



## **Safety Notice** Senscient ELDS™ Open Path Gas Detector

December 4, 2020

**MSA Corporate Center**  
1000 Cranberry Woods Drive  
Cranberry Township, PA 16066  
800.MSA.2222  
www.MSAafety.com

**Dear MSA Gas Detection Customer,**

MSA is issuing this Safety Notice to inform you that MSA has received a field report of frozen 4-20mA outputs on a limited number of Senscient ELDS™ Open Path Gas Detectors.

The report comes from one customer in one application. The customer observed outputs frozen at 4 mA and which did not respond to the presence of gas during a routine response check.

**MSA has not received any reports of injuries associated with this condition. However, we are requesting that you perform the actions outlined in this notice.**

A root cause investigation has determined that detectors at Mod state 2 only may be affected. These were manufactured and supplied between May 2013 and May 15th 2015.

Detectors which meet any of the following criteria are **not** affected:

- Detectors at Mod state 0, 1 or 3 and above.
- Detectors manufactured after May 15th 2015.
- Detectors at Mod state 2 with Comms Firmware version 1.1.35 OR with Device Firmware version 002.008.006 or later.

**Any Senscient ELDS Open Path Gas Detectors at Mod state 2 that are not covered by the above list of exclusions and are included in this Safety Notice. The part numbers for Senscient ELDS Open Path Gas Detectors begin with any of the following letters: L, M, S, XC, XD and XV.**

**MSA is advising all customers to immediately update the device firmware to the latest version for Senscient ELDS Open Path Gas Detectors at Mod state 2, that were manufactured between May 2013 and May 15 2015, that are running a device firmware version that is prior to version 002.008.006.**

**Until this update can be completed, test the device per the instructions in this notice.**



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### **Identifying Devices That Require Action**

The Mod state number of any system is stamped into a dedicated field at the top of the hazardous area certification plate, which is riveted to the terminal enclosure on the back of both the transmitter and receiver.

MSA Senscient has records of the date of manufacture, mod state, comms firmware revision and serial number of all ELDS units produced.

MSA Senscient has reviewed these records and identified the serial numbers of all ELDS systems that are NOT running 1.1.35 comms firmware. Additionally, MSA Senscient has reviewed the list of serial numbers and identified those that have already been updated with device firmware version 002.008.006 or later through MSA Senscient service, repair or field activities.

MSA Senscient knows which customers were supplied with these units and will be contacting the customer to inform them of this Safety Notice and assist, as needed, with any remedial action.

If you have a detector that is at Mod state 2 and want to check whether it is included in this Safety Notice, please contact MSA at the contact information below with the serial number of the device.

### **Addressing Affected Product**

Affected detectors must have their firmware updated as per the instructions in [Appendix A](#) immediately.

If the devices cannot be immediately updated, conduct the test outlined in [Appendix B](#) on a regular basis until the device firmware is updated.

### **MSA Contact Information:**

If you have any questions regarding this Safety Notice, please contact [Nick Walker](#) at +44 (0) 7917 184 286 or [nick.walker@msasafety.com](mailto:nick.walker@msasafety.com).

We apologize for any inconveniences that this may cause; however, your safety and continued satisfaction with our products is important to us.

Best regards,

A handwritten signature in blue ink that reads "Nathan Andrulonis".

Nathan Andrulonis  
Director Global Risk and Product Safety

## **Appendix A: Updating Device Firmware**

### **Requirements**

- Firmware/Updater software pack (supplied by MSA Senscient)
- PC with SITE software already installed
- Unit(s) to be updated must be powered with a reliable power supply; any failure of the power during the process may leave units requiring specialist rectification by MSA Senscient
- RS485/USB adapter and cable (supplied by MSA Senscient)

### **Software Pack Contents**

The firmware updater pack is supplied in a 'compressed' folder (to allow sending via email or file sharing service). The contents of this must be extracted to a normal (i.e. NOT compressed) folder before the updater can be run.

The contents of the update pack are described below:

ELDS Firmware Updater.exe - This is the update application which must be run to update ELDS units. The tool operation is described below in "Procedure"

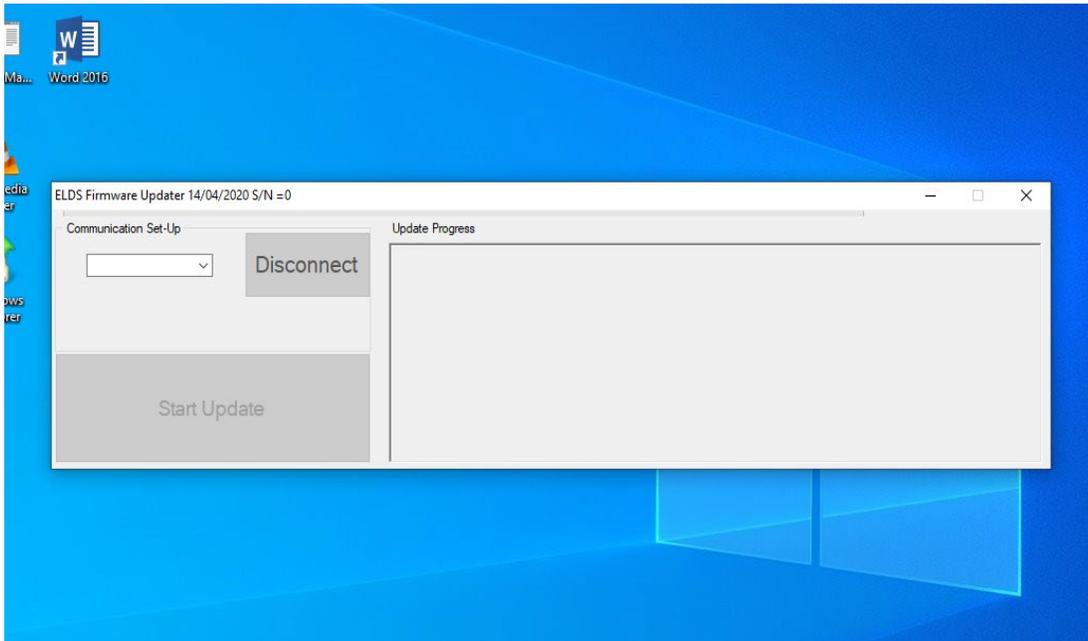
RX.upd – this is the firmware 'image' for the ELDS Receiver

TX.upd – this is the firmware 'image' for the ELDS Transmitter

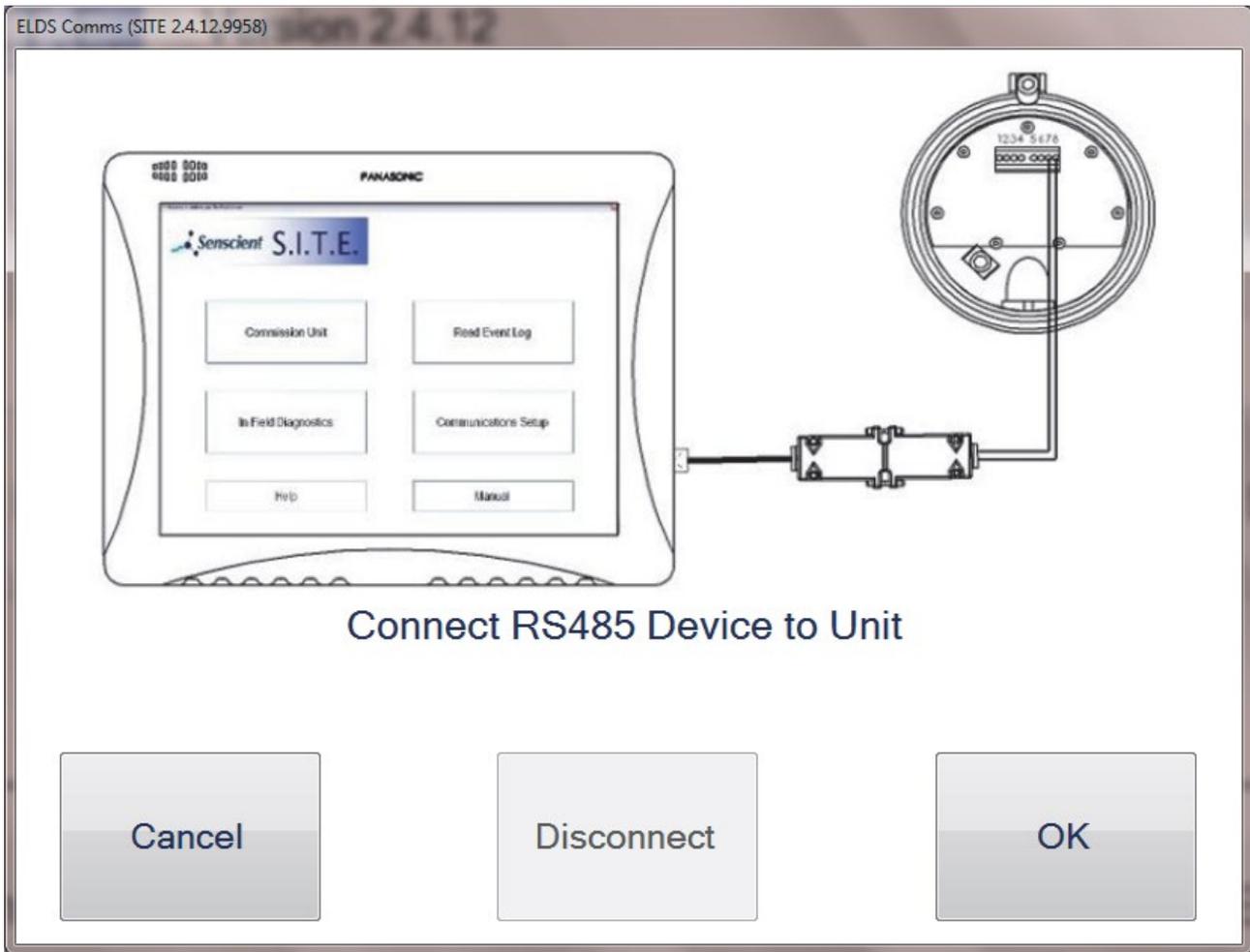
Various library files (\*.dll) – these are all necessary for the updater to run.

### **Procedure**

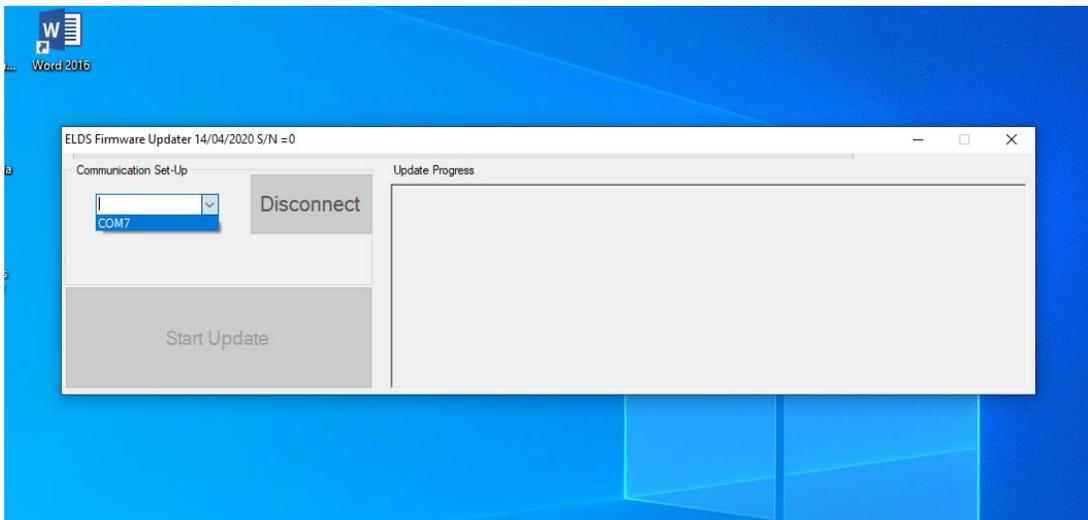
1. Extract the contents of the update package from the compressed folder it is supplied in to a normal folder (i.e. NOT a compressed folder) on the PC that will be used to update the units.
2. Start the ELDS Updater, the following screen should be seen.



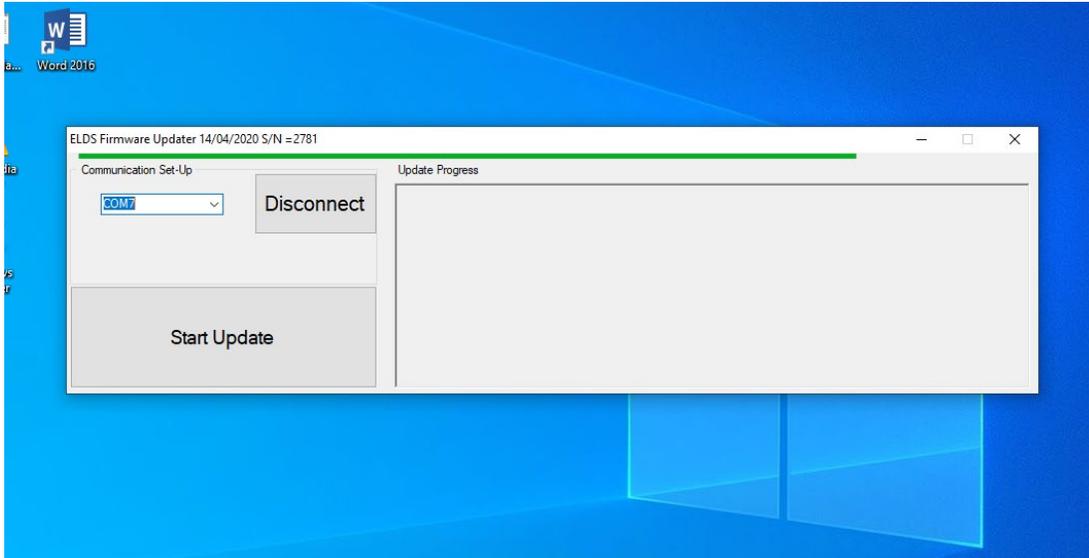
**Note:** The ELDS firmware update process needs to be performed using the most reliable communications link available. The RS485 communications link is more reliable than a wireless Bluetooth communications link and is the only link used by the ELDS Firmware Updater. Before performing updates, ensure that an MSA Senscient supplied USB: RS485 adaptor is connected to a USB port in your computer; and that the RS485 A and B connections have been connected to the correct terminals of the unit to be updated.



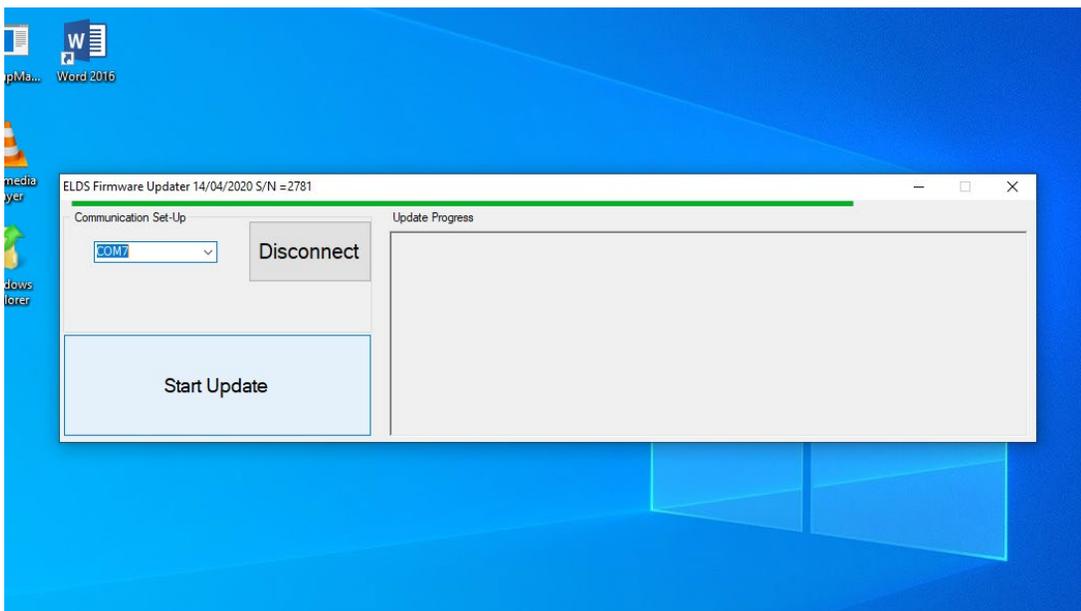
3. Select the comms port to be used and wait for the updater to detect the ELDS unit connected.



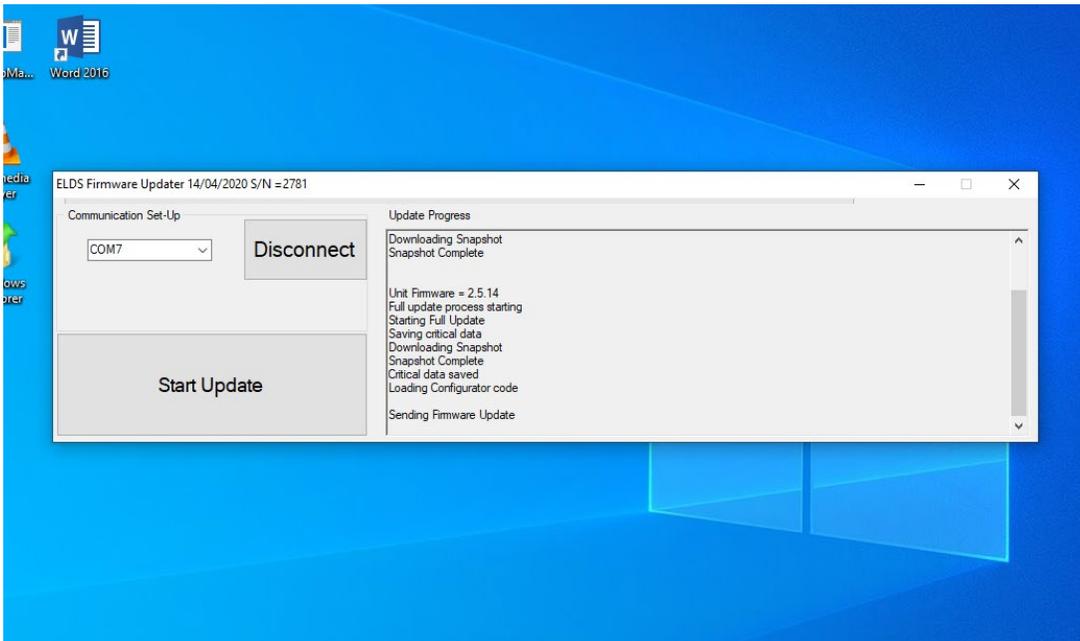
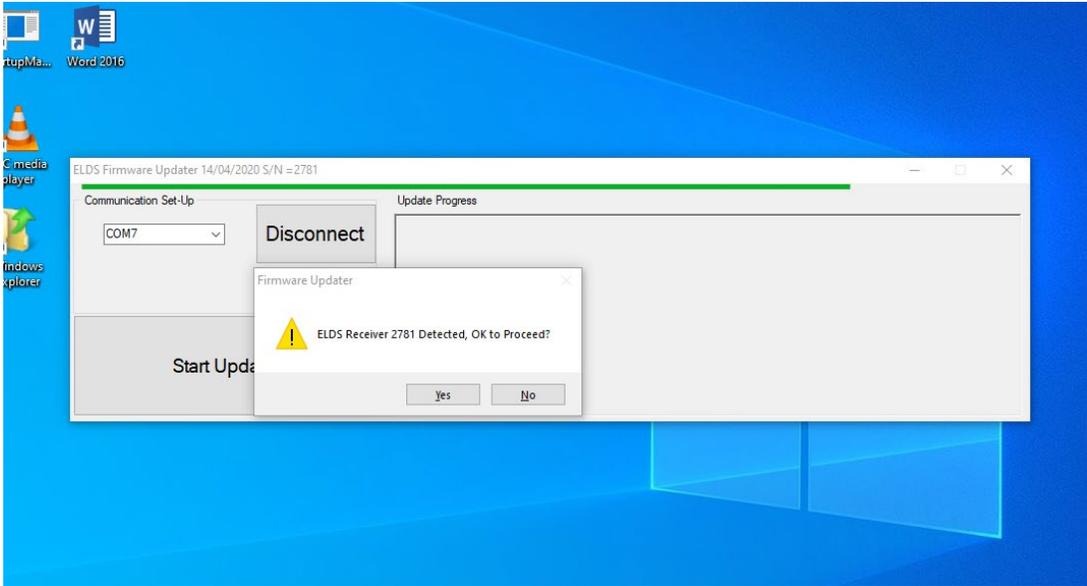
4. The serial number of the connected ELDS unit is displayed in the top left corner of the updater screen.



5. Once the unit connected has been displayed the Start Update button should become live. Begin the firmware update process by clicking on the Start Update button.

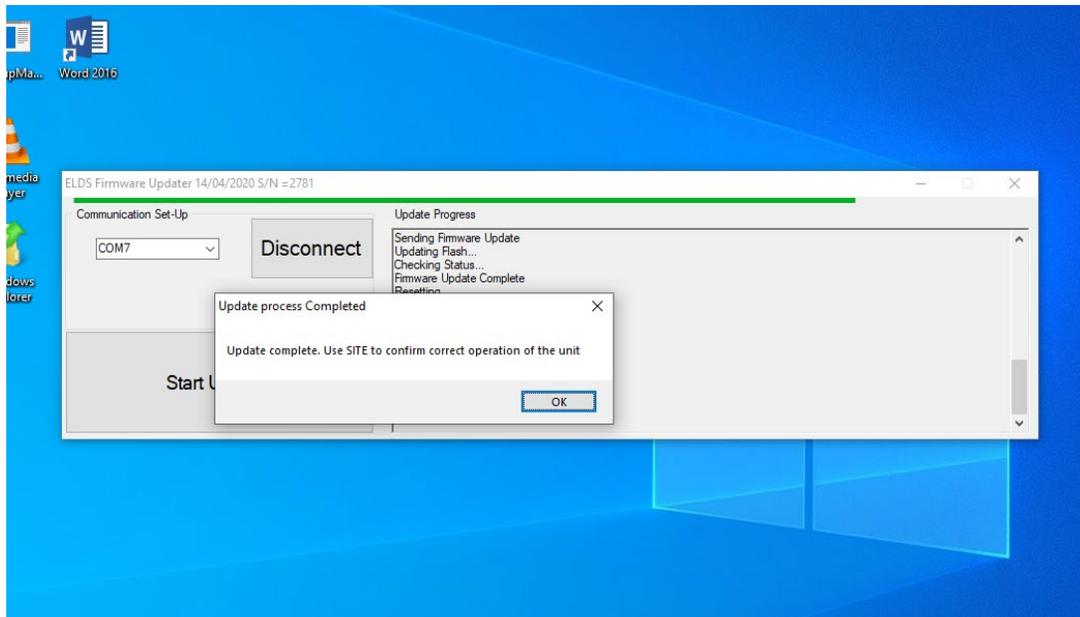


6. The firmware updater will download data from the unit to be updated and will ask the user to confirm that it is okay to proceed with the update. Click Yes button to confirm OK to Proceed.



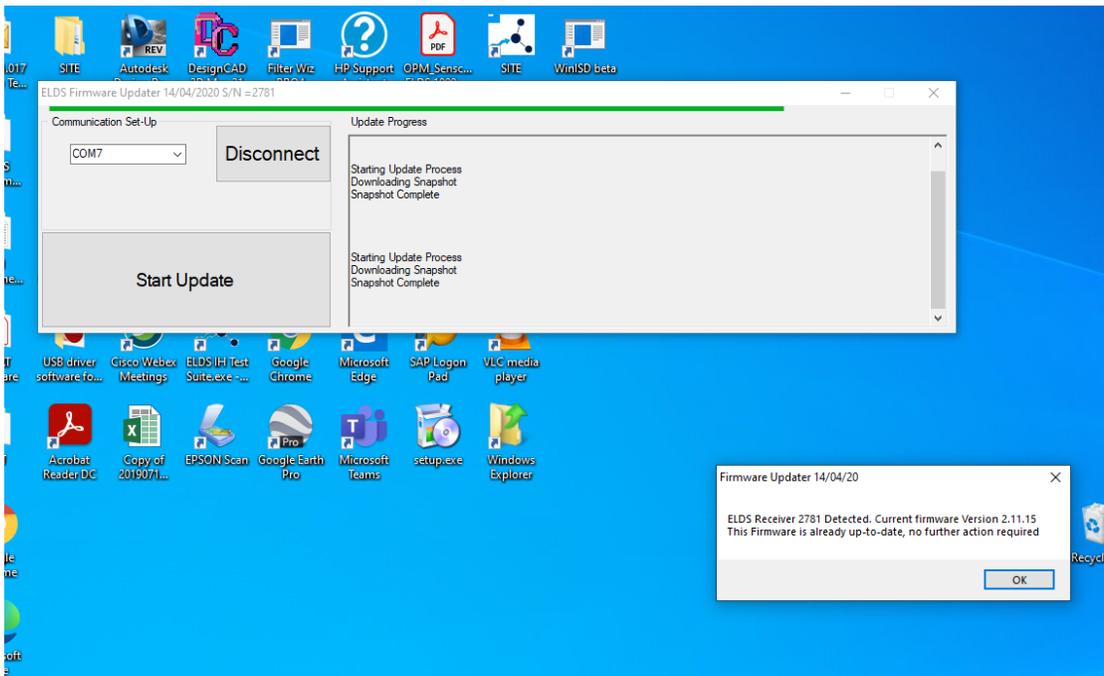
7. Throughout the firmware update, progress will be displayed in the Update Progress box.

**Note:** The progress update information displayed during the firmware update includes descriptions of multiple steps that need to be completed during the firmware update. Do not misinterpret notifications that discrete steps have been completed as indications that the firmware update has completed. Wait for the whole firmware update process to complete, which is notified by the dialogue box below being displayed. A typical firmware update takes approximately 5 minutes to perform.



### Checking if a Unit Has Been Updated

The update tool can be used to see if a unit has already been updated. Proceed as described in the procedure above with steps 1 through 5. If the unit has already been updated then pressing “Start Update” will lead to the dialogue box below being displayed. This box advises that “The Firmware is up-to-date. No further action required.”



In this case no further action is taken by the updater and a different unit can be selected, or the update tool closed.

## Appendix B: Testing Devices if Device Firmware Cannot be Immediately Updated

### Test Instructions

There are three different methods that can be used for testing ELDS units for a frozen 4-20mA output. Customers are advised to choose the test method that is best suited to their installation and application. The three test methods are described below:-

#### 1. Beam-Block Test

Verify that the ELDS receiver is working correctly by checking that it is signalling 4mA on it's 4-20mA output. This can be done by either:

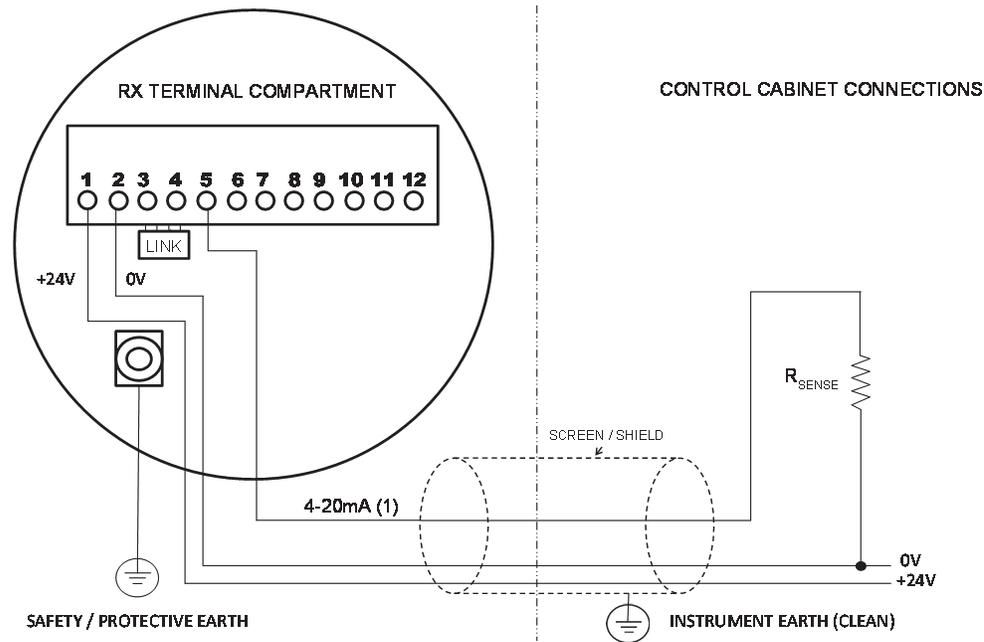
- i. Checking the 4-20mA signal reaching the corresponding control system input. (4mA corresponds to 0%FSD).
- ii. Using SITE software to Read the 4-20mA signal being sent by the receiver.

The screenshot shows the 'ELDS Status' software interface. At the top, there are buttons for 'Force 4-20', 'Read 4-20mA Current', and 'Exit'. Below these, the device ID 'Rx CH4 (XDUCT/SHORT/ATEX) [S02781 M15-GD-146R]' is displayed. The main display area shows 'Gas Level CH4' with a large green bar and the number '0'. Below this, there are two '0-1 LFL:' indicators, each showing '4.0 mA'. The 'Signal Levels' section shows 'Sig1: 4.45' and 'Sig2: 0.00'. The 'Info' section at the bottom shows '8 High', 'System Running', and '03/11/20 12:25:33'. There is also a 'Reset' button in the bottom right corner.

- iii. Connecting a multimeter in series with 4-20mA(1)\*.

\* ELDS receiver units have two 4-20mA outputs, referred to as 4-20mA(1) and 4-20mA(2). The primary output of Methane (CH<sub>4</sub>) ELDS units is 4-20mA(1) and it is **only** this 4-20mA output that should be tested for being frozen.

In the ELDS receiver wiring diagram below, 4-20mA(1) has been configured as a current source. The 4-20mA loop current is coming out of terminal 5 and will flow towards the corresponding control room 4-20mA input.



In order to monitor the current output by 4-20mA(1) users can either connect a multimeter in series with the loop flowing from terminal 5 to the control card, or temporarily disconnect the field cable wire connected to terminal 5; and then connect a multimeter between terminals 5 and 6.

Using a sheet of cardboard or a similarly opaque material, completely block the optical path between the transmitter and receiver. Monitor the 4-20mA output from the receiver and confirm that after 30 seconds the output signals the Beam-Block state, which by default is configured to be 2.5mA\*.

ELDS Status (SITE 2.6.31.20608)

ELDS Status

Force 4-20

Read 4-20mA Current

Loop 1 current is 2.4 mA

Exit

Rx CH4 (XDUCT/SHORT/ATEX) [S02781 M15-GD-146R]

S02781

Gas Level CH4

0

0-1 LFL: 2.5 mA

0-1 LFL: 2.5 mA

Signal Levels

Sig1: 0.00

Sig2: 0.00

Info

16 High

Gain

Beamblock

Status

03/11/20 12:30:33

Time

Reset

If the 4-20mA output changes to 2.5mA\* (Beam-Block), the output is **not** frozen and the beam blockage can be removed. Removing the beam blockage for such units will see the 4-20mA current return to 4mA.

\* The Beam-Block current is user configurable to between 0mA and 3.5mA (default 2.5mA). For units configured with a non-default Beam-Block current, check for the 4-20mA output signalling the user configured Beam-Block current.

If after blocking the beam for 45 seconds (or longer than the configured time to Beam-Block) the 4-20mA output has **not** begun to signal 2.5mA\* (Beam-Block) then the 4-20mA output **is frozen**. Instructions for unfreezing frozen 4-20mA outputs are provided in a dedicated section below.

## 2. Gas Test

Verify that the ELDS receiver is working correctly by checking that it is signalling 4mA on it's 4-20mA output. This can be done by either:

- i. Checking the 4-20mA signal reaching the corresponding control system input. (4mA corresponds to 0%FSD).
- ii. Using SITE software to Read the 4-20mA signal being sent by the receiver.

The screenshot shows the 'ELDS Status' window for 'SITE 2.6.51.20608'. It features a 'Force 4-20' button, a 'Read 4-20mA Current' button, and an 'Exit' button. The 'Read 4-20mA Current' button is active, displaying 'Loop 1 current is 4.0 mA'. Below this, the device is identified as 'Rx CH4 (XDUCT/SHORT/ATEX) [S02781 M15-GD-146R]'. The 'Gas Level CH4' is shown as '0' on a green bar. Two '0-1 LFL:' indicators both show '4.0 mA'. The 'Signal Levels' section shows 'Sig1: 4.45' and 'Sig2: 0.00'. The 'Info' section includes '8 High', 'System Running', and '03/11/20 12:25:33'. A 'Reset' button is located at the bottom right.

- iii. Connecting a multimeter in series with 4-20mA(1).

**Note:** In order for for a gas test to be successfully used to test for a frozen 4-20mA output, the gas burden in the cell must be sufficient to produce a clearly discernible change in the current signalled on the 4-20mA output. For cross-duct units installed over a path-length of 5 meters, a 3,000ppm.m CH<sub>4</sub> burden will produce a 4-20mA loop current of ~ 4.2mA, which is at the limit of what can be reliably discerned. For this reason, the minimum test gas burden recommended for this test is 3,000ppm.m; whilst higher gas burdens may be advantageous. Filling the Cross Duct Refillable Gas Test Cell with 100%V/V CH<sub>4</sub> will produce a burden of approximately 10,000ppm.m CH<sub>4</sub>; whilst filling a Gassing Cell with 5%V/V CH<sub>4</sub> will produce a burden of 11,800ppm.m CH<sub>4</sub>. With 100%V/V CH<sub>4</sub> and 5%V/V CH<sub>4</sub> being widely available and providing a more clearly discernible change in 4-20mA output, these gas burdens are recommended for most users.

**Further Note:** For cross-duct systems with a 0-10%LFL measurement range, operating over a path-length of 0.5m, the full-scale gas burden for an ATEX certified unit is just 2,200ppm.m CH<sub>4</sub>. Inserting 10-12,000ppm.m CH<sub>4</sub> in the beam-path of such units will exceed their full-scale measurement range, leading to the signalling of OverRange on the 4-20mA output. This will not cause any harm; and the signalling of Over-Range on the 4-20mA output is a clear indicator that the 4-20mA output is not frozen. This further note is provided to inform users what to expect when testing detectors with lower measurement ranges and short path-lengths.

**Recommendation:** The calculation of gas burdens depending upon gas concentration and the type of gas cell used is described in detail in Appendix C of the ELDS Operating Manual. This appendix also describes the correct procedures to be used for filling the Cross Duct Refillable Gas Test Cell and the Gassing Cell. Users are strongly recommended to read Appendix C – Functional Testing Using Gas.

### Gas Test (cont.)

Having verified that the 4-20mA(1) output is signalling 4mA and filled the chosen gas cell with a sufficient burden of CH<sub>4</sub> gas, users are ready to perform the gas test.

Insert the gas cell in the beam-path of the ELDS detector and monitor the 4-20mA output from the receiver. Within a few seconds, the 4-20mA output should start signalling a current that is greater than 4mA, indicating the detection of gas in the beam-path and confirming that the 4-20mA output is **not** frozen.

The screenshot shows the ELDS Status interface. At the top, there are buttons for 'Force 4-20', 'Read 4-20mA Current', and 'Exit'. The 'Read 4-20mA Current' button is highlighted, and a tooltip below it says 'Loop 1 current is 6.5 mA'. The main display area shows 'Rx CH4 (XDUCT/SHORT/ATEX) [S02781 M15-GD-146R]' and 'S02781'. Below this, a green bar displays 'Gas Level CH4' as '0.154'. At the bottom, there are two '0-1 LFL:' indicators, each showing '6.5 mA'. The 'Signal Levels' section shows 'Sig1: 4.24' and 'Sig2: 0.00'. The 'Info' section shows '8 High', 'Gain', 'Gas Alarm (Methane)', 'Status', and 'Time: 03/11/20 12:37:56'. A 'Reset' button is located at the bottom right.

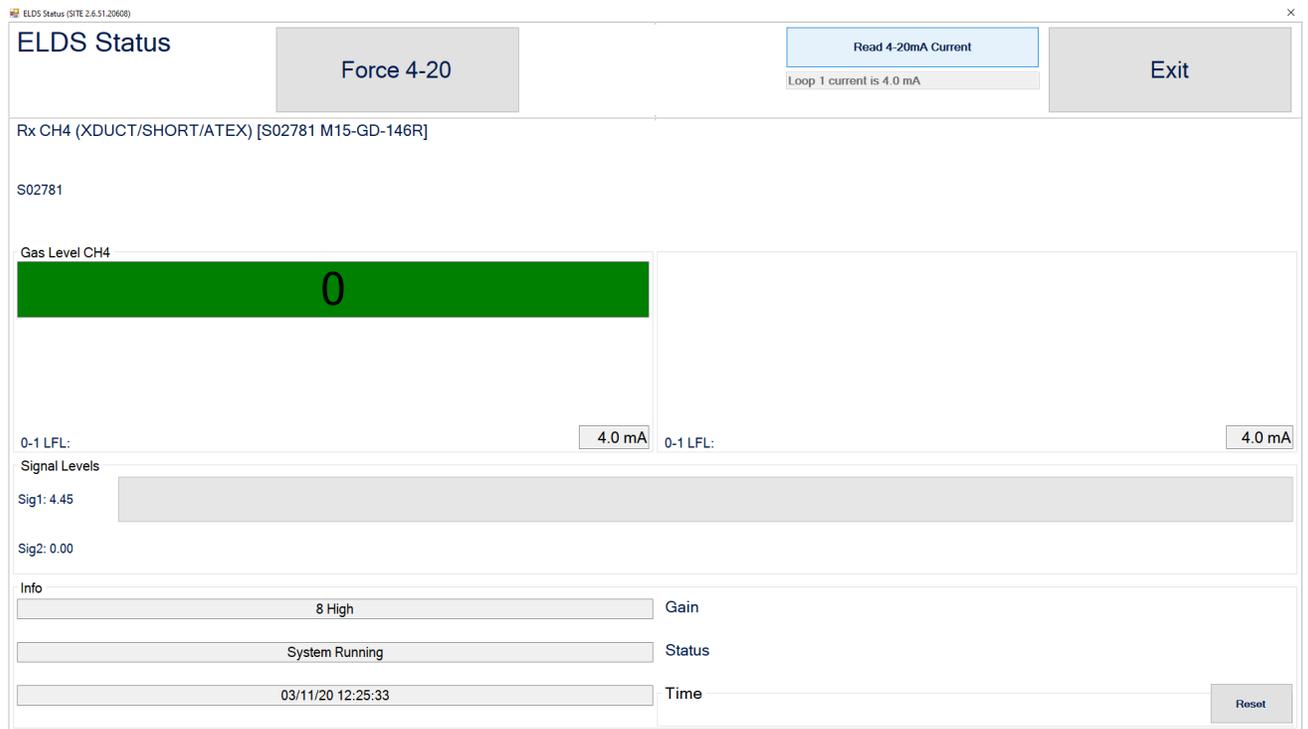
If after more than 10 seconds of the gas cell being in the beam-path the 4-20mA(1) output is still signalling 4mA, this 4-20mA output is frozen. Instructions for unfreezing frozen 4-20mA outputs are provided in a dedicated section below.

Remove the gas cell from the beam-path and the 4-20mA output should return to 4mA.

### 3. SimuGas Live

Verify that the ELDS receiver is working correctly by checking that it is signalling 4mA on it's 4-20mA output. This can be done by either:-

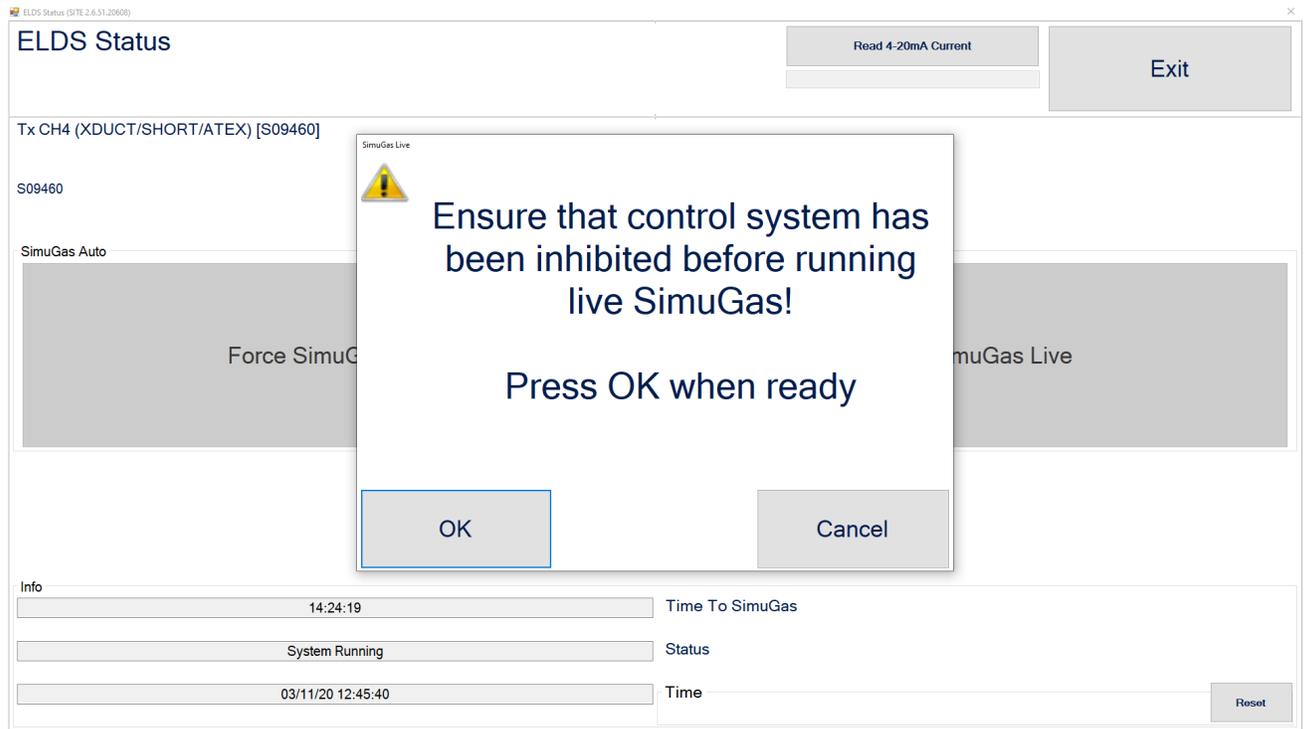
- i. Checking the 4-20mA signal reaching the corresponding control system input. (4mA corresponds to 0%FSD).
- ii. Using SITE software to Read the 4-20mA signal being sent by the receiver.



- iii. Connecting a multimeter in series with 4-20mA(1).

Using SITE, make a connection via Bluetooth or RS485 to the transmitter that forms part of the ELDS gas detector system that is to be tested.

Select the Test/Diagnostics menu option and instruct the transmitter to Start SimuGas Live.



This will command the transmitter to simulate the presence of ~3,000ppm.m CH<sub>4</sub> in the beam-path.

Soon after the SimuGas Live Test commences, the receiver opposite will start detecting gas and this should be signalled on the 4-20mA(1). For this test, the 4-20mA(1) output needs to be monitored at exactly the same time that the SimuGas Live gas simulation is taking place. This is because the SimuGas Live test only simulates gas for about 20 seconds, meaning that there is only a short window of time during which the change in 4-20mA current can be observed.

The 4-20mA(1) output can be monitored by:

- i. Communications with an operator in the control room that is monitoring this ELDS detector's output.
- ii. Using a multimeter in series with 4-20mA(1).
- iii. Using SITE whilst connected to **both** the transmitter and receiver that comprise the gas detector system under test. Check that the 4-20mA output has changed by clicking on the Read 4-20mA Current button. **NB:** Do not rely on the current displayed in the Gas Level CH<sub>4</sub> box, this information shows what current should be being output. The actual 4-20mA output current being measured is shown in the box below the Read 4-20mA Current button.

The screenshot shows the ELDS Status interface with the following details:

- Top Bar:** ELDS Status (SITE 2.6.31.20608), Force 4-20, Read 4-20mA Current (Loop 1 current is 6.5 mA), Exit.
- Rx CH4 (XDUCT/SHORT/ATEX) [S02781 M15-GD-146R]:**
  - Device ID: S02781
  - Gas Level CH4: 0.156 (displayed in a green box)
  - 0-1 LFL: 6.5 mA
  - Signal Levels: Sig1: 4.08, Sig2: 0.00
  - Info: Gain (8 High), Status (Gas Alarm (Methane)), Time (03/11/20 14:13:00), Reset button.
- Tx CH4 (XDUCT/SHORT/ATEX) [S09460]:**
  - Device ID: S09460
  - SimuGas Auto: Force SimuGas Auto, Start SimuGas Live buttons.
  - Info: SimuGas Active, Time To SimuGas, System Running, Status, Time (03/11/20 14:12:52), Reset button.

If the current on 4-20mA(1) becomes greater than 4mA this confirms that the 4-20mA output is **not** frozen.

If the current on 4-20mA(1) remains at 4mA throughout the SimuGas Live test, the 4-20mA output **is frozen**. Instructions for unfreezing frozen 4-20mA outputs are provided in a dedicated section below.

## **Releasing a Frozen 4-20mA Output**

There are two simple methods that can be used to release a frozen 4-20mA output, which are described below:

### **1. Cycle Power to the Receiver**

Confirm the identity of the receiver that has a frozen 4-20mA output and the means by which +24V power is supplied to this unit.

Remove or disconnect the supply of +24V power to the unit for 5 seconds or more.

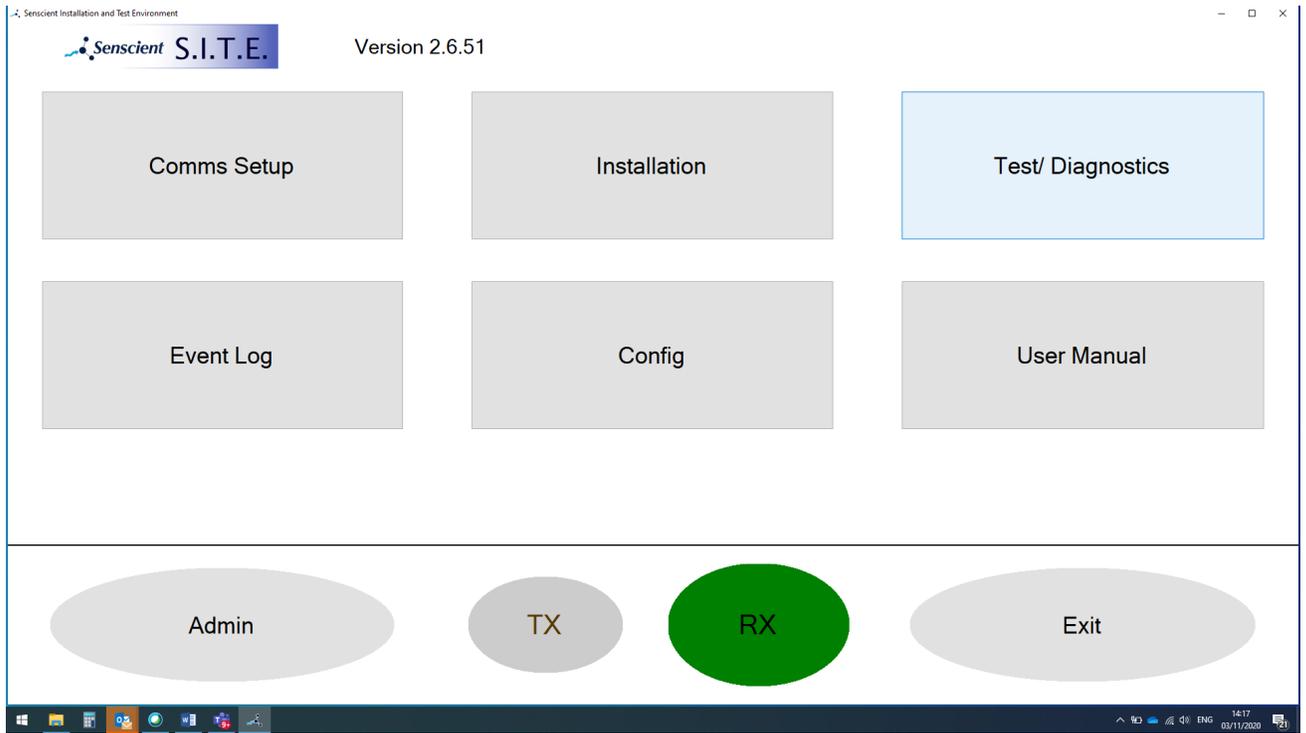
Return or reconnect the +24V supply to the receiver. Monitor the 4-20mA output for up to 5 minutes and confirm that it returns to signalling 4mA.

Using one of the test methods described above for testing for a frozen 4-20mA output, confirm that the receiver's 4-20mA output is no longer frozen.

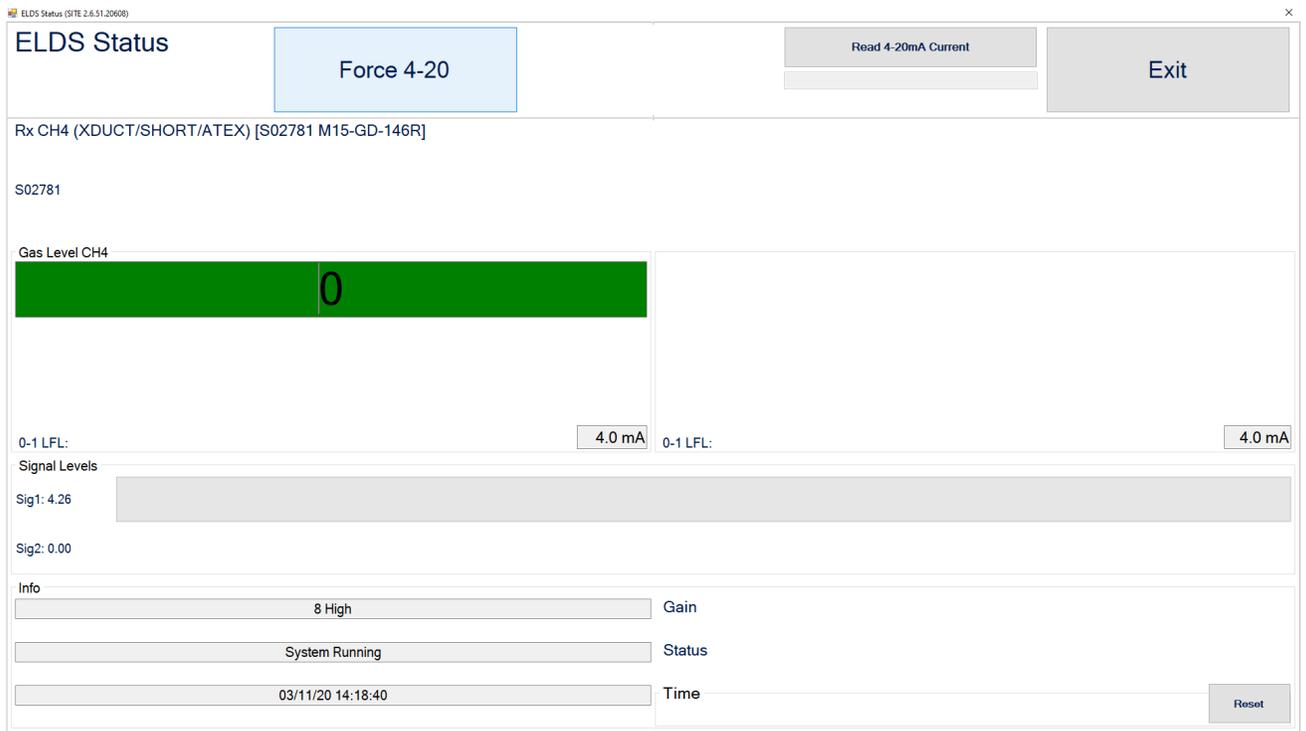
### **2. FORCE the 4-20mA Output**

Confirm the identity of the receiver that has a frozen 4-20mA output and using SITE make a connection to this unit via Bluetooth or RS485.

Select the Test/Diagnostics menu option.



Click on the Force 4-20mA button and select the Force option.



ELDS Status (SITE 2.6.51.20608)

ELDS Status

Force 4-20

Read 4-20mA Current

Exit

Rx CH4 (XDUCT/SHORT/ATEX) [S02781 M15-GD-146R]

S02781

Force 4-20 mA Live

Gas Level CH4

0

0-1 LFL:

Signal Levels

Sig1: 4.40

Sig2: 0.00

Info

8 High

Gain

System Running

Status

03/11/20 14:20:43

Time

Reset

4.0 mA

OK

Cancel

Ensure that control system has been inhibited before forcing 4-20 mA!  
Press OK when ready

Use the Force command to set the current to 8mA.

ELDS Status (SITE 2.6.51.20608)

ELDS Status

Forcing...

Read 4-20mA Current

Exit

Rx CH4 (XDUCT/SHORT/ATEX) [S02781 M15-GD-146R]

S02781

8

Gas Level CH4

0.25 F

0-1 LFL:

Signal Levels

Sig1: 4.22

Sig2: 0.00

Info

8 High

Gain

Readback 8.1 mA

Status

03/11/20 14:25:10

Time

Reset

8.0 mA

8.0 mA

Loop 1 current is 8.1 mA

Use the Read 4-20mA Current option to confirm that the monitored current is between 7.5mA & 8.5mA.

Click on the Force 4-20mA button and select the Un-Force option.

ELDS Status (SITE 2.6.51.20608)

ELDS Status

Force 4-20mA

Force  
Unforce

Read 4-20mA Current  
Loop 1 current is 8.0 mA

Exit

Rx CH4 (XDUCT/SHORT/ATEX) [S02781 M15-GD-146R]

S02781

4

Gas Level CH4

0

0-1 LFL: 4.0 mA      0-1 LFL: 4.0 mA

Signal Levels

Sig1: 4.04

Sig2: 0.00

Info

8 High      Gain

System Running      Status

03/11/20 14:30:14      Time

Reset

The 4-20mA output should now be unfrozen.

Using the test methods described above for testing for a frozen 4-20mA output, confirm that the receiver's 4-20mA output is no longer frozen.