SLC-811X Series

Single Loop Proportional Temperature Controller
General Instructions

APPLICATION

Electronic temperature controller for single loop control of media in ducts, tanks and liquid lines.

SPECIFICATIONS

Construction: Self contained proportional temperature controller with integral setpoint for use with remotely located Schneider Electric System 8000 1000 ohm Balco sensors.
Setpoint Dial Range: See Table 1
Throttling Range: Pin selectable (3, 8, 12, or 20°F); factory set at 8°F for 3 Vdc output change.
Power Requirements: 20 Vdc (+1.0, -1.5), 13 mA.
Output Voltage: 2 to 15 Vdc direct acting (D.A.) field changeable to 15 to 2 Vdc reverse acting (R.A.). Calibrate at 7.5 Vdc when dial setting matches temperature at primary (black leads) sensing element.
Controlled Devices: Maximum of six Schneider Electric System 8000™ devices or two MP-5210 actuators.
Selectable Reset Ratio: Selectable on a prewired DIP switch for 0.7:1, 1:1, 1.5:1, or 15:1. (0.7:1 equivalent to Honeywell's 1.5:1 ratio)
Control and Sensor Connections: See Table 1.
Environment:
Ambient Temperature limits,
Shipping and Storage -40 to 160°F (-40 to 71°C).
Operating 40 to 140°F (4.4 to 60°C).
Humidity, 5 to 95% RH, non-condensing.
Locations, NEMA Type 1 indoor only.
Cover: Beige colored plastic with brushed bronze metal insert.

Mounting: Controller installed on 4 x 4 electrical box for mounting directly on wall or inside a panel (enclosure).
Dimensions: 4-3/8" high x 4-1/8" wide x 4-1/2" deep (111 mm x 105 mm x 114 mm).
Digital Temperature Display: Not available on these models.

Order Schneider Electric System 8000 sensor(s) separately.

ACCESSORIES

AD-8122	Signal adaptor for dual outputs (two direct acting)
AD-8123	Signal adaptor for dual outputs (one direct, one direct acting)
AD-8124	Signal adaptor for dual outputs (one reverse, one direct acting)
AT-215	Stainless steel bulb well
TS-8201	Duct/immersion sensor
TS-8405	5' (1.5 m) averaging sensor
TS-8422	22' (6.7 m) averaging sensor
TS-8501	Outdoor air sensor

Table-1 Specifications.

Part Number	Setpoint Dial Range	Sensor Connections[a]	Control Connections[a]
SLC-8112	0 to 100°F	Use standard Schneider Electric System 8000 sensors. Two (2) black pigtail leads provide for primary sensor (typically TS-8201, TS-8405 or TS-8422). Two (2) white pigtail leads provided for optional reset sensor (typically TS-8501).	Red, yellow and blue pigtail leads provided for low voltage connection to Schneider Electric System 8000 controlled devices.
SLC-8113	60 to 160°F		
SLC-8114	120 to 220°F		
SLC-8116	-20 to 40°C		
SLC-8117	15 to 70°C		
SLC-8118	50 to 105°C		

[a] Terminate all pigtail leads in 4 x 4 electrical box provided.

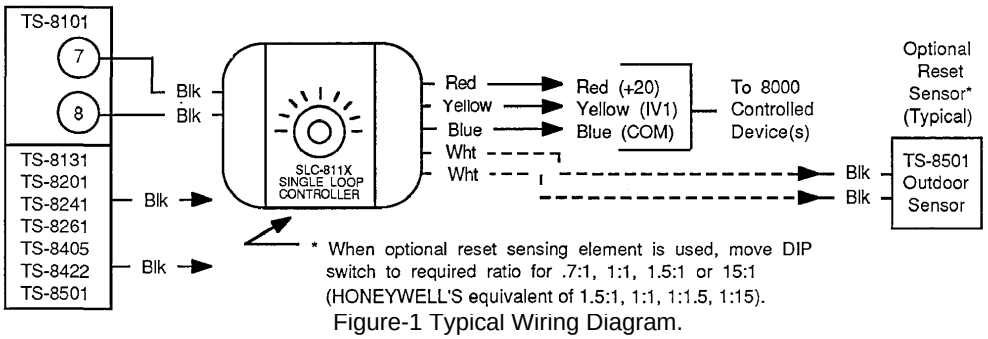

Figure-1 Typical Wiring Diagram.

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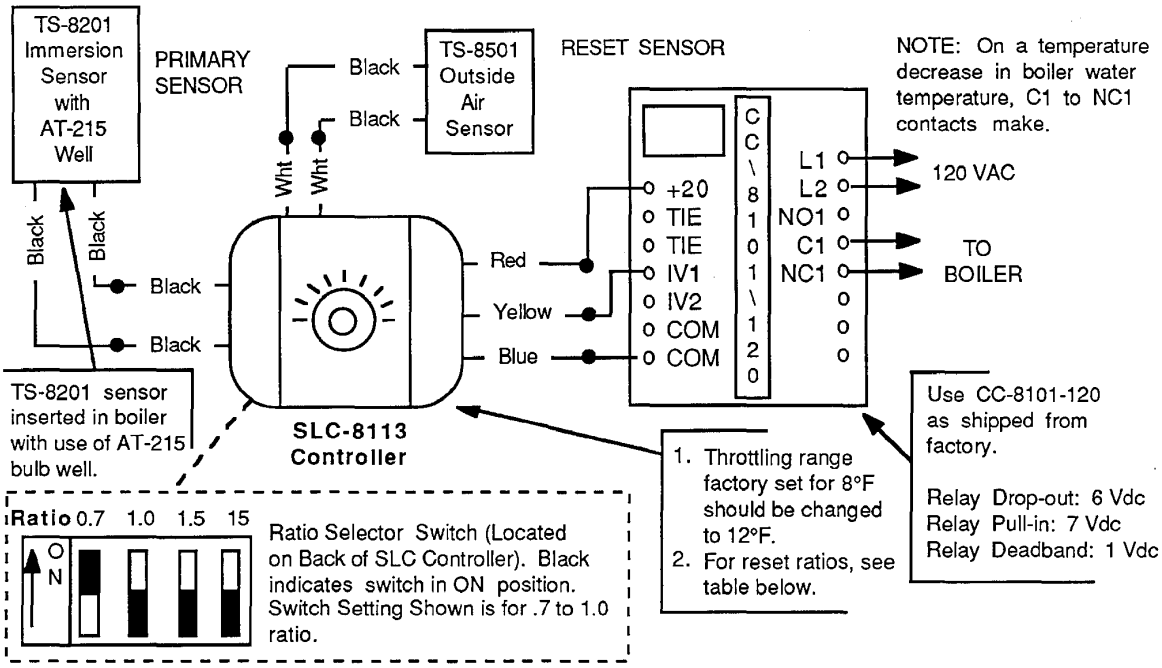

Ratio Selection Table

Outdoor Temp. (°F)	Ratio	Change in Water Temperature for Different Ratios as Outdoor Temperature Drops from 70°F to Design Temperature					
		Dial Set at 70°F	Dial Set at 80°F	Dial Set at 90°F	Dial Set at 100°F	Dial Set at 110°F	Dial Set at 120°F
-30	0.7 to 1.0* 1.0 to 1.0 1.5 to 1.0	70 to 220 70 to 170 70 to 137	80 to 230 80 to 180 80 to 147	90 to 240 90 to 190 90 to 157	100 to 250 100 to 200 100 to 167	110 to 260 110 to 210 —	120 to 270 120 to 220 —
-20	0.7 to 1.0* 1.0 to 1.0 1.5 to 1.0	70 to 205 70 to 160 70 to 130	80 to 215 80 to 170 80 to 140	90 to 225 90 to 180 90 to 150	100 to 235 100 to 190 100 to 160	110 to 245 110 to 200 —	120 to 255 120 to 210 —
-10	0.7 to 1.0* 1.0 to 1.0 1.5 to 1.0	70 to 190 70 to 150 70 to 123	80 to 200 80 to 160 80 to 133	90 to 210 90 to 170 90 to 143	100 to 220 100 to 180 100 to 153	110 to 230 110 to 190 —	120 to 240 120 to 200 —
0	0.7 to 1.0* 1.0 to 1.0 1.5 to 1.0	70 to 175 70 to 140 70 to 117	80 to 285 80 to 150 80 to 127	90 to 195 90 to 160 90 to 137	100 to 205 100 to 170 100 to 147	110 to 215 110 to 180 —	120 to 225 120 to 190 —
+10	0.7 to 1.0* 1.0 to 1.0 1.5 to 1.0	70 to 160 70 to 130 70 to 110	80 to 170 80 to 140 80 to 120	90 to 180 90 to 150 90 to 130	100 to 190 100 to 160 100 to 140	110 to 200 110 to 170 —	—
+20	0.7 to 1.0* 1.0 to 1.0 1.5 to 1.0	70 to 145 70 to 120 70 to 103	80 to 155 80 to 130 80 to 113	90 to 165 90 to 140 90 to 123	100 to 175 100 to 150 100 to 133	110 to 185 110 to 160 —	120 to 150 120 to 170 —
+30	0.7 to 1.0* 1.0 to 1.0 1.5 to 1.0	70 to 130 70 to 110 70 to 97	80 to 140 80 to 120 80 to 107	90 to 150 90 to 130 90 to 117	100 to 160 100 to 140 100 to 127	110 to 170 110 to 150 —	120 to 180 120 to 160 —

* 0.7 to 1.0 (Honeywell = 1.5 to 1) - 1.0°F).A. change, hot water changes 1.5°F.

Figure-2 Hot Water Control with Outside Air Temperature Reset.

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Installation

Pre-Installation Inspection:

Visually inspect the carton for damage. If damage, notify the appropriate carrier immediately. If undamaged visually inspect the device for obvious defects. Return damaged or defective products.

Required Installation Items:

- Wiring Diagrams.
- Tools (not provided).
  Appropriate screwdriver for mounting screws and terminal connections.
  Appropriate drill and drill bit for mounting screws.
- Appropriate accessories.

Caution:

1. Installer must be a qualified, experienced technician.
2. Disconnect power supply (line power) before installation to prevent equipment damage.
3. Make all connections in accordance with the wiring diagram, and in accordance with national and local electrical codes. *Use copper conductors only.*
4. Do not exceed ratings of the device(s).

Mounting Instructions

Caution: Avoid locations where excessive vibration, moisture, corrosive fumes or vapors are present. NEMA Type 1 covers are intended for indoor use primarily to provide a degree of protection against contact with the enclosed equipment.

1. Determine the controller mounting location.
2. Use the 4 x 4 electrical handy box as a template (or refer to Figure 3 for mounting dimensions) for mounting hole location.

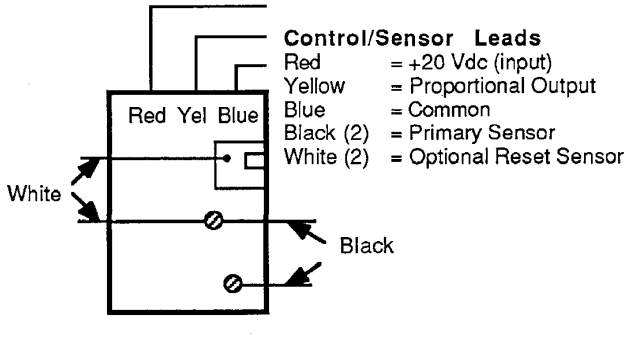
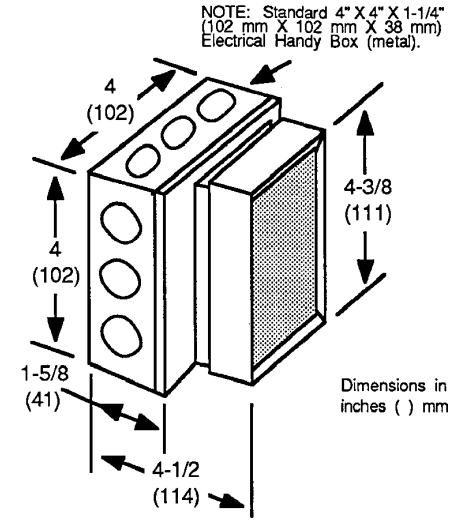


Figure-3 SLC-8XX Field Wiring.



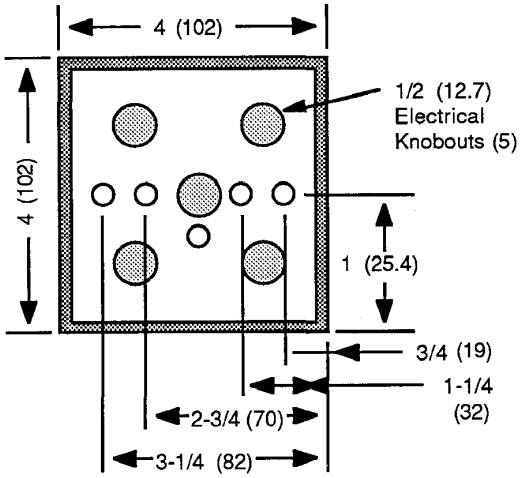


Figure-4 SLC-811X Controller's Dimensions.

Definitions and Nomenclature

Direct Acting Control (DA): Increase in temperature at the sensor causes the controller output (yellow to blue leads) signal to increase.

Reverse Acting Control (RA): Increase in temperature at sensor causes the controller output (yellow to blue leads) signal to decrease.

Reverse Reset (RR) Control Only: Decrease in temperature at resetting element (white leads) raises the SLC-8XXX controller's temperature setpoint upward.

Throttling Range: Throttling range (T.R.) is defined as the °F change at the primary temperature sensor in order to cause a 3 Vdc controller out-put signal change.

SLC-8XXX Terminal Nomenclature:

Reset DIP Switch Nomenclature: The reset ratio is defined as the temperature change at the reset sensing element required to reset the SLC control point 1°F (0.5°C) higher. DIP switch ratios of 0.7, 1, 1.5, and 15 are provided. A controller with a DIP switch setting of 0.7 will increase the control point temperature 1.5°F (0.8°C) for a 1°F change at the reset element. See Figure 5 for DIP switch location.

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Wiring

Make all electrical connections according to installation wiring diagrams. Comply with national and local electrical codes. Use copper conductors only.

To install, proceed as follows:

1. Wiring for the controllers are shown in Figures 5 and 6.
2. “Pull” all wires required.
3. Connect all control and optional reset sensing wiring to the controller element. The 4 x 4 box cover can be removed for wiring by loosening the two (2) cover screws. NOTE: The 4 x 4 cover plate is permanently attached to the base by a metal strap to insure that the sensor wires are not placed under tension.

Wiring of Controlled Devices to Controller

Types of Controlled Devices and Their Power Supplies:

1. Filtered and regulated power supplies: All Schneider Electric System 8000 controlled devices except MP-52XX and MP-54XX series actuators.
2. Filtered and unregulated power supplies: MP-54XX series actuators.
3. Unfiltered and unregulated power supplies: MP-52XX series actuators.

General Rules for Wiring Controllers to Controlled Devices:

1. Never connect red lead (or +20 terminal) of any controlled device which has a regulated power supply to the red lead (or +20 terminal) of any other controlled device.
2. Controlled devices with unfiltered and unregulated power supplies must be filtered. Schneider Electric System 8000 controllers will provide filtering for a maximum of two (2) controlled devices by connecting the two red leads (+20 terminals) together at the controller’s red lead (+20 terminal).
3. Controlled devices with filtered and unregulated supplies: Up to six (6) controlled devices with the red leads (+20 terminals) can be connected together. Number of units paralleled depends on the current (mAdc) requirements of the controller or adaptor.
4. Devices and their internal supplies:

Table-2 Power Supplies.

Filtered and Regulated	Filtered and Unregulated	Unfiltered and Unregulated
CC-8101 CC-8102 CC-8103 CC-8104 CC-8111 Series CC-8118 Series CC-8218 Series CP-8301 Series[a] CP-8161 Series CP-8425 Series CP-8502 Series CP-8511 CP-8513 PP-8121 PP-8516	MP-5XX MP-54XX MS-1233 MS-8XXXX Actuators	MP-52XX Actuators

[a] Except CP-8301-101 which does not have a power supply.

Table-3 Wire Length.

Wire Gauge	Length of Run in Feet		
	Controller to Controlled Device	Controller to Adaptor	Adaptor to Controlled Device
22	--	--	
18	1,000	1,000	1,000
16	2,250	2,250	2,250
14	4,000	4,000	4,000

Caution: Use 18 gauge 3-conductor twisted shielded wire when it becomes necessary to run or install leads in the same conduit with power wiring or when high RFI/EMI generating devices are near. Connect the shield to the BLUE lead at the SLC-8XXX controller only.

Adjustments

Setpoint Dial

Turn the setpoint dial (located on front of controller) to the desired temperature setting. Normally, no further adjustments are required.

Throttling Range

Throttling range settings of 3, 8, 12 or 20°F. Factory set at 8°F. Throttling range determined by placing the T.R. jumper (BROWN) on the proper T.R. Pin. See Figure 7 for details. For other T.R.s, use the extended T.R. jumper AD-8969-901. The T.R. will be the sum of the value of the T.R. pins connected.

Control Action

Factory set for direct acting (D.A.). Reverse acting (R.A.) can be selected by moving the jumpers as shown in Figure 7.

Ratio Reset

Reset ratios of 0.7 to 1, 1 to 1, 1.5 to 1 and 15 to 1. Reset ration is determined by positioning a DIP switch on the back side of the controller (after SLC controller is removed from 4 x 4 handy box). See Figure 8 for details.

Caution: If reset is not used, all DIP switching must be in OFF position and white wires (auxiliary sensor pigtails) must be taped or protected to assure proper controller operation.

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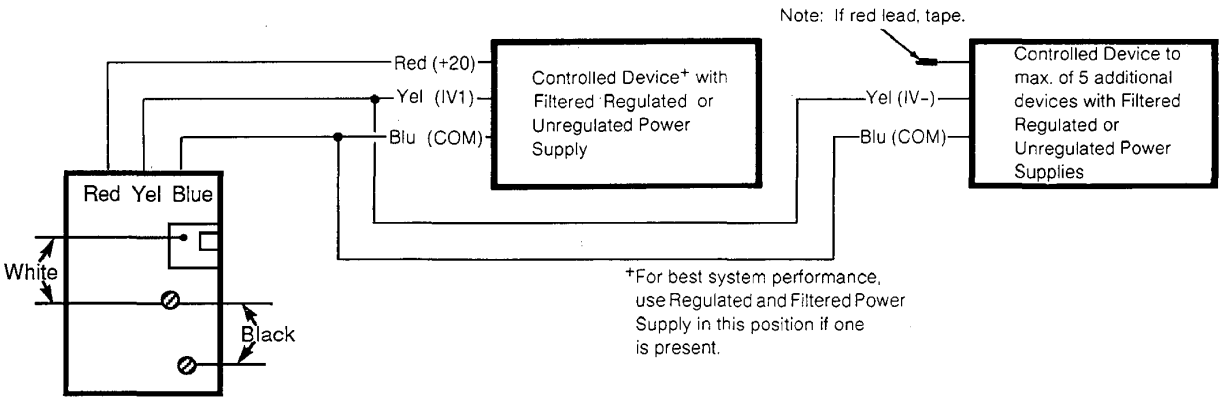

Figure-5 Typical Wiring *without* MP-52XX Actuators.

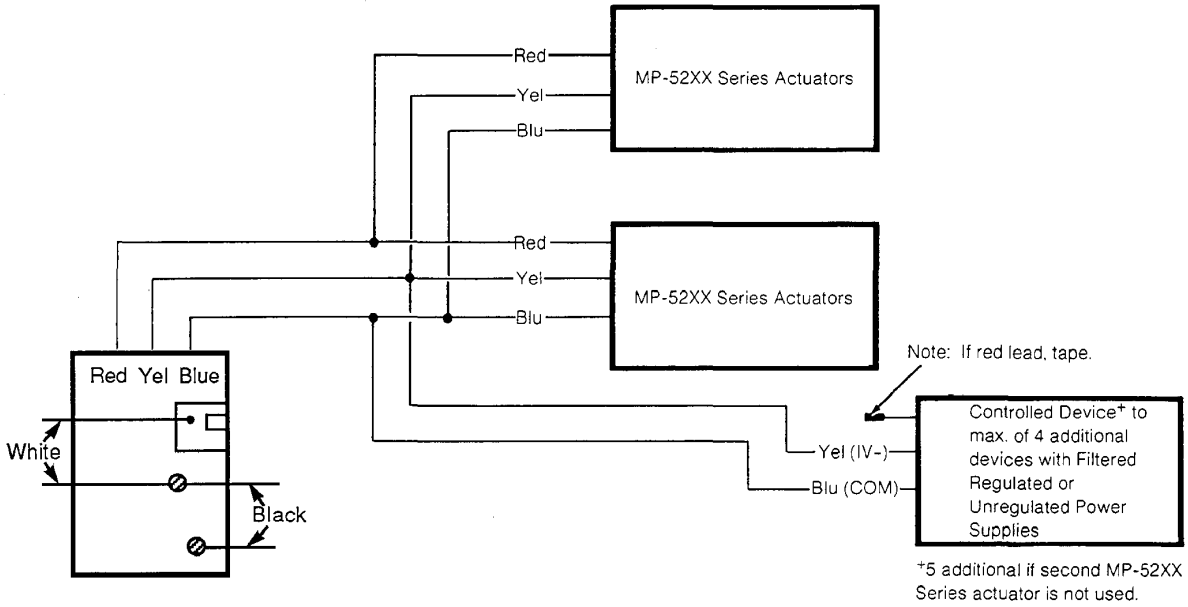

Figure-6 Typical Wiring *with* MC-52XX Actuators.

Checkout

Note: The SLC-811X has been factory calibrated to produce a 7.5 Vdc output signal at the yellow and blue leads (TO+ and TS-) when the setpoint and the temperature at the primary sensor are equal. Optional reset sensor must be disconnected.

1. Verify wiring per wiring diagram.
2. Measure with a 20,000 ohm per Vdc VOM.
   a. **Power supply 20 Vdc**, Red (+) to blue (-) wires or test point pins TS- and TS+ (+ end of the 47 µf. capacitor).
   b. **Output 2-15 Vdc**, Yellow (+) to blue (-) wires or TO+ and TS- test pins. The voltage varies between 2-15 Vdc as dial knob is rotated.
3. Replace controller if it is defective.

Calibration

If calibration is necessary, proceed as follows:

1. Connect a 20,000 ohm per Vdc VOM between the yellow(+) and blue (-) leads or TO+ and TS- pins on the controller.
2. Place all ratio switches to the OFF position.
3. Measure the temperature at the primary sensor with an instrument with a ± 1°F accuracy or better.
4. Loosen set screw on setpoint knob and remove knob.
5. Adjust setpoint potentiometer until VOM reads 7.5 V ±0.1 Vdc.
6. Place setpoint knob over potentiometer shaft and align pointer with temperature on scale equal to temperature displayed on instrument at primary sensor. Tighten set screw, taking care not to turn potentiometer shaft in the process.
7. Controller is calibrated.

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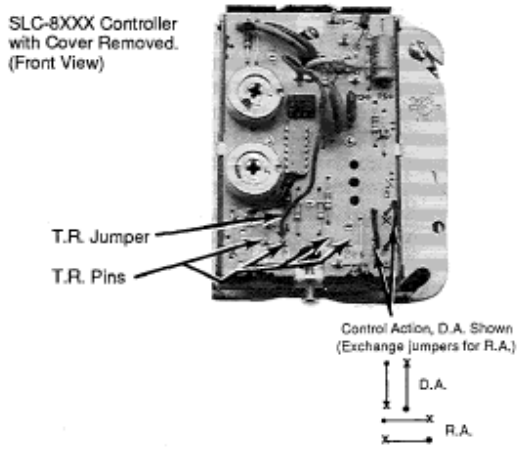

Figure-7 Throttling Range and Control Action Selection.

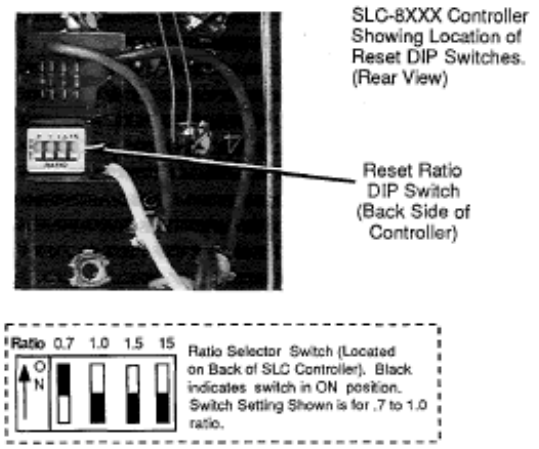

Figure-8 Ratio Reset.

Table-4 Ratio Selection Table.

Outdoor Temp. (°F)	Ratio	Change in Water Temperature for Different Ratios as Outdoor Temperature Drops from 70°F to Design Temperature					
		Dial Set at 70°F	Dial Set at 80°F	Dial Set at 90°F	Dial Set at 100°F	Dial Set at 110°F	Dial Set at 120°F
-30	0.7 to 1.0* 1.0 to 1.0 1.5 to 1.0	70 to 220 70 to 170 70 to 137	80 to 230 80 to 180 80 to 147	90 to 240 90 to 190 90 to 157	100 to 250 100 to 200 100 to 167	110 to 260 110 to 210 —	120 to 270 120 to 220 —
-20	0.7 to 1.0* 1.0 to 1.0 1.5 to 1.0	70 to 205 70 to 160 70 to 130	80 to 215 80 to 170 80 to 140	90 to 225 90 to 180 90 to 150	100 to 235 100 to 190 100 to 160	110 to 245 110 to 200 —	120 to 255 120 to 210 —
-10	0.7 to 1.0* 1.0 to 1.0 1.5 to 1.0	70 to 190 70 to 150 70 to 123	80 to 200 80 to 160 80 to 133	90 to 210 90 to 170 90 to 143	100 to 220 100 to 180 100 to 153	110 to 230 110 to 190 —	120 to 240 120 to 200 —
0	0.7 to 1.0* 1.0 to 1.0 1.5 to 1.0	70 to 175 70 to 140 70 to 117	80 to 285 80 to 150 80 to 127	90 to 195 90 to 160 90 to 137	100 to 205 100 to 170 100 to 147	110 to 215 110 to 180 —	120 to 225 120 to 190 —
+10	0.7 to 1.0* 1.0 to 1.0 1.5 to 1.0	70 to 160 70 to 130 70 to 110	80 to 170 80 to 140 80 to 120	90 to 180 90 to 150 90 to 130	100 to 190 100 to 160 100 to 140	110 to 200 110 to 170 —	—
+20	0.7 to 1.0* 1.0 to 1.0 1.5 to 1.0	70 to 145 70 to 120 70 to 103	80 to 155 80 to 130 80 to 113	90 to 165 90 to 140 90 to 123	100 to 175 100 to 150 100 to 133	110 to 185 110 to 160 —	120 to 150 120 to 170 —
+30	0.7 to 1.0* 1.0 to 1.0 1.5 to 1.0	70 to 130 70 to 110 70 to 97	80 to 140 80 to 120 80 to 107	90 to 150 90 to 130 90 to 117	100 to 160 100 to 140 100 to 127	110 to 170 110 to 150 —	120 to 180 120 to 160 —

* 0.7 to 1.0 (Honeywell = 1.5 to 1) - 1.0°F).A. change, hot water changes 1.5°F.

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