS-BACnet/MODBus

Allows the user to update the network settings for BMS Integration via BACnet/MODBus.



NOTE: CAREL supports only BACnet & MODBus communication protocol via RS485 or IP

To update the IP address for BACnet IP or MODBus TCP communication, please refer Update IP address

The following parameters needs to be updated as per site network settings to enable BMS communication.

The following table illustrates which parameters are applicable for each specific communication protocol. Please disregard the remaining parameters.

| | BACnet MSTP | MODBus RTU | BACnet IP | MODBus TCP |
|----------------|----------------|---------------|-----------|---------------|
| Enable Network | ✓ | ✓ | ✓ | ✓ |
| Baud Rate | ✓ | ✓ | | |
| Parity | | ✓ | | |
| STOP Bits | | ✓ | | |
| MAC | ✓ | | | |
| Device ID | ✓ | | ✓ | |
| Max Master | ✓ | | | |

Enable Network: 0/1 (0 = Disable, 1= Enable)

Baud Rate: (4800,9600,19200,38400,76800)

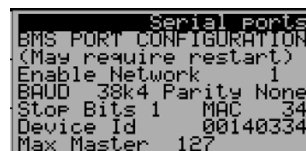
Parity: None, ODD, EVEN

STOP Bits: 0,1,2

MAC: 127 (0 to Max Master)

Device Id: BACnet Instance ID

Max Master: The maximum address for the MAC address.



Once the BMS network parameters are updated, verify that the BMS can communicate with the controller. Refer to the BMS Points List for BMS points integration

5.10.5 Override Network

If the controller is configured for BMS integration, BACnet/ MODBus has higher priority, i.e. certain overrides, setpoints performed locally on the controller will not be considered or they may be disregarded.

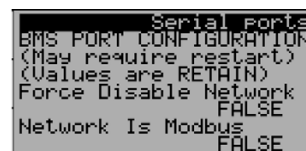
The user can manually disable the BACnet/MODBus communication on the controller. This is performed when the user wants the controller to operate stand-alone or to modify some parameters on the controller locally. Since the BMS has higher priority, disabling the network will allow the user to control the unit from the controller keypad.

Force Disable network: FALSE/TRUE

Setting this variable to FALSE will disable BACnet communication.

Network is MODBUS: FALSE/TRUE

Setting this variable to FALSE will disable Modbus communication.



5.11 Commissioning

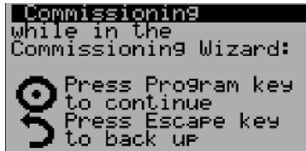


The commissioning tab will help to perform factory tests and on-site tests at startup. This will ensure the unit's mechanical components are working as intended.

Once the user reaches the commissioning tab in the program menu, press enter and the following screen appears:

DIGITAL CONTROLLER

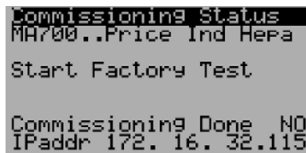
General Operating Instruction



Press **Up** and **Down** together and hold for 3 seconds. The following screen appears, use **Up/Down** keys to change to 'Start Factory Test' and press **Enter**.

Press **Escape** key to get back and press **Program** again to enter the following commissioning screens:

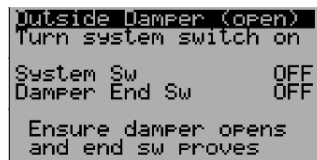
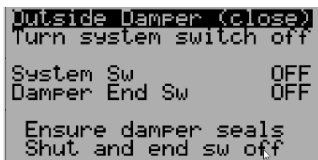
5.11.1.1 Factory Test



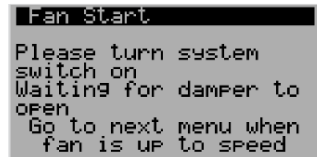
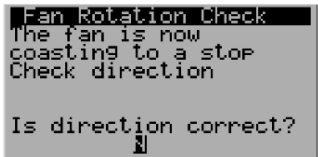
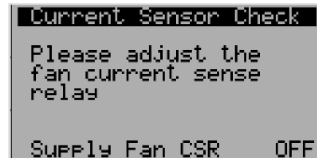
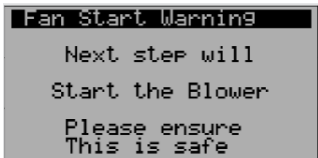
Perform the following instructions as prompts to perform the factory test. The instructions are in sequential order.

Press **Program** to move to Next Screen in Commissioning Mode

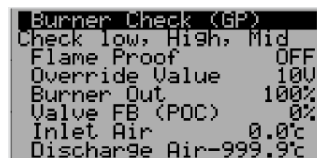
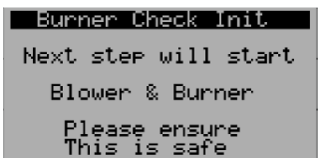
System On



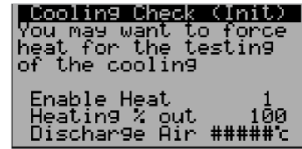
Outside Air Damper - Fan Blower



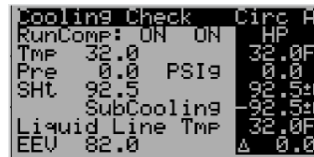
Burner



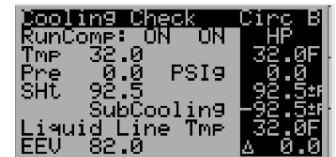
Cooling



Circuit A

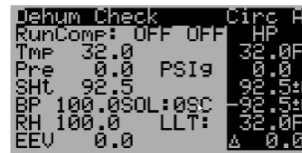


Circuit B

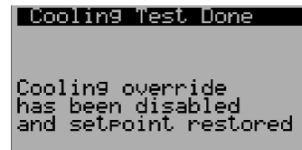


Dehumidification

If the unit is configured for dehumidification, the following screen appears. During this testing, both the HGRH and HGBP valves are forced to 100%.

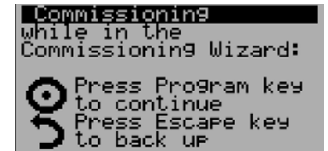
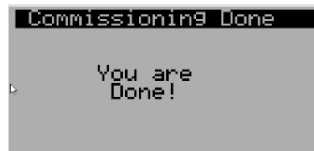


Once cooling and dehumidification testing are done, the following screen appears:

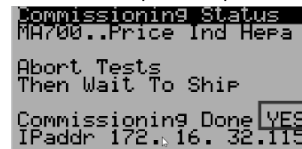


Completed

Once the commissioning process is complete, the display shows the following:



Press **Up** and **Down** together and hold for 3 seconds, the following screen appears, use **Up/Down** keys to change to 'Abort Tests then wait to Ship' and press **Enter**.



Press **PRG** to exit the commissioning tab

DIGITAL CONTROLLER

General Operating Instructions

5.12 Run Time Hours

The runtime hours displays the run hours of the unit, compressor hours, burner stages and dehumidification circuit compressor hours as shown below:

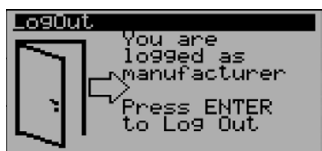


5.13 Log out

Once complete with the changes/updates in the program menu, please log out. This will prevent unauthorized persons making changes to the controller/unit. This will also ensure and prompt to enter the password when logging back into the program menu.



Press enter to exit the program menu.

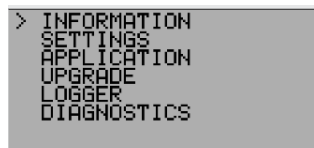


Once the user logs out and enters the program menu again, it will ask for the Password. Please ensure to check this step.



6 Controller Hardware Settings

To access the controller settings, press **Alarm** and **Enter** together for 3 seconds to enter the menu tree:



| INFORMATION | PCO INFORMATION |
|-------------|------------------|
| | I/O INFO |
| | PLAN INFO |
| | FILESYSTEM INFO |
| | TASK INFO |
| | APPLICATION INFO |
| | BUILT IN INFO |

| SETTINGS | PASSWORD |
|----------|-------------------|
| | USB SETTINGS |
| | TERMINAL SETTINGS |
| | CLOCK SETTINGS |
| | TCP/IP SETTINGS |

| APPLICATION | PCO INFORMATION |
|-------------|------------------|
| | I/O INFO |
| | PLAN INFO |
| | FILESYSTEM INFO |
| | TASK INFO |
| | APPLICATION INFO |
| | BUILT IN INFO |

| UPGRADE |
|---------|
|---------|

| LOGGER | EXPORT LOGS |
|--------|--------------|
| | RESTART LOGS |
| | FLUSH LOGS |
| | WIPE LOGS |

| DIAGNOSTICS | SYSTEM LOGS |
|-------------|-------------|
|-------------|-------------|

DIGITAL CONTROLLER

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7 Installation and Maintenance

7.1 Uploading the Program/OS to the Controller

The program or OS can be uploaded into the controller by three different means: Menu Tree

- USB
- PC Laptop
- FTP

Once uploaded into the controller, the procedure of updating is the same.

7.1.1 USB

Copy the compiled Ap1 to a USB stick. The Ap1 file must be placed in a folder named **UPGRADE** that is put in the root directory of the USB drive.



For the Mini controller, a USB key with a USB-Micro plug will be required:



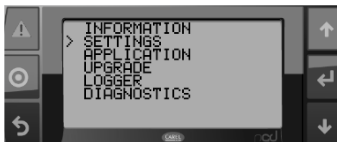
For all other controllers, a standard USB stick is sufficient.

Plug the USB stick into the port on the controller and press and hold the **Alarm** and **Enter** for at least 3 seconds.

Scroll down using the arrow keys and select the **SETTINGS** menu and press **Enter**.



Scroll down using the arrow keys and select the **USB SETTINGS** menu and press **Enter**



Ensure that the **Pen drive** is set to **Enable** and the status reads "**pen drive ready**"

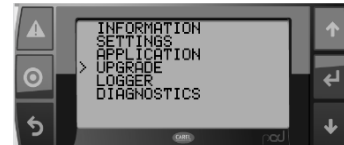


Press the **Back** button twice to return to the main device configuration menu.

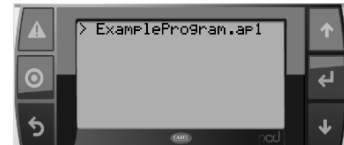


Scroll down to the **UPGRADE** menu and press **Enter**.

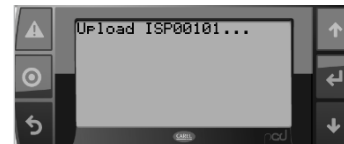
The program that was loaded onto the USB stick should be visible on the screen, select it and press **Enter**.



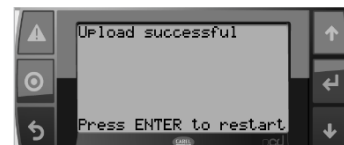
Press **Enter** to confirm the upgrade and wait for the program to be loaded onto the controller. This may take a few minutes.



Once the upload is complete, press **Enter** to restart the controller.



Once the program has started up, testing of the unit may begin.

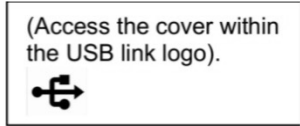
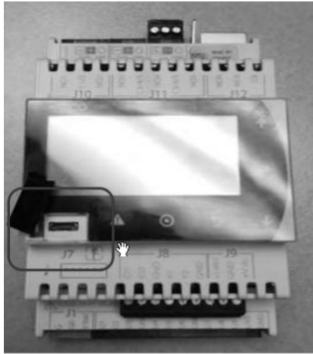


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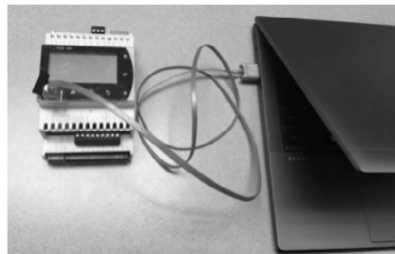
7.1.2 PC Laptop

This procedure is performed if the controller needs to update or reflashes the system with a new program using the USB/mini cable.



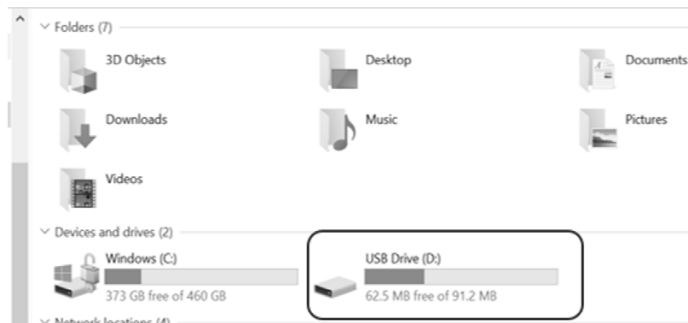
Locate the controller host USB Port.

Connect the USB printer cable (USB AB Cable) to the controller into the battery powered laptop or windows tablet.

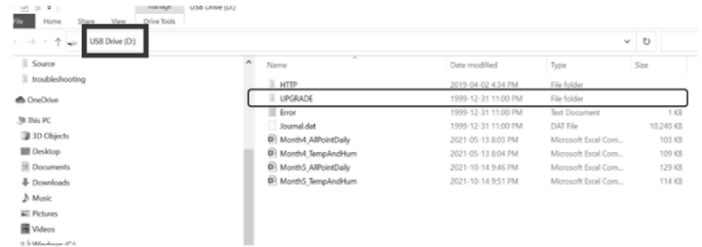


Use any USB 2.0 to micro-USB cable.

- Once connected, download the latest code then open the Windows file explorer and check the USB Drive: (controller memory, make sure no other USB device are plugin).



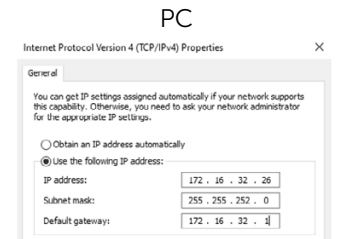
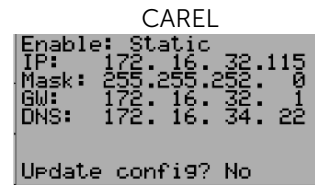
- Copy and paste the latest OS or the AP1 file to the UPGRADE folder of the controller memory. Once the file is copied to the controller, refer to **Program/OS Upgrade**



7.1.3 FTP

To Establish FTP connection

- Connect the PC/Laptop to the controller via an Ethernet Cable (Cat 5/Cat 6) or ensure the controller and the computer are on the same LAN network.
- Ensure the PC/laptop and the controller are in the same subnet and same IP address range.



- To configure the laptop, refer to **Configuring the Laptop 7.1.5**
- To configure the controller, refer to **Update IP Address 7.1.4**
- Once the IP addresses are in the same range and subnet, go to File Explorer and type the controller's IP address in the address bar in the following format

ftp://ControllersIPAddress

e.g.: ftp://172.16.32.115

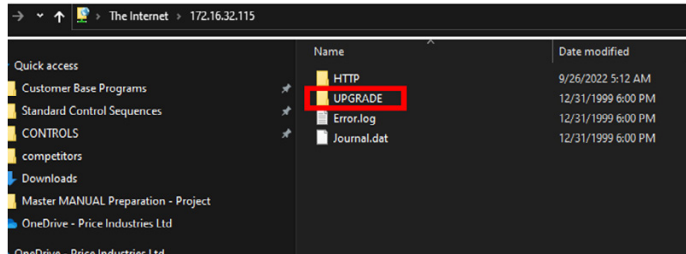


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Inside the controller's folder, there should be an **UPGRADE** folder.

Copy and paste the latest OS or the AP1 file to the **UPGRADE** folder of the controller memory.



Once the Program or OS has been uploaded into the Controller via USB/PC/FTP, refer to **Program/OS Upgrade 7.2**.

7.1.4 Update IP Address

When the controller is connected to the LAN network/PC, by default it will take DHCP (Auto) IP address. The IP address can be changed to a static IP address through the following steps.

Connecting a controller through IP enables FTP communication, Web Browser features including Data Logger.

From the PGD screen:

Hold Alarm + Enter for at least 3 seconds:



The controller will go into hardware setup, scroll down, and hit **Enter** on settings:

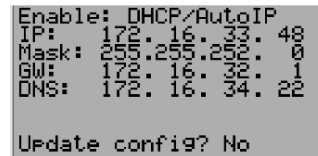


Scroll down using arrow keys and select TCP/IPv4 Settings:



By Default, the controller will be in DHCP/Auto IP when it's connected to the network/PC. This can be left as is if it is on the LAN network or it can be updated to a specific static

IP address if connecting a Laptop Directly to the controller or as per an IT request.



To update to static IP address, change **enable** to **static**, and enter the relevant IP information:



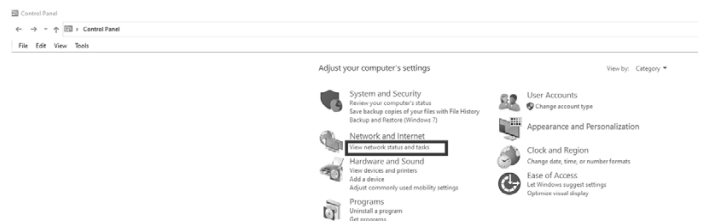
Important: Set update config to **YES** and press **Enter** to save the values.

To revert back to DHCP/Auto IP, change **enable** to DHCP and Update Config? To **YES**

7.1.5 PC - Controller Ethernet Connection

If connecting a PC/Laptop directly to the controller via RJ45, follow the below steps to update the network settings in the PC

1. Ensure the controller is connected to the PC via ethernet cable type RJ45
2. Go to **Control Panel** -> View **Network Status and Tasks** (under Network and Internet)



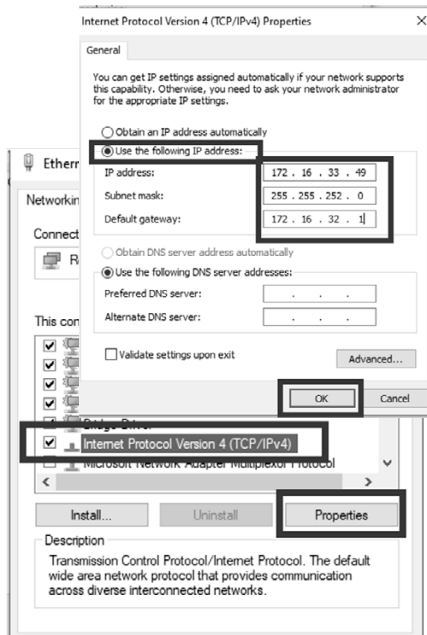
3. Click on the Ethernet Connection that is visible in the PC and a dialogue box appears. Click **Properties** on the dialogue box as shown below:



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4. Scroll down to Internet Protocol version 4 (TCP/IPv4) and click **properties**.
5. A new pop-up box appears, click on '**use the Following IP Address**' and enter the required IP address (ensure the controller and the PC are in the same IP range and subnet) and then click **OK**



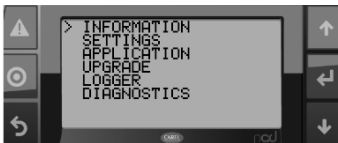
6. Enter the controller's IP address in a web browser to check if the PC is communicating with the controller.

7.2 Upgrading the Program/OS in the Controller

Press and hold the '**Alarm**' and '**Enter**' for at least 3 seconds.



The unit will enter the hardware setup menu.



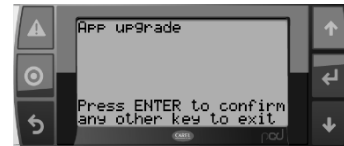
Scroll down to the "**UPGRADE**" menu and press "**Enter**"



The program that was loaded onto the USB stick should be visible on the screen, select it and press "**Enter**"



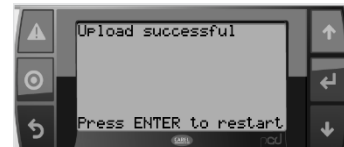
Press "**Enter**" to confirm the upgrade and wait for the program to be loaded onto the controller. This may take a few minutes.



During the upgrade, the following sequence will prompt into the display:



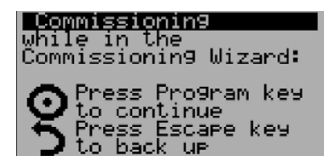
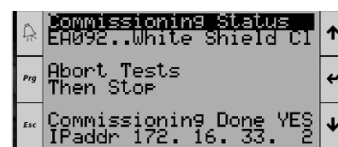
Once upload is complete, press "**Enter**" to restart the controller.



If there are any issues during upgrade, please contact SolutionAir.

Once the program has started up, testing of the unit may begin. The user can either initiate commissioning or skip the commissioning process by following the steps below:

1. Skip the commissioning page by aborting the test. Pressing the **Up** and **Down** arrow keys together for 3 seconds will proceed to commissioning page setup.
2. Press arrow down button to find the abort tests and then press **Enter** button again to toggle the commissioning done into **YES**.



DIGITAL CONTROLLER

General Operating Instruction

- Press **Return** button to escape, and it should proceed to home page.



7.3 Log Transfer

The Logs can be exported either to an USB or to a PC/ Laptop.

7.3.1 USB

Locate the controller host USB Port.



(Access the cover within the USB link logo).



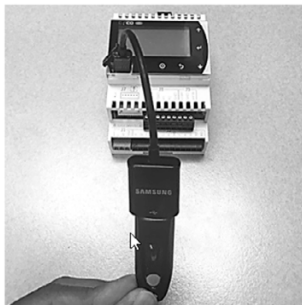
Plug in the thumb drive. There are two options to link the thumb drive into the controller as shown below:

A. With male micro-USB to female USB adapter cable:



In this method the male micro-USB to female USB adapter cable was used.

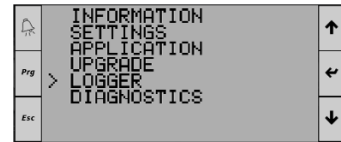
B. With male micro-USB thumb drive:



- Access the main screen of the controller, press and hold the **Alarm** and **Enter** for at least 3 seconds until the home display shifts to the other option display (labeled as warning symbol or bell symbol and as arrow to the left symbol).



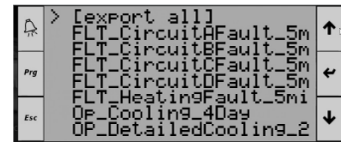
- Navigate to the menu option and select "**logger**" using the arrow down button and then press **Enter** button.



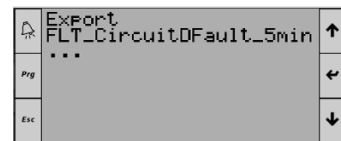
- Select the option "**export logs**" and it will proceed to download the log files from the controller onto the USB.



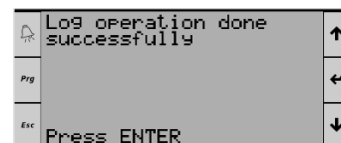
- Select "**[export all]**" and press **Enter**.



- During download, the screen should show this page:



- Once the download has been successful, press the **Escape** button (labeled as **Esc** or **Undo**) until the home screen is displayed. Unplug the USB thumb drive and verify the files.



NOTES: By default, navigating the controller USB drive folder to verify the logs, will show an empty excel log file. The logs will appear in the folder only if step 4 to 6 is completed. This is true whether downloading the file via USB or laptop.

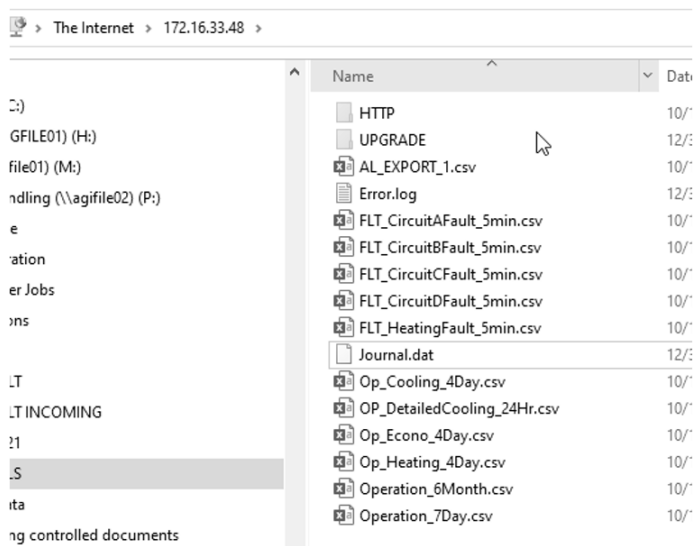
DIGITAL CONTROLLER

General Operating Instructions

7.3.2 Laptop/PC

If exporting via a laptop/PC, refer to connect laptop via **USB** or **FTP** and copy the logger files from the controllers folder to the computer's local memory

Log files in the controller's memory, accessed via FTP are shown below:



7.4 Wipe Retain and Restart Application

This procedure is performed if the controller freezes and/or there is a memory error alarm.

| Screen Description | Description |
|---------------------|---|
| STOP APPLICATION | To stop/re-start execution of the application program |
| START APPLICATION | |
| RESTART APPLICATION | Corresponds to STOP + START |
| WIPE RETAIN | The "Retain" variables return to the default values |
| WIPE NVRAM | Clear clock or RAM buffer memory: this stores the values of parameters that change often, such as counters (if configured in the application) |

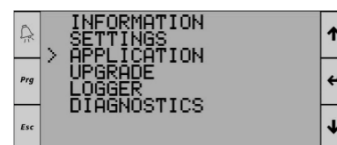
NOTE: Perform Wipe Retain **FIRST** and then Restart Application

7.4.1 Wipe Retain

Access the main screen of the controller, press and hold the **Alarm** and **Enter** for at least 3 seconds until the home display shifts to other option display (labeled as warning symbol or bell symbol and arrow to the left symbol).



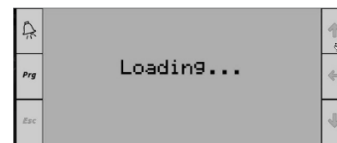
Navigate to the menu option and select **"application"** using the arrow down button and then press **Enter** button.



Select the option **"wipe retain"** and it will proceed to wipe and retain process.



During the wipe retain process the display will show loading as shown below:



Once the wipe retain has been successful, the controller will show SolutionAir page display and then will prompt to the language confirmation. Press the **Enter** button to confirm and will return to the main page



7.4.2 Restart Application

Follow the same procedure as above



DIGITAL CONTROLLER

General Operating Instruction

8 Alarms

When an alarm is triggered, the alarm button on the controller turns **RED**.

Pressing the **alarm button** takes the user to the list of active alarms.



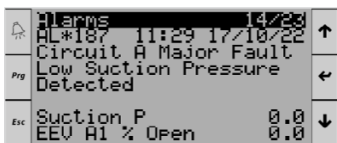
8.1 Alarm Screen

The alarm screen displays the following Information:

1. Alarm ID
2. Time and date when the alarm was triggered
3. Total active alarms
4. Description of the alarm
5. Sensor or associated variable value when the alarm was triggered. *



***NOTES:** Two parameters can be linked to an alarm and not all alarms will have associated variables. This is useful in diagnosing what caused the alarm, e.g. the below low suction alarm is lined with suction pressure and EEV valve position. In this example, the valve position was 0% and suction pressure was 0, which caused the low suction pressure alarm.



8.2 Alarm Reset

The alarms lists include both auto reset and manual reset alarms. To determine which alarms are configured as auto or manual reset, refer to the **Alarm Summary**.

Auto reset alarms reset automatically once the trigger condition is back to normal.

Manual reset alarms require manual reset by the operator, even when the trigger condition is back to normal. Mostly critical alarms in the unit are configured as manual reset alarms.

These alarms can also be reset from the BMS.

NOTE: When the trigger condition is true, resetting the alarms will not RESET the alarm, so please ensure the issue is fixed/checked/sorted before resetting the alarm.



To reset the alarms, press the **enter key** and **alarm key** together for 3 seconds.

8.3 Troubleshooting Alarms

Though the alarm screen displays enough information regarding the alarm, sometimes further details are required for troubleshooting.

| Alarm ID | Alarm Name |
|---|---|
| Enter Alarm ID Here-> | 180 |
| | AI_DX_Circ_A_Flt |
| Alarm Reset Type | Auto reset until counter |
| Alarm Description | Circuit A overload or high or low pressure switch |
| Interlocks | Circuit A Compressor Shut Down |
| Alarm Sequence (Customer) | The Alarm is Triggered when the Circuit Trips on Compressor safety interlock (High pressure Switch) When the Compressor Discharge pressure is > 400 PSI |
| Alarm Sequence (Solution Air) | When the SensorCheckEnable is True and Circ_A_Ok_Bin.Bal is False, Alarm is Triggered. |
| Alarm Delay | ... |
| Alarm set point | 400 PSI |
| Variable/Parameters to check for (Solution Air) | Suction_Press_A_PSB.AW1 Hard Value on the Device |
| | LIQLine_Press_A_PSB.AW1 |
| Troubleshooting Guidelines | 1. Check for Possible Dirt in the screen, blocked needle valve(EV) |

SolutionAir has created an alarm troubleshooting tool to help technicians in the field diagnose/troubleshoot alarms.

To access the alarm troubleshooting tool, use the QR code or click on the link below. Enter the alarm ID from the alarm screen into the alarm troubleshooting tool to see the alarm delay, alarm set point, variables associated and the troubleshooting guidelines to fix the issue.



Link: <https://solutionairgroup.com/alarm-assistant/>

Please contact SolutionAir for further assistance.

DIGITAL CONTROLLER

General Operating Instructions



9 Connecting to the Web server

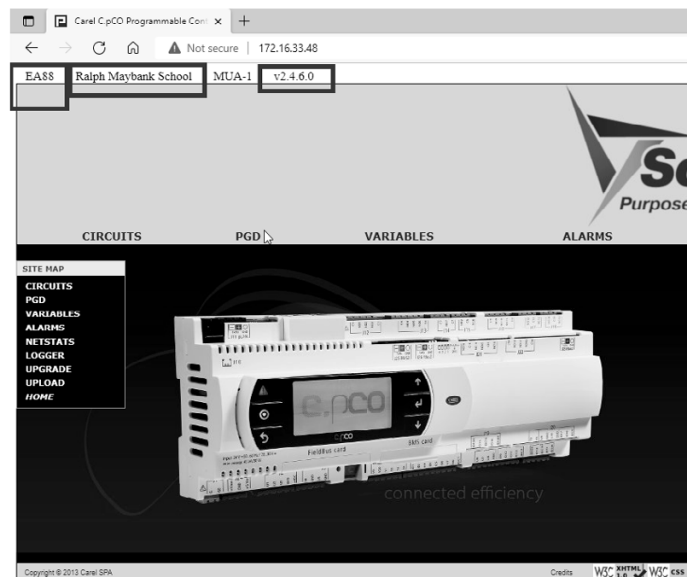
All SolutionAir controllers are equipped with built-in web server that allows the user to connect to the controller via a web browser (Google Chrome/Microsoft Edge for example).

Once the controller is on the network or connected directly to a PC (refer to configuring PC), type the IP address of the controller in a web browser.

The following home page opens, which shows the

- Job number
- Job name
- Software version

Each tab in the home page are explained below:



9.1 PGD- Controller Web Display

Clicking the PGD Tab displays the following web page, which is the exact mirror of the display screen on the controller. Any buttons clicked, will be executed on the controller as well. It is useful when the controller on the unit is very hard to access. Any actions on the controller can be performed by accessing the PGD screen through the web server.

9.2 Alarms

Clicking on the alarms tab displays the following alarm summary web page:

| ID | Name | Start time | Stop time | Var 1 start | Var 2 start | Var 1 stop | Var 2 stop | Reset |
|-----|--------------------------------|---------------------|-----------|-------------|-------------|------------|------------|-------|
| 69 | AI_SF_VFD_RtActive | 2022/10/17 18:06:20 | N/A | 0.000000 | 0.000000 | N/A | N/A | Reset |
| 73 | AI_RF_VFD_RtActive | 2022/10/17 18:06:20 | N/A | 0.000000 | 0.000000 | N/A | N/A | Reset |
| 117 | AI_FA_Temp_Sensor_RtActive | 2022/10/17 18:07:28 | N/A | -999.900000 | -1 | N/A | N/A | Reset |
| 119 | AI_RA_Temp_Sensor_RtActive | 2022/10/17 18:07:28 | N/A | -999.900000 | -1 | N/A | N/A | Reset |
| 120 | AI_SA_Temp_Sensor_RtActive | 2022/10/17 18:07:28 | N/A | -999.900000 | -1 | N/A | N/A | Reset |
| 166 | AI_RegerLostPositionA_RtActive | 2022/10/17 18:06:56 | N/A | | | N/A | N/A | Reset |
| 167 | AI_RegerLostPositionB_RtActive | 2022/10/17 18:06:56 | N/A | | | N/A | N/A | Reset |

The information available on the alarms web page are pretty much the same as what is available on the PGD Alarm Screen 8.1.

The additional information available on the alarm web page are as follows

- **Stop time:** The time at which the alarm was reset (Auto/Manual)
- **Var1 & Var 2 Stop:** The variables value when alarm was reset

9.2.1 Wipe Alarms History

Clicking the **wipe history** button will clear all the past alarm logs from the controller memory (the active alarms will be retained in the memory).

- **Reset:** In the alarms web page, alarms can be reset individually, unlike the PGD Screen, where all alarms must be reset together.

9.3 Logger – Point Trends

9.3.1 Datalogger

The datalogger tab is useful for unit diagnostic and troubleshooting purposes.

The following data logs are available on the controller for different modules. Choose the right log to get the desired variable log data for troubleshooting.

DIGITAL CONTROLLER

General Operating Instruction

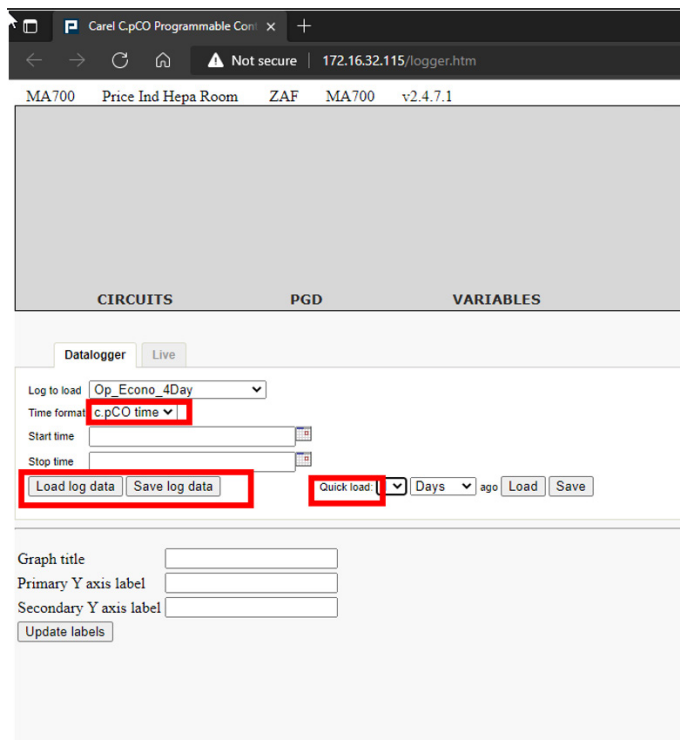
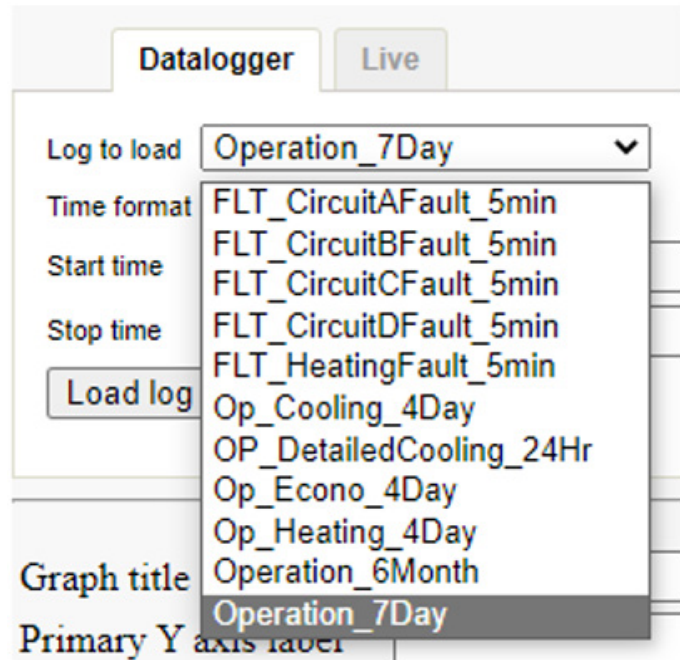
9.3.2 Setting up the Data Logger

Log to Load: Select the desired log to be accessed

Time Format: Ensure the time format is in c.PCO time

Start Time: If desired, fill in the log to start at a specific time. If not, leave it blank.

Stop Time: If desired, fill in the log to stop at a specific time. If not, leave it blank



Load Log Data: Click on load log data to load the point trend.

Save Log Data: Clicking save load data will download an Excel sheet instead of a graph on the web page. This will be useful for documenting purposes or for further data analysis.



Quick Load: The quick load option loads or saves the log without having to fill in the start time and stop time.

The quick load option loads/saves the log based on the log data memory capacity.

9.3.3 Live Trend

The live log is useful to monitor the live trend of the parameters.

This is useful during commissioning, testing or for **PID Tuning**. To view the live log trend, follow the below steps:

1. **Click Show/Hide Variables**, on clicking, all parameters list will be displayed.

| CIRCUITS | | PGD | VARIABLES | ALARMS |
|----------------------------|--|------------------------------------|--|--------|
| Datalogger | | Live | | |
| Scan period presets: | | 1 second Apply | | |
| Scan period (seconds): | | 1 (min=1, max=600) | | |
| Graph time span (minutes): | | 1 (min=1, max=25) | | |
| Selected variables: | | Show/Hide variables Save live data | | |
| Trace ID | Name | Current Value | Description | |
| 00 | AL_126 Active | 0 | Automatic generated by Alarm editor - Alarm status | |
| 01 | AL_126 Trigger | 0 | Automatic generated by Alarm editor - Alarm status Trigger | |
| 02 | AL_176 Active | 0 | Automatic generated by Alarm editor - Alarm status | |
| 03 | AL_176 Trigger | 0 | Automatic generated by Alarm editor - Alarm status Trigger | |
| 04 | AL_OX_CondensateOverflow Active | 0 | DX Drain Pan Condensate Overflow condition detected - Alarm status | |
| 05 | AL_OX_CondensateOverflow Trigger | 0 | DX Drain Pan Condensate Overflow condition detected - Alarm status | |
| 06 | AL_EvapLeaving_Temp_Sensor_Flt.Active | 0 | Evaporator Leaving Air Temperature Sensor Fault - Alarm status | |
| 07 | AL_EvapLeaving_Temp_Sensor_Flt.Trigger | 0 | Evaporator Leaving Air Temperature Sensor Fault - Alarm status Trigger | |
| 08 | AL_SA_Sensor_Network_Flt.Active | 0 | Supply air Network Sensor Fault - Alarm status | |
| 09 | AL_SA_Sensor_Network_Flt.Trigger | 0 | Supply air Network Sensor Fault - Alarm status Trigger | |
| 10 | AL_VFD_Offline_Cond_B.Active | 0 | VFD for Cond B offline - Alarm status | |
| 11 | AL_VFD_Offline_Cond_B.Trigger | 0 | VFD for Cond B offline - Alarm status Trigger | |
| 12 | AL_10 Active | 0 | Automatic generated by Alarm editor - Alarm status | |
| 13 | AL_10 Trigger | 0 | Automatic generated by Alarm editor - Alarm status Trigger | |
| 14 | AL_102 Active | 0 | Automatic generated by Alarm editor - Alarm status | |
| 15 | AL_102 Trigger | 0 | Automatic generated by Alarm editor - Alarm status Trigger | |
| 16 | AL_103 Active | 0 | Automatic generated by Alarm editor - Alarm status | |
| 17 | AL_103 Trigger | 0 | Automatic generated by Alarm editor - Alarm status Trigger | |
| 18 | AL_104 Active | 0 | Automatic generated by Alarm editor - Alarm status | |
| 19 | AL_104 Trigger | 0 | Automatic generated by Alarm editor - Alarm status Trigger | |
| 20 | AL_105 Active | 0 | Automatic generated by Alarm editor - Alarm status | |
| 21 | AL_105 Trigger | 0 | Automatic generated by Alarm editor - Alarm status Trigger | |

Choose the desired variables to be viewed on the live trend. For example, troubleshooting/tuning a heating control, click on Sa_Temp_Pr.b.Aval, Heat1_Aout.Aval, and SA_Temp_SP_Internal.

Consult SolutionAir for point variables reference.

DIGITAL CONTROLLER

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Scan Period: It is suggested to give 1 seconds, the controller will scan every one second and will not miss out on any sudden variation.

Time Span: Give the maximum value of 25 minutes, so the graph can hold value for the last 25 minutes.

Once the details have been filled out and the variables have been selected, click on the **Play** icon.

The screenshot shows the 'Datalogger' tab selected. Under 'Live', there are input fields for 'Scan period (seconds): 1' and 'Graph time span (minutes): 25'. Below these are 'Selected variables' and a 'Save live data' button with a play icon.

The plot will begin and can be observed over time. The trend will start updating for every one second (scan period). Once the Tuning/Troubleshooting is complete, the Live data can be saved for reference/documentation.

Save Live Data

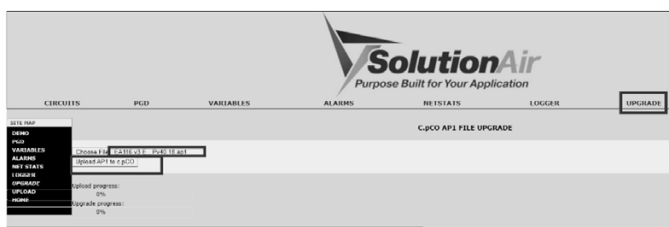
To save the live data, hit the **Stop** icon and click on **Save Live Data**. The following Excel sheet Live_data.csv will be downloaded:



9.4 Control Program/OS Upgrade

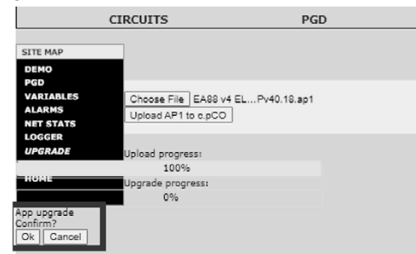
The control program (. Ap1 File)/OS can also be uploaded through the web server using the following steps:

1. Click on the **upgrade** tab.
2. Choose the desired .AP1 file (control program) or the controller OS to upload.

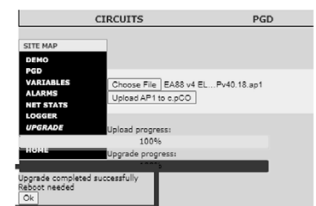
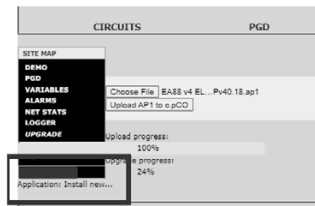


3. Click upload AP1 to c.PCO
4. Once the file has been uploaded into the controller, it prompts the following message:

App Upgrade Confirm? Click OK



5. A progress bar appears indicating if the upgrade has been completed or not. Once the upgrade is completed, press **OK** and wait a couple of minutes. Then the controller should be updated with latest program/ OS.



NOTE: The PGD screen can be watched at the same time via web page to observe the upgrade process.

10 Remote User Terminal

The remote user terminal module is the exact mirror screen of the controller.

It is an optional component in the unit, and it can be panel mount or wall mount.

This allows the user to monitor and override all the information and settings available on the controller.

The remote user terminal does not have any I/O terminals to connect any devices and it does not have any ports to integrate BMS or connect PC.

The user will be able to view, read and write parameters and options available via the display screen.

Any hardware connections or file exports and imports must be done directly on the controller mounted on the unit.



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General Operating Instruction

11 BMS Points List (BACnet/MODBus)

| BACnet | | Modbus | | | Variable | Units | Read/Write | Description |
|----------|--------------|----------|------|---------------|----------------------------|-------|------------|--|
| Instance | Type | Instance | Size | Type | | | | |
| AI 1 | Analog Input | 0 | 2 | InputRegister | FreshAirTemp | °F | Read Only | Measured temperature of outside/fresh air |
| AI101 | | 100 | 2 | | FreshAirTemp | °C | | |
| AI 2 | Analog Input | 2 | 2 | InputRegister | SupplyAirTemp | °F | Read Only | Measured Discharge/Supply air temperature |
| AI 102 | | 102 | 2 | | SupplyAirTemp_C | °C | | |
| AI 3 | Analog Input | 4 | 2 | InputRegister | ReturnAirTemp | °F | Read Only | Measured return air temperature |
| AI 103 | | 104 | 2 | | ReturnAirTemp_C | °C | | |
| AI 4 | Analog Input | 6 | 2 | InputRegister | MixedAirTemperature | °F | Read Only | Measured temperature after mixing fresh & return air |
| AI 104 | | 106 | | | MixedAirTemperature_C | °C | | |
| AI 5 | Analog Input | 8 | 2 | InputRegister | EvaporatorLeavingAirTemp | °F | Read Only | (Reheated systems only) dewpoint of supply air |
| AI 105 | | 108 | | | EvaporatorLeavingAirTemp_C | °C | | |
| AI 6 | Analog Input | 10 | 2 | InputRegister | ExhaustAirTemp | °F | Read Only | (Dual air path only) exhausted return air leaving temp |
| AI 106 | | 110 | | | ExhaustAirTemp_C | °C | | |
| AI 7 | Analog Input | 12 | 2 | InputRegister | SpaceTemp | °F | Read Only | Measured Room / Space temperature |
| AI 107 | | 112 | | | SpaceTemp_C | °C | | |
| AI 10 | Analog Input | 18 | 2 | InputRegister | SpaceCO2 | PPM | Read Only | Measured Room / Space CO2 level in PPM |
| AI 11 | Analog Input | 18 | 2 | InputRegister | SpaceCO2 | PPM | Read Only | Actual Discharge/Supply air carbon monoxide in PPM |
| AI 12 | Analog Input | 20 | 2 | InputRegister | SupplyCO | PPM | Read Only | Measured Supply / Discharge CO2 level in PPM |
| AI13 | Analog Input | 22 | 2 | InputRegister | SupplyCO2 | PPM | Read Only | Measured Return CO2 level in PPM |
| AI 20 | Analog Input | 24 | 2 | InputRegister | ReturnCO2 | PPM | Read Only | Measured RH of outside air |
| AI 21 | Analog Input | 38 | 2 | InputRegister | FreshAirHumidity | %RH | Read Only | Measured RH of supply/discharge air |
| AI 22 | Analog Input | 40 | 2 | InputRegister | SupplyAirHumidity | %RH | Read Only | Measured RH of return air (room sample) |
| AI 23 | Analog Input | 42 | 2 | InputRegister | ReturnAirHumidity | %RH | Read Only | Measured RH of air after mixing fresh and supply air |
| AI 24 | Analog Input | 44 | 2 | InputRegister | MixedAirHumidity | %RH | Read Only | Measured RH of room/space air |
| AI 30 | Analog Input | 46 | 2 | InputRegister | SpaceHumidity | %RH | Read Only | Measured CFM of fresh air path |
| AI 31 | Analog Input | 58 | 2 | InputRegister | FreshAirAirflow | CFM | Read Only | Measured CFM of supply / unit discharge |
| AI 32 | Analog Input | 60 | 2 | InputRegister | SupplyAirAirflow | CFM | Read Only | Measured CFM of return air path |
| AI 33 | Analog Input | 62 | 2 | InputRegister | ReturnAirAirflow | CFM | Read Only | Measured DSP of the supply duct |
| AI 34 | Analog Input | 64 | 2 | InputRegister | SupplyDuctStaticPress | "WC | Read Only | Measured DSP of the return duct |

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General Operating Instructions

| BACnet | | Modbus | | | Variable | Units | Read/Write | Description |
|----------|--------------|----------|------|-----------------|--------------------------|-------|-------------|---|
| Instance | Type | Instance | Size | Type | | | | |
| AV 1 | Analog Input | 0 | 2 | InputRegister | SP_SupplyAirTemp | °F | Commandable | Discharge/Supply Air Temperature setpoint in °F (or °C) |
| AV 101 | | 100 | 2 | | SP_SupplyAirTemp_C | °C | | |
| AV 2 | Analog Input | 2 | 2 | HoldingRegister | SP_SpaceTemp | °F | Commandable | Room/Space temperature setpoint (for reset) |
| AV 102 | | 102 | 2 | | SP_SpaceTemp_C | °C | | |
| AV 3 | Analog Input | 4 | 2 | HoldingRegister | SP_SpaceDewpoint | °F | Commandable | Room/Space dewpoint setpoint (max. target) |
| AV 103 | | 104 | 2 | | SP_SpaceDewpoint_C | °C | | |
| AV 4 | Analog Value | 6 | 2 | HoldingRegister | SP_MaxFreshAirPcnt | % | Commandable | Maximum fresh air setpoint in % |
| AV 5 | Analog Value | 8 | 2 | HoldingRegister | SP_MinFreshAirPcnt | % | Commandable | Minimum fresh air setpoint in % |
| AV 6 | Analog Value | 10 | 2 | HoldingRegister | SP_SupplyFanSpeedPcnt | % | Commandable | Supply Fan Speed |
| AV 7 | Analog Value | 12 | 2 | HoldingRegister | SP_ReturnFanSpeedPcnt | % | Commandable | Return Fan Speed |
| AV 8 | Analog Value | 14 | 2 | HoldingRegister | SP_SupplyDuctStaticPress | "WC | Commandable | Target supply duct static pressure |
| AV 9 | Analog Value | 16 | 2 | HoldingRegister | SP_ReturnDuctStaticPress | "WC | Commandable | Target return duct static pressure |
| AV 10 | Analog Input | 18 | 2 | HoldingRegister | BMSRoomAirTemp | °F | Commandable | Space Temperature, if sensor by BMS |
| AV114 | Analog Input | 106 | 2 | | BMSRoomAirTemp_C | °C | | |
| AV 11 | Analog Input | 20 | 2 | HoldingRegister | BMSFreshAirTemp | °C | Commandable | Space Temperature, if sensor by BMS |
| AV 12 | Analog Input | 22 | 2 | HoldingRegister | BMSRoomAirDewpoint | °F | Commandable | Room Air Dewpoint Temperature if sensor by BMS |
| AV 112 | Analog Input | 108 | 2 | HoldingRegister | BMSRoomAirDewpoint_C | °C | Commandable | Room Air Dewpoint Temperature if sensor by BMS |
| AV 13 | Analog Input | 24 | 2 | HoldingRegister | SP_MixboxAirTemp | °F | Commandable | Mixbox Air Temperature setpoint in °F (or °C) |
| AV 113 | | 124 | 2 | | SP_MixboxAirTemp_C | °C | | |
| AV 14 | Analog Value | 26 | 2 | HoldingRegister | SP_MaxReturnAirPcnt | % | Commandable | Maximum Return air setpoint in % |
| AV 15 | Analog Value | 28 | 2 | HoldingRegister | SP_MinReturnAirPcnt | % | Commandable | Minimum Return air setpoint in % |
| AV 16 | Analog Value | 30 | 2 | HoldingRegister | SP_CO2_Threshold | PPM | Commandable | Threshold for CO2 Logic to become active |
| AV 17 | Analog Value | 32 | 2 | HoldingRegister | SP_CO2_FADemand | % | Commandable | Fresh Air Demand for CO2 logic |
| AV 18 | Analog Value | 34 | 2 | HoldingRegister | SP_SupplyAirflowCFM | CFM | Commandable | Target supply airflow |
| AV 19 | Analog Value | 36 | 2 | HoldingRegister | SP_ReturnAirflowCFM | CFM | Commandable | Target return airflow |
| AV 40 | Analog Value | 78 | 2 | InputRegister | FreshAirPcnt | % | Read Only | Current Fresh air damper position |

DIGITAL CONTROLLER

General Operating Instruction

| BACnet | | Modbus | | | Variable | Units | Read/Write | Description |
|----------|---------------|----------|------|-----------------|-------------------------------------|---------|-------------|---|
| Instance | Type | Instance | Size | Type | | | | |
| AV 41 | Analog Value | 80 | 2 | InputRegister | ReturnAirPcnt | % | Read Only | Current Return air damper position |
| AV 42 | Analog Value | 82 | 2 | InputRegister | HeatingDemand | % | Read Only | Current Heating Demand from Heating PID |
| AV 43 | Analog Value | 84 | 2 | InputRegister | CoolingDemand | % | Read Only | Current Cooling Demand from Cooling PID |
| AV 44 | Analog Value | 86 | 2 | InputRegister | HeatWheelDemand | % | Read Only | Current Commanded Heatwheel Speed |
| AV 45 | Analog Value | 88 | 2 | InputRegister | CubeBypassDamperDemand | % | Read Only | Current Cube Bypass Damper position |
| AV 46 | Analog Value | 94 | 2 | InputRegister | SupplyanSpd | % | Read Only | Current Supply Fan Speed Signal |
| AV 47 | Analog Value | 96 | 2 | InputRegister | ReturnFanSpd | % | Read Only | Current Return Fan Speed Signal |
| AV 56 | Analog Value | 56 | 2 | HoldingRegister | RegenCore. HeatRecoveryCycleTime | Seconds | Commandable | Time in Second for one complete cycle (2 damper changes) in ER mode |
| AV100 | Analog Value | 200 | 2 | HoldingRegister | AlarmMng.BMS_Alarm_ID | | | Active Alarms ID's, Refer Alarm Summary for Alarm Description |
| IV 54 | Integer Value | 54 | 2 | HoldingRegister | RegenCore. FreeCoolingCycleTime | Minutes | Commandable | Time in Minute for one complete cycle (2 damper changes) in FC mode |
| IV 31 | Integer Value | 90 | 2 | InputRegister | Num_Alarms | | Read Only | Number of active alarms |
| IV 32 | Integer Value | 92 | 2 | InputRegister | Num_Warnings | | Read Only | Number of active warnings |

All heaters installed on the floor must have a minimum clearance of 3" (76mm) which is provided by the heaters base frame.

DIGITAL CONTROLLER

General Operating Instructions

| BACnet | | Modbus | | | Variable | Inactive Text | Active Text | Read/Write | Description |
|----------|--------------|----------|------|---------------|-------------------------------|---------------|-------------|-------------|--|
| Instance | Type | Instance | Size | Type | | | | | |
| BV 1 | Binary Value | 0 | 1 | Coil | Unit_Run | OFF | ON | Commandable | Unit Run Command |
| BV 2 | Binary Value | 1 | 1 | Coil | AlrmResByBMS | - | Reset | Commandable | Toggle Point to Reset Active Alarms |
| BV 10 | Binary Value | 9 | 1 | DiscreteInput | Unit_InAlarm | OK | InAlarm | Read Only | When true, unit has alarm but may still be operational |
| BV 11 | Binary Value | 10 | 1 | DiscreteInput | Unit_SeriousAlarm | OK | InAlarm | Read Only | When true, unit has shutdown due to a serious alarm |
| BV 12 | Binary Value | 11 | 1 | DiscreteInput | Dirty_FreshAir_Filter_Alm | Clean | Dirty | Read Only | Pressure drop on Fresh Air filter high |
| BV 13 | Binary Value | 12 | 1 | DiscreteInput | Dirty_FreshAir_Prefilter_Alm | Clean | Dirty | Read Only | Pressure drop on Fresh Air prefilter high |
| BV 14 | Binary Value | 13 | 1 | DiscreteInput | Dirty_ReturnAir_Filter_Alm | Clean | Dirty | Read Only | Pressure drop on Return Air filter high |
| BV 15 | Binary Value | 14 | 1 | DiscreteInput | Dirty_ReturnAir_Prefilter_Alm | Clean | Dirty | Read Only | Pressure drop on Return Air prefilter high |
| BV 21 | Binary Value | 20 | 1 | DiscreteInput | Cooling_CircA_Fault | OK | FAULT | Read Only | Cooling Circuit A has a fault |
| BV 22 | Binary Value | 21 | 1 | DiscreteInput | Cooling_CircB_Fault | OK | FAULT | Read Only | Cooling Circuit B has a fault |
| BV 23 | Binary Value | 22 | 1 | DiscreteInput | Cooling_CircC_Fault | OK | FAULT | Read Only | Cooling Circuit C has a fault |
| BV 24 | Binary Value | 23 | 1 | DiscreteInput | Cooling_CircD_Fault | OK | FAULT | Read Only | Cooling Circuit D has a fault |
| BV 30 | Binary Value | 30 | 1 | DiscreteInput | Compressor_A1_Running | OFF | ON | Read Only | Compressor 1 of circuit A is running |
| BV 31 | Binary Value | 31 | 1 | DiscreteInput | Compressor_A2_Running | OFF | ON | Read Only | Compressor 2 of circuit A is running |
| BV 32 | Binary Value | 32 | 1 | DiscreteInput | Compressor_B1_Running | OFF | ON | Read Only | Compressor 1 of circuit B is running |
| BV 33 | Binary Value | 33 | 1 | DiscreteInput | Compressor_B1_Running | OFF | ON | Read Only | Compressor 2 of circuit B is running |
| BV 34 | Binary Value | 34 | 1 | DiscreteInput | Compressor_C1_Running | OFF | ON | Read Only | Compressor 1 of circuit C is running |
| BV 35 | Binary Value | 35 | 1 | DiscreteInput | Compressor_C2_Running | OFF | ON | Read Only | Compressor 2 of circuit C is running |
| BV 36 | Binary Value | 36 | 1 | DiscreteInput | Compressor_D1_Running | OFF | ON | Read Only | Compressor 1 of circuit D is running |
| BV 37 | Binary Value | 37 | 1 | DiscreteInput | Compressor_D2_Running | OFF | ON | Read Only | Compressor 2 of circuit D is running |
| BV 50 | Binary Value | 50 | 1 | DiscreteInput | Heat1_Running | OFF | ON | Read Only | Stage 1 Heat Running |
| BV 51 | Binary Value | 51 | 1 | DiscreteInput | Heat2_Running | OFF | ON | Read Only | Stage 2 Heat Running |
| BV 52 | Binary Value | 52 | 1 | DiscreteInput | Heat3_Running | OFF | ON | Read Only | Stage 3 Heat Running |

DIGITAL CONTROLLER

General Operating Instruction

| BACnet | | Modbus | | | Variable | Inactive Text | Active Text | Read/Write | Description |
|----------|--------------|----------|------|---------------|---------------|---------------|-------------|------------|--|
| Instance | Type | Instance | Size | Type | | | | | |
| BV 53 | Binary Value | 53 | 1 | DiscreteInput | Heat4_Running | OFF | ON | Read Only | Stage 4 Heat Running |
| BV 54 | Binary Value | 54 | 1 | DiscreteInput | SupplyFanCSR | OFF | ON | Read Only | Status of Supply Fan Current Sense Relay |
| BV 55 | Binary Value | 55 | 1 | DiscreteInput | ReturnFanCSR | OFF | ON | Read Only | Status of Return Fan Current Sense Relay |

DIGITAL CONTROLLER

General Operating Instructions

| BACnet | | Modbus | | | Variable | Read/Write | Description |
|----------|------------------|----------|------|-----------------|--|----------------------------------|---|
| Instance | Type | Instance | Size | Type | | | |
| MSV 1 | Multistate Value | 1000 | 1 | HoldingRegister | Unit_Mode_Override Unit_Mode_Override_Default | Commandable RelinquishDefault | Set to force unit into the following modes: 1=Auto (Normal) 2=ForceDehum 3=ForceEcono 4=ForceHeating 5=ForceCooling 6..9=Reserved 10=ForceOff |
| MSV 2 | Multistate Value | 1000 | 1 | InputRegister | Unit_Status | Read Only | Unit Status: 1=Unit On 2=Off due to alarm 3=Off due to BMS 4=Off due to Schedule 5=Off due to System Switch 6=Off due to Keypad Enable 7=Off due to Interlock 8=Manual Mode 9=Unit in Startup Sequence |
| MSV 3 | Multistate Value | 1001 | 1 | InputRegister | Unit_SystemStatus | Read Only | Unit mode enumeration: 1=Unit Off 2=Dehum 3=Econo 4=Heating 5=Cooling 6=Burner Warmup 7=Burner Cooldown 8=Damper Opening 9=Smoke Purge Sequence |
| MSV 11 | Multistate Value | 1010 | 1 | HoldingRegister | PRC_ DamperMode_Override_BMS | Commandable | Set to force unit into the following modes: 1=Auto (Normal) 2=ForceEnergyRecovery 3=ForceFreeCooling 4=ForceRecirculation 5+=ForceOff Dampers Only (Fans ON, TEST ONLY) |
| MSV 13 | Multistate Value | 1010 | 1 | InputRegister | PRC_ DamperMode_Status | Read Only | RegenCore Damper Status: 1=Off 2=EnergyRecovery 3=FreeCooling 4=Recirculation 5=SmokePurge |



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