# Honeywell EC350



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# About this document

This document is for operators and technicians working in the natural gas industry. This document provides an overview of EC350 and instructions to install EC350 on any meter equipped with an instrument drive capability (common to diaphragm and turbine meters) using a Universal Mounting Bracket (UMB) or a rotary mount. To be able to perform the tasks in this document, you must have knowledge about the physical properties of gas (volume, pressure, temperature, and supercompressibility).

# Terms and definitions

The following table lists some special terms that are used across this document and provides their definitions.

Term	Definition
Meter gasket	It is used as an environmental seal for mounting EC350 on a meter.
Opto-isolators	Devices that prevent unwanted current flow or possible damage from high voltage or/and from external devices connected to the instrument.
Rivets	Used to install the slides on the index.
Slide	A small piece of plastic used for covering the digits on the index.
Spline wrench.	Used to loosen and tighten set screw in order to move the Thimble gear assembly <b>UP</b> or clock- wise (CW) direction or <b>DOWN</b> for counter clock-wise (CCW) direction.
Thimble gear assembly	Rotates the digits on the index in CW direction when it is set <b>UP</b> or CCW when it is set <b>DOWN</b> .

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# 1 About EC350

This section provides information about the main interfaces of EC350 - LCD, Keypad, and External connections. It also lists the safety instructions that must be followed while installing and commissioning EC350.

- <u>Safety instructions</u>
- Theory of Operation
- Main interfaces of EC350

CHAPTER 1

# 1.1 EC350 specifications

This section provides the specifications and certifications for EC350.

- <u>Certifications</u>
- <u>Power</u>
- Environmental
- <u>Temperature measurement</u>
- Pressure measurement
- API 21.1 compliance

## 1.1.1 Certifications

- Electrostatic Discharge Immunity Test (EN61000-4-2)
- Radiated, Radio-Frequency Electromagnetic Field Immunity Test (EN61000-4-3)
- Electrical Fast Transient/Burst Immunity Test (EN61000-4-4)
- Conducted Radio-Frequency Electromagnetic Field Immunity Test (EN61000-4-6)
- Radiated Emissions (EN 61000-6-4)
- FCC Part 15
- Measurement Canada
- CSA C/US--- Class I, Div 1/Zone 0
- CSA C/US Class I, Division 2, Groups C and D, T3C
- IECEx --- Class I, Zone O (pending)
- IECEx --- Class I, Zone 2 (pending)
- IEC-Ex ec [ia Ga] ic nC IIB T4 Gc

## 1.1.2 Power

- Battery
  - 7 Volt 2 cell lithium battery pack
  - 6 Volt 4 cell alkaline battery pack
- External DC supply 5 15 Volts DC
- Battery can optionally serve as back-up for external DC voltage

# 1.1.3 Environmental

- Operating Temperature Range: -40 °F to +158 °F (-40 °C to +70 °C).
  - If you are using an EC350 device with a modem, then it is recommended to consider the operational temperature range of the modem. The temperature system will continue providing accurate measurements even if the modem is unable to operate because of environmental conditions.
    - -22 °F to +158 °F (-30 °C to +70 °C) when used with CNI2
    - -13 °F to +158 °F (-25 °C to +70 °C) when used with Cloud Link 4G modem
- Humidity: 0-95% non-condensing

### 1.1.4 Temperature measurement

- Highly stable, solid state temperature sensor (thermistor)
- Range: -40 °F to +158 °F (-40 °C to +70 °C).

## 1.1.5 Pressure measurement

Ambient temperature range: -40°F to 158°F (-40° to 70°C)

## 1.1.6 API 21.1 compliance

• The "Flow Time" item (i1690) is added. It shows the number of seconds the instrument is not in a "no flow" state.

For example, under continuous flow, the no of seconds are equal to the log, and if there is no flow during the interval, the value becomes zero.

• The "No Flow Cutoff" item (i1691) is added. Item Units are the same as the Flow Rate item.

If the flow is equal to or above the threshold, the Flow Time value advances.

If the flow is less than the threshold, the Flow Time stops.

# 1.2 Safety instructions

EC350 complies with the general safety standards and regulations. However, failure to operate EC350 as per the safety instructions available in this document may lead to hazards.

EC350 is approved for use in hazardous areas (Class I Division 1 or Class I Division 2). Different versions of EC350 are available depending on the operating conditions. The permitted operating conditions are marked on each EC350. Check the operating condition limits of EC350 before installing. You must be familiar with the currently applicable electrical installation standards and regulations before installing and operating EC350 in hazardous areas.

**Warning:** Denotes an explosion hazard. Ensure you follow all instructions described in the warning notification.

To avoid explosion hazard, ensure to note the following:

- Install EC350 depending on the operating conditions permitted for that particular EC350 unit.
- EC350 device for Class I Division 1 is intrinsically safe and must be connected to other circuits as per the installation drawing specified on each EC350.
- EC350 device for Class I Division 2 must be connected to other circuits as per the installation drawing specified on each EC350.
- Substitution of components may impair suitability for use in a hazardous location.

**Caution:** The caution warns you of possible damage to property and provides instructions to avoid damage to EC350.

Honeywell recommends you to observe the warning information described in this document and other generally applicable safety rules.

No warranty claims can be asserted if there is an unauthorized interference with the device.

## 1.2.1 Things to remember

### 1.2.1.1 Usage of EC350 in hazardous areas

You are allowed to use EC350 in hazardous areas, under some permitted operating conditions. Ensure to comply with the applicable laws and regulations, and company policies for the usage of EC350.

#### Installation and commission EC350 in hazardous areas

EC350 must be installed and commissioned only by specially trained and qualified staff. The device is designed in accordance with the IP 65 degree of protection as per EN 60529. The installation of the intrinsically safe circuits must comply with the applicable local laws or regulations. Operate EC350 only if the instrument is completely intact.

### 1.2.1.2 Service, maintenance, and troubleshooting EC350

The service, maintenance and troubleshooting of EC350 device operating in hazardous areas must be performed only by specially trained and qualified staff.

#### Replacement of EC350 battery pack

To maintain acceptability of use in hazardous locations, you must use replacement batteries supplied by Honeywell. For further information about changing the EC350 battery pack, refer to the section, "Replacing the Battery Pack"

# 1.3 Theory of Operation

- <u>Correction Factors to Metered Volume</u>
- Pressure Factor Fp
- Temperature Factor Ft
- Supercompressibility Factor Fpv

## 1.3.1 Correction Factors to Metered Volume

Ideal or perfect gases follow the relationship of Boyle's Law for pressure effect and Charles' Law for temperature effect, which can be stated: The volume of any definite weight of a perfect gas varies inversely with change in absolute pressure and directly with change in absolute temperature. The equation for this relationship of the two laws is expressed as follows:

$$\frac{V1^*P1}{T1} = \frac{V2^*P2}{T2}$$

The Symbols V1, P1 and T1 refer to the original volume, pressure and process temperature while V2, P2 and T2 refer to the volume, pressure and temperature of the new or changed conditions. Rearranging the equation and rewriting subscripts, we can express it as follows:

$$Vb=Vm * \frac{(Pm * Tb)}{(Pb * Tm)}$$

Where:

Vb = gas volume (cu. Ft.) at base condition corrected

Pb = absolute base pressure (psia)

Tb = absolute base temperature (deg. R)

Vm = gas volume metered (cu. Ft.) uncorrected

- Pm = absolute meter pressure (psia)
- Tm = absolute meter temperature (deg. R)

# 1.3.2 Pressure Factor Fp

The pressure factor (Fp) to apply to metered volume is expressed by the Boyle's Law relationship as follows:

# $Fp = \frac{Pm}{Pb} = \frac{Meter Pressure (PSIG) + Atmospheric Pressure (PSIA)}{Base Pressure (PSIA)}$

Each increment of meter pressure represents a different pressure factor. As the flowing gas pressure (Pm) changes, the EC350 automatically applies the pressure factor (Fp) to the metered volume (Vm).

# 1.3.3 Temperature Factor Ft

The temperature factor (Ft) to apply to metered volume is expressed by the Charles' Law relationship as follows:

## Ft = Tb = Base Temperature, deg F + 459.67Tm Meter Temperature, deg F + 459.67

Each increment of meter temperature represents a different temperature factor. Therefore, as the flowing gas temperature changes, the EC350 automatically applies the temperature factor (Ft) to the metered volume.

## 1.3.4 Supercompressibility Factor Fpv

Gases actually behave slightly different than what the ideal gas laws indicate. This deviation depends on the molecular composition of the gas and the specific gravity as well as the pressure and temperature. Natural gas, for instance, compresses by a greater amount than that computed by Boyle's law and hence the term "supercompressibility" is used for this deviation. It is small at very low pressure, but becomes substantial as the pressure increases. The EC350 automatically applies the supercompressibility factor and therefore the equation for total volume correction that the EC350 applies to metered volume, is expressed as:

$$Vb = Vm * Fp * Ft * (Fpv)^2$$

Where:

Vb = gas volume (cu. Ft.) at base condition corrected

Vm = metered volume read from meter index

Fp = pressure factor

Ft = temperature factor

Fpv = supercompressibility determined from NX-19 or AGA-8

The EC350 automatically squares the supercompressibility factor displayed, which is based on the pressure and temperature sensed at the meter. The resulting volume readout is corrected for pressure, temperature, and supercompressibility.

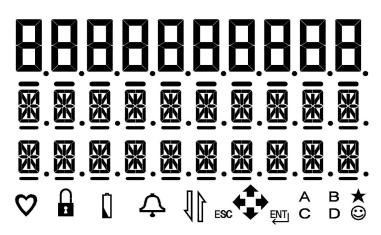
# 1.4 Main interfaces of EC350

The main interfaces of the EC350 are:

- <u>LCD</u>
- Keypad
- External connections

## 1.4.1 LCD

EC350 provides a ten character, configurable, alphanumeric LCD display with icons to display the status information and alarm conditions. The LCD display can be configured to on or off at different times of day. During normal operation (Correction mode), the corrected volume is displayed on the LCD. Following is an LCD display illustration, showing all segments ON.



The following table lists the icons on the LCD display.

lcon	Description
$\heartsuit$	<b>Heart Beat</b> : flashes every 3 seconds to indicate normal operation (Correction mode).
	<b>Lock</b> : Indicates that the instrument is in a metrologically protected mode
	<b>Unlock</b> : Indicates that the instrument is not in a metrologically protected mode
	<b>Battery</b> : indicates a low battery condition. Refer to the section <u>Replacing the Battery Pack</u> . Battery alarm is also indicated by this icon.

lcon	Description
Ļ	<b>Alarm</b> : indicates the alarm for low pressure, volume sensor, system, temperature, flow rate, pressure limit, and daily corrected volume limit.
11	<b>IrDA</b> : indicates that communication with the device via the front panel IR port is enabled.
	<b>Navigation key function indicator</b> : as you navigate through the options in each operating mode, this icon indicates the keys that are active for the selected option.
A B C D	<b>Pulse output channel indicator</b> : indicates which of the 4 pulse output channels are enabled, and flashes when a pulse is transmitted.
$\odot$	<b>Smile</b> : indicates the HMI is unlocked. The navigation keys are functional.
*	<b>Star</b> : The Star icon turns on during pressure and temperature measurement, which typically occurs every 30 seconds.

## 1.4.2 Keypad

The keypad is used for scrolling through the menu options. The following table lists the keys.

Option	Description
ESC ①	Use these keys for unlocking the keypad and activating the display. To unlock the keypad, press and hold <b>ESC</b> and <b>UP arrow</b> at the same time until display text appears.
다 <sub>and</sub> 仓	Use these keys for scrolling up and down in a menu. You can also use to enter input by increasing and decreasing a value at the current position.
⟨⊐ and ⊏⟩	Use these keys for navigating to the next and/or previous digit. Use these keys to move the cursor one character at a time, in forward or backward directions.
Enter	Use this key to access the main menu or display the submenu of the current menu. It is also used for accepting an input value.
Esc	Use this key to display the Home screen, cancel an entry, or go back to the previous menu.

To conserve battery power, after each processing cycle the EC350 keypad is locked, if there is no input received within the time out period (1 to 10 minutes).

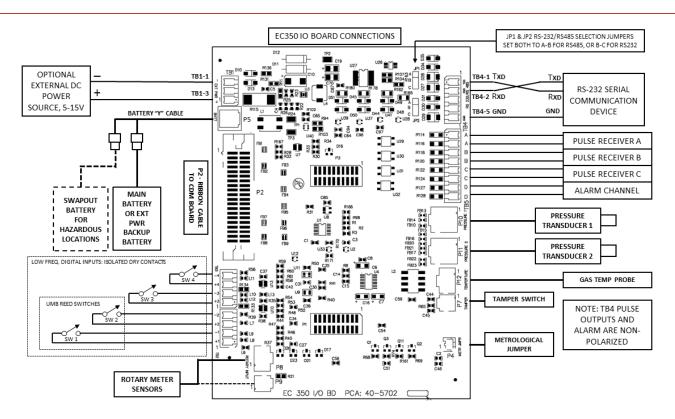
# 1.4.3 External connections

The external connections from EC350 are:

- Pulse outputs
- Serial port
- Alarm outputs
- External supply voltage (TB1)
- Battery pack (P5)

The figure below illustrates the purpose of different jumpers and other connections on an EC350 IO board:

1 About EC350 1.4 Main interfaces of EC350



# 2 Security Guidelines

This section provides security guidelines for EC350 device.

CHAPTER 2

# 2.1 Device Security Recommendations

Following are the recommendations to prevent malicious users from accessing the device and its data:

- Change the default password on first use, and ensure that user passwords are changed on a regular basis and securely stored.
- Unauthorized people should be kept away from the loading bay area.
- Use an earth connection interlock to prevent loading from starting without the driver physically present.

# 2.2 Implementing stringent password guidelines

Password attacks of various kinds occur, so the following password management procedure must be followed:

- Change standard password.
- Use secure password for EC350 device.
- Change password immediately in case someone has tried to attack the system.

Note: A Complex password must:

-Be at least 8-15 characters in length.

-Contain both Upper and lowercase alphabetic characters. (e.g: A-Z & a-z)

-Have at least one numerical character. (e.g: 0-9)

-Have at least one special character. (e.g: ~!@#\$%^&\*()\_+=)

# 2.3 How to report a security vulnerability

A vulnerability is defined as an error or weakness in the software which can be exploited to adversely affect or reduce the operation or security of the parameterization or device software.

Honeywell reviews all reports about vulnerabilities relating to Honeywell products and services. You can find further information about the Honeywell Security Policy at: <a href="https://www.honeywell.com/product-security">www.honeywell.com/product-security</a>

If you would like to report a possible vulnerability in a Honeywell product, follow the instructions on the Honeywell website at: <a href="http://www.honeywell.com/product-security">www.honeywell.com/product-security</a>

You can find information about current malware threats at: https://process.honeywell.com

OR

Contact your local Honeywell Process Solutions Customer Contact Center (CCC) or our <a href="https://process.honeywell.com/us/en/site/elster-instromet/support">https://process.honeywell.com/us/en/site/elster-instromet/support</a>

# 2.4 Preventing unauthorized external access using a firewall

To reduce the risk for your network, we recommend that you use a firewall or another mechanism to restrict network traffic between the "external" central billing or control system and the "internal" network of the gas metering systems. Furthermore, EC350 device should only be installed in the gas metering system, where access control is guaranteed, i.e., protective action is taken to prevent unauthorized persons gaining access to the device.

We also recommend that you only allow protocols and ports which are actually used for data exchange with the external network and that these are added, for example, to the firewall's whitelist.

# 3 EC350 installation

This chapter deals with the installation of EC350 on conventional gas meters (such as rotary, diaphragm, and turbine). This chapter also provides procedures for installing and replacing the battery and output wire connections to obtain pulse output from EC350.

- EC350 contents verification
- Overview of installation
- Model number interpretation
- Prerequisites
- Installing EC350 on conventional diaphragm, rotary or turbine gas meters
- Installing EC350 on a rotary mount
- Power Supply Options
- General Wiring connections
- Installation Drawings

# 3.1 EC350 contents verification

The following components are installed and connected inside EC350 when shipped.

- Pressure transducers (upto 2 transducers, if ordered)
- Temperature probe (if ordered)
- Volume input method (if ordered)
- Telemetry (if ordered)

After you receive EC350:

- Remove the contents from the box and from the mounting kit bag.
- Check the shipment against the invoice to ensure that the components ordered are installed in EC350.
- Report any shortage or shipping damages to your nearest Honeywell Account Manager.

# 3.2 Overview of installation

The EC350 installation consists of mounting and wiring EC350 according to the instructions given in this section. Before proceeding, read the installation information provided in this section and refer to the section "<u>Model number interpretation</u>", to familiarize yourself with the EC350 model you have selected.

Based on the mounting selected, refer to one of the following two methods for installing EC350 on a meter.

• Installing EC350 on conventional diaphragm, rotary or turbine gas meters. The following image illustrates with a UMB.



• Installing EC350 on a rotary mount. The following image illustrates EC350 configured for a rotary mount. (Adapter plate, which varies by meter model, not shown.)



# 3.3 Model number interpretation

EC350 is available in different models. Refer to the Model Selection Guide (MSG), available from your Mercury sales representative, for details.

# 3.4 Prerequisites

Ensure that the following components are installed and connected inside EC350, before installing EC350 on meters.

- Battery pack
- Pressure transducer (if ordered)
- Temperature probe (if ordered)
- Volume input method (if ordered)
- Telemetry (if ordered)

# 3.5 Installing EC350 on conventional diaphragm, rotary or turbine gas meters

This section describes the procedures to install EC350 on conventional diaphragm, rotary or turbine gas meters, equipped with instrument drive capability.

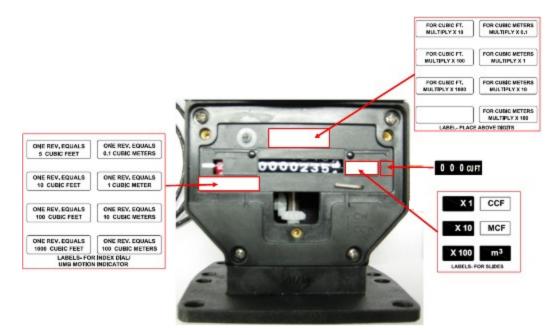
- Installing the index slide and label
- Changing the drive rotation
- Mounting EC350 on the meter
- Connecting a pressure line to EC350

## 3.5.1 Installing the index slide and label

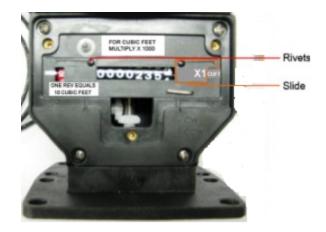
The UMB has a digital index for indicating uncorrected volume. You can move the slide on the mechanical counter to cover the digits that are not used, based on customer configuration.

To install the index slide and label

• Based on your application, apply **labels** to the UMB. Refer to the following image for applying the labels.



The following image illustrates the labels applied to the UMB, slides, and rivets.



### 3.5.1.1 Next steps

Verify if the digital index reading rotates in the proper direction. If not, perform the tasks described in the following section, <u>"Changing the drive rotation</u>", to position the bevel-gear thimble of EC350 to ensure the reading rotates in the proper direction.

## 3.5.2 Changing the drive rotation

The bevel-gear Thimble assembly or the Thimble gear assembly in the UMB permits either clockwise (CW) or counterclockwise (CCW) rotation. Before installing EC350, note whether the output shaft of the meter rotates CW or CCW. You can change the driver rotation by positioning the Thimble gear assembly of EC350 to match the meter rotation.

To change the driver rotation to match the meter rotation

Remove the supplied Spline wrench from the front plate storage.
 The following image illustrates the Spline wrench in the front plate storage.



- Loosen the Set screw on the Thimble gear assembly.
   The Thimble gear assembly position can be adjusted without removing the front plate of the UMB assembly.
- Shift the Thimble gear assembly **Up** to set the drive rotation in the CW direction or **Down** to set the drive rotation in the CCW direction.
- Tighten the set screw after the Thimble gear assembly is properly positioned and fully meshed with the Vertical miter gear on the horizontal shaft.
- Replace the transparent index cover and the three Phillips-head screws after stowing the Spline wrench.

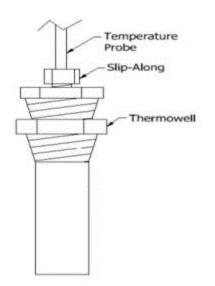
# 3.5.3 Mounting EC350 on the meter

Ensure that you have the right mounting kit. Refer to the MSG or the image provided along with EC350 to ensure it is the right mounting kit.

Use the base plate to rotate EC350 about 360 degrees in any four directions. To rotate EC350, remove all four screws, which attach the base plate to the bracket housing.

To mount EC350 on the meter:

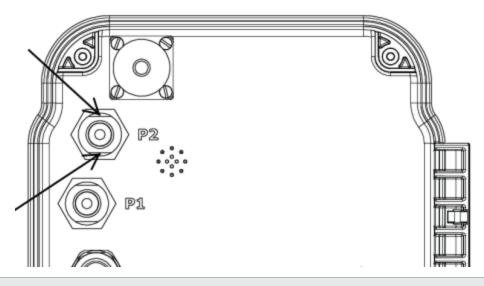
- Place the meter gasket against the meter end and attach EC350 with the UMB to the meter mounting plate.
- Install the four meter mounting bolts (provided with the kit) and tighten the bolts after you have positioned the UMB.
- Thread the slip-along fitting into the thermowell and place the temperature probe into the slip-along fitting, sliding the probe down until it bottoms out from the thermowell before tightening the slip-along nut. Make sure there is a liquid (such as antifreeze, meter oil, or alcohol in the thermowell) and that the temperature probe is not bottomed out on the thermowell.



## 3.5.4 Connecting a pressure line to EC350

Use a pressure connection kit, and connect the pressure line to the 1/4 inch NPT fitting.

Hold wrench on flats when installing pressure line on Pressure transducer to ensure proper seal and avoid loads on composite case.



**Warning:** To avoid explosion, it is extremely important to ensure the pressure transducer is capable of handling the pressure in the gas line. Check item entry 137 (user units) or item entry 25(PSI) on the EC350 for maximum pressure transducer information before applying live gas pressure to the EC350.

# 3.6 Installing EC350 on a rotary mount

This section describes the procedures to install EC350 on a rotary mount.

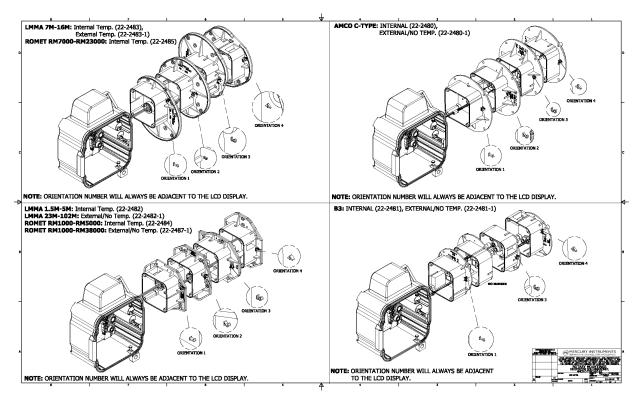
- Selecting the mounting orientation
- Installing the temperature probe
- Connecting a pressure line to the EC350
- Installing EC350 on rotary mounts

#### 3.6.1 Selecting the mounting orientation

EC350 supports four orientations for instruments and mounting plates. The EC350 can be rotated about 90 degrees increments based on your meter configuration.

To select the mounting orientation:

- Loosen and remove the four mounting screws holding the mounting plate.
- Rotate the mounting plate to the required orientation.
- Reinstall and tighten the four mounting screws to 18–20 inch LBS. The following image illustrates the mounting orientation of EC350.



### 3.6.2 Installing the temperature probe

Insert the temperature probe into the meter thermowell before mounting the EC350 on the meter.

To mount the temperature probe into the meter base:

• Pull the temperature probe out of the mounting plate as illustrated in the following image.





EC 350 as received

Probe extended

• Use the temperature probe as a measuring device, and insert the probe until it bottoms out from the thermowell of the meter as illustrated in the following image.



• Mark the temperature probe cable at the point where the cable comes out from the meter body as illustrated in the following image.



• The temperature probe is held in place with a rubber gland in the mounting plate. Push the probe into EC350 until the mark is one inch from the mounting plate, as illustrated in the following image.



The one inch additional length ensures that the probe bottoms out at the end of the thermowell.

• Insert the temperature probe into the thermowell as illustrated in the following image.

The temperature probe is mounted into the meter base.

# 3.6.3 Connecting a pressure line to the EC350

Use a pressure connection kit and connect the pressure line to the ¼ inch NPT fitting. The following images illustrates a pressure transducer connected to a pressure line using the pressure connection kit.





# 3.6.4 Installing EC350 on rotary mounts

This section describes the various types of rotary meter mounting kits. The following table illustrates the mounting of EC350 on each type of rotary mounts.

Rotary meter mounting kit	Rotary mount illustration		Part Number
LMMA 1.5m to 5m and 23m to 102m mounting kit with snap seals.			22- 2089
LMMA 1.5m to 5m and 23m to 102m mounting kit with cross-drilled screws.			22- 2089-1

Rotary meter mounting kit	Rotary mount illustration		Part Number
LMMA 1.5m to 5m and 23m to 102m mounting kit with Tamperproof screw.			22- 2089-2
LMMA 7m to 16m mounting kit with snap seals.			22- 2090
LMMA 7m to 16m mounting kit with cross-drilled screws			22- 2090-1

Rotary meter mounting kit	Rotary mour	t illustration	Part Number
LMMA 7m to 16m mounting kit with Tamperproof screw.			22- 2090-2
Romet RM1000 to RM5000 mounting kit with snap seals.			22- 2104
Romet RM1000 to RM5000 mounting kit with cross-drilled screws			22- 2104-1

Rotary meter mounting kit	Rotary mour	t illustration	Part Number
Romet RM1000 to RM5000 mounting kit with Tamperproof screw.			22- 2104-2
Romet 7000 to 23000 mounting kit with snap seals.			22- 2105
Romet 7000 to 23000 mounting kit with cross-drilled screws			22- 2105-1

Rotary meter mounting kit	Rotary mour	t illustration	Part Number
Romet 7000 to 23000 mounting kit with Tamperproof screw.			22- 2105-2
AMCO C-type mounting kit with snap seals			22- 2106
AMCO C-type mounting kit with cross-drilled screws.			22- 2106-1

Rotary meter mounting kit	Rotary moun	t illustration	Part Number
AMCO C-type mounting kit with Tamperproof screw.			22- 2106-2
Romet external temperature mounting kit with snap seals.			22- 2107
Romet external temperature mounting kit with cross-drilled screws			22- 2107-1

Rotary meter mounting kit	Rotary mour	t illustration	Part Number
Romet external temperature mounting kit with Tamperproof screw.			22- 2107-2
B3 or TQM mounting kit with snap seals.			22- 2108
B3 or TQM mounting kit with cross- drilled screws.			22- 2108-1

Rotary meter mounting kit	Rotary mount illustration		Part Number
B3 or TQM mounting kit with Tamperproof screw.			22- 2108-2

# 3.7 Power Supply Options

The EC350 has flexible power supply options. The unit can operate from an externally supplied DC power source or from a 4-cell Alkaline, a 2-cell Lithium, or dual 2-cell Lithium Battery Packs.

- External Power Supply
- Battery Powered
- Battery Life/ Usage Tracking
- Replacing the Battery Pack
- Low battery/ External Power shutdown mode
- User Shelf/ Shutdown mode

### 3.7.1 External Power Supply

The input voltage range for using an externally supplied **DC power source** is **+5.0 VDC to +15.0 VDC**. The Honeywell power 9 VDC pack p/n: **40-2291** can be used as an external voltage source.

Connections for the external supply are made at the **TB1** connector on the EC350 IO Board. Terminal-1 nearest the top of the IO Board is GND and Terminal-3 is the positive (+) input. When operating from an externally supplied DC power source, a backup battery pack may also be installed with the intent of powering the instrument in situations where the external (remote) power is interrupted.

**Installations requiring CLASS 1 - DIV 2 approval**, the following Battery Packs are approved: 40-6048 (2-cell Lithium), 40-6050 (4-cell Alkaline), and 40-6064 (4-cell Alkaline with 47 ohm Res). These Battery Packs can be connected to the P5 Battery connector using cable p/n: 40-6045.

**Note:** Battery packs 40-6050, 40-6054, and 40-6064 must be connected and disconnected only in a non-hazardous (safe) area. These battery packs have cells that can be replaced, but only in a non-hazardous (safe) area.

In these battery packs, only Duracell MN1300 non-rechargeable cells are to be used. In a hazardous area, battery pack 40-6048 should be replaced.

Installations requiring CLASS 1 - DIV 1 approval, only the Battery Pack 40-6064 is approved.

When operating from an externally supplied DC power source, configure the External Supply Low Alarm Limit (**Item 795**) to be a value greater than 5.0 and generally less than 7.0 V. The default value of Item 795 is -1.0 to effectively disable the Alarm Item 796. The External Supply voltage is measured on a 10 minute interval. Three consecutively low readings are required to the trip the Low Voltage Alarm (Item 796) – this is done to help guard against falsely setting alarm due to a power supply glitch.

# 3.7.2 Battery Powered

Connections for the Battery pack are made at the P5 connector on the EC350 IO Board. There are three Battery choices for operating the EC350 from battery power:

- 40-6050 (4-cell Alkaline) 5 year operating life under specified conditions
- 40-6048 (2-cell Lithium)
- Dual set of 40-6048 (2-cell Lithium) extended life or heavy usage / comms applications.
- Use the Battery Type (Item 1061) to select the type of Battery pack that is being used to power the instrument.
  - 0= 4 Cell Alkaline (default type)
  - 1= 2 Cell Lithium
  - 2= 4 Cell Lithium (dual set of p/n 40-6048)

The Battery voltage is measured on a 10 minute interval. Three consecutively low readings are required to the trip the Low Voltage Alarm (Item 99) – this is done to help guard against falsely setting alarm due to a supply glitch.

**Note:** The Low Battery Voltage Alarm (Item 99) will not set if an External Supply voltage is present at TB1 with a voltage level greater than the Battery voltage by over 1.0 VDC. When a Low Battery Voltage Alarm is tripped (set), an Alarm Log record entry is generated along with updates to time stamp Items 462 and 463.

# 3.8 General Wiring connections

This section describes the pulse outputs from EC350.

- Three Form-A volume pulse outputs
- One Form-B alarm output

These outputs are electronic switches. The first three pulse outputs are configured as either corrected volume or uncorrected volume. The fourth pulse output is used only for alarm output.

**Note:** Outputs are conventionally called "pulse outputs", but it should be understood that they are actually solid state (transistor) switches and do not produce any voltage. The external device to which they are connected must provide wetting voltage with current limiting, and be able to respond to the contact closures.

- Pulse output communication
- Pulse output specification
- Pulse outputs via the case connector option

#### 3.8.1 Pulse output communication

EC350 provides four pulse outputs, three (channels A, B, and C) normally-open Form A type, and one (channel D) normally closed Form B type. The pulse outputs are typically used for connection to an AMR (Automatic Meter Reader) device.

These outputs are electronic switches that operate like an isolated bidirectional switch. Channels A, B, and C (normally open type) can be configured as corrected volume or uncorrected volume. Channel C can alternatively be configured as a (normally open) alarm output. Channel D (normally-closed type) is only for alarm output use. All the pulse outputs of the EC350, including the alarm pulse output, use opto-isolators for isolating the EC350 circuitry from the devices receiving the pulses. Opto-isolators are devices that prevent unwanted current flow or possible damage from high voltage.

#### Alarm pulse outputs

An alarm pulse (on channel C or D) is generated when EC350 enters an alarm condition. Use channel C (NO or Normally Open) or channel D (NC or Normally Closed) depending on the AMR device accepting the alarm pulse. Use of channel D (NC) allows for a cut wire to be interpreted as an alarm condition to the AMR device.

#### Volume pulse outputs

EC350 provides three Form-A pulse outputs (channels A, B, and C) for volume output pulses.

Volume pulses can correspond to either uncorrected volume (as counted in item 2) or corrected volume (as counted in item 0). The type of volume pulse (and whether the channel is enabled) is configured through items 93-95.

The "weight" of each pulse (e.g. whether a pulse corresponds to 10 cubic feet or 1 cubic meter) is configured via items 1193-1195.

**Note:** In prior Mercury products the pulse weight was configured differently through items 93-95. These are now read-only values provided for reference.

Pulse output timing is configurable via items 1014, 1015, and 1024. Various pulse ON and OFF times can be chosen. Default is a pulse ON time of 62.5 milliseconds and a pulse OFF time of at least 62.5 milliseconds, for a minimum pulse period of 125 milliseconds.

Channel	ltem function	ltem number	Parameters	Description
A	Enable/Type	93	0 = CorVol pulses 2 = UncVol pulses 3 = Off	Channel A pulse output selection. Select the type of information to be transmitted out of Channel A.
	Weight	1193	100 CF (Default)	Volume associated with a single pulse on channel A.
	Timing	1014	50/250 ms	Channel A pulse output timing. Select the On and Off timing requirements for Channel A output.
	Queue	5	0 (Default)	Channel A pulses waiting. Provides the number of pulses waiting to be sent to the remote device. Pulse queue = 2 x the number of Channel A output pulse remaining from the previous wakeup period.

#### Pulse Output Configuration Summary

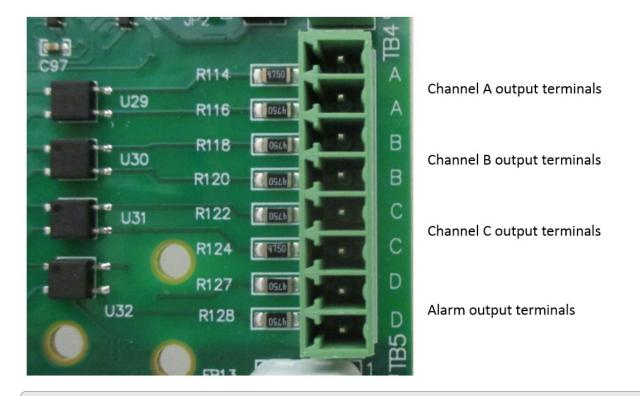
Channel	ltem function	ltem number	Parameters	Description
В	Enable/Type	94	0 = CorVol pulses	Channel B pulse output selection. Select the type of information to be transmitted out of Channel B.
			2 = UncVol pulses	
			3 = Off	
	Weight	1194	100 CF (Default)	Volume associated with a single pulse on channel B.
	Timing	1015	50/250 ms	Channel B pulse output timing. Select the On and Off timing requirements for Channel B output.
	Queue	6	0 (Default)	Channel B pulses waiting. Provides the number of pulses waiting to be sent to the remote device.
				Pulse queue = 2 x the number of Channel B output pulse remaining from the previous wakeup period.
С	Enable/Type	95	0 = CorVol pulses	Channel C pulse output selection. Select the type of information to be transmitted out of Channel C.
			2 = UncVol pulses	
			3 = Off	
			4 = Alarm	
	Weight	1195	100 CF (Default)	Volume associated with a single pulse on channel C.
	Timing*	1024	50/250 ms	Channel C pulse output timing. Select the On and Off timing requirements for Channel C output.
	Queue	7	0 (Default)	Channel C pulses waiting. Provides the number of pulses waiting to be sent to the remote device. Pulse queue = 2 x the number of Channel C output
				pulse remaining from the previous wakeup period.
D	Alarm Channel On time	1016	Default = 10 seconds	Alarm pulse width. Since this channel is Normally Closed, the channel goes open for this duration on an alarm event.

Note: If channel C is used as an alarm output, the pulse width is fixed at 100 milliseconds.

### 3.8.2 Pulse output specification

Following are the specifications for pulse output.

- All outputs are isolated from ground and each other.
- Outputs are rated for DC values from 0 to 30.0 volts, non polarized in non-hazardous locations.
- In Division 1 or Zones 1 & 2 hazardous locations, voltage rating is reduced to 8 volts maximum.
- Each circuit includes 100 ohms of current limiting resistance.
- Maximum load current 20 mA.



**Note:** Pulse outputs are not polarity sensitive but this is a change from MMX and MAT, but common to TCI.

### 3.8.3 Pulse outputs via the case connector option

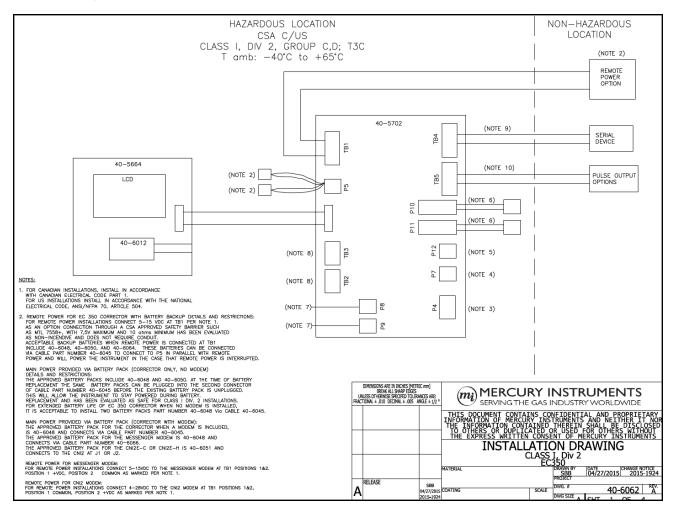
A 6 pin Amphenol case connector can be ordered to provide for the connection of two of the three pulse outputs plus the alarm from outside the instrument. The connector as shown below is viewed from outside the instrument. Pins A – F are labeled clockwise with pin A at the top. The table below shows the connections.

**Note:** Note that since the outputs are non-polarized, wires can be connected in either polarity to each output.

PIN	COLOR	PIN FUNCTION
Α	WHITE	OUTPUT A
В	RED	OUTPUT A
С	BLUE	OUTPUT B
D	BLUE	OUTPUT B
Е	BLACK	ALARM
F	BLACK	ALARM



# 3.9 Installation Drawings



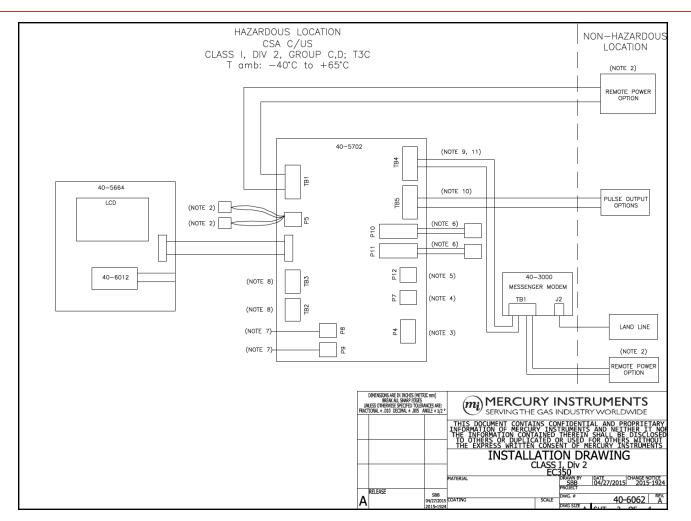
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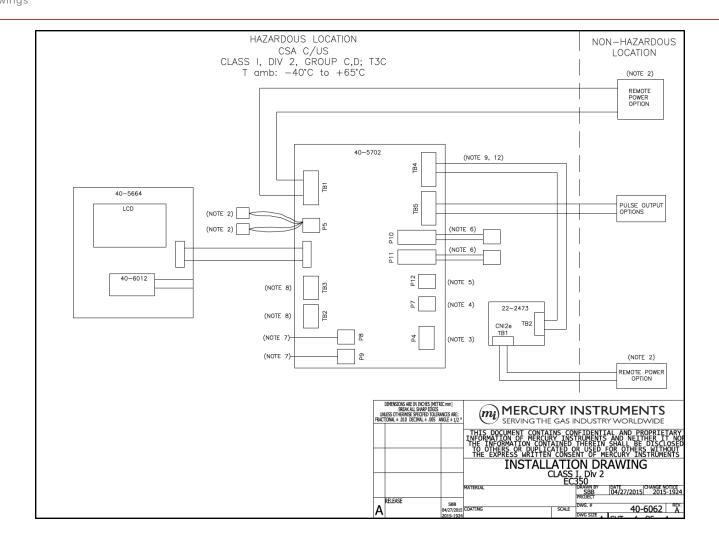
3. P4 IS A METROLOGICAL JUMPET THAT HAS BEEN EVALUATED AS NONNCENDIX AND CAN BE REMORED AND/OR REPLACED IN Div 2 HARARODUS LOCATION.     4. P7 IS A TAMEER DETECTION REED SWITCH WHICH IS MOUNTED TO CASE AND ACTIVATED BY A MADRET IN THE DOOR. THIS CONNECTION HAS BEEN DIVERSING TEMPERATURE SONDER AND THE CONNECTION AT P12 HAS BEEN PAULATED AS NON-INCENDIVE LEMPERATURE SENSOR OPTIONS INCLUDE 40-0814, 40-6008, 40-6007, 40-6008, 40-6005, P10 AND THAT HARE PREVENTIVE SINCE MANNESSINGE SHORE P10 AND THAT HARE PREVENTIVE SINCE AND ALCONT AND THE SINCE TRANSDUCERS CAN BE USED IN CLASS I, DIV 2, PART NUMBERS FOR TRANSDUCERS CAN BE USED IN CLASS I, DIV 2, PART NUMBERS FOR TRANSDUCERS CAN BE USED IN CLASS I, DIV 2, PART NUMBERS FOR TRANSDUCERS CAN BE USED IN CLASS I, DIV 2, PART NUMBERS FOR TRANSDUCERS CAN BE USED IN CLASS I, DIV 2, PART NUMBERS FOR TRANSDUCERS CAN BE USED IN CLASS I, DIV 2, PULSE CENERATOR OPTIONS: P40-4697, C-0572-1 AND GO-3070-1 B. TB2 AND TB3 ARE FORD DIGTAL PULSE INFUTS DIV 2 PULSE CENERATOR OPTIONS: P455514, TRANSDUCERS STORM DO DATE OF TRANSPOLERS FOR TRANSDUCERS INCLIDIC 40-63-0570-1 B. TB2 AND TB3 ARE FORD DIGTAL PULSE INFUTS SHARE ON TOTORS: P455514, TRANSPOLERS' STORM DEXICO OF DIVISE GENERATOR OPTIONS: P455514, TRANSPOLERS' STORM DEXICO OF DIVISE GENERATOR OPTIONS: P45514, TRANSPOLERS' STORM DEXICO OF DIVISE GENERATORS ARE NOT TO BE CONNECTED SMULTANEOUSLY. TABLE 1. DUPUT DIVISE OF NON HAZARODUS LOCATION. MAXIMUM CABLE LEWIGH 200 FEET. NAT COMBINITION OF THE OPTIONS FOR PULSE GENERATORS ARE NOT TO BE CONNECTED SMULTANEOUSLY. TABLE 1. DUPUT DIVISE OF THE CONNECTED IS APPARATUS MUST MEET THE FOLLOWING COM MARCH AND P7, P71 MIN 92 SINTES SINCED STOLED STATE FEACED DIVIS A MON BY DIVISED FOR SERVER SERVICE AND AS NON INSDIVE AND CONNECTION AT JP1 AND JP2 HAS BEEN EXALLATED AS NON INSDIVE AND CONNECTION AT JP1 AND JP2 HAS BEEN EXALLATED AS NON INSDIVE AND CONNECTION AT JP1 AND JP2 HAS BEEN EXALLATED FOR ACCD DIVIS A MANDERTERS MONTHER FOLLOWER DIVIS DIVIS THE	10. T85 IS FOR CONNECTION TO PULSE OUTPUTS FROM THE EC 350. CONNECTION TO TTES CAN BE MADE VIA CONDUIT with MAX 12 VIC PER NOTE 1, OR WITHOUT CONDUIT TO A CLASS 1, DV 1 OR ON 2 APPROVED BARKER WITH FOLLOWING PARAMETERS. OF PRODUCT WITH ENTITY PARAMETERS MATCHING THE FOLLOWING PARAMETERS. OFTION 1: X5 A FIRST OPTION CONNECTION TO T85 PULSE OUTPUTC AN BE CONNECTED WITHOUT CONNE. SUCH AS WIT. 7713+ b) 28Y 300 ohms. SUCH AS WIT. 7723+ OPTION 2: X5 A SECON OPTION EACH CHANNEL (CHANNELS IDENTIFED BELOW) CAN BE CONNECTED TO A CLASS 1, DV 2 APPROVED PRODUCT WITH ENTITY PARAMETERS. THESE PULSE RECEIVERS ON BE LOATED IN CLASS 1, DV 1/DV 2 ON NON NAZAROUS LOATION. TABLE 1. Imput parameters For Marcury Instruments 40-5702 T85 Electrical Pormeters For Marcury Instruments 40-5702 T85 Electrical Pormeters For Marcury Instruments 40-5702 T85. Electrical Pormeters For Marcury Instruments 40-5702 T85. Electrical Pormeters For Marcury Instruments 40-5702 T85. Electrical Pormeters For Her CONNECTED IS APPARATUS MUST MEET THE FOLLOWING Maximum Input Valage VW out 1 in 100V Maximum Input Corrent I i 0 DV MAXMEM VM MARAMETERS. THE PARAMETERS OF THE CONNECTED IS APPARATUS MUST MEET THE FOLLOWING CONNETIONS. Voc/U is V IMAX/UI Isc/Ie is Imax/C Ca/Co 2 if i + Cooble La/Lo 2 if i + Cooble CHD I 7 CHA I 7
OPTION 1: 1. AS AN OPTION TO THE CONNECTION SHOWN ON PAGE 1 FOR THE 1. AS AN OPTION TO THE TOO AND RXD CONNECTIONS CAN BE SAME FROM SCRIL PORT THAT TO A STRALL OVICE HING CONTY PARAMETERS CONFORMING TO TABLE 1 AND 2 BELOW. THESE STRALL DEVICES CAN BE LOCATED IN DW.1/ZONE 0, DW. 2/ZONE 2, OR NON-HAZARDOUS LOCATIONS.	11. USE OF THE MESSENGER MODEN 40-3000 HKS BEEN EVALUATED AND IS APPROVED FOR CLASS I, DW 2 MAXARODUS, ICOCNIDNS, POWER IS CONNECTED AS DISCUSSED IN NOTE 2, SERAL CONNECTION IS BETWEEN EC 303 THA 4ND MESSENGER MODEM TB1, LAND LINE TELEPHONE LINE TO BE INSTALLED PER NOTE 1. 12. USE OF THE CHAZ 22-2473 HAS BEEN EVALUATED AND IS APPROVED FOR CLASS I, DW 2 HAZARODUS LOCATIONS, POWER IS CONNECTED AS DISCUSSED IN NOTE 2. SERAL CONNECTION IS BETWEEN IC 330 TB4 AND CHAZ BE2.
TABLE 1.	
Input parameters For Mercury Instruments 40–5702 TB4           Electrical Permeters         DIV Marking         Zone Marking         Value           Maintmum Input Corrent         III         300*           Maintmum Input Corrent         IIII         300*           Maintmum Input Corrent         IIII         300*           Maintmum Input Corrent         IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	DIVERSIONS ARE IN DICHS (NET DICK) ULLESS OTHERINGS SECTOD TOLERANCS ARE: RECTORNEL & SUBJECTOD TOLERANCS ARE: RECTORNEL & SUBJECTOD TOLERANCS ARE: RECTORNEL & SUBJECTOD TOLERANCS ARE: RECTORNEL & SUBJECTOD TOLERANCS ARE: THIS DOCUMENT CONTAINS CONFIDENTIAL AND PROPRIETARY INFORMATION OF MERCINY INSTALMENTS AND RETHER TO ANO THE STORESS WAITEN OCCONSENT OF MERCURY INSTALL & DISCLOSED TO OTHERS OR DUPLICATED OR USED FOR OTHERS WITHOUT THE EXPRESS WAITEN CONSENT OF MERCURY INSTALL & SUBJECTS
AGINAL CONCERNMENT OF ADDRESS OF A CONCECTED WITHOUT CONDUT VECKSA CERTIFICE DARRIER HAVING PARAMETERS OF 9V MAX AND 90 ohms Min SUCH AS MIL 7761 AC	Inite Law Response         Inite L

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3 EC350 installation 3.9 Installation Drawings



# 4 Securing the device

This chapter describes the different safety and security features of a EC350 device.

- <u>Case</u>
- Metrological protection modes
- Defining access privileges
- Metrological configuration mode
- Validating setup configuration

CHAPTER 4

# 4.1 Case

The case can be locked or tamper sealed with a padlock or seal on the door hasp.

# 4.2 Metrological protection modes

Item classifications

- Item classifications
- <u>Access restriction Item 139 configuration options</u>
- Event log full note
- Changing item 139
- Using MasterLink Software Application SQL to change item 139

#### 4.2.1 Item classifications

Each item has a fixed classification – one of those below. Contact Honeywell for classification of each item. These classifications pertain to the access restriction modes below.

Туре	ICB Dump Terminology	When Writable	Changes Logged	Example
Always Writable	OPEN	Unless item 139 = 1 (Full Read Only)	If and only if item 139 = 0 or 3	Display list configuration
Read-Only	READONLY	Never (implicitly, per their function)	Never	Battery voltage
Change only if Event Logged	EVENT LOG	If not in Metrological Protection mode OR if event log not full	Always	Gas composition (item 53)
Change only if no restrictions	SEALED	Only if not in metrological protection mode	Always (if changed, but not possible unless 139=0)	Calibration

ltem 139	Туре	Item Change Restrictions	Event Logging	Firmware Upgradable	Lock Icon
0	Unrestricted	All items (that are not Implicitly Read- Only) can be written.	All item changes are event logged.	Yes	Open
1	Full Read Only	No items may be written.	NA	No	Closed
2	Metrological Event Protection	OPEN items may be modified. SEALED items may not be modified. EVENT items may be modified only if the event log is not full of unread records. (Only log records that have been read can be overwritten.) (This mode corresponds to a Measurement Canada Type B Event Log.)	Only changes to EVENT items are logged. Changes to OPEN items are NOT logged.	No	Closed
3	Metrological Sealed	Only OPEN items may be modified.	All item changes are event logged.	No	Closed
4	Metrological Event Locked	OPEN items may be modified. SEALED items may not be modified. EVENT items may be modified only if the event log is not full of changes since put in protected mode. Reading Event Log has NO affect on allowing write access. Once event log is full of changes since it was put in protected mode (with item 139 change) no more changes to protected items are allowed until item 139 is set back to zero. (This mode corresponds to a Measurement Canada <i>Type A</i> Event Log.)	Only changes to EVENT items are logged. Changes to OPEN items are NOT logged.	No	Closed

# 4.2.2 Access restriction Item 139 configuration options

# 4.2.3 Event log full note

In modes 2 and 4 (Metrological Event Protection and Metrological Event Locked), changes to EVENT items are blocked *before* overwriting the record that shows the item 139 write putting it into a protected mode. This allows verification that you are seeing *all* of the changes since it was put into a protected mode. In mode 2 it assures that the item 139 change is uploaded, and it mode 4 it assures that the item 139 change is visible in event log in the device.

# 4.2.4 Changing item 139

If item 139 is set to any value other than 0 (unrestricted) - it may not be changed unless the METROLOGICAL ACCESS JUMPER is OFF.

Attention: Firmware can be upgraded if either the override jumper is off OR if item 139 is set to unrestricted.

The METROLOGICAL ACCESS JUMPER is located in the lower right corner of the IO Board at the back of the case (labeled "METR JMPR"). If a sealing plate is in place that must first be removed.



# 4.3 Defining access privileges

Access to the EC350 can be controlled by defining users and assigning them passcodes and privileges. Use MasterLink Software Application SQL (4.41 and above) to set up a User Table and to download it to the device.

- Default User Table
- Creating a user table file
- Sending a user table file

# 4.3.1 Default User Table

User	Enabled	Passcode	Privileges
0	Yes	33333	All, HMI L3
1	Yes	33333	All, HMI L3
2	Yes	20000	All, HMI L2
3	Yes	30000	All, HMI L3
4-99	No		

Event log records reference this user ID, to identify who made configuration changes.

Full use of multi-user features requires host software supporting the SS protocol command. For backwards compatibility with host software that only supports the older SN sign on command (which does not support multiple users), the user O passcode is required for sign on via the SN command. In that case all configuration changes made through an SN sign on are attributed to user O in the event log records. The legacy item 196 (event log user ID) is not supported.

The screenshot below shows a typical User Table.

			Add User						Add I	Role Update	D
ble (	User ID	Password	Role		Role Name		Admin - Privilege				
0	D	•••••	Admin	•	Admin	•	Modify Open Items	Modify Event Items	Modify S	lealed Items	
1	1	•••••	Admin	•	Test	►	Can Read Event Log	Can Change User Table	HMI Love	el 2 Access	
4	2	•••••	Admin	-			HMI Level 3 Access	Cloud Link Write			
\$	3	•••••	Admin	•			Current Privilege 65663				
4	4	•••••	Admin	-							
6	5	•••••	Admin	-							
6	5	•••••	Admin	-							
1	7	•••••	Admin	-							
	В	•••••	Admin	-							
9	9		Admin	-							
1	10	•••••	Admin	-							
1	11		Admin	-							
1	12		Admin	-							
1	13	•••••	Admin	-							
1	14	•••••	Admin	•							
	15	•••••	Admin	•							
1	16		Admin	•							
	17		Admin	-							
	18		Admin	•							
~	Hide Empty F	Privileges Show Pass	word								
					Open Re	esot	Save As Send to Device				
					opon na						

Valid user IDs are 0 through 99 (decimal numeric). Valid passcodes are 0 through 99999 (decimal numeric).

The following privileges can be granted or denied users:

- MODIFY OPEN ITEMS
- MODIFY EVENT ITEMS
- MODIFY SEALED ITEMS
- READ EVENT LOG
- USER TABLE DOWNLOAD
- HMI LEVEL 2 ACCESS
- HMI LEVEL 3 ACCESS

OPEN, EVENT, and SEALED are three classifications of items (the other classification is READONLY, which cannot be modified with any privilege).

A user granted level 3 HMI access will enter level 3 HMI menus after entering their user ID and password into the HMI (regardless of whether they are granted level 2 access). To allow a user to enter level 2, they must not be granted level 3 access. A single user can either have level 2 HMI access or level 3 HMI access or neither, but may not access both level 2 and 3.

# 4.3.2 Creating a user table file

#### To create a user table file:

- Establish a serial communication between EC350 and MasterLink Software Application SQL. Refer to the *MasterLink Software Application SQL User's Guide* for information about establishing a serial connection between EC350 and MasterLink Software Application SQL.
- In the MasterLink Software Application SQL window, click Instrument > Edit User Table.

View	/ Edit									
Confi	gure by Grou	ip 🛛 Configu	re by Item	Send Item File	Logging C	onfiguration	Manage User Tab	e   Manage Shortlis	t Manage AGA-8	
				Add User					Add Role	
Enable	User ID	Password	Role			Role Name		Privilege		
								Modify Open Items	Modify Event Items	Modify Sealed Items
								Can Read Event Log	Can Change User Table	HMI Level 2 Access
								HMI Level 3 Access	Cloud Link Write	
							c	rrent Privilege		
	Hide Empty Pri	ivileges	Show Passwor	1						
					Open	Reset				

• In the User Table dialog box, click New.

		Add Role	Update Delete
ole Name	- Privilege		
	Modify Open Items	Modify Event Items	Modify Sealed Items
	Can Read Event Log	Can Change User Table	HMI Level 2 Access
	HMI Level 3 Access	Cloud Link Write	
	Current Privilege		

П

• Enter User ID and Password and select the privileges to want to grant to the user under Privileges.

View	/ Edit								
Confi	gure by Gro	up Configu	re by Item Send	I Item File   Logging (	Configuration	Manage User Table	Manage S	hortlist   Manage AGA-8	
			Add	I User Delete				Add Role	Update Delete
Enable	User ID	Password	Role		Role Name	- P	rivilege		
	11	•••••		•			Modify Open Ite	ems Modify Event Items	Modify Sealed Items
	12	•••••		•			Can Read Even	nt Log Can Change User Table	HMI Level 2 Access
	13	•••••		•			HMI Level 3 Act	cess Cloud Link Write	
	14	•••••		•		Curre	nt Privilege		
	15	•••••		•					
	16	•••••		•					
	17	•••••		•					
	18	•••••		•					
	Hide Empty F	Privileges	Show Password						
				Open	Reset	Save As Se			

- Click **Apply** to save the privileges for the newly created user.
- Click Save.

The Save User Table File As dialog box appears.

- Enter a filename and click **OK**. The **Choose Password** dialog box appears.
- Enter a password and click **OK**. This password is required when you want to send the user table file.

# 4.3.3 Sending a user table file

#### To send a user table file:

- Establish a serial communication between EC350 and MasterLink Software Application SQL. Refer to the *MasterLink Software Application SQL User's Guide* for information about establishing a serial connection between EC350 and MasterLink Software Application SQL.
- In the MasterLink Software Application SQL window, click Transfer > Send User Table.

			Add User Delo						
nable	User ID	Password	Role		Role Name	Admin - Privilege			
2	0		Admin	-	Admin 🕨	Modify Open Items			
2	1	•••••	Admin		Test	Can Read Event Log Can Change User T			
2	2	••••••	Admin			HMI Level 3 Access			
2	3	••••••	Admin			Current Privilege 65663			
	4	••••••	Admin			Garon Printinge			
2	5	••••••	Admin -						
7	6	••••••	Admin -						
1	7	••••••	Admin			$\otimes$			
٢	8	•••••	Admin	$\mathcal{O}$	Success !				
2	9	•••••	Admin	Č	User table has been sent to devic	a successfully			
1	10	•••••	Admin						
1	11	•••••	Admin						
	12	•••••	Admin -						
1	13	•••••	Admin						
	14	•••••	Admin						
	15	•••••	Admin •						
	16	•••••	Admin •						
	17		Admin -	-					
	18		Admin						

The EC350 ships in unsecure mode with default passwords. Change the default passcodes at least to secure the device.

**Note:** For convenient device access by users choosing not to secure their devices, MasterLink Software Application SQL will attempt to access user 0 with the default passcode and will only prompt the user if that fails.

# 4.4 Metrological configuration mode

A special operational mode is available which may be useful when making configuration changes to an instrument already in service. Most changes would not require this, but if multiple changes are being made and there could be dependencies between those changes (in particular if the instrument would measure incorrectly if it received a volume pulse from the meter while the changes are still in progress – only partially completed). The mode is called Metrological Configuration Mode. In this mode, input volume pulses are queued but not processed, and Pressure and Temperature measurements are deferred. Processing continues normally after you exit the mode, with the queued input volume pulses handled per the new configuration.

You enter and exit the mode either through the HMI (L2.9 and L3.11 MET CONFIG), or through MasterLink Software Application by setting/clearing item 1239.

**Note:** The mode will also be exited automatically on an exit from HMI mode (either explicitly or by inactivity time-out) and likewise on a serial comm (MasterLink Software Application ) disconnect from the instrument (either explicit or by inactivity time-out). (It will exit the mode on either HMI or Serial exit, regardless of which was used to activate the mode.)

# 4.5 Validating setup configuration

After installing EC350 on the meter and updating its configuration settings, ensure to perform the following final checkout tasks:

- Verify the pulse input. Refer to the section "Testing the pulse input".
- Verify corrected and uncorrected volume. Refer to the section "Selecting the unit of measure".
- Verify pressure/temperature factors. Refer to the section "<u>Verifying pressure</u>" or "<u>Verifying</u> temperature".

# 5 Key features

This chapter describes the key features of an EC350 device.

- Volume Measurement
- <u>P-T-Z Measurement</u>
- Meter Proving
- <u>Alarms</u>
- Logging
- Battery Life/Usage Tracking
- Display ON/OFF

CHAPTER 5

# 5.1 Volume measurement

EC350 generally operates in the Corrector mode. In this mode, EC350 receives and processes uncorrected volume, pressure, and temperature inputs to produce corrected volume information.

The following image illustrates a typical Corrector mode display.



- Top line of LCD display indicates the totalized corrected volume value.
- Second line indicates the corrected volume unit of measure (e.g. MCF).
- Third line indicates the item's name (e.g. CORVOL, which is corrected volume).
- Bottom line shows active icons to indicate various system status information.

### 5.1.1 Corrected volume

EC350 accurately measures and maintains the total uncorrected volume passing through the meter on which it is installed. In addition to the uncorrected volume, EC350 also computes the corrected volume.

The corrected volume is computed by multiplying a *total correction factor* by the uncorrected volume input from the meter.

EC350 maintains items called *Hi-Res* (High Resolution) volumes for indicating a fractional part of the corrected and uncorrected volumes that are not visible in the primary items (0 and 2).

Total Correction Factor = Temperature Factor X Pressure Factor X Auxiliary Factor (normally 1.0) X Squared Supercompressibility Factor.

EC350 supports a large range of units for measuring volume; some of them are as follows:

CF, CFx10, CFx100, CCF, CFx1000, MCF, CFx10000, m3x0.1, m3, m3x10, m3x100, and m3x1000.

You can independently configure corrected and uncorrected volume items.

# 5.1.2 Uncorrected volume

The gas flowing through rotary meter is measured by multiplying the input signals supplied by the two redundant volume sensors with the appropriate scaling factor (in item 114) for a particular rotary meter (selected in item 432). Generally, 114 value is set automatically when the meter model is selected, but 114 can also be set manually for other meters models.

Currently, EC350 supports over 140 meter models explicitly. Others can be supported with manual configuration.

# 5.1.3 Energy

In addition to the corrected and uncorrected volume, EC350 also calculates the energy (in item 140) corresponding to the corrected volume, based on a fixed user-configurable conversion factor (item 142).

EC350 supports a large range of units for measuring energy; some of them are as follows: Therms, Decatherms, Mega Joules, Giga Joules, Kilo Calories, and Kilo Watts.

Refer to the *Item Reference Guide* for information about *Energy (item 140)*, *Energy units (item 141)*, and *Gas energy value (item 142)*.

### 5.1.4 Volume statistics

The EC350 supports numerous gas volume statistical related items (Mins. Maxs, Peaks, Avgs) for Cor-Vol, Unc-Vol, Flow rate, and Dial rate.

Refer to "Item Reference Guide" for information about the gas volume statistical Items.

### 5.1.5 Volume Input Modes

Refer to the "*Item Reference Guide*" for information about Input volume mode (item 433) and Rotary Integral mount (item 432).

#### 5.1.5.1 UMB, Instrument Drive & Remote input

EC350 supports gas volume measurement from UMB (Universal Mounting Bracket) and Instrument Drive interfaces. Select the meter model from the list provided from item 432. If the meter is not in the list, use item 433 to set selection: LF-UMB/Instrument Drive and configure meter index rate (item 98) and meter scaling (item 114) to match the application. Note that item 114 is typically set to value 1.000.

Note that two switch inputs are normally used in these applications to provide for switch input redundancy (one switch can backup the other).

### 5.1.5.2 Direct Rotary mount input

EC350 supports gas volume measurement from directly mounted Rotary meters. Select the meter model from the list provided from item 432. In doing so, the EC350 will automatically set items 114 to its proper value based on item 439. Note that item 98 is not used in Direct mount rotary and is assumed to be value 1.0 CF or 1.0 m3 depending on Volume units. Item 433 will also be set automatically to low resolution mode for rotary input. Low resolution rotary mode uses a pulse input divider to increase battery life while still proving adequate volume measurement resolution.

For direct-mount Rotary configurations only, EC350 also supports an option called high resolution mode for obtaining a higher degree of gas volume measurement resolution. Use the Input volume mode (item 433) for selecting the high resolution mode option. In this mode, EC350 measures the gas volume using a very low divider ratio for the input signals supplied by the two volume input sensors. In low resolution rotary mode, the divider ratio is much higher for making a sensible trade-off between the measurement resolution and the instrument battery life. High resolution mode is a useful test and verification tool for obtaining accurate volume measurement within a shorter period of time (less gas passing through the meter) – but consumes more battery power.

**Note:** EC350 battery life specifications are based on using the low resolution mode (not high resolution).

### 5.1.5.3 Bidirectional volume or Reverse flow

EC350 supports another volume input option called Bidirectional volume input mode (Reverse flow) for obtaining gas volume measurement in applications where flow direction is desired. Two configuration options are possible for Bidirectional volume modes: Forward direction = Clockwise rotation, and Forward direction = Counter-clockwise direction. Use the Input volume mode (item 433) for selecting either of these two input mode options.

Listed here are the main volume items used for Bidirectional mode:

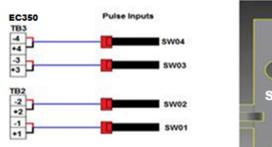
- CorVol (item 000) always counts up regardless of rotation direction
- UncVol (item 002) always counts up regardless of rotation direction
- Forward CorVol (item 896) counts up based solely on forward rotation direction per item 433 configuration
- Forward UncVol (item 898) counts up based solely on forward rotation direction per item 433 configuration
- Reverse CorVol (item 902) counts up based solely on reverse rotation direction per item 433 configuration

- Reverse UncVol (item 906) counts up based solely on reverse rotation direction per item 433 configuration
- Net CorVol (item 900) is the difference between Forward and Reverse Cor-Vol (item 896 item 902)
- Net UncVol (item 904) is the difference between Forward and Reverse Cor-Vol (item 898 item 906)

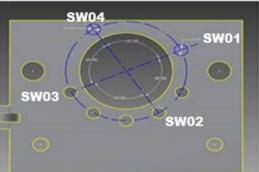
Four switch sensors are utilized in Bidirectional volume mode to allow for direction detection as well as redundancy protection. If one of the four switch sensors is not detected after completing a full revolution, the EC350 will trigger a switch Alarm for that particular 'missing' switch sensor. For example: switch sensor input sequence of: 1-2-4-1-2... will trigger a Switch-3 sensor Alarm.

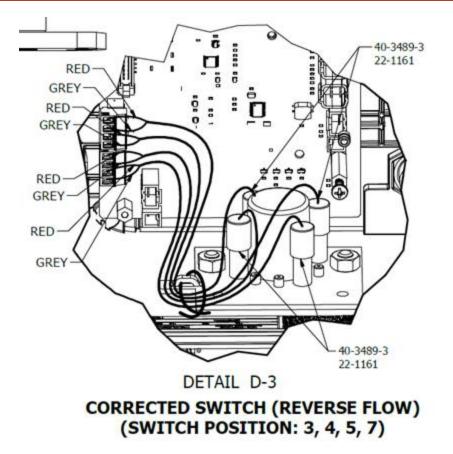
Attention: Three switch sensors are required to count volume input. If two switch sensors fail the EC350 will trigger a switch Alarm for the second 'missing' switch sensor and will then stop counting Volume input as it can no longer distinguish between back and forth partial rotations and full rotations. Example: switch sensor input sequence of: 1-3-1-3-1 can either be partial rotation or full rotation

Bidirectional volume mode has four switch sensors installed on the switch plate where standard UMB/ID input has only two switch sensors installed. Shown below is wiring and switch plate diagram for Bidirectional Volume. Also see: 'section, " <u>Changing the drive rotation</u> ", to position the bevel-gear thimble of EC350 to ensure the reading rotates in the desired direction of rotation.



#### **Connection & Position of input pulse sensors**



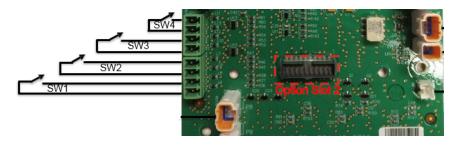


### 5.1.6 Volume switch filtering

After a long period of operation, some units experience a large number of unexpected spikes at volume inputs. To avoid this, enable the filtering feature by writing the value '1' (enable) to item i449.

### 5.1.7 Digital switch inputs

In EC350, Switch 3 (SW3) and Switch 4 (SW4) are primarily used for the reverse flow. If the reverse flow is not used, SW3 and SW4 can be configured as digital input alarm 1 and alarm 2. These digital input switch alarms can be configured using items i762 and i763.



**Note:** If the user wants to use SW3 and SW4 for reverse flow, the digital switch input alarms (i762 & i763) must be disabled.

# 5.2 P-T-Z Measurement

### 5.2.1 Gas Pressure

Gas pressure is measured on a time-based approach (every 30 seconds), as opposed to being based on volume input. With each 30 second measurement, the gas pressure correction factor is computed and high and low Pressure alarms are checked (regardless of flow rate conditions).

The EC350 uses a high resolution analog to digital conversion process to produce a very accurate final reading.

Up to two Pressure Transducer can be used with the EC350. The Pressure Transducer connected to the P1 input is used for computing the Gas pressure correction factor (item 044). If a second Pressure transducer is connected at P2 input, this serves to monitor pressure but is not used for correction. Gas pressure measurement can be disabled for either transducer by use of items 1052 (P1 Enable) or 1053 (P2 Enable).

The P4 is a virtual sensor connected to all pressure sensors. It calculates the pressure differences between any two pressure sensors.

See *Item Reference Guide*" for information about the following pressure items and several other additional pressure Items.

- Gas Pressure (item 008)
- Gas Pressure units (item 087)
- Gas Pressure no. of decimal points (item 088)
- Pressure correction factor (item 044)
- Base Pressure (item 013)
- Atmospheric Pressure (item 014)
- Pressure Low alarm (item 143)
- Pressure Low alarm limit (item 011)
- Pressure High alarm (item 145)
- Pressure High alarm limit (item 010)

### 5.2.1.1 Gas Pressure statistics

EC350 supports various pressure statistical items.

Following are several of the P1 pressure statistical items:

- P1 Max pressure (item 285)
- P1 Max pressure date (item 287)
- P1 Max pressure time (item 286)
- P1 Min pressure (item 289)
- P1 Min pressure date (item 291)
- P1 Min pressure time (item 290)
- Prev day average P1 pressure (item 185)
- P1 Interval average pressure (item 206)
- P1 Interval high pressure (item 214)
- P1 Interval low pressure (item 215)
- P1 Daily average pressure (item 256)

Following are several of the P2 pressure statistical items:

- P2 Interval average pressure (item 421)
- P2 Interval high pressure (item 422)
- P2 Interval low pressure (item 423)
- P2 Daily average pressure (item 424)
- P2 Previous daily average pressure (item 425)
- P2 Max pressure (item 426)
- P2 Max pressure time (item 427)
- P2 Max pressure date (item 428)
- P2 Min pressure (item 429)
- P2 Min pressure time (item 430)
- P2 Min pressure date (item 431)

Following are several of the P4 pressure statistical items:

- P4 RBX Deadband Pressure (item 1640)
- P4 Interval Average Pressure (item 1641)
- P4 Daily Average Pressure (item 1642)
- P4 Previous Daily Avg Pressure (item 1643)
- P4 Max Pressure (item 1644)
- P4 Max Pressure Time (item 1645)

- P4 Max Pressure Date (item 1646)
- P4 Min Pressure (item 1647)
- P4 Min Pressure Time (item 1648)
- P4 Min Pressure Date (item 1649)
- P4 Interval High Pressure (item 1650)
- P4 Interval High Pressure Time (item 1651)
- P4 Interval High Pressure Date (item 1652)
- P4 Interval Low Pressure (item 1653)
- P4 Interval Low Pressure Time (item 1654)
- P4 Interval Low Pressure Date (item 1655)
- P4 Day High Pressure (item 1656)
- P4 Day High Pressure Time (item 1657)
- P4 Day High Pressure Date (item 1658)
- P4 Day Low Pressure (item 1659)
- P4 Day Low Pressure Time (item 1660)
- P4 Day Low Pressure Date (item 1661)
- P4 Previous Day High Pressure (item 1662)
- P4 Previous Day High Pressure Time (item 1663)
- P4 Previous Day High Pressure Date (item 1664)
- P4 Previous Day Low Pressure (item 1665)
- P4 Previous Day Low Pressure Time (item 1666)
- P4 Previous Day Low Pressure Date (item 1667)

Note: P4 value shows an error code (9999) if any one of the sensor is disconnected.

### 5.2.1.2 Fixed Gas pressure

The EC350 can be configured to function as a fixed pressure device by setting item 109 to fixed pressure. In this mode, the pressure value configured in item 1161–Fixed pressure value (instead of the live pressure at item 8) is used for pressure correction.

Refer to Item Reference Guide" for information about the gas temperature statistical items.

## 5.2.2 Gas Temperature

EC350 Gas temperature is measured on a time-based approach (every 30 seconds), as opposed to being based on volume input. With each 30 second measurement, the gas temperature correction factor is computed and high and low Temperature alarms are checked (regardless of flow rate conditions).

The EC350 uses a high resolution analog to digital conversion process to produce a very accurate final reading.

Only one Temperature probe can be used with the EC350. The Temperature probe is used for computing the Gas temperature correction factor (item 045). Gas temperature measurement can be disabled for either transducer by use of item 1055 (T1 Enable).

Refer to "*Item Reference Guide*" for information about the following temperature items and several other additional temperature Items.

- Gas temperature (item 026)
- Gas temperature units (item 089)
- Temperature correction factor (item 045)
- Base temperature (item 034)
- Temperature low alarm (item 144)
- Temperature low alarm limit (item 027)
- Temperature high alarm (item 146)
- Temperature high alarm limit (item 028)

### 5.2.2.1 Temperature statistics

EC350 supports various gas temperature statistical items. Following are the supported gas temperature statistical items:

- Interval high gas temperature (item 216)
- Interval low gas temperature (item 216)
- Daily average gas temperature (item 257)
- Previous day gas temperature (item 186)
- Max gas temperature (item 293)
- Max gas temperature date/time (item 294/295)
- Min gas temperature (item 297)
- Min gas temperature date/time (item 298/299)

### 5.2.2.2 Fixed Gas temperature

The EC350 can be configured to function as a fixed temperature device by setting item 111 to fixed temperature. In that mode, the temperature value configured in item 1162–Fixed temperature value (instead of the live temperature at item 26) is used for temperature correction.

### 5.2.3 Supercompressibility

Gases actually behave in a manner slightly different from what the ideal gas laws indicate. This deviation depends on the molecular composition of the gas as well as the pressure and temperature. Natural gas, for instance, compresses by a greater amount than that computed by Boyle's law and hence the term "supercompressibility" is used for this deviation. It is small at very low pressure, but becomes substantial as the pressure increases.

### 5.2.3.1 Supercompressibility Factor

Gases actually behave in a manner slightly different from what the ideal gas laws indicate. This deviation depends on the molecular composition of the gas as well as the pressure and temperature. Natural gas, for instance, compresses by a greater amount than that computed by Boyle's law and hence the term "supercompressibility" is used for this deviation. It is small at very low pressure, but becomes substantial as the pressure increases. The EC350 automatically applies the supercompressibility factor and therefore the equation for total volume correction that EC350 applies to metered volume is expressed as:

Vb = Vm \* Fp \* Ft \* (Fpv)<sup>2</sup>

Where:

- Vb (item 0) = volume corrected to base conditions
- Vm (item 2) = volume from the meter (at measured conditions)
- Fp (item 44) = pressure factor
- Ft (item 45) = temperature factor
- Fpv (item 47) = supercompressibility factor per NX-19 or AGA-8 standard (derived for orifice meters)
- (Fpv)2 (item 116) = supercompressibility factor used for diaphragm, rotary, and turbine meters

The EC350 can calculate the supercompressibility factor according to the following standards:

- AGA-8
  - Gross method 1
  - Gross method 2
  - Detail method
- NX-19

ltem Number	Item Description	NX-19	AGA-8 Gross Method1	AGA-Gross Method2	AGA-8 Detail
147	SuperCompress Tbl Used	~	$\checkmark$	$\checkmark$	~
53	Specific Gravity	~	$\checkmark$	$\checkmark$	
142	Gas Energy Value		$\checkmark$		
141	Gas Energy Units		$\checkmark$		
54	% Nitrogen	~		$\checkmark$	~
55	% Carbon Dioxide	~	$\checkmark$	$\checkmark$	~
373	% Methane				~
374	% Ethane				~
375	% Propane				~
376	% Iso-Butane				~
377	% N-Butane				~
378	% Iso-Pentane				~
379	% N-Pentane				~
380	% N-Hexane				~
381	% N-Heptane				~
382	% N-Octane				~
383	% N-Nonane				~
384	% Hydrogen Sulfide				~
385	% Hydrogen				~
386	% Helium				~
387	% Oxygen				~
388	% Carbon Monoxide				~
389	% Argon				×

### 5.2.3.2 Item Description for Supercompressibility factors

ltem Number	Item Description	NX-19	AGA-8 Gross Method1	AGA-Gross Method2	AGA-8 Detail
390	% N-Decane				~
391	% Water				~
34	Base Temperature	~	✓	$\checkmark$	~
13	Base Pressure	~	✓	~	~
26	Flow Temperature*	$\checkmark$	~	$\checkmark$	~
8	Flow Pressure*	$\checkmark$	~	$\checkmark$	~
1161	Fixed Pressure Value*	$\checkmark$	~	$\checkmark$	~
1162	Fixed Temperature Value*	~	✓	~	×

Note: (\*) Items 8 and 26 are live readings (not user configurable). They are used for supercompressibility calculations when pressure and/or temperature calculations are "live" per items 109 and 111, respectively. If pressure and/or temperature is fixed, items 1161 and/or 1162 (user configurable fixed pressure and fixed temperature values, respectively) are used instead of items 8 and/or 26 in supercompressibility calculations.

# 5.3 Meter proving

The public utility commissions or various governmental regulations may require you to check the accuracy of the actual volume of gas flowing through a gas meter. Prover devices such as the Dresser Model 5 Prover and the Elster/American Meter SNAP Sonic Nozzle Prover are used for verifying the accuracy of the volume of gas flowing through a gas meter. Prover devices pass a known volume and temperature of gas through the meter being tested. They compare their own standard volume to the volume reported by EC350, which is mechanically connected to the rotary gas meter.

EC350 uses switch closure pulse counts for providing volume data to the Prover device. The meter bodies and EC350 are tested at various rates such as 10%, 50%, and 100% of rated capacity. You can connect EC350 to a prover to test both uncorrected and temperature corrected volumes.

EC350 has a special operating mode that makes meter proving process very easy and fast. This mode is called *Pushbutton Proving*. No special configuration settings are required to use the *Pushbutton Proving* feature of EC350.

- Connecting the USB cable to the prover dongle
- Proving dongle indicators
- <u>Starting Pushbutton proving</u>
- Volume per proving output pulse

# 5.3.1 Connecting the USB cable to the prover dongle

The following image illustrates a proving kit.



The proving kit includes the following components for connecting the EC350 to a Dresser Model 5 Prover:

- EC350 prover dongle
- Cable assembly (USB and Model 5 connectors)
- Magnetic coupler

### 5.3.1.1 Cable adapter for the SNAP prover system

The cable adapter assembly is used with an Elster/American Meter SNAP prover system. This cable adapter is included in the 40-4913-1 prover kit along with all of the components in the 40-4913 base prover kit. The following image illustrates the cable adapter for the SNAP prover system.



# 5.3.2 Proving dongle indicators

### 5.3.2.1 Proving dongle

The infrared prover dongle is a device that can be connected to the IrDA data port on EC350. It receives IR LED pulses from EC350 and converts the appropriate pulses into electronic switch contacts. This allows a rotary meter with the EC350 to be tested as a unit without breaking the meter seal. The following image illustrates an IR proving dongle.



#### Prover dongle indicators

The following image illustrates a prover dongle indicators.



- PULSE: A red light appears to indicate that the electronic switch to the Model-5 prover is closed.
- LINKED: A green light appears to indicate that EC350 and the prover dongle are synchronized. This must be ON when you are in the *Pushbutton Proving* mode.
- CPU OK: A yellow light appears to indicate that the prover dongle is powered and is operational. Ensure that the yellow light is always ON during operation. If the light goes off, it indicates that the prover dongle does not receive the 5V power supplied by the computer.

## 5.3.3 Starting Pushbutton proving

The basic operation of the *Pushbutton Proving* mode is as follows:

- The prover dongle receives uncorrected or temperature corrected volume in the form of infrared light pulses from EC350.
- The prover dongle converts the received infrared light pulses to electronic switch closure pulses that can be handled directly by the supplied prover.
- These electronic switch closure pulses are sent to the prover. Each electronic switch closure pulses represents either one (1), ten (10), or one hundred (100) cubic feet of gas volume, depending upon the model of the rotary meter.
- When EC350 is in *Meter Proving* mode, the volume pulse inputs from the meter are read at a much higher resolution than what is normally processed. This allows the most rapid proving cycle time for a given accuracy. Most proving runs can be accomplished within 60 seconds. Attention: When EC350 is in *Pushbutton Proving* mode, the IrDA Serial communications are disabled. Before you enter the *Pushbutton Proving* mode, ensure that the prover dongle is connected to EC350.
  - Entering Pushbutton Proving mode

### 5.3.3.1 Entering Pushbutton Proving mode

#### To enter Pushbutton Proving mode:

 Unlock the keypad and type the PASSCODE to enter level 3 mode. Refer to the section <u>"level 3</u> mode" for accessing level 3 mode. By default, in level 3 mode the following appears on the display. MAIN MENU

ALARMS

- Using the UP arrow and DOWN arrow scroll through the options in level 3 mode until MTR PROVER appears.
- Press **OK**. The following appears on the display. UC

IDIAL RATE

This represents the current meter Dial Rate for uncorrected volume.

Press and hold OK for five seconds. The following message appears on the LCD.
 PROVE

UC

This indicates that EC350 is in *Pushbutton Proving* mode.

 To exit uncorrected proving and proceed on with temperature corrected proving, press OK. The following message appears on the display.
 UC

IDIAL RATE

Press the DOWN arrow, the following appears on the display.
 TC

IDIAL RATE

This represents the current meter Dial Rate for temperature corrected volume.

Press and hold OK for five seconds. The following message appears on the LCD.
 PROVE

ΤС

This indicates that EC350 is in *Pushbutton Proving* mode.

### 5.3.4 Volume per proving output pulse

In *Pushbutton Proving* mode, EC350 writes electronic switch closure pulses to the prover system with a predefined volume scaling factor of: one (1), ten (10), or one hundred (100) cubic feet (CF) of gas volume, depending upon the rotary meter model *Rotary integral mount (item 432)*. The following table represents the predefined volume scaling factor for the rotary meter models.

	Output Pulse Amount					
	1.0 CF	10.0 CF	100.0 CF			
	B3 8C175 200	B3 23M175				
	B3 11C175 200	B3 23M232				
	B3 15C175 200	B3 38M175				
	B3 1M300	B3 56M175				
Dresser B3 Meters	B3 2M175 200					
Dresser bo meters	B3 3M175 300					
	B3 5M175					
	B3 7M175					
	B3 11M175					
	B3 16M175					
	LMMA 1.5M	LMMA 23M	LMMA 102M			
	LMMA 2M	LMMA 38M				
	LMMA 3M	LMMA 56M				
Dresser LMMA Meters	LMMA 5M					
	LMMA 7M					
	LMMA 11M					
	LMMA 16M					

	Out	put Pulse Amou	nt
	1.0 CF	10.0 CF	100.0 CF
	RPM 9C		
	RPM 1.5M		
	RPM 2M		
Elster RPM Meters:	RPM 3dot5M		
Eister RPM Meters.	RPM 5.5M		
	RPM 7M		
	RPM 11M		
	RPM 16M		
	RM600	RM38000	
	RM1000	RM56000	
	RM1500		
	RM2000		
	RM3000		
Demost DM Immerical Materia	RM5000		
Romet RM Imperial Meters	RM7000		
	RM11000		
	RM16000 24		
	RM16000 20		
	RM23000		
	RM25000		

	Output Pulse Amount					
	1.0 CF	10.0 CF	100.0 CF			
	RM16	RM700				
	RM30	RM1100				
	RM40	RM1600				
	RM55					
Romet RM Metric Meters	RM85					
Romet RM Metric Meters	RM140					
	RM200					
	RM300					
	RM450					
	RM650					
	G10	G400				
	G16	G400 150				
	G25	G650				
Romet G series Metric Meters:	G40	G1000				
Romer & series Metric Meters:	G65					
	G100					
	G160					
	G250					

# 5.4 Alarms

EC350 monitors a list of parameters and compares their measured values to configurable limits to determine if a fault condition has occurred. When any of these measured parameters has exceeded their respective limit, EC350 will create an Alarm.

EC350 currently supports monitoring eight (8) parameters and supplies an Alarm Item for each. Shown below are the eight Alarm Items.

Alarm Item	Alarm Item No.	Alarm Limit Item	Alarm Limit Item No.	Basic Operational Description
Battery Low	99	Battery Low Limit	49	Battery life remaining < set limit
Battery Cycles Alarm	100	Battery Months Remaining	1001	Battery life months remaining < set limit
Volume Sensor 1	102	n/a	n/a	Internal tests
Volume Sensor 2	103	n/a	n/a	Internal tests
System Alarm	104	n/a	n/a	Internal tests
Pressure Low	143	Pressure low limit	11	Gas pressure < set low limit
Pressure High	145	Pressure high limit	10	Gas pressure > set high limit
Temperature Low	144	Temperature low limit	027	Gas temperature < set low limit
Temperature High	146	Temperature high limit	028	Gas temperature > set high limit
Flow Rate high	163	Flow rate high limit	164	Flow rate > set high limit
Daily Cor volume	222	Daily cor volume limit	221	Daily CorVol > set limit
P2 Press High Alarm	451	P2 Press High Alarm Limit	455	Alarm is raised when P2 goes above its high limit
P2 Press Low Alarm	452	P2 Press Low Alarm Limit	456	Alarm is raised when P2 goes below its low limit

Alarm Item	Alarm Item No.	Alarm Limit Item	Alarm Limit Item No.	Basic Operational Description
Extern Supply Low Alarm	796	External Supply Low Limit	795	Alarm is raised when external supply voltage goes below its low limit
Super Compress Alarm	1025	n/a - internal error	n/a - internal error	Any one of several errors in super comp calculation process
Metro Cnfg Chng Alarm	1035	n/a - internal error	n/a - internal error	An attempt was made to change an item not appropriate for current metrological state / jumper
P1 Transducer Alarm	1058	n/a - internal error	n/a - internal error	Any one of several internal failures of pressure transducer
P2 Transducer Alarm	1059	n/a - internal error	n/a - internal error	Any one of several internal failures of pressure transducer
Temp Probe Alarm	1335	n/a - internal error	n/a - internal error	Any of several internal failures of probe itself
Comms Login Alarm	1388	n/a - internal error	n/a - internal error	Attempt to login serially with invalid credentials
HMI Login Alarm	1392	n/a - internal error	n/a - internal error	Attempt to login to HMI with invalid credentials
Alarm Log Record CRC Alarm	1409	n/a - internal error	n/a - internal error	if > 0, some number of corrupt records were encountered during record search/read
Event Log Record CRC Alarm	1410	n/a - internal error	n/a - internal error	if > 0, some number of corrupt records were encountered during record search/read
Audit Log Record CRC Alarm	1411	n/a - internal error	n/a - internal error	if > 0, some number of corrupt records were encountered during record search/read
Vol Sensor-3 Alarm	1424	n/a - internal error	n/a - internal error	malfunction indicated by volume sensor 3
Vol Sensor-4 Alarm	1425	n/a - internal error	n/a - internal error	malfunction indicated by volume sensor 4

Alarm Item	Alarm Item No.	Alarm Limit Item	Alarm Limit Item No.	Basic Operational Description
P4 High Alarm Limit	1634	P4 Low Alarm Limit	1635	Alarm is raised when P4 goes above its high limit
P4 Press High Alarm Time	1668	P4 Press Low Alarm Time	1670	Alarm is raised when P4 goes above its high alarm time
P4 Press High Alarm Date	1669	P4 Press Low Alarm Date	1671	Alarm is raised when P4 goes above its high alarm date
P4 High/High Alarm Limit	1672	P4 Low/Low Alarm Limit	1673	Alarm is raised when P4 goes above its high limit
P4 Press High/High Alarm	1674	P4 Press Low/Low Alarm	1677	Alarm is raised when P4 goes above its high alarm
P4 Press High/High Alarm Time	1675	P4 Press Low/Low Alarm Time	1678	Alarm is raised when P4 goes above its high alarm time
P4 Press High/High Alarm Date	1676	P4 Press Low/Low Alarm Date	1679	Alarm is raised when P4 goes above its high alarm date
P4 Transducer Alarm	1680	n/a - internal error	n/a - internal error	Any one of several internal failures of pressure transducer
P4 High Alarm Value	1683	P4 Low Alarm Value	1684	Alarm is raised when P4 goes above its high alarm value
P4 High/High Alarm Value	1685	P4 Low/Low Alarm Value	1686	Alarm is raised when P4 goes above its high alarm value

### Report By Exception (RBX)

RBX (Report By Exception) is an alarm mode that is enabled via item 165. RBX controls the behavior of the following alarms.

- Pressure 1 High
- Pressure 1 Low
- Temperature High
- Temperature Low
- Pressure 2 High

- Pressure 2 Low
- Flow Rate High

When enabled, the RBX function automatically clears an instrument alarm after an alarm parameter has returned to its normal operating range, buffered by a user specified deadband (hysteresis). The deadband values are specified in items 166 (Pressure 1), 167 (Temperature), 169 (Flow Rate), and 459 (Pressure 2). When disabled, the alarms remain in their current state until the user manually clears it.

# 5.5 Logging

- Audit Trail Logging Configuration
- Reading Audit Trail from the EC350
- Event logger
- Log record integrity verification

### 5.5.1 Audit Trail Logging Configuration

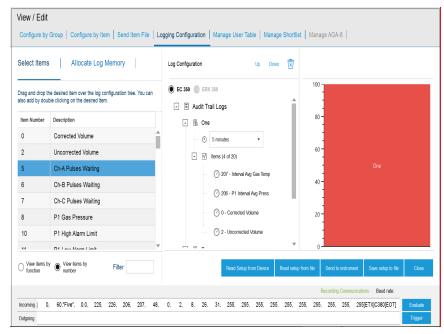
Using MasterLink Software Application software, an EC350 device can be configured to contain as many as 5 independent logs, each with its own collection of item values and collection (sample) frequency. Each log can be configured to collect values for up to 20 items.

To configure logs:

- Ensure that MasterLink Software Application is linked to the EC350.
- In MasterLink Software Application , select Instrument, Logging Configuration and then EC350.

Select Items	Allocate Log Memory	Log Configuration Up Down	
	he desired item over the log configuration tree. You can ble clicking on the desired item.	EC 350     ERX 350     EXX 350     EXX 350     EXX 350	100
item Number	Description	🛨 🗟 One	80-
0	Corrected Volume		
2	Uncorrected Volume	🛨 🗟 Three	60-
5	Ch-A Pulses Waiting	🛨 🗟 Four	One
6	Ch-B Pulses Waiting	+ 🗒 Five	40-
7	Ch-C Pulses Waiting		
8	P1 Gas Pressure		20-
10	P1 High Alarm Limit		
44	D1 Lour Alarm Limit	<b>V</b>	0-
View items b	y View items by Filter	Read Setup from Device Rea	d setup from file Send to instrument Save setup to file Close

• Drag and drop the desired items from the Select Items list over to the log configuration tree.



In order to remove an item from the log configuration tree, highlight it and press the 'Delete' key.

- The order of the items in the Log Configuration list determines the order in which the values are stored and thus the order in which they will later appear in a report. Items in the list can be 'grabbed' and moved up and down to change the order.
- You can save a configuration for future reference to a configuration file (\*.cnfg) with the Save setup to file button. It can later be retrieved with the **Read setup form file** button. Only \*.cnfg files can be read; item files (\*.ie3) are not compatible.
- You can right click on the time interval displayed in the Log Configuration tree, to configure the period at which log records are recorded.

elect Items	Allocate Log Memory	Log Co	nfigura	ation	Up Down 👿		
	ne desired item over the log configuration tree. You can	• EC	350	ER		100 -	
iso add by dou	ble clicking on the desired item.				2 - Uncorrected Volume		
item Number	Description		-	Tw	0	80 -	
0	Corrected Volume			0	10 minutes •	1	
2	Uncorrected Volume		E	• •	Items (5 of 20)	60 -	
5	Ch-A Pulses Waiting				226 - Incremental Unc Vol	:	
6	Ch-B Pulses Waiting				206 - P1 Interval Avg Press	40 -	
7	Ch-C Pulses Waiting				(7) 207 - Interval Awg Gas Temp	:	
8	P1 Gas Pressure				Ŭ P P	20 -	
10	P1 High Alarm Limit				48 - Battery Voltage Reading		
44	D1 Lour Alarm Limit				🖓 0 Corrected Volume	0	
View items b	y View items by Filter				Read Setup from Device Read setu	p from file Send to in	strument Save setup to file Clo

• In the Allocate log memory tab, configure the percentage of available memory allocated to each log.

View / Edit		
Configure by Group   Configure by Item   Send Item File   Lo	ogging Configuration   Manage User Table   Manage Shorti	ist   Manage AGA-8
Select items Allocate Log Memory	Log Configuration Up Down 👿	Error! The total of the allocations exceeds the available capacity by 10% where 100% is total log percentage
Percent Days Records Enable	EC 350 ERX 350     EX 4011 Trail Logs	100 - Oile
One 20 • 24 6956	- B One	80 - Two
Two 30 - 60 8695 🗸	.      .      M Items (4 of 20)	60 Three
Three 10 - 66 1581	206 - P1 Interval Avg Press	40 Four
Four 35 🔻 231 5533 🗸	<ul> <li>⑦ 0 - Corrected Volume</li> <li>② 2 - Uncorrected Volume</li> </ul>	20 Five
Five 15 • 99 2371 V	Read Setup from Device Read setu	p from file Send to instrument Save setup to file Close
		Recording Communications Baud rate:
Incoming   0, 60,"Five", 0.0, 225, 226, 206, 207, 48, Outgoing	0, 2, 8, 26, 31, 255, 255, 255, 255, 255,	255, 255, 255, 255, 255[ETX]C380[EOT] Evaluate Trigger

For each log, you can select the percentage of memory allocated, if fewer than 5 logs are desired the percent of the unused ones must be set to zero.

### Note: The sum total of memory allocated for all logs must be equal to 100%.

The smaller a log's allocation, the less data it will be able to store. When the limit is reached, the oldest records will be overwritten with the newer ones. The consequence of a particular

allocation setting is reflected in the number of **Days** worth of data as well as the Number of records that can be written before overwriting will occur.

### Note: A log's interval setting will impact Days, but not Numbers.

- The Enable checkboxes may be used to suspend data collection for one or more logs. A log's existing records will not be affected when the log is disabled. The fact that a log is disabled will be reflected in the Log Configuration window by the presence of a red 'x' at the top of that log's item tree. In addition, the area for that log in the bar graphic will be grayed and marked as 'Disabled'
- Finally, click **Send to Instrument** to push the log configuration to the EC350 Device. A few seconds will be required for the transfer. A window should appear indicating 'Successfully Configured'.

## 5.5.2 Reading Audit Trail from the EC350

Once audit trail logging is configured and some amount of data has been collected, it may be

transferred to the host. The process can be initiated from the Transfer menu or icon wind using the Read Audit Trail Data window.

Read Data		
Item File   Audit Trail   Alarm Logs   Event Logs   Diagnostic Logs   Cellular Logs	Shortlist   Activity Log   Item Reference CSV Export	
Audit Trail Report Name: Item Report		ph Options Report Options
Read data from:	Date Range	
Connected Site	Select dates to use when this report is printed:	Date Range Options
Report data from:	O Today	Sort Latest Date First
Selected Sites	Yesterday This Month	Start of Day Time
EG350 12222221 - 12222221	C Last Month	00:00:00
	Last N Days 2	Exclude data after
	○ Since 2/1/2023 🗰 00:00:00 🕓	Today's end time
	○ From/To 1/11/2023	00:00:00
Log selection Check All	2/16/2023 🛗 15:56:31 🕓	
✓ Log 1 Log 2 Log 3 Log 4 Log 5	Since Last Download	
Enable Unit Corversion Dynamic Column Format Show Units In Verbose	Log1 Since Download Log2 Since Download Log3 Since Download	
View	Edit	
	Recording Communication:	s Baud rate:
Incoming 0, 60,"Five", 0.0, 225, 226, 206, 207, 48, 0, 2, 8, 26, 31,	255, 255, 255, 255, 255, 255, 255, 255,	TX]C380[EOT] Evaluate
Outgoing		Trigger

You must specify the number of logs to read and the amount of data to transfer. All configured and enabled logs can be checked in the **Log Selection frame**. If a log is not configured it cannot be checked. The amount of data is specified by date/time ranges. The simplest option is **Since Last Download**. The host will examine its database for the most recent record for each log for this instrument and construct a command to the EC350 for all data it has collected since then. Using this option each time will ensure that the host database contains a complete set of audit trail records for each log in each instrument. There are three other options if a specific data range of data is desired.

**Note:** Reading of audit trail records does not remove them from EC350's memory. They can be read any number of times until they are overwritten, as explained above.

Once MasterLink Software Application finishes reading all data for all logs the user is given the chance to view all the downloaded records. This is a useful practice to ensure that the transfer succeeded and that all the expected records were read.

• Displaying/Viewing Audit Trail reports

### 5.5.2.1 Displaying/Viewing Audit Trail reports

**Note:** This operation only involves the host computer and its database. No connection to an EC350 is necessary.

- In the MasterLink Software Application SQL window, click Reports and select one of the following options:
  - Audit Trail Report (With Summary)
  - Audit Trail Report (Without Summary)
  - Audit Trail Report (Summary Only)
  - Audit Trail Report (Daily Summary)
  - Audit Trail Report (Monthly Summary)

Based on the option selected, a corresponding dialog appears allowing the user to specify the Audit Trail data to view.

- Click the Select Sites button to browse to the desired EC350 unit by SITE ID/ Site name.
- Click on the Date Range tab to bring up a control window to select date range display options for the log report.
- Click Preview to view the Audit Trail report, or click the Print to send the report to a specified printer.

### 5.5.3 Event logger

The function of the Event Logger is to record configuration changes and significant system events. Each record includes:

- Date
- Time
- User ID
- Sequence Number (starts at 1, wraps from 65535 to 0)
- Before and After for changes made to instrument parameters.

#### Event Log capacity is 1024 records

See section Metrological Protection Modes for details of Event Log behavior in different item 139 modes.

- Supported Event Codes
- Clearing Event Log

### 5.5.3.1 Supported Event Codes

EVENT TYPE	EVENT
NON CAL ITEM CHANGE	0
CAL ITEM CHANGE	1
INSTR SHUTDOWN	3
DEFAULT BY ITEM 264	8
CLOCK TIME REPAIRED	10
EE MEMORY CORRUPT	11
UNEXPECTED RESETS	13
WATCHDOG RESET	14
CPU RESET	15
POWER CYCLE RESET	16
SYSTEM EVENTS DAILY LIMIT	23
BATTERY LIFE RESET	24
FIRMWARE UPGRADE	25

### 5.5.3.2 Clearing Event Log

To clear the event log:

Write a value of 19230429 to item 264 using **Setup > Advanced > Raw Instrument Access > Raw Item Access** in MastgerLinkSQL.

### 5.5.4 Log record integrity verification

Audit Trail and Event Log records have a CRC value associated with them to allow verification that they have not been corrupted or modified. CRCs of log records that have been uploaded to a computer using MasterLink Software Application SQL can be compared to log record CRCs displayed on the HMI. Since records cannot be modified in the device, the CRC values shown through the HMI are always correct and so if the CRC values shown in MasterLink Software Application SQL do not match, then the log record on the computer may have been corrupted or otherwise modified.

First view the log records uploaded with MasterLink Software Application SQL. Audit Trail record CRCs can be viewed through the Audit Trail CSD Conversion feature in the File menu. That outputs a Comma Separated Value file that includes the record CRC as transmitted by the device and also as computed by MasterLink Software Application SQL of the record as stored in the MasterLink Software Application SQL database. Event Log record CRCs can be viewed through the Event Log Report. In the report configuration, select the option to view the CRC values.

To view records in the HMI, select the corresponding menu item, select the desired log (Audit Trail 1 through 5, or Event Log), enter a Sequence Number for a record (as seen in MasterLink Software Application SQL). The corresponding record will be shown with the sequence number, the CRC value (in decimal), and the date and time of the record. (Other record values cannot be displayed via the HMI.

Compare the CRC value on the device display with the one in the Audit Trail CSD file or the Event Log report. The UP and DOWN arrow keys can be used to show the previous or next record.

# 5.6 Battery Life/ Usage Tracking

- Alkaline Battery Item 48 tracks the Battery voltage and Item 49 is the configurable Low Limit for tripping a low Battery Alarm condition. Item 50 is the configurable Low Limit for putting the EC350 in to a low Battery 'shutdown' condition ending most of its operations to greatly conserve the battery power.
- Lithium Battery Items 1001 and 1002 indicate the remaining months and percentage of the Lithium Battery pack based on estimated 'usage cycles'. Item 59 tracks the battery usage cycles – but only for a limited amount (mainly for testing purposes). Item 60 is the configurable Low Limit for tripping a low Battery Alarm condition based on too high of battery usage cycles. Item 59 value represents micro-Amp-seconds usage of the Battery.

### Battery / External Supply Alarms – RBX Mode

- Non-RBX Mode (Item 165 = 0) No automatic clearing of alarm condition. User must clear (acknowledge) the alarm condition of Item 99 or 796 before a new Alarm Log entry or timestamp update can be made for any subsequent Low Voltage Alarm conditions.
- **RBX Mode (Item 165 = 1)** RBX Mode enabled will allow for automatic clearing of a Low Voltage alarm condition of Item 99 or 796 if the measured voltage reaches a value greater than 0.60 VDC above the Low Limit value in Item 49 or 795 respectively (Battery or External Voltage).

# 5.7 Display ON/OFF

The EC350 display can be configured to turn on and off at specific times during the day.

You can configure this in the MasterLink Software Application software using the following itemcodes:

Item Code	Name / Description	Default
1056	LCD display ON time	00 00 00
1057	LCD display OFF time	00 00 00

# 6 User Access

This chapter provides an overiew on using a EC350 device. It includes information on how to work with HMI displays and how the connections must be done between EC350 and MasterLink Software Application .

- Getting started with the keypad
- Working with HMI
- <u>Connecting to EC350 via MasterLink Software Application SQL</u>
- Working with MasterLink Software Application SQL
- Working with PowerSpring
- <u>Connecting EC350 with PowerSpring using a Messenger Modem</u>

# 6.1 Getting started with the keypad

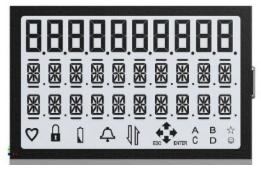
Unlocking the keypad

- Unlocking the keypad
- Human Machine Interface (HMI)

### 6.1.1 Unlocking the keypad

Perform the following steps to unlock the keypad.

 Press and hold ESC and UP arrow ( Display test appears.



 Press the DOWN arrow to enter Scroll List/ Meter Reader mode or press OK to access any one of the HMI keypad modes.

ESC

) at the same time until the following

### 6.1.2 Human Machine Interface (HMI)

It provides access to the information about EC350. You can configure the information using the integral LCD panel and keypad. HMI keypad mode can be classified into the following four sub-levels.

- <u>Level O mode</u>- It is the scroll list mode where the customer-configured list of items appear on the display. No passkey is required to access this mode. After the keypad is active, use the **UP arrow** and **DOWN arrow** to scroll through the items in this mode. The items in this mode are read-only.
- <u>Level 1 read only mode</u>- It is used for viewing the instrument settings and live parameters. You do not require any passkey to access this mode. In this mode, the instrument functions are categorized into 11 submenus. By scrolling through the 11 submenus, you can view over 60 factory-defined instrument parameters. The items in this mode are read-only.
- <u>Level 2 mode</u>- It is used for accessing the less sensitive parameters and configuration options of EC350. This mode provides six submenus. You can view and configure the items in this mode by scrolling through the six submenus. A passkey is required to access this mode.

- <u>Level 3 mode</u>- It is used for accessing all the parameters, configuration, and functions of EC350. This mode provides nine submenus. A passkey is required to access this mode.
- Level 0 mode
- Level 1 mode
- Level 2 mode
- Level 3 mode

**Note:** If a user chooses a complex password, the user will not be able to access HMI levels 1, 2, and 3. To access HMI.

### 6.1.2.1 Level 0 mode

The level 0 mode is also known as the Scroll List Mode (or Meter Reader Mode). The following table lists the factory-default items that appear on the display when you enter the level 0 mode (in the order in which they appear as you press the **DOWN arrow**). This list is configurable. The *Configurable item* column identifies the item number at which each list item is programmed.

Scroll list	Displayed on LCD	Item description	ltem code	Configurable item
1	UNCVOL	Uncorrected volume	002	130
2	CORVOL	Corrected volume	000	131
3	MTR MODEL	Meter model	077	132
4	P1 Pressure			
5	GAS TEMP	Gas temperature	026	76
6	REMAIN BAT	Remaining Battery		
7	PRESS FACT	Pressure factor	044	75
8	TEMP FACT	Temperature factor	045	77
9	TOTAL FACT	Total correction factor	043	78
10	HI RES CV	High resolution corrected volume	113	133
11	HI RES UV	High resolution uncorrected volume	892	134
12	MTR SCALING	Meter scaling	114	79

Scroll list	Displayed on LCD	Item description	ltem code	Configurable item
13	FW VERSION	Firmware version	122	80
14-18	Reserved		255	81-86

Using the UP arrow and DOWN arrow you can scroll through this list of item readings. The list (12 items) is configured using items 130 through 135 and items 075 through 086. All values that are displayed in this mode are static readings, which means that they are sampled when you enter the level 0 mode and the displayed values will not change while you remain in the scroll list mode. Scroll List mode has a 60-second inactivity time-out. If you do not press any key for 60 consecutive seconds, EC350 exits the level 0 mode and returns to the normal Corrector mode.

### Accessing level O scroll list mode

To access level O scroll list mode:

• Press and hold the ESC and UP arrow at the same time for about three seconds or until the following Display Test appears.

88888888	88
.88.88.88.88.88.88. ≎≎. 11 ↔ 12 B ♥	<b>₩</b>

This unlocks the EC350 keypad and EC350 enters the HMI keypad mode.

- Press the DOWN arrow.
   EC350 enters the level 0 mode.
- Use the UP arrow and DOWN arrow to scroll through the available menus.

**Attention:** When one of the arrows on the display disappears, it indicates that you have reached either the bottom or top of the scroll list, and therefore you must scroll the opposite direction..

• Press ESC to exit level 0 mode and return to the Corrector mode.

## 6.1.2.2 Level 1 mode

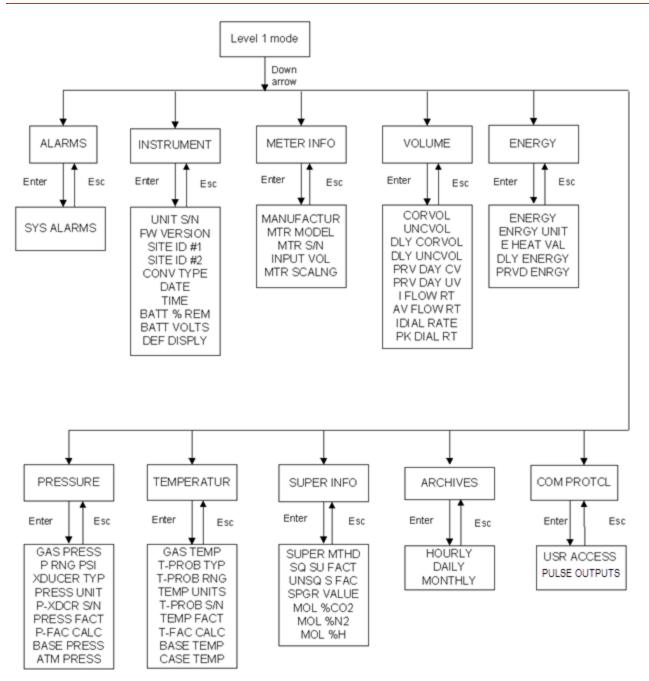
Level 1 mode provides read-only information on the following:

- Scroll list items
- Alarms

- Instrument
- Meter Info
- Volume
- Energy
- Pressure
- Temperature
- Supercompressibility
- Archives
- Communication Protocol
- Pulse Outputs

The level 1 mode is read-only mode where you can view alarms, firmware, and configuration information. Perform the following steps to enter the level 1 mode.

The following flowchart illustrates the items in level 1 mode.



The following table lists the factory-defined list for level 1 mode.

Level 1 main menu ID number	Level 1 main menu categories	Level 1 main menu as displayed on LCD	Level 1 submenu as displayed on LCD	ltem code	Description
L1.1	Security code	PASSKEY			

Level 1 main menu ID number	Level 1 main menu categories	Level 1 main menu as displayed on LCD	Level 1 submenu as displayed on LCD	ltem code	Description
L1.2	Alarm Information	ALARMS			Displays individual alarms. Press <b>OK</b> , the active alarms appear on the display. The individual alarm items are not displayed in the L1.2 menu, unless that particular alarm is active.
			BAT LO ALM	99	Battery Voltage Lo Alarm
			BAT WC ALM	100	Battery Consumption Hi Alarm
			SW-1 ALARM	102	Input Vol Switch-1 Fault Alarm
			SW-2 ALARM	103	Input Vol Switch-1 Fault Alarm
			SYS ALARM	104	System Error Alarm
			P LO ALARM	143	Gas Pressure Lo Alarm
			P HI ALARM	144	Gas Pressure Hi Alarm
			T LO ALARM	145	Gas Temperature Lo Alarm
			T HI ALARM	146	Gas Temperature Hi Alarm
			FLOW HI ALM	163	Flow Rate Hi Alarm
			DLY CV ALM	222	Daily CorVol Exceeded Alarm
			P2 LO ALRM	452	P2 Pressure Low Alarm
			P2 HI ALRM	453	P2 Pressure High Alarm
			EXTERN L AL	796	External Supply Low Voltage Alarm
			P1 XDCR AL	1058	P1 Transducer Alarm
			P2 XDCR AL	1059	P2 Transducer Alarm

6 User Access6.1 Getting started with the keypad

Level 1 main menu ID number	Level 1 main menu categories	Level 1 main menu as displayed on LCD	Level 1 submenu as displayed on LCD	ltem code	Description
			T PROBE AL	1335	T1 Probe Alarm
			SUPR ALAM	1025	Super Compressibility calculation Alarm
			COM LOG FL	1388	Serial Comms Login Failure (count)
			HMI LOG FL	1392	HMI Login Failure (count)
			LR CNFG AL	1035	Metrological Config Changed Alarm
			ALM LOG ER	1409	Alarm Log Record Error (CRC)
			EV LOG ER	1410	Event Log Record Error (CRC)
			AT LOG ER	1411	Audit Trail Record Error (CRC)
			SW-3 ALARM	1424	Input Vol Switch-3 Fault Alarm
			SW-4 ALARM	1425	Input Vol Switch-4 Fault Alarm

Level 1 main menu ID number	Level 1 main menu categories	Level 1 main menu as displayed on LCD	Level 1 submenu as displayed on LCD	ltem code	Description
L1.3	Instrument Information	INSTRUMENT			Displays information about the instrument. Press OK. The following items appear on the display. Use UP arrow and DOWN arrow keys to scroll through the items.
			UNIT S/N	062	Unit Serial Number
			FW VERSION	122	Firmware Version
			SITE ID #1	200	Site Identification #1
			SITE ID #2	201	Site Identification #2
			CONV TYPE	1188	Volume Conversion Type
			DATE	204	Instrument Date
			TIME	203	Instrument Time
			BATT % REM	1002	Battery % Life Remaining
			BATT VOLTS	048	Battery Voltage Reading
			DEF DISPLAY	482	LCD Default Display
			BATT TYPE	1061	Battery Type
			EXTERNL PWR	1046	External Supply Voltage

Level 1 main menu ID number	Level 1 main menu categories	Level 1 main menu as displayed on LCD	Level 1 submenu as displayed on LCD	ltem code	Description
L1.4	Gas Meter Information	METER INFO			Displays information about the meter. Press <b>OK</b> , the following items appear on the display.
			MANUFACTUR	432	Meter Manufacturer
			MTR MODEL	432	Meter Model Number
			MTS S/N	1190	Meter Serial Number
			INPUT VOL	098	Input Volume Value
			MTR SCALNG	114	Meter Scaling Factor
L1.5	Volume Information				Displays the gas volume and flow information. Press <b>OK</b> , the following items appear on the display.
			CORVOL	000	Corrected Volume Total
			UNCVOL	002	Uncorrected Volume Total
			DLY CORVOL	223	Daily Corrected Volume
			DLY UNCVOL	224	Daily Uncorrected Volume
			PRV DAY CV	183	Previous Day CorVol
			PRV DAY UV	184	Previous Day UncVol
			I FLOW RATE	209	Instantaneous Flow Rate
			AV FLOW RT	208	Average Flow Rate
			I DAIL RATE	218	Instantaneous Dial Rate
			PK DIAL RT	219	Peak Dial Rate

Level 1 main menu ID number	Level 1 main menu categories	Level 1 main menu as displayed on LCD	Level 1 submenu as displayed on LCD	ltem code	Description
L1.6	Energy Information	ENERGY			Displays the energy and heat information. Press <b>OK</b> , the following items appear on the display.
			ENERGY	140	Energy Total
			ENRGY UNIT	141	Energy Units
			E HEAT VAL	142	Gas Heat Value
			DLY ENERGY	190	Daily Energy
			PRVD ENRGY	191	Previous Day Energy
L1.7	Pressure Information	PRESSURE			Displays the pressure information. Press <b>OK</b> , the following items appear on the display.
			GAS PRESS	008	Gas Pressure
			P RNG PSI	025	Press Transducer Range (psi)
			XDUCER TYP	112	Press Transducer Type
			PRESS UNIT	087	Pressure Units
			P-XDCR S/N	138	Press Transducer Serial No.
			PRESS FACT	044	Pressure Factor
			P-FAC CALC	109	Press Factor Calculation Type
			BASE PRESS	013	Base Pressure
			AMT PRESS	014	Atmospheric Pressure

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Level 1 main menu ID number	Level 1 main menu categories	Level 1 main menu as displayed on LCD	Level 1 submenu as displayed on LCD	ltem code	Description
L1.8	Temperature Information	TEMPERATURE			Displays the temperature information. Press <b>OK</b> , the following items appear on the display.
			GAS TEMP	026	Gas Temperature
			T-PROB TYP	1185	Temp Probe Type
			T-PROB RNG	1186	Temp Probe Range
			TEMP UNITS	089	Temperature Units
			T-PROB S/N	1187	Temp Probe Serial No.
			TEMP FACT	045	Temp Factor
			T-FAC CALC	111	Temp Factor Calculation Type
			BASE TEMP	034	Base Temperature
			CASE TEMP	031	Case Temperature

Level 1 main menu ID number	Level 1 main menu categories	Level 1 main menu as displayed on LCD	Level 1 submenu as displayed on LCD	ltem code	Description
L1.9	Super- compressibility Information	SUPER INFO			Displays super- compressibility information. Press <b>OK</b> , the following items appear on the display.
			SUPER MTHD	147	Super Method
			SQ SU FACT	116	Squared Super Factor
			UNSQ S FAC	047	Un-squared Super Factor
			SPGR VALUE	053	Specific Gravity Value
			MOL %CO2	055	Mol. %CO2 Value
			MOL %N2	054	Mol. %N2 Value
			MOL %CH	373	MOL %CH Value
			MOL %C2H6	374	MOL %C2H6 Value
			MOL %C3H8	375	MOL %C3H8 Value
			MOL%iC4H10	376	MOL%iC4H10 Value
			MOL%nC4H10	377	MOL%nC4H10 Value
			MOL%iC5H12	378	MOL%iC5H12 Value
			MOL%nC5H12	379	MOL%nC5H12 Value
			MOL %C6H14	380	MOL %C6H14 Value
			MOL %C7H16	381	MOL %C7H16 Value
			MOL %C8H18	382	MOL %C8H18 Value
			MOL %C9H20	383	MOL %C9H20 Value
			MOL %H2S	384	MOL %H2S Value
			MOL %H2	385	MOL %H2 Value
			MOL %He	386	MOL %He Value

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Level 1 main menu ID number	Level 1 main menu categories	Level 1 main menu as displayed on LCD	Level 1 submenu as displayed on LCD	ltem code	Description
			MOL %02	387	MOL %O2 Value
			MOL %CO	388	MOL %CO Value
			MOL %Ar	389	MOL %Ar Value
			MOL %C10H22	390	MOL %C10H22 Value
			MOL %H2O	391	MOL %H2O Value
L1.10	Communication Protocol	COM PROTCL			Displays information about the communication protocol. Press <b>OK</b> , <b>USR</b> <b>ACCESS</b> appears on the display.
			USR ACCESS	139	User Access Type
			COMM BAUD	272	User Access Type
			COM FORMAT	995	Serial Comm Format
			СОММ ТҮРЕ	1220	Serial Comm Type
			HANDSHAKE	1221	Serial Handshake Type
			COMWAKEUP	1219	Serial Wakeup Method
			TIMEOUT 2	172	Timeout Delay 2

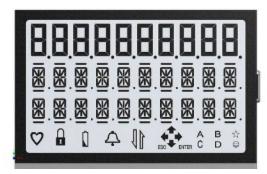
Level 1 main menu ID number	Level 1 main menu categories	Level 1 main menu as displayed on LCD	Level 1 submenu as displayed on LCD	ltem code	Description
L1.11	Pulse Output	PULSE OUT			Displays Pulse Output channels' configuration information.
			CH-A SELCT	93	Pulse Channel A Selection
			CH-B SELCT	94	Pulse Channel B Selection
			CH-C SELCT	95	Pulse Channel C Selection
			CH-A TIME	1014	Pulse Channel ATiming
			CH-B TIME	1015	Pulse Channel B Timing
			CH-C TIME	1024	Pulse Channel C Timing
			CH-A PULSE	5	Pulse Channel AValue
			CH-B PULSE	6	Pulse Channel B Value
			CH-C PULSE	7	Pulse Channel C Value
L1.12	Cloud Link	CLOUD LINK	DEVICE S/N		
			RADIO IME		
			BATT TYPE		
			CHARGE AMT		Charge amount in percentage
			CHARGE TM		Charge amount in time
			BATT VOLTS		
			SCAP VOLTS		
			SSL STATUS		
			SSL-CERT		
			SIM CARD #		
			CARRIER ID		
			LAST RSSI		

Level 1 main menu ID number	Level 1 main menu categories	Level 1 main menu as displayed on LCD	Level 1 submenu as displayed on LCD	ltem code	Description
			LAST IP AD		
			LAST IP PT		
			COMM STAT		
			CL CELL FW		
			MODEM TYPE		
			BLE SECURT		
			CL MAIN FW		
			FW CHKSUM		
			PULSE CNT		
			PAIRED DEV		

#### Accessing level 1 read only mode

To access level 1 read only mode:

• Press and hold the **ESC** and **UP arrow** at the same time for about three seconds or until the following **Display Test** appears.



This unlocks the EC350 keypad and EC350 enters the HMI keypad mode.

• Press **OK** to enter level 1 mode.



- Press the **DOWN arrow** to enter level 1 mode.
- Use the **UP arrow** and **DOWN arrow** to scroll through the main menu items (L1.2 through L1.11) in level 1 mode.

Attention:L1.1 through L1.11 provides a numeric indicator of the menu item being accessed.

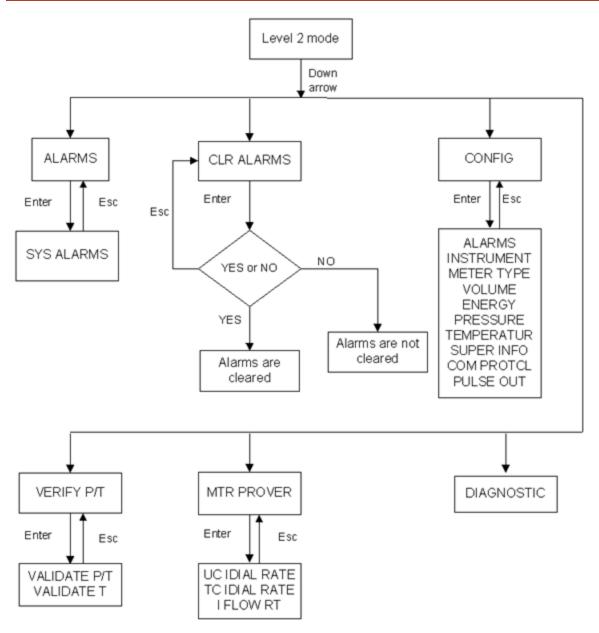
- Press **OK** to select the necessary main menu item.
- After the main menu item is selected, use the **UP arrow** and **DOWN arrow** to scroll through the list of read-only items.
- Press **ESC** to return to the main menu item.
- From the main menu item, press **ESC** to exit level 1 mode.

## 6.1.2.3 Level 2 mode

Level 2 mode is the limited-access configuration mode and provides read-only information on the following:

- Passcode
- Alarms
- Clear Alarms
- Configuration
- Verify Pressure
- Verify Temperature
- Meter Prover
- Diagnostics

The following flowchart illustrates the main menus and submenus in the level 2 mode.



After you enter level 2 mode, the items listed in the table appear on the display; by default, **ALARMS** appear. Use the **UP arrow** and **DOWN arrow** to scroll through the items in level 2 mode.

Level 2 ID Nr	L2 main menu categories	L2 main menu as displayed on LCD	L2 submenu as displayed on LCD	ltem code	Description
L2.1	PASSCODE				

Level 2 ID Nr	L2 main menu categories	L2 main menu as displayed on LCD	L2 submenu as displayed on LCD	ltem code	Description	
L2.2	ALARMS			alarms. Press OK ms appear on the dis	play.	
L2.3	CLR ALARMS		Allows you to clear the active alarms on the display. If the condition that caused the alarm is still present, a new alarm is activated on the next measurement.			
L2.4	CONFIG		Allows you to configure the Level 2 sub-menu 1 items.			
L2.4.1		ALARMS				
L2.4.1.1			LIMITS			
L2.4.1.1.1				P HI LIMIT		
L2.4.1.1.2				P LO LIMIT		
L2.4.1.1.3				T LO LIMIT		
L2.4.1.1.4				T HI LIMIT		
L2.4.1.1.5				BAT LO LIM		
L2.4.1.1.6				BAT MO LIM		
L2.4.1.1.7				FLOWHI LIM		
L2.4.1.1.8				D CV LIMIT		
L2.4.2		INSTRUMENT				
L2.4.2.1			SITE INFO			
L2.4.2.1.1				UNIT S/N		
L2.4.2.1.2				FW VERSION		

Level 2 ID Nr	L2 main menu categories	L2 main menu as displayed on LCD	L2 submenu as displayed on LCD	ltem code	Description
L2.4.2.1.3				SITE ID #1	
L2.4.2.1.4				SITE ID #2	
L2.4.2.1.5				CONV TYPE	
L2.4.2.1.6				DATE	
L2.4.2.1.7				TIME	
L2.4.2.1.8				DEF DISPLY	
L2.4.2.2			BATTERY		
L2.4.2.2.1				BAT MO LIM	
L2.4.2.2.2				REMAIN BAT	
L2.4.2.2.3				BATT % REM	
L2.4.2.2.4				BATT VOLTS	
L2.4.3		METER TYPE			
L2.4.3.1			DRESSER		
L2.4.3.1.1				I-D B3	
L2.4.3.1.2				I-D LMMA	
L2.4.3.1.3				ROT B3	
L2.4.3.1.4				ROT LMMA	
L2.4.3.2			ELSTER AMC		
L2.4.3.2.1				ROT RPM	

Level 2 ID Nr	L2 main menu categories	L2 main menu as displayed on LCD	L2 submenu as displayed on LCD	ltem code	Description
L2.4.3.2.2				I-D DIAPHR	
L2.4.3.2.3				I-D TURBIN	
L2.4.3.2.4				PULSE RABO	
L2.4.3.3			ROMET ®		
L2.4.3.3.1				ROT RM IMP	
L2.4.3.3.2				ROT RM MET	
L2.4.3.3.3				ROT G MET	
L2.4.3.4			SENSUS		
L2.4.3.4.1				I-D DIAPHR	
L2.4.3.4.2				I-D ROTARY	
L2.4.3.4.3				I-D TURBIN	
L2.4.3.5			OTHER		
L2.4.3.5.1				I-D/PULSE	
L2.4.3.5.2				ROTARY MNT	
L2.4.4		VOLUME			
L2.4.4.1			INPUT TYPE		
L2.4.4.2			CORVOL		
L2.4.4.2.1				CORVOL	
L2.4.4.2.2				CV UNITS	
L2.4.4.2.3				CV DIGITS	

Level 2 ID Nr	L2 main menu categories	L2 main menu as displayed on LCD	L2 submenu as displayed on LCD	ltem code	Description
L2.4.4.3			UNCVOL		
L2.4.4.3.1				UNCVOL	
L2.4.4.3.2				UV UNITS	
L2.4.4.3.3				UV DIGITS	
L2.4.5		ENERGY			
L2.4.5.1			ENERGY		
L2.4.5.2			ENERGY UNIT		
L2.4.5.3			E HEAT VAL		
L2.4.6		PRESSURE			
L2.4.6.1			GAS PRESS		
L2.4.6.1.1				GAS PRESS	
L2.4.6.1.2				PRESS UNIT	
L2.4.6.1.3				P-DECIMALS	
L2.4.6.1.4				xDUCER TYP	
L2.4.6.1.5				P-RNG USER	
L2.4.6.1.6				P-XDCR S/N	
L2.4.6.1.7				PRESS FACT	
L2.4.6.1.8				P-FAC CALC	
L2.4.6.1.9				FIXED P	

Level 2 ID Nr	L2 main menu categories	L2 main menu as displayed on LCD	L2 submenu as displayed on LCD	ltem code	Description
L2.4.6.2			BASE PRESS		
L2.4.6.3			ATMS PRESS		
L2.4.7		TEMPERATUR			
L2.4.7.1			GAS TEMP		
L2.4.7.1.1				GAS TEMP	
L2.4.7.1.2				TEMP UNITS	
L2.4.7.1.3				T-PROB TYP	
L2.4.7.1.4				T-PROB RNG	
L2.4.7.1.5				T-PROB S/N	
L2.4.7.1.6				TEMP FACT	
L2.4.7.1.7				T-FAC CALC	
L2.4.7.1.8				FIXED TEMP	
L2.4.7.2			BASE TEMP		
L2.4.7.3			CASE TEMP		
L2.4.8		SUPER INFO			
L2.4.8.1			SUPER TYPE		
L2.4.8.2			SUPER FACT		
L2.4.8.2.1				SQ SU FACT	
L2.4.8.2.2				UNSQ S FAC	

Level 2 ID Nr	L2 main menu categories	L2 main menu as displayed on LCD	L2 submenu as displayed on LCD	ltem code	Description
L2.4.8.3			PARAMETERS		
L2.4.8.3.1				SPGR VALUE	
L2.4.8.3.2				MOL %N2	
L2.4.8.3.3				MOL %CO2	
L2.4.8.3.4				E HEAT VAL	
L2.4.8.3.5				MOL %H2	
L2.4.9		COM PROTCL			
L2.4.9.1			COM ACCESS		
L2.4.9.2			COM-1		
L2.4.9.2.1				COMM BAUD	
L2.4.9.2.2				COMM FORMAT	
L2.4.9.2.3				COMM TYPE	
L2.4.9.2.4				HANDSHAKE	
L2.4.9.2.5				COMMWAKEUP	
L2.4.9.2.6				TMOUT DEL1	
L2.4.9.2.7				TMOUT DEL2	
L2.4.10		PULSE OUT			
L2.4.10.1			CH-A		
L2.4.10.1.1				CH-A SELCT	

Level 2 ID Nr	L2 main menu categories	L2 main menu as displayed on LCD	L2 submenu as displayed on LCD	ltem code	Description	
L2.4.10.1.2				CH-A VALUE		
L2.4.10.1.3				CH-A TIME		
L2.4.10.2			CH-B			
L2.4.10.2.1				CH-B SELCT		
L2.4.10.2.2				CH-B VALUE		
L2.4.10.2.3				CH-B TIME		
L2.4.10.3			CH-C			
L2.4.10.3.1				CH-C SELCT		
L2.4.10.3.2				CH-C VALUE		
L2.4.10.3.3				CH-C TIME		
L2.4.11		CLOUD LINK				
L2.4.11.1			PULSE CNT			
L2.5	VERIFY P/T		-	alidate the accuracy erature measured by		
L2.5.1		VALIDATE P	To verify or validate the accuracy of the items (for example, VALIDATE P); after the appropriate item appears on the display, Use the keypad to enter or change the value of pressure/ temperature that EC350 must measure. After you enter the value, press . The EC350 calculates the % ERROR.			
L2.5.2		VALIDATE T	%ERROR is the difference between the pressure/temperature value measured by EC350 and the value (the entered value) that EC350 must measure.			

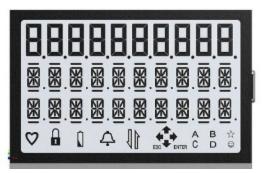
Level 2 ID Nr	L2 main menu categories	L2 main menu as displayed on LCD	L2 submenu as displayed Item code Description on LCD			
			Allows you to check the accuracy of the actual volume of gas flowing through a gas meter. Press OK . The following items appears.			
L2.6	MTR PROVER		UC IDIAL RATE - Uncorrected Input Dial Rate.			
			TC IDIAL RATE - stands for Temperature Corrected Input Dial Rate.			
			I FLOW RT - stands for Input Flow Rate.			
L2.7	DIAGNOSTIC		Functions as a sensor, and ensures that the pulse inputs provided to EC350 are functioning.			
L2.7.1		SENSOR TST				
L2.8	VIEW LOGS		Allows you to view a specified Log Record's Date, Time, and CRC value (in decimal).			
L2.8.1		AT-LOG1	Actual Log Item Values are not available. This function is mainly to serve the needs of Compliance verification. Specify a Log Record number to begin and then press the Enter Key to view the actual record's parameters (Date, Time, and CRC).			
L2.8.2		AT-LOG2				
L2.8.3		AT-LOG3				
L2.8.4		AT-LOG4				
L2.8.5		AT-LOG5				
L2.8.6		EVENT LOG				
L2.9	MET CONFIG		Special mode to make updates to Legally Relevant (metrological) type items.			

Level 2 ID Nr	L2 main menu categories	L2 main menu as displayed on LCD	L2 submenu as displayed Item code Description on LCD			
L2.10	SHUTDOWN		Special mode to take the unit out of service – i.e. to put in long term storage (shelf mode) Limited functionality is enabled in this mode –just time update. No volume or measurements are performed. HMI is active.			
L2.11	BATT CHNG		Enter this mode when replacing the battery – includes resetting battery gauge.			
L2.12	RESET BATT		Allows resetting the battery gauge (assumes installing a new battery).			
L2.13	RESET COMMS		Resets Serial Comms – generally should not be needed.			
L2.14	MODEM CALLS	ALARM CALL	Allows user to force an Alarm Call in to occur – assuming proper configurations			
L2.15		SCHED CALL	Allows user to force a Scheduled Call in to occur – assuming proper configurations			
L2.16		STOP CALLS	Allows user to cancel both Alarm and Scheduled Call retires – Note: does not disable Call-in			
L2.17		BT PAIRING				
			BT PAIRING			
L2.18		FORGET DEV				
			YES /NO			

# Accessing level 2 mode

To access level 2 mode:

• Press and hold the ESC and UP arrow at the same time for about three seconds or until the Display Test (all segments on) appears.



This unlocks the EC350 keypad and EC350 enters the HMI keypad mode.

• Press **OK** to enter level 2 mode.

The level 1 mode **PASSCODE** screen appears.



• To access the passkey screen, in level 2 mode press **OK**. The following appears on the display. 0000000

## PASSCODE

For firmware versions before 1.0068, you must enter a five digit security code followed by a two digit user ID code to enter level 2 mode. The default value for the level 2 passcode is **20000**. The default value of the last two digit user ID is **00**. Enter a two digit user ID code followed by a five

digit security passcode to enter level 2 or level 3 mode. You can enter any value for the event log user ID. If the unit is configured to log events in an event log, the user ID identifies the user who made the changes in the event log.

For firmware version 1.0068 and later, of the 7 digits entered, the *first two* are the user id and the *last five* are the passcode. By default only user 02 is permitted access to Level 2. The default passcode is 20000, so the value entered would be 0220000. Other users can be granted access to level 2 menus, but a user can only access level 2 if they are **not** granted access to level 3. (A single user can access level 2, level 3, or neither, but cannot access *both* level 2 and level 3. Level 2 functionality is a subset of level 3 functionality.)

- To enter passcode, press the UP arrow or the DOWN arrow at the current position to change the displayed digit to the required numeral.
- For example, press the **UP arrow** twice at the current position, the value **0000000** changes to **2000000**.
- Press the **RIGHT arrow** to move one position to the right. Using the **UP arrow** or the **DOWN arrow** change the displayed digit to the required numeral.
- For example, press the **RIGHT arrow** until you reach the sixth digit. At the sixth digit press the **UP arrow** twice. The value 2000000 changes to 2000020.
- Repeat this step until you enter the passcode of the instrument.
- To accept changes after entering the last digit (all seven digits of passcode), press the **RIGHT arrow**.

Attention: You can also press **OK** for entering the passkey value.

The **OK** key enters the displayed digit at the current position and advances to the next position.

If the log in was successful, the display indicates that you are in level 2 mode. If the user ID or passcode were invalid, you will be returned to the main level 1 menu.

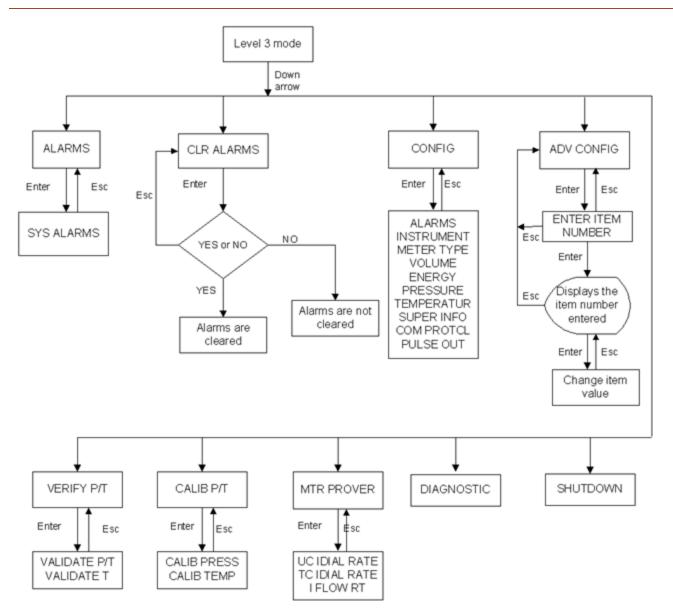
- Use the **UP arrow** and **DOWN arrow** to scroll through the main menu items (L2.2 through L2.7) in level 2 mode.
- Press **OK** to select the necessary main menu item.
- Use the UP arrow and DOWN arrow to scroll through the submenu items in level 2 mode.
- Press **OK** to select the necessary submenu.
- Press ESC to return to the main menu item.
- From the main menu item, press **ESC** to exit level 2 mode.

# 6.1.2.4 Level 3 mode

Level 3 mode is the limited-access configuration mode and provides read-only information on the following:

- Passcode
- Alarms
- Clear Alarms
- Configuration
- Advance Configuration
- Verify Pressure
- Verify Temperature
- Calibrate Pressure
- Calibrate Temperature
- Meter Prover
- Diagnostics
- Shutdown

The following flowchart illustrates the items in level 3 mode.



After you enter the level 3 mode, the items listed in the table appear on the display; by default, **ALARMS** appear. Use **UP arrow** and **DOWN arrow** to scroll through the items in the level 3 mode.

Level 3 ID Nr	L3 main menu categories	L3 main menu as displayed on LCD	L3 submenu as displayed on LCD	ltem code	Description	
L3.1	PASS KEY					
L3.2	ALARMS		Displays active alarms. Press OK. The active alarms appear on the display.			
L3.3	CLR ALARMS		Clears the alarms. Press OK and then press YES to clear the alarms.			

Level 3 ID Nr	L3 main menu categories	L3 main menu as displayed on LCD	L3 submenu as displayed on LCD	ltem code	Description
L3.4	CONFIG		Allows you to configure the Level 3 submenu 1 items.		
L3.4.1		ALARMS			
L3.4.1.1			LIMITS		
L3.4.2		INSTRUMENT			
L3.4.2.1			SITE INFO		
L3.4.2.2			BATTERY		
L3.4.3		METER TYPE			
L3.4.3.1			DRESSER		
L3.4.3.1.1				I-D B3	
L3.4.3.1.2				I-D LMMA	
L3.4.3.1.3				ROT B3	
L3.4.3.1.4				ROT LMMA	
L3.4.3.2			ELSTER AMC		
L3.4.3.2.1				ROT RPM	
L3.4.3.2.2				I-D DIAPHR	
L3.4.3.2.3				I-D TURBIN	
L3.4.3.2.3				PULSE RABO	
L3.4.3.3			ROMET ®		
L3.4.3.3.1				ROT RM IMP	
L3.4.3.3.2				ROT RM MET	
L3.4.3.3.3				ROT G MET	
L3.4.3.4			SENSUS		
L3.4.3.4.1				I-D DIAPHR	
L3.4.3.4.2				I-D ROTARY	

Level 3 ID Nr	L3 main menu categories	L3 main menu as displayed on LCD	L3 submenu as displayed on LCD	ltem code	Description
L3.4.3.4.3				I-D TURBIN	
L3.4.3.5			OTHER		
L3.4.3.5.1				I-D/PULSE	
L3.4.3.5.2				ROTARY MNT	
L3.4.4		VOLUME			
L3.4.4.1			INPUT TYPE		
L3.4.4.2			CORVOL		
L3.4.4.3			UNCVOL		
L3.4.5		ENERGY			
L3.4.5.1			ENERGY		
L3.4.5.2			ENERGY UNIT		
L3.4.5.3			E HEAT VAL		
L3.4.6		PRESSURE			
L3.4.6.1			GAS PRESS		
L3.4.6.2			BASE PRESS		
L3.4.6.3			ATMS PRESS		
L3.4.7		TEMPERATUR			
L3.4.7.1			GAS TEMP		
L3.4.7.2			BASE TEMP		
L3.4.7.3			CASE TEMP		
L3.4.8		SUPER INFO			
L3.4.8.1			SUPER TYPE		
L3.4.8.2			SUPER FACT		
L3.4.8.3			PARAMETERS		

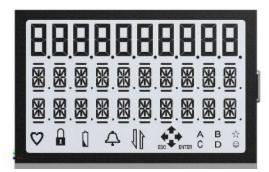
Level 3 ID Nr	L3 main menu categories	L3 main menu as displayed on LCD	L3 submenu as displayed on LCD	ltem code	Description	
L3.4.9		COM PROTCL				
L3.4.10		PULSE OUT				
L3.4.10.1			CH-A			
L3.4.10.2			CH-B			
L3.4.10.3			CH-C			
L3.4.11		CLOUD LINK				
			PULSE CNT			
L3.5	ADV CONFIG		Allows you to enter the item number. Press OK. The following appears.			
			ENTER	ENTER ITEM NUMBR		
			ITEM NUMBR			
			item number. Af the respective it You can modify example, if you	bad, you can enter the required After you enter the item number, item appears on the display. fy/set the value of the item. For u enter the item number PRESS appears on the display.		
L3.6	VERIFY P/T		Allows you to validate the accuracy of the pressure or temperature measured by EC350.			
L3.6.1		VALIDATE P	Select VALIDATE P/VALIDATE T and press OK. Use the keypad to enter or change the value of pressure/ temperature that the EC350 must measure. After you enter the value, press OK. The EC350 calculates the % ERROR. %ERROR is the difference between the pressure/temperature value measured by EC350 and the value (the entered value) that EC350 must measure.			
L3.6.2		VALIDATE T				
L3.7	CALIB P/T		Allows you to calibrate the pressure and temperature measured by EC350.			

Level 3 ID Nr	L3 main menu categories	L3 main menu as displayed on LCD	L3 submenu as displayed on LCD	Item code	Description	
L3.7.1		CALIB PRES	Select CALIB PRESS/CALIB TEMP and press OK. Use the keypad and enter the value of pressure/temperature that EC350 must measure. After you enter the value, press OK. The EC350 calculates the % ERROR. %ERROR is the difference between the pressure/temperature value measured by EC350 and the value (the entered value) that EC350 must measure. The calibration allows you to make changes to the instrument to bring the % ERROR to zero.			
L3.7.2		CALIB TEMP				
L3.8	MTR PROVER		actual volume o	ows you to check the accuracy of the ual volume of gas flowing through a gas ter. Press OK. The following items appear.		
			UC IDIAL RATE			
			TC IDIAL RATE			
			I FLOW RT			
			UC IDIAL RATE, stands for Uncorrected Input Dial Rate, TC IDIAL RATE stands for Temperature Corrected Input Dial Rate, and I FLOW RT stands for Input Flow Rate.			
L3.9	DIAGNOSTIC		Functions as a sensor, and ensures that the pulse inputs provided to EC350 are functioning.			
L3.9.1		SENSOR TST				
L3.10	10 VIEW LOGS		Allows you to view a specified Log Record's Date, Time, and CRC value (in decimal).		g Record's cimal).	
			function is mair Compliance veri number to begir	Values are not av hly to serve the ne ification. Specify a h and then press t al record's param	eds of a Log Record he Enter Key	
L3.10.1		AT-LOG1				
L3.10.2		AT-LOG2				
L3.10.3		AT-LOG3				
L3.10.4		AT-LOG4				

Level 3 ID Nr	L3 main menu categories	L3 main menu as displayed on LCD	L3 submenu as displayed on LCD	ltem code	Description
L3.10.5		AT-LOG5			
L3.10.6		EVENT LOG			
L3.11	MET CONFIG		Special mode to make updates to Legally Relevant (metrological) type items.		
L3.12	SHUTDOWN		Special mode to take unit out of service – i.e. to put in long term storage (shelf mode).		
			Limited functionality is enabled in this mode –just time update. No volume or measurements are performed. HMI is active.		
L3.13	BATT CHNG		Enter this mode when replacing the battery – includes resetting battery gauge.		
L3.14	RESET BATT		Allows resetting the battery gauge (assumes installing a new battery)		
L3.15	RESET COMMS		Resets Serial Comms – generally should not be needed		
L3.16	MODEM CALLS	ALARM CALL	Allows user to force an Alarm Call in to occur – assuming proper configurations		
L3.17		SCHED CALL	Allows user to force a Scheduled Call in to occur – assuming proper configurations		
L3.18		STOP CALLS	Allows user to cancel both Alarm and Scheduled Call retires – Note: does not disable Call-in		
L.3.19	BT PAIRING				
		BT PAIRING			
L.3.20	FORGET DEV				
		YES /NO			

To access level 3 mode:

• Press and hold the **ESC** and **UP arrow** at the same time for about three seconds or until the following **Display Test** (all segments on) appears.



This unlocks the EC350 keypad and EC350 enters the HMI keypad mode.

• Press **OK** to enter level 3 mode.

The level 3 mode **PASSCODE** screen appears.



• To access the passkey screen, in level 3 mode press **OK**. The following appears on the display. 0000000

## **PASSCODE** appears.

For firmware versions before 1.0068, you must enter a five digit security code followed by a two digit user ID code to enter level 3 mode. The default value for the level 3 passcode is 30000. The default value of the last two digit user ID is 00. Enter a two digit user ID code followed by a five digit security passcode to enter level 2 or level 3 mode. You can enter any value for the event log

user ID. If the unit is configured to log events in an event log, the user ID identifies the user who made the changes in the event log.

For firmware version 1.0068 and later, of the 7 digits entered, the *first two* are the user id and the *last five* are the passcode. By default only user 03 is permitted access to Level 3. The default passcode for user 03 is 30000, so the value entered would be 0330000. Other users can be granted access to level 3 menus, but a user can only access level 2 if they are **not** granted access to level 3. (A single user can access level 2, level 3, or neither, but cannot access *both* level 2 and level 3. Level 2 functionality is a subset of level 3 functionality.)

- To enter the passcode, press the **UP arrow** or the **DOWN arrow** at the current position to change the displayed digit to the required numeral.
- For example, press the **UP arrow** thrice at the current position, the value **0000000** changes to **30000000**.
- Press the **RIGHT arrow** to move one position to the right. Using the **UP arrow** or the **DOWN arrow** change the displayed digit to the required numeral.
- For example, press the **RIGHT arrow** until you reach the sixth digit. At the sixth digit, press the **UP arrow** thrice. The value *3000000* is changed to *3000030*.
- Repeat this step until you enter the passcode of the instrument.
- To accept the changes after entering the last digit (all seven digits of passcode), press the **RIGHT arrow**.

Attention: You can also press **OK** for entering the passkey value.

The **OK** key enters the displayed digit at the current position and advances to the next position.

If the log in was successful, the display indicates that you are in level 3 mode. If the user ID or passcode were invalid, you will be returned to the main level 1 menu.

- Use the **UP arrow** and **DOWN arrow** to scroll through the main menu items (L3.2 through L3.10) in level 3 mode.
- Press **OK** to select the necessary main menu item.
- Use the UP arrow and DOWN arrow to scroll through the submenu items in level 3 mode.
- Press **OK** to select the required submenu.
- Press ESC to return to the main menu item.
- From the main menu item, press **ESC** to exit level 3 mode.

## 6.2 Working with HMI

Choosing the meter type

- Choosing the meter type
- Verifying pressure
- Verifying temperature
- Testing the pulse input
- Entering the site ID
- Setting the date and time
- Selecting the unit of measure
- Single point temperature and pressure calibration

### 6.2.1 Choosing the meter type

- Unlock the keypad and type the PASSCODE to enter level 2 mode or level 3 mode. Refer to the section "<u>Accessing level 2 mode</u> " for accessing level 2 mode or section "<u>Access level 3 mode</u> " for accessing level 3 mode.
- By default, in level 2 mode or level 3 mode the following appears on the display. MAIN MENU

### ALARMS

Using the **UP arrow** and **DOWN arrow** scroll through the options in level 2 mode or level 3 mode until **CONFIG** appears.

 Press OK. The following appears on the display. CONFIG

#### ALARMS

- Using the UP arrow and DOWN arrow scroll through the options until METER TYPE appears.
- Press OK.

The following default meter maker appears on the display.

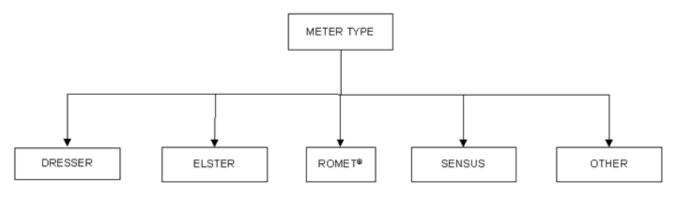
METER TYPE

DRESSER

The following preconfigured types of makers of meters appear. Using the UP arrow and DOWN arrow scroll through the options.

- DRESSER
- ELSTER AMC
- ROMET
- SENSUS
- OTHER
- Press **OK** to select the required type of meter maker.
- Using the **UP arrow** and **DOWN arrow** scroll through the options and press **OK** to select the required type of meter.

The following image illustrates the preconfigured types of meter makers and the meters available under each maker.



## 6.2.2 Verifying pressure

#### To verify the pressure:

- Unlock the keypad and type the PASSCODE to enter level 2 mode or level 3 mode Refer to the section "<u>Accessing level 2 mode</u>" for accessing level 2 mode or section "<u>Access level 3 mode</u>" for accessing level 3 mode.
- By default, the following appears on the display. MAIN MENU

ALARMS

- Using the UP arrow and DOWN arrow scroll through the options in level 2 mode or level 3 mode until VERITY P/T appears.
- Press OK. For example, the following appears on the display. VERIFY P/T

VALIDATE P

• Press **OK**. The live pressure measurement made by the instrument appears on the display. For example:

51.00

PSI

LIVE PRESS

The pressure value that appears in this step is the value that EC350 reads.

• Press OK. For example, the following appears on the display.

50.00

PSI

INPUT REFP

• Enter the reference pressure (the actual/exact pressure being piped to EC350) using the keypad and press

OK.

The percentage difference between the pressure that EC350 reads and the reference pressure appears on the display. For example:

2.00

% ERROR LIVE

PRESS

• Press OK. The control returns back to the following:

VERIFY P/T

VALIDATE P

## 6.2.3 Verifying temperature

To verify the temperature:

- Unlock the keypad and type the PASSCODE to enter level 2 mode or level 3 mode. Refer to the section "<u>Accessing level 2 mode</u> " for accessing level 2 mode or section "<u>Access level 3 mode</u> " for accessing level 3 mode.
- By default, the following appears on the display. MAIN MENU

ALARMS

- Using the UP arrow and DOWN arrow scroll through the options in level 2 mode or level 3 mode until VERITY P/T appears.
- Press OK. The following appears on the display. VERIFY P/T

VALIDATE P

 Press the DOWN arrow, the following appears on the display. VERIFY P/T

VALIDATE T

• Press **OK**, the temperature read by EC350 appears on the display. For example:

75.20

F

LIVE TEMP

Here, **75.20** is the value that EC350 reads and **F** stands for the unit of temperature that is Fahrenheit.

• Press **OK**. The following appears on the display. 75.20

```
F
```

INPUT REFT

Here, **REFT** stands for reference temperature.

 Enter the reference temperature (the temperature that EC350 must read) by using the keypad and then press
 OK.

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The percentage difference between the temperature that EC350 reads and the reference temperature appears on the display. For example, the following appears.

0.04

% ERROR LIVE

TEMP

• Press **OK**, the control returns back to the following:

VERIFY P/T

VALIDATE T

## 6.2.4 Testing the pulse input

To test the pulse input:

- Unlock the keypad and type the PASSCODE to enter level 2 mode or level 3 mode. Refer to the section "<u>Accessing level 2 mode</u> " for accessing level 2 mode or section "<u>Access level 3 mode</u> " for accessing level 3 mode.
- By default, in level 2 mode or level 3 mode the following appears on the display. MAIN MENU

ALARMS

- Using the UP arrow and DOWN arrow scroll through the options in level 2 mode or level 3 mode until DIAGNOSTIC appears.
- Press OK.

By default, the following appears on the display.

DIAGNOSTIC SENSOR TST

• Press **OK**. The following appears on the display.

00

ERR CNTS

SENSOR TST

Ensure that the value of **ERR** remains zero +/- one count, whereas the value of **CNTS** must increase with each volume input.

## 6.2.5 Entering the site ID

- Unlock the keypad and type the PASSCODE to enter level 2 mode or level 3 mode. Refer to the section "<u>Accessing level 2 mode</u> " for accessing level 2 mode or section "<u>Access level 3 mode</u> " for accessing level 3 mode.
- By default, in level 2 mode or level 3 mode the following appears on the display. MAIN MENU

ALARMS

- Using the UP arrow and DOWN arrow scroll through the options in level 2 mode or level 3 mode until CONFIG appears.
- Press OK. The following appears on the display. CONFIG

ALARMS

- Using the **UP arrow** and **DOWN arrow** scroll through the options in level 2 mode or level 3 mode until **INSTRUMENT** appears.
- Press **OK**. The following appears on the display.

INSTRUMENT

SITE INFO

- Press OK, the following appears on the display. UNIT S/N
- Using the UP arrow and DOWN arrow scroll through the options until SITE ID #1 appears.
- To change the SITE ID #1, press OK and then using the keypad enter the eight-digit SITE ID.
- SITE ID is in addition to the UNIT S/N. Follow the site-specific rules for configuring the site ID number.
- Once you enter all the eight digits, press **OK**.

## 6.2.6 Setting the date and time

- Setting the date
- Setting the time

### 6.2.6.1 Setting the date

### To set the date:

- Unlock the keypad and type the PASSCODE to enter level 2 mode or level 3 mode. Refer to the section "<u>Accessing level 2 mode</u> " for accessing level 2 mode or section "<u>Access level 3 mode</u> " for accessing level 3 mode.
- By default, in level 2 mode or level 3 mode the following appears on the display. MAIN MENU

ALARMS

- Using the UP arrow and DOWN arrow scroll through the options in level 2 mode or level 3 mode until CONFIG appears.
- Press **OK**. The following appears on the display. CONFIG

ALARMS

- Using the **UP arrow** and **DOWN arrow** scroll through the options in level 2 mode or level 3 mode until **INSTRUMENT** appears.
- Press OK.

The following appears on the display.

INSTRUMENT

SITE INFO

- Press OK, the following appears on the display. UNIT S/N
- Using the UP arrow and DOWN arrow scroll through the options until DATE appears.
- Press OK.
- Using the keypad set the DATE and press OK.

### 6.2.6.2 Setting the time

### To set the time:

- Unlock the keypad and type the PASSCODE to enter level 2 mode or level 3 mode. Refer to the section "<u>Accessing level 2 mode</u> " for accessing level 2 mode or section "<u>Access level 3 mode</u> " for accessing level 3 mode.
- By default, in level 2 mode or level 3 mode the following appears on the display. MAIN MENU

ALARMS

- Using the UP arrow and DOWN arrow scroll through the options in level 2 mode or level 3 mode until CONFIG appears.
- Press OK. The following appears on the display. CONFIG

ALARMS

- Using the **UP arrow** and **DOWN arrow** scroll through the options in level 2 mode or level 3 mode until **INSTRUMENT** appears.
- Press OK.

The following appears on the display.

INSTRUMENT

SITE INFO

- Press OK, the following appears on the display. UNIT S/N
- Using the UP arrow and DOWN arrow scroll through the options until TIME appears.
- Press OK.
- Using the keypad set the TIME and press OK.

### 6.2.6.3 Auto set date and time

At regular intervals, the date and time information for the EC350 device is logged in audit logs. Whenever there is a power reboot, the device retains the date and time from the last saved audit log.

If the device retains the date and time from the audit log, the HMI display shows as **FIX Date and TIME**.

- Click **FIX Date and TIME** to sync the date and time manually through the Masterlink. (or)
- The device automatically syncs with the server on the next successful **Call In**.

## 6.2.7 Selecting the unit of measure

Using EC350 you can select the unit of measurement for volume (corrected and uncorrected volume), energy, pressure, and temperature.

- Selecting the unit of measurement for volume
- Selecting the unit of measurement for energy
- Selecting the unit of measurement for pressure
- Selecting the unit of measurement for temperature

### 6.2.7.1 Selecting the unit of measurement for volume

To select the unit of measurement for volume:

- Unlock the keypad and type the PASSCODE to enter level 2 mode or level 3 mode. Refer to the section "<u>Accessing level 2 mode</u> " for accessing level 2 mode or section "<u>Access level 3 mode</u> " for accessing level 3 mode.
- By default, in level 2 mode or level 3 mode the following appears on the display. MAIN MENU

ALARMS

- Using the UP arrow and DOWN arrow scroll through the options in level 2 mode or level 3 mode until CONFIG appears.
- Press OK. The following appears on the display. CONFIG

ALARMS

- Using the UP arrow and DOWN arrow scroll through the options in level 2 mode or level 3 mode until VOLUME appears.
- Press OK.

By default, following appears on the display.

VOLUME

INPUT TYPE

Press the DOWN arrow key.
 The following appears on the display.

VOLUME

CORVOL

For corrected volume, press OK.
 By default, the following appears on the display.

00000000

CCF CORVOL

• To select the unit for corrected volume, press the **DOWN arrow** key. The following appears on the display.

5

CCF

CV UNITS

• Press **OK** and then using the **UP arrow** and **DOWN arrow** increase or decrease the value of Code.

The corresponding unit associated with the code appears. For example, **Code O** represents **CF**. Following are the codes and the corresponding units of measurement for **VOLUME**.

Code	Units					
Code O	CF					
Code 1	CFX10					
Code 2	CFX100					
Code 3	CFX1K					
Code 4	CFX10K					
Code 5	CCF					
Code 6	MCF					
Code 7	M3X0.1					
Code 8	М3					
Code 9	M3X10					
Code 10	M3X100					
Code 11	M3X1K					

- Press **OK** to select the required unit. For example, if you press **OK** at Code 0, CF is selected as the unit of corrected volume.
- Repeat step 6 through step 10 for selecting the unit for uncorrected volume. Selecting the unit of measurement for energy

### 6.2.7.2 Selecting the unit of measurement for energy

To select the unit of measurement for energy:

- Unlock the keypad and type the PASSCODE to enter level 2 mode or level 3 mode. Refer to the section "<u>Level 2 mode</u>" for accessing level 2 mode or section "<u>Level 3 mode</u>" for accessing level 3 mode.
- By default, in level 2 mode or level 3 mode the following appears on the display. MAIN MENU

ALARMS

- Using the UP arrow and DOWN arrow scroll through the options in level 2 mode or level 3 mode until CONFIG appears.
- Press OK. The following appears on the display. CONFIG

ALARMS

- Using the UP arrow and DOWN arrow scroll through the options in level 2 mode or level 3 mode until ENERGY appears.
- Press OK.

By default, the following appears on the display.

0000000

THERMS

ENERGY

• Press the **DOWN arrow** key.

The following appears on the display.

THERMS

ENERGY UNIT

 Press OK and then using the UP arrow and DOWN arrow increase or decrease the value of Code. The corresponding unit associated with the code appears. For example, Code O represents THERMS.

Following are the codes and the corresponding units of measurement for ENERGY.

Code	Units					
Code O	THERMS					
Code 1	DECATHERMS					
Code 2	MEGAJOULES					
Code 3	GIGAJOULES					
Code 4	KILOCALS					
Code 5	K-WATT HRS					

• Press **OK** to select the required unit.

For example, if you press OK at Code 0, THERMS is selected as the unit of ENERG Y.

### 6.2.7.3 Selecting the unit of measurement for pressure

To select the unit of measurement for pressure:

- Unlock the keypad and type the PASSCODE to enter level 2 mode or level 3 mode. Refer to the section "<u>Accessing level 2 mode</u> " for accessing level 2 mode or section "<u>Access level 3 mode</u> " for accessing level 3 mode.
- By default, in level 2 mode or level 3 mode the following appears on the display. MAIN MENU

ALARMS

- Using the UP arrow and DOWN arrow scroll through the options in level 2 mode or level 3 mode until CONFIG appears.
- Press OK. The following appears on the display. CONFIG

ALARMS

- Using the UP arrow and DOWN arrow scroll through the options in level 2 mode or level 3 mode until PRESSURE appears.
- Press OK.

By default, the following appears on the display.

PRESSURE

GAS PRESS

• Press OK.

By default, the following appears on the display.

0

PSI

GAS PRESS

• Press the **DOWN arrow** key.

The following appears on the display.

0

PSI

PRESS UNIT

• Press **OK** and then using the **UP arrow** and **DOWN arrow** increase or decrease the value of **Code**. The corresponding unit associated with the code appears. For example, **Code O** represents **PSI**. Following are the codes and the corresponding units of measurement for **PRESSURE**.

Code	Units
Code O	PSI
Code 1	kPa
Code 2	mPa
Code 3	Bar
Code 4	bar
Code 5	KGcm2
Code 6	In WC
Code 7	In HG
Code 8	mm HG

• Press **OK** to select the required unit.

For example, if you press **OK** at Code 0, PSI is selected as the unit of **PRESSURE**.

### 6.2.7.4 Selecting the unit of measurement for temperature

To select the unit of measurement for temperature:

- Unlock the keypad and type the PASSCODE to enter level 2 mode or level 3 mode. Refer to the section "<u>Accessing level 2 mode</u> " for accessing level 2 mode or section "<u>Access level 3 mode</u> " for accessing level 3 mode.
- By default, in level 2 mode or level 3 mode the following appears on the display. MAIN MENU

ALARMS

- Using the UP arrow and DOWN arrow scroll through the options in level 2 mode or level 3 mode until CONFIG appears.
- Press OK. The following appears on the display. CONFIG

ALARMS

- Using the UP arrow and DOWN arrow scroll through the options until TEMPERATURE appears.
- Press OK.

By default, the following appears on the display.

TEMPERATURE

GAS TEMP

• Press OK.

By default, the following appears on the display.

60.00

F

GAS TEMP

Press the DOWN arrow key.
 The following appears on the display.

F

TEMP UNITS

• Press OK and then using the UP arrow and DOWN arrow increase or decrease the value of **Code**. The corresponding unit associated with the code appears. For example, **Code 0** represents **F**.

Following are the codes and the corresponding units of measurement for **PRESSURE**.

Code	Units
Code O	F
Code 1	С
Code 2	R
Code 3	к

• Press **OK** to select the required unit.

For example, if you press **OK** at Code 0, F is selected as the unit of **TEMPERATURE**.

## 6.2.8 Single point temperature and pressure calibration

- Calibrating temperature
- <u>Calibrating pressure</u>

### 6.2.8.1 Calibrating temperature

### To calibrate temperature:

- Unlock the keypad and type the **PASSCODE** to enter level 3 mode. Refer to the section "<u>Access</u> <u>level 3 mode</u> " for accessing level 3 mode.
- By default, the following appears on the display.
   MAIN MENU

ALARMS

- Using the UP arrow and DOWN arrow scroll through the options in level 3 mode until CALIB P/T appears.
- Press OK. The following appears on the display. CALIB P/T

CALIB PRES

• Press the **DOWN arrow**, the following appears on the display.

CALIB P/T

CALIB TEMP

Press **OK**, the temperature read by EC350 appears on the display.

For example:

75.20

F

LIVE TEMP

Here, **75.20** is the value that EC350 reads and **F** stands for the unit of temperature that is Fahrenheit.

• Press **OK**. The following appears on the display. 75.20

F

INPUT REFT

Here, **REFT** stands for reference temperature.

• Enter the reference temperature (the temperature that EC350 must read) by using the keypad and then press **OK**.

The percentage difference between the temperature that EC350 reads and the reference temperature appears on the display. For example, the following appears.

0.04

% ERROR LIVE TEMP

• Press **OK**, the control returns back to the following: CALIB P/T

CALIB TEMP

### 6.2.8.2 Calibrating pressure

#### To calibrate pressure:

- Unlock the keypad and type the **PASSCODE** to enter level 3 mode. Refer to the section "Accessing level 3 mode " for accessing level 3 mode.
- By default, the following appears on the display.
   MAIN MENU

ALARMS

- Using the UP arrow and DOWN arrow scroll through the options in level 3 mode until CALIB P/T appears.
- Press **OK**. The following appears on the display.

CALIB P/T

CALIB PRES

• Press **OK**, the pressure read by EC350 appears on the display. 51.00

PSI

LIVE PRESS

The pressure value that appears in this step is the value that EC350 reads.

• Press **OK**. The following appears on the display. 50.00

PSI

INPUT REFP

• Enter the reference pressure (the actual/exact pressure being piped to EC350 ) using the keypad and press **OK**.

The percentage difference between the pressure that EC350 reads and the reference pressure appears on the display. For example:

2.00

% ERROR

LIVE PRESS

• Press **OK**, the control returns back to the following:

CALIB P/T

CALIB TEMP

## 6.3 Connecting to EC350 via MasterLink Software Application R515

- About MasterLink Software Application R515
- <u>Connecting the IrDA communication USB dongle to the computer</u>
- <u>Connecting the IrDA communication USB dongle to EC350</u>
- Signing on to the EC350
- Updating EC350 firmware

### 6.3.1 About MasterLink Software Application R515

MasterLink Software Application R515 is a communication software package that enables interaction with EC350. Using MasterLink Software Application R515 you can:

- Configure EC350 to meet particular needs.
- Calibrate EC350.
- Read the collected data such as volumes, pressures, temperature, and alarms.
- Generate reports for the collected data.
- Provide computer to instrument communication. Computer to instrument communication can be through the IrDA (infrared) port on the front panel, an optional direct serial link (RS-232/485), modem (CNI2 for cellular or Messenger for land line).

### 6.3.2 Connecting the IrDA communication USB dongle to the computer

To connect the IrDA communication USB dongle to the computer, insert the IrDA USB dongle in the USB port of the computer.

If the IrDA USB dongle is connected properly, a small LED on the dongle flashes intermittently, which indicates that the computer can communicate with the IrDA USB dongle. Using the MasterLink Software Application SQL communications configuration menu, confirm that the IrDA interface has been configured properly.

## 6.3.3 Connecting the IrDA communication USB dongle to EC350

To connect the IrDA communication USB dongle to EC350

- Insert the dongle into the magnetic pipe boot. Ensure that the cable passes through the hook provided in the magnetic pipe boot to prevent the dongle from displacing.
- Place the boot on EC350. Ensure that the leg of the boot is above the eyebrow.

The following image illustrates the IrDA communication USB dongle connected to EC350.



## 6.3.4 Signing on to the EC350

Open MasterLink Software Application SQL and fill in any fields in the opening screen. You can connect to a specific site through the Site List (this is required for remote connections through a modem), or, for local connections you can simply request some operation and MasterLink Software Application SQL will initiate the connection automatically.

If requested, enter a user ID and passcode. Your organization should provide you with this information. User ID can be any value from 0 to 99. By default only users 0 through 3 are activated. Passcode can be any value 0 to 999999. Given below are the default passcodes for users 0 to 3.

The user must use the default password to log in the first time, and after that, need to change it to a complex password.

**Note:** A Complex password must:

- -Be at least 8-15 characters in length.
- -Contain both Upper and lowercase alphabetic characters. (e.g: A-Z & a-z)
- -Have at least one numerical character. (e.g: 0-9)
- -Have at least one special character. (e.g: ~!@# $\%^{*}()_+=$ )

Ta	able 1.
User	Default passcode
User O and 1	33333
User 2	20000
User 3	30000

Default users 2 and 3 are primarily intended for HMI access (levels 2 and 3 respectively) but serial access with MasterLink Software Application SQL through those users is also possible with those passcodes.

### Note:

- -To meet security standards, change the default password.
- -Passwords are displayed in encrypted format.

If the user utilises cloudlink in addition to the EC350, cloudlink must also be running the secure firmware.

## 6.3.5 Updating EC350 firmware

EC350 is provided with a built-in firmware loader that allows new versions of firmware to be installed easily. Firmware can be upgraded using the Firmware Upgrader option available in the MasterLink Software Application SQL software. When you select this option, the MasterLink Software Application SQL software works with the built-in loader of EC350 and provides a very robust system for upgrading the EC350 firmware.

The firmware upgrade is performed through the IrDA serial interface that is used by the MasterLink Software Application SQL software. The IrDA serial interface provides an electrically isolated interface and requires no additional hardware or software beyond what is already needed to utilize the MasterLink Software Application SQL software. (Firmware upgrades can also be performed over the RS-232 port but not the RS-485 port.)

The following firmware upgrades should be performed in order when switching from non secure to secure firmware:

-Application Firmware -Key File -Boot Loader.

### **Caution:**

It is important that you read all items and logs (audit trail logs, event log, alarm log) before performing a firmware upgrade because most items will be set to default values and the audit trail logs will be erased.

### Note:

-After upgrading to secure firmware 1.70, a device cannot be downgraded to a firmware version below 1.70.

-Secure firmware version number starts with 1.7xxx.

You can use MasterLink to upgrade EC 350/ ERX 350 firmware

### 6.3.5.1 Application Firmware

To get started, click **Browse** and select the application firmware file.

Honeywell	MasterLink							Version: R60	0.1   (i)   (?)   (Q) Admin   _ &	×
Dashboard	Update									
2	EVC 1.4712   Mode	em Certificate								
Site	r						Step	Status		
6)	Firmware File Name:	File Location: C:	ProgramData\Honeyw	ell/Masterlink\Firmware	Files\350APP1602.Bi	in Browse	Validate FW file			
View / Edit							Send Firmware			
Calibrate	Versions			Selected Firmware De	tails		Validate Firmware			
9	Current Firmware	1.4712		Firmware Type	App Image		Sync date and time			
Read Data	Loader	3.1000		New Firmware	001.6020					
Live Data										
Ż										
Administer										
Ø Settings										
<u>نې</u>										
Security										
₹£										
Update										
_										
ÛE						Start Upgrade	Reset			
ShortList									g Communications Baud rate:	
CloudLink	Outgoing JF78[ETX]D9C		0[ETX]0BA0[EOT]	ISOUID CISTVIA22 D		[SOH] 1.4712, 3.1000			01-01,01 49 08[ETX]D06C[EOT] Evaluate Trigger	
<u>í</u>	Connected (EC350		nnectf   00000000	[SOH]RG[STX]122,B	/[E1X]084E[E01]		Įso	HJRG[STX]262,204,203[ETX]96B5[EOT]	Send Capture Buffer to File   Ema	

Click **Start Upgrade** to upgrade the EC 350/ERX 350 firmware. As the firmware upgrade progresses, you can observe the status on the right pane.

On successful firmware update, Click OK.

After application firmware update, users need to update Key File firmware.

Depending on the firmware type chosen, the Current Firmware and the New Firmware alters.

### **Note:** The firmware file for the Application has the name 350APPXXXXX.bin.

### 6.3.5.2 Key File

To get started, click **Browse** and select the Key File firmware. Public key is contained in key file; when key file is upgraded, key is stored in device.

The key will be used to upgrade secure firmware.

Honeywell	MasterLink							Ň	/ersion: R600.1   (i)   (?)	🔘 Admin 🔰 🚽 🗗	×
Dashboard	Update EVC 1.6010   Mod	em   Certific	cate								
∑ Site							Step	Status			
6)	Firmware File Name:	File Location:	D:\Downloads\350KEY1	602.bin		Browse	Validate FW file				
View / Edit							Send Firmware				
Calibrate	Versions			Selected Firmware D	etails		Validate Firmware				
6)	Current Firmware	1.6010		Firmware Type	Key Image		Sync date and time				
Read Data	Loader	3.1000		New Firmware	001.0000						
⊘ Live Data	Louder	0.1000		incontraining of the							
2											
Administer											
Ø Settings											
*											
Security											
-{∮∲ Update											
Opdate											
_											
						Start Upgrade	Reset				
ShortList	Incoming SOH]235.6800	,235.6800, 6	6, 5[ETX]D91D[EOT]			SOH] 1.6010, 3.1000			Recording Communications [SOH] 0,01-22-23,05 37 45[ETX]		
CloudLink	Outgoing		.,	[SOH]RG[STX]122,B				DHJRG[STX]262,204,203[ETX]96B5[EOT]	reading the second second second	Trigger	

Click **Start Upgrade** to upgrade the EC 350/ERX 350 firmware. As the firmware upgrade progresses, you can observe the status on the right pane.

On successful firmware update, Click OK.

### 6.3.5.3 BootLoader Firmware

To get started, click **Browse** and select the Bootloader firmware file.

Honeywell	MasterLink								Version: R600.1	1)	Q Admin	l = - é	⊽ ×
⊞ ^	Update												
Dashboard	EVC 1.4712   Mod	em Certificate	1										
2 Site							Step	Status					
6)	Firmware File Name:	File Location: D:	Downloads\EC350 No	nTSA to TSAWonTSA	A to TSA\350LDR4000	0.Bin Browse	Validate FW file						
View / Edit							Send Firmware						
Ø							Validate Firmware						
Calibrate	Versions			Selected Firmware D	Details		Sync date and time						
ন্দ্রি Read Data	Current Firmware	1.4712		Firmware Type	Loader Image								
$\otimes$	Loader	3.1000		New Firmware	004.0000								
Live Data													
2													
Administer													
Ø Settings													
÷													
Security													
КŶ													
Update													
-													
ÛĒ						Start Upgrade	Reset						
ShortList									Recording Co	mmunications	Baud rate:		
Oloudl ink	Incoming	[SOH]	0[ETX]0BA0[EOT]			[SOH] 1.4712, 3.1000	[ETX]76A3[EOT]		[SOH] 0,01-01-0	1,01 49 08[ETX	JD06C[EOT]	Evaluat	e
Ĩ	Outgoing JF78[ETX]D9C			[SOH]RG[STX]122,E	B77[ETX]694E[EOT]		[S0	DHJRG[STX]262,204,203[ETX]96B5[EOT]				Trigger	
	Connected (EC350	)   🖵 Direct Co	nnectf 00000000	- 00000000							e Buffer to F		ail

Click **Start Upgrade** to upgrade the EC 350/ERX 350 firmware. As the firmware upgrade progresses, you can observe the status on the right pane.

On successful firmware update, Click OK.

Note: The firmware file for the Loader has the name 350LDRXXXX.bin.

**Note:** If only a limited chunk of packets have been released for the upgrade this 'Reset' button allows you to commence the firmware upgrade from the starting point. When not clicked, the update will resume from the point where it stopped.

#### Running Firmware Upgrader

• In the MasterLink Software Application SQL window, click Instrument > Firmware Upgrader .

						Step	Statu
Firmware File Name:	File Locatio	n: C:\Users\h	517968\OneDrive - H	loneywell\Deskto	Browse	Validate FW file	
						Send Firmware	
						Validate Firmware	
Versions			Selected Firmware	Details		Sync date and time	
Current Firmware	1.7031		Firmware Type	App Image			
_oader	3.1000		New Firmware	001.7031			
					Start Upgrade	Resat	

The Firmware Upgrader dialog box appears.

Update																												
EVC 1.7031 M	odem   Cen	incate										St	ep		St	atus												
Firmware File Name	File Loca	tion:							1	Brow	se	Va	lidate F	/V file														
												Se	and Firm	ware														
						_						V٤	ilidate Fi	rmware														
Versions				Selecte			etails					S	nc date	and tim	e													
Current Firmware	1.7031			Firmwa	re Type	•																						
Loader	3.1000			New Fi	rmware																							
													Reset															
																			Recor	rding (	Commu	unicati	ions	Bauc	l rate:	_		
	0,"Five", 0.0	225,	226,	206,	207.	48.	0,	2,	8,	26,	31,	255,	255,	255,	255,	255,	255,	255	5, 28	55.	255,	255	5[ETX	JC380	(EOT)		Evaluate	
Outgoing																												

- To select the firmware file, click **Browse** and navigate to the path where the EC350 firmware file is saved.
- From the **Serial Port** list, select **USB IrDA**. Ensure to select the proper serial port for communicating with EC350.
- Select the Set instrument's date and time check box.
- Click Start Upgrade.

The program begins to read the current item file from EC350. The WARNING dialog box appears.

Firmware Upgrader	x
- WARNING -	
ITEM VALUES AND LOG DATA NEED TO BE SAVED BEFORE THE UPGRADE. THEY WILL BE ALTERED OR DELETED!	
Instrument items, including calibration items, SHOULD be saved BEFORE the firmware upgrade and restored after it because they usually go to default values on a firmware upgrade. Log data is usually cleared by a firmware upgrade, so in most cases you'll also want to read the log data before an upgrade.	
It is necessary to use Masterlink to accomplish these tasks. If you have not read items and log data yet, please exit this program by clicking Cancel below, then click Exit, and use MasterLink to do so. Then return to this program to perform the firmware upgrade. When that's done, use MasterLink to restore the items.	
If you have already read items and log data with MasterLink, click OK below to proceed with the firmware upgrade.	
OK Cancel	

Click OK only if you have saved ALL (Calibration and non-Calibration) items in EC350.
 The program begins to load the new firmware and then validates its integrity. Once the firmware is validated, the firmware is sent to the MasterLink Software Application SQL software, as illustrated

in the following image.

 Click OK only if you have saved ALL (Calibration and non-Calibration) items in EC350. The program begins to load the new firmware and then validates its integrity. Once the firmware is validated, the firmware is sent to the MasterLink Software Application SQL software, as illustrated in the following image.

EVC 1.7031   Mod	dem Certificate				
				Step	Status
Firmware File Name:	File Location: C:\Use	ers\h517968\OneDrive - H	oneywell\Deskte Browse	Validate FW file	File validated.
				Send Firmware	Uploading (20/366)
				Validate Firmware	
Versions		Selected Firmware	Details	Sync date and time	
Current Firmware	1.7031	Firmware Type	App Image		
Loader	3.1000	New Firmware	001.7031		
		Uploading	Uploading	(20/366)	_
			Abor	t	
			Start Upgra	ade Reset	
ncoming [SOH]00	[ETX]F053[EOT]		[SOH]00[E	ETX]F053[EOT]	

• After the upgrade is complete, **Upgrade was successful** (in green) appears at the lower left corner of the main **Firmware Upgrader** dialog box.



• Click Exit to close the Firmware Upgrader dialog box.

## 6.3.6 Force schedule Call-In Time After FW Update

If the device date and time are not set within the configured time after updating the firmware, the device initiates **Force Schedule Call-In Time Aft FW Update (i1694)** with the server to load the previous or backup item values.

## 6.4 Working with MasterLink Software Application SQL

- Items by function
- Setting time and date
- Item files
- <u>Calibrating pressure</u>
- <u>Calibratign PLog pressure</u>
- <u>Calibrating temperature</u>
- <u>Configuring the Meter reader list</u>
- <u>Configuring Call in feature</u>

### 6.4.1 Items by function

To select items (for viewing and modifying) by their functional categories:

- Establish a serial communication between EC350 and MasterLink Software Application SQL. Refer to the *MasterLink Software Application SQL User's Guide* for information about establishing a serial connection between EC350 and MasterLink Software Application SQL.
- In the MasterLink Software Application SQL window, click Display > Items by Function.
   The Display/Change Items By Function dialog box appears.

101 Site Information	▶ 🔒	104 P2 Pressure			
102 Volume & Energy	►	Item Number	Description	Value	Uni
03 P1 Pressure		420	P2 Gas Pressure	13.775	PS
		412	P2 Press Range (PSI)	100.00	PS
04 P2 Pressure	•	419	P2 Press Range User	100.00	PS
06 P4 Pressure		407	P2 Transducer Type	Absolute	·
		411	P2 Transducer S/N	00000000	
107 Temperature	►	817	P2 High/High Alarm Limit	99999.99	PS
08 Suprcompress	►	455	P2 High Alarm Limit	99999.99	PS
09 Flow & Dial Rates		456	P2 Low Alarm Limit	-1.000	PS
	-	818	P2 Low/Low Alarm Limit	-1.000	PS
10 Battery Power		408	P2 Pressure Units	PSI	•
11 Pulse Outputs	►	409	# of Dec for P2 Press	××××.×××	•
12 Communications	▶	1053	P2 Transducer Enable	Yes	
12 Communications		1215	P2 High Alarm Value	0.000	PS
13 Call-In	►	1216	P2 Low Alarm Value	0.000	PS
14 Call Out Windows		1542	P2 High/High Alarm Value	0.000	PS
15 Date & Time Config	▶	1543	P2 Low/Low Alarm Value	0.000	PS
17 LCD Scroll List	<b></b>				

You can select and configure all the items that are displayed in the **Display/Change Items By Function** dialog box.

For example, if you want to configure Volume & Energy, perform the following:

- Select Volume & Energy and click OK. The Volume & Energy dialog box appears.
- Select Corr Volume Units and click Change. The Change Item dialog box appears.
- From the list, select the required unit for volume and then click Save.

Similarly you can select and configure all the items in the **Volume & Energy** dialog box. Attention: Follow the same procedure to change other functions.

6/12 Satting time and date

# 6.4.2 Setting time and date

- Establish a serial communication between EC350 and MasterLink Software Application SQL. Refer to the *MasterLink Software Application SQL User's Guide* for information about establishing a serial connection between EC350 and MasterLink Software Application SQL.
- In the MasterLink Software Application SQL window, click on Instrument > Set Instrument Date and Time via Computer to update EC350 with the current PC's date and time.
   A dialog appears allowing the user to accept the date and time update.
- Click the **Yes** button to proceed with the Date/Time update. MasterLink Software Application SQL will always re-read the PC's clock date and time just before sending the data packet over to EC350.

### 6.4.3 Item files

- Reading/Creating item files
- Displaying/Viewing item files

### 6.4.3.1 Reading/Creating item files

To read or create item files:

- Establish a serial communication between EC350 and MasterLink Software Application SQL. Refer to the *MasterLink Software Application SQL User's Guide* for information about establishing a serial connection between EC350 and MasterLink Software Application SQL.
- In the MasterLink Software Application SQL window, click the ITEM File icon The Select Destination for Item File dialog box appears.
- Select a location and enter the name of the file. MasterLink Software Application SQL will automatically name the file if one is not entered.
- Click Save.

MasterLink Software Application SQL proceeds to read all of the items values from the connected EC350 unit.

### 6.4.3.2 Displaying/Viewing item files

To display or view item files:

- Establish a serial communication between EC350 and MasterLink Software Application SQL. Refer to the *MasterLink Software Application SQL User's Guide* for information about establishing a serial connection between EC350 and MasterLink Software Application SQL.
- In the MasterLink Software Application SQL window, click on Reports > I tems Report to view any item file previously read from EC350.
   The Item Report dialog box appears.
- Click Select and browse to the file you want to view
- Click **Preview** to view the item report, or click the **Print** to send the item file report out to a specified printer

### 6.4.4 Calibrating pressure

Attention: Check the sensors before calibrating pressure. To calibrate pressure:

In the MasterLink Software Application SQL window, click Calibrate > Pressure.
 The Pressure 1 dialog box appears.

PI Calibration         Preparature Calibration         Collibration Preparature Calibration Collibration Parameter           Pressure 12:co Calibration         International System Collibration Parameter         International System Collibration Parameter           International System Collibration         International System Collibration Parameter         International System Collibration Parameter           13         Base Pressure         14.7200         PB         International System Collibration Parameter International System Collibration Parameter International System Collibration Parameter         International System Collibration Parameter<	
New Number         Description         Wate         Description         Wate         Description         Apply any time inferror pressure inpla and wall for the instances to stables before pressing the AREAGE NOW           13         Base Pressore         14.220         P8         Apply any time inferror pressare in the instances to stables before pressing the AREAGE NOW           14         Annupric Pressore         14.2200         P8         Image: Participation of Participation of Participation of Participation of Participation of Participation         Apply any time inferror pressare in the instances to stable before pressing the AREAGE NOW           14         Annupric Pressore         14.2200         P8         Use Pressore         4.023         P8	
13         Sate Presure         14/200         PB           14         Anospiet Presure         14/200         PB           17         Cellstoon F-12co         2000         PB           14         Cellstoon F-12co         2000         PB           14         Cellstoon F-12co         2000         PB           17         Cellstoon F-12co         2000         PB	
13         Base Pressure         14.7300         PBI           14         Anonpeter Pressure         14.7300         PBI           17         Calibrator P12-ono         0000         PBI           14         Collection P12-ono         0000         PBI           15         Collection P12-ono         0000         PBI	v
14         Altropage/Ent/Pressure         14/200         PBI           17         Calibration P12-box         0.0000         PBI           14         Calibration P12-box         0.0000         PBI	
17 Calabra F1240 0.000 F8	
18 Cal Prev-1 P1-Zaro 0.0000 PSI	
19 Cell Perez P1-2ero 0.0000 PSI	
20 Calibration PI-Span 1.0000	
21 Cel Prev-1P1-Span 1.0000	
22 Cel Prev2 PI-Gpan 1.0000	
23 Min PCal Point Diff % 50.0000	
24 Excess PCal Charge % 2.0000	
25 P1 Press Range (PSI) 60.00 PSI	
87 PI Pressure Units PSI	
88 # of Dec for P1 Press XXXX.XXX	
112 P1 Transduor Type Gauge	
120 Calibration Date P1 Press 01-01-01 MM-DO-YY	
137 P1 Press Range User 60.00 PS1	
filter Cathonion Dem Spar	
Recording Communications Band Infe	
Comparing C	

- Apply a zero reference pressure (0.00 PSI) to the P1 pressure transducer of EC350. Wait for the pressure reading displayed on the **Pressure 1** dialog box to stabilize.
- After the reading stabilizes, click Average Pressure Now .
   MasterLink Software Application SQL averages the reading and displays the average pressure.

• Click Change.

The Change Pressure Calibration Value dialog box appears.

- Change the value to accurately match the zero reference pressure applied to the pressure transducer.
- Click OK.
- Click Span Calib.

The **Pressure 1 Span Calibration** page appears.

Calibrate								
P1 Calibration	P2 Calibration	Temperature C	alibration   Calibration Paramete	<ul> <li>1</li> </ul>				
Pressure 1 S	oan Calibration							
Item Number	Description	Value	Unit		Apply a pressur	re reference that exceeds zero reference by at least 50% and wait for the	readings to stabilize.	
13	Base Pressure	14.7300	PSI		(1)			
14	Atmospheric Pressure	14.7300	PSI		Dive Pressure	0 PSI		
17	Calibration P1-Zero	0.0230	PSI					
18	Cal Prev-1 P1-Zero	0.0000	PSI			Average Nov Change		
19	Cal Prev-2 P1-Zero	0.0000	PSI					
20	Calibration P1-Span	1.0000						
21	Cal Prev-1 P1-Span	1.0000						
22	Cal Prev-2 P1-Span	1.0000						
23	Min PCal Point Diff %	50.0000						
24	Excess PCal Change %	2.0000						
25	P1 Press Range (PSI)	60.00	PSI					
87	P1 Pressure Units	PSI						
88	# of Dec for P1 Press	****						
112	P1 Transducer Type	Gauge						
120	Calibration Date P1 Press	01-01-01	MM-DD-YY					
137	P1 Press Range User	60.00	PSI					
				Start Calibration Done	Span Calibration			
				Coarri Genomentifi	Spart Calibration			
							Recording Communications Baud rate:	
Incoming	(SOH)008(STX) -0.0	COLETX(8D2D(EOT		[SOH]008[STX] -0.000[ETX]8D2D[EOT]		I(STX] -0.000[ETX]8D2D[EOT]	[SOH[008[STX] 0.000[ETX]6727[EOT]	Evolusio
Outgoing "X]55C3	EOTJ		[SOH]LR[STX]008[ETX]65C3[EOT]	(SOH)LR[STX]C	08(ETX)65C3(EOT)	[SOH]LR[STX]008[ETX]65C3[EOT]		Trigger

• Apply a high pressure such that the pressure applied is at least 50% more than the zero reference pressure.

Wait for the pressure reading displayed on the **Pressure 1** dialog box to exceed the zero reference pressure by 50%. For example, if the zero reference pressure on a 100 PSI transducer equals 0.00 PSI, then the span reference pressure must be between 50.00 and 100.00 PSI. If the zero reference pressure on a 600 PSI transducer equals 0.00 PSI, then the span reference pressure must be between 300.00 and 600.00 PSI.

- After the pressure stabilizes, click **Average Pressure Now**. MasterLink Software Application SQL averages the reading and displays the average pressure.
- Click Change.

The Change Pressure Calibration Value dialog box appears.

- Change the value to accurately match the high reference pressure applied to the pressure transducer.
- Click OK.

The **Restore Line Pressure** dialog box appears.

• Restore the normal pressure line to EC350 and click **Done** to exit the calibration.

## 6.4.5 Calibrating PLog pressure

To calibrate PLog pressure or P2:

• In the MasterLink Software Application SQL window, click Calibrate> Ressure. The Calibration Options dialog box appears. Select PLog.

Calibration C	Options
C PCor	
• PLog	
ОК	Cancel

• The **Pressure 2** dialog box appears.

Pressure 2 Ze	ero Calibration								
tem Number	Description	Value	Unit		Apply a	my 'zero reference' pressure to the instru	ment's pressure input and wait for the instru	ment to stabilize before pressing the A	VERAGE NO
13	Base Pressure	14.7300	PSI		{ } button.	After the averaged pressure is displaye	, press the NEXT button to enter a new ZER	D cal point.	
14	Atmospheric Pressure	14.7300	PSI		Live Pre	13.775	PSI		
23	Min PCal Point Diff %	50.0000			Live Fie	13.770	- 51		
24	Excess PCal Change %	2.0000	****			Average Now Change			
407	P2 Transducer Type	Absolute							
808	P2 Pressure Units	PSI							
409	# of Dec for P2 Press	****							
10	Calibration Date P2 Press	01-01-01	MM-DD-YY						
112	P2 Press Range (PSI)	100.00	PSI						
414	Calibration P2-Zero	0.0000	PSI						
415	Cal Prev-1 P2-Zero	0.0000	PSI						
117	Calibration P2-Span	1.0000	-						
18	Cal Prev-1 P2-Span	1.0000							
119	P2 Press Range User	100.00	PSI						
				Start Calibration Dane	Span Calibration				
								according Communications Baud rate:	_
oming ETX]F90	[SOH]LR[STX]420		[SOH]420[STX] 13.775[ETX]AC5C[EOT]	[SOH]420[STX] 1 [SOH]LR[STX]420[ETX]48FB[EOT]	3.775[ETX]AC5C[EOT]	[SOH]LR[STX]420[ETX]48FB[EOT]	[SOH]420[STX] 13.775[ETX]AC5C[EOT]	[SOH]LR[STX]420[ETX]48FB[EOT]	Evelue

- Apply a zero reference pressure (0.00 PSI) to the pressure transducer of EC350. Wait for the pressure reading displayed on the Pressure 2 dialog box to stabilize.
- After the reading stabilizes, click **Average Pressure Now**. MasterLink Software Application SQL averages the reading and displays the average pressure.
- Click Change.

The Change PressureCalibration Value dialog box appears.

- Change the value to accurately match the zero reference pressure applied to the pressure transducer.
- Click OK.
- Click Span Calib.

The **Pressure 1 Span Calibration** page appears.

Calibrate								
P1 Calibration	P2 Calibration	Temperature G	alibration Calibration Parameter					
Pressure 2 Sp	an Calibration							
Item Number	Description	Value	Unit		Apply a pressu	ure reference that exceeds zero reference	e by at least 50% and wait for the readings to stabilize.	
13	Base Pressure	14.7300	PSI		3. 8	13.775		
14	Atmospheric Pressure	14.7300	PSI		T Live Pressure	13.775	PSI	
23	Min PCal Point Diff %	50.0000				Average Now Change		
24	Excess PCal Change %	2.0000						
407	P2 Transducer Type	Absolute	****					
408	P2 Pressure Units	PSI						
409	# of Dec for P2 Press	****						
410	Calibration Date P2 Press		MM-DD-YY					
412	P2 Press Range (PSI)	100.00	PSI					
414	Calibration P2-Zero	0.0000	PSI					
415	Cal Prev-1 P2-Zero	0.0000	PSI					
417	Calibration P2-Span	1.0000	-					
418	Cal Prev-1 P2-Span	1.0000						
419	P2 Press Range User	100.00	PSI					
				Start Calibration Done	Span Calibration			
							Recording Communications	Baud rate:
Incoming ETXJAC5			[SOH]420[STX] 13.775[ETX]AC5C[EOT]		13.775[ETX]AC5C[EOT]		(#20(STX) 13.775(ETX)AC5C(EOT)	Evaluate
Outgoing	[SOH]LR[STX]420	[ETX]48FB[EOT]		[SOH]LR[STX]420[ETX]48FB[EOT]	[SOH	HLR[STX]420[ETX]48FB[EOT]	[SOH]LR[STX]420[ETX	(J48FB[EOT] Trigger

• Apply a high pressure such that the pressure applied is at least 50% more than the zero reference pressure.

Wait for the pressure reading displayed on the **Pressure2** dialog box to exceed the zero reference pressure by 50%. For example, if the zero reference pressure on a 100 PSI transducer equals 0.00 PSI, then the span reference pressure must be between 50.00 and 100.00 PSI. If the zero reference pressure on a 600 PSI transducer equals 0.00 PSI, then the span reference pressure must be between 300.00 and 600.00 PSI.

- After the pressure stabilizes, click **Average Pressure Now**. MasterLink Software Application SQL averages the reading and displays the average pressure.
- Click Change.

The Change Pressure Calibration Value dialog box appears.

- Change the value to accurately match the high reference pressure applied to the pressure transducer.
- Click OK.

The Restore Line Pressure dialog box appears.

• Restore the normal pressure line to EC350 and click **Done** to exit the calibration.

## 6.4.6 Calibrating temperature

Attention: Check the sensors before calibrating temperature.

To calibrate temperature:

• In the MasterLink Software Application SQL window, click **Calibrate > Temperature** .

The Temperature Calibration dialog box appears.

Calibrate P1 Calibration   P2 Calibra	ion   Tempera	ature Calibration Calibration Parameter					
Temperature Zero Calibration							
Item Number         Description           31         Case Temperatu           34         Base Temperatu           35         Calibration T-Ze	e 60.00	F		Insert the temperature to match the temperature to match the temperature to match the temperature to match the temperature to temperature to the t	sensor in a low temperature calibration bath and wait for the the zero reference temperature. 76.12 F	emperature reading to stabilize before accepting	g or changing th
36         Cal Prev-1 T-26           37         Cal Prev-2 T-26           38         Calibration T-8p           39         Cal Prev-1 Terry           40         Cal Prev-2 Terry           41         Min TG4 Print 1           42         Excess Table 10           69         Temperature Unit	o 0.0000 in 1.0000 Span 1.0000 iff% 10.0000 iff% 2.0000	F 			Awaye for		
121 Geldnafo Dele 1186 Ti Tamp Probe			Ber Gander Dee	Type California			
Incoming 12[ETX]142E[EOT]		[SOH]626[STX] 76.12[ETX]142E[EOT]		76.12[ETX]142E[EOT]	[SOH[026[STX] 76.12[ETX]142E		Evaluate
Outooing ISO	LRISTX025/ETX2	BAC[EOT]	[SOH[LRISTX]026[ETX]28AC[EOT]	[SOH]LR(ST	TX(026(ETX)28AC(EOT)	[SOH]LR(STX)026[ETX]28AC[EOT]	Trigger

• Insert the temperature probe of EC350, along with an accurately calibrated thermometer calibrated thermometer into a low temperature bath or dry well, which provides the temperature zero reference.

Wait for the temperature reading displayed on the **Temperature Calibration** dialog box to be stabilized.

- After the reading stabilizes, click Average Temperature Now .
   MasterLink Software Application SQL averages the reading and displays the average temperature.
- Click Change.

The Change Temperature Calibration Value dialog box appears.

- Change the value to accurately match the temperature measured by the calibrated thermometer placed in the low temperature bath.
- Click OK.
- Click Span Calib.

The Temperature Span Calibration page appears.

Calibrate								
P1 Calibration	P2 Calibration	Tempera	ture Calibration Calibration Parameter					
Temperature \$	Span Calibration							
Item Number	Description	Value	Unit		Set the temperature	e input to exceed the zero reference temperature by at least 15% of t	he rated temperature range and wait for the r	eading to
31	Case Temperature	77.15	F		( ) stabilize.			
34	Base Temperature	60.00	F		2.64	75.98 F		
35	Calibration T-Zero	0.0000	<i>r</i>		- Live Temperature	75.98 F		
36	Cal Prev-1 T-Zero	0.0000	F			Autorage New Change		
37	Cal Prev-2 T-Zero	0.0000	F					
38	Calibration T-Span	1.0000	-					
39	Cal Prev-1 Temp-Span	1.0000						
40	Cal Prev-2 Temp-Span	1.0000						
41	Min TCal Point Diff %	10.0000						
42	Excess TCal Change %	2.0000						
89	Temperature Units	F						
121	Calibration Date Temp	01-01-01	MM-DD-YY					
1186	T1 Temp Probe Range	-40 to 158	F					
				Start Calibration Done	Steen Calibration			
				Date Calorinos	open Centralition			
							Recording Communications Based rate:	
Incoming 99(ETX)			[SOH]026[STX] 75.99[ETX]8FA7[EOT]		75.99(ETX)8FA7(EOT)	(SOH)026(STX) 76.98(ETX)BC96(EC		Evolute
Dutgoing	[SOH]LR[ST	XJOZE[ETX]28	AC[EOT]	[SOH]LR[STX]025[ETX]28AC[EOT]	(SOH)LR	[STX]026[ETX]28AC[EOT]	[SOHJUR[STX]026[ETX]28AC[EOT]	Tripper

• Insert the temperature probe of EC350 and the calibrated thermometer into a high temperature bath, which provides the temperature span reference.

The temperature reading displayed on the **Temperature Calibration** dialog box must exceed the zero reference temperature by at least 15% to proceed with span calibration.

- After the reading stabilizes, click **Average Temperature Now** . MasterLink Software Application SQL averages the reading and displays the average temperature.
- Click Change. The Change Temperature Calibration Value dialog box appears.
- Change the value to accurately match the temperature measured by the calibrated thermometer placed in the high calibration bath.
- Click OK .

## 6.4.7 Configuring the Meter reader list

When you access the Meter reader mode of EC350, 12 default items are available on the LCD display. Press the down arrow to sequentially scroll through items. Refer to the section " Level 0 mode " for the 12 default items. You can configure the Meter reader list to display the items of your choice, in the order of your choice.

To configure the Meter reader list

- Establish a serial communication between EC350 and MasterLink Software Application SQL. Refer to the *MasterLink Software Application SQL User's Guide* for information about establishing a serial connection between EC350 and MasterLink Software Application SQL.
- In the MasterLink Software Application SQL window, click Find Item by Number icon.
   The Find Item dialog box appears.
- Type 130 and click OK.

The **Scroll List** dialog box appears. By default, Uncorrected V olume (item 002) is configured to appear first in the list (item 130, which is the scroll list) that appears on the LCD display.

Search:							
Number	Description	Value	Units	<u>C</u> hange			
130	Scroll List Item 1	2	Uncorrected Volume				
131	Scroll List Item 2	0	Corrected Volume	Print			
132	Scroll List Item 3	432	Meter Model	_			
133	Scroll List Item 4	113	High Resolution Cor Vol	Find			
134	Scroll List Item 5	892	High Resolution Unc Vol	Eina			
135	Scroll List Item 6	8	Gas Pressure				
075	Scroll List Item 7	44	Press Correction Factor	Close			
076	Scroll List Item 8	26	Gas Temperature				
077	Scroll List Item 9	45	Temp Correction Factor				
078	Scroll List Item 10	43	Total Correction Factor				
079	Scroll List Item 11	114	Meter Scaling				
080	Scroll List Item 12	122	EC300 Firmware Ver				
081	Scroll List Item 13	255	Reserved				
082	Scroll List Item 14	255	Reserved				
083	Scroll List Item 15	255	Reserved				
084	Scroll List Item 16	255	Reserved				
085	Scroll List Item 17	255	Reserved				
086	Scroll List Item 18	255	Reserved				

#### • Click Change.

The Change Item dialog box appears.

• Type the item number of your choice that must be listed first in the Meter reader list and then click **Save**. For example, if you want *Battery usage alarm (item 100)* to appear first in the Meter reader list, then type item number **100** and then click **Save**.

The Scroll List dialog box appears and the item 130 (first list in Meter reader list) is configured to

Battery usage alarm (item 100).

Sear	ch:			
Number	Description	Value	Units	<u>C</u> hange
130	Scroll List Item 1	100	Battery Usage Alarm	
131	Scroll List Item 2	0	Corrected Volume	Print
132	Scroll List Item 3	432	Meter Model	
133	Scroll List Item 4	113	High Resolution Cor Vol	Find
134	Scroll List Item 5	892	High Resolution Unc Vol	<u> </u>
135	Scroll List Item 6	8	Gas Pressure	
075	Scroll List Item 7	44	Press Correction Factor	Close
076	Scroll List Item 8	26	Gas Temperature	
077	Scroll List Item 9	45	Temp Correction Factor	
078	Scroll List Item 10	43	Total Correction Factor	
079	Scroll List Item 11	114	Meter Scaling	
080	Scroll List Item 12	122	EC300 Firmware Ver	
081	Scroll List Item 13	255	Reserved	
082	Scroll List Item 14	255	Reserved	
083	Scroll List Item 15	255	Reserved	
084	Scroll List Item 16	255	Reserved	
085	Scroll List Item 17	255	Reserved	
086	Scroll List Item 18	255	Reserved	

• Perform step 3 through step 5 sequentially to change items 130 through 135 and 75 through 86, if you want to change all the 12 default items.

## 6.4.8 Configuring Call in feature

To configure the Call in feature

- Launch MasterLink Software Application . From the Display tab select and click the Item by Function option. The Display/Change Items By Function dialog box appears.
- Double click the Site Information option and enter the site ID.

Configure by Group Configure by Item Configure b		em File   Loggi	ng Configuration   Manage User Ta	able   Manage Shortlist	Manage AGA	8
	101 5	Lite Information				
02 Volume & Energy						Read flow Write flow Advanced Options Export
		Item Number	Description	Value	Unit	
03 P1 Pressure		200	Site ID# Part 1	00000000		
		201	Site ID# Part 2	00000000	-	
04 P2 Pressure >>		062	Unit Serial Number	00000000		
06 P4 Pressure		1019	Main Board 5/N	00000000		
07 Temperature		586	Sample Interval	30 Seconds	-	
37 Temperature		1190	Meter S/N	00000000	-	
08 Suprcompress		127	Instrument Type	EC 350 (14)	-	
09 Flow & Dial Rates		122	Firmware Version	1.7031		
		1175	Firmware CRC	26059	-	
10 Battery Power		1177	Loader Version	3.1000		
11 Pulse Outputs		1176	Loader CRC	25471	-	
12 Communications		1056	LCD Display On Time	20:27:00		
		1057	LCD Display Off Time	00:00:00	5	
13 CalHn 🕨		1163	Access Jumper Status	Disconnected		
14 Call Out Windows		1062	Door Status	Door Closed		
15 Date & Time Config 🔊		1044	Board Version	CDM REV G	-	
		118	Reference Number 1	00000000		
17 LCD Scroll List		119	Reference Number 2	00000000		
18 Audit Trail Log Configuration		779	Calibration Mode	No Calibration		
19 Audit Trail Volume & Energy		1396	Alarm Mask	0008	-	
re waar mer vourne a chergy		1023	Alarm Items Disable	0008		
20 Audit Trail Pressure & Temperature						
21 P1 Pressure and Temperature Statistics >> *						
						Recording Communications Baud rate:
Incoming Outpoint 3, 127, 122, 875, 877, 876, 456, 457, 863, 462				00000,"00000000","0000000	7, 1,70000000	27, 14, 1.7031, 26059, 3.1000, 25471,20 27 00,00 00 00, 0, 0, 0, CCM REV G*,0000000,00000000, 0, 0008, 0008[ETX]CSE1[EOT] Evaluation Trigger

- The site ID must be identical to the one configured in PowerSpring during the EC350 product addition. It is a six digit, hexadecimal number.
- Click OK to close the Site Information window.
- Double click the Audit Trail Log Configuration option from the Display/Change Items By Function dialog box. The EC350 audit log appears.

Select Items	Allocate Log Memory	Log Configuration Up Down
	e desired item over the log configuration tree. You can ole clicking on the desired item.	● EC 350 ○ ERX 350
Item Number	Description	-
0	Corrected Volume	• • • • • • • •
2	Uncorrected Volume	✓ Items (0 of 20)
5	Ch-A Pulses Waiting	- 🗟 LOG2
6	Ch-B Pulses Waiting	① 10 minutes
7	Ch-C Pulses Waiting	₩ Items (0 of 20)
8	P1 Gas Pressure	+
10	P1 High Alarm Limit	+
11	P1 Low Alarm Limit	+
12	P1 Cal Atmos Pressure	
13	Base Pressure	
14	Atmosphoris Brossuro	·

- Specify the log interval size (this should match the interval size specified in the **Input** field definition in PowerSpring). Configure the **Audit Trail** items of EC350 from the left pane. The sequence and number of Audit Trail items must match the inputs provided for **RUID Inputs** on **Definiton** page in PowerSpring.
- Click OK to close the Configuration window.
- Double click the **Call-In Config** option from the **Display/Change Items By Function** dialog box. The **Call-In Config** dialog box appears.

## 6 User Access6.4 Working with MasterLink Software Application SQL

08 Suprcompress	▶ 1	113 0	all-In					
09 Flow & Dial Rates			Item Number	Description	Value		Unit	
	_		333	Call-In Trigger Type	No Call-In	-		
0 Battery Power			1230	Call In Sequence	Both	-		
1 Pulse Outputs			493	Alarm Call-In Number 1				
2 Communications	•		785	Alarm Call-In Number 2				
			339	Sched Call-In Number 1	192.168.0.100/50467			
3 Call-In	•		1030	Sched Call-In Number 2				
4 Call Out Windows			334	Scheduled Call-In Date	01-01-01		MM-DD-YY	
5 Date & Time Config			335	Scheduled Call-In Time	09:00:00	$\odot$		
,	-		847	Next Sched Call-In Date	01-01-01		MM-DD-YY	
7 LCD Scroll List			846	Next Sched Call-In Time	09:00:00	$\odot$		
8 Audit Trail Log Configuration	<b>P</b>		845	Last Sched Call-In Date	01-01-01		MM-DD-YY	
9 Audit Trail Volume & Energy			844	Last Sched Call-In Time	09:00:00	$\odot$		
9 Addit Than volume & Energy	-		336	Call-In Retry By:	Instrument	-		
0 Audit Trail Pressure & Temperature	►		1235	Alarm Call Priority Number	Call Tel Number 1 First	-		
1 P1 Pressure and Temperature Statistic	s 🕨		1382	Sched Call Priority Number	Call Tel Number 1 First	-		
2 P2 Pressure Audit Trail & Stats			337	Last Mdm Call-In Result	No Call Attempted	-		
2 P2 Pressure Audit Trail & Stats	PP		338	Sched Call Unprocessed	No	-		
4 P4 Pressure Audit Trail & Stats	►		491	Modem Init String	ATE0Q0V0			
5 Volume and Flow Statistics			492	Modem Dial String	ATDT			
			494	Modem Hangup String	ATHO			
6 Monthly Volume Statistics			495	Modem Retry-A Interval	10		Minutes	
7 Bidirectional Volumes			496	Modem Retry-B Interval	1260		Minutes	
8 Digital Switch Inputs	<b></b>		497	Modem Retry-A Count	3			

• Type the information as shown, items: 1230, 333 (you may choose some other item numbers as well, 491, 492, 494,495, 496, upto last). Critical items are, 339 & 493, where the Host machine's IP Address for MERCURYSERVER and TCP Port (50467) should be correctly specified. The remaining fields can be defined by the user.

108 Suprcompress	113 0	113 Call-In							
109 Flow & Dial Rates		Item Number	Description	Value	Unit				
		333	Call-In Trigger Type	No Call-In 👻	] I				
10 Battery Power		1230	Call In Sequence	No Call-In					
111 Pulse Outputs		493	Alarm Call-In Number 1	Alarm Call-In Only					
112 Communications		785	Alarm Call-In Number 2	Scheduled Call-In Only					
		339	Sched Call-In Number 1	Alarm and Scheduled Call-In					
13 Call-In		1030	Sched Call-In Number 2						
14 Call Out Windows		334	Scheduled Call-In Date	01-01-01	MM-DD-YY				
15 Date & Time Config		335	Scheduled Call-In Time	09:00:00					
		847	Next Sched Call-In Date	01-01-01	MM-DD-YY				
17 LCD Scroll List		846	Next Sched Call-In Time	09:00:00					
18 Audit Trail Log Configuration		845	Last Sched Call-In Date	01-01-01	MM-DD-YY				
19 Audit Trail Volume & Energy		844	Last Sched Call-In Time	09:00:00	·				
T9 Audit Thail volume & Energy					Recording Cor				

**Note:** The Corrected Volume # of digits is defined for item-90, 97 and the Uncorrected Volume # of digits is defined for item-92, 97 These values must match the **No. of Dials** field in the **Unit Configuration** tab in PowerSpring.

01 Site Information	▶ 🔒	102 Volume & En	ergy			
02 Volume & Energy	•	Item Numbe	Description	Value	Unit	
		000	Corrected Volume	0000000	CCF	
3 P1 Pressure	- F	002	Uncorrected Volume	0000	m3x10	
04 P2 Pressure	- F	043	Total Correction Factor	194.6025		
06 P4 Pressure		046	Aux Correction Factor	200.0000		
	-	1188	Vol Conversion Method	Press + Temp + Super	· ····	
07 Temperature	▶	113	Hi Res Cor Vol	0.0000	CCF	
08 Suprcompress	- F	892	Hi Res Unc Vol	0.0000	m3x10	
09 Flow & Dial Rates		090	Cor Volume Units	CCF	•	
	-	096	Corr Vol # of Digits	8 Digits	•	
10 Battery Power		092	Unc Volume Units	m3x10	•	
11 Pulse Outputs	►	097	Unc Vol # of Digits	4 Digits	•	
2 Communications	<b>b</b>	098	Meter Index Rate	1000 M3	•	
Communications	-	114	Meter Scaling Factor	1000000		
13 Call-In	►	805	Auxiliary Meter Factor	1.000000		
14 Call Out Windows	►	433	Volume Input Mode	LF-UMB/Instrument Drive	•	
	▶	432	Meter Model	Other	•	
15 Date & Time Config	P-	439	Meter Displacement (CF)	1.000000	CF/rev	
17 LCD Scroll List	►	434	Daily Backup Volume	0000	m3x10	
18 Audit Trail Log Configuration	▶	1463	Backup Volume Alarm Lim	0000	m3x10	
		140	Energy	00000000	Therms	
9 Audit Trail Volume & Energy	▶	141	Energy Units	Therms	•	
20 Audit Trail Pressure & Temperature	►	142	Gas Energy Value	1000.00	BTU/cu.ft.	
21 P1 Pressure and Temperature Statist		1340	Error Volume Enable	No	•	

#### View / Edit

Co ble | Manage st | Manage AGA nfigure by G item | Se d Item File | Log 102 Volume & Energy ⊳ î Unit CCF m3x10 102 Volume & Ene • Item Na Description Corrected Volume Uncorrected Volume Total Correction Factor Aux Correction Factor 000 0000000 ▶ 000 002 043 046 00000 104 P2 Pressure 200.0000 106 P4 Pressure A A A A 1188 Vol Conversion Method 107 Temperature 0.0000 0.0000 CCF cc≢ m3x10 1113 892 090 096 092 097 098 114 805 433 Hi Res Cor Vol Hi Res Unc Vol 108 Supreo Cor Volume Units 109 Flow & Dial Rat Corr Vol # of Digits 8 Digits Corr Vol # of Digits Unc Volume Units Unc Volume Units Meter Index Rate Meter Scaling Factor Auxiliary Meter Factor Volume Input Mode Meter Model Meter Disiderment (C 110 Battery Power m3x10 4 Digits 1000 M3 111 Pulse Outputs ▶ --------CF/rev m3x10 m3x10 Therms 1000000 113 Call-In 1.000000 LF-UME 114 Call Out V -432 Other 115 Date & Time Co 432 439 434 1463 140 141 142 1340 Meter Displacement (CF) . Daily Backup Volume Backup Volume Alarm Lim Energy Energy Units 0000 118 Audit Trail Log Co -119 Audit Trail Volume & Thorms 1000.00 No BTU/cu.ft Gas Energy Value Error Volume Enable 120 Audit Trail Press -121 P1 P . 7. 0.0000. 0.0000. 6. 8. 9. 14.10000000.1.000000. 0. 8. 0000. ng 194.6025.200.0000. 4. 0.1.000000. 0000.0000 00 0. 0, 1000.0 Incoming Outgoing

## 6.5 Working with PowerSpring

Once the EC350 is added to PowerSpring, the configuration can be done based on your requirement.

• Adding EC350 to PowerSpring

## 6.5.1 Adding EC350 to PowerSpring

To add EC350 to PowerSpring

• Go to the PowerSpring Dashboard, select and click **Remote Units** listed under **Configuration**.

werSpring 302.1								Time Remaining : 4	4:27 () ADMI	NISTRATOR 👻 🌲
Dashboard										
Sub System Status			Start All	Stop All	Active Aler	ts : 4				
			Search:						Search:	
Process/Status	Max/Restarts	Host Name	Restart Time (MM/DD/YYYY HH:MM:SS)	Start/Stop					Received Date Time	
ALARM_HANDLER CURRENTLY_RUNNING	5/1	IE4LLT415KDN3	02/23/2023 01:38:36	Stop	RU_ID	•	Alarm Number	Alarm Description	0MM/DD/YYYY HH:MM:SS)	Alarm Date Time
AUTOLOAD CURRENTLY_RUNNING	5/1	IE4LLT415KDN3	02/23/2023 01:38:36	Stop	00000001		1058	EC350 P1 Transducer Alarm	02/14/2023 02:06:55	12/24/2019 07:10:00
DATA_COLLECTION CURRENTLY_RUNNING	5/1	IE4LLT415KDN3	02/23/2023 01:38:36	Stop	00000001		107	EC350 Tamper Detected Alarm	02/14/2023 02:06:55	12/24/2019 00:00:10
DATA_PROCESSING CURRENTLY_RUNNING	5/1	IE4LLT415KDN3	02/23/2023 01:38:36	Stop	000001		107	EC350 Tamper Detected Alarm	02/16/2023 05:35:47	12/24/2019 00:00:10
EXECUTIVE_MASTER CURRENTLY_RUNNING		IE4LLT415KDN3	02/23/2023 01:38:36		00000002		107	EC350 Tamper Detected	02/17/2023	12/24/2019
ROUTER_ CURRENTLY_RUNNING	5/1	IE4LLT415KDN3	02/23/2023 01:38:36	Stop	Showing 1 to 4 of	4 entr	es.	 Alarm	15:55:27	00:00:10 Previous 1
Overdue Calls										
			Search:							
RU_ID	▲ L 0	ast Call Date Time								
000000	0	1/01/1980 00:00:00								
0000001	0	2/14/2023 03:06:15								
0000002	0	2/17/2023 15:55:24								
000001	0	2/16/2023 05:35:43								
00000101	0	2/16/2023 10:11:18								
132755	1	2/08/2022 10:28:26								

- The Remote Units page appears. Click Add New.
- In the selection pane, select EC350 from the **Product Type** selection list.

PowerSpring 302.1 Time Remaining : 43:12											: 43:12	
🏫 DASHBOARD 🔅 CON	FIGURATION	REPORTING	SCHEDULER	🕂 UTILITIES	🔧 SETUP	🛃 DAT	A VIEWER	🖪 TRACE	:		Rator -	0
Home > Configuration												
► Remote Units	Showing	20 Of Total 4	3 Remote Units	Add Nev	v 😒 <u>Bulk Ir</u>	nport		Search	RU ID	✓ for %		Q
<ul> <li>Accounts</li> </ul>												
▶ Lists	Product			Nev	v Configur	ation	Existing	Configu	ration			
Call Profiles	SIP CA2	~			strument Ty				- irmware Versio	n		
Multi-members	ECI-II WAG RGP4		•		-Select-	-						
<ul> <li>Firmwares</li> </ul>	F CMU			_	all Profile Default Call Prof	1			Battery Type			
Special Factors	ER AE_M				Jelault Call Proi	lie		× 🖬	Unknown		× 🗄	
Multi-Member Correctors	MINI-A ANSI-I Mini-M	Device										
Multi-Member Devices	Turbo		eated ne id									
▶ 5000/6000 Multi-Member	ERX Sentry		Active									
	CloudL	_ink	- Active									
	ERX35 CNI4 EK280											
Conditions   Privacy Statement									Cu	istomer Logo	Hone	

• Specify the device configuration details.

**Note: Remote Unit ID** (RUID) and **FirmWare version** must be the same as specified in EC350. The Instrument Type must be selected as MERCURY EC350.

PowerSpring 302.1 Time Remaining : 42:50											
송 dashboard 🔅 con	FIGURATION 🖹 REPORTING 🛗	SCHEDULER 🖆 UTILITIES	🔧 SETUP 🔛 DATA VIEWER								
Home > Configuration											
Remote Units	Showing 20 Of Total 29 R	emote Units 🖪 Add New	v 🔄 Bulk Import	Search RU ID	✓ for %	Q					
<ul> <li>Accounts</li> </ul>											
▶ Lists	Product Type	New	w Configuration Existing	n Configuration							
Call Profiles	EC350 V New Remote Unit ID		strument Type	Firmware V	arcian						
Multi-members	New Remote Onicity		IERCURY EC350	· 1.0099	~						
Firmwares	Remote Unit Name		all Profile	Battery Typ							
Special Factors		15	5min	V 🗄 Unknown	~ 🖽						
Multi-Member Correctors	A default account will be created for this remote unit with same id										
Multi-Member Devices	and name										
> 5000/6000 Multi-Member	IP Enabled • Yes O No	Active									
	Attach Cellular Modem										
	Add Cancel										
		<	< < Page 1 V	>							
	Remote Unit ID	Information	Address & Phor	те Туре	Active						
	SSSSER Mercury ER Default Installed On: 07/08/1996 03:52:00 Contract ID: x00-x0-x0000	Site ID : Mercury ER Def CallProfileInfo: 15min Last Call Date: 01/01/198 Next Call Date: 10/14/198	80 12:00:00 FI	ER	•						

## 6.5.2 Configure EC350 in PowerSpring

• Go to the PowerSpring dashboard and inside the **Configuration** list, click on the **Remote Units**.

Dashboard										
				_						
Sub System Status			Start All	Stop All	Active Aler	rts : 4	1			
			Search:						Search	
Process/Status	A Max/Restarts	Host Name	Restart Time (MM/DD/YYYY HH:MM:SS)	Start/Stop					Received Date Time	
ALARM_HANDLER CURRENTLY_RUNNING	5/1	IE4LLT415KDN3	02/23/2023 01:38:36	Stop	RU_ID	•	Alarm Number	Alarm Description	(MM/DD/YYYY	Alarm Date Time
AUTOLOAD CURRENTLY_RUNNING	5/1	IE4LLT415KDN3	02/23/2023 01:38:36	Stop	00000001		1058	EC350 P1 Transducer Alarm	02/14/2023 02:06:55	12/24/2019 07:10:00
DATA_COLLECTION CURRENTLY_RUNNING	5/1	IE4LLT415KDN3	02/23/2023 01:38:36	Stop	00000001		107	EC350 Tamper Detected Alarm	02/14/2023 02:06:55	12/24/2019 00:00:10
DATA_PROCESSING CURRENTLY_RUNNING	5/1	IE4LLT415KDN3	02/23/2023 01:38:36	Stop	000001		107	EC350 Tamper Detected Alarm	02/16/2023 05:35:47	12/24/2019 00:00:10
EXECUTIVE_MASTER CURRENTLY_RUNNING		IE4LLT415KDN3	02/23/2023 01:38:36		00000002		107	EC350 Tamper Detected	02/17/2023	12/24/2019
ROUTER_ CURRENTLY_RUNNING	5/1	IE4LLT415KDN3	02/23/2023 01:38:36	Stop	Showing 1 to 4 of	4 entri		 Alarm	15:55:27	00:00:10 Previous 1
Overdue Calls										
			Search:							
RU_ID	La M	IST Call Date Time M/DD/YYYY HH:MM:SS)								
000000	01	/01/1980 00:00:00								
0000001	02	/14/2023 03:06:15								
0000002	02	/17/2023 15:55:24								
000001	02	/16/2023 05:35:43								
00000101	02	/16/2023 10:11:18								

Click on **ADD NEW** button.

PowerSpring 302.1					Time Re	maining : 44:10
🏫 DASHBOARD 🔅 CON	FIGURATION 🖹 REPORTING	🛍 SCHEDULER 🖆 UTILITIES 🔧	SETUP 🛃 DATA VIEWER [	TRACE		0 🦊
Iome > Configuration	_					
Remote Units	Showing 20 Of Total 29	Remote Units 🖪 Add New 😒	Bulk Import	Search RU ID	✓ for %	Q
Accounts		< <	Page 1 🗸 > 刘			
Lists				_	• #	
Call Profiles	Remote Unit ID	Information	Address & Phone	Туре	Active	
Multi-members	SSSER Mercury ER Default Installed On: 07/08/1996 03:5	Site ID : Mercury ER Default CallProfileInfo: 15min Last Call Date: 01/01/1980 12:	, 00:00 <sup>'</sup>	FR		
Firmwares	Contract ID: xxx-xx-xxxx Account Identifier Part 2: xx-n	Next Call Date: 10/14/1997 07:	FI	En	•	
Special Factors	nnnn	Firmware Version: 0100				
Multi-Member Correctors	\$\$\$CA1 Default Name	Site ID : Default Site ID	Default Address 1 , Default Address 1 .			
Multi-Member Devices	Installed On: 07/08/1996 03:3 Contract ID: xxx-xxx-xxxx	3:00 CallProfileInfo: 15min Last Call Date: 01/01/1980 12:	Default City ,FL ,Defa		•	
5000/6000 Multi-Member	Account Identifier Part 2: xx-n nnnn	n-xxx- Next Call Date: 07/08/1996 03:	38:00 ????? , Ph:Default ph number	none		
	S\$\$CA2 Default Name Installed On: 07/08/1996 03:5 Contract ID: x0x-x0x-x0x Account Identifier Part 2: x0-n nnn	Last Call Date: 01/01/1980 12:	22222 Ph:Default nh		•	
	SSSCloudLink SSSCloudLink Installed On: 03/31/2020 07:0 Contract ID: 300-300-3000 Account Identifier Part 2: xo-n nnn	Last Call Date: 03/31/2020 07:	Default Address 1 , Default Address 2 , Default City, WA , Def 329 , Ph:Default pho		jnk	

• In the **Product type** dropdown, select the EC350 product type.

송 DA SHBOARD 🔅 CONF	IGURATION	B REPORTING	SCHEDULER	🖆 UTILITIES	🔧 SETUP	🛃 DATA VIEWER	🗟 TRACE		Rator 🗸 🧃
ome > Configuration									
Remote Units	Showing	20 Of Total 4	3 Remote Units	S 🕂 Add Nev	<u>r</u> 🛛 <u>Bulk In</u>	<u>nport</u>	Search RU ID	✓ for %	٩
Accounts									
Lists	Product 1	уре		Nev	v Configura	ation Existin	g Configuration		
Call Profiles	SIP CA2	¥			strument Ty		Firmware	/ersion	
Multi-members	ECI-II WAG		*		Select-	pe	v select	70151011	
Firmwares	RGP4 F CMU ECAT	- 1			all Profile		Battery Ty	pe	_
Special Factors	ER AE_M	_			efault Call Prof	le	V H Unknown		✓
Multi-Member Correctors	MINI-A ANSI-E	levice							
Multi-Member Devices		Annual and a second sec	eated ne id						
5000/6000 Multi-Member	ERX	locumulator	0						
	EC350 (CloudL	ink	C Active						
	ERX35 CNI4	0							

Enter the device configuration details.

**Note:** Remote Unit ID (entered in New Remote Unit ID), FirmWare version, should be same as is specified in EC350 corrector and the Instrument Type must be selected as MERCURY EC350.

• Click on ADD Button in left bottom.

PowerSpring	302.1							Time	Remaining : 42:50
🏫 DA SHBOARD	CONFIGURATION	REPORTING	SCHEDULER	🕂 UTILITIES	م setup	🛃 DATA VIEWER	🗟 TRACE	ADMINISTRATOR •	r 💿 🔎
Home > Configuration									
<ul> <li>Remote Units</li> </ul>	Showin	g 20 Of Total 2	9 Remote Unit	S + Add New	<u>8 Bulk I</u>	nport	Search RU ID	✓ for %	Q
<ul> <li>Accounts</li> </ul>									
▶ Lists	Product			Nev	v Configur	ation Existin	g Configuration		
Call Profiles		mote Unit ID		In	strument Ty	rpe	Firmwar	re Version	
<ul> <li>Multi-members</li> </ul>			*				∨ 1.0099		~
<ul> <li>Firmwares</li> </ul>	Remote	Unit Name	_		II Profile		Battery		V H
<ul> <li>Special Factors</li> </ul>									· •
Multi-Member Cor	rectors	ult account will be cre remote unit with san							
Multi-Member Dev			Active						
▶ 5000/6000 Multi-M	ember Yes	O No	Active						
	C Atta	ch Cellular Modem							
	Add	Cancel							
	700	Gundur							
				1	< < Pag	e 1 v >	>		
	Remote	Unit ID	Inform	ation		Address & Phor	ne Ty	ype Active	
	Installed	R Default On: 07/08/1996 03:5 ID: x0x-xx-xx-xxxx	52:00 CallPro Last Ca	: Mercury ER De fileInfo: 15min II Date: 01/01/19 all Date: 10/14/19	80 12:00:00	, ,FL , ,	EF	۶ .	

• In the General tab enter all the applicable information and enable the device ACTIVE check box.

PowerSpring 30	Time Re	maining	<b>; : 44:</b> 39								
송 DASHBOARD 2	CONFIGURATION	B REPORTING	SCHEDULER	🕂 UTILITIES	🔧 setup	🗠 DATA VIEWER	TRACE		▲ ADMINISTRATOR -	0	.0
Home > Configuration > All I	Remote Units > RU D	evice Information									
All Remote Units	\$\$\$EC	350									
Act     Remote Unit ID	ive View Sun	Edit	General Call	Inputs Alarms	Site Inst	all User Table			Discar	d	Save
\$\$\$EC350	Configu	ration				Battery					
Remote Unit Name Administrator	Active	]				Battery Type			Battery Install Date		
Call Profile 15min	Remote U EC350	nit Product Type	Availabl 400	e HW Inputs		Nicad		~	12/10/2019 09:32:19 (MM/DD//YYY HH:MM:SS)		
Installer Name installer name	MERCUR	Type XY EC350	V 1.0099	ent Firmware Vers I	ion 🗸	AC Powered O Yes 💿 N	lo				
Product Desc EC350	Audit Trail	Date & Time Format				Other Inforr	nation				
Last Call Date 01/01/1980 00:00:00						Atmospheric Pr	essure		Contact Pressure		
(MM/DD/YYYY HH:MM:SS)			arm Occurrence Red			14.73		^	14.4		
			use an alarm record evice that has an act			Standard Comn Send Latest	nand Control	$\sim$			
× <u>Delete this Unit</u>	will be a L		records. Example: / orded in the databas is replaced.								
	Access	bility									
	User Id 0		Passwo ••••• Passwo	rd rd strength is not	© strong enough						

• In the **Call** tab, in the **Other Information** sub-window, specify the type of communication i.e. IP Enabled or Not.

PowerSpring	302.1									Time R	emainin	g : 44:47
🎓 DA SHBOARD	ន្ទី CONI	FIGURATION	REPORTING	🗰 SCHEDULER	🖆 UTILITIES	🔧 SETUP	🗠 DATA VIEWER	🖪 TRACE		▲ ADMINISTRATOR ▼		0
ome > Configuration >	All Remote	Units > Call In	formation									
All Remote Units		\$\$\$EC	350									
Remote Unit ID	Active	View Sum	Edit	General Call	Inputs Alarms	Site Inst	all User Table			Disca	rd	Save
\$\$\$EC350		Dial Out	Information				Host Inform	nation				
Remote Unit Name Administrator		Prefix		Suffix			Host Phone					
Call Profile 15min		(Max 25 Ch Phone Nun	· · ·		Characters) ance Capability		Calling Tim	e				
Installer Name installer name		999999999 (Max 25 Ch	999	O Yes	<ul> <li>No</li> </ul>		Call Profile	0				
Product Desc EC350		Calls					15min		~			
Last Call Date 01/01/1980 00:00: (MWDDYYYY HH:MM:		Called In		Last Call Da 01/01/1980 (MM/DD/YYY	00:00:00		Other Inform			Invisi-Connect Device		
× <u>Delete this Unit</u>			late 19 09:32:19 Y HH:MM:SS)	*			Set Transparen Ves No	t		Slave Device		$\sim$
		Field Mo	odem Types				○ NA					
		Standar	rd O	Mercury A	O Mercury	с						
		<ul> <li>Metrete</li> </ul>	k O	Mercury B	O Mercury	D						
		Attach C	Cellular Modem									

• The sequence and number of inputs inside the INPUTS tab must be identical to *EC350 Audit Trail Log1.* 

A DASHBOARD 🖾 CON	IFIGURATION		SCHEDULER	TUTILITIES	SETUP	₩ DATA VIEWER	TRACE		■ ADMINISTRATOR ▼	0
		_	Jonebocen		4 02101				_	• <b>•</b>
me > Configuration > All Remol	le Units > Input (	Configuration								
All Remote Units	\$\$\$EC	350								
Active	View Sum	marv Edit	General Call	Inputs Alarms	Site Ins	all User Table			Disca	rd Save
Remote Unit ID	tion out		Jeneral Call	Alarins	Site IIIs	all User Table			Dista	0010
\$\$\$EC350	4 Inputs	Available/ Syn	chronized 4	+ Add New						
Remote Unit Name	Set a	s Default Configurat	ion for all Inputs							
Administrator										
Call Profile 15min	Input No	Description		Date & T	Time YYY HH:MM:SS	Factor & O	perator	Sync	Current Reading	
nstaller Name					111111111111111111111111					
nstaller name		0 Corrected Vo Dial Count 8	olume			Factor 1: 1	, Operator 1: *		0	
Product Desc	1	Log: Log1 Address: 0		01/01/2	000 00:00:00	Factor 2: 0	Operator 2: +	1	Field Unit: Default Unit	
EC350		Address: U								
.ast Call Date )1/01/1980 00:00:00		2 Uncorrected	Volume						0	
MM/DD/YYYY HH:MM:SS)	2	Dial Count 8 Log: Log1		01/01/2	00:00:00		, Operator 1: * , Operator 2: +	4	Field Unit: Default	
		Address: 2							Unit	
×Delete this Unit										
	3	206 Average P Dial Count 8	ressure	01/01/2	000 00:00:00	Factor 1: 1	, Operator 1: *	,	Field Unit: Default	
	5	Log: Log1 Address: 206		0110112	000 00.00.00	Factor 2: 0	, Operator 2: +		Unit	
		1001000.200								
		207 Average T	emperature							
	4	Dial Count 8 Log: Log1		01/01/2	000 00:00:00		, Operator 1: * , Operator 2: +	4	Field Unit: Default Unit	
		Address: 207								

Click on **EDIT** tab on the Input to be edited.

owerSpring	y <b>302.</b> 1									Time	Remaining :	13:51
A DASHBOARD	🔅 CONF	GURATION	🔋 Reporting	SCHEDULER	🖶 UTILITIES	م setup	🛃 DATA VIEWER	🖪 TRACE		👤 ADMINISTR	ator 🔻	0
me > Configuration >	All Remote	Units > Alarms Ir	nformation									
All Remote Units	•	000001										
•	Active	View Summa	Edit	General Call	Inputs Alarms	Site Ins	tall User Table			Dis	card Sa	ave
Remote Unit ID 000001		47 Hardw	are Alarms /	Product Type I	EC350							
Remote Unit Name EC350		Alarm Nu	m Descripti	on		Nuisance Lim	it Clear Ala	arm	Properties			
Call Profile Default Call Profile	9	1	EC350	Battery Low Alan	m	0	Yes		Save; Log;		l	z
Installer Name		2	EC350	Battery Cycles A	larm	0	Yes		Save; Log;			Edit
installer name		3	EC350	Vol Sensor-1 Ala	m	0	Yes		Save; Log;			
EC350		4	EC350	Vol Sensor-2 Ala	m	0	Yes		Save; Log;			
Last Call Date 02/16/2023 05:35: (MM/DD/YYYY HH:MM		5	EC350	System Alarm		0	Yes		Save; Log;			
	,	6	EC350 I	Master Alarm Sta	itus	0	Yes		Save; Log;			
× <u>Delete this Unit</u>	<u>t</u>	7	EC350	P1 Press Low Ala	am	0	Yes		Save; Log;			
		8	EC350	Temperature Low	/ Alarm	0	Yes		Save; Log;			
vacy Statement   I	License	About								Customer Logo	Honey	

In **EDIT Input window > Input Definition**, enter the following critical parameters:

- Input description
- Input Interval
- Enable the Billable option
- Save Data (enable checkboxes to store the Interval, Time of Call, Daily Reading)
- Daily Read Hour (specify the hour at which the Remote Unit performs a read on the selected input. Type the hour, (O to23), minute and second). Profile 1, Profile 2, Profile 3 and Profile 4: To define four profiles for CAO and CA1 Remote Units that enable you to set up more than one Daily Readings, that is, define four profiles at which the Remote Unit performs a read on the selected input. Type the Hour, Minute, and Second for each Profile. One Profile must match the Daily Read Hour.

PowerS	vring 302 1	Т	ine.Remaining : 44:27
🏫 DASHI	0 Corrected Volume	Discard	Save
Home > Cont	Inputs Definitions Remote Data Alarms Central Data Alarms Units		
	Data Description Dail	ly Read Hour	
Remote LI SSSEC Remote LI Administr Call Public Defaut C	Input Type Files Input Type Description 0 Corrected Volume v 10 Serial Number Interval Sce Log Data V 0000 Serial Number Sce Log 0000 Serial Number 00000 Serial Number 0000 Serial Number 0000 Serial Numb	0.00 00.00 00.00 e 3 Profile 4	Sar
Installer I Installer T Product D EC350 Last Call I UNICOTY UNICOTY	Last Call 01/01/2000 00:00 Save	e Data Data As Follows terval  Time of Call Daily Reading Profile I	Peak
x <u>Delete</u> Terms & Conditions   Privacy Stat	Type Actual Calculated Encoded Ren: Packene Packee	Customer Log	Personal and a second

#### INPUTS>Central Data Alarms tab:

Use this tab to define automatic central limit checking. PowerSpring allows you to set up a simple, yet extremely effective, Central Interval Level Checking scheme that enables you to report on intervals outside user-configured boundaries. You can configure this tri-level checking scheme for both High and Low Intervals; however, you are not required to use both. Let's assume you have a customer that is "interruptible" (curtailed). Of course, you cannot completely shut the gas off because the customer has a large number of pilot lights that must remain operative; therefore, a very small consumption is expected. You could set up the following tri-level central interval high checking scheme:

- Central Interval 1 High Set this to the lowest level of severity. If consumption rises above this level, monitor this customer more closely.
- Central Interval 2 High Set this to the middle level of severity. If consumption rises above this level, call the customer.
- Central Interval 3 High Set his to the highest level of severity. If consumption rises above this level, you know that the customer is using gas Inside the Edit Input (Corrected Volume) window, go to the UNITS tab. Inside the Edit Input (Corrected Volume) window, go to the UNITS tab.

<ul> <li>All Remot</li> </ul>	0 Corrected Volume				Di	scard Save
Remote Uni	Inputs Definitions Remote Data	Alarms Central Data	Alarms	Units		
\$\$\$EC35	Interval High Alarms	○ Enable	Disable	Interval Low Alarms	○ Enable	Disable
Remote Uni	-		0.00000			
Administra	Interval High Alarm Description 1	Limits	_	Interval Low Alarm Description 1	Limits	_
Call Profile Default Ca	Central TTI Consumption High Level 1	V 0		Central TTI Consumption Low Level 1	v 0	
Installer Na	Interval High Alarm Description 2	Limits		Interval Low Alarm Description 2	Limits	
installer na	Central TTI Consumption High Level 2	√ 0		Central TTI Consumption Low Level 2	v 0	
Product Des EC350	Interval High Alarm Description 3	Limits		Interval Low Alarm Description 3	Limits	
		✓ 0			Y 0	
Last Call Da 01/01/1980						
(MM/DD/YYY)	Alarm Properties			Alarm Properties		
	Save Log Alert			Save Log Alert		
× <u>Delete th</u>						

#### INPUT > UNITS tab:

This sub-window can be used to:

- Add edit, and delete field unit conversions. You use these conversions to convert your raw data to a scaled format before it is saved in the database.
- Add, edit, and delete report unit conversions. You can apply these conversions to your data, using the Custom Report and Data Viewer applications, and view the data in a new format. Most important information, the latest ADDED field or REPORT units will be used to save the data, since when they are created. Previous existing units shall still show the history in the respective units.

Click on the EDIT icon for editing a FIELD UNIT.

PowerSpring 302.	.1								Time Remain	ing : 43:11	
	ONFIGURATION	SCHEDULER							<b>1</b> ADMINISTRATOR		
All Remote Units	0 Corrected Dial Count 8	Volume	01/01	12000.00:00:00	Facto	or 1: 1 , Operator	t.*	0 Fiel	il Unit: Default		
0 Corrected Volume										Discard	Save
Inputs Definitions Remote Data	a Alarms Central Data Ala	rms Units									
Field Units     C Report Units			F						٦	Add New L	Init
Effective Date & Time	Units D	escription	(	Operator 1	Factor1	Operator 2	Factor2	Dials			
01/01/1980 00:00:00	Default Unit Default Unit	efault Unit Description			1	+	0	8		Ľ	
	CCF ¥			Add(+) 🗸	1	Add(+) 🖌	0		Add		
× Delete tins onit											
onditions   Privacy Statement   License									stomer Logo	neywell	

Also user can add customized UNITS with Operator and Factors for calculation and display in Data viewer, as desired. Similarly add the REPORT UNITS for calculating and loading the data in Data Viewer application, shown below. Go to the REPORT UNIT radio button and click on the ADD NEW tab (shown below).

	Power	Spring	302.1										
	🏫 DASH			📋 REPORTING	SCHEDULER	🖆 UTILITIES		🛃 DATA VIEWER	🖪 TRACE		L ADMINISTR		
•	All Remo	ote Units	1	0 Corrected Vo Dial Count 8	olume	01/01/200	00.00.00.00	Factor 1: 1 ,	Operator 1: *	( . / F	Sald Unit: Default		
	0 Ren	Correc	ted Volume								Discard	Save	
		nputs Defi	nitions Remote	Data Alarms	Central Data Alarr	ns Units							
	Ren (	Field Un	its 🔍 Report Un	its							Add Ne	w Unit	
	Call	Effective	e Date & Time	Units	Description	ı	Оре	rator 1 Fact	or1 Opera	ator 2 Fa	ictor2		
	Defa			COMMON V	/		Mu	ltiply( 🗸	Add(	+) 🗸 0	Add		
	inst												
	Proc EC3												
	Last 01/C												
	(MM)												
	×Derete t												
	A Delete t												
Terms & Conditions   P	Privacy Stat	ement   L	icense   About									Honeyw	

		🗰 SCHEDULER 📫					
All Remote Units	View Summary Edit	General Call Inputs	Alarms Site Insta	User Table		Discard	Save
Active Remote Unit ID 000001	4 Inputs Available/ Syn		<u>id New</u>				
Remote 0 Corrected	l Volume						
Call Pro	ns Remote Data Alarms	Central Data Alarm	s Units				
Default Installer							
nstaller Unit Descript	tion DefaultFa	ctor1 DefaultFactor2	DefaultOperator1	DefaultOperator2	Unit Type		
COMMON	1	0	*	+	Report	Edit	
ast Cal SCM	10	1	+	+	Report	Edit	
MM/DDY			Add(+) 🗸	Add(+) 🗸	Add		
× <u>Delet</u>							
	4 Dial Count 8 Log: Log1		02/16/2023 05:35:43	Factor 1: 1 , Op Factor 2: 0 , Op		Field Unit: Default Unit	
	Address: 207					Unit	
	About					Hor	eywell

Once user clicks on ADD button, the entered unit and factors should be added and publish in the dropdown list of available UNITS.

	IGURATION 📋 REPORTING	SCHEDULER 💼 UT				L ADMINISTRATOR ▼	
All Remote Units	View Summary Edit Ger	eral Call Inputs	Alarms Site Insta	II User Table		Discard Sav	e
Active     Remote Unit ID 000001	4 Inputs Available/ Synch		New				
Remote 0 Corrected V	Volume						
EC350 Call Pro	Remote Data Alarms	Central Data Alarms	Units				
Default Back							
Installer Installer Unit Descriptio	n DefaultFactor	DefaultFactor2	DefaultOperator1	DefaultOperator2	Unit Type		
Product	1	0	*	+	Report	Edit	
EC350 COMMON	10	1	+	+		Edit	
02/16/2 (MM/DD)	10	1	+	+	Report	Edit	
			Add(+) 🗸	Add(+) 🗸	Add		
× <u>Delet</u>							
	4 Dial Count 8 4 Log: Log1		02/16/2023 05:35:43	Factor 1: 1 , Op Factor 2: 0 , Op		Field Unit: Default Unit	
	Address: 207					Unit	
						Customer Logo	

SAVE the changes and reopen the UNITS window for selected input. The added REPORT UNIT should be listed in the REPORT units dropdown as shown below:

All Re	emote Units	Summary Edit	General Call Inp	uts Alarms Site I	nstall User Tabl	e			Discard
Ren	0 Corrected Volume	)						D	iscard Save
000	Inputs Definitions Re	emote Data Alarms	Central Data Alarms	Units					
Rem EC3	O Field Units 🔍 🖲 Rep	oort Units							Add New Unit
Call	Effective Date & Time	Units	Description		Operator 1	Factor1	Operator 2	Factor2	
Defi Insta insta Proc EC3 Last 02/1 MM/	02/23/2023 00:00:00	COMM COM SCM		t Unit	Multiply( V	1	Add(+) <b>v</b>	0	Add
		Address: 200	3					Unit	

Specify the date from when this report unit will be applicable for data calculation. Also define the description of this report unit for easy identification as is shown in below screenshot:

		REPORTING	🛍 SCHEDULER 📫 UTIL		✓ DATA VIEWE	R 🔚 TRACE		<b>ADMINISTRATOR</b>	
All Remote Units	View Summ	nary Edit G	ieneral Call Inputs Al	arms Site Instal	II User Table			Discard	Sav
Street restores and	cted Volume							Discard Save	
en O( Inputs De	finitions Remote	Data Alarms	Central Data Alarms	Units					
en O Field U C3	Inits 🔍 Report Un	hits						Add New Unit	
	ve Date & Time	Units	Description	Ope	rator 1 Fa	ctor1 Opera	itor 2 Factor	2	
efi 02/23/	2023 00:00:00	SCM V	SCM Report Unit	Add	d(+) 🗸 10	Add(-	+) 🗸 1	Add	
sta roc C3									
sta									

owerSpring 302.1											
n dashboard 🔅 con	IFIGURATION 📋	REPORTING	SCHEDULER	🖆 UTILITIES	A SETUP	🛃 DATA VI	ewer 🖪	TRACE	2	ADMINISTRATOR	
All Remote Units	View Summary	Edit Gener	al Call Ing	outs Alarms	Site Install	User Tabl	e			Discard	Save
0 Corrected Vo	olume									Discard Save	•
n Inputs Definitions	Remote Data	Alarms Cent	ral Data Alarm	s Units							
n O Field Units	Report Units									Add New Unit	
Effective Date & 1	Time	Units	Description		Oper	ator 1	Factor1	Operator 2	Factor2		IJ
fi 02/23/2023 00:0	00:00	SCM ¥	SCM Repo	rt Unit	Add(	(+) 💙	10	Add(+) 🗸	1	Add	
sta										_	
2											
st /1											
N .											
Derete uns omt		r. Log i dress: 206	-	_	_	Factor	2.0, Operat	UI 2. +	Unit		
Denere unis onu	Ado					Facior	2.0, Operat	UI 2. +	Unit		

Click on **SAVE** button.

Once the new report unit is available in dropdown, now user can associate this report unit to any inputs existing in the database. To validate this UNIT is available for calculation; verify it in DATA VIEWER application, shown below:

🎓 DA SHBOARD	惊 Configuration	🕯 REPORTING	SCHEDULER	🕂 UTILITIES	🔧 setup	🛃 DATA VIEWER	🖪 TRACE	▲ Administrator -	0 🙎
Load New Re nput Number: 1 RU ID: 000001 View Graph R Time	adings::1 7 Rows Data Type: Time Of Call esync Bulk Change Value	Units Field U ✓ Save Delete Unit Statt	Account Id Members	v Readings::2 000001 1,000001,0 Cor Interval Size: 15	rected Volume	Browse	Account Id Members	w Readings::3 000001 1,00001,0 Corrected Volume Interval Size: 15 minutes	Browse
2/15/2023 02:27:39 12/15/2023 02:34:51 12/15/2023 02:34:51 12/15/2023 02:40:30 12/15/2023 03:38:44 12/15/2023 12:28:12 12/15/2023 12:32:19	1065 1495 1834 1041 1060 1036 1053	Default Unit Default Unit Default Unit Default Unit Default Unit Default Unit Default Unit	5K/6K Data ANSI Data Data Type From To Show Last Synchronic	-Select- Interval Data 02/15/2023 00:0 (MMDDIYYYY HHM 02/22/2023 07:0 (MMDDIYYYY HHM 22/22/2023 07:0 (MMDDIYYYY HHM 22/22/2023 07:0 (MMDDIYYYY HHM	IM:SS) 0:00		5K/6K Data ANSI Data Data Type From To Show Last C Synchroni	Select Interval Data (22/15/023 00 00 (MMDDYYYY H+MM:S5) (22/22/023 07:00.00 (MMDDYYYY H+MM:S5) Ze Scrolling	
				Load Readin	gs Now			Load Readings Now	

**Note:** The Operator and Factors given for the REPORT or FIELD UNITS should be used correctly in DATA VIEWER. In the below screenshot user can see the SCM report unit contains the Operator1=\* and Factor1=10. It means the multiplication by 10 should be done in data viewer, if user displays the data in data-viewer application for report unit selected as SCM .

A DASHBOARD	호 CONFIGURATION	REPORTING	SCHEDULER	🖶 UTILITIES	🔧 SETUP	✓ DATA VIEWER	R TRACE	▲ Administrator ▼	0	
							u)			
Load New Re	adings::1		Load Nev	w Readings::2	2	•	Load Ne	w Readings::3		,
Input Number: 1	7 Rows	Units 🛛 Field U 🗸	Account Id	000001		Browse	Account Id	000001	B	Brows
RU ID: 000001 View Graph R	Data Type: Time Of Call esync Bulk Change	Save Delete	Members	1,000001,0 Con	rected Volume	~	Members	1,000001,0 Corrected Volume	~	
Time	Value	Unit Status		Interval Size: 15	minutes			Interval Size: 15 minutes		
02/15/2023 02:27:39	1065	Default Unit	5K/6K Data				5K/6K Data			
2/15/2023 02:34:51 2/15/2023 02:40:30	1495 1834	Default Unit Default Unit	ANSI Data				ANSI Data			
2/15/2023 03:38:44	1041	Default Unit	Data Type	Interval Data	~		Data Type	Interval Data 🗸		
)2/15/2023 12:28:12 )2/15/2023 12:32:19	1060 1036	Default Unit Default Unit	From	02/15/2023 00:00	D		From	02/15/2023 00:00		
5/2023 12:37:01	1053	Default Unit	То	(MW/DD/YYYY HH:M 02/22/2023 07:00	-		То	(MWDD/YYYY HH:MM:SS) 02/22/2023 07:00:00		1
			10	(MWDD/YYYY HH:M			10	(MWDD/YYYY HH:MM:SS)		
			Show Last				Show Last			
			Synchronia	ze Scrolling			Synchroni	ze Scrolling		
				Load Reading	as Now			Load Readings Now		

• Alarms tab for Remote Unit

A DASHBOARD       ♥ CONFICURATION       I III SCHEDULER       I UTUTTES       < SETUP	naining : 44
Ail Remote Units       \$\$\$\$EC350         Active Remote Unit ID \$\$\$EC350       View Summary       Edit       General       Call       Inputs       Attams       Bite       Install       User Table       Discar         Administrator       Call Profile       1       EC350 Battery Low Alarm       0       Yes       Save, Log;       1       EC350 Battery Cycles Alarm       0       Yes       Save, Log;       1       EC350 Vol Sensor-1 Alarm       0       Yes       Save, Log;       1       EC350 Vol Sensor-1 Alarm       0       Yes       Save, Log;       1       EC350 Vol Sensor-2 Alarm       0       Yes       Save, Log;       1       1       EC350 System Alarm       0       Yes       Save, Log;       1 <t< th=""><th>0</th></t<>	0
Active       View Summary       Edit       General       Call       Inputs       Alarms       Site       Install       User Table       Discar         Remote Unit ID       SSSEC350       A/       Hardware Alarms / Product Type EC350       A/       Article       Properties       Image: Call Inputs Alarms       Site Install User Table       Discar         Remote Unit ID       SSSEC350       A/       Hardware Alarms / Product Type EC350       Image: Call Inputs Alarms       Nuisance Limit       Clear Alarm       Properties       Image: Call Inputs Alarms       Image: Call Input Site       Image:	
Airmote Unit ID       New countinity       Coll Product       Type Coll       Product Type EC350         Remote Unit Name Administrator       Alarm Num       Description       Nuisance Limit       Clear Alarm       Properties         1       EC350 Battery Low Alarm       0       Yes       Save, Log;         1       EC350 Battery Cycles Alarm       0       Yes       Save, Log;         1       EC350 Battery Cycles Alarm       0       Yes       Save, Log;         1       EC350 Vol Sensor-1 Alarm       0       Yes       Save, Log;         1       EC350 Vol Sensor-2 Alarm       0       Yes       Save, Log;         1       EC350 System Alarm       0       Yes       Save, Log;         1       EC350 Vol Sensor-2 Alarm       0       Yes       Save, Log;         1       EC350 System Alarm       0       Yes       Save, Log;         1       EC350 Vol Sensor-2 Alarm       0       Yes       Save, Log;         10/10/1580 00:00:00, NMUDDYWY HeHMMSIS       6       EC350 Vol Sensor-2 Alarm       0       Yes       Save, Log;         2       EC350 Temperature Low Alarm       0       Yes       Save, Log;       1	
SSSEC350       A7 Hardware J Product Type EC350         Remote Unit Name Administrator       Naisance Limit       Clear Alarm       Properties         1       EC350 Battery Low Alarm       0       Yes       Save; Log;         1       EC350 Battery Cycles Alarm       0       Yes       Save; Log;         1       EC350 Vol Sensor-1 Alarm       0       Yes       Save; Log;         1       EC350 Vol Sensor-2 Alarm       0       Yes       Save; Log;         1       EC350 Vol Sensor-2 Alarm       0       Yes       Save; Log;         1       EC350 System Alarm       0       Yes       Save; Log;         1       EC350 Mol Sensor-2 Alarm       0       Yes       Save; Log;         1       EC350 Mol Sensor-2 Alarm       0       Yes       Save; Log;         1       EC350 Master Alarm Status       0       Yes       Save; Log;         1       EC350 Temperature Low Alarm       0       Yes       Save; Log;	Sav
Administrator       Alarm Num       Description       Nuisance Limit       Clear Alarm       Properties         Call Profile 15min       1       EC350 Battery Low Alarm       0       Yes       Save, Log;         Installer Name installer name Product Desc EC350       2       EC350 Battery Cycles Alarm       0       Yes       Save, Log;         3       EC350 Vol Sensor-1 Alarm       0       Yes       Save, Log;         4       EC350 Vol Sensor-2 Alarm       0       Yes       Save, Log;         10/01/1580 00:00:00 (MMDDOYYY HeLMLSS)       6       EC350 System Alarm       0       Yes       Save, Log;         6       EC350 Parters Log Alarm       0       Yes       Save, Log;         7       EC350 Temperature Low Alarm       0       Yes       Save, Log;         8       EC350 Temperature Low Alarm       0       Yes       Save, Log;	
15min       1       COOD Date() Control, Contrel, Control, Contrel, Control, Contrel, Con	
Installer name         Image: Comparison of the comp	
Product Desc EC350         3         EC350 Vol Sensor-1 Alarm         0         Yes         Save, Log;           Last Call Date 01/01/1980 00:00:00 (MMDDYYYY H+MMSs)         4         EC350 Vol Sensor-2 Alarm         0         Yes         Save, Log;           6         EC350 Master Alarm         0         Yes         Save, Log;           7         EC350 Temperature Low Alarm         0         Yes         Save, Log;           8         EC350 Temperature Low Alarm         0         Yes         Save, Log;	
Instruct Call Date         4         EC350 Vol Sensor-2 Alarm         0         Yes         Save; Log;           5         EC350 System Alarm         0         Yes         Save; Log;           6         EC350 Master Alarm         0         Yes         Save; Log;           7         EC350 Press Low Alarm         0         Yes         Save; Log;           8         EC350 Temperature Low Alarm         0         Yes         Save; Log;	
01/01/1980 00:00:00         5         EC350 System Alarm         0         Yes         Save; Log;           6         EC350 Master Alarm Status         0         Yes         Save; Log;           x Delete this Unit         7         EC350 P1 Press Low Alarm         0         Yes         Save; Log;           8         EC350 Temperature Low Alarm         0         Yes         Save; Log;	
6     EC350 Master Alarm Status     0     Yes     Save, Log.       x Delete this Unit     7     EC350 P1 Press Low Alarm     0     Yes     Save, Log.       8     EC350 Temperature Low Alarm     0     Yes     Save, Log.	
8 EC350 Temperature Low Alarm 0 Yes Save; Log;	
9 EC350 P1 Press High Alarm 0 Yes Save, Log,	
10 EC350 Temperature High Alarm 0 Yes Save; Log;	
1 2 3 4 Last	

Navigate to ALARMS tab as and configure the ALARMS for EC350 device, user can configure the alarms thathe wants to display in PowerSpring Alarm/System Monitor application. As shown below user has to EDIT the existing alarm.

PowerSpring 302.1									Time Remain	ng : 44:34
🏫 DASHBOARD 🔅 CONF		REPORTING	SCHEDULER	🖆 UTILITIES		🛃 DATA VIEWER				0
Home > Configuration > All Remote	Units > Alarms In	formation								
All Remote Units	000001									
Active Remote Unit ID 000001 Remote Unit Name EC350	View Summa 47 Hardwa Alarm Nun	are Al User	50 Battery Lo	]	Clear Ala		el Save	Properties	Discard	Save
Call Profile Default Call Profile	1	EC3	50 Battery Low Alarr	n 🗸				Save; Log;		
Installer Name installer name Product Desc	2	Prop	ery Low Alarm erties ave 🗹 Log 🗹 Alert					Save; Log; Save; Log;		
EC350	4							Save; Log;		
Last Call Date 02/16/2023 05:35:43 (MM/DD/YYYY HH:MM:SS)	5			_	_			Save; Log;		
	6	EC350 I	Aaster Alarm Sta	tus	0	Yes		Save; Log;		
× <u>Delete this Unit</u>	7		P1 Press Low Ala		D	Yes		Save; Log;		
Privacy Statement   License	8 About	EC350 1	emperature Low	Alarm	0	Yes		Save; Log;	ustomer Logo	eywell

Use this tab to edit the Remote Unit Hardware Alarms' information. However, there are certain hardware alarms that are "non-maskable;" that is, the hardware alarms are always active and you are only permitted to customize the name (user description). When you select one of these hardware alarm types, (from the Hardware alarm list), the Immediate alarm notification check box and Nuisance limit box, (under Alarm Specification), appear dimmed and are unavailable for modification.

**Note:** Alert Mode: Select the Notify Immediately check box to enable the Remote Unit to call immediately when the selected hardware alarm is detected. Another critical purpose of CLEAR ALARMS checkbox is that, it will clear the hardware alarms in the device (i.e. EC350) once the call is successful in PowerSpring.

Nuisance Limit: Specifies the number of times that the selected alarm can occur prior to being disabled. Type a number and if the "Nuisance limit" is met, the alarm notifies the selected Remote Unit to repeat the alarm. Properties: You can save, log, or select to alert an alarm.

Save - Saves the selected Hardware alarm occurrence to the database (Alarm Data File).

Log - Logs the selected Hardware alarm occurrence to your alarm logging device. This logging device, usually a printer, is specified in the Alarm Maintenance application.

Alert - an alarm (beep) is sounded by the printer when the selected Hardware alarm is detected. Site Information tab for Remote Unit:

Site Information tab for Remote Unit:

n DASHBOARD	CONFIGURATION	🖹 REPORTING	SCHEDULER		s 🔧 setup	🗠 DATA VIEV	VER 🖪 TRAC	
me > Configuration > All Re	mote Units > Site In	formation						
All Remote Units	000001							
<ul> <li>Activ</li> <li>Remote Unit ID</li> </ul>	View Sum	Edit	General Call	Inputs Alarm	ns Site In:	stall User Table	5	
000001	Site Info	rmation						
Remote Unit Name EC350 Call Profile	Site ID Default Si		Nam EC3	50				
Default Call Profile	(Max 25 Ch Address 1	aracters)	(Max Addr	25 Characters)				
Installer Name installer name	Default Ar		Defa	ault Address 2 25 Characters)				
Product Desc EC350	Site Phone		Wall	location code				
Last Call Date	(Max 25 Ch	none number	A01	A01 (Max 25 Characters)				
02/16/2023 05:35:43 (MM/DD/YYYY HH:MM:SS)	Extension r	,	Time	Timezone				
	### (Max 25 Cf	aracters)	+05	:30 Indian Stand	lard Time	~		
× Delete this Unit	County		State					
	Default C		WA	WA				
	(Max 25 Ch City	laracters)	Zip					
	Default C	itv	329					
	(Max 30 Ch	,	(Max	12 Characters)				
	Latitude		Long	itude				
	(Max 12 Cr			12 Characters)				

Install tab for Remote Unit:

n dashboard 🔅 co	NFIGURATION	B REPORTING		🖆 UTILITIES	🔧 SETUP		RAT 🛃
me > Configuration > All Remo	ote Units > Install	Information					
All Remote Units	000001						
<ul> <li>Active</li> <li>Remote Unit ID</li> </ul>	View Sum	Edit	General Call	Inputs Alarms	Site Ins	tall User Table	
000001	Install In	formation				]	
Remote Unit Name EC350	Installer ID						
Call Profile Default Call Profile	installer n (Max 25 Ci	aracters)					
nstaller Name installer name	02/15/202	Date/ Time 23 23:19:40 Y HH:MM:SS)					
Product Desc EC350	02/15/202	23 23:19:40					
Last Call Date 02/16/2023 05:35:43 (MM/DD/YYYY HH:MM:SS)	Account No						
	(Max 255 0	Characters)			11		
ĸ <u>Delete this Unit</u>						J	

## 6.6 Connecting EC350 with PowerSpring using a Messenger Modem

Follow the steps below to connect a EC350 device with PowerSpring using a Messenger Modem:

- Configure EC350 using MasterLink Software Application
- Configure EC350 in PowerSpring

#### 6.6.1 Configure EC350 using MasterLink Software Application

Launch MasterLink Software Application , and go to **DISPLAY** tab in tool bar and click on *Item by Function* option.

Inside the **Display/Change Items By Function** window double click the **Site Information** option.

Configure the following parameters:

• SITE INFORMATION: The site ID should be identical to (six digit, hexadecimal) the one configured in **PowerSpring** during the EC350 product addition.

View / Edit					
Configure by Group Confi	figure by Item   S	Send Item File   Log	gging Configuration   Manage	User Table   Manage Shortlist	Manage AGA-8
101 Site Information	► Î	101 Site Informatio	n		
102 Volume & Energy	►	Item Number	Description	Value	Unit
103 P1 Pressure		200	Site ID# Part 1	00000000	
103 P1 Pressure	►	201	Site ID# Part 2	00000000	
104 P2 Pressure	►	062	Unit Serial Number	00000000	
106 P4 Pressure		1019	Main Board S/N	00000000	
		586	Sample Interval	30 Seconds 👻	
107 Temperature	►	1190	Meter S/N	00000000	
108 Suprcompress	►	127	Instrument Type	EC 350 (14) -	
109 Flow & Dial Rates	•	122	Firmware Version	1.7031	
		1175	Firmware CRC	26059	
110 Battery Power		1177	Loader Version	3.1000	
111 Pulse Outputs	•	1176	Loader CRC	25471	
112 Communications		1056	LCD Display On Time	20:27:00 🕑	
12 Communications	▶	1057	LCD Display Off Time	00:00:00	
113 Call-In	►	1163	Access Jumper Status	Disconnected -	

PowerSpring can use Site ID 1 or Site ID 2, that is setup in *System Configuration -> Data Collection settings*. The default is Site ID 2.

System Configuration - Edit DATA_COLLECTION
Configure Trace Analog Modem Ports Internet Ports
Working directory: \\FL0GLT4KM6N32\METF
Release directory: \\FL0GLT4KM6N32\METF
Executable directory: R:\
Executable: PC7_DC.EXE
Mercury Device Options
Use Site ID 1 as the Remote ID
Map Time of Call data for Item Codes 225/22

Inside the Display/Change Items By Function sub-window, double click on Audit Trail Log configuration option. This will open the audit trail configuration window. Specify the information marked in red window, i.e. LOG INTERVAL size (this should match with the interval size given in Input definition of the PowerSpring.) Configure the AUDIT TRAIL items of EC350, from left pane with the sequence & number of Audit Trail items equal to PowerSpring RUID Inputs Definition page.

Select Items		
Select items	Allocate Log Memory	Log Configuration Up Down
	e desired item over the log configuration tree. You can ole clicking on the desired item.	EC 350 ERX 350     2 - Uncorrected Volume
Item Number	Description	E Two
0	Corrected Volume	<ul> <li>① 10 minutes</li> </ul>
2	Uncorrected Volume	- M Items (5 of 20)
5	Ch-A Pulses Waiting	226 - Incremental Unc Vol
6	Ch-B Pulses Waiting	206 - P1 Interval Avg Press
7	Ch-C Pulses Waiting	207 - Interval Avg Gas Temp
8	P1 Gas Pressure	
10	P1 High Alarm Limit	48 - Battery Voltage Reading
11	P1 Low Alarm Limit	n
O View items by function	View items by Filter	Read Setup from Device Read setur
Incoming   0,	60,"Five", 0.0, 225, 226, 206, 207, 48,	0, 2, 8, 26, 31, 255, 255, 255, 255, 255,

• Call-In Configuration: Inside the Display/Change Items By Function sub-window, double click on Call-In Config option. Enter the information as shown in the region marked in red.

i.e. items 1230, 333, 491, 492, 494,495, 496, upto last – depending on how the user wants the Callin to happen.

Critical items are- 339 & 493, where the HOST machine IP Address for MERCURY SERVER and TCP Port (50467) should be correctly specified. The rest items are user dependent.

Filter:				
Number	Description	Value	Units	Change
1230	Call In Sequence	Priority		
333	Call-In Trigger Type	Alarm and Schedule		Print
491	Modem Init String	ATE0V0		<u></u>
492	Modem Dial String	ATDT		
494	Modem Hangup String	ATHO		<u>F</u> ind
495	Modem Retry-A Interval	5	Minute(s)	
496	Modem Retry-B Interval	1440	Minute(s)	Close
336	Call-In Retry By:	Host		
497	Modem Retry-A Count	0		
821	Modem Init Delay	50	Second(s)	
405	Call-In Dialing Delay	5	Second(s)	
493	Alarm Call-In Number-1	198.198.198.1		
785	Alarm Call-In Number 2	198.198.198.2		
339	Sched Call-In Number-1	198.198.100.1		
1030	Sched Call-In Number-2	198.198.100.2		
334	Sched Call-In Date	07-14-15		
335	Sched Call-In Time	15 33 00		
338	Sched Call Unprocessed	No		
337	Last Mdm Call-In Result	No Call Attempted		
487	Call-In Keep Alive Time	5	Minute(s)	

08 Suprcompress	113 0	Call-In			
09 Flow & Dial Rates		Item Number	Description	Value	Unit
10 Battery Power		333	Call-In Trigger Type	No Call-In 🗸	
To Battery Power		1230	Call In Sequence	No Call-In	
11 Pulse Outputs		493	Alarm Call-In Number 1	Alarm Call-In Only	
12 Communications		785	Alarm Call-In Number 2	Scheduled Call-In Only	
		339	Sched Call-In Number 1	Alarm and Scheduled Call-In	
13 Call-In		1030	Sched Call-In Number 2		
14 Call Out Windows		334	Scheduled Call-In Date	01-01-01	MM-DD-YY
15 Date & Time Config		335	Scheduled Call-In Time	09:00:00	§
		847	Next Sched Call-In Date	01-01-01	MM-DD-YY
17 LCD Scroll List		846	Next Sched Call-In Time	09:00:00	S
18 Audit Trail Log Configuration		845	Last Sched Call-In Date	01-01-01	MM-DD-YY
		844	Last Sched Call-In Time	09:00:00	

• Corrected Volume # of digits: item-90, 97

Uncorrected Volume # of digits: item-92, 97

These values should be match with the "**No. of Dials field**", in **UNIT** configuration in PowerSpring input configuration.

101 Site Information	► Î	102 \	/olume & Energ	у			
102 Volume & Energy	•		Item Number	Description	Value		Unit
			000	Corrected Volume	0000000		CCF
103 P1 Pressure	►		002	Uncorrected Volume	0000		m3x10
104 P2 Pressure	▶		043	Total Correction Factor	194.6025		
106 P4 Pressure	•		046	Aux Correction Factor	200.0000		
			1188	Vol Conversion Method	Press + Temp + Super	*	
107 Temperature	►		113	Hi Res Cor Vol	0.0000		CCF
108 Suprcompress			892	Hi Res Unc Vol	0.0000		m3x10
109 Flow & Dial Rates			090	Cor Volume Units	CCF	•	
			096	Corr Vol # of Digits	8 Digits	•	
110 Battery Power			092	Unc Volume Units	m3x10	•	
111 Pulse Outputs	►		097	Unc Vol # of Digits	4 Digits	-	
112 Communications	▶		098	Meter Index Rate	1000 M3	•	
			114	Meter Scaling Factor	1000000	_	

View / Edit					
Configure by Group	Configure by Item	Send It	em File   Log	ging Configuration   Manage I	Jser Table   Manage Shortlist   Ma
101 Site Information	►	102 V	olume & Energ	ах	
102 Volume & Energy	►		Item Number	Description	Value
			000	Corrected Volume	0000000
103 P1 Pressure	►		002	Uncorrected Volume	0000
104 P2 Pressure	►		043	Total Correction Factor	194.6025
106 P4 Pressure	▶		046	Aux Correction Factor	200.0000
			1188	Vol Conversion Method	Press + Temp + Super 🔹
107 Temperature	►		113	Hi Res Cor Vol	0.0000
108 Suprcompress	►		892	Hi Res Unc Vol	0.0000
109 Flow & Dial Rates			090	Cor Volume Units	CCF •
ios i lon a Dial Rates			096	Corr Vol # of Digits	8 Digits 👻
110 Battery Power	▶		092	Unc Volume Units	m3x10 •

# 7 Remote Communications

This chapter describes the different communication mechanisms featured in a EC350 device.

- Use of RS232/ 485
- Call in and call out
- Modbus Host Communication

CHAPTER 7

## 7.1 Use of RS232/485

#### Application

EC350 is capable of communicating with a number of types of external devices, such as cellular or landline modems, and RTUs. EC350 supports the following protocols: MI Protocol, Modbus RTU, Modbus ASCII. The description of those protocols is beyond the scope of this manual, although a basic discussion of Modbus operation is presented later in this chapter. This section describes the physical connections and instrument configuration parameters that are required.

#### Connections

Wiring connections are made to TB4, see below:



For RS-232, only 3-wire communications is supported: pin 1 TXD (Transmit Data), pin 2 RXD (Receive Data), and pin 5 GND (Ground). (The TB4 RTS/CTS connections are not used.) TXD and RXD are labelled as a DTE device (EC350 transmits on TXD).

For RS-485, use TB4 pin 1 (TXD) as line A, pin 2 (RXD) as line B, and pin 5 (GND) as Ground.

The RS-232 and RS-485 standard specifications should be consulted for the proper wire type, maximum cable length, etc.

#### Jumpers

In addition to wiring, jumpers on JP1 and JP2 must be properly positioned. For RS-232, both jumpers must be set to B and C as shown in the picture above. They must be placed on A and B for RS-485.

#### **Configuration Parameters**

EC350 items in the 'Communications' group in MasterLink Software Application may need to be modified to accommodate a particular external device.

Communicatio	ons			
F <u>i</u> lter:				
Number	Description	Value	Units	<u>C</u> hange
170	Protocol Code A	No Errors		
172	Wait for SN Timeout	25	Second(s)	Print
272	Serial Baud Rate	9600		<u> </u>
995	Serial Comms Format	8/N/1		
1220	Serial Port Type	RS-232		<u> </u>
				Close

Items 170 and 172 are primarily associated with the behavior of MI Protocol. These should normally left as default (shown here). The remainder will vary depending on the external devices. See also Modbus section below for settings relevant to the Modbus protocol.

# 7.2 Call in and call out

- <u>Call in</u>
- <u>Call out</u>

# 7.2.1 Call in

EC350 has the capability to initiate a modem to modem telephone call. This is called call in and can happen under two circumstances.

- Alarm Call-In
- Scheduled Call-In.

### 7.2.1.1 Call in

When connected to either a cellular or landline modem the EC350 can be configured to autonomously dial and connect to a host computer. It can do this according to a preset schedule or in the event of an alarm condition. Previous Mercury Instruments products have incorporated similar features, but the EC350 is unique in its support of four phone numbers (or IP addresses); two for scheduled calls and two for alarms. This provides the ability to communicate with four different hosts. In turn, this feature leads to some differences in the retry algorithm. Call in configuration items are:

Filter:				
Number	Description	Value	Units	Change
1230	Call In Sequence	Priority	SLOCE A	
333	Call-In Trigger Type	Alarm and Schedule		Print
491	Modem Init String	ATE0V0		
492	Modem Dial String	ATDT		
494	Modem Hangup String	ATH0		Eind
495	Modem Retry-A Interval	5	Minute(s)	
496	Modem Retry-B Interval	1440	Minute(s)	Close
336	Call-In Retry By:	Host		
497	Modem Retry-A Count	0		
821	Modem Init Delay	50	Second(s)	
405	Call-In Dialing Delay	5	Second(s)	
493	Alarm Call-In Number-1	198.198.198.1		
785	Alarm Call-In Number 2	198.198.198.2		
339	Sched Call-In Number-1	198.198.100.1		
1030	Sched Call-In Number-2	198.198.100.2		
334	Sched Call-In Date	07-14-15		
335	Sched Call-In Time	15 33 00		
338	Sched Call Unprocessed	No		
337	Last Mdm Call-In Result	No Call Attempted		
487	Call-In Keep Alive Time	5	Minute(s)	

Modem items are shared between the scheduled and alarm call in features. If the modem requires an initialization string it must be set into item 491 along with an Init Delay (Item 821). The initialization delay is applied so that the modem, having just been powered up, has a chance to stabilize before being sent the initialization string. A dial prefix must be configured in item 492 and a hangup string in 494. The Dialing Delay will take place following the issuance of the initialization string. Call in sequence, Trigger Type and retry parameters are also shared between scheduled and alarm calls. Those will be discussed later.

### 7.2.1.2 Scheduled Call In

The EC350 can initiate a call at a preset time. The time may have been manually specified, but on an ongoing basis the host(s) is responsible for the schedule. At the end of each call the host is must set item values that determine when the next call is to take place. That time will always be contained in items 334 and 335. Items 338 and 337 indicate the result of the latest call ( or call attempt ). If only one host exists, its phone number is set in item 339. If a second host exists, its number is set in item 1030. To

enable scheduled call in, at least phone number must be configured and item 333 must be set to either Alarm and Scheduled Call In or Scheduled Call In Only.

# 7.2.1.3 Alarm Call In

If alarm call in is configured and enabled, a call will be initiated whenever a new alarm occurs or, if in RBX mode, an alarm condition clears. This requires a phone number in item 493 ( and optionally in 785 ) and item 333 must be set to either Alarm and Scheduled Call In or Alarm Call In Only.

### 7.2.1.4 Force schedule Call

If the Force Schedule Call (i1693) is configured and enabled, and the device does not attempt Schedule Call In (i1693) in configured time for various reasons, the Force Schedule Call initiates Call In with the server.

Note: By default, the Force Schedule Call is configured for 36 hours (2160 minutes).

Note: If the user wants to disable the Force Schedule Call feature, set the item i1693 value to 0.

### 7.2.1.5 Management of Multiple Phone Numbers

If multiple phone numbers are configured, item 1230 determines ( along with the retry strategy ) when and if the second number is called. The setting will affect the behavior of scheduled and alarm calls identically.

#### Call In Sequence = BOTH:

When a call is triggered, the EC350 will dial the first number first. Regardless of whether that call succeeds or fails, the second number will also be called. The BOTH algorithm ensures that both hosts will (eventually) receive notification. If a call to a host fails, it will be retried as many times as necessary until the call succeeds. The two numbers are independent – whatever happens on phone number 1 will not affect phone number 2 and vice-versa.

#### Call In Sequence = PRIORITY:

This algorithm ensures that someone will (eventually) receive notification, and it will be whoever succeeds first. As soon as either one succeeds the process is complete. Some possible sequences are:

1 S. Done.

1 F, 2 S. Done.

1 F, 2 F, 1 S. Done.

1 F, 2 F, 1 F, 2 S. Done.

(where 1 and 2 represent the first and second phone numbers, S denotes success, F denotes failure )

# 7.2.1.6 Retry Timing

Not all call failures are resolved with 'retries'. 'Retries' is defined as the termination of the current attempt and the scheduling of another attempt some minutes or hours hence. In some cases the EC350 may try to resolve the failure immediately. If, for instance, an initialization string is sent to the modem but no positive response is received within several seconds, it will simply send it again. If several initialization attempts fail, then it will be deemed hopeless (for now) and a future retry will be scheduled. The same is true if a dial string goes unanswered. But after a certain point another immediate attempt would be futile and a future retry is scheduled.

There are three retry timing parameters – two delays ( A and B ) and a counter. For any given trigger (schedule or alarm ) the first retry will be scheduled to take place Retry A minutes in the future. Retry A will be used for subsequent retries until Modem Retry A count is exhausted. The next ( and subsequent ) failures will be scheduled at intervals of Retry B minutes. Once the call finally succeeds ( or another trigger occurs ) the counter, and thus the retry sequence, will be reset.

### 7.2.1.7 LCD indications

When a call is triggered, the information on the 2nd and 3rd lines of the LCD will be replaced with messages indicating the progression of the call, such as 'INIT MODEM', 'DIALING #', 'DIAL FAILED', 'CONNECTED', 'WAIT FOR CONN RESPONSE', 'CONNECTED', 'WAITING +-+CLRALMS', and 'HOST SYSTEM CONNECTED'.

### 7.2.1.8 Forcing a Test Call

During initial commissioning as well as subsequent troubleshooting, it is useful to be able to manually evoke a call. This can be done by writing the proper value to item 264: 20139796 will trigger a scheduled call; 20139813 will force an alarm call. The same can be done using the HMI. See the HMI section for details.

# 7.2.2 Call out

The Call Out window (COW) allows EC350 to accept remote communications during one or two blocks of time during the day.

When used with a CNI2 cellular modem, the CNI2 will be set to "server mode" during the call out window (s) so it can accept calls from a host system during those times. The CNI2 consumes more power in server mode, regardless of whether communication occurs.

EC350 can also be kept "awake" during the call out window(s) such that even the initial characters of a communication session are accepted. Otherwise, the initial characters "wake up" the EC350. The MI Protocol includes such wake up characters in its protocol so that this feature is not required for MI Protocol communication. But the Modbus protocol includes no wake-up characters, so this feature can be used so that the EC350 processes the first Modbus packet. Without it, the first packet is not processed and the Modbus host system must send a "retry" packet. More power is consumed during the call out window in this mode, regardless of whether communication occurs or not. To use this mode, in addition to specifying a call out window, set item 1236 (Port Active During COW) to enabled. This mode consumes more battery power but reduces retries on Modbus activity.

There are items for specifying the start and stop times for two call out windows. Set the start and stop times equal to disable a call out window. (Do so for both if they have no call out window.) Times are specified in 24-hour format. The maximum value is "23 59 00". Seconds other than "00" are ignored. The resolution for the times is one minute. No single call out window can be longer than 18 hours, but greater than 18 hours can be achieved by scheduling two call out windows "back to back" (e.g. 00 00 00 - 12 00 00, 12 00 00 - 23 59 00 would effectively give you a call out window for the entire day except one minute before midnight).

The modem will stay active until a stop time is reached or when the current call (if after the stop time) has ended. EC350 goes back to sleep if there is no call out.

- Set Call Out time
- Set a call out stop time

### 7.2.2.1 Set Call Out time

To set a call out start time:

- Establish a serial communication between EC350 and MasterLink Software Application SQL. Refer to the *MasterLink Software Application SQL User's Guide* for information about establishing a serial connection between EC350 and MasterLink Software Application SQL.
- In the MasterLink Software Application SQL window, click Find Item by Number icon. The Find Item dialog box appears.

• Type 1231 and click OK.

The Call Out Times dialog box appears.

Filter.				
Number	Description	Value	Unita	Change
1231	MPC Timer-1 Stat Time	00 00 00		1
1232	MPC Timer-1 Stop Time	00 00 00		Print
1233	MPC Timer-2 Start Time	00 00 00		Find
1234	MPC Timer-2 Stop Time	00 00 00		Eluq

• Click Change.

The Change Item dialog box appears.

- Enter the desired start time and click Save.
- Repeat steps 2 to 5 if you want to change item 1233.

### 7.2.2.2 Set a call out stop time

#### To set a call out stop time

- Establish a serial communication between EC350 and MasterLink Software Application SQL. Refer to the *MasterLink Software Application SQL User's Guide* for information about establishing a serial connection between EC350 and MasterLink Software Application SQL.
- In the MasterLink Software Application SQL window, click Find Item by Number icon. The Find Item dialog box appears.
- Type **1232** and click **OK**.

The Call Out Times dialog box appears.

Filter.				
Number	Description	Value	Units	Change
1231	MPC Timer-1 Stat Time	00 00 00		11.
1232	MPC Timer-1 Stop Time	00 00 00		Print
1233	MPC Timer-2 Start Time	00 00 00		200
1234	MPC Timer-2 Stop Time	00 00 00		End

• Click Change.

The Change Item dialog box appears.

- Enter the desired stop time and click Save.
- Repeat steps 2 to 5 if you want to change item 1234.

# 7.3 Modbus Communication

Modbus is a common industrial communication protocol. The EC350 supports the Modbus protocol (as a slave device) on the TB4 RS-232/485 port as well as the front panel IrDA port. Through the RS-232/485 port it can also be used with modems including Messenger, CNI2, and Cloud Link. Function codes 01, 02, 03, 04, 05, 06, 15 and 16 are supported, in both RTU and ASCII modes.

The Modbus protocol standard defines the format of the data and the techniques used to control the flow of data. It supports one master device and up to 247 slave devices on one bus (although a maximum of 32 slave devices are permitted on an RS-485 network, due to physical layer limitations). The master always initiates a communication exchange. Each slave on a Modbus network has its own unique address (1...247) so that it can be addressed independently from other slaves. This address is sent by the master as part of every message. All slaves on the network see the message, but only the slave with the matching address will respond to the message. A message sent to a slave from the master is called a request, the answer sent back to the master is called a response. Request and response messages are also called packets or frames. The master can also broadcast a message to all slave devices, using a slave address of 0. In that case there is no response.

Modbus configuration items are found in the 'Modbus Protocol' and 'Modbus Map Registers' function groups of MasterLink Software Application :

Filter:				
Number	Description	Value	Units	Change
985	Modbus Enable	0		
994	Modbus Protocol Type	RTU		Print
990	Modbus Device Address	1		Eune
991	Modbus Register Format	32-Bit MSB First		
993	Registers Offset By One	No		<u>F</u> ind
992	Modbus Read-Only Mode	No		

If the external device communicates via Modbus protocol, item 985 must be set to 1. Item 994 will need to be set to the proper Modbus variation, either RTU or ASCII. The correct setting for all of these items will be determined by the external device used.

Modbus registers can be 'mapped' to items in the EC350 via the items in the following group. For example, pressure can be mapped to register 7003 by enabling Float mapping in item 935 and setting item 943 to '8'.

Number	Description	Value	Units	×	<u>C</u> hange
935	Modbus Float Mapping	No			
936	Modbus Boolean Mapping	No		=	<u>P</u> rint
1228	Modbus Integer Mapping	No			
1229	Modbus Long Mapping	No			<u>F</u> ind
940	Modbus Float 7000 Item	255			
941	Modbus Float 7001 Item	255			Close
942	Modbus Float 7002 Item	255			
943	Modbus Float 7003 Item	255			
944	Modbus Float 7004 Item	255			
946	Modbus Elect 7005 Hom	255			

# 8 Maintenance

This chapter lists out the temperatue and transducer related kits. It also includes information on how to remove the HF cover.

- Temperature Probe Measurement Kits
- Transducer Replacement Kits
- Redundant Uncorrected Switch
- Installing Measurement Canada (MC) Sealing Cover
- Removing and Re-Installing Human Factor (HF) Cover

# 8.1 Temperature Probe Measurement Kits

40-5814-KIT	Internal (Rotary ONLY)
40-6008-1-KIT	6" Armored 6' Cable
40-6008-2-KIT	9" Armored 6' Cable
40-6008-3-KIT	9" Armored 30' Cable
40-6007-KIT	3" Pete's Plug Armored
40-6005-1-KIT	2-1/8" Pete's Plug Teflon
40-6005-2-KIT	3" Pete's Plug Teflon 3' Cable
40-6005-3-KIT	3" Pete's Plug Teflon 10 ' Cable
40-6002-KIT	External Teflon
40-6003-KIT	3/16" Sheath Teflon
40-6004-KIT	6" Sheath 6' Teflon Cable

CHAPTER 8



# 8.2 Transducer Replacement Kits

22-2950-1-KIT	6 psig
22-2950-2-KIT	30 psig
22-2950-3-KIT	60 psig
22-2950-4-KIT	100 psig
22-2950-5-KIT	300 psig
22-2950-6-KIT	600 psig
22-2950-7-KIT	1000 psig
22-2950-8-KIT	1500 psig
22-2950-9-KIT	15 psig
22-2950-10-KIT	150 psig
22-2950-11-KIT	200 psig
22-2950-12-KIT	30 psia
22-2950-13-KIT	60 psia

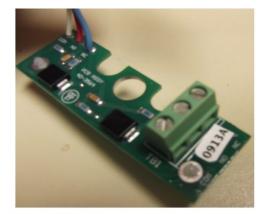
22-2950-14-KIT	100 psia
22-2950-15-KIT	300 psia
22-2950-16-KIT	600 psia
22-2950-17-KIT	1000 psia
22-2950-18-KIT	1500 psia
22-2950-19-KIT	150 psia
22-2950-20-KIT	200 psia

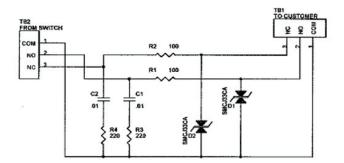


# 8.3 Redundant Uncorrected Switch



NC	Normally Closed	
NO	Normally Open	
СОМ	Common	



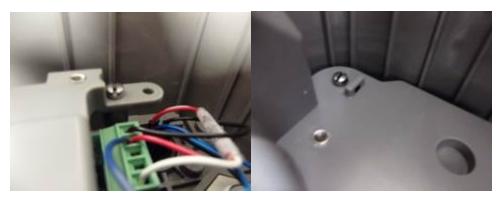


# 8.4 Metrological Sealing Cover (MC)

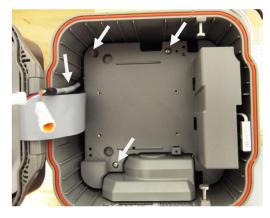
• The following figure shows MC Cover installed with 3 Cross-Drilled security screws at locations indicated by arrows.



• Using sealing wire and lead seal, seal cover at these locations. Run wire through the screw head, and then through the MC cover sealing features.



• Re-install Human Factor cover tightening the screws to 9 +/- 1 in-lbs of torque at these locations. Ensure power cable is routed in the orientation shown for battery connection.



# 8.5 Removing and Re-Installing Modem Mounting Plate



Loosen screws in 3 positions



Remove HF Cover





Route cables in the orientations as shown, before re-assembling HF cover



Tighten screws to 8-10 in-lbs

# 8.6 Replacing the Battery Pack

If your EC350 displays **REPLACE BATTERY**, it indicates that EC350 has gone into a power conservation mode due to low battery voltage.

- Replacing the battery in a hazardous DIV-1/ZONE-0 environment
- Replacing the battery in a non-hazardous environment

# 8.6.1 Replacing the battery in a hazardous DIV-1/ZONE-0 environment

A special operating mode is provided to allow changing of a battery pack in a hazardous location. (If the location is known to be non-hazardous, for example, if the location has been tested for the presence of gas and it has been determined that gas is not present, this section can be skipped. Go to the <u>Replacing</u> the battery in a non-hazardous environment section). The special operating mode puts the corrector in a standby condition in which volume continues to be accumulated and event logging and alarms are still active, but all other functions are stopped to ensure very low power drain. This allows a low power (Swap out) battery (40-6054) to be plugged in while the main battery pack (40-6048) is changed, and then removed after the new battery back is plugged in.

To replace the battery in a hazardous DIV-1/ZONE-0 environment, perform the following steps:

- Enter HMI and set the EC350 to Battery Change mode. You can use the L2.11 or L3.13 HMI menus.
- The BATT CHNG message is displayed on the LCD screen. Press the Enter key.
- Select Yes and press Enter. The unit is now ready for a battery change out. CHNG BATT THEN ESC is displayed on the LCD screen.
- Plug the *Low Power (Swap out) Battery* (part no. 40-6054) into the open connector on the battery Y cable.
- Unplug the old battery.
- Plug in the fresh battery (part no. 40-6048) where the old battery was plugged in.
- Remove the Low Power (Swap out) Battery
- Press the **ESC**key twice to exit the battery change mode. When the **ESC** key is pressed, all the battery life items are automatically set to 100% new values and the battery usage cycle is set to zero.

# 8.6.2 Replacing the battery in a non-hazardous environment

To replace the battery in a non-hazardous environment, perform the following steps:

- Plug in the fresh battery into the open connector on the battery Y cable.
- Unplug the old battery.
- Reset Battery Life Items to defaults (100% new) by following steps shown below:

- Unlock the keypad and type the PASSCODE to enter level 2 or level 3 menus. Refer to the section "<u>Accessing level 2 mode</u>" for accessing level 2 mode or section "<u>Access level 3</u> <u>mode</u>" for accessing level 3 mode.
- Scroll down in to HMI menu to L2.12 or L3.12 where it displays: "RESET BATT" on LCD and then press the Enter key.
- Press YES key to confirm (see note below).
- EC350 resets the battery usage Items to factory default values: (Item 59 = 0, Item 1001 = 60 mo, Item 1002 = 100%).
- Press ESC until you have exited the HMI.

# 8.7 Low battery/ External Power shutdown mode

EC350 automatically enters a low battery shutdown mode when the battery voltage measurement falls below the value of Item 50 (Battery Shutdown Limit) for three (3) consecutive times.

#### Note: Item 50 Shutdown Limit applies to both Battery Voltage and External Supply Voltages.

While in low power shutdown mode, the LCD displays the following (except if user enters HMI mode):

\_\_\_\_\_

"REPLACE"

#### **"BATTERY"**

To **exit** Low Power Shutdown, the Battery voltage must be above the Item 50 limit value and the user must enter HMI mode. User enters HMI and menus down arrow to the screen showing: **SHUTDOWN** - HMI menus: L2.10 or L3.12. Next, the User presses Enter key and display will show: 'ENTER MODE' as first selection. Arrow down to '**EXIT** MODE' selection. User again presses the Enter key to confirm – the unit leave (exit) Shutdown/Shelf mode. When the User exits the HMI menus – the LCD will then return to normal default screen.

Refer to the table below to see which functionality is limited or blocked in low battery shutdown mode.

Functionality	What Happens
Pressure measurement	Stopped
Temperature measurement	Stopped
Supercompressibility calculations	Stopped
Battery measurements	Stopped
External Supply measurements	Stopped
Volume	Calculates volume input using PTZ factors from before entering Shutdown mode
Pulse Outputs	No output pulses sent. Items 5 to7 continue to update per new volume input and will be sent only after exiting Shutdown mode
Alarm Output	No Alarm output signal is sent. If pending, it will be sent only after exiting Shutdown mode
IrDA communications	Stopped
RS-232/485 communications	Stopped

Functionality	What Happens
Scheduled / Alarm Call-in	Stopped
Date and Time	Continues to update as normal
Audit Trail logging	Stopped

Refer to the table below to see which functionality is not blocked in shutdown mode.

Functionality	What Happens
Alarm logging	Runs as normal. However it is unlikely to have any alarms
Event logging	Runs as normal
HMI Menus and Scroll List	Active- No live readings are taken

# 8.8 User Shelf/ Shutdown mode

The EC350 can be placed in to a User Shelf / Shutdown mode to take it out of service for extended periods of time. This mode is useful to conserve battery life when the instrument is not in use. In this mode **EC350** conserves battery energy by limiting most of its normal functionality while preserving data and keeping time.

You can enter user shutdown mode using:

- HMI menu levels 2 or 3
- MasterLink Software Application SQL
- To enter user shutdown mode using HMI mode 2 or 3
- To enter user shutdown mode using MasterLink Software Application SQL

# 8.8.1 To enter user shutdown mode using HMI mode 2 or 3

- Unlock the keypad and type the PASSCODE to enter level 2 mode or level 3 mode Refer to the section "<u>Accessing level 2 mode</u>" for accessing level 2 mode or section "<u>Access level 3 mode</u>" for accessing level 3 mode.
- By default, the following appears on the display.
   MAIN MENU

#### ALARMS

- Using the UP arrow and DOWN arrow scroll through the options in level 2 mode or level 3 mode until SHUTDOWN appears.
- Press **OK**. The following appears on the display. ENTER MODE
- Press OK to confirm.
   EC350 enters shutdown/shelf mode.
- Press ESC to exit HMI mode 2 or 3.

# 8.8.2 To enter user shutdown mode using MasterLink Software Application SQL

- Establish a serial communication between EC350 and MasterLink Software Application SQL. Refer to the *MasterLink Software Application SQL User's Guide* for information about establishing a serial connection between EC350 and MasterLink Software Application SQL.
- In the MasterLink Software Application SQL window, click Instrument > Shutdown.
- Click Yes.

Functionality	What Happens
Pressure measurement	Stopped
Temperature measurement	Stopped
Supercompressibility calculations	Stopped
Battery measurements	Stopped
External Supply measurements	Stopped
Volume	Volume input fully disabled
Pulse Outputs	Output pulses disabled
Alarm Output	NoAlarm output signal is sent. If pending, it will besentonly after exiting Shutdown mode
IrDA communications	Stopped
RS-232/485 communications	Stopped
Scheduled / Alarm Call- in	Stopped
Date and Time	Continues to update as normal
Audit Trail logging	Stopped

Refer to the table below to see which functionality is not blocked in User Shelf mode.

Functionality	What Happens
Alarm logging	Runs as normal. However it is unlikely to have any alarms
Event logging	Runs as normal

Functionality	What Happens
HMI Menus and Scroll List	Active- No live readings are taken