

### REMOVE THE SHIPPING PIN BEFORE POWERING THE CLOCK.

The shipping pin is a small pin located on the back of the clock mechanism that prevents the hands from moving during shipping. The shipping pin may have been removed by the factory.

The Spectrum Series clocks can operate on a master clock system by National Time or clock systems from other manufacturers. It is compatible with the most popular 3-wire synchronous reset sequences used by other secondary clocks. It can also operate as a 2-wire clock with a National Time master clock supporting On-Demand Instant reset. This format uses the same two wires that power the clock to transmit time data allowing the clocks to correct to the time without having to wait for a 12-hour reset like the 3-wire synchronous clocks.

#### Supported 3-wire Synchronous Resets:

Neutral power applied to the common and voltage on the run wire, the reset wire will pulse voltage at the following times and duration.

Reset pulse(s)	Common Manufacturers
Hour: 25 seconds each xx:00:00 12-hour: 25 minutes each 6:00:00	National Time & Signal (Circuit Type NTS:D/DX/RDS), Rauland, Lathem, and others
Hour: 8 seconds each xx:57:54 12-hour: 14 seconds each 5:57:54	Simplex, Lathem, IBM, Edwards, Cincinnati D10 D12, and others
Hour: 55 seconds each xx:58:05 12-hour: Ten 95 second pulses each odd minute from 5:05:00 to 5:23:00	Standard Electric Time, Faraday, Cincinnati D8, HoneyWell and others
Hour: none 12-hour: 0.25 to 2 second pulse at 12:00:00am	Common digital clock resets by Faraday, National Time, and others

#### Supported 2-wire Resets:

Neutral power applied to the common and voltage applied to BOTH the run and reset wires

Reset pulse(s)	Common Manufacturers
Instant Reset: upon power up, or manually activated by the user, time data will be transmitted over the power wires. 24-hour: 0.25 second off pulse 12:00:00am	National Time & Signal (Circuit Type NTS:D/DX/RDS)
24-hour: 0.25 seconds off at 12:00:00am	Any programmable Mater Clock by others

#### Selecting 2-wire or 3-wire Operation:

The same model of Spectrum clock can operate as a 2-wire or 3-wire clock. When the Spectrum clock leaves the factory, it is in "Learn" mode. When the clock is powered for the first time, it will learn if the power is applied to the clock in the 3-wire or 2-wire wiring scheme. Once the wiring scheme is learned, it is stored in nonvolatile memory and it will operate this way even after power is lost. If it is necessary to change the learned operation, the learn mode can be re-initiated as described below.

**IMPORTANT:** When powering up the clocks for the first time on a 3-wire system, make sure that a reset signal is not active from the master clock. This will cause the clocks to erroneously learn that it is connected to a 2-wire system and will have to re-learn.

#### LED Blink patterns:

The LED on the back of the clock will indicate which wiring scheme it detected as well as the reset signal state.

*If the state of the LED on the back of the clock is:*

Blinking 1 time, repeating - Error, the clock is wired in 3-wire fashion but the clock has learned to become 2-wire.

Blinking 2 times, repeating - The clock is wired in 2-wire format and operating in 2-wire mode.

Blinking 3 times, repeating - The clock is wired in 3-wire format and is operating in 3-wire mode.

Blinking 4 times, repeating - The clock is in 3-wire mode and the reset pulse is currently active. (If the clock is always in this state, this could indicate that the clock is wired in 2-wire fashion but the clock had learned to become 3-wire.)

Blinking 5 times, repeating - The clock has entered Re-Learn state by pressing the button for 5 seconds. When changing from 2-wire to 3-wire, it is required to cycle power to the clock. Remove power and wire for the desired format so the clock can re-learn the wiring connection.

#### To make the clock re-learn:

If the clock LED is not blinking the correct wiring format, wire the for the desired connection. For example, if 2-wire is desired, make sure the Red and Black wires are connected together and to the RUN power. Press the button on the back of the clock for approximately 5 seconds until the LED turns on steady. The clock will re-learn the wiring method and blink the corresponding selection shown above.

### Clock Operation (3-wire):

The LED should be blinking either 3 blinks or 4 blinks if the reset is currently active. When power is applied to the clock, the hands will advance to the 12:00:00 position. The clock will pause at 12:00 for approximately 4 minutes.

If no resets have been received, the clock will advance to approximately 12:37.

The first reset that is received from the master clock will cause the clock to reset to 12:00, pause for 4 minutes, then advance to the time according to the reset. If only an hourly reset is received, only the minute hand will be correct until after a 12-hour reset is sent from the master clock.

If the hands do not advance to the 12:00:00 position, either:  
 -The shipping pin has not been removed from the mechanism.  
 -The hands have been put on in the incorrect position on the shaft(s).  
 -The hands are colliding with one another or making contact with the dial or lens.

### Clock Operation (2-wire):

The LED should be blinking 2 blinks.

When power is applied to the clock, the hands will advance to the 12:00:00 position.

The clock will pause at 12:00 for approximately 4 minutes then advance to approx. 12:37.

When an On-Demand Instant reset is sent from the master, the clock will reset its hands to the 12:00 position, pause 4 minutes, then advance to the correct time.

If only 0.25 second midnight pulses are used, the clock will correct by 1:04am.

Although the Spectrum clock is compatible to the existing synchronous clock system, it may correct the time differently than the existing clocks. Depending upon the resets, the Spectrum clock may get to the correct time quicker or slower than existing clocks. The Spectrum clock should be on the correct time within 2 hours of the 12-hour reset.

### Button Function:

A short press of the button will cause the clock to reset its hands to where it thinks they should be. The clock will advance to the 12:00 position, pause 4 minutes, then advance to the current time. This is useful to test if the hands are located on the shafts properly (i.e. it stops at 12:00 and not some other time) and the hands do not hit an obstruction.

A long press of the button (5 seconds or more) will enter the "re-learn" mode as described previously.

### Wiring and Electrical Specifications:

Clock Type	Wire	3-wire	2-wire*
120VAC	BLACK	RUN (120V)	RUN (120V)
	RED	RESET (120V)	RUN (120V)
	WHITE	NEUTRAL	NEUTRAL
24VAC	BLACK	RUN (24V)	RUN (24V)
	RED	RESET (24V)	RUN (24V)
	YELLOW	NEUTRAL	NEUTRAL
24VDC	BLACK	RUN (+24V)	RUN (+24V)
	RED	RESET (+24V)	RUN (+24V)
	YELLOW	GND (-)	GND (-)

Clock Type	Run	Reset
2-Wire 120VAC	15mA	n/a
3-Wire 120VAC	15mA	1mA
2-Wire 24VAC	20mA	n/a
2-Wire 24VDC	9mA	n/a
3-Wire 24VAC	20mA	1mA

\*2-wire configuration requires the Black and Red wires to be connected together

