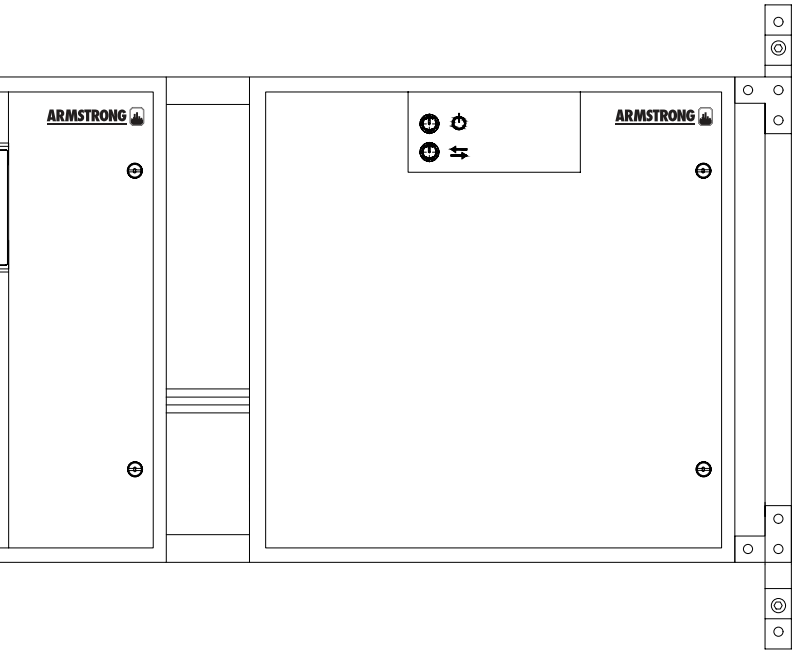
ARMSTRONG



IPC 9521

Chilled water plant control system

Installation and operating instructions

File No: 90.878
Date: SEPTEMBER 26, 2019
Supersedes: 90.878
Date: DECEMBER 12, 2017

CONTENTS

INSTALLATION INSTRUCTIONS

Incoming supply

Stand-alone IPC 9521 control system (with wall rack) - The incoming power supply should be brought in through the bottom of the panel adjacent to the main terminals. Note that this is the only electrical connection required at the panel.

The power supply voltage is 100-240VAC / 50-60 Hz as standard.

Please refer to the wiring diagram supplied with the unit for instructions on how to connect to IPC 9521 control system terminal block.

Note: The control system does not support power interruption. If the operation is critical, it is up to the user to provide a UPS (not included) capable of minimum 1500 VA.

Environmental limits

Operation temperature range: 0°C - 45°C (32°F-113°F) (must not be exposed to direct sunlight)

Operation humidity range: (10% - 85%) non-condensing

Operating altitude up to 2000 m (6561 feet)

Ambient air temperature for storage : 0°C - 60°C (32°F-140°F)

Note: All electrical wiring should be performed by a qualified electrician in accordance with the latest edition of the National Electrical Code, local codes and regulations.

Field devices installation instructions

Before attempting to start configuring the IPC 9521 control system using the Operator Interface (HMI – touch-screen), make sure all field installed devices such as DP sensors, flow sensors, DP switches, chiller communication wires are properly installed and wired to the IPC 9521 control system as per wiring diagrams provided.

Building automation system (BAS) connection

The IPC 9521 control system is provided with an RS 485 serial port or an Ethernet port to communicate to the BAS. Supported BAS communication protocols are Modbus and BACnet. Please refer to wiring diagrams supplied with the unit for wiring instructions, and the generic terminal block diagram for the different parameters and data points communicated to the BAS. For more information please contact your local Armstrong representative or Armstrong factory service department.

1.0 DISPLAY OVERVIEW

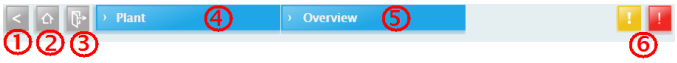
1.1 LOGIN SCREEN

Upon power on, manually logout or time out, the IPC9521 shows the login screen:

To login enter one of the following user/passwords. For level 2 (full access) contact Armstrong:

USER	PASSWORD
LEVEL0	12345
LEVEL1	husky09876

1.2 HEADER



The header is common to all screens. The following are its elements:

① Back. Goes to previous viewed screen

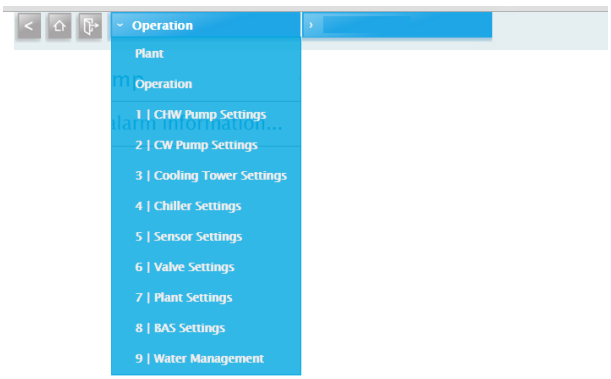
② Home. Goes to the System Overview screen

③ Logout. Logs the current user out, it then displays the IPC9521 login screen (**SEE 1.1**)

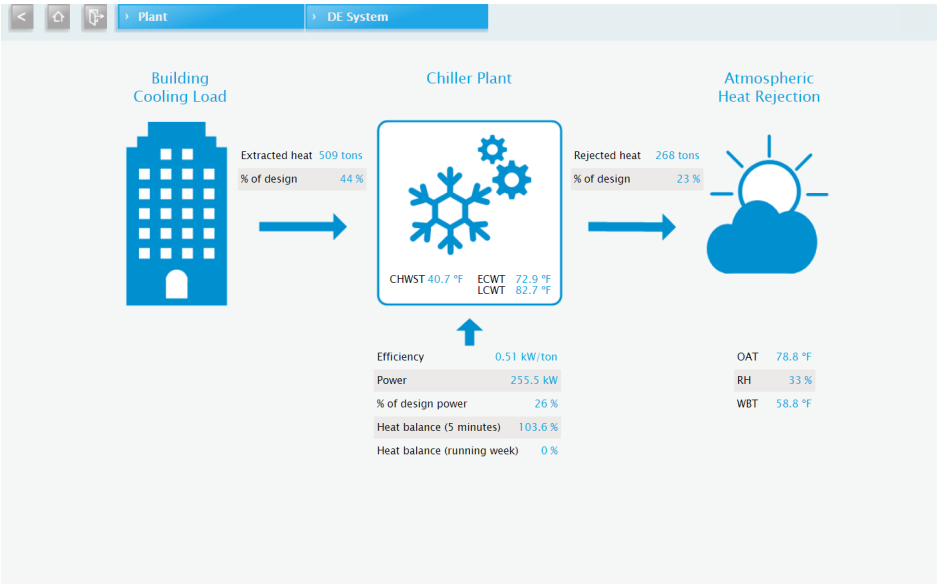
④ Drop down menu. Touch/click to show the navigation menu (see picture below)

⑤ Drop down submenu. Some of the selections on the drop down menu have one more level. Touch/click to select

⑥ Warnings/Alarms. The red icon indicates an alarm in the system, touch it to go to the Alarms screen. The yellow icon indicates a warning, touch it to bring up a popup window with a list of warnings

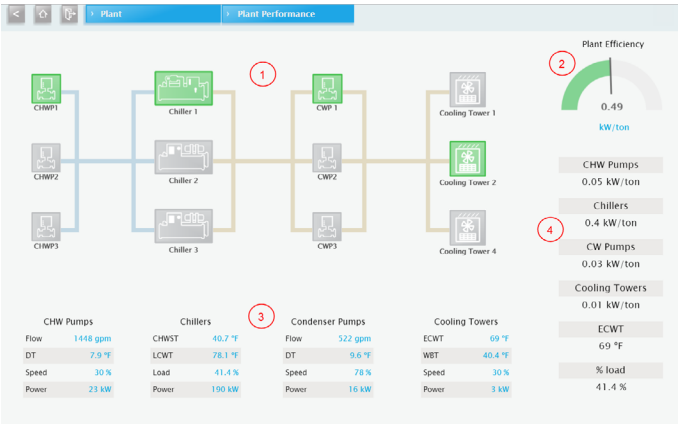


1.3 DE SYSTEM



This screen provides an overview of the energy and heat balance of the plant

1.4 PLANT PERFORMANCE



This screen provides details about the performance of the chilled water plant

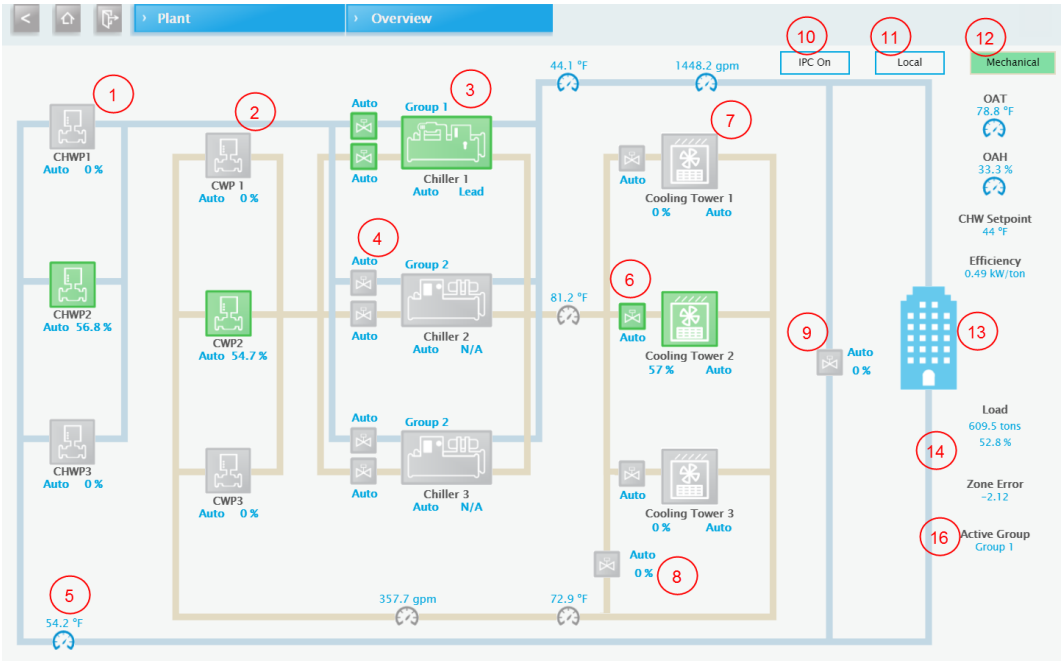
① Dynamic plant schematic. It shows the plant configuration and the status (running, idle, alarm) of each piece of equipment

② Plant efficiency gauge. Shows in real time the plant efficiency (in kW/ton)

③ Table that shows operating values of each group of equipment in the plant (Chilled Water Pumps, Chillers, Condenser Pumps & Cooling Towers)

④ Indicators of individual component efficiency (in kW/ton). Components include chillers, chilled water pumps, condenser water pumps and cooling towers.

1.5 SYSTEM OVERVIEW



① Chilled water pump icons:

- Color of pump indicates status: grey means off, green means running, red means alarm
- Speed (in %) is shown to the right of the icon
- Pump mode: Indicates if the pump is in Off, in Hand or in Auto, it is shown below the icon.
- Touching a chilled water pump icon opens the Chilled Water Pump Control Popup (**SEE SECTION 1.10**)

② Condenser water pump icons:

- Color of pump indicates status: grey means off, green means running, red means alarm
- Speed (in %) is shown to the right of the icon
- Pump mode: Indicates if the pump is in Off, in Hand or in Auto, it is shown below the icon.
- Touching a chilled water pump icon opens the Condenser Water Pump Control Popup (**SEE SECTION 1.12**)

③ Chiller icons:

- Color of chiller indicates status: grey means off, green means running, red means alarm
- Duty status is shown to the right of the icon: Lead, Lag1, Lag2, N/A, etc.
- Touching a chiller icon opens the Chiller Control Popup (**SEE SECTION 1.11**)
- If chillers are mixed, chillers in group 1 and in group 2 are represented by different icons, and the group number is shown on top of the chiller.

④ Chiller isolation valves icons (evaporator and condenser):

- Color of valve indicates status: grey means closed, green means open, red means alarm
- Touching an isolation valve icon opens the Isolation Valve Control Popup (**SEE SECTIONS 1.12 & 1.16**)

⑤ Sensors: The following sensors are shown at their approximate locations on the piping: chilled water supply and return temperatures ('CHWST', 'CHWRT' respectively), Entering Condenser Water Temperature and Leaving Condenser Water Temperature ('ECWT', 'LCWT' respectively), Chilled Water Flow ('Flow'), and Condenser Water Flow ('CW Flow'), Outdoor Air Temperature (OAT) and Outdoor Air Humidity (OAH).

⑥ Cooling tower isolation valve icons:

- Color of valve indicates status: grey means closed, green means open, red means alarm
- Touching a valve icon opens the Tower Isolation Valve Control Popup (**SEE SECTION 1.17**)

⑦ Cooling tower icons:

- Color of tower indicates status: grey means off, green means running, red means alarm
- Touching a tower icon opens the Cooling Tower Control Popup (**SEE SECTION 1.15**)

⑧ Condenser bypass valve icon:

- Shown only if bypass valve is enabled (parameter 6.60)
- Color of valve indicates status: grey means closed, green means open, red means alarm
- Valve position (opening in %) is shown beside the icon

- Touching the icon opens the CW Bypass Valve Control Popup (**SEE SECTION 1.18**)

⑨ Chilled water bypass valve icon:

- Indicates status of valve: grey means closed, green means open, red means alarm
- Valve position (opening in %) is shown beside the icon
- Touching the icon opens the CHW Bypass Valve Control Popup (**SEE SECTION 1.13**)

⑩ IPC9521 On/Off button:

- Touching the button toggles between On and Off
- In the Off position, the IPC9521 commences a normal stop sequence. All equipment will stop operating
- In the On position, the IPC9521 is enabled to start, the actual start of the plant depends on other conditions (see Local/Remote button below)

⑪ IPC9521 Local/Remote button:

- Touching the button toggles between Local and Remote
- In the Local position, the IPC9521 is enabled to start as soon as the IPC9521 On/Off button is in the On position
- In the Remote position, the IPC9521 is enabled to start as soon as two conditions are met: the IPC9521 On/Off button is in the On position and a remote signal from the BAS is active

⑫ IPC9521 status indicator:

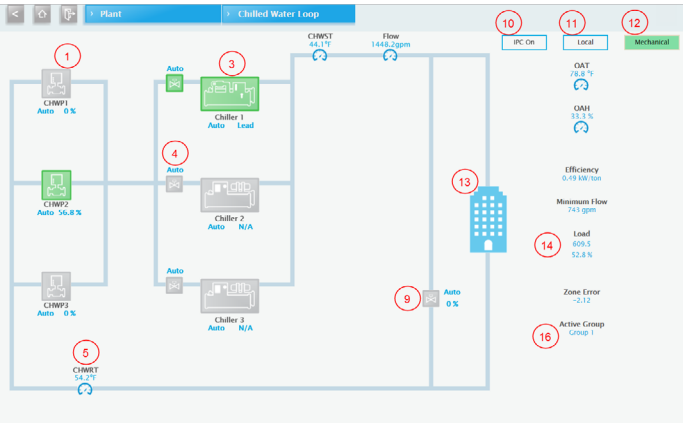
- Off: IPC9521 is off, no equipment will run. See IPC9521 On/Off button above
- Mechanical: IPC9521 is enabled, at least the lead chiller is enabled to run
- Standby: The IPC9521 detected low load in the building, all chillers are disabled and only the CHW Duty1 pump runs

⑬ Building icon: Touching the icon opens the zone overview or the sensorless popup window (**SEE SECTION 1.8**)

⑭ Miscellaneous indicators. Along the right border are variables associated with the plant operation: Chilled Water Supply Temperature Setpoint (CHW Setpoint), Efficiency (in kW/Ton), Plant Load (in Tons and %) and Zone Error (or Delta).

⑯ **Active group indicator:** If chillers are mixed, this indicator appears and show which chiller group (1 or 2) is currently active

1.6 CHILLED WATER CIRCUIT

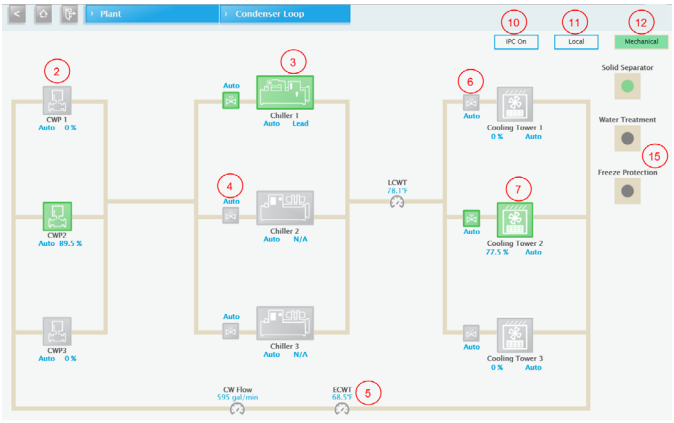


This screen provides an overview of the chilled water circuit. The screen shot on the left shows a specific plant configuration with 3 chillers and equal number of headered pumps, however the screen dynamically adjusts to the selected configuration.

⑭ **Miscellaneous indicators.** Along the right border are variables associated with the plant operation:Efficiency (in kW/Ton), Minimum Flow (of running chillers), Plant Load (in Tons and %) and Zone Error (or Delta).

Please refer to system overview section for detailed description of the remaining icons.

1.7 CONDENSER WATER CIRCUIT

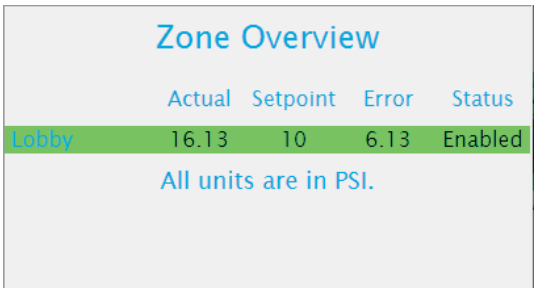


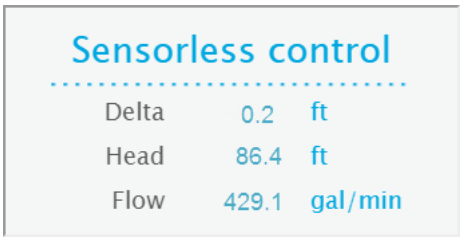
This screen provides an overview of the condenser water circuit. The screen shot on the left shows a specific plant configuration with 3 chillers and equal number of headered pumps and towers, however the screen dynamically adjusts to the selected configuration.

⑮ **Auxiliary equipment:** Indicates the status (Off, Running or Alarm) of the Solid Separator, Water Treatment and Freeze Protection systems. These systems must be enabled on the Water Management setting screen to be shown on this screen.

Please refer to system overview section for detailed description of the remaining icons.

1.8 ZONE OVERVIEW





When parameter **1.7** is set to Zone DP/Temp control, this popup screen provides detailed information about the zones

1. Actual is the current value from the sensor
2. Setpoint indicates the user adjustable Setpoint for each zone
3. Error is the difference between Actual and Setpoint, the zone with the most negative error becomes the Active Zone
4. Status indicates whether the zone is enabled or disabled
5. The Active Zone is indicated by a green band

When parameter **1.7** is set to Sensorless, this popoup screen provides detailed information about sensorless pump control

1. Delta indicates how far the pumps operate from the optimum control. A delta of zero is desired.
2. Head indicates the current pump head
3. Flow indicates the system flow

1.9 CONTROL SCREENS BUTTONS

HAND

OFF

AUTO

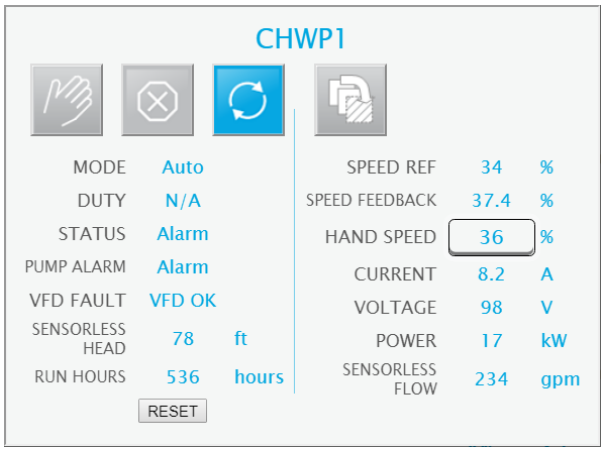
SET AS LEAD

OPEN

CLOSE

The control screens have the following buttons.
Grey color indicates inactive, blue indicates active.

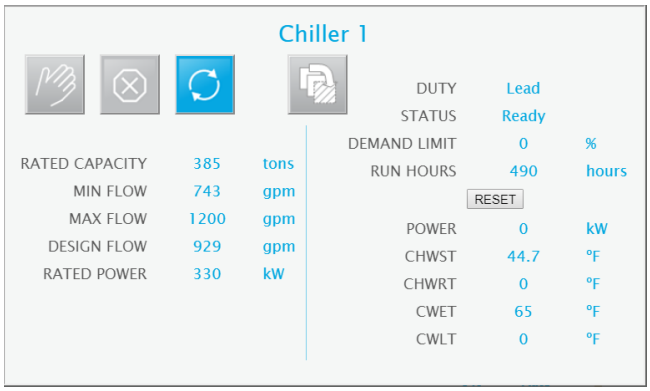
1.10 CHILLED WATER PUMP CONTROL SCREEN



This popup screen provides control of the chilled water pumps. One screen per pump.

1. Press the **HAND**, **OFF**, **AUTO** buttons to select the desired mode
2. Press **SET AS LEAD** button to set the pump as lead pump, also referenced as Duty 1. The other pumps in the IPC will rearrange themselves as Duty 2, Duty 3, etc. or Stand-by if selected
3. **Duty** displays the pump duty status Duty 1, Duty 2, Duty 3 etc. or stand-by if selected. If the configuration is dedicated Duty is displayed. If the pump is Off or in Alarm N/A is displayed
4. **Status** displays Pump status (Running/Off/Alarm)
5. **Pump Alarm** displays Ok or Alarm to indicate the pump status
6. **VFD Fault** displays VFD Ok or Fault to indicate the VFD status
7. **Run Hours** indicates the pump total running time since the last reset and can be reset by pressing the **RESET** button.
8. **Speed Ref** displays the reference speed sent to the VFD in % value of pump full speed
9. **Speed Feedback** displays pump actual speed feedback from the VFD in % value of pump full speed
10. When in **HAND** mode, enter the desired speed in the **Hand Speed** box
11. VFD Current (amps), Voltage (volts) and Power (kW) are displayed
12. VFD sensorless head and flow are displayed if available

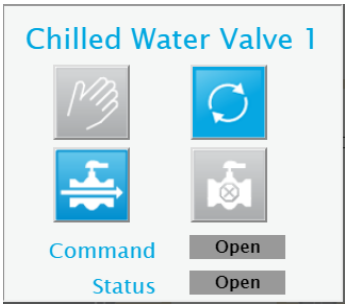
1.11 CHILLER CONTROL SCREEN



This popup screen provides control of the chillers. One screen per chiller.

1. Press the **HAND**, **OFF**, **AUTO** buttons to select the desired mode
2. Press **SET AS LEAD** button to set the chiller as lead chiller. The other chillers in the IPC will rearrange themselves as Lag 1, Lag 2, etc.
3. **Duty** displays the chiller duty status: Lead, Lag1, Lag2, N/A, etc.
4. **Status** displays chiller status (Ready/Not Ready/Enabled/ Started/Running/Shutdown/Alarm)
5. **Demand Limit** displays the reference demand limit sent to the chiller in% value of chiller full capacity
6. **Run Hours** indicates the chiller total running time since the last reset and can be reset by pressing the **RESET** button
7. Chiller Current (amps) or Power (kWs), Leaving and Entering Chilled Water Temperatures (Evaporator & Condenser) are displayed.
8. **Rated Capacity** Displays the chiller corresponding capacity for user reference.
9. Chiller Minimum, Maximum & Design Flow are displayed
10. Rated power is displayed

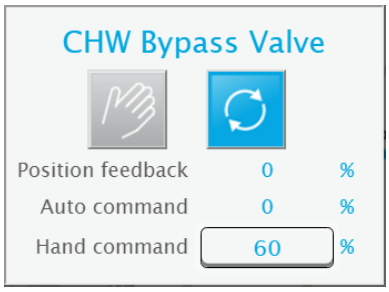
1.12 CHW ISOLATION VALVES CONTROL SCREEN



This popup screen provides control of the chilled water isolation valves. One screen per valve.

1. Press the **HAND** or **AUTO** button to select the desired mode
2. When in **HAND** mode, press the **OPEN** or **CLOSE** button to perform the desired action
3. **Status** indicates the position of the valve or if it is in alarm

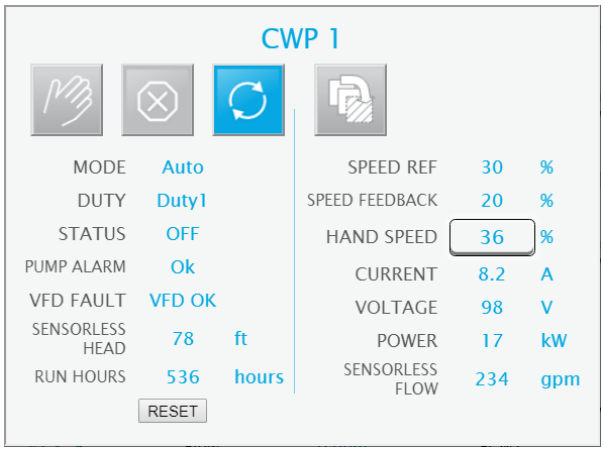
1.13 CHW BYPASS VALVE CONTROL SCREEN



This popup screen provides control of the chilled water bypass valve.

1. Press the **HAND** or **AUTO** button to select the desired mode
2. Position Feedback displays the actual position of the valve opening in %, if enabled in bypass valve setup
3. **Auto Command** indicates the valve command in percentage, when in auto mode
4. When in **HAND** mode, enter the desired position in the **Hand Command** box

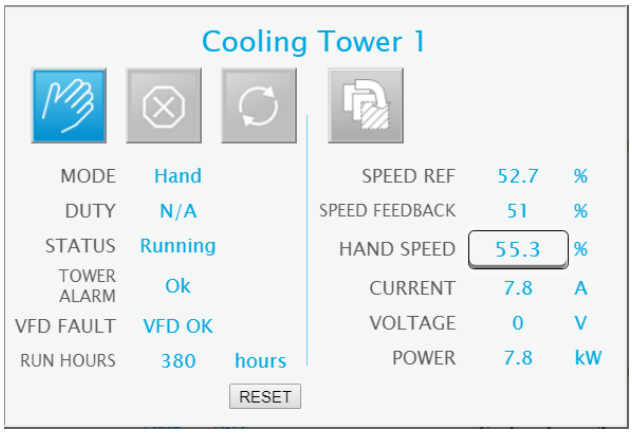
1.14 CONDENSER PUMP CONTROL SCREEN



This popup screen provides control of the condenser water pumps. One screen per pump.

1. Press the **HAND**, **OFF**, **AUTO** buttons to select the desired mode
2. Press **SET AS LEAD** button to set the pump as lead pump, also referenced as Duty 1. The other pumps in the IPC will rearrange themselves as Duty 2, Duty 3, etc. or Stand-by if selected
3. **Duty** displays the pump duty status Duty 1, Duty 2, Duty 3 etc. or stand-by if selected. If the configuration is dedicated Duty is displayed. If the pump is Off or in Alarm N/A is displayed
4. **Status** displays Pump status (Running/Off/Alarm)
5. **Pump Alarm** displays Ok or Alarm to indicate the pump status
6. **VFD Fault** displays VFD Ok or Fault to indicate the VFD status
7. **Run Hours** indicates the pump total running time since the last reset and can be reset by pressing the **RESET** button.
8. **Speed Ref** displays the reference speed sent to the VFD in % value of pump full speed
9. **Speed Feedback** displays pump actual speed feedback from the VFD in % value of pump full speed
10. When in **HAND** mode, enter the desired speed in the **Hand Speed** box
11. VFD Current (amps), Voltage (volts) and Power (kW) are displayed
12. VFD sensorless head and flow are displayed if available

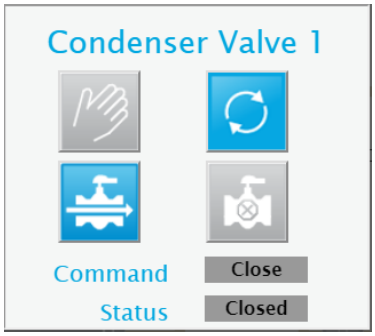
1.15 COOLING TOWER CONTROL SCREEN



This popup screen provides control of the towers. One screen per tower.

1 Press the **HAND**, **OFF**, **AUTO** buttons to select the desired tower fan mode
2 Press **SET AS LEAD** button to set the tower as lead tower, also referenced as Duty 1. The other towers in the IPC will rearrange themselves as Duty 2, Duty 3, etc.
3 **Duty** displays the tower duty status Duty1, Duty2, Duty3 etc. If the tower or isolation valve is Off/closed or in Alarm, N/A is displayed
4 **Status** displays tower fan status (Running/Off/Alarm)
5 **Tower Alarm** displays Ok or Alarm to indicate the tower status
6 **VFD Fault** displays VFD Ok or Fault to indicate the tower fan VFD status
7 **Run Hours** indicates the tower fan total running time since the last reset and can be reset by pressing the **RESET** button.
8 **Speed Ref** displays the reference speed sent to the VFD in % value of tower fan full speed
9 **Speed Feedback** displays tower fan actual speed feedback from the VFD in % value of fan full speed
10 When in **HAND** mode, enter the desired speed in the **Hand Speed** box
11 VFD Current (amps), Voltage (volts) and Power (kW) are displayed

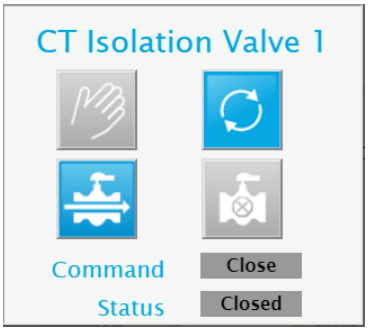
1.16 CW ISOLATION VALVES CONTROL SCREEN



This popup screen provides control of the condenser water isolation valves. One screen per valve.

1 Press the **HAND** or **AUTO** button to select the desired mode
2 When in **HAND** mode, press the **OPEN** or **CLOSE** button to perform the desired action
3 **Status** indicates the position of the valve or if it is in alarm

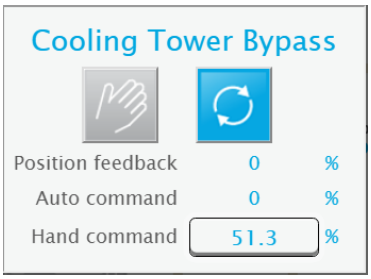
1.17 COOLING TOWER ISOLATION VALVES CONTROL SCREEN



This popup screen provides control of the cooling tower isolation valves. One screen per valve.

1. Press the **HAND** or **AUTO** button to select the desired mode
2. When in **HAND** mode, press the **OPEN** or **CLOSE** button to perform the desired action
3. **Status** indicates the position of the valve or if it is in alarm

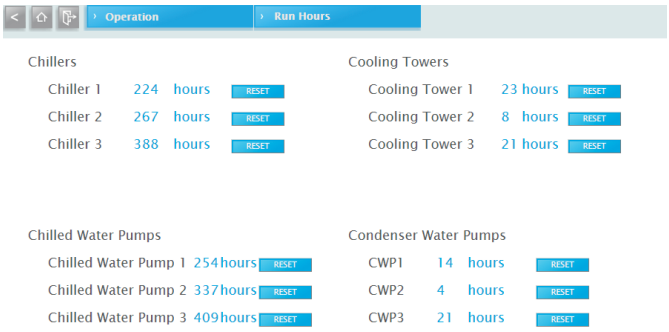
1.18 COOLING TOWER BYPASS VALVE CONTROL SCREEN



This popup screen provides control of the condenser water bypass valve.

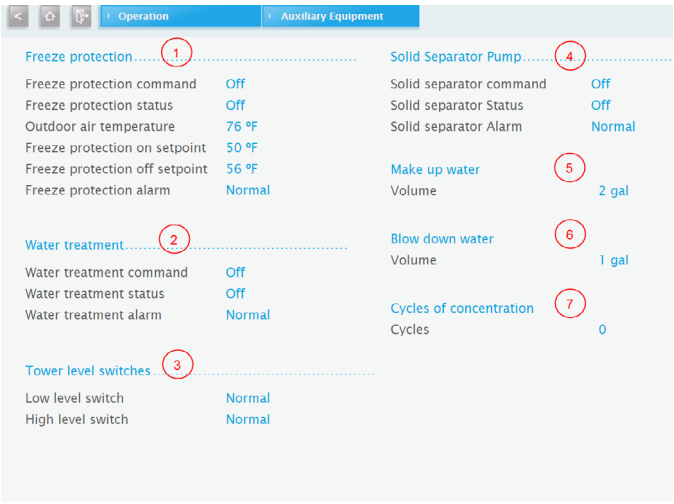
1. Press the **HAND** or **AUTO** button to select the desired mode
2. Position Feedback displays the actual position of the valve opening in %, if enabled in bypass valve setup
3. **Auto Command** indicates the valve command in percentage, when in auto mode
4. When in **HAND** mode, enter the desired position in the **Hand command** box

1.19 RUN HOURS



This screen shows the run hours of each device in the plant. Press the **RESET** button next to each device to reset its run hours counter.

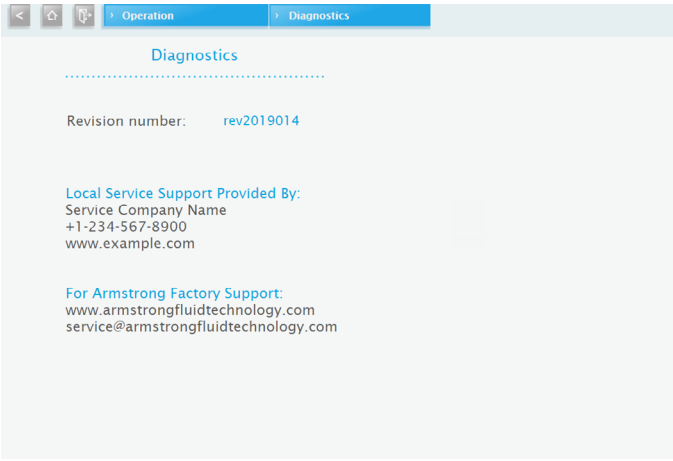
1.20 AUXILIARY EQUIPMENT



This screen shows the status of the auxiliary equipment for the condenser water loop. Its elements are:

1. **Freeze protection:** If enabled (parameter **9.5**) shows if the IPC9521 is commanding the freeze protection On or Off. The run feedback status, the current OAT, the setpoints to turn On or Off the freeze protection, and the alarm status (Normal or Alarm) are shown.
2. **Water treatment:** If enabled (parameter **9.3**) shows if the IPC9521 is commanding the water treatment system On or Off. The run feedback status and the alarm status (Normal or Alarm) are shown.
3. **Tower level switches:** Shows the status of the two Tower Level Switches (High & Low). The status can be Normal or Alarm
4. **Solid separator:** If enabled (parameter **9.4**) shows if the IPC9521 is commanding the solid separator system On or Off. The run feedback status and the alarm status (Normal or Alarm) are shown.
5. **Makeup water counter:** If enabled (parameter **9.1**) shows the daily makeup water consumption
6. **Blow down water counter:** If enabled (parameter **9.15**) shows the daily blow down water consumption
7. **Cycles of concentration:** If Makeup and Blow down water counters are enabled, cycles of concentration shows their ratio

1.21 DIAGNOSTIC



This screen provides information about the software revision and contact information for service.

1. Indicates the current revision installed
2. Provides contact of the local service support representative. The name, phone number and website of the local supplier are editable by pressing the corresponding Edit buttons (requires Level2 access)
3. Factory support contact

1.22 TRENDS

Use this page to display trends of the main variables in the system.

The list on the left side (1) shows the trends available for display. Touch the variable you want to display and it will be added on the chart area (2) and auto scaled.

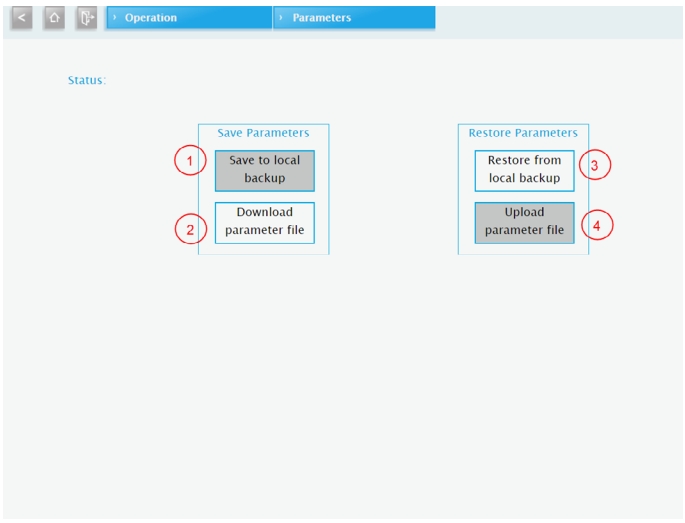
You can choose up to 5 trends at the same time.

To remove a trend, touch on its name again.

Touching the filter icon (3) opens the time range menu for the trends, the options are:

- Today
- Last 24 hours
- Yesterday
- Last 7 days
- Month to date
- Everything

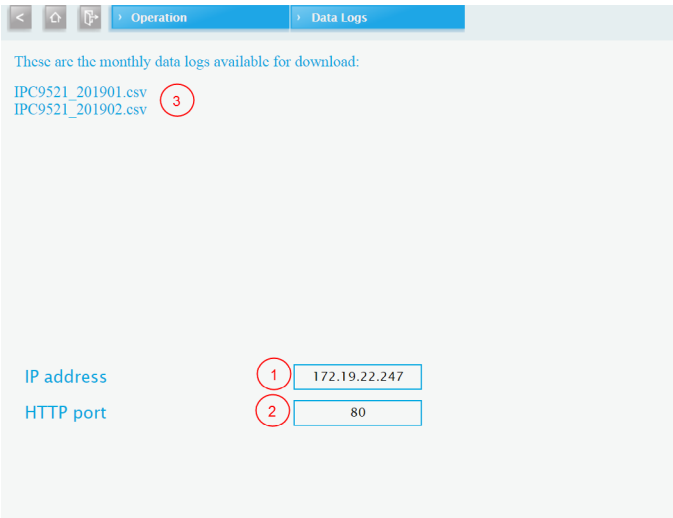
1.23 PARAMETERS



This screen allows the user to manage backups of all the settings. The options are:

1. **Save to local backup:** This button saves all the parameters to the controller memory. The date of the backup creation is displayed.
2. **Download parameter file:** This button downloads the backup created to locally (see 1 above). It is a text file that can be stored and used at a later time (see 4 below)
3. **Restore from local backup:** If after creating a local backup (see 1 above), some settings were changed, pressing this button will restore all parameters to the local backup (from point 1 above)
4. **Upload parameter file.** Pressing this button opens a dialog to select the desired backup file. This will over write all the current settings with the ones from the file. Use this option to return the IPC9521 to a previous configuration that was satisfactory

1.24 DATA LOGS



This screen allows the user to retrieve the IPC9521 data logs. The data logs are csv files that are created at the end of the month, the name of the file reflects its date, for example: IPC9521_201901.csv is the data log corresponding to January 2019.

The IPC9521 stores 24 months of data, the oldest data logs are lost when reaching the limit.

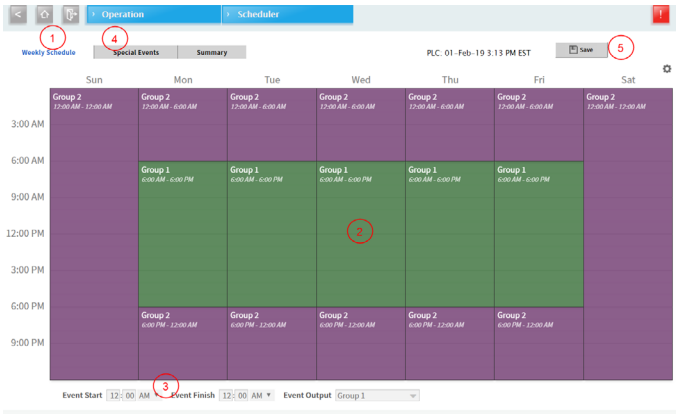
The following are the elements on the page:

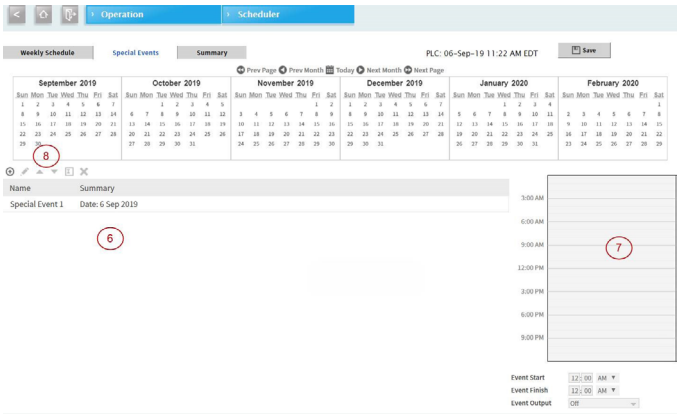
1 IPC9521 IP address: Contains the IP address of the IPC9521 controller. The default is 192.168.127.101 and it does not need to be changed if connecting directly to the router inside panel or to the ethernet port on the side.
If connecting to the IPC9521 remotely, enter in this field the external IP address of the controller. If in doubt enter the address on navigation bar of the browser.

2 HTTP port: Indicates the port for HTTP data transferring. The default is 80 and generally it does not need to be changed.
If connecting remotely, it is possible that a firewall will block traffic on this port, in that case contact the IT department for the authorized port.

3 List of available data logs. The last part of the name indicates the date of the log, for example IPC9521_201901.csv is the data log corresponding to January 2019. Touch on the name of the file to start the download process. If using Chrome as browser (recommended), when the file is downloaded it will appear at the bottom left of the browser window

1.25 SCHEDULER





Use this page to configure the IPC9521 scheduler.

NOTE:

- The scheduler has to be enabled via parameter **7.28**, otherwise the changes don't take effect.
- Even when enabled, the scheduler is only effective when parameter **4.2** is set to Mixed.

There are two main tabs on the scheduler: Weekly Schedule & Special Events

Weekly Schedule tab (①)

Use the Weekly Schedule tab in the Scheduler view to enter **normal schedule events** that repeat from week to week, based on the day of the week and the time of day. Once entered, operating events appear as green or purple colored blocks (2) with the label **Group 1** or **Group 2**. **OFF** events (default) appear as red colored blocks.

To add a new event simply click in a day at the approximate event start time, and drag down to define the start and finish time, as shown here.

While the event is selected you can click on the Start and Finish dropdown lists located in the lower left corner to adjust start and finish times and select the Group that will operate in that time slot. (③).

After configuration of the Scheduler is done, press the Save icon (⑤) on the top right of the screen.

Special events tab (④)

Special events apply to weekly schedules only, and are considered an exception to the (normal) weekly schedule. Special events can be **one-time** only event changes or recurring event changes, such as holidays.

The Special Events tab is comprised of the Special Events table (⑥), and a 24-hour time pane (⑦). The Special Events table shows a listing of all existing schedules by name and summary. At the top of the table, controls are provided for adding, editing, or deleting schedules (⑧). In addition, Up and Down links are provided for sorting schedules in order of priority (in case of schedule overlaps). Schedules at the top have the highest priority.

A newly-created special event has no details defined. To add or change details, select the special event and click on the 24-hour time pane to define the start time, finish time, and output (**Group 1**, **Group 2** or **OFF**), in the same way as in the Weekly Schedule tab.

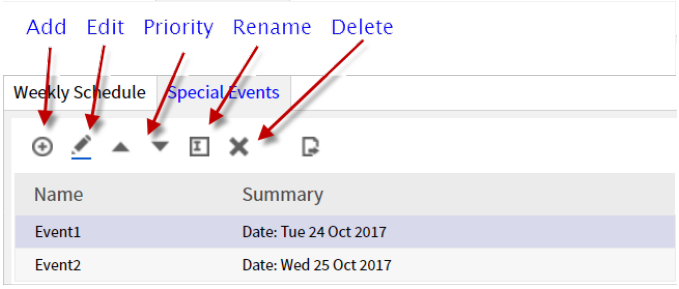
NOTE: You must specify details for any special event to occur. Where nothing is scheduled, the special event relinquishes control back to any lower-priority schedule events. To completely override the weekly schedule, configure a special event for the entire day.

Special event priorities

All special events take priority over regular weekly events. Among special events, you define relative priorities by the order of listing in the Special Events table, as follows:

- Highest priority is at top of list. Events in this special event, when active, always occur.
- Lowest priority is at bottom of list. Events occur only if not overlapped by other special events active during the same period.

Change a special event's priority by selecting it and using the priority arrow buttons, as shown in the following image.



Options may include the following:

Add: Add a new special event

Edit: Edit day(s) selection criteria (but not changing special event type).

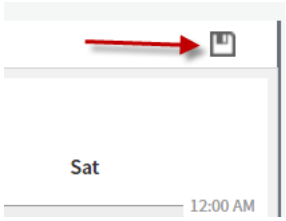
Rename: Rename selected special event.

Priority (up): Move special event up in priority list.

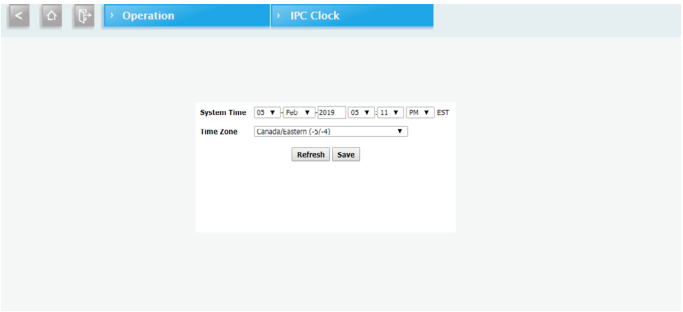
Priority (down): Move special event down in priority list.

Delete: Removes selected special event from the schedule component.

After configuration of the Scheduler is done, press the Save icon (⑤) on the top right of the screen.



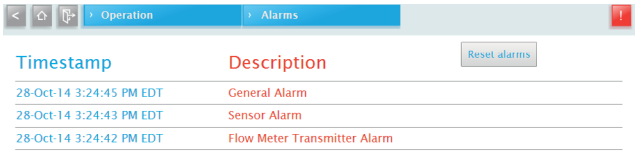
1.26 IPC CLOCK



This screen allows the user to adjust the IPC clock.

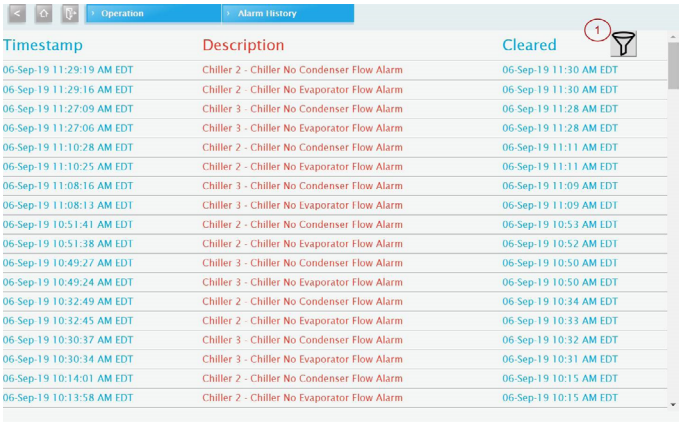
2.0 ALARMS

2.1 ALARMS SCREEN



1. All alarms will be displayed in chronological order
2. The last alarm will be at the top of the screen
3. Press **Reset Alarm** to reset all active alarms
4. Press the up and down arrow buttons to view more alarms

2.2 ALARM HISTORY SCREEN



1. The alarm history saved in the internal memory is displayed
2. Press the Filter button by the top-right screen to select the time range (Today/Last 24 Hours/Yesterday/Week to Date/Last Week/Last 7 days/Month to Date/Last Month/ Year to Date/Last Year) for alarm history to display
3. Press the up and down arrow buttons to view more alarms

2.3 LIST OF ALARMS

ALARM	DESCRIPTION	POSSIBLE CAUSES
General alarm	Any alarm in the system	
Sensor alarm	There is a sensor alarm in the system	
CHWP n no run feedback alarm	The PLC didn't detect the pump run feedback after commanding the pump to start. This alarm auto-resets every 5 minutes	• VFD not configured for serial control • VFD not in AUTO at the local panel • Impeller is stuck
CHWP n VFD fault alarm	The pump VFD is reporting a fault. This alarm auto-resets every 5 minutes	VFD over current or other problem. Check VFD local display
CHWP n communication alarm	The IPC does not have communication with the pump VFD. This alarm auto-resets every 30 seconds	• Not proper VFD selected (parameter 1.6) • VFD not configured for serial communication • Loose or broken wire from VFD • Damaged serial port on PLC
Chilled water supply temperature transmitter alarm	The PLC detects a signal out of range	• Connection to transmitter is short or open circuited • Damaged PLC analog input • Loose or broken wire from transmitter • Damaged transmitter
Chilled water return temperature transmitter alarm	The PLC detects a signal out of range	• Connection to transmitter is short or open circuited • Damaged PLC analog input • Loose or broken wire from transmitter • Damaged transmitter
Chilled water flow meter transmitter alarm	The PLC detects a signal out of range	• Connection to transmitter is short or open circuited • Damaged PLC analog input • Loose or broken wire from transmitter • Damaged transmitter
IPC 3500 outdoor air temperature transmitter alarm	The PLC detects a signal out of range	• Connection to transmitter is short or open circuited • Damaged PLC analog input • Loose or broken wire from transmitter • Damaged transmitter
Chilled water pump head transmitter alarm	The PLC detects a signal out of range	• Connection to transmitter is short or open circuited • Damaged PLC analog input • Loose or broken wire from transmitter • Damaged transmitter
Chilled water system DP transmitter alarm	The PLC detects a signal out of range	• Connection to transmitter is short or open circuited • Damaged PLC analog input • Loose or broken wire from transmitter • Damaged transmitter
Zone n transmitter alarm	The zone transmitter is out of range	• Connection to transmitter is short or open circuited • Damaged PLC analog input • Loose or broken wire from transmitter • Damaged transmitter
All zones transmitter alarm	All zone transmitters are out of range. Pumps will run at speed determined by parameter 1.23	• Connection to transmitters is short or open circuited • Damaged PLC analog inputs • Loose or broken wire from transmitters • Damaged transmitters

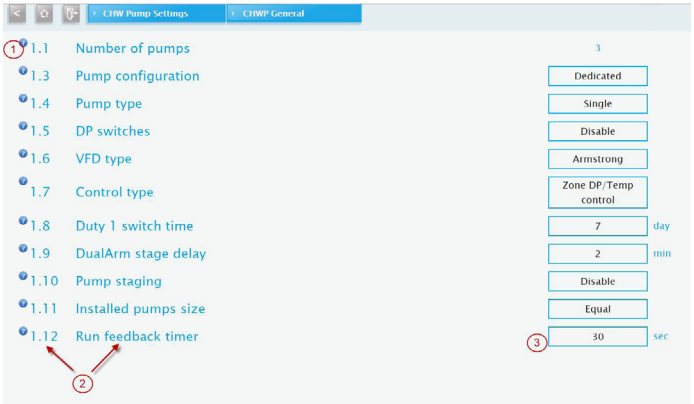
ALARM	DESCRIPTION	POSSIBLE CAUSES
Chiller n kW sensor alarm	The PLC detects a signal out of range	• Connection to transmitter is short or open circuited • Damaged PLC analog input • Loose or broken wire from transmitter • Damaged transmitter
Chilled water bypass valve sensor alarm	The PLC detects a signal out of range	• Connection to transmitter is short or open circuited • Damaged PLC analog input • Loose or broken wire from transmitter • Damaged transmitter
Chilled water isolation valve n open feedback alarm	The valve is not at the open position after the corresponding delay expired	• There is a problem with valve position limit switch • The valve is not operating • Loose or broken wire from limit switch or to valve actuator • Damaged digital input or output
Chilled water isolation valve n close feedback alarm	The valve is not at the closed position after the corresponding delay expired	• There is a problem with valve position limit switch • The valve is not operating • Loose or broken wire from limit switch or to valve actuator • Damaged digital input or output • PLC not connected or not working
Chilled water bypass valve feedback alarm	The position of the bypass valve is 5% or more off the commanded position	• Valve not operating properly • Position sensor not calibrated • Valve actuator not calibrated • Incorrect wiring • Damaged analog input • PLC not connected or not working
Chiller communication alarm	The IPC does not have communication with the chiller. This alarm auto-resets every 30 seconds	• Incorrect protocol selected (parameters 4.71/271/371/471/571) • Chiller not configured for serial communication at the local panel • PLC doesn't have the proper communication driver installed • Loose or broken wire from chiller • Damaged serial port on PLC
Chiller n no evaporator flow alarm	The IPC tried to start the chiller but no flow was detected	• The pump associated with the chiller is not running • The chiller isolation valve is not open • The chiller flow switch (obtained from serial communication) is not communicated
Chiller no condenser flow alarm	The IPC tried to start the chiller but no flow was detected	• The pump associated with the chiller is not running • The chiller isolation valve is not open • The chiller flow switch (obtained from serial communication) is not communicated
Chiller n no run feedback alarm	There was no chiller run feedback detected within the corresponding delay	• In case of hard wired chillers, check that the chiller is receiving the start command • In case of hard wired chillers, check that the IPC reads current/power and that it is at least 10% (or parameter 4.57/257/357/457/557) of RLA/rated power • In case of serial communication, verify that the chiller is sending the run feedback • Verify that chiller is configured for remote operation

ALARM	DESCRIPTION	POSSIBLE CAUSES
Chiller panel alarm	The chiller local control panel is reporting an alarm	• Check chiller panel for a cause • In case of hard wired chillers, check for digital input to PLC
CWP n no run feedback alarm	The PLC didn't detect the pump run feedback after commanding the pump to start. This alarm auto-resets every 5 minutes	• VFD not configured for serial control • VFD not in AUTO at the local panel • Impeller is stuck
CWP n VFD fault alarm	The pump VFD is reporting a fault. This alarm auto-resets every 5 minutes	• VFD over current or other problem. Check VFD local display
CWP n communication alarm	The IPC does not have communication with the pump VFD. This alarm auto-resets every 30 seconds	• Incorrect VFD selected (parameter 2.6) • VFD not configured for serial communication • Loose or broken wire from VFD • Damaged serial port on PLC
Entering condenser water temperature transmitter alarm	The PLC detects a signal out of range	• Connection to transmitter is short or open circuited • Damaged PLC analog input • Loose or broken wire from transmitter • Damaged transmitter
Leaving condenser water temperature transmitter alarm	The PLC detects a signal out of range	• Connection to transmitter is short or open circuited • Damaged PLC analog input • Loose or broken wire from transmitter • Damaged transmitter
Condenser water flow meter transmitter alarm	The PLC detects a signal out of range	• Connection to transmitter is short or open circuited • Damaged PLC analog input • Loose or broken wire from transmitter • Damaged transmitter
Condenser water pump DP transmitter alarm	The PLC detects a signal out of range	• Connection to transmitter is short or open circuited • Damaged PLC analog input • Loose or broken wire from transmitter • Damaged transmitter
ITC 3600 outdoor air temperature transmitter alarm	The PLC detects a signal out of range	• Connection to transmitter is short or open circuited • Damaged PLC analog input • Loose or broken wire from transmitter • Damaged transmitter
Outdoor air humidity transmitter alarm	The PLC detects a signal out of range	• Connection to transmitter is short or open circuited • Damaged PLC analog input • Loose or broken wire from transmitter • Damaged transmitter
Condenser water bypass valve position sensor alarm	The PLC detects a signal out of range	• Connection to transmitter is short or open circuited • Damaged PLC analog input • Loose or broken wire from transmitter • Damaged transmitter
Condenser water isolation valve n open feedback alarm	The valve is not at the open position after the corresponding delay expired	• There is a problem with valve position limit switch • The valve is not operating • Loose or broken wire from limit switch or to valve actuator • Damaged digital input or output

ALARM	DESCRIPTION	POSSIBLE CAUSES
Condenser water isolation valve n close feedback alarm	The valve is not at the close position after the corresponding delay expired	• There is a problem with valve position limit switch • The valve is not operating • Loose or broken wire from limit switch or to valve actuator • Damaged digital input or output
Cooling tower isolation valve n open feedback alarm	The valve is not at the open position after the corresponding delay expires	• There is a problem with valve position limit switch • The valve is not operating • Loose or broken wire from limit switch or to valve actuator • Damaged digital input or output
Cooling tower isolation valve n close feedback alarm	The valve is not at the close position after the corresponding delay expires	• There is a problem with valve position limit switch • The valve is not operating • Loose or broken wire from limit switch or to valve actuator • Damaged digital input or output
Condenser water bypass valve position feedback alarm	The position of the bypass valve is 5% or more off the commanded position	• Valve not operating properly • Position sensor not calibrated • Valve actuator not calibrated • Incorrect wiring • Damaged analog input
CTF n no run feedback alarm	The PLC didn't detect the pump fan feedback after commanding the fan to start. This alarm auto-resets every 5 minutes	• VFD not configured for serial control • VFD not in AUTO at the local panel • Mechanical problem with fan
CTF n communication alarm	The IPC does not have communication with the cooling tower fan VFD. This alarm auto-resets every 30 seconds	• Incorrect VFD selected (parameter 3.8) • VFD not configured for serial communication • Loose or broken wire from VFD • Damaged serial port on PLC
CTF n VFD fault	The CTF VFD is reporting a fault. This alarm auto-resets every 5 minutes	• VFD over current or other problem. Check VFD local display
Emergency stop alarm	The Emergency Stop button has been pressed (see two alarms below)	
IPC3500 emergency stop	The Emergency Stop button on the IPC9521 panel has been pressed	• If the button is not pressed check wiring • If no button is installed and not required, install a jumper between terminals 67 & 68
ITC3600 emergency stop	The Emergency Stop button on the ITC3600 panel has been pressed	• If the button is not pressed check wiring • If no button is installed and not required, install a jumper between terminals 517 & 518
Cooling towers high level alarm	The IPC detected cooling tower water high level	• Makeup water system not working properly • Wiring on terminals 573 & 574 • If there is no level detection, install a jumper on terminals 573 & 574
Cooling towers low level alarm	The IPC detected cooling tower water low level. This is a critical alarm, IPC is shutdown	• Check for leaks • Makeup water system not working • Wiring on terminals 571 & 572 • If there is no level detection, install a jumper on terminals 571 & 572

ALARM	DESCRIPTION	POSSIBLE CAUSES
All cooling tower fans failed alarm	All cooling tower fans are in alarm. This is a critical alarm, the IPC is shutdown	• Verify each fan and clear alarms
Water treatment run feedback alarm	The PLC didn't detect the water treatment system run feedback within the corresponding delay	• Verify configuration of the water treatment system • Verify connections • Damaged digital input
Solid separator run feedback alarm	The PLC didn't detect the solid separator pump run feedback within the corresponding delay	• Verify configuration of solid separator system • Verify connections • Damaged digital input
Heat trace run feedback alarm	The PLC didn't detect the heat trace operating feedback within the corresponding delay	• Verify configuration of heat trace system • Verify connections • Damaged digital input
Daily CT water consumption exceeded for 5 days	The IPC detected high consumption of tower makeup water (more than 130% of expected for 5 consecutive days)	• Verify makeup water system • Confirm that meter calibration is correct and verify parameter 9.8 • Check connection • Damage digital input
Daily CT water consumption exceeded by 200%	The IPC detected very high consumption of tower makeup water (more than 200% of expected in one day)	• Verify makeup water system • Confirm that meter calibration is correct and verify parameter 9.8 • Check connection • Damage digital input
Low cooling tower water cycles of concentration	The IPC calculated that the tower water cycles of concentration are lower than 5 indicating low water usage efficiency	• Verify makeup & blow down water systems • Confirm that meter calibrations are correct and verify parameters 9.2 & 9.16
Secondary loop not operating	No confirmation that the secondary pumps are operating was detected (on terminals 175 & 176) when the IPC started the plant	• Parameter 7.20 is set to Enabled by mistake • Incorrect wiring • The secondary pumps controller is not commanded by the IPC • Damaged digital input

3.0 SETTINGS SCREENS



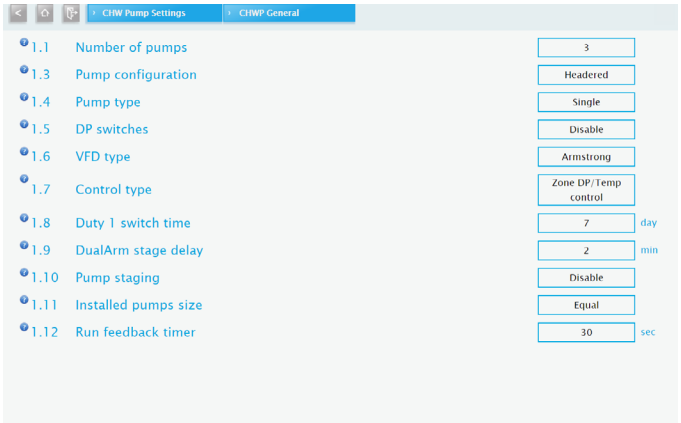
The settings screens are used to configure the IPC9521. Every setting screen has the following features/buttons in common:

1 **Help.** Hover mouse pointer over each individual line (or touch the ? symbol next to a parameter) to obtain help about each parameter.

2 Parameter number and parameter name.

3 Parameter value or options button. If logged in as level 1 or 2, touch the button to modify its value.

3.1 CHWP GENERAL



1.1 NUMBER OF PUMPS

RANGE	FUNCTION
1–5	Indicates how many primary pumps are installed in the system. Not adjustable, depends on number of chillers (parameter 4.1)
	To be configured onsite

1.3 PUMP CONFIGURATION

OPTIONS	FUNCTION
Header	The pumps have a header
Dedicated	Each pump has a dedicated connection to a chiller
	To be configured onsite

1.4 PUMP TYPE

OPTIONS	FUNCTION
Single	System configured for single pump operation.
dualArm	System configured for dualArm pump operation.
Twin	System configured for Twin pump operation.
Tango	System configured for Tango pump operation.
	To be configured onsite

1.5 DP SWITCHES

OPTIONS	FUNCTION
Disable	Pump DP switches are not installed. The IPC will use the drives' run feedback as confirmation that the pumps are operating
Enable	Pump DP switches are installed. The IPC will use them as confirmation that the pumps are operating
	To be configured onsite

1.6 VFD TYPE

OPTIONS	FUNCTION
Armstrong	Serial communication to Armstrong IVS drive
Danfoss	Serial communication to Danfoss FC-102 drive
ABB	Serial communication to ABB ACH550 drive
Yaskawa	Serial communication to Yaskawa E7 drive
	To be configured onsite

Note: The selected VFD drive must be configured to the following specific setting in order to communicate with the IPC 9521: Modbus RTU, 19200 baud, no parity, 8 bits 1 stop. Contact Armstrong for a different configuration.

1.7 CONTROL TYPE

OPTIONS	FUNCTION
Zone DP / Temp. control	The pump speed will be controlled by controller local PID based on the DP sensor/Temp. sensor feedback
Sensorless	The pump speed will be calculated by the control system as per the sensorless algorithm
External command.	The pump speed will be controlled by an external optimization system
	To be configured onsite

1.8 DUTY1 SWITCH TIME

RANGE	FUNCTION
1-999 days	Indicates how often the lead (duty 1) pump will rotate among the duty pumps
7 days	Default

1.9 DUALARM STAGE DELAY	
RANGE	**FUNCTION**
1-999 min	The delay will be considered to stage the dualArm pump as per the chiller flow condition in dedicated configuration
2 min	Default

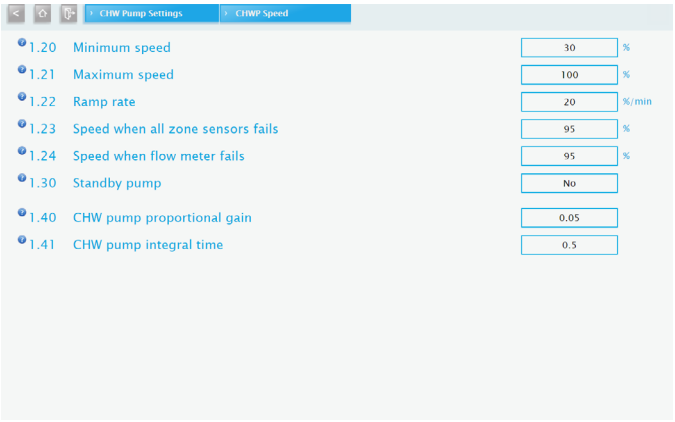
1.10 PUMP STAGING	
OPTIONS	**FUNCTION**
Enable	Pumps are sequenced based on best efficiency point
Disable	Pumps are staged one to one with chiller staging. (Default Setting)
	To be configured onsite

1.11 INSTALLED PUMPS SIZE	
OPTIONS	**FUNCTION**
Mixed	Different sized pumps are allowed matching the differently sized chillers
Equal	All pumps are equally sized. This setting is forced if the chillers are equal sized. (Default Setting)

1.12 RUN FEEDBACK TIMER	
RANGE	**FUNCTION**
0-999 sec	Length of time system will wait for a run feedback before triggering an alarm
30 sec	Default

3.2 CHWP SPEED

Options for Equal Pumps



1.20 MINIMUM SPEED	
RANGE	**FUNCTION**
0.0–100.0%	The minimum speed the pumps will be allowed to run in Auto or Hand mode
30%	Default

1.21 MAXIMUM SPEED	
RANGE	**FUNCTION**
0.0–100.0%	The maximum speed the pumps will be allowed to run in Auto or Hand mode
100%	Default

1.22 RAMP RATE	
RANGE	**FUNCTION**
0–100	Dictates the rate at which pumps increase their speed from 0% to 100% or decrease their speed from 100% to 0%
20% / min	Default

1.23 SPEED WHEN ALL ZONE SENSORS FAIL	
RANGE	**FUNCTION**
0.0–100.0%	Indicates the speed the pumps will run at if all zone sensors fail
95%	Default

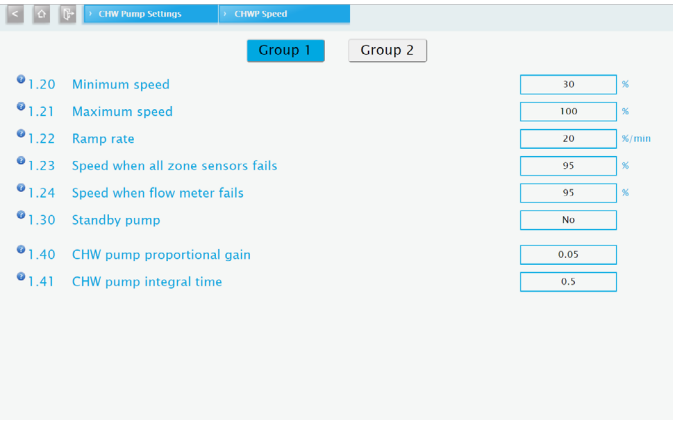
1.24 SPEED WHEN FLOW METER FAILS	
RANGE	**FUNCTION**
0.0–100.0%	Indicates the speed the pumps will run at if system flow sensor fails
95%	Default

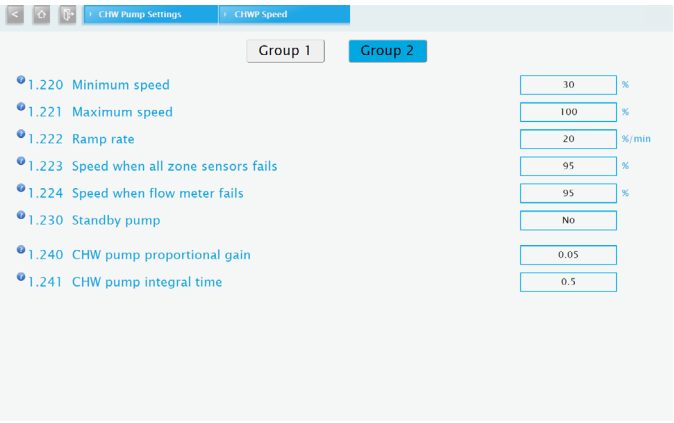
1.30 STAND-BY PUMP	
OPTIONS	**FUNCTION**
No standby pump	All pumps in the system are duty. In a dedicated system this parameter is meaningless
One standby pump	One of the pumps in the system will be assigned as standby, it will only operate if a duty pump fails and there is no other duty pump to replace it. In a dedicated system this parameter is meaningless
	To be configured onsite

1.40 CHW PUMP PROPORTIONAL GAIN	
RANGE	**FUNCTION**
0–9999	Determines the pump speed control PID loop gain. Larger values correspond to a more responsive control system
0.05	Default

1.41 CHW PUMP INTEGRAL GAIN	
RANGE	**FUNCTION**
0–999	Determines the pump speed control PID loop integral time. Larger values correspond to more iterations and reduction of steady state error
0.5	Default

Options for Mixed Pumps Headered





1.220 MINIMUM SPEED

RANGE	FUNCTION
0.0–100.0%	The minimum speed the pumps will be allowed to run in Auto or Hand mode
30%	Default

1.221 MAXIMUM SPEED

RANGE	FUNCTION
0.0–100.0%	The maximum speed the pumps will be allowed to run in Auto or Hand mode
100%	Default

1.222 RAMP RATE

RANGE	FUNCTION
0–100	Dictates the rate at which pumps increase their speed from 0% to 100% or decrease their speed from 100% to 0%
20% / min	Default

1.223 SPEED WHEN ALL ZONE SENSORS FAIL

RANGE	FUNCTION
0.0–100.0%	Indicates the speed the pumps will run at if all zone sensors fail
95%	Default

1.224 SPEED WHEN FLOW METER FAILS

RANGE	FUNCTION
0.0–100.0%	Indicates the speed the pumps will run at if system flow sensor fails
95%	Default

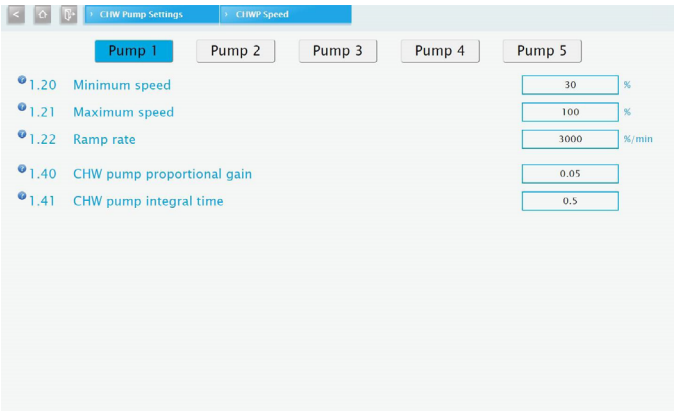
1.240 CHW PUMP PROPORTIONAL GAIN

RANGE	FUNCTION
0–9999	Determines the pump speed control PID loop gain. Larger values correspond to a more responsive control system
0.05	Default

1.241 CHW PUMP INTEGRAL GAIN

RANGE	FUNCTION
0–999	Determines the pump speed control PID loop integral time. Larger values correspond to more iterations and reduction of steady state error
0.5	Default

Options for Mixed Pumps Dedicated



1.20/220/320/420/520 MINIMUM SPEED

RANGE	FUNCTION
0.0–100.0%	The minimum speed the pumps will be allowed to run in Auto or Hand mode
30%	Default

1.21/221/321/421/521 MAXIMUM SPEED	
RANGE	**FUNCTION**
0.0–100.0%	The maximum speed the pumps will be allowed to run in Auto or Hand mode
100%	Default

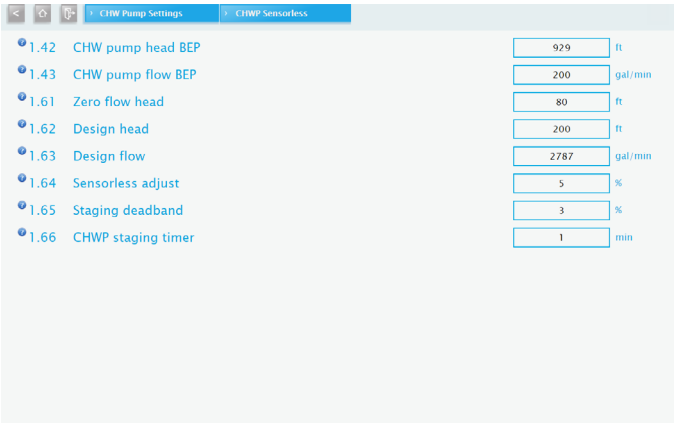
1.22/222/322/422/522 RAMP RATE	
RANGE	**FUNCTION**
0–100	Dictates the rate at which pumps increase their speed from 0% to 100% or decrease their speed from 100% to 0%
20% / min	Default

1.40/240/340/440/540 CHW PUMP PROPORTIONAL GAIN	
RANGE	**FUNCTION**
0–9999	Determines the pump speed control PID loop gain. Larger values correspond to a more responsive control system
0.05	Default

1.41/241/341/441/541 CHW PUMP INTEGRAL GAIN	
RANGE	**FUNCTION**
0–999	Determines the pump speed control PID loop integral time. Larger values correspond to more iterations and reduction of steady state error
0.5	Default

3.3 CHWP SENSORLESS

Options for Equal Pumps



1.42 CHW PUMP HEAD BEP	
RANGE	**FUNCTION**
0–999	Head at best efficiency point. Used for efficient pump staging. Contact Armstrong for help
	Factory configured

1.43 CHW PUMP FLOW BEP	
RANGE	**FUNCTION**
0–999	Flow at best efficiency point. Used for efficient pump staging. Contact Armstrong for help
	Factory configured

1.61 ZERO FLOW HEAD	
RANGE	**FUNCTION**
0–999	Pump Head at zero flow. It is used to determine the system control curve
	To be configured onsite

1.62 DESIGN HEAD	
RANGE	**FUNCTION**
0–999	Pump Design Head. It is used to determine the system control curve
	To be configured onsite

1.63 DESIGN FLOW	
RANGE	**FUNCTION**
0–99999	Pump Design Flow (total of all duty pumps). It is used to determine the system control curve
	To be configured onsite

1.64 SENSORLESS ADJUST	
RANGE	**FUNCTION**
0–10	Factor that compensates for errors in the sensorless mapping of the pump
50%	Default

1.65 STAGING DEADBAND	
RANGE	**FUNCTION**
0–5	Dead band around the best efficiency point to eliminate excessive staging
10%	Default

1.66 CHWP STAGING TIMER	
RANGE	**FUNCTION**
0–999 min	Timer to adjust the staging frequency. The longer the timer the less frequent the staging, can help avoid unstable conditions.
1 min	Default

Options for Mixed Pumps Headered

1.242 CHW PUMP HEAD BEP

RANGE	FUNCTION
0–999	Head at best efficiency point. Used for efficient pump staging. Contact Armstrong for help
	Factory configured

1.243 CHW PUMP FLOW BEP

RANGE	FUNCTION
0–999	Flow at best efficiency point. Used for efficient pump staging. Contact Armstrong for help
	Factory configured

1.261 ZERO FLOW HEAD

RANGE	FUNCTION
0–999	Pump Head at zero flow. It is used to determine the system control curve
	To be configured onsite

1.262 DESIGN HEAD

RANGE	FUNCTION
0–999	Pump Design Head. It is used to determine the system control curve
	To be configured onsite

1.263 DESIGN FLOW

RANGE	FUNCTION
0–99999	Pump Design Flow (total of all duty pumps). It is used to determine the system control curve
	To be configured onsite

1.264 SENSORLESS ADJUST

RANGE	FUNCTION
0–10	Factor that compensates for errors in the sensorless mapping of the pump
50%	Default

1.265 STAGING DEADBAND

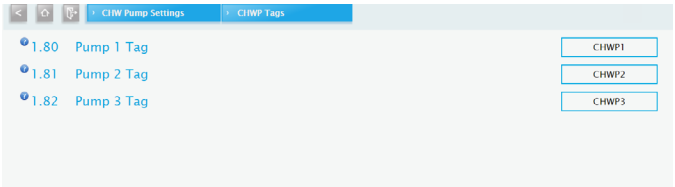
RANGE	FUNCTION
0–5	Dead band around the best efficiency point to eliminate excessive staging
10%	Default

1.266 CHWP STAGING TIMER

RANGE	FUNCTION
0–999 min	Timer to adjust the staging frequency. The longer the timer the less frequent the staging, can help avoid unstable conditions.
1 min	Default

3.4 CHWP TAGS

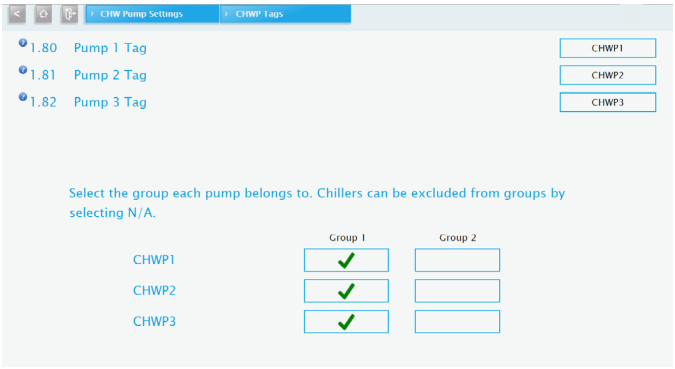
Options for Equal Pumps and Mixed Pumps Dedicated



1.80/81/82/83/84 PUMP 1/2/3/4/5 TAGS

OPTIONS	FUNCTION
	Enter the tag that identifies chilled water pump 1/2/3/4/5 in order to display it on the screens. Note: There is limited space on the screens, the system automatically wraps text but short tags are recommended
	To be configured onsite

Options for Mixed Pumps Headered

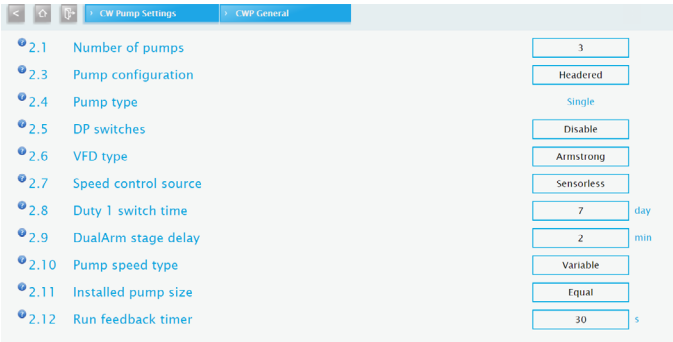


1.80/81/82/83/84 PUMP 1/2/3/4/5 TAGS

OPTIONS	FUNCTION
	Enter the tag that identifies chilled water pump 1/2/3/4/5 in order to display it on the screens. Note: There is limited space on the screens, the system automatically wraps text but short tags are recommended
	To be configured onsite

There are two columns with check marks indicating to which Group each pump belongs to. Touch the box of the desired Group to assign a pump

3.5 CWP GENERAL



2.1 NUMBER OF PUMPS

RANGE	FUNCTION
1–5	Indicates how many condenser pumps are installed in the system. Not adjustable, depends on number of chillers (parameter 4.1)
	To be configured onsite

2.3 PUMP CONFIGURATION

OPTIONS	FUNCTION
Header	The pumps have a header
Dedicated	Each pump has a dedicated connection to a chiller
	To be configured onsite

2.4 PUMP TYPE

OPTIONS	FUNCTION
Single	System configured for single pump operation.
dualArm	System configured for dualArm pump operation.
Twin	System configured for Twin pump operation.
Tango	System configured for Tango pump operation.
	To be configured onsite

2.5 DP SWITCHES

OPTIONS	FUNCTION
Disable	Pump DP switches are not installed. The IPC will use the drives' run feedback as confirmation that the pumps are operating
Enable	Pump DP switches are installed. The IPC will use them as confirmation that the pumps are operating
	To be configured onsite

2.6 VFD TYPE

OPTIONS	FUNCTION
Armstrong	Serial communication to Armstrong IVS drive
Danfoss	Serial communication to Danfoss FC-102 drive
ABB	Serial communication to ABB ACH550 drive
Yaskawa	Serial communication to Yaskawa E7 drive
	To be configured onsite

Note: The selected VFD drive must be configured to the following specific setting in order to communicate with the IPC 9521: Modbus RTU, 19200 baud, no parity, 8 bits 1 stop. Contact Armstrong for a different configuration.

2.7 SPEED CONTROL SOURCE

OPTIONS	FUNCTION
Sensor	Condenser water flow sensor required. Pump speed to maintain the condenser water flow setpoint
Sensorless	Condenser water flow determined by the sensorless algorithm. Pump speed to maintain the condenser water flow setpoint
Heat balance	Condenser water flow approximated using heat balance. Pump speed to maintain the condenser water flow setpoint. (Default Setting)
External	The pump speed will be controlled by an external optimization system

2.8 DUTY1 SWITCH TIME

RANGE	FUNCTION
1-999 days	Indicates how often the lead (duty 1) pump will rotate among the duty pumps
7 days	Default

2.9 DUALARM STAGE DELAY

RANGE	FUNCTION
1-999 min	The delay will be considered to stage the dualArm pump as per the chiller flow condition in dedicated configuration.
1 min	Default

2.10 PUMP SPEED TYPE

RANGE	FUNCTION
Variable	Pumps are equipped with VFDs (Default Setting)
Constant	Pumps are constant speed

2.11 INSTALLED PUMPS SIZE

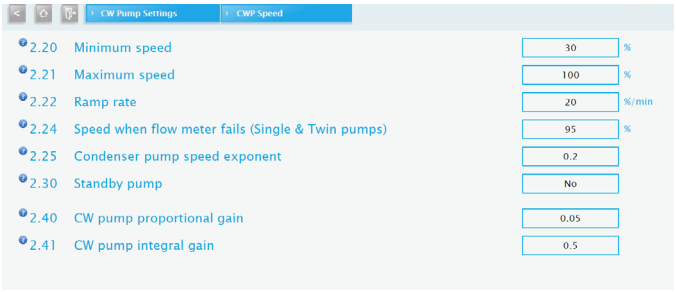
OPTIONS	FUNCTION
Mixed	Different sized pumps are allowed matching the differently sized chillers
Equal	All pumps are equally sized. This setting is forced if the chillers are equal sized. (Default Setting)

2.12 RUN FEEDBACK TIMER

RANGE	FUNCTION
0-999 sec	Length of time system will wait for a run feedback before triggering an alarm
30 sec	Default

3.6 CWP SPEED

Options for Equal Pumps



2.20 MINIMUM SPEED

RANGE	FUNCTION
0.0–100.0%	The minimum speed the pumps will be allowed to run in Auto or Hand mode
30%	Default

2.21 MAXIMUM SPEED

RANGE	FUNCTION
0.0–100.0%	The maximum speed the pumps will be allowed to run in Auto or Hand mode
100%	Default

2.22 RAMP RATE

RANGE	FUNCTION
0–100%	Dictates the rate at which pumps increase their speed from 0% to 100% or decrease their speed from 100% to 0%
20%/min	Default

2.24 SPEED WHEN FLOW METER FAILS (SINGLE & TWIN PUMPS)

RANGE	FUNCTION
0–100%	Indicates the speed the pumps will run at if system flow sensor fails
95%	Default

2.25 CONDENSER PUMP SPEED EXPONENT

RANGE	FUNCTION
0–1	Determines pump speed characteristics. Contact Armstrong Fluid Technology for more information.
0.2	Default

2.30 STANDBY PUMP

OPTIONS	FUNCTION
No standby pump	All pumps in the system are duty. In a dedicated system this parameter is meaningless
One standby pump	One of the pumps in the system will be assigned as standby, it will only operate if a duty pump fails and there is no other duty pump to replace it. In a dedicated system this parameter is meaningless
	To be configured onsite

2.40 CW PUMP PROPORTIONAL GAIN

RANGE	FUNCTION
0–9999	Determines the pump speed control PID loop gain. Larger values correspond to a more responsive control system
0.05	Default

2.41 CW PUMP INTEGRAL GAIN

RANGE	FUNCTION
0.0–100.0%	Determines pump speed control PID integral time. Larger values correspond to more iterations and a reduction of steady state error
0.5	Default

Options for Mixed Pumps Headered

2.220 MINIMUM SPEED

RANGE	FUNCTION
0.0–100.0%	The minimum speed the pumps will be allowed to run in Auto or Hand mode
30%	Default

2.221 MAXIMUM SPEED

RANGE	FUNCTION
0.0–100.0%	The maximum speed the pumps will be allowed to run in Auto or Hand mode
100%	Default

2.222 RAMP RATE

RANGE	FUNCTION
0–100%	Dictates the rate at which pumps increase their speed from 0% to 100% or decrease their speed from 100% to 0%
20%/min	Default

2.225 CONDENSER PUMP SPEED EXPONENT	
RANGE	**FUNCTION**
0–1	Determines pump speed characteristics. Contact Armstrong Fluid Technology for more information.
0.2	Default

2.230 STANDBY PUMP	
OPTIONS	**FUNCTION**
No standby pump	All pumps in the system are duty. In a dedicated system this parameter is meaningless
One standby pump	One of the pumps in the system will be assigned as standby, it will only operate if a duty pump fails and there is no other duty pump to replace it. In a dedicated system this parameter is meaningless
	To be configured onsite

2.240 CW PUMP PROPORTIONAL GAIN	
RANGE	**FUNCTION**
0–9999	Determines the pump speed control PID loop gain. Larger values correspond to a more responsive control system
0.05	Default

2.241 CW PUMP INTEGRAL GAIN	
RANGE	**FUNCTION**
0.0–100.0%	Determines pump speed control PID integral time. Larger values correspond to more iterations and a reduction of steady state error
0.5	Default

Options for Mixed Pumps Dedicated

2.20/220/320/420/520 MINIMUM SPEED	
RANGE	**FUNCTION**
0.0–100.0%	The minimum speed the pumps will be allowed to run in Auto or Hand mode
30%	Default

2.21/221/321/421/521 MAXIMUM SPEED	
RANGE	**FUNCTION**
0.0–100.0%	The maximum speed the pumps will be allowed to run in Auto or Hand mode
100%	Default

2.22/222/322/422/522 RAMP RATE	
RANGE	**FUNCTION**
0–100%	Dictates the rate at which pumps increase their speed from 0% to 100% or decrease their speed from 100% to 0%
20%/min	Default

2.40/240/340/440/540 CW PUMP PROPORTIONAL GAIN	
RANGE	**FUNCTION**
0–9999	Determines the pump speed control PID loop gain. Larger values correspond to a more responsive control system
0.05	Default

2.41/241/341/441/541 CW PUMP INTEGRAL GAIN	
RANGE	**FUNCTION**
0.0–100.0%	Determines pump speed control PID integral time. Larger values correspond to more iterations and a reduction of steady state error
0.5	Default

3.6.1 CWP SENSORLESS

Options for Equal Pumps

2.42 CWP HEAD BEP	
RANGE	**FUNCTION**
0–999	Pump head at the best efficiency point of the condenser water pumps.
	To be configured onsite

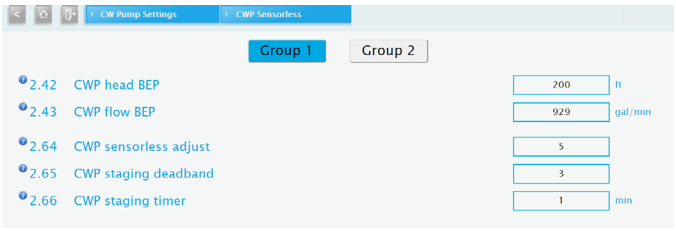
2.43 CWP FLOW BEP	
RANGE	**FUNCTION**
0–999	Pump flow at the best efficiency point of the condenser water pumps.
	To be configured onsite

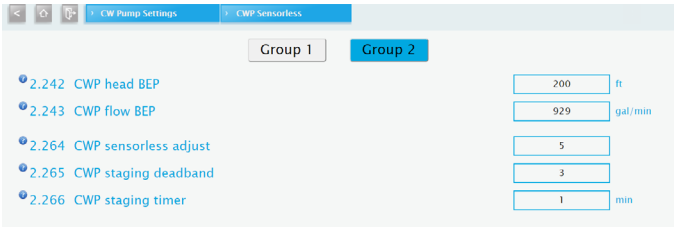
2.64 CWP SENSORLESS ADJUST	
RANGE	**FUNCTION**
0–999	Factor that compensates for errors in the sensorless mapping of the pump.
0.5	Default

2.65 CWP STAGING DEADBAND	
RANGE	**FUNCTION**
0–999	Dead band around the best efficiency point to eliminate excessive staging.
0	Default

2.66 CWP STAGING TIMER	
RANGE	**FUNCTION**
0–999 min	Timer to adjust the staging frequency. The longer the timer the less frequent the staging, can help avoid unstable conditions.
1 min	Default

Options for Mixed Pumps Headered





2.242 CWP HEAD BEP	
RANGE	**FUNCTION**
0–999	Pump head at the best efficiency point of the condenser water pumps.
	To be configured onsite

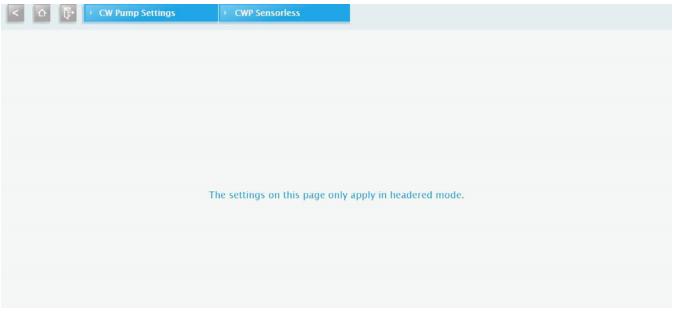
2.243 CWP FLOW BEP	
RANGE	**FUNCTION**
0–999	Pump flow at the best efficiency point of the condenser water pumps.
	To be configured onsite

2.264 CWP SENSORLESS ADJUST	
RANGE	**FUNCTION**
0–999	Factor that compensates for errors in the sensorless mapping of the pump.
0.5	Default

2.265 CWP STAGING DEADBAND	
RANGE	**FUNCTION**
0–999	Dead band around the best efficiency point to eliminate excessive staging.
0	Default

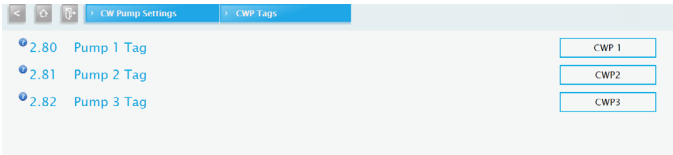
2.266 CWP STAGING TIMER	
RANGE	**FUNCTION**
0–999 min	Timer to adjust the staging frequency. The longer the timer the less frequent the staging, can help avoid unstable conditions.
1 min	Default

Options for Mixed Pumps Dedicated



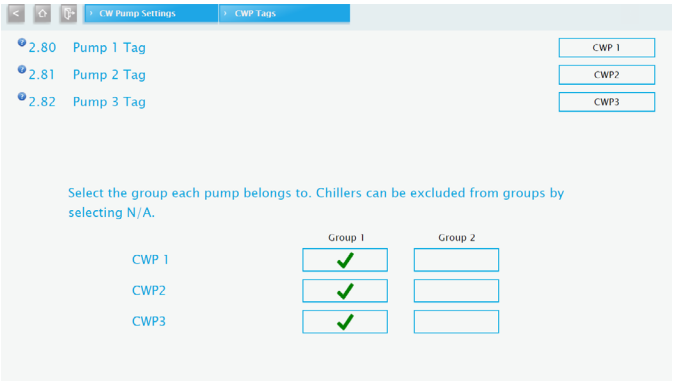
3.7 CWP TAGS

Options for Equal Pumps and Mixed Pumps Dedicated



2.80/81/82/83/84 PUMP 1/2/3/4/5 TAGS	
OPTIONS	**FUNCTION**
	Enter the tag that identifies condenser water pump 1/2/3/4/5 in order to display it on the screens. Note: There is limited space on the screens, the system automatically wraps text but short tags are recommended
	To be configured onsite

Options for Mixed Pumps Headered

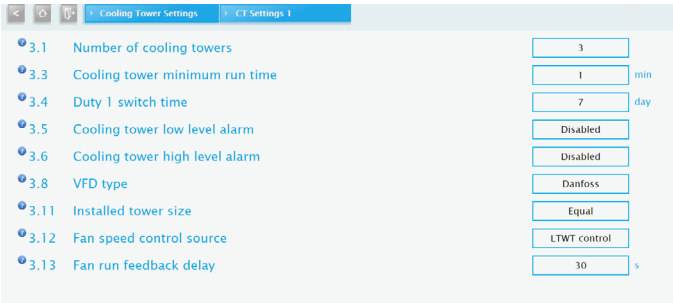


2.80/81/82/83/84 PUMP 1/2/3/4/5 TAGS

OPTIONS	FUNCTION
	Enter the tag that identifies condenser water pump 1/2/3/4/5 in order to display it on the screens. Note: There is limited space on the screens, the system automatically wraps text but short tags are recommended
	To be configured onsite

There are two columns with check marks indicating to which Group each pump belongs to. Touch the box of the desired Group to assign a pump

3.8 CT SETTING 1



3.1 NUMBER OF COOLING TOWERS

RANGE	FUNCTION
1–5	Indicates how many cooling towers are installed in the system.
	To be configured onsite

3.3 COOLING TOWER MINIMUM RUN TIME

RANGE	FUNCTION
1–9999	Minimum time a cooling tower must run before it can be shut off
5 min	Default

3.4 DUTY 1 SWITCH TIME

RANGE	FUNCTION
1–9999	Time before the duty 1 cooling tower is rotated to another tower
7 days	Default

3.5 COOLING TOWER LOW LEVEL ALARM

OPTIONS	FUNCTION
Enabled	The IPC9521 monitors the cooling tower water low level switch. An alarm is triggered and the plant is shutdown when active
Disabled	The IPC9521 does not monitor the cooling tower water low level switch. (Default Setting)

3.6 COOLING TOWER HIGH LEVEL ALARM

OPTIONS	FUNCTION
Enabled	The IPC9521 monitors the cooling tower water high level switch. An alarm is triggered
Disabled	The IPC9521 does not monitor the cooling tower water high level switch. (Default Setting)

3.8 VFD TYPE

OPTIONS	FUNCTION
Danfoss	Serial communication to Danfoss FC-102 drive
ABB	Serial communication to ABB ACH550 drive
Yaskawa	Serial communication to Yaskawa E7 drive
	To be configured onsite

Note: The selected VFD drive must be configured to the following specific setting in order to communicate with the IPC 9521: Modbus RTU, 19200 baud, no parity, 8 bits 1 stop. Contact Armstrong for a different configuration.

3.11 INSTALLED TOWER SIZE

OPTIONS	FUNCTION
Mixed	Different sized towers are allowed matching the differently sized chillers
Equal	All towers are equally sized. This setting is forced if the chillers are equally sized. (Default Setting)

3.12 FAN SPEED CONTROL SOURCE

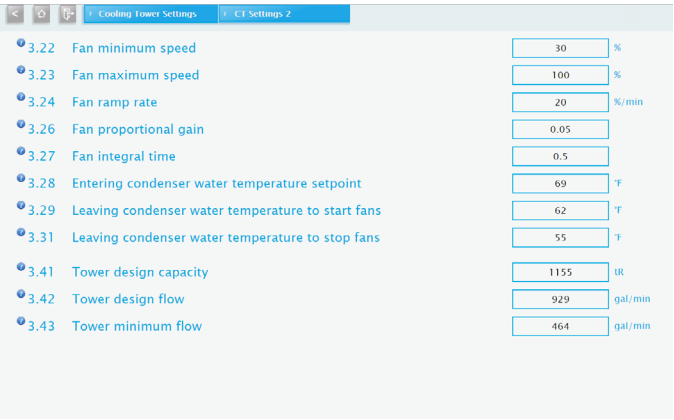
OPTIONS	FUNCTION
LTWT control	The fan speed is modulated based on the leaving tower water temperature PID loop. (Default Setting)
External	The fan speed is controlled by an external optimization source

3.13 FAN RUN FEEDBACK DELAY

RANGE	FUNCTION
1–999	Length of time system will wait for a run feedback before triggering an alarm
30 sec	Default

3.9 CT SETTING 2

Options for Equal Towers



3.22 FAN MINIMUM SPEED

RANGE	FUNCTION
0–100%	Minimum allowed speed of the cooling tower fans
30%	Default

3.23 FAN MAXIMUM SPEED

RANGE	FUNCTION
0–100%	Maximum allowed speed of the cooling tower fans
100%	Default

3.24 FAN RAMP RATE

RANGE	FUNCTION
0–100%	Dictates the rate at which fans increase their speed from 0% to 100% or decrease their speed from 100% to 0%
20%/min	Default

3.26 FAN PROPORTIONAL GAIN

RANGE	FUNCTION
1–999	Determines fan speed control PID loop gain. Larger values correspond to a more responsive control system
0.05	Default

3.27 FAN INTEGRAL TIME

RANGE	FUNCTION
1–999	Determines fan speed control PID integral time. Larger values correspond to more iterations and a reduction of steady state error
0.5	Default

3.28 ENTERING CONDENSER WATER TEMPERATURE SETPOINT

RANGE	FUNCTION
1–999	Design entering condenser water temperature setpoint
69°F	Default

3.29 LEAVING CONDENSER WATER TEMPERATURE TO START FANS

RANGE	FUNCTION
1–999	Minimum water temperature entering the cooling tower before cooling tower fans start operating
62°F	Default

3.31 LEAVING CONDENSER WATER TEMPERATURE TO STOP FANS

RANGE	FUNCTION
1–999	Temperature at which to stop the fans from operating to prevent freezing the chillers
55°F	Default

3.41 TOWER DESIGN CAPACITY

RANGE	FUNCTION
1–999 tR	Rated capacity in tons of all installed towers.
	To be configured onsite

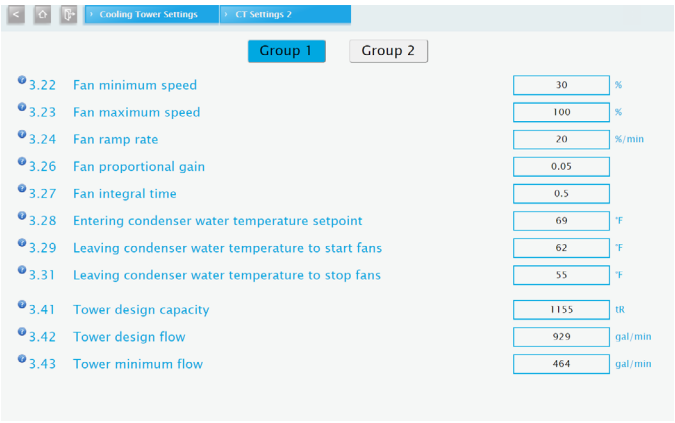
3.42 TOWER DESIGN FLOW

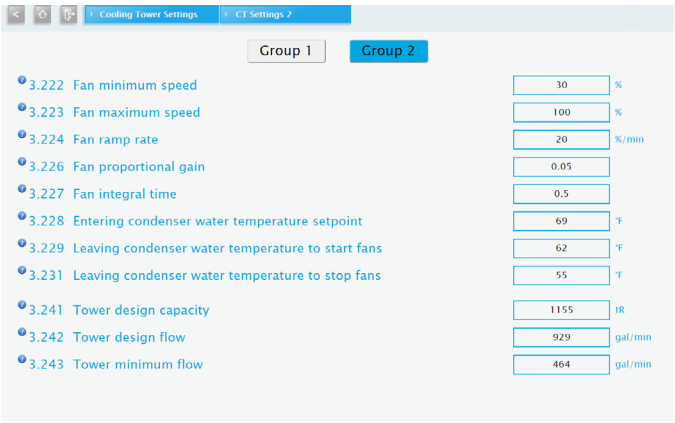
RANGE	FUNCTION
0–9999 gal/min	Design flow of all installed towers.
	To be configured onsite

3.43 TOWER MINIMUM FLOW

RANGE	FUNCTION
1–9999	Minimum flow required for each cooling tower to run properly
	To be configured onsite

Options for Mixed Towers





3.222 FAN MINIMUM SPEED

RANGE	FUNCTION
0–100%	Minimum allowed speed of the cooling tower fans
30%	Default

3.223 FAN MAXIMUM SPEED

RANGE	FUNCTION
0–100%	Maximum allowed speed of the cooling tower fans
100%	Default

3.224 FAN RAMP RATE

RANGE	FUNCTION
0–100%	Dictates the rate at which fans increase their speed from 0% to 100% or decrease their speed from 100% to 0%
20%/min	Default

3.226 FAN PROPORTIONAL GAIN

RANGE	FUNCTION
1–999	Determines fan speed control PID loop gain. Larger values correspond to a more responsive control system
0.05	Default

3.227 FAN INTEGRAL TIME

RANGE	FUNCTION
1–999	Determines fan speed control PID integral time. Larger values correspond to more iterations and a reduction of steady state error
0.5	Default

3.228 ENTERING CONDENSER WATER TEMPERATURE SETPOINT

RANGE	FUNCTION
1–999	Design entering condenser water temperature setpoint
69°F	Default

3.229 LEAVING CONDENSER WATER TEMPERATURE TO START FANS

RANGE	FUNCTION
1–999	Minimum water temperature entering the cooling tower before cooling tower fans start operating
62°F	Default

3.231 LEAVING CONDENSER WATER TEMPERATURE TO STOP FANS

RANGE	FUNCTION
1–999	Temperature at which to stop the fans from operating to prevent freezing the chillers
55°F	Default

3.241 TOWER DESIGN CAPACITY

RANGE	FUNCTION
1–999 tR	Rated capacity in tons of all installed towers.
	To be configured onsite

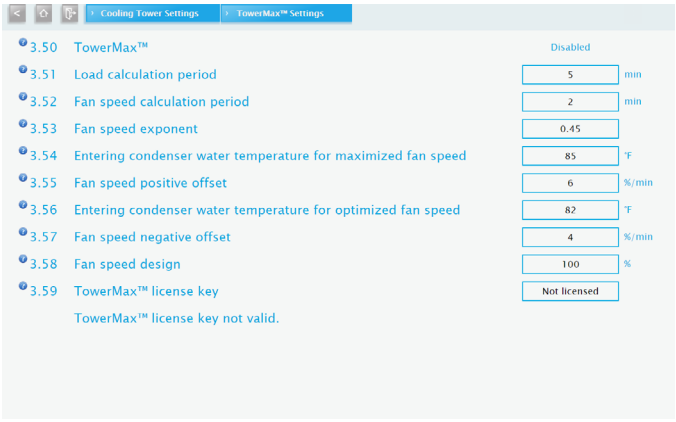
3.242 TOWER DESIGN FLOW

RANGE	FUNCTION
0–9999 gal/min	Design flow of all installed towers.
	To be configured onsite

3.243 TOWER MINIMUM FLOW

RANGE	FUNCTION
1–9999	Minimum flow required for each cooling tower to run properly
	To be configured onsite

3.9.1 TOWERMAX™ SETTINGS



3.50 TOWERMAX™

OPTIONS	FUNCTION
Enabled	Enables the TowerMax™ algorithms for cooling tower and condenser pumps optimization. Note: Requires activation (see parameter **3.59** below), contact Armstrong Fluid Technology
Disabled	TowerMax™ algorithms are not enabled. (Default Setting)

3.51 LOAD CALCULATION PERIOD

RANGE	FUNCTION
1–999 min	Period of time used to calculate load. It should cover the time it takes for an inventory of condenser water to circulate around the condenser circuit.
5 min	Default

3.52 FAN SPEED CALCULATION PERIOD

RANGE	FUNCTION
1–999 min	Time period utilized to calculate fan speed, longer times produce smoother response. However this timer should be no more than 80% of **3.51**.
2 min	Default

3.53 FAN SPEED EXPONENT

RANGE	FUNCTION
0–1	Determines fan speed characteristics. Contact Armstrong Fluid Technology for more information.
0.45	Default

3.54 ENTERING CONDENSER WATER TEMPERATURE FOR MAXIMIZED FAN SPEED

RANGE	FUNCTION
0–999	When the entering condenser water temperature exceeds this value, the fan speed will be ramped up to maximum in increments given by parameter **3.55**.
85°F	Default

3.55 FAN SPEED POSITIVE OFFSET

RANGE	FUNCTION
0–30% / min	Offset in percentage by minute to be added to the calculated fan speed.
6% /min	Default

3.56 ENTERING CONDENSER WATER TEMPERATURE FOR OPTIMIZED FAN SPEED

RANGE	FUNCTION
0–999	If fan speed is being increased (as per **3.54**), when the entering condenser water temperature falls below this value, the fan speed will be ramped down to optimized in decrements given.
82°F	Default

3.57 FAN SPEED NEGATIVE OFFSET

RANGE	FUNCTION
0–30%/ min	Offset in percentage by minute to be subtracted from the calculated fan speed.
4%/min	Default

3.58 FAN SPEED DESIGN

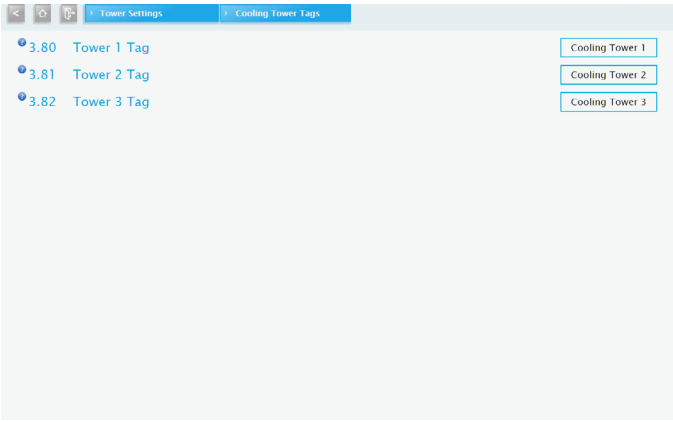
RANGE	FUNCTION
0–100%	Indicates fan speed at design day.
100%	Default

3.59 TOWERMAX™ LICENSE KEY

OPTIONS	FUNCTION
Licensed	The license key entered is valid and TowerMax™ is available.
Not licensed	TowerMax™ is not available. The license key hasn't been entered, or the current license key is incorrect or has expired. Please contact Armstrong Fluid Technology to obtain a license key. To activate TowerMax™, enter a valid key using the on-screen keypad. The indicator below displays the expiration date of the current license. (Default Setting)

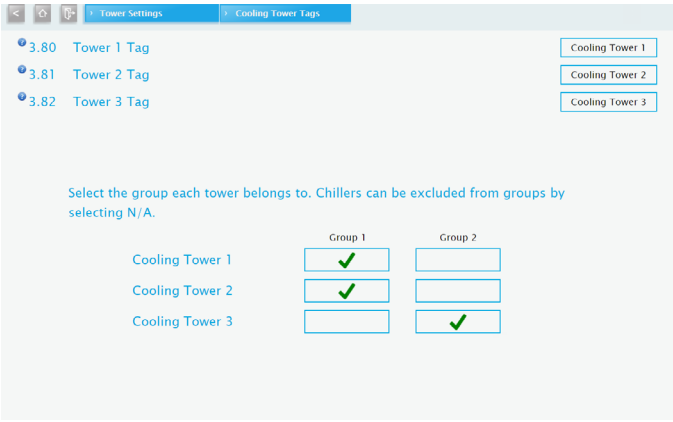
3.9.2 COOLING TOWER TAGS

Options for Equal Towers



3.80/81/82/83/84 TOWER 1/2/3/4/5 TAGS	
OPTIONS	**FUNCTION**
	Enter the tag that identifies tower 1/2/3/4/5 in order to display it on the screens. Note: There is limited space on the screens, the system automatically wraps text but short tags are recommended
	To be configured onsite

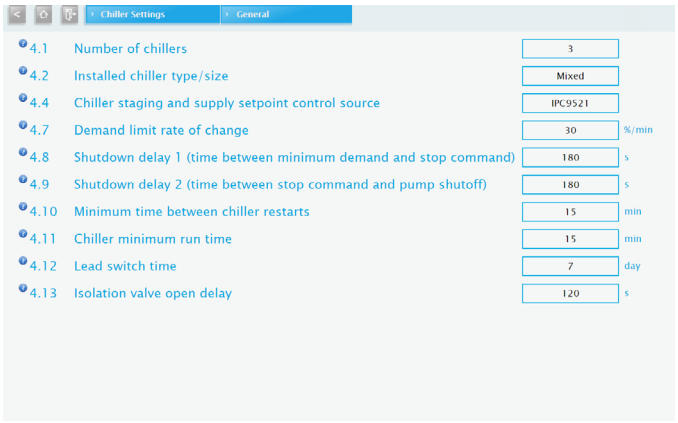
Options for Mixed Towers



3.80/81/82/83/84 TOWER 1/2/3/4/5 TAGS	
OPTIONS	**FUNCTION**
	Enter the tag that identifies tower 1/2/3/4/5 in order to display it on the screens. Note: There is limited space on the screens, the system automatically wraps text but short tags are recommended
	To be configured onsite

There are two columns with check marks indicating to which Group each tower belongs to. Touch the box of the desired Group to assign a tower

3.10 CHILLER SETTINGS GENERAL



4.1 NUMBER OF CHILLERS	
RANGE	**FUNCTION**
1–5	Selects the number of chillers in the system
	To be configured onsite

4.2 INSTALLED CHILLER TYPE/SIZE	
OPTIONS	**FUNCTION**
Mixed	The plant uses chillers with different capacities
Equal	All chillers are the same capacity. (Default Setting)

4.4 CHILLER STAGING & SUPPLY SETPOINT CONTROL SOURCE	
OPTIONS	**FUNCTION**
IPC9521 series control system	Supply temperature setpoint and chiller staging done through the IPC 9521 control system. (Default Setting)
External Optimization	Supply temperature setpoint and chiller staging done by an external optimization source

4.7 DEMAND LIMIT CHANGE RATE	
RANGE	**FUNCTION**
0.0–100.0%/min	Determines the rate of change of the chillers demand limit measured in percentage per minute. Use this value to determine how fast the IPC will increase the demand limit from minimum to maximum (and vice versa). The greater this value, the faster the IPC will increase or reduce the demand limit of the chillers
30%/min	Default

4.8 SHUTDOWN DELAY 1 (MIN. DEMAND TO CHILLER STOP)	
RANGE	**FUNCTION**
0–999 sec	When shutting down a chiller, this is the time delay from the moment the demand limit reached the minimum to the moment the IPC sends the stop signal to the chiller
180 sec	Default

4.9 SHUTDOWN DELAY 2 (CHILLER STOP TO PUMP STOP)

OPTIONS	FUNCTION
0–999 sec	When shutting down a chiller, this is the time delay from the moment the IPC sends the stop signal to the chiller to the moment the IPC stops the associated chilled water pump and closes the isolation valve
180 sec	Default

4.10 MINIMUM TIME BETWEEN CHILLER RESTART

RANGE	FUNCTION
0–999 min	Once a chiller stops, this value indicates the time the IPC will wait before allowing the chiller to run again
15 min	Default

4.11 CHILLER MINIMUM RUN TIME

RANGE	FUNCTION
0–999 min	Indicates the minimum time a chiller will run, even if the staging Off conditions are present.
15 min	Default

4.12 LEAD SWITCH TIME

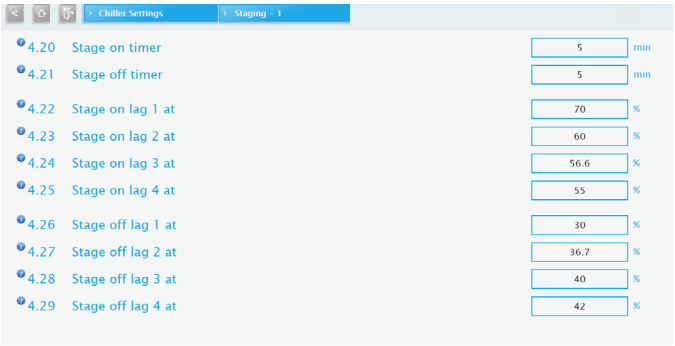
RANGE	FUNCTION
0–999 days	Indicates how often the rotation of the lead chiller occurs
7 day	Default

4.13 ISOLATION VALVE OPEN DELAY

RANGE	FUNCTION
0–999 sec	Indicates the time the isolation valves take to go from closed to fully open.
120 sec	Default

3.11 CHILLER STAGING - 1

Options for Equal Chillers



4.20 STAGE ON TIMER

RANGE	FUNCTION
0-999 sec	Time delay to wait before staging on the next lag chiller after the condition is met (parameters 4.22 to 4.25)
5 min	Default

4.21 STAGE OFF TIMER

RANGE	FUNCTION
0-999 sec	Time delay to wait before staging off the last lag chiller after the condition is met (parameters 4.26 to 4.29)
5 min	Default

4.22 STAGE ON LAG 1 AT

RANGE	FUNCTION
0.0–100.0%	Indicates the load percent threshold to stage on Lag 1 chiller. The chiller will be staged on when the load exceeds this threshold longer than the Stage On Delay (parameter 4.20)
70%	Default

4.23 STAGE ON LAG 2 AT

RANGE	FUNCTION
0.0–100.0%	Indicates the load percent threshold to stage on Lag 2 chiller. The chiller will be staged on when the load exceeds this threshold longer than the Stage On Delay (parameter 4.20)
60%	Default

4.24 STAGE ON LAG 3 AT

RANGE	FUNCTION
0.0–100.0%	Indicates the load percent threshold to stage on Lag 3 chiller. The chiller will be staged on when the load exceeds this threshold longer than the Stage On Delay (parameter 4.20)
56.60%	Default

4.25 STAGE ON LAG 4 AT

RANGE	FUNCTION
0.0–100.0%	Indicates the load percent threshold to stage on Lag 4 chiller. The chiller will be staged on when the load exceeds this threshold longer than the Stage On Delay (parameter 4.20)
55%	Default

4.26 STAGE OFF LAG 1 AT

RANGE	FUNCTION
0.0–100.0%	Indicates the load percent threshold to stage off Lag 1 chiller. The chiller will be staged off when the load falls under this threshold longer than the Stage Off Delay (parameter 4.21)
30%	Default

4.27 STAGE OFF LAG 2 AT

RANGE	FUNCTION
0.0–100.0%	Indicates the load percent threshold to stage off Lag 2 chiller. The chiller will be staged off when the load falls under this threshold longer than the Stage Off Delay (parameter 4.21)
36.70%	Default

4.28 STAGE OFF LAG 3 AT

RANGE	FUNCTION
0.0–100.0%	Indicates the load percent threshold to stage off Lag 3 chiller. The chiller will be staged off when the load falls under this threshold longer than the Stage Off Delay
40%	Default

4.29 STAGE OFF LAG 4 AT

RANGE	FUNCTION
0.0–100.0%	Indicates the load percent threshold to stage off Lag 4 chiller. The chiller will be staged off when the load falls under this threshold longer than the Stage Off Delay (parameter 4.21)
42%	Default

Options for Mixed Chillers

4.220 STAGE ON TIMER

RANGE	FUNCTION
0-999 sec	Time delay to wait before staging on the next lag chiller after the condition is met (parameters 4.22/4.222 to 4.25/4.225)
5 min	Default

4.221 STAGE OFF TIMER

RANGE	FUNCTION
0-999 sec	Time delay to wait before staging off the last lag chiller after the condition is met (parameters 4.26/4.226 to 4.29/4.229)
5 min	Default

4.222 STAGE ON LAG 1 AT

RANGE	FUNCTION
0.0–100.0%	Indicates the load percent threshold to stage on Lag 1 chiller. The chiller will be staged on when the load exceeds this threshold longer than the Stage On Delay (parameter 4.20 & 4.220)
70%	Default

4.223 STAGE ON LAG 2 AT

RANGE	FUNCTION
0.0–100.0%	Indicates the load percent threshold to stage on Lag 2 chiller. The chiller will be staged on when the load exceeds this threshold longer than the Stage On Delay (parameter 4.20 & 4.220)
60%	Default

4.224 STAGE ON LAG 3 AT

RANGE	FUNCTION
0.0–100.0%	Indicates the load percent threshold to stage on Lag 3 chiller. The chiller will be staged on when the load exceeds this threshold longer than the Stage On Delay (parameter 4.20 & 4.220)
56.60%	Default

4.225 STAGE ON LAG 4 AT

RANGE	FUNCTION
0.0–100.0%	Indicates the load percent threshold to stage on Lag 4 chiller. The chiller will be staged on when the load exceeds this threshold longer than the Stage On Delay (parameter 4.20 & 4.220)
55%	Default

4.226 STAGE OFF LAG 1 AT

RANGE	FUNCTION
0.0–100.0%	Indicates the load percent threshold to stage off Lag 1 chiller. The chiller will be staged off when the load falls under this threshold longer than the Stage Off Delay (parameter 4.21 & 4.221)
30%	Default

4.27 STAGE OFF LAG 2 AT

RANGE	FUNCTION
0.0–100.0%	Indicates the load percent threshold to stage off Lag 2 chiller. The chiller will be staged off when the load falls under this threshold longer than the Stage Off Delay (parameter 4.21 & 4.221)
36.70%	Default

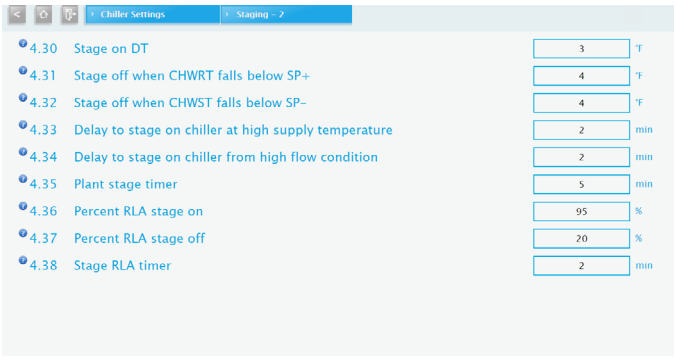
4.228 STAGE OFF LAG 3 AT

RANGE	FUNCTION
0.0–100.0%	Indicates the load percent threshold to stage off Lag 3 chiller. The chiller will be staged off when the load falls under this threshold longer than the Stage Off Delay (parameter 4.21 & 4.221)
40%	Default

4.229 STAGE OFF LAG 4 AT

RANGE	FUNCTION
0.0–100.0%	Indicates the load percent threshold to stage off Lag 4 chiller. The chiller will be staged off when the load falls under this threshold longer than the Stage Off Delay (parameter 4.21 & 4.221)
42%	Default

3.12 CHILLER STAGING - 2



4.30 STAGE ON DT

RANGE	FUNCTION
0–99.9 °F or °C	If the chilled water supply temperature exceeds its setpoint by this value for longer than the time indicated on **4.33**, the next lag chiller will be staged on
3°F	Default

4.31 STAGE OFF WHEN CHWRT FALLS BELOW SP+

RANGE	FUNCTION
0–99.9°F or °C	If the chilled water return temperature falls below chilled water supply temperature setpoint plus this value for longer than one minute, the last lag chiller will be staged off
4°F	Default

4.32 STAGE OFF WHEN CHWST FAILS BELOW SP-

RANGE	FUNCTION
0–99.9°F or °C	If the chilled water supply temperature falls below its setpoint minus this value for longer than one minute, the last lag chiller will be staged off
4°F	Default

4.33 DELAY TO STAGE ON CHILLER AT HIGH SUPPLY TEMPERATURE

RANGE	FUNCTION
0–999 min	Time delay for condition of parameter 4.30
2 min	Default

4.34 DELAY TO STAGE ON FROM HIGH CHILLER FLOW CONDITION

RANGE	FUNCTION
0–999 min	Time delay to stage on the next lag chiller based on high flow
2 min	Default

4.35 PLANT STAGE TIMER

RANGE	FUNCTION
0–999 min	After a chiller has been staged on or off, the IPC9521 will ignore all staging conditions until this timer expires
5 min	Default

4.36 PERCENTAGE OF RLA TO STAGE ON NEXT LAG CHILLER

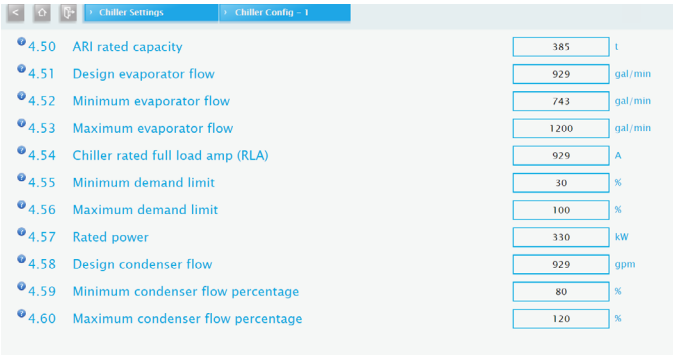
RANGE	FUNCTION
0–100.0%	When the combined current (in percentage) of the operating chillers exceeds this value for longer than the time specified on **4.38**, stage on the next lag chiller
95%	Default

4.37 PERCENTAGE OF RLA TO STAGE OFF LAST LAG CHILLER	
RANGE	**FUNCTION**
0–100.0%	When the combined current (in percentage) of the operating chillers falls below this value for longer than the time specified on **4.38**, stage off the last lag chiller
20%	Default

4.38 STAGE RLA TIMER	
RANGE	**FUNCTION**
0–999 min	Time delay for condition of parameters **4.36** and **4.37**
2 min	Default

3.13 CHILLER CONFIG-1

Options for Equal Chillers



4.50 ARI RATED CAPACITY	
RANGE	**FUNCTION**
0–9999 tons	Rated cooling capacity of the chiller in tons as per Air-conditioning & Refrigeration Institute
	To be configured onsite

4.51 DESIGN EVAPORATOR FLOW	
RANGE	**FUNCTION**
0–9999 gpm	Determines the chiller design flow. Used to stage On & Off dualArm/Tango pumps
	To be configured onsite

4.52 MINIMUM EVAPORATOR FLOW	
RANGE	**FUNCTION**
0–9999 gpm	Determines the chiller rated minimum flow. The IPC9521 will open the bypass valve and increase the pump speed if the flow falls under this value (combined with all operating chillers)
	To be configured onsite

4.53 MAXIMUM EVAPORATOR FLOW	
RANGE	**FUNCTION**
0-9999 gpm	Determines the chiller rated maximum flow. The IPC9521 will reduce pump speed if the flow climbs above this value (combined with all operating chillers)
	To be configured onsite

4.54 RLA	
RANGE	**FUNCTION**
0–999.9 A	Determines the chiller nameplate RLA
	To be configured onsite

4.55 MINIMUM DEMAND LIMIT	
RANGE	**FUNCTION**
0–100.0%	Determines the chiller minimum demand limit (in percentage). When the chiller is started, the IPC9521 will initially limit its demand to this value
	To be configured onsite

4.56 MAXIMUM DEMAND LIMIT	
RANGE	**FUNCTION**
0–100.0%	Determines the demand limit (in percentage) to be sent (gradually, see parameter **4.7**) to the chiller once the chiller is confirmed running. Default is 100.0%, if there is a problem with the chiller that doesn't allow it to run at maximum capacity, use this parameter to limit the chiller to a reduced capacity
	To be configured onsite

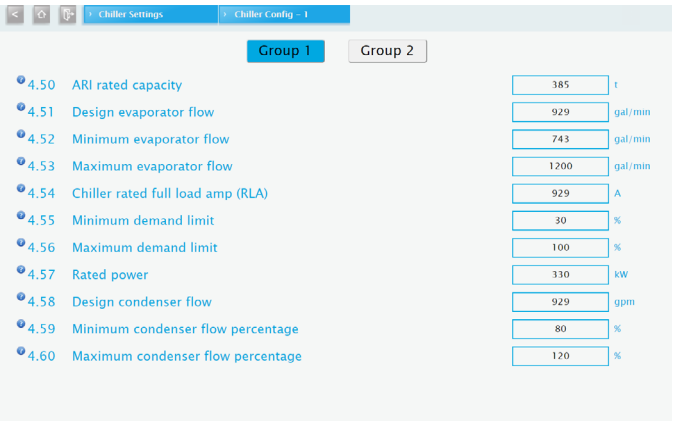
4.57 RATED POWER	
RANGE	**FUNCTION**
0–9999 kW	Nameplate power rating of the chiller
	To be configured onsite

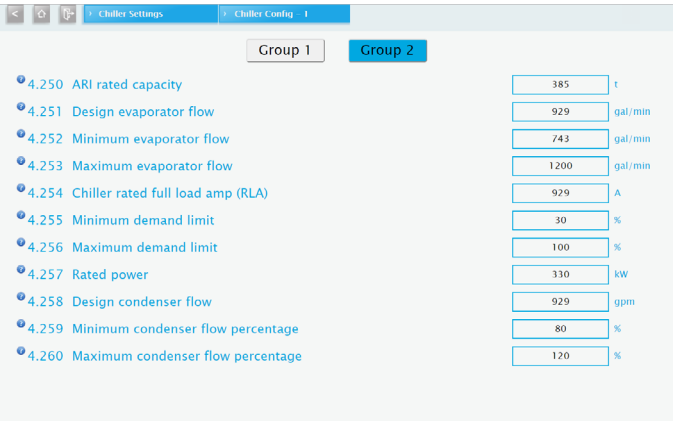
4.58 DESIGN CONDENSER FLOW	
RANGE	**FUNCTION**
0–9999	Design condenser flow from chiller specs.
	To be configured onsite

4.59 MINIMUM CONDENSER FLOW PERCENTAGE	
RANGE	**FUNCTION**
0–100 %	Minimum percentage of rated condenser flow at which the chiller will be allowed to run
80 %	Default

4.60 MAXIMUM CONDENSER FLOW PERCENTAGE	
RANGE	**FUNCTION**
0–120 %	Maximum percentage of rated condenser flow at which the chiller will be allowed to run
120 %	Default

Options for Mixed Chillers Headered





4.250 ARI RATED CAPACITY

RANGE	FUNCTION
0–9999 tons	Rated cooling capacity of the chiller in tons as per Air-conditioning & Refrigeration Institute
	To be configured onsite

4.251 DESIGN EVAPORATOR FLOW

RANGE	FUNCTION
0–9999 gpm	Determines the chiller design flow. Used to stage On & Off dualArm/Tango pumps
	To be configured onsite

4.252 MINIMUM EVAPORATOR FLOW

RANGE	FUNCTION
0–9999 gpm	Determines the chiller rated minimum flow. The IPC9521 will open the bypass valve and increase the pump speed if the flow falls under this value (combined with all operating chillers)
	To be configured onsite

4.253 MAXIMUM EVAPORATOR FLOW

RANGE	FUNCTION
0-9999 gpm	Determines the chiller rated maximum flow. The IPC9521 will reduce pump speed if the flow climbs above this value (combined with all operating chillers)
	To be configured onsite

4.254 RLA

RANGE	FUNCTION
0–999.9 A	Determines the chiller nameplate RLA
	To be configured onsite

4.255 MINIMUM DEMAND LIMIT

RANGE	FUNCTION
0–100.0%	Determines the chiller minimum demand limit (in percentage). When the chiller is started, the IPC9521 will initially limit its demand to this value
	To be configured onsite

4.256 MAXIMUM DEMAND LIMIT

RANGE	FUNCTION
0–100.0%	Determines the demand limit (in percentage) to be sent (gradually, see parameter **4.7**) to the chiller once the chiller is confirmed running. Default is 100.0%, if there is a problem with the chiller that doesn't allow it to run at maximum capacity, use this parameter to limit the chiller to a reduced capacity
	To be configured onsite

4.257 RATED POWER

RANGE	FUNCTION
0–9999 kW	Nameplate power rating of the chiller
	To be configured onsite

4.258 DESIGN CONDENSER FLOW

RANGE	FUNCTION
0–9999	Design condenser flow from chiller specs.
	To be configured onsite

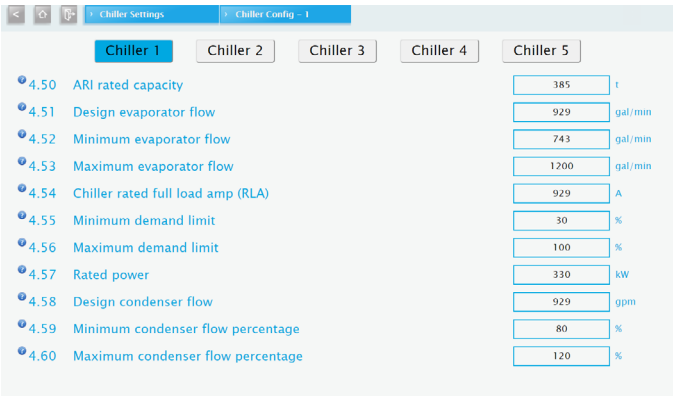
4.259 MINIMUM CONDENSER FLOW PERCENTAGE

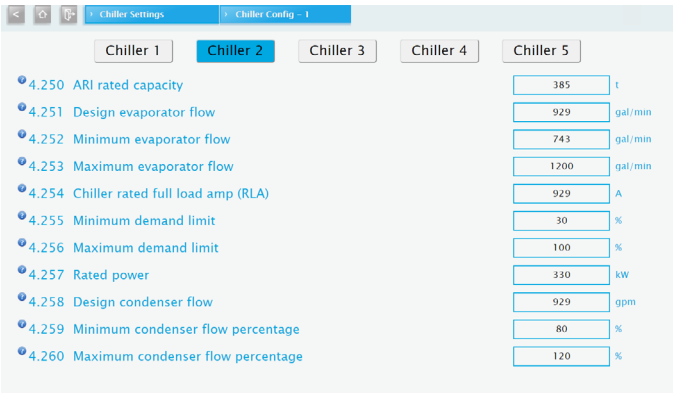
RANGE	FUNCTION
0–100 %	Minimum percentage of rated condenser flow at which the chiller will be allowed to run
80 %	Default

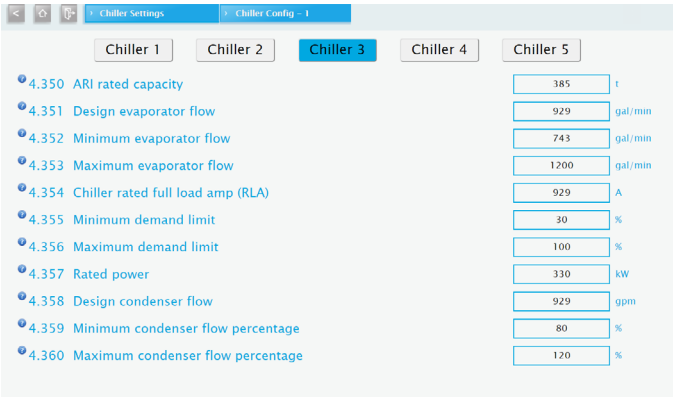
4.260 MAXIMUM CONDENSER FLOW PERCENTAGE

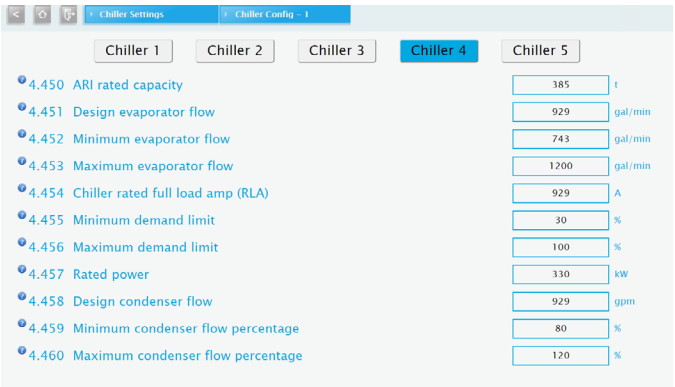
RANGE	FUNCTION
0–120 %	Maximum percentage of rated condenser flow at which the chiller will be allowed to run
120 %	Default

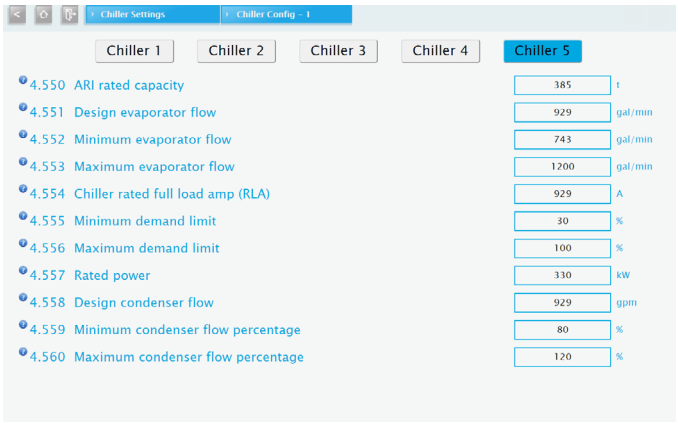
Options for Mixed Chillers Dedicated











4.50/250/350/450/550 ARI RATED CAPACITY

RANGE	FUNCTION
0–9999 tons	Rated cooling capacity of the chiller in tons as per Air-conditioning & Refrigeration Institute
	To be configured onsite

4.51/251/351/451/551 DESIGN EVAPORATOR FLOW

RANGE	FUNCTION
0–9999 gpm	Determines the chiller design flow. Used to stage On & Off dualArm/Tango pumps
	To be configured onsite

4.52/252/352/452/552 MINIMUM EVAPORATOR FLOW

RANGE	FUNCTION
0–9999 gpm	Determines the chiller rated minimum flow. The IPC9521 will open the bypass valve and increase the pump speed if the flow falls under this value (combined with all operating chillers)
	To be configured onsite

4.53/253/353/453/553 MAXIMUM EVAPORATOR FLOW

RANGE	FUNCTION
0-9999 gpm	Determines the chiller rated maximum flow. The IPC9521 will reduce pump speed if the flow climbs above this value (combined with all operating chillers)
	To be configured onsite

4.54/254/354/454/554 RLA

RANGE	FUNCTION
0–999.9 A	Determines the chiller nameplate RLA
	To be configured onsite

4.55/255/355/455/555 MINIMUM DEMAND LIMIT

RANGE	FUNCTION
0–100.0%	Determines the chiller minimum demand limit (in percentage). When the chiller is started, the IPC9521 will initially limit its demand to this value
	To be configured onsite

4.56/256/356/456/556 MAXIMUM DEMAND LIMIT

RANGE	FUNCTION
0–100.0%	Determines the demand limit (in percentage) to be sent (gradually, see parameter **4.7**) to the chiller once the chiller is confirmed running. Default is 100.0%, if there is a problem with the chiller that doesn't allow it to run at maximum capacity, use this parameter to limit the chiller to a reduced capacity
	To be configured onsite

4.57/257/357/457/557 RATED POWER

RANGE	FUNCTION
0–9999 kW	Nameplate power rating of the chiller
	To be configured onsite

4.58/258/358/458/558 DESIGN CONDENSER FLOW

RANGE	FUNCTION
0–9999	Design condenser flow from chiller specs.
	To be configured onsite

4.59/259/359/459/559 MINIMUM CONDENSER FLOW PERCENTAGE

RANGE	FUNCTION
0–100 %	Minimum percentage of rated condenser flow at which the chiller will be allowed to run
80 %	Default

4.60/260/360/460/560 MAXIMUM CONDENSER FLOW PERCENTAGE

RANGE	FUNCTION
0–120 %	Maximum percentage of rated condenser flow at which the chiller will be allowed to run
120 %	Default

3.13.1 CHILLER CONFIG – 2

Options for Equal Chillers

4.62 FAIL TO START DELAY

RANGE	FUNCTION
0–999 sec	Indicates the time the IPC waits for the chiller run feedback to be detected before issuing a chiller run feedback alarm
120 sec	Default

4.63 MINIMUM PERCENTAGE RLA FOR RUNNING CHILLER

RANGE	FUNCTION
0–100%	Percentage of rated load amps or rated kW to determine that a chiller is running
10%	Default

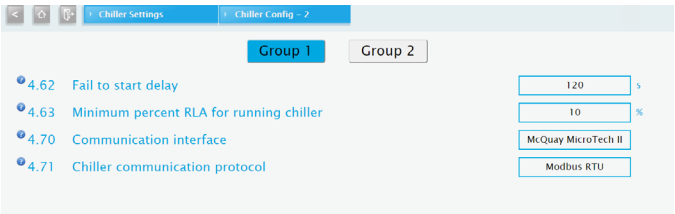
4.70 COMMUNICATION INTERFACE

OPTIONS	FUNCTION
Hardwired	Selects hardwired control of the chillers. The signals used are: DO to start/stop the chiller, AO for chilled water setpoint, AO for demand limit control (this is optional, see chiller stage type), AI for amps reading.
Smardt	Control system communication with Smardt chillers.
York Talk2	Control system communication with York Talk2 chillers.
York Talk3	Control system communication with York Talk3 chillers.
McQuay MicroTech II	Control system communication with McQuay MicroTech II
McQuay MicroTech III	Control system communication with McQuay MicroTech III
Trane RT/CG	Control system communication with Trane RT/CG
	To be configured onsite

4.71 CHILLER COMMUNICATION PROTOCOL

OPTIONS	FUNCTION
N/A	No protocol is selected
Modbus RTU	Selects Modbus RTU
BACnet	Selects BACnet
	To be configured onsite

Options for Mixed Chillers Headered



4.262 FAIL TO START DELAY

RANGE	FUNCTION
0–999 sec	Indicates the time the IPC waits for the chiller run feedback to be detected before issuing a chiller run feedback alarm
120 sec	Default

4.263 MINIMUM PERCENTAGE RLA FOR RUNNING CHILLER

RANGE	FUNCTION
0–100%	Percentage of rated load amps or rated kW to determine that a chiller is running
10%	Default

4.270 COMMUNICATION INTERFACE

OPTIONS	FUNCTION
Hardwired	Selects hardwired control of the chillers. The signals used are: DO to start/stop the chiller, AO for chilled water setpoint, AO for demand limit control (this is optional, see chiller stage type), AI for amps reading.
Smardt	Control system communication with Smardt chillers.
York Talk2	Control system communication with York Talk2 chillers.
York Talk3	Control system communication with York Talk3 chillers.
McQuay MicroTech II	Control system communication with McQuay MicroTech II
McQuay MicroTech III	Control system communication with McQuay MicroTech III
Trane RT/CG	Control system communication with Trane RT/CG
	To be configured onsite

4.271 CHILLER COMMUNICATION PROTOCOL

OPTIONS	FUNCTION
N/A	No protocol is selected
Modbus RTU	Selects Modbus RTU
BACnet	Selects BACnet
	To be configured onsite

Options for Mixed Chillers Dedicated

4.62/262/362/462/562 FAIL TO START DELAY

RANGE	FUNCTION
0–999 sec	Indicates the time the IPC waits for the chiller run feedback to be detected before issuing a chiller run feedback alarm
120 sec	Default

4.63/263/363/463/563 MINIMUM PERCENTAGE RLA FOR RUNNING CHILLER

RANGE	FUNCTION
0–100%	Percentage of rated load amps or rated kW to determine that a chiller is running
10%	Default

4.70/270/370/470/570 COMMUNICATION INTERFACE	
OPTIONS	**FUNCTION**
Hardwired	Selects hardwired control of the chillers. The signals used are: DO to start/stop the chiller, AO for chilled water setpoint, AO for demand limit control (this is optional, see chiller stage type), AI for amps reading.
Smardt	Control system communication with Smardt chillers.
York Talk2	Control system communication with York Talk2 chillers.
York Talk3	Control system communication with York Talk3 chillers.
McQuay AGZ	Control system communication with McQuay AGZ.
Trane LonTalk	Control system communication with Trane LonTalk
	To be configured onsite

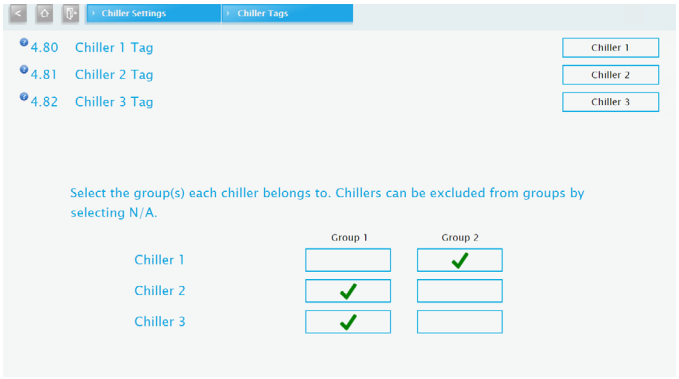
4.71/271/371/471/571 CHILLER COMMUNICATION PROTOCOL	
OPTIONS	**FUNCTION**
N/A	No protocol is selected
Modbus RTU	Selects Modbus RTU
BACnet	Selects BACnet
	To be configured onsite

3.13.2 CHILLER TAGS

Options for Equal Chillers

4.80/81/82/83/84 CHILLER 1/2/3/4/5 TAGS	
OPTIONS	**FUNCTION**
	Enter the tag that identifies the chiller in order to display it on the screen. Note: There is limited space on the screens, the system automatically wraps text but short tags are recommended
	To be configured onsite

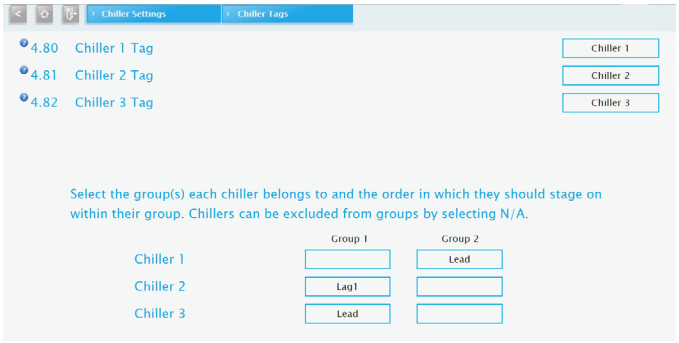
Options for Mixed Chillers Headered



4.80/81/82/83/84 CHILLER 1/2/3/4/5 TAGS	
OPTIONS	**FUNCTION**
	Enter the tag that identifies the chiller in order to display it on the screen. Note: There is limited space on the screens, the system automatically wraps text but short tags are recommended
	To be configured onsite

There are two columns with check marks indicating to which Group each chiller belongs to. Touch the box of the desired Group to assign a chiller

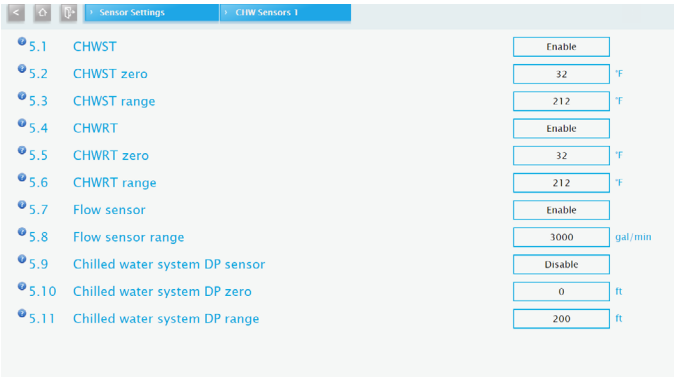
Options for Mixed Chillers Dedicated



4.80/81/82/83/84 CHILLER 1/2/3/4/5 TAGS	
OPTIONS	**FUNCTION**
	Enter the tag that identifies the chiller in order to display it on the screen. Note: There is limited space on the screens, the system automatically wraps text but short tags are recommended
	To be configured onsite

- There are two columns indicating which Group each chiller belongs to and the sequence they run at. For instance, in the picture above:
  - Chiller 2 & Chiller 3 belong to Group 1
    - Chiller 3 is the Lead chiller in that Group and runs first
    - Chiller 2 is Lag 1 and runs after Chiller 3
  - Chiller 1 belongs to Group 2
    - Since Chiller 1 is the only chiller in this group it is the Lead
- It is possible for a chiller to belong to both Groups

3.14 CHW SENSORS 1



5.1 CHWST

OPTIONS	FUNCTION
Enable	Sensor is enabled. (Default Setting)
Disable	Sensor is disabled

5.2 CHWST ZERO

RANGE	FUNCTION
0 to 999.9 °F, °C	Range of the sensor in engineering units. This value corresponds to the sensor's 4mA output
32°F	Default

5.3 CHWST RANGE

RANGE	FUNCTION
0 to 999.9 °F, °C	Range of the sensor in engineering units. This value corresponds to the sensor's 20mA output
212 °F	Default

5.4 CHWRT

OPTIONS	FUNCTION
Enable	Sensor is enabled. (Default Setting)
Disable	Sensor is disabled

5.5 CHWRT ZERO

RANGE	FUNCTION
0 to 999.9°F, °C	Range of the sensor in engineering units. This value corresponds to the sensor's 4mA output
32 °F	Default

5.6 CHWRT RANGE

RANGE	FUNCTION
0 to 999.9°F, °C	Range of the sensor in engineering units. This value corresponds to the sensor's 20mA output
212°F	Default

5.7 FLOW SENSOR

OPTIONS	FUNCTION
Enable	Sensor is enabled. (Default Setting)
Disable	Sensor is disabled

5.8 FLOW SENSOR RANGE

RANGE	FUNCTION
0 to 9999.9	Range of the sensor in engineering units. This value corresponds to the sensor's 20mA output
	To be configured onsite

5.9 CHILLED WATER SYSTEM DP SENSOR

OPTIONS	FUNCTION
Enable	Sensor is enabled. (Default Setting)
Disable	Sensor is disabled

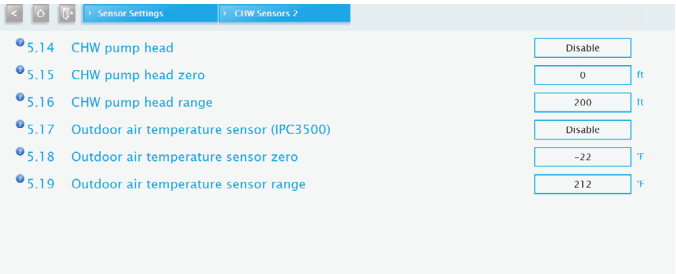
5.10 CHILLED WATER SYSTEM DP ZERO

RANGE	FUNCTION
–999 to 999	Range of the sensor in engineering units. This value corresponds to the sensor's 4mA output
	To be configured onsite

5.11 CHILLED WATER SYSTEM DP RANGE

RANGE	FUNCTION
0 – 999	Range of the sensor in engineering units. This value corresponds to the sensor's 20mA output
	To be configured onsite

3.15 CHW SENSOR 2



5.14 CHW PUMP HEAD

OPTIONS	FUNCTION
Enable	Sensor is enabled
Disable	Sensor is disabled. (Default Setting)

5.15 CHW PUMP HEAD ZERO

RANGE	FUNCTION
0–999	Range of the sensor in engineering units. This value corresponds to the sensor's 4mA output
	To be configured onsite

5.16 CHW PUMP HEAD RANGE

RANGE	FUNCTION
0–999	Range of the sensor in engineering units. This value corresponds to the sensor's 20mA output
	To be configured onsite

5.17 OUTDOOR AIR TEMPERATURE SENSOR (IPC3500)

OPTIONS	FUNCTION
Enable	Sensor is enabled
Disable	Sensor is disabled. (Default Setting)

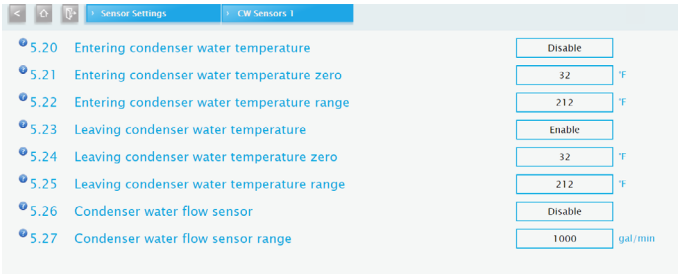
5.18 OUTDOOR AIR TEMPERATURE SENSOR ZERO

RANGE	FUNCTION
–999 to 999	Range of the sensor in engineering units. This value corresponds to the sensor's 4mA output
	To be configured onsite

5.19 OUTDOOR AIR TEMPERATURE SENSOR RANGE

RANGE	FUNCTION
-999 to 999	Range of the sensor in engineering units. This value corresponds to the sensor's 20mA output
	To be configured onsite

3.16 CW SENSOR 1



5.20 ECWT

OPTIONS	FUNCTION
Enable	Sensor is enabled. (Default Setting)
Disable	Sensor is disabled

5.21 ECWT ZERO

RANGE	FUNCTION
–999 to 999	Range of the sensor in engineering units. This value corresponds to the sensor's 4mA output
32°F	Default

5.22 ECWT RANGE

RANGE	FUNCTION
–999 to 999	Range of the sensor in engineering units. This value corresponds to the sensor's 20mA output
212°F	Default

5.23 LCWT

OPTIONS	FUNCTION
Enable	Sensor is enabled. (Default Setting)
Disable	Sensor is disabled

5.24 LCWT ZERO

RANGE	FUNCTION
–999 to 999	Range of the sensor in engineering units. This value corresponds to the sensor's 4mA output
32°F	Default

5.25 LCWT RANGE

RANGE	FUNCTION
–999 to 999	Range of the sensor in engineering units. This value corresponds to the sensor's 20mA output
212°F	Default

5.26 CONDENSER WATER FLOW SENSOR

OPTIONS	FUNCTION
Enable	Sensor is enabled
Disable	Sensor is disabled. (Default Setting)

5.27 CONDENSER WATER FLOW SENSOR RANGE

RANGE	FUNCTION
0 to 9999	Range of the sensor in engineering units. This value corresponds to the sensor's 20mA output
	To be configured onsite

3.17 CW SENSOR 2

5.31 RELATIVE HUMIDITY SENSOR

OPTIONS	FUNCTION
Enable	Sensor is enabled
Disable	Sensor is disabled. (Default Setting)

5.32 RELATIVE HUMIDITY SENSOR RANGE

RANGE	FUNCTION
0 – 100%	Range of the sensor in engineering units. This value corresponds to the sensor's 20mA output
	To be configured onsite

5.33 CONDENSER WATER DP SENSOR

OPTIONS	FUNCTION
Enable	Sensor is enabled
Disable	Sensor is disabled. (Default Setting)

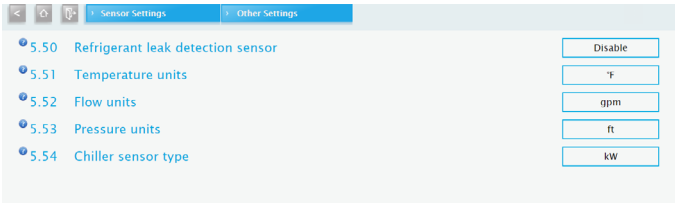
5.34 CONDENSER WATER DP SENSOR ZERO

OPTIONS	FUNCTION
–999 to 999	Range of the sensor in engineering units. This value corresponds to the sensor's 4mA output
	To be configured onsite

5.35 CONDENSER WATER DP SENSOR RANGE

RANGE	FUNCTION
-999 to 999	Range of the sensor in engineering units. This value corresponds to the sensor's 20mA output
	To be configured onsite

3.18 OTHER SETTINGS



5.50 REFRIGERANT LEAK DETECTION SENSOR

OPTIONS	FUNCTION
Enable	Sensor is enabled
Disable	Sensor is disabled. (Default Setting)

5.51 TEMPERATURE UNITS

OPTIONS	FUNCTION
°F	Selects °F as the sensor's engineering units. (Default Setting)
°C	Selects °c as the sensor's engineering units

5.52 FLOW UNITS

OPTIONS	FUNCTION
USgpm	Selects gpm as the sensor's engineering units. (Default Setting)
l/s	Selects lps as the sensor's engineering units
m^3/hr	Selects m^3/hr as the sensor's engineering units

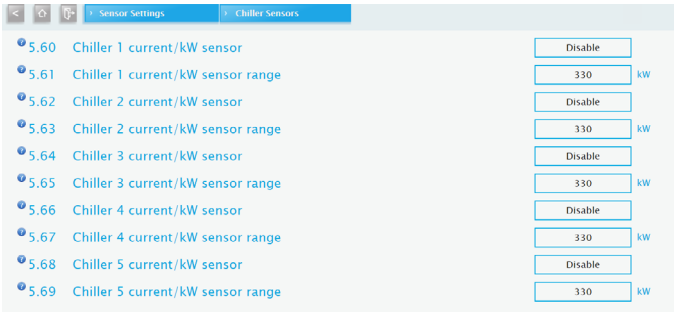
5.53 PRESSURE UNITS

OPTIONS	FUNCTION
psi	DP sensors in psi are used. (Default Setting)
ft	DP sensors in ft are used
kPa	DP sensors in kPa are used
m	DP sensors in m are used
bar	DP sensors in bar are used

5.54 CHILLER SENSOR TYPE

OPTIONS	FUNCTION
Current	Current sensors are connected to terminals 21 to 30. IPC9521 uses current over serial connection for staging
kW	kW sensors are connected to terminals 21 to 30. IPC9521 uses power over serial connection for staging
	To be configured onsite

3.19 CHILLER SENSORS



5.60 CHILLER 1 CURRENT/kW SENSOR

OPTIONS	FUNCTION
Enable	Current/power transmitter is installed
Disable	No current/power transmitter is installed. The IPC relies on the serial communication to determine the chiller current/power
	To be configured onsite

5.61 CHILLER 1 CURRENT/KW SENSOR RANGE

RANGE	FUNCTION
0–9999 A/ kW	Range of the sensor in engineering units. This value corresponds to the sensor's 20mA output
	To be configured onsite

5.62 CHILLER 2 CURRENT/KW SENSOR

OPTIONS	FUNCTION
Enable	Current/power transmitter is installed
Disable	No current/power transmitter is installed. The IPC relies on the serial communication to determine the chiller current/power
	To be configured onsite

5.63 CHILLER 2 CURRENT/kW SENSOR RANGE

RANGE	FUNCTION
0–9999 A/ kW	Range of the sensor in engineering units. This value corresponds to the sensor's 20mA output
	To be configured onsite

5.64 CHILLER 3 CURRENT/kW SENSOR

OPTIONS	FUNCTION
Enable	Current/power transmitter is installed
Disable	No current/power transmitter is installed. The IPC relies on the serial communication to determine the chiller current/power
	To be configured onsite

5.65 CHILLER 3 CURRENT/kW SENSOR RANGE

RANGE	FUNCTION
0–9999 A/ kW	Range of the sensor in engineering units. This value corresponds to the sensor's 20mA output
	To be configured onsite

5.66 CHILLER 4 CURRENT/kW SENSOR

OPTIONS	FUNCTION
Enable	Current/power transmitter is installed
Disable	No current/power transmitter is installed. The IPC relies on the serial communication to determine the chiller current/power
	To be configured onsite

5.67 CHILLER 4 CURRENT/kW SENSOR RANGE

RANGE	FUNCTION
0–9999 A/ kW	Range of the sensor in engineering units. This value corresponds to the sensor's 20mA output
	To be configured onsite

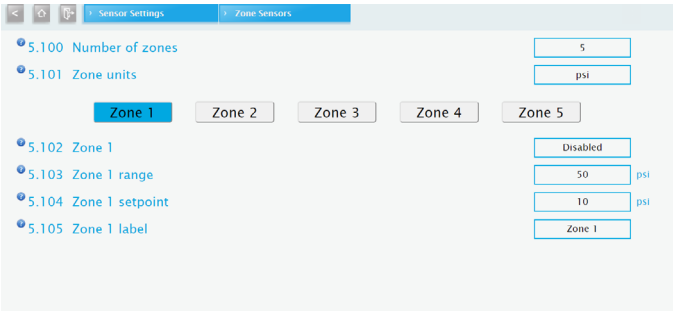
5.68 CHILLER 5 CURRENT/kW SENSOR

OPTIONS	FUNCTION
Enable	Current/power transmitter is installed
Disable	No current/power transmitter is installed. The IPC relies on the serial communication to determine the chiller current/power
	To be configured onsite

5.69 CHILLER 5 CURRENT/kW SENSOR RANGE

RANGE	FUNCTION
0–9999 A/ kW	Range of the sensor in engineering units. This value corresponds to the sensor's 20mA output
	To be configured onsite

3.20 ZONE SENSORS



5.100 NUMBER OF ZONES

RANGE	FUNCTION
1–5	Number of zones that will be used to control the system, typically one zone per area of the building
1	Default

5.101 ZONE UNITS

OPTIONS	FUNCTION
psi	DP sensors in psi are used. (Default Setting)
ft	DP sensors in ft are used
kPa	DP sensors in kPa are used
m	DP sensors in m are used
bar	DP sensors in bar are used
°F	Temperature sensors in °F are used
°C	Temperature sensors in °C are used

5.102/106/110/114/118 ZONE 1,2,3,4,5

OPTIONS	FUNCTION
Enabled	The zone is enabled. It will be used to determine the Active Zone and pump speed. (Default Setting)
Disable	The zone is disabled. It will not be used to determine the Active Zone and pump speed

5.103/107/111/115/119 ZONE 1,2,3,4,5 RANGE

RANGE	FUNCTION
0–999.9 (psi, ft, kPa, m, bar, °F, °C)	Range of the DP or temperature sensor of the zone
50 psi	Default

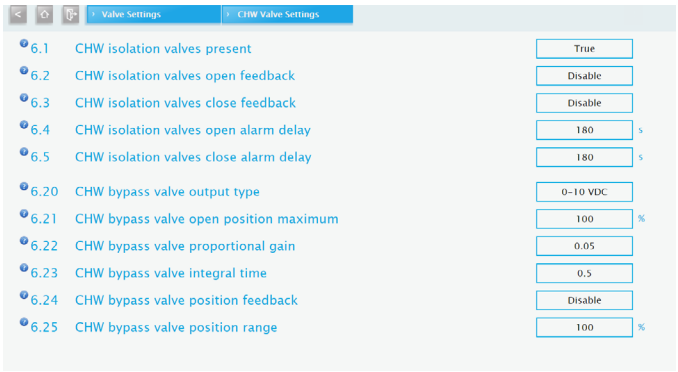
5.104/108/112/116/120 ZONE 1,2,3,4,5 SETPOINT

RANGE	FUNCTION
0–999.9 (psi, ft, kPa, m, bar, °F, °C)	Setpoint of the zone. The IPC uses this value to determine the pump speed
	To be configured onsite

5.105/109/113/117/121 ZONE 1,2,3,4,5 LABEL

OPTIONS	FUNCTION
N/A	Enter the zone name or location
	To be configured onsite

3.21 CHW VALVE SETTINGS



6.1 CHW ISOLATION VALVES PRESENT

OPTIONS	FUNCTION
True	Valves exist in this configuration and will be shown on the layout. (Default Setting)
False	No valves exist and they will not show up on the plant layout.

6.2 CHW ISOLATION VALVES OPEN FEEDBACK

OPTIONS	FUNCTION
Enable	Digital inputs are utilized as valve open feedback. (Default Setting)
Disable	No digital inputs are utilized as valve open feedback. The valves are considered open when they are commanded to do so

6.3 CHW ISOLATION VALVES CLOSE FEEDBACK

OPTIONS	FUNCTION
Enable	Digital inputs are utilized as valve close feedback
Disable	No digital inputs are utilized as valve close feedback. The valves are considered closed when they are commanded to do so. (Default Speed)

6.4 CHW ISOLATION VALVES OPEN ALARM DELAY

RANGE	FUNCTION
0–999 sec	Time the IPC waits for the isolation valve open feedback to be detected before issuing an isolation valve alarm
180 sec	Default

6.5 CHW ISOLATION VALVES CLOSE ALARM DELAY

RANGE	FUNCTION
0–999 sec	Time the IPC waits for the isolation valve close feedback to be detected before issuing an isolation valve alarm
180 sec	Default

6.20 CHW BYPASS VALVE OUTPUT TYPE

OPTIONS	FUNCTION
0–10 VDC	Selects 0 VDC as valve fully closed command. (Default Setting)
2–10 VDC	Selects 2 VDC as valve fully closed command

6.21 CHW BYPASS VALVE OPEN POSITION MAXIMUM

RANGE	FUNCTION
0–100%	Determines the maximum allowable opening (in%) of the valve
100%	Default

6.22 CHW BYPASS VALVE PROPORTIONAL GAIN

RANGE	FUNCTION
0–9999	Valve control PID loop gain. Larger values correspond to a more responsive control system
0.05	Default

6.23 CHW BYPASS VALVE INTEGRAL TIME

RANGE	FUNCTION
0–9999	Valve control PID loop integral time. Larger values correspond to a more iterations and reduction of steady state error
0.5	Default

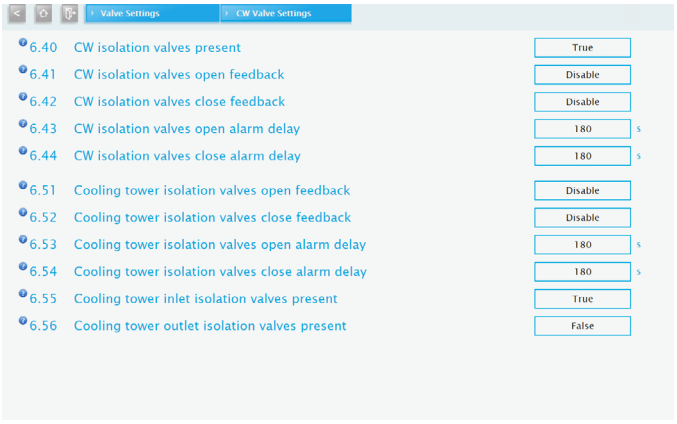
6.24 CHW BYPASS VALVE POSITION FEEDBACK

OPTIONS	FUNCTION
Enable	Sensor is enabled
Disable	Sensor is disabled. (Default Setting)

6.25 CHW BYPASS VALVE FEEDBACK POSITION RANGE

RANGE	FUNCTION
0-100%	Range of the sensor in engineering units. This value corresponds to the sensor's 20mA output
100%	Default

3.22 CW VALVE SETTINGS



6.40 CW ISOLATION VALVES PRESENT

OPTIONS	FUNCTION
True	Valves exist in this configuration and will be shown on the layout. (Default Setting)
False	No valves exist and they will not show up on the plant layout.

6.41 CW ISOLATION VALVES OPEN FEEDBACK

OPTIONS	FUNCTION
Enable	Digital inputs are utilized as valve open feedback. (Default Setting)
Disable	No digital inputs are utilized as valve open feedback. The valves are considered open when they are commanded to do so

6.42 CW ISOLATION VALVES CLOSE FEEDBACK

OPTIONS	FUNCTION
Enable	Digital inputs are utilized as valve open feedback. (Default Setting)
Disable	No digital inputs are utilized as valve close feedback. The valves are considered open when they are commanded to do so.

6.43 CW ISOLATION VALVES OPEN ALARM DELAY

RANGE	FUNCTION
0–999 sec	Time the IPC waits for the isolation valve close feedback to be detected before issuing an isolation valve alarm
180 sec	Default

6.44 CW ISOLATION VALVES CLOSE ALARM DELAY

RANGE	FUNCTION
0–999 sec	Time the IPC waits for the isolation valve close feedback to be detected before issuing an isolation valve alarm
180 sec	Default

6.51 COOLING TOWER ISOLATION VALVES OPEN FEEDBACK

OPTIONS	FUNCTION
Enable	Digital inputs are utilized as valve open feedback. (Default Setting)
Disable	No digital inputs are utilized as valve open feedback. The valves are considered open when they are commanded to do so

6.52 COOLING TOWER ISOLATION VALVES CLOSE FEEDBACK

OPTIONS	FUNCTION
Enable	Digital inputs are utilized as valve open feedback. (Default Setting)
Disable	No digital inputs are utilized as valve open feedback. The valves are considered open when they are commanded to do so

6.53 COOLING TOWER ISOLATION VALVES OPEN ALARM DELAY

RANGE	FUNCTION
0–999 sec	Time the IPC waits for the isolation valve close feedback to be detected before issuing an isolation valve alarm
180 sec	Default

6.54 COOLING TOWER ISOLATION VALVES CLOSE ALARM DELAY

RANGE	FUNCTION
0–999 sec	Time the IPC waits for the isolation valve close feedback to be detected before issuing an isolation valve alarm
180 sec	Default

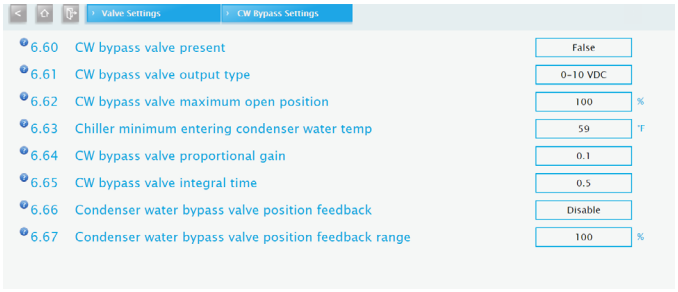
6.55 COOLING TOWER INLET ISOLATION VALVES PRESENT

OPTIONS	FUNCTION
True	Valves exist in this configuration and will be shown on the layout. (Default Setting)
False	No valves exist and they will not show up on the plant layout

6.56 COOLING TOWER OUTLET ISOLATION VALVES PRESENT

OPTIONS	FUNCTION
True	Valves exist in this configuration and will be shown on the layout. (Default Setting)
False	No valves exist and they will not show up on the plant layout

3.23 CW BYPASS SETTINGS



6.60 CW BYPASS VALVE PRESENT

OPTIONS	FUNCTION
True	There is a cw bypass valve installed in the system. (Default Setting)
False	There is no cw bypass valve installed

6.61 CW BYPASS VALVE OUTPUT TYPE

OPTIONS	FUNCTION
0–10 VDC	Selects 0 VDC as valve fully closed command. (Default Setting)
2–10 VDC	Selects 2 VDC as valve fully closed command

6.62 CW BYPASS VALVE MAXIMUM OPEN POSITION

RANGE	FUNCTION
0–100%	Maximum open position of the condenser bypass valve
100%	Default

6.63 CHILLER MINIMUM ENTERING CONDENSER WATER TEMP

RANGE	FUNCTION
–999 to 9999	Minimum condenser water temperature entering the chiller. This is based on the chiller' design specifications
59°F	Default

6.64 CW BYPASS VALVE PROPORTIONAL GAIN

RANGE	FUNCTION
0 – 9999	Determines valve control PID loop gain. Larger values correspond to a more responsive control system
0.05	Default

6.65 CW BYPASS VALVE INTEGRAL TIME

RANGE	FUNCTION
0 – 9999	Determines valve control PID loop integral time. Larger values correspond to more iterations and a reduction of steady state error.
0.5	Default

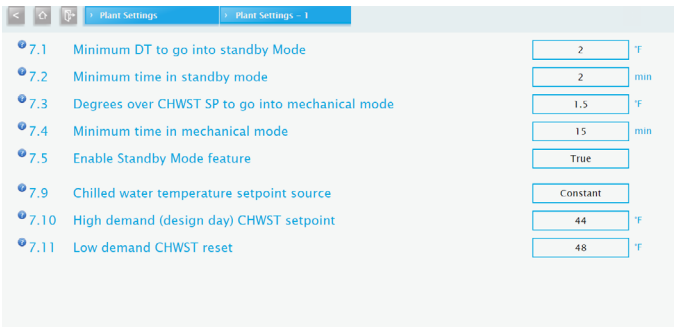
6.66 CW BYPASS VALVE POSITION FEEDBACK

OPTIONS	FUNCTION
Enable	Sensor is enabled
Disable	Sensor is disabled (Default Setting)

6.67 CW BYPASS VALVE POSITION FEEDBACK RANGE

RANGE	FUNCTION
0 – 100%	Range of the sensor in engineering units. This value corresponds to the sensor's 20mA output
100%	Default

3.24 PLANT SETTINGS 1



7.1 MINIMUM DT TO GO INTO STANDBY MODE

RANGE	FUNCTION
0–999.9°F, °C	When the plant is in mechanical mode, the IPC constantly monitors the difference (DT) between Chilled Water Return Temperature and Chilled Water Setpoint, if it falls under this value and the corresponding timer has expired (parameter 7.4), the plant will be changed to standby mode (no chillers operate, only the duty 1 pump runs)
2°C	Default

7.2 MINIMUM TIME IN STANDBY MODE

RANGE	FUNCTION
0–999 min	Once the plant switches to standby mode, it will remain in this mode until this timer expires
15 min	Default

7.3 DEGREES OVER CHWST SP TO GO INTO MECHANICAL MODE

RANGE	FUNCTION
0–999.9°F, °C	When the plant is in standby mode, the IPC constantly monitors the Chilled Water Supply Temp, if it climbs over the Chilled Water Temp Setpoint by this value and the corresponding timer has expired (parameter 7.2), the plant will be changed to mechanical mode
1.5°C	Default

7.4 MINIMUM TIME IN MECHANICAL MODE

RANGE	FUNCTION
0–999 min	Once the plant switches to mechanical mode, it will remain in this mode until this timer expires
15 min	Default

7.5 ENABLE STANDBY MODE FEATURE

OPTIONS	FUNCTION
True	The IPC will change to standby mode when the conditions are met (parameters 7.1 & 7.4) (Default Setting)
False	The IPC will not change to standby mode

7.9 CHILLED WATER TEMPERATURE SETPOINT SOURCE

OPTIONS	FUNCTION
Constant	CHWST setpoint remains constant at design day (7.10) (Default Setting)
OAT	CHWST setpoint is reset based on OAT (7.16 and 7.17)
External	CHWST setpoint is controlled by an external source

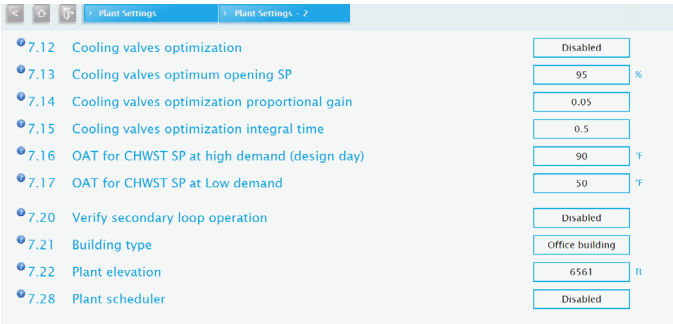
7.10 HIGH DEMAND (DESIGN DAY) CHWST SETPOINT

RANGE	FUNCTION
0–999.9°F, °C	Chilled water setpoint at design day. When parameter 7.9 is set to constant, this is the CHWST setpoint. When parameter 7.9 is set to OAT, this is the CHWST setpoint when the OAT is at the value entered in parameter 7.16
44min	Default

7.11 LOW DEMAND CHWST RESET

RANGE	FUNCTION
0–999.9°F, °C	Chilled water setpoint at low load. When parameter 7.9 is set to constant it is not used. When parameter 7.9 is set to OAT, this is the CHWST setpoint when OAT is at the value entered in parameter 7.16
48min	Default

3.25 PLANT SETTINGS 2



7.12 COOLING VALVES OPTIMIZATION

OPTIONS	FUNCTION
Enabled	The IPC will receive the position of the most open cooling valve from the BMS and using a PID loop will maintain the said valve at the desired setpoint (parameter 7.13), by means of modifying the active zone setpoint
Disabled	The cooling valves option is not used. (Default Setting)

7.13 COOLING VALVES OPTIMUM OPENING SP

RANGE	FUNCTION
0–100%	If parameter 7.12 is TRUE, this is the position at which the IPC will maintain the position of the cooling valve with the maximum opening
95%	Default

7.14 COOLING VALVES OPTIMIZATION PID PROPORTIONAL GAIN

RANGE	FUNCTION
0–100	Cooling valves PID proportional gain
0.05	Default

7.15 COOLING VALVES OPTIMIZATION PID INTEGRAL TIME

RANGE	FUNCTION
0–100	Cooling valves PID integral time
0.5	Default

7.16 OAT FOR CHWST SP AT HIGH DEMAND (DESIGN DAY)

RANGE	FUNCTION
0–100	If parameter 7.9 is set to OAT, this is the OAT value at which the CHWST setpoint will be at design day
	To be configured onsite

7.17 OAT FOR CHWST SP AT LOW DEMAND

RANGE	FUNCTION
0–100	If parameter 7.9 is set to OAT, this is the OAT value at which the CHWST setpoint will be reset at the low demand setpoint (7.11)
	To be configured onsite

7.20 VERIFY SECONDARY LOOP OPERATION

OPTIONS	FUNCTION
Enabled	The IPC9521 monitors the secondary loop controller status. If the secondary loop is not operational, the IPC9521 will not be enabled
Disabled	The IPC9521 ignores the status of the secondary loop. (Default Setting)

7.21 BUILDING TYPE

OPTIONS	FUNCTION
N/A	Green Mark certification calculations are not performed
Office building	Green Mark certification looks at building heat balance from 8am to 5pm, Monday to Friday
Retail mall	Green Mark certification looks at building heat balance from 10am to 9pm, Monday to Sunday
Hotel	Green Mark certification looks at building heat balance 24 hours, Monday to Sunday

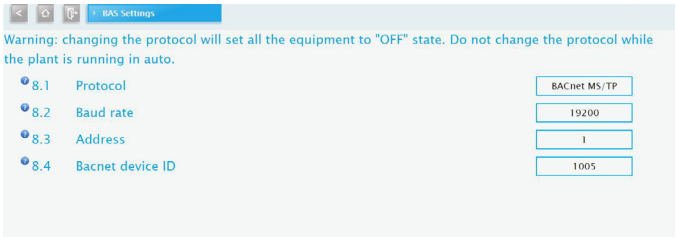
7.22 PLANT ELEVATION

RANGE	FUNCTION
0-99999	Elevation of the plant. This value is used for wetbulb temperature calculations only
	To be configured onsite

7.28 PLANT SCHEDULER

OPTIONS	FUNCTION
Enabled	The plant will operate following the plant schedule.
Disabled	The plant will run based on local or remote enable/disable commands only

3.26 BAS SETTINGS



8.1 PROTOCOL

OPTIONS	FUNCTION
N/A	No BAS protocol selected
Modbus RTU	Selects Modbus RTU
Modbus TCP	Selects Modbus TCP
BACnet IP	Selects BACnet IP
BACnet MS/TP	Selects BACnet MS/TP
	To be configured onsite

8.2 BAUD RATE

OPTIONS	FUNCTION
9600	Selects 9600 as baud rate. Only applies to Modbus protocol
19200	Selects 19200 as baud rate. Only applies to Modbus protocol
38400	Selects 38400 as baud rate. Only applies to Modbus protocol
76800	Selects 76800 as baud rate. Only applies to Modbus protocol
	To be configured onsite

8.3 ADDRESS

RANGE	FUNCTION
0–127	Selects the IPC BAS address. Only applies to Modbus protocols
	To be configured onsite

8.4 BACNET DEVICE ID

RANGE	FUNCTION
1–99999	Selects the IPC BACnet device address. Only applies to BACnet protocols.
	To be configured onsite

3.27 WATER MANAGEMENT

9.1 MAKEUP WATER METER

OPTIONS	FUNCTION
Enabled	Makeup water meter present
Disabled	No makeup water meter present (Default Setting)

9.2 WATER VOLUME PER PULSE

RANGE	FUNCTION
0–100	If a water meter is present, this specifies the amount of water in gallons or liters of water per pulse from the meter
	To be configured onsite

9.3 WATER TREATMENT SYSTEM CONTROL

OPTIONS	FUNCTION
Enabled	Water system control (Pulse Pure or similar) is started when the condenser water pumps are active
Disabled	Water system control is not active (Default Setting)

9.4 SOLID SEPARATOR

OPTIONS	FUNCTION
Enabled	Solid separator is started when the condenser water pumps are started
Disabled	Solid separator system is not active. (Default Setting)

9.5 FREEZE PROTECTION

OPTIONS	FUNCTION
Enabled	Freeze protection to prevent cooling towers from freezing enabled
Disabled	Freeze protection to prevent cooling towers from freezing disabled. (Default Setting)

9.6 OAT TO TURN ON FREEZE PROTECTION

RANGE	FUNCTION
0–100	Temperature to turn freeze protection on
	To be configured onsite

9.7 OAT TO TURN OFF FREEZE PROTECTION

RANGE	FUNCTION
0–100	Temperature to turn freeze protection off
	To be configured onsite

9.8 EXPECTED 1 DAY CT WATER CONSUMPTION

RANGE	FUNCTION
0-9999 l/ gal	Expected make up water consumption of cooling tower
	To be configured onsite

9.15 BLOW DOWN WATER METER

OPTIONS	FUNCTION
Enabled	Blow down water meter is enabled
Disabled	Blow down water meter is disabled. (Default Setting)

9.16 VOLUME PER PULSE

RANGE	FUNCTION
0-9999 l/ gal	Volume of water passing through the blow-down meter per pulse
	To be configured onsite

4.0 IPC 9521 CONTROL SYSTEM SERVICE LIFECYCLE

MANUFACTURER'S SUGGESTED MAINTENANCE SCHEDULE AND COMPONENT LIFE			YEAR AFTER INSTALLATION									
			1	2	3	4	5	6	7	8	9	10
SOFTWARE AND SETTINGS	**MAINTENANCE**	**INCLUDED IN ANNUAL SERVICE PLAN**										
All Firmware	As required by manufacturer	Included	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Optimization logic & control programming	As Service Packs as released by Armstrong	Included	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Data logs backup and storage	Semi-annually at minimum	Included	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Alarm and parameter backup and storage	Semi-annually at minimum	Included	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PANELS & PC/TOUCHSCREEN												
Integrated PC & Touchscreen	Replace PC & Touchscreen	Included with a 5 Year Plan - otherwise extra					✓					
PLCs	Check and confirm voltage	Included	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PLCs and associated components	Replace	Extra - if beyond warranty										✓
Power supply	Check and confirm voltage	Included	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Power supply	Replace on failure	Extra - if beyond warranty										
Panel integrity (gasket, terminals, glands...)	Inspect and repair as needed	Included	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Panel filter (when included)	Inspect and clean as needed	Included	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SENSORS												
Chilled and condenser water temperature sensors	Confirm accuracy	Included	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Chilled and condenser water temperature sensors	Full calibration	Extra			✓			✓			✓	
Chilled and condenser water flow sensors	Confirm accuracy	Included	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Chilled and condenser water flow sensors	Full calibration	Extra			✓			✓			✓	
Pressure differential sensor	Confirm accuracy	Included	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pressure differential sensor	Full calibration	Extra			✓			✓			✓	
Outdoor air temperature/ Humidity sensor	Confirm accuracy	Included	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

NOTES

- As with any system the component life expectancy varies according to usage and operating conditions.
- Components operating inside of clean and weather controlled environment will typically last longer than components exposed to the elements or otherwise operating in dirty environments.
- Component life expectancy also varies according to the power quality (absence of harmonic distortion) and consistency of voltage supplied to the device.

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