

DRAFT



ACCLARA<sup>®</sup>

# **Series 4000 MTU Maintenance and Operation Manual**

**Y20456-TUM  
Rev. A**



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## WARNINGS, CAUTIONS, AND NOTES

Always consult and adhere to all local and national safety codes, regulations, and standards. WARNING, CAUTION and Note statements are used throughout this manual to emphasize important and critical information to help you ensure safety and prevent product damage. These statements are defined below.

### WARNING



indicates a potentially hazardous situation which, if not avoided, could result in death or serious physical injury.

### CAUTION



indicates a situation, which, if not avoided, could result in damage to equipment, damage to software, loss of data or invalid results.

### NOTE

indicates important supplemental information.

## FCC/IC Compliance

The following statements cover the RF exposure guide and the field calibration procedure.

### FCC/IC RF Exposure Guide

Aclara Technologies LLC low power RF devices and their antennas must be fixed-mounted on indoor or outdoor permanent structure(s) providing a separation distance of at least 20 cm from all persons during normal operation. This device is not designed (and it has no external connection) to operate in conjunction with any other antennas or transmitters. No other operating instructions for satisfying RF exposure compliance are needed.

### Field Calibration Procedure

Aclara Technologies LLC low power RF devices have passed through extensive testing and calibration procedures while in the factory. Therefore, no additional calibration or adjustment is required in the field.

## AVERTISSEMENTS, MISES EN GARDE ET REMARQUES

Toujours consulter et respecter les codes, règlements et normes de sécurité locaux et nationaux. Des AVERTISSEMENTS, MISES EN GARDE et remarques sont utilisés tout au long de ce guide pour souligner l'information importante et critique qui vous aidera à assurer la sécurité et à prévenir les dommages au produit. Ces énoncés sont définis ci-dessous.

### AVERTISSEMENT



indique une situation potentiellement dangereuse qui, si elle n'était pas évitée, pourrait entraîner la mort ou des blessures graves.

### MISE EN GARDE



indique une situation qui, si elle n'était pas évitée, pourrait entraîner des dommages à l'équipement, des dommages au logiciel, des pertes de données ou des résultats invalides.

**REMARQUE** indique des informations supplémentaires importantes.

## Conformité FCC/IC

Les énoncés qui suivent portent sur le guide d'exposition aux RF et la procédure de calibration sur place.

### Guide d'exposition aux RF FCC/IC

Les appareils RF à faible puissance Aclara Technologies LLC ainsi que leurs antennes doivent être montés de manière fixe sur des structures intérieures ou extérieures permanentes qui se trouvent à au moins 20 cm des personnes pendant le fonctionnement normal. Cet appareil n'est pas conçu (et il n'a aucun branchement externe) pour être utilisé en association avec toute autre antenne ou tout transmetteur. Aucune autre instruction d'utilisation n'est requise pour assurer la conformité aux règles d'exposition aux RF.

### Procédure de calibration sur place

Les appareils RF à faible puissance Aclara Technologies LLC ont été soumis à des tests étendus et multi-tâches et à des procédures de calibration complexes en usine. Par conséquent, ils ne requièrent pas de calibration ni d'ajustement supplémentaire sur place. Les appareils RF à faible puissance Aclara Technologies LLC sont expédiés au client dans des boîtiers scellés. Aucun ajustement ne peut donc être effectué sur place sans briser le boîtier scellé en usine.

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# STAR NETWORK OVERVIEW

The STAR Network is a fixed-network, Advanced Metering Infrastructure (AMI) that automatically reads water and gas instruments. The STAR Network uses a 3-tier configuration to read and transmit information between the measuring instrument and the utility office. The three tiers of the STAR Network are:

1. Meter Transmission Units (MTUs)
2. Data Collection Units (DCUs)
3. Network Control Computer (NCC)

## Two-Way Communications

The STAR Network two-way advanced metering infrastructure (AMI) system allows encrypted data communications over secure, FCC licensed radio frequencies. This wireless fixed network consists of the Meter Transmitter Unit (MTU), Data Collector Unit (DCU), and Network Control Computer (NCC). Communications between the MTU, DCU, and NCC are explained in greater detail below.



## MTU/DCU Communications

MTU/DCU communications occur on two FCC licensed (450-470 MHz) frequency channels. Configuration settings, on-demand requests, and Time Sync messages are sent from the DCU to the MTU. Instrument measurement and configuration readings and Time Sync requests are sent from the MTU to nearby DCUs.

## DCU/NCC Communications

DCU/NCC communications are conducted over TCP/IP protocols via the cellular, Ethernet, or Wi-Fi™ backhaul. The DCU initiates and maintains communications with the NCC. Configuration changes, on-demand requests, and Time Sync messages originate in the NCC and are sent to the MTU via the DCU.



## SERIES 4000 OPERATION

The Series 4000 MTU is designed to connect with a Honeywell ERX pressure monitor, a Honeywell Mini-AT volume corrector, or a Mini-Max volume corrector. In addition to a 10 item audit trail, the Series 4000 allows the user to perform on-demand reads and reconfigure the instrument and the MTU via the NCC. It contains a replaceable battery, two LEDs, and a USB port used for commissioning and reading information from the MTU locally.

The Series 4000 MTU is mounted to a wall or a pipe near the volume corrector or pressure monitor. The MTU connects to the instrument via cable and communicates with the DCU using FCC licensed frequencies.

### Configuration

The Series 4000 MTU allows the user to change instrument configuration settings from the NCC. The MTU checks the instrument configuration daily, and returns the changed parameter and the new value to the NCC in a daily Change Report. The NCC will then compare the Change Report data to the initial configuration value transmitted to the NCC immediately after installation. In addition to these Change Reports, the user can also configure the MTU to send a full Configuration Report to the NCC every 30, 60, 90, or 180 days.

For added security, if there is an attempt to change the configuration settings through the MTU USB port, the MTU will notify the NCC within 25 hours.

### Read Intervals

The rate at which the MTU reads data from the instrument is configurable to support instrument log intervals of 15 minutes or more. At the end of each interval, the MTU will read the instrument. The data will then be transmitted back to the NCC at an interval that is equal to the instrument log interval.

### Time Synchronization

Time keeping is crucial for accurate reporting. The Series 4000 MTU and the NCC software are designed to ensure that the internal clocks of the instrument, MTU, and NCC all remain synchronized. In addition to synchronizing the time at initial installation, the MTU checks the instrument clock daily. If the clock is off by more than 10 seconds, it will automatically synchronize the instrument clock.

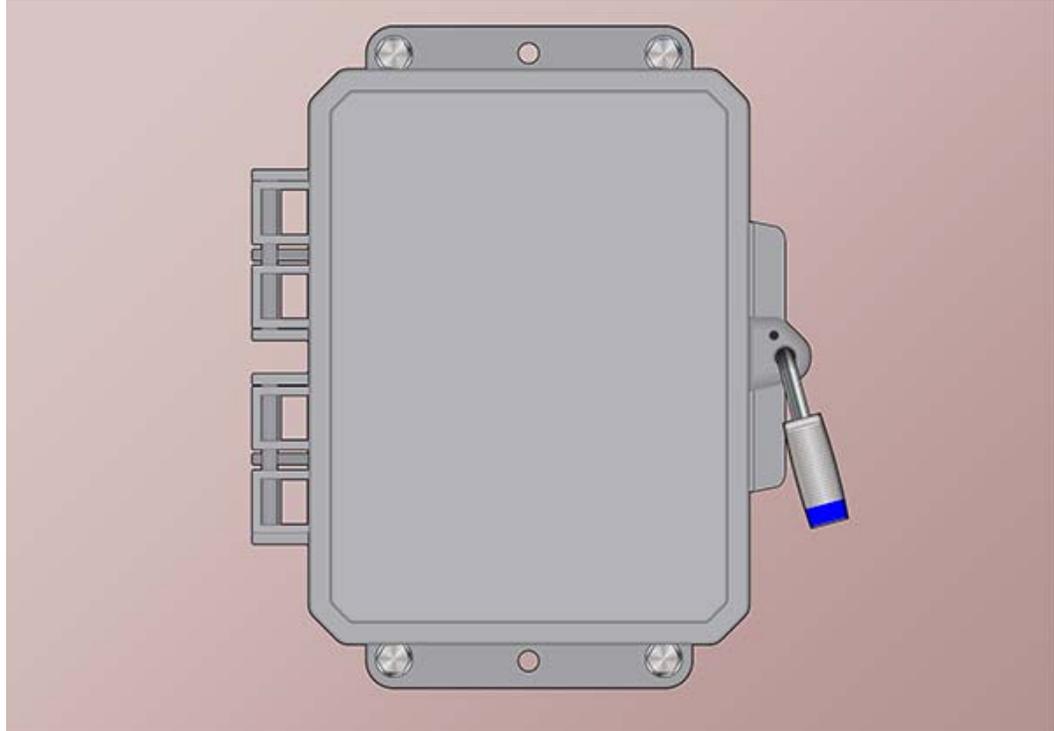
The MTU will send a flag to the NCC along with the amount of adjustment made to the instrument clock for any readings that are off by more than two minutes. When the NCC receives readings that are flagged with incorrect time, it will automatically correct the time stamps according to the difference reported by the MTU.

## Security

The 4000 Series MTU provides options for both hardware and software security.

### Hardware

The Series 4000 MTU enclosure is designed to allow the user to secure the door with a lockout device.



### Software

The MTU may be configured to send the following tamper alarms to the NCC:

1. Interface tamper (configuration change via USB port)
2. Cut serial communication wire

Each tamper condition generates a corresponding alarm transmission that can be viewed in the NCC when viewing the Premise transmissions.

The MTU can be programmed to transmit an alarm for any of these tamper conditions. In the case of a tamper condition alarm, the unit will transmit an alarm message every minute for a given number of times (with a default of 3). When the tamper condition is no longer present, the alarm flag is cleared. Each time the tamper condition is detected, the unit will trigger an alarm.

## Alarms

In addition to the tamper alarms, the MTU may also be configured to send the following alarms to the NCC:

### Last Gasp

The MTU will regularly report battery voltage values to the NCC. When this value falls below a specified value, the NCC will display a Low Battery notification. Aclara recommends changing the battery promptly when a low battery alarm is received. Please see *Maintenance* on page 35 for more information.

### Pressure

The user can configure the MTU to return a pressure alarm whenever the pressure reading from the instrument is outside a given range. If enabled, the MTU will also begin operating in Trend Mode until the pressure returns to the desired range. Please refer to *Trend Mode* on page 5 for more information.

### Serial Communication Problems

The MTU will return an alarm to the NCC if basic communication with the instrument is not possible. This will most likely be due to incorrect instrument configuration.

## Data Encryption

The Series 4000 MTU units support the encryption of user sensitive data. When data encryption is enabled, all readings and data packets except for alarms will be encrypted prior to transmission.

## Trend Mode

Trend Mode is an operating mode of the MTU that, when enabled, will begin automatically sending pressure values (and corresponding time stamps) at regular intervals whenever a pressure or other configured alarm is received from the instrument.

Trend Mode may also be initiated or canceled directly from the NCC. Using the default settings for Trend Mode, the MTU will record the pressure once a minute and transmit these readings once every six minutes to the NCC.

### Read Interval

The user may configure Trend Mode to read the pressure either once a minute or once every five minutes.

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## Transmit Interval

The transmit interval for Trend Mode is pre-configured at six times the read interval. That is:

- If a 1 minute read interval is selected, the transmit interval will be 6 minutes.
- If a 5 minute read interval is selected, the transmit interval will be 30 minutes.

If Trend Mode is canceled from the NCC or if the MTU receives a clear pressure alarm signal from the instrument, the MTU will notify the NCC that only six more readings will be received in Trend Mode. The MTU will read and transmit the remaining Trend Mode reads, before it switches back to normal operating mode.

If Trend Mode is initiated manually via the NCC, it will continue for a maximum of 30 minutes if it is not manually canceled from the NCC.

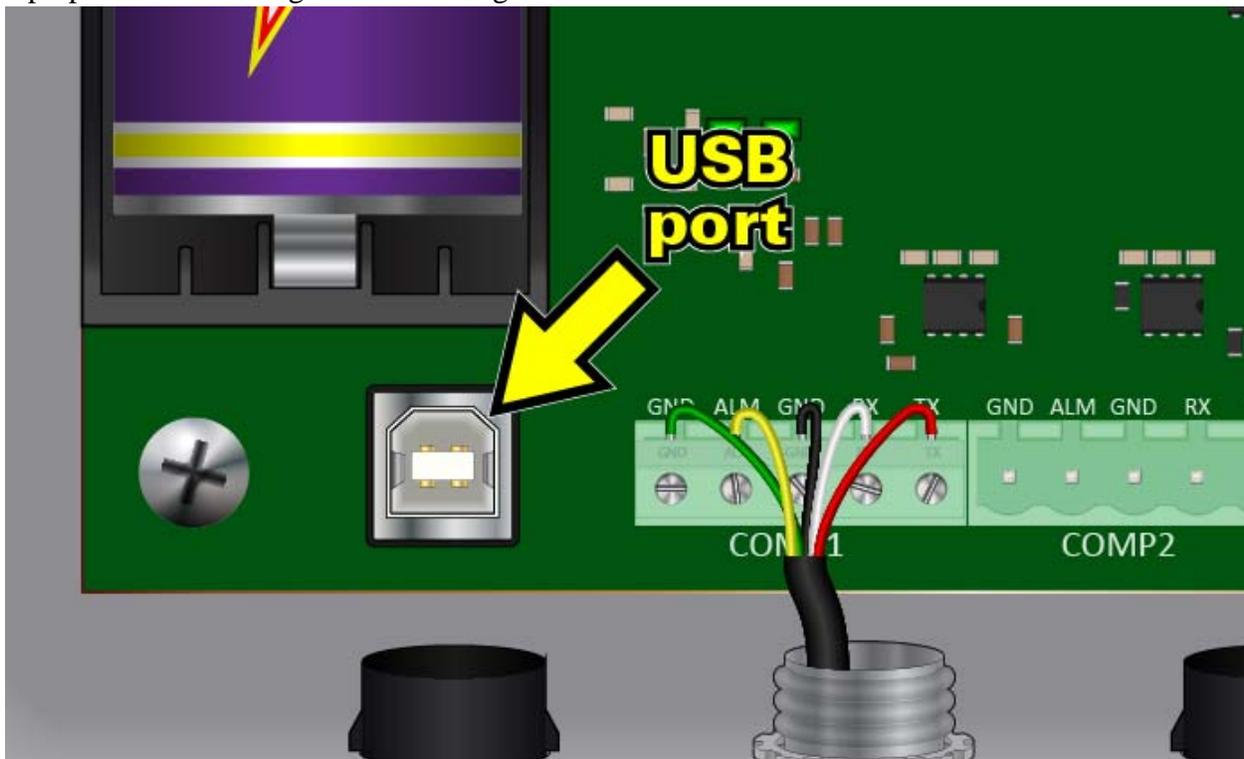
Trend Mode data is recorded and stored along with graphical representations in the NCC for up to 13 months.

## STAR PROGRAMMER SOFTWARE

The STAR Programmer application is used along with a suitable tablet or laptop and a USB cable (Aclara part number 070-1700) to commission an MTU after installation or to turn an MTU off prior to storage or relocation. This section provides information on the USB communication interface and how to interact with the MTU using this application.

### USB Port

The Series 4000 MTU uses a standard USB Type B port that allows for communication with a laptop or tablet running the STAR Programmer software.

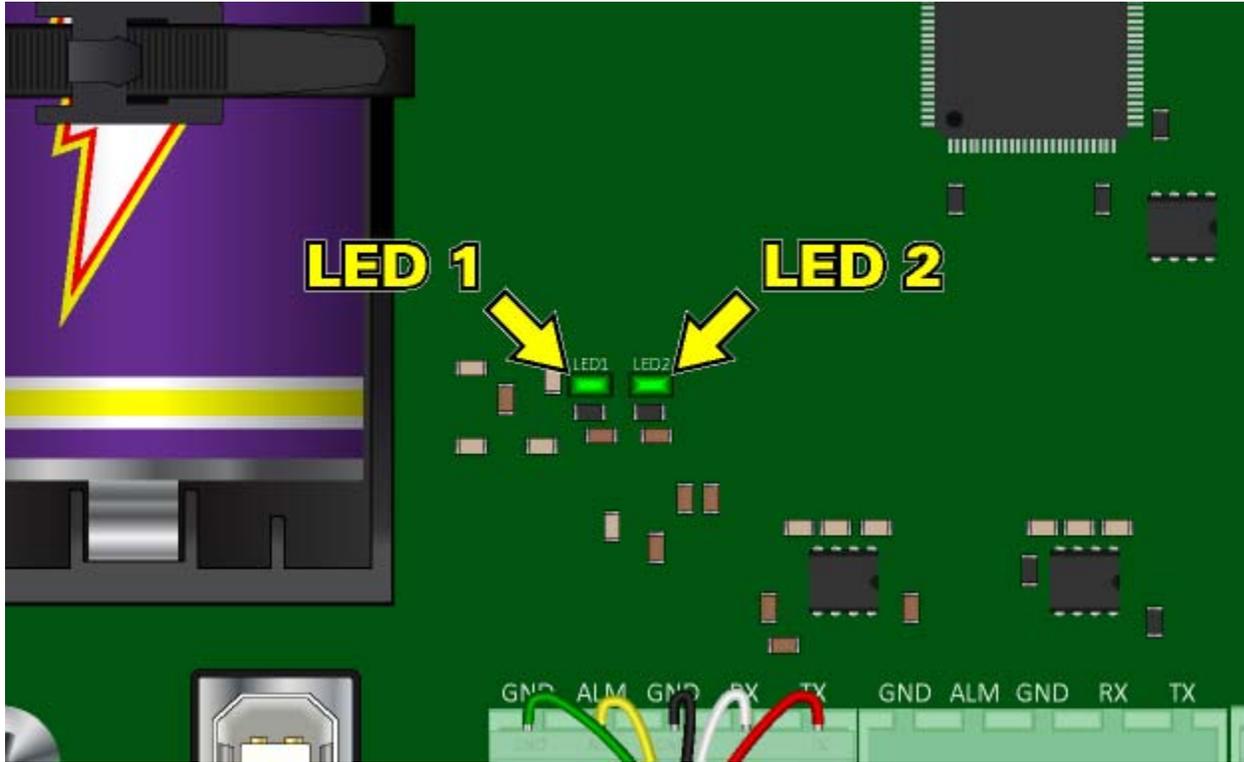


**WARNING:** EXPLOSION HAZARD - BATTERIES MUST ONLY BE CHANGED IN AN AREA KNOWN TO BE NON-HAZARDOUS

**AVERTISSEMENT:** RISQUE D'EXPLOSION - AFIN D'ÉVITER OUT RISQU D'EXPLOSION, S'ASURER QUE L'EMPLACEMENT EST DÉSIGNÉ NON DANGEREUX AVANT DE CHANGER LA BATTERIE.

## Communication LEDs.

Two LEDs located to the right of the battery and above the COMP1 connector indicate the direction of communication through the USB port.



- The left LED (LED 1) indicates when data is sent from the tablet or laptop through the USB port to the Series 4000 MTU.
- The right LED (LED2) indicates when data is sent from the MTU out through the USB port to the tablet or laptop.

## Software

The STAR Programmer application may be used to commission an MTU after installation, read and troubleshoot an MTU in the field, or to turn off an MTU if it will not be in use for an extended period of time. Actions performed using the STAR Programmer software are logged and uploaded to the Network Control Computer (NCC) for verification at the end of each shift.

## Prerequisites

The STAR Programmer application requires the following to communicate with a Series 4000 MTU:

Tablet or laptop with

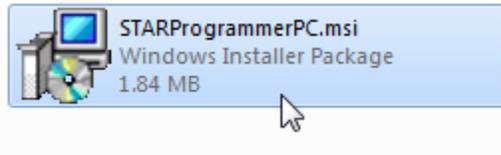
- Windows® 7
- $\geq 1.5$  GHz
- $\geq 2$  GB RAM
- $\geq 80$  GB HDD
- Open USB port

USB-A to USB-B cable (Aclara #070-1700)

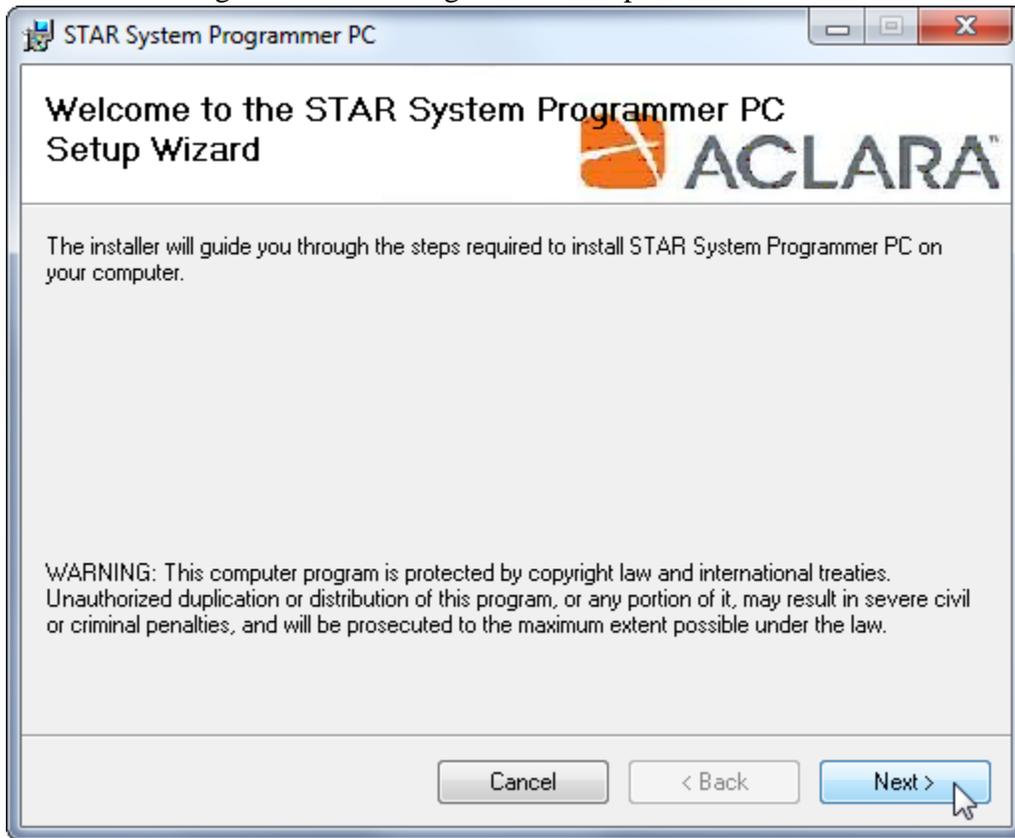
## Application Installation

Use the following procedure to install the STAR Programmer software on a suitable tablet or laptop.

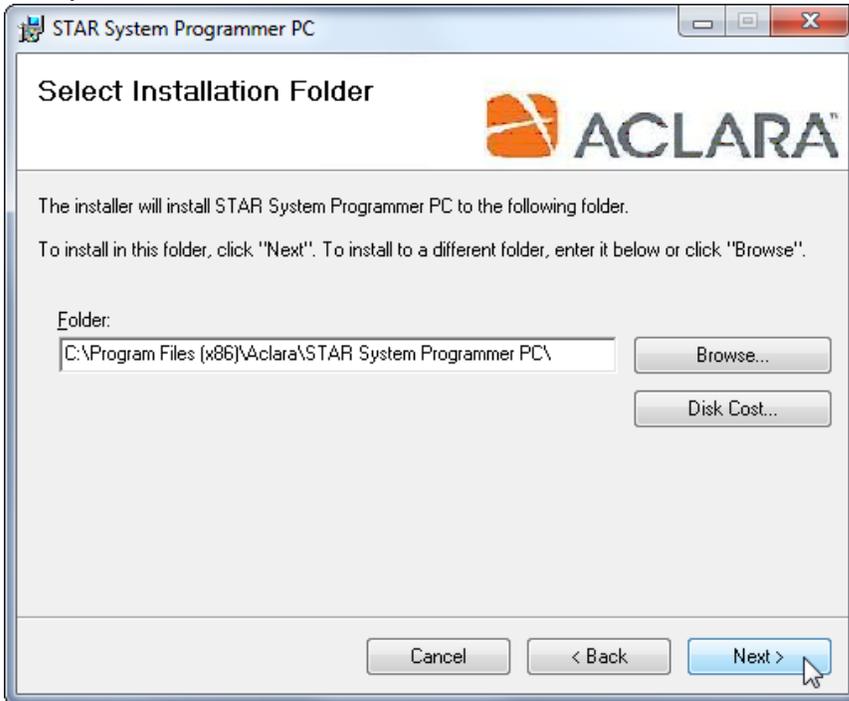
- 1) Double-click the STARProgrammerPC.msi file.



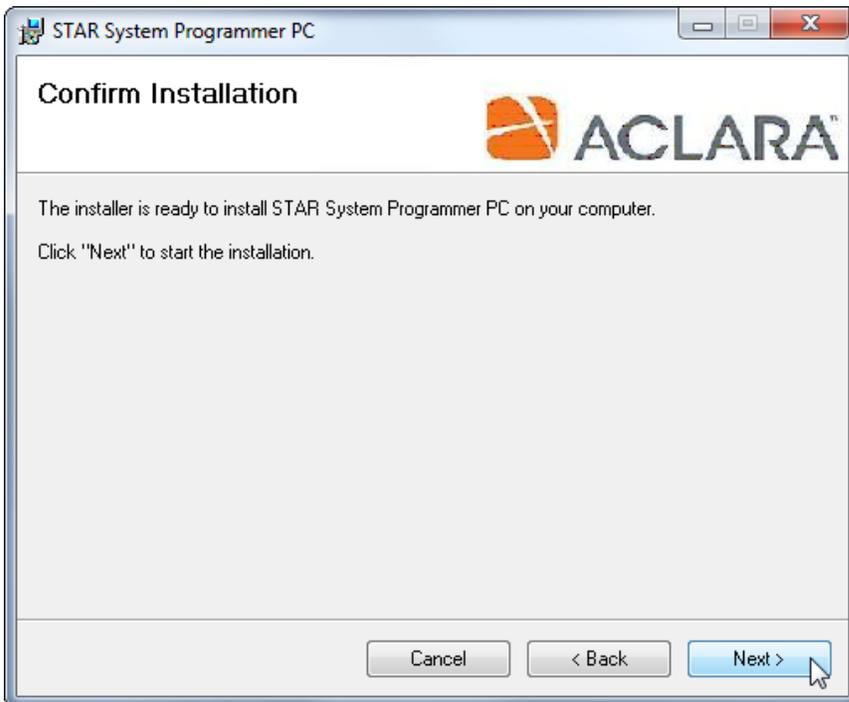
- 2) Click Next to begin the STAR Programmer Setup Wizard.



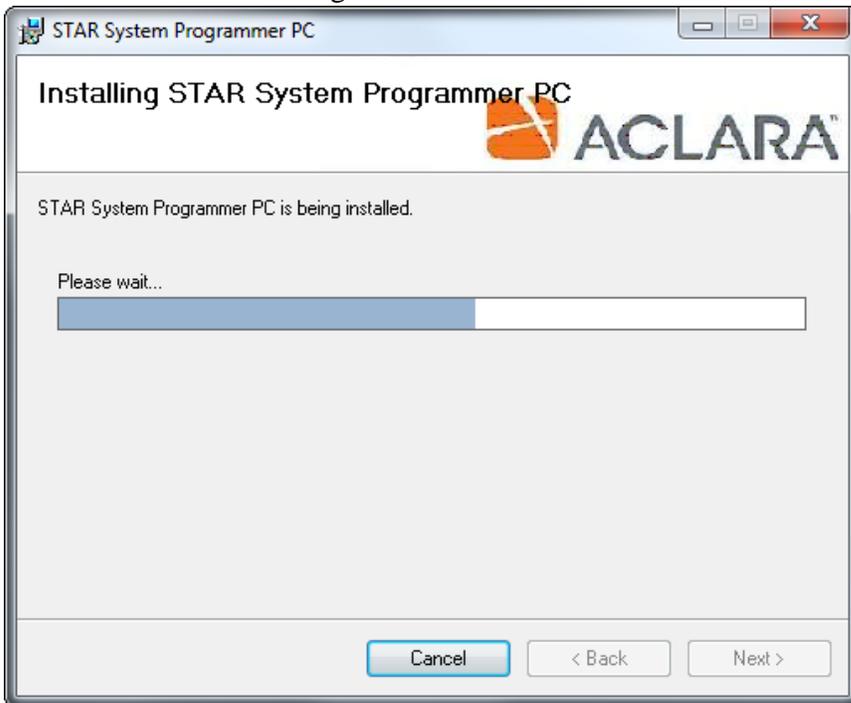
- 3) Verify the installation location, and click **Next**.



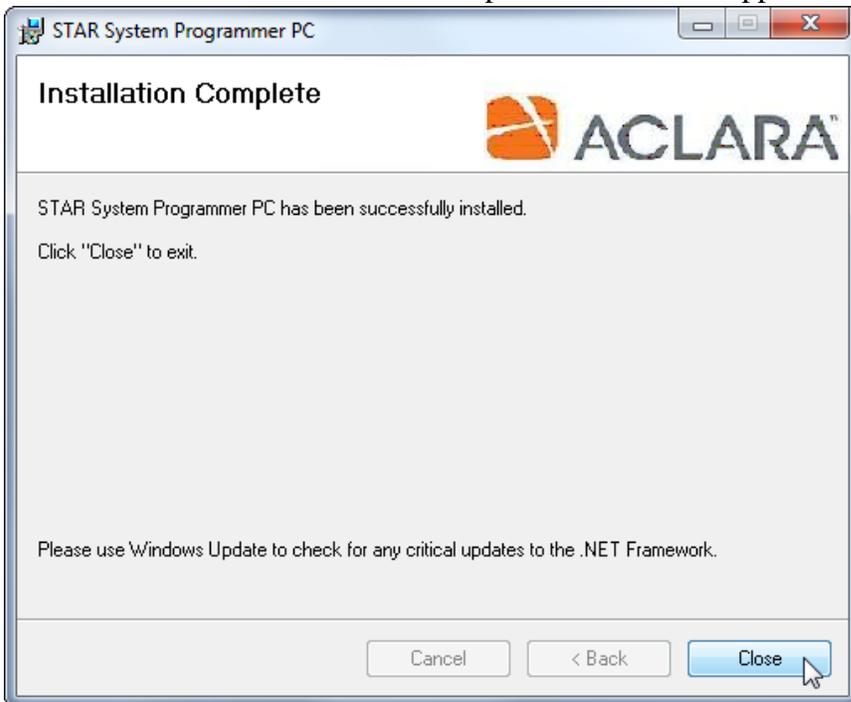
- 4) Click **Next** to initiate the installation.



- 5) Wait while the STAR Programmer is installed.



- 6) Click Close after the Installation Complete confirmation appears.



## XML File Installation

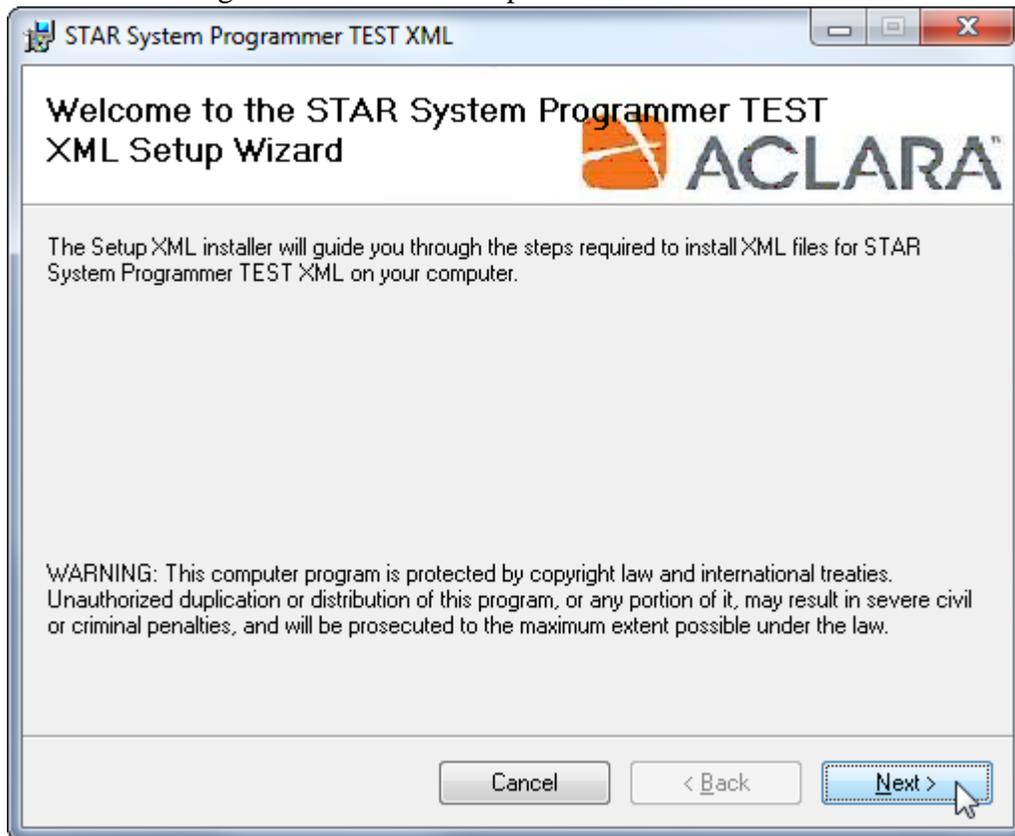
Use the following procedure to install the XML files that accompany the STAR Programmer application.

- 1) Refer to the table below when selecting the appropriate STARXML.msi file for the installation.

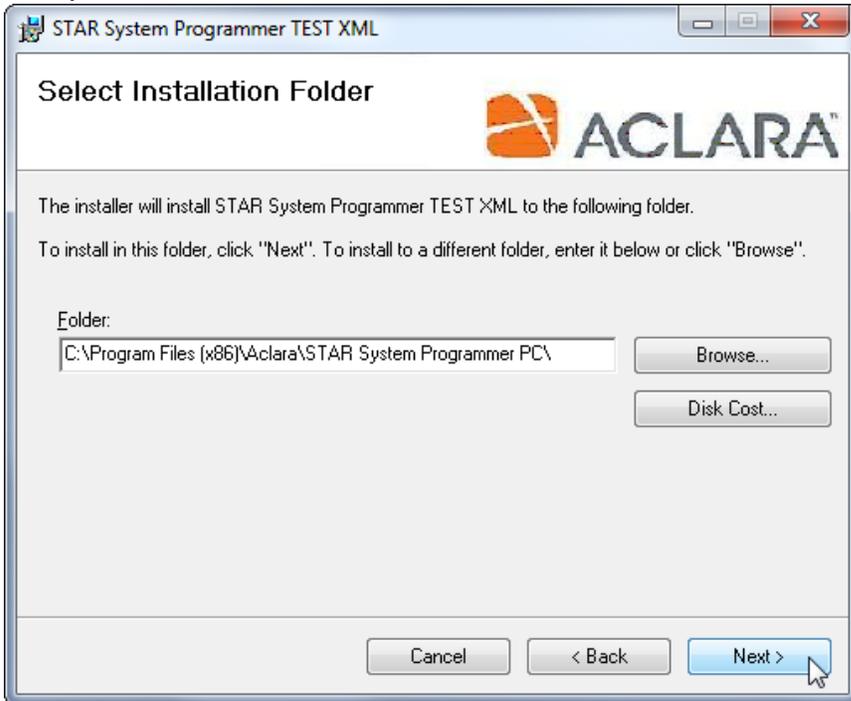
NOTE: Multiple STARXML installations cannot coexist on the same machine.

Installation Type	.MSI File
PC Interactive Mode - With Encryption	STARXMLPCTEST.msi
PC Interactive Mode - Without Encryption	STARXMLPCTESTNONENCRYPT.msi
PC Scripted Mode	STARXMLPC.msi

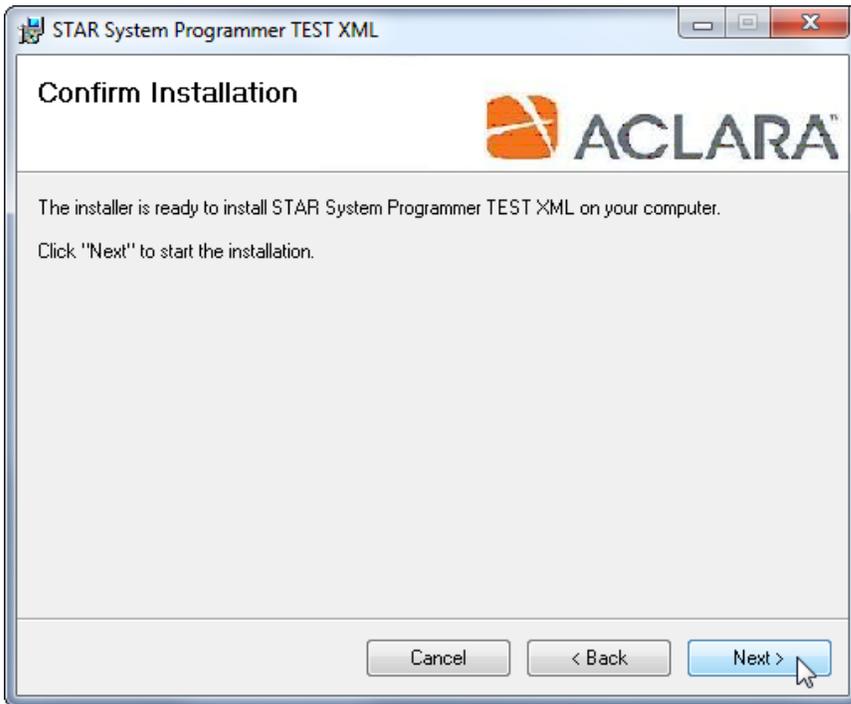
- 2) Double-click the appropriate .msi file.
- 3) Click Next to begin the XML File Setup Wizard.



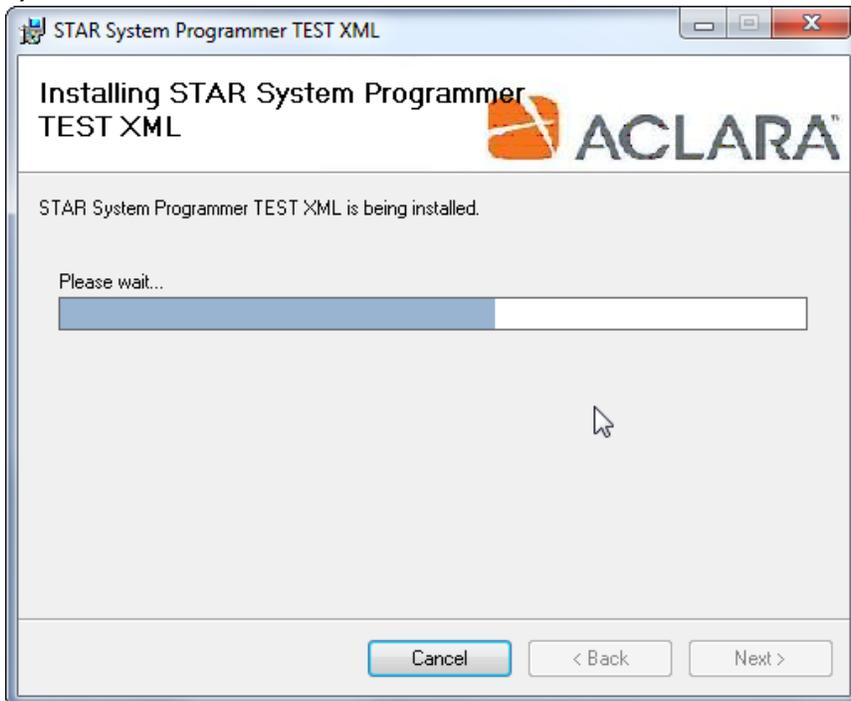
- 4) Verify the installation location, and click Next.



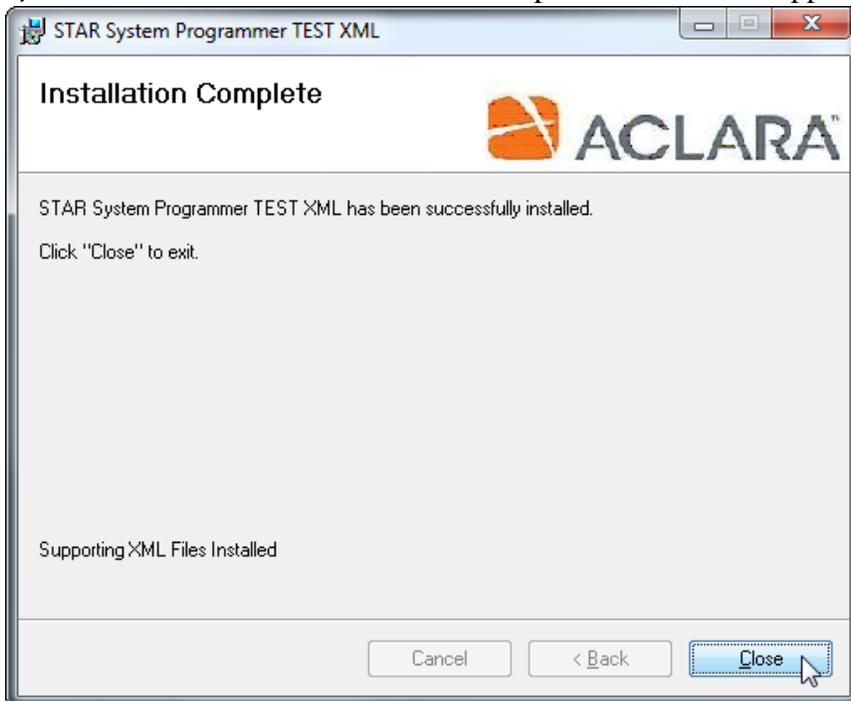
- 5) Click Next to initiate the installation.



6) Wait while the XML files are installed.



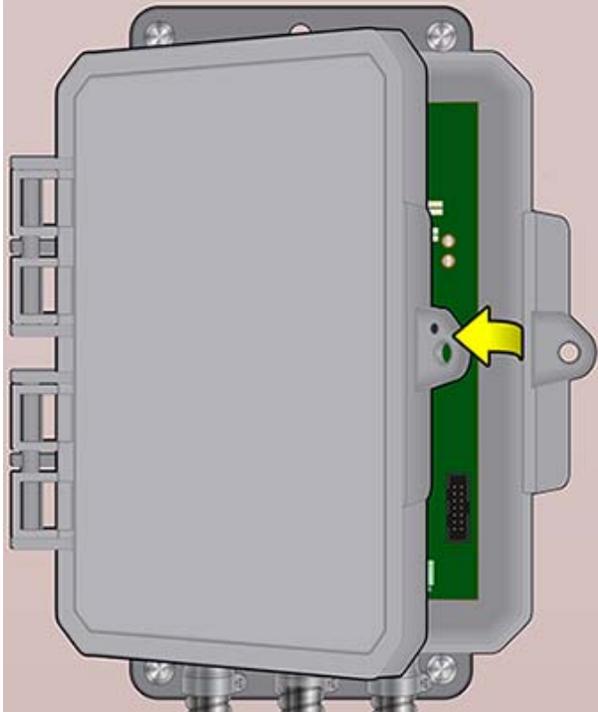
7) Click Close after the Installation Complete confirmation appears.



## Connection

Use the following procedure to connect a tablet or laptop to a Series 4000 MTU and open the STAR Programmer application.

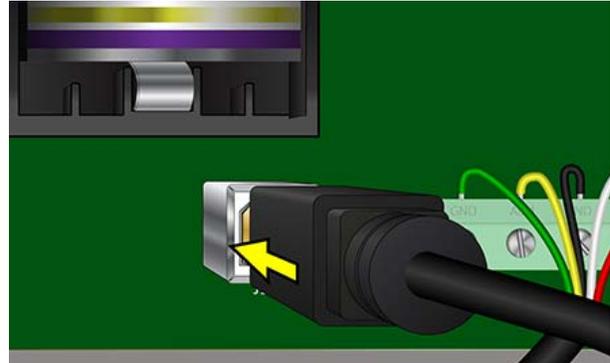
- 1) Remove any security hardware from the MTU door.
- 2) Open the door of the MTU.



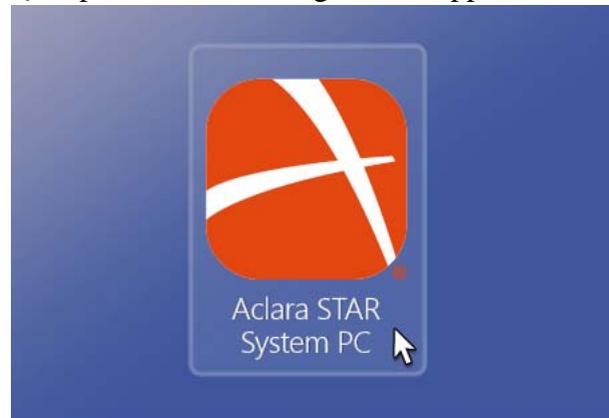
- 3) Connect the USB cable to the laptop or tablet.



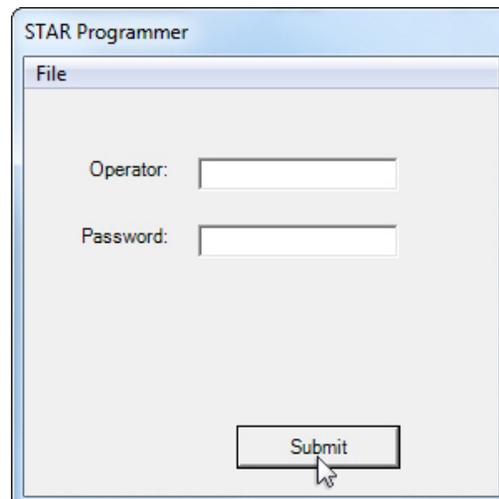
- 4) Connect the remaining end of the USB cable to the Series 4000 MTU.



- 5) Open the STAR Programmer application.

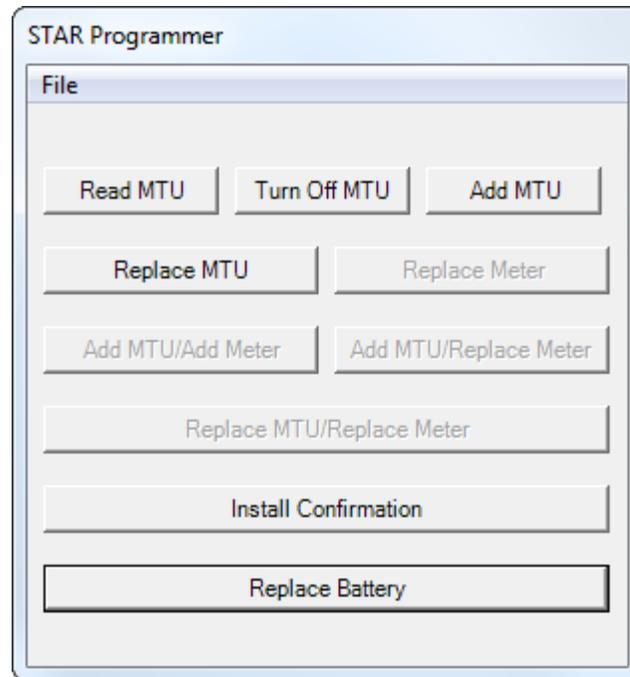


- 6) Leave the Operator and Password fields blank and click Submit.



## Operation

The STAR Programmer menu functions for Series 4000 MTUs are Read MTU, Turn Off MTU, Add MTU, Install Confirmation, and Replace Battery. Each of these functions are described in the following sections.



### Read MTU

This option allows the user to read information from the MTU and the instrument. It will also write configuration settings to the instrument. Select this option to see the current MTU settings or after changing a battery that has not completely lost power. When the user selects the Read MTU option:

- 1) Select Read MTU.

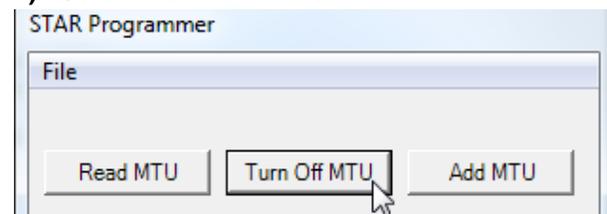


- 2) Wait while the STAR Programmer reads the MTU.
- 3) After viewing the MTU information screen, select OK to log the activity and return to the Main Menu.

### Turn Off MTU

This option allows the user to deactivate and turn off a previously commissioned MTU. When a Series 4000 MTU has been turned off, the STAR Programmer software will read the MTU Type, firmware version, and MTU ID before turning off the MTU. The MTU will cease all RF transmission and will only respond to commands sent through the USB port.

- 1) Select Turn Off MTU.

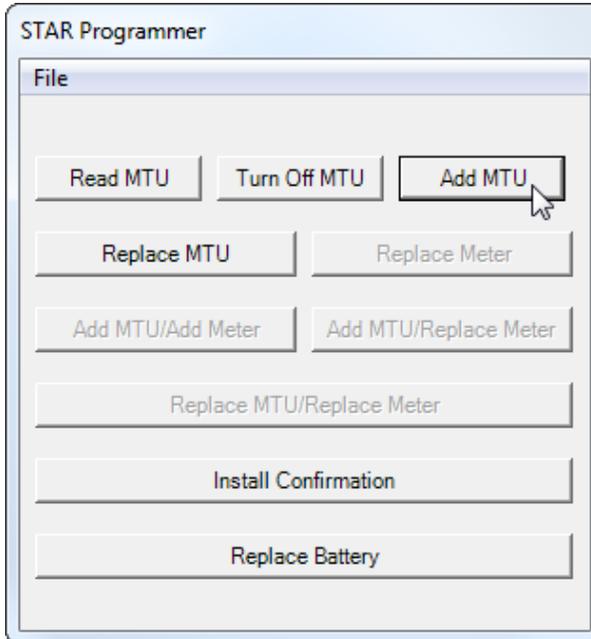


- 2) Wait while the application reads and turns off the MTU.
- 3) Click OK to log the activity and return to the Main Menu.

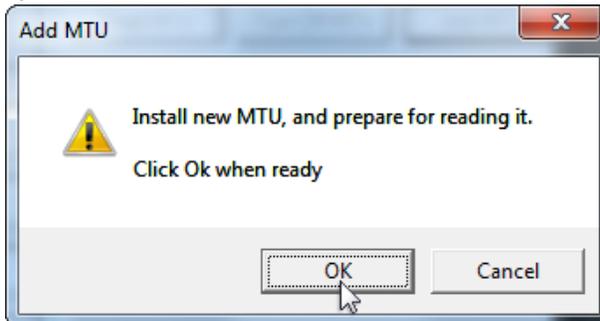
## Add MTU

Select this option to commission a new MTU or an MTU that was turned off.

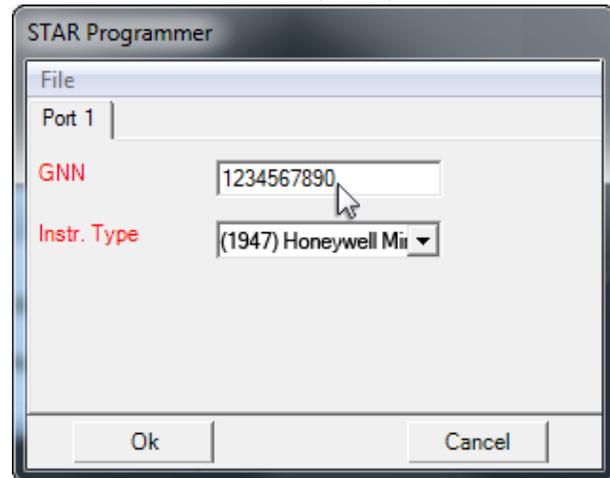
- 1) Select Add MTU.



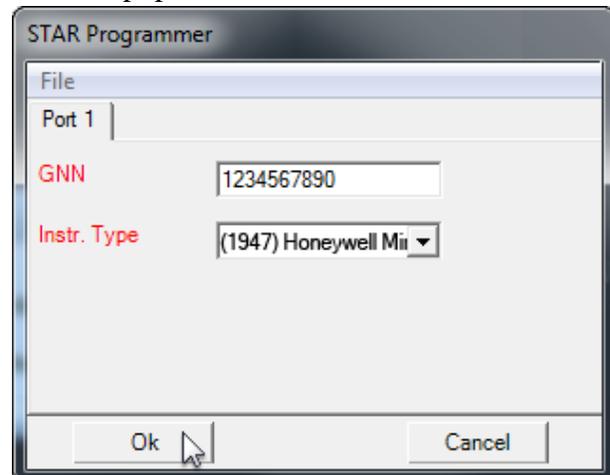
- 2) Click OK to read the MTU and instrument.



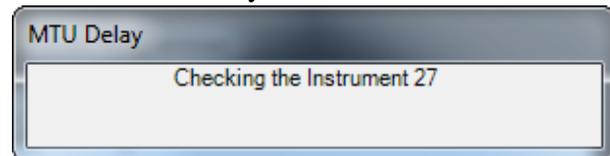
- 3) Enter the 10-digit Account Number into the Gas Network Node (GNN) field.



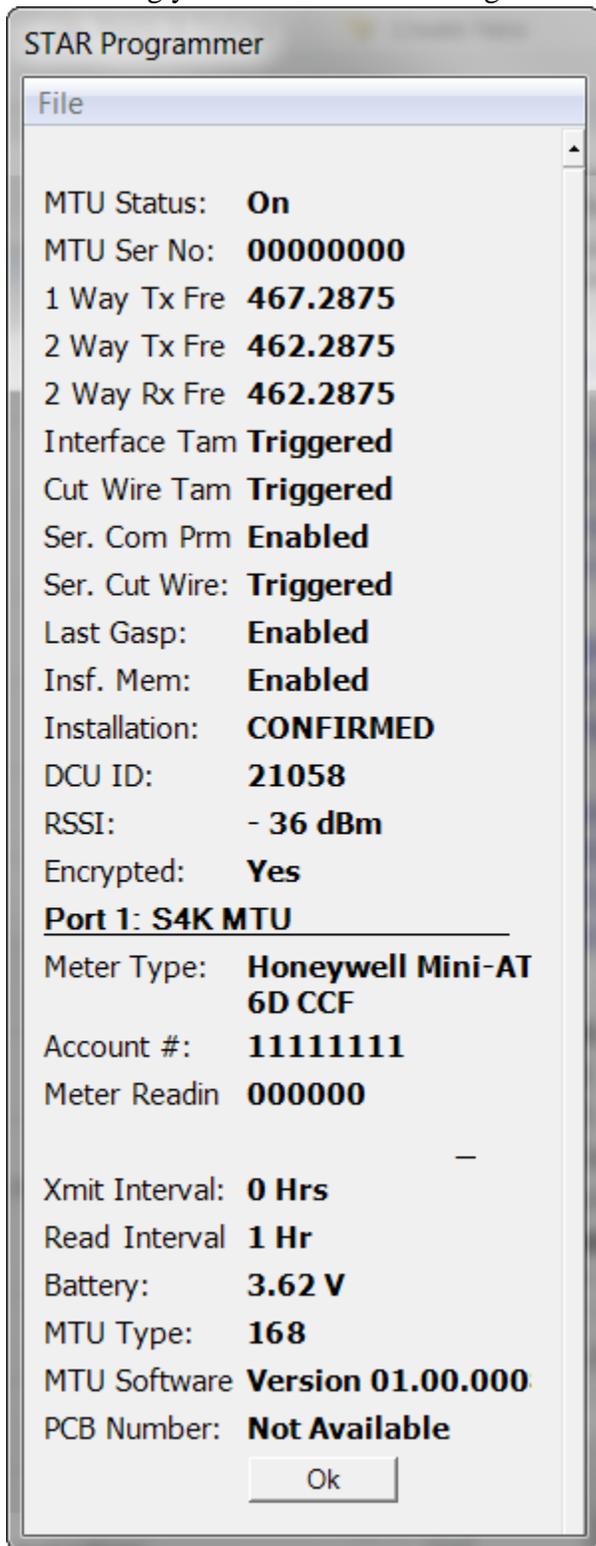
- 4) Verify the Instrument Type field has auto-populated, and click OK.



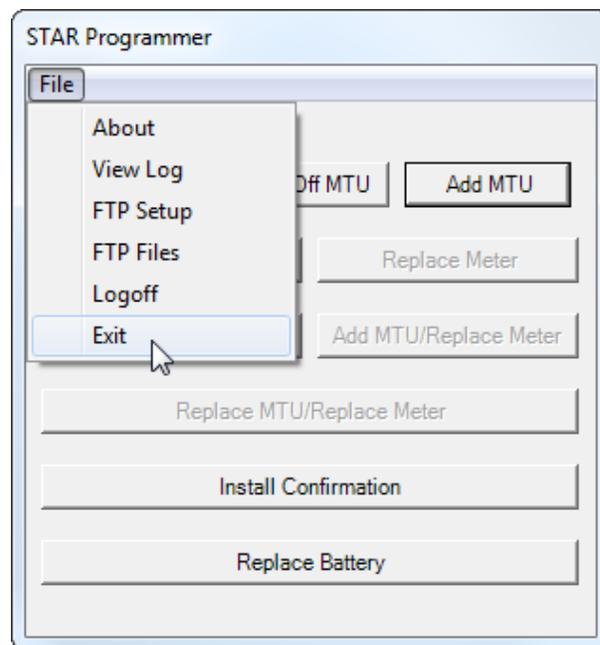
- 5) Wait while the software commissions the MTU. This may take several minutes.



- 6) Once commissioning is complete, the software will return the current values allowing you to confirm the settings.



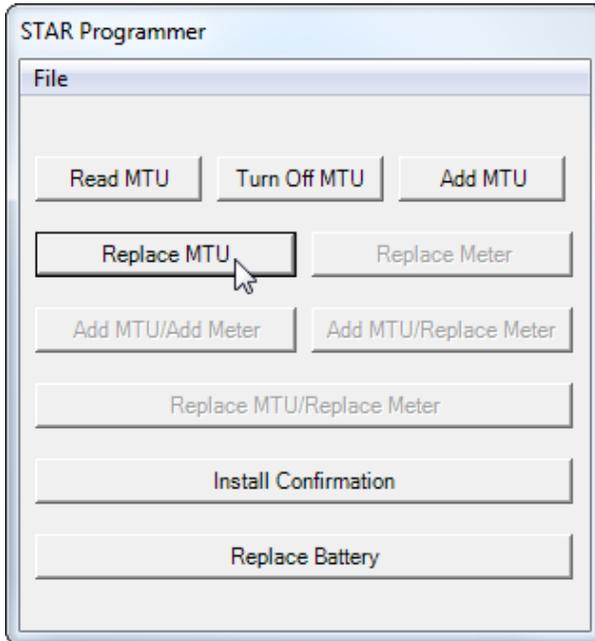
- 7) Click OK to confirm the log entry and return to the Main Menu.
- 8) To close the STAR Programmer application, select **File > Exit**.



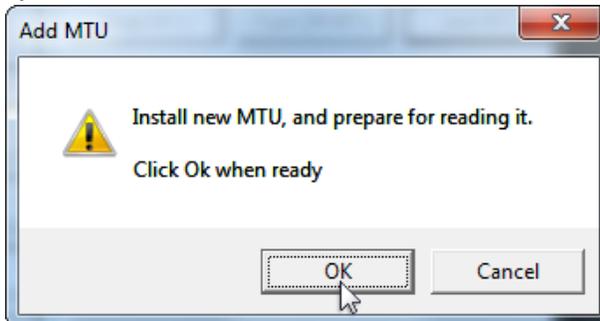
## Replace MTU

To replace an existing MTU or after installing a new battery in an MTU that has been without power for an extended amount of time, use the Replace MTU option in the STAR Programmer application.

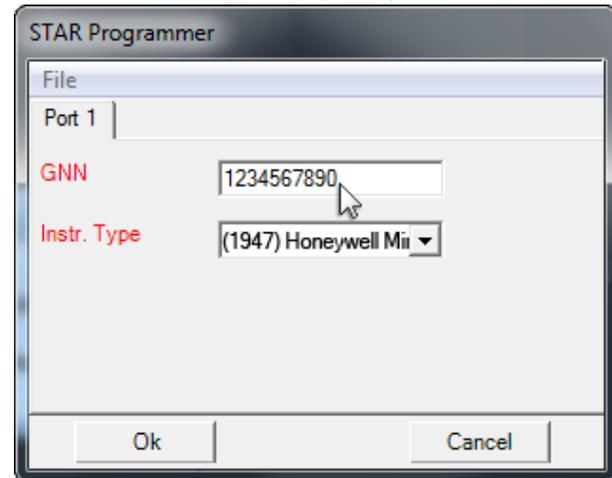
- 1) Select Replace MTU.



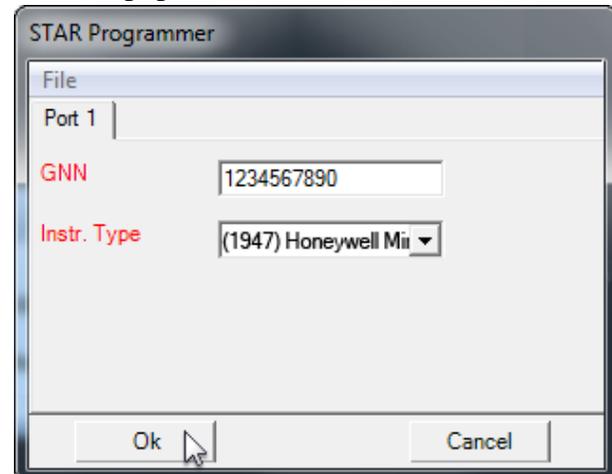
- 2) Click OK to read the MTU and instrument.



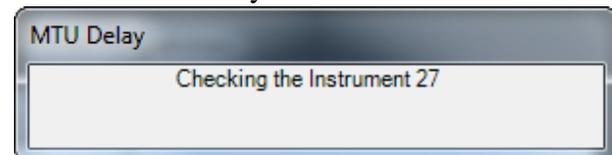
- 3) Enter the 10-digit Account Number into the Gas Network Node (GNN) field.



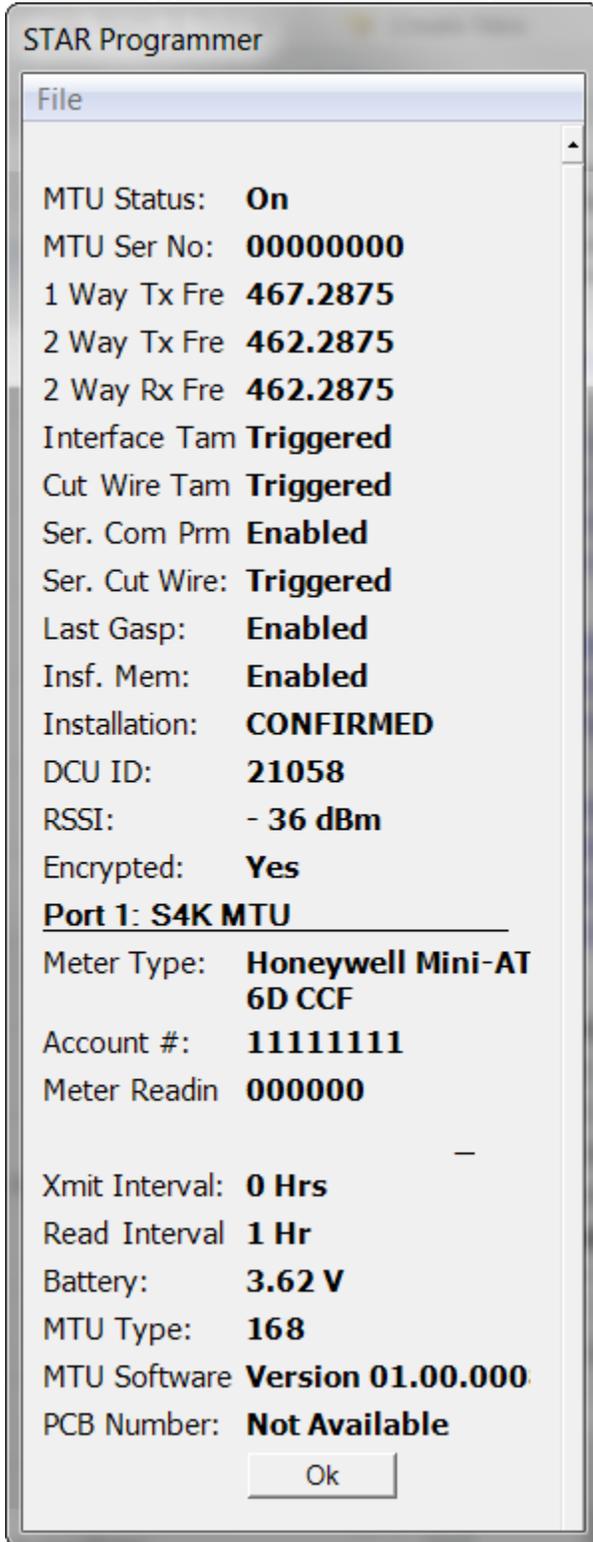
- 4) Verify the Instrument Type field has auto-populated, and click OK.



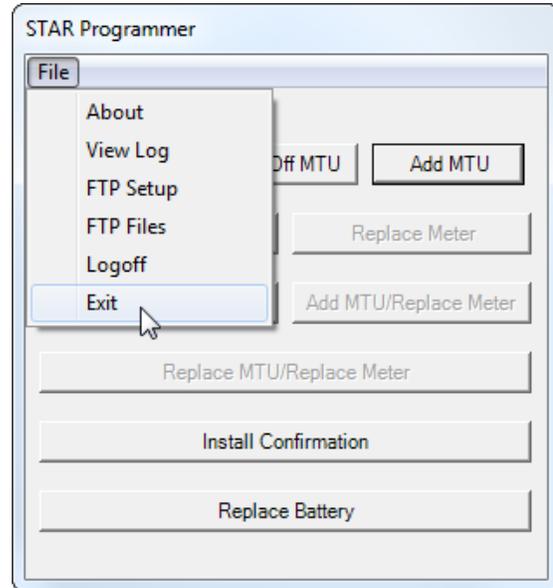
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- 6) Once commissioning is complete, the software will return the current values allowing you to confirm the settings.



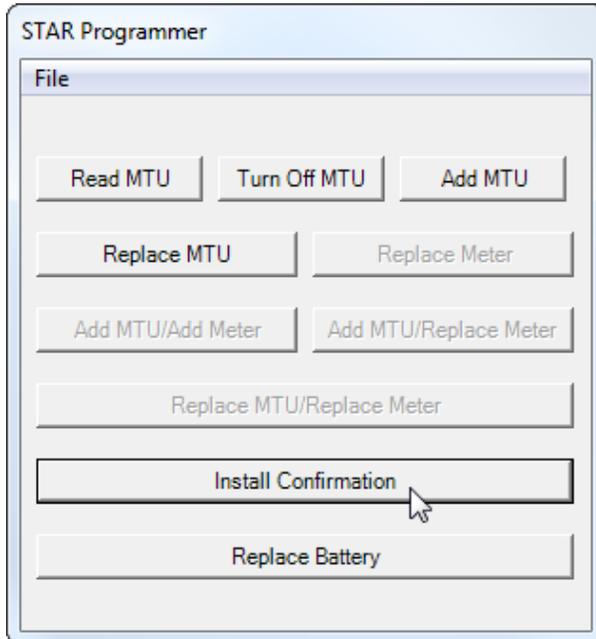
- 7) Click OK to confirm the log entry and return to the Main Menu.
- 8) To close the STAR Programmer application, select **File > Exit**.



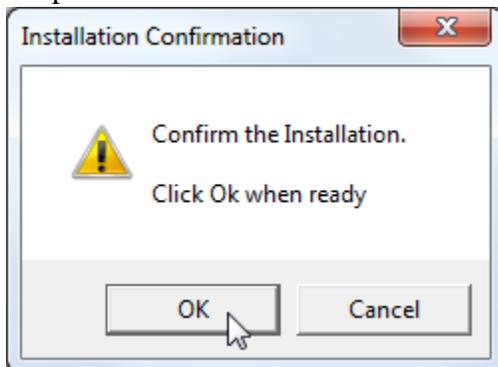
## Install Confirmation

This option allows the user to confirm that the MTU can communicate with the available DCUs and to see information about the MTU, DCU, and the communication between the two.

- 1) Select Install Confirmation.



- 2) Click OK to initiate the confirmation process.

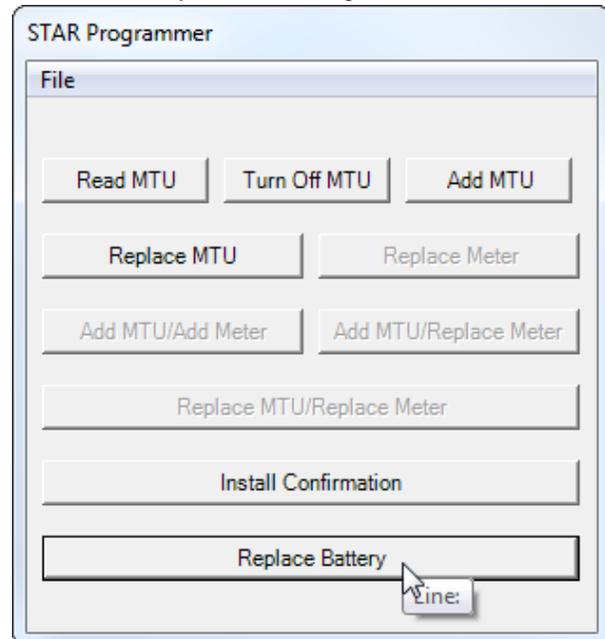


- 3) Wait while the STAR Programmer reads the MTU.
- 4) After viewing the MTU information screen, select OK to log the activity and return to the Main Menu.

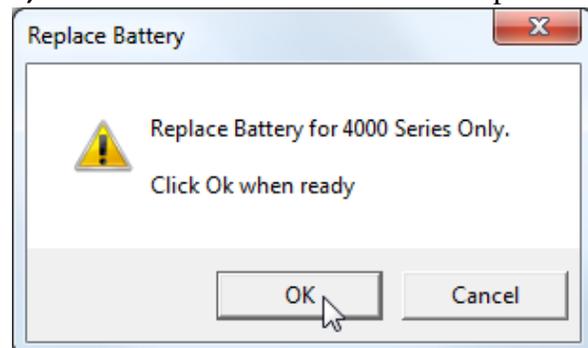
## Replace Battery

Use the following procedure after replacing the battery in the MTU.

- 1) Select Replace Battery.



- 2) Click the OK button to initiate the process.



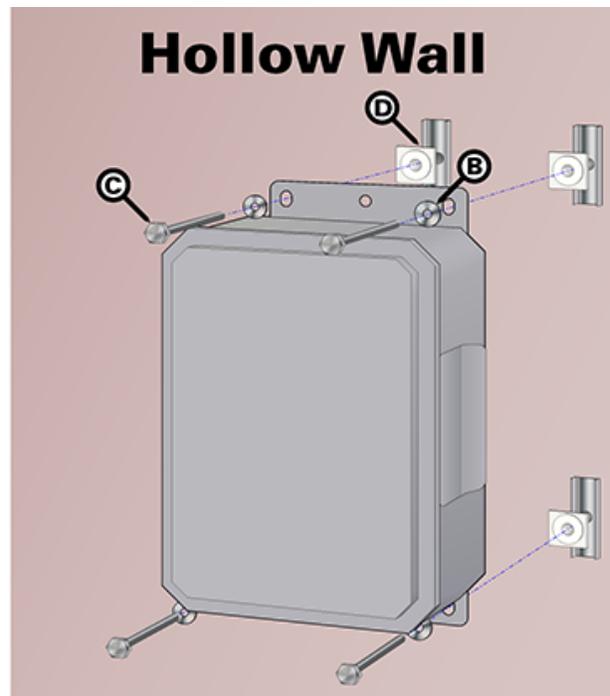
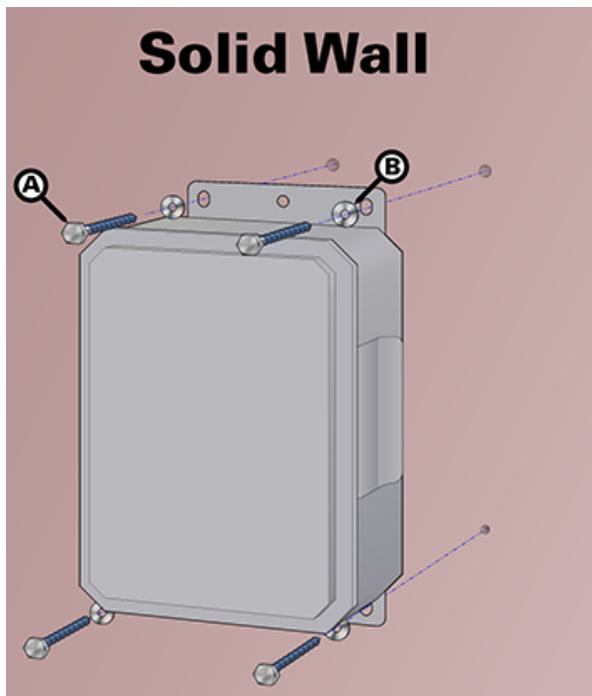
- 3) Wait while the STAR Programmer reads the MTU.
- 4) Click OK to log the activity and return to the Main Menu.

## HARDWARE INSTALLATION

Aclara offers kits to mount the Series 4000 MTU to a wall or to a pipe with an outside diameter of 2" - 3". Use the corresponding instructions to mount a Series 4000 MTU using one of these kits.

**NOTE** In addition to the mounting hardware, the installation kits also include one 10' length of conduit, two conduit fittings, one 12' length of five conductor cable, and one 12' length of two conductor cable. Please refer to the *Wiring* section on page 29 for installation procedures for these items.

### Wall Mount



#### Wall Kit #109-2015-001M-020

Item	Description	Application	Quantity
A	¼ x 2" Stainless steel wedge bolt	Solid walls	4
B	¼" Stainless steel flat washer	Solid and hollow walls	4
C	¼ - 20 x 2½" Stainless steel bolt	Hollow walls	4
D	Wall anchor	Hollow walls	4

## Solid Wall

Follow this procedure to mount the MTU to a solid wall.

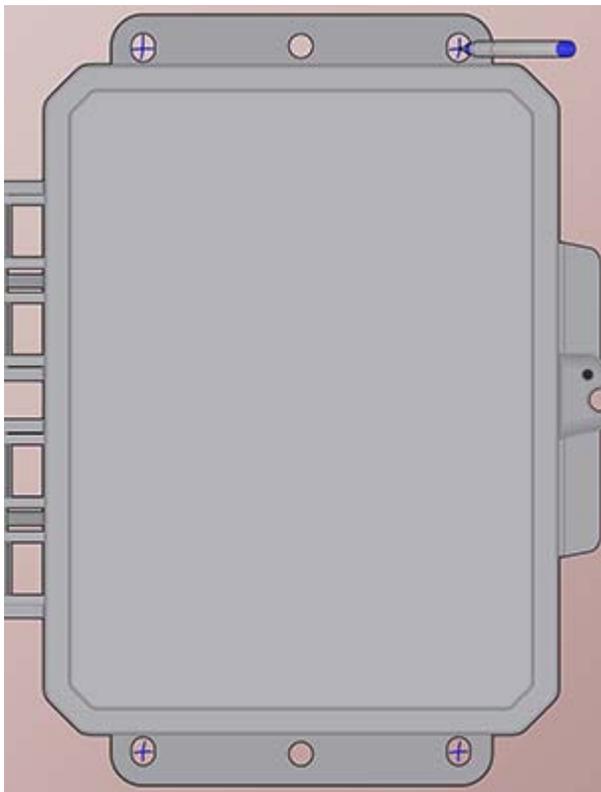
### Special Tools

In addition to standard tools and safety equipment, you will need the following tools to mount the MTU to a solid wall:

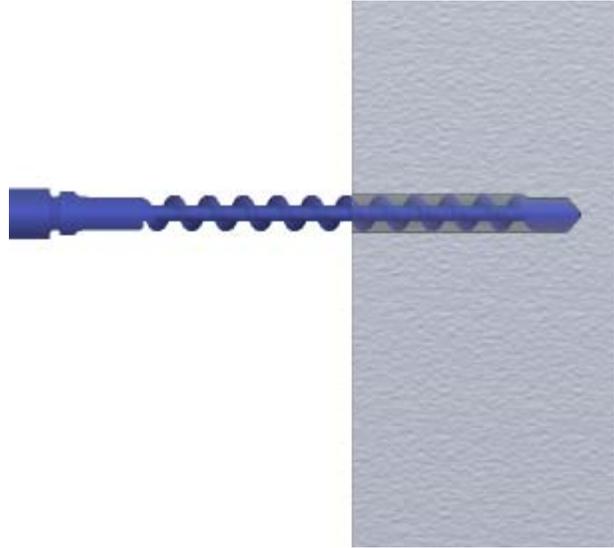
- Drill
- ¼" Wedge drill bit
- 0-35 ft-lb Torque-limiting wrench

### Instructions

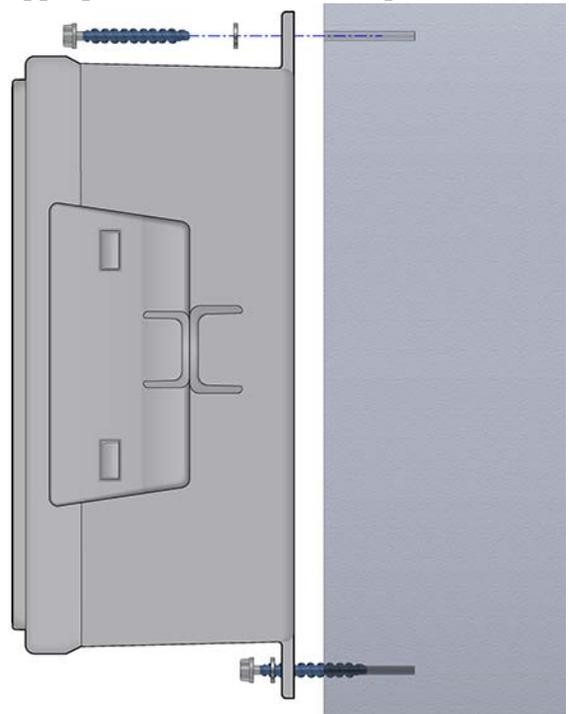
- 1) Determine the appropriate mounting location for the MTU. Keep RF signal propagation in mind when choosing a location.
- 2) Position the MTU against the wall at the desired location and mark locations for the four bolt holes.



- 3) Drill holes at the four marked locations with a ¼" Wedge Bit.



- 4) Insert a wedge bolt through a flat washer and one of the mounting holes on the MTU.
- 5) Thread the bolt partially into the appropriate hole drilled in step 3.



- 6) Repeat steps 4 and 5 for the remaining bolts.
- 7) Tighten all four wedge bolts to 27-33 ft-lb.

## Hollow Wall

Follow this procedure to mount the MTU to a hollow wall.

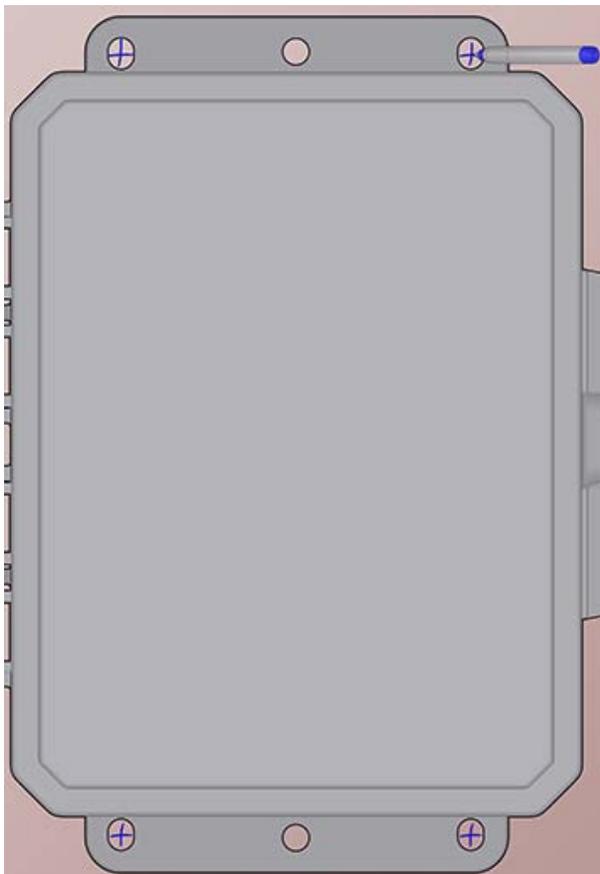
### Special Tools

In addition to standard hand tools and safety equipment, you will need the following tools to mount the MTU to a hollow wall:

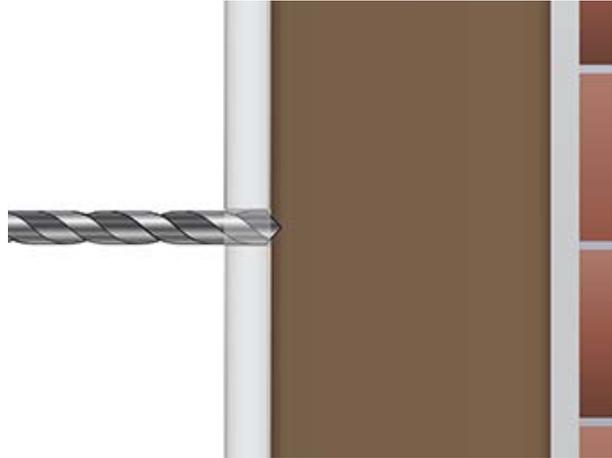
- Drill
- ½" Drill bit
- 0-10 ft-lb Torque-limiting wrench

### Instructions

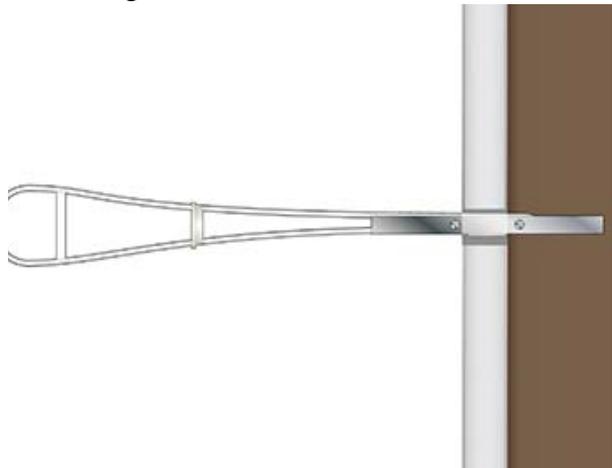
- 1) Determine the appropriate mounting location for the MTU. Keep RF signal propagation in mind when choosing the location.
- 2) Position the MTU against the wall at the desired location and mark locations for the four bolt holes.



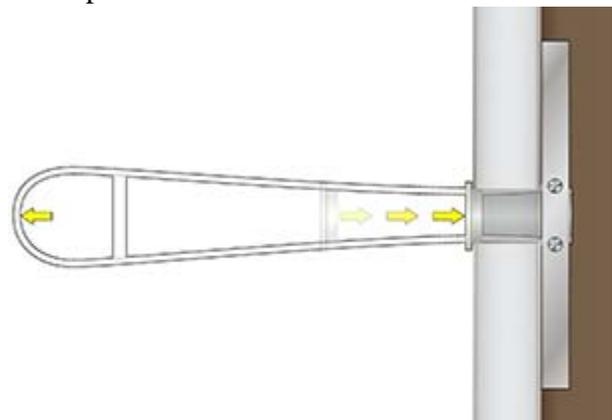
- 3) Drill holes at the four marked locations with a ½" drill bit.



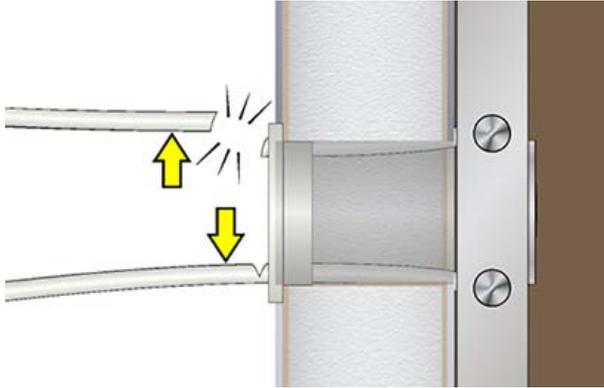
- 4) Insert the anchor end of one wall anchor through one of the drilled holes.



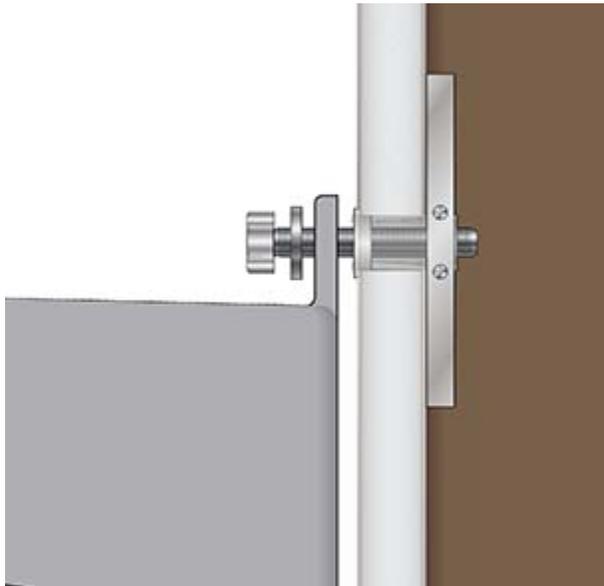
- 5) Pull the anchor until it is tight against the back side of the wall surface. Then slide the cap forward until it is flush with the wall.



- 6) Snap off the excess strap by pressing the top strap up and the bottom strap down.

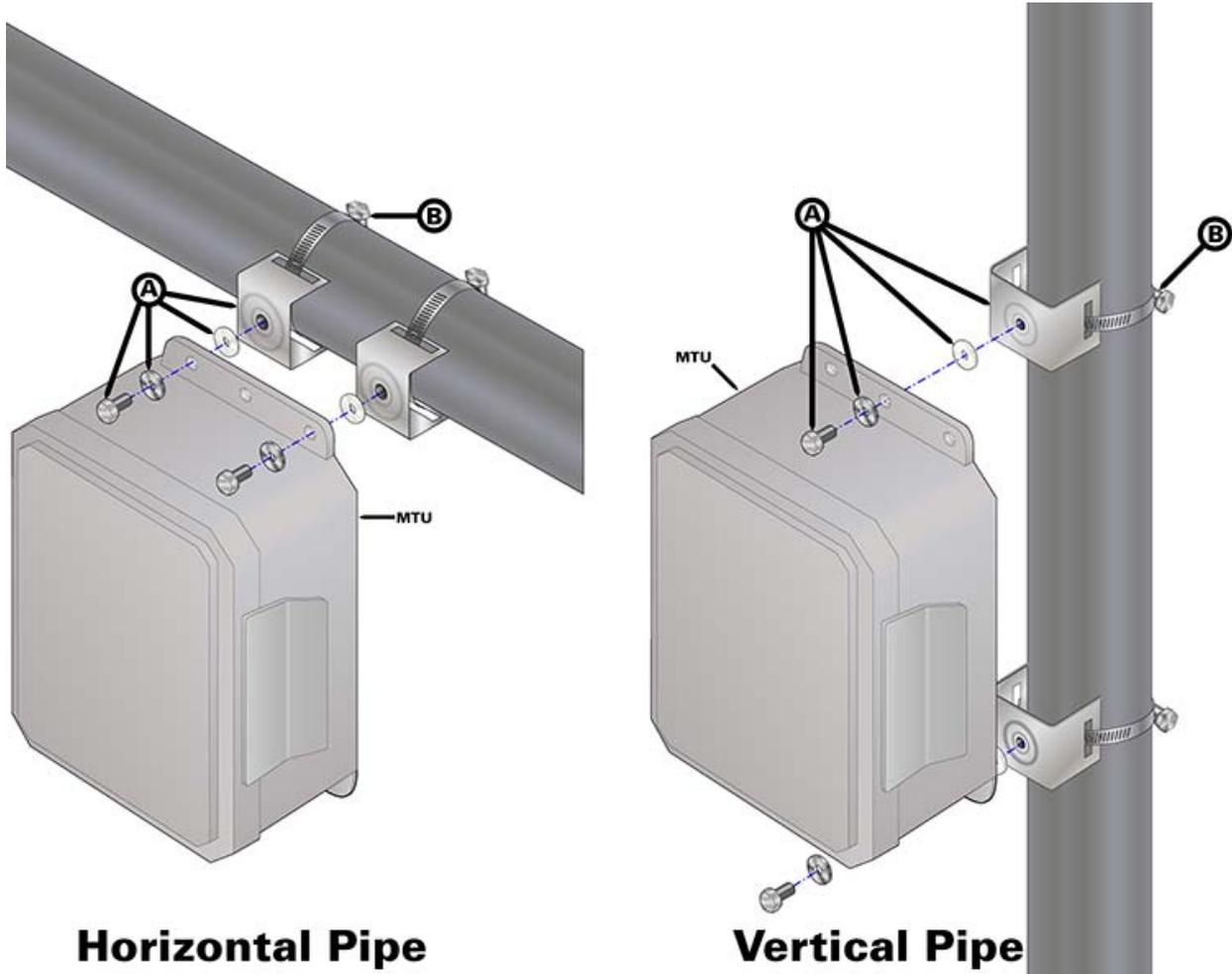


- 7) Repeat Steps 4-6 for the three remaining anchors.
- 8) Place a flat washer on each of the bolts, and insert the bolts through the mounting holes of the MTU.
- 9) Thread each bolt into the appropriate anchor.



- 10) Tighten each bolt to 5-7 ft. lbs.

## Pipe Mount



**Horizontal Pipe**

**Vertical Pipe**

### Pipe Mount Kit #109-2015-001M-21

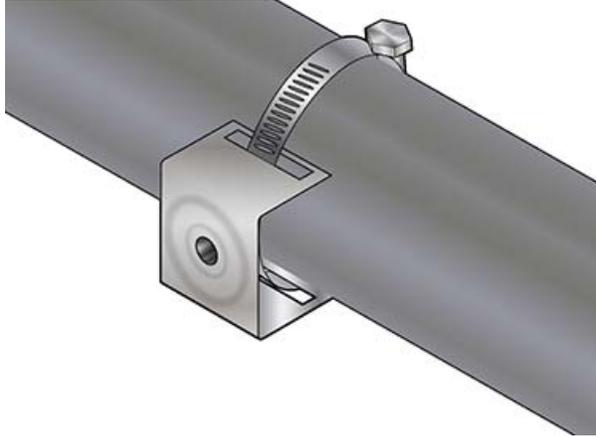
Item	Description	Quantity
A	Bracket assembly ( $\frac{5}{16}$ "-18 bolt, metal washer, nylon washer, & bracket)	2
B	2" - 3" Screw-drive tube clamp	2

## Special Tools

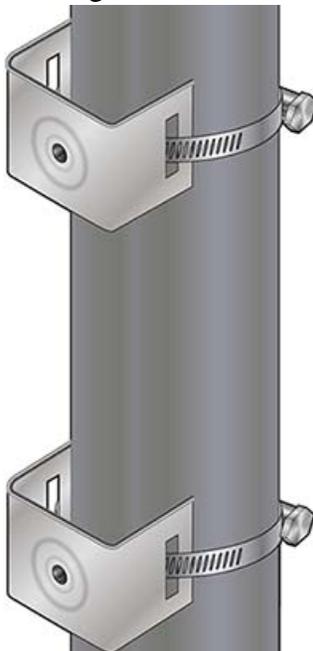
In addition to standard hand tools and safety equipment, the Pipe Mounting kit also requires the following:

- 0-20 ft-lb Torque-limiting wrench
- 0-10 in-lb Torque-limiting wrench or screwdriver

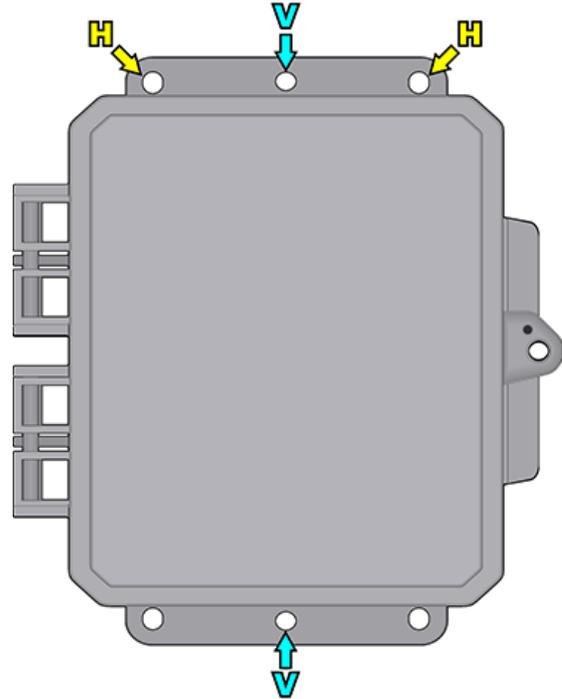
- 1) Thread one of the clamps through both slots in one of the brackets and around the pipe.



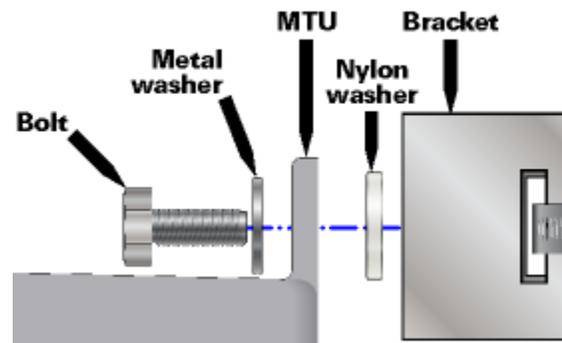
- 2) Rotate the bracket to the desired mounting position and tighten the clamp just enough to maintain bracket position.
- 3) Thread the remaining clamp through the remaining bracket and around the pipe.



- 4) There are three mounting holes at the top of the MTU and three at the bottom.
  - If mounting to a **H**orizontal pipe, use the top left and top right mounting holes.
  - If mounting to a **V**ertical pipe, use the top center and bottom center mounting holes.



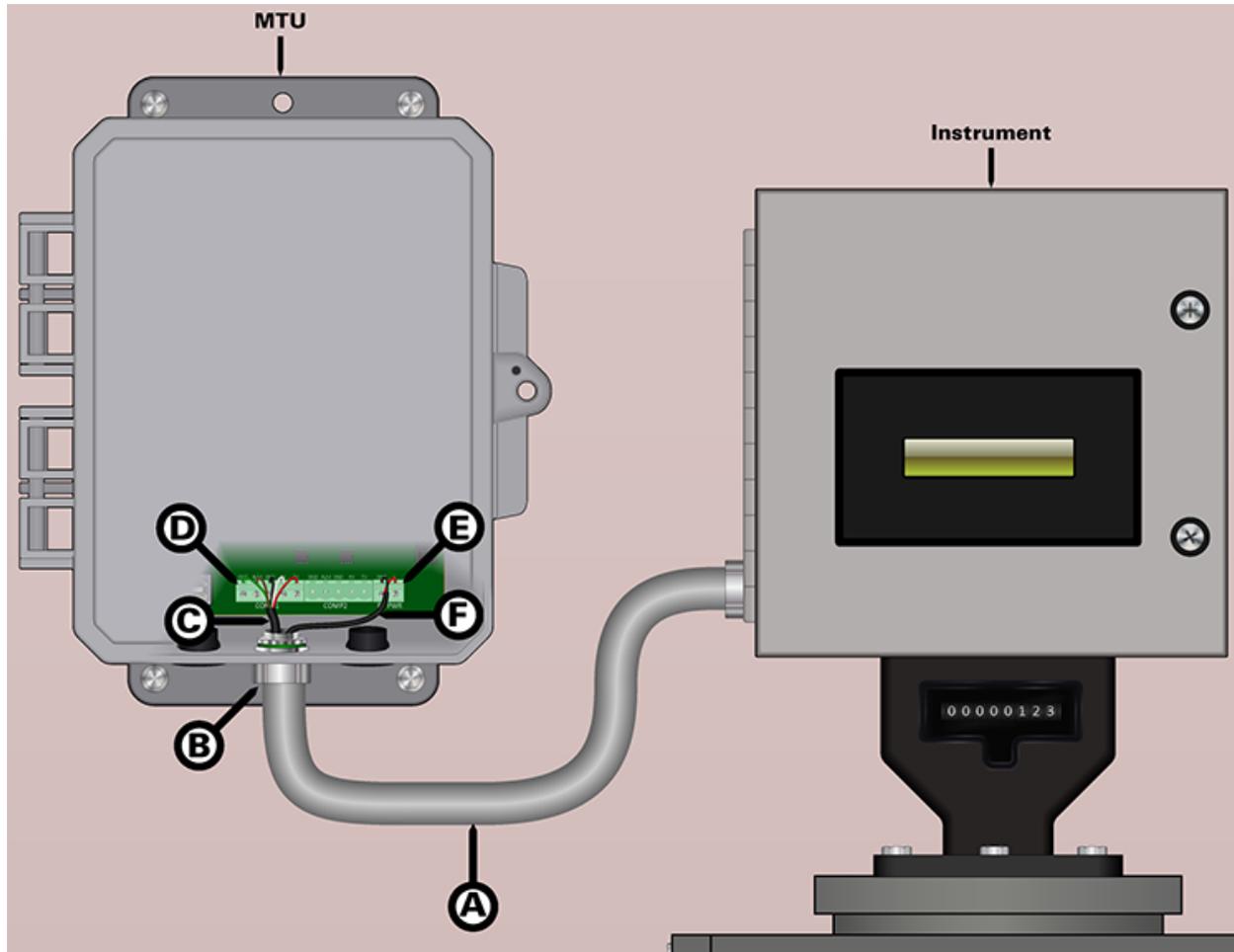
- 5) Insert one of the bolts through a metal washer, the appropriate MTU mounting hole, and a nylon washer before threading it into the bracket.



- 6) Repeat step 5 with the remaining hardware to secure MTU to the remaining bracket.
- 7) Tighten both clamp screws to 7-9 in-lb.
- 8) Tighten both bracket bolts to 14-16 ft-lb.

## Wiring

Use the following instructions to connect the MTU to a Honeywell electronic pressure monitor or volume corrector.

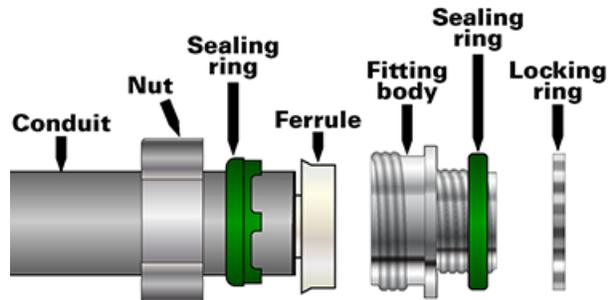


Item	Description	Quantity
A	10' Conduit <i>(Included in mounting kit)</i>	1
B	½" Conduit fitting <i>(Included in mounting kit)</i>	2
C	12' Five conductor cable <i>(Included in mounting kit)</i>	1
D	Five pin mating terminal <i>(Included with MTU)</i>	1
E	Two pin mating terminal <i>(Included with MTU)</i>	1
F	12' Two conductor cable <i>(Included in mounting kit)</i>	1

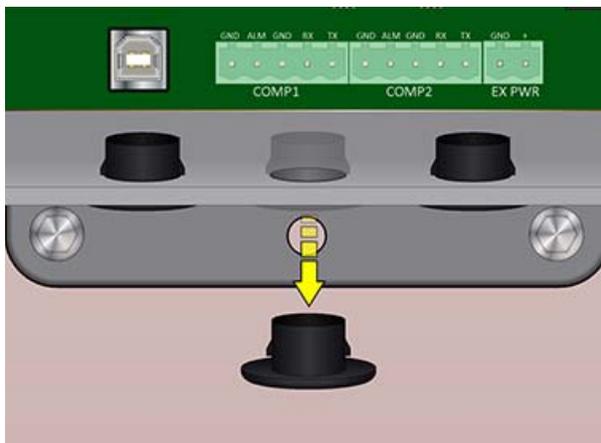
**NOTE:** This equipment provides non-incendive field wiring outputs for Class I, Division 2, Group D.

## Conduit & Fittings

The cable connecting the MTU to the instrument must be routed through the included conduit. Use the following procedure to install the conduit.

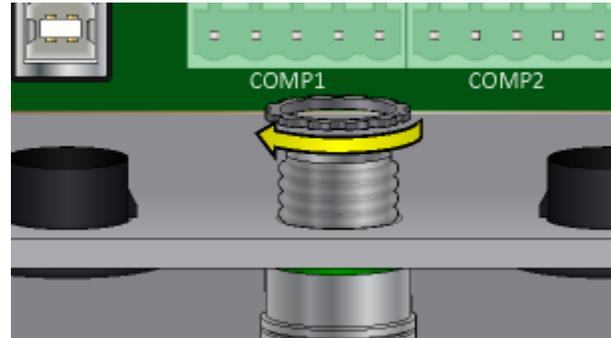


- 1) Remove the nut, sealing ring, and ferrule from one of the conduit fittings.
- 2) Slide the nut and sealing ring over the end of the conduit.
- 3) Insert the ferrule into the end of the conduit.
- 4) Thread the fitting body over the ferrule and secure by tightening the gland nut. Tighten the nut to 28-32 in-lb.
- 5) Repeat steps 1-4 to secure the remaining fitting to the other end of the conduit.
- 6) Remove a weather seal plug from the bottom of the MTU enclosure.



- 7) Remove the lock ring from one of the conduit fittings and insert the fitting body into the opening in the bottom of the MTU.

- 8) Secure the fitting to the MTU with the lock ring. Tighten the ring to 15-19 in-lb.



- 9) Route the conduit to the instrument.

**CAUTION** Do not bend the conduit smaller than a 3" radius.

- 10) Remove the lock ring from the remaining conduit fitting and insert the fitting body into an available opening in the pressure monitor or volume corrector enclosure.
- 11) Secure the fitting to the instrument enclosure with the lock ring. Tighten the ring to 15-19 in-lb.

## MTU Connections

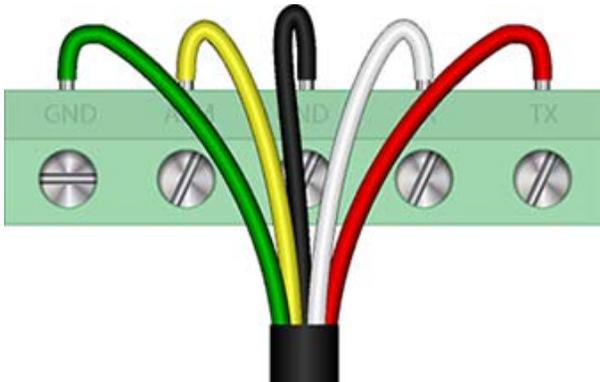
Use the following information when connecting the cables to the MTU.

- 1) Route the cable through the conduit.
- 2) Use the following information to connect the cable wires to the MTU mating connector. Secure each wire into the connector by tightening the corresponding set screw.

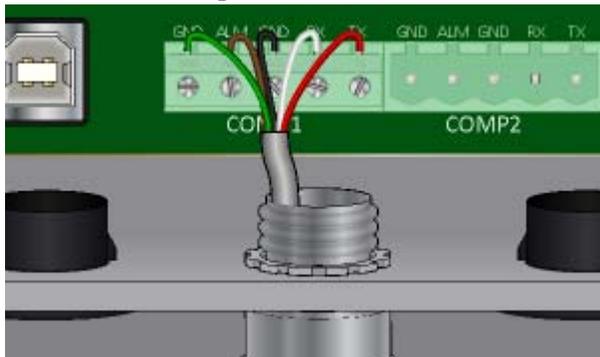
### Comp1

- 1) Use the five conductor cable to connect the communication terminals on the MTU with the instrument.

MTU Connector	Wire
GND (Ground)	Green
ALM (Alarm)	Yellow
GND (Ground)	Black
TX (MTU Transmission)	White
RX (MTU Reception)	Red



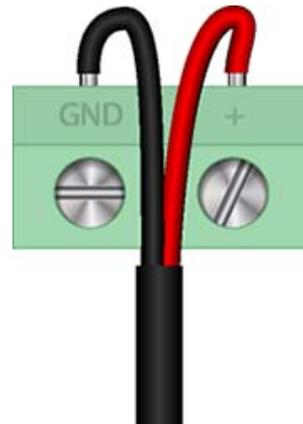
- 2) Plug the MTU mating connector into the COMP1 receptacle.



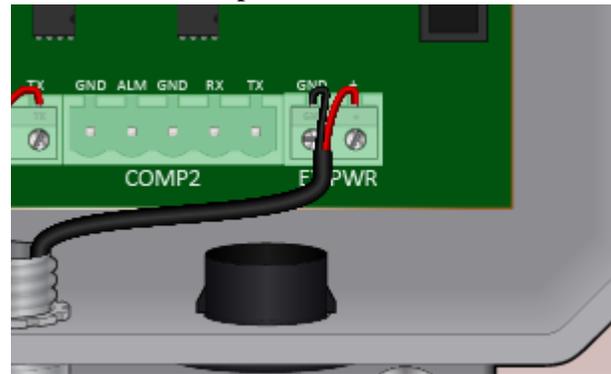
## Optional Power

- 1) Use the two conductor cable to connect the MTU to an instrument supplied 10-15 VDC power source.

MTU Connector	Wire
GND (10-15 VDC ground)	Black
+ (10-15 VDC positive)	Red



- 2) Plug the MTU mating connector into the EX PWR receptacle.

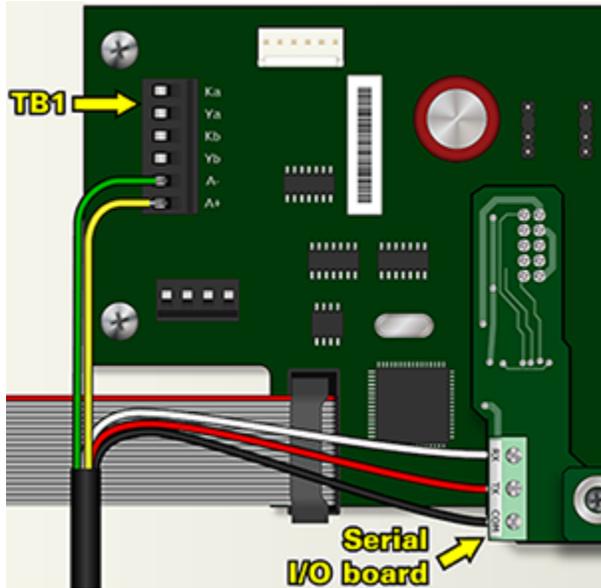


## Instrument Connections

Use the information for the appropriate meter type to connect the MTU cable(s) to the instrument. Refer to the *Electrical Connection Parameters* table for electrical parameters of each connector.

### Mini-Max or ERX

Use the following information to connect the MTU cable to a Honeywell Mini-Max volume corrector or ERX pressure monitor.

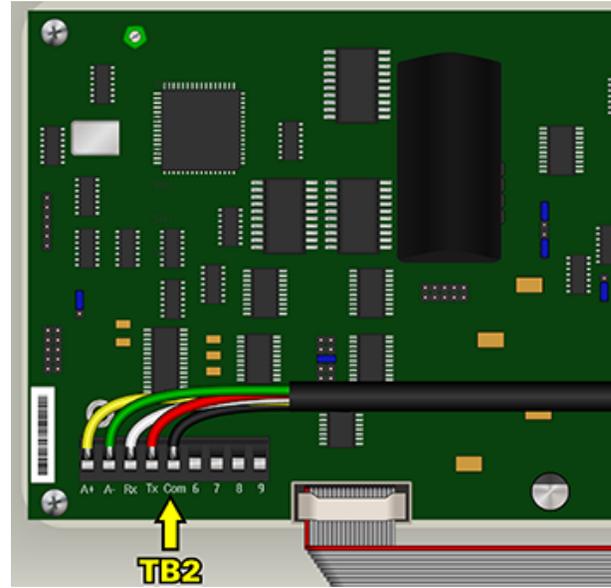


#### COMP1

MTU	Wire	Mini-Max or ERX
GND	Green	TB1 A- (Ground)
ALM	Yellow	TB1 A+ (Alarm)
GND	Black	Serial I/O GND (Ground)
TX	White	Serial I/O RX (Receive)
RX	Red	Serial I/O TX (Transmit)

### Mini-AT

Use the following information to connect the MTU cable to the TB2 connector on a Honeywell Mini-AT volume corrector.



#### COMP1

MTU	Wire	Mini-AT
GND	Green	A- (Ground)
ALM	Yellow	A+ (Alarm)
GND	Black	Com (Ground)
TX	White	RX (Receive)
RX	Red	TX (Transmit)

### External Power (Optional)

Connect the red (positive) and black (ground) wires from the MTU to an appropriate 10-15 VDC auxiliary power source on the instrument. Please refer to specific instrument documentation for detailed information.

#### Electrical Connection Parameters

COMP1 & COMP2 (J6 & J7) Input	Output	External Power (J12) Input
$U_i = 12 \text{ V}$	$U_o = 3.5 \text{ V}$	$U_i = 15 \text{ V}$
$I_i = 4 \text{ mA}$	$I_o = 60 \text{ mA}$	$I_i = 45 \text{ mA}$
$P_i = 50 \text{ mW}$	$P_o = 210 \text{ mW}$	$P_i = 675 \text{ mW}$
$C_i = 250 \text{ pF}$	$C_o = 0 \text{ pF}$	
$L_i = 0$	$L_o = 0$	

## Commissioning

After installing and connecting the MTU to the instrument, it is necessary to commission the MTU using the *Add MTU* function of the STAR Programmer software. Please refer to the *STAR Programmer Software* section on page 7 for more information on connecting the STAR Programmer and adding an MTU.



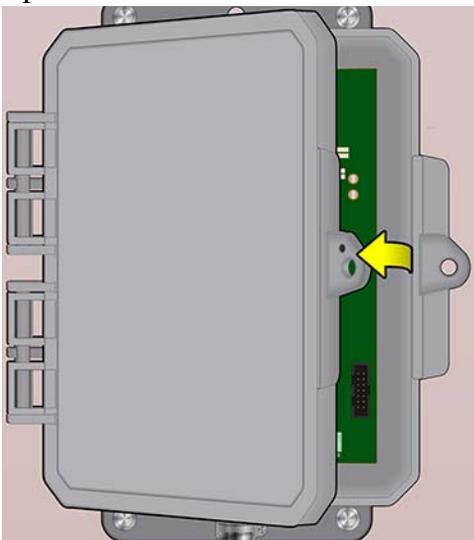
# MAINTENANCE

The Series 4000 MTU is designed to be largely maintenance free. Periodic replacement of the battery, however, will be necessary over the life of the MTU. The Series 4000 MTU is powered by a 3.6V lithium, D cell battery (Aclara part number 042-0049). The NCC reports regular battery voltage readings, and also provides a low battery warning to provide ample time for the utility to replace a battery without loss of data. Use the following procedure to replace the battery in a Series 4000 MTU.

**WARNING: EXPLOSION HAZARD - BATTERIES MUST ONLY BE CHANGED IN AN AREA KNOWN TO BE NON-HAZARDOUS**

**AVERTISSEMENT: RISQUE D'EXPLOSION - AFIN D'ÉVITER OUT RISQU D'EXPLOSION, S'ASURER QUE L'EMPLACEMENT EST DÉSIGNÉ NON DANGEREUX AVANT DE CHANGER LA BATTERIE.**

- 1) Remove any security hardware from the MTU door.
- 2) Open the door of the MTU.
- 5) Remove the battery from the battery holder.
- 6) Insert the new battery into the battery holder. The holder is keyed so the battery can only be installed in one direction.



**NOTE:** A backup capacitor will maintain MTU memory during battery replacement provided power is not removed for longer than 10 minutes. Extended power outages may require recommissioning the MTU.

- 3) Note the polarity orientation of the battery.
- 4) Press in on the tab to release the battery tie.



- 7) Secure the new battery into the holder by threading the tapered end of the tie through the open end and pulling until snug against the battery.
- 8) Use the STAR Programmer to log the battery replacement.
  - Connect the STAR Programmer and select **Read MTU** to record the battery replacement in the activity log. Please see *Read MTU* on page 17 for more information.
  - If the MTU was without power for an extended period of time, use the **Replace MTU** option on the STAR Programmer Main Menu. Please see *Replace MTU* on page 20 for more information.
- 9) Close and secure the MTU door according to utility standard practices.