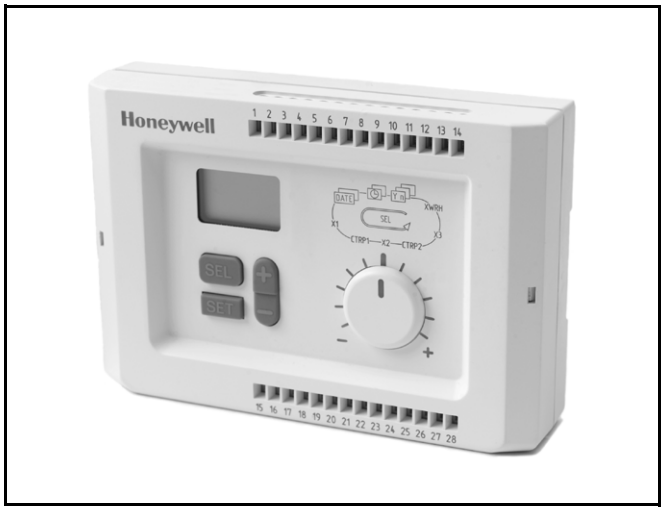
Honeywell

R7426A,B,C Temperature Controller

WITH REAL TIME CLOCK

PRODUCT DATA



APPLICATION

R7426A,B,C Temperature Controllers use direct digital control technology to provide more accurate and efficient operation of heating, ventilation and air conditioning (HVAC) systems. Parameters are preset for plug and play operation and provide different control strategies for optimum system performance. The controller performs proportional or proportional plus integral (P+I) control and covers all space, supply air or water flow applications within the specified ranges of 32°F to 130°F or 32°F to 260°F. Standard Pt 1000 or NTC 20K ohm temperature sensors can be used.

The modern design with its easy to operate user interface and LCD allows complete flexibility of control system design, accurate parameter setting, and display of actual temperature values, setpoints and outputs.

FEATURES

- **Models with selectable floating output functions:**
  - — Floating.
  - — 2, 3, 4, or 6 stage.
- **Models with analog outputs 0/2 to 10 Vdc selectable.**
- **Space/supply limit or cascade control.**
- **Sequence control of heating, mixed air damper, economizer, or energy recovery system and cooling.**
- **Weekly time schedule with up to 6 switching points per day.**
- **Automatic daylight saving time change.**
- **Four different operating modes: Occupied, Unoccupied, Night, and Off.**
- **Yearly advance holiday programming.**
- **Three types of holiday schedules.**
- **Self-adaptive optimum start program for room control system.**
- **Night-cycle program.**
- **Selectable control: proportional (P) or proportional plus integral (P+I).**
- **Pre-programmed control parameters.**
- **Digital parameter setting.**
- **Selectable direct/reverse acting analog output.**
- **24 Vac power supply.**
- **3 inputs for temperature sensors.**
- **Automatic sensor type identification of Pt 1000 or NTC 20K ohm.**
- **2 digital inputs, occupancy (alternatively summer/ winter changeover) and freeze protection.**
- **Start-up routine.**

Contents

63-2564-1

SPECIFICATIONS

Models:
R7426: Temperature controller with integrated real time clock (RTC), On/Off output, and other model-specific features.
R7426A: Includes one three-position floating output. Choice of selectable output signals to drive solid-state or step relays.
R7426B: Three three-position floating outputs. Choice of selectable output signals to drive solid-state or step relays.
R7426C: For sequence control of heating, energy recovery or mixed-air damper, and cooling.
Three analog 0/2 to 10 Vdc outputs.

Dimensions: See Fig. 1.

Weight: 0.55 lb (250g).

Mounting: Back panel, wall, DIN rail, or (with panel mounting accessory frame) front panel.

Electronic:
Microcontroller: 8-bit, 10-bit A/D converter, EEPROM and LCD.
Power Supply: 24 Vac +10, -15%, 50/60Hz.
Power Consumption: 3 VA.
Battery: Lithium/Manganese Dioxide; 3 Vdc, 170 mAh (approximate life: 8 years).

Wiring:
Maximum Wiring Run from Controller to All Devices:
18 AWG: 328 ft (100m).
16 AWG: 492 ft (150m).
Offset Due to Wire Resistance: See Table 1.

Ambient Ratings:
Temperature:
Operating: 32°F to 122°F (0°C to 50°C).
Storage: -31°F to +158°F (-35°C to +70°C).
Humidity: 5 to 95% relative humidity, non-condensing.

Control Point Adjustment (CPA)/Setpoint Adjustment (SPA) Input: See Accessories and Table 2.

Control ranges:
32°F to 130°F.
32°F to 260°F.

Input (Temperature Sensors):
I01: Main.
I02: Limit or cascade.
I03: Compensation.

Accuracy: ±0.9°F (±0.5K) (not including sensor inaccuracy).

Digital inputs:
Occupancy (Summer/Winter Changeover):
Operation Mode: unoccupied (winter), occupied (summer).
Potential Free Contact:
open > 40K ohms, closed < 100 ohms.
Freeze Protection:
Operation Mode: freeze protection (normal contact closed).
Potential Free Contact:
open > 40K ohms, closed < 100 ohms.

Output:
Maximum Load:
R7426A,B: 450 mA at 24 Vac.
R7426C (Analog 0/2 to 10 Vdc Outputs): 1.2 mA at 12 Vdc.
On/Off: 24 Vac On/Off single-pole, single-throw (spst) digital output to switch pump or fan.
TRIAC (selectable):
Floating: Single-pole, double-throw (spdt) switching.
Multi-Stage: On (24 Vac) / Off (0 Vac).
Pulse Width Modulation: 6 to 180 sec pulse width (for European electric current valves).

Sensor Ratings:
Temperature Range:
Pt 1000: -22°F to 266°F (-30°C to +130°C).
NTC 20K ohms: -22°F to 266°F (-30°C to +130°C).
Characteristics:
Pt 1000: 1000 ohms at 32°F (0°C).
NTC 20K ohms: 20K ohms at 77°F (25°C).

Approvals:
Protection class II.
NEMA 1, IP30 or (with front panel mounting *only*) IP40.
FCC Part 15, Class B.
Meets CE requirements.

Accessories:
43193862-001 Front panel mounting frame.
NTC 20K ohm sensors:
C7031B1033: For duct discharge air, hot water.
C7031D1062: For hot or chilled water.
C7031F1018: For outdoor air temperature.
C7031J1050: For duct discharge air (averaging).
C7031K1017: For hot or chilled water (strap-on).
T7770A1006: Wall module with locking cover.
T7770B1004: Wall module with locking cover and setpoint adjustment knob (55°F to 85°F) for CPATYP 3.

ORDERING INFORMATION

When purchasing replacement and modernization products from your TRADELINE® wholesaler or distributor, refer to the TRADELINE® Catalog or price sheets for complete ordering number.

If you have additional questions, need further information, or would like to comment on our products or services, please write or phone:

1. Your local Home and Building Control Sales Office (check white pages of your phone directory).
2. Home and Building Control Customer Relations
   Honeywell, 1885 Douglas Drive North
   Minneapolis, Minnesota 55422-4386

In Canada—Honeywell Limited/Honeywell Limitée, 35 Dynamic Drive, Scarborough, Ontario M1V 4Z9.
International Sales and Service Offices in all principal cities of the world. Manufacturing in Australia, Canada, Finland, France, Germany, Japan, Mexico, Netherlands, Spain, Taiwan, United Kingdom, U.S.A.

Pt 1000 sensors:
C7031D1070: For hot or chilled water.
C7031F1026: For outdoor air temperature.
C7031J1068: For duct discharge air (averaging).
C7031K1025: For hot or chilled water (strap-on).

Table 1. Sensor Offset Per 33 ft (10m) of Wire.

Wire Type in AWG (mm^2)	Temperature offset in °F (°C)	
	Pt 1000	NTC
20 (0.5)	0.32 (0.18)	negligible
17 (1.0)	0.16 (0.09)	
15 (1.5)	0.11 (0.06)	

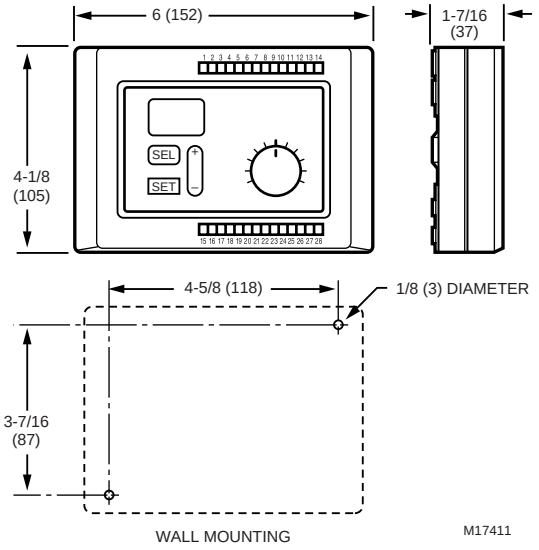


Fig. 1. R7426 Dimensions.

Table 2. CPA/SPA Selectable Inputs.

CPATYP Value	Potentiometer (in ohms)	CPA/SPA range
0[a]	internal	CPA: ±10°F
1	9574 to 1426	
2	100K to 0	
3	9574 to 1426	SPA: 55°F to 85°F
4	100K to 0	
5	0 to 100K	
6	0 to 100K	SPA: 32°F to 130°F or 32°F to 260°F

[a] Default value.

INSTALLATION

When Installing this Product...

1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check the ratings given in the instructions and on the product to make sure the product is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. After installation is complete, check out product operation as provided in these instructions.

IMPORTANT

All wiring must agree with applicable codes, ordinances and regulations.

⚠ CAUTION

Electrical Shock or Equipment Damage Hazard. Can shock individuals or short equipment circuitry.

Disconnect power supply before installation.

Mounting

The controller can be mounted in an electric cabinet or other suitable enclosure. They are suitable for back panel, wall, and DIN rail mounting.

Back Panel or Wall Mounting

1. Drill two holes in the mounting surface (see Fig. 1).
2. Remove the controller from the baseplate:
   a. Insert a flat head screwdriver into the slot at the right side of the control face.
   b. Pull the right side of the control slightly away from the baseplate.
   c. Insert a flat head screwdriver into the slot at the left side of the control face.
   d. Pull the controller away from the baseplate.
3. Mount the baseplate to the surface.
4. Replace the controller on the baseplate.

DIN Rail Mounting

1. Remove the controller from the baseplate:
   a. Insert a flat head screwdriver into the slot at the right side of the control face.
   b. Pull the right side of the control slightly away from the baseplate.
   c. Insert a flat head screwdriver into the slot at the left side of the control face.
   d. Pull the controller away from the baseplate.
2. Mount the baseplate to the TS35 DIN rail.
3. Replace the controller on the baseplate.

Wiring

Connect the wires to the device:

1. Strip 3/8 in. to 1/2 in. of insulation from controller end of wire.
2. Push stripped end of each wire into appropriate terminal (see Fig. 2 to 4).
3. Apply power to device.

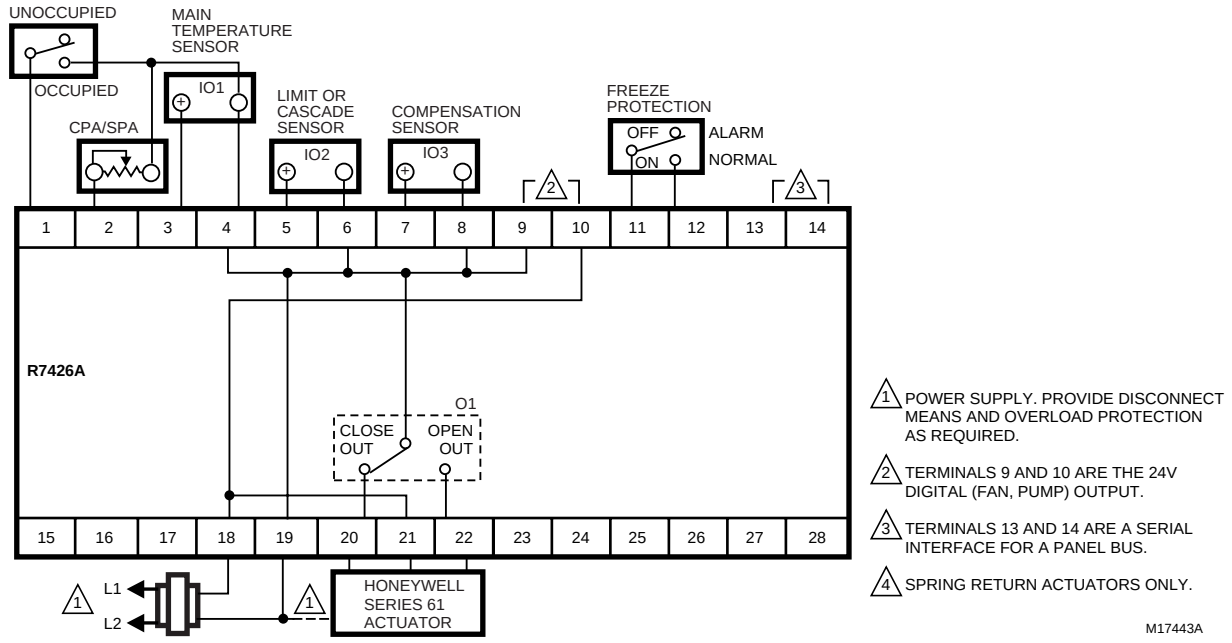


Fig. 2. R7426A typical wiring.

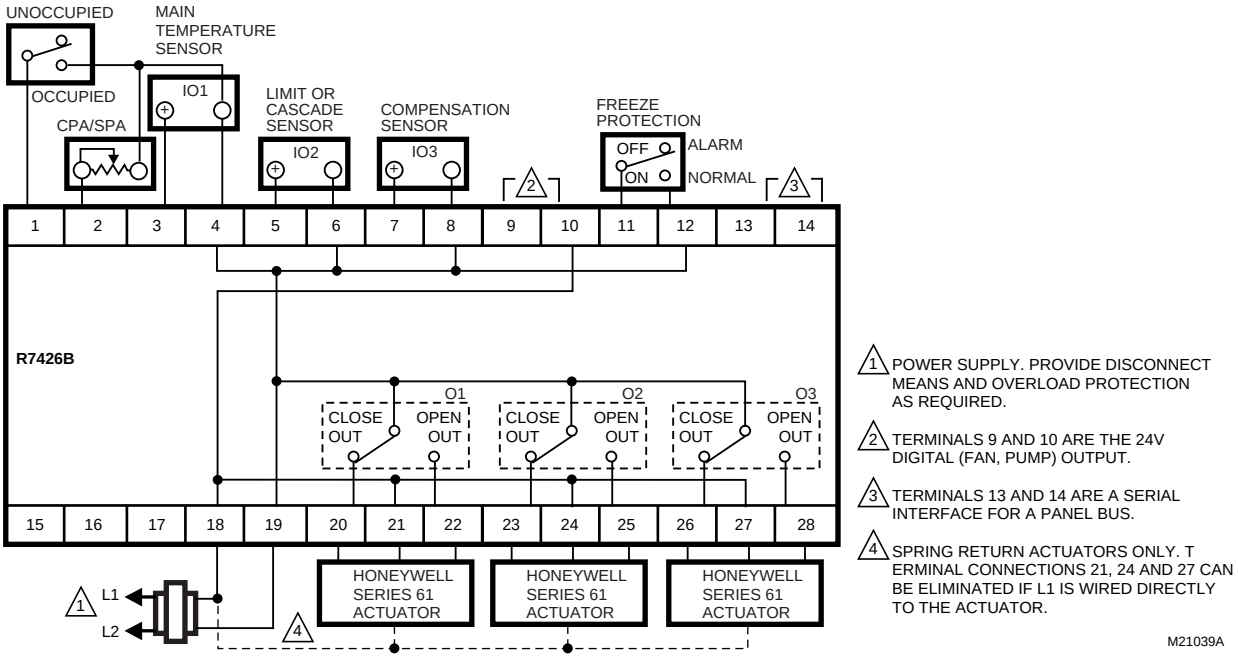


Fig. 3. R7426B typical wiring.

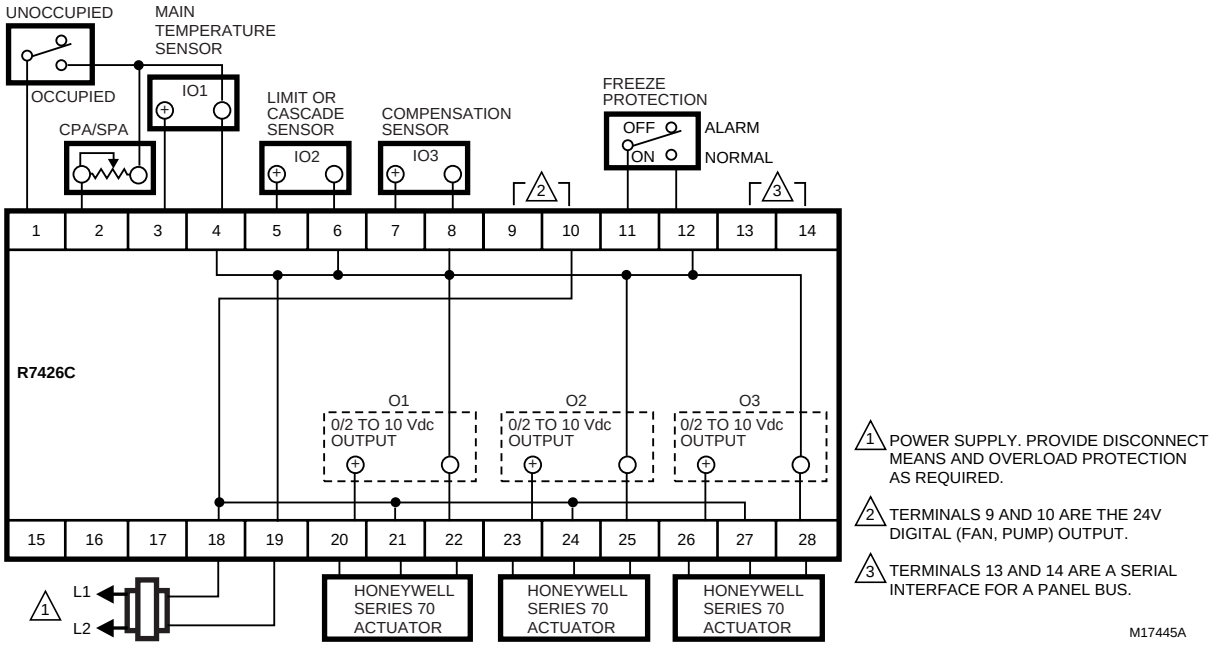


Fig. 4. R7426C typical wiring.

INTRODUCTION

The R7426A,B, or C with remote time clock can be used for a wide variety of applications:

— R7426A, with a single floating output, can be configured to:
  — Control a floating actuator.
  — Stage up to three two-position actuators (using relays).
  — In either case, it can be configured for heating or cooling or auto-changeover with external input.

— R7426B, with three floating outputs, can be configured to:
  — Stage (on/off) up to six relays in any of the following combinations: 6-heat, 6-cool, 4-heat/2-cool, 4-cool/2-heat.
  — Sequence (using floating outputs) up to 3 actuators in any of the following combinations: 3 heat, 3 cool, 2-heat/1-cool, or 2-cool/1-heat.
  — Control heating (up to 3-stage or floating), cooling (up to 3-stage or floating), and mixed air damper using the built in algorithm with adjustable parameters.

— R7426C, with three 0/2-10 Vdc outputs, can be configured to:
  — Sequence up to 3 actuators in any of the following combinations: 3 heat, 3 cool, 2 heat/1 cool, or 2 cool/1 heat.
  — Control heating, cooling, and a mixed air damper, all with 2-10 Vdc outputs.

NOTE: The R7426C cannot stage outputs like the R7426B.

All of the above configurations are handled in parameters C.08, C.09, C.10, and C.11 (see Table 14). The O1, O2, and O3 referenced in these parameters simply identify the actuator outputs that are shown in the wiring diagrams.

To aid in understanding the R7426, Honeywell recommends:

1. Look at the wiring diagrams (Fig. 2 through 4) to see the inputs and outputs.

   NOTE: These figures show floating or analog outputs only. If wiring for staged control, see Table 7.

2. After understanding the wiring, read through the control and configuration parameters one at a time (see Tables 13 and 14). An explanation for each follows these tables.
3. Read through the Operation section, referencing the wiring diagrams and parameter tables as needed.

OPERATION

R7426A Main Temperature Control

The controller compares the main sensor temperature measured (I01) with the calculated setpoint (CTRP1) to generate an internal deviation signal (X_W).

NOTES: The value of *CTRP1* is affected by:
  — OAT compensation effect.
  — CPA.
  — Setback (mode-dependant).

The control output value (O1) is calculated and converted to a floating signal based on the deviation signal. The configuration parameter *O1CRTF* selects cooling or heating action. The throttling range setting (Xp1) controls output span. The startpoint (O_{start}) determines O1 midrange shift (in degrees Fahrenheit) from *CTRP1*.

NOTES:
  — All diagrams show proportional control action only. If P+I control is in operation, the slopes for heating and cooling are not fixed.
  — For control output function see Fig. 5.

Limit Control (W_{lim}, Xp2 and tr2)

The R7426A offers limit control (W_{lim}). It compares main and limit control loop deviation signals. The lowest (low-limit control) or highest (high-limit control) deviation signal is selected and fed to the output stage.

High limit control is performed when parameter LimTyp is 1. Low limit control is performed when parameter LimTyp is 0. During limit control, throttling range (Xp2) and reset time (tr2) are active.

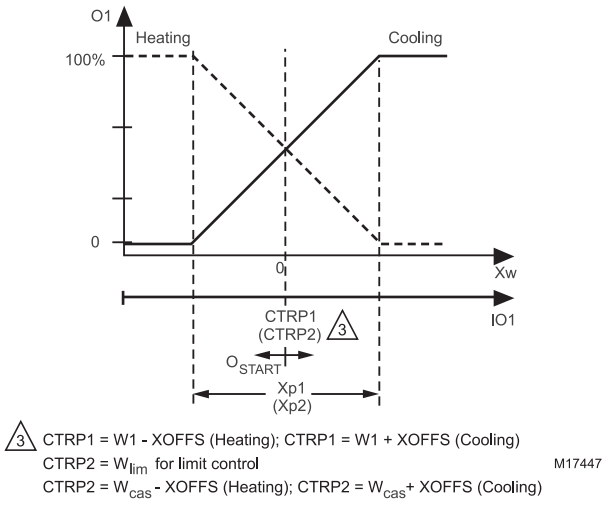


Fig. 5. R7426A cooling or heating control output.

NOTES: Limit control is active only if either:
- — I02 temperature sensor (parameter I02ext is 0) is connected, or
- — I01 sensor (control parameter I02ext is 1) supplies the control loop.

Cascade Control (W_{cas}, R_{cas} and tr2)

The R7426A provides cascade control using two control loops (master and submaster) to maintain setpoint (CTRP1).

At zero room temperature deviation (X_WMaster), discharge temperature (I02) is controlled by the programmed setpoint (W_{cas} = CTRP2). If room temperature deviates, submaster setpoint (CTRP2) is altered. See Fig. 6.

— Reset span adjustment (R_{cas}) determines degree of reset effect.
— Integral reset time and throttling range of submaster P+I control can be adjusted with *tr2* and *Xp2*.
— *CTRP2* high limit is performed if *LimTyp* is 1.
— *CTRP2* low limit is performed if *LimTyp* is 0.

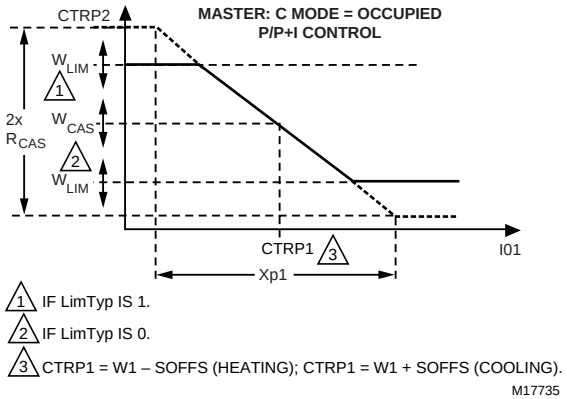


Fig. 6. Occupied cascade control.

R7426B,C Control with Heating, Mixed Air Dampers or Energy Recovery and Cooling

Standard Sequence Control

This application will be active with the R7426B,C controllers when I02 is not connected. It can be used for sequence control of a heating valve, an energy recovery system or a mixed air damper and a cooling valve.

NOTE: If no cooling actuator is available, the parameter Xpc can be set to Off and damper output is maintained at 100 percent above control point (CTRP1) (see Fig. 8).

If damper output should be reduced to MINPOS level above CTRP1 (see Fig. 8), and if no cooling actuator is available, parameter Xpc must be adjusted to a value between 2°F and 72°F.

⚠ CAUTION

Equipment Damage Hazard.
Can damage the controller beyond repair.
Keep floating output load below 450 mA.

On the R7426C controller the characteristic of each output can be selected via the parameters DIR/REVx (where x is O1, O2 or O3). See Fig. 8 for Dir characteristic for all outputs.

Temperature Cascade Control

This application will be active with the R7426B,C controllers if parameter W_{cas} is set to any value other than Off. It can be used for sequence control of a heating valve, an energy recovery system, or mixed air damper and cooling valve.

Two cascade control modes are available:
- With occupied (contact closed) mode. (see Fig. 6).
- With unoccupied (contact open) mode. (See Fig. 7.)

— CTRP2 high limit is performed if parameter LimTyp is 1.
— CTRP2 low limit is performed if parameter LimTyp is 0.

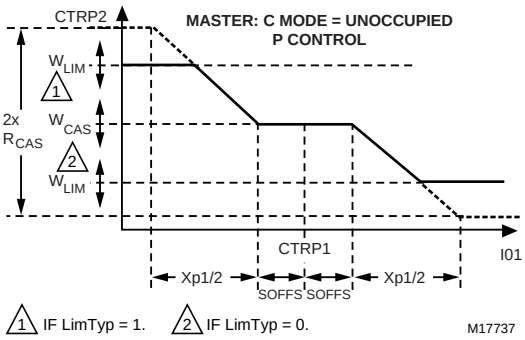


Fig. 7. Unoccupied cascade control.

NOTES:
- The Offs value varies with the control modes:
  — Occupied: Offs is 0.
  — Unoccupied: Offs is SOFFS.
  — Night: Offs is NOFFS.
- See Fig. 8 for damper control signal within the range Xp1 or Xp2 for cascade control.

On the R7426C controller each output characteristic can be selected via parameters DIR/REVx (where x is O1, O2 or O3). Fig. 8 shows:
- Dir characteristic for all outputs.
- Control of damper signal within the range Xp2.

NOTE: If no cooling actuator is available, the parameter Xpc can be set to Off.

If parameter Xpc is Off, the cooling signal is set to 0 percent and damper output is maintained at 100 percent above control point (CTRP2).

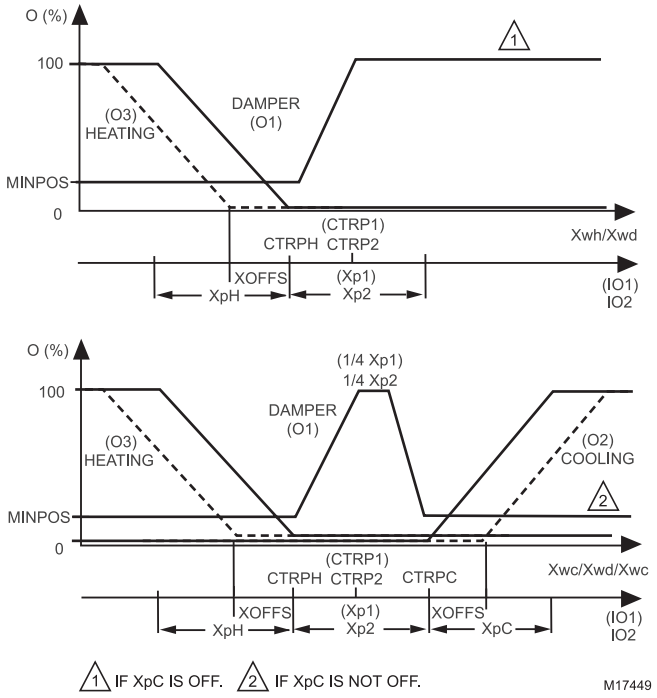


Fig. 8. Cascade control output sequence.

Economizer Modes

Economizer modes are suitable for installations where the main temperature sensor (I01) is installed in either return air or the room with a constant offset between room and return air conditions. The offset value is programmable within 0°F to 10°F with parameter RetOffs which will be added to the actual room temperature value to simulate return air conditions.

NOTE: Economizer mode is disabled if parameter RetOffs is programmed Off, or no OAT sensor is connected.

By comparing the conditions of outside air with return air, the O1 output on the three-output controller operates using Mixed Air Dampers or an Energy Recovery System.

Economizer Mixed Air Damper Mode

Economizer mixed air damper mode is active when:
- RetOffs is not Off.
- O1CTRF is 0.

NOTE: See Table 3 for control logic and Fig. 9. for sequence output operation.

Table 3. Economizer Mixed Air Damper Mode.

Outside Air Temperature	O1
Greater than return air temperature	MINPOS
Less than return air temperature	Included in sequence control

NOTE: A fixed hysteresis of 2°F is used to switch between MINPOS and actual O1 control output signal.

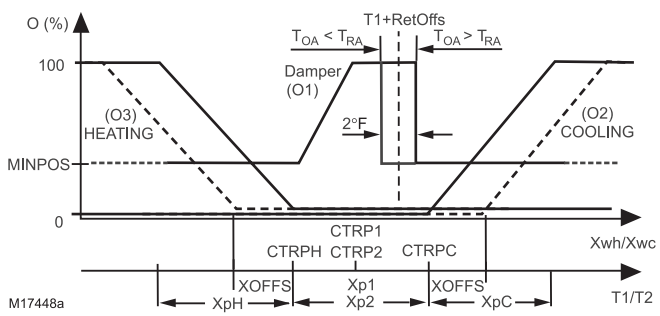


Fig. 9. Mixed air damper sequence output.

Economizer Energy Recovery System

Economizer energy recovery mode is active when:
- RetOffs is not Off.
- O1CTRF is 1.

NOTE: See Table 4 for control logic and Fig. 10 for sequence output operation.

Table 4. Economizer Energy Recovery System Mode.

Outside Air Temperature	O1
Greater than return air temperature	100 percent
Less than return air temperature	Energy Recovery System included in sequence control. MINPOS is not active.

NOTE: A fixed hysteresis of 2°F is used to switch between 100 percent and actual O1 control output signal.

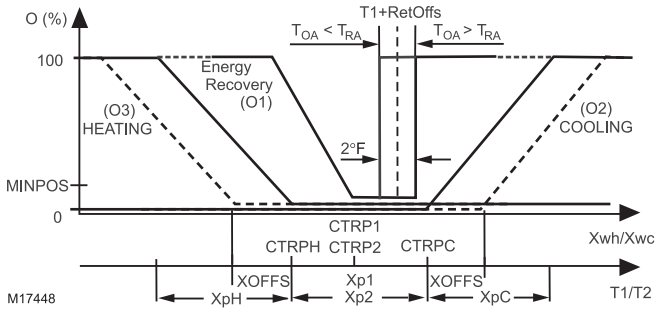


Fig. 10. Energy recovery sequence output.

Controller Functions

Outside Air Temperature Compensation

Outside air temperature compensation is performed when I03 is connected. The parameter W_{comp} defines the summer and winter compensation changeover point. Parameters Wi and Su define the degree of summer and winter compensation.

- Winter compensation is performed if $I03 < W_{COMP}$.
- Summer compensation is performed if $I03 > W_{COMP}$.

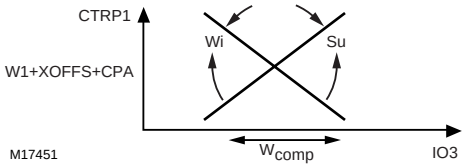


Fig. 11. OAT compensation.

SMOOTHING FILTER FOR OUTSIDE AIR TEMPERATURE INPUT

A smoothing filter for OAT input I03 is incorporated to eliminate sudden temperature variations. This provides more stable control system operation.

Summer/Winter Changeover Function (R7426A *only*)

The occupancy input can alternatively be used for summer/winter changeover. Activate the summer/winter changeover function by setting the control parameter O1CTRF to 2.

A potential free contact can be used between terminals 1 and 4 to switch the controller mode to heating (contact open) or cooling (contact closed).

Freeze Protection

See Table 5 for actions executed when the contact connected to the freeze protection input is opened. A closed contact performs frost recovery (see Table 6).

NOTE: Freeze protection operation takes priority over all other control operations.

Table 5. Freeze Protection Actions.

Model	Parameter O1CTRF	Freeze Protection Action			
		Outputs (in percent)			On/Off Output
		O1	O2	O3	
R7426A	0 (Cooling)	0	—	—	Off
	1 (Heating)	100	—	—	
	2 (Summer)	0	—	—	
	2 (Winter)	100	—	—	
R7426B	—	0	0	100	
R7426C	—	0	0	100	

Table 6. Frost Recovery.

Conditions of Outdoor Temperature (I03)	Frost Recovery
Greater than 43°F (6°C) or I03 not connected.	Main temperature control.
Less than 43°F (6°C).	Setpoint W1 raised by Xp1 and linearly decreased to normal value over an adjustable delay time.

Optimum Start Program

The optimum start program objective is to minimize total energy consumption. It calculates heating or cooling mode start time in room control applications to bring space temperature to the comfort zone boundary at occupancy start time. The optimum start program uses historical data for self-adaptive adjustment.

Night-cycle Program

The night-cycle program offers the ability to assign unoccupied night low or high limits with 2°F (1K) hysteresis during OFF mode. This is for protection of a space and its contents against temperature extremes. It automatically cycles between user-selected upper and lower limits and turns on full heating or cooling whenever a limit is reached.

Output Functions

The controller provides a choice of output signals suitable for operating a range of final control devices. Suitability is based on the parameter setting of OMode and OxMode (where x is 1, 2 or 3) parameters.

R7426A and R7426B

The R7426A,B have unconfigured outputs. This is done to avoid damaging installed devices by sending improper output signals when power is applied to the controller.

FLOATING VALVE OR DAMPER ACTUATORS (FLOATING MODE)

Parameter setting for Heating/Cooling Control Outputs: OMode is 0, 1, 2, 3 or 4 (R7426B only); OxMode (where x is 1, 2 or 3) is 0.

The controller converts the deviation signal to a proportional output pulse which drives the actuators depending on the Runtimex (where x is O1, O2 or O3) parameter value.

An automatic synchronization function ensures correct actuator positioning. This is performed by periodically running all actuators to the closed position. Synchronization run time is derived by control parameter Runtimex (where x is O1, O2 or O3) multiplied by 1.25.

Synchronization by the controller is initiated:
- After power up reset (initial start).
- After 250 control steps as soon as control output is below 5 percent.

ELECTRIC HEAT CURRENT VALVE (PWM OUTPUT)

PWM output is suitable for driving European electric heat current valves. It is controlled from the heating signal. The interval or total cycle time is set by the parameter Runtimex (where x is O1 or O3).

2-STAGE ON/OFF SEQUENCE CONTROL

The R7426A,B controllers convert the output signal into a 2-stage On/Off sequence output signal suitable for operating relays. Two relays can be connected to provide sequence control of two stages (such as electric heat stages).

Parameter setting for Output Switching Position:
- OMode is 0, 1, 2, 3 or 4 (R7426B only).
- OxMode (where x is 1, 2 or 3) is 1.

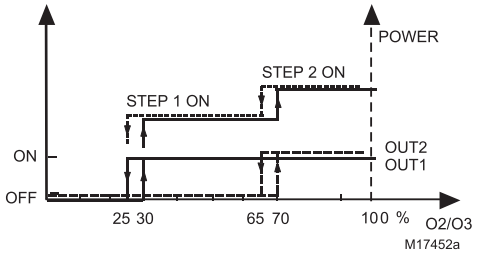


Fig. 12. 2-stage on/off sequence control.

3-STAGE BINARY ON/OFF SEQUENCE CONTROL

The R7426A,B controllers convert the heating signal into a 3-stage binary On/Off sequence.

Parameter setting for Output Switching Position:
- OMode is 0, 1, 2, 3 or 4 (R7426B only).
- OxMode (where x is 1 or 3) is 2.

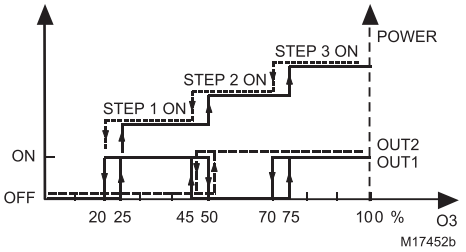


Fig. 13. 3-stage binary on/off sequence control.

Table 7. Output Operation and Wiring Connection for Stage On/Off Sequence Control.

R7426A	R7426B					
2-stage (Omode = 0)		4-stage	6-stage	Output (24V)		Terminals
N/A	Step1 Heat	Step1	Step1	O3	OUT1	27,28
	Step2 Heat	Step2	Step2	O3	OUT2	26,27
	Step1 Cool	[a]	Step3	O2	OUT1	24,25
	Step2 Cool	[a]	Step4	O2	OUT2	23,24
Step1	Damper or Energy Recovery	Step3	Step5	O1	OUT1	21,22
Step2	Damper or Energy Recovery	Step4	Step6	O1	OUT2	20,21

[a] Two-stage or floating.

NOTE: Same connection for 3-stage binary control as for 2-stage control on R7426A and R7426B used for electric heating control (output O3).

Outputs for R7426B *only*

4-STAGE ON/OFF ELECTRIC HEATING OR COOLING

When OMode is 2, the output sequence of O3/O1 is controlled from the heating signal and O2 is controlled from the cooling signal. When OMode is 3 the output sequence of O3/O1 is controlled from the cooling signal and O2 is controlled from the heating signal.

NOTES:
- — Mixed air damper operation is not available.
- — Output O2 operates in accordance with O2Mode.
- — O1Mode and O3Mode are 4.

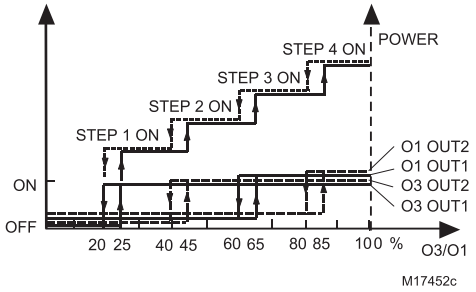


Fig. 14. 4-stage on/off electric heating or cooling.

6-STAGE ON/OFF SEQUENCE CONTROL HEATING OR COOLING

When OMode is 1, and O1Mode, O2Mode and O3Mode are 4 the output sequence of O3/O2/O1 is controlled from one output signal (See Main Temperature Control or R7426A Cascade Control.). Cooling or heating action is selected by the configuration parameter O1CTRF.

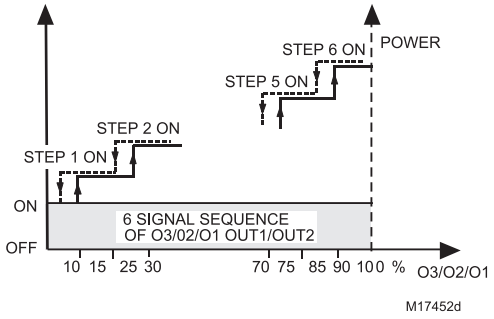


Fig. 15. 6-stage on/off sequence control heating or cooling.

15-STAGE BINARY ON/OFF ELECTRIC HEATING AND COOLING

When OMode is 5 the output sequence of O3/O1 is controlled from the heating signal. The output sequence of O2 is controlled from the cooling signal. O2 output is operated in accordance with O2Mode.

NOTE: The mixed air damper operation is not available.

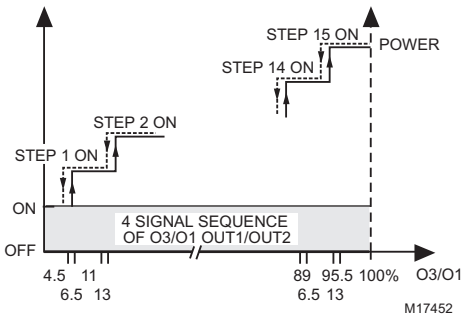


Fig. 16. 15-stage binary on/off electric heating and cooling.

Two Position Damper Control (R7426B,C)

If parameter OMode is 4, then the R7426B,C damper output signal O1 operates as a two-position control output:

- When the controller mode is occupied, unoccupied or night: O1 is 100 percent.
- When the controller mode is Off: O1 is 0 percent.
- The O2/O3 output sequence operates as heating/cooling sequence control.

NOTE: The start-up routine must be disabled.

Analog Output (R7426C *only*)

Three dc output control signals are provided to control actuators for valves, dampers, or pneumatics (through E/P transducers).

The full output range is 0 to 12 Vdc. The control range is common to all outputs and is software configurable to either: 2 to 10 Vdc, or 0 to 10 Vdc.

NOTE: Use the parameter ORange to configure the output.

On/Off (Fan, Pump) Output

The On/Off output (terminals 9 and 10) is provided to switch a fan, pump, or R7426 without the Real Time Clock. See Table 8 for operation.

NOTES: The R7426A controller will switch the On/Off output off when the following criteria are all met:
- — Parameter Ctrltyp is Hi2.
- — OAT is above 46°F.
- — O1 is 0 percent for more than 5 minutes during any mode other than Off.

Table 8. On/Off Output Operation.

Freeze Protection	Control Mode	Output	
		On[a]	Off
Active	—	—	x
Inactive	Off	—	x[b]
	Occupied	x	—
	Unoccupied	x	
	Night	x	

[a] Controller has an adjustable delay time before switching on.

[b] Exception: On/Off output will switch to On if NightHigh or NightLow limits are reached.

Adjustments

Control Point / Setpoint Adjustment (CPATYP)

The control or setpoint can be adjusted using an internal or external potentiometer connected to the CPA/SPA input (see Technical Data). The CPA/SPA type is selected by the control parameter CPATYP (see Technical Data).

Temperature Sensor Calibration (I01CAL, I02CAL and I03CAL)

In case of an offset resulting from long wiring lengths, the temperature sensor inputs (I01, I02 and I03) can be adjusted separately using parameters I01CAL, I02CAL and I03CA.

KEYPAD OPERATION

Display and Operation Elements

The user interface is shown in Fig. 17.

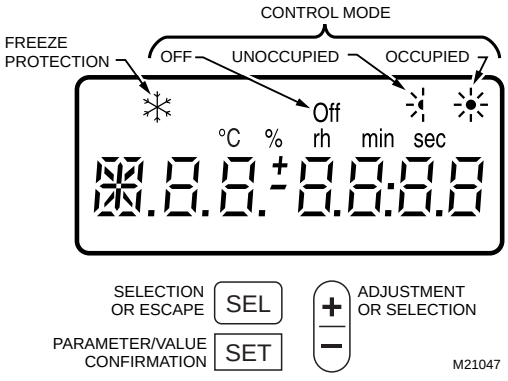


Fig. 17. R7426 user interface.

NOTES: Pressing the + or - button modifies values or scrolls through the parameter list:
- — One press: single step.
- — Pressing and holding: automatically modifies value or scrolls through list.
- — After 3 seconds of pressing without release: speed of modification/scrolling increases.

Standard Display Mode

After power-up, the controller version and revision number blink for approximately 20 seconds (See Fig. 18) and then the controller enters standard display mode (see Fig. 17). In this mode, selected input/output values are displayed.

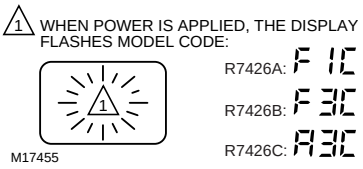


Fig. 18. Controller Version.

Parameter Selection/Adjustment Mode

Use this mode for application configuration:

1. Press and hold the + and - buttons to display parameter selection mode.
2. Press + or - until the desired parameter is displayed.
3. Press SET to enter adjustment mode.
4. Use + and - to adjust parameter to desired setting.
5. Return the controller to selection mode using either:
   a. SET places the parameter value into the EEPROM.
   b. SEL discards the change.

To Display Actual Values

In standard display mode, one of all listed below actual values can be selected and displayed (see Table) by pushing SEL.

Table 9. Standard Displays.

Display	Description
hour:minutes	Clock (A = am, P = pm)
month.day.year	Date
I01	Main Sensor I01
CP.1	Main Setpoint CTRP1
I02	Limit or Cascade Sensor I02
CP.2	Limit/Cascade Setpoint CTRP2
I03	Outdoor Air Compensation Sensor I03
O1	Output 1
O2	Output 2
O3	Output 3

Resetting Parameter Values to Default

To reset all parameter values to default (see Tables 13 and 14 for default values):

1. Press and hold the + and - buttons prior to and during power up.
2. When the display flashes *dEF*, release the buttons.

   NOTE: Setting the DefProg parameter (C.23) to 1 resets parameter values to default.

Time out

After approximately 10 minutes of inactivity (no buttons pressed) the controller automatically returns to standard display mode. Inputs not yet confirmed by the SET button are discarded and old parameter values retained.

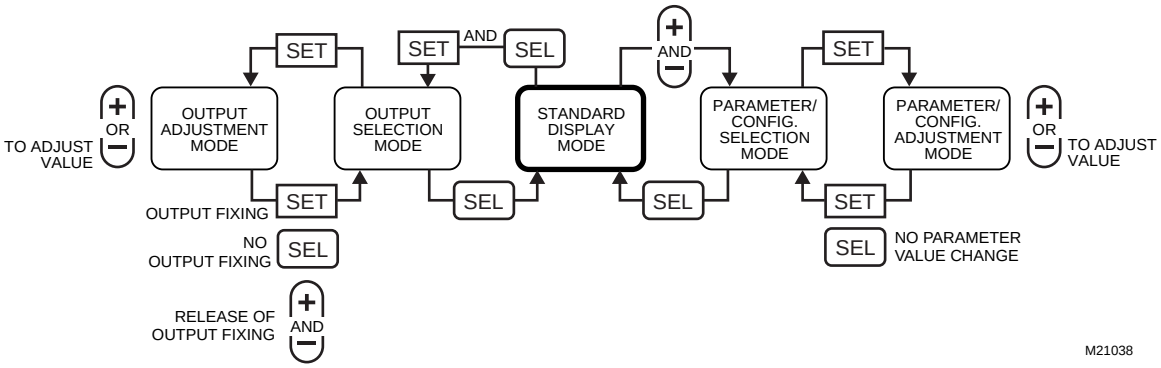


Fig. 19. Operating Overview.

Output Manual Override Mode

Output selection mode displays the output value and indicates manual overrides. An activated manual override is indicated by a displayed *F* (fixed). Use this mode for manual override. It is especially useful during installation and setup:

1. Press and hold the SET and SEL buttons to display output data selection mode.
2. Press +or - until the desired output is displayed.
3. Press SET to enter adjustment mode.
4. Use + and - to adjust the output to the desired value.
5. Return the controller to selection mode:
   a. SET changes the output to fixed.
   b. An activated manual override is indicated by an *F* (fixed) on the display.
   c. SEL discards the change.
6. To disable the manual override:
   a. Repeat steps 2 and 3.
   b. Press and hold + and - until the device displays *rEL*.

   NOTE: Before exiting manual override, disable all overrides according to step 5.

7. To exit manual override, press SEL.

   NOTE: If necessary, repeat step 6.

SCHEDULES

Two schedules, one for weekly switching points and one for holiday switching points, are available. These schedules and the clock/date are stored in the memory (EEPROM) of the device. The battery maintains the correct time in the event of power loss.

NOTES:
- When the battery is running low, the display provides an indication of this (see Fig. 17).
- Weekly switching point default settings are:
  — Occupied mode: Monday through Sunday from 6 AM to 6 PM (switching point 1).
  — Night mode: Monday through Sunday from 6 PM to 6 AM (switching point 6).
  — All other switching points are empty.
- Holiday switching point default settings are:
  — Off: 24 hours a day (switching point 1).
  — All other switching points are empty.

Standard Schedule

The standard schedule switches controller mode (off, night, occupied or unoccupied) at programmed switching points (S1 through S6). These points can be set for:
- Weekdays.
- Weekday groups.
- Holiday types (H1, H2 and H3).

When the occupied or unoccupied mode is taken from the schedule and an occupancy switch connected, control mode is determined by occupancy input:
- Occupied (contact closed): Controller mode is occupied.
- Unoccupied (contact open): Controller mode is unoccupied.

NOTE: Off and night control modes are not influenced by occupancy input.

The clock automatically changes controller mode according to the programmed schedule. In unoccupied or night mode, the *SOFFS* or *NOFFS* is added to (cooling) or subtracted from (heating) the calculated control point. A one-week schedule with up to six switching points per day can be programmed in advance and repeated weekly.

Holiday Schedules

Three different holiday schedule types (H1, H2 and H3) can be programmed with up to six switching points per day. One of these types can be assigned to each date of the year—01.01 (January 1) to 12.31 (December 31).

NOTE: Schedule times and modes of utilized holiday types (H1, H2 or H3) must be programmed in the standard schedule.

Table 10. Holiday Schedule Types.

Type	Special Program Notes	Applies	To Clear Program
H1	Can set off all day	One specific day	Automatic at midnight of the day
H2	Can set on for short period at end of day[a]		
H3	—	All fixed holidays	Manual

[a] H2 is typically used to preheat or precool the space before the first occupied day.

NOTES:
— H0 indicates absence of holiday and the weekday schedule applies.
— H1 and H2 holidays are not influenced by manually changing today's date.
— When power is interrupted for more than one day, all H1 and H2 holidays within that period are deleted.

Programming

Before attempting to program the device, make sure the standard display is showing.

NOTE: If the standard display is not showing or you are unsure of the display, press SEL until the standard display is showing.

1. Press and hold the SET and - buttons to display Programming mode for clock/date and schedule.
2. Press the + or - button to change the programming mode (see Table 11).

   NOTE: If, at any time, you press SEL, the device will return to the previous display, aborting all changes made since you last pressed SET.

Table 11. Programming Modes.

Programming Mode	Display
Clock/Date	RtC
Schedule	SCH
Holiday	HoL

Clock and Date Programming

1. While the device displays *RtC*, press SET.
2. Adjust the hours to the proper value.

   NOTE: The letter on the display indicates PM (*P*) or AM (*A*).

3. Press SET to confirm this information and advance to set the minutes.
4. Adjust the minutes to the proper value.
5. Press SET to confirm this information and advance to set the year.
6. Adjust the year to the proper value.
7. Press SET to confirm this information and advance to set the month.
8. Adjust the month to the proper value.
9. Press SET to confirm this information and advance to set the day.
10. Adjust the day to the proper value.

11. Press SET to place this information into the EEPROM. The device will cycle back to the hour.
12. If no more changes are needed to the clock or date, press SEL to return to the display of *RtC*.

Schedule Programming

1. While the device displays *SCH*, press SET.
2. The display should show an *S* and a flashing day.
3. Press + or - to display a weekday, week group, or holiday type.
4. Press SET to select the type shown and advance to select the switching point.
5. Press + or - to display the desired switching point.
6. Press SET to select the point shown and advance to adjust the schedule time.
7. Adjust the time to the proper value.

   NOTE: In order to ignore a switching point, the time must be set to display --:--. In order to do this press and hold the + and - buttons until the time blanks, or set the time between 11:50 PM and 12:00 AM.

8. Press SET to select the time shown and advance to adjust the control mode (see Fig. 17).
9. Press SET to select the mode shown and advance to program another switching point (repeat steps 2 - 9).

   NOTE: If you desire to use holiday programming, be sure to program the holiday switching points in the schedule mode.

10. If the schedule requires no more changes, press SEL to return to the display of *SCH*.

Holiday Programming

1. While the device displays *HoL,* press SET.
2. Press the + or - button to cycle through holidays already programmed.

   NOTE: If no holidays have been programmed, the display will show *H0* and today's date.

3. Press SET to change an existing or create a new holiday.
4. Adjust the month to the proper value.
5. Press SET to confirm this information and advance to set the day.
6. Adjust the day to the proper value.
7. Press SET to confirm this information and advance to set the holiday type.
8. Select the proper holiday type.

   NOTE: To delete a holiday, set the type to *H0*.

9. Press SET to place this holiday information into the EEPROM and advance to program another holiday (repeat steps 2 through 9).
10. If no more holiday changes or additions are needed, press SEL to return to the display of *HoL*.

NOTE: If February 29 is programmed with H1 or H2 and the current year is not a leap year, the holiday program for that day will be deleted January 3.

TROUBLESHOOTING

Error Messages

Improper sensor inputs will trigger an error message to flash on the display. (See Table 12.)

Table 12. Error Messages.

Standard Display	Description
I01 E.01	Incorrect main sensor (I01) input.
I01 – –. –	No input to I01.
I02 E.02	Incorrect limit/cascade sensor (I02) input.
I02 – –. –	No input to I02.
I03 E.03	Incorrect compensation sensor (I03) input.
I03 – –. –	No input to I03.

NOTES: For the external CPA/SPA potentiometer input, no error message is indicated, if the potentiometer or wiring is defective. In this case for control point or setpoint calculation the following values are used:

- For CPATYP 0,1, or 2, the controller uses CPA value of 0 for control point calculations.
- For CPATYP 3, the controller uses SPA value equal to W1 for setpoint calculations.

APPENDIX A

Control and Configuration Parameters

The controller includes two groups of settings (I and II) for control and configuration parameters. These settings are automatically selected during programming. See Tables 13 and 14.

NOTES: Parameter *Ctrltyp* determines the setting:
— *Ctrltyp* Lo selects setting I.
— *Ctrltyp* Hi1 and Hi2 select setting II.

Table 13. Control Parameters.

R7426			Parameter			Setting I / Setting II				
A	B	C	#	Name	Description	Low	High	Default	Resolution	Unit[a]
x	x	x	P.01	W1	I01 main setpoint	32	130 / 260	70 / 160	1	°F
x	x	x	P.02	W_{lim}	I02 limit setpoint (low or high. See C.13)	40	130 / 260	60 / 200		
x	x	x	P.03	W_{comp}	I03 compensation changeover point	20	110	70	1	°F
x	x	x	P.04	Wi	Winter reset	-350	+350	0	2	%
x	x	x	P.05	Su	Summer reset	-100	+100	0	1	
x	x	x	P.06	W_{cas}	Submaster or cascade setpoint	Off, 50	130/260	70/Off	1	°F
x	x	x	P.07	R_{cas}	Cascade reset span adjustment	0	70	20		
x	x	x	P.08	Xp1	I01 Throttling range (main control loop)	1	70	4/20		
x	x	x	P.09	Xp2	I02 Throttling range (cascade or limit control loop)	1	70	20		
	x	x	P.10	Xpc	Cooling throttling range (sequence control)	Off, 1	70	6		
	x	x	P.11	Xph	Heating throttling range (sequence control)	1	70	12		
x	x	x	P.12	tr1[b]	Reset time (main control loop)[c]	Off, 20 sec	20 minutes	Off	10 sec / 0.5 min	sec / min
x	x	x	P.13	tr2[b]	Reset time (cascade or limit control loop)[c]					
	x	x	P.14	MINPOS	Minimum position (damper actuators)	0	50	20	1	%
x	x	x	P.15	O_{start}	Mid-range shift start point (O1)	-40	+40	0	1	°F
x	x	x	P.16	SOFFS	Main setpoint offset (unoccupied mode)	0	20	4 / 10	0.1	
x	x	x	P.17	I01Cal	Calibration of sensor I01	-40	+40	0		
x	x	x	P.18	I02Cal	Calibration of sensor I02					
x	x	x	P.19	I03Cal	Calibration of temperature sensor I03					
	x	x	P.20	RetOffs	Return air offset to simulate return air conditioning	Off, 0	10	Off		
x	x		P.21	RuntimeO1	Actuator run time (O1)	6	180	60	1	sec
	x		P.22	RuntimeO3	Actuator run time (O3)					
	x		P.23	RuntimeO2	Actuator run time (O2)					
x	x	x	P.24	NightLow	Night temperature low limit	Off, 50	70	Off	1	°F
x	x	x	P.25	NightHigh	Night temperature high limit	Off, 70	100			
x	x	x	P.26	NOFFS	Main setpoint offset (night mode)	0	60	10 / 40	0.1	

[a] Unless otherwise noted.

[b] If *tr* is greater than 120 sec, resolution is 30 sec; if *tr* is less than 120 sec, resolution is 10 sec.

[c] Reset times are for P+I control.

Table 14. Configuration Parameters.

Parameter		R7426			Description					Setting I / Setting II Default
#	Name	A	B	C						
C.01	DIR/ REVO1			x	Selects O1 output action to adapt valve or damper direction (Dir: DA, Rev: RA).					Dir
C.02	DIR/ REVO3			x	Selects O3 output action to adapt valve or damper direction.					
C.03	DIR/ REVO2			x	Selects O2 output action to adapt valve or damper direction.					
C.04	Ctrltyp1[a]	x	x	x	Control type (setpoint operating range and default parameter setting).					Lo
					Setpoint	Operating Range			Setting	
					Lo	32 to 130°F for ventilation systems			I	
					Hi1	32 to 260°F for heating systems			II	
					Hi2	32 to 260°F with pump On/Off operation				
C.05	CPATYP	x	x	x	Selects Control Point Adjustment (CPA) / Set Point Adjustment (SPA) type.					0
					CPATYP	Potentiometer	CPA/SPA Range			
					0	internal	CPA: ±10°F			
					1	9574 to 1426 ohms	CPA: ±10°F			
					2	100K to 0 ohms	CPA: ±10°F			
					3	9574 to 1426 ohms	SPA: 55 to 85°F			
					4	100k to 0 ohms	SPA: 55 to 85°F			
					5	0 to 100K ohms	SPA: 55 to 85°F			
					6	0 to 100K ohms	SPA: 32 to 130°F or 32 to 260°F			
C.06	ORange			x	Selects output control range for O1, O2 and O3 outputs (0: 2-10 Vdc; 1: 0-10 Vdc).					1
C.07	Startup		x	x	Enable/Disable start-up routine (0 = Off, 1 to 10 min).					0
C.08	O1Mode	x	x		O1 output mode selects an individual output function for O1.					4 (un-configured)
C.09	O3Mode		x		O3 output mode selects an individual output function for O3.					
C.10	O2Mode		x		O2 output mode selects an individual output function for O2.					
					Values for C.08,C.09 and C.10	0	Synchronous / floating	2	3-stage binary-coded On/Off	
						1	2 stage On/Off	3	PWM (European electric current valves)	
C.11	OMode				Selects the output mode for sequence operation or multistage On/Off function.					0
			x	x	0	Damper (O1), cooling (O2) and heating (O3)				
			x	x	1	Sequence control: heating or cooling (O1,O2, O3)				
			x			Sequence control: 6-stage On/Off (O1Mode, O2Mode, O3Mode = 4)				
			x	x	2	Sequence control: heating (O1, O3) and cooling (O2)				
			x			Sequence control: 4-stage On/Off heating (O1, O3) and cooling (O2) (O1Mode, O3Mode = 4)				
			x	x	3	Sequence control: cooling (O1, O3) and heating (O2)				
			x			Sequence control: 4-stage On/Off cooling (O1, O3) and heating (O2) (O1Mode, O3Mode = 4)				
			x	x	4	Two-position damper control (O1), heating (O3) and cooling (O2)				
			x		5	15-stage binary coded On/Off for heating (O1, O3), and cooling (O2)				
C.12	I02ext	x	x	x	Dictate usage of I01 and I02 sensor inputs.					0
					0	I02 installed				
					1	I01 signal used for I02 input				
C.13	LimTyp	x	x	x	Limit type (0: Low limit; 1: High limit).					0 / 1

[a] Actual Value unchanged during reset to default. [b] Controller can overwrite for self-adaptation purposes.

Table 14. Configuration Parameters. (Continued)

Parameter		R7426			Description				Setting I / Setting II Default
#	Name	A	B	C					
C.14	Senstyp	x	x	x	Sensor type detection (0: Automatic detection; 1: Manual selection of NTC).				0
C.15	O1CTRF	x	x	x	Control function.				0 / 1
		x	x	x	0	Economizer Mixed Air or Cooling	1	Economizer Energy Recovery	
		x			2	Summer/Winter Changeover		or Heating	
C.16	AddHour	x	x	x	Adjusts month for winter/summer time change. Minimum: 0 (disabled), Maximum: 12.				3
C.17	SubHour	x	x	x	Adjusts month for summer/winter time change. Minimum: 0 (disabled), Maximum: 12.				10
C.18	PSTG_H[b]	x	x	x	Prestart gradient for heating (in °F/min): 0 (disabled) is minimum, 2 is maximum.				0
C.19	PSTG_C[b]	x	x	x	Prestart gradient for cooling (in °F/min): 0 (disabled) is minimum, 2 is maximum.				0
C.20	tvd		x	x	Damper prestart time: Minimum: 0 (normal control), Maximum: 90 minutes.				15
C.21	Adapt	x	x	x	Optimum Start-Self Adaptation speed (in percent): 0 is minimum, 100 is maximum.				50
C.22	Adr[a]	x	x	x	Serial communication address (value from 0 to 255).				254
C.23	DefProg	x	x	x	Default program initiation (0: No default program; 1: Initiates default program).				0
C.27	OnDelay	x	x	x	On/Off output on delay in minutes (0 to 10 min. with 1 min. resolution).				3
C.28	TRAMP		x	x	Start-up ramp time in minutes (0 = Off, 0 to 10 min. with 1 min. resolution).				10

[a] Actual Value unchanged during reset to default. [b] Controller can overwrite for self-adaptation purposes.

Parameter Details

The following information applies *only* to controllers that have the noted parameter (see Tables 13 and 14). Not all parameters are detailed.

NOTE: All configuration parameters (see Table 14) have to be set to select the correct control functions required by the job application and, in some cases, to start control operation and synchronization of the final control devices.

Action: Dir/RevO1, O2 or O3 (C.01, C.02, C.03)

The output action of the analog outputs on the R7426C Con-troller must sometimes be reversed for a correct opening and closed direction of the valve or damper. This depends on whether the output controls a 2-way or 3-way valve or on the direction the damper shaft moves to open the damper (cw or ccw). It is only needed if the actuator does not provide a direction selector switch, plug or similar.

On the R7426A,B controllers the change of the direction can be performed by exchange of the wiring connections open-close (OUT2-OUT1).

Operating Range Selection: Ctrltyp (C.04)

Changing parameter Ctrltyp value from Lo to Hi control range or vice versa causes the R7426A controller to change all parameter values to the appropriate default.

For manual parameter reset see How to Reset Parameter Values to Default Values section.

Enable Start-up Routine (C.07)

A start-up routine is provided to prevent start-up problems for R7426B,C controllers (three outputs). Enable this routine by setting Startup parameter to On.

After power up reset (initial start) or the controller mode changes to night, unoccupied or occupied, the outdoor air and exhaust air dampers (O1) will stay in the closed position (0 percent). After an adjustable time (1 to 10 minutes) of operation, O1 returns to normal operation.

NOTE: If OAT is below 43°F (6°C), setpoint W1 is raised temporarily by Xp1 and linearly decreased to its normal value over an adjustable time period (1 to 10 minutes) by the configuration parameter TRAMP.

If the controller mode changes to Off, output signals O1, O2 and O3 are set to 0 percent. If the Optimum Start Program is enabled the Start-up Routine is disabled.

Control Function: O1CTRF (C.15)

If parameter O1CTRF is 2 (R7426A only), output O1 action depends on occupancy input (see Summer/Winter Changeover Function).

If the parameter is set to 0, output O1 is selected for cooling (R7426A), or mixed air control is selected (R7426B,C).

If the parameter is set to 1, heating (R7426A) or energy recovery is selected (R7426B,C).

Time Change: AddHour / SubHour (C.16 / C.17)

These parameters are required to adjust the time for Daylight Saving Time. The one hour clock change occurs at 2:00 AM the last Sunday of the month selected.

Prestart Gradient: PSTG_H / PSTG_C (C.18 / C.19)

These parameters determine the necessary prestart gradients to reach the occupied setpoint at occupancy start. The controller modifies the prestart gradient to optimize the start cycle through a self-adaptation routine.

NOTE: Disable the optimum start cycle for heating and/or cooling by setting PSTG_H or PSTG_C to 0.

Damper Prestart Time: tvd (C.20)

The parameter tvd is active with the optimum start program only. It sets the time before occupied mode switches the output signal O1 to supply fresh air to the space in mixed air applications.

Optimum Start-Self Adaptation Speed: Adapt (C.21)

The self adaptation routine uses this parameter to optimize energy consumption during the start cycle. A corrected prestart gradient is calculated once per day. Adaptation to the actual prestart gradient for the next optimum start cycle is determined by the Adapt parameter:

- 0 percent disables adaptation.
- 100 percent utilizes the maximum adaptation speed.

Serial Communication Address: Adr (C.22)

The parameter Adr sets the serial communication address. The serial communication bus allows to connect the Operator's Terminal to one or several controllers. This PC tool provides access to all application configuration and control parameters, time schedules, input and output values of the connected controllers and easy setting of these via the bus by mouse click or keyboard.

Default Programming: DefProg (C.23)

Setting parameter DefProg to 1 resets all parameters to default values (see Tables 13 and 14). Default programming is indicated by a display of def.

NOTE: After default programming, DefProg resets to 0.

TRAMP Time (C.28)

The parameter *TRAMP* determines the time in the start-up routine during which the W1 setpoint decreases from its temporary value to the normal programmed value.

NOTE: This only operates with an OAT sensor connected and the OAT is below 42°F.

High/Low Limit Setpoint: W_{lim} (P.02)

For high or low limit control, parameter W_{lim} is the setpoint.

During limit control, the throttling range Xp2 and reset time tr2 are active. Limit control is active only when I02 temperature signal (I02ext is 0) is available, or sensor I01 (I02ext is 1) is used for limit control.

For cascade control, limit setpoint W_{lim} determines the control point at which:

- Submaster setpoint (W_{cas}) maintains the limit value.
- W_{lim} is not shifted by the master control loop.

NOTE: High or low limit control is in accordance with the configuration parameter LimTyp (C.13).

Compensation Changeover Point: W_{comp} (P.03)

The parameter W_{comp} defines the start point of summer or winter compensation.

Compensation is performed:

- Above W_{comp} for summer compensation.
- Below W_{comp} for winter compensation.

Summer/Winter Reset: Su/Wi (P.04/P.05)

Summer/Winter reset settings determine the compensation sensor (I03) reset effect (TComp) on the main setpoint (W1).

To calculate winter and summer reset, throttling range must be considered in proportional-only control (see Table 15). With P+I control xp is 0.

NOTE: Compensation changeover (Xp) at +68°F OAT.

Table 15. Summer/Winter Reset Calculation.

Control Schedule	Room Temperature (I01)	OAT (I03/Tcomp)	Throttling Range (XP)
Winter	68°F	68°F	4°F
	72°F	5°F	
$AutWi = \frac{\Delta IO1 + Xp}{\Delta OAT} x100 = \frac{(72-68)+4}{63} x100 \cong 13\%$			
Summer	68°F	68°F	4°F
	79°F	95°F	
$AutSu = \frac{\Delta IO1 - Xp}{\Delta OAT} x100 = \frac{(79-68)-4}{27} x100 \cong 26\ \%$			

Reset Span Adjustment: R_{cas} (P.07)

The reset span adjustment (R_{cas}) determines the reset effect in degrees. If I01 deviates by 50 percent of the throttling range (Xp1), this effect alters the submaster setpoint (W_{cas}).

Throttling Range: Xp1/Xp2 (P.08/P09)

Throttling range (Xp) adjustment determines the change required at the main sensor and limit or cascade sensor to operate the output device through full stroke. Xp1 is the main control loop throttling range. Xp2 is used when limitation or cascade control (submaster control loop) are active (see Table 16).

Table 16. Throttling Range and Reset Time Reference

Application	Sensor	Xp1	Xp2	Xpc	Xph	tr1	tr2
R7426A							
Main Temperature Control	I01	x				x	
High or Low Limit Temperature Control	I02		x				x
Master Cascade Control	I01	x				x	
Submaster Cascade Control	I02		x				x
R7426B,C (Main Temperature Sequence Control)							
Mixed Air Damper	I01	x				x	
Energy Recovery	I01	x				x	
Heating	I01				x	x	
Cooling	I01			x		x	
R7426B,C (Temperature Cascade Sequence Control)							
Master	I01	x				x	
Submaster							
- Mixed Air Dampers	I02		x				x
- Energy Recovery	I02		x				x
- Heating	I02				x		x
- Cooling	I02			x			x

To estimate the throttling range (Xp) for stable control under all different load conditions, you must know the control or correcting range (Xh).

Xh is the maximum air temperature increase (heating) or decrease (cooling) produced by the coil, with a fully open control valve.

Calculate Xp for discharge air control using the following:

$$X_p = \frac{X_h}{5}$$

For room temperature control use the following:

$$X_p = \frac{X_h}{10} \text{ or } \frac{\Delta t_{max}}{10}$$

NOTE: Δt_{max} (Xh) of the discharge air for mixed air damper control is the maximum difference between OAT and return air temperature.

The often specified accuracy for room control of ±2°F (where Xp is 4.0°F) allows a discharge air alteration of 36°F.

P+I and proportional control can use the same throttling range. Use the following formula for P+I control:

$$X_p = \frac{X_h}{x}$$

- Discharge air control: x ranges from 4 to 5.
- Room control: x ranges from 8 to 10.

Reset Time: tr1/tr2 (P.12/P13)

With P+I control, reset time (tr) is defined as the required time after which the integral part is equal to the change due to the proportional action for a predetermined step change in the input variable. See Fig. 20.

The control parameter tr1 sets the reset time of the P+I main temperature control loop.

For limit or submaster cascade control the control parameter tr2 sets the reset time of these control loops (such as discharge temperature I02. See Table 16.)

NOTE: If only proportional control is required, set tr to Off.

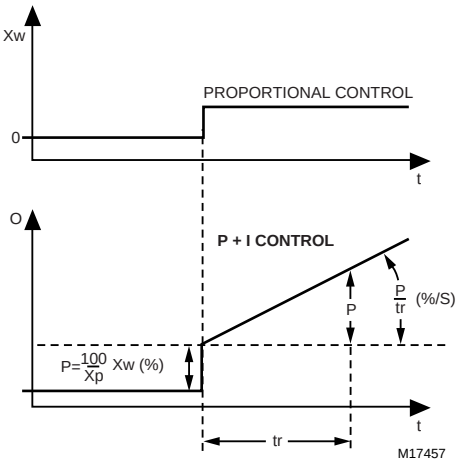


Fig. 20. Step change responses of proportional and P+I controls.

SETTING GUIDELINES FOR P+I CONTROL RESET TIME

Adjust reset time (tr) to 2 to 3 times the response time (Tu).

NOTE: Tu is the time interval between the beginning of a sustained disturbance (such as a rapid step change of valve position) and the instant when the resulting output signal change reaches a specified fraction of its final steady-state value, either before or in the absence of overshoot.

- Discharge air control: Tu normally ranges from 0.1 to 0.6 min. Therefore tr adjustment can range from 0.2 to 2 min.
- Room control: Tu ranges from 0.5 to 5 minutes. This results in a tr setting of 1 to 15 minutes.

Minimum Position: MINPOS (P.14)

Adjustment of parameter MINPOS is available only with R7426B,C controllers. MINPOS determines the outdoor air damper actuator minimum position. It maintains the minimum outdoor air damper setting even when temperature conditions call for a fully closed position.

NOTE: Controller Off mode for plant/system shut off overrides minimum position. When switched to Off, actuators are driven fully-closed.

Start Point: O_{start} (P.15)

O_{start} determines the output O1 midrange shift from the calculated control point.

O_{start} is available on the single output R7426A and the R7426B when the three floating outputs are configured for OMode = 1.

Calibrate O_{start} in degrees Fahrenheit. It is equal to the offset (plus or minus) from the set values or calculated control points at which O1 is at 50 percent.

NOTE: In P+I control, the start point should be set at zero.

Occupied/Unoccupied Function: SOFFS (P.16)

A potential free contact can be used between terminals 1 and 4 to switch between occupied (contact closed) and unoccupied (contact open) modes.

Control point calculation:
- Occupied mode: Use temperature setpoint (W1).
- Unoccupied mode: SOFFS parameter value is added to (cooling) or subtracted from (heating) the calculated control point.
- Heating and cooling sequence applications: SOFFS value is added to cooling control point (CTRPC) and subtracted from heating control point (CTRPH). See Fig. 21.

IMPORTANT

Set R7426A parameter O1CTRF to 0 or 1 to match the required application. If parameter O1CTRF is 2 (summer/winter changeover), SOFFS is ignored.

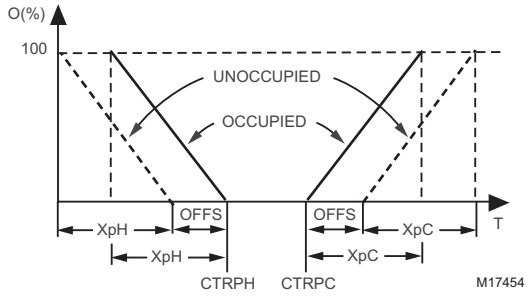


Fig. 21. Sequence control occupied/unoccupied function.

Return Air Offset: RetOffs (P.20)

Parameter RetOffs is available on R7426B,C controllers *only*. For mixed air damper or energy recovery system control, it activates *Economizer* mode when On.

NOTE: With the main temperature sensor (I01) installed in the return air, set RetOffs to 0.

With the main sensor installed in the room and with a constant offset between room and return air conditions, this offset value can be adjusted from 0°F to 10°F using RetOffs. This value is added to the measured room temperature to simulate return air conditions.

When RetOffs is programmed to Off, or with no OAT sensor connected, *Economizer* mode is disabled.

RuntimeO1, O2, O3 (P.21,P.22,P.23)

Parameters RuntimeO1,O2,O3 are available on R7426A,B controllers *only*.

For three-position floating actuator control, the controller converts the deviation signal to a proportional output pulse. This pulse drives the actuators based on the Runtime value.

An automatic synchronization function ensures correct actuator positioning. Synchronization run time is derived by multiplying Runtime by 1.25.

By selecting pwm mode for output O1 or O3, the pwm output (suitable for driving electric heat current valves) is controlled from the heating signal. Interval and total cycle time is set by the parameter RuntimeO1 or RuntimeO3.

Night Cycle: NightLow and NightHigh (P.24/P.25)

Parameters NightLow and NightHigh are used by the night cycle program (controller mode is Off).

NOTE: Disable this function by setting these parameters Off.

Night Mode Offset: NOFFS (P.26)

This control parameter is used to set the night mode offset. During night mode, freeze protection is active and the occupied/unoccupied function is disabled.

- Night Mode: NOFFS parameter value is added to (cooling) or subtracted from (heating) the calculated control point.
- Heating and cooling sequence applications: NOFFS value is added to cooling control point (CTRPC) and subtracted from heating control point (CTRPH). See Fig. 21.

APPENDIX B

Programming Charts

Table 17. Weekly and Holiday Switching Points.

	Switching Point 1		Switching Point 2		Switching Point 3		Switching Point 4		Switching Point 5		Switching Point 6	
Day	Time	Control Mode	Time	Control Mode	Time	Control Mode	Time	Control Mode	Time	Control Mode	Time	Control Mode
Mo												
Tu												
We												
Th												
Fr												
Sa												
Su												
H1												
H2												
H3												

Honeywell

Automation and Control Solutions
Honeywell
1985 Douglas Drive North
Golden Valley, MN 55422

Honeywell Limited-Honeywell Limitée
35 Dynamic Drive
Scarborough, Ontario
M1V 4Z9

Honeywell International
Control Products
Honeywell Building
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