MS3620E

High Resolution ER Data Logger – Bluetooth

Operator's Manual
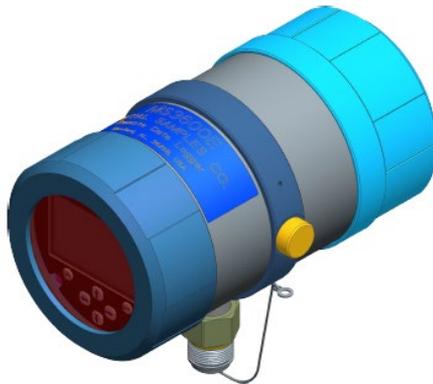
Table of Contents

I. Introduction

A. General Description

The MS3620E is a battery powered, corrosion meter capable of measuring and storing data from all types of electrical resistance (ER) corrosion probes. The instrument is light weight, microprocessor-based, and features a simple, menu-driven interface using a keypad and a graphical LCD display.

Corrosion rate measurements are made using the electrical resistance method. Essentially, the instrument measures the resistance of the probe element which changes over time, as metal loss occurs. The rate of change is directly proportional to corrosion rate. This method finds a wide variety of applications since it can be used in conductive and nonconductive environments such as petroleum, chemical, water, soil, or even atmosphere. The new high-resolution measurement of the MS3620E detects smaller increments of metal loss, providing faster response than traditional ER instruments.

After taking a reading, the instrument displays metal loss in mils. All stored readings are automatically time and date stamped. Readings are stored to non-volatile Flash memory which retains data without the need for a battery backup.

The MS3620E High Resolution ER Data Logger can store more than 100,000 readings. Stored data can be downloaded to a Bluetooth compatible device via Bluetooth. Data can be opened and charted using the provided CDMS software, or can be imported into any standard data analysis (spreadsheet) program such as Microsoft Excel. Data can also be reviewed and charted on the instrument's LCD display for quick reference.

B. Principles of Operation

The MS3620E High Resolution ER Data Logger operates on the Electrical Resistance (ER) technique and is used in conjunction with an ER probe. The ER probe utilizes a resistive sensing element manufactured from the material of interest (or a close approximation) which is exposed to a corroding environment. This is called the Exposed or Corroding Element. The resistance of the Exposed Element is directly related to its thickness, so as the element corrodes the resulting loss of metal causes a proportional increase in the element's resistance. The probe also contains an internal Reference Element which is used to compensate for the influences of temperature on the Exposed Element.

The MS3620E High Resolution ER Data Logger is designed to work with any standard ER probe, but it is recommended that Cylindrical and Large Flush type probes be used to ensure optimum performance. Their physical design places the Reference Element in closer proximity to the Exposed Element compared to other probe types, providing more effective temperature compensation and thus reducing the effects of thermal noise.

Because they are designed to corrode, ER probes are sacrificial in nature. Each ER probe will have a finite life that is based on the element thickness. ER probes are available in a number of geometries and thicknesses designed to suit a wide variety of applications. Table 1 lists the common ER element options available from Metal Samples and the effective life of each.

Element Type		Compatibility	Thickness	Probe Life (Span)
	Tubular Loop	Compatible	4	2
			8	4
	Wire Loop	Compatible	40	10
			80	20
	Flush (Small)	Compatible	4	2
			8	4
			20	10
	Cylindrical	**Preferred**	10	5
			20	10
			50	25
	Flush (Large)	**Preferred**	5	2.5
			10	5
			20	10
			40	20

Table 1. Standard ER Probe Elements

The MS3620E High Resolution ER Data Logger measures an ER probe utilizing a high-resolution, 16-bit measurement. This allows the unit to detect much smaller amounts of metal loss, thus responding faster to corrosion events and upsets. At 16-bit resolution the MS3620E ER Data Logger can measure metal loss amounts as small as 0.004% of the probe life. For highly sensitive probes such as the 5-mil large flush shown above, that results in a detection limit of less than one angstrom.

C. Technical Specifications

Model
MS3600E - Basic Model
MS3610E - Basic Model + 4-20mA Current Loop Output
MS3620E - Basic Model + Bluetooth

Physical Data

Instrument Weight (w/ boot):	5.75 lbs. (2.61 kg)
Total Weight w/ Case & Accessories:	7.75 lbs. (3.52 kg)
Instrument Dimensions:	12.00"H x 5.55" W x 7.61" D (30.48cm x 14.10cm x 19.33cm)
Case Specifications:	NEMA 4X / IP66 - stainless steel
Mounting Specifications:	Direct probe Mount
Operating Temperature:	-40° to 158°F (-40° to 70°C)
Storage Temperature:	-40° to 185°F (-40° to 85°C)
Operating Humidity Range:	30% - 95%

Performance Data

Measurement Type:	ER measurement using any standard ER Probe Types Preferred Probe Types: Cylindrical, Flush Compatible probe types: Tube Loop, Wire Loop, Flush , Strip, etc.
Range:	0 - 65,535 probe life units (displayed as 0.00 to 1000.00 PLU's in 0.04 increments)
Resolution:	0.0015% of Probe Life
Repeatability:	± 0.2% of Full Scale

Electrical Data

Power Requirements:	7.2V lithium Battery pack
Nominal Probe Cable Distance:	30 ft. (10 m)
Download Method:	To certified Bluetooth enabled devices

Hazardous Location Certifications – Intrinsic Safety
See Appendix B

Included Accessories
Meter Prover, Operation Manual, Corrosion Data Management Software

Optional Accessory Items (Ordered Separately)
Certified Data Transfer Unit (required for transferring data in a hazardous area)

II. Start-up and Operation

A. Receiving the MS3620E High Resolution ER Data Logger

Check the MS3620E High Resolution Data Logger for any shipping damage when it is first received. When the unit is unpacked, verify that the following items are included:

- Data Logger
- Battery Pack
- Meter Prover
- User's Manual

In the event of shipping damage, quantity shortage, or missing items, it is recommended that the event is documented immediately and that digital photographs are taken. Any shortages or missing items should be reported to Metal Samples immediately. In the event of shipping damage, a claim should be opened with the responsible carrier.

B. Start-Up

CAUTION: Using this product in any way other than that specified within this manual may impair the intrinsic safety protection.

Start-up of the MS3620E Data Logger involves the following steps:
1. Port Details and Probe Connection
2. Power-Up
3. Setup and Operation

1. Probe Connection
When selecting a location to mount the data logger it is important to consider the surrounding environment. To ensure proper operation:

- Do not mount the transmitter in a location that exceeds its operating temperature.
- Avoid mounting the transmitter near sources of strong electrical noise.
- Ensure that there is sufficient clearance for installation and to open the transmitter cover afterwards.

a. Direct-Probe Mounting

The MS3620E Data Logger is designed for direct-probe mounting which eliminates the need for additional hardware and transmitter-to-probe cabling. This greatly simplifies installation, reduces costs, and minimizes electrical noise that can be coupled onto probe cabling from nearby electrical equipment.

Before mounting the MS3620E Data Logger, first ensure that the probe is installed properly and securely. During installation, it is important that you do not apply excessive force on the probe or seals, as doing so could break the seal and result in system leakage.
To mount the MS3620E Data Logger:

1. Align the keyways of the data logger and probe connectors.
2. Insert the data logger connector plug fully into the probe connector receptacle.
3. Secure the data logger to the top of the probe by tightening the coupling nut.

NOTE: Hand-tight is sufficient. Do not over-tighten the coupling nut.
NOTE: Never force the connectors to mate. If there is resistance, stop and check for bent pins on the probe and for foreign material in the female sockets of the transmitter connector. Gently straighten any bent pins and clear any foreign material that may be found.
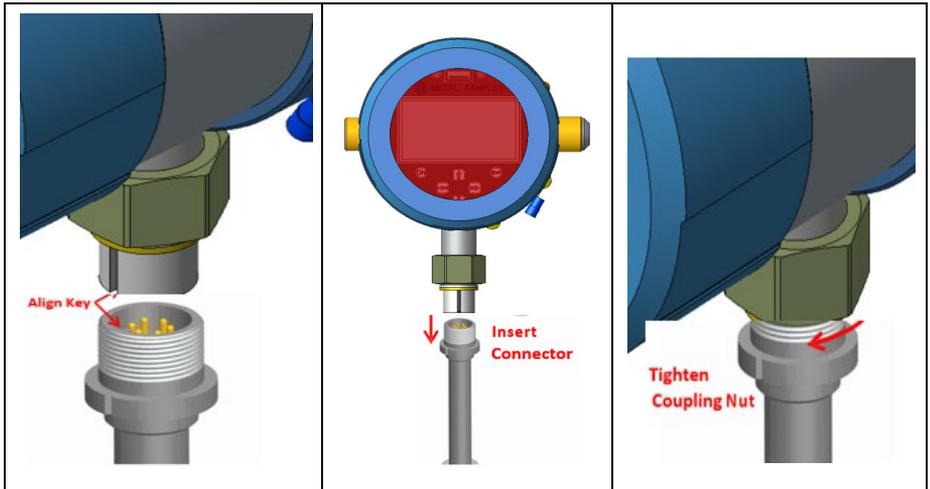
b. Remote Mounting

When it is not practical to direct-probe mount the MS3620E data logger, the unit can be remote mounted instead. In this case, the instrument is mounted to a separate mounting pole using the optional Remote Mounting Hardware Kit. The transmitter is then connected to the ER probe via the optional probe extension cable. When possible, the transmitter should be mounted within 10' (3m) of the probe to keep the probe cabling short and minimize signal degradation.

2. Power-Up

The unit is supplied with a battery pack in a separate package. Install the battery pack and power up the unit by pressing the 'ON' button on the keypad. The start-up screen with the Metal Samples logo will appear on the screen; the start-up screen confirms the software version currently running and the SD card status. The keypad layout is shown below.

Display Window

Power On Button   Menu / Enter Button
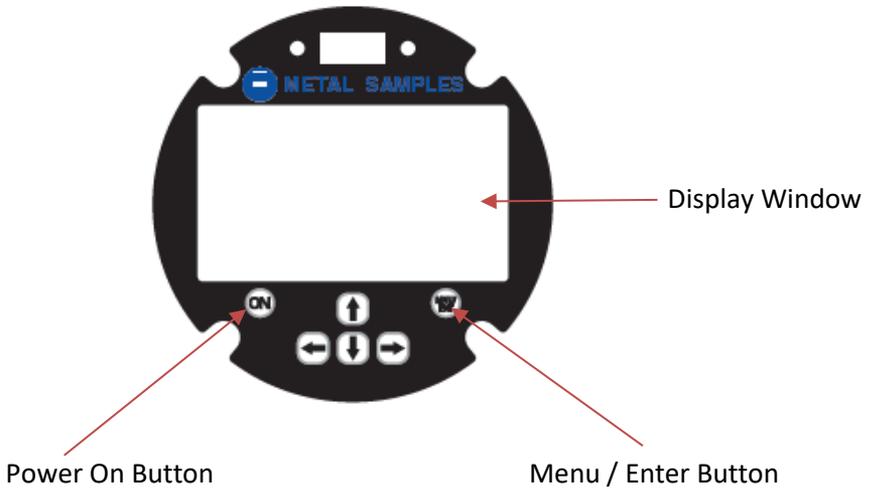
a. Safe Area Usage
The MS3620E High Resolution Data Logger is approved for use in hazardous areas, but can be used in non-hazardous areas as well.

The cells in the battery pack must be replaced only in safe areas and it should be replaced with the same make and model.

b. Hazardous Area Usage
Refer to Appendix B for details.

c. Battery Replacement

The battery compartment is located on the back of the instrument.
You must first remove it to access the battery compartment.
To replace the batteries, first loosen and remove the cover screw,
then remove the battery cover to expose the batteries. Remove
the old batteries and replace them with two new batteries of the
same type, being sure to follow the polarity (+/-) symbols in the
battery compartment. Replace the battery cover and cover screw.

WARNING:
- *Do not mix old and new batteries. Equipment is intended for use only with Xeno Energy model XL-205F and Tadiran model TL-5930 cells. Use of any other battery in this device may impair intrinsic safety.*
- *Do not mix batteries of different types (such as alkaline and lithium.)*
- *The cover screw is used to prevent unauthorized tampering of the batteries and is required to ensure intrinsic safety.*
- *Do not over-tighten the cover screw, as this may damage the instrument case.*

SCALE 0.438
(BACK COVER REMOVED
FOR CLARITY)
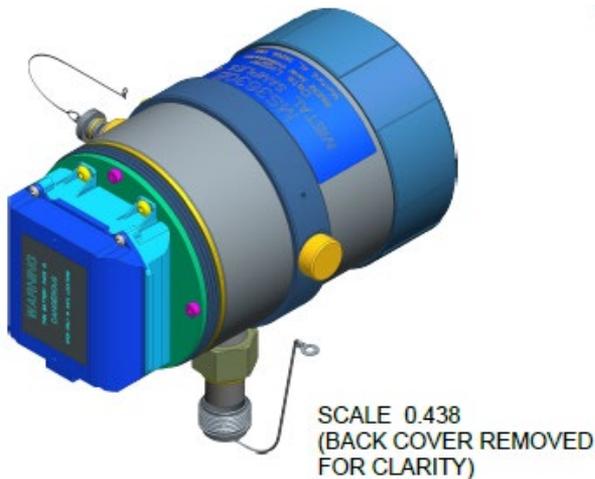
C. Setup and Operation

MAIN MENU
The MS3620E allows you to measure metal loss and
corrosion rate. Start-Up display:

```
┌─────────────────────────────────────┐
│                                      │
│           METAL SAMPLES              │
│                                      │
│   Unit ID: 0000000001                │
│   Data (PLU): 32075                  │
│   Metal Loss: 4.89 mils              │
│   CR: 21.141685 mpy                  │
│   PID: 9991                          │
│   TYPE: WIRE        PL:10.00         │
│   08/28/18  16:10                    │
│                                      │
└─────────────────────────────────────┘
```
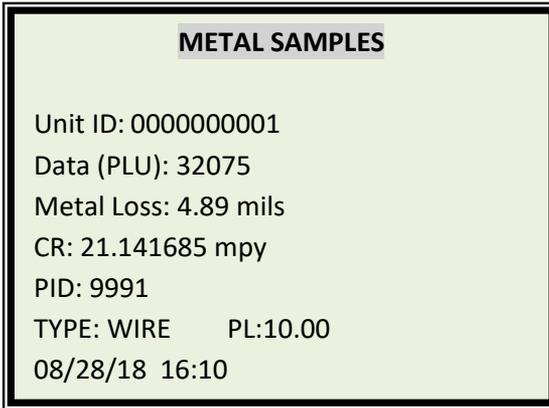
The Start-Up display shows the recent probe data in probe life units
which is from 0 to 65535 and Metal loss in mils.
Probe ID, Type and Probe Life also displays at the bottom of the
screen. Current date and time display on the last line.
Press the 'MNU/ENT' key on the keypad to display the menu screen.

Review this section which describes the functions that display on the Main Menu.
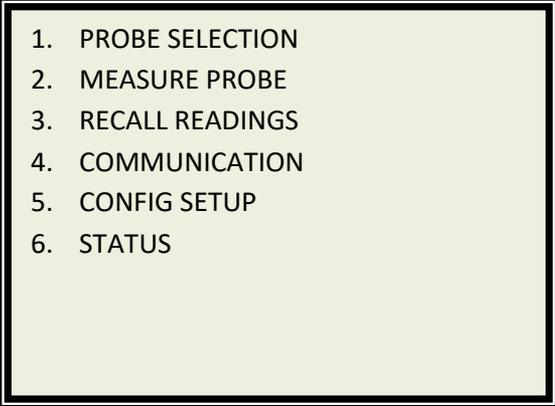
```
1.   PROBE SELECTION
2.   MEASURE PROBE
3.   RECALL READINGS
4.   COMMUNICATION
5.   CONFIG SETUP
6.   STATUS
```

Select the functions by using the up or down arrow and pressing the 'MENU/ENTER' key. Pressing '<-' will return the selection to the previous screen.

1. PROBE SELECTION

The display will show as below if you select the 'PROBE SELECTION' menu from the Main Menu. You can enter a new probe, delete a probe, or select an existing probe from this section.

```
            PROBE SELECTION
    1.  ENTER NEW PROBE
    2.  DELETE EXISTING



    9991    ,WI,10.00 – A
    9992    ,TU,10.00
    9993    ,CL,10.00
    9994    ,HS,10.00

```
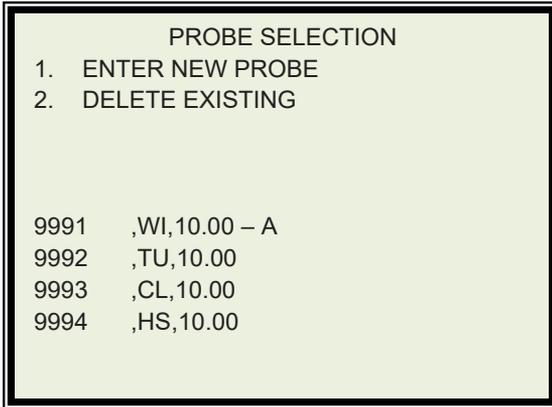
a. ENTER NEW PROBE

To enter the ID of a new probe, select the 'ENTER NEW PROBE' menu by using the arrow keys and pressing the 'MENU/ENTER' key. The next screen allows you to enter the ID number and the type.

1. Enter the Probe ID using the Up/Down arrow keys. (Use the Up/Down arrows to scroll between alphanumeric characters. Use the Right/Left arrows to advance to the next character or go back to the previous character.) When a 7-digit Probe ID is entered the cursor automatically advances to the Probe Type field.
2. Use the Up/Down arrows to select the Probe Type. Use the Right arrow to advance to the Probe Life field.
3. Enter the Probe Life using the up/Down arrow keys.
4. Press ENTER.
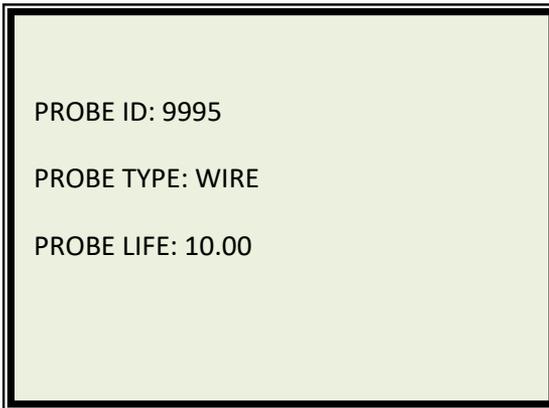
PROBE ID: 9995

PROBE TYPE: WIRE

PROBE LIFE: 10.00

---

b. SELECT EXISTING PROBE

To assist you with selecting a probe ID, the screen displays a list of four probe IDs currently in memory (on the Probe Selection menu).

Select from the list of probes in memory the one for which you wish to run a function by using the Up/Down arrow keys and pressing the 'MNU/ENT' key. (Make Measurement, Recall Readings, and Delete Readings). Current selected probes /active probes will be displayed with 'A' symbol at the end of the probe ID line.

c. DELETE EXISTING PROBE

It is occasionally necessary to remove the ID of a probe from memory, for example:

- o   When the memory bank is full
- o   When a probe is no longer used

To delete the ID of a probe in memory, select Probe Selection Menu from the Main Menu. Select DELETE EXISTING.

```
                  DELETE EXISTING


   PROBE1, WI,01.00 – A
   PROBE2, FL,10.00
   PROBE3, CY,10.00
```

---
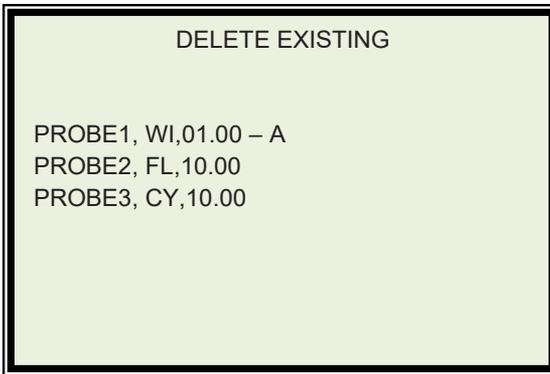
1.   Press the Down arrow to select the probe ID which needs to be deleted.
2.   Press the 'MNU/ENT' key. The selected probe id will be deleted from the memory and display updates with the current memory.

2. MEASURE PROBE

Select a probe before you run the function
In order for you to run 'MAKE MEASUREMENT' & 'RECALL READINGS', you must have already selected a probe from memory. Select 'PROBE SELECTION' from the Main Menu.

To take measurements from probes in memory manually, select 'MEASURE PROBE' from the Main Menu. Please ensure the probe is selected as the active probe before using this function. The display changes as below and starts measuring the probe.

Probe ID, Type and Probe Life of the current measuring probe will be displayed at the bottom of the screen.

```
            2. MEASUREMENT

Measuring..

ID: 9991
TYPE: WIRE              PL:10.00
^: Measure
```
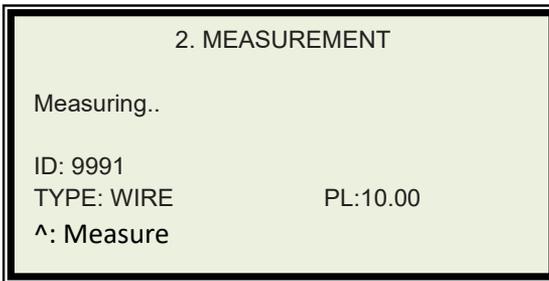
On completion of the measurement the measured values will be displayed as shown below.

```
            2. MEASUREMENT

READING: 32767
M. LOSS: 5.00 mils
CHECK: 803

ID: PROBE1
TYPE: WIRE              PL:10.00
^ MEASURE              ENT: SAVE
```
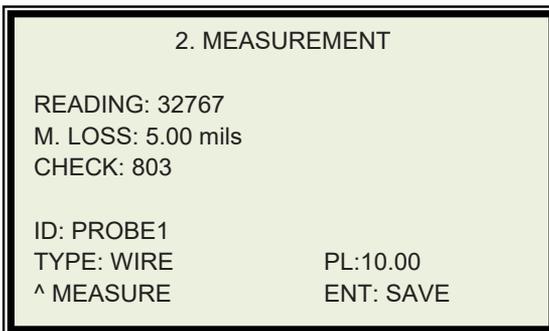
The measured value can be saved permanently by pressing the 'MNU/ENT' key. The probe measurement can be repeated by pressing the 'up' arrow key.

3.   RECALL READINGS

Selecting 'RECALL READINGS' from the Main Menu screen will display the Recall Readings menu with a list of probe IDs.

```
              RECALL READINGS

9990      ,WI,10.00 - A
9991      ,TU,10.00
9992      ,CL,10.00
9993      ,HS,10.00

PRESS ENTER TO SELECT
```
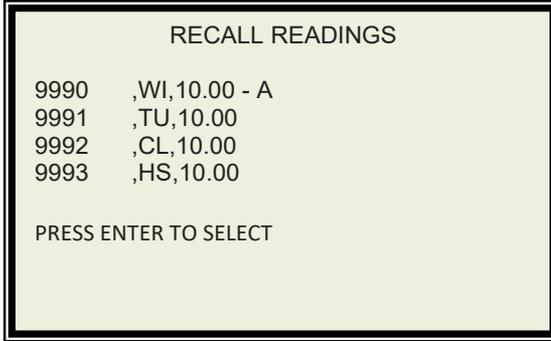
Choose one of the probe IDs from the list and press Enter. The screen will then display the last 7 readings of the probe that was selected.

```
LAST READING..

32025, 08/28/2018, 12:5
32017, 08/28/2018, 10:5
32091, 08/28/2018, 09:5
32091, 08/28/2018, 08:5
32064, 08/28/2018, 07:5
32083, 08/28/2018, 06:5
32007, 08/28/2018, 05:5
```
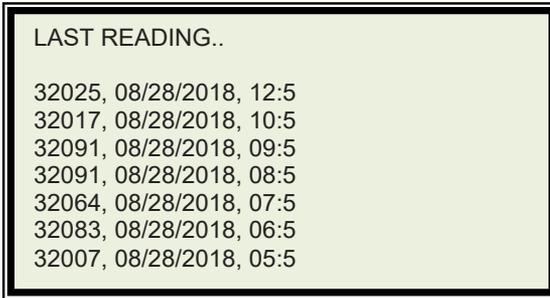
4.   COMMUNICATION

Selecting 'Communication' from the Main Menu screen will display the File Transfer screen as below.

```
                    BLUETOOTH
        1. Sweep mode
        2. Pairing Mode
        3. Power Saving Mode
        4. Initialization
        5. Sweep interval
```
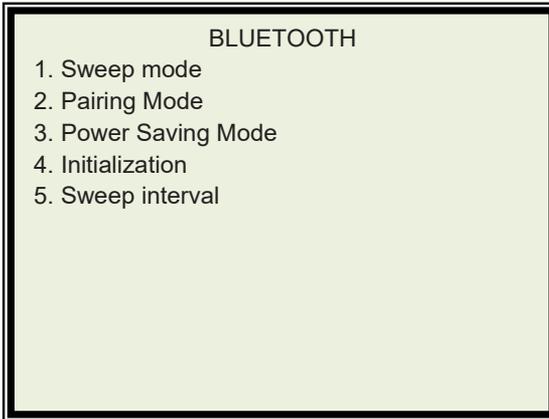
1. Sweep Mode – Selecting sweep mode turns off the unit and puts the unit in Bluetooth sweep mode as per the interval set under 'Sweep interval' menu. Default set interval is 1 Minute. In the sweep mode, the unit looks for scanning Bluetooth host devices at set intervals for 15 seconds and it stays on for more time if 'MSBT' device appears in the scanning list. During this scan time, the Host unit can be connected to the device and can execute BT function as listed Bluetooth functions section. The host device and the instrument needs to be paired before establishing the connection.

2. Pairing Mode – Selecting a pairing mode puts the instrument in pairing session and the instrument scans /looks for the devices with the pairing request and it does the required handshaking data for pairing and stores the pairing info to its memory. Once if it is paired, the device shows 'BT is not connected' until the unit connected to the host.

3. Power Saving Mode – This is the default selection, in this mode the Bluetooth scans only when the unit is powered up and selecting the main screen. This mode is recommended for extending the battery life. Instrument stops scanning if any of the menu is accessed or during measurement interval.

4. Initialization - This is required to reset the Bluetooth settings of the instrument. Do not initialize the settings, if not necessary.

5. Sweep interval – Sweep Interval time enter screen appears; the time can be changed from 1 minute to 5 minutes. Change the time and press enter to register the new time. In the Sweep mode the instrument turns on as per the set time in this interval.

5.   CONFIG SETUP

Select 'CONFIG SETUP' from the Main Menu to set Date & Time, Alarm Time and other settings. The below screen appears with available settings.

```
                    CONFIG MENU

      1.   DATE & TIME
      2.   ALARM TIME
      3.   DISPLAY PWR DN TIME
      4.   UNIT ID
```
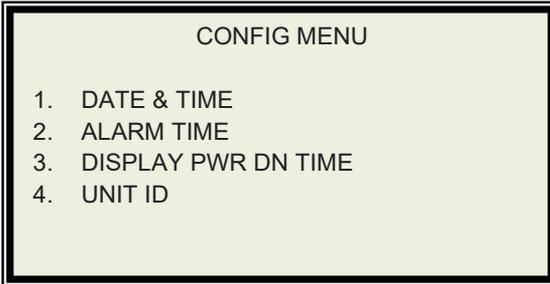
1.   DATE & TIME

Selecting 'DATE & TIME' from the Config Menu screen will display the date and time setup screen. Enter the current date and time using Up/Down arrows and Left/Right arrows.

```
                 SET DATE & TIME



                 08 / 28 / 18 16:07
                 MM/DD/YY HH:MM
```
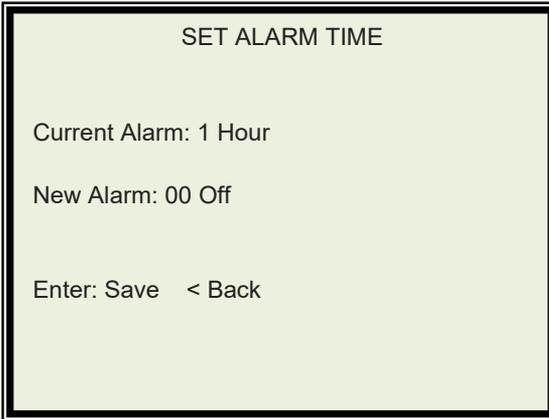
2. ALARM TIME

```
                SET ALARM TIME


Current Alarm: 1 Hour

New Alarm: 00 Off


Enter: Save    < Back
```

Use Right/Left arrow keys to turn on/off the data logging.
Use Up/Down arrow keys to change the data logging interval.
Minimum can be set as 1 Hours and maximum can be set as 99
Days. The unit takes the reading once per the set interval.

3. DISPLAY POWER DOWN
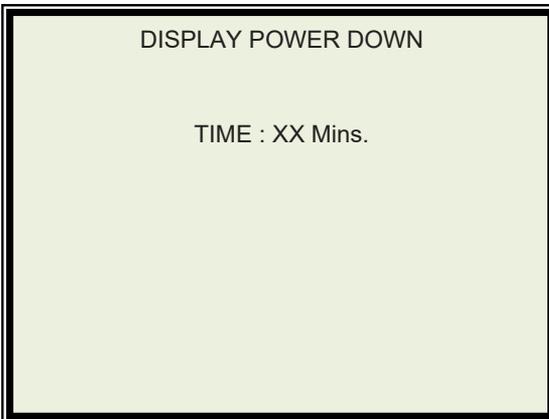
```
            DISPLAY POWER DOWN


                TIME : XX Mins.
```

This is the display power Down Time, if no activity on the unit
for the set period. The time can be set between 1 to 99 minutes.
2 Minutes Power Down time is default. Metal Samples strongly
recommends not to change this value for optimal battery
performance.

4. **UNIT ID**

   Selecting the UNIT ID menu displays the password entry screen. Enter '3333' and press 'MENU/ENTER' button. Use right arrow key to select next digit. The screen changes with the below shown menus.

   ```
   1.   Unit ID Setting
   2.   Alarm Mins. Disable
   3.   Factory Reset
   ```
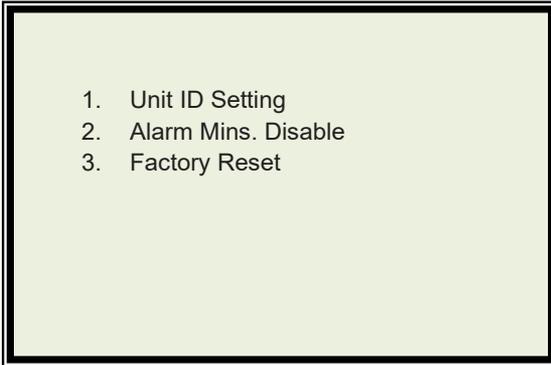
   1. Unit ID Setting → Select this menu and press MENU/ENTER. The Unit ID setting page appears as below. Enter the Required Unit ID. Use right arrow key to enter the next digit. On completion of entry Press 'MENU/ENTER' button. The screen closes and backs to the previous menu screen.

   ```
   Unit ID Setting

   0
   ```
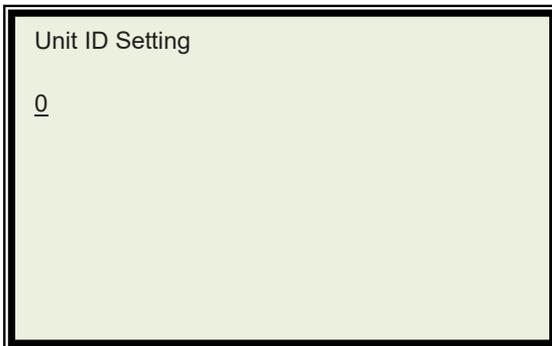
2. ALARM Mins. Disable → This is used for Enabling the alarm measurement in Minutes. Press Right arrow key to enable /disable the alarm time in minutes.
Metal Samples strongly suggests not to enable this feature. Alarm in minutes affects the battery performance.

3. Factory Reset → Select this menu and Press 'MENU/ENTER' for resetting the instrument to factory defaults. This feature deletes all current probes and data and creates default probe.
Use this feature with Caution only when it is absolutely necessary or please contact Metal Samples before using this function.
After Pressing the 'Menu/Enter' button , unit resets all its parameters and turns off. Press Power button again to turn on the machine. This menu will not reset Bluetooth parameters hence please do not use this feature for Bluetooth initialization.

6. STATUS

```
                   STATUS

BAT. VOLTAGE: Normal
INTERNAL MEMORY: OK
FREE SPACE: 7430 MB
SERIAL NO.: 0000106
VER:2096-3620.19.010
```
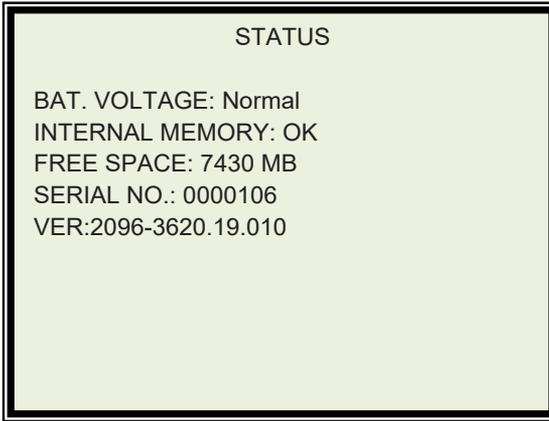
Current battery voltage status displays on the first line.
Internal memory status will be displayed on the second line.
Free memory space will be displayed on the third line in KB.
Unit Serial Number will be displayed on the fifth line.
The firmware revision will be displayed on the last line.

D. BLUETOOTH FUNCTIONS

MASTER: Hand held / Mobile phone / PC

SLAVE: MS3600E

Master initiates communication. Master sends query/command and Slave responds to it.

Functions:

1. Connect
2. Upload config
3. Download config
4. Upload Datafile
5. Measure
6. End Connect

'*' is used as start marker and '#' as end marker.

Description:

Master device should search for available Bluetooth devices and it should pair to the slave namely MS3520X/MS3620X. Pairing pass word is '1234' by default. After successful pairing the device may start sending commands / query.

On a PC, press 'OKAY' if automatic generating code appears on the screen and if it requests validation.

COMMANDS LIST

1. **Connect**: The master initiate communication by sending
   Command → *CO#

   Response → *OK#

   The slave responds with *OK#

2. **Upload Config**: The master requests the salve to send the config file.
   Command → *UC#

   Response → *OK#

   The slave responds with *OK# if it has config file or *ERR# if any issues.
   After the response the data / file transfer takes place.

3. **Download config**: The master requests the salve to receive the config file and save it in its memory.
   Command → *DC#

   Response → *OK#

   The slave responds with *OK# and file transfer takes place.

4. **Upload Data file:** The master requests the slave to send particular data file.
   Command → *UDXXXX____#

   Response → *OK#

   Note: *UDxxxx___ #   where xxxx is the probe ID (Probe ID is 7 digits hence space needs to be entered at trailing order)
   The slave responds with *OK# if the datafile is available or *ERR# if any issues. Then the file transfer takes place if the data file is available.

5. **Measure:** The master requests to take a measurement with current probe ID and send back the result.
    Command → *ME#

    Response → *OK#

    The slave responds with *OK# if an active probe ID is available and starts measurement. As soon as the measurement is over, the slave sends back the result to the master. If no active probe ID is not available the slave responds with *ERR#.

6. **End connect:** The master informs the slave to end of the communication session.
    Command → *EC#

    Response → *OK#

    The slave responds with *OK# and if turns off the slave unit.

E. CONNECTING TO PC WITH BLUETOOTH ADAPTER

1. Press Add device under Bluetooth devices
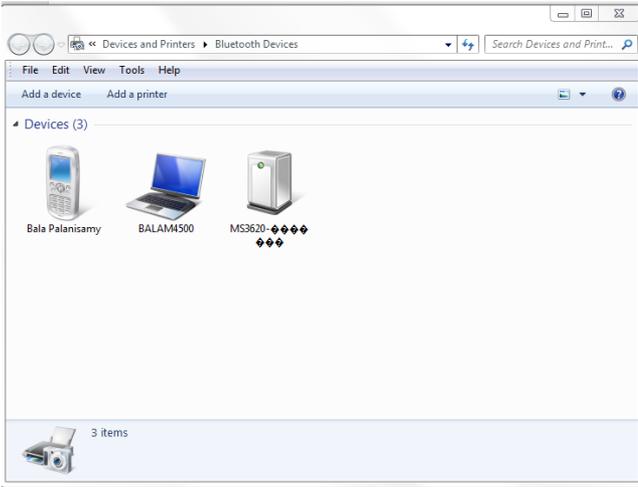
2. 'Select a device to add to this Computer' Pop-Window appears as below. Usually the device appears as MS3620 -XXXX' or 'RNBT-XXXX' under Bluetooth devices. Select the device and press 'Next'
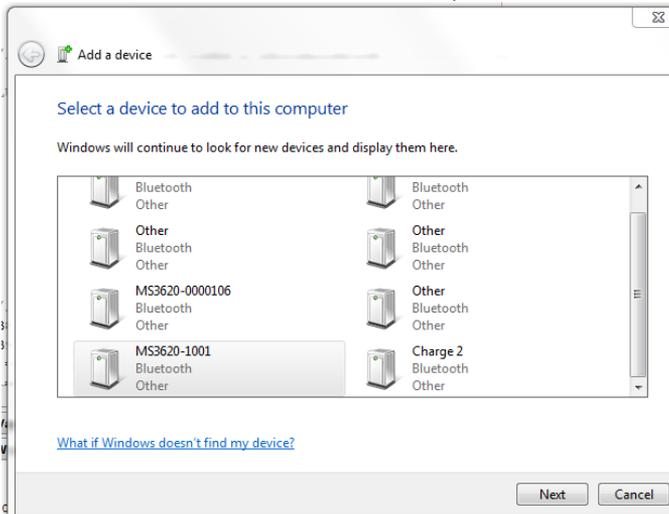
3. The Below Window appears with pairing Code. Select 'Yes' and Press 'Next' button.
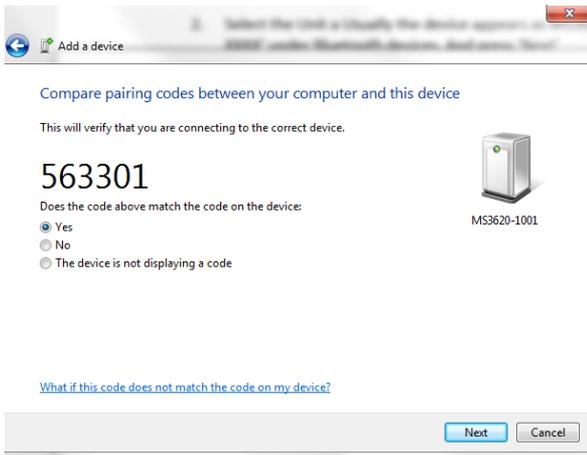
4. 'The device has been successfully added to this Computer' window appears on the screen. Press Close button.
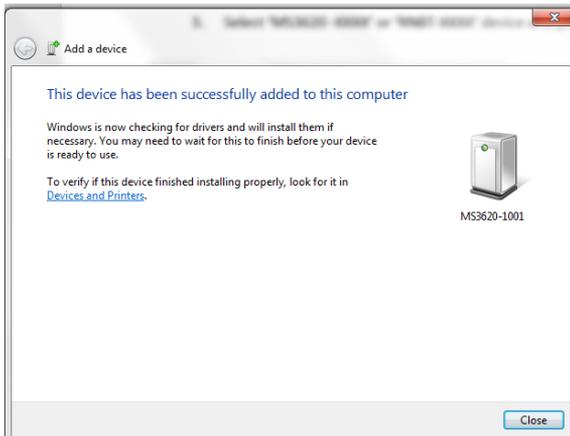
5. Open Bluetooth Devices page. The device which you have added to the computer appears in the window with all other Bluetooth devices.
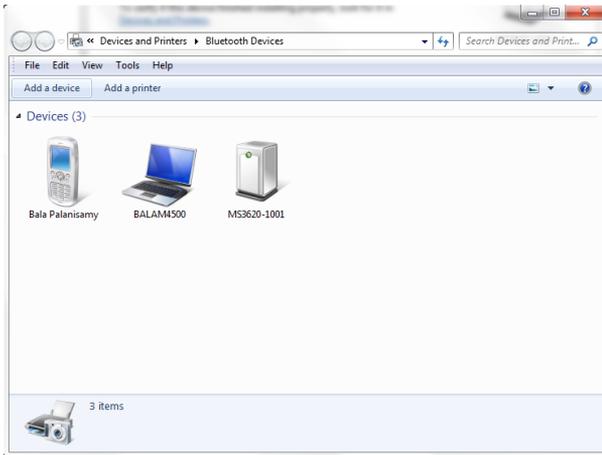
6. Right Click the instrument (device added) and select 'Properties'. Properties page of the device opens. Select 'hardware' tab and check the Name and Communication Port number of the Device.
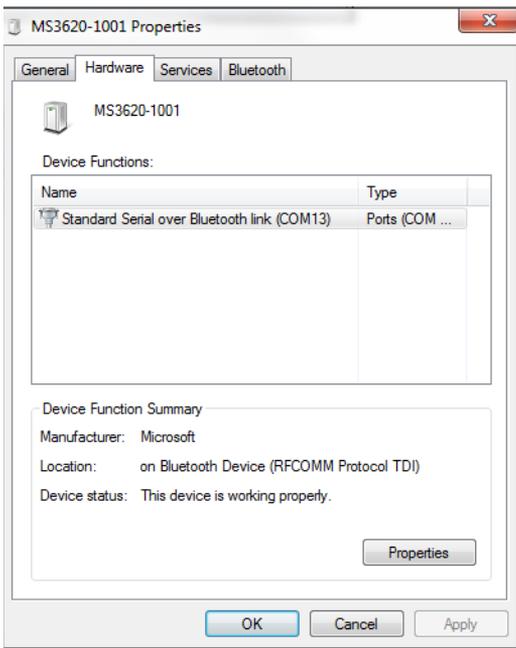
7. Use any Serial Communication Software and Connect the device using the Com Port number noticed on the above window, Data bits as '8' , Baud rate as '9600', Parity as 'None' and Stop bit as '1'. Use the Command sets provided in the Bluetooth commands section and communicate to the device to execute various functions and download data from the device. Example Serial Interface shown below.
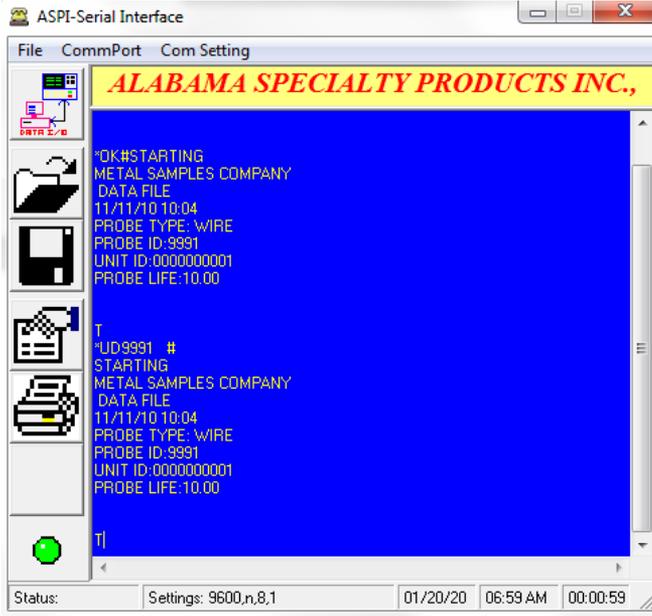
F. ANDROID APPLICATION EXAMPLE

1. For Android Phone Application, search 'Serial Bluetooth Terminal Application' which supports 'Bluetooth LE' and download.
2. Install the Application on your Phone or Notepad.
3. Scan Devices under the Bluetooth devices and add the device to the Phone and pair the device.
4. Open the Application
5. Select menu from the Left top corner
6. Select 'Devices' sub menu
7. Select the device which you have paired
8. The Device tab shows with Green Line
9. Select "Terminal' menu
10. Press Serial connection Symbol.
11. Phone tries to connect to the device and Connected message appears on the screen.
12. Use *CO# command to active the connection
13. 'OK' appears on the screen
14. To download probe data Enter *UD_____# and press enter
15. The data shows on the screen
16. The data can be saved by pressing right menu key and Press 'Data' menu and press 'Save' menu. The data will be saved to the default folder. Folder can be changed under 'Settings' and under 'Misc.' sub menu.
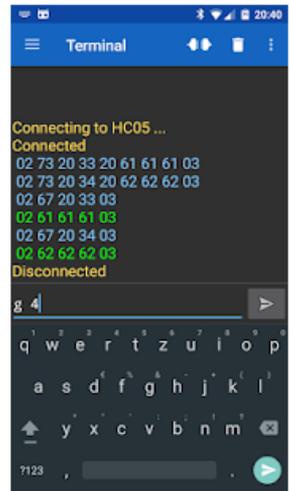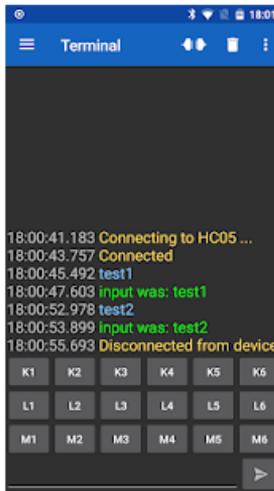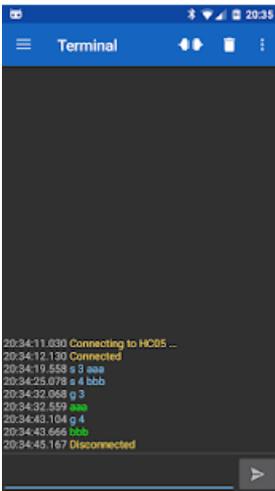
Note: Metal Samples can provide Serial Data terminal Configuration file with macro buttons, contact Metal Samples.

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G. Maintenance

Once installed, the MS3620E High Resolution ER Data Logger requires no maintenance. However, it is important to verify the following items periodically to ensure continued safe operation.

CAUTION: *Before performing any tests or maintenance on the* MS3620E High Resolution ER Data Logger*, ensure that all hazardous area requirements are met.*

Inspection Item	Frequency
Inspect the enclosure for any signs of damage. Return if necessary.	Annually
Inspect the probe cable / connector for any signs of damage. Replace as necessary.	Annually
Replace the Battery pack	As needed

Contact Metal Samples for replacement parts or if instrument repair is necessary.

Testing the MS3620E ER Data Logger with the Meter Prover
A Meter Prover is provided to allow routine checks of the MS3620E High Resolution ER Data Logger. The Meter Prover simulates a Wire Loop type probe at a fixed value. To test the unit with the Meter Prover:

1) Connect the Meter Prover to the probe connector.
2) Turn on the MS3620 data logger by pressing the 'ON' button.
3) Select the probe type as Wire Loop.
4) Select MAKE MEASUREMENT from the Main Menu.
5) Press the 'ENT' button to start measuring the probe value. During measurement the 'MEASURING' message displays on the screen. On completion of measurement the display shows the Meter Prover reading. The output should closely match the value printed on the Meter Prover label.

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If the Data Logger output matches the Meter Prover value, the instrument can be used for probe measurement by selecting the appropriate PROBE ID and connecting to the respective probe. If the Data Logger output shows a significant difference compared to the Meter Prover value, further troubleshooting may be required. Refer to page 34 for troubleshooting or contact Metal Samples for further assistance.

H. Troubleshooting

If the MS3620E High Resolution ER Data Logger does not seem to perform as expected, check the following items:

CAUTION: *Before performing any tests or maintenance on the MS3620E* High Resolution ER Data Logger*, ensure that all hazardous area requirements are met.*

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1. Ensure that the probe is operational and is not completely corroded. This can be done in two ways.
   a. Test the probe with another portable ER meter if available.
   b. Test the probe with a portable resistance or continuity meter as follows:
      i. Connect one test lead to pin 'A' of the probe's 6-pin connector.
      ii. Measure continuity to each of the other pins. There should be continuity (low resistance) to each pin.

NOTE: Continuity on each pin does not ensure that the probe is good. However, if you find an open circuit on any pins then it is almost certain that the probe is bad and should be replaced.

2. Ensure the battery voltage.
3. Test the MS3620E High Resolution ER Data Logger transmitter using the supplied Meter Prover (see page 32.)

These basic checks should indicate the source of any problem (probe, power supply, wiring, etc.). If it is determined that the MS3620E High Resolution ER Data Logger is malfunctioning, or if you need further assistance in troubleshooting, contact Metal Samples Technical Support.

CAUTION: *If the MS3620E High Resolution ER Data Logger shows any signs of damage, remove it from service immediately and consult Metal Samples.*

III. Service and Warranty Information

A. Warranty

Metal Samples warrants that any part of the model **MS3620E High Resolution ER Data Logger** and accessories which proves to be defective in material or workmanship within one year of the date of original shipment to Purchaser will be repaired or replaced, at Metal Samples' option, free of charge. This warranty does not cover (1) probe assemblies, (2) items expendable in nature, or (3) items subject to damage from normal wear, misuse or abuse, or failure to follow use and care instructions.

All damaged items are to be shipped at Purchaser's expense to and from Metal Samples which shall have the right to final determination as to the existence and cause of a defect.

The foregoing shall constitute the sole and exclusive remedy of any purchaser of Metal Samples products for breach of warranty and IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED OR STATUTORY, INCLUDING THE IMPLIED WARRANTIES OR MERCHANTABILITY AND FITNESS. IN NO EVENT SHALL METAL SAMPLES BE LIABLE FOR SPECIAL OR CONSEQUENTIAL DAMAGES, OR FOR ANY DELAY IN THE PERFORMANCE OF THIS WARRANTY DUE TO CAUSES BEYOND ITS CONTROL.

The technical information and suggestions contained herein are believed to be reliable, but they are not to be construed as warranties since conditions of use are beyond our control.

B. Obtaining Service and Returning the Instrument for Repair

If you experience problems with your instrument please contact Metal Samples at 256-358-4202 and ask for customer support for instrumentation. Our customer support department will assist you in troubleshooting your instrument.

Most issues can be resolved over the phone, but in some cases it may be necessary to return your instrument for further evaluation and repair. In this case, please obtain a Return Materials Authorization (RMA) number from the sales person or support technician. This RMA number will ensure that your instrument is routed to the correct department when it is received at the factory.

After receipt of an RMA number you may pack your instrument for return. Be sure to pack your instrument in a sturdy box and to pad it sufficiently to avoid damage during transit. Also be sure to complete the "Instrument Repair Form" on the next page and include a copy with your repair. This will ensure that the repair department has sufficient information regarding the problems you are experiencing with your instrument, as well as the billing, contact, and return shipping details for the repair.

Once you have obtained an RMA number, completed the "Instrument Repair Form", and packed your instrument securely, please ship it prepaid to the following address:

> Metal Samples
> 152 Metal Samples Road
> Munford, AL 36268
> ATTN: RMA# _ _ _ _ _

NOTE: Be sure to list your RMA number in the attention line (shown as blanks in the example above.)

C. Instrument Repair Form

This form may be copied for use when returning an instrument to Metal Samples for repair. Please fill in all known information and enclose a copy of the completed form with the instrument.

General Information

Model Number		Serial Number	
RMA Number		Date of Purchase*	

If known.

Contact Information for Repair

Contact Name		Company	
Phone Number		E-mail Address	

Return Shipping Information

Recipient Name*		Company*	
Return Address			

If different than above.

Reason for Return. (Provide as much detail as possible. Attach additional pages if required.)

Invoice Instructions (For non-warranty repairs)

☐ **Invoice me for the repair**
(Requires an open account with Metal samples.) ⟶ **Reference PO#**

☐ **Contact me for credit card information**
(For security purposes, do not list credit card information on this form..)

Appendix A: Revision History

Revision	Date	Changes
0	01/08/20	Initial release

Appendix B : CERTIFICATION DETAILS

Worldwide and Europe

Ex ia [ia] IIC T4 Ga
-40°C ≤ Ta ≤ +70°C
(When used with Tadiran TL-5930 Cells)
-40°C ≤ Ta ≤ +50°C
When used with Xeno Energy XL-205F Cells

ATEX Cert. No: ITS17ATEX201833X
IECEx Cert No: ETL 17.0020X
X – See special Conditions below

Special Conditions
1. Potential Electro charging Hazard.
2. Only Battery packs allowed to replace in Hazardous areas.

Hazardous Area Installation

CAUTION : This section provides general guidelines for hazardous area wiring. However, regardless of anything stated here, the MS36XXE transmitter must be installed in full compliance with the control drawing provided Annexure-C and all of the local area requirements.

Entity Parameters

at Probe (common for all models)

Uo:	4.94V
Io:	0.85A
Po:	1.05W
Ci:	44.55µF
Li:	0µH
Co:	1.9µF
Lo:	10µH

at J2 Connector (Serial output to Certified handheld equipment)

This is applicable to Model number MS3630E and MS3640E

U_o:	4.94V
I_o:	20mA
P_o:	24.7mW
C_i:	0μF
L_i:	0μH
C_o:	100μF
L_o:	880.0μH

at J3 Connector (4-20 current loop input thru' barrier)

This is applicable to Model number MS3610E and MS3640E

U_i	28V
I_i	93mA
P_i	0.75W
C_i (@28V)	0.054μF
C_i: (@4.94V)	5.59μF
L_i:	0H

CAUTION:

1. When replacing the battery packs in Hazardous area, discharge the static charge from the body using ground strips or other methods.
2. Use gas analyzers or other type of equipment to ensure the area is non-hazardous before changing the batteries. Cells in the batteries not allowed to replace in hazardous areas.
3. Use only with battery pack part # ET1664 or ET1857.
4. Equipment is intended for use only with Xeno Energy model XL-205F and Tadiran model TL-5930 cells. Use of any other battery in this device may impair intrinsic safety.
5. Do not replace cells in the pack unless area is known to be Non-Hazardous.

Appendix C: Control Drawing

Control Drawing (Hazardous Area Wiring Diagram)

NOTE: Some options shown are unavailable at this time.

Appendix D: BLUETOOTH REGULATORY APPROVAL

This Device contains FCC ID: T9J-RN42.

This device complies with part 15 of the FCC rules.

Operation is subject to the following two conditions:

1. This device must accept any interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

This Equipment has been tested and found to comply with the limits for a Class b digital service, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help