

INSTALLATION AND OPERATION

NEMA 4X Dual Stage Temperature Controller

Models 565-2-120/240V & 565-2-24V

Description

The Series 565-2 controllers are 2 stage On/Off temperature controllers featuring independently adjustable set points and separate relay outputs. Each stage is programmable for operating in the Heating or Cooling mode. High and Low Alarms provide a visual warning (flashing the display) if the process temperature exceeds either of the alarm set points. The controller comes complete with a solid state temperature sensor in a 1/4" OD x 4" L SS probe with 6 ft cable. The temperature sensor is unique in that it provides a digital temperature output with an accuracy of 1°F and interfaces directly with the controller's microprocessor and allows field replacement of the sensor without the need for recalibration.

Button Functions

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

UP/DOWN Arrow Buttons - Used to view & change parameter values when programming the controller.

SET Button - Accesses the programming mode to view & change set points and other parameters.

Display Functions

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

STAGE 1 & 2 LEDES - Indicate when outputs are energized and which stage is being programmed in programming mode.

Controller Operation

ACTIVATING & DE-ACTIVATING THE CONTROLLER

Pressing the ON/OFF button will toggle 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 then reapplied to the controller it will return to the state it was in before power was removed.**

VIEWING THE SET POINT

While the controller is in the normal operating mode, pressing the UP or DOWN arrow button will momentarily display Stage 1 or Stage 2 set point respectively.

STAGE 1 AND 2 OPERATION

Stage 1 and Stage 2 can be independently set for Heating or Cooling mode (see programming below). In Heating mode the output relay is energized when the process temperature is below the set point and is de-energized when the process temperature is above the set point. Once the output relay has de-energized it will not re-energize until the process temperature drops below the respective stage's set point by the magnitude of the programmed Differential (hysteresis).

In Cooling mode the output relay is energized when the process temperature is above the set point and is de-energized when the process temperature goes below the set point. Once the output relay has de-energized it will not re-energize until the process temperature rises above that stage's set point by the magnitude of the programmed Differential (hysteresis).

Whenever an output relay is energized the respective Stage 1 or Stage 2 LED is illuminated.

HIGH/LOW ALARM

The High/Low alarm function is visual only and does not provide an output. When either alarm function is active, the temperature display will flash if the process temperature rises above the High Limit Alarm set point or falls 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 setting of set points is done in the programming mode. To enter the programming mode press and hold the SET button until the “F” or “C” prompt appears on the display. The value of the displayed parameter is changed using the UP & DOWN arrow buttons. Pressing the SET button will save the new value and display the next prompt (See 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	F or C	°F or °C Display	F or C	F
2	SP1	Stage 1 Set Point	-30 to +220°F (-34 to +105°C)	70°F
3	dF1	Stage 1 Differential (Hyst.)	1 to 30°F (.5 to 17°C)	5°F
4	H1 or C1	Stage 1 Mode	H1 (Heating) or C1 (Cooling)	H1
5	SP2	Stage 2 Set Point	-30 to +220°F (-34 to +105°C)	80°F
6	dF2	Stage 2 Differential (Hyst.)	1 to 30°F (.5 to 17°C)	5°F
7	H2 or C2	Stage 2 Mode	H2 (Heating) or C2 (Cooling)	C2
8	ALH	Alarm SP, High	-30 to +220°F (-34 to +105°C) & OFF	OFF
9	ALL	Alarm SP, Low	-30 to +220°F (-34 to +105°C) & OFF	OFF
10	oFS	Sensor Offset	-30°F to +30°F (-17°C to +17°C)	0°F
11	LoC	Programming Lock	ON or OFF (See instructions below)	OFF

LOCKING THE SET BUTTON

The “Loc” function allows the SET button to be disabled (locked) to prevent tampering by unauthorized persons. With the lock set to “On” access to the programming mode by the normal means is denied.

To lock the SET button press both the UP & DOWN buttons simultaneously at the “Loc” prompt.

UNLOCKING THE SET BUTTON

To un-lock the SET button and access the programming mode after it has been locked, the controller must first be deactivated using the ON/OFF button. **Then re-activate the controller while holding the SET button until the “F” or “C” prompt appears.** The SET button is now unlocked and the controller is in the programming mode. When exiting the programming mode the lock function will remain Off by default. To re-lock the SET button the lock function must be again set to “On” before exiting the programming mode.

DISABLING AN UNUSED STAGE

The 565-2 controller is factory configured as a 2 Stage controller. If only Stage 1 is to be used then set Stage 2 to Cooling mode and adjust SP2 to maximum (220°F) to keep the stage 2 relay de-energized and to prevent the stage 2 LED from illuminating.

Diagnostics

The controller continually checks for internal errors. Should an error occur the output relays will de-energize and one of the following error codes 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.

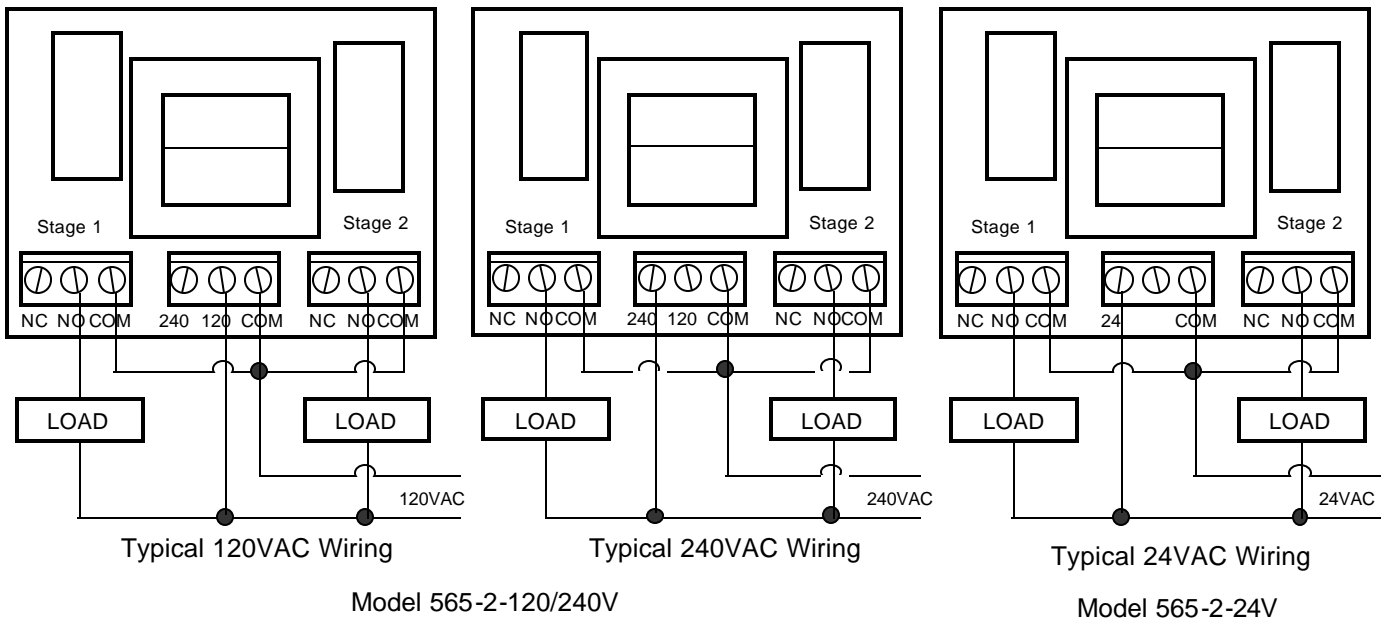
CAUTION

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

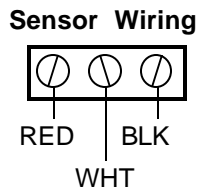
Loosen the four (4) cover screws, carefully lift the cover and unplug the power supply harness from the display board. Allow the cover to hang on the sensor wires while the control wiring is being done. Refer to diagrams below for typical wiring. All power wiring is done to the power circuit board located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



Specifications

Power Input: 120/240VAC $\pm 15\%$, 50/60Hz (Model 565-2-120/240V)
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: Red LEDs illuminated 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)

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.