

# Multi-Gauge Telemetry Card

---

User Manual V1.3

[www.datacan.ca](http://www.datacan.ca)

# Table of Contents

1	ABOUT THIS GUIDE .....	5
1.1	WHO SHOULD USE IT.....	5
1.2	DISCLAIMER .....	5
2	INTRODUCTION.....	6
2.1	GENERAL INFORMATION .....	6
2.2	NETWORK CONNECTIONS.....	7
3	BASIC HARDWARE SETUP.....	8
3.1	TOOL INSPECTION .....	8
3.2	CONNECTING TO THE DOWNHOLE GAUGE.....	8
3.3	MODBUS CONNECTION.....	9
3.4	INPUT POWER.....	11
3.5	CONFIRMING GAUGE COMMUNICATION .....	12
3.6	INSTALLATION SETUP .....	13
3.7	BACKUP CLOCK BATTERY .....	13
4	BASIC SOFTWARE OPERATION.....	14
4.1	CONNECTING TO DATACAN DOWNLOAD SOFTWARE .....	14
4.2	CONFIRMING SENSOR SETUP .....	18
4.3	PROGRAMMING SAMPLE RATE.....	19
4.4	CHANGING UNITS .....	21
4.5	MODBUS MAP .....	23

4.6	DOWNLOADING AND ERASING ALL JOBS .....	24
4.6.1	Downloading Data.....	24
4.6.2	Erase All Jobs.....	26
5	GRAPHING DATA (JOBS) .....	28
6	REAL TIME DATA DISPLAY .....	30
7	LED INDICATOR DESCRIPTIONS.....	32
8	TELEMETRY CARD SENSOR SETUP .....	34
8.1	GAUGE SETUP – ORIGINAL STYLE .....	34
8.1.1	Software Setup.....	34
8.2	GAUGE SETUP – MULTI-GAUGE STYLE.....	37
8.2.1	Software Setup.....	37
8.3	OUTPUT VOLTAGE.....	41

## ***History of Changes***

Rev. No.	Date	Pages	Description of Changes	Author
0.1	November 2018		Initial Draft	J.W.
1.0	February 2019		Initial Release	M.J.
1.1	February 2019	42	Included Tool Line Voltage	M.J.
1.2	October	42	Fixed Supervisor mode shortcut	J.W.
1.3	August 2021	42	Added single gauge Modbus Map	M.J.

---

# 1 About this Guide

---

## 1.1 Who Should Use It

This guide is intended for users of different degrees of knowledge and experience:

Operators – Tool operators can learn how to operate the software and maintain the tools.

Technicians – Our technicians can learn how to interrogate and troubleshoot the tools.

This guide assumes that you have some computing and tool knowledge. For more information, contact your local service representative.

[www.datacan.ca](http://www.datacan.ca)

[info@datacan.ca](mailto:info@datacan.ca)

We thank you for any feedback or comments that will help us to continue to improve our products and service.

---

## 1.2 Disclaimer

This document is intended as a supplement to formal training. DataCan is constantly working to improve its products. We must therefore reserve the right to change designs, materials, specifications, and prices without notice. DataCan declines any liability that may arise out of the potential inaccuracies in this guide. We thank you for any feedback or comments that will help us to continue to improve our products and service

---

## 2 Introduction

The DataCan Multi-Gauge Telemetry Card is a logging unit capable of storing and transmitting Data from downhole gauges. The telemetry card can be programmed to communicate with any of DataCan's one-way (original style) or two-way (multi-gauge or newer-style) permanent / SRO gauges.

This manual is supplemented by a number of other manuals depending on the elements of your system:

- DataCan Download Software User Manual – for all features of the software and graphing.
- Multi-Gauge Surface Box Manual
- Cablehead Installation Manual
- Permanent Gauge Installation Manual
- Multi-Gauge Telemetry Card Troubleshooting Guide

To answer questions not covered in the manual about a specific component of your system, please refer to the manual for that specific component.

---

### 2.1 General Information

The DataCan Telemetry Card is a reliable instrument that works in conjunction with DataCan telemetry units, DataCan Downhole gauges, and a ModBus data collection system. In addition to providing power to the attached equipment, the Telemetry Card logs the downhole data, and makes it available to a ModBus network. A PC can be plugged into the Telemetry Card to set up the networks, program data collection rates, as well as to download records from the memory using the included DataCan Download Software.

---

## 2.2 Network Connections

The Telemetry Card connects to 2 different networks, as well as a USB link to a PC. The 2 networks are the downhole tool network, and the Modbus-Out network used to connect to a user's SCADA system or a DataCan data aggregation and display network, such as a DataCan surface box or DataCan Data2Desk system. Multiple telemetry cards can be connected to the same ModBus network, but each Multi-Gauge Telemetry Card has its own downhole tool network.

For two-way communication style gauges, each downhole gauge on each telemetry card must be set up with its own unique gauge address. These gauge addresses have nothing to do with the Modbus addresses between telemetry cards. If a gauge has never had its address changed, it defaults to address 1.

---

**Note:** Make sure each multigauge down hole gauge has a unique address programmed into it. More than one gauge with the same programmed address on a line will cause communication to stop.

---

## 2.3 Recommended procedure

---

## 3 Basic Hardware Setup

DataCan will attempt to program the Telemetry Card for the customer's requirements prior to shipping whenever possible. Most units should show up configured. Just hook up the needed connections and turn it on; however, it is recommended that users connect the system and confirm the setup before attempting to install the system in the field. The rate data is recorded and the units for time, pressure and temperature can be changed using the download software. If it is discovered that the sensors are not set up to the user's requirements then proceed to section 8—Telemetry Card Sensor Setup—to change the setup.

See the cable head instructions for attaching gauges to downhole cables.

**Note:** It is always safest to connect gauges before powering the Telemetry Card on.

---

### 3.1 Tool Inspection

Ensure that the shipment includes all of the components and accessories that were requested. Ensure there is no visible damage that may have occurred in shipping. Record the serial number of the Telemetry Card, and the downhole gauges. Once each gauge is configured, record the address and expect depth for each gauge serial number.

### 3.2 Connecting to the Downhole Gauge

The Telemetry Card should already be configured to log the gauges shipped with the card. There will be labels describing the configured gauges affixed on the outside of the card. Please confirm



the gauges you have are the ones assigned to that card. Otherwise, you will have to configure the system—see section 8 to configure the system.

Downhole Gauges are connected to the **TOOL** connection of the Telemetry Card. The **TOOL Vo+** terminal must be connected to the center pin of the gauge, and the **TOOL Vo-** must be connected to the housing of the gauge. To connect multiple gauges, start with a pass-through gauge, and use a pass-through cable to connect the next gauge. The “bottom” gauge can only be the last gauge in the chain.



Figure 1: Tool power connection.

---

### 3.3 ModBus Connection

Before powering on the telemetry card, if you are using the ModBus connection, set the **MODBUS ADDRESS** using the +/- push button selector (address 0 is invalid). The Telemetry

Card uses the address on the selector at power up as its ModBus network address. If you want to change the address you must power down the card and power back up.

The ModBus differential signal lines are hooked up to the **MODBUS A** (non-inverted) and **B** (inverted) connections. With the GND connection as a voltage reference for isolated systems.



Figure 2: ModBus connection and address selector.

**NOTE:** The USB connection supplies minimum power to the telemetry card when plugged in. If you are changing the ModBus address, make sure the USB is unplugged before you attempt to power down the Card.

The ModBus settings are:

Baud Rate	9600
Data Bits	8
Parity Bits	None
Stop Bits	1

See section 4.5-ModBus Map about downloading the ModBus map for the device once the sensors are setup.

---

### 3.4 Input Power

The Telemetry card accepts 9.5 VDC to 24VDC for power with a max power draw of 4W. Power connects to the **POWER** connection on the telemetry card, with positive connecting to the **POWER Vin+** terminal and negative to the **POWER GND** terminal.



Figure 3: DC input Power connections.

When power is applied the **POWER** indicator LED should come on. The **POWER** indicator will slowly flash if the input power is between 5 V and 9.5V; this is high enough to download the memory but too low for tool operation. If the power indicator does not come on at all then your

power is either below 5V or not connected at all, confirm that your power supply is on, that you have connected the power lines to the correct terminals, and that any fuse in line with the system is intact.

---

### 3.5 Confirming Gauge Communication

Shortly after power up, the **TOOL** LED indicator should start flashing. The **TOOL** indicator behaviour is described in the below table

---

**NOTE:** The first few flashes will always be Red as the gauges takes longer to start up then the box.

---

Blue Flash	Comms Success
Red Flash	Comms Failure <b>[Note:</b> Gauge communication is tried 3 times. E.g. If the telemetry card is programed to talk to a gauge that is not connected, the red LED will flash 3 times.
Solid Blue	No tool connection <b>[Note:</b> the line is only checked at the start of the next sample, it does not detect an open line until it starts the next sample and it does not detect that the gauges are connected until the start of the next sample. So depending on the sample rate, it may be a long time before a change in indication occurs.]
Solid RED	Tool Power fault (line short circuit) <b>[Note:</b> a power fault is detected immediately, but clearing the fault only happens at the start of the next sample. So depending on the sample rate, it may be a long time before the red light turns off after the short circuit is fixed. Also, plugging in gauges make cause the fault to trip.

When blue flashes start you know that a gauge is communicating. Proceed to section 4—*Basic Software Operation*, for a description of how to connect the card to a PC and view data. If the **TOOL** indicator is solid on, confirm your connection to the gauges. If the indicator is still flashing red after 10 seconds, proceed to section 4—*Basic Software Operation* for a description of how to confirm the telemetry card is configured to read the gauges you have attached. See section 7—*LED Indicator Descriptions*, for further explanation on the LED indicators.

---

### 3.6 Installation setup

The setup for installation is almost identical to the procedure described above. The only differences will be that the “bottom” gauge will start by being connected to the spool of cable and the hook-up cable will be connected to the commutator cable as well as to the pass-through gauges.

To confirm connectivity through the installation process, all that is needed is to see blue flashes on the **TOOL** indicator. If a gauge stops communicating with the Telemetry Card or loses connectivity, there will be red Flashes.

---

**WARNING:** The connectivity check is only performed when a sample is taken, so it is advised to use the minimum sample rate (1sec/gauge) during installation.

---

### 3.7 Backup Clock Battery

The telemetry card uses a rechargeable backup clock battery. It should function for the lifetime of your device and never need to be replaced. If your device is not powered on for months the battery may drain and the clock may lose time. If the telemetry card does not retain its time on power up, simply leave the device powered on for 24hrs and the battery will recharge.

If even after charging up the telemetry does not retain its time through power losses, please return the card to DataCan for servicing.

---

## 4 Basic Software Operation

---

### 4.1 Connecting to DataCan Download Software

The user interface with the Telemetry Card is through a Windows PC connected via a USB cable while running the DataCan Download Software. You will need a Windows PC with the DataCan Download Software installed, a USB-A to USB-B cable, and a DataCan Multi-gauge Telemetry Card that is powered up and connected to sensors.

STEP1: connect the Telemetry Card to a Windows PC using the USB cable and run the DataCan Download Software. (Connector is on the front of Telemetry Card)



Figure 4: USB connector

**WARNING:** The card can draw minimum power from the USB if the main power supply is turned off. This is to allow a user to download a log without the need for an external power supply; however, there is not enough power to run the sensors. If you want to power down the card, you must disconnect the USB cable.

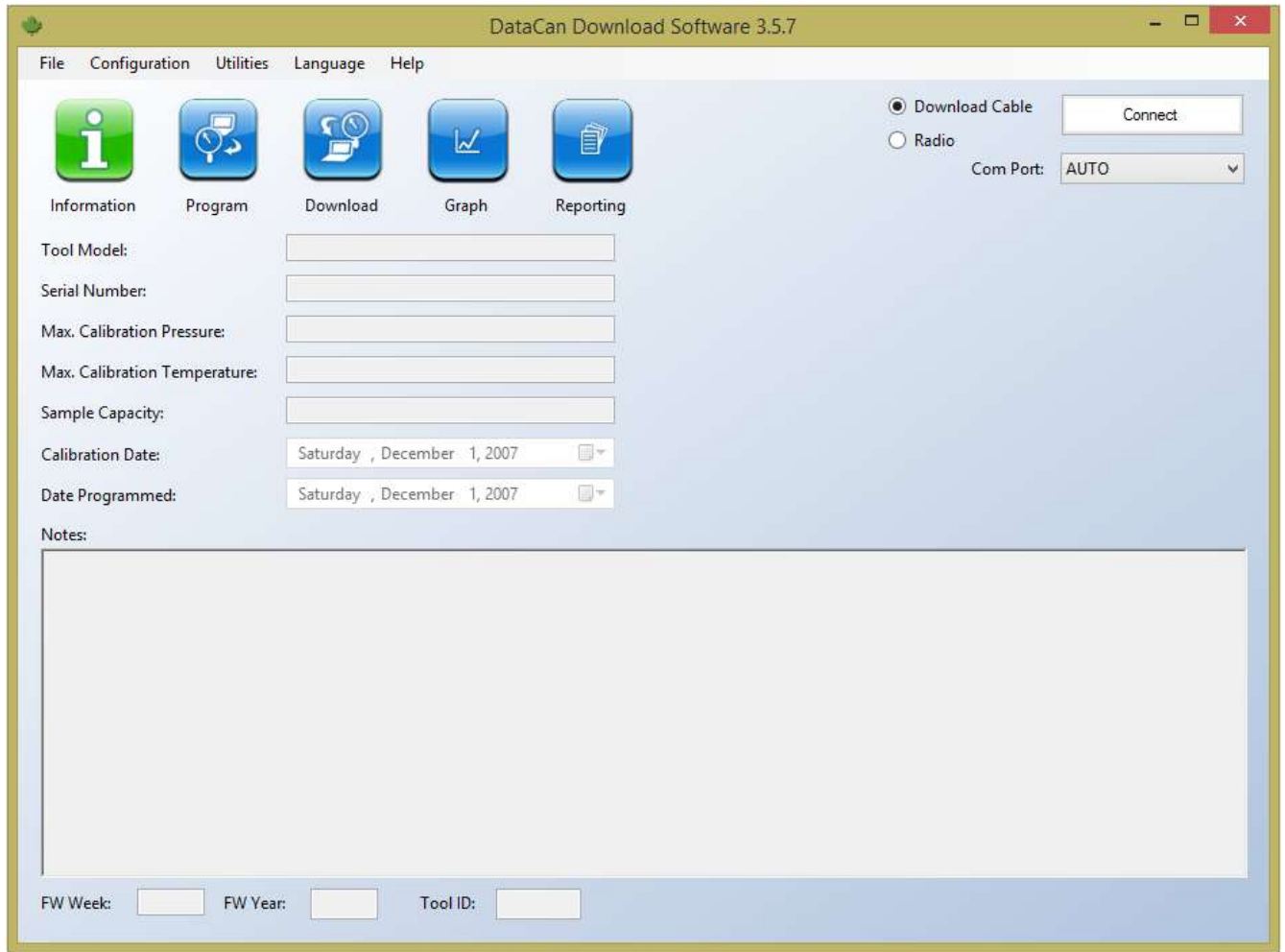


Figure 5: DataCan Download Software main page

Connect

Step 2: Click on the **Connect** button. A progress bar will appear, stating its connectivity status as shown below.

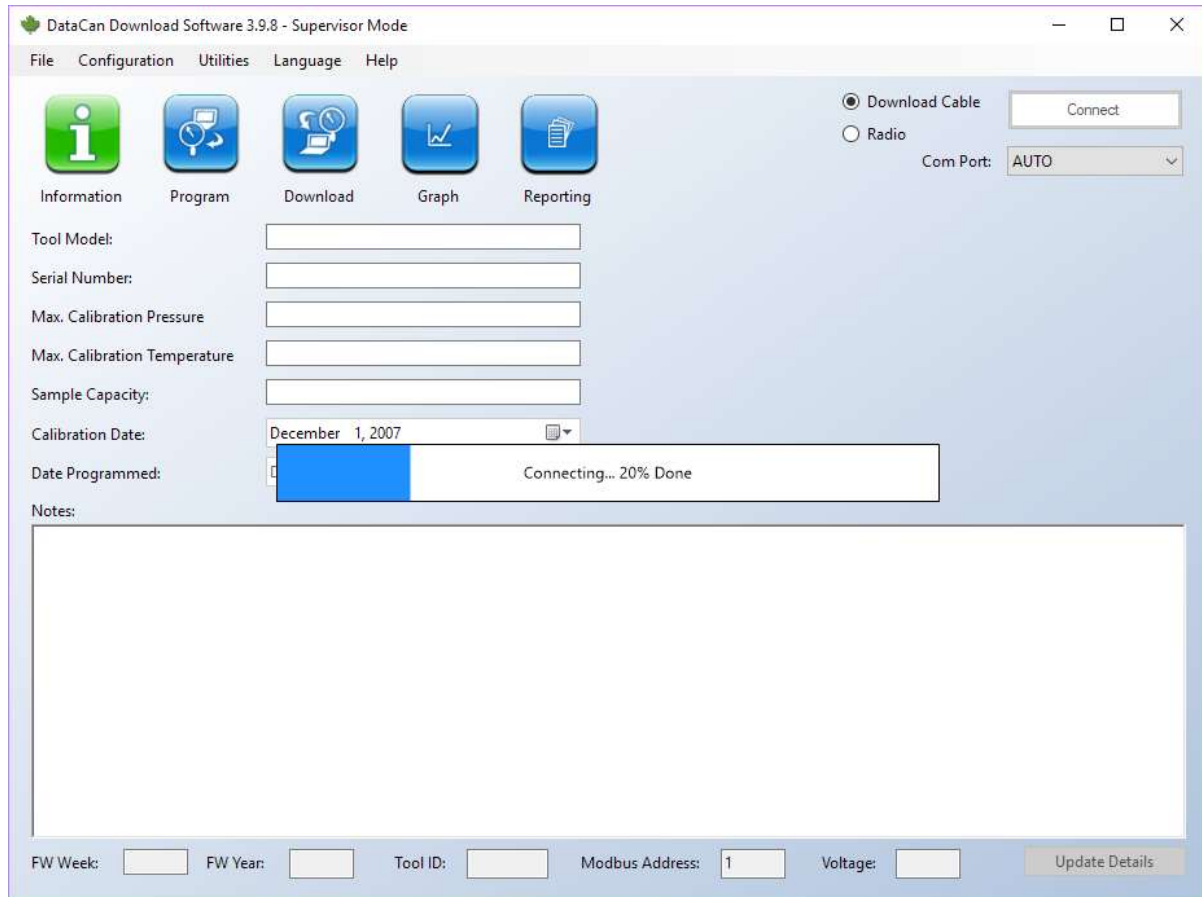


Figure 6: Progress bar demonstrating the connectivity with the device.

**Note:** If you are prompted to set the time when you connect to the download software see section 3.7- Backup Clock Battery.

Step 3: After successful connection, in the information page you should see the following details:

- Tool Model of the Telemetry Card
- Serial Number of the Telemetry Card



- Company Info
- Location Info
- Date and time of the card's clock
- ModBus Baud Rate
- Details of downhole tools connected to logger
- Tool ID, Modbus Address and Firmware Week & Year

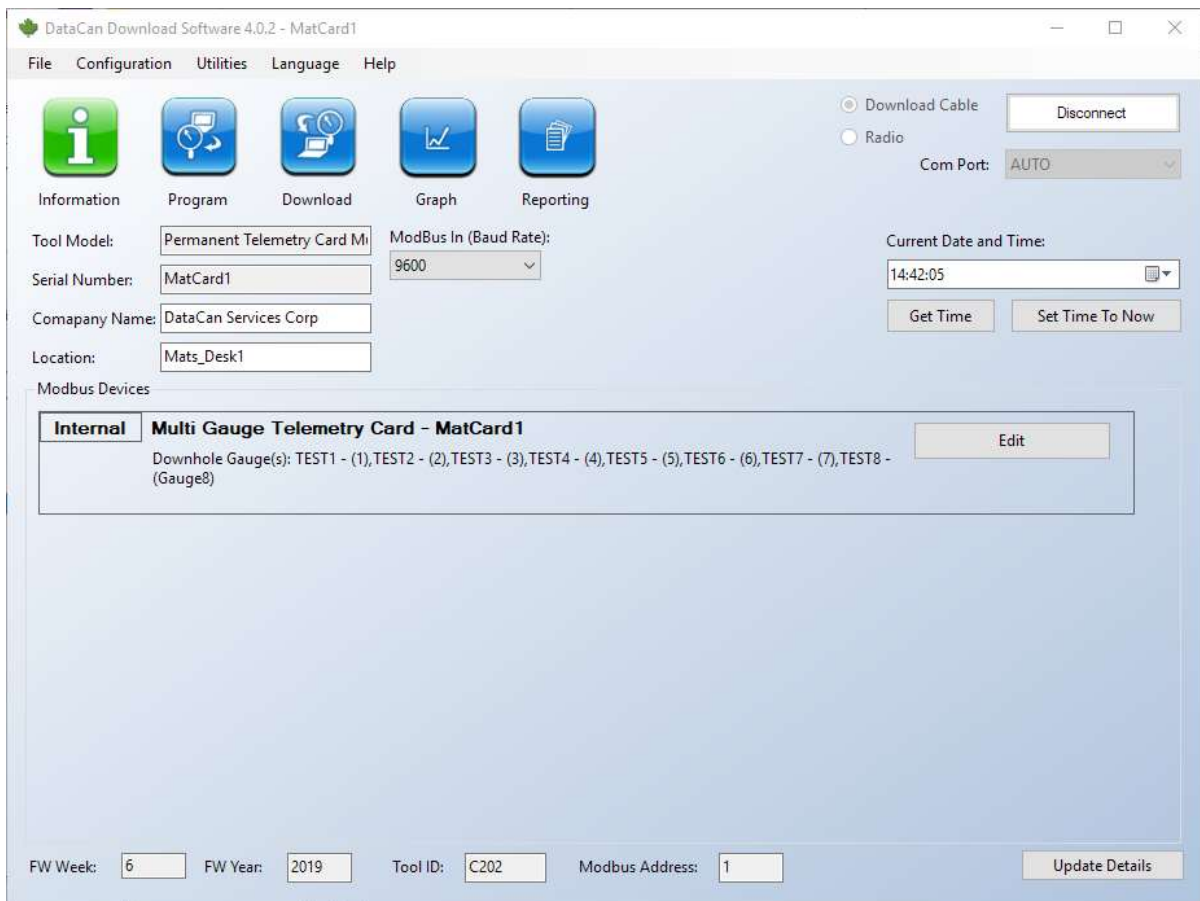


Figure 7: Information after successful connection.

---

## 4.2 Confirming Sensor Setup

As shown above, the “Information” page has a list of all connected devices. If the list of Downhole Gauges does not match the list of gauges attached, please confirm you have the devices you intend to install with this Telemetry Card. If you need to change the gauge configuration, please proceed to section 8—Telemetry Card Sensor Setup—to change the sensor setup.

To view current data from the connected gauges open the diagnostics window. From the main menu bar, clicking “Utilities -> Diagnostics” opens a window that shows real time data from all programmed and connected devices.

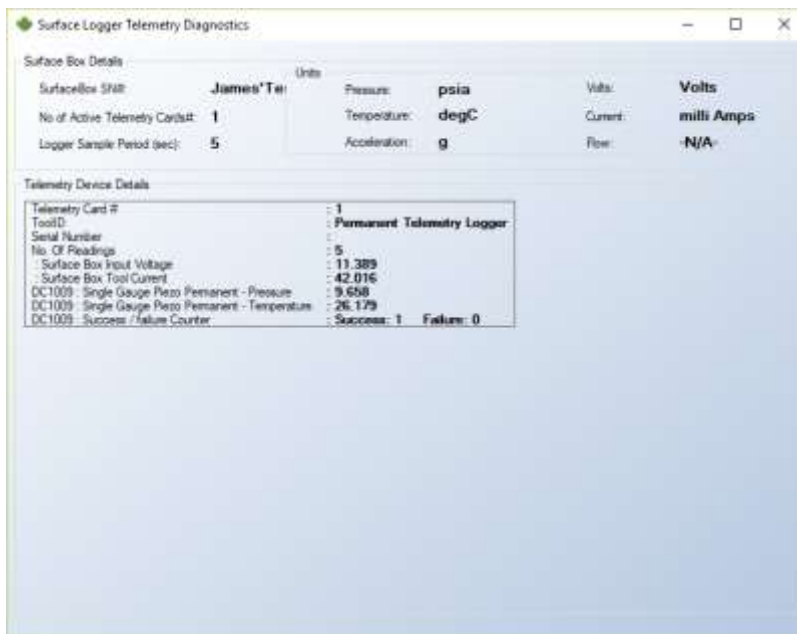


Figure 8: Diagnostics screenshot from a single one-way style gauge.

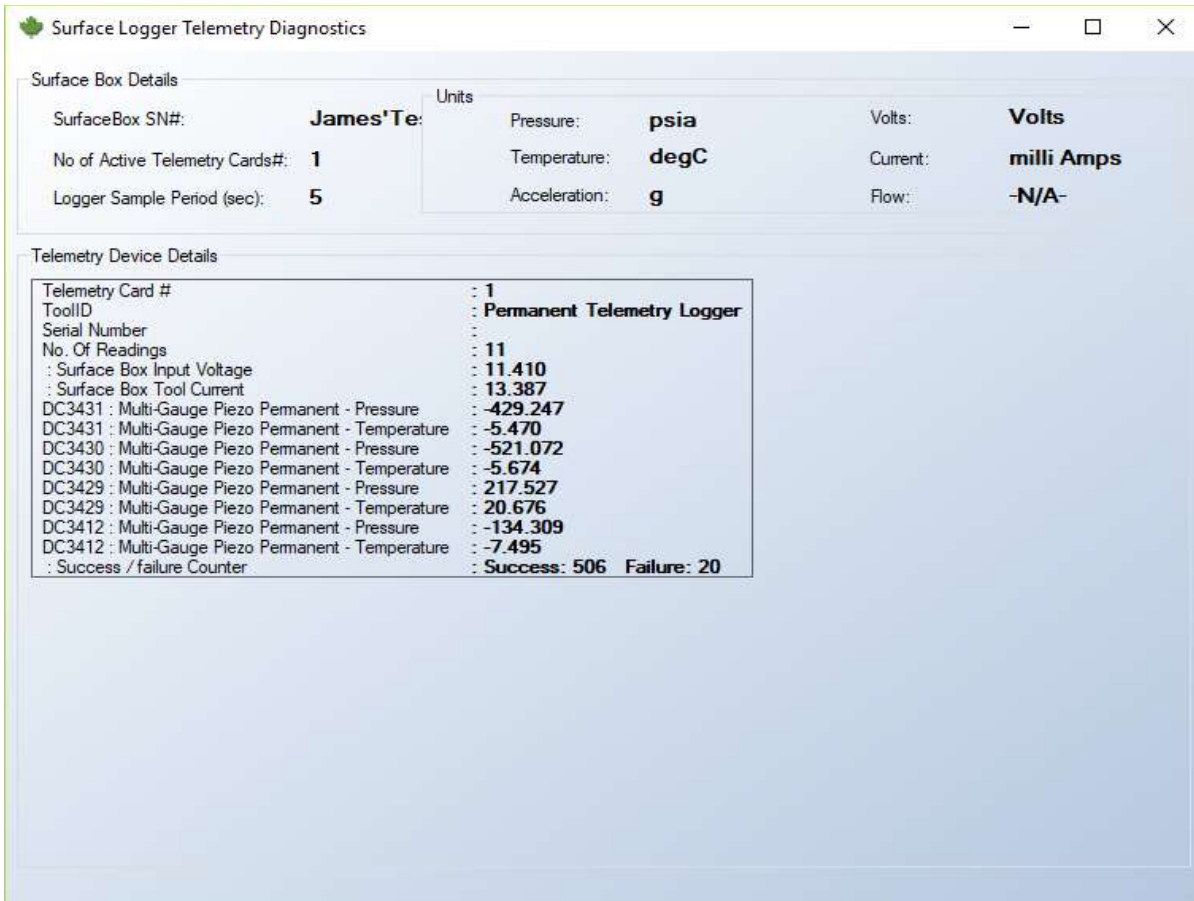


Figure 9: Diagnostics screenshot from 4 two-way communication style gauges.

If a Downhole gauge is in the “Downhole Gauge(s)” list but NAN is displayed on the diagnostics screen from that gauge, please try to confirm that it is connected and then proceed to Telemetry Card Sensor Setup to remove the gauge and then re-add it.

### 4.3 Programming Sample Rate

Programming Sample Rate sets how often the data is collected and stored to memory. For example, if the sample rate is set to 60 seconds, data will be sampled and recorded every 60

seconds. The default rate is 5 seconds. After connecting the box to the software, if you wish to change the sample rate, proceed with the following steps:



Step 1: Click on the **Program** icon to get to the programming page.

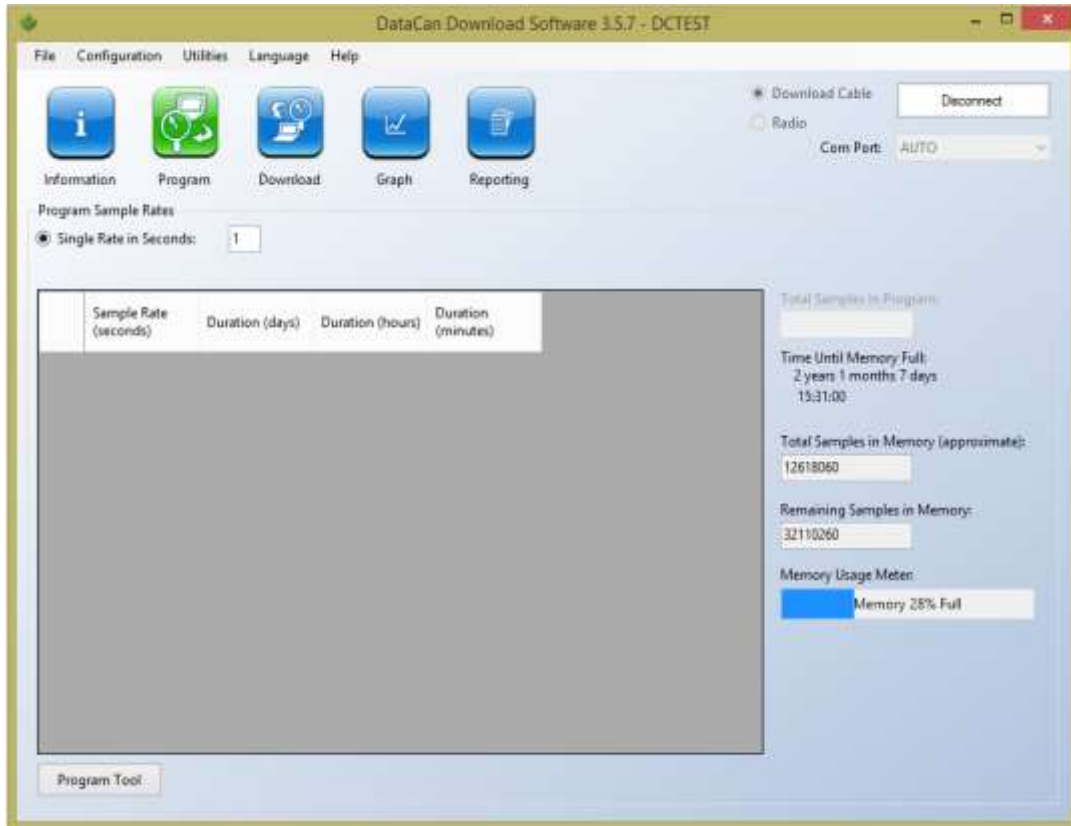


Figure 10: Program page.

Step 2: Enter an appropriate sample rate in seconds and click on the **Program Tool** button found at the bottom left of the screen.

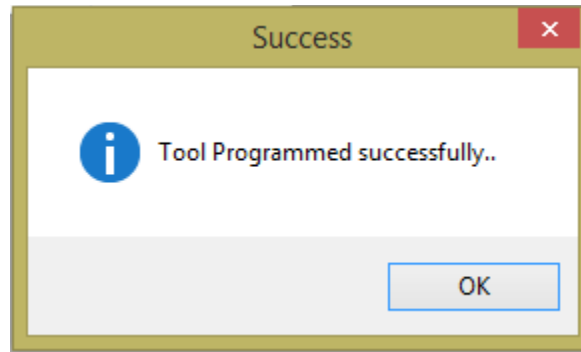


Figure 11: Success Dialogue box after clicking program tool button.

---

## 4.4 Changing Units

The DataCan readout can display units in a wide variety of formats.

If you wish to change the format, after connecting to the software, proceed with the following steps:

Step 1: Click on the **Configuration** menu, and then click on **Change Units** as shown in the figure.



Figure 12: Change units from configuration menu.

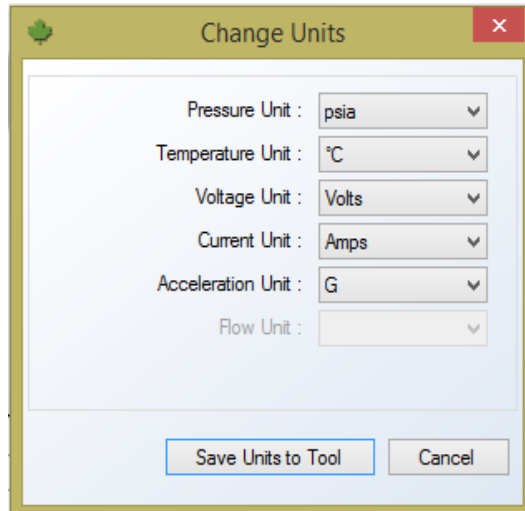


Figure 13: Change units form.

Step 2: Select appropriate units for each and click on **Save Units to Tool**. Once successful, you should see a dialogue showing status of operation and information related to the Job (i.e. job number and date and time of the job start)

[Note: This operation automatically restarts the device]

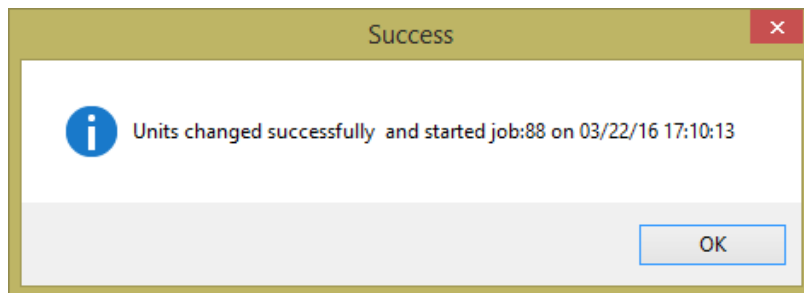


Figure 14: Dialogue confirming Changes.

Step 3: Click on **OK** to exit.

---

## 4.5 ModBus Map

When connected to the Telemetry card with the DataCan Download Software, to view the ModBus Map for the telemetry card, select "Utilities -> Generate Modbus Map (PDF)." A PDF containing information about the telemetry card and the ModBus Map can be saved where desired. **A copy of the ModBus Map should be saved after setup.**

Below is the sensor data registers for a single pressure and temperature gauge, locations will be different depending on the number and type of gauges connected.

Register Number	Data Address	Data Description	Data Type
30129	128	Surface Box Input Voltage	Swapped Float
30131	130	Surface Box Tool Current	Swapped Float
30133	132	Single gauge Pressure	Swapped Float
30135	134	Single gauge Temperature	Swapped Float
30137	136	Success counter	Decimal
30138	137	Failure Counter	Decimal

Logging the Surface Box Input Voltage, and Surface Box Tool Current for health monitoring and debugging purposes, can be very helpful when diagnosing issues.. The Success and Fail counters can also be useful for debugging purposes. The Success counter increments with every successful communication with a downhole gauge. The fail counter increments with every failed attempt to communicate with a downhole gauge, and communication is attempted 3 times every sample period. Both counters are only 1 register and roll over every 65 535 counts.

---

## 4.6 Downloading and Erasing All Jobs

Data records are recorded in the logger as jobs. The Telemetry Card creates a new job every time it is powered up and is able to collect data. It also creates a new job anytime the settings are changed.

### 4.6.1 Downloading Data

To download jobs, after connecting to the software, proceed with the following steps:



Step 1: Click on the  button to go to the download page.



Figure 15: Download page with jobs.



Step 2: Select jobs that need to be downloaded and click on the **Download** button. You will be prompted to save a binary file for each job selected. Choose a location to save to and click **OK**. Once it succeeds, you will see a progress bar with the download progress.

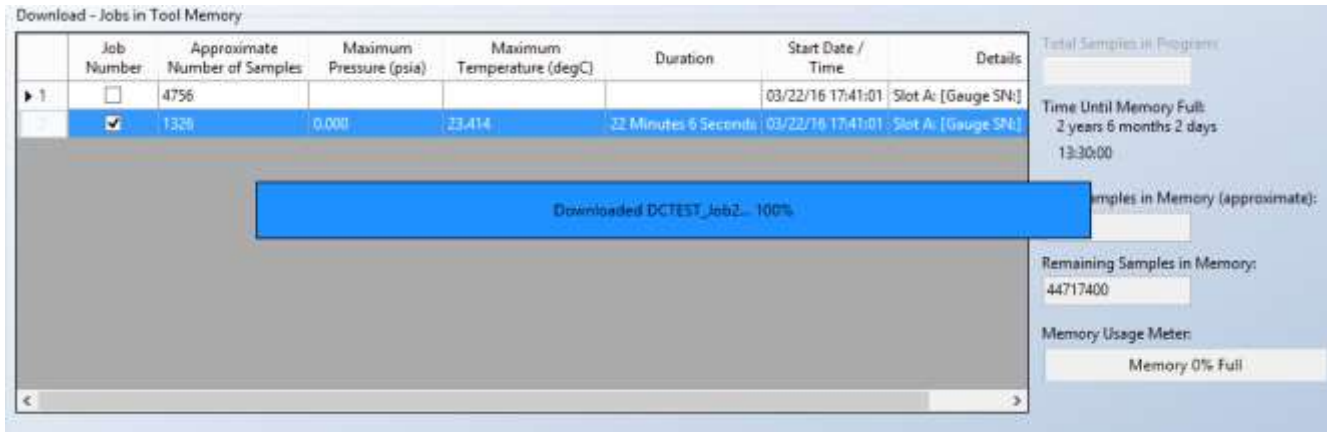


Figure 16: Progress bar showing status of download.

After the download, a dialogue box will appear stating the result of the download.

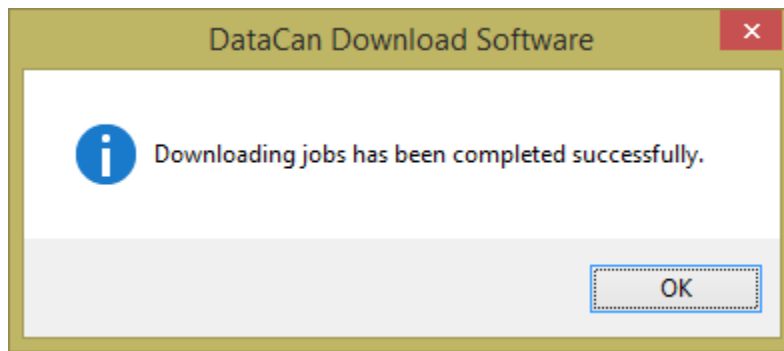


Figure 17: Success status after download succeeds.

## 4.6.2 Erase All Jobs

In the download page, click on the **Erase All Jobs** button to erase all jobs. Once you click on it, a confirmation prompt appears and states the approximate time to erase all jobs in memory depending on the memory filled.

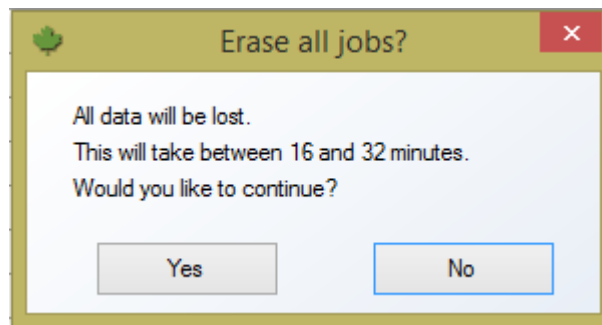


Figure 18: confirming erase all jobs dialogue box.

Click **Yes** to continue.

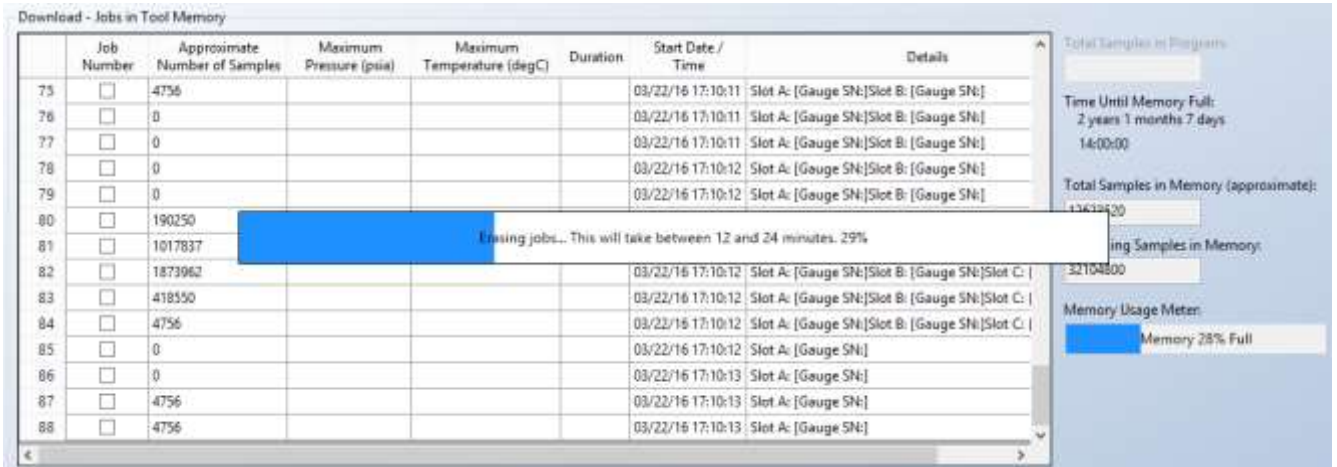


Figure 19: Progress bar stating status.

After the erase completes, you will see a dialogue box stating the results of the erase.

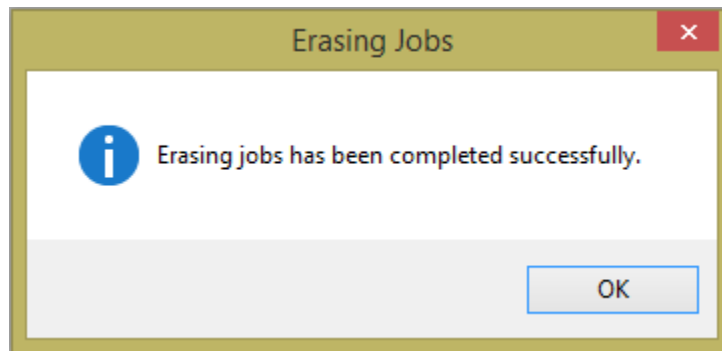



Figure 20: Erase jobs success dialogue box.

# 5 Graphing Data (Jobs)

After downloading a job, you can display the data by loading it in the graph screen.



Click the  button to get to the graph page.

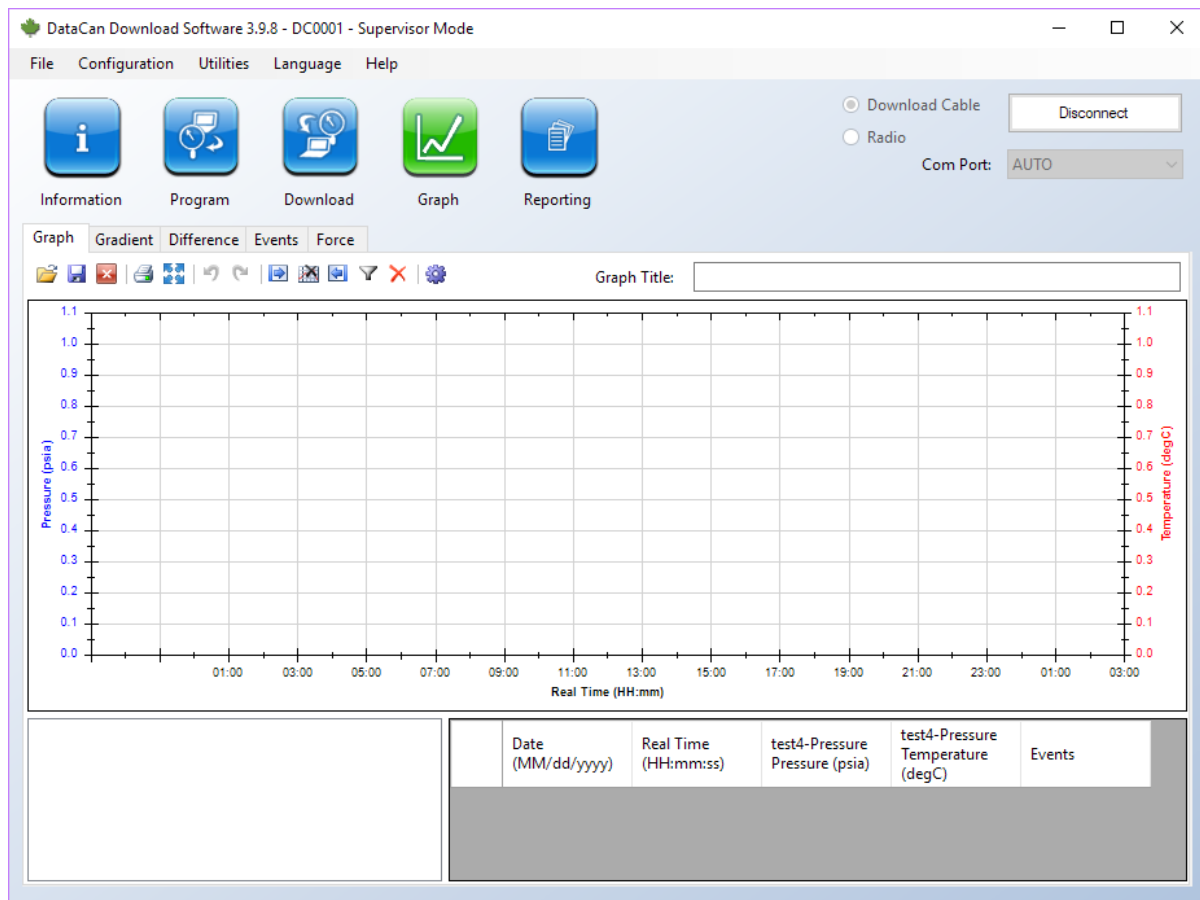

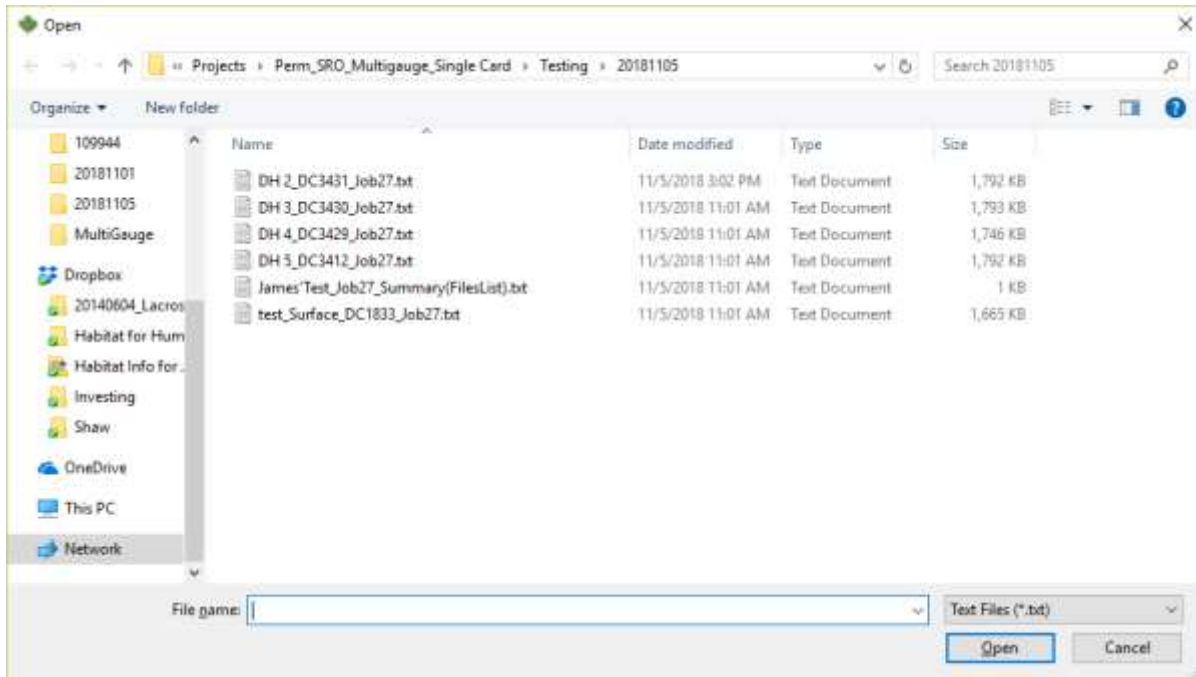


Figure 21: Graph page.

Next click the open icon .



**Figure 22: Graph "Open" window showing all files downloaded when 4 downhole gauges and 1 surface gauge were connected during a job.**

If more than one gauge was connected during a job, the data downloaded is divided into one file per device and one summary file. The summary file has "\_Summary(FilesList).txt" at the end of the file name. This summary file can be opened in the graphing software if the user would like to view all gauges from one job at the same time. Alternatively, each file can be opened and viewed individually.

Please see the *DataCan Download Software Guide* for a description of all the graphing functionality.

## 6 Real Time Data Display

The DataCan Multi-gauge Telemetry Card can graph data in real time on a PC and then save that graph to the computer. After confirming that all gauges are connected and communicating, and programming the desired sample rate, select "Utilities -> Real Time Logging" to go to the real time graphing page. Before starting the log you can select the file format as .TXT or .CSV, and you can select the location for the file.

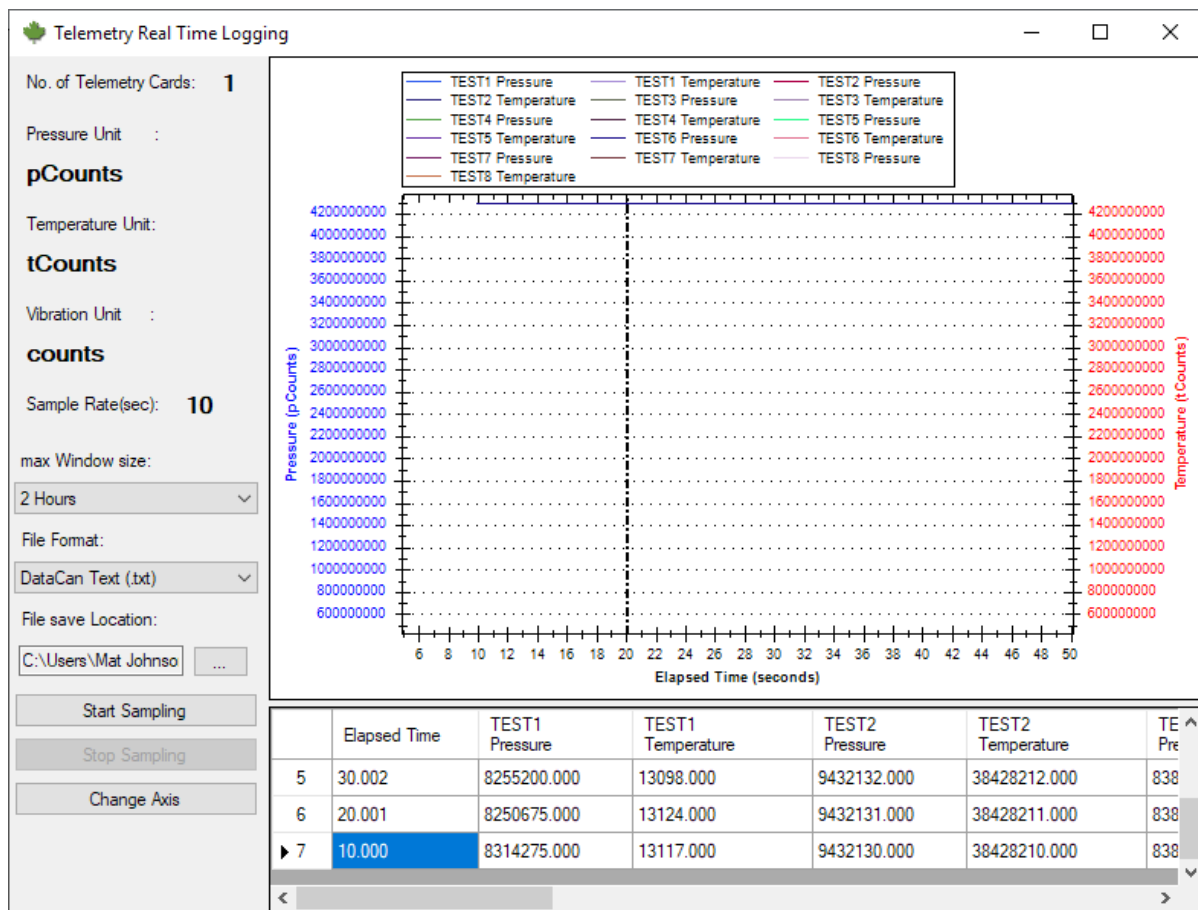


Figure 23: Real Time Logging Window.

To begin the graph click **Start Sampling**. The graph will start once the first complete sample set has been collected, and then update every sample interval, displaying a graph of the collected data in real time. To end the graph click **Stop Sampling**

---

**WARNING:** The log is saved to an auto-generated file at the location specified. If you click start sampling when the file location is the same as a previous recorded job you will **OVERWRITE** to old file. The data is still recorded in the telemetry card memory, but the timing of the Start Sampling and Stop Sampling button presses are lost.

---

## 7 LED Indicator Descriptions

Indicator	Behaviour	Meaning
<b>POWER</b> (Orange)	Solid	Power is on and adequate to power telemetry card
	Flashing slowly (1 blink/second)	Power is on and you can connect to the device using USB but power is not enough to run gauges.
	Fast or erratic blinking	Device cannot start up properly, check that the power supply to the card has adequate power output (4W)
<b>MODBUS</b> (Green)	Flash	The Telemetry card has responded to a data request on the ModBus network.
	Solid	The card has had an error, please power the card off and on.
<b>Tool</b> (Blue) (Red) (Blue)	Flashing	A sample has been collected by a downhole gauge
	Flashing	The card has failed to collect a sample from a downhole gauge. Please confirm the list of configured gauges on the information screen and the gauges connected.
	Solid	No tool connection fault. There is no current draw on the tool network. (Note: this is only updated when the card attempts to talk with a gauge. If the sampling rate is set for a long interval it can be a long time before this indicator responds.)



(Red)

Solid

Tool Power fault. This is most likely caused by a short circuit in the tool line. Check tool connections. If there is no short circuit in your connections. With the tools connected, disconnect and reconnect telemetry card power.

If you have disconnected the tool line from the card and the indicator stays on longer than your sample rate, please return the card to DataCan for service.

---

## 8 Telemetry Card Sensor Setup

DataCan will attempt to program the Telemetry Card for the customer's requirements prior to shipping whenever possible. This section describes how to either do the initial setup of the telemetry system and gauges or how to completely reconfigure a Telemetry Card for a different configuration than was previously set up.

It is assumed you are familiar with the basic functionality of the DataCan Download Software.

---

### 8.1 Gauge Setup – Original Style

When using "original style" (one-way communication) gauges down hole, the gauges themselves do not need any software setup. The Telemetry Card does need to be set up to handle this style of gauge.

#### 8.1.1 Software Setup

The internal telemetry card always shows up on the **Information** page in the DataCan Download Software as address 0. To change your setup, you must enter supervisor mode by pressing **Ctrl+SHIFT+D** at the same time, and "- Supervisor Mode" should appear in the top bar. To then set up a one-way communication gauge, press the **Edit** button for the "Permanent Telemetry Logger".

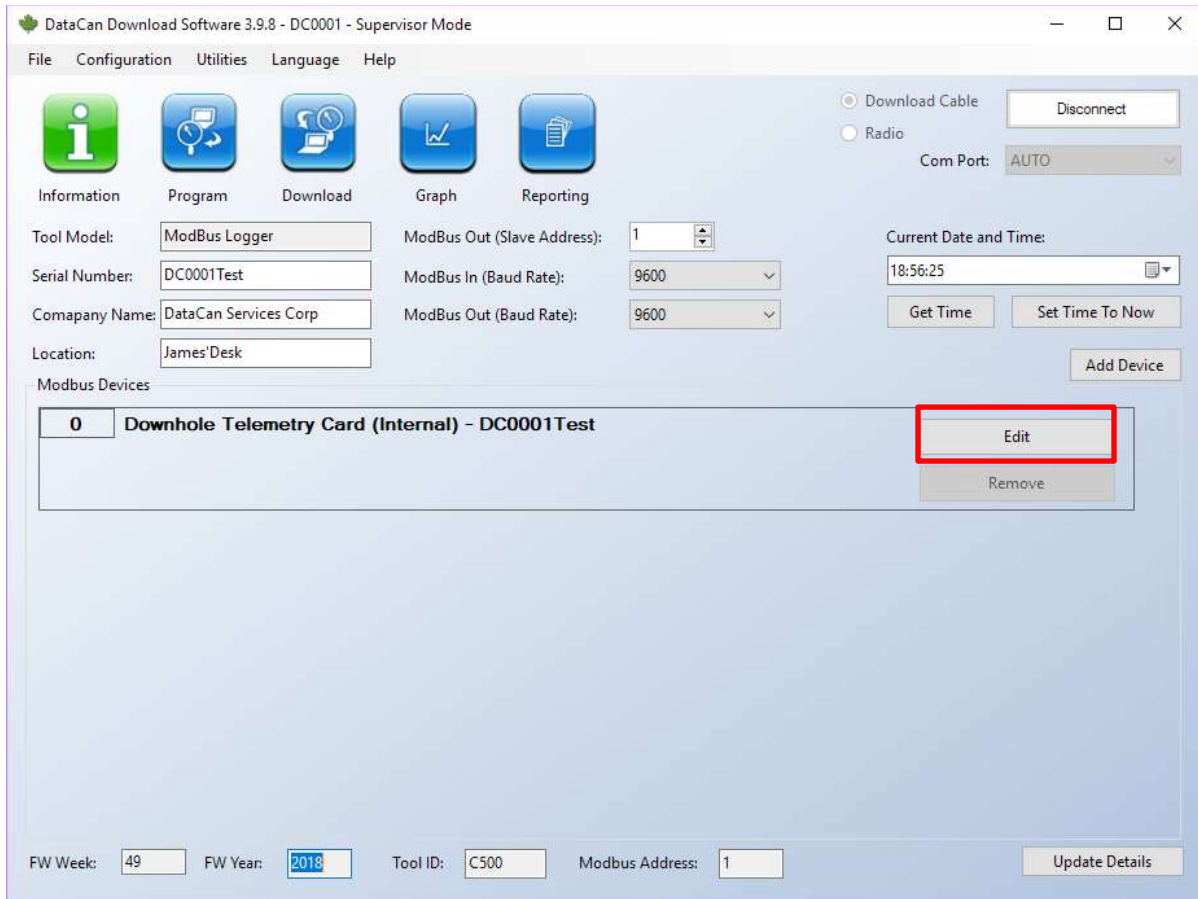
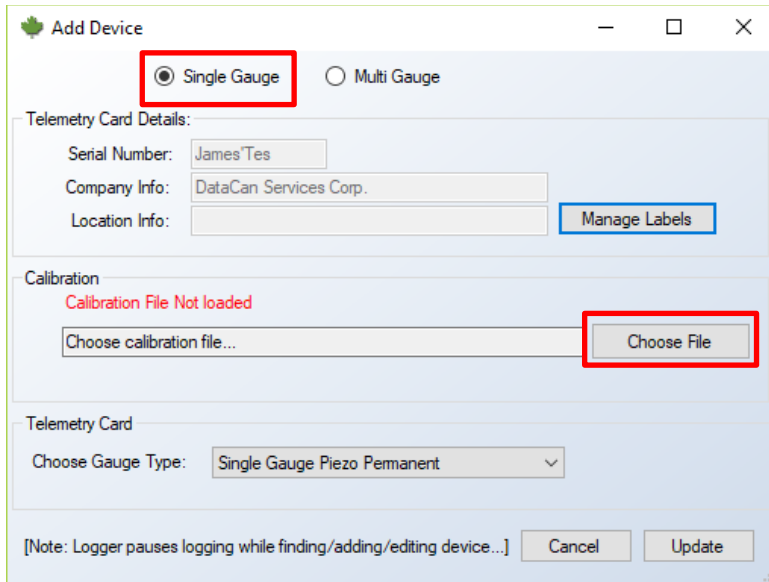


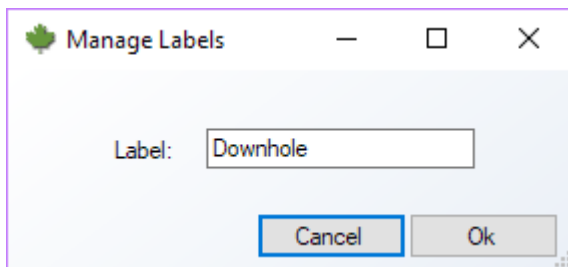
Figure 24: One-way communication gauge, "Edit" button.



**Figure 25: Select "Single Gauge".**

Select **Single Gauge** for one-way communication style gauges. You will notice the warning that **Calibration File Not Loaded**. In the **Calibration** section, press **Choose File** and browse to the calibration files for the gauge to be connected, select the file, and click **Open**.

A label can be added for the gauge. The label will be displayed on the Telemetry Card for each gauge reading. In the **Telemetry Card Details** section, press the **Manage Labels** button.



**Figure 26: Gauge label section.**

The label can be up to 20 characters. Suggested labels for each gauge are gauge depth (e.g. 2516 feet) or sensor measurement location (e.g. tubing, casing or vent).

In the **Telemetry Card** section, choose the gauge type from the drop-down list.

Click the **Update** button to store these settings to the Telemetry Card. The software will store the information to the Telemetry Card and then start a new job in the Telemetry Card memory.

---

## 8.2 Gauge Setup – Multi-Gauge Style

When using “multi-gauge style” (two-way communication) gauges down hole, the gauges themselves need to be set up in software. The Telemetry Card also needs to be set up to handle this style of gauge and know how many gauges to communicate with. To configure the gauges they must be electrically connected to the **DH TOOL** connection of the Telemetry Card, and you must know their serial number. To connect multiple gauges start with a pass-through gauge and use a pass-through cable to connect the next gauge. The bottom-hole gauge can only be the last gauge in the connection.

### 8.2.1 Software Setup

The internal telemetry card always shows up on the **Information** page in the DataCan Download Software as address 0. To change your setup you must enter supervisor mode by pressing **Ctrl+SHIFT+D** at the same time, and “- Supervisor Mode” should appear in the top bar. Once in supervisor mode press the **Edit** button for the “Permanent Telemetry Logger”.

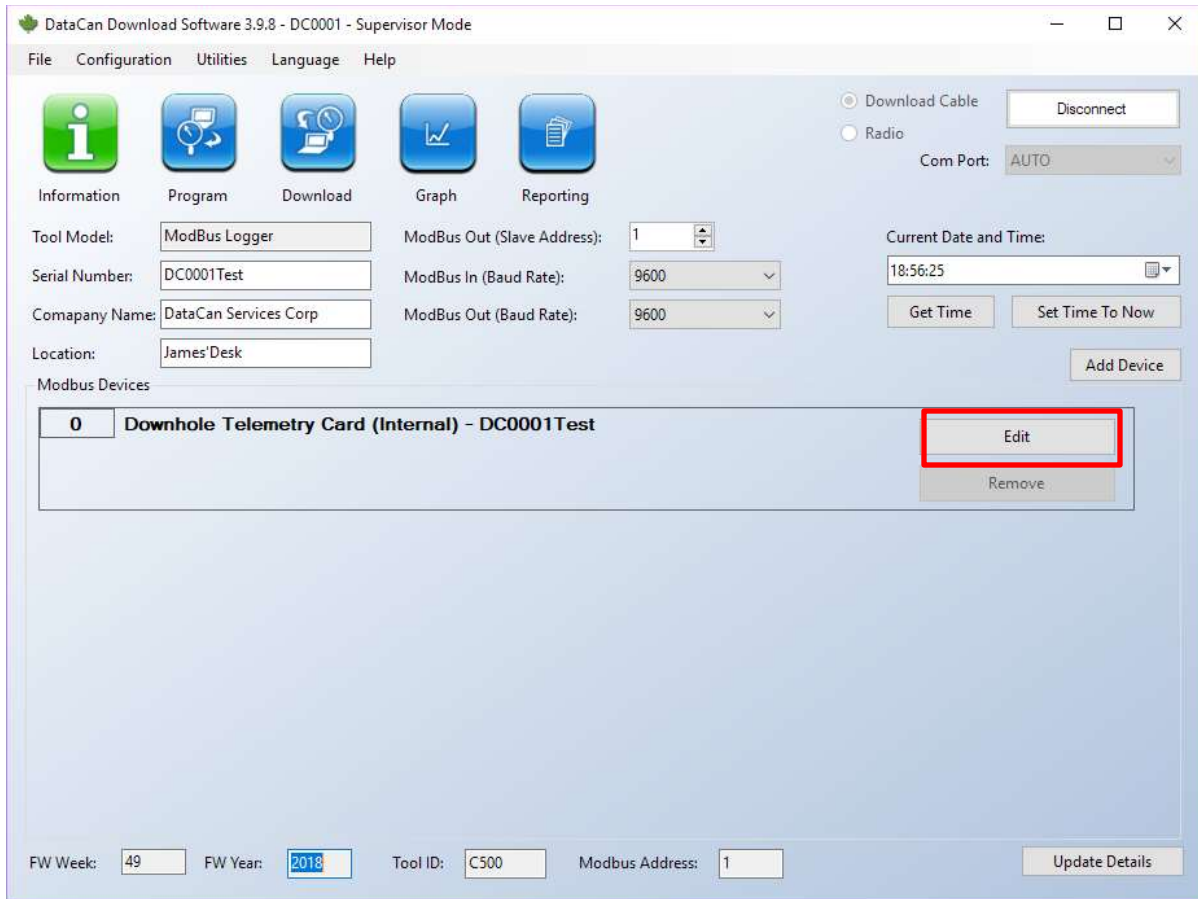
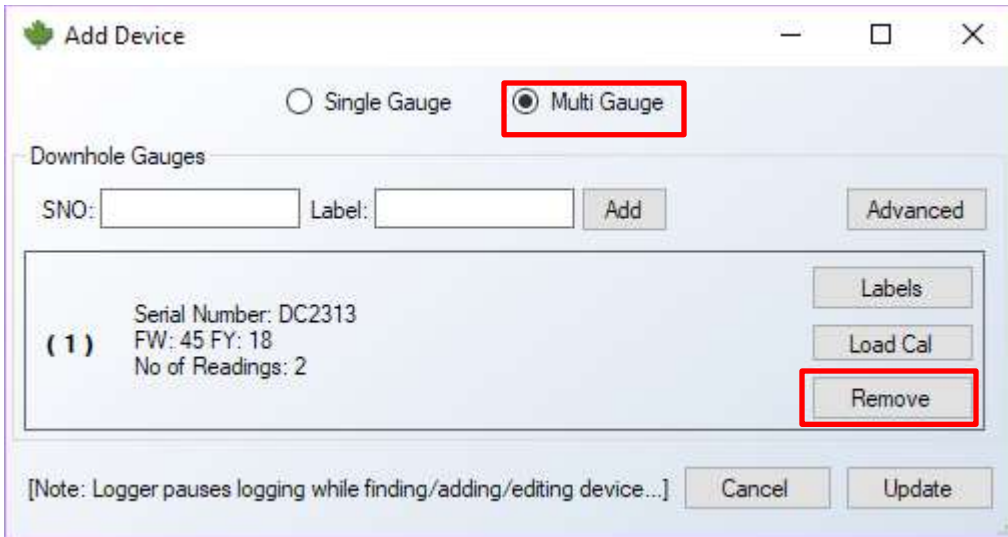


Figure 27: Two-way communication gauge, "Edit" button.

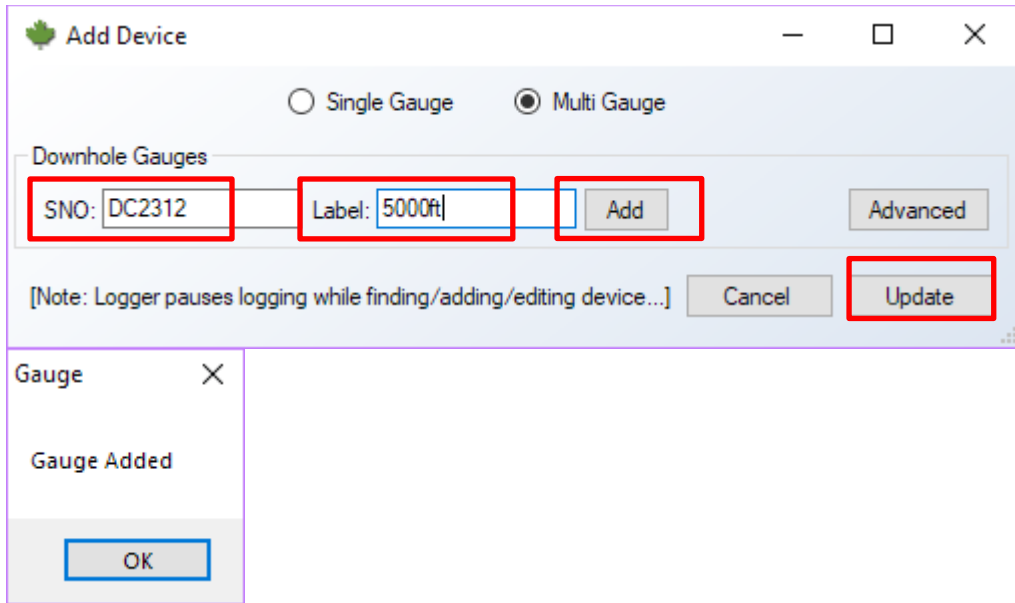


**Figure 28: Select "Multi Gauge".**

Select "Multi Gauge" for two-way communication style gauges.

If there are any gauges listed that will not be connected to this Telemetry Card, press the **Remove** button.

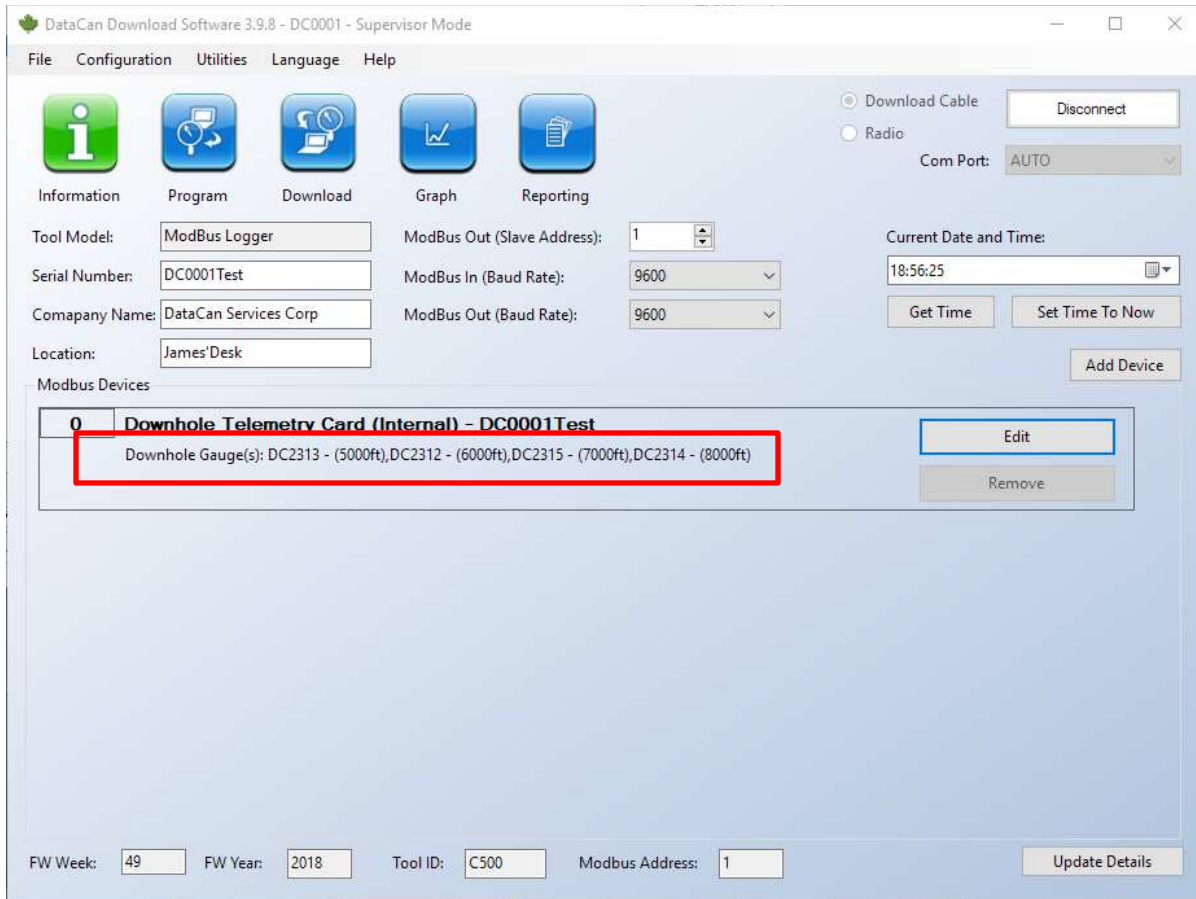
Once the gauges are connected, fill in the serial number and desired label for the first gauge. The label can be up to 20 characters. Suggested labels for each gauge are gauge depth (e.g. 2516 feet) or sensor measurement location (e.g. tubing, casing or vent). Once filled in, click the **Add** button.



**Figure 29: Add gauge dialog.**

Repeat the procedure until all the gauges are entered. If you receive the error "Gauge Not Found!" please confirm all your connections and that you have the correct gauge serial number as printed on the side of the tool. Once all the tools are added click the "Update" button. The software will store the information to the Telemetry Card and then start a new job in the Telemetry Card memory. Once updated you should see the list of downhole gauges with (labels) in the information page.





**Figure 30: Updated Gauge List**

The labels can be edited at any time by pressing the **Edit** then **Labels** buttons.

It is recommended that the user connects all the gauges to the Telemetry Card and then runs Diagnostic mode to confirm that everything is working correctly.

## 8.3 Output Voltage

The telemetry card can output either 12 Volts or 24 Volts to the tool line. Lower voltage requires less power and puts less stress on the tools, extending their life. A single tool on a line less than 7 000 m (23000 ft) should be run on 12 Volts. A pair of tools run on a line less than 4 000 m (13

000 ft) should be run on 12 Volts. If you have more than 2 tools or depths deeper then described above, you will likely need to run the system at 24 V output.

To change the tool line voltage you must enter supervisor mode by pressing **Ctrl+SHIFT+D** at the same time, and "- Supervisor Mode" should appear in the top bar. Then select *Configuration* -> *Logger Setup*.

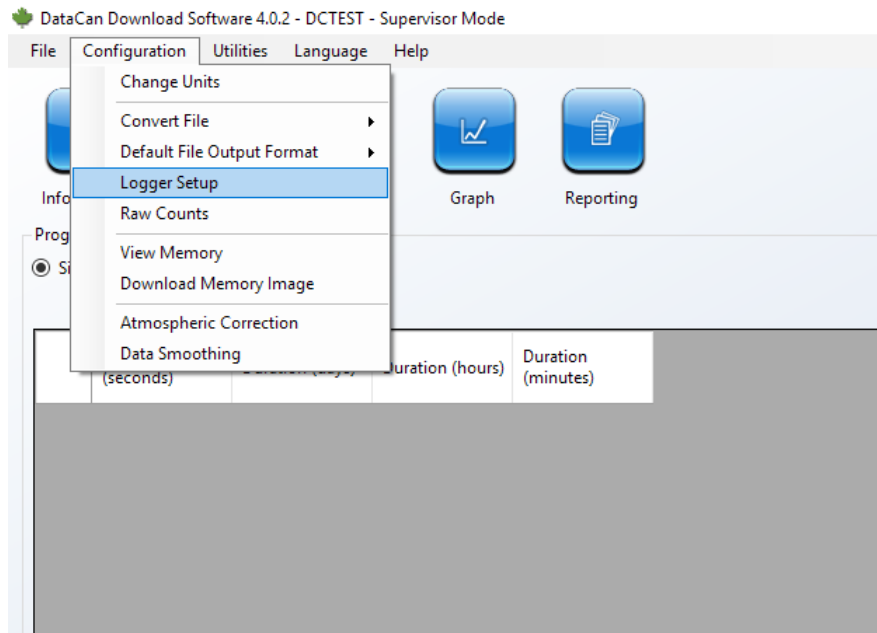


Figure 31: Select *Logger Setup*

The **Logger Setup** popup will appear. Select the desired output voltage then click **Save**.

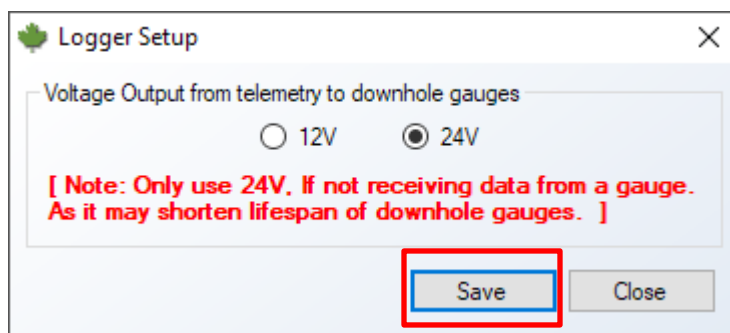


Figure 32: Select Tool Line Voltage