TRAXALL

MULTIFREQUENCY PIPELINE PIG TRACKING TRANSMITTERS

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

USER GUIDE

Apache
PIPELINE PRODUCTS

CE

QUALITY SYSTEM CERTIFICATION
DNV·GL
ISO 9001

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Revision 17 Apr 2015

The TRAXALL family of transmitters is patent applied for in the U.S.A., Canada, and the European Union.

TRAXALL, TRAXALL Remote Control, FieldLink, and Configurator products are covered under United States Patents

CONTENTS

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.

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 is designed to 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 32Hz) as well as the industry-standard 22Hz. 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.).

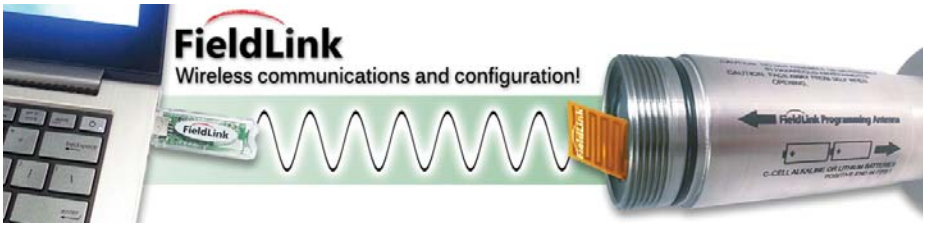
The X400 is a TRAXALL-compatible electromagnetic pipeline pig-tracking transmitter that offers both programmable frequency and power control through CDI's proprietary FieldLink wireless communications system.

Frequency Control allows the operator to configure the transmitter to one of TRAXALL's seven colorized frequencies, or the 22-Hz legacy frequency for backward compatibility with CDI's CD42 receiver or competitive receivers.

Power Control allows the operator to directly manage a tradeoff between X400 range vs. battery life. For example, you can set output power to maximum for short runs/long range, or reduce output power for long runs/long battery life.

FieldLink is CDI's proprietary wireless communications network. Each X400 transmitter comes with a built-in radio frequency antenna. By connecting a supplied radio frequency USB key, any Windows PC or laptop can be used to configure the X400.

Configurator



Configurator is a Windows application that will let you customize frequency, pulse rate, and output power of your transmitters via FieldLink wireless communication.

Requirements:

- PC or laptop computer with Windows® 7 or 8 (32-bit or 64-bit]
- Configurator software*
- FieldLink USB device**
- Adobe® Reader® is required to access PDF documents

* Available download from CDI website
** Supplied by CDI

GETTING STARTED

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

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.)

PREPARE TRANSMITTER: POWER

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. Observe nomenclature on transmitter case to determine correct cap, battery quantity, and battery polarity. Battery and antenna end caps are not interchangeable (antenna caps are left-hand threaded) but removal and replacement procedures are similar.

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.

ANTENNA CAP BATTERY CAP

Always observe these precautions before removing any transmitter end cap:

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

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

Remove Battery Cap

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

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.

Load Batteries

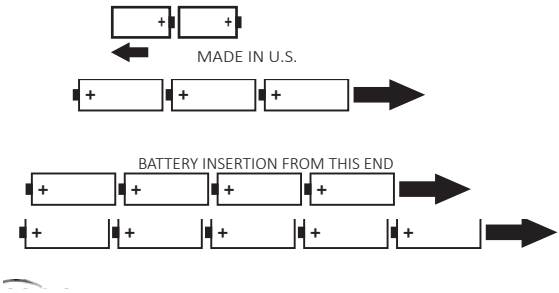
X400 Series transmitters are powered by D-Cell alkaline batteries.

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

All batteries are to be inserted positive (+) end first as shown:

- **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

Battery quantity and polarity are marked on each transmitter case:



Replacing cap (see following pages) completes the battery circuit and activates the transmitter.

Replace Battery Cap

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.*

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.

* CDI Part No. 700-50-2034-70

Reinstall Cap

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.

Replacing cap completes the battery circuit and activates the transmitter. Transmitter will remain energized until battery cap is removed.

PREPARE TRANSMITTER: CONFIGURATION

You will need to have your transmitter powered and antenna cap removed to run Configurator.

Once transmitter is configured, the 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.

Remove Antenna Cap

Unscrew and carefully remove the antenna cap.

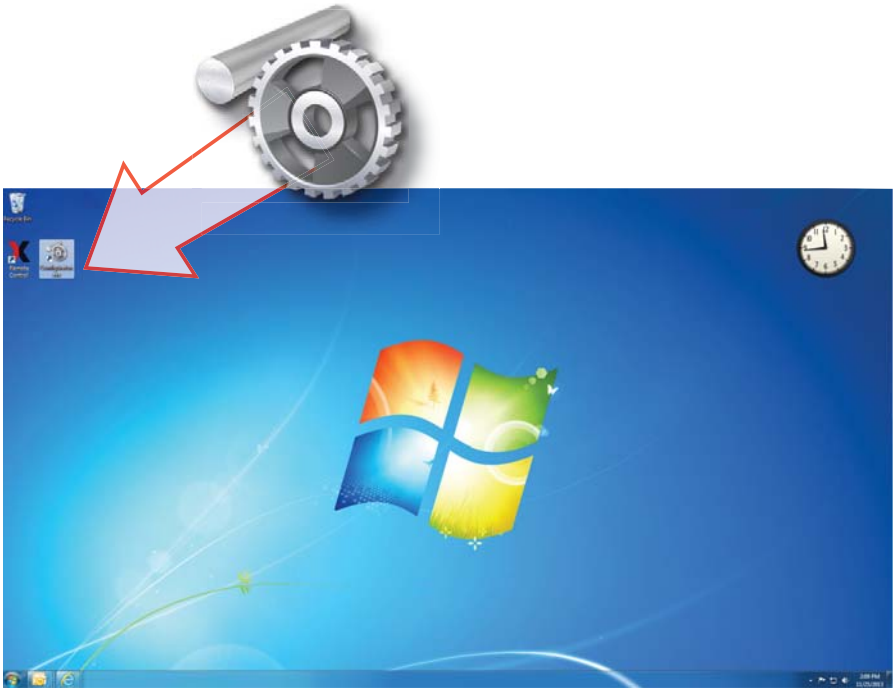
NOTE: Transmitter antenna end caps marked as shown have LEFT-HAND threads. Turn CLOCKWISE to remove.

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

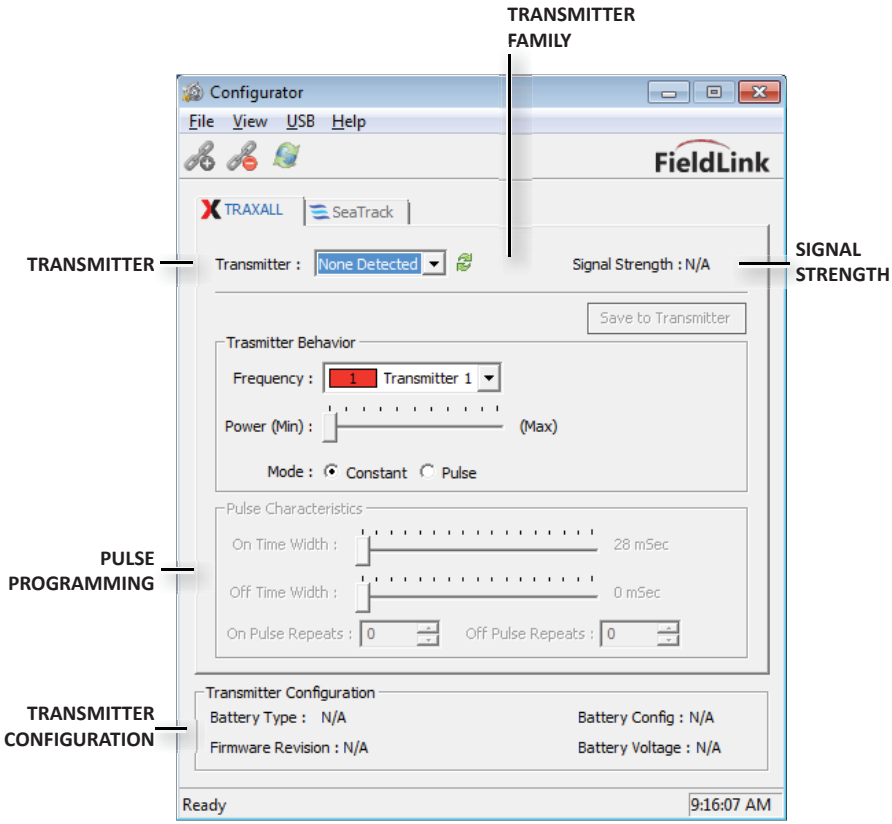
Launch Configurator

Use Configurator If you wish to customize frequency, pulse rate, and/or output power of your transmitter.

Launch Configurator by clicking the icon on your PC desktop.



The initial Configurator window will appear as shown here. *Transmitter, Transmitter Family, Signal Strength,* and other fields will be blank or indicate “N/A” until communication with a transmitter is established.



Activate FieldLink

FieldLink is CDI's proprietary wireless PC-to-transmitter communications network you will use to program your transmitter.

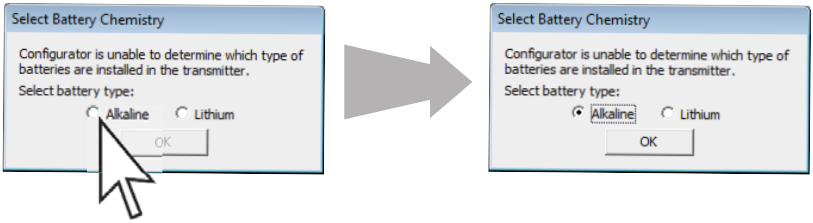
Insert the FieldLink device* into a USB port on your pc.

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

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

Select Battery Chemistry

When Configurator detects a transmitter, it may ask you if the transmitter is powered by Alkaline or Lithium batteries. Click the appropriate button and then click "OK" to confirm.

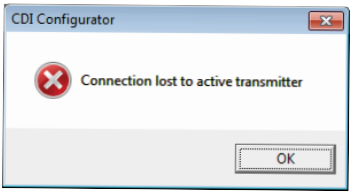


NOTE: When batteries and battery cap are in place

- 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.
- FieldLink will be activated and for the next five minutes will seek to establish a communication link (see below).

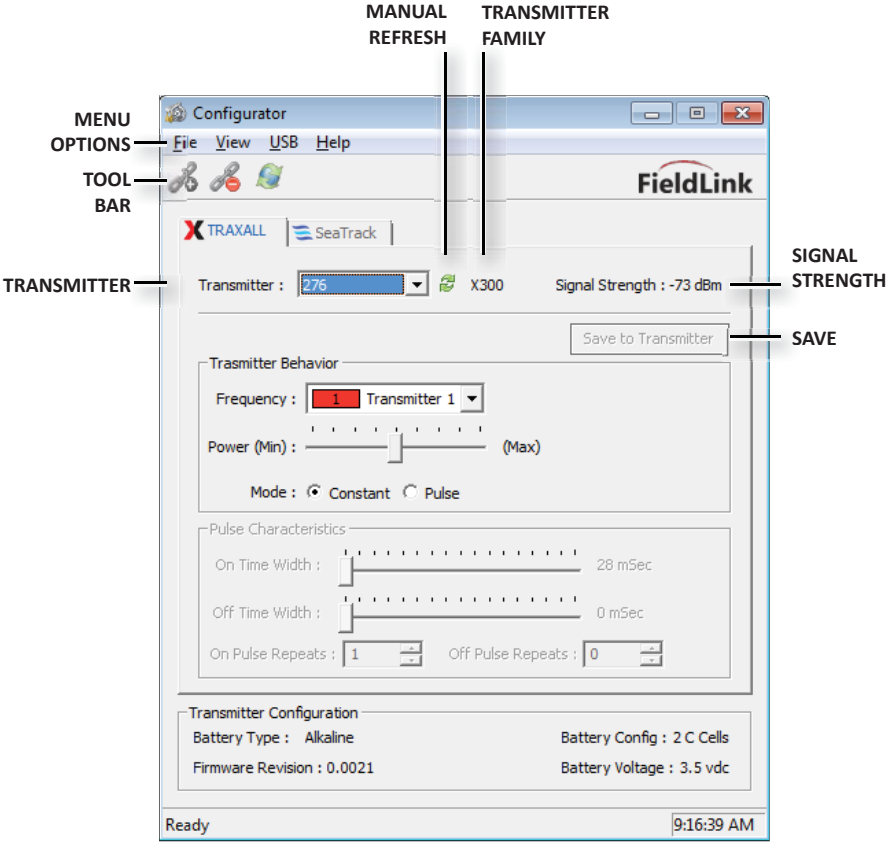
Re-establishing FieldLink Communication

If FieldLink communication “times out” or is otherwise disrupted, this message will appear.



Should this occur, restart Configurator by momentarily removing and replacing battery cap to cycle transmitter power.

If you are still unable to establish communication, you may need to replace batteries.


MANUAL REFRESH
TRANSMITTER FAMILY
MENU OPTIONS
TOOL BAR
TRANSMITTER
SIGNAL STRENGTH
SAVE
Configurator
File View USB Help
FieldLink
TRAXALL
SeaTrack
Transmitter : 276
X300
Signal Strength : -73 dBm
Save to Transmitter
Trasmitter Behavior
Frequency : 1 Transmitter 1
Power (Min) : (Max)
Mode : Constant Pulse
Pulse Characteristics
On Time Width : 28 mSec
Off Time Width : 0 mSec
On Pulse Repeats : 1
Off Pulse Repeats : 0
Transmitter Configuration
Battery Type : Alkaline
Battery Config : 2 C Cells
Firmware Revision : 0.0021
Battery Voltage : 3.5 vdc
Ready
9:16:39 AM

MENU OPTIONS

File

Exit
Closes the Configurator application

View

Status Bar
Check/uncheck to show

Tool Bar
Check/uncheck to show

USB

Connect/Disconnect
Controls communication with FieldLink flash drive

Update Firmware*
Places FieldLink device into update mode

Reset USB Device
Returns FieldLink device to normal operation

Help

Configurator Help
Opens a PDF version of this Quick-Start Guide

About Configurator
Software Version and Build information

TOOL BAR

Connect/Disconnect
Controls communication from FieldLink flash drive

Update Firmware*
Places FieldLink flash drive into update mode

TRANSMITTER INDICATOR
Auto-populated with transmitter information

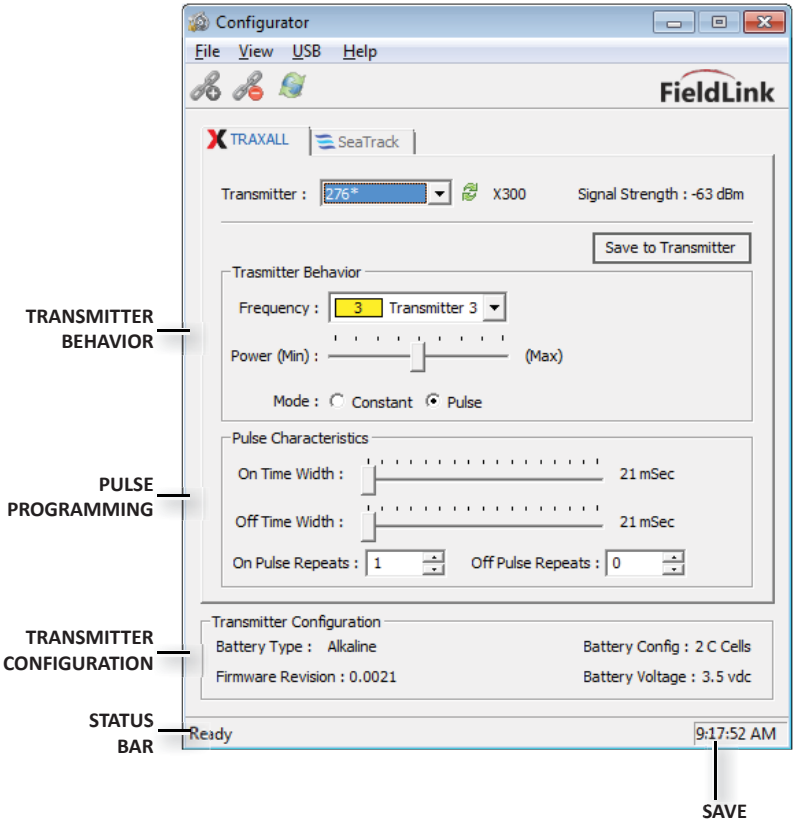
TRANSMITTER FAMILY
Indicates X100, X200, X300, or X400

MANUAL REFRESH
Configurator automatically refreshes every four seconds

SIGNAL STRENGTH
Indicates current transmitter signal strength

SAVE
Saves configuration settings to transmitter

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


Configurator
File View USB Help
FieldLink
TRAXALL
SeaTrack
Transmitter : 276*
X300
Signal Strength : -63 dBm
Save to Transmitter
Trasmitter Behavior
Frequency : 3 Transmitter 3
Power (Min) :
(Max)
Mode : Constant Pulse
Pulse Characteristics
On Time Width :
21 mSec
Off Time Width :
21 mSec
On Pulse Repeats : 1
Off Pulse Repeats : 0
Transmitter Configuration
Battery Type : Alkaline
Battery Config : 2 C Cells
Firmware Revision : 0.0021
Battery Voltage : 3.5 vdc
Ready
9:17:52 AM
TRANSMITTER BEHAVIOR
PULSE PROGRAMMING
TRANSMITTER CONFIGURATION
STATUS BAR
SAVE

TRANSMITTER BEHAVIOR

Frequency

Use the drop-down menu to select specific transmitter

Transmitter 1–7

Legacy

Power

Duty Cycle

Sliding scale to adjust Battery Life vs Effective 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 would likely be more important where the pipe is deep pipe and the run relatively short.

Mode

Constant

Pulse

PULSE PROGRAMMING*

On Time Width

Off Time Width

Selectable duration of on and off cycles

On Pulse Repeat

Off Pulse Repeat

Selectable number of on and off cycles to repeat

TRANSMITTER CONFIGURATION

Battery Type

Indicates Alkaline or Lithium batteries in transmitter

Battery Config

Indicates battery quantity and type (AA, C, D, etc)

Battery Voltage

Indicates current battery voltage

Firmware Revision

Indicates transmitter firmware

STATUS BAR

Application Status

Displays current state of Configurator application

Time

Local time-of-day

** See APPENDIX A, pg. 27, for Transmitter Behavior and Pulse Characteristics details.*

Save Settings

When transmitter has been configured, select Save to Transmitter button to retain your transmitter settings.

Replace Antenna Cap

Inspect cap threads, transmitter case threads, O-ring groove, and O-ring (see pgs. 12–13). If threads and O-ring are serviceable, 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.

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

Screw antenna end 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.

Your transmitter is now ready to be placed into service.

Flange Kit

A flange kit* included with your transmitter for mounting on a metal pig. Install the flange kit with Allen wrench and screws as shown.

Note orientation of flange. This will position transmitter coil outside the pig (see following page).

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

PLACING TRANSMITTER INTO SERVICE

Metal-bodied Pigs

Transmitters must be mounted outside the metal casing. A transmitter flange must be installed.

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

Foam and Plastic Pigs

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

PLACING TRANSMITTER INTO SERVICE (cont.)

Checklist

Before placing a transmitter into service, always ensure that:

- Batteries are fresh and of proper size and type (see pg. 11).
- 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

Connection and Communication

CDI transmitters, when supplied with fresh batteries of the proper type and size, should automatically connect to the FieldLink interface on your PC and display the transmitter serial number.

To conserve battery power during a pig run, the FieldLink radio is deactivated after five minutes if no connection has been established. To reactivate FieldLink, the device must be power-cycled by removing and reinstalling batteries.

If your transmitter fails to establish communication after following all battery installation and Fieldlink configuration procedures, it will be necessary to contact CDI at 1-800-580-4234 or 918-258-6068 for product support.

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.

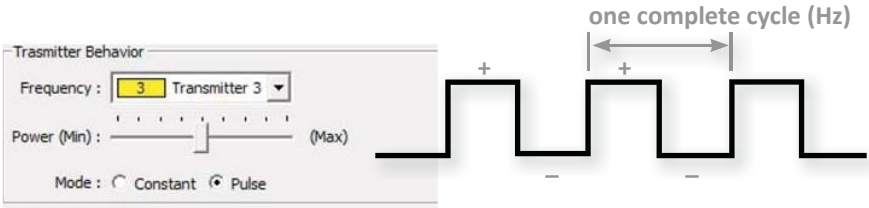
As possible for liquids to be present within cap threads, point transmitter downward to drain liquid out of and away from transmitter components or batteries.

APPENDIX A: TRANSMITTER BEHAVIOR

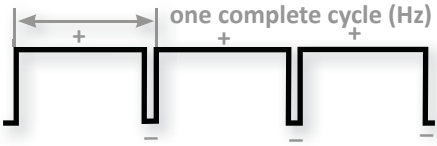
Frequency & Power

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

The Power slider control increases transmitter range (at the expense of battery life). 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.)



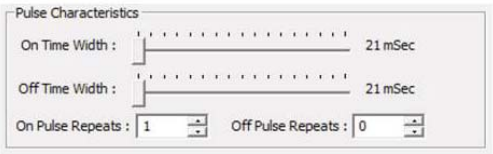
As the Power slider is moved to the right, transmitter power is increased. A 90% power setting would resemble this:



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 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.]

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.