PC-3

User Guide

010220

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Preface

The LC-3 Psychrometric Controls Package is a cost-effective system that will control discharge conditions for installations that need discharge control of temperature, de-humidification and/or humidification. All calculations are performed internally so the user only needs to input their desired discharge conditions. An option for airflow (CFM) monitoring and control is also available.

For de-humidification the unit will cool the air to the desired dew point, then heat it to the desired discharge temperature set point. This controls package will support either a DX unit with an analog signal or a chilled water valve for cooling. Modulated gas, modulated hot water/steam, or electric heat sources can be utilized.

If a humidification package with re-heat is added, full control of discharge conditions can be realized. This can be accomplished with evaporative media or steam depending on the requirements of the facility with re-heat being of any type listed above.

Airflow monitoring and control is accomplished by monitoring the air passing through the fan and controlling a VFD. This allows for automatic control of air volume with a manual override option for single speed operation.

Filter monitoring and a full array of alert notifications are also available, all in a simple to use HMI with a friendly look and feel.

Introduction

The Smart-Vue User Interface (UI) for the LC-3 Control System displays the information necessary to operate and diagnose the Discharge Temperature and Humidity Control Unit.

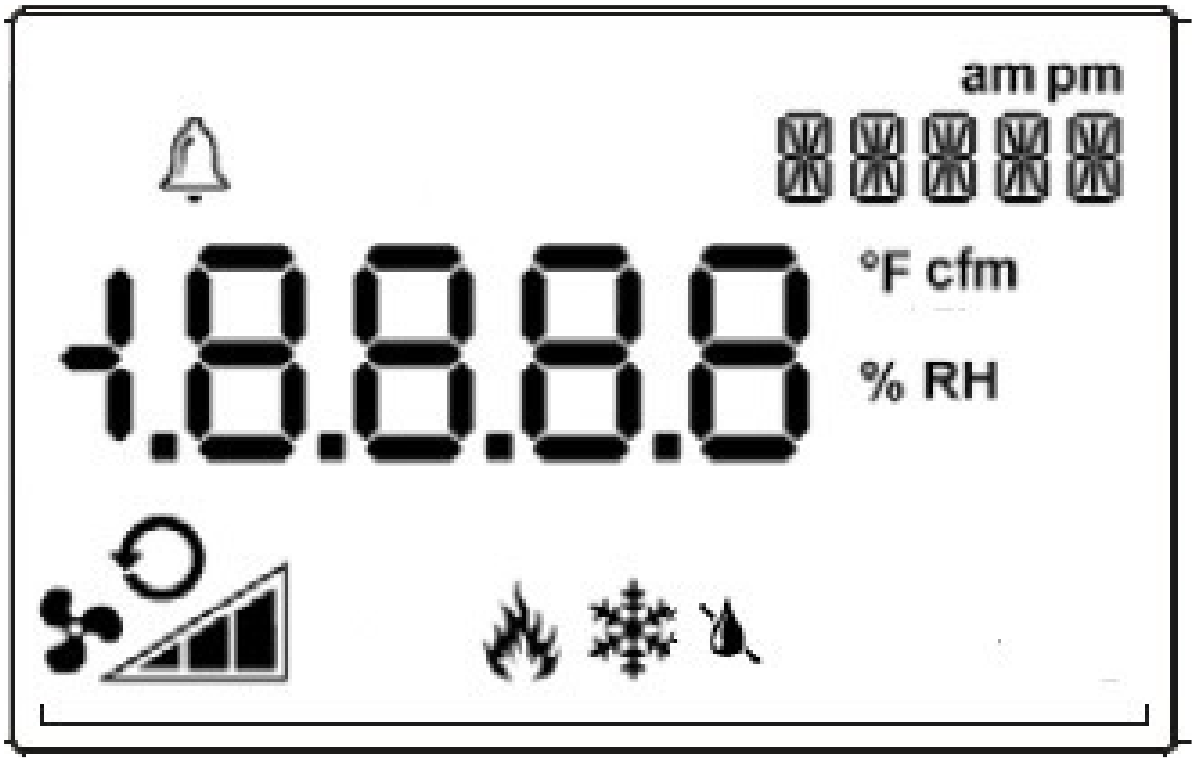

Figure 1

At the top left corner of the display there is a bell symbol. This is the system alarm indicator. If an alarm is present in the unit this indicator will blink. If no alarm is present this indicator will not be visible. At the top right of the display is the time in 12-hour format during normal display. When navigating the menu, the menu title will be displayed here. Across the center of the display is the data with the units of measure. The system is capable of displaying up to 4 decimal places. At the bottom left is the fan status and in the bottom center is the mode of operation.

Three buttons are available for operation (see cover page). The center button allows you to access the menu and scroll through the menu items. The up/down buttons are used to change values.

Operation

The system has a scrolling display which displays the current Discharge Temperature, as well as Relative Humidity and Airflow CFM (if equipped with airflow monitoring and control). The menu is separated into sub-menus for ease of use, and only the options the unit is equipped with will be displayed. When navigating the menu blinking items are set points that can be changed, while non-blinking items are statuses which can only be viewed.

To turn the unit on or off, press the “up arrow” to access the Fan Command. Use the “up arrow” to select the desired option, then press the center button “menu” to return to the main display.

To change set points such as discharge temperature or discharge humidity, press the “menu” button until you see “SET POINTS” in the top right of the screen. Press the “up arrow” to enter this sub-menu. Your first choice will be “TEMP_SET_POINT”. Use the up arrow to select the desired discharge temperature. When you have made your choice, press the “menu” button to move to the next menu item, which will be the Discharge Humidity Set Point. Again, use the “up/down” arrow buttons to make your entry and press “menu” when finished. Continue scrolling through the Set Points sub-menu until all of your desired settings are completed. When scrolling the menu and you see the option “BACK” in the top right, pressing the “up arrow” will take you to the previous menu.

Scrolling through the “STATUS” sub-menu will allow you to view the status of all of the unit sensors, cooling, humidity and burner operation. This is useful for checking unit operation or outdoor conditions.

The “ALARMS” menu will only be displayed if there is a system alarm, as indicated by the blinking alarm bell on the display. When an alarm is present, scrolling through this sub-menu will allow you to view the alarm(s) in “plain English” enumerated text. This is useful for diagnosing the unit in the event of a problem.

The “CONFIG” menu is where the primary operating set points for the unit are set such as the minimum and maximum allowable discharge temperatures, as well as other items. Again, use the “menu” button to scroll through the sub-menu and the “up/down” buttons to edit your selection.

Menu Tree

Scrolling Display

Discharge_Temp – Current discharge temperature at the unit discharge (if more than one discharge sensor is used this will be an averaged value of the sensors).

Discharge_Humidity – Current discharge humidity at the unit discharge (if more than one discharge sensor is used this will be an averaged value of the sensors).

Discharge_Airflow – If the unit is equipped with airflow monitoring and control, this will reflect the discharge CFM of the unit (only visible when airflow monitoring and control is available).

Quick Access

Fan_Command – This is accessed by pressing the “up arrow” from the main screen and is used to turn the unit ON and OFF.

Set Points

Temp_Set_Point – Discharge Temperature Set Point.

Hum_Set_Point – Discharge Humidity Set Point

CFM_Set_Point – Discharge Airflow CFM Set Point (only available if airflow monitoring and control is available).

Manual_VFD_Speed – Manual VFD Speed Percent Set Point. This will override the CFM Set Point (above) and force the VFD to run at a constant, pre-set speed. For automatic control enter ‘null’ value.

Burner_1_Reset – Preheat Burner reset command for use during a burner lockout alarm. This is an “on/_on_” toggle selectable via the “up arrow” button.

Burner_2_Reset – Reheat Burner reset command for use during a burner lockout alarm. This is an “on/_on_” toggle selectable via the “up arrow” button.

Status

OA_Temp – Current outside air temperature.

OA_Humidity – Current outside air humidity.

Coil_Temp – Current cooling coil exit temperature.

Preheat_Temp – Current preheat exit temperature.

DA_Temp – Current discharge air temperature (if more than one discharge sensor is used this will be an averaged value).

DA_Humidity – Current discharge humidity (if more than one discharge sensor is used this will be an averaged value).

DA_Airflow – Current discharge airflow CFM (only available if airflow monitoring and control is available).

Cooling_Command – Current cooling demand (0% - 100%).

Heat_Command – Current preheat demand (0% - 100%).

Humidity_Command – Current humidification demand (0% - 100%).

Reheat_Command – Current reheat demand (0% - 100%).

Alarms (alarm menu is only visible if an alarm is present)

Dirty_Prefilter – Dirty pre-filter indication (only available if the unit has dirty pre-filter monitoring as an option).

Dirty_Final_Fltr – Dirty final filter indication (only available if the unit has dirty final filter monitoring as an option).

Low_Temp_Alarm – Low temperature lockout alarm. This is an indication that the unit was discharging air colder than the “Low Temp Alarm” setting in the “Config” menu for greater than “Low Temp Time” minutes. Check the burner for proper operation.

OA_Temp_Sensor – Outside temperature sensor alarm status. Enumerated “no-fault/open/short”. Check sensor wiring.

OA_Hum_Sensor – Outside humidity sensor alarm status. Enumerated “no-fault/open/short”. Check sensor wiring.

Coil_Sensor – Coil exit sensor alarm status. Enumerated “no-fault/open/short”. Check sensor wiring.

Pre_Heat_Sensor – Preheat temperature sensor alarm status. Enumerated “no-fault/open/short”. Check sensor wiring.

DA_Temp_Sensor_1 – Discharge sensor #1 alarm status. Enumerated “no-fault/open/short”. Check sensor wiring.

DA_Temp_Sensor_2 – Discharge sensor #2 alarm status. Enumerated “no-fault/open/short”. Check sensor wiring.

DA_Hum_Sensor_1 – Discharge humidity sensor #1 alarm status. Enumerated “no-fault/open/short”. Check sensor wiring.

DA_Hum_Sensor_2 – Discharge humidity sensor #2 alarm status. Enumerated “no-fault/open/short”. Check sensor wiring.

Preheat_Lockout – Preheat burner lockout alarm status. Indicates the burner failed to light when requested. Enumerated “normal/lockout”.

Reheat_Lockout – Reheat burner lockout alarm status. Indicates the burner failed to light when requested. Enumerated “normal/lockout”.

Motor_Not_Resp – Motor not responding alarm status. This indicates the unit was enabled and the supply fan motor failed to start within two minutes. Check VFD or overload (as available), OA damper limit switch and wiring, and power.

Config

Low_Temp_Alarm – If the unit discharges air below this temperature set point for “Low Temp Time” minutes it will shut down and close the isolation dampers.

Low_Temp_Time – The time delay (in minutes) for the “Low Temp Alarm”.

Min_Discharge – The units minimum allowable discharge temperature.

Max_Discharge – The units maximum allowable discharge temperature.

Advanced Menu (Press and hold “menu” button for 5 seconds to enter)

Date Time

Year – Set the real time clock year.

Date – Set the real time clock date.

Time – Set the real time clock time.

Advanced Config – (Password Protected, Factory Only)

Network Integration

The controller in this unit can easily be integrated into a BACnet MS/TP Building Management System. The controller will automatically detect the baud rate of the network it is connected to after a power cycle, and will automatically begin communications.

The MAC Address is set via the dip switches on the front of the controller. When shipped, each unit will have a factory default MAC address with multiple units for the same project having incremented MAC addresses. The dip switches are numbered 1 through 8, with 1 being the LSB. The numbering is standard binary format (switches 1 and 3 ON equals an address of 5).

The Network Instance Number (device instance) is automatically configured based on the MAC Address setting. The network instance number will always be 3640+(MAC Address). For example, if the MAC address is set to 25 the network instance number would be 364025. In the event of a duplicate instance number on the network, simply change the MAC address to change the instance number.

The following page has a complete listing of the BACnet points with their descriptions.

Point Number	Point Name	Description	Type	Writable	Units
Analog Value 36	OutsideTemperature	Outside Temperature	Analog Value	N	Unit: degrees-Fahrenheit
Analog Value 37	OutsideHumidity	Outside Air Humidity	Analog Value	N	Unit: degrees-Fahrenheit
Analog Value 38	CoilExitTemperature	Coil Exit Temperature	Analog Value	N	Unit: degrees-Fahrenheit
Analog Value 39	PreheatExitTemperature	PreheatExitTemperature	Analog Value	N	Unit: degrees-Fahrenheit
Analog Value 40	DischargeTemperature	Discharge Air Temperature	Analog Value	N	Unit: degrees-Fahrenheit
Analog Value 41	DischargeHumidity	Discharge Humidity	Analog Value	N	Unit: degrees-Fahrenheit
Analog Value 42	DischargeAirflowCFM	Discharge Airflow CFM	Analog Value	N	Unit: degrees-Fahrenheit
Analog Value 43	CoolingCommand	Cooling Command Precent	Analog Value	N	Unit: degrees-Fahrenheit
Analog Value 44	PreheatCommand	Preheat Command Percent	Analog Value	N	Unit: degrees-Fahrenheit
Analog Value 45	HumiditficationCommand	Humidification Command Percent	Analog Value	N	Unit: degrees-Fahrenheit
Analog Value 46	ReheatCommand	Reheat Command Percent	Analog Value	N	Unit: degrees-Fahrenheit
Analog Value 47	ControlHysteresis	Temperature control hysteresis	Analog Value	Y	Unit: degrees-Fahrenheit
Analog Value 48	BuildingPressureSetPoint	Building pressure set point for control	Analog Value	Y	Unit: inches-of-water
Analog Value 49	BuildingPressureSensor	Building pressure sensor	Analog Value	N	Unit: inches-of-water
Analog Value 50	network_MinimumEconomizer_VFD	Minimum allowed VFD speed or OA percent	Analog Value	Y	Unit: percent
Analog Value 51	network_MazimumEconomizer_VFD	Maximum allowed VFD speed or OA percent	Analog Value	Y	Unit: percent
Analog Value 52	network_TempSetPoint	Discharge Temperature Set Point	Analog Value	Y	Unit: degrees-Fahrenheit
Analog Value 53	network_HumiditySetPoint	Discharge Humidity Set Point	Analog Value	Y	Unit: percent-relative-humidity
Analog Value 54	network_CFM_SetPoint	Discharge Airflow (DM) Set Point	Analog Value	Y	Unit: cubic-feet-per-minute
Analog Value 55	network_VFD_Econ_SetPoint	Manual VFD Speed Set Point (overrides automatic VFD control / use 'null' value for automatic control)	Analog Value	Y	Unit: percent
Analog Value 56	network_PreHeatBurnerReset	Preheat Burner Reset Command [on/_on_ toggle to reset burner]	Analog Value	Y	
Analog Value 57	network_ReHeatBurnerReset	Reheat Burner Reset Command [on/_on_ toggle to reset burner]	Analog Value	Y	
Analog Value 58	network_LowTempSetPoint	Low Temp Alarm Set Point	Analog Value	Y	Unit: degrees-Fahrenheit
Analog Value 59	network_LowTempDelayTime	Low Temp Alarm Time (minutes)	Analog Value	Y	Unit: minutes
Analog Value 60	network_MinimumDischargeTemp	Minimum Discharge Temperature	Analog Value	Y	Unit: degrees-Fahrenheit
Analog Value 61	network_MaximumDischargeTemp	Maximum Discharge Temperature	Analog Value	Y	Unit: degrees-Fahrenheit
AnalogValue 62	EFF_SpaceTemperature	Current Space Temperature	Analog Value	N	Unit: degrees-Fahrenheit
AnalogValue 63	EFF_SpaceHumidity	Current Space Humidity	Analog Value	N	Unit: percent-relative-humidity
Binary Value 21	ControlType	Space or Discharge control	Binary Value	Y	Boolean (SPACE;DISCHARGE)
Binary Value 22	network_FanCommand	Unit ON/OFF Command	Binary Value	Y	Boolean (On;Off)
Multi State Value 1	DirtyPreFitlerAlarm	Dirty Filter Alarm [MSV Enumerated]	Multi State Value	N	Enum: Filters
Multi State Value 2	LowTempAlarm	Low Temp Alarm [MSV Enumerated]	Multi State Value	N	Enum: Alarm / Normal
Multi State Value 5	OutsideTempSensorAlarm	Outside Temp Sensor Alarm [MSV Enumerated]	Multi State Value	N	Enum: SensorReliability
Multi State Value 6	OutsideHumiditySensorAlarm	Outside Humidity Sensor Alarm [MSV Enumerated]	Multi State Value	N	Enum: SensorReliability
Multi State Value 7	PreheatBurnerLockoutAlarm	Burner Lockout Alarm [MSV Enumerated]	Multi State Value	N	Enum: Alarm / Normal
Multi State Value 9	MotorNotRespondingAlarm	Motor Not Responding Alarm [MSV Enumerated] (unit was commanded on for 2 minutes and fan motor did not start)	Multi State Value	N	Enum: Alarm / Normal
Multi State Value 21	DirtyFinalFilterAlarm	Dirty Filter Alarm [MSV Enumerated]	Multi State Value	N	Enum: Filters
Multi State Value 22	CoilExitTempSensorAlarm	Coil Exit Sensor Alarm [MSV Enumerated]	Multi State Value	N	Enum: SensorReliability
Multi State Value 23	PreheatTempSensorAlarm	Preheat Sensor Alarm [MSV Enumerated]	Multi State Value	N	Enum: SensorReliability
Multi State Value 24	DischargeTempSensorAlarm	Discharge Temp Sensor Alarm [MSV Enumerated]	Multi State Value	N	Enum: SensorReliability
Multi State Value 25	ReturnTempSensorAlarm	Discharge Temp Sensor Alarm [MSV Enumerated]	Multi State Value	N	Enum: SensorReliability
Multi State Value 26	DischargeHumiditySensorAlarm	Discharge Humidity Sensor Alarm [MSV Enumerated]	Multi State Value	N	Enum: SensorReliability
Multi State Value 27	ReturnHumiditySensorAlarm	Discharge Humidity Sensor Alarm [MSV Enumerated]	Multi State Value	N	Enum: SensorReliability
Multi State Value 28	ReheatBurnerLockoutAlarm	Reheat Burner Lockout Alarm [MSV Enumerated] (unit was commanded on for 2 minutes and fan motor did not start)	Multi State Value	N	Enum: Lockout / Normal