A419 Electronic Temperature Control with Display

The A419 control is a single-stage, electronic temperature control with an SPDT output relay. It features a keypad for programming and a liquid crystal display for viewing the sensed temperature and the status of other functions. A front panel LED indicates the control's output relay status. The control has a setpoint range of -30 to 212°F (-34 to 100°C) and is available in 24 VAC or 120/240 VAC models.

The A419 control has heating and cooling modes with adjustable setpoint and differential, a lockable keypad, an adjustable anti-short cycle delay, and a temperature offset function. The control combines remote sensing capability and interchangeable sensors with electronic accuracy in a NEMA 1, high-impact plastic enclosure suitable for surface or DIN rail mounting.

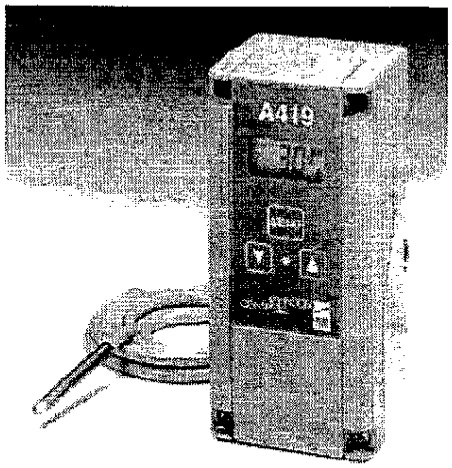


Figure 1: A419 Electronic Temperature Control and Sensor

Features and Benefits

❑ **Easy-to-Read Liquid Crystal Display**	Displays sensed temperature and function status clearly. Custom icons indicate system status at a glance. Digital display allows precise setpoint setting.
❑ **Wide Adjustable Differential 1 to 30F° or C°**	Enables the user to optimize system performance for a given application; allows a tighter differential than typical electromechanical controls (1F° or C°)
❑ **Anti-Short Cycle Delay**	Ensures that the output relay remains off for a user-determined period of time. This helps avoid hard starts, nuisance overload outages, and unnecessary equipment wear.
❑ **Interchangeable Temperature Sensors and Mounting Accessories**	Offer application flexibility, increase versatility and serviceability, and accommodate cable lengths to 800 ft
❑ **Temperature Offset Function**	Allows the user to shift the temperature setpoint by an adjustable amount based on the status of an external switch, such as a time clock
❑ **Front Panel Keypad with Lock**	Provides quick access to change setpoint, differential, and other functions. A concealed jumper locks keypad to deter unauthorized changes to control settings.
❑ **Low- and Line-Voltage Models**	Increase application options. Two controls available to cover all common voltage applications.

Part No. 24-7664-1539, Rev. A
Code No. LIT-125188

Dimensions

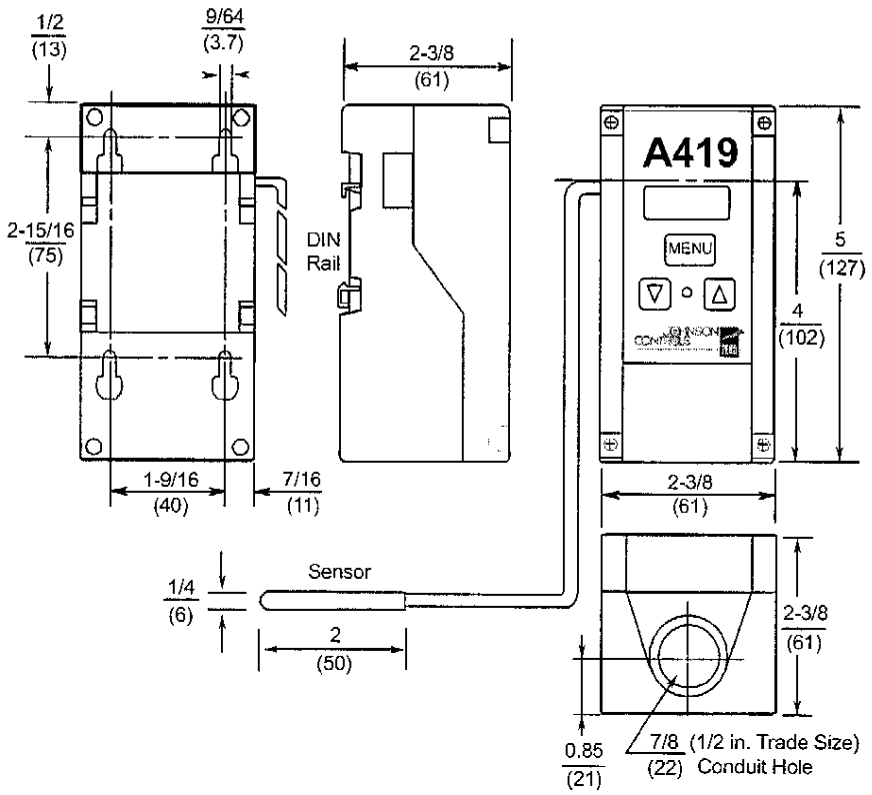


Figure 2: Dimensions, in. (mm)

Application Overview

The A419 Electronic Temperature Control can be used to control a wide variety of single-stage refrigeration or HVAC equipment. Typical applications include the following:

- convenience store freezers
- reach-in coolers
- supermarket display cases for produce/meats
- restaurant/convenience store walk-in coolers
- boiler control (used as a thermostat)
- condenser fan cycling
- cooling tower pump control
- space and return air temperature control

FCC Compliance

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of FCC rules. These limits are designed to provide reasonable protection against harmful interference when this equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his or her own expense.

Overview

IMPORTANT:	The A419 controls are intended to control equipment under normal operating conditions. Where failure or malfunction of the controls could lead to an abnormal operating condition that could cause personal injury or damage to the equipment or other property, other devices (limit or safety controls) or systems (alarm or supervisory systems) intended to warn of or protect against failure or malfunction of the controls must be incorporated into and maintained as part of the control system.

Definitions

Cut-in: The temperature at which the N.O. (Normally Open) SPDT (Single-Pole, Double-Throw) output relay contact closes.

Cut-out: The temperature at which the N.O. SPDT output relay contact opens.

Control Functions

The A419 control allows the user to set a variety of functions using the keypad and jumpers. These functions are described below. For instructions on setting function parameters, see the *Adjustments* section.

Keypad Programmable Functions

Setpoint (SP) establishes the temperature at which the equipment is switched on or off, depending on the user selected mode of operation. Setpoint range is -30 to 212°F (-34 to 100°C). See the *Cooling/Heating and Setpoint Modes* section.

If Setpoint mode is set to cut-in, setpoint is the temperature at which the control closes the N.O. contacts. If Setpoint mode is set to cut-out, setpoint is the temperature at which the N.O. contacts open. Refer to Figures 5 and 6.

Differential (dIF) establishes the difference in temperature between cut-in and cut-out. The differential is set relative to Setpoint and may be set from 1 to 30F° or C°. See Figures 5 and 6.

Anti-Short Cycle Delay (ASd) establishes the minimum time that the controlled equipment remains off before restarting again. The anti-short cycle delay is activated when the A419 control has cycled the equipment off. The delay does not allow the equipment to be restarted until the programmed amount of time has elapsed. When the delay is activated, the LCD alternately flashes the sensor temperature and ASd. The anti-short cycle delay may be programmed for 0 to 12 minutes in 1-minute increments.

For example, if the anti-short cycle delay is programmed for 7 minutes, the control will not restart the equipment until 7 minutes after the equipment was turned off, regardless of the temperature. See Figure 3. During the 7-minute period, if the temperature reaches the cut-in setpoint, the display alternates between the sensor temperature and ASd to indicate that the on cycle is being delayed. After the 7-minute delay has elapsed, the equipment is turned on, and ASd stops flashing.

Note: A power interruption to the control will activate the anti-short cycle delay.

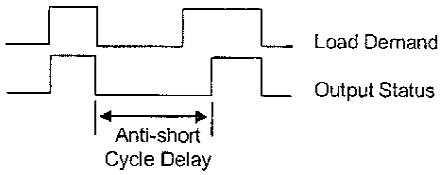


Figure 3: Anti-short Cycle Delay

Sensor Failure Operation (SF): establishes how the A419 control operates the equipment in the event of a sensor or sensor wiring failure. The user may select either to run the equipment continuously or to shut it down. When the control detects a sensor circuit failure, the LCD flashes SF alternately with OP if the sensor circuit is open, or SH if the sensor circuit is shorted. Before indicating a failure, the control implements a 1-minute delay, which allows verification of failure condition and avoids nuisance failure indications.

Temperature Offset (OFS): establishes the temperature setpoint shift (F° or C°) applied when the binary input (BIN) and common (COM) terminals are connected together. The Temperature Offset may be set from 0 to 50F° or C°. See the *Offset Function* section.

Temperature Units: establishes the units of temperature (Fahrenheit or Celsius) displayed on the LCD.

Functions Set by Jumper Position

For instructions on positioning jumpers, see *Positioning the Jumpers* in the *Adjustments* section. Refer to Figure 11 for jumper locations.

Heating/Cooling: Removing or installing the upper jumper at P4 establishes whether the control operates in the Heating or Cooling mode.

Setpoint Mode: Removing or installing the lower jumper at P4 establishes whether Setpoint is the cut-in temperature or cut-out temperature.

Keypad Lock: Removing or installing the jumper at P5 establishes whether the keypad is locked or unlocked. Locking the keypad deters accidental or unauthorized changes to all of the function parameters.

Temperature Offset Function

The Temperature Offset function shifts Heating setpoint lower and Cooling setpoint higher by the value in the Temperature Offset.

The Temperature Offset is activated by closing a circuit between BIN and COM. (See Figures 7, 8, or 9.) The BIN and COM terminals may be connected to a user-supplied external switching device, such as a time clock, that has a set of SPST contacts.

This option enables the control to alternate between two temperature setpoints based on the position of the binary input switch. The number of degrees added to or subtracted from Setpoint is established in the Temperature Offset function (OFS) using the keypad, as described in *Setting Other Functions.*

Table 1 shows an example of the effect of the Temperature Offset function when it is active.

Table 1: Sample Offset Function Effect

Mode	Setpoint	Temperature Offset Value	Shifted Setpoint*
Cooling	70°	8°	78°
Heating	70°	8°	62°
*Setpoint when switch is closed			

When the binary input (BIN) is connected to the common (COM), the Offset function is enabled and ***BIN*** is displayed on the LCD above the °***F*** or °***C*** symbol, as shown in Figure 4.

Display

The front panel of the A419 control has a liquid crystal display (LCD) and an output relay status LED (Light-Emitting Diode) indicator.

Liquid Crystal Display

During normal operation, the LCD displays the sensor temperature, a symbol indicating units of temperature (°***F*** or °***C***), and an icon indicating Heating (♨) or Cooling (❄) mode. See Figure 4.

The temperature value ranges from -30 to 212°F (-34 to 100°C) in 1° increments. The LCD also displays ***BIN*** if the Temperature Offset function is activated.

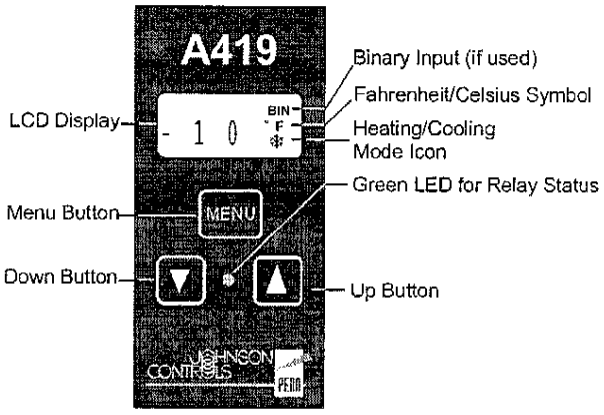


Figure 4: Front Panel and Display

During programming, the LCD displays the control functions and their programmed values. After 30 seconds of inactivity, the display returns to the sensor temperature. See the *Adjustments* section for instructions on using the keypad to change settings.

Output Relay Status Indicator LED

A green LED on the control's front panel illuminates when the output relay is energized and the N.O. contacts are closed.

Cooling/Heating and Setpoint Modes

Jumpers are used to place the A419 control in Cooling or Heating mode and set whether cut-in or cut-out occurs at Setpoint. Four operating modes are possible: Cooling/Cut-in, Cooling/Cut-out, Heating/Cut-in, and Heating/Cut-out.

Cooling Modes

When **Cooling/Cut-in mode** is selected, the differential is below Setpoint. The output relay energizes and the LED indicator illuminates when the temperature rises to Setpoint. When the temperature drops to Setpoint *minus* the differential value, the output relay and LED indicator de-energize.

When **Cooling/Cut-out mode** is selected, the differential is above Setpoint. The output relay energizes and LED indicator illuminates when the temperature rises to Setpoint *plus* the differential value. When the temperature drops to Setpoint, the output relay and LED indicator de-energize.

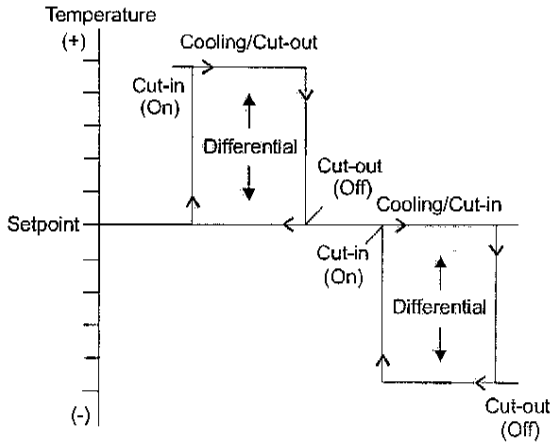


Figure 5: Cooling Modes

Heating Modes

When the **Heating/Cut-in mode** is selected, the differential is above Setpoint. The output relay energizes and LED indicator illuminates when the temperature drops to Setpoint. When the temperature rises to Setpoint *plus* the differential value, the output relay and LED de-energize.

When **Heating/Cut-out mode** is selected, the differential is below Setpoint. The output relay energizes and LED indicator illuminates when the temperature drops to Setpoint *minus* the differential value. When the temperature rises to Setpoint, the output relay and LED indicator de-energize.

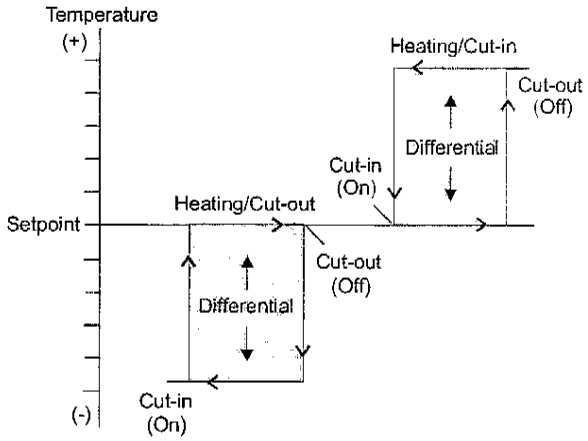


Figure 6: Heating Modes

Installation and Wiring

The A419 control has a NEMA 1 plastic enclosure with four key-slot mounting holes on the back for surface mounting. The mounting hole pattern of the A419 control is identical to that of the A319 control, System 350™ modules, and most models of the A19 control. Provision for 35 mm DIN rail mounting is also provided.

The A419 control is not position sensitive but should be mounted for convenient wiring and adjustment.

Note: When mounting the control to rigid conduit, attach the hub to the conduit before securing the hub to the control enclosure.

> **WARNING: Risk of Electrical Shock.** To avoid the risk of electrical shock or damage to equipment, disconnect all power sources to the control before wiring any connections.

- All wiring must conform to the National Electric Code and local regulations.
- Use copper conductors for all wiring connections.
- Input terminal blocks accept a maximum of 12 AWG wire. The sensor terminal block accepts a maximum of 16 AWG wire.
- Minimum wire insulation rating is 90°C.
- Maximum recommended wire length (distance between load and control) is 50 ft (15.2 m).
- Figures 7, 8 and 9 illustrate typical wiring arrangements.

When connecting the sensor, keep conductors as short as possible to minimize temperature error. Long wire leads with excessive wire resistance can cause inaccurate control display and operation. See Table 2 for maximum recommended cable lengths.

Shielded cable is not generally required for sensor wiring on runs of less than 50 ft (15.2 m). When shielded cable is used, wire the shield to the sensor block common terminal (COM). Refer to Figures 7, 8, and 9. Sensor A99BA-200, which includes a shielded cable, is available if needed.

Mount and wire the sensor as follows:

1. Mount the sensor where it can accurately sense the temperature of the controlled medium.
2. Wire the sensor to the common (COM) and sensor (SEN) terminals of the terminal strip located at the top left of the printed circuit board (see Figures 7, 8 and 9). The sensor leads are interchangeable.

Table 2: Maximum Recommended Sensor Cable Lengths

Wire Gauge	Maximum Sensor Cable Length*	
	Feet	Meters
14 AWG	800	244
16 AWG	500	152
18 AWG	310	94
20 AWG	200	60
22 AWG	124	38

*At the maximum cable lengths listed, no more than 1F° (0.6C°) error in the sensed temperature will result due to wire resistance.

If the Temperature Offset function is used, wire a switch (such as a switching time clock) between the binary input terminal (BIN) and the common terminal (COM). See Figures 7, 8, and 9 for terminal strip location.

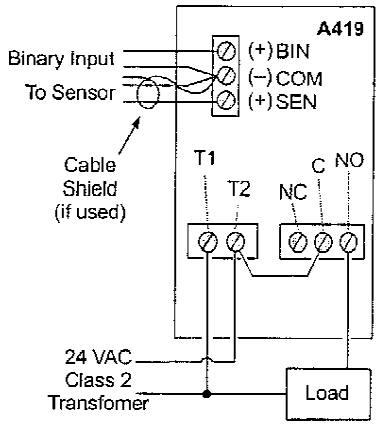


Figure 7: Typical 24 VAC Wiring for the A419GBF-1

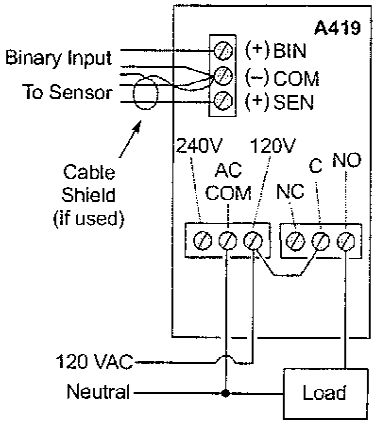


Figure 8: Typical 120 VAC Wiring for the A419ABC-1

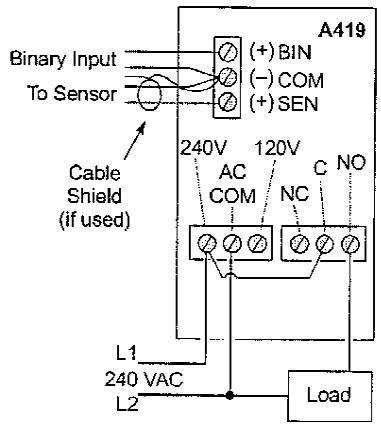


Figure 9: Typical 240 VAC Wiring for the A419ABC-1

Adjustments

This section provides instructions for adjusting the A419 control using the jumpers and keypad.

IMPORTANT:	Verify that the Cooling/Heating jumper is positioned properly before powering the A419 control, to ensure that the relay operates as intended.

Positioning the Jumpers

The P5 Jumper Pin Block has a single set of jumper pins and is used to lock or unlock the keypad. The P4 Jumper Pin Block has two sets of jumper pins.

The top set of pins at P4, labeled JUMP1, is used to set the control for Heating or Cooling mode. The bottom set of pins, labeled JUMP2, is used to establish Setpoint at cut-in or at cut-out. See Figure 11.

To position a jumper in the Installed position, place the jumper on both pins. To position a jumper in the Removed position, place the jumper on only one pin. (Save the jumper in case it is required in the future.) See Figure 10.

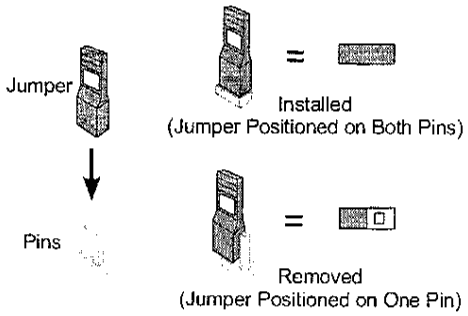


Figure 10: Positioning the Jumpers

Set the jumpers as follows, using Figures 10 and 11 as guides.

1. Verify that all power to the A419 control has been removed.
2. Remove the control's cover by loosening the four captive cover screws.
3. Position the jumpers to set Cooling/Heating, Setpoint, and Keypad Lock functions.
4. Replace the cover and fasten in place with the four screws.
5. Restore power to the control.

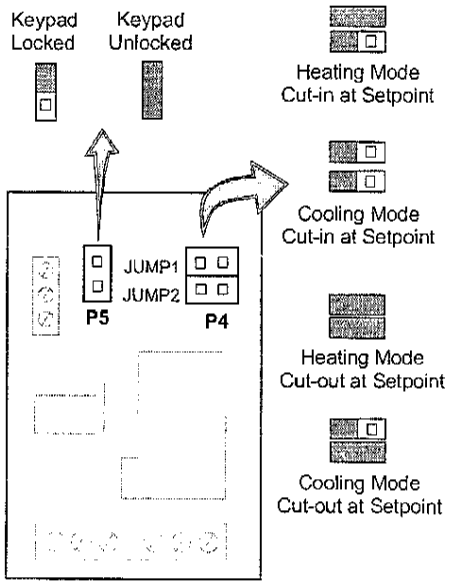


Figure 11: Jumper Positions and Control Settings

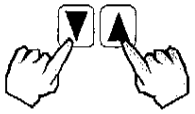
Table 3: Jumper Designations, Jumper Positions and Control Settings

Function	Jumper Pins Designation on Control	Setting	Jumper Position*	Factory Default Setting (and Jumper Position)
Operating Mode Cooling/Heating	JUMP1 (Top Pair of Pins on Block P4)	Cooling	Removed	Cooling (Removed position)
		Heating	Installed	
Setpoint	JUMP2 (Bottom Pair of Pins on Block P4)	At Cut-in	Removed	Cut-in (Removed Position)
		At Cut-out	Installed	
Keypad Lock	P5-Keypad Unlock	Locked	Removed	Unlocked (Installed Position)
		Unlocked	Installed	

*Important: The keypad cannot be unlocked without a jumper. Do not discard any jumpers in case they are required in the future.

Changing Temperature Units

The A419 control is set at the factory to display in Fahrenheit temperature units.



To convert to Celsius units, press the Up and Down buttons simultaneously. Press them again to return to Fahrenheit units.

Note: Make sure the Keypad Lock jumper is in the unlocked (installed) position before adjusting the control.

Verify that the control is displaying the desired temperature units before setting the setpoint.

Setting the Setpoint

To view and adjust the setpoint, follow these steps:

1. Press and hold the Menu button until the display changes to flashing SP. This will take about 2 seconds.

Note: If no entries are made for 30 seconds, the control reverts to the temperature display.

2. Press the Menu button again. The current setpoint is displayed.

3. Press the Up or Down button to adjust the setpoint temperature.

4. Press the Menu button to save. The display then returns to the sensor temperature.

Note: If the Menu button is not pressed after changing the setpoint, the control reverts to the setpoint value previously programmed into the A419 control.

Table 4: Function Ranges and Settings

Function		Range	Factory Setting
SP:	**Setpoint**	-30 to 212°F (-34 to 100°C)	30
dIF:	**Differential**	1 to 30° (F or C)	5
ASd:	**Anti-short Cycle Delay**	0 to 12 minutes	1
OFS:	**Temperature Offset**	0 to 50° (F or C)	0
SF:	**Sensor Failure Operation**	0 = output de-energized 1 = output energized	1

Note: **Operation at Extremes:** If the combination of setpoint plus or minus the differential falls outside the temperature range (-30 to 212°F [-34° to 100°C]), the A419 control operates as follows:

Cooling/Cut-in: If the control is operating in Cooling/Cut-in mode and setpoint minus differential is less than -30°F, the control switches on at setpoint and off when the temperature drops below -30°F (-34°C).

Heating/Cut-in: If the control is operating in Heating/Cut-in mode and setpoint plus differential is greater than 212°F (100°C), the control switches on at setpoint and off when the temperature exceeds 212°F (100°C).

Cooling/Cut-out: If the control is operating in Cooling/Cut-out mode and setpoint plus differential is greater than 212°F (100°C), the control switches on when the temperature exceeds 212°F (100°C) and off at setpoint.

Heating/Cut-out: If the control is operating in Heating/Cut-out mode and setpoint minus differential is less than -30°F (-34°C), the control switches on when the temperature drops below -30°F (-34°C) and off at setpoint.

Setting Other Functions

To set the Differential (dIF), Anti-short Cycle Delay (ASd), Temperature Offset (OFS), or Sensor Failure (SF) operation, use the following method.

Figure 12 illustrates the order of functions shown using the Up or Down button. The Up button accesses functions in the clockwise direction; the Down button accesses functions in the counterclockwise direction.

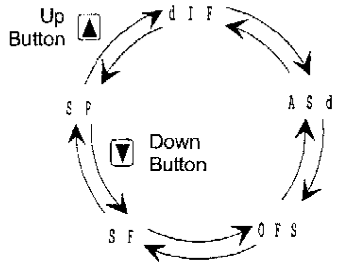
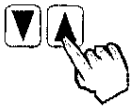


Figure 12: Order of the Functions

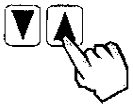
1. Press and hold the Menu button until the display changes to flashing SP. This will take about 2 seconds.

Note: If no entries are made for 30 seconds while programming is in progress, the control reverts to the temperature display.



2. Press the Up or Down button repeatedly until the desired function is displayed.

3. Press the Menu button to display the function's current value.



4. Press the Up or Down button until the desired value is displayed.

5. Press the Menu button to save the new value. The display then returns to the sensor temperature.

Note: If you do not press the Menu button after setting the new value, the control reverts to the previously programmed value for that function.

Checkout

Before applying power, make sure installation and wiring connections are according to job specifications. After necessary adjustments and electrical connections have been made, put the system in operation and observe the control for at least three complete operating cycles before leaving the installation.

Troubleshooting

If the control system does not function properly, verify that the unit is wired, configured, and set properly. If the problem persists, use the following procedures to determine the cause of the problem:

1. **Check for proper supply voltage to the A419 control.**

   a. Remove the cover by loosening the four captive cover screws.

> WARNING: **Risk of Electrical Shock.** High voltages may be present at electrical terminals and other exposed internal metal surfaces. Avoid contact with all metal surfaces on control when cover is removed.

   b. Use a reliable AC voltmeter to check the voltage between the COM and 120V or 240V terminals on line voltage models and the two 24V terminals on low-voltage models. Refer to Figures 7, 8, and 9.

   c. The voltage must be between:20 and 30 VAC for 24 volt applications, 102 and 132 VAC for 120 volt applications, 177 and 264 VAC for 208/240 volt applications

      If the voltage reading is within the required range, proceed to Step 2.

      If the voltage reading is **not** within the required range, check the power source and input power wires for problems.

2. **Check for proper sensor operation.**

   a. Disconnect all power sources to control.

   b. Take a temperature reading at the sensor location, using an accurate thermometer.

   c. Disconnect the sensor from the control.

   d. Using an ohmmeter, measure the resistance across the two sensor leads while the sensor is at the temperature taken in step b.

   e. Consult Figure 13 to verify that the measured temperature and resistance conform to established temperature and resistance values.

   f. If the measured values conform to the values in Figure 13, proceed to Step 3.

   g. If the sensor's measured resistance value is substantially different from the expected value for that temperature, check the sensor wiring. If sensor wiring is OK, replace the sensor.

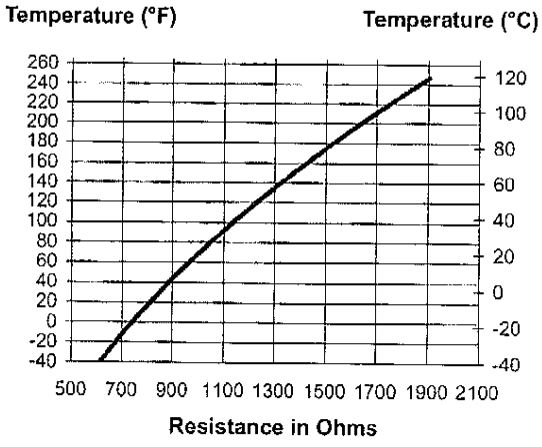


Figure 13: Nominal Temperature vs. Sensor Resistance

3. **Check the A419 for proper operation.**

   Note: Perform *Troubleshooting* Steps 1 and 2 before performing this step.

   a. Disconnect the load from the output relay terminals.

   b. Ensure that the Keypad Lock jumper is installed, so that the keypad is unlocked.

   c. Reconnect the sensor leads and supply power to the control.

   d. Replace the cover.

   e. Check the control settings for proper values.

   f. Press and hold the Menu button until Setpoint appears (occurs in about 2 seconds).

   g. Use the Up and Down buttons to change the Setpoint temperature above and below the current sensor temperature until the output relay energizes and de-energizes as shown in Table 5.

      Note: If the anti-short cycle delay has a time greater than 0 minutes, the relay will not energize until the timed delay has elapsed.

   h. If the output relay does **not** perform as indicated in Table 5, replace the A419 control.

   i. If proper operation of the A419 control is verified, reconnect the load and consult the equipment manufacturer's instructions for troubleshooting the controlled equipment.

Table 5: A419 Output Relay Operation

Setpoint Mode	Operating Mode	Output Relay Energized at...	Output Relay De-energized at...
Cut-out	Cooling	Setpoint plus differential	Setpoint
	Heating	Setpoint minus differential	Setpoint
Cut-in	Cooling	Setpoint	Setpoint minus differential
	Heating	Setpoint	Setpoint plus differential

Note: When the relay is energized, the N.O. contacts are closed and the LED is illuminated.

Fault Codes

If the LCD displays an alarm or fault code (SF or EE), consult Table 6 for explanation.

Table 6: Fault Codes Defined

Fault Code	Definition	System Status	Solution
SF **flashing alternately with** OP	Open temperature sensor or sensor wiring	Output functions according to the selected sensor failure mode (SF setting)	See Troubleshooting section. Cycle power to reset the control.
SF **flashing alternately with** SH	Shorted temperature sensor or sensor wiring	Output functions according to the selected sensor failure mode (SF setting)	See Troubleshooting section. Cycle power to reset the control.
EE	Program failure	Output is off	Reset the control by pressing the Menu button. If problems persist, replace the control.

Repairs and Replacement

Do not attempt to repair or recalibrate the A419 Control. In case of a defective or improperly functioning control, contact your nearest Authorized Johnson Controls/PENN Distributor or Sales Representative. When contacting Johnson Controls/PENN, have the model number of the control available. This number can be found on the label inside the cover of the control.

Ordering Information

Table 7: Ordering Information

Item	Product Code Number	Description
Line Voltage A419 Electronic Temperature Control with Display and Sensor	A419ABC-1	Supply Voltage: 120 or 240 VAC Range: -30 to 212°F (-34 to 100°C) Differential: 1 to 30F° (1 to 30C°) Sensor Lead Length: 6-1/2 ft (2 m)
24 VAC A419 Electronic Temperature Control with Display and Sensor	A419GBF-1	Supply Voltage: 24 VAC, Class 2 Range: -30 to 212°F (-34 to 100°C) Differential: 1 to 30F° (1 to 30C°) Sensor Lead Length: 6-1/2 ft (2 m)
Replacement Temperature Sensors	A99BB-200 A99BA-200	PTC Sensor with 6-1/2 ft (2 m) Leads PTC Sensor with 6-1/2 ft (2 m) Shielded Leads
Accessory Mounting Hardware	BKT287-1R BKT287-2R PLT344-1R	12 in. (305 mm) long DIN Rail 36 in. (914 mm) long DIN Rail Two End Clamps for DIN Rail Mounting
Digital Clock	CLK350-1	7-Day Programmable Digital Clock
Immersion Well	WEL11A-601R	Immersion Well

Specifications

Product	A419 Electronic Temperature Control with Display			
Setpoint Range	-30 to 212°F (-34 to 100°C)			
Differential Range	1 to 30F° (1 to 30C°)			
Supply Voltage	**A419ABC-1:** 120 or 240 VAC, 50/60 Hz **A419GBF-1:** 24 VAC, 50/60 Hz, Class 2			
Power Consumption	1.8 VA Maximum			
Relay Electrical Ratings	**A419GBF-1** (24 volt model):	100 VA, 30 VAC maximum, Class 2		
	A419ABC-1 (120/240 volt model):	**120V**	**208V**	**240V**
	Horsepower N.O. (N.C.):	1 (0.25) hp	1 (0.33) hp	1 (0.5) hp
	Full Load Amperes N.O. (N.C.):	16 (5.8) A	9.2 (4.0) A	8.0 (4.9) A
	Locked Rotor Amperes N.O. (N.C.):	96 (34.8) A	55.2 (24) A	48 (29.4) A
	Non-inductive Amperes N.O. (N.C.):	15 (10) A	10 (10) A	10 (10) A
	Pilot Duty: 125 VA (N.O.) @ 24 to 240 VAC 125 VA (N.C.) @ 120 to 240 VAC 50 VA (N.C.) @ 24 VAC			
Sensor Type	A99BB-200C PTC Sensor with 6-1/2 ft (2 m) Leads			
Control Ambient Temperature	Operating: -30 to 140°F (-34 to 60°C) Shipping: -40 to 185°F (-40 to 85°C)			
Ambient Humidity	0 to 95% RH Non-condensing; Maximum Dew Point: 85°F (29°C)			
Control Material	Case and Cover: NEMA 1 High-impact Thermoplastic			
Agency Listings	UL: File E27734; Guide XAPX Canadian UL: File E27734; Guide XAPX7			

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, contact Refrigeration Application Engineering at (414) 274-5535. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.

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