Liquid Ultrasonic Flowmeters

Smith Meter®
Ultra™ Series C Remote Display

Installation / Operation / Maintenance Manual

+FMC Technologies

Important

All information and technical specifications in this documentation have been carefully checked and compiled by the author. However, we cannot completely exclude the possibility of errors. FMC Technologies is always grateful to be informed of any errors.

Smith Meter® is a registered trademark of FMC Technologies.

Customer Support

Contact Information:
Customer Service
FMC Technologies Measurement Solutions, Inc.
1602 Wagner Avenue
Erie, Pennsylvania 16510 USA
P: +1 814 898-5000
F: +1 814 899-8927
measurement.solutions@fmcti.com
www.fmctechnologies.com

Table of Contents

1 – Overview

The Ultra Series Ultrasonic Flowmeter Remote Display Unit is a touch screen display designed to be used as an HMI for FMC Technologies equipment with a web based operator interface. The display is enclosed in an explosion proof housing and is designed to be located outdoors and in hazardous environments. The Remote Display Unit includes all software for configuring connections to the desired equipment and includes security functions for compliance with WELMEC standards for weights and measures. Once configured, the display will automatically connect to the desired Ultra Series flowmeter upon start up.

1.1   Features

- **Touch Screen Display** – The touch screen display is pressure sensitive and can be activated with gloved hands.

- **Security** – The display includes built in security features for compatibility with WELMEC standards for custody transfer.

- **Configurable** – The display can be configured to search for any FMC Technologies Ultra Series meter on the network. Once configured the display will automatically connect to the configured device.

- **Automatic Connection** – Once configured the display will automatically connect to the configured device upon reboot.

1.2   Specifications

See specification sheet SSLS008, 5.7" Remote Display.

1.3   Receipt of Equipment

When the equipment is received, the outside packing case should be checked immediately for any shipping damage. If the packing case has been damaged, the local carrier should be notified at once regarding their liability. Carefully remove the unit from its packing case and inspect for damage.

If damage has occurred during shipment or parts are missing, a written report should be submitted to the Customer Service department by using the contact information at the beginning of this manual.

Prior to installation, the unit should be stored in its original packing case and protected from adverse weather conditions and abuse. Throughout the installation process, the electronics should be protected from adverse weather conditions.

2 – Installation

2.1.   Mechanical Installation

2.1.1.   General

The display is designed to be mounted to a plate through the holes tapped in to the rear of the housing using size M6 x 1.8 screws.
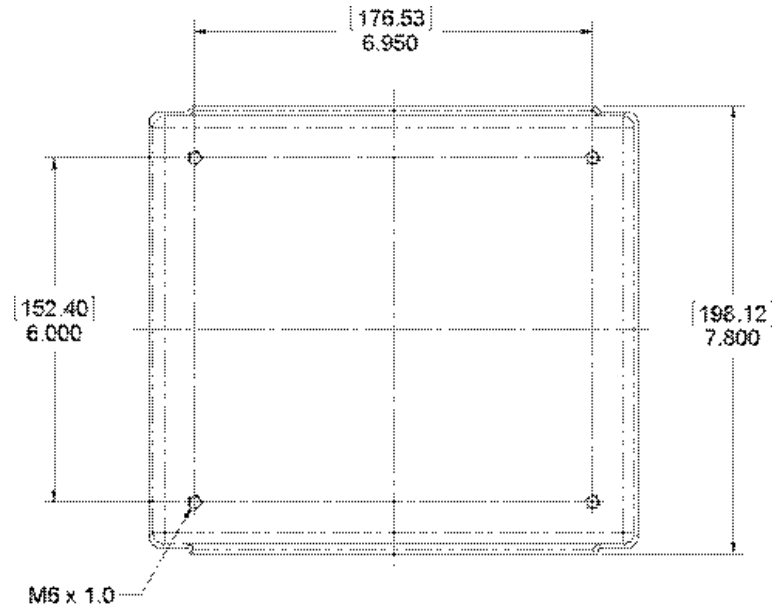
The display unit must be supplied with an Ethernet RJ45 connection and 24 VDC power. The cable, conduit and conduit fittings for these connections must meet installation requirements, such as hazardous area classifications, humidity, temperature, voltage, current and others. All conduit connections must be installed with approved conduit seals within the required distance according to the applicable electrical code(s).

The touch screen is protected by an intrinsic safe barrier. The enclosure must be grounded as per national electrical code regulations, for example NEC/CEC etc.

2.1.2.   For ATEX and IEC Ex Installations

The following installation instructions apply for the certified equipment listed in the equipment covered portion of the table below as per section 1.06 of Annex II of Directive 94/9/EC (ATEX Directive):

Standards used:

IEC 60079-0 6th Edition, EN 60079-0: 2012, UL 60079-0 4th Edition

IEC 60079-1 6th Edition, EN 60079-1: 2007, UL 1203 4th Edition

IEC 60079-11 6th Edition, EN 60079-11: 2012, UL 60079-ll 5th Edition, UL 913 7 Edition UL 1203 4th Edition

Cable entries must be in accordance to EN/IEC 60079-1 section 13.

For wiring systems utilizing cable glands, the gland and/or thread adaptor must be

Ex d certified. The cable end must be securely installed and, depending on the cable type, be properly protected from mechanical damage.

For wiring systems utilizing conduit, an Ex d certified sealing device must be used immediately at the entrance of the enclosure. Any unused entry must be suitably blocked with an Ex d certified plug.

The maximum ambient temperature for the enclosure is 60°C; if the enclosure is directly mounted to a process piping system that exceeds this value then the enclosure shall be remotely mounted to guarantee the 60°C ambient is not exceeded.

Equipment bonding shall be provided at the external grounding facility terminal. External connection is not required when using metallic conduit or armored cable.

CAUTION: To prevent ignition of hazardous atmospheres and to prevent electrical shock, disconnect from supply circuits before opening, keep tightly closed when circuits are in operation.

CE 0539 $\langle Ex \rangle$ II 2G
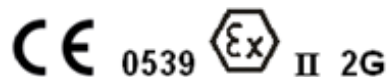
Marking	Equipment Covered	Certificate
Ex d ib IIB T5 Gb IP66 Tamb = -40°C to +60°C	Remote Mounted Display	DEMKO 13 ATEX 1204991X IEC Ex UL 13.0019X

WARNING: Contains internal battery-powered circuit to prevent ignition of hazardous atmospheres, do not open enclosure unless area is known to be non-hazardous. To reduce the risk of ignition of hazardous atmospheres, conduit runs must have a sealing fitting connected within 18 inches of the enclosure. Substitution of components may impair intrinsic safety.

Special conditions for safe use:

• Select wiring and cable glands suitable for 90°C operation.

• Contact manufacturer at address listed for information on the dimensions of the flameproof joints.

  FMC Technologies Measurement Solutions, Inc.
  1602 Wagner Avenue
  Erie, Pennsylvania 16510
  USA

2.1.3. For North American Installations:

Conduit connections must be in accordance to: USA – National Electric Code (NFPA 70), Canada – Canadian Electric Code (CSA C22.1).

A listed seal-off box must be used immediately at the entrance of the enclosure. (i.e.: within 3 inches). Any unused entry must be suitably blocked with a suitable listed plug.

2.1.4. All Installations – Notes

> **CAUTION:** To prevent ignition of hazardous atmospheres, disconnect from supply circuit before opening any enclosure. Keep tightly closed when circuits are in operation.
>
> **WARNING:** Contains internal battery-powered circuit. To prevent ignition of hazardous atmospheres, do not open enclosure unless area is known to be non-hazardous.
>
> DO NOT SWITCH POWER ON until all questions pertaining to installation wiring are resolved. Any damage caused by unauthorized operation will void the warranty.
>
> **CAUTION:** The cable installation must be performed according to the relevant cabling lists and/or connection diagrams.

2.1.5. Installation of Cables

Due to customer or location specific requirements, the cables for communication and power supply lines are not a part of the delivery. However, the technical specifications for the cables MUST be followed. Prior to installation, these requirements must be checked. The number of and types of cables are dependent on options utilized by the end customer. A set of wiring diagrams are available covering the different options later in this manual.

Cables must be protected against mechanical damage.

Be aware of the minimum bending radius of the cable. The bending radius for multi-core cable is normally 6 times the diameter. However, the minimum bending radius for a fiber optic cable may vary from this and must be checked with the cable manufacturer in each case.

3 – Display Control Board

3.1. Wiring Examples / Information

3.1.1. Power Supply

The electronics are designed to be powered by 24 VDC, +20% / -15%, 7W.

The shield of the cable should be connected only at the electronic enclosure, via the cable gland.

Connect input power cable to connector CN4

DC Input Wire	Terminal
24 VDC (+)	CN4-1
24 VDC (common)	CN4-2
Ground	CN4-3

3.1.2. Network Ethernet Connection

The display utilizes ANSI/IEEE 802.3 Ethernet operating at 10/100 Mbps. The 10/100 Base-TX connection is made to the RJ45 connector at ETH1. The display unit will need to be able to see the IP address of the ultrasonic meter from this network connection in order to function. Refer to Configuration (Section 5.2) of this manual for details on connecting to the ultrasonic meter.

Comm. Port	Connection Port
10/100 Base-TX	ETH1
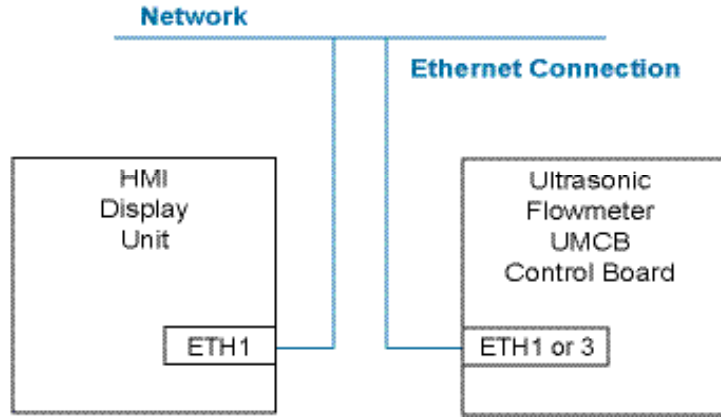
3.1.3. Direct Connection to the Ultrasonic Meter

The display unit can also be connected directly to the Ultrasonic meter using a CAT5 Ethernet cable (or better). Note that the Remote Display will still need to be configured with the Serial Number or IP Address of the ultrasonic meter to function. Refer to Configuration (Section 6.2) of this manual for details on connecting to the ultrasonic meter.

Maximum cable distance: 100m (328ft)
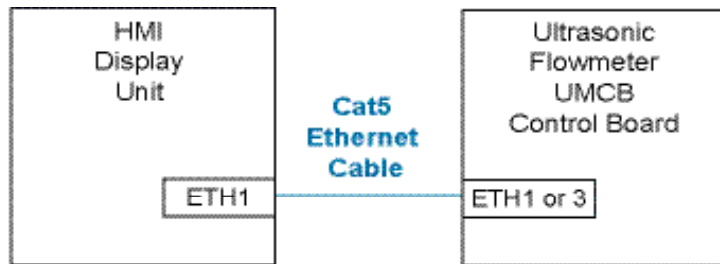
4 – Powering Up the Remote Display

Before powering on the display unit, verify that the following items are completed:

• Display unit has been installed securely to a fixed mounting location.

• Power and network connections have been checked for proper wiring and connection integrity.

• All conduit and/or gland connections are in adherence to applicable electrical codes.

When power is applied to the unit it will go through a boot sequence and the unit will attempt to connect to the configured device. If the display has not been configured or if it fails to connect to the desired device, the display will return to the Main Menu.

4.1. Start-Up

Upon power up the unit will proceed through the following boot sequence:

1. FMC Technologies logo screen with boot progress bar.

2. For a short period, a configuration icon is shown (gears graphic); if this button is pressed, the connection sequence in the next item is skipped and the display connects immediately to the Display main menu.

3. If the display is configured, it will attempt to connect with the host device:

   a. If the Primary URL is configured, the display will attempt to connect to this host. If the Primary URL fails it will try to connect to the device with the specified "Device Serial Number".

   b. If a host serial number is configured, the display will search the network for an FMC Technologies device with the specified serial number, obtain an IP address, and attempt to connect with that host. If it fails with the device serial number it will attempt to connect to the secondary URL.

   c. If a fallback URL is configured the Display will attempt to connect to that host.

4. If step 2 is unsuccessful in connecting to any configured device or if the Remote Display has not been configured, the Remote Display main menu will be shown. From the Main Menu the connection settings can be configured and the connection sequence repeated.

## 5 – User Display Interface

5.1.   Main Menu

The main menu will be displayed if the display does not connect to a device after powering up. The main menu can also be accessed by interrupting the startup process by tapping the configuration icon during startup. The following information and configuration options are presented in the display main menu:

- **Configuration** – settings for a connection to a device
- **Maintenance** – adjustment of display setting
- **Information** – key identification and settings data
- **Reconnect** – initiate a reconnection to the configured device
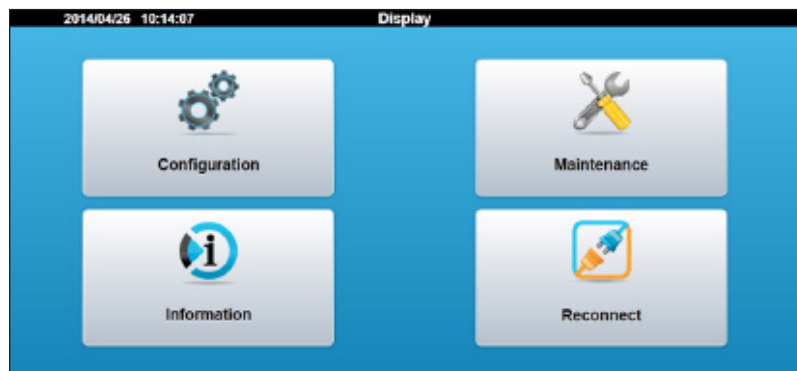

5.2.   Configuration
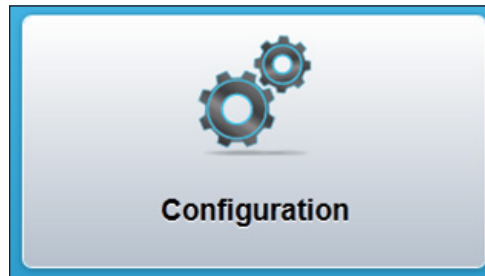
The configuration tab is used .to set up the display to communicate with the desired device and to set the password to control access of the display settings. A password is required to access the configuration settings. When the Configuration Button Icon is selected, a Login Screen will appear. There are two different levels of security access for the Display with the following default passwords:

- **Level 4 Password** – 4444 Network configuration level
- **Level 5 Password** – 5555 Weights & Measures access level

It is recommended to change the passwords from the default value to a more secure setting. Refer to Section 5.2.1 for password setting instructions.
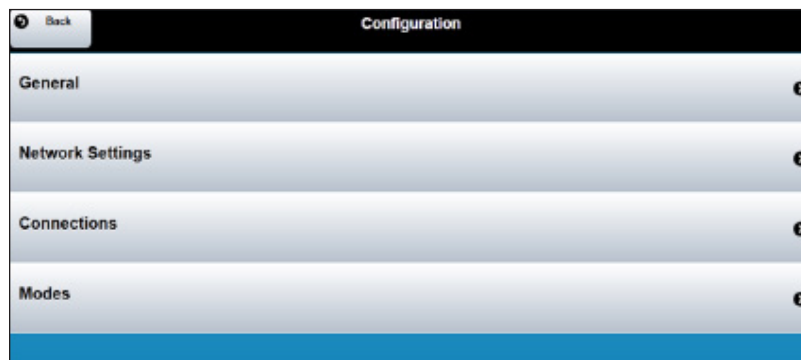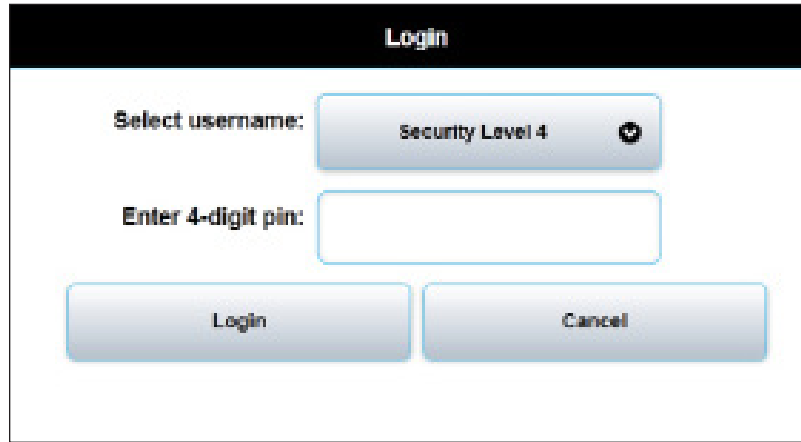
5.2.1.   Configuration – General
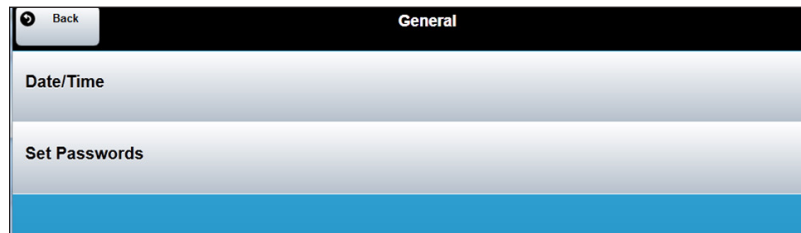
Date/Time – Adjust the date and time of the display unit. Once the display has been sealed the date and time adjustment will be locked out.

Set Passwords – Update the passwords for either level 4 or level 5 access. The screen will prompt for the old password and for the new password to be entered twice for confirmation.

The password is unique to the remote display and is not shared with the ultrasonic meter.

IMPORTANT: Record all password modifications and store in a secure location.

5.2.2.   Network Settings

The network settings are to configure the address of the Remote Display on the network. Note that this is not the address of the meter that the display is connecting to. The display is required to have a unique IP address because it exists as a device on the IP network. There are two modes to create the display's network address:

DHCP - The Dynamic Host Configuration Protocol is used to request the IP address from the network server. With this configuration checked, the DHCP server assigns a local

IP address to the Remote Display connected to the local network. This is the default network setting from the factory.

Fixed – If the network administrator prefers to fix the IP address then this configuration can be used. The network settings for the fixed address must be entered manually on the display screen.
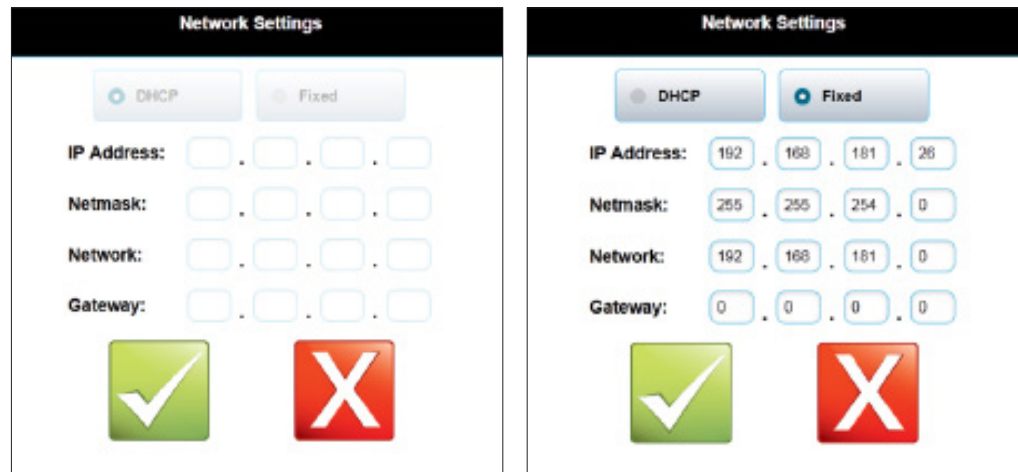
Note: The unit must be power cycled for the new settings to take effect.

5.2.3. Connections

The connections setting is used to connect to the desired ultrasonic flow meter.

Primary URL – This fixes a target IP/URL address that the display will first attempt to connect to upon startup of the unit. In order to configure this value the IP address of the ultrasonic flow meter must be known.

Primary Timeout – Maximum time allowed for the primary URL connection attempt, in seconds. The URL connection attempt can be skipped by setting a zero timeout.

Device Serial Number – The unique serial number assigned to the ultrasonic meter control board. The Ultra S eries flow meter will broadcast this Serial Number over the network in a way that the Remote Display unit can detect. When the Remote Display matches the configured Serial Number to a device on the network it will form a connection. The ultrasonic meter Serial Number will be displayed in the meter electronics box. This is the recommended connection method to the ultrasonic flow meter.

Device Timeout – Maximum time to allow for the device Serial Number connection attempt.

Secondary URL – An alternate target IP/URL address that the display will attempt to connect to. In order to configure this value the IP address of the target device must be known.

Secondary Timeout – Maximum time allowed for the secondary URL connection attempt. The connection attempt can be skipped by setting a zero timeout.

Minimum Up Time – A minimum time since power up to allow before attempting a host connection. Setting this to a larger value (in seconds) may be needed if the display attempts to connect to its host before the host is ready to accept connections (for example, if all instruments are turned on with the same power source, and the host takes longer to boot up).
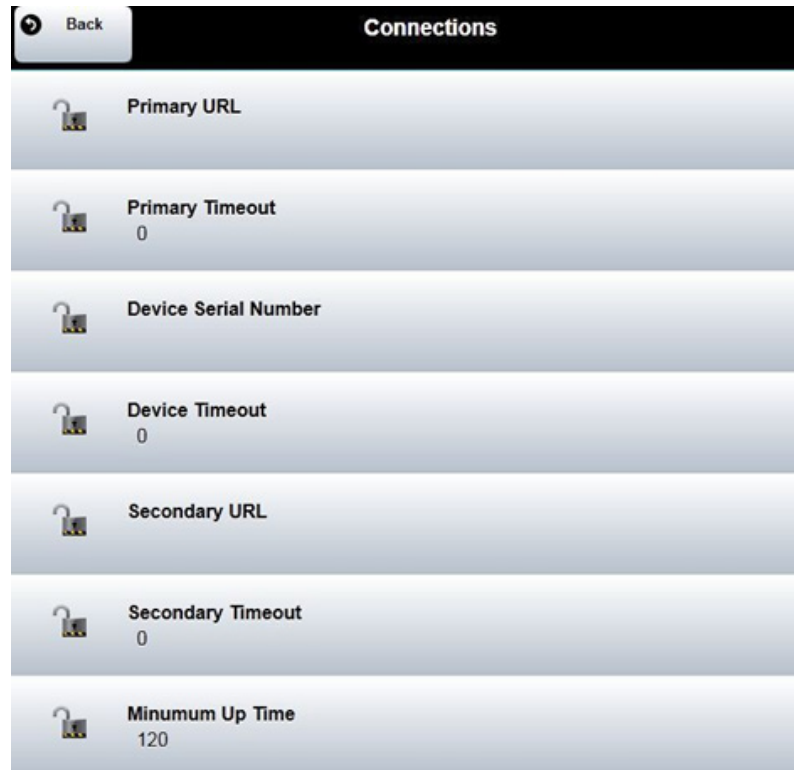
5.2.4.   Modes

The Modes setting is used to configure the electronic seal and to configure the back-lighting sleep mode for the display.


Electronic Seal State

This is used to set the electronic seal onto the display unit. Sealing locks out the adjustment of parameters that would be required to be fixed by a weights and measures official. Sealing can only be opened on Level 4 or 5 access. Sealing can only be set by Level 5 access.
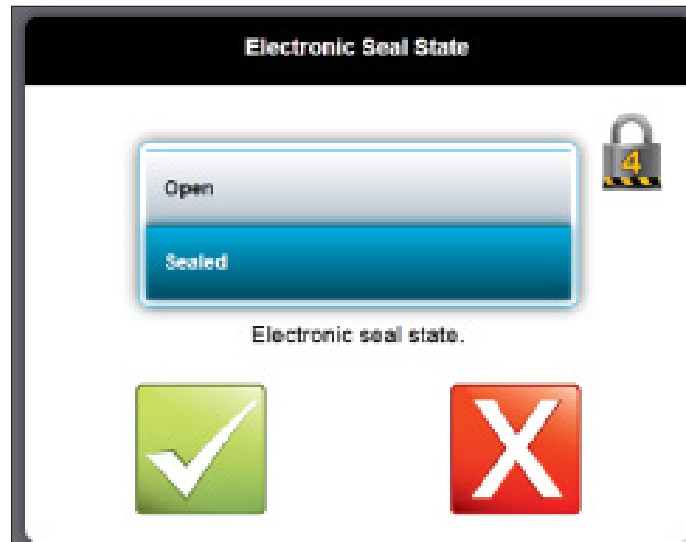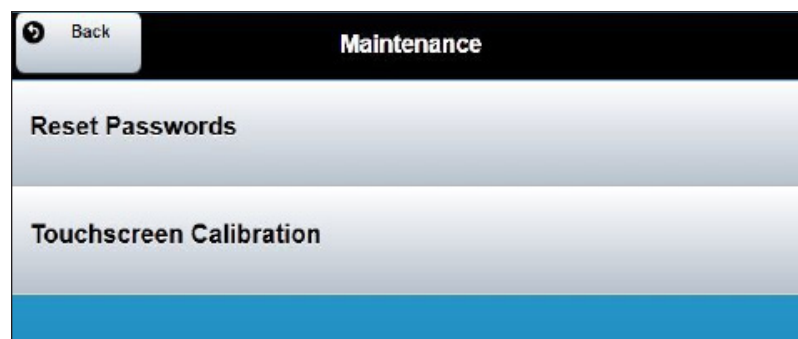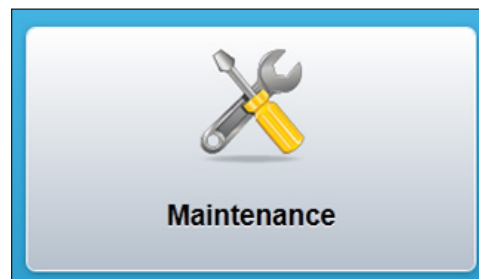
Backlight Timeout

This sets the amount of time before the LCD backlight switched off for a sleep mode. The following backlight timer duration options are available from the configuration screen.

- Always On

- 1 Minute

- 5 Minutes

- 20 Minutes

- 1 Hour
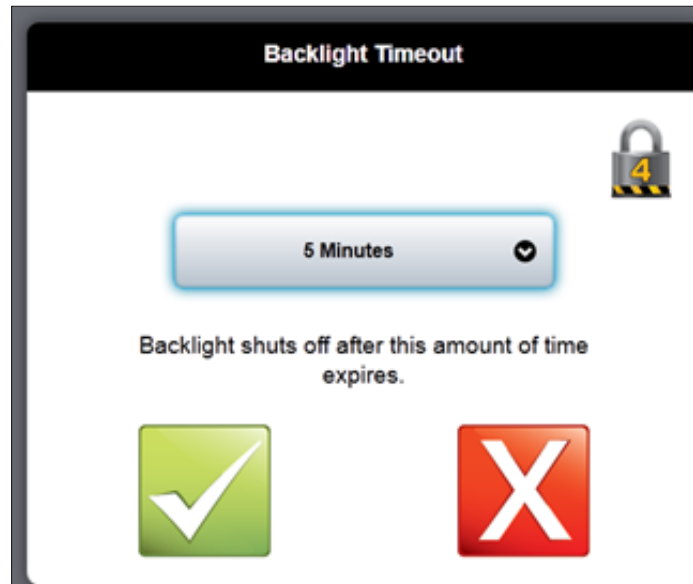
5.3. Maintenance Settings

Allows for the unit to be reset to factory defaults by clearing all new settings.

5.3.1. Touch Screen Calibration

Opens a touch position calibration screen. This will calibrate the screen input by displaying a series of touch screen targets and matching the input values with the known location of the targets.

5.3.2. Password Reset

This option allows resetting all passwords to factory defaults. The procedure described below must be followed to successfully accomplish this task. Please note that if successful, the electronic seal will be broken and the action logged; if the unit is under Weights and Measures control, it will need inspected and sealed again.

1. Order a USB adapter cable from FMC Technologies; this cable connects to CN3 and presents a standard type A USB connector.

2. Prepare a USB flash drive by creating an empty file named "password-reset.txt" on the root directory (folder).

3. Ensure the area contains no flammable gases and break the physical seal on the display enclosure. Open the housing and plug the adapter cable into CN3. Plug the USB flash drive into the other end of the cable.

4. Select the password reset on the Maintenance Menu and follow the instructions.

5. Once the passwords have been reset, remove the flash drive and cable.

5.4.   Information

The information screen displays key data about the Remote Display.
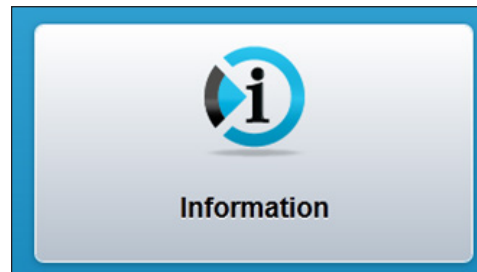
- •   **Software Revision** – Software version running on the display

- •   **Browser Signature** – Checksum value to be noted after the unit has been sealed

- •   **Parameter Seal** – Indicates if the display has been sealed a lock icon for sealed and an unlock icon for unsealed.

- •   **Welmec Log** – A log of all changes to parameters than could be relevant to a weights and measures official.

Welmec log entry layout:

Log Entry #	Timestamp	Entry Type	Description of Change

5.5. Reconnect

The Reconnect button initiates an attempt to connect to configured devices using the same sequence used during power up.

If the connection attempt is unsuccessful the Remote Display will return to the main menu.

5.6 Weights & Measures Sealing Procedures

The display may be sealed for Weights and Measures purposes; this guarantees the display may only connect to the devices configured and cannot be redirected using the touch screen. There are two seals that must be applied:

1. Electronic seal – this seal may only be activated using a level 5 password. When this seal is active, no legally relevant parameters may be changed; the seal must be deactivated before changes may be made.

2. Physical seal – this is a wire and lead seal crimped on to the enclosure such that it is impossible to open the enclosure without destroying the seal.

The following procedure must be used to seal the unit:

1. Configure the display. Verify the connection parameters only allow the display to connect with devices that are part of the legally relevant system.

2. Change the passwords.

3. Change the electronic seal state parameter to "sealed".

4. Inspect the connections to the display; verify there are NO connections to the display except for power (CN4) and Ethernet (ETH1). Any other connections to the display are not allowed as they compromise security.

5. Bolt the enclosure closed and apply a lead/wire seal such that it must be destroyed to open the enclosure again.

6 – Maintenance

6.1.   Display HMI Electronics

> **Note:** The Display must be powered off while the electronics enclosure is open in a hazardous atmosphere. The Display must also be powered off it any electronic boards are to be replaced.

> **Important:** Removal or handling of the electronics outside of the enclosure should only be performed while following ESD-safe procedures. Electronic assemblies should be immediately placed into Anti-Static bag(s) upon removal and sealed. A grounded wrist strap, such as 3M #2209, should be worn anytime the boards are handled.

6.1.1.   Board Replacement

To replace the Display electronics, follow these steps:

1. Remove power from the device.

2. Open the electronics housing.

3. Disconnect/Remove all connectors from CN4 and ETH1.

4. Using a screwdriver, remove the touch screen connector guard on the side (near CN4).

5. Remove the (4) screws holding the THMI to the bezel on the UMCB board with a screwdriver and gently unplug the touch screen connector before moving the unit. Note which row of pins the connector was inserted so it may be reassembled correctly later. Gently pull the UCMB board out of the Electronics Box.

6. Repeat this procedure in reverse order to install a new Display HMI Unit.

After replacement of the board, the following actions must be performed:

1. Configure electronics with correct network IP address.

2. Enter the target ultrasonic meter's Serial number and/or IP address

3. Select reconnect or cycle the power to the unit

> **WARNING:** Breaking the physical seals should only be done when approved by the authorities having jurisdiction.

6.2. Returned Goods Policy

A Return Material Authorization (RMA) number must be obtained prior to returning any equipment to FMC Technologies Measurement Solutions, Inc. for any reason. An RMA number can be obtained by contacting Customer Service via the information on page 2 of this manual.

To conform with the OSHA "Right to Know Act" and provide a safe working environment for our employees, the following requirements have been made for any returned material:

1. All equipment must be completely cleaned and decontaminated. Incomplete cleaning of the returned equipment may result in having the equipment cleaned or returned at the owner's expense.

2. A Material Safety Data Sheet (MSDS) is required for all process fluids and fluids used for cleaning that have come in contact with the equipment.

3. The RMA number must be clearly marked on the outside of the shipping container. A document packet containing copies of the RMA and MSDS forms for all process fluids and cleaning fluids must also be attached to the outside of the shipping container.

Returning equipment that does not conform to these requirements may not be processed.

7 – Related Publications

The following literature can be obtained from FMC Technologies Measurement Solutions Literature Fulfillment at measurement.fulfillment@fmcti.com or online at www.fmctechnologies.com/mesurementsolutions.

When requesting literature from Literature Fulfillment, please reference the appropriate bulletin number and title.

Specifications – Ultra Series C Remote Display..Bulletin SSLS008

Editorial revisios included in MNLS007 rev. 0.0 (7/15):
Section 2.1.2 - First paragraph has been rewritten. 'Ex certified' has been changed to 'Ex d certified' in 3 places.
The specifications contained herein are subject to change without notice and any user of said specifications should verify from the manufacturer that the specifications are currently in effect. Otherwise, the manufacturer assumes no responsibility for the use of specifications which may have been changed and are no longer in effect.
Contact information is subject to change. For the most current contact information, visit our website at www.fmctechnologies.com/measurementsolutions and click on the ˝Contact Us˝ link in the left-hand column.

Headquarters:
500 North Sam Houston Parkway West,
Suite 100, Houston, TX 77067 USA
Phone: +1 (281) 260 2190
Fax: +1 (281) 260 2191

Operations:
Measurement Products and Equipment:
Ellerbek, Germany +49 (4101) 3040
Erie, PA USA +1 (814) 898 5000

Integrated Measurement Systems:
Corpus Christi, TX USA +1 (361) 289 3400
Kongsberg, Norway +47 (32) 286700

The specifications contained herein are subject to change without notice and any user of said specifications should verify from the manufacturer that the specifications are currently in effect. Otherwise, the manufacturer assumes no responsibility for the use of specifications which may have been changed and are no longer in effect.

Contact information is subject to change. For the most current contact information, visit our website at www.fmctechnologies.com/measurementsolutions and click on the "Contact Us" link in the left-hand column.

www.fmctechnologies.com/measurementsolutions