
ecô
Intelligent Climate Control
User's Manual
2014

Table of Contents

Table of Figures

Overview

The Ecô System is designed to monitor and control all aspects of your buildings mechanical systems. Access to Ecô is through a standard web browser interface.

Ecô can monitor and control all of the buildings mechanical HVAC devices equipment.

Ecô uses a dedicated server which resides in your building. You can access this system from any browser anywhere in the world using a standard internet browser, cell phone or tablet.

Accessing Ecô from a Browser

There are two browser programs in the Ecô system, Configurator and Dashboard. Configurator is used by the installer to create and maintain the Ecô database configuration tables. Dashboard is used by the installer and building occupants to view and monitor the system. You must have an Administrator password to use Configurator.

1. If you are on the Ecô computer, to logon onto Dashboard, start a Windows Browser session and enter the following in the URL eld of the browser : //localhost/ENV

2. From another computer on the same network (LAN) as the Ecô computer you have to know the IP address of the Ecô computer. It could be 192.168.1.124 but this may vary from site to site. Assuming that is the correct IP address (ask your installer): http://192.168.1.124/ENV

3. If you are away from the building on an internet connection you must know the Customer Number of the Ecô installation. This is assigned when you or the programmer registers Ecô. Assuming the Customer Number is XX123, your userid = joe, and your password= sam the following links will get you to the Dashboard on your computer:

http://climateautomationsystems.net/?XX123
http://climateautomationsystems.net/?customer=XX123

If you use one of the userid/password formats and if they are correct, you will bypass the login screen and go directly to the Dashboard. Otherwise you will be directed to the Dashboard login screen.

Note: This method requires that your router be setup so that Port 80 is forwarded to the IP address of the Ecô computer. The method for setting up port forwarding varies by router manufacturer and is beyond the scope of this manual.

Setup a Home Page Link to Ecô on an Apple iPad or iPhone

Here is the procedure to place a link to the Ecô Dashboard on a iPad Home Page.

a. Bring up Safari and locate the "+" key to the left of the URL area. On the iPhone, instead of a "+" key, you'll see an arrow in the middle at the bottom of the screen. Click on it and you will see a pop up menu that will allow you to add a link to your Home Page. You are not quite ready to do this yet.

b. Type the following into the URL area but do not hit the GO key yet:
http://climateautomationsystems.net/?customer=XX123&userid=joe&password=sam
Or
http://mcdonald@dyndns.org/env?userid=joe&password=sam

Note: refer to the previous section, paragraph #3, for the definition of these parameters.

c. The next step has to be performed very quickly or you'll get the wrong result. First Click on the GO key and then very quickly click on the "+" sign to the left of the URL area and then click on the Add to Home Screen button. You will get a new pop up that will let you type a name of the new link. Use DashBoard...but this could be anything you want.

d. You should now have an icon titled DashBoard. Click on it and it should take you straight to your dashboard, not the Login page. If you get to the Login page you did something wrong so try it again. Note that you will see the URL you typed in above when you click on the Home Page link.

How to go directly to the Thermostat or Macro Screen

You can append the following URL parameter to any of the above URL formats and go directly to either the Thermostat or Macro screen bypassing the Dashboard:

1.&goto=macros
2.&goto=thermostat

To use this option, you must enter a valid userid and password.

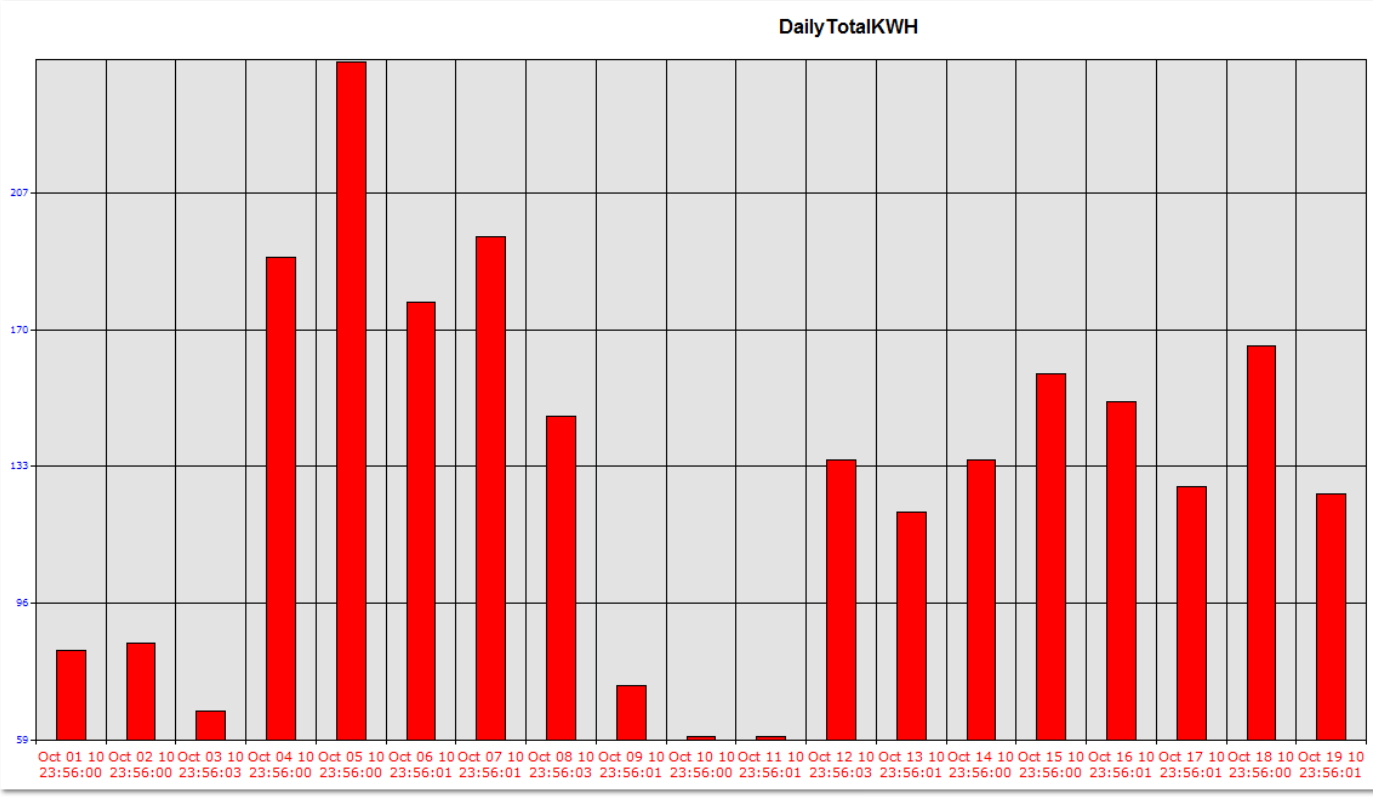
For Thermostats, if you want to jump to a specific Zone, add: &name=ZoneName.

SQL Server Database and Monitoring

A SQL database is used by Ecô to store all of the information used to configure the system and store all of the data being monitored. SQL is an extremely robust architecture which allows Ecô to produce charts, trend lines, graphs, spreadsheets, and real time monitors from any browser anywhere in the world, including smarthones and tablets.

In just a few minutes using a browser interface, a user can setup a monitor. A monitor consists of a group of fields or data points, a sampling interval, and a retention interval. There is no limit to the number monitors that can be described.

Figure 1 - Monitor



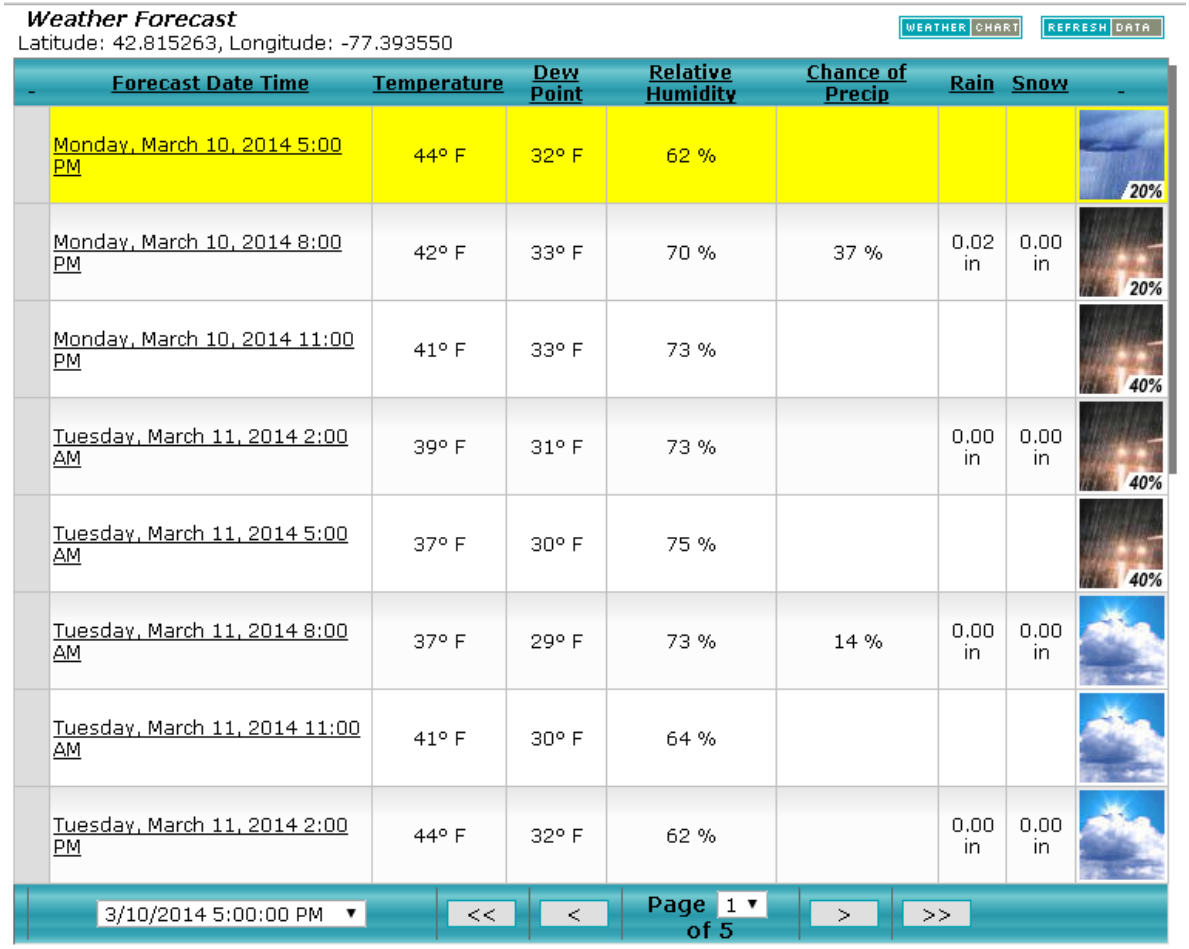
National Weather Service (NOAA)

Ecô accesses the NOAA weather service and stores forecasts in the SQL database. The forecast can be used to adjust the rules of operation based on rapidly changing temperature conditions. If, for example, the outdoor temperature is rising rapidly. In a high mass radiant building this could result in an overshoot condition because the slab temperature will be high causing the space to be higher than the setpoint. Or if the temperature is dropping rapidly, the slab will not be warm enough . In either condition building occupants will be uncomfortable.

Since it takes a long time for some radiant zones to react to a set point change, the forecast can be used to adjust the set point in a zone ahead of time automatically. This is the equivalent of a building occupant changing the set point at a thermostat when they have become too hot or too cold; but then it is too late.

Also, the forecast can be used to predict snow for a snow melt application and in that way, the outdoor slab temperature can be ramped up long before the snow hits the pavement keeping the slab snow free during snowfall.

Figure 2 - Weather Data



Weather Forecast

Latitude: 42.815263, Longitude: -77.393550

WEATHER CHART REFRESH DATA

Forecast Date Time	Temperature	Dew Point	Relative Humidity	Chance of Precip	Rain	Snow	
Monday, March 10, 2014 5:00 PM	44° F	32° F	62 %				20%
Monday, March 10, 2014 8:00 PM	42° F	33° F	70 %	37 %	0.02 in	0.00 in	20%
Monday, March 10, 2014 11:00 PM	41° F	33° F	73 %				40%
Tuesday, March 11, 2014 2:00 AM	39° F	31° F	73 %		0.00 in	0.00 in	40%
Tuesday, March 11, 2014 5:00 AM	37° F	30° F	75 %				40%
Tuesday, March 11, 2014 8:00 AM	37° F	29° F	73 %	14 %	0.00 in	0.00 in	
Tuesday, March 11, 2014 11:00 AM	41° F	30° F	64 %				
Tuesday, March 11, 2014 2:00 PM	44° F	32° F	62 %		0.00 in	0.00 in	

3/10/2014 5:00:00 PM << < Page 1 of 5 > >>

Communicating Thermostats

Ecô can operate your HVAC system by using sensors installed throughout the building or using thermostats.

If you want a physical thermostat, Ecô uses a communicating thermostat so that when you change a set point at the thermostat, Ecô knows it and will adjust its programming. If you change a set point or mode of operation in Ecô using the Ecô Browser program, Ecô will broadcast that change to the thermostat.

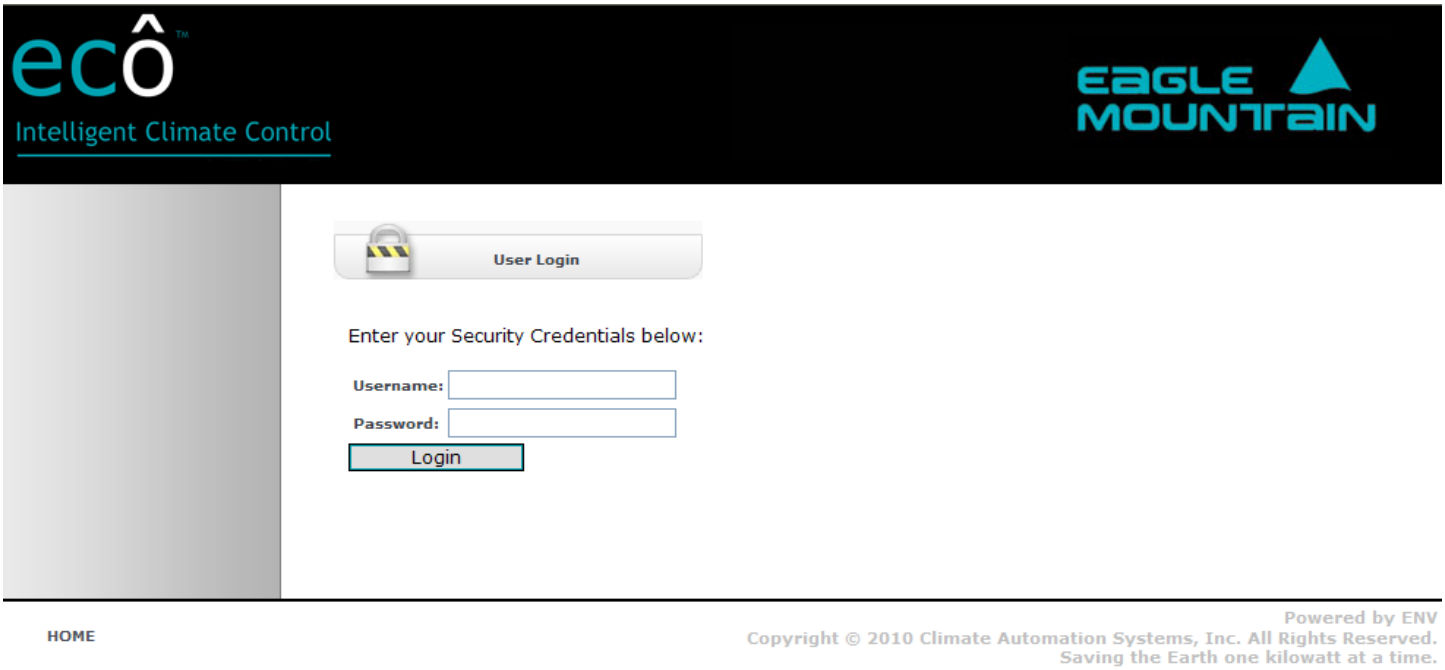
If you prefer a hidden thermostat, the physical thermostat can be placed in a nearby closet and a smaller temperature sensor can be placed on the wall. For radiant floor zones, you don't even need a thermostat. Instead, a hidden sensor can be buried in the sheetrock or in the floor slab. This option requires that changes to the set point and mode of operation be made through the Ecô Browser program.

Figure 3 - Ecôstat

The Login Screen

The programmer will have setup one or more usernames and passwords when they install Ecô on the computer. Some of these are Administrative. Only administrators can logon to Configurator. Enter your assigned User-name and Password and press the Enter key on the keyboard or click on the Login button with the mouse.

Figure 4 - Login Screen



Ecô Browser – Rules for Navigation

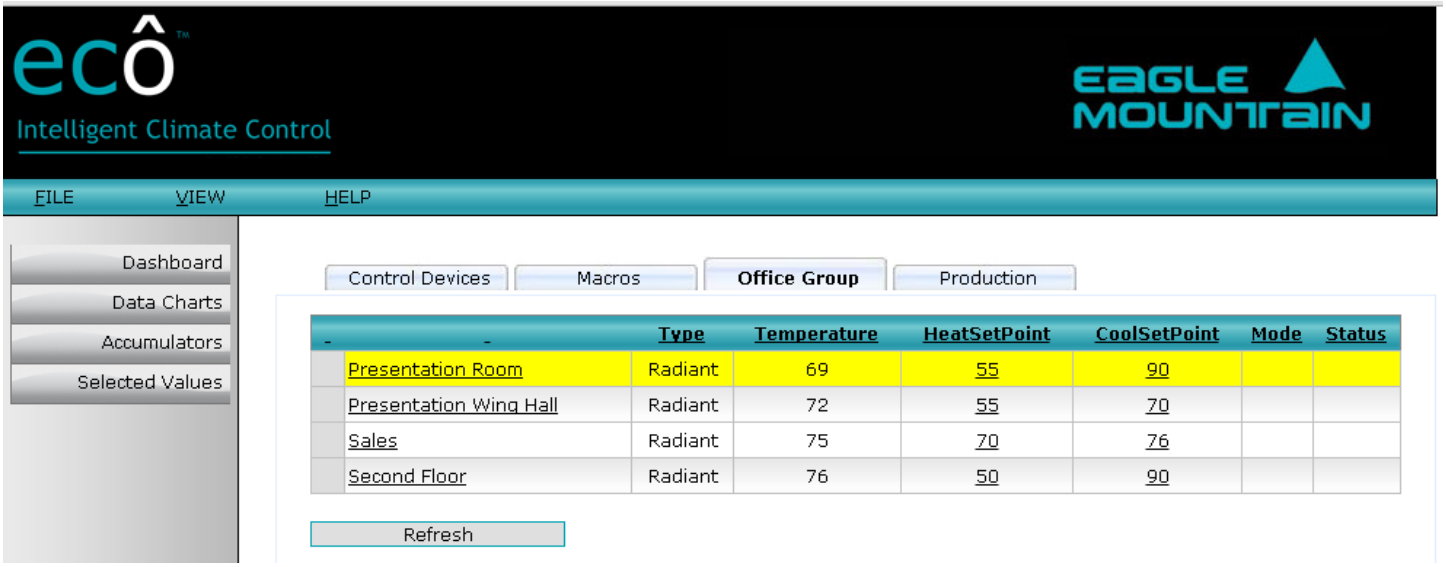
After a successful Login you will see the following screen referred to as the Dashboard. The four grey bars in the left most columns are referred to as Navigation Buttons. They will be referenced throughout this document. There is a menu directly above the Navigation Buttons. Moving your cursor over the menu items will reveal sub menus used for further navigation to other functions.

When you click on a Navigation button you will be directed to a specific table and a set of records in that table. Some tables/grids have more records than can fit on one screen. When this occurs you will see some numbers that appear at the bottom of the grid starting with “12…” etc. Clicking on these numbers is the equivalent of a “scroll bar” or a method to page through the entries in the grid .

The Dashboard

The four navigation buttons on the left are used to view the Dashboard, Data Charts, Accumulators and Selected Values you have chosen to show in this area.

Figure 5 - Dashboard



The Dashboard is shown above in Figure 2. It consists of three or more tabs along the top of the display area:

1. Control Devices
2. Macros
3. Zones or Zone Groups

In Figure 2, the Office Group Zone tab is selected. You can see the names of the individual zones in the table, along with the type of zone, current temperature, heating and cooling setpoints, mode, and status. Temperature setpoints may be changed from this screen by clicking the underlined temp. If you click on the zone name, it will open up the Virtual Thermostat.

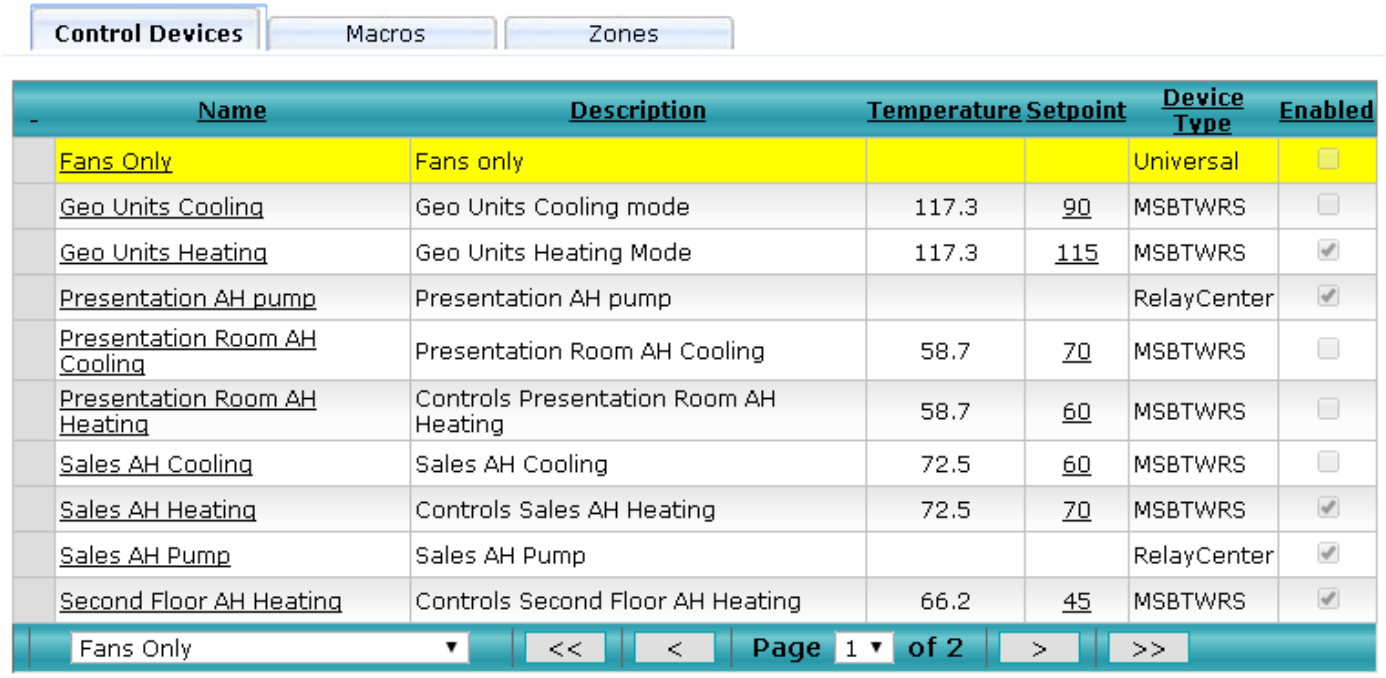
Control Devices

One other grid that can be seen is the Control Device grid. A Control Device is used by Ecô to manage devices such as heat pumps and boilers. These will vary for each system and are added during the system programming. Only administrators can add new Control Devices.

In the grid below, note the Control Device labeled Geo Units Heating. It is used to manage the geothermal units, turning them off and on based on a set point. The current set point is 115. You can change that set point by clicking on the number 115, and a box will pop-up to make the change.

Some set points cannot be changed and are not underlined. These were setup by the installer to control critical functions.

Figure 6 - Control Devices Grid



Macros

A Macro is a set of commands that can make changes to the data base when invoked. For example, a macro might set back, (lower), all of the zones or turn off the hot water heater for the night and then back on in the morning.

There is no limit to the number of macros that can be created by the user. The Macro screen shown below fits nicely on an iPhones browser screen. Traveling and forget to turn off the hot water heater? Just click on the appropriate macro.

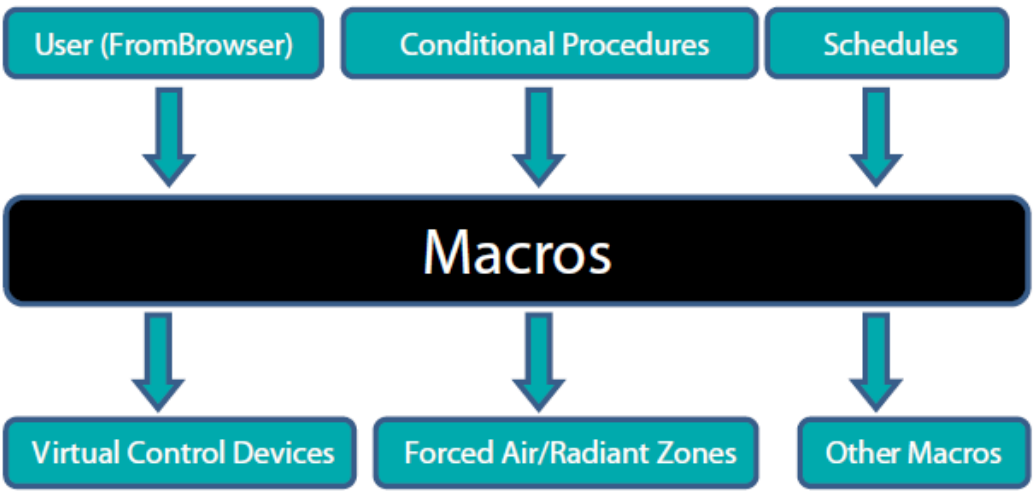
A macro can be invoked by:

- One Click Macros
- Conditional Procedures - if the outdoor temperature < 20 = true then execute the Macro
- Schedule - at 6AM execute the Macro to turn on the hot water heater.

A Macro can act on or modify:

- Control Devices
- Change the temperature in all of the zones or change them from heat to cool mode.
- Another macro after a time delay - turn on the radiant floors and one hour later turn on the forced air

Figure 7 - Macro Concept



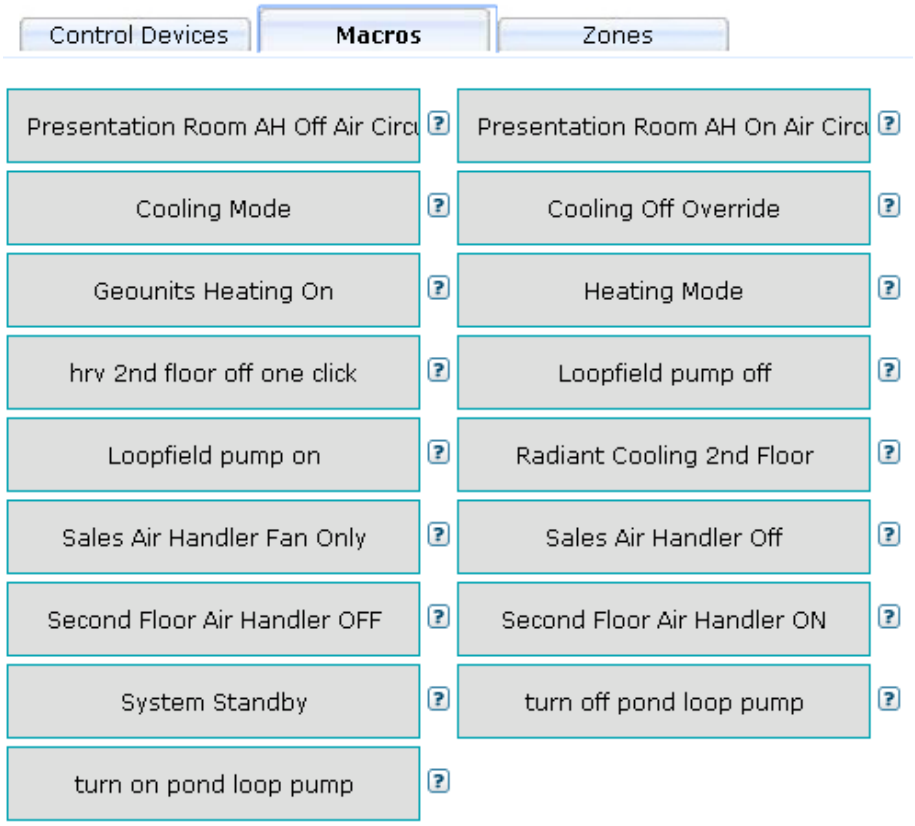
How to Execute a One Click Macro

One Click Macros can be executed directly from one of your browser screens . The values you will see on your screen are a function of the Macros you have set up. These are only examples.

1.View your current Macros via the Dashboard

2. If you have:
   a. Created any Macros as described above, and
   b. The Macro does not contain a Timer, and
   c. You have enabled the Visible flag they will appear like this:

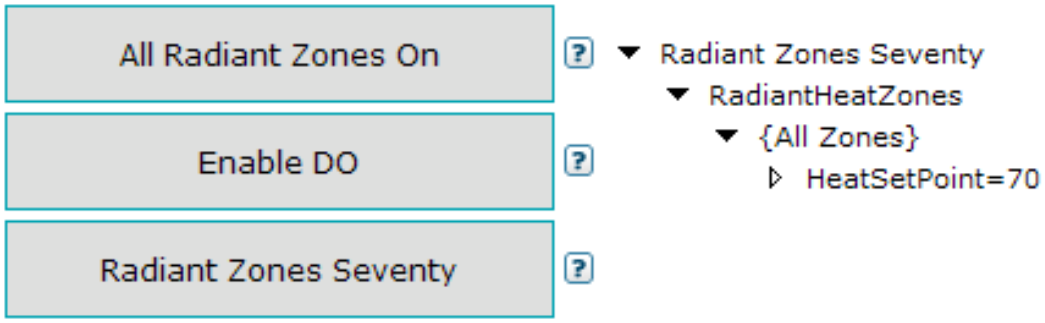
Figure 8 - One Click Macros Screen



3. If you click on the  next to any of the Macro buttons you will see the following. The tree view illustrates what the Macro will do when executed. In this example all of the Forced Air Zones will be set to Cool Mode and all of the Radiant Zones will be disabled .

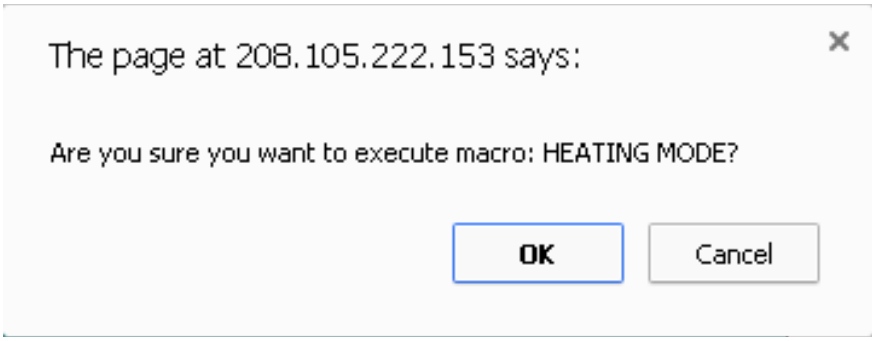
How to Execute a One Click Macro

Figure 9 - Macro



4. Click on the desired Macro. You will see a popup asking you to confirm :

Figure 10 - Macro Popup

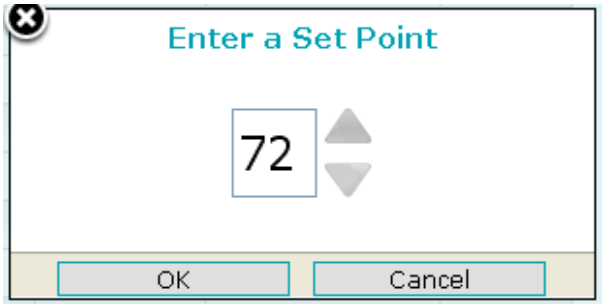


5. If you click on the OK button, the Macro will be executed.

Zones

If you click on an underlined temperature, the set point, you will see a popup that will allow you to change the set point in that zone. Use the up/down arrows and click on the OK button :

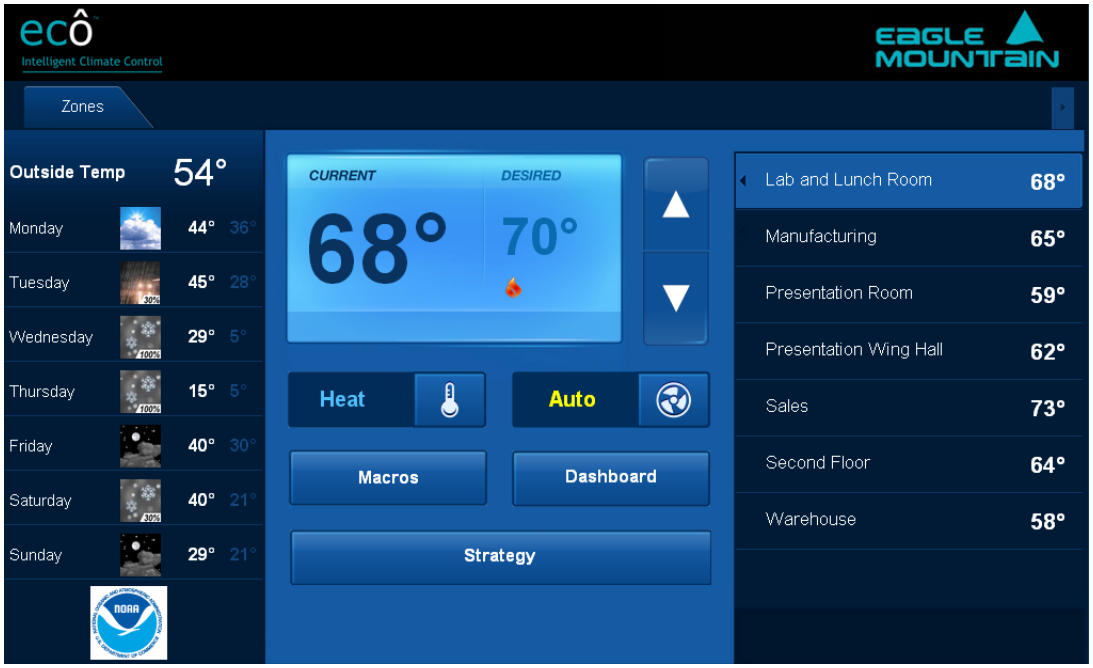
Figure 11 - Setpoint Popup



If you click on a zone name, you will see the Virtual Thermostat in a separate browser window that will allow you to change the mode, change the fan settings, and adjust the set points in that zone. Note the Cool button is red denoting that Cool is the current mode of that zone. There is also a drop down list box in the upper left corner that would allow you to select another zone and make changes there as well without going back to the Dashboard.

Also shown in the thermostat are the outdoor air temperatures , the temperature forecast, and the iconic representation of the current and forecast outside weather conditions. The Forced Air and/or the Radiant zone thermostat popup shown below can also be reached using the ForcedAirZones and Radiant Zones navigation buttons on the left.

Figure 12 - Virtual Thermostat Image



How to Change the Mode of a Zone

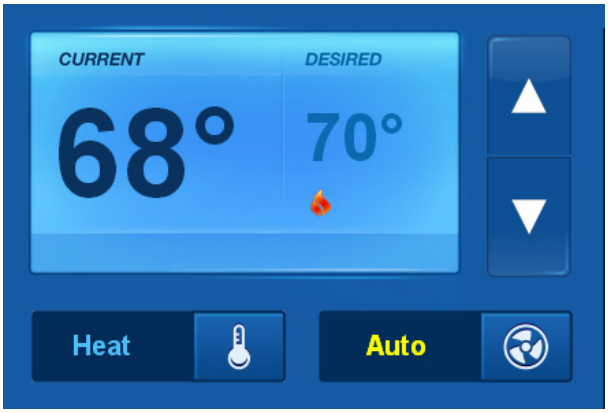
The Mode of a Forced Air zone is either Off, Heat, Cool, Auto, or Fan. The Mode of a Radiant Zone is Off, Heat, or Cool . When you change the Mode via the Virtual Thermostat screen, Ecô will transmit those changes to the thermostat assigned to that Zone, if any. If you use the physical thermostat to change the Mode (or Setpoint), the thermostat will communicate those changes to Ecô.

If a physical thermostat is shared by both the Forced Air and Radiant zones, a change made to the Mode at the thermostat will only affect the Forced Air Zone. Ecô would only use the temperature reading from the thermostat to control the radiant zone. Changes in Mode for the radiant zone would have to be made via the Ecô Browser.

To change the Mode from the Virtual Thermostat:

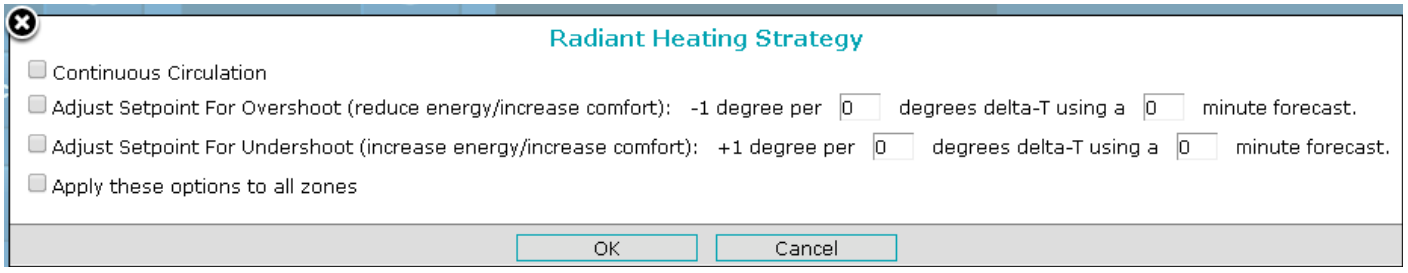
1. Click on the thermometer image to change between the modes, Off, Heat, and Cool.
2. To change the fan mode, click on the fan symbol.

Figure 13 - Mode Change



Strategy Button

Figure 14 - Radiant Strategy Popup



Data Charts

How to View Data Charts and Spreadsheets

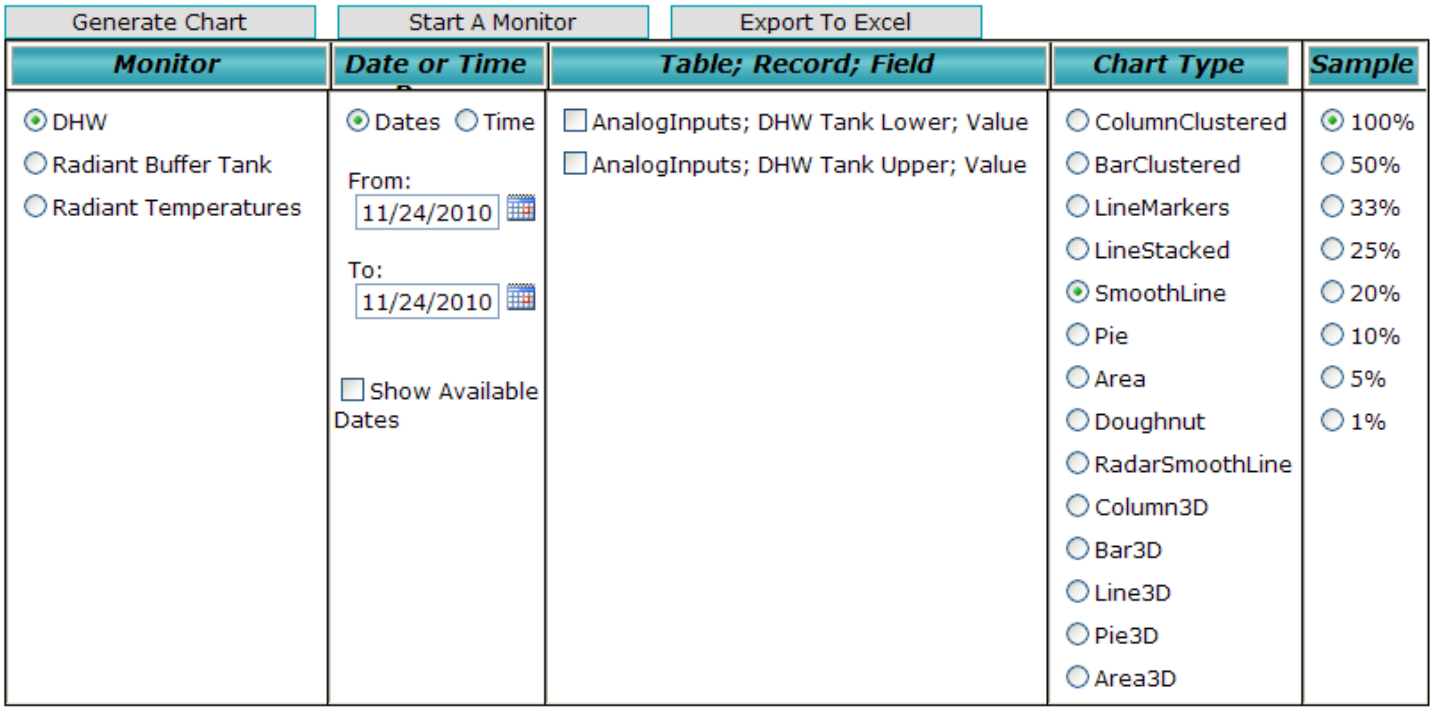
In order to view a Trend Chart or a Spreadsheet of sampled data, or look at a Real Time Monitor of data as it is changing, you must first create a Data Monitor as described above. After doing that:

1. Click on 

found on the left side of your screen.

2. The following will appear:

Figure 15 - Generate Chart Grid



3. Select a Monitor by clicking on one of the radial buttons in the Monitor column.

4. Select a Date Range and a Sample. You can use the small  icon. The number of values that will be placed on the chart is a function of the number of days selected and the Sample size. The maximum number of values that can be printed and viewed is approximately 1500 values. If your Timer fires once per minute the number of samples taken is 1440 per day which is close to the upper limit. Therefore the From/To date range must be one (1) day. If your Timer fires once per hour, you could look at 60 days.

Data Charts

The Sample column on the far right of the above grid is a way of reducing the number of values that will be extracted from the data base and shown on the chart :

a. 100% - all values
b. 50% - every other values
c. 33% - every third values, etc.

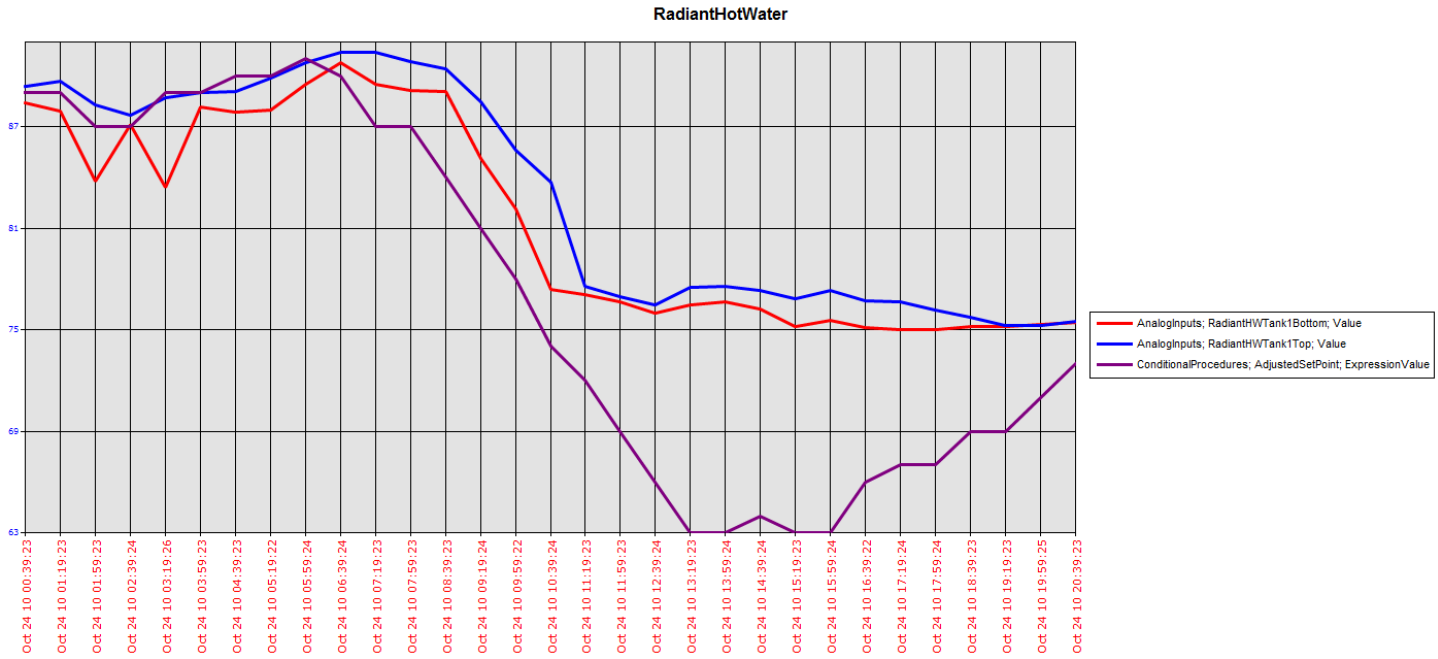
5. Select the points you want to see on the Trend chart. You can only select a maximum of seven (7) points but more than three (3) makes the chart hard to read.

6. Select a Chart Type. Try di erent options. The chart below is LineStacked .

7. Click on Generate Chart . A chart similar to this will appear. Expand your window to full size.

8. Of course the chart you see will be a function of the monitor you have created.

Figure 16 - Trend Chart



9. You can also produce an Excel Spreadsheet by following all of the above steps by clicking on.

Export To Excel

Data Charts

You will see a report like this. For this option there is virtually no limit to the number of days and Sample size selected :

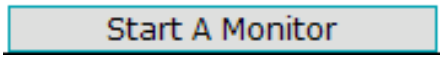
Figure 17 - Spreadsheet

1	Date	AnalogInputs; RadiantHWTank1Bottom; Value	AnalogInputs; RadiantHWTank1Top; Value	ConditionalProcedures; AdjustedSetPoint; ExpressionValue
2	Oct 24 10 00:01:23	85.45999908	87.73999786	87
3	Oct 24 10 00:03:24	87.26999664	87.80000305	87
4	Oct 24 10 00:05:23	87.19999695	87.69000244	87
5	Oct 24 10 00:07:24	87.05999756	87.83999634	87
6	Oct 24 10 00:09:23	86.76000214	87.91000366	89
7	Oct 24 10 00:11:23	85.20999908	87.91000366	87
8	Oct 24 10 00:13:22	83.20999908	87.90000153	87
9	Oct 24 10 00:15:26	84.70999908	87.87999725	89
10	Oct 24 10 00:17:23	87.37999725	88	89
11	Oct 24 10 00:19:24	88.81999969	88.55999756	89
12	Oct 24 10 00:21:23	88.69000244	89.11000061	89

DataCharts

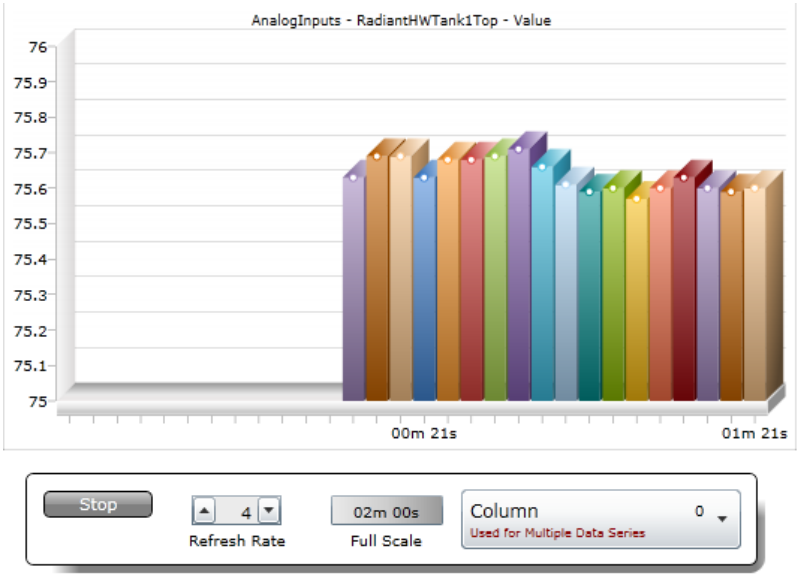
How to View a Real Time Monitor

A Real Time Monitor samples data and displays it in a real time fashion. To create a real time monitor follow the procedures above for creating a Trend Chart or Spreadsheet. However, you only have to select a specific Monitor and the Fields you want to see. You do not need to select date ranges, chart type, or Sample size. You could create a Monitor only for the purpose of using a Real Time Monitor and not for sampling data. In that case do not “Enable” the monitor.

1. After you have selected the Monitor and Fields, click on 

2. You will see a display similar to this:

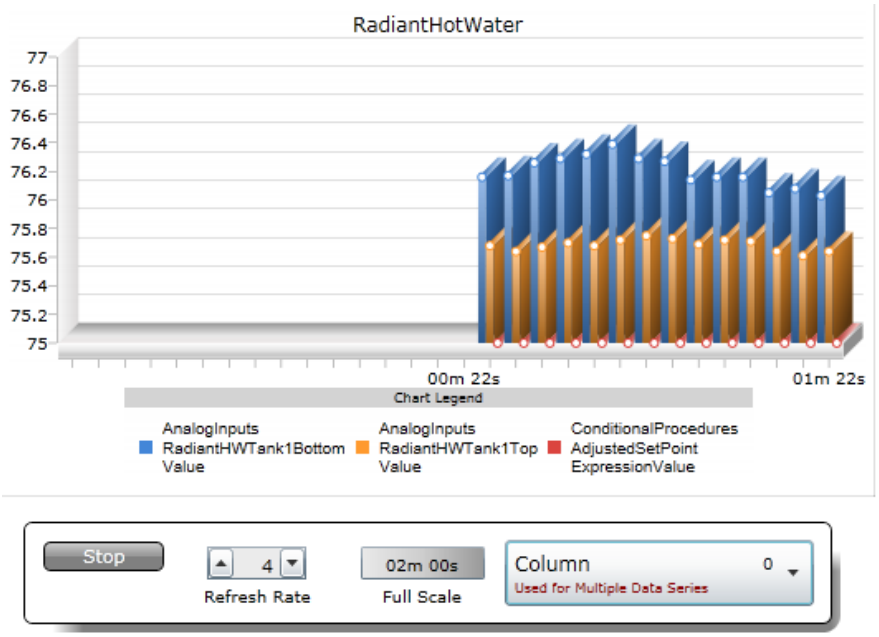
Figure 18 - Real Time Monitor



Data Charts

3. The data points are moving to the left. The newest data is on the right.
4. You can change the Refresh Rate but a value less than 4 seconds is probably faster than the data is changing internally.
5. If you move your mouse over a data point you will see the value of that data point .
6. You can start more than one monitor at the same time.
7. The name of the data point being monitored is at the top .
8. If you select more than one field, the monitor will look like this. Each color represents and different data point. The color legend is below the monitor.

Figure 19 - Real Time Monitor - 2 Points



Accumulators

The next Dashboard grid is the Accumulator grid. Special hardware can be installed that can accumulate kilo-watt hours, gallons per minute of liquid ow, etc. The programmer will set up the Ecô tables to accumulate that data. This table displays those values . The Type column defines the kind of accumulator it is. All of these below are Kilowatt Hours. The Today column indicates usage for today and the Yesterday column is usage yesterday.

Figure 20 - Accumulators Grid

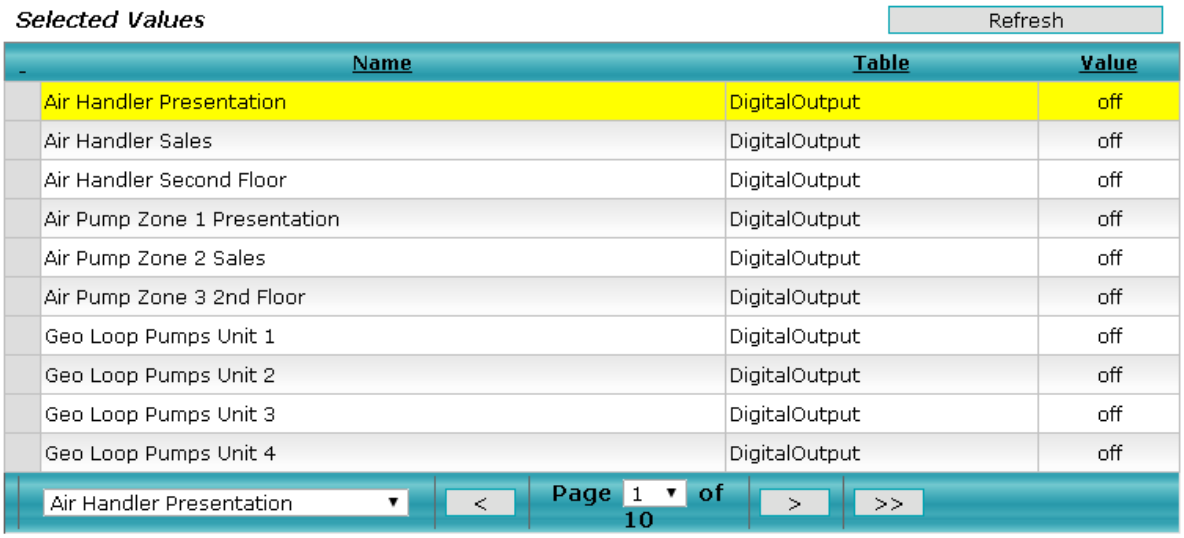
Accumulators

Name	Type	Yesterday	Today	Total
HeatPumpKWH	KWH	2.8	4.3	5548.8
WellPumpKWH	KWH	0.7	1.4	85.1

Selected Data Values

The last grid is the Selected Data Values. These are data points in Ecô that have been selected by the user to be on the Dashboard in this grid. These same fields can be seen in other grids throughout Ecô, but by selecting them for this Selected Data Values grid you don't have to drill down to other grids to see them. They might represent fields that you want to see right away when the Dashboard appears. The method for selecting them will be illustrated below as each of the various grids is described.

Figure 21 - Selected Data Values Grid



How to Setup a Timer or Schedule

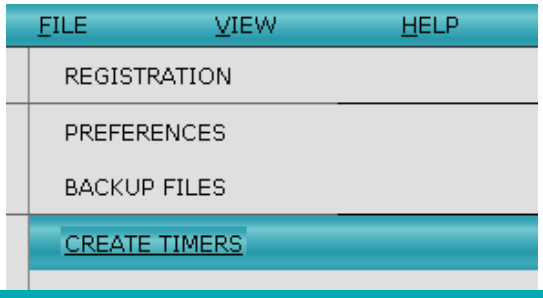
Timers are used in two ways:

1. By Macros to definne a schedule when the Macro will be executed, and
2. By Data Monitors to define a sampling interval.

Note: You must setup the appropriate timer before you can add a scheduled Macro or a Monitor to the system that uses that timer.

To add a timer:

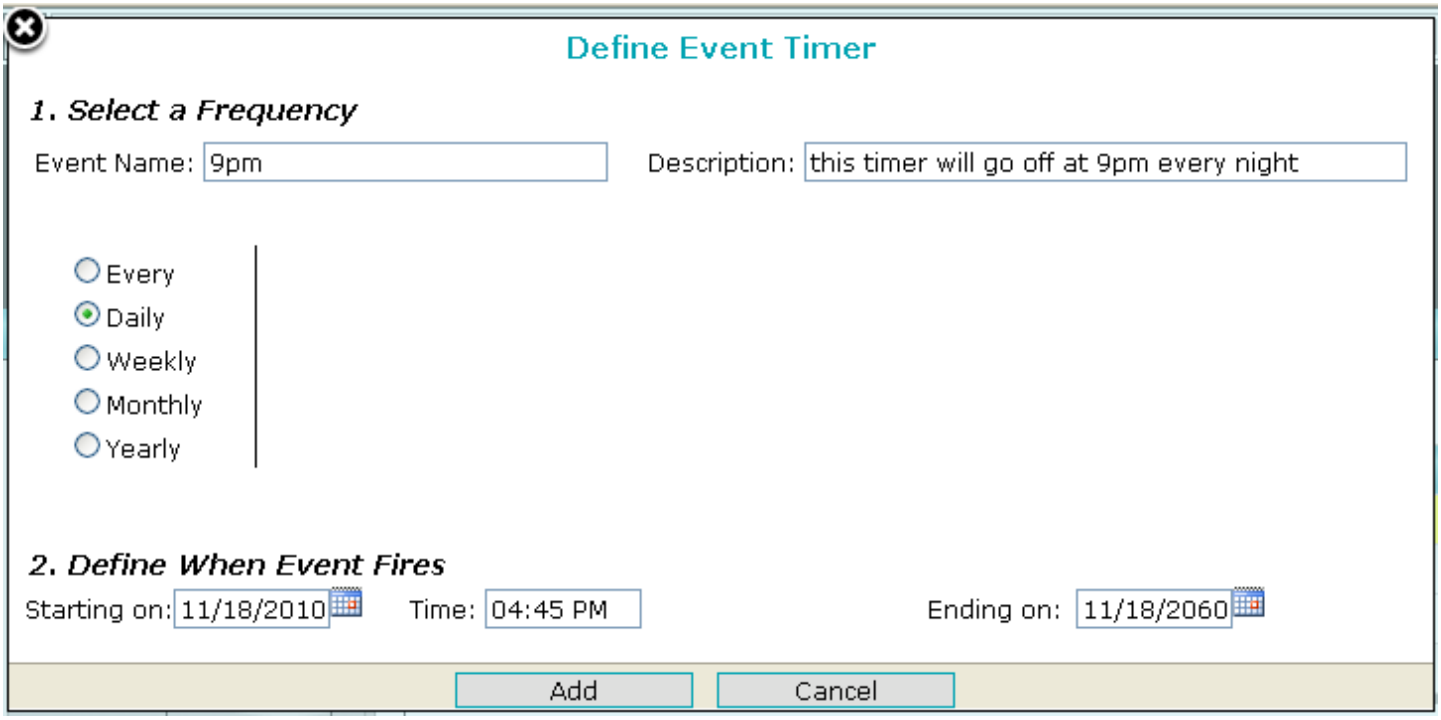
1. Locate the Create Timers entry on the drop down File menu:



2. Click on the Add a Timer button: 

3. Select the appropriate option, Name the timer, and click on the Add button. In this example the timer will refresh Daily at 9 PM.

Figure 22 - Define an Event Timer Popup



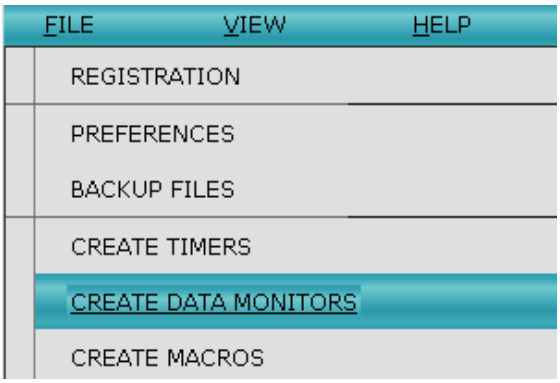
How to Create a Data Monitor

Data Monitors can be used to sample data that is in the Ecô system, i.e., room temperatures, KWH, zone status (Mode), hot water temperature, etc. You must define the following information when setting up a monitor :

- Name of the monitor
- Sampling interval – a Timer
- Retention period – how long do you want to keep the data sampled
- The data points to be sampled, one or more.

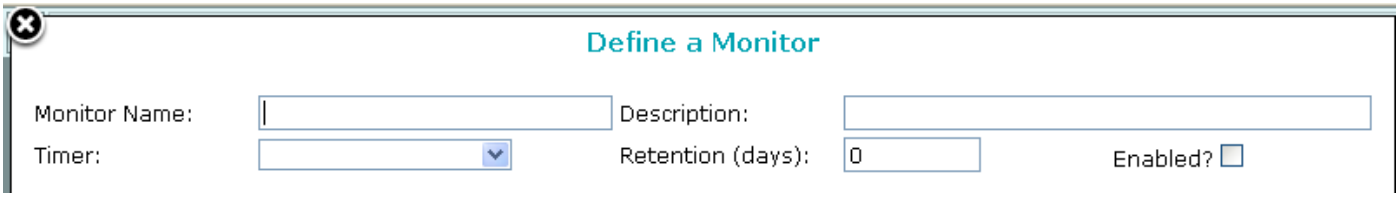
To add a Monitor:

1. Before you can setup a Monitor, you must firrst setup a Timer as described in the previous section.
2. Locate the Create Data Monitors entry on the drop down File menu:



3. Click on the Add a New Monitor button.
4. Name it, enter an optional Description, select a Timer from the dropdown list, and enter the Retention period in days. When the data sampled reaches the Retention period, the oldest day will drop off as the newest is added.

Figure 23 - Define a Monitor Popup



5. For each data point you want to monitor your will proceed in the popup below in the numbered order:
    1. Select a Table
    2. Select a Record from that Table
    3. Select a Field from that Record
    4. Click on the Add to Fields in Monitor button

How to Create a Data Monitor

Figure 24 - Select Fields To Monitor

6. As you add fields, they will appear as follows. When you have added all of the records you want, click on the Add button.

Figure 25 - Fields in Monitor Grid

TableName	RecordName	FieldName	Delete
RadiantHeatZones	Attic Office 102-1	ComfortValue	Delete
RadiantHeatZones	Great\Billiards\Hall 101-3	ComfortValue	Delete
RadiantHeatZones	Leah\Sophie Bedrooms 101-9	ComfortValue	Delete
RadiantHeatZones	Bedroom 3\Laundry 101-12	ComfortValue	Delete

7. If you need to make changes to an existing monitor, click on the monitor name in this grid. You will be able to Delete fields and add new ones.

Figure 26 - Monitors Grid

Setup Data Monitor

Name	Description	EventTimer	Retain	Enabled
DHW	DWH Tank Temp	2Minute	14	☑
Radiant Buffer Tank	Radiant Buffer Tank Temps	5Minutes	14	☑
Radiant Temperatures	Radiant Temps	5Minutes	14	☑

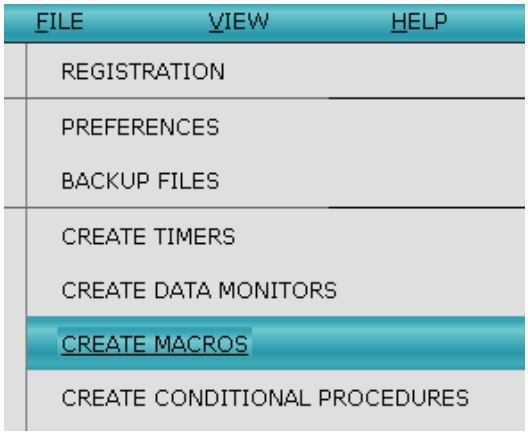
Add A New Monitor

8. Don't forget to enable it or no samples will be taken. Note: If you disable a monitor for 10 days that as a Retention period of 7 days, when you enable it after 10 days all of the sampled data will be deleted.

How to Create a Macro

Macros are added using a procedure very similar to adding a Data Monitor :

1. Locate the Create Macros entry on the drop down File menu:

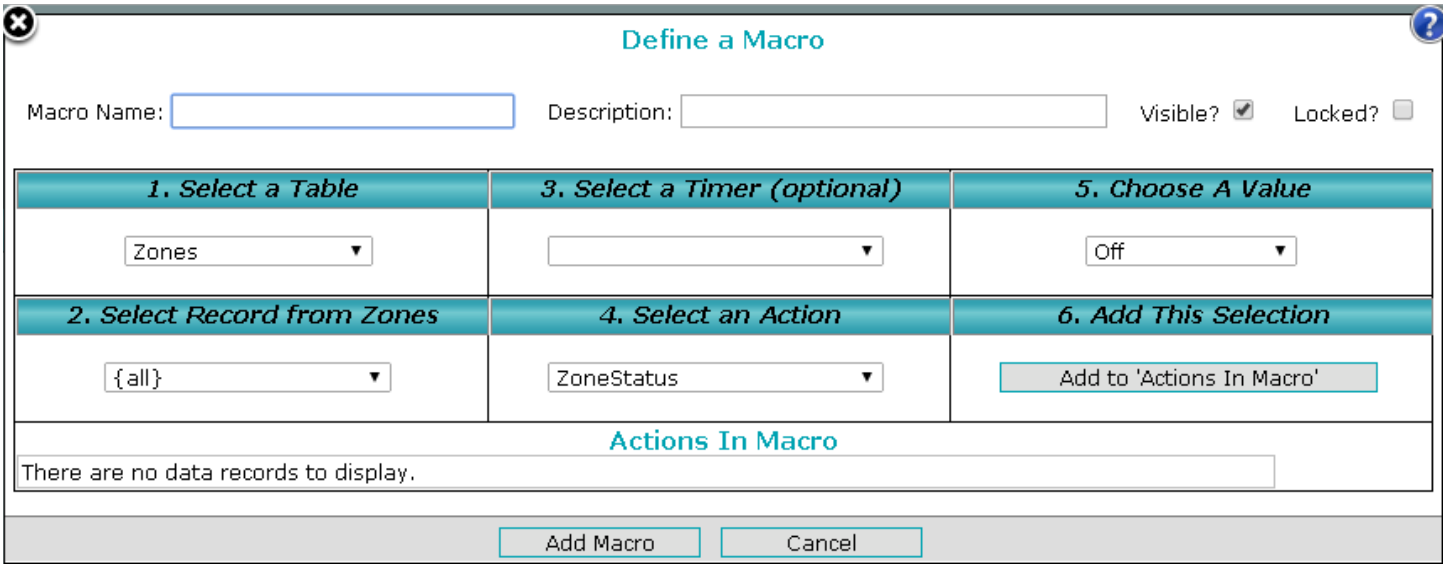


2. Click on the Add a New Macro button. It is at the bottom of the grid : 

3. Name it, enter an optional Description. For each Macro instruction you want to create proceed through the popup as follows :

   a. Select a Table
   b. Select a Record from the table – {all} denotes all records in the table selected.
   c. Select a Timer – optional. If one item has a timer all items must have timers.
   d. Select and Action – these vary by table
   e. Select a Value – this will vary based on the selection made in D.
   f. Click on the Add to 'Actions in Macro'

Figure 27 - Define a Macro Popup



How to Create a Macro

4. You can add additional actions by repeating s teps 1-6 above. As you add your selections, the items selected will be added to the bottom of the popup screen .

5. If a Macro has a timer then it will not appear on the One Click Macro Screen. If you check the Visible flag Visible? in the upper right corner, the Macro will appear in the One Click Macro screen. If you have a Macro that will be used by a Conditional Procedure and you do not want someone to accidently execute it, leave the Visible flag blank.

6. When you have finished, click on the Add Macro button.

Conditional Procedures

A Conditional Procedure (CP) is a rule that can be used to:

1. Make a calculation
2. Execute a Macro
3. Send an alert via text message or email

Most of the CPs in the Ecô system will have been created by the programmer to control complex operations of the various HVAC devices; but you can create them as well. They will probably set up CPs to send alerts if something goes wrong like a pump failure or the hot water not working. They will also set up CPs to switch valves that control water ow or turn boilers on and off. You don't have to understand how those CPs are used.

But you could set up your own conditional procedures that send you a text message if the burglar alarm goes off. This assumes that the alarm company's alarm panel has a contact that closes in the event of an alarm. Maybe you travel and you want to know if the outside air temperature is below freezing or if the humidity goes above a certain point or if the CO2 has risen above a certain level. All of these conditions can be tested and a text or email message sent. In the example below, if a certain pipe is freezing an alert is sent to the Customer and to the Service Org.

CPs can also execute Macros if the CP condition is true. For example you might set Ecô into Summer Mode using a Macro and the CP would execute other Macros to shut o all of the Radiant oors and turn on the air conditioning.

How to Create a Conditional Procedures and Alerts

A Conditional Procedure can be used to :

- Automatically execute a Macro, or
- Send and Alert by text message or email, or Both

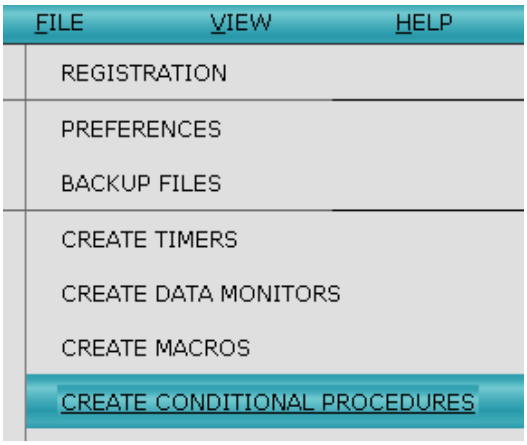
A Macro is executed and/or Alerts sent based on a Criteria evaluation. The Criteria is made up of four parts:

- An Expression,
- A Comparator,
- A Value, and
- An Elapsed Interval (For (seconds)).

Conditional Procedures

The following steps illustrate how to create a Conditional Procedure. Note that the fields shown in this example may not match those in your Ecô database; but the step by step procedure will be the same.

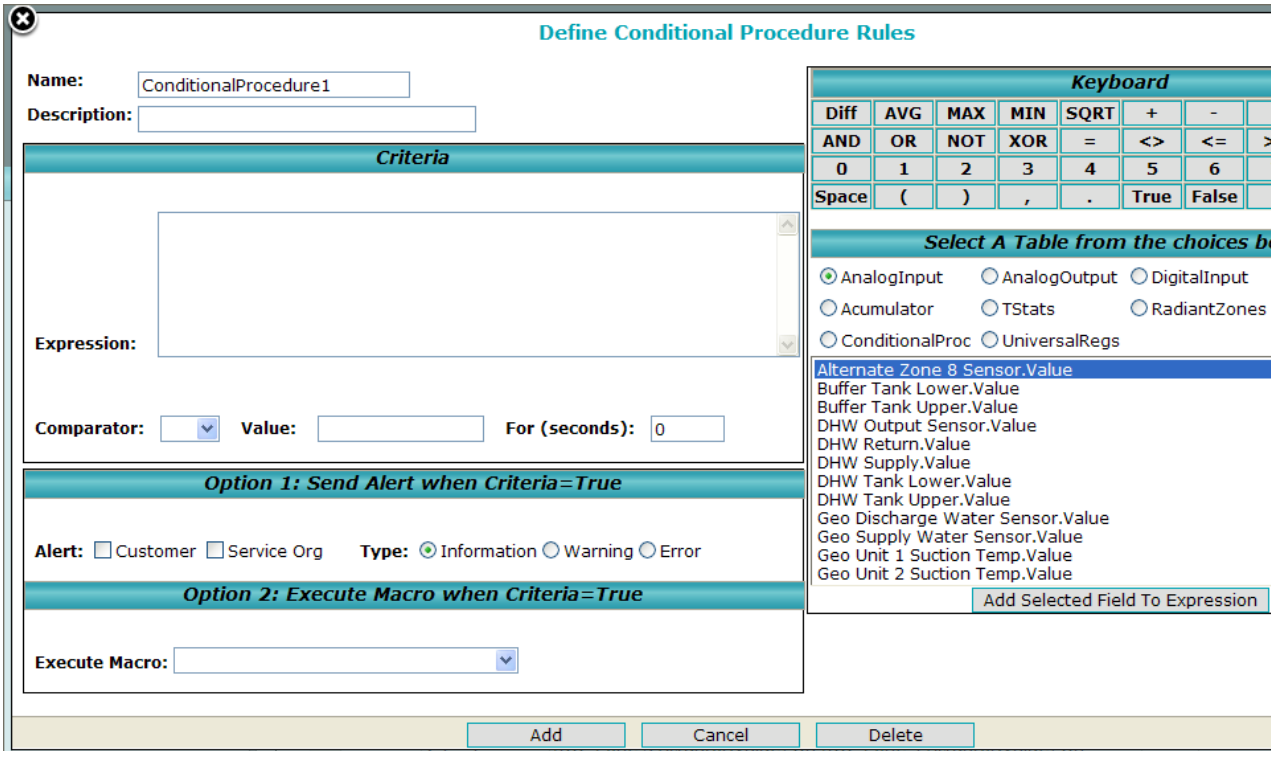
1. Click on the CreateConditionalProcedures navigation button. It is on the left side of your screen:



2. Click on the Add a Conditional Procedure button. It is at the bottom of the grid :

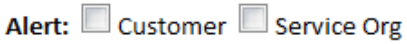
3. The popup you see will look like the following :

Figure 28 - Conditional Procedures Popup



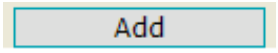
4. Enter a Name and an optional Description .
5. Click on the Expression field.
6. Select the Table that contains the field you want. Then select the field by clicking on it. It will turn blue.
7. Click on the 

button. Note that the field will appear in the Expression.
8. Use the keyboard to select an operator like AND, OR, +, = etc, whatever is appropriate.
9. If appropriate, select the next Table and Field and click on the 

button. Continue this process until you have created the Expression desired.
10. Click on the **Comparator:**  dropdown list box and select one of the appropriate symbols.
11. Click on the **Value:**  text box and using the keyboard select the appropriate Value.
12. If you want to send an Alert, select one or both of the Alert options: 

13. Select the Alert Type:

14. If you want to execute a Macro, use the dropdown list box to select a Macro.

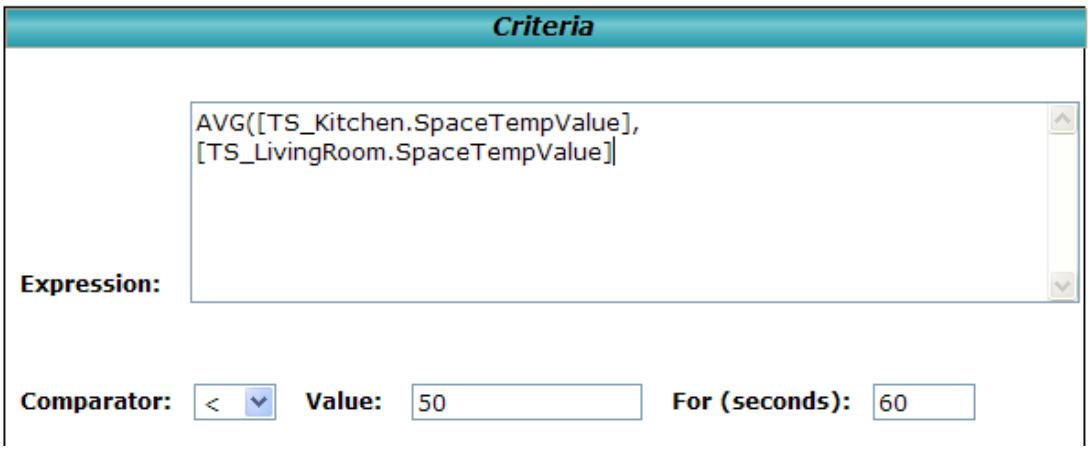
15. Click on the 

button.

Conditional Procedures

As displayed below, the Expression, Comparator, Value, and “For (seconds)” define the Criteria.

Figure 29 - Expression Field



In the example above:

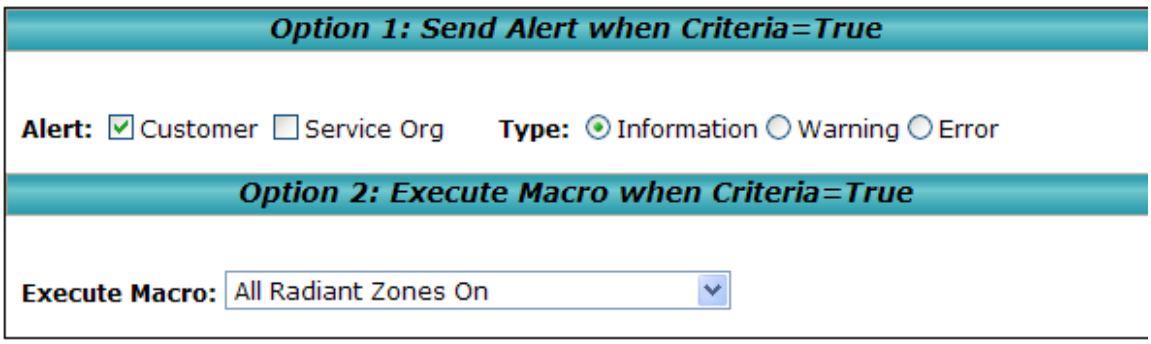
1. Expression = AVG([TS_Kitchen.SpaceTempValue], [TS_LivingRoom.SpaceTempValue])
2. Comparator = “<” less than
3. Value = 50
4. For (seconds) = 60

Stated in English:
If the average of the Kitchen and the Living Room space temperatures is less than 50 degrees for 60 seconds then the Criteria is True.

In the above example the Expression is a math statement but when the Comparator, Value and “For” are added the resulting Criteria is a True or False value. The Criteria is always True or False. Based on current conditions of the various values in the Expression, the Criteria will change from true to false to true, etc. over time. When it changes from false to true, the Conditional Procedure can be set up to send an alert or execute a Macro.

The figure below illustrates how to add an alert and execute a Macro. Refer to the sections labeled Options 1: Send Alert When Criteria is True and Options 2: Execute Macro When Criteria is True. The alert can be sent to either the Service Organization and/or the Customer (you). The Macro is selected from a list of pre-defined Macros. Note that the Macro to be executed is Radiant Floors On. Setting up a Macro is described below.

Figure 30 - Alerts and Macro’s



Conditional Procedures

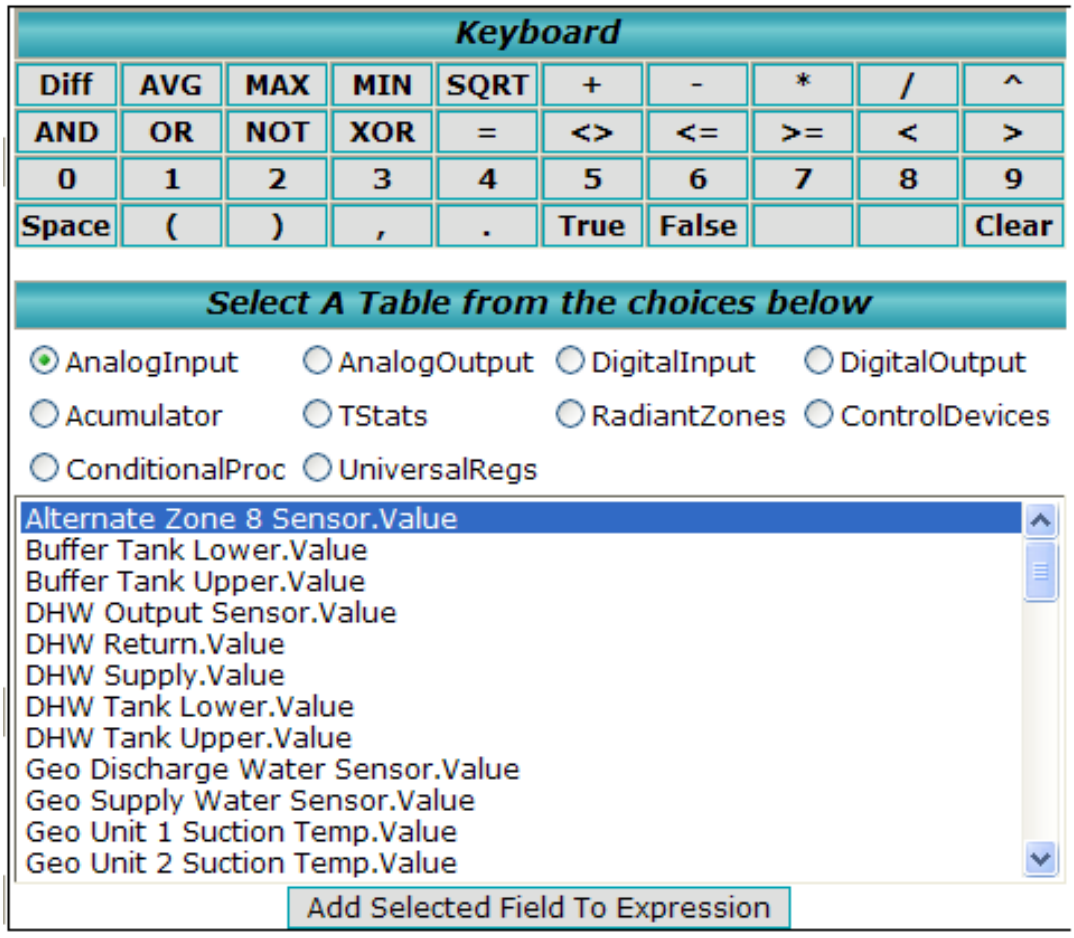
If an Alert is selected, then the message Type should be considered as follows:

- Information – the alert is sent one time only and never again until Acknowledged.
- Warning – the alert is sent on two successive days and never again until Acknowledged.
- Error – the alert is sent every day until the Criteria goes False. Once False, if the Criteria becomes true again, the alerts will start up again, i.e., each day as described.

Information and Warning Type alerts must be acknowledged or they will never be sent again deffectively disabling the Alert feature of the conditional procedure. This is described below in Acknowledging Alerts.

You don't have to type the Expression. It is easier to use the Keyboard because it will automatically generate the correct syntax that Ecô needs in order to evaluate the Expression.

Figure 31 - Conditional Procedures Tool



Conditional Procedures

The Keyboard is made up of:

- Keys or buttons, like keyboard keys
- A list of various Ecô tables, and
- Fields in those tables.

The Keys consist of:

1. Math functions
    a. D – compute the di erence of two values
    b. AVG – compute the average of a list of values
    c. MAX – compute the greater value in a list of values
    d. MIN – compute the smallest value in a list of values
    e. SQRT – compute the square root of a number or an expression
2. Math operators: +, -, *, /, ^ (power)
3. Boolean operators: AND, OR, NOT, XOR (exclusive OR), =, <> (not equal), < (less than, > (greater than), <= (less than or equal), >= (greater than or equal) .
4. Syntax – "(", ")", ",", "."
5. Space and Clear. The Clear key will clear all elements in the text box where the cursor is located including the Value text box.

The Expression can be created by placing your cursor in the Expression field, and using the Keyboard on the right side of the popup to select tables, records, and fields. The Table is selected using one of the Radio buttons below the keyboard. Once a table is selected the list of records in that table are displayed. After selecting a record, click on the Add Selected Field To Expression button and it will be inserted wherever the cursor is located in the Expression field.

The mouse can be used in the upper part of the keyboard to enter numbers or Boolean operators into the Expression Field as well. Also, there are built in math routines for computing AVG, MAX, MIN, SQRT of a list of fields selected. Click on one of these and then select the list of fields, one at a time, from the tables shown below the keyboard.

Remember, syntax is important as it would be in writing any mathematical or logical expression :

(X AND Y) OR Z is different than X AND (Y OR Z)
MM_x.z * 25 is going to produce an error since there is no table designated as MM
SQRT() 36 is an invalid. It should be SQRT(36) or SQRT(AI_Record.Value).

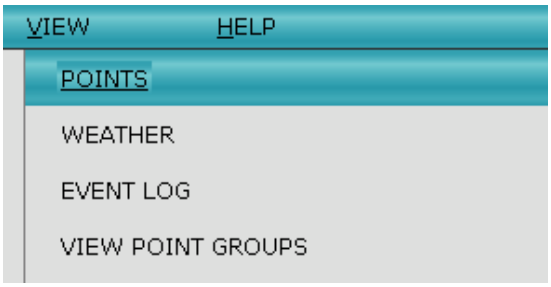
Note: The Comparator is required when sending alerts or executing a macro.

How to View Input and Output Values

Inputs and Outputs are the various points that are being monitored (Inputs) and controlled (Outputs). Inputs will normally be temperature sensors, humidity sensors, etc. They have a numeric value.

Outputs are not sensors. They are typically, pumps, zone actuators, etc. They will have an ON or OFF or True or False value internally to Ecô. When you see them in the Output grid, they will be displayed as On or off

1. Locate the Points entry on the drop down View menu:



2.You will see a grid something like this with four tabs: Analog Inputs, Analog Outputs, Digital Inputs, and Digital Outputs. Select the tab you want. If there are more data points than will fit in the grid, you will have to use the Pager controls at the bottom of the screen.

Figure 32 - Inputs and Outputs Grid

Inputs and Outputs

Analog Inputs | Analog Outputs | Digital Inputs | Digital Outputs

Name	Value	In Dashboard
Air Handler Return	88.55	☑
Air Handler Supply	106.55	☑
Buffer Tank 1 Lower	117.14	☑
Buffer Tank 1 Upper	91.53	☑
Buffer Tank 2 Lower	102.65	☑
Buffer Tank 2 Upper	113.77	☑
CO2 Sensor Sales	1021.53	☐
CO2 Sensor Second Floor	0.00	☐
CO2 Sensor Training	0.00	☐
Hydronic Return Unit 1	99.71	☑

Air Handler Return ▾ | << | < | Page 1 ▾ of 7 | > | >>

3.You have to click on the Refresh button to see the most current values.

4.f you Click on the InDashboard column next to a given item, that item will appear in the SelectedDataValues grid on the Dashboard

How to Acknowledge an Alert

As described above in How to Create a Conditional Procedure and Alerts, Alerts can be generated based on the True or False value of a Conditional Procedure. The Alerts can be sent to you (the Customer) or to the Service Organization as a Text message or an Email based on the options established in the Registration procedure.

Based on the Type of Alert d ned in the Conditional procedure, the Alert will be sent one or more times as follows. If the Type is:

- **Information** – Alert sent one time and never again until the Alert is acknowledged
- **Warning** – the Alert is sent two days in a row and never again until the Alert is acknowledged.
- **Error** – the Alert continues to be sent each day until the Alert is Acknowledged or the condition becomes False. If the condition goes False and then becomes True the Alerts will start up again.

Alerts that are of Type Error probably represent conditions that need to be rectified before acknowledging the Alert even if the conditional procedure has become False.

1. Locate the Alerts entry on the drop down View menu:

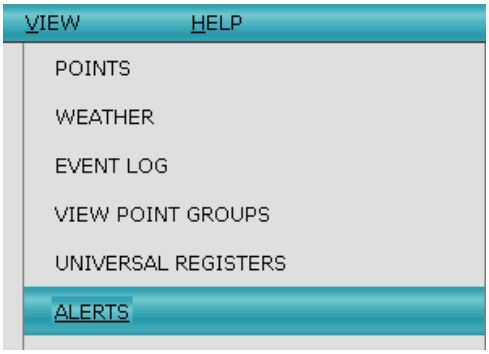


Figure 33 - Acknowledge Alert Grid

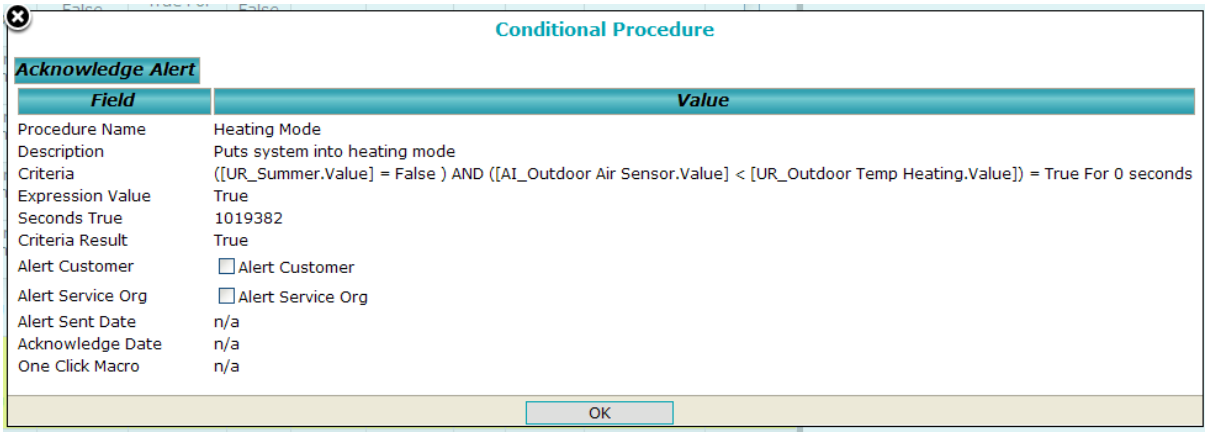
Conditional Procedures

Name	Description	Expression Value	Comparator	Criteria Result	Elapsed Time	Time Remaining	Macro	AlertSent	Acknowledged	In Dashboard
Cooling Mode	Cooling Mode	False	= True For 300 secs	False						☐
Fans Only	Enables all fans	True	= True For 0 secs	True						☐
Heating Mode	Heating Mode	False	= True For 0 secs	False						☐
Lockout	Sends warning if any unit locks out	False	= True For 0 secs	False				11/1/2013 6:22:04 PM		☐
loop field demand	turns on loop field pump	False	= True For 0 secs	False			Loopfield pump on			☐
loop field demand off	turns off loop field pump	False	= False For 0 secs	True			Loopfield pump off			☐
Radiant Floor Cooling 2nd floor off		103.24	= 55 For 0 secs	False						☐
Sales Temp Average		73.18								☐
Zone 1-4 Pump	Zone 1-4 Pump	False	= True For 20 secs	False						☐

How to Acknowledge an Alert

2.If an Alert has been sent and not acknowledged, you will see a Date in the Alert Sent Column. Click on the Alert Name in the left most column of the grid and you will see the following:

Figure 34 - Acknowledge Alert Popup



3. Click on the **Acknowledge Alert** button. If you don't see the button, the Alert has already been acknowledged . Note that if the Criteria Result is currently True, the Alert will be immediately resent. There is no reason to acknowledge it until you clear up the reason for the alert in the rst place.

Except for Type=Error, If the Criteria goes from False to True a new Alert will not be sent until the original alert is acknowledged.

How to View the Weather Grid

Ecô accesses the weather every few hours in order to acquire the latest weather data. To view this data:

1. Locate the Weather entry in the View drop down menu:

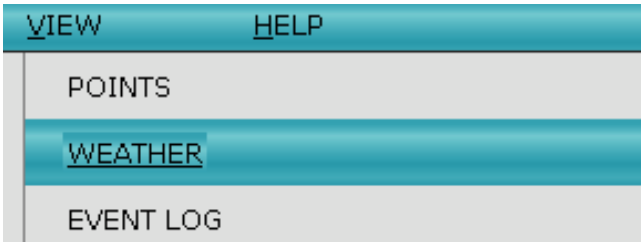
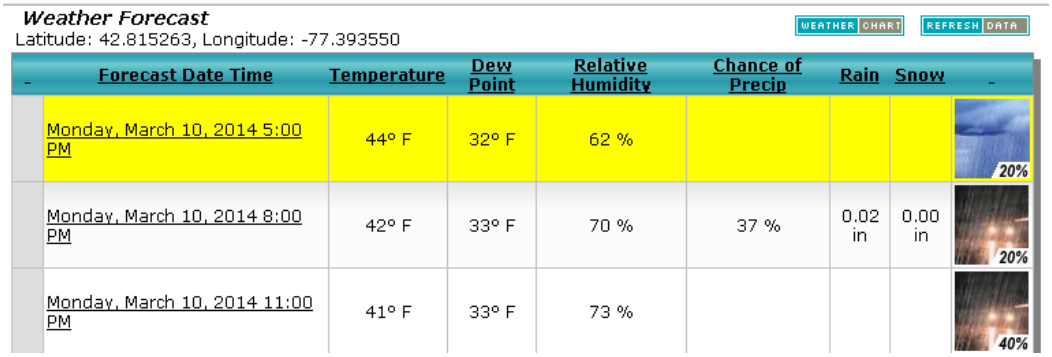
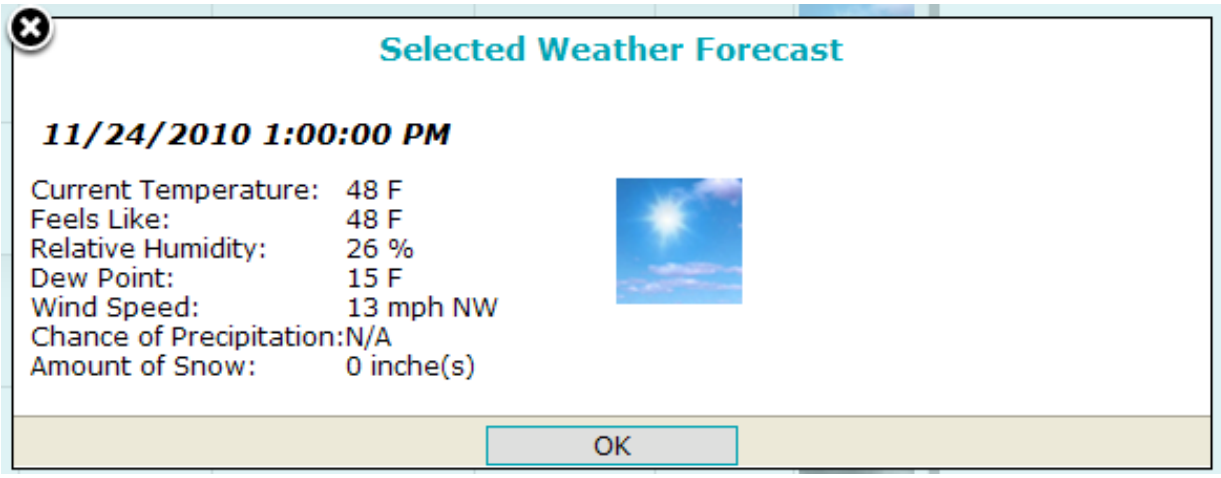


Figure 35 - Weather Grid



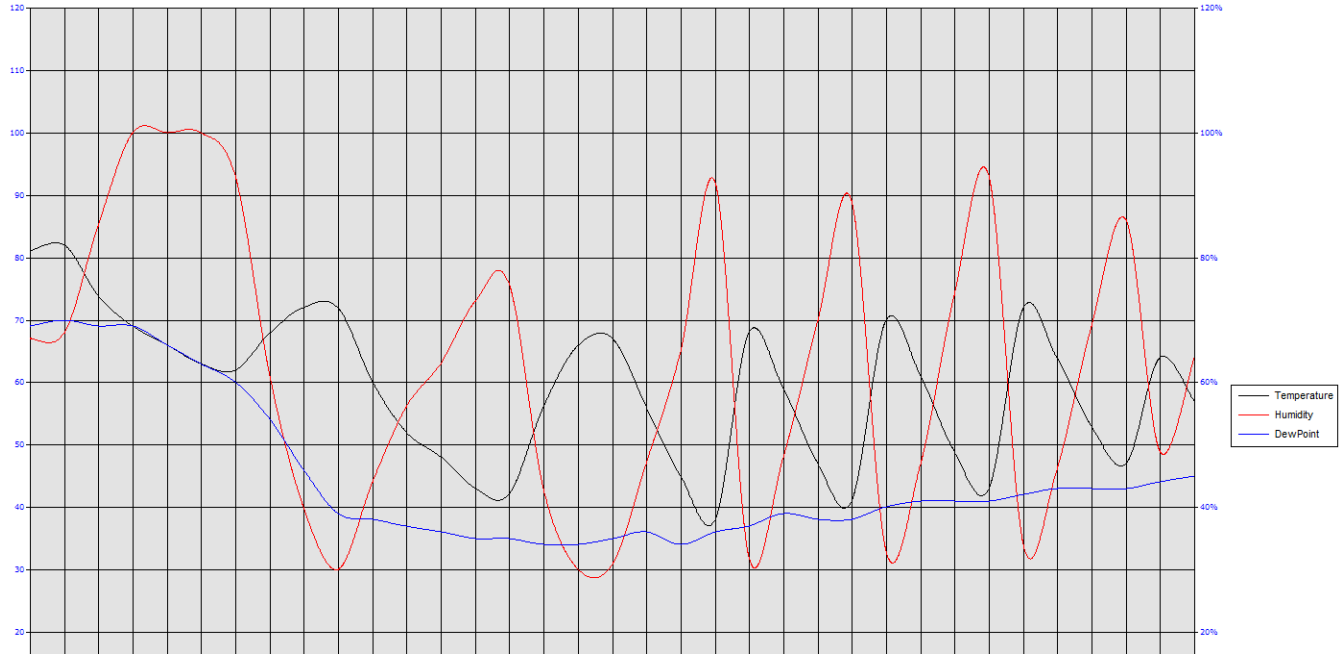
2. Click on one of the underlined dates and you will see :

Figure 36 - Weather Popup



3. Click on the WEATHER CHART button and you will see the Temperature Humidity and Dew Point graph below:

Figure 37 - Temp, Humidity, Dew Point Graph



4. Click on NOAA Weather Data provided by National Oceanic and Atmospheric Administration (NOAA) and you get live weather service of your current location.

How to Update a Universal Register

Universal Registers are a facility of Ecô that may have been utilized by the installer who designed and created your Ecô system. They can be edited by you from your browser and used to cause operations of your mechanical systems to function in d erent ways. For example, you could have a Universal Register called OnVacation and if you set it to True from your browser, a Macro might automatically execute that would cause various zones to be turned off and your hot water heater to turn o , including the recirculation pump. Your installer would have to tell you what actions occur when a Universal Register is changed .

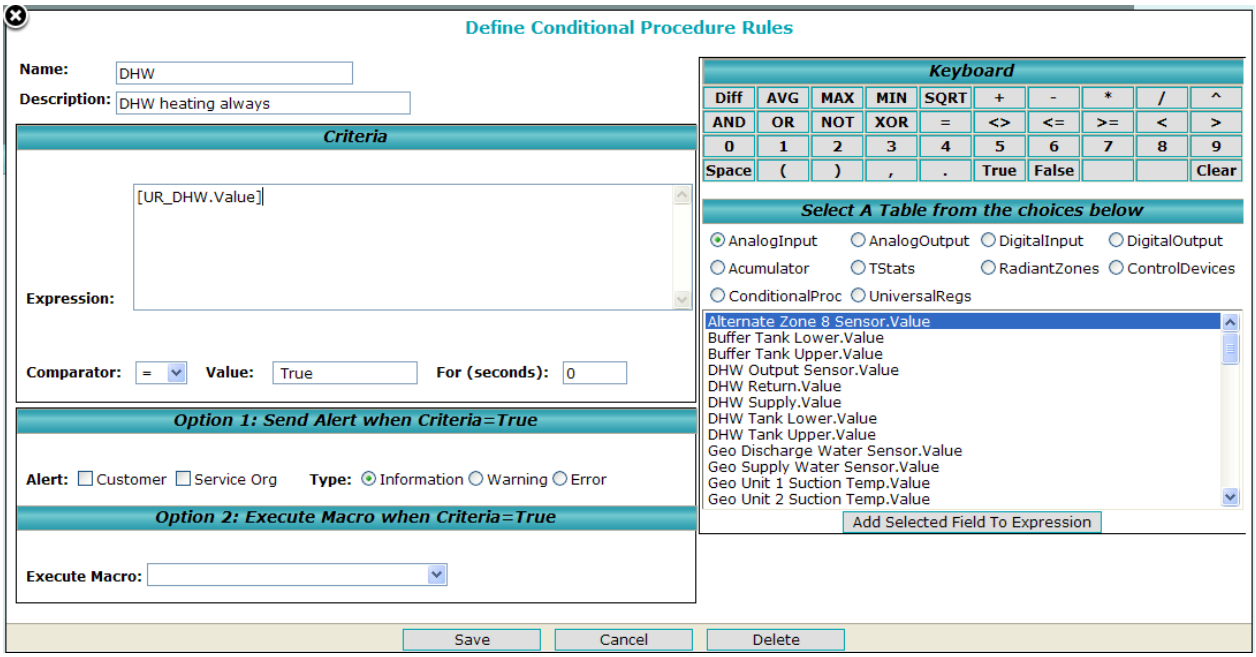
Some Universal registers are Boolean, i.e., they can either be True or False. Some may be numeric and have a value. These could appear in Conditional Procedures and be used to invoke a Macro or be used as a Demand for a Control Device. This would have been worked out by the installer and they would provide you instructions as to which Universal Register performs what function. Here are a few examples:

Figure 38 - Universal Registers Grid

Update Universal Registers

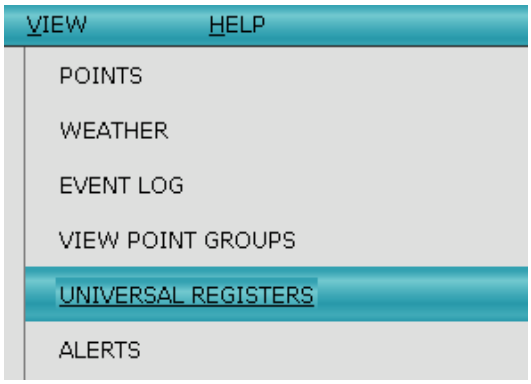
Name	Description	Value	DateLastChanged	Changed By	Enabled	In Dashboard
DHW	DHW always in heating mode	(•) True ( ) False	11/9/2010 5:05:02 PM	admin	☑	☐
Outdoor Temp Cooling	Temp to start cooling	80	11/9/2010 5:41:16 PM	admin	☑	☑
Outdoor Temp Heating	Temp to start heating	65	11/12/2010 3:15:21 PM	admin	☑	☑
Summer	Puts system into Cooling Mode	( ) True (•) False	11/12/2010 3:15:00 PM	admin	☑	☐

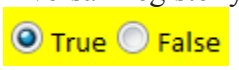
In the above example the DHW is True, the Summer is False For example, if you looked at your Conditional Procedures using these registers you might see:



How to Update a Universal Register

1. Locate the Universal Entry on the View Menu drop down list:



2. Find the Universal Register you want and if it is a Boolean (True or False) click on the True or False radio button 

to change it.

3. If it is a Value register enter the proper value 

and then tab out of the text box.

How to Backup Your Database

Ecô maintains all of the data associated with your system in a SQL Server database. It is important that this data be backed up every night. This is an automatic function in Ecô but you must give Ecô a location as to where to save the data. This is done via the Preferences screen which can be reached via the drop down menu:

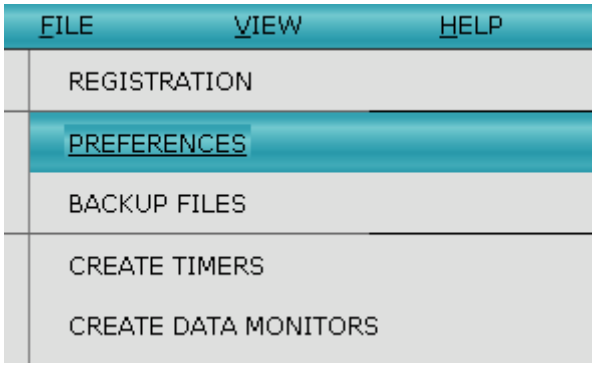
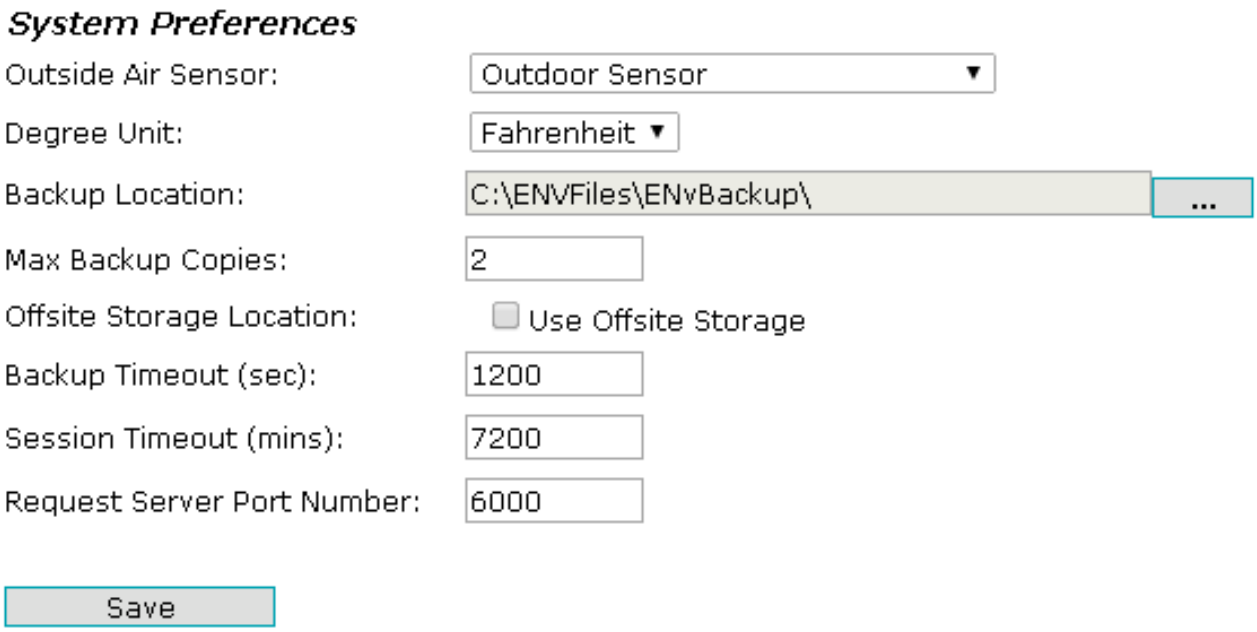


Figure 39 - Preferences

Selecting Preferences leads to this screen:

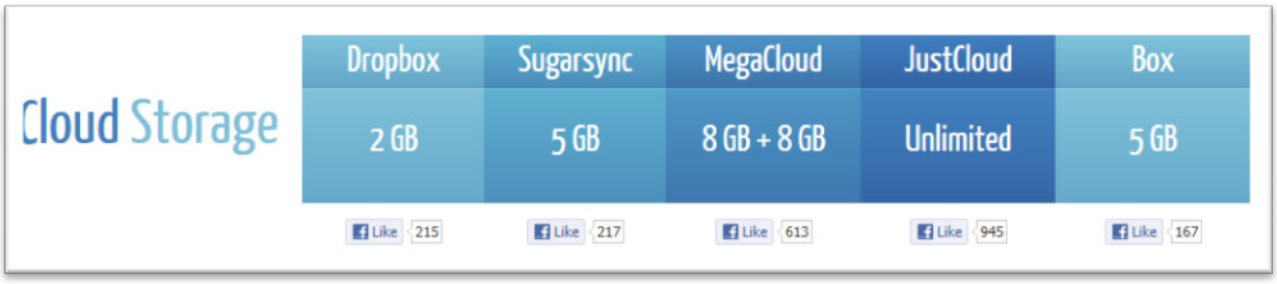


How to Backup Your Database

You have the option of selecting two backup locations, one local and one offsite. The local location, "Backup Location", should not be on the hard drive of the Ecô computer. In the event the Ecô PC should fail, you'd have no backup.

In order to use the Offsite Storage facility you must first subscribe to one of the free cloud storage providers. As of this writing, here is a list:

Figure 40 - List of Cloud Storage Providers



Once you install the necessary software provided by the Cloud Storage providers, all you have to do is tell Ecô the directory location used. Click on the:

By using the drop down list box and the "Up" entry in the grid, navigate to the location of the Cloud folder, which will appear on the line above the grid, i.e., "Offsite Backup Location:". You must also select "Use Off-site Storage" and the Offsite Storage Max Copies options. For the offsite storage, Max Copies = 1 should be sufficient.
For the local backup location, use the same procedures described above to select a directory location. If you have a network drive, find it in the drop down list otherwise it is highly recommended that you use a USB pen drive and specify 3-5 Max Copies.