

INSTALLATION AND OPERATION

NEMA 4X Dual Stage Temperature Controller w/RS485

Models 565PC-2-115V & 565PC-2-24V

Description

The Model 565PC-2 dual stage (heating/cooling) temperature controller features two separate temperature control stages each with independently adjustable set points & relay outputs. Each stage can be programmed for Heating or Cooling control mode. Independently adjustable visual High/Low Alarms and a means for entering and storing a Brix value at the tank or remotely are also provided. Each controller is supplied with a solid state temperature sensor in a 1/4" OD x 4" L SS probe with 6ft cable. The temperature sensor is unique in that it provides a digital temperature output with an accuracy and interchangeability of $\pm 1^{\circ}\text{F}$ allowing field replacement without the need for recalibration.

The 565PC is capable of both manual and remote control operation. When used with the MV2000 PC based software from Moon Valley Circuits up to 255 Model 565PC controllers can be monitored and controlled remotely over an RS485 communications network using inexpensive twisted pair cable.

Button Functions

ON/OFF Button - Activates/de-activates the display and outputs - **power is not removed from the controller.**

UP/DOWN Arrow Buttons - Used to adjust set points and other operating parameter values during programming.

SET Button - Accesses programming mode to view & change Brix value, set points and other setup parameters.

Display Functions

TEMPERATURE DISPLAY - Displays actual & set point temperatures, programming prompts and parameter values during programming. In normal operation the actual process temperature will be displayed.

STAGE 1 & 2 LEDES - Indicate which output is energized and which stage is being programmed in program mode.

Manual Controller Operation

ACTIVATING & DE-ACTIVATING THE CONTROLLER

Pressing the ON/OFF button will toggle the between the active (On) and inactive (Off) state. A delay of several seconds is built into the ON/OFF function to prevent inadvertent activation or de-activation of the controller. **If power is removed and reapplied the controller returns to the state it was in before power was removed.**

VIEWING SET POINTS

While the controller is in the normal operating mode, pressing the UP arrow button will cause the Stage 1 set point to be displayed and pressing the DOWN arrow button will cause the Stage 2 set point to be displayed. The display returns to process temperature when the button is released.

STAGE 1 AND 2 OPERATION

Stage 1 and Stage 2 can be independently set for Heating or Cooling mode (see programming below). The Stage 1 and 2 LEDs illuminate whenever the respective output relay is energized.

In Heating mode the output relay will be energized when the process temperature is below that stage's set point and will de-energize when the process temperature reaches or exceeds that stage's set point. In Cooling mode the output relay will be energized when the process temperature is above that stage's set point and will de-energize when the process temperature drops down to or below that stage's set point.

Once the set point has been achieved and the output relay has de-energized it will not re-energize until the process temperature drops below (Heating mode) or rises above (Cooling mode) the respective stage's set point by the magnitude of the programmed Differential (hysteresis).

HIGH/LOW ALARM

The High/Low alarm function is visual only and does not provide an output. When the high and low alarm functions are active, the temperature display will flash whenever the process temperature is above the High Limit Alarm set point or below the Low Limit Alarm set point. The alarm will automatically reset when the process temperature returns to normal. Alarm set points are set in the programming mode (see Programming below).

Programming

All programming including entering Brix values and setting of set points is done in the programming mode. To enter the programming mode press and hold the SET button until the “br” prompt appears on the display. The value of the displayed parameter can be changed using the UP & DOWN arrow buttons. Pressing the SET button will save the new value and display the next prompt (see programming table below). Repeatedly pressing the SET button will scroll through the prompts without making any changes. If no buttons are pressed the controller will save any new values and exit the programming mode automatically after 30 seconds.

All programmed values are retained in non-volatile memory for a minimum of 10 years.

Step #	Prompt	Parameter	Adj. Range	Default
1	br	Brix Entry	-9.9 to +99.0	0.0
2	F or C	°F or °C Display	F or C	F
3	SP1	Stage 1 Set Point	-30 to +220°F (-34 to +105°C)	70°F
4	dF1	Stage 1 Differential (Hyst.)	1 to 30°F (0.5 to 17°C)	5°F
5	H1, C1, oF1	Stage 1 Mode	H1 (Heating), C1 (Cooling) or oF1 (Off)	H1
6	SP2	Stage 2 Set Point	-30 to +220°F (-34 to +105°C)	80°F
7	dF2	Stage 2 Differential (Hyst.)	1 to 30°F (0.5 to 17°C)	5°F
8	H2, C2, oF2	Stage 2 Mode	H2 (Heating), C2 (Cooling) or oF2 (Off)	C2
9	ALH	Alarm SP, High	-30 to +220°F (-34 to +105°C) & OFF	OFF
10	ALL	Alarm SP, Low	-30 to +220°F (-34 to +105°C) & OFF	OFF
11	oFS	Sensor Offset	-30°F to +30°F (-17°C to +17°C)	0°F
12	LoC	Programming Lock ¹	ON or OFF (See instructions below)	OFF
13	Add	Network Address ²	1 to 256	1

1. To prevent accidental setting of the Lock both the UP & DOWN buttons must be pressed simultaneously to set the Lock to ON.

2. The network address can only be set once after controller initialization. To change the address after it is been set the controller must be re-initialized by holding the On/Off and Up Arrow buttons while applying power to the controller. This action will also reset all programmable parameters to their default values.

PROGRAMMING LOCK

To prevent accidental changes or tampering access to all programming functions except Brix can be blocked by setting the “Loc” function to “On” (see programming table above). When the “Loc” function is “On” pressing the SET button will only allow the Brix “br” parameter to be viewed or changed. To restore full access to the programming mode, first press the ON/OFF button to deactivate the controller then hold the SET button while re-activating the controller. Continue to hold the SET button until the “br” prompt is displayed. The “Loc” function is now “Off” and will remain “Off” until the “Loc” parameter is changed to “On” again.

DISABLING AN UNUSED STAGE

The 565PC-2 controller is factory configured as a 2 Stage controller, however, if only one stage is going to be used the unused stage can be turn Off in setup (see programming table above).

Diagnostics

The controller continually checks for internal errors. Should an error occur the output relays will de-energize and an error message will be displayed.

Description	Error Message
Sensor Fault	Prb
Memory Error	E1
Stuck Key	E2
EEPROM Read/Write failure	E3

Installation

Mount the controller to a flat surface using the mounting brackets provided and suitable screws (not supplied). There is provision for a 1/2 inch conduit hub connection for the electrical wiring. A hub designated as "Liquid-Tight" must be used in order to maintain the watertight integrity of the enclosure.

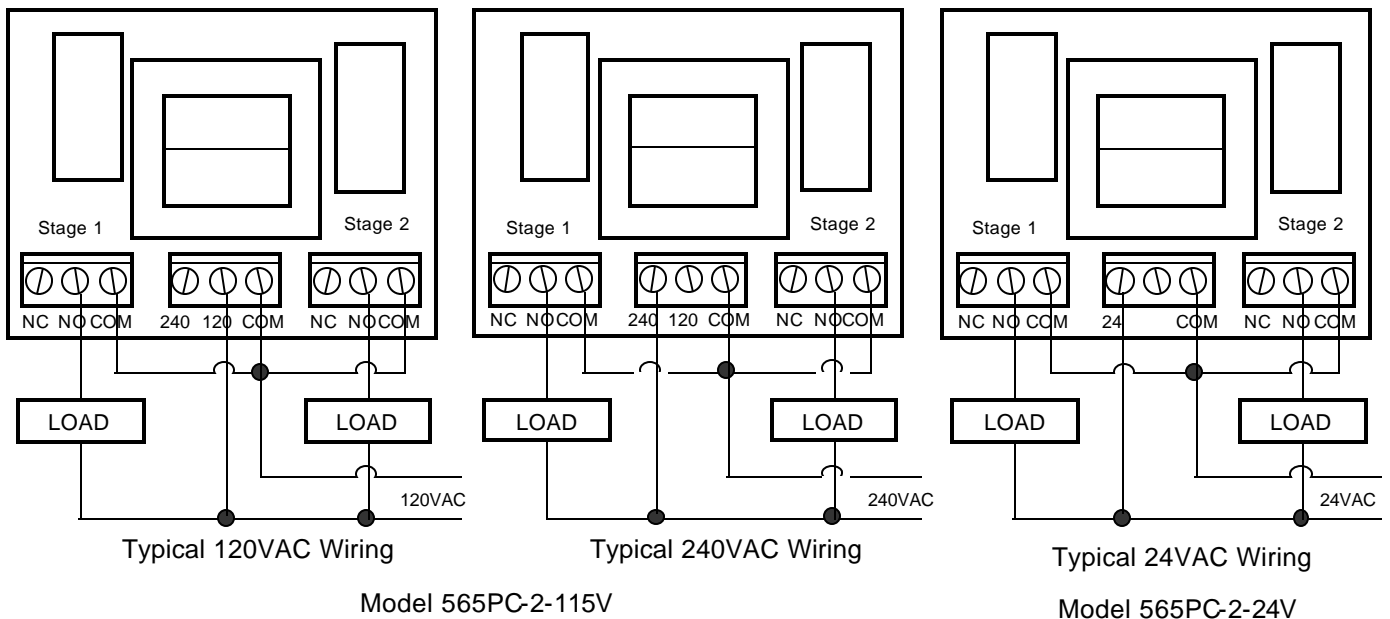
CAUTION

To prevent possible electrical shock or equipment damage, disconnect electrical power to the unit before and during installation. **DO NOT** restore electrical power to unit until the control is properly installed and the cover is assembled.

CONTROL WIRING

Loosen the four (4) cover screws, carefully lift the cover and unplug the power supply harness from the display board. Allow the cover to hang on the sensor wires while the control wiring is being done. Refer to diagrams below for typical wiring. All power wiring is done to the power circuit board located in the enclosure base.

All wiring should be done by a qualified electrician following National Electric Code and local regulations. Use copper conductors only. The total electrical load must not exceed the maximum rating of the controller (see specifications).

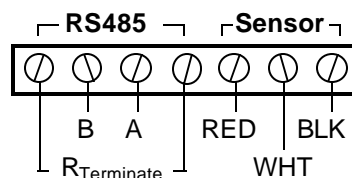


SENSOR WIRING

The sensor connections are made to the display circuit board located in the enclosure cover. Be sure to follow the wire color sequence printed on the circuit board when connecting the sensor.

COMMUNICATIONS WIRING

If used, the communications (RS485) cable connections are made to the display circuit board located in the enclosure cover. Refer to instructions supplied separately for communications wiring installation.



Specifications

Power Input: 120/240VAC $\pm 15\%$, 50/60Hz (Model 565PC-2-115V)
24VAC $\pm 15\%$, 50/60Hz (Model 565-2-24V)

Outputs 1 & 2: SPDT relays rated as follows.

	120VAC		208/240VAC		24VAC (option)	
	N.O.	N.C.	N.O.	N.C.	N.O.	N.C.
Resistive/GP	10 Amps	6 Amps	5 Amps	3 Amps	10 Amps	6 Amps
Full-load	9.8 Amps	5.8 Amps	4.9 Amps	2.9 Amps	-	-
Lock Rotor	58.8 Amps	34.8 Amps	29.4 Amps	17.4 Amps	-	-
Horsepower	1/2 hp	1/4 hp	1/2 hp	1/4 hp	-	-
Pilot Duty	125VA	125VA	125VA	125VA	125VA	125VA

Control Action: On-Off with adjustable differential 1 to 30°F; the factory default differential is 5°F.

Control Mode: Each stage is independently selectable for Heating or Cooling mode; the factory default is Heating for Stage 1 and Cooling for Stage 2.

Stage 1&2 SP Range: -30 to +220°F (-34 to +105°C)

Temp. Display: 3 Digit Red LED, .56" High

Display Range: -67 to +257°F (-55 to +125°C)

Sensor: Solid State Transducer, P/N 50-4108-6

Annunciators: LEDs illuminate when outputs are energized

Alarm Action: Display flashes when temperature exceeds either alarm set point.

Alarm SP Range: -30 to +220°F (-34 to +105°C)

Brix Setting Range: -9.9 to 99.0

Op Amb. Temp: -25 to 140°F (-32 to +60°C)

Storage Temp: -40 to +185°F (-40 to +85°C)

Definition of Terms

Cooling - Control operating mode whereby the output relay is de-energized (N.O. contacts open) when the process temperature goes below the set point.

Differential - The change in temperature required to cause the output relay to re-energize after the set point temperature has been achieved the relay has de-energized.

Heating - Control operating mode whereby the output relay is de-energized (N.O. contacts open) when the process temperature goes above the set point.

Hysteresis - See "Differential"

Normally Open (N.O.) - Refers to the condition of the contacts when the relay is not energized.

Normally Closed (N.C.) - Refers to the condition of the contacts when the relay is not energized.

NEMA 4X - Designates a waterproof enclosure suitable for outdoor use.

Offset - A temperature adjustment factor which shifts the displayed temperature above or below the actual temperature seen by the sensor.

Set Point -The temperature at which the output relay de-energizes.

Solid State Temperature Sensor - An integrated electronic circuit (chip) which produces a specific signal output in response to temperature.