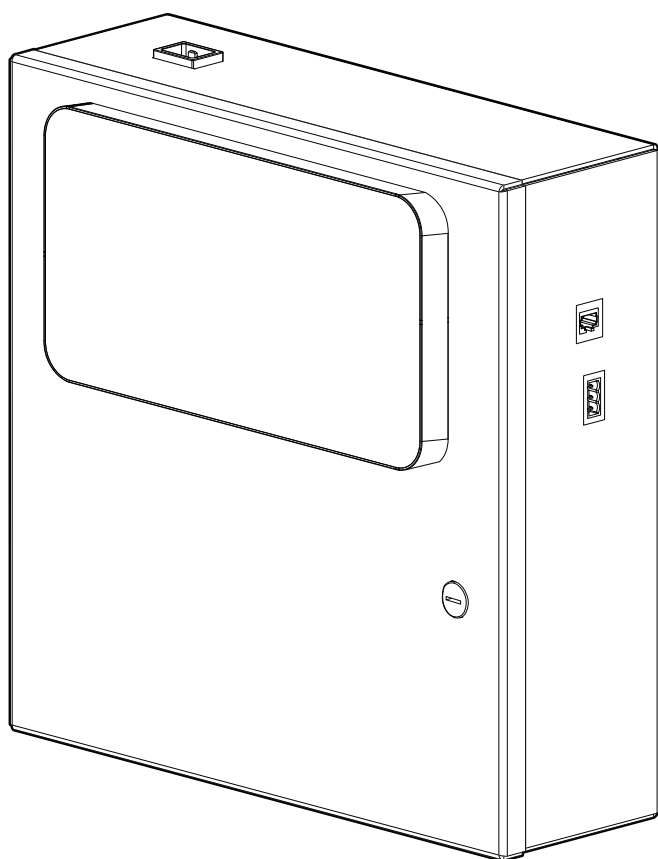


Ecoflair™ Indirect Air Economizer

Automation Server

User Manual

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06MM0382@00B0100
Release Date: 02/2019



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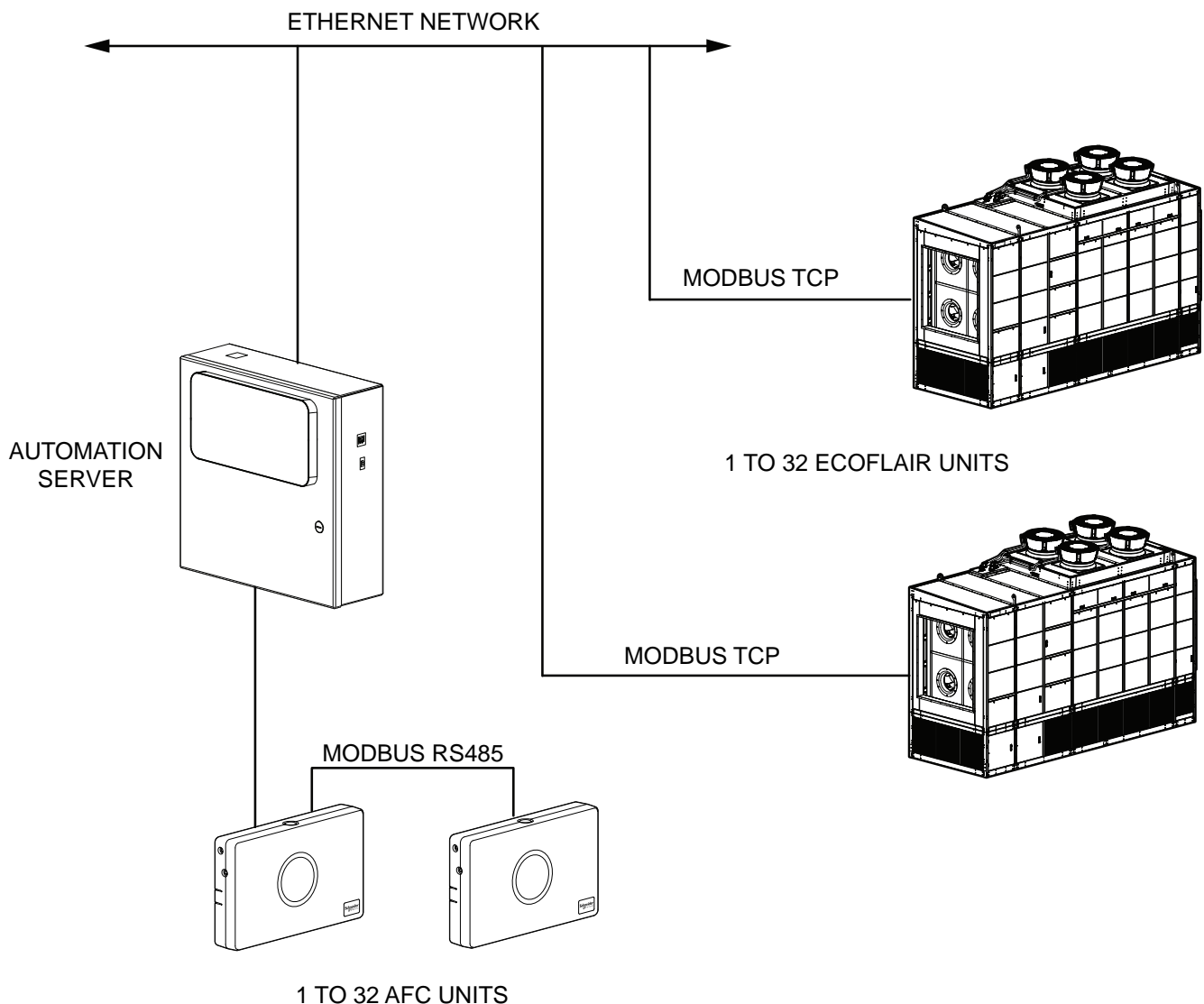
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Overview

The solution architecture is based on the use of the Automation Server as a multipurpose controller to provide the following functionality:

- Data aggregator to read data (temperature, setpoints, configuration data) from one or more Ecoflair™ Indirect Air Economizer.
- Data aggregator to read pressure readings from one or more Active Flow Controller (AFC) units.
- Web server to provide a user interface to a touch panel display connected directly to the Automation Server.
- Configuration monitor to validate various settings in each Ecoflair unit or AFC unit to determine that all systems stay synchronized.
- PID controller using data read from both the AFC units and the Ecoflair units.



Interfaces

There are two types of communication interfaces configured in the system that allow the Automation Server to communicate with the Ecoflair units (Modbus TCP) and the Air Flow Controller units (Modbus RS485).

Modbus TCP

Ecoflair Indirect Air Economizer units are connected to the Automation Server with an Ethernet TCP network connection. The Automation Server can communicate with up to 32 Ecoflair units.

NOTE: The system integrator must use the Automation Server to configure the site-specific IP addresss for each Ecoflair unit connected to the Automation Server.

Registers

The following registers are being read from or written to the Ecoflair unit via Modbus TCP. Each of these registers is predefined in the database for each Ecoflair unit.

Alarms	Registers 403002 to 403004
Data	Registers 401001 to 401026
Info	Registers 400021 to 400022

Modbus RS485

Active Flow Controller (AFC) units are connected to the Automation Server with a twisted pair RS485 communication connection. The Automation Server can communicate with up to 32 AFC units. The Automation Server is configured as the Modbus Master, RTU mode, 19.2 kbaud, no parity.

NOTE: The system integrator must use the Automation Server to configure the Modbus address for each AFC unit connected to the Automation Server.

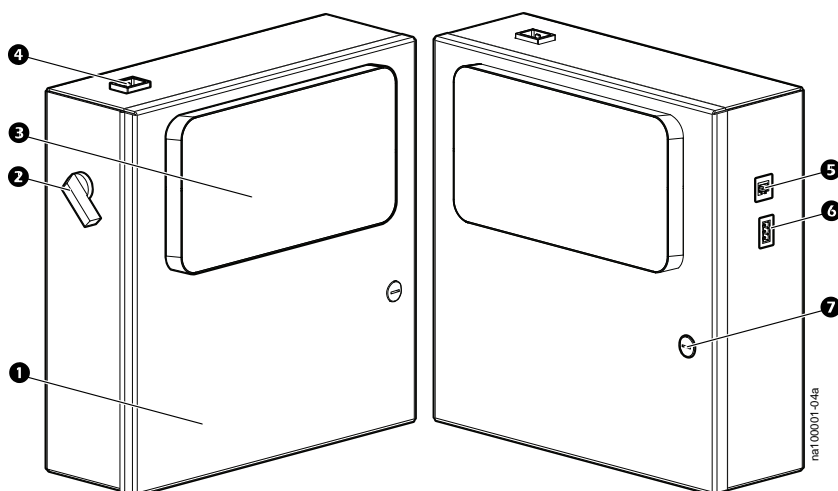
Registers

The following registers are being read from or written to the AFC unit via Modbus RS485. Each of these registers is predefined in the database for each AFC unit.

Name	Value	Register Number	Register Type	Type	Read Function Code	Write Function Code
Pressure_01	0.00 inH ₂ O	1	16-bit signed	Modbus Analog Input Point	03	None
Health_01	0.00	3	16-bit unsigned	Modbus Analog Input Point	03	None
Altitude_01	0.00 ft	5	16-bit unsigned	Modbus Analog Output Point	03	06

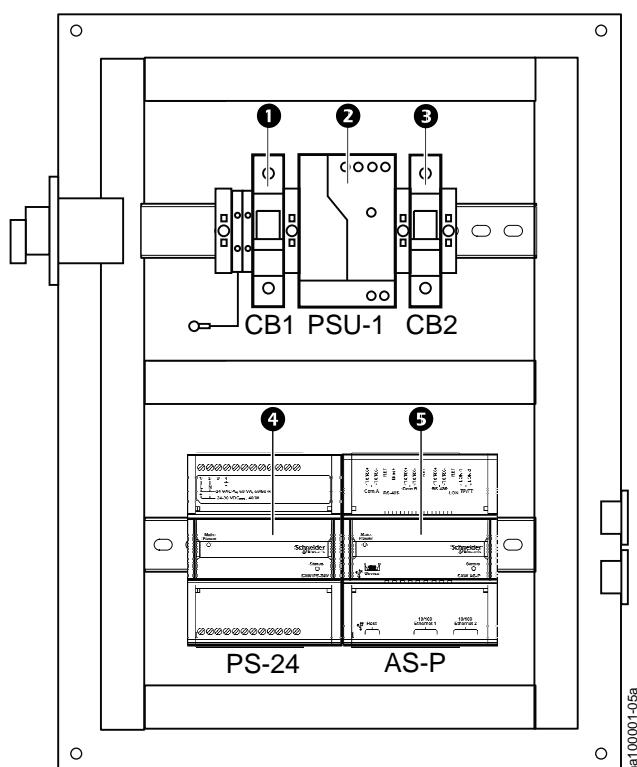
Component Identification

External Components



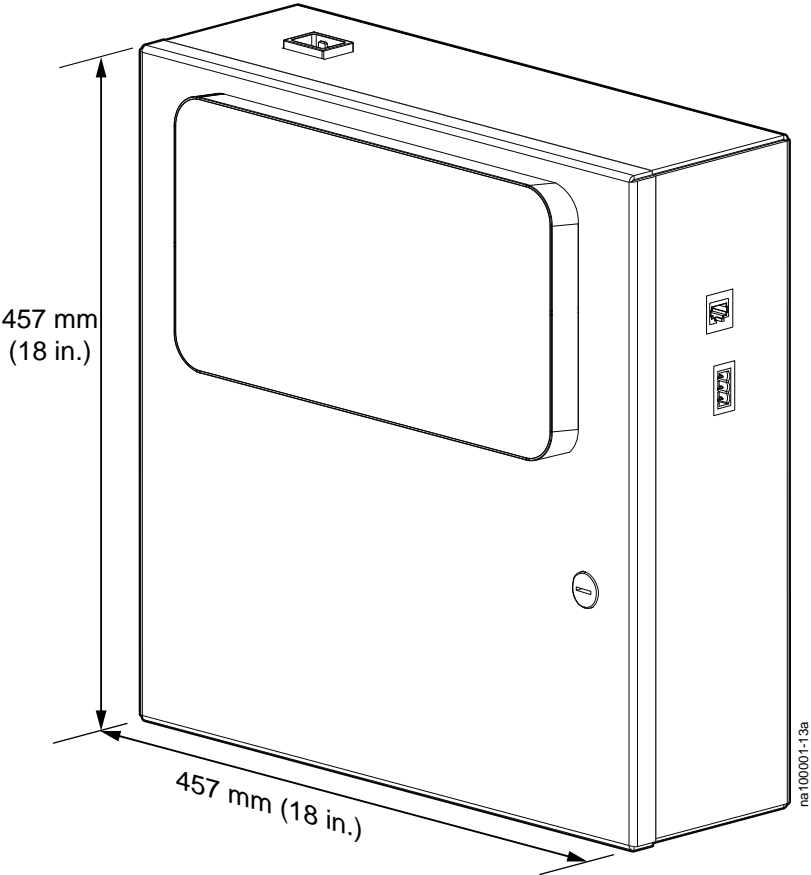
Item	Description
1	Hinged door
2	Voltage selection switch
3	Display interface
4	Power supply connection
5	Network port
6	AFC connection port
7	Hinged door lock

Internal Components



Item	Description
1	250-V fuse (CB1)
2	Power supply unit (PSU-1)
3	250-V fuse (CB2)
4	24-V power supply (PS-24)
5	SmartX controller (AS-P)

Dimensions



Installation

Installing the Automation Server

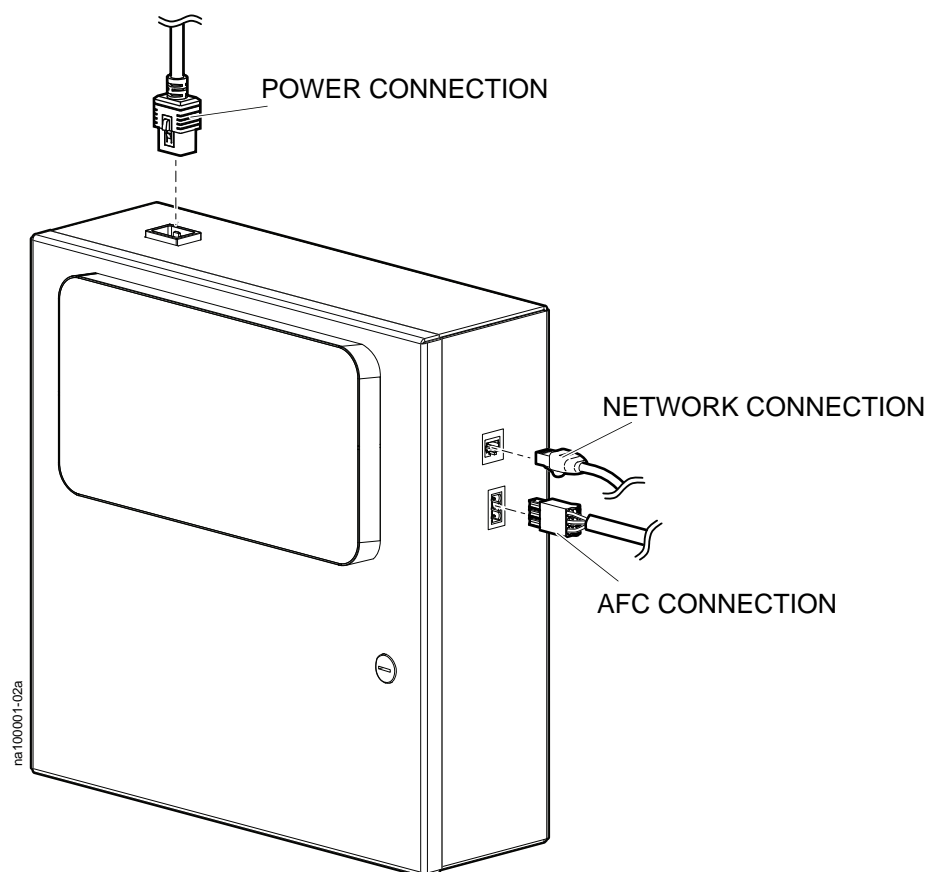
1. Open the hinged door of the automation server.
2. Mount the automation server to the desired location with field-supplied hardware through the four mounting holes on the rear of the box.
3. Close the hinged door.

Connections

Make the power connection, network connection, and AFC connection (if applicable).

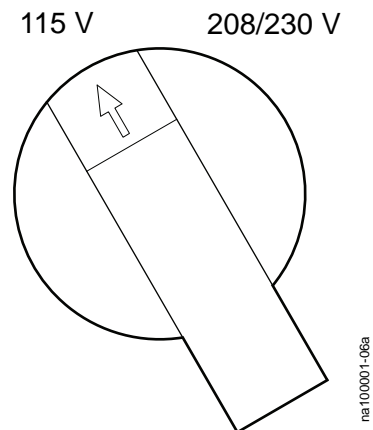


See the *Active Flow Controller (AFC) Installation Manual* for installation procedures for the AFC units. Use the “Non-InRow system installation” section for AFC connectivity.



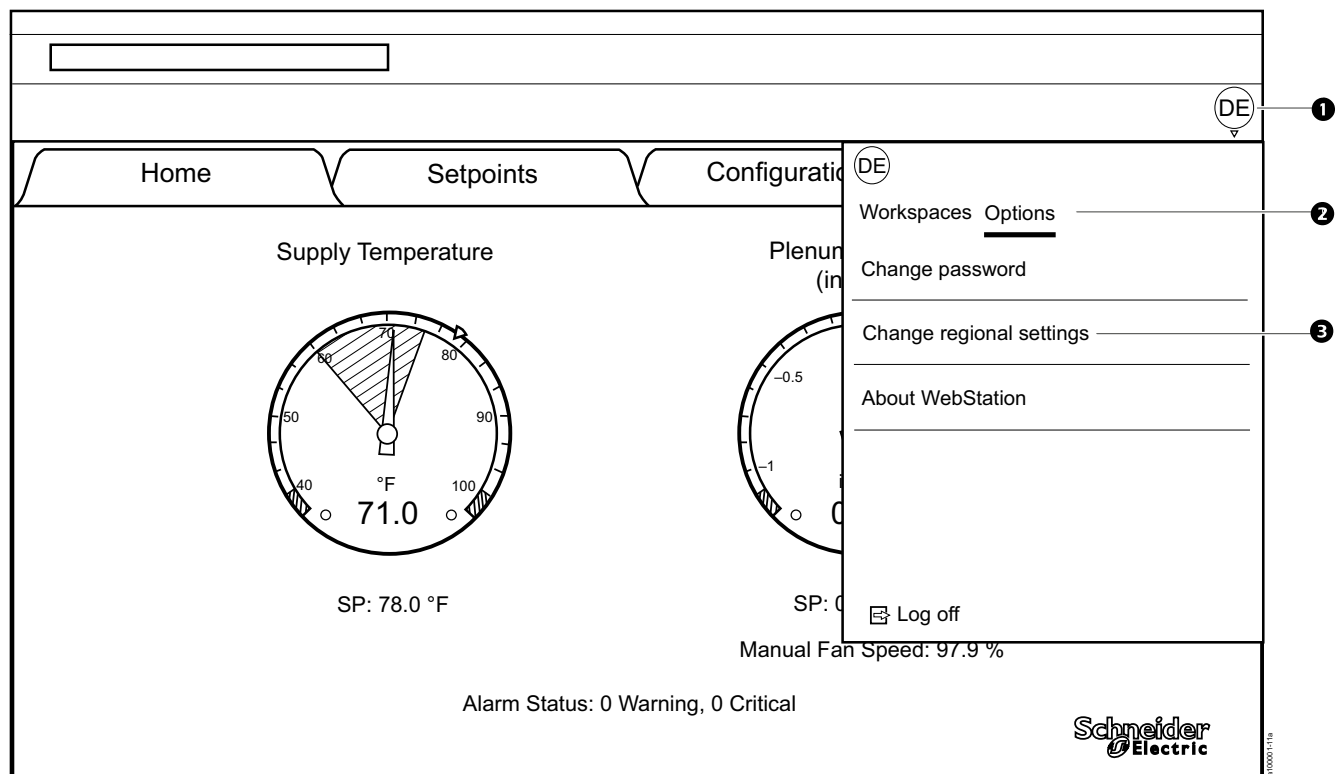
Voltage Selection

Use the voltage selection switch on the side of the unit to select the required voltage.



Operation

Display Settings



The display appears in a browser window. The upper-right corner of the window displays an icon noting the user type that is logged in (1).

1. Select the icon to open a settings menu.
2. Select **Options** (2).
3. Select **Change regional settings** (3).

The **Regional settings** window opens.

4. Select display settings for the logged-in user.
 - **Language:** Select the language for the display interface from the menu.
 - **Date, time, and number format:** Select the formatting of the date, time, and numbers based on language.
 - **Measurement system:** Select the units in which to display values.
 - **International System of Units (metric)**
 - **United States Customary Units**
5. Select **OK** to confirm settings.

Changing Economizer Settings

Settings under the **Setpoints** and **Configuration** tabs can be edited if the user has the appropriate permissions.

1. Press the setting to be changed.
A numeric keypad will display.
2. Enter the required value for the setting.
3. Press **Apply** to confirm settings.

Air Pressure Setpoint

Range : [-250.0 – 250.0] Pa

1 2 3 ±

4 5 6

7 8 9 C

0 . Delete

Apply Cancel

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User Profiles

There are three user profiles available to access the Automation Server.

- Read-only user
- Device user
- Admin

Default credentials for each user are defined in the following table:

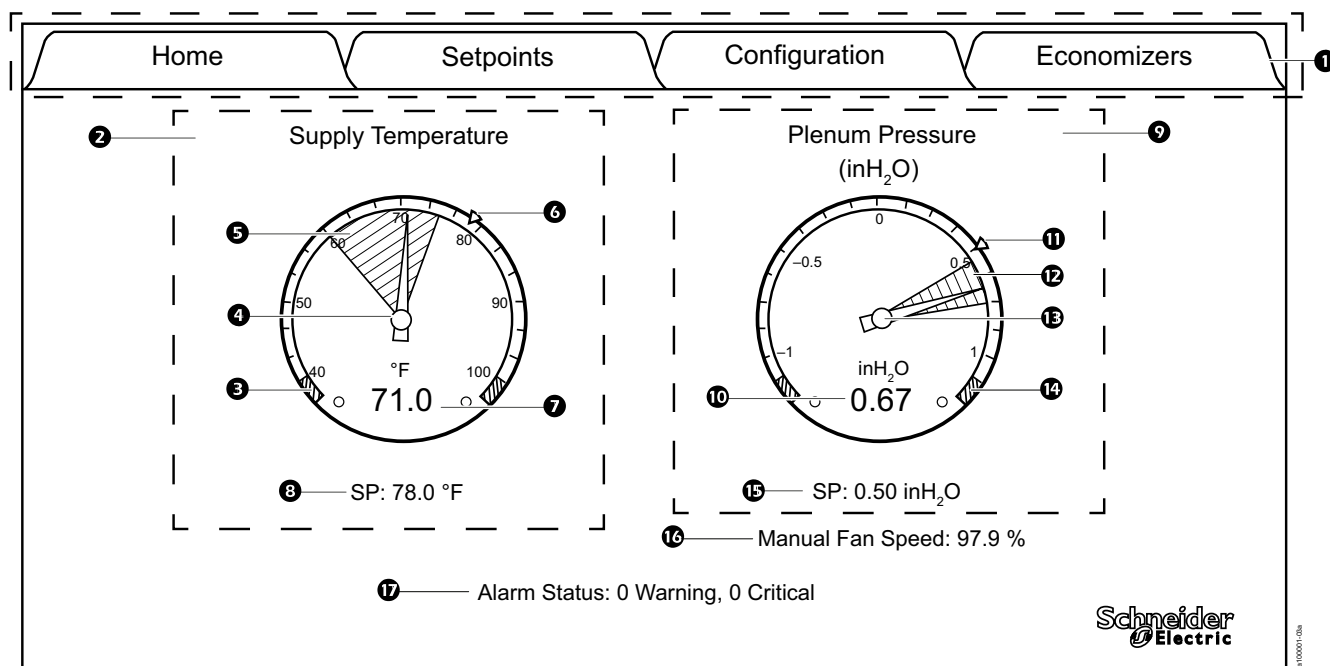
User Profile	Login Name	Password
Device User	DeviceUser	air3conomizer!
Read-Only User	ReadOnly	air3conomizer!
Admin	Admin	air4conomizer!

Each user can have different access rights on every tab. Default access rights for each user are defined in the following table:

Tab	Device User	Read-Only User	Admin
Home	R	R	R
Setpoints	R/W	R	R/W
Configuration	R	R	R/W
Economizers	R	R	R/W

NOTE: Only qualified personnel should log in as an admin account.

Home Tab



Item	Description
1	Screen selection tabs
2	The supply temperature gauge provides setpoint and supply air temperature information from the Ecoflair units. Selecting the supply temperature gauge will open a 24-hour trend chart for the supply temperature. The units displayed will vary between °C and °F depending on the configuration for the user.
3	Red areas on the graph indicate areas that are within an unacceptable operating range.
4	The red needle on the gauge indicates the average supply air temperature value from all Ecoflair units.
5	The blue shaded area on the gauge indicates the range of values for supply air temperature readings from all Ecoflair units from the lowest to the highest.
6	The yellow triangle indicates the target supply air temperature setpoint.
7	The temperature value is the average supply air temperature value also indicated by the red needle.
8	The numerical value of the target supply air temperature setpoint also indicated by the yellow triangle.
9	The plenum pressure gauge provides setpoint and pressure information from the AFC units. The units displayed will vary between Pa and inH ₂ O (in. WC) depending on the configuration for the user. NOTE: This gauge will only appear when Active Flow Controller units are connected to the Automation Server.
10	The pressure value is the average pressure temperature value also indicated by the red needle.
11	The yellow triangle indicates the target pressure setpoint.
12	The blue shaded area on the gauge indicates the range of values for pressure readings from all AFC units from the lowest to the highest.
13	The red needle on the gauge indicates the average pressure value from all AFC units.
14	Red areas on the graph indicate areas that are within an unacceptable operating range.
15	The numerical value of the target pressure setpoint also indicated by the yellow triangle.
16	Displays the manual or automatic fan speed percentage of the IT fans of the Ecoflair units.
17	The alarm status provides a sum of alarms from all Ecoflair units for both warning alarms and critical alarms.

Trends Chart

When the **Supply Temperature** gauge is pressed, a trend chart displays to show trend logs for minimum values, maximum values, average temperatures, and setpoints. Each log takes a reading at five minute intervals for a period of one day, which provides about 300 log entries in a 24-hour period.

Setpoints Tab

NOTICE

DAMAGE TO EQUIPMENT

This procedure is to be performed by Schneider Electric qualified personnel only. Improperly set PID controls could result in equipment damage.

Failure to follow these instructions can result in equipment damage.

The **Setpoints** tab lets users set temperature and pressure setpoints. When setpoints are changed on the display interface, data values are stored in the Automation Server and are distributed to all Ecoflair units.

NOTE: Only users with “Write” permissions for the **Setpoints** tab will be able to change settings.

NOTE: Only qualified personnel should modify these settings.

HomeSetpointsConfigurationEconomizers

Supply Air Setpoint [40.0 –100.0]

78.0°F

Air Pressure Setpoint [–1.0 – 1.0]

0.50inH₂O

Automatic Fan Speed [15.0 – 100.0]

74.8%

IT Fan Speed Control

☒ Automatic

☐ Manual

Air Pressure Measurement

☒ Average

☐ Minimum

☐ Maximum

Proportional (P)

0.007000

Integral (I)

0.008000

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- **Supply Air Setpoint:** The required temperature of the air entering the IT space from the Ecoflair Indirect Air Economizer. (°C (°F))
- **Air Pressure Setpoint:** Enter the group setpoint for the pressure to be maintained. (Pa (in. WC))
- Fan Speed
 - **Automatic Fan Speed:** When **IT Fan Speed Control** is set to **Automatic**, the IT fan speed percentage of the Ecoflair units is displayed.
 - **Manual Fan Speed:** When **IT Fan Speed Control** is set to **Manual**, the IT fans of the Ecoflair units run at this entered speed.
- **IT Fan Speed Control**
 - **Automatic:** When **Automatic** is selected, the speed of the IT fans is controlled by the PID loop.

- **Manual:** When **Manual** is selected, the speed of the IT fans is manually controlled by the user.
- **Air Pressure Management:** Select how the air pressure is controlled.
 - **Average:** Select **Average** to control the average pressure to the setpoint.
 - **Minimum:** Select **Minimum** to control the minimum pressure to the setpoint.
 - **Maximum:** Select **Maximum** to control the maximum pressure to the setpoint.
- PID Variables

NOTE: These values can only be edited when **IT Fan Speed Control** is set to **Automatic**.


 - **Proportional (P):** The proportional multiplier (gain) for the IT fans. The proportional multiplier adjusts for the difference (error) between the measured value and the setpoint.
 - **Integral (I):** The integral multiplier (reset rate) for the IT fans. The integral multiplier adjusts for error measurement and the amount of time that the error has existed. The integral multiplier adds to or subtracts from the output in small increments to correct for the offset error caused by the proportional contribution.

Configurations Tab

The **Configurations** tab lets users set thresholds for alarms and the altitude.

NOTE: Only users with “Write” permissions for the **Configurations** tab will be able to change settings.

NOTE: Only qualified personnel should modify these settings.

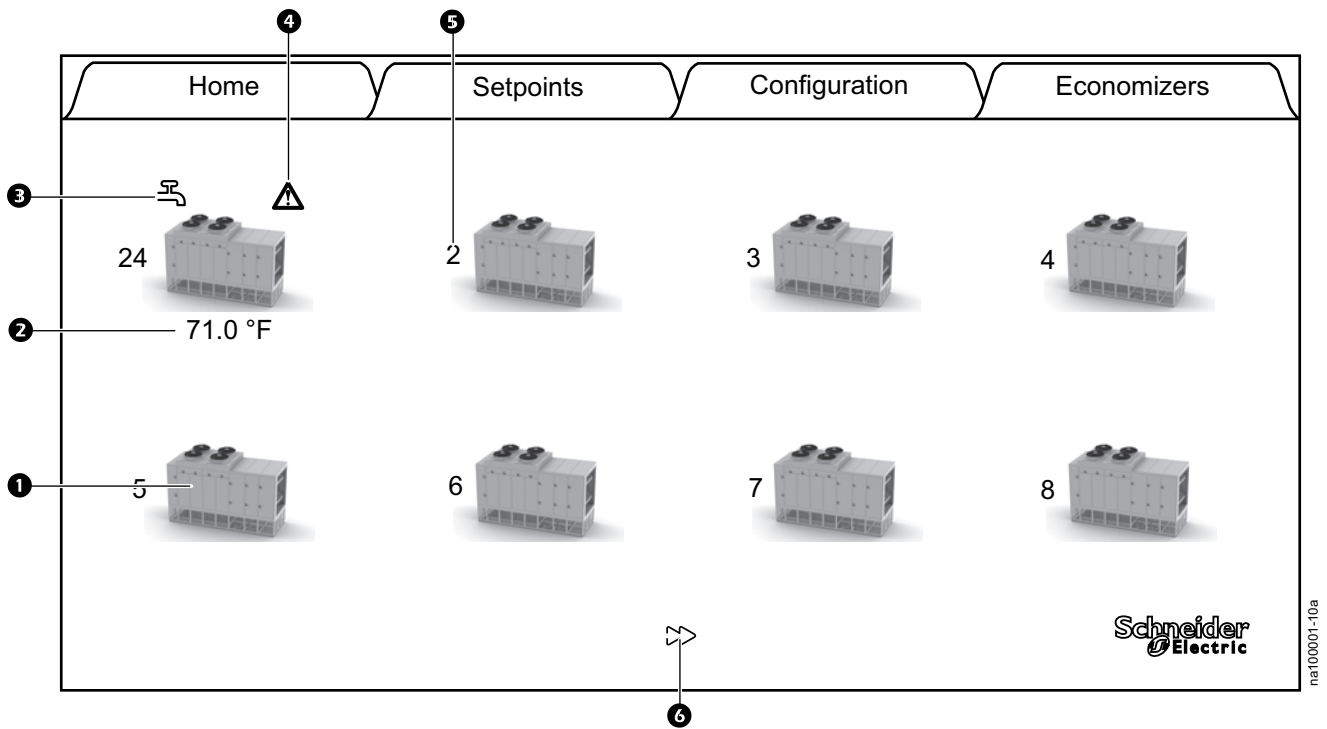
Home	Setpoints	Configuration	Economizers
Wet Operate Temp Setpoint [45.0 – 100.0] <div style="border: 1px solid black; padding: 2px; display: flex; align-items: center;"> <input style="width: 80%;" type="text" value="45.0"/> °F </div>		Supply Air Low Threshold [35.0 – 45.0] <div style="border: 1px solid black; padding: 2px; display: flex; align-items: center;"> <input style="width: 80%;" type="text" value="40.0"/> °F </div>	
Altitude [0.0 – 10000.0] <div style="border: 1px solid black; padding: 2px; display: flex; align-items: center;"> <input style="width: 80%;" type="text" value="7842.0"/> ft </div>		Supply Air High Threshold [95.0 – 105.0] <div style="border: 1px solid black; padding: 2px; display: flex; align-items: center;"> <input style="width: 80%;" type="text" value="95.0"/> °F </div>	
Water Conductivity Threshold [500.0 – 2500.0] <div style="border: 1px solid black; padding: 2px; display: flex; align-items: center;"> <input style="width: 80%;" type="text" value="600.0"/> µS/cm </div>			
			

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- **Wet Operate Temp Setpoint:** If the ambient air temperature is below this value, the unit will not enter wet operation mode. (°C (°F))
- **Altitude:** The distance of the unit above sea level. The altitude is also used in conversions between absolute (g/Kg) and relative (%RH) humidity.
- **Water Conductivity Threshold:** The conductivity level at which water will start to be partially drained from the basin to reduce conductivity of the water. (µS/cm)
- **Supply Air Low Threshold:** Displays the high temperature threshold for air entering the unit at which an alarm will occur. (°C (°F))

- **Supply Air High Threshold:** Displays the low temperature threshold for air entering the unit at which an alarm will occur. (°C (°F))

Economizers Tab



Item	Description																								
❶	<p>The Ecoflair Indirect Air Economizer icon represents the installed unit. A 250-kW or 500-kW unit will be shown depending on the unit type. The numbers and symbols around the icon indicate the operating mode of the unit, the Modbus address of the unit, and if any alarms are present. Select the icon to open the Web user interface for that Ecoflair unit.</p> <p>See the <i>Ecoflair Indirect Air Economizer Online Guide</i> for information on the Web user interface.</p>																								
❷, ❸	<p>This text (❷) in conjunction with the icon (❸) indicates the operating mode of the Ecoflair unit. Temperatures displayed are the supply air temperature reading from that unit.</p> <table><tr><th>Operating Mode</th><th>Displayed Text (❷)</th><th>Displayed Icon (❸)</th></tr><tr><td>Off</td><td>Off</td><td>None</td></tr><tr><td>Remote Off</td><td>Remote Off</td><td>None</td></tr><tr><td>Maintenance Mode</td><td>Maintenance</td><td>Maintenance icon</td></tr><tr><td>Dry Cooling</td><td>XX.X°C (XX.X°F)</td><td>None</td></tr><tr><td>Wet Cooling</td><td>XX.X°C (XX.X°F)</td><td>Wet cooling icon</td></tr><tr><td>Dry Cooling with Trim Cooling</td><td>XX.X°C (XX.X°F)</td><td>Trim cooling icon</td></tr><tr><td>Wet Cooling with Trim Cooling</td><td>XX.X°C (XX.X°F)</td><td>Wet and trim cooling icons</td></tr></table>	Operating Mode	Displayed Text (❷)	Displayed Icon (❸)	Off	Off	None	Remote Off	Remote Off	None	Maintenance Mode	Maintenance	Maintenance icon	Dry Cooling	XX.X°C (XX.X°F)	None	Wet Cooling	XX.X°C (XX.X°F)	Wet cooling icon	Dry Cooling with Trim Cooling	XX.X°C (XX.X°F)	Trim cooling icon	Wet Cooling with Trim Cooling	XX.X°C (XX.X°F)	Wet and trim cooling icons
Operating Mode	Displayed Text (❷)	Displayed Icon (❸)																							
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Dry Cooling with Trim Cooling	XX.X°C (XX.X°F)	Trim cooling icon																							
Wet Cooling with Trim Cooling	XX.X°C (XX.X°F)	Wet and trim cooling icons																							
❹	Icons will display here to indicate if the unit has any warning alarms (yellow) or critical alarms (red).																								

Item	Description
5	This number is the Modbus unit number configured for the unit.
6	Eight Ecoflair units can be displayed on one screen at a time. If more than eight units are on the network, page navigation arrows will be displayed here.

Troubleshooting

If necessary, call Technical Support describing the nature of the fault and its possible cause displayed on the control panel.

Communication Issues

Problem	Possible Cause	Possible Solution
An AFC unit will not come online	The wrong Modbus address has been configured in the AFC.	Contact Schneider Electric.
	The wrong Modbus address has been configured in SmartStruxure.	Contact Schneider Electric.
	The UDP port (default 502) is blocked on the network	Verify with IT that port 502 is open for all UPD communication
	The wiring between the AFC and the SmartStruxure Automation Server is incorrect or loose.	Verify the wiring between the AFC and the SmartStruxure Automation Server is correct and not loose.

Problem	Possible Cause	Possible Solution
An Ecoflair unit will not come online	The IP address of the Economizer in SmartStruxure is configured incorrectly.	Contact Schneider Electric.
	The wrong Modbus address has been configured in SmartStruxure.	Contact Schneider Electric.
	The UDP port (default 502) is blocked on the network.	Verify with IT that port 502 is open for all UPD communication

Display Issues

Problem	Possible Cause	Possible Solution
Pressure gauge is not shown on the Home tab	PressureSensorQty variable may be set to 0.	Contact Schneider Electric.
Ecoflair units are not displaying on the Economizers tab	The number of units configured in the EconomizersQty variable is not correct.	Contact Schneider Electric.
The wrong IP address for the Ecoflair unit is configured in the Automation Server	The IP address is not correct.	<ul style="list-style-type: none"> • Verify the correct IP address is set on the device and on the Automation Server. • Verify that communication to the Ecoflair unit is valid. • Connect via a Web browser to Ecoflair unit using same IP address. • If the problem persists, contact Schneider Electric.

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