TruVu™ ChillerVu™ Energy Dashboard

Installation and Start-up Guide

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Important changes are listed in **Document revision history** at the end of this document.

Contents

What are the TruVu™ ChillerVu™ Energy Dashboards?

The TruVu™ ChillerVu™ Energy Dashboards are graphic representations of a chilled water plant's energy performance. You can manipulate how the performance data is displayed, both numerically and graphically. Overall plant performance is tracked using the measurement kW/Ton or, for metric applications, the Coefficient of Performance and ikW/kW.

You must have the SAL library version 1.2 or higher to use the Energy Dashboards.

Assuming you have the correct instrumentation, the dashboards can track and display:

- The electric demand for each piece of equipment (chillers, pumps, fans), both individually and totalized
- The electric consumption for each system (chilled water and condenser water), both individually and totalized
- The totalized peak electric demand for each system
- Accumulated energy use in kW/h
- Accumulated chilled water consumption in consumed Tonnage
- Certain device-specific operational data points (VFD speed, chilled water flow rate, chilled water temperature, etc.)

The data is organized into **Home** and **Detail** dashboards.

- **Home** displays overall plant demand, consumption, and performance.
- **Detail** displays a more in-depth view of the data that is related to the chilled water and condenser water systems.

  NOTE You can click the arrow  on any dashboard to switch to a different one.

Standard dashboards are available for both air-cooled and water-cooled plants. The default dashboards have data for:

- 8 chillers
- 8 chilled water pumps
- 8 condenser water pumps
- 8 single-cell cooling towers

You can easily modify the default configurations in ViewBuilder and you can download secondary loop pumping system dashboards by starting with the default views. You can remove or add data.

Logic and associated view files are part of the TruVu™ ChillerVu™ SAL file (version 1.2 or higher). In EquipmentBuilder, you create and download the control program and dashboard graphics and then you add them to the TruVu™ ChillerVu™ chiller plant control system in SiteBuilder.

For kW/Ton, ikW/kW, and COP calculations, you **MUST HAVE** chilled water flow data from a chilled water flow meter, calculated by an evaporator differential pressure sensor or other source.

Electrical power values for devices must have data from one or a combination of the following:

- Carrier PIC on-board chiller controls
- Data from communicating third party chiller controls
- Communicating variable frequency drives
- Additional field-installed electrical monitoring instrumentation

Carefully review the data display needs of the project to ensure that suitable instrumentation, either existing or able to be field-installed, is available to support the project requirements of the Energy Dashboards.

Overview to setting up the Energy Dashboards

The Energy Dashboard control program (energy_dashboard-x_x_xxxxxxxx.equipment) includes support for the following dashboard views:

- **Air-cooled chiller plants**
  - Home screen - **Total Plant Energy Dashboard** for air-cooled plants - (cvu_ac_hm_db.view)
  - Detail screen - **Chiller Water System Energy Dashboard** - (cvu_chw_db.view)

- **Water-cooled chiller plants**
  - Home screen - **Total Plant Energy Dashboard** for water-cooled plants - (cvu_wc_hm_db.view)
  - Detail screen **- Condenser Water System Energy Dashboard** - (cvu_cw_db.view)
  - Detail screen - **Chiller Water System Energy Dashboard** - (cvu_chw_db.view)

Overview of steps to set up the dashboards

1 Customize the appearance of the dashboards

1. Use EquipmentBuilder to obtain your graphics and equipment file. See Select control program and graphics in EquipmentBuilder.
2. In ViewBuilder, you can modify your dashboards in several ways:
   - Change the text
   - Change your currency symbol
   - Link OA conditions on each graphic (default is #oa_conditions)
   - Delete information for unneeded towers, pumps, and chillers if you have less than 8, which is the default maximum configuration for a single view file
   - Change the equipment graphic on the air-cooled Home dashboard (cvu_ac_hm_db.view) to match your equipment model

NOTE See Customize your graphics in ViewBuilder for more details.

2 Add dashboard files to your TruVu™ ChillerVu™ controller

Add graphics and control program in the i-Vu® application.

NOTE See *Add control programs and graphics in the i-Vu® interface* (page 7).

3 Set up gauges

In the i-Vu® application, you must assign the minimum and maximum values for each gauge.

NOTE See *Enter cost value and set up gauges* (page 12).

4 Map the Inputs

In the i-Vu® application, you must map the inputs to the dashboards.

NOTE See *Map inputs* (page 8).

Select control program and graphics in EquipmentBuilder

1. Obtain the latest SAL library (version 1.2 or higher).
2. Save the file in the **I-Vu_Tools_x.x\sals** folder.
3. In EquipmentBuilder, click **Create Equipment**.
4. Select psm-x.x-<date>.sal from the **Library** drop-down menu.
5. Select **Energy Dashboard** under **Energy Dashboard** at the bottom of the list.
6. Click **Next**.

   NOTE Do not change the **Equipment Name**.
7. Check **English** or **Metric**.

   NOTE If you select **Metric**, all units of measure, except the currency symbol (see Customize your graphics), are automatically metricized throughout the dashboards. The only modification to the graphics that you must make in ViewBuilder is changing the currency symbol.
8. Click **Next**.
9. Verify that **Control Program** and Attachment are checked.
10. Save the .equipment file and attachments to your computer.
11. Click **Next**.
12. Click **Next**.
13. Click **Exit**.

Customize your graphics in ViewBuilder

To edit the dashboards in ViewBuilder, select **File** > **Open** and browse to the .view files.

You can modify the dashboards in the following ways:

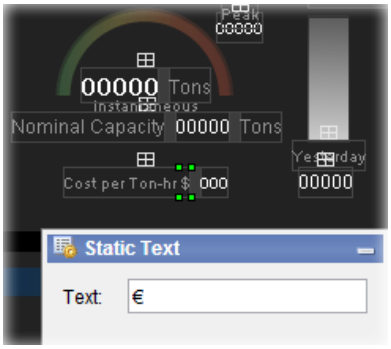
Change currency

1 Change your currency symbol if you do not use the dollar sign.

a) Click on a dollar sign on the graphic.

b) In the **Static Text** dialog that appears, type in your currency symbol.

CAUTION Do **NOT** use **Edit** > **Find/Replace**. You must change each symbol individually.



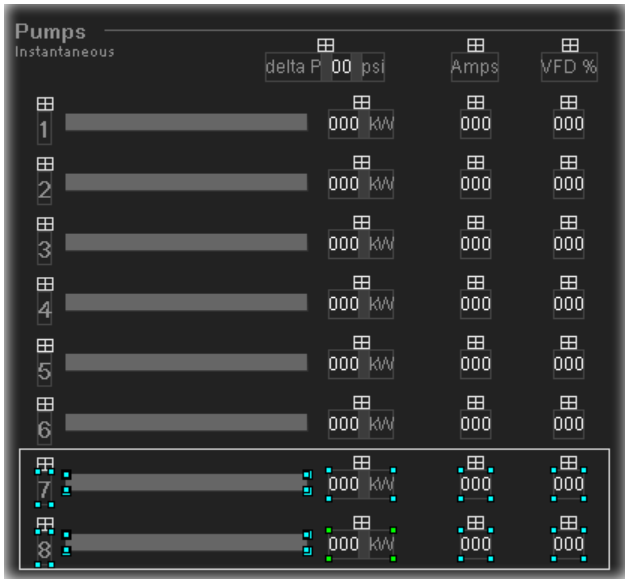
Number of currency signs to change	Dashboard
5	Home - Water-cooled chiller plants - (cvu_wc_hm_db.view)
5	Home - Air-cooled chiller plants - (cvu_ac_hm_db.view)
4	Detail - Chiller manager - (cvu_chw_db.view)
3	Detail - Tower manager - (cvu_cw_db.view)

NOTES

- If you do not need an energy use currency value, you can delete the graphic element.
- If you selected **Metric** in EquipmentBuilder, all units of measure, except the currency symbol, are automatically metricized. You do not need to edit them.

Change the number of equipment inputs on the Detail dashboards

Customize the number of tower manager and chiller manager inputs (8 is the default maximum configuration for a single dashboard view) to match your system's configuration. You can delete extra inputs for Chillers, Towers, and Pumps, by selecting the line(s) and details from the bottom of the list and then pressing **Delete** or **Ctrl-x** on your keyboard.



Change the equipment graphic on the Home dashboard for air-cooled chiller plant

1. Select the default equipment graphic on the dashboard - (cvu_ac_hm_db.view).
2. Press **Delete** or **Ctrl-x** on your keyboard.
3. Click the **Add Image** tab  in the **Tools** window.
4. In the **Look in** field, browse to the folder that contains the image you want.
5. Select the image.
6. Click in the workspace to place the image.
7. Save your customized dashboard.

   You MUST not change the default name of the dashboard .view file.

Change text

Click and type in any editable field to change the text.

Add control programs and graphics in the i-Vu® interface

Add the control program (.equipment file)

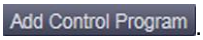
1 Uncheck **Include graphics in Open programmable controller download** as follows:

In the i-Vu® Standard or Plus interface, go to  and select **System Options** > **General** tab > **Download**.

In the i-Vu® Pro interface, go to  and select **System Options** > **System Settings** > **General** tab > **Download**.

2 In the navigation tree, select the TruVu™ ChillerVu™.

3 On the **Devices** > **Manage** tab, select the TruVu™ ChillerVu™ in the list on the page.

4 Click the **Add Control Program** button 

. A dialog window appears.

5 Enter a **Display Name** for the control program.

6 Select the **Controller** that you are adding the program to.

NOTE If you already have the maximum number of control programs for the controller, it will not appear in the list.

7 To add the control program, do the following:

If the control program is...	
In the **Control Program** drop-down list	1. Select the control program that you generated in EquipmentBuilder. 2. Click **Accept**.
Not in the **Control Program** drop-down list	1. Click **Add New**. 2. Browse to select the control program. 3. Click **Open**. 4. Click **Continue**. 5. Click **Close**. 6. Click **Accept**.

Adding Graphics (.view files)

1 To add the graphics, click **Add New** under **Views** and browse to your .view files.

2 Click **Continue**. When message appears **File added successfully**, click **Close**.

3 Click **Close** again.

4 Right-click on the TruVu™ ChillerVu™ in the controller list and select **Check Status** from the list. The status of the controller should say **File Mismatch**.

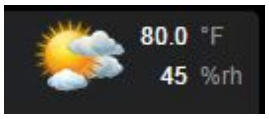
5 Click the **Download All Content** button.

6 Check out and commission the equipment.

Map inputs

You have to map each input that is on the dashboard.

Map the temperature and humidity



Follow these steps to obtain live data for the weather icon in the right upper corner of the dashboards.

1 In the i-Vu® interface, go to the **Properties** page > **Control Program** tab > **Configuration** section.

2 Click on **Outdoor Air Temperature** (ANI2) to open the microblock popup.

3 On the **Details** tab, expand the tree under Primary Address and click on the point that you want to map the temperature from.

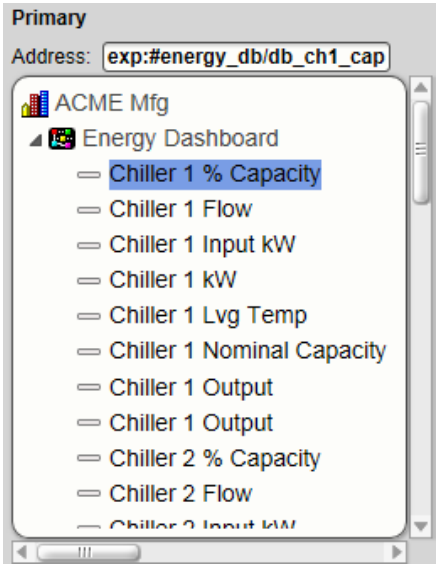
4 Repeat for **Outdoor Air Humidity** (ANI2).

To map the points

1 In the i-Vu® interface, go to the **Properties** page > **Network Points** tab.

2 Click a point name to open the microblock popup.

3 On the **Details** tab, expand the tree under **Primary Address** and click on the point that you want to map from.



4 Repeat for every point.

Mapped Points

NOTES

- All of the following points are BACnet Analog Values (BAV)
- CHW = Chilled water
- CW = Condenser water

Name	English Unit	Metric Unit	Description	Reference Name	Object ID	Data Source
Chiller 1-8% Capacity	%	%	% of total refrigeration capacity chiller is currently running	db_chX_cap		Mapped
Chiller 1-8 Flow	GPM	L/M	water flow rate through chiller	db_chX_flow		Mapped
Chiller 1-8 Input kW	kW	kW	chiller electrical demand	db_chX_kw		Mapped
Chiller 1-8 Lvg Temp	F	C	chiller leaving water temp	db_chX_lvg_t		Mapped
Chiller 1-8 Nominal Capacity	Tons	kW	refrigeration capacity of chiller	db_chX_nom_cap_ton		Mapped
Chiller 1-8 Output	Tons	kW	chiller refrigeration output	db_chX_otpt		Mapped
CHWP 1-8 VFD %	%	%	CHW pump Vfd speed	db_chwpX_vfd		Mapped
CHW Pump 1-8 Amps	A	A	instantaneous current draw of CHW pump	db_chwpX_amp		Mapped
CHW Pump 1-8 kW	kW	kW	CHW pump electrical demand	db_chwpX_kw		Mapped
CWP 1-8 VFD %	%	%	cw pump Vfd speed	db_cwpX_vfd		Mapped
CW Pump 1-8 Amps	A	A	current draw of CW pump	db_cwpX_amp		Mapped
CW Pump 1-8 kW	kW	kW	CW pump electrical demand	db_cwpX_kw		Mapped
Tower 1-8 kW	kW	kW	tower fan electrical demand	db_twX_kw		Mapped
Tower 1-8 Lvg Temp	F	C	cooling tower leaving water temp	db_twX_lvg_t		Mapped
Tower 1-8 VFD %	%	%	tower fan Vfd speed	db_twX_vfd		Mapped
CHW Cost Per Output Unit			cost per unit of refrigeration output measured by electrical power comsumption for CHW system only	db_chw_cost_per_otpt_unit	AV:1	Calculated
CHW Cost Today			electrical cost for CHW system only for the current day	db_chw_cost_today	AV:2	Calculated
CHW Cost Yesterday			electrical cost for CHW system only for the previous day	db_chw_cost_yesterday	AV:3	Calculated
CHW DP	PSI	kPa	CHW loop dp	db_chw_dp		Mapped

Name	English Unit	Metric Unit	Description	Reference Name	Object ID	Data Source
CHW Entering Temp	F	C	common CHW return temp	db_chw_ent_t		Mapped
CHW kWh Today	kWh	kWh	electrical usage for CHW system only for current day	db_chw_kwh_today	AV:4	Calculated
CHW kWh Yesterday	kWh	kWh	electrical usage for CHW system only for previous day	db_chw_kwh_yesterday	AV:5	Calculated
CHW Leaving Temp	F	C	common CHW supply temp	db_chw_lvg_t		Mapped
CHW Output Today	ton-hr	kWh	refrigeration output of CHW system only for the current day	db_chw_otpt_today	AV:6	Calculated
CHW Output Yesterday	ton-hr	kWh	refrigeration output of CHW system only for the previous day	db_chw_otpt_yesterday	AV:7	Calculated
CHW Peak Input kW	kW	kW	Peak demand of CHW system only for current day	db_chw_peak_kw	AV:8	Calculated
CHW Peak Inst. Output	tons	kW	Peak refrigeration demand of CHW system only for current day	db_chw_peak_otpt	AV:9	Calculated
CHW system Efficiency	kW/ton	ikW/kW	electrical power consumed per ton of refrigeration output for CHW system	db_chw_efficiency	AV:10	Calculated
CW Cost Today			electrical cost for CW system only for the current day	db_cw_cost_today	AV:11	Calculated
CW Cost Yesterday			electrical cost for CW system only for the previous day	db_cw_cost_yesterday	AV:12	Calculated
CW DP	PSI	kPa	CW loop dp	db_cw_dp		Mapped
CW Entering Temp	F	C	CW return temp	db_cw_ent_t		Mapped
CW kWh Today	kWh	kWh	electrical usage for CW system only for current day	db_cw_kwh_today	AV:13	Calculated
CW kWh Yesterday	kWh	kWh	electrical usage for CW system only for previous day	db_cw_kwh_yesterday	AV:14	Calculated
CW Peak kW	kW	kW	peak electrical demand of CW system for current day	db_cw_peak_kw	AV:15	Calculated
Total Chiller Input kW	kW	kW	electrical demand of all chillers	db_ttl_chl_kw	AV:16	Calculated
Total Chiller Inst. Output	tons	kW	instantaneous refrigeration output of all chillers	db_ttl_chl_otpt	AV:17	Calculated
Total CHW Input kW	kW	kW	electrical demand of CHW system	db_ttl_chw_kw	AV:18	Calculated
Total CHWP kW	kW	kW	electrical demand of CHW pumps	db_ttl_chwp_kw	AV:19	Calculated
Total CW kW	kW	kW	electrical demand of system	db_ttl_cw_kw	AV:20	Calculated
Total CWP kW	kW	kW	electrical demand of CW pumps	db_ttl_cwp_kw	AV:21	Calculated
Total Plant Input kW	kW	kW	electrical demand of plant	db_ttl_plant_kw	AV:22	Calculated
Total Tower kW	kW	kW	electrical demand of tower fans	db_ttl_twr_kw	AV:23	Calculated

Name	English Unit	Metric Unit	Description	Reference Name	Object ID	Data Source
Differential Temp	F	C	differential temperature of CHW loop	db_diff_t		Mapped
Plant COP			plant coefficient of performance	db_plant_cop	AV:24	Calculated
Plant Cost Per Output Unit			cost per unit of refrigeration output measured by electrical power comsumption for plant	db_plant_cost_per_otpt_unit	AV:25	Calculated
Plant Cost Today			electrical cost for plant for the current day	db_plant_cost_today	AV:26	Calculated
Plant Cost Yesterday			electrical cost for plant for the previous day	db_plant_cost_yesterday	AV:27	Calculated
Plant Efficiency	kW/ton	ikW/kW	electrical power consumed per ton of refrigeration output for plant	db_plant_efficiency	AV:28	Calculated
Plant kWh Today	kWh	kWh	electrical usage for plant for current day	db_plant_kwh_today	AV:29	Calculated
Plant kWh Yesterday	kWh	kWh	electrical usage for plant for previous day	db_plant_kwh_yesterday	AV:30	Calculated
Plant Nominal Capacity	tons	kW	refrigeration capacity of plant	db_ttl_nom_cap	AV:31	Calculated
Plant Peak Input kW	kW	kW	Peak demand of plant for current day	db_plant_peak_kw	AV:32	Calculated
Outdoor Air Humidity	%rh	%rh	current outdoor air humidity	db_oah		Mapped
Outdoor Air Temperature	F	C	current outdoor air temperature	db_oat		Mapped

Enter cost value and set up gauges

You must enter the cost value and set the range for every gauge that is displayed on the graphics.

1 In the i-Vu® interface, go to the **Properties** page > **Control Program** tab > **Configuration** section.

2 Type in the **Cost Per kWh** in your local currency in **Default Value**.

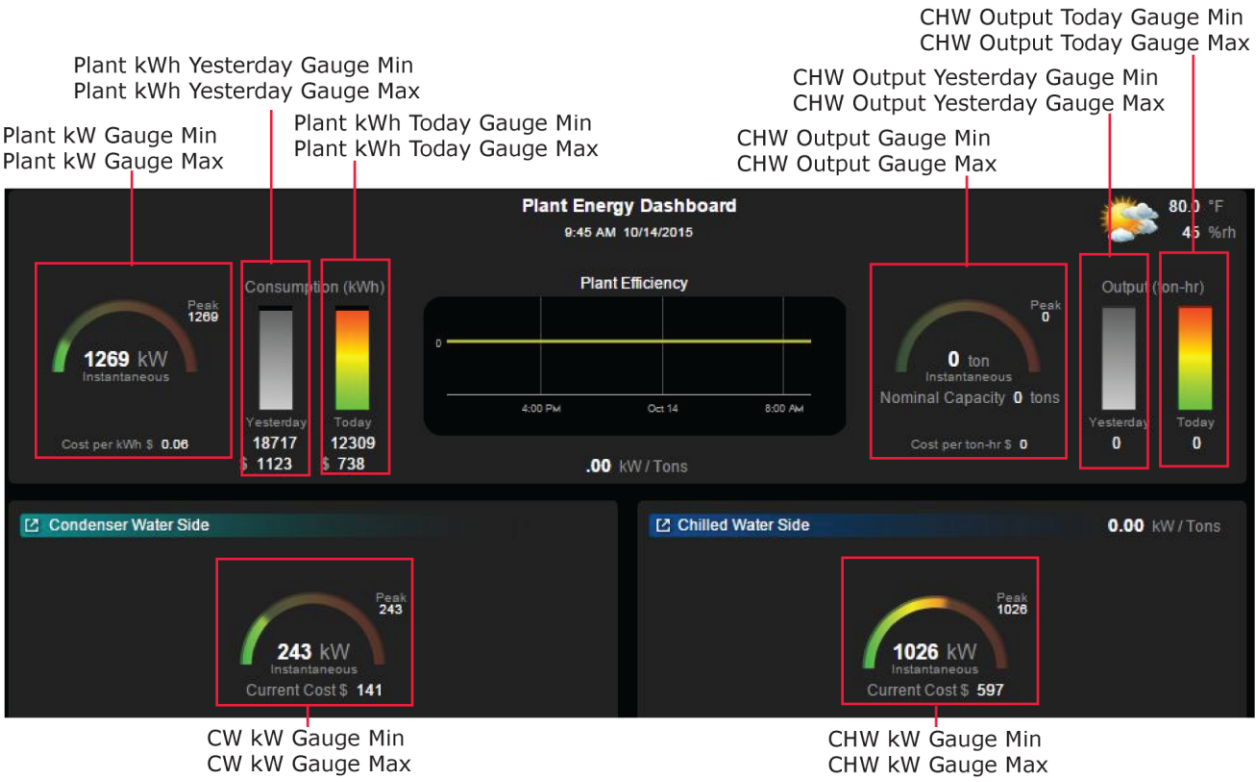
3 Type in the minimum and maximum values for each gauge, as shown below.

4 Use the following labeled graphics as a guide to the properties that correspond to each gauge.

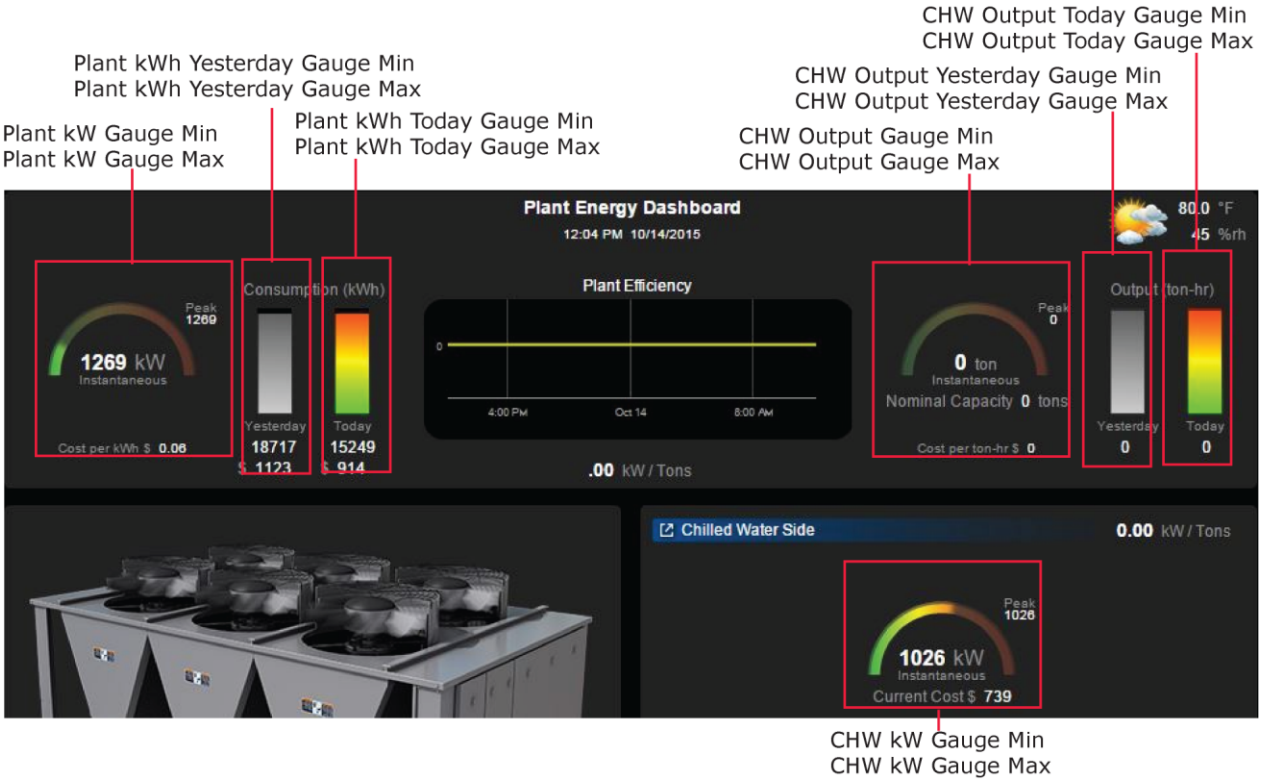
Home dashboard gauges

In the i-Vu® interface, go to the **Properties** page > **Control Program** tab > **Configuration** section.

Home dashboard for water-cooled chiller plant -(cvu_wc_hm_db.view)

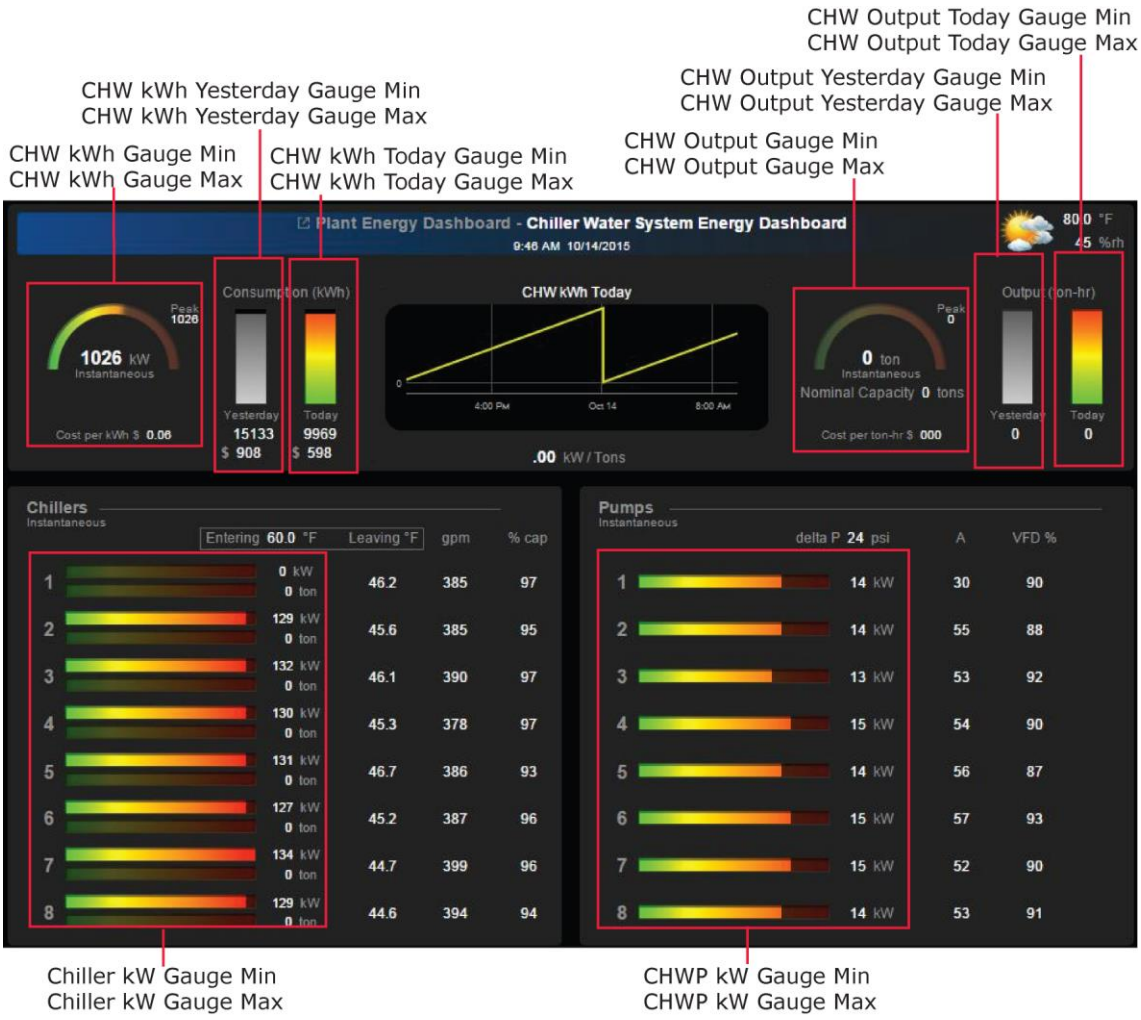


Home dashboard for air-cooled chiller plant - (cvu_ac_hm_db.view)



Detail dashboard for water-cooled chiller plant gauges

Detail dashboard for air-cooled chiller plant gauges



Document revision history

Important changes to this document are listed below. Minor changes such as typographical or formatting errors are not listed.

Date	Topic	Change description	Code*
		No changes yet	

* For internal use only