

TRAXALL

MULTIFREQUENCY PIPELINE PIG TRACKING TRANSMITTERS

Models X400-2D, X400-3D, X400-4D, and X400-5D

USER GUIDE



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member



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WARNING



Any operation involving work on pipelines containing gases or liquids under pressure is potentially hazardous. It is necessary, therefore, to follow correct procedures in the use of this equipment to maintain a safe working environment.

No person should use this equipment unless fully aware of potential hazards of working with pressurized pipelines and trained in the procedures stated in this manual.

The purchaser of this equipment is responsible for the training and competence of operators and the manner in which it is used.

Contact CDI immediately should any difficulty arise in the use of this equipment.

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WARNING

Always use caution when opening any CDI transmitter that has been in a pressurized environment.

It is possible for pressurized liquid or gas to leak into a transmitter and remain there even after the transmitter has been removed from the pipeline.

Always point the transmitter away from yourself or others when opening a cover or end cap.

INTRODUCTION

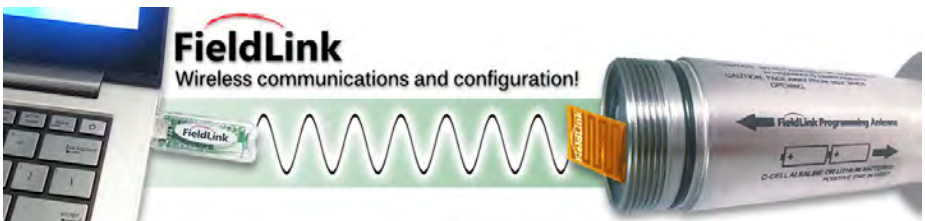
This User Guide will instruct you in the function, capabilities, use, and care of CDI X400 Series multifrequency pig-tracking transmitters.

OVERVIEW

Electromagnetic pipeline pig location and tracking transmitters

TRAXALL Multi-frequency transmitters operate by emitting electromagnetic fields at a very low frequency (between 17 and 32 Hz) as well as the industry-standard 22 Hz. This makes them safe and reliable for use in any onshore or offshore environment and any pipeline product (water, oil, gas, ammonia, carbon dioxide, etc.).

The X400 is a TRAXALL-compatible electromagnetic pipeline pig-tracking transmitter that offers both programmable frequency and power control through CDI's proprietary FieldLink wireless communications system.

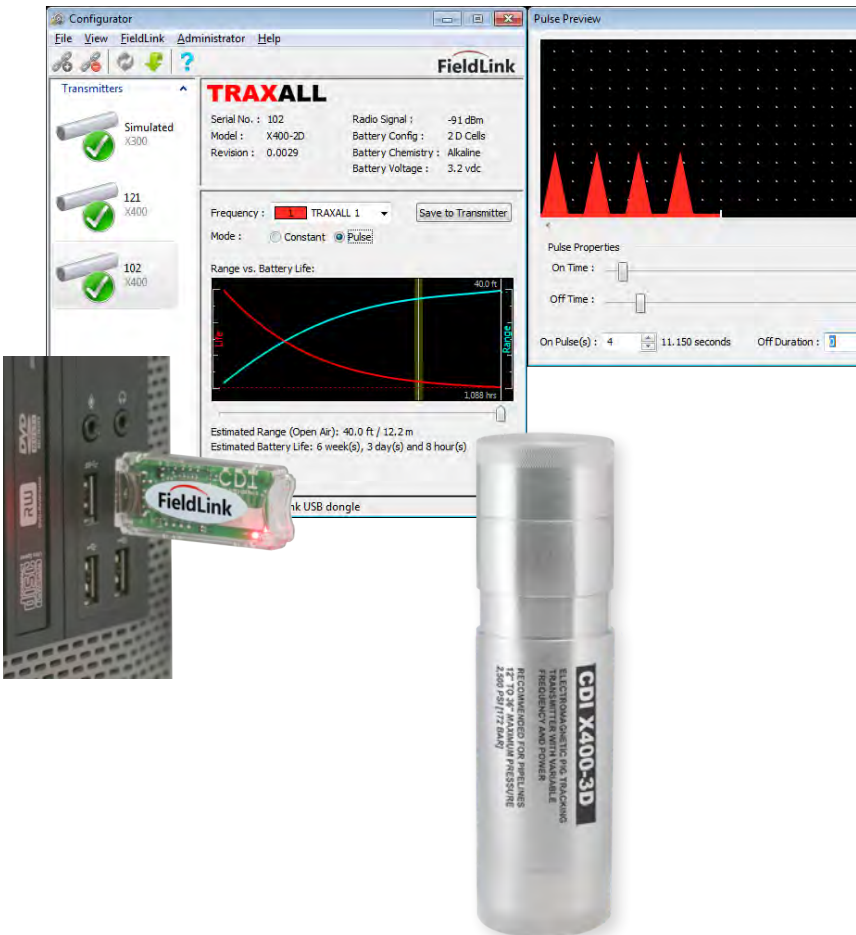


Configurator

Configurator is a Windows application that will let you customize transmitter frequency, pulse rate, and output power.

Requirements:

- PC or laptop computer with Windows® 7 or higher (32-bit or 64-bit)
- Configurator software*
- FieldLink USB device**
- Adobe® Reader® is required to access the PDF *Help* menu

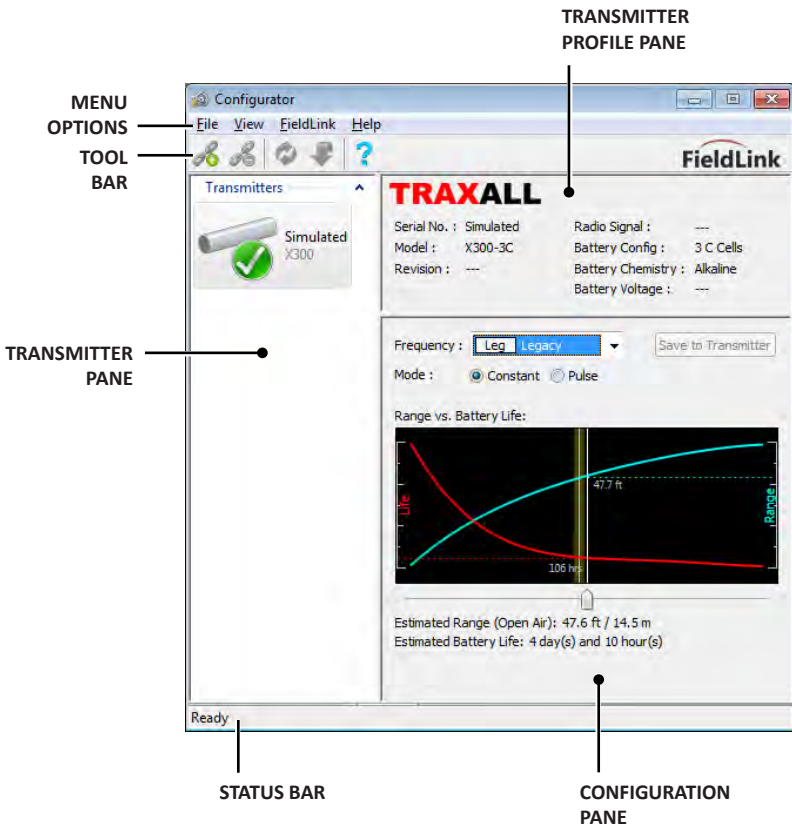


GETTING STARTED

Your transmitter requires little in the way of preparation. Simply activate FieldLink, launch Configurator, install fresh batteries, run Configurator to set transmission signal or power performance, and your transmitter is ready for a pigging run.

New for Configurator ver. 2.0

In addition to the menu options and a tool bar, Configurator 2.0 features three transmitter information and control panes. The next few pages will describe these controls and options in detail.



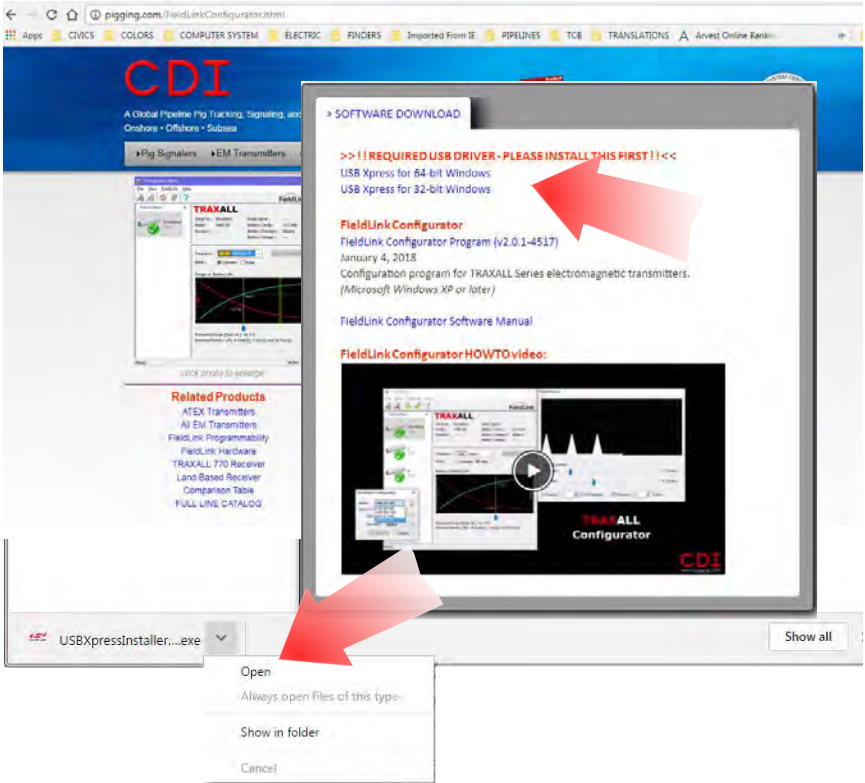
1. INSTALL CONFIGURATOR

From the main CDI web page, select **Other**, then **FieldLink Configurator Software** from the drop-down menu.

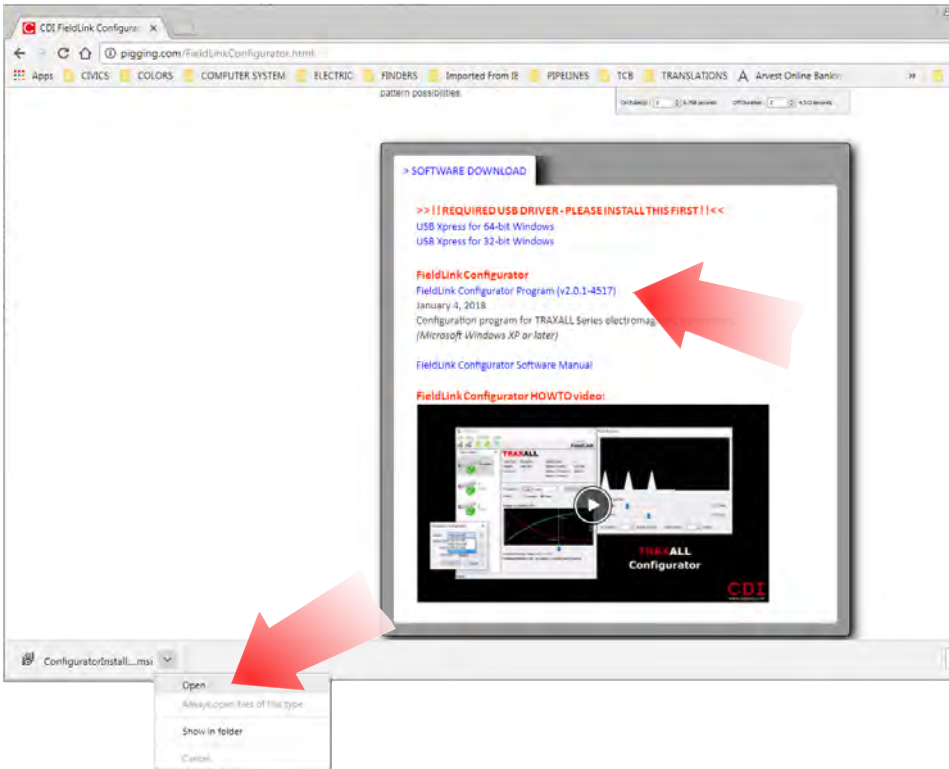


Scroll to the SOFTWARE DOWNLOAD tab.

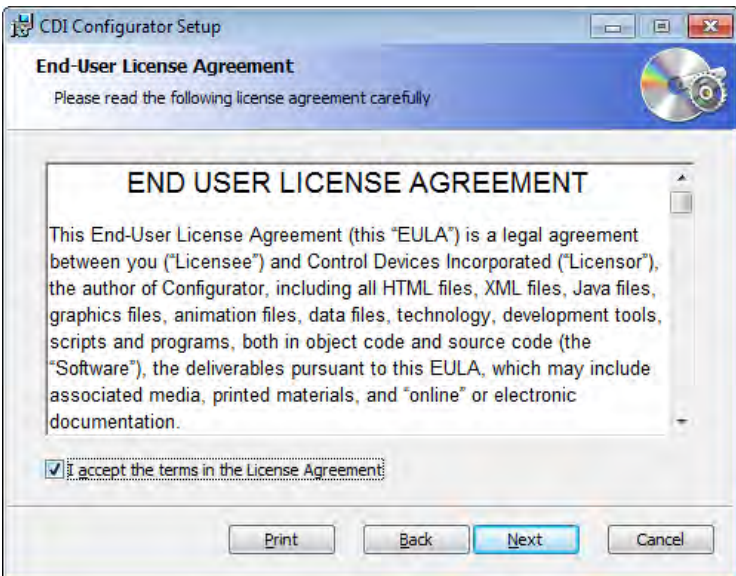
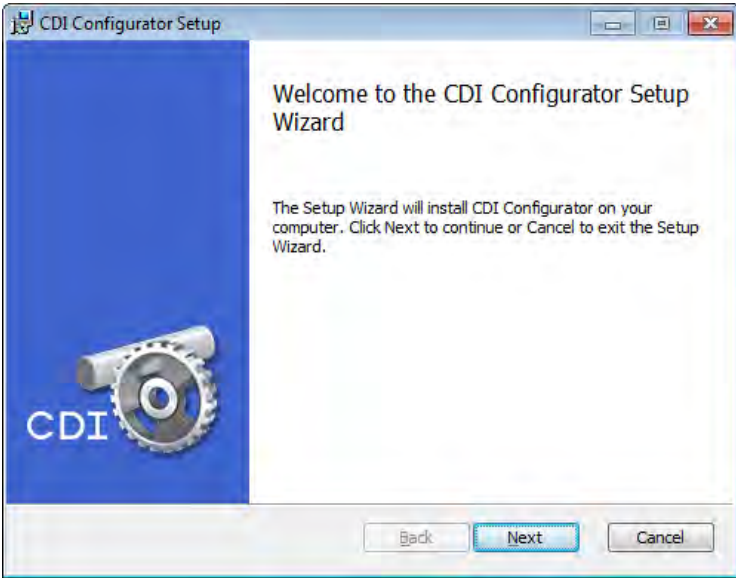
First, install a USB driver for either **64-bit** or **32-bit Windows**. Follow the installation prompts.



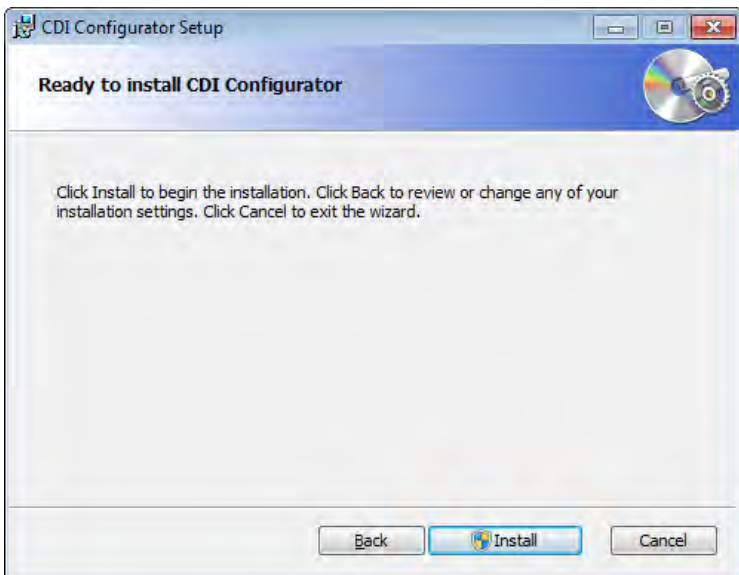
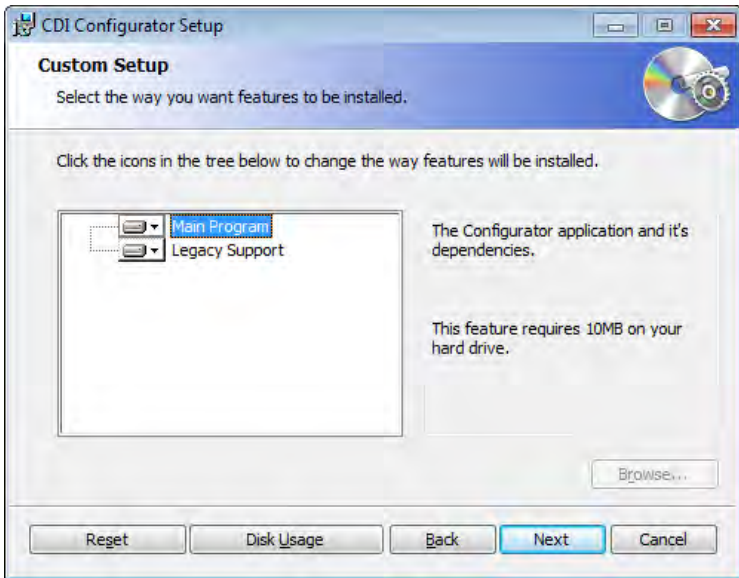
Return to the SOFTWARE DOWNLOAD tab and click on **FieldLink Configurator Program** to download latest version.

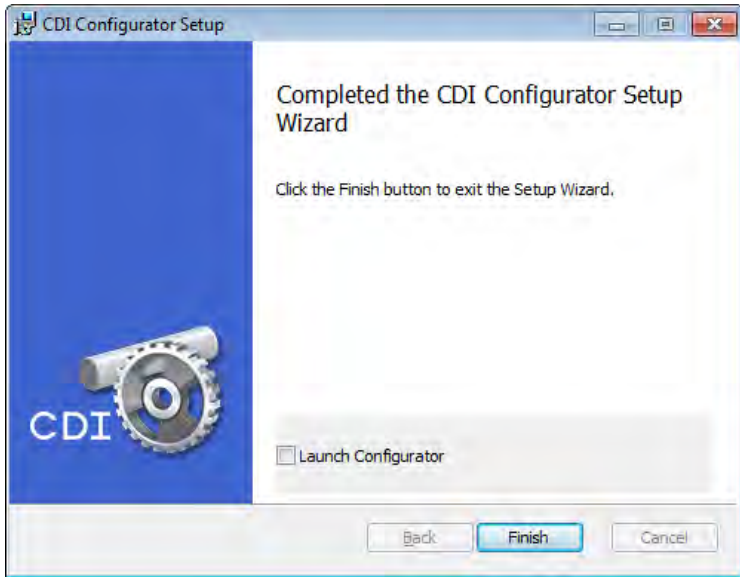


When download is complete, open the installer and follow prompts. The Windows Install Wizard will extract and install Configurator.



Take defaults (unless instructed otherwise by CDI Support.)





2. ACTIVATE FIELDLINK

FieldLink is the communications network you will use to program your transmitter. Insert the FieldLink device* into a USB port on your PC or laptop.

* also known as a *flash drive, memory stick, or “dongle”*



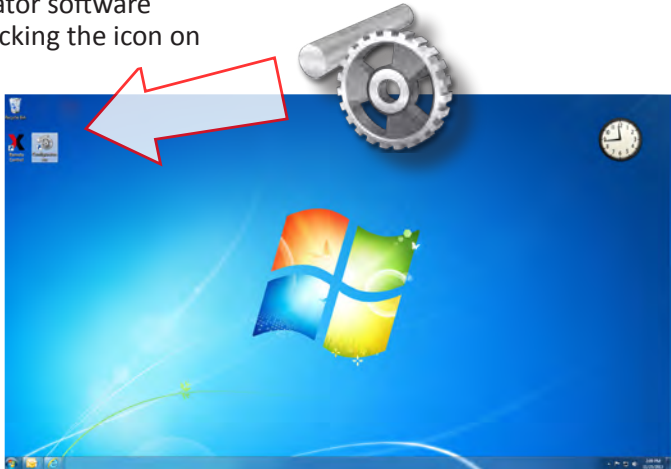
A red LED on the device will flash every three seconds, indicating Configurator is seeking to establish a communication link with a transmitter.



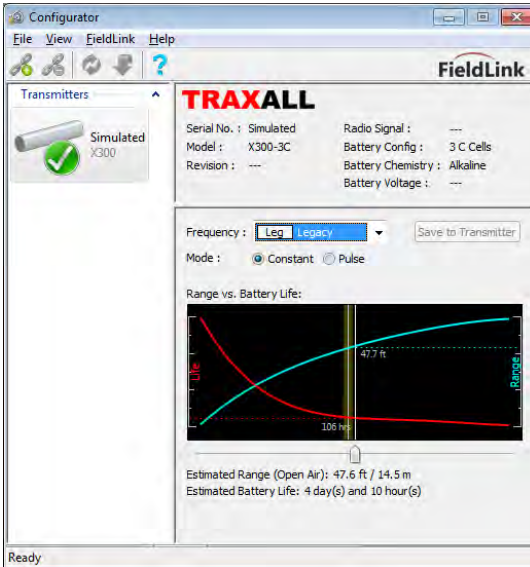
A link will not be established until the transmitter is powered and the configuration antenna is prepared (Steps 4 and 5).

3. LAUNCH CONFIGURATOR

Launch Configurator software application by clicking the icon on your PC desktop.



The initial Configurator window will appear. Note *Revision*, *Radio Signal*, and *Battery Voltage* fields will be blank until communication with a transmitter is established.



You will need to have your transmitter powered and antenna cap removed to proceed further.

4. ACTIVATE TRANSMITTER

End Caps

All CDI transmitters have a knurled threaded cap on each end. To prepare the X400 for operation you will need to momentarily remove these caps to access the batteries and configuration antenna.



WARNING: Transmitter end caps are NOT interchangeable. Attempting to install a battery cap onto the antenna end may damage the configuration antenna or transmitter case.



NOTE: Most CDI transmitter antenna end caps have LEFT-HAND threads and will be so marked. Turn CLOCKWISE to remove.



WARNING



Always use caution when opening any CDI transmitter that has been in a pressurized environment.

It is possible for pressurized liquid or gas to leak into a transmitter and remain there even after the transmitter has been removed from the pipeline.

Always point the transmitter away from yourself or others when opening a cover or end cap.

Power

X400 Series transmitters are powered by D-Cell alkaline or lithium batteries.



⚠ NOTE: Transmitters have no “ON/OFF” switch, but are activated when batteries are installed and battery cap is replaced. Therefore, install batteries only when you are about to configure transmitter or beginning a pig run.

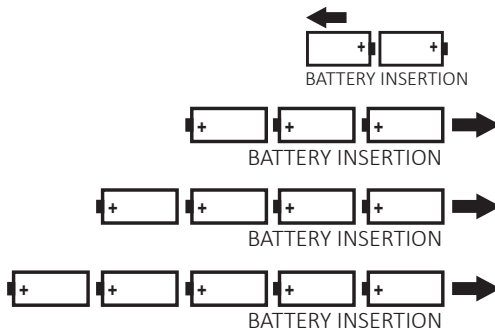
The X400 is available in 2D, 3D, 4D, and 5D versions. They differ in performance, case dimensions (length) and number of batteries required, but configuration and battery installation procedures are essentially the same for all versions.

Observe nomenclature on transmitter case to determine correct cap, battery quantity, and battery polarity.

BATTERY CAP



ANTENNA CAP



Install Batteries

Unscrew battery cap by turning counter-clockwise (CCW).

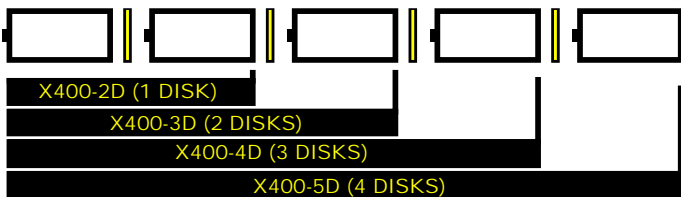


Battery Disks

CDI recommends inserting a battery disk* between each battery cell. These disks will help protect transmitter batteries by absorbing and distributing potential stress from high shock and vibration experienced during some pig runs.



*Included with your transmitter





WARNING



When installing batteries, replace all batteries at the same time.

When replacing batteries, use batteries from the same package or manufacturing batch whenever possible.

Do not mix alkaline and lithium batteries in the same device.

**Always observe correct polarity when installing batteries.
(Polarity is provided on each transmitter case.)**



NOTE: It is good practice to always install fresh batteries before deploying any pipeline pigging device.

Always insert batteries positive (+) end first into transmitter.

- **X400-2D:** Insert two (2) D-Cell batteries
- **X400-3D:** Insert three (3) D-Cell batteries
- **X400-4D:** Insert four (4) D-Cell batteries
- **X400-5D:** Insert five (5) D-Cell batteries

Inspect Threads

Before replacing cap, inspect cap threads, transmitter case threads, and O-ring groove, all threads must be free of

- dents
- deformities
- ruptures
- nicks
- scratches
- dirt
- foreign objects

or anything else that might interfere with a proper seal.



Inspect O-Rings

Ensure O-ring is serviceable.
A brittle and/or deformed O-ring
may not properly seal.
If in doubt, replace it.*



* CDI Part No. 700-50-2034-70
(included with transmitter)

Lubricate O-ring with a light coating of high-temperature grease (such as Dow Corning MOLYKOTE® 44)



Carefully replace O-ring over threads and onto its groove.



Reinstall Cap

⚠ WARNING: Transmitter end caps are NOT interchangeable. Attempting to install a battery cap onto the antenna end may damage the configuration antenna or transmitter case.

Apply a light coating of Permatex® Anti-Seize Lubricant* to threads.



* CDI Part No. 90-52-0005-00

Screw battery cap onto transmitter.

Do not over torque. Hand tightening is sufficient as long as cap is sufficiently tightened against rubber O-ring to maintain a seal.



When batteries and battery cap are in place

- The transmitter itself will be activated and will stay active for the life of the battery. Removal of battery cap will terminate all transmitter function.
- The transmitter will actively seek to establish a communications link for the next five minutes. If communication is not established within five (5) minutes, the transmitter will “time out.”

Should this occur, cycle the power to the transmitter by momentarily removing and replacing battery cap. If you are still unable to establish communication, you may need to replace batteries.

5. PREPARE TRANSMITTER FOR CONFIGURATION

Expose Antenna

Unscrew and carefully remove the antenna cap.



NOTE: Transmitter antenna end caps marked as shown have LEFT-HAND threads. Turn CLOCKWISE to remove.



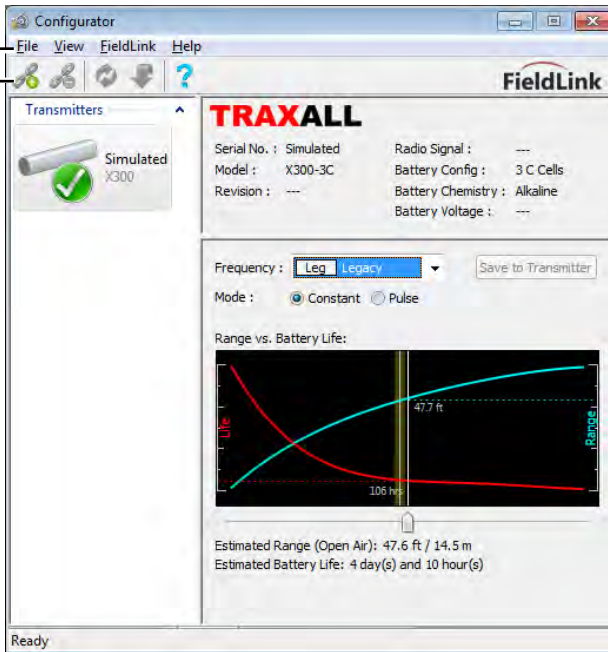


WARNING: Do not attempt to unfold or otherwise handle the flexible antenna.



6. RUN CONFIGURATOR

MENU
OPTIONS
TOOL
BAR



MENU OPTIONS

File

Load Profile

A profile is a custom XML file containing frequency, mode, and pulse settings.

Save Profile As...

Once a transmitter is configured, its profile may be stored for re-use, such as reassignment to another transmitter. This can be a time-saver for batch configurations.

Exit

Closes the Configurator application

View

Status Bar

Check/uncheck to show

Tool Bar

Check/uncheck to show

FieldLink

Connect/Disconnect

Controls communication with FieldLink flash drive

Refresh Devices*

Updates list of transmitters detected by FieldLink

Update Firmware**

Places FieldLink device into update mode

Reset Device

Returns FieldLink device to normal operation

Help

System Info

Lists all relevant information about an active transmitter as well as Configurator host PC

Help

Launches PDF version of this User Guide

About Configurator

Application software version and build information

TOOL BAR

Connect/Disconnect

Controls communication with FieldLink flash drive

Refresh Devices

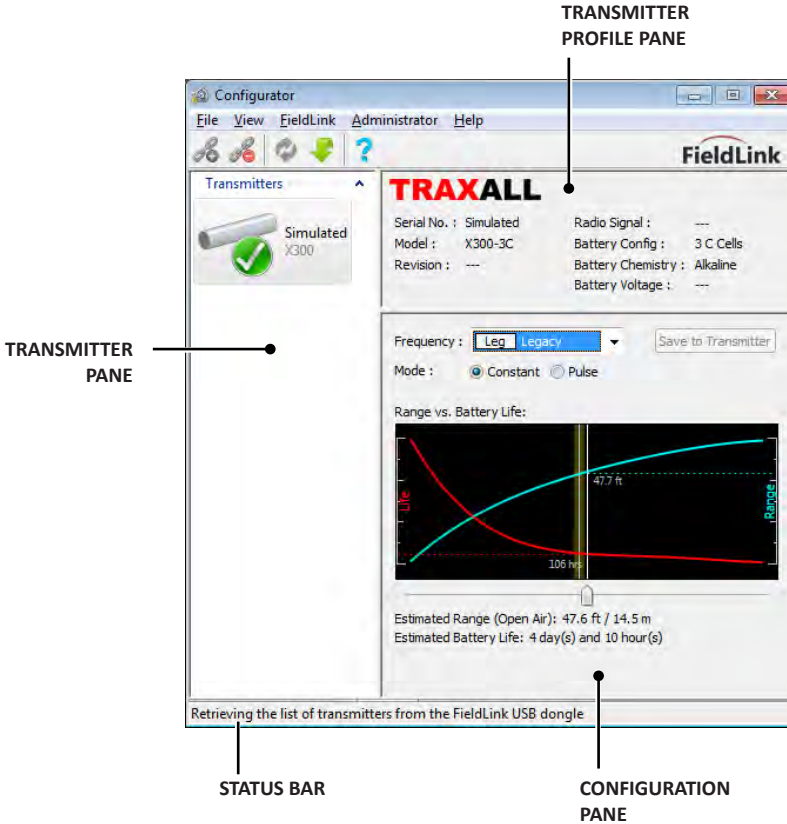
Updates list of transmitters detected by FieldLink

Update Firmware**

Places FieldLink device into update mode

**Configurator automatically refreshes every four seconds*

*** Firmware updates are to be performed only at the direction of CDI Technical Support*



TRANSMITTER INFORMATION AND CONTROL PANES

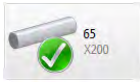
Profile Pane

Indicates serial number, model, firmware, signal strength, battery load, battery chemistry (Alkaline or Lithium), and available voltage of whichever transmitter is actively selected in the Transmitter Pane.

Note *Revision*, *Radio Signal*, and *Battery Voltage* fields are blank when a simulated transmitter is selected.

Transmitter Pane

Lists all transmitters “seen” by FieldLink. Transmitters are added to this pane as they are detected by FieldLink. FieldLink can list as many as four transmitters at any given time. Green, Red, or Yellow icons indicate transmitter connection state.



Active Transmitter (when highlighted)



Detected Transmitter

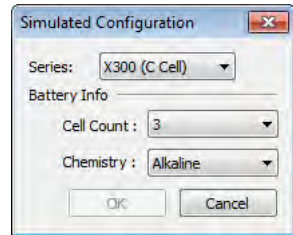


Offline or Lost Connection



Invalid Configuration

A “Simulated” transmitter is provided to familiarize you with Configurator. You may change the simulated transmitter to any X-Series model and battery configuration by double-clicking the icon.



Configuration Pane

Interactive window with drop-down, radio button, and slider controls. Here you can select a frequency, a constant or pulse operational mode, and examine various range vs. battery life scenarios. A corresponding graph illustrates the range–power relationship.

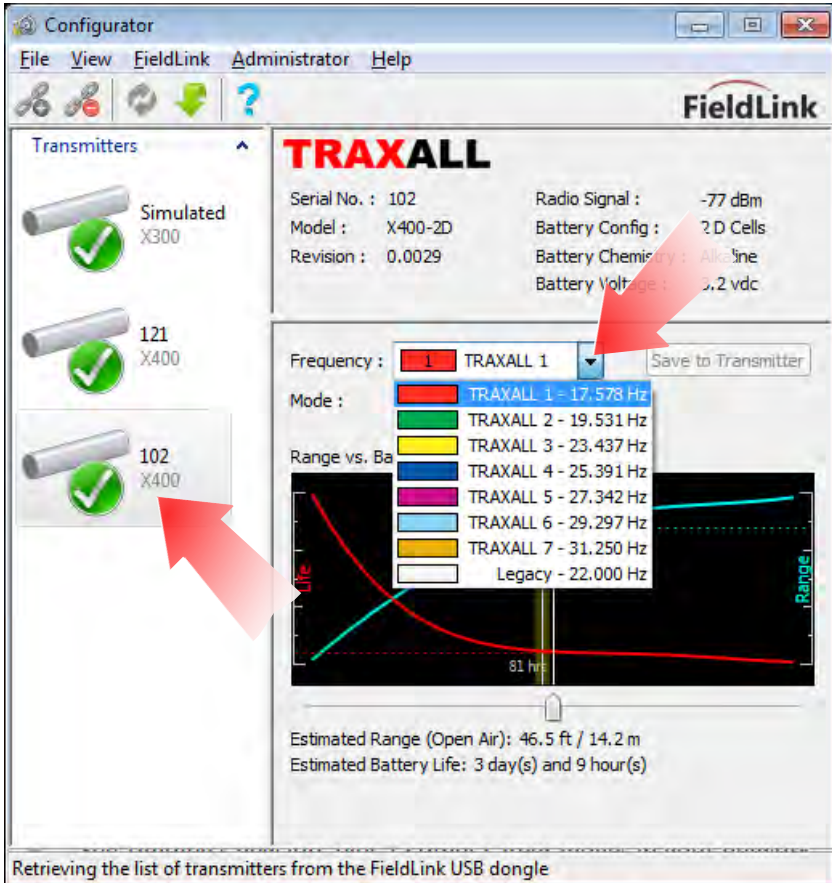
When you have the configuration you want, the *Save to Transmitter* button will write the configuration to the transmitter memory where it will be stored until changed.

Status Bar

Text prompt indicating state of Configurator application.

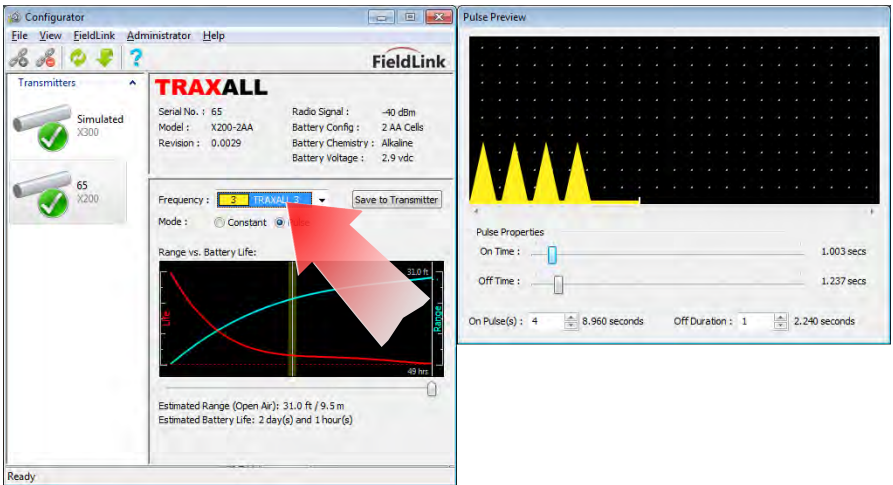
Select Frequency

Here, FieldLink has detected several transmitters. The most recent (and currently selected) transmitter is an X400-2D. The drop-down menu offers seven TRAXALL frequencies in addition to the default “Legacy” 22 Hz setting.



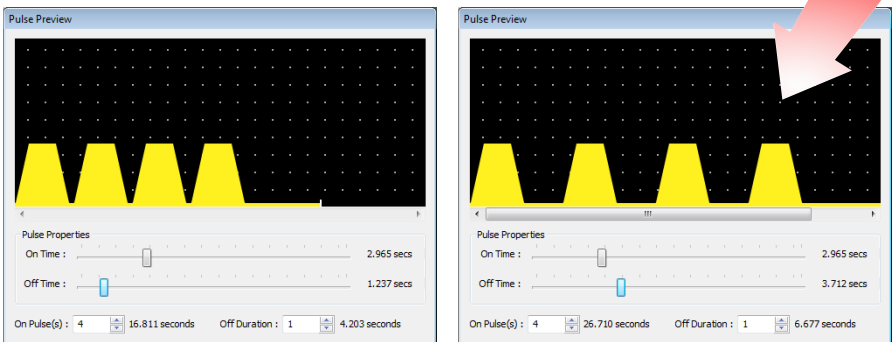
Select Mode

The default transmission mode is *Constant* (continual) signal. Selecting *Pulse* opens a second window showing a pulse pattern. Pulse mode generally results in increased battery life during a run. In addition, customized pulse patterns can provide each pig with a unique electronic signature, useful when running a pig train containing multiple transmitters.



Modify Pulse Mode

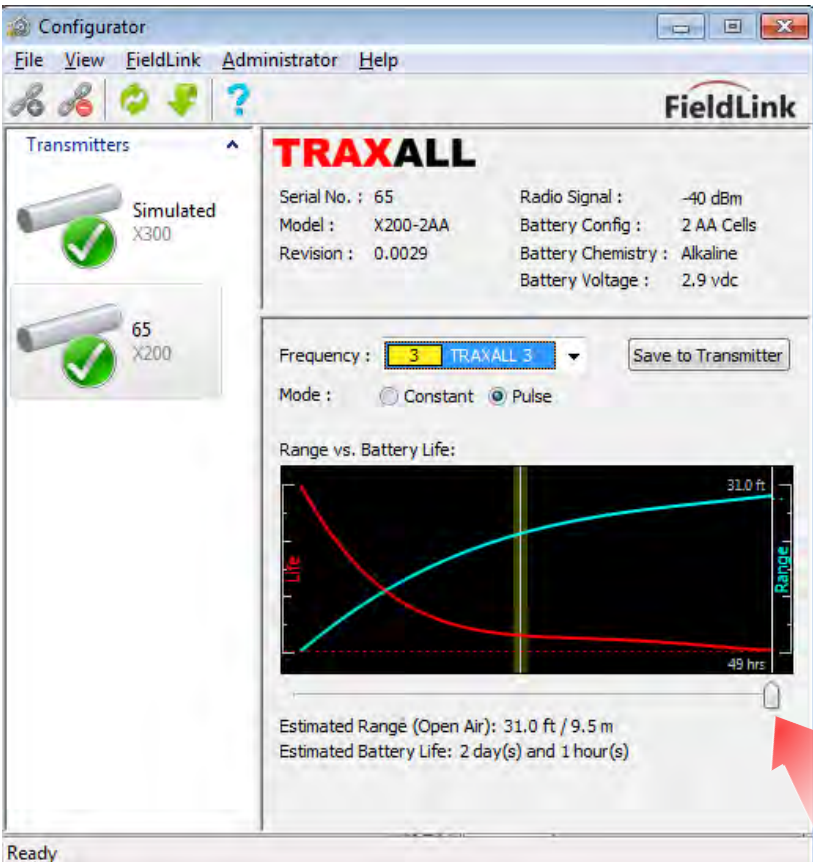
Moving On Time and Off Time sliders will change the signal pulse:



Power (Range–Battery Life Tradeoff)

The Range–Battery Life slider can balance range and power consumption of each transmitter for optimized performance. Moving slider left will increase transmitter run time—with a corresponding decrease in range.

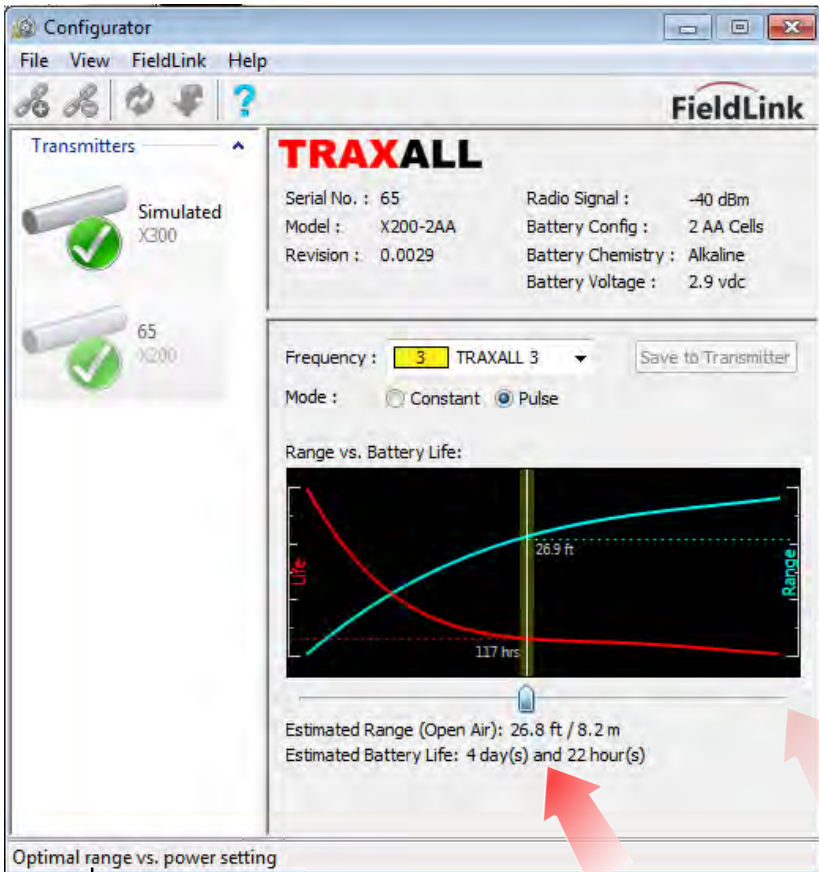
For example: on a long run with a relatively shallow pipe, battery life is likely to be more important than signal strength. Conversely, signal strength is more important where the pipe is deep pipe and the run relatively short.



STATUS: READY TO SELECT A CONFIGURATION

A fixed yellow line near the center of the range-power graph indicates the estimated optimal balance for the selected transmitter. As you move the slider to this line it will momentarily “snap” in place.

Here, the estimated signal range for this X200-2AA is nearly 30 ft, with an estimated run time of nearly five days.

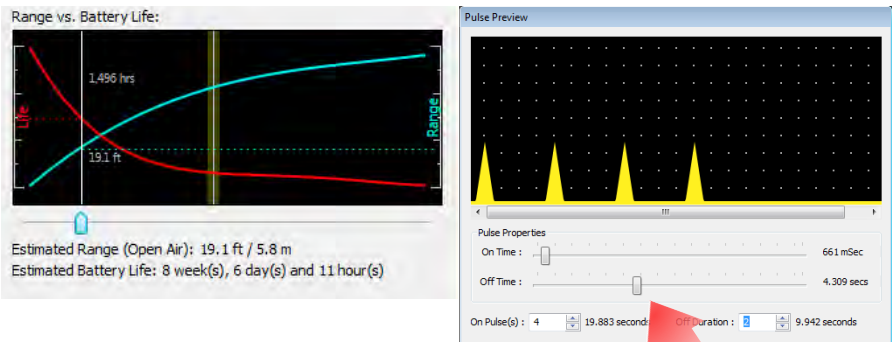


STATUS: OPTIMAL RANGE/POWER BALANCE FOR THIS TRANSMITTER

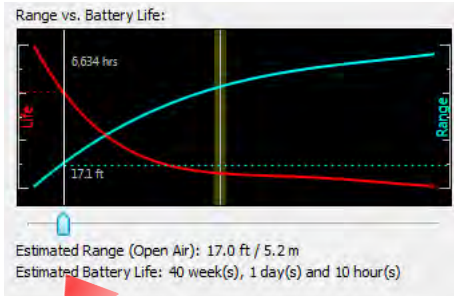
Continued experimentation extends estimated battery life to two weeks (with a corresponding decrease in range).



Increasing pulse Off Time extends the battery life to nearly nine weeks.



Further decreasing Range, decreasing On Pulses, and increasing Off Duration can extend this transmitter's run time beyond 40 weeks!



The "Pulse Preview" window displays a pulse waveform on a grid. Below the waveform, the following settings are shown:

- Pulse Properties: 66.1 mSec
- On Time: 4.309 secs
- Off Time: 19.883 seconds
- On Pulse(s): 1 (4.971 seconds)
- Off Duration: 4 (19.883 seconds)



Save Settings

When the desired configuration has been determined, select Save to Transmitter button to retain your transmitter settings. These configuration settings are stored in the transmitter flash memory and you may power down by removing batteries until you are ready to place the transmitter into service.

The configuration window shows "Frequency: 3 TRAXALL 3" and "Mode: Constant Pulse". A red arrow points to the "Save to Transmitter" button.

Remember, you may save the profile (see pg. 25) if there is a possibility you will be reusing this configuration on another transmitter.

Replace Antenna Cap

Inspect cap threads, transmitter case threads, O-ring groove, and O-ring as with battery cap (pgs. 19–20) and apply lubricant and anti-seize.



Carefully lower the end cap over the flexible antenna circuitry until cap and transmitter screw threads meet.



! **WARNING: Do not attempt to bend, tuck, fold, or otherwise handle the flexible antenna.**



! **WARNING: Transmitter end caps are NOT interchangeable. Attempting to install a battery cap onto the antenna end may damage the configuration antenna or transmitter case.**

Screw antenna end cap onto transmitter. (Observe Left-Hand Thread marking.) Do not over torque. Hand tightening is sufficient as long as cap is sufficiently tightened against rubber O-ring to maintain a seal.

Your transmitter is now ready to be placed into service.



PLACING TRANSMITTER INTO SERVICE

Metal-bodied Pigs

Transmitters must be mounted outside the casing of a metal pig. A flange kit* is included with your transmitter for this purpose.

- Install the flange kit with Allen wrench and screws as shown.



- Mount the transmitter to the mounting plate. Mount plate securely to the pig with transmission coil facing outward.



* CDI Replacement Part No. 922-36-0003-01

Foam and Plastic Pigs

- Remove plug or bolt
- Place transmitter in cavity (either direction)
- Replace plug or bolt



Checklist

Before placing a transmitter into service, always make sure:

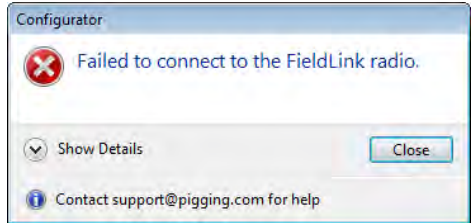
- Batteries are fresh and of proper size and type.
- Battery polarity is properly observed.
- Serviceable O-rings are installed. Brittle and/or deformed O-rings may not properly seal, thus compromising case Integrity.
- Transmitter case, caps, and cap threads are clean and free of dents, ruptures, or other damage which could compromise the transmitter components.

TROUBLESHOOTING

FieldLink Connection Failure

FieldLink connection failure can be result from obsolete device firmware or a missing or corrupted device driver.

Click Show Details to determine the cause.

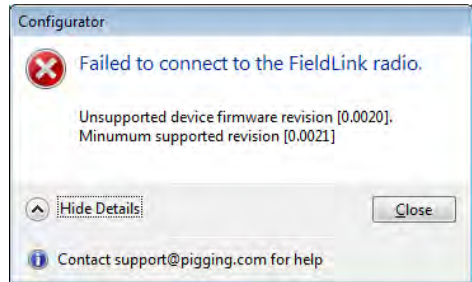


FieldLink programming, or *firmware*, is stored in the device's flash memory. (Transmitters have their own integral firmware).

This error message indicates unsupported or obsolete firmware.

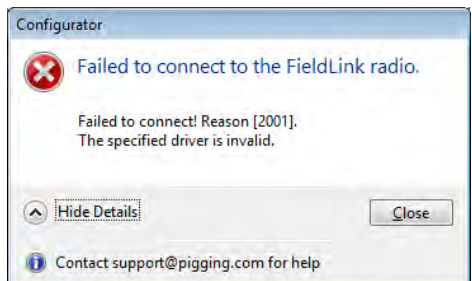
FieldLink devices with firmware revision 0.0021 or greater can be updated.

Devices with firmware 0.0020 or older cannot be updated and must be replaced.




Unlike firmware, the FieldLink device driver resides on your PC or laptop.

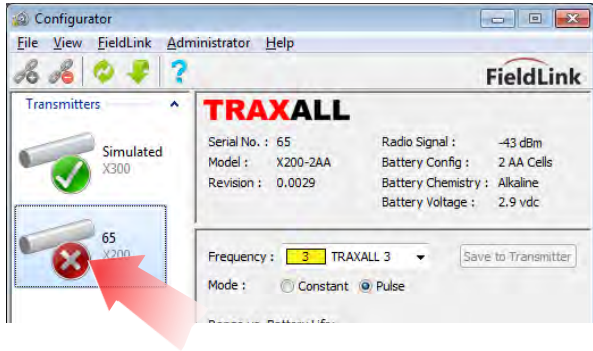
A new driver may be easily downloaded from the CDI website (www.pigging.com).



Transmitter Connection Loss/Failure

This icon  indicates a transmitter is offline. This can be the result of a routine shutdown, system timeout, power loss, or RF signal disruption.

Here, for example, the X200-2AA has been powered down after its configuration has been set and batteries removed. As long as the transmitter has been successfully configured, this is no cause for concern.



Connection failure can also indicate a system timeout. Upon activation, the transmitter will attempt to establish a communication link.

If communication is not established within five (5) minutes, the transmitter will time out.

Should this occur, cycle the power to the transmitter by momentarily removing and replacing battery cap. If you are still unable to establish communication, you may need to replace batteries.

The RF signal can be disrupted when an antenna cap is prematurely replaced, or by a signal path obstruction such as a structure or vehicle. Signal loss can also occur when a transmitter is moved too far from the Fieldlink device.

If this is the case, simply clear the signal path. You may need to cycle power as described above.

REMOVING TRANSMITTER FROM SERVICE



WARNING:
Always remove batteries before placing the unit into storage. Failure to do so may result in damage and may void warranty.



WARNING



Always ensure immediate environment is free of explosive gases, liquids, or other substances.

Always use caution when opening any CDI transmitter that has been in a pressurized environment.

It is possible for pressurized liquid or gas to leak into a transmitter and remain there even after the transmitter has been removed from the pipeline. For this reason, always point the transmitter away from yourself or others when opening a cover or end cap.

As possible for liquids to be present within cap threads, point transmitter downward to drain liquid out of and away from transmitter components or batteries.

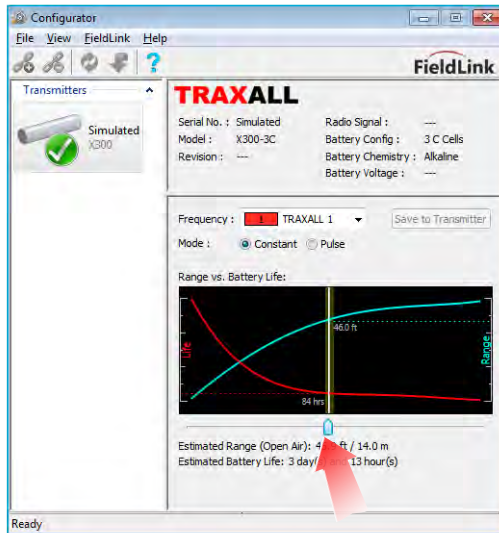
APPENDIX A: TRANSMITTER BEHAVIOR

Frequency & Power

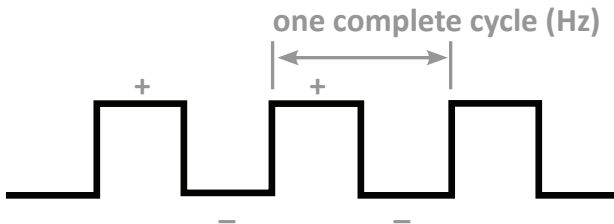
Whether in Constant or Pulse mode, an active transmitter is sending a signal at a frequency ranging from about 15 to 30 Hz (with 22 Hz being the traditional or “legacy” frequency).

The Power slider control increases transmitter range (at the expense of battery life). Assume a constant battery voltage regardless of settings.

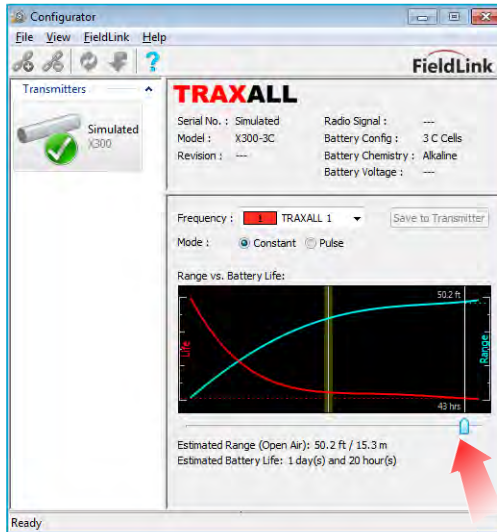
Here, we see a transmitter set to run at 50% power.



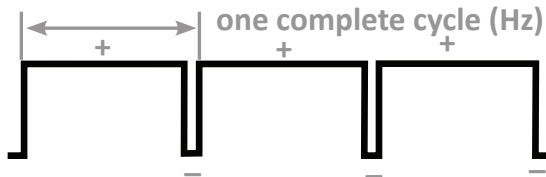
Therefore, one complete cycle (Hz) consists of equal “positive” and “negative” duty cycles. (Assume a constant battery voltage regardless of settings.)



As the Power slider is moved to the right, transmitter power is increased.

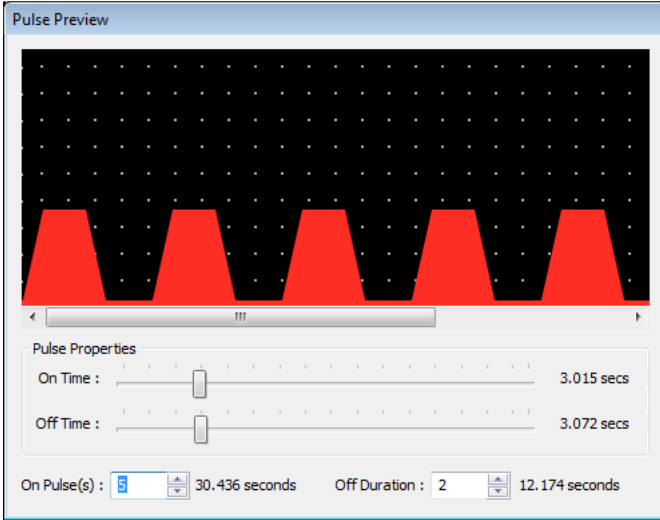


A 90% power setting would resemble this:



Pulse Characteristics

When Pulse mode is selected, Width and Repeat settings are accessible. They affect duration and spacing of transmitter signals.



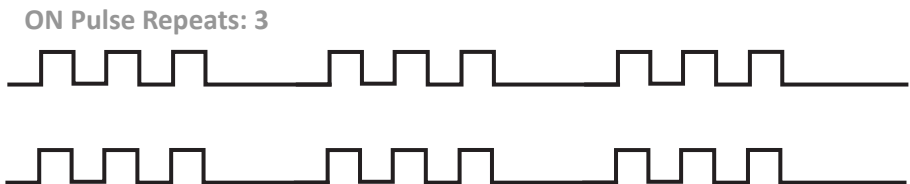
ON/OFF Time Width

Sets duration of on and off cycles. At *On Time Width*, transmission occurs. At *Off Time Width*, there is no transmission.



ON/OFF Pulse Repeat

Sets number of on and off cycles to repeat.



APPENDIX B: SYSTEM SPECIFICATIONS

Transmission Type:	Electromagnetic
Detection Devices:	Magnetic Pipeline Pig Location and Tracking Systems, Land-based and Subsea Signaling Systems
External Pressure Rating:	172 bar [2,500 psi]
End Cap O-rings:	53.7 mm I.D. x 1.78 mm [2.114 in. x 0.07 in.] N1499-70 NITRILE
Power:	Alkaline or Lithium D-Cell
Material:	304L Stainless Steel
Resistivity:	0.72
Magnetic Permeability:	1.02
Pipe Line Sizes:	
X400-2D	305 mm to 711 mm [12 in. to 28 in.]
X400-3D	305 mm to 914 mm [12 in. to 36 in.]
X400-4D	355 mm and larger [14 in. and larger]
X400-5D	406 mm and larger [16 in. and larger]
Pipe Wall Thickness:	Up to 38.1 mm [1.5 in.]

APPENDIX C: TITANIUM TRANSMITTERS

TRAXALL X-400T Titanium transmitters require installation of a PARBAK seal at each end cap (battery and antenna) in addition to the standard O-Rings. The PARBAK provides an additional seal between the transmitter caps and O-Ring.

Installation procedure is similar to that of the O-Rings as outlined in pgs. 19–20 of this user guide, with these exceptions:

- Do not apply anti-seize lubricant to titanium threads



- As the additional seal material (PARBAK combined with existing O-Ring) is likely to result in more compressive resistance when removing and replacing caps, Strap Wrenches are highly recommended.



End cap replacement:

1) Apply Molykote to PARBAK




2) Install PARBAK over O-ring; flat side toward cap threads, concave side toward existing O-ring.



When properly installed, PARBAK should be seated over O-Ring as shown:



3) Screw cap onto transmitter.

 **WARNING: Transmitter end caps are NOT interchangeable. Attempting to install a battery cap onto the antenna end may damage the configuration antenna or transmitter case.**



 **NOTE: Ensure O-ring and PARBAK seals are properly seated and not protruding outside cap(s).**

4) Once you have determined PARBAK and O-rings are properly seated, secure transmitter case and tighten cap with strap wrenches as shown:



APPENDIX D: X400-SWX (PRESSURE ACTIVATED)

The TRAXALL X400-SWX is a specially-built transmitter with the capability of being switched ON at a customer-defined pipeline pressure. This behavior is useful whenever the precise date of pig deployment is unknown and battery conservation is critical. Power consumption prior to activation is zero.



Pressure Activation

Unlike conventional transmitters which begin operation when powered, the SWX can, upon deployment, lay dormant for an indefinite time until a predetermined pipeline pressure is attained.

The heart of the X400-SWX is a stainless steel diaphragm pneumatic adjustable pressure switch which contains a normally-open relay. The X400 transmitter is energized when the relay circuit is closed.

This switch is factory-configured for activation at any customer-specified increment between 15–3,000 psi [1–207 bar].



Latching or Non-Latching

Activation of the transmitter may be either latching or non-latching. Latching behavior causes the transmitter to turn ON and remain ON once the activation pressure is reached the first time. Non-Latching behavior causes the transmitter's ON state to follow pipeline pressure; i.e., the transmitter will turn ON when the pressure is above the set-point and turn OFF when pressure falls below the set-point.

Your X400-SWX is shipped in the default *latching* mode. To change to non-latching behavior:

Remove Pressure Module

Carefully unscrew the pressure module end of the transmitter.



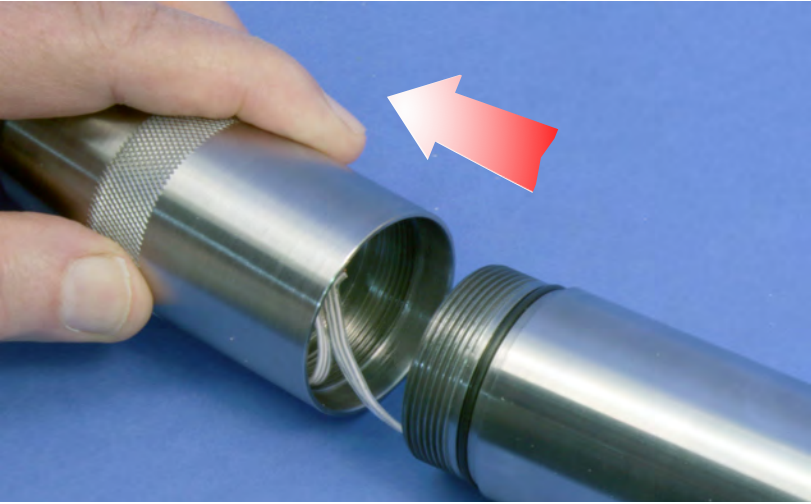
NOTE: Pressure module has LEFT-HAND threads. Turn CLOCKWISE to remove.



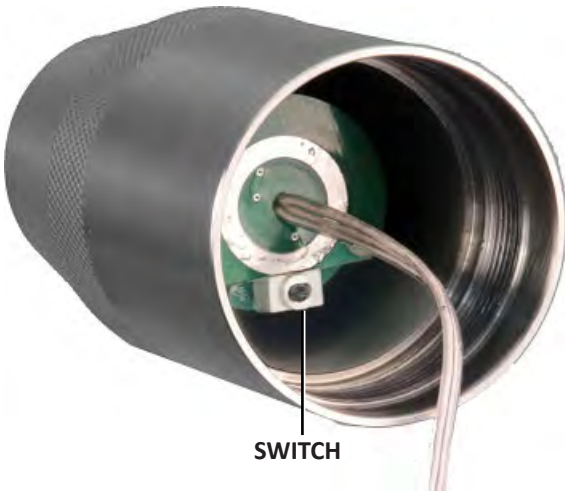
Pull pressure module away to access the latching programming switch. Note how connector cable is stowed within the module to prevent strain to cable and connector when removing/replacing module.



NOTE: Avoid straining the connector cable.



The programming switch is located on the edge of the sensor circuit board.

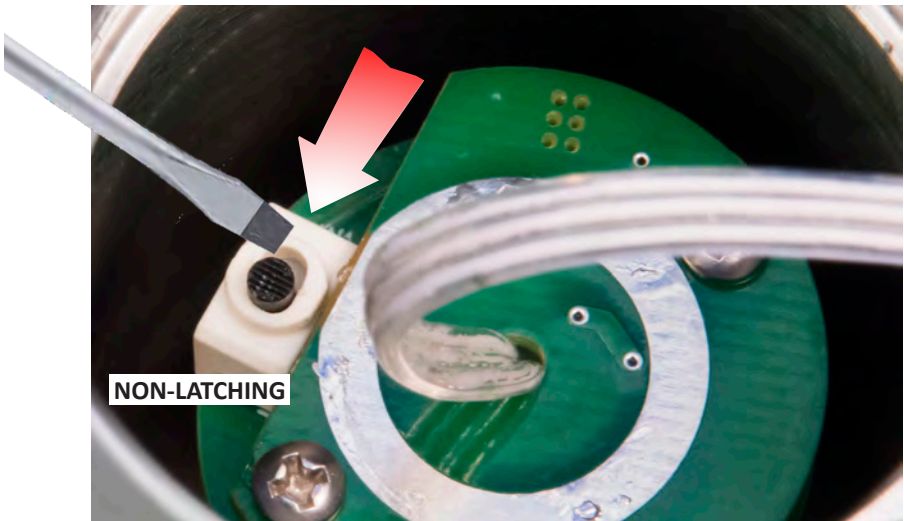


The default position is Latching.



Change Switch Position

With small screwdriver or other tool, move the switch in opposite direction for Non-latching mode.



Replace Pressure Module

As with battery cap, inspect cap threads, transmitter case threads, O-ring groove, and O-ring and apply lubricant and anti-seize.



Carefully replace cable within the module as you bring module and transmitter together.



Remember to screw *counter-clockwise* to tighten.



WARRANTY

All equipment sold by Control Devices, Incorporated (CDI) is warranted for a period of one (1) year from the date of shipment to Purchaser, providing the instrument or equipment has not been modified, abused, or used for purposes which it was not designed for.

Batteries, probes, leads, magnets, and other consumables subject to wear are not covered by this warranty. CDI will repair or replace faulty equipment during the warranty period when the cause is a defect arising from faulty design, materials or workmanship.

Making a Warranty Claim

Equipment being considered for warranty repair, or a representative sample thereof, must be returned to CDI at the Purchaser's expense. The equipment must be accompanied by the Purchaser's written order* describing the defect(s) and authorizing CDI to invoice the Purchaser for any charges not covered by the warranty.

Upon receipt of the equipment and Purchase Order, CDI will examine the equipment and make a determination of the nature and cause of the defect. If the defect is not covered by the warranty, CDI will quote to Purchaser the cost for replacement or repair equipment, and will not proceed until Purchaser delivers a written acceptance of the quotation.

During the one year warranty, CDI will bear the cost to return units repaired under the warranty back to the Purchaser's domestic premises. CDI will return units to foreign countries at Purchaser's expense.

* Contact CDI at 1-800-580-4234, ext 143 for *CDI RMA Form FM-03-0089*

CARE, MAINTENANCE, AND SERVICING

Equipment designed by CDI is protected against the environment in which it is intended to operate. Much of the equipment is designed for prolonged use in the field without any special maintenance other than routine battery replacements. It is the Purchaser's responsibility to insure that proper precautions are taken during installation and operation so that weather seals are in place, routine maintenance occurs, etc. Failure to perform these operations nullifies this warranty.

CDI equipment should only be operated by qualified personnel who are familiar with any and all manuals and procedures for said equipment's operation.

Service and Repairs

Cost for repairs not covered by the warranty or carried out after the warranty period has expired will be charged at the current hourly or set service rate, plus the cost of materials, upon approval by Purchaser.

Equipment for repair must be sent at the Purchaser's expense and be accompanied by the Purchaser's written order describing the defect and authorizing CDI to invoice the Purchaser for labor, materials and return delivery cost.

No service or repair will be undertaken until an approved written order is received from the Purchaser.

Operating equipment while in a damaged condition nullifies this warranty.

ABOUT CDI

CDI is a family-owned and operated business located in Broken Arrow, Oklahoma, just 12 miles from downtown Tulsa. Incorporated in 1982, CDI has proudly been manufacturing products in the United States for more than 32 years. CDI currently employs 45 people in the areas of electronics and mechanical design, software and firmware programming, electronics manufacture, machining, and more.

All CDI products are designed and built completely in-house utilizing an on-premises machine shop boasting six fully-automated CNC machines as well as full-time electronics assembly personnel.

