

THE PECO® WAVE WIRELESS® SYSTEM

The PECO Wave Wireless System is comprised of the wireless TW205 or TW206 Thermostat paired with a RW205 Receiver. Optional accessories to the System are the SW205 wireless occupancy sensor and/or SW206 wireless door switch. This installation guide explains how to install the RW205 Receiver, the TW205/TW206 Thermostat, and select optional accessories.

The TW205 and TW206 can be powered by 24 VAC, batteries, or by both (recommended). The TW205 and TW206 both feature wireless communication with the RW205 Receiver. The TW205 Thermostat is **non-programmable** digital model. The TW205 features a single setpoint with deadband, auto changeover, and fan control functions. The TW206 Thermostat is the **programmable** digital model. The TW206 can be programmed for 7-day individual, 5/2-day, 5/1/1-day, or 7-day identical programmable operation, with four time periods per day. The TW206 also features separate heating and cooling setpoints, auto changeover, and fan control functions.

The RW205 Receiver is wired to the HVAC equipment and controls all outputs. The optional SW205 occupancy sensor and SW206 door switch also communicate wirelessly with the RW205 Receiver to signal occupancy status.

APPLICATIONS AND FEATURES

The PECO Wave Wireless System is intended for use in PTAC, PTHP, fan coil, and heat pump applications.

- System mode selections: Off-Heat-Cool-Auto-Setback
- Stages: 1 Heat/1 Cool, 2 Heat/1 Cool, 1 Heat/2 Cool
- 6 outputs (RW205): 1 Heat, 1 Cool, Up to 3 Fan, Outside Air Damper / Reversing Valve
- Fan control: 1-3 Speeds, Cycling (Auto) or Continuous (On)
- Permanent memory: The thermostat does not need batteries to store user-configured settings in memory. Nonvolatile memory (EEPROM) saves temperature setpoints, fan, and system settings for unlimited time.
- Connections for Remote Temperature Probe and Setback (RW205)

CAUTION

- Use copper wire only; insulate or wire nut all unused leads.
- Use care to avoid electrostatic discharge to the thermostat and receiver.
- In order to establish correct pairing, the RW205 must be mounted and wired before applying power to the TW205/TW206.
- Read and understand "Table 1. Advanced Configuration Service Menus" to determine preferred settings on TW205/TW206 before performing wireless pairing.

FRONT PANEL REFERENCE

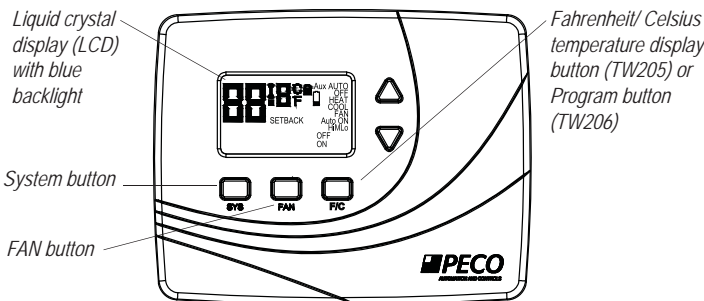


Figure 1: TW205 Thermostat.

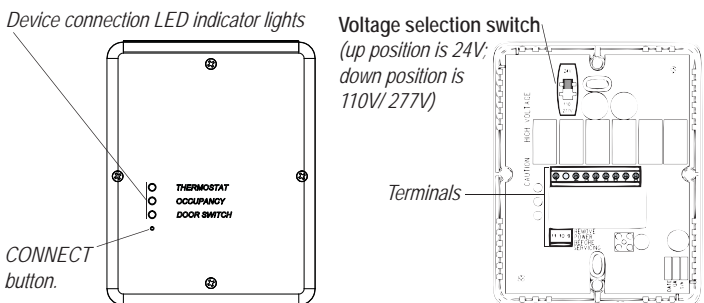


Figure 2: RW205 Receiver: LED indicators and CONNECT button.

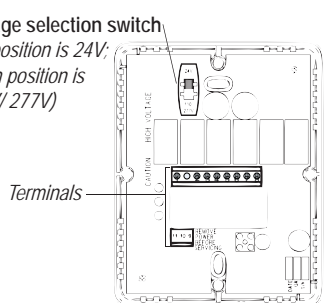


Figure 3: RW205 Receiver with front cover removed.

WARNING

- READ THESE INSTRUCTIONS CAREFULLY BEFORE ATTEMPTING TO INSTALL, OPERATE OR SERVICE THIS THERMOSTAT OR RECEIVER.
- Before installing this control, the **RW205 Voltage Selection Switch must be placed in the correct position.** See instructions.
- Failure to observe safety information and comply with instructions could result in PERSONAL INJURY, DEATH AND/OR PROPERTY DAMAGE.
- To avoid electrical shock or damage to equipment, disconnect power before installing or servicing and use only wiring with insulation rated for full thermostat operating voltage.
- To avoid potential fire and/or explosion do not use in potentially flammable or explosive atmospheres.
- Retain these instructions for future reference. This product, when installed, will be part of an engineered system whose specifications and performance characteristics are not designed or controlled by PECO. You must review your application and national and local codes to assure that your installation will be functional and safe.

SPECIFICATIONS

- Temperature Range: 50° to 90°F (10° to 32°C)
- Differential: 1°F (0.5°C)
- Input Power: TW205 / TW206 Thermostat: Two AA alkaline batteries or 24 VAC, 50/60 Hz.
RW205 Receiver: 24 VAC or 100-277 VAC, 50/60 Hz
RW205 Receiver Output Rating: 24 VA (pilot duty)
- Wireless Type: 902 to 928 MHz Band, FHSS (Frequency Hopping Spread Spectrum)
- Wireless Range: 100 ft minimum in open air
- Operating Temperature: 0° to 120°F (-17° to 48°C)
- Shipping Temperature: -20° to 130°F (-28° to 54°C)
- Operating Humidity: 5% to 95% RH, non-condensing
- Physical Dimensions: TW205 / TW206: 4.5"H x 5.75"W x 1.1"D
RW205: 4.8"H x 3.8"W x 1.3"D

Wave Wireless System complies with Part 15 of FCC guidelines (see Operating Manual).

RW205 OUTPUT RATINGS:

VOLTAGE	RATINGS				
	FLA	LRA	RES AMPS	PILOT DUTY	HP
24 VAC	NA	NA	NA	24 VA	NA
120 VAC	5.8	34.8	6.0	125 VA	1/4
240 VAC	2.9	17.4	5.0	125 VA	1/4
277 VAC	2.4	14.4	4.2	125 VA	1/4

COMBINED LOAD CURRENT NOT TO EXCEED 20 AMPS



INSTALLATION: WAVE WIRELESS SYSTEM

Mounting Considerations for Wave Wireless System

When selecting mounting locations for Wave Wireless System components, it is important to consider the number and types of obstructions between components. The Wave Wireless System will communicate through walls and other obstructions, but they will reduce the effective operating range of these devices. The effectiveness of the Wave Wireless System will be greatly reduced if it is mounted within a metal enclosure. The Wave Wireless System uses frequency-hopping technology to improve its resistance to wireless interference; however, malfunctioning or improperly used wireless devices may interfere with the Wave Wireless System. Take note of any other wireless devices in use near the Wave Wireless System before installation or if communication errors occur.

- Locate TW205/TW206 and RW205 within 100 ft. (30 m.) of one another for optimal operation.
- Choose indoor mounting locations free from obstructions; avoid locating devices within a metal enclosure or between large obstructions.

Mounting Configuration, RW205

The RW205 may be mounted:

- on a vertical 2" X 4" device box
- on a flat surface
- using a flush mount (Optional: See PECO Web site for PTAC Cutout Template.)

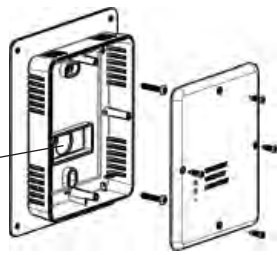
Required components (tools not included):

- Two new AA batteries (included)
- RW205 Receiver
- TW205/TW206 Thermostat
- PECO Wave Wireless System Operating Manual

PART I: RW205 RECEIVER WIRING AND MOUNTING

Figure 4.
RW205 Receiver
backplate and
mounting screws.

wiring passage

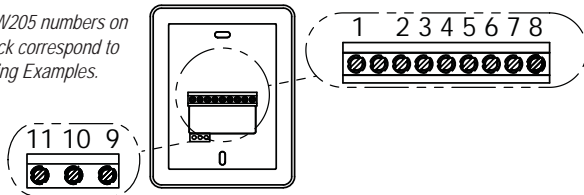


1. Remove the RW205 front cover.
2. Select input power by changing RW205 voltage selection switch: Select "24V" if input power is 24 VAC; select "110/277V" if input power is line voltage (see Fig.3, p.1).

WARNING: Setting the voltage selection switch in the incorrect position will damage or destroy the RW205.

3. Pull equipment wires through the RW205 wiring passage (see Fig.4).
4. Drill holes appropriately in the mounting surface.
5. Mount the RW205 using the enclosed mounting screws. Tighten screws evenly.
Note: This instruction does not apply if mounting behind a PTAC wall cutout.
6. Connect equipment wire to the RW205 terminals:
 - a. Match equipment wire to RW205 terminals (see "RW205 Wiring Examples" below).
 - b. Loosen screw terminals.
 - c. Insert wires into the appropriate terminals (see Fig.5).
 - d. Re-tighten screw terminals.
7. Cap off any unused wires or terminate properly according to local building codes.
8. Reattach the RW205 front cover (see Fig.4).

Figure 5. RW205 numbers on
terminal block correspond to
RW205 Wiring Examples.



RW205 Wiring Examples

System Type 0 (1H/1C)			System Type 1 & 2 (1H/1C Heat Pump)		
TERM	Name	Function	TERM	Name	Function
1	C	24VAC 2/L2	1	C	24VAC 2/L2
2	R	24VAC 1/L1	2	R	24VAC 1/L1
3	Y1	Cooling	3	Y1	Compressor Cool*
4	W1	Heat	4	Y2	Compressor Heat*
5	G1	Fan Low	5	G1	Fan Low
6	G2	Fan Medium	6	G2	Fan Medium
7	G3	Fan High	7	G3	Fan High
8	OA	Outside Air	8	O/B	Reversing Valve

*Note: In the Heat Pump mode, use jumper wire to connect terminals 3 and 4.

System Type 3 (2H/ 1C)			System Type 4 (1H/ 2C)		
TERM	Name	Function	TERM	Name	Function
1	C	24VAC 2/L2	1	C	24VAC 2/L2
2	R	24VAC 1/L1	2	R	24VAC 1/L1
3	Y1	Cool	3	Y1	Cool 1
4	W1	Heat 1	4	W1	Heat
5	G1	Fan Low	5	G1	Fan Low
6	G2	Fan Medium	6	G2	Fan Medium
7	G3	Fan High	7	G3	Fan High
8	W2	Heat 2	8	Y2	Cool 2

NOTE: ALL ELECTRICAL LOADS MUST BE CONNECTED TO L2.



WARNING: DO NOT connect the following optional accessories to high voltage/24VAC circuits.

These optional accessories are also available from PECO.

PECO Optional Accessories RW205	
TERM	Function
9	Sensor Common
10	Setback Input
11	Remote Probe Input

Fan Coil Systems

The RW205 can control fan coil systems; however, the RW205 Receiver is not equipped with internal seasonal changeover capability.

Setback

The RW205 Receiver SETBACK INPUT is a low-level switchable input that is normally open. When the switch is closed, the system is in setback mode. In setback mode, the heating and cooling setback limits are used as temperature control points and fan operation is cycled with demand at the lowest speed. Pressing any button on the TW205/206 Thermostat will override the setback for 1 hour.

Setback function is enabled via the Service Menu on the TW205/206 Thermostat:

- To enable setback function: Set Service Menu #14 to "1."
- To specify the Heating setback limit: Access Service Menu #6 and scroll to desired temperature.
- To specify the Cooling setback limit: Access Service Menu #7 and scroll to the desired temperature.

NOTE: Setback may be triggered automatically or manually. See "System Button Operation" section of the Wave Wireless Operating Manual for more information.

PART II: TW205/TW206 THERMOSTAT WIRING AND MOUNTING

This instruction assumes that the installer will use pre-existing wires found at the location of the previously-installed thermostat.

Mounting Location

The TW205/TW206 is intended for indoor installation only. It should be mounted on an inner wall, in a location with freely circulating air, **where it will be responsive to changes in room temperature.** Avoid mounting thermostat near heat generating appliances (i.e. TV, heater, refrigerator) or in direct sunlight.

Power Options

- TW205/TW206 will operate on 24 VAC power and/or two AA alkaline batteries. Where possible, the thermostat should be operated on 24 VAC power with battery backup.
- To avoid electrical shock or damage to equipment, disconnect all power before installing this thermostat.

1. Remove the front cover of old thermostat (remove old thermostat if applicable).
2. Before removing wires from old thermostat, label each wire with the terminal designation from which it was attached.
3. Disconnect the wires from the old thermostat one at a time. Do not let wires fall back into the wall.

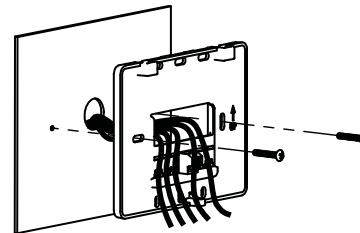


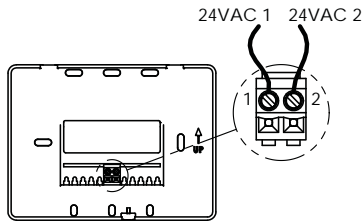
Figure 6.
TW205/TW206
Thermostat
backplate,
mounting screws.

4. Remove backplate from the wall after all wires are labeled. If old thermostat has a wall mounting plate, remove both of these as an assembly.
5. Use the level to mark the backplate mounting position.
6. Mark positions of the screw holes (two at minimum) with a pencil.
7. Drill holes at pencil-marked locations (3/16" for drywall, 7/32" for plaster).
8. Insert the wall anchors in the holes. Use a hammer to gently tap anchors into holes.
9. Mount the TW205/TW206 Thermostat backplate (see Fig. 6).

Attach wires to the TW205/TW206 Thermostat backplate.

10. Using a small flathead screwdriver, loosen the screws on the terminal block, located on the backplate, to allow the wires to be easily inserted.
11. Strip the insulation of each wire at a proper length (about 1/4" or 64 cm).

Figure 7.
TW205/TW206
backplate with
terminal block.

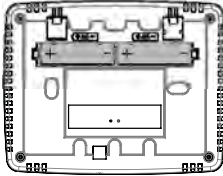


12. Insert the appropriate wires into terminal block as shown in wiring diagram (see Fig. 7).
 - a. Connect 24VAC 1 to terminal 1.
 - b. Connect 24VAC 2 to terminal 2.
13. Tighten each terminal block screw until the wires are held firmly in place. Ensure that no uninsulated wire is exposed.

PART III: INSTALL BATTERIES IN THE TW205/TW206

Batteries are recommended for the TW205/TW206. Insert two AA batteries (included) in the back compartment where indicated (see Fig. 8). Assure batteries are inserted properly.

Figure 8.
TW205/TW206
reverse view:
Insert two AA
batteries into
reverse side.

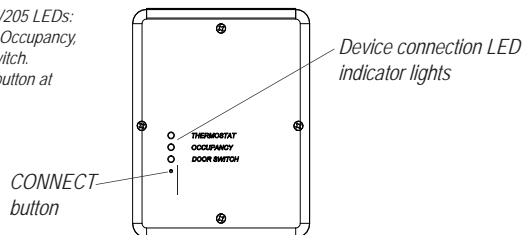


Note: If power is disconnected from RW205, remove batteries from the TW205/TW206. When power is restored, replace the batteries.

PART IV: ADVANCED CONFIGURATION

Perform advanced configuration for TW205/TW206 Thermostat before establishing wireless pairing (see "Table 1. Advanced Configuration Service Menus" p. 4). Advanced configuration allows you to customize thermostat settings, such as temperature display, time and day display (TW206 only), programming commands, and to create setpoints for scheduling different time periods. Ensure service menu settings correspond to the System Type (see "RW205 Wiring Examples").

Figure 9. RW205 LEDs:
Thermostat, Occupancy,
and Door Switch.
CONNECT button at
bottom.



PART V: ESTABLISH A WIRELESS CONNECTION

NOTE: Wireless pairing is time sensitive. Pairing the TW205/TW206 with the RW205 must be completed within two minutes after initiating the pairing process. (If you wait longer than two minutes, restart the wireless pairing process at Step 1.)

Installation Tips

- Hold the TW205/TW206 Thermostat within 6-10 feet (3 m.) of the RW205 Receiver during pairing.
- Step 3 (below) must be completed within two (2) minutes of completing Step 2, initiating the flashing LEDs on the RW205.

1. Turn on power to both the TW205/TW206 and RW205. Note: DO NOT attempt to pair more than one Wave Wireless System simultaneously.
2. Using a paperclip, push and hold the CONNECT button on the RW205 Receiver until all three LED lights flash for about 10 seconds (see Fig. 9). If only two LEDs flash, continue pressing CONNECT button until all three LEDs flash.
Note: The following steps must be performed within two minutes of initiating the flashing LEDs on the RW205 (Step 2, above).
3. Push simultaneously ▲ and ▼ buttons on the TW205/TW206 until "1" appears in Display.
 - a. Push the SYSTEM button continuously until Service Menu 43 appears.
 - b. Pause at Service Menu 43. Display will change to 0.
 - c. Push ▲ button to change the 0 to 1 within Service Menu Function 43.
Note: TW205/TW206 Display will begin countdown from 99 and stop before 0. (Countdown indicates that pairing process has begun).
 - d. Wait for the Service Indicator ⚡ on the TW205/TW206 to begin flashing (indicating the RW205 was found but pairing process is not yet complete). TW205/TW206 Display will show the room temperature.
 - e. Wait for about 10 minutes to allow completion of pairing process.
DO NOT press buttons during this process.

Wireless pairing is successful only when you see the following:

- RW205 "Thermostat" LED is continuously lit.
- TW205/TW206 Service Indicator ⚡ disappears from Display.

PART VI: VERIFY WIRELESS PAIRING

After the TW205/TW206 and RW205 are installed, configured, and the wireless pairing process is complete, verify the TW205/TW206 wireless operation:

1. Press FAN button on TW205/TW206 Thermostat.
2. Press FAN button continuously until ON is flashing.
Note: Fan blower should begin to operate (there may be a delay).
3. Allow timeout. Flashing menu option (ON) is automatically selected.
Note: FAN has now been reset to AUTO.
4. Press FAN button until AUTO begins flashing so it is automatically selected.
Note: FAN has now been reset to AUTO.
5. Allow the device to time out. Wireless verification is complete.

PART VII: REPLACING OR ADDING ACCESSORIES (OPTIONAL)

Follow either the (A) or (B) connection process below, whichever applies to your installation:

- **(A) Connection process for a replacement installation.** A brief connection process must be performed that erases all previously paired devices from the RW205 memory. Hold the CONNECT button down (see Fig.9) until all the LED lights begin to flash (about 10 seconds) on the RW205. Wait until all three LEDs stay lit and begin to flash. Begin the pairing process again at section "PART V: ESTABLISH A WIRELESS CONNECTION."
- **(B) Connection process for adding a SW205/SW206 device to an existing Wave Wireless System.** If you are only attempting to add a SW205 occupancy sensor or SW206 door switch to an existing PECO Wave Wireless System, a 5-second connection process can be performed. Hold down the CONNECT button until the lights begin to flash. If you are attempting to connect a device and its corresponding LED does not flash after 5 seconds of holding down the connect button, a 10-second connection process must be performed. **Note:** The RW205 will attempt to connect to any available device for two (2) minutes or until all available devices have been paired.

Interpreting the RW205 LED Lights

After devices have been paired (wirelessly) to the RW205, the corresponding LED indicator lights should remain lit. If communication is broken for more than 5 minutes, in the case of the TW205/TW206, or 30 minutes for the SW205/206, the LED associated with that device will shut off. In the event of a communication loss with the TW205/TW206, the RW205 will shut off all outputs. If the RW205 loses communication with the SW205 or SW206, it will assume the room is occupied.

The LED indicator lights on the RW205 may also be used to diagnose communication errors. Use the following table to interpret the RW205 LEDs.

If RW205 LED...	Interpretation
Blinks once	RW205 is receiving valid messages from another device.
Blinks twice	RW205 is receiving invalid messages from another device.
Blinks intermittently	RW205 is receiving invalid messages that may be caused by an excessive amount of obstruction between the RW205 and other wireless paired devices; or from excessive interference from other wireless devices. Note: If the RW205 LEDs indicate invalid messages frequently, review the following section: "RW205 WIRING AND MOUNTING."

PART VIII: MOUNT THE TW205/TW206 ONTO THE BACKPLATE

1. Attach thermostat by sliding the mounting tabs (on its reverse side) down onto the hinge pockets on the backplate (see Fig. 10). Make sure that thermostat's pins on reverse fit securely into the terminal block on backplate.
2. Install retaining screw provided with the mounting hardware (see Fig. 10).
Note: Inserting the retaining screw is recommended to assure thermostat is securely attached to the wall.

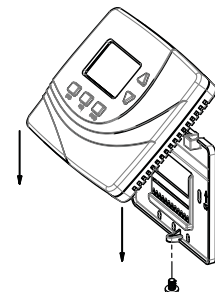


Figure 10.
Mount thermostat onto
backplate. Use the retaining
screw shown here.

USER OPERATION

For user operation of the TW205/TW206, including Front Panel Display Reference and Button Functions, please refer to the "PECO Wave Wireless System Operating Manual."

TABLE 1. ADVANCED CONFIGURATION SERVICE MENUS

The Service Menu exits and returns to the user display after about 15 seconds of inactivity. Changed values are automatically saved to permanent memory.

MENU	FEATURE	RANGE	STD.MODEL DEFAULT	DESCRIPTION / COMMENTS
1	F / C	0, 1	1	Sets the temperature display in Fahrenheit (1) or Celsius (0).
3	Fan Delay	0-99 Sec.	0	The amount of time (in seconds) the lowest available fan speed will run after the thermostat outputs are disabled.
4	Range Low	50-90°F, 10-32°C	50°F	The lowest user-selectable temperature setpoint value.
5	Range High	50-90°F, 10-32°C	90°F	The highest user-selectable temperature setpoint value.
6	Setback Low	50-82°F, 10-28°C	55°F	The temperature setpoint value you want the thermostat to Heat to when the thermostat is in the Setback mode. 0 represents OFF.
7	Setback High	58-90°F, 10-32°C	90°F	The temperature setpoint value you want the thermostat to Cool to when the thermostat is in the Setback mode. 0 represents OFF.
8	Zone Temp Offset	+/- 9°F, +/- 4.5°C	0°F	Zone Temperature offset adjusts display value; value may differ from actual zone temperature.
9	Keypad Lockout	0-2	0	Allows you to choose what the occupant can access. The Service Menu is still available if Keypad Lockout is ON. 1= Disables all buttons except ▲ and ▼ buttons. 2= Disables all buttons. 0= No keypad lockout.
10	Fan Program Mode	1-3	3	1= ON= Fan is always on regardless of demand. 2= AUTO= Fan is only on with heating or cooling demand. 3= ON or AUTO= User can choose either selection.
11	Fan Program Speed	1-3	3	1= HIGH= 1-speed fan (only displays "On Auto" in Fan menu) 2= LOW, HIGH= 2-speed fan 3= LOW, MED, HIGH= 3-speed fan
12	System Program Mode	0-3	1	Allows you to determine what system modes the occupant can select. 0= OFF, AUTO 1= OFF, HEAT, COOL, AUTO 2= OFF, HEAT, COOL 3= AUTO, HEAT, COOL
14	Setback Mode Enable	0, 1	0	When ON (1), Setback is shown as an available system mode selection. If Setback mode is selected, the thermostat will control to the current Setback Heat and Setback Cool setpoints. 0= OFF 1= ON
15	Outside Air (OA) Damper	0, 1	0	1= OFF= Cycles; OA output cycles with active heat or cool demand. 0= ON= Continuous; OA output is active anytime the thermostat is out of the OFF mode.
17	Minimum Deadband Adjust	3-10°F, 1.5-5°C	3°F	A changeover deadband value prevents short cycling between Heating and Cooling modes. The value is adjustable to meet various HVAC system requirements.
25	Pre-occupancy Purge	0-3 Hours	0 Hours	Defines a period of time for the fan to run prior to an occupied period, to circulate fresh air.
30	Cycles Per Hour for Cool	0-6 CPH	3 CPH	0 disables cycling and thermostat becomes an ON/OFF control.
32	Cycles Per Hour for Heat	0-12 CPH	5 CPH	0 disables cycling and thermostat becomes an ON/OFF control.
35	Heat Recovery Rate	0-18°F/Hr, 0-10°C/Hr	5°F/Hr, 3°C/Hr	0 disables ramp recovery, uses step response.
36	Cool Recovery Rate	0-18°F/Hr, 0-10°C/Hr	5°F/Hr, 3°C/Hr	0 disables ramp recovery, uses step response.
40	Output Min Off Time for Heat and Cool	1-10 Minutes	4 Minutes	Sets the minimum off time for both heat and cool output.
41	OA/ RV Output Configuration	0-4	0	0= OA/ RV Output is used to control the outside air damper. 1= OA/ RV Output is on when there is a demand for heating. 2= OA/ RV Output is on when there is a demand for cooling. 3= OA/ RV Output is 2nd Stage Heat. 4= OA/ RV Output is 2nd Stage Cool.
42	Temp Source (Remote)	0, 1	0	0= The temperature will be measured by the thermostat's internal sensor. 1= The temperature will be measured by a remote probe connected to the RW205 Receiver.
43	Pairing Start	0, 1	0	This item should remain OFF until the installer is ready to perform the wireless connection process to the RW205 Receiver. 0= OFF= The thermostat will not attempt to pair with the RW205 Receiver. 1= ON= The thermostat will attempt to pair with the RW205 Receiver.
45	Intermittent Fan	0, 1	0	If enable is selected, the lowest speed fan will operate during setback operation. 0= Disable 1= Enable
46	Intermittent Fan On Time	1-60 Minutes	5 Minutes	Defines the duration in which low-speed fan will be on. Fan On Time will be activated after Fan Off Time has passed.
47	Intermittent Fan Off Time	0-60 Minutes	25 Minutes	Defines the duration in which fan will be off. Fan Off Time will be activated after Fan On Time has passed.

MENU FUNCTIONS FOR
TW206 MODEL ONLY