vLoc3-DM (Defect Mapper)
User Handbook

(English Edition)

Version 1.0

P/N: 4.04.000171

General Safety & Care Information

Who Can Use This Equipment

- This equipment must only be used by people suitably trained in the use of pipe and cable locators.

Work-site Safety

- Use your company's, or other applicable safety codes and rules when using this equipment.
- Unless having the required authorization, license and appropriate training – **do not** make connections to any pipe, cable or conductor.
- The equipment should not come in contact with corrosive or hazardous chemicals, or gases or dust.
- **Do not** directly connect this equipment to cables or pipes that have a potential difference to ground of greater than 25V AC.

Equipment Safety

- **Do not** open the enclosures (housings) of either the transmitter or receiver.
- Place the ground stake firmly in the ground before connecting the cable from the transmitter.
- **Do not** hold any uninsulated portion of the connection leads & clips when the transmitter is switched on.

Batteries and Environmental Safety

Vivax-Metrotech products use four types of batteries:

- Alkaline batteries
- Ni-MH (Nickel-Metal Hydride) batteries – rechargeable
- Lithium-Ion batteries – rechargeable
- Lithium-Metal batteries – (small non-rechargeable button cells for "clock" applications)

1. Alkaline Batteries (Non-Rechargeable)

- When replacing the alkaline batteries – use only the size and type specified – **do not** mix battery types (rechargeable and alkaline).
- **Do not** mix partially discharged and fully charged cells in the same battery pack – **do not** mix old with new.
- Never attempt to charge alkaline batteries.

2. Nickel-Metal Hydride Batteries (Rechargeable)

- When using rechargeable batteries, use only the correct charging device supplied or specified by the manufacturer. The battery pack or the battery charger will contain circuitry to manage the charging process – other chargers (even if they have the same connector, polarity, voltage & current rating will not have the same control circuitry and can cause damage to the product, overheating, and in extreme cases fire or harm to the individual.
- **Do not** assume that if the plug fits, it is the correct charger – a charger with the correct part number **must** be used – just because it is a Vivax-Metrotech charger, and the plug fits **does not** mean it is the correct charger.
- Before using for the first time, charge rechargeable batteries for six hours. If at any time the rechargeable batteries **do not** last as long as anticipated – discharge fully and then charge for six hours.
- Care should be taken when charging batteries – **Never** repeatedly recharge batteries (or turn power off & on) without using the instrument. If used with an inverter in a vehicle – charge the product then unplug the charger and **do not** charge again until the rechargeable batteries have been used for at least ten minutes. Failure to do this could result in the overcharging of the battery which will shorten the life of the battery and could in some circumstances cause overheating or fire.
- If ever the product becomes hot during the charging process, **immediately** unplug the charger and use the rechargeable batteries for at least ten minutes before recharging. If this reoccurs the next time the unit is charged – return immediately to Vivax-Metrotech for repair.
- **Do not** charge batteries for prolonged periods of time without using the locator for at least ten minutes. Charging for prolonged period of time could overcharge the battery, reduce the battery life and in extreme circumstances cause damage to the locator and fire.

3. Lithium-Ion Batteries (Rechargeable)

- Lithium-Ion Batteries – some products use Lithium-Ion batteries – the requirements for marking and transportation are still developing. Please contact Vivax-Metrotech before shipping products containing Lithium-Ion batteries or Lithium-Ion battery packs on their own for any "special instructions".

4. Lithium-Metal Batteries (Non-Rechargeable)

- Commonly known as "button cells" these are small – non-rechargeable batteries used to power internal "clocks" within some units (similar to computers). Generally, they have a life of three to five years.
- Under no circumstances should any attempt be made to charge these batteries.
- Dispose of to your company's work practice/environmental standards, the prevailing laws, or recognized best practice. Always dispose of batteries responsibly.

5. General Rules regarding Disposal of Batteries

- **Never** disassemble a battery, or battery pack.
- **Never** dispose of in a fire or water.
- Dispose of batteries in accordance with your company's work practice/environmental standards, the prevailing laws, or recognized best practice. Always dispose of batteries responsibly.

6. Transportation of Lithium-Ion and Lithium-Metal Batteries

- The Lithium-Ion and Lithium-Metal batteries used in Vivax-Metrotech products meet the required safety standards and include the designated protection circuitry.
- Recent regulation changes require that when batteries with Lithium-Ion and Lithium-Metal batteries are transported, the packaging **must** include specified warning labels.
- **Please contact Vivax-Metrotech Customer Service (USA 1-800-446-3392, International +1-408-734-1400 (USA Pacific Time Zone)) for more details.**
- Regulations have also changed regarding the shipping of spare battery packs (battery packs that are not inside a product). There are limitations on the weight of the package, and the packaging must be marked with the appropriate warning labels.
- **Please contact Vivax-Metrotech Customer Service (USA 1-800-446-3392, International +1-408-734-1400 (USA Pacific Time Zone)) for more details.**
- Vivax-Metrotech vLoc Series 3 products using Lithium-Ion battery are classified as "not restricted" they can be shipped normally by road/rail/sea & air (passenger & freight aircraft) without restrictions.

IMPORTANT

Remember – Batteries contain dangerous chemicals – They can be affected by many things such as water ingress or heat – In some circumstances they can explode. They also can cause electric shocks!

Care of Equipment

- Use equipment only as directed in this User Handbook.
- **Do not** immerse any part of this equipment in water.
- Store in a dry place.
- Keep equipment in the case provided when not in use.
- If left for prolonged period of time – remove alkaline batteries.
- Keep unit clean and free of dust and dirt.
- Protect against excessive heat.

Care when Interpreting the Information provided by the Locator

- Like all locators – this instrument is locating and providing depth and current readings based on electromagnetic signals that radiate from the buried cable or pipe. In most cases these signals will enable the locator to pinpoint both position depth and current correctly.
- **Beware** – in some cases other factors will distort electromagnetic fields radiating from cable or pipe being located, resulting in incorrect information.
- Always locate responsibly and use information learned during your training to interpret the information provided by the locator.
- **Do not** provide information regarding depth of cable or pipe to anyone unless authorized to do so by your company.
- **Remember** that depth measurements are to the center of the electromagnetic field or pipe – In the case of pipes this may be significantly deeper than the top of the pipe.

American & Canadian Safety Notices

USA

- This transmitter and receiver comply with the general conditions of operation, pursuant to part 15 of the FCC Rules.
  - CFR 47 Part 2
  - CFR 47 Part 15
- Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the products.

CANADA

- Equipment is for use by trained operators only, and not for general household or consumer use.
- Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference that may cause undesired operation of the device.

EUROPE

- Vivax-Metrotech confirms that the location system is compliant with relevant provision of European directive 1999/5/EC.
  - EN 55011
  - EN 61000-4-2: A1 & A2
  - EN 61000-4-3
  - EN 61000-4-8: A1
  - ETSI EN 300 330-2
  - ETSI EN 301 489-1
  - ETSI EN 301 489-3

Table of Content

1. Service & Support

1.1 Serial Number and Software Revision Number

Always quote your receiver or transmitter model, serial number, and software revision number when requesting product support. They can be found as follows:

1	Model & Serial Number

NOTE

The software revision number, for both receiver and transmitter, is displayed on the LCD during the startup sequence or can be found in the "About" section of the user menus.

1.2 Distributors and Service Centers Closest to You:

Worldwide Sales Offices and Service Centers

World Headquarters, United States of America

Vivax-Metrotech Corporation
3251 Olcott Street,
Santa Clara, CA 95054, USA
Website : www.vivax-metrotech.com

Sales & Sales Support:
T/Free : 800-446-3392
Tel : +1-408-734-1400
Fax : +1-408-734-1415
Email : SalesUSA@vxmt.com

Service & Repairs:
T/Free : 800-638-7682
Tel : +1-408-962-9990
Fax : +1-408-734-1799
Email : ServiceUSA@vxmt.com

Central/South America and the Caribbean

Ventas para América Latina
3251 Olcott Street,
Santa Clara, CA 95054, USA

T/Free : 800-446-3392
Tel : +1-408-734-1400
Fax : +1-408-743-5597
Website : www.vivax-metrotech.com
Email : LatinSales@vxmt.com

Canada

Vivax Canada Inc.
41 Courtland Ave Unit 8,
Vaughan, ON L4K 3T3, Canada

Tel : +1-289-846-3010
Fax : +1-905-752-0214
Website : www.vivax-metrotech.com
Email : SalesCA@vxmt.com

France

Vivax-Metrotech SAS
Technoparc - 1 allée du Moulin Berger,
69130 Ecully, France

Tel : +33(0)4 72 53 03 03
Fax : +33(0)4 72 53 03 13
Website : www.vivax-metrotech.fr
Email : SalesFR@vxmt.com

Germany

Metrotech Vertriebs GmbH
Am steinernen Kreuz 10a
D-96110 Schesslitz

Tel : +49 954 277 227 43
Website : www.vivax-metrotech.de
Email : SalesEU@vxmt.com

United Kingdom

Vivax-Metrotech Ltd.
Unit 1, B/C Polden Business Centre,
Bristol Road, Bridgwater,
Somerset, TA6 4AW, UK

Tel : +44(0)1793 822679
Website : www.vivax-metrotech.com
Email : SalesUK@vxmt.com

International Distributors and Service Centers

Australasia

Vivax-Metrotech AUS
Unit 1, 176 South Creek Road,
Cromer NSW 2099, Australia

Tel : +61-2-9972-9244
Fax : +61-2-9972-9433
Website : www.vivax-metrotechaus.com
Email : sales@vxmtaus.com
service@vxmtaus.com

China

Leidi Utility Supply (Shanghai) Ltd.
No. 780, Tianshan Rd,
Shanghai, China 200051

T/Free : 4008-206-719
Tel : +86-21-5235-3001
Fax : +86-21-5235-8365
Website : www.leidi.cn
Email : info@leidi.cn

2. Introduction

2.1 About this Manual

This handbook assumes some understanding of Cathodic Protection techniques, It covers the operation of the Loc-150Tx transmitter and the vLoc3-DM receiver.

2.2 Overview of vLoc3-DM System

The vLoc3-DM (Defect Mapper) has been designed to:

- identify the position of coating defects
- identify shorts to other structures
- help categorize the faults
- help plan and prioritize remedial work
- operate as a long line pipeline locator

The vLoc3-DM uses the latest locating and signal processing techniques to plot the current gradient of an industry-standard low frequency (3Hz or 4Hz) profiling current. The current is typically applied at CP stations so the disruption of the pipeline can be minimized.

The Loc-150Tx, 150W transmitter (DM transmitter), is used to apply a signal current to the anode bed. The pipeline returns the signal via coating faults back to the transmitter. The transmitter is designed to be powered from CP (Cathodic Protection) stations, AC or external batteries, eliminating the need for internal batteries.

The non-intrusive measuring device, the vLoc3-DM receiver, takes measurements along the pipeline and plots the results directly onto the screen of the receiver. There is no need to carry extra logging and display devices. All the data is displayed and logged into the receiver and can be downloaded to a spreadsheet or dedicated analysis program.

An internal +/- 3m accuracy GPS antenna is included with the system. Alternatively, a Bluetooth enabled GPS device can be linked to the vLoc3-DM receiver via Bluetooth radio link. The GPS enables the user to generate real-time current gradient graphs and guides the user back to the point of interest by highlighting the user’s position on the graph. This feature is called the “walk back” feature. The system can also be integrated with other high accuracy GPS systems and software packages.

Storing the results also has the benefit of facilitating the technique of comparative tests. Comparing the results from previous surveys of the same length of the pipe allows the Cathodic Protection engineer to establish trends of coating deterioration.

The A-frame fault-finding accessory is used to accurately locate the position of a fault. An arrow points the user to the position of the fault whilst quickly and efficiently graphing the characteristic shape and magnitude of the fault signal on the receiver's display. This ensures the user minimizes the chances of misidentification.

The A-frame is also used to undertake full ACVG surveys along a pipeline route. Results are stored with GPS data and real-time graphs generated on the vLoc3-DM screen.

Setting the vLoc3-DM to simultaneous mode allows the user to simultaneously take ACVG and current profiles during just one survey of the pipeline.

2.3 Planning a Survey

Surveys will vary greatly depending on the type of terrain, accessibility, condition of the pipeline, type of pipeline and coating type.

The first step of undertaking any survey should be to obtain information about the stretch of the pipeline to be surveyed. More work at this stage may well save time and effort later. Obtaining maps showing route information, CP stations, sacrificial anodes and cross bonding points will be of great help.

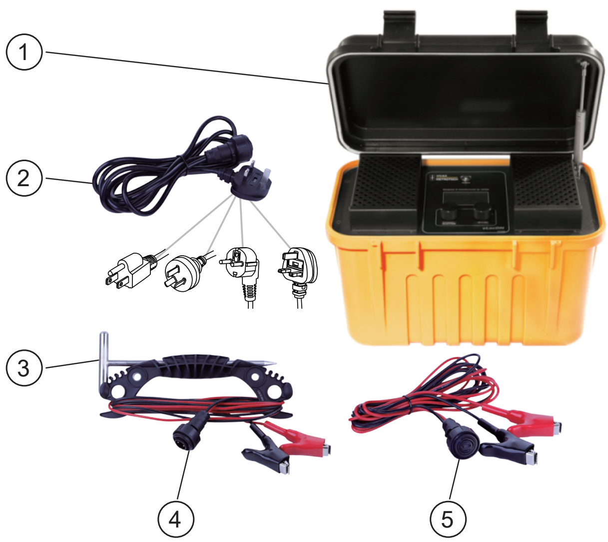
The transmitter should be capable of transmitting from one CP station to another, so although not absolutely necessary, plan to have the previous and after CP stations disconnected from the stretch of the pipeline to be surveyed. Remember that the pipeline is not protected whilst the survey is being undertaken, so unnecessary downtime of CP stations should be avoided.

Choose the survey interval to match the condition of the pipeline. In areas where the coating is particularly poor, a survey interval of as little as 10m may be desirable. However, if the coating is in very good condition and the distance between CP stations is many km, it may be better to choose a survey interval of as much as 200m. Taking measurements at large intervals will enable the surveyor to quickly asses the condition of the pipeline and subsequently identify areas that require further inspection at closer survey intervals or detailed analyses using the A-frame Fault Finder accessory.

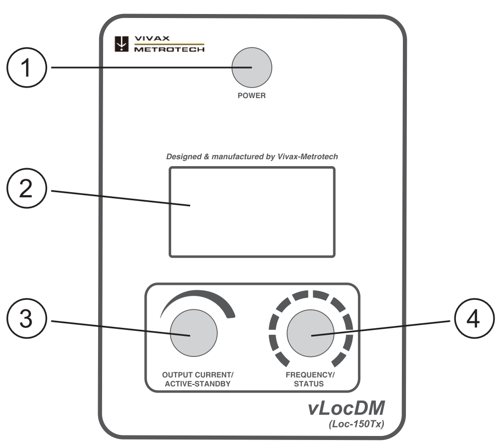
WARNING
Parts of the pipeline may be crossing road junctions and may even follow the route of roads. Obtaining accurate results from the vLoc3-DM requires full concentration from the operator. It is, therefore, essential that correct traffic management is undertaken at these points to avoid poor results or injury to the operator. Safety should always be the first concern.

3. Loc-150Tx, 150Watt Transmitter Functions and Operations

3.1 Transmitter Overview

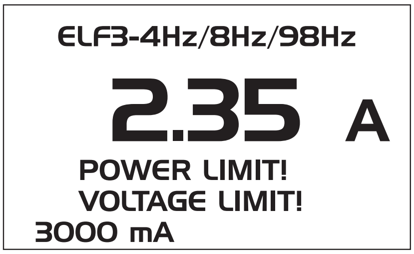


1	Loc-150Tx Transmitter
2	AC power cord *one of supplied based on geographical location
3	Ground stake
4	Signal Output Cable, with clamps & Signal Output Connector
5	DC power cord

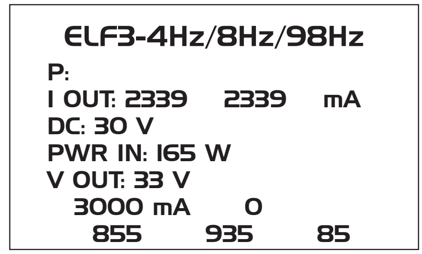


Ref.	Control	Function
1	Power	To power on/off the unit
2	LCD Display	View menu status and information from the transmitter
3	Output Current/Active-Standby	- Rotate rotary switch to select output current - Press and hold to power on or standby
4	Frequency/Status	- Rotate rotary switch to select a frequency - Press momentarily to view status (refer to status screen in the section below)

3.2 Display



Main Screen



Status Screen

NOTE
Power Limit = The Overpower alarm will be shown on the display when the output power rating of the transmitter is reached. (150W or 50W if 12-28Vdc input is used.)
Voltage Limit = The output voltage limit is 100V. If the current cannot be stabilized with a voltage less than 100V, it will display an overvoltage alarm.

3.3 Power Supplies and Connections

1	Mains Input
2	Mains Input Fuse (5A, 250V)
3	12 - 60V DC Input
4	Output Fuse (10A, 250V)
5	Output Socket

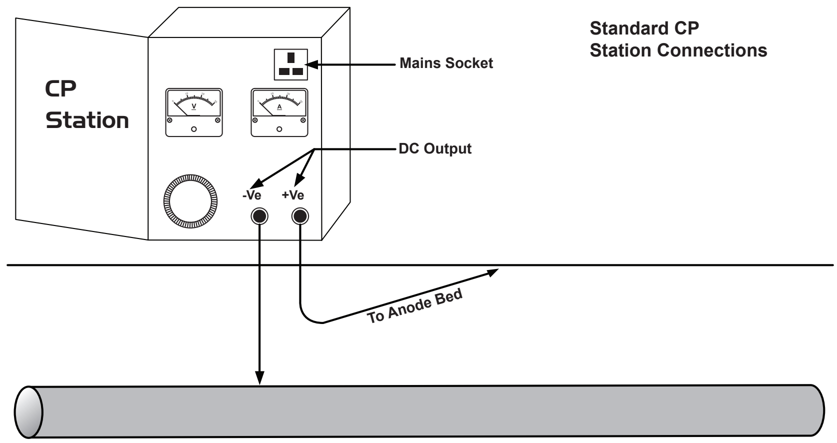
3.4 Connecting to the Pipeline

3.4.1 Connecting at a CP (Cathodic Protection) Station

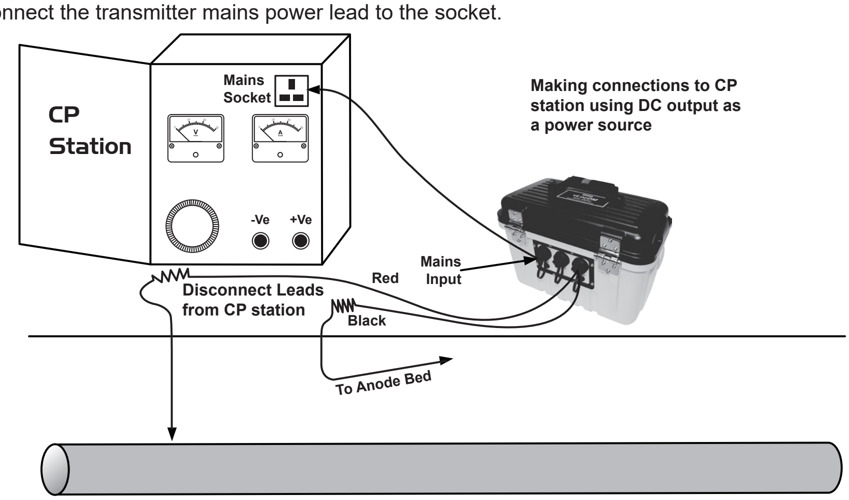
WARNING
Connecting to the CP station involves removing connections from the CP transformer rectifier and should only be performed by authorized personnel. Always make connections before switching on the unit. Switch off before disconnecting the transmitter.

Method:

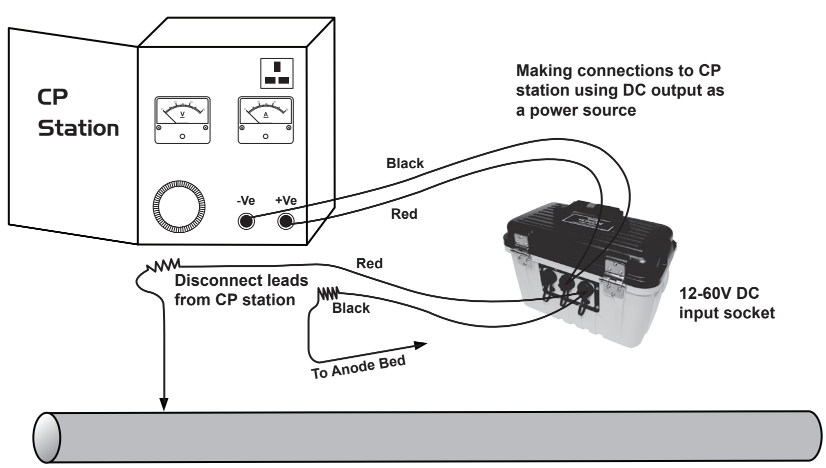
1. Make a note of the CP settings (output current and voltage settings). This is important as the settings must be checked to ensure they return to the original settings when the connections are re-made.
2. Switch off the CP transformer rectifier and allow the residual voltage to dissipate. This may be a few seconds or a few minutes, depending on the pipe condition.



3. Disconnect the output wires connecting the CP station to the pipeline and anode bed. If there is an earthed mains socket at the station, connect the transmitter mains power lead to the socket.



4. If there is no mains socket, it is possible to use the DC output of the transformer rectifier. See the diagram below.



5. Adjust the transformer output to approximately 40V DC (although the unit will function from 12V DC to 60V DC) and use the DC input lead to connect the transmitter to the transformer terminals.

6. With the output lead connected to the transmitter, connect the red wire to the lead connecting to the pipeline. Connect the Black wire to the lead connecting to the anode bed. See the diagram above.

NOTE
If the output leads are white and green, the white cable should be connected to the pipe.

3.4.2 Connecting to the Pipe when there is No Access to a CP Station

Sacrificial Anode

Very often the cable connecting a sacrificial anode to a pipe is fed through an above-ground connection box. If this is the case the anode can be disconnected, and these cables used to connect the transmitter to the pipe. The Red connection lead needs to be connected to the pipe side and the black to the sacrificial anode.

It will be necessary to power the transmitter either from a portable 110V AC mains generator or from a vehicle car battery or external 12V DC power source.

NOTE
It may not be possible to attain high current from the transmitter, as a sacrificial anode will not provide as good a ground as a system anode bed.

Connecting at a Point where Access to the Pipe is Possible

It is possible to connect the transmitter at any point along the pipe length where an electrical connection is possible. If this is the case, a good independent ground will need to be generated by driving a ground stake into the ground a few meters perpendicular to the pipe. The ground needs to be low impedance, so the copper ground rod needs to be at least 0.5 meters long. In some cases, multiple stakes may be necessary.

A poor ground will result in the transmitter showing the overvoltage alarm even at low currents. If this occurs, add further ground rods connected in parallel and dampen the surrounding soil.

WARNING
Use a cable locator to ensure the area is clear of services before the rod is driven into the ground.

3.5 Selecting the Correct Frequency

The available frequency options are:

- 98Hz
- 128Hz
- 512Hz
- 640Hz
- ELF1-3Hz/6Hz/98Hz
- ELF2-3Hz/6Hz/128Hz
- ELF3-4Hz/8Hz/98Hz
- ELF4-4Hz/8Hz/128Hz
- SD EUR (640/320Hz)
- SD USA (512/256Hz)

Note that some frequencies may be missing depending on age and software revision of the transmitter. Vivax-Metrotech reserve the right to change this frequency list without notification.

3Hz/6Hz/98Hz or 3Hz/6Hz/128Hz are the most commonly used frequencies. They provide the low-frequency 3Hz component required for current mapping and a low frequency (98Hz or 128Hz depending on local mains frequencies) used to pinpoint the position and is used to determine the pipe depth. The 6 or 8Hz enables the locator to calculate the DM current direction.

The other frequency options can be used to improve reception in areas of high interference.

SD signals are explained in the section: Signal Direction Precision Identification

3.6 Output Current Select

There are seven current settings:

- 100mA
- 300mA
- 600mA
- 1A
- 2A
- 3A
- 4A (when a single locate frequency is selected)

Choosing the correct setting for a particular application depends on many factors, but as a general rule, the higher the setting the better. The higher the current the more stable the readings at long distance and larger currents create larger current changes at faults. However, it will not always be possible or desirable to apply the maximum current.

With the transmitter connected as above, select the 3A position. Wait to see if any alarms are displayed, such as over-voltage, overpower, over-temperature. If after 20 seconds, no alarms are shown, note the return current reading. This should be 3A+/-0.1A. Now note the output voltage. This should be less than 100V. The transmitter stabilizes the output current by altering the output voltage. The output voltage limit is 100V. If the current cannot be stabilized with a voltage less than 100V, it will display an overvoltage alarm. The transmitter is not damaged if this is displayed but the output will not be stabilized. To overcome this, select a lower current setting.

Other causes of overvoltage alarms are:

1. Pipeline in very good condition (Small high impedance faults will require higher voltages to achieve the requested current).
2. Poor anode bed -poor anode beds will require a high voltage drop across them to create the requested current.
3. Poor pipe connections.

3.7 Alarms

3.7.1 Over Voltage

Output exceeds 100V. (also see Output Current Select)

3.7.2 Over Temperature

The over-temperature alarm will show on the display when the temperature of the output amplifier exceeds a predetermined level. At this temperature, the unit will shut down and cannot be switched on until the unit has cooled down.

After the unit has been cooled down, it may be necessary to place the unit in a position where the ambient temperature is less such as a shaded position. Alternatively, select a lower current output.

3.7.3 Overpower

The Over Power alarm will be shown on the display when the output power rating of the transmitter is reached. The unit will shut down until the output power is reduced.

This can be doing either:

1. Reduce the output current setting.
2. Improve the ground and pipe connections. (this may be the case where the ground used is not an anode bed. For instance, where a ground rod is used because access to a CP station is not possible.)

4. vLoc3-DM Receiver Functions and Operations

4.1 Receiver Overview

1	vLoc3-DM Receiver (with DM Foot attached)
2	Mini-USB cable
3	Li-ion battery
4	Charger
5	AA Alkaline batteries
6	Alkaline battery holder
7	Power cable for charger *one of supplied based on geographical location
8	vLoc3-DM Foot
9	Receiver Blanking Plate
10	User manual
11	Soft carry bag

1	Pushbutton keypad and display	7	Accessory socket and charging point
2	Model number & serial number	8	Expansion sockets for additional features such as the Bluetooth module
3	Battery retaining cover		
4	AA Alkaline battery pack/rechargeable battery pack	9	Receiver stem
5	Mini-USB port for data transfer and software updates	10	Sensor retaining screw
6	Battery compartment cover	11	Low-frequency sensor

4.2 DM Low-Frequency Sensor Foot

The device at the bottom of the locator tube is the DM low-frequency sensor foot. This device is used to detect the low-frequency component (frequencies between 3Hz and 8Hz). These are the vLoc3-DM current mapping frequencies. When the low-frequency mapping is not required, for instance, if the equipment is being used for pipeline locating but not defect mapping, the DM foot can be removed.

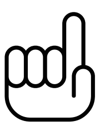
Removing the DM sensor foot will help reduce the weight of the locator and also change the way the logging is done. The logged frequency will then be the locate frequency selected, and graphing will also use this frequency.

4.2.1 Removing the DM Low-frequency Sensor foot

Rotate the retaining screw on the bottom of the receiver stem counter-clockwise for ¼ turn.
Grasp Low-frequency sensor and rotate it counterclockwise until it releases.

Now fit the blanking plate supplied by following the above instructions in reverse order.

IMPORTANT
Always install the blanking plate when the low-frequency sensor foot is not attached. There are critical contacts within the antenna tube that require protection. Not doing so will void the warranty.



NOTE
When setting the retaining screw on the side of the antenna tube, hand tighten only.

4.3 Charging the Receiver Batteries

The vLoc3-DM can be used with either alkaline batteries or an interchangeable rechargeable battery pack.

The central illuminated section within the battery icon indicates the amount of charge remaining.

- Blue center indicates alkaline batteries
- Green center indicates rechargeable batteries
- When batteries are low, the remaining charge section becomes red and will flash
- Just before the shutdown, the following symbol will be shown:

Rechargeable batteries are supplied with a mains charger. This is specific to the batteries, avoid the use of other manufacturers' chargers as these may damage the battery pack and may result in overheating of the battery pack.
To charge the rechargeable batteries, first make sure the pack is inserted in the receiver battery compartment as charging is done with the battery inside the receiver.

Connect the charger to the charging/accessory socket of the receiver. Connect the charger to the mains and switch on. The LED indicator on the charger will illuminate red until the batteries are fully charged, at which time the LED will change to green.

WARNING
Rechargeable batteries are supplied with a mains or 12V DC charger. These are specific to the batteries. Only use the charger that is appropriate for the batteries in the product. If in doubt, call the Vivax-Metrotech customer service department at +1(800) 446-3392. Failure to use the appropriate charger could result in damage to the battery pack, locator, and in extreme cases, cause a fire.

Avoid charging the unit in extreme temperature conditions, i.e., below 0ºC and above 45ºC.

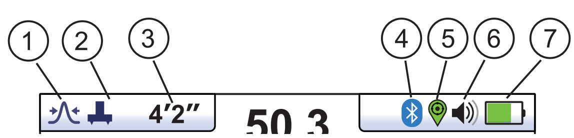
Although Vivax-Metrotech batteries include all the required safety-related features, immediately discontinue the use of the charger and battery pack if the battery pack becomes excessively warm. Return both to where they were purchased for investigation.

Always ensure batteries have at least a partial charge if storing for long periods without use.

Dispose of all batteries in accordance with your company procedures and or Federal/State and local regulations.

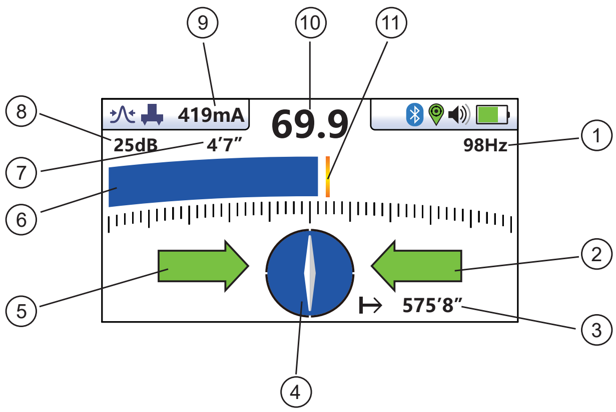
Never dismantle batteries, put them in a fire, or get wet.

Status bar:
All the screens have a status bar at the top, which indicates various settings of the locator. The bar is shown below:



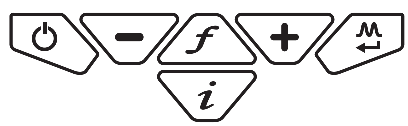
1	Antenna configuration (meter response) described later in the manual.	4	Bluetooth status: Grey indicates a module is not fitted. Black indicates fitted but not active. Blue indicates active and paired.
2	This icon is shown in this position when the low-frequency sensor is fitted and active.	5	GPS status (Green indicates GPS signal lock).
3	Depth to the target line. This can also be set to display signal current online or both.	6	Speaker volume setting.
		7	Battery type and remaining charge.

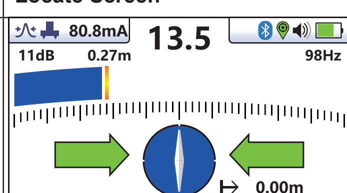
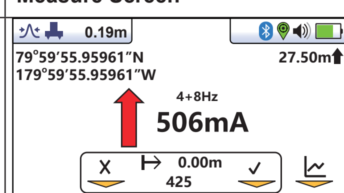
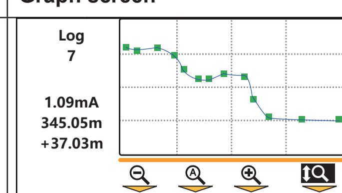
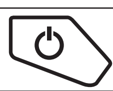
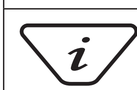
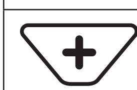
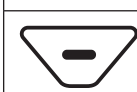
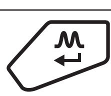
4.4 vLoc3-DM Receiver Main Display (Locate Screen)



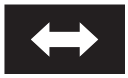
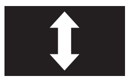
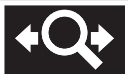
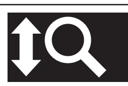
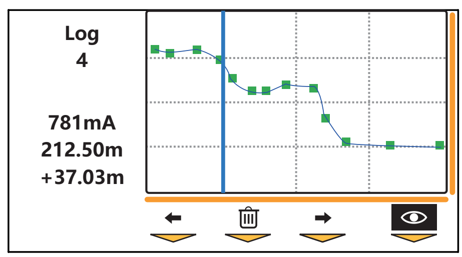
1	Locate frequency
2	Left/Right locate arrows
3	Distance from last recorded reading (requires GPS option active)
4	Compass Line direction indicator
5	Left/Right arrows
6	Locate signal bar graph: Green indicates low distortion, Blue indicates minor distortion, and Red indicates excessive distortion.
7	Depth to the center of the pipe
8	Peak level indication
9	Locate tone current (not to be confused with DM current)
10	Numeric signal strength reading
11	Gain setting

4.5 Pushbuttons



Pushbuttons	Locate Screen	Measure Screen	Graph screen
			
	On/Off	On/Off	On/Off
	Change frequency, long press shows frequency list	Not active	 Auto scale when this icon is shown  Delete when this icon is shown
	Short press for measure and long press for the user menu	Jump back to Locate Screen	Return to the locate screen
	Increase gain	Save and go to the graph	Increase scaling
	Decrease gain	Reject and go to graph and long press to delete log in memory	Reduce scaling
	Change antenna mode	Save a record and return to Locate Screen	Change scaling aspect (see next chart)

When in the graphing Mode/Screen the soft key operated by the key has the following functions as indicated by the changing icon:

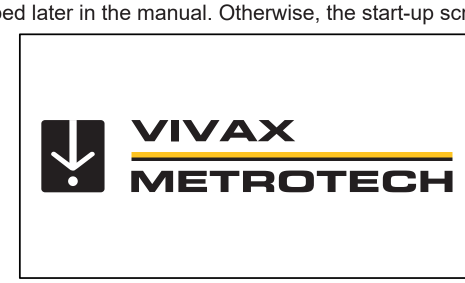
Softkey icon in Graph mode	Function
	Scales the horizontal axis
	Scales the vertical axis
	Allows the horizontal axis to be zoomed
	Allows the vertical axis to be zoomed
	This is the review mode. Use left/right soft keys to highlight a point of interest, as indicated by the blue line. Data is displayed on the left-hand side of the screen example:  Pressing the "f" key deletes the highlighted point.

Note, press the "i" button to return to the locate screen.

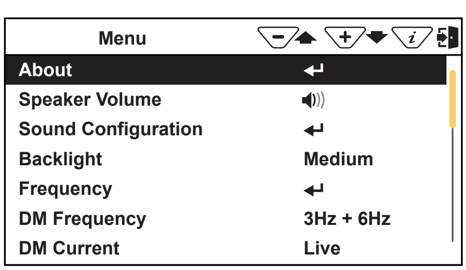
4.6 User Menu

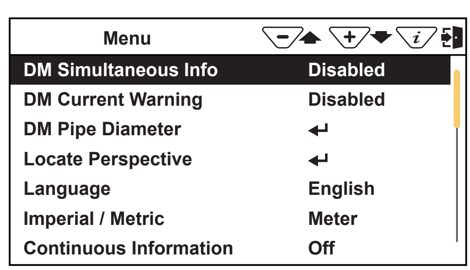
The vLoc3-DM has several features that can be switched on and off. These features are accessed through the user menu.

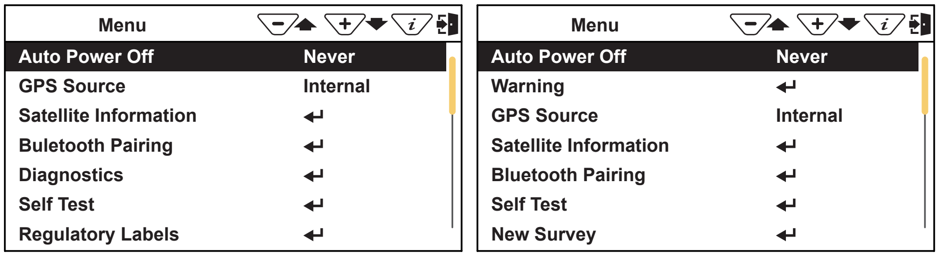
Switch on the unit by pressing and holding the on/off key until the start-up screen appears. The start-up screen can be configured to the user's preference and is described later in the manual. Otherwise, the start-up screen will default to the one below:



Access to the User Menu is via the "i" button. Press and hold down the button until the menu appears.







Main Menu

Note that the manual shows four screens, but only one is shown on the vLoc3-DM display at a time.
Note that where you see this sign ↵ , it means that pressing the enter button gives access to the sub-menu associated with this button.
To exit the menu or sub-menu, press the “i” button.

Where the ↵ icon is not shown, the enter button is used to scroll through the options of that feature.
Use the “+” and “- “buttons to scroll up and down through the menu.

The features are described below:

About - This section holds the data about the locator such as software revision, calibration data etc.

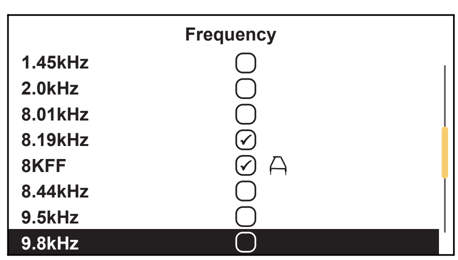
Speaker Volume - Press the enter button to scroll through the speaker volume settings.

Sound Configuration - Allows configuration of sounds generated in locate modes

- Active mode:
  - Frequency Modulated (FM) sound pitch changes with signal strength
  - Amplitude Modulated (AM) sound volume changes with signal strength
- Radio mode: FM or Real (sound derived directly from the received signal)
- Power mode: FM or Real

Backlight - Press the enter button to change the backlight intensity setting. Note that a high backlight setting will affect battery life. You can also select “Auto,” which automatically sets the backlight depending on ambient light levels.

Frequency - Use the enter key to enter the Frequency sub-menu. Scroll up and down the table using the “+” and “-” keys. The table contains all available frequency options. To simplify the operation of the unit, select only the frequencies applicable to your application. To do this, use the enter key to check the boxes on the right. Frequencies not checked will not appear on the locate screen.



Note also that certain frequency options have an A-frame icon next to them. This indicates that these frequencies are selected to be used with the fault find A-frame.

DM Frequency - Use the enter key to select either:

- 3Hz
- 4Hz
- 3+6Hz
- 4+8Hz

DM Current - Use the enter key to select either:
Static: - Displayed DM current is the first measurement when entering the “Info” screen.
Live: - The displayed current is continually updated when in the “Info” screen.

DM Simultaneous Info - Use the enter key to select either:

Enabled: When enabled, pressing the “info” screen when the A-Frame is connected, displays both the A-frame and the DM current. Saving the info screen saves both lots of data.

Disabled: When disabled, pressing the “info” screen when the A-Frame is connected, displays only the DM current and only the DM current is saved.

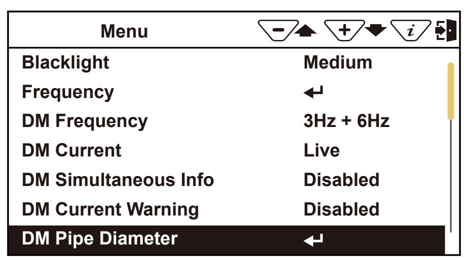
DM Current Warning - The vLoc3-DM locator monitors changes from the previous current reading. If the change is larger than what is set in the user menu, a warning indicator is shown in the “Info” screen.

When in the User Menu, the threshold at which the warning is triggered is set by using the “Enter” key. Choosing the option “Disabled” prevents the feature from showing the warning.

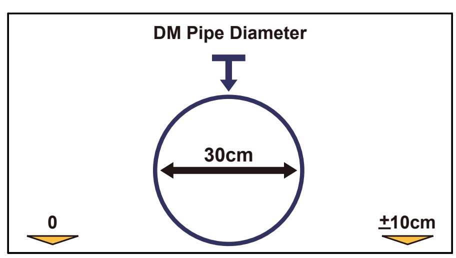
The DM Current Warning feature is enabled or disabled using the app “MyLocator3”.

Pipe Diameter - The vLoc3-DM receiver measures the distance to the center of the pipe. If the pipe diameter is entered, the depth indicated will be the depth to the top of the pipe i.e. the depth of cover.

To enter a pipe diameter enter the user menu by using a long press of the info key. When in the User Menu scroll to DM Pipe Diameter.

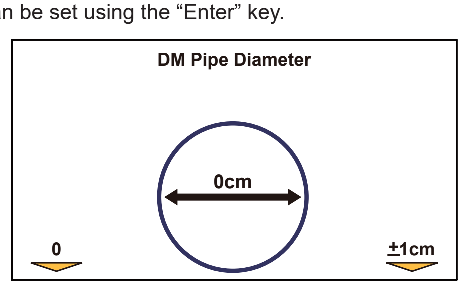


Use the “Enter” key to enable the diameter of the pipe to be entered.



Use the “+” and “-” keys to enter the desired value. Note that entering the incorrect value will result in a depth of cover indication error.

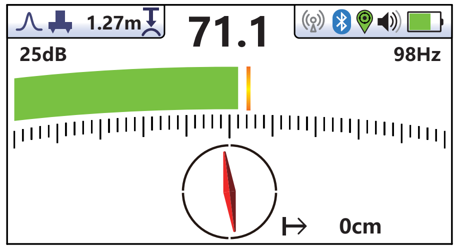
The size of the incremental changes can be set using the “Enter” key.



A short press of the On/Off key sets the diameter to zero, which effectively switches off the depth of cover feature and measurements are then to the center of the pipe.

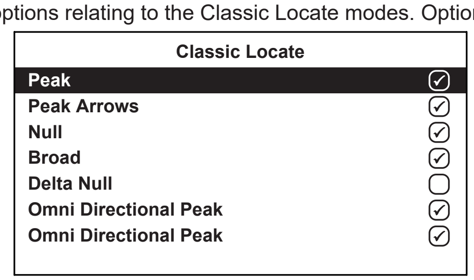
Exit the menu by pressing the “info” key until back to the locate screen.

The icon indicates that the depth of cover feature is active as below:

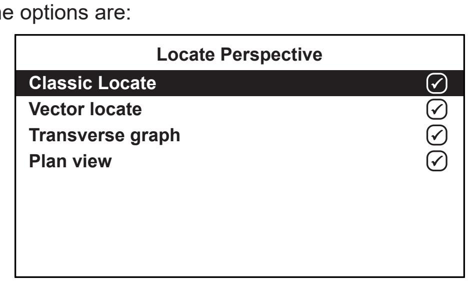


Re-enter the User Menu to check pipe diameter settings.
The pipeline diameter feature/depth of cover feature is enabled or disabled using the app “MyLocator3”.

Classic Locate - This option is only shown if the User Menu is entered from the Classic Screen. Use the Enter key to reveal the list of options relating to the Classic Locate modes. Options are:



Locate Perspective - Enter this option to be able to select in what graphical format the data is displayed. These displays are described further in the manual. The options are:



Language - The unit is supplied with different language options. Use the Enter key to select the language of choice.

Imp/Metric - Select either Imperial or Metric measurements.

Continuous Info - The front Locate Screen can display a continuous reading of either depth, current, both or can be switched off. Use the Enter button to select your preference.

Auto Power Off - The unit can be set to switch off after a set time. The Auto Power Off options are 5-minutes, 10-minutes, or Never.
Note that when the A-frame is connected, the timer will automatically set itself to never.

GPS Source - Use the Enter key to select either:
Internal - The vLoc3-DM has an internal GPS module installed as standard. This is a low accuracy, typically +/-3m.
Bluetooth - If the Blue tooth option is selected, the vLoc3-DM can be paired by Bluetooth with a more accurate GPS system. This is described later.

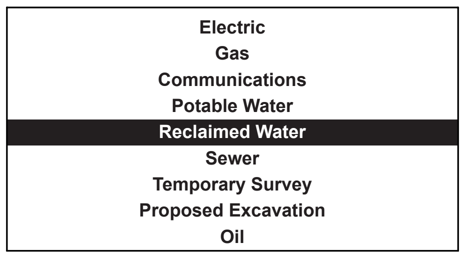
Satellite Information - Select this option using the Enter key to see the available satellite information.

Warnings - Warnings relating to - Shallow cable, Overload, Overhead cable, DM current warning, and Signal Overload. Scroll down to the relevant warning and use the Enter button to select or de-select.

Bluetooth Pairing (Optional Feature) - Press the Enter button to enter the Bluetooth pairing routine. This allows the unit to link with external devices such as data loggers and GPS devices that have Bluetooth capability.

Self-Test - Pressing the enter key will initiate a series of self-tests. If any of the tests fail, repeat the test in a more interference-free site i.e. away from fluorescent lights, power signal sources, etc. If the unit continues to fail, the unit should be returned to Vivax-Metrotech Corporation or one of its authorized service centers for repair.

New Survey - Entering the Survey sub-menu causes a new survey to be initiated in the SD Card Data Logger.
DM Graphs are cleared so that a new survey is identifiable from older measurements.
Different Survey types can be selected as shown
Navigating into this menu and selecting a survey type always causes a new survey to be registered, regardless of whether it is the same type as the previous log record.

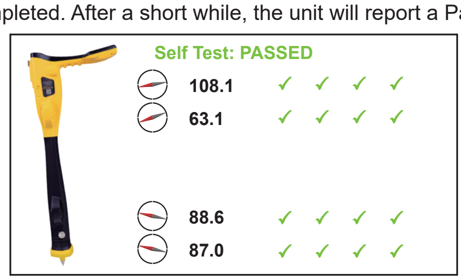


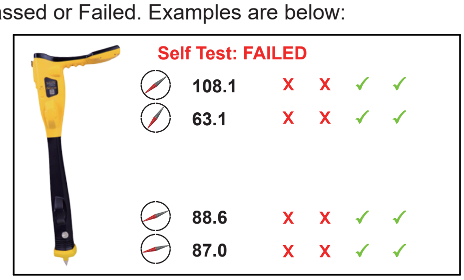
4.7 Self-Test

The vLoc3-DM has a self-test feature. The test confirms that the equipment is fit for use, and the calibration has not drifted from its expected settings.

To undertake the test, first find an area free from excessive interference such as overhead fluorescent lighting, large transformers, etc. Also, check that any nearby vLoc transmitters are switched off.

Select “Self Test” from the user menu and press the “Return” button. The test will self-start. Keep the equipment stationary while the test is completed. After a short while, the unit will report a Passed or Failed. Examples are below:



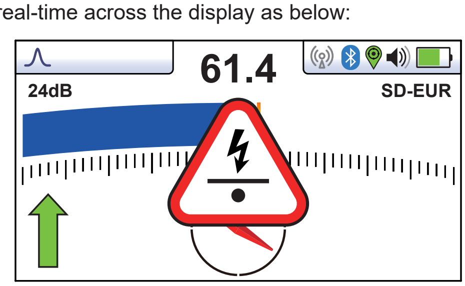


If the unit fails the test, try again in a more interference-free area. If it continues to fail, return the unit to Vivax-Metrotech or one of its approved repair centers for investigation and repair.

Note that the vLoc3-DM foot is not tested during the self-test. To test this item, use the unit over a known pipe and check measured values fall within the published specification.

4.8 Warnings

If activated, warnings are displayed in real-time across the display as below:



4.8.1 DM current warning

It only appears in the Info screen when the current change exceeds a pre-determined value.

4.8.2 Signal Overload

This a very unusual situation and is usually caused by operating **very** close to a power transformer or placing the unit very close to a transmitter in the Induction mode. Moving slightly away from the interfering signal will cure the problem. Signal overload will not cause damage to the instrument.

4.8.3 Shallow Cable

This indicates that the locator has detected a cable that is possibly less than 15cm deep. Proceed with caution.

4.8.4 Swing Alert

This indicates that the operator is swinging the locator excessively and could result in misleading information. When sweeping the locator across the direction of the line, try to keep it vertical. This will improve accuracy.

4.8.5 Overhead cable

This indicates that the signal is mainly radiating from above. This is usually caused by the signal traveling along overhead cables.

The warning symbols are accompanied by an audible sound and a vibration in the handle unless configured otherwise (see MyLocator3). Warnings can also be switched off in the User Set-up Menu.

4.9 Locate Modes

Use short presses of the pushbutton to select the desired locate mode.

Screen Icons explained

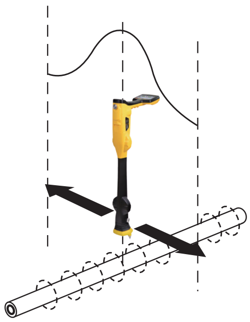
Classic Screen/Antenna configurations:

Icon	Description	Function/response
	Peak	Dual horizontal antennas are giving the largest signal over the line with sharp, accurate results. Less affected by distorted signals.
	Null	Vertical antenna giving minimum signal over the line with a sharp response but more affected by distorted signals. It can be used to identify distorted signals by comparing results with the peak mode.
	Broad peak	It uses just a single antenna. It is not so accurate as dual peak antennas and more difficult to pinpoint the line but gives a signal boost from deep lines.
	Delta-Null	Uses dual null antennas to minimize the offset effects of field distortion. This mode tends to be more precise than the Null mode.
	Peak with Arrows	Same bar graph response as Peak but Left/Right Arrows indicate the Null locate position. Good, general-purpose mode, giving quick, intuitive results.
	Omni direction	When you see the two double-ended arrows around an icon, this means that the line is detectable regardless of locator blade orientation. It is very useful for quickly checking an area for buried lines.

4.10 Classic Locating Modes (Response)

The vLoc3-DM receiver has an array of six antennas, and these can be toggled through different configurations (modes) to provide different responses to the signals radiating from buried utilities. The modes are:

4.10.1 Peak Response Mode

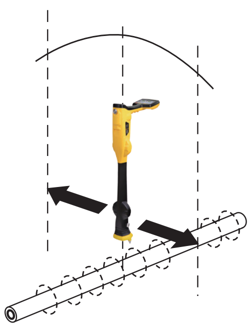


Two horizontal antennas provide a “Peak” or maximum signal response over the center of the buried line. The compass (line direction indicator) aligns itself parallel to the direction of the cable (available in Active modes).

This is an accurate method of locating as both horizontal antennas are used to provide a clearly identifiable “Peak.” It is also less prone to the effects of signal distortion.

A Peak Level Indicator is also provided on the bar graph. This indicates the largest signal detected, allowing the user to quickly return to this point.

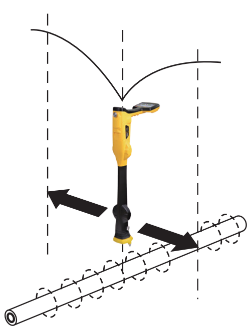
4.10.2 Broad Peak Mode



This uses a single horizontal antenna and provides a “Peak” or maximum signal response over the center of the buried line. The compass (line direction indicator) aligns itself parallel to the direction of the cable (available in Active modes).

This gives a less defined peak than the twin horizontal antenna “Peak” mode – but is useful in some situations such as deep lines because using a single antenna has the effect of boosting the received signal.

4.10.3 Null Mode



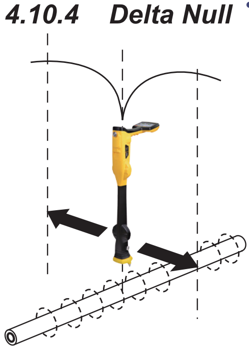
This uses vertical antennas, and provides a minimum or “Null” response over the center of the buried line.

The compass (line direction indicator) aligns itself parallel to the direction of the cable (available in Active modes)

The null mode works well in uncongested areas but is more prone to inaccuracies due to the effects of field distortion. This effect can be utilized to detect the presence of distorted fields. Compare the locate position “Null Mode” with the position “Peak Mode.” If the two positions do not coincide, this indicates possible distortion. The greater the difference, the greater the distortion.

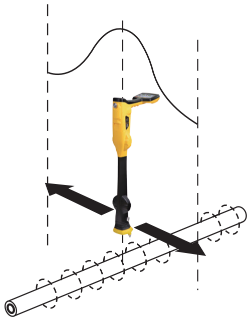
Left/Right indication arrows are also displayed when in the “Null” mode. The arrows indicate the direction to move the receiver to locate the position of the buried line.

4.10.4 Delta Null



This uses dual vertical antennas. This has the advantage that it provides a sharper response than the “null” mode and is less affected by distorted fields. All other functions are the same as the “Null” mode.

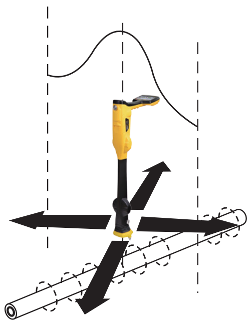
4.10.5 *Peak with Arrows Response Mode*



The peak with arrows mode operates in the same way as the peak mode. It gives the largest meter deflection when directly over the line. However, Left/Right indication arrows are also displayed. The arrows indicate the direction to move the receiver to locate the position of the buried line.

Note:
If the arrows indicated a different position for the cable than the peak bar graph position, this indicates the possibility of a distorted field. Check by taking a depth reading on the ground and then lift the cable locator a known distance such as 1m *(3ft)*. If the depth does not increase by this amount, it confirms a distorted field, and the data should be treated with caution.

4.10.6 *Omni Peak Response Mode*



When you see the two double-ended arrows around an icon, this means that the line is detectable regardless of locator blade orientation. It is very useful for quickly checking an area for buried lines using a grid search as one sweep will catch all locatable lines. In the classic screen, the Omni feature is available in the "Peak" and "Broad peak" modes.

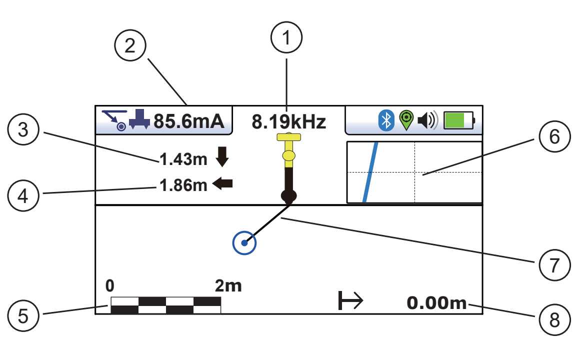
Press the "M" pushbutton to select or deselect a function as indicated by a dot. To exit the user menu, press "i" pushbutton.

Alternative Locate Screens
As previously mentioned, the vLoc3-DM has a number of alternative screens. The following section describes the operation of these screens. It is left to the user to decide which is the best screen for a particular application.

To scroll through the available screens, use long keypresses on the "return" key.

	Vector configuration	Shows a cross-section of the ground and line position relative to the locator.
	Plan view	Gives a plan view as if looking into the ground.
	Trans. Graph	Shows a graphical representation of the peak and null field shape over a line (Active modes only) Good for analyzing signal distortion.

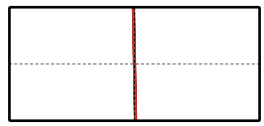
Vector Screen
The Vector Screen shows a cross-sectional view through the ground. A plan view is also shown to help orientate the user over the line. The Vector Screen is particularly useful where access directly over the line is not possible. The depth and horizontal displacement distances are shown, even when not directly over the line.



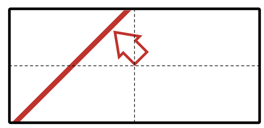
1	Frequency selected
2	Signal current
3	Vertical distance to the target
4	Horizontal distance to the target
5	Scaling (adjust with +/- keys)
6	Shows plan view of the target
7	Cross-section view that shows vectors to target
8	Distance from the last logged point

Using the Vector screen

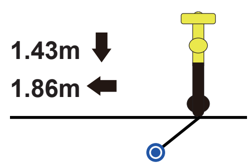
1. Apply the signal to the target line in the usual way and select the vector screen by using long presses on the “return” button until the desired screen appears.
2. Position the locator within the approximate position of the target line. Use the plan view to help guide you towards the target line. You can imagine that the plan view is giving you a view into the ground.
3. Position yourself so that the red target line is pointing forward/back and is centralized on the screen.



4. If the target is off the screen, an arrow will appear on the screen to help direct you to the target line.



5. The cross-sectional section of the screen will respond as the target is approached. Use the + and – keys to alter the scaling if necessary.
6. There is a black line leading from the locator to the target line. The target is represented by a blue dot. Around the dot is a circle; the size of the circle indicates a confidence factor. The larger the circle, the less confident the indicated position. Generally, the actual position of the line will be within the confidence circle.



The color of the confidence circle also changes depending on the degree of confidence:
Green - Low distortion/high confidence.
Blue - Minor distortion/medium confidence, proceed with care.
Red - Excessive distortion/low confidence, treat all data and measurements with caution.

7. Notice that vertical and horizontal distances from the target line are displayed.

1.43m ⬇

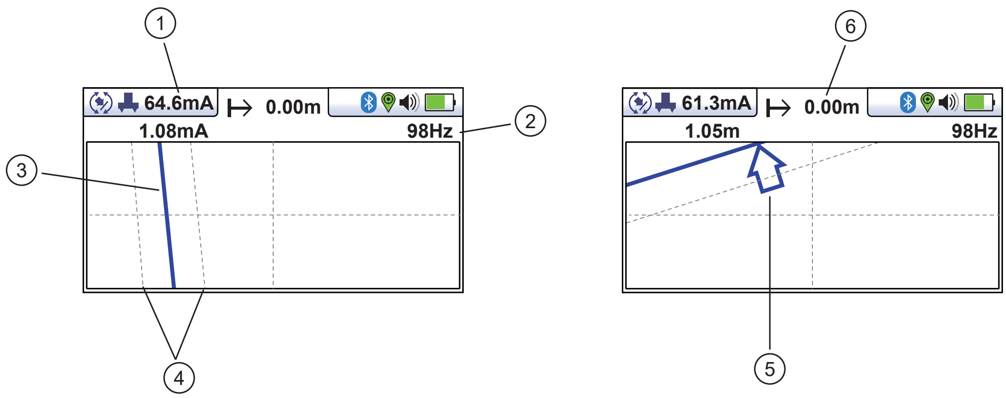
1.86m ⬅

This must not be mistaken for the distance diagonally to the target; this information is not displayed. The vertical distance is the true depth from the bottom of the locator. The advantage of this is that the depth and position of the target can be determined without being directly over the target line. So, in the event of an obstruction at the measuring point, data can still be gathered by placing the locator on one side of the target.

However, note that low frequency DM current readings should only be taken when carefully positioned directly above and in-line with the pipe.

Plan View Screen

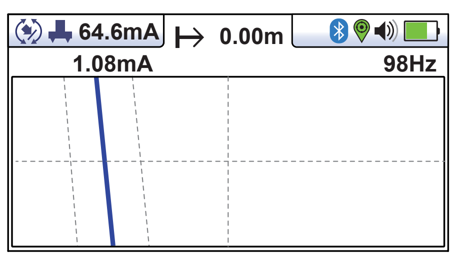
The plan view screen shows a picture as if you were viewing the line from above ground. When the red line is in the center and pointing forward/back, then you are directly over the line and pointing in the direction of the line.



1	The depth and current readings
2	Frequency selected
3	Target line
4	Lines of confidence (closer these are to the target line indicates more confidence)
5	Arrow indicates the direction to move towards the line. It will only show when the distance to the target line is far away.
6	Distance from last logged position (only active with valid GPS signal)

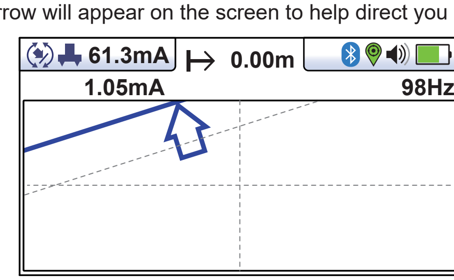
Using the Plan View screen

1. Apply the signal to the target line in the usual way and select the plan view screen by using long presses on the return button until the desired screen appears.
2. Position the locator within the approximate position of the target line. Use the plan view to help guide you toward the target line. You can imagine that the plan view is giving you a view into the ground.
3. Position yourself so that the target line is pointing forward/back and is centralized on the screen.

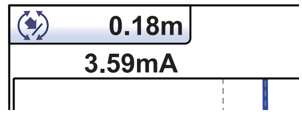


"Tram" lines either side of the line indicate an area of confidence. The closer the tram lines are together, the greater the confidence.
In addition to the tram lines, the color of the target line also changes depending on the degree of confidence:
Green: - low distortion/high confidence.
Blue: - Minor distortion/medium confidence, proceed with care.
Red: - Excessive distortion/low confidence, treat all data and measurements with caution.

4. If the target is off the screen, an arrow will appear on the screen to help direct you to the target line.



5. As long as the locator is detecting a valid signal, the depth (or locate current) will be available regardless of locator orientation, i.e. the locator does not need to be aligned with the target line in the forward back orientation. It is recommended that, in this mode, the current is always displayed as it is possible the signal will bleed off onto other services. Regular checks on the signal current, i.e. checking for large changes, will ensure the correct line is detected.



Note that low frequency DM current readings should only be taken when carefully positioned directly above and in-line with the pipe.

6. A short press on the info button will display the information screen. More information relating to the information screen is described in the section “Taking Depth and Current Readings (Information Screen)” Section 5.3.

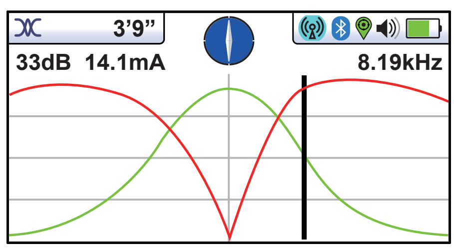
Transverse Plot Screen

The Transverse Plot screen is used to analyze the field shape at a particular location. This enables the user to get a better feel for the reliability of the data gathered.

Two plots are generated simultaneously.

- Peak response
- Null response

In undistorted fields, the peak and null positions should coincide, and the shape of the fields should be symmetrical about the centerline. The picture below shows an undistorted field.



To take a plot, first locate the target using one of the other locate screens. Now select the Transverse screen by a prolonged press of the return button. Repeat this until the Transverse screen appears.

Position yourself to one side of the line such that the field markers are just on the screen. You will see that the lines automatically remove themselves after a set period of a few seconds. Clear the screen by pressing the “ –” button. Now walk across the line of the target at a steady pace until you are on the other side of the target line. Immediately press the “+” button to save the plot on the screen.

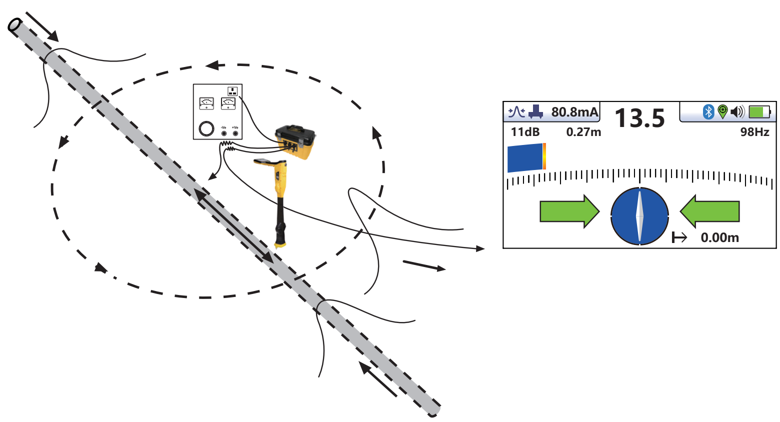
It is still possible to walk back over the target, locating the position of the line when in the transverse screen while still retaining the saved screen.

5. Using the vLoc3-DM Receiver

5.1 *Locating a Pipeline*

NOTE
There are a number of antenna configurations available, and each has a particular response. However, for the purposes of simplicity, the method below uses the generic "peak with left-right arrows."

Connect the transmitter to the pipeline to be surveyed as instructed in the transmitter user manual. Switch on the receiver and select the frequency to match the frequency selection on the transmitter. Typically, this is 3/6/128Hz in 50Hz environments and 3/6/98Hz for 60Hz environments. Stand approximately 10 to 20 meters/yards from the transmitter and over the suspected position of the pipe. Stand facing the transmitter and with the handle and display pointing at the connection point. (see the diagram below)



Keeping the receiver pointing at the connection point, walk around the connection point for a full 360 degrees. The reading on the receiver signal strength meter will rise and fall as it passes over:

- the two pipe locations (forward and aft)
- the cable running to the anode bed

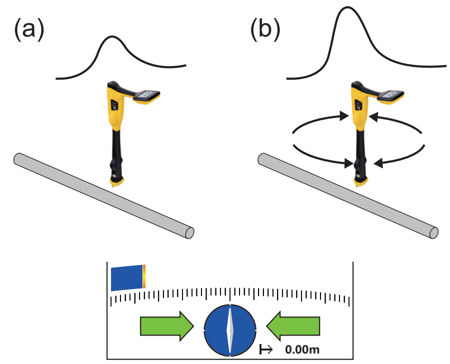
It will be necessary to adjust the sensitivity of the receiver to keep the signal strength within the signal strength scale. If the signal is very low on the scale, pressing the "+" pushbutton will adjust the gain so that the signal strength is approximately 50% of the scale. If the signal goes over the top of the scale press the "-" pushbutton to return it to approximately 50%. Subsequent pressing of the "+" or "-" pushbuttons will increment the gain.

Notice that as the pipe is neared, the left/right arrow will point to the position of the pipe and the pipe directions indicator will align itself with the direction of the pipe.

5.2 *Pinpointing*

Before measurements are taken, it is necessary to precisely pinpoint the pipeline.
To do this, use the following steps:

- Rotate the locator so that the compass (line direction indicator) is pointing north/south.
- Move the locator in the direction indicated by the arrow. Stop when the arrow changes to the opposite direction.
- Adjust the gain by pressing the "+" or "-" pushbuttons so that the bar graph reads approximately 50%.
- Find the largest signal by moving the receiver side-to-side over the suspected position of the pipeline, see:
  - (a) Stop at the largest signal. (note that the left/right arrows will help in this process, but the largest bar graph reading gives a truer indication of the actual pipe position) Now rotate the receiver again until the largest signal is found, and the line indicator is pointing at the north and south position. Note the color of the bar graph. The color gives an indication of field distortion. Green = little or no distortion, Blue = moderate distortion, continue with care, Red = excessive distortion, do not trust results.
  - (b) The receiver is now over, and the handle is in line with the pipe.



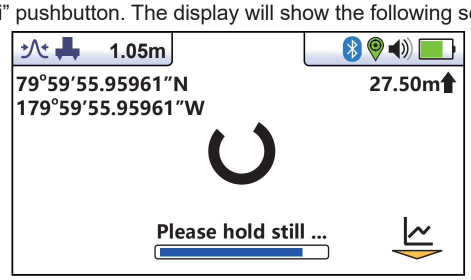
NOTE
The largest signal and current reading will probably be generated by the anode bed cable. Confirm which is which by taking DM current readings and noting the current direction. The currents on the pipe will be flowing toward the transmitter. The current on the anode cable will be flowing away.

NOTE
The sum of the currents on the two pipe locations should be close to the current displayed on the transmitter. If they are not, it may be that there is a fault at the connection point or that the current flowing on the anode bed cable is interfering with the signal from the pipe. To confirm this, take readings a good distance from the connection point. Be aware that the anode bed cable very often runs along the same trench as the pipe for some distance and will affect the readings.

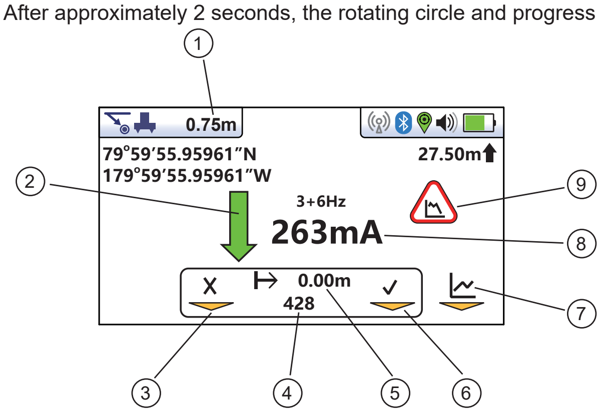
5.3 Taking Depth and Current Readings (Information Screen)

To take any measurements, it is first necessary to pinpoint the pipe as instructed in the previous *"pinpointing"* section.

Next, hold the receiver on the ground vertically and with the handle in line with the pipe and your back to the transmitter. Keep the receiver very stationary and press the "i" pushbutton. The display will show the following screen whilst the measurement is made.



After approximately 2 seconds, the rotating circle and progress bar will be replaced with the result display as below.



1	Depth Reading
2	DM current direction
3	Do not log results and return to the locate screen
4	Number of logs made
5	Distance from last logged DM current point. If no GPS lock, this defaults to 10m.
6	Log results and return to the locate screen
7	Enter Graph screen to review results
8	vLoc3-DM Mapping Current
9	DM current warning. It's only shown if it has dropped from the previous value more than the pre-defined value.

5.4 Storing the Results

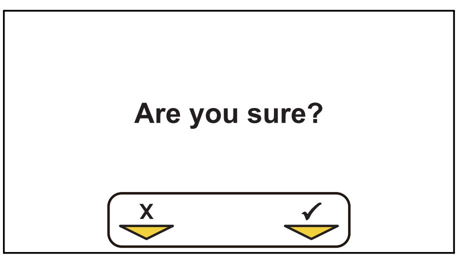
NOTE
The vLoc3-DM current reading will continue to be updated approximately every second unless "Static" is chosen in the User setup of "DM Current." This is done so that fluctuations in readings can be identified, allowing the user to wait until stable readings are shown before recording the result.

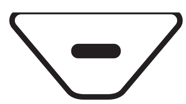
Pressing the "+" pushbutton while the measurement is being displayed will save the results to the next available internal log location and return to the Locate Screen.

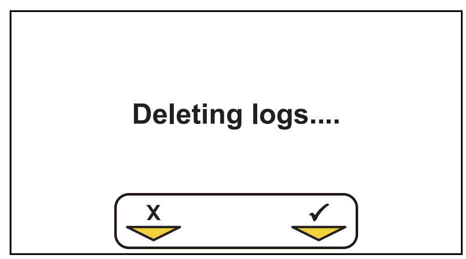
5.5 Clearing the log

The data log can also be deleted from the info screen. From the Info screen press and hold the " - " key. The message below will be shown.

Press the "+" key to confirm. The locator will ask again "Are you sure?". Press the " - " key to delete or the "+" key to cancel the deletion and return to the locate/accessory screen.

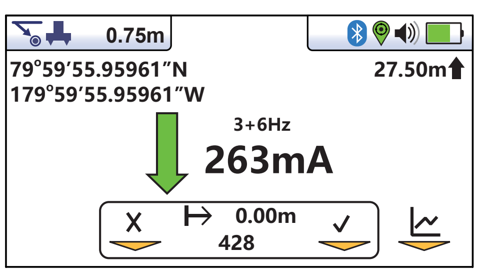






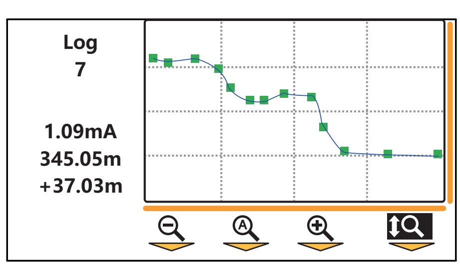
5.6 Graphing results on the screen

The vLoc3-DM has an onscreen graphing facility. Access to this facility is through the info screen. Press the "enter" key when in the "Info" screen.

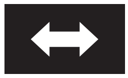
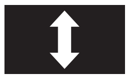
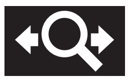
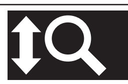
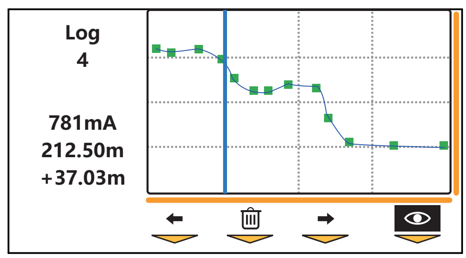


Graphing icon

The graphing screen is displayed below:



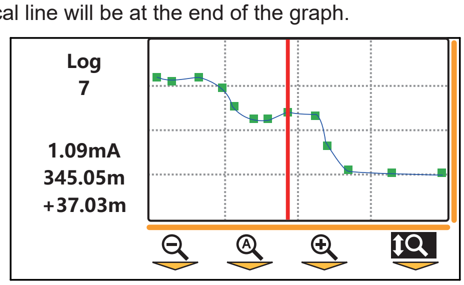
When in the graphing mode/screen the soft key operated by the key has the following functions as indicated by the changing icon:

Softkey icon in Graph mode	Function
	Shifts the horizontal axis, use the left and right soft keys to shift the horizontal axis.
	Shifts the vertical axis, use the up and down soft keys to shift the vertical axis.
	Allows the horizontal axis to be zoomed use the"+" and "-" soft keys to zoom the horizontal axis.
	Allows the vertical axis to be zoomed, use the"+" and "-" soft keys to zoom the vertical axis.
	This is the review mode. Use left/right soft keys to highlight a point of interest, as indicated by the blue line. Data is displayed on the left-hand side of the screen example:  Pressing the "f" key deletes the highlighted point.
	This appears in the center soft key and is used to delete unwanted recorded points.
	This appears in all graphing screens except the review screen. Pressing this key auto-scales the graph in either vertical or horizontal plains depending on the axis chosen.

Note, press the "i" button to return to the locate screen.

5.7 The Walk-back feature

When in the graphing mode and receiving a valid GPS lock (except the "Review" screen) the graph will have a vertical line indicating the position of the locator along the pipeline.
While undertaking the survey, the vertical line will be at the end of the graph.



If the operator walks back along the pipeline, the curser will alter, indicating the position of the operator. This allows the operator to return to the point of interest without having to repeat the survey.

The color of the vertical line will change depending on how close the operator is to a surveyed point. The color codes represent distances as below:

- Green ⟺ Less than 10m from measurement

- Orange ⇔ Less than 50m from measurement
- Red ⇔ Greater than 50m from measurement

5.8 Signal Direction Precision Identification

(Available for vLoc3-DM with SD activated)

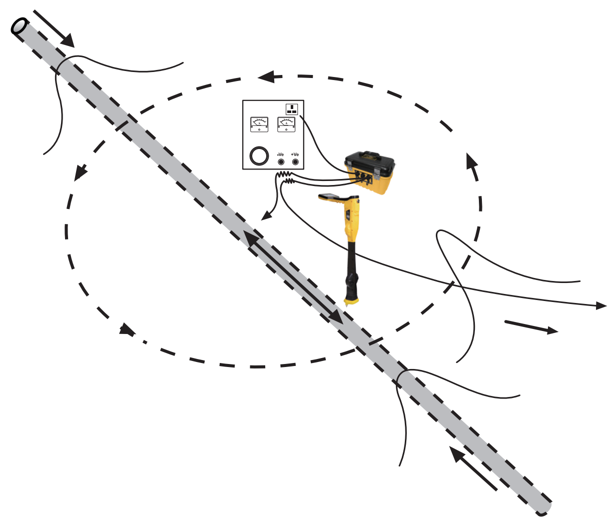
Some models in the vLoc series of locators contain a feature called “Signal Direction”. This feature is used to verify if the line being located is the target to which the transmitter has been connected.

When a transmitter is connected to a target line, the signal travels along it and finds the easiest way to travel back, usually via the ground and ground stake. However, very often the signal will travel back along adjacent cables or pipes as these can offer an easier route.

As a result, there can be multiple signals radiating from cables and pipes in the area making it difficult to identify the target line. These return signals are typically traveling in the opposite direction than the applied signal. The Signal Direction feature identifies which direction the signal is flowing and hence the target line.

To use the signal direction system:

- Connect the SD enabled transmitter to the target pipe in the usual way.



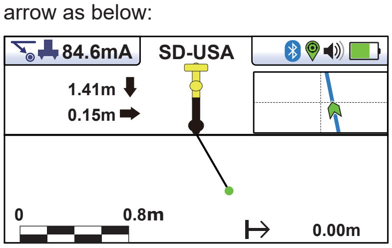
Turn the transmitter and receiver on and set both to:

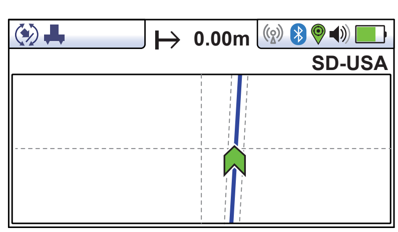
o SD-USA – if in North America or any territory where the power system is 60Hz.

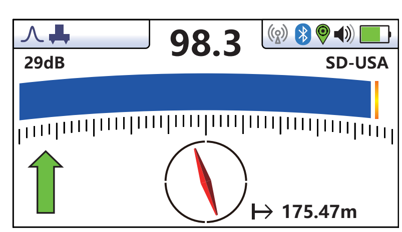
o SD-EUR – if in Europe or any territory where the power system is 50Hz.

Locate the pipe. The receiver may or may not be flashing the “SD” Forward/Back arrows icon.

The arrows appear differently depending on what locate screen is used but follow the convention of green for forward and red for backward. This section of the manual assumes a conventional screen is used but for reference, the other screens show the arrow as below:

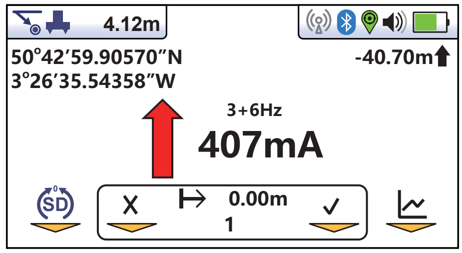




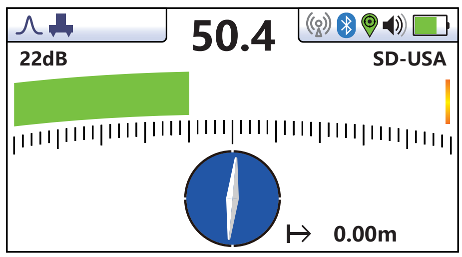


A flashing SD arrow indicates that the unit needs to be synchronized with the transmitter. Even if the arrow is not flashing, it is always good practice to synchronize the system at the beginning of a survey to ensure reliable results and to maximize the distance to the next synchronization point.

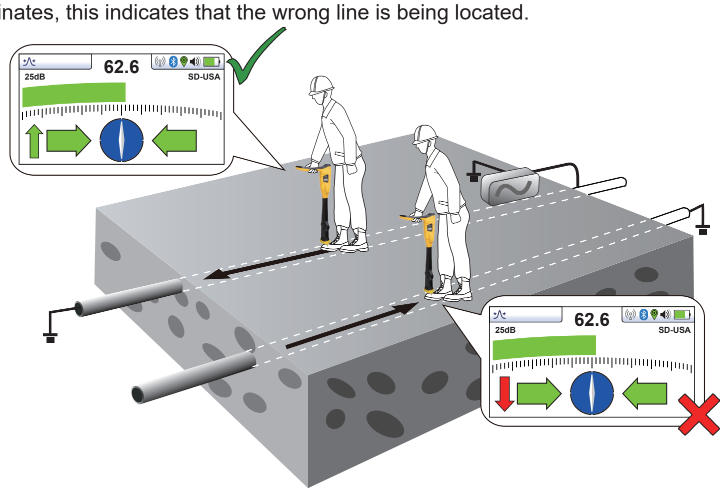
To synchronize the receiver to the transmitter at the beginning of a survey, pinpoint the pipe very close to the transmitter, be sure that it is the correct line. Then, standing facing away from where the transmitter is attached, press the “i” pushbutton. The unit will now display the information screen showing the depth of line, signal current, and an “SD” icon positioned over the return pushbutton.



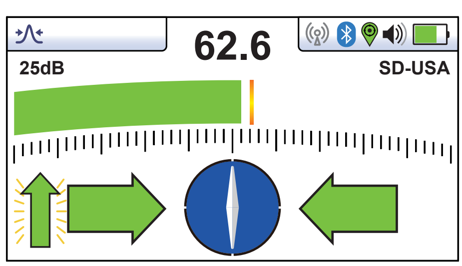
A short press of the On/Off pushbutton will synchronize the system and return the unit to the locate screen. The green forward arrow will light and not be flashing indicating the receiver is locked onto the signal. The system is now synchronized.



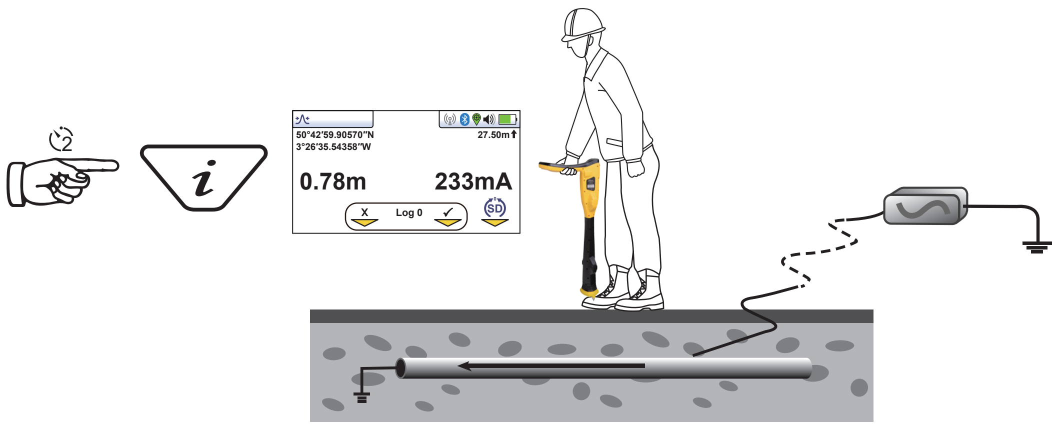
Proceed to locate, trace and pinpoint as required ensuring at all times the green forward arrow is illuminated. If at any time the red backward arrow illuminates, this indicates that the wrong line is being located.



At some point you may find that the SD arrow starts to flash. This is indicating that synchronization with the transmitter has deteriorated and a reset is required.



Re-trace your line back to a point where a solid signal direction is obtained. Precisely pinpoint the line and stand with your back to the direction of the transmitter as you did when you initiated the original sync and press the “i” pushbutton, then a short press of the pushbutton to re-sync with the transmitter signal.

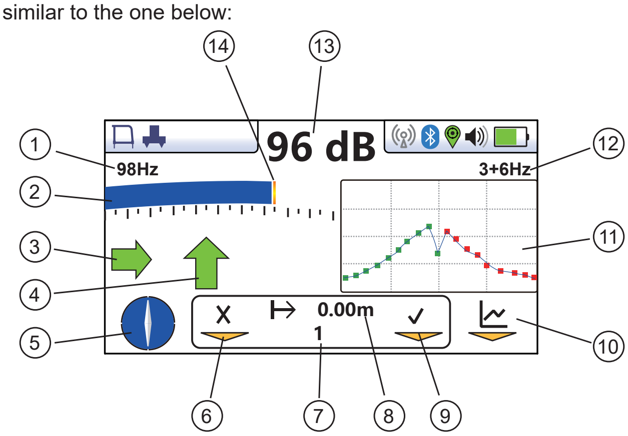


Continue to locate, pinpoint, and trace.

5.9 Using the A-frame Fault Finder

The A-frame is used to pinpoint coating defects along the pipeline. It does this by measuring the voltage in the ground caused by the vLoc3-DM signal current entering the pipe at a fault. It is necessary to make a physical/electrical contact with the ground. The A-frame has two spikes to facilitate this. Although the spikes are a few inches long, it is usually only necessary to puncture the ground with the spikes. Inserting them fully is only necessary where the ground conditions are particularly dry or high resistance.

The A-frame should be plugged into the accessory port. The receiver will automatically recognize the A-frame and enter the fault find mode. The display will be similar to the one below:



1	Locate frequency	8	Distance from last saved DM current reading
2	Locate signal strength indicator	9	Record data point key
3	Left/Right cable location indicator	10	Graphing options soft key
4	Fault direction indicator	11	Graphing area
5	Compass line direction indicator	12	DM FF frequency
6	Press and hold to delete log	13	Fault find signal level
7	Log number	14	Peak signal level indicator

The A-Frame can be used in two configurations:

Standard Mode (Low-frequency sensor foot on): Used to pinpoint or survey a section of pipeline by undertaking an ACVG survey (Alternating Current Voltage Gradient). The ACVG and Current gradient survey can be gathered at the same time. See further explanation in the following section.
Simultaneous/Standard mode can be selected in the User Menu.

Simultaneous mode (Low-frequency sensor foot on): As standard mode with the addition of DM current measurements and ACVG measurements are shown and logged simultaneously. See further explanation in the following section.
Simultaneous/Standard mode can be selected in the User Menu.

5.9.1 Fault Finding Method

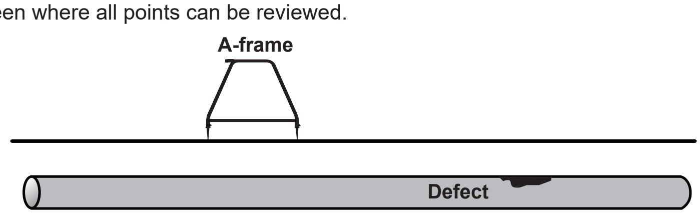
Connect the transmitter as previously described. Select either 3Hz/6Hz/98Hz (ELF1) or 3Hz/6Hz/128Hz (ELF2) depending on the mains frequency as previously described.

Using the A-frame

If the approximate position of a defect has been identified by the vLoc3-DM using the current gradient technique, start an A-frame survey approximately 20 meters before this point. Place the A-frame in the ground with the A-frame in line, the green pinpointing towards the suspected fault and directly above the pipe.

Use the locate section of the screen to position the A-frame above the pipe.

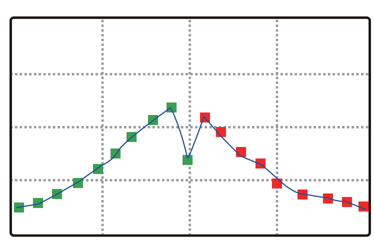
The signal strength will be displayed, and if the signal is strong enough, an arrow will point forward. Press the "+" pushbutton to save the reading. This will enter the result into the graph. The scaling of the graph is automated and may change as points are added. Only the last 20 records will be shown on the screen. If you need to review other points, press the "enter" key which will take you to the review screen where all points can be reviewed.



Note that the receiver is not shown so as to simplify the diagrams. In all diagrams, the vLoc3-DM receiver would be connected.

Continue walking in the direction of the arrow, placing the A-frame in the ground at approximately one-meter intervals saving the results as you go. The graph will rise as the defect is approached and then fall at the defect. Continuing past the defect will create a similar but reversed effect. A typical defect "signature" is shown below.

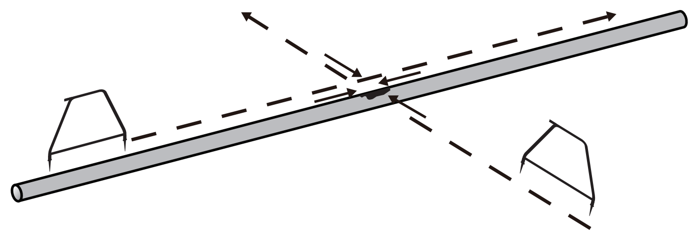
Note that the points shown on the graph will change depending on the fault direction indicated, i.e., green for forward and red for backward.



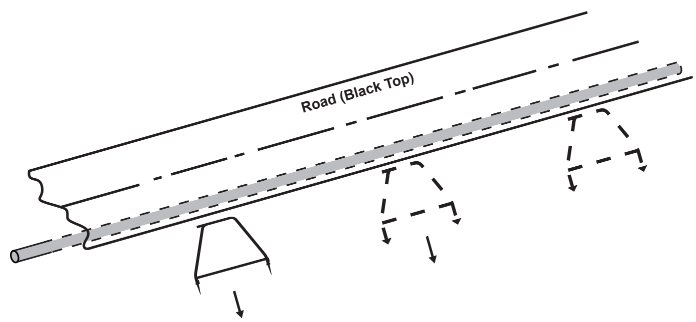
NOTE
If GPS is not activated, the horizontal intervals are assumed to be equal. If a GPS option is activated, the intervals are still shown as equal on the graph, but the internal data log stores the GPS coordinates with the GPS data. This is because the accuracy of the GPS function tends to be less accurate than is what is required for A-frame fault finding.

To delete the log, proceed as previously described in "Deleting the log."

At the null point, the arrows will reverse; this is the location of the defect. Repeating the procedure across the pipeline will help pinpoint the defect in the other plane. See the following diagram.



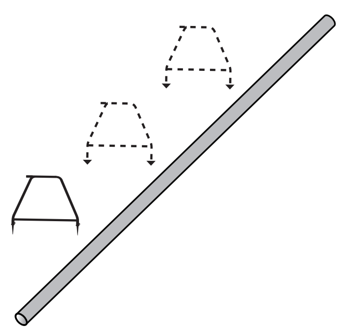
Sometimes it is not possible to gain access to the pipe position. If this is the case walking along the route of the pipe a few meters to one side can very often produce good results. This procedure is also useful where the pipe runs under "blacktop," which acts as an insulator preventing the A-frame from making a good connection to ground.



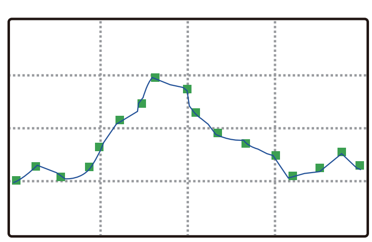
5.9.2 Using the A-frame where there are Many Defects Such as Porous Coating

Poorly coated pipelines such as old bitumen coating may create a confusing result when multiple defects interfere with each other. To overcome this, it is sometimes beneficial to adopt a different approach.

This alternative approach involves using the A-frame perpendicular and to one side of the pipeline. See the diagram below:



Note the depth of the pipeline. Move approximately this distance to one side. Keep the orientation as the above walk along the section of the pipeline taking readings at regular intervals. A typical result is shown below with the main defect being the largest reading. Note that the arrow will always point to the pipe, i.e., will not reverse unless the signal reduces to a level that cannot be processed correctly.

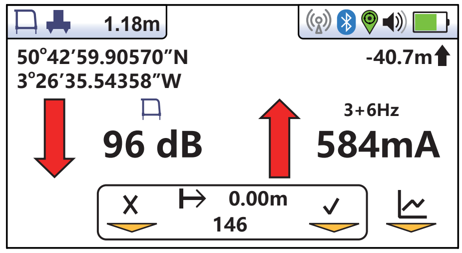


Taking DM current readings when using the A-Frame.

With both the A-Frame and DM foot fitted, it is possible to take DM current readings whilst remaining in the A-frame mode. This allows the operator to undertake ACVG and current gradient (CAT surveys) at the same time.

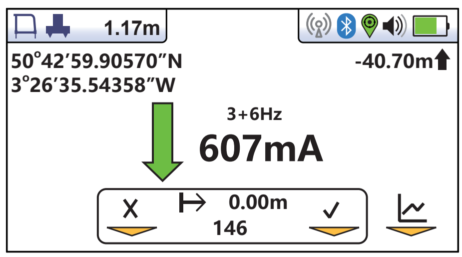
Two methods are available, both enable simultaneous ACVG and Current gradient mapping.

To take a DM current reading when in the A-Frame mode, press the "Info" key. If in simultaneous mode the following will be displayed:



Pressing the "Enter" key will save both A-frame and DM current readings.

If in ***standard mode*** the display below will be displayed:



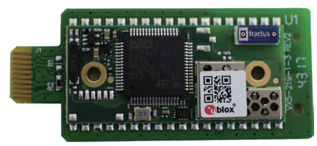
Pressing the "Enter" key will save the DM current shown with the saved A-Frame results.

In both cases, pressing the "Info" key will return the display to the A-Frame screen.

6. Using External GPS

6.1 Compatible GPS and GPS Data Loggers
The vLoc3-DM is compatible with most Bluetooth operating systems.

6.2 Bluetooth



The vLoc3-DM receiver can be fitted with an optional Bluetooth communications accessory. This allows communication with external GPS and or Dataloggers. The Bluetooth option can be retrofitted and can be ordered at a later date if preferred.

6.2.1 Fitting the Bluetooth Module
1. Turn the receiver off and remove the battery pack.
2. With a small cross-head screwdriver remove the two screws of the module cover and remove the cover.

Remove screws

Remove cover

3. The slot on the left is for the Bluetooth module, the slot on the right is not active and for future developments. Carefully slide the Bluetooth module slide it into the slot and press with your thumb to secure it in the slot.

Install Bluetooth module into the left slot

4. Replace the cover and tighten the two retaining screws being careful not to overtighten.
5. Install the receiver battery, switch on the unit, and after a few seconds, a black Bluetooth icon should appear, showing that the module is fitted.
6. If the Bluetooth icon is grey, this means the GPS option is not fitted or incorrectly fitted.
7. The Bluetooth can communicate with external devices that are also Bluetooth enabled. Generally, Bluetooth devices fall into two categories, high or low power devices. The vLoc3-DM Bluetooth is compatible with low power devices.

6.3 Pairing with external GPS/Dataloggers
To pair with an external device first ensure the Bluetooth option is fitted. This can be checked on the Status bar. If the Bluetooth icon is grey this means it is not fitted. Black icon indicates the option is fitted. The Bluetooth is retrofit table and is “Plug and Play”.

Method
- Switch on the external device.
- Switch on the vLoc3-DM and enter the User setup menu by a long press on the “i” button.
- Use the “+” and “-” keys to scroll down to the option “Bluetooth Pairing”.
- Press the Enter key.
- Press the Enter key to commence “Bluetooth search”.
- A list of available devices will be shown.
- Scroll down to the desired device and press the Enter key.
- Double press the “I” button to return to the main screen.
- After a few seconds the Bluetooth icon should turn blue indicating the device has paired successfully.
- The unit will remember the pairing even after switching off. However, the unit can only remember one unit at the time so if the unit is paired with another device the settings will be forgotten.

GPS (Global Positioning System)/GNSS (Global Navigation Satellite System)
The vLoc3-DM can utilize location data from an external GPS/GNSS. For the vLoc3-DM needs to be paired with an external device (see previous section on Bluetooth devices).

Once paired with an external device, the vLoc3-DM will await valid GPS data from the external device. The GPS icon will turn green when a valid GPS signal is detected. This can take from a few seconds to a few minutes depending on the device and whether it is doing a “cold” or “hot” start.

6.4 Transferring Data from the Locator to a Computer

To transfer data it is necessary to use the vLoc3-DM Configurator Tool called MyLocator3. This is a simple program that can be downloaded from the Vivax-Metrotech web site at ***www.vivax-metrotech.com***.

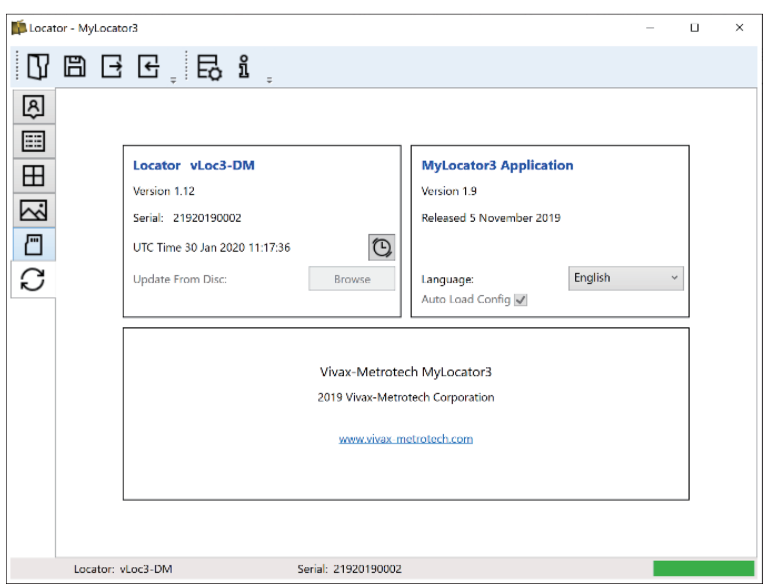
TIP
To view Google files, it is first necessary to install the Google earth application to your computer. This is a free application which can be found at http://www.google.com

6.4.1 MyLocator3

MyLocator3

This section describes the user operation of the MyLocator3 PC application.
MyLocator3 is a desktop PC application which is capable of downloading code and configuring the vLoc3-DM series of locators.
The first part of this document (Basic Operation) describes usage not requiring a USB security dongle. The second part of this document (Advanced Features) describes usage requiring a security dongle.
MyLocator3 is a free downloadable App available at ***www.vivax-metrotech.com***.
Follow the instructions to download and install the application.

A “MyLocator3” icon will appear on the computer desktop.
Connect your vLoc3-DM to your computer via the mini USB connector which can be found under the battery cover flap.
Launch MyLocator3 by double clicking on the icon.



6.4.2 MyLocator3’s Basic Operation

MyLocator3 operation, not requiring a USB security dongle.

6.4.2.1 Updates Page

When a locator is first connected to the PC, the "**Updates Page**" will be displayed, and this will show the locator variant type along with the locator serial number and the running firmware version in the upper left-hand box. The upper right-hand box will show information about the MyLocator3 PC application.
Clicking on the Clock symbol sets the locator time to UTC time. To check local and UTC time, hover over the icon, and the times will be displayed to the right, flashing alternately.
MyLocator3 can also be viewed in a number of language options. Click on the pull-down menu to select the desired option.

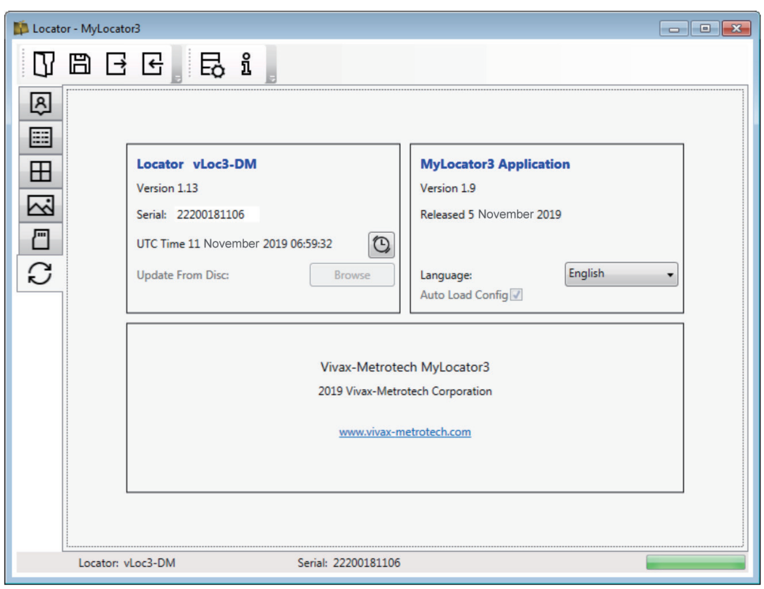
Checking the "Auto Load Config" box ensures the configuration setting of the locator is automatically uploaded to the MyLocator3 app when the locator is connected.

6.4.2.2 Application Update

Every time the MyLocator3 Application is started, its version number is checked against the latest version available on the Vivax-Metrotech server, and the user is notified if an update is available, as shown below. This feature will only be available if the computer is "online."
Clicking on the Update Now button will download the latest version from the Vivax-Metrotech server, which can then be installed by the user.

6.4.2.3 Locator Firmware update

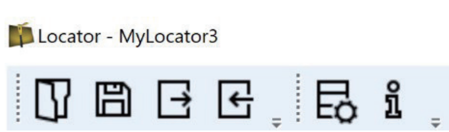
Each time a locator is connected to the PC, it's firmware version is checked against the latest version available on the Vivax-Metrotech server, and the user is notified if an update is available, as shown below. This feature will only be available if the computer is online.
Clicking on the Update Now button will fetch the latest version from the server and then download it to the locator.
The "Update From Disc" feature will only be available if a suitable dongle is also attached to the PC. This feature allows the user to install older versions of firmware stored on the computer, although it is advised that only the latest version of firmware is used.



6.4.3 Toolbar

The vLoc3-DM locator can be configured so that features can be switched on or off. This enables the user to tailor the instrument to meet the needs of their application while keeping the user interface uncluttered. The toolbar at the top of the screen enables the user to create configurations.

The application toolbar looks like this:



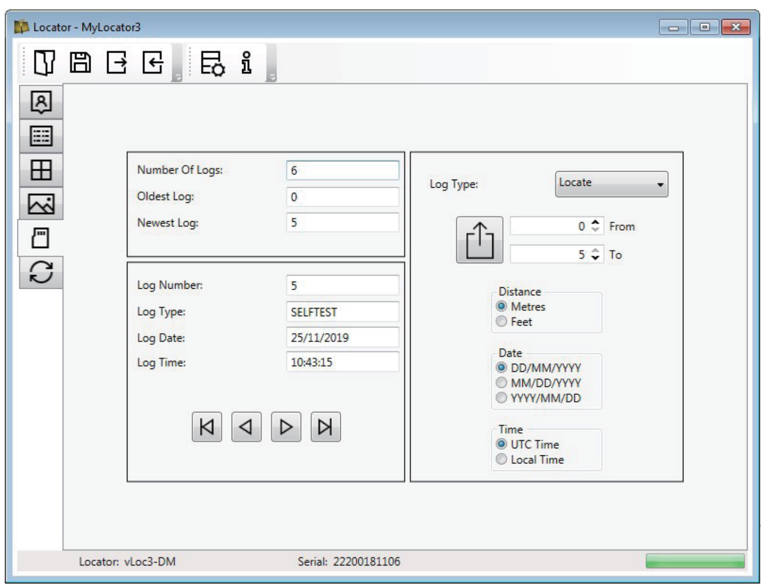
	This will open an existing configuration file (*.vmcfg).		This will read the configuration from the connected locator.
	This will save the configuration to a file.		Icon not Active for vLoc3-DM.
	This will write the configuration to the connected locator.		This will display information about MyLocator3.

6.4.4 Data Logging

Clicking on the Data Logging tab will display information about the state of the attached locator's data log contents. The data log contents can be stepped through by using the controls on the right-hand side. The user can upload a selection of logs from the locator to the PC by using the controls on the upper right-hand side. The data in the data log can be configured before exporting. The parameters that can be set are:

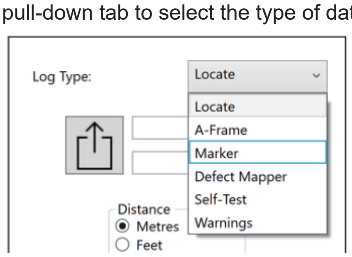
- Distance units
- Date format
- Time format, i.e. UTC or local time

Files may be exported/saved locally as .csv/.bin/.kml/.shp files and examined later. The default filename is based on the serial number of the connected locator but can be changed during the saving process.



Before exporting the data, use the "Log type" pull-down tab to select the type of data required. Options are:

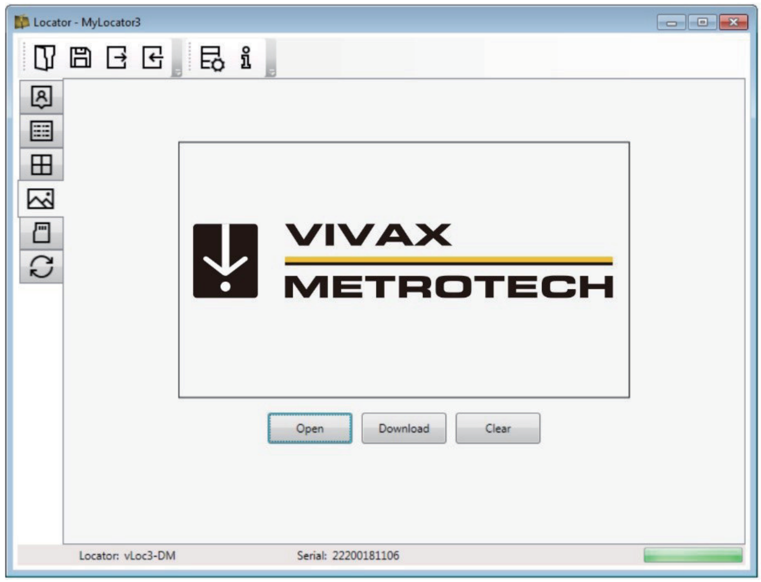
- Locate
- A-Frame
- Defect Mapper
- Warnings
- Self-test



Tip

If it is only required to export a portion of the log (for instance, a survey on a particular day), use the data log scroll facility at the bottom left of the display to scroll through to the start date/time. Note the log number and then scroll to the end date/time and note also this log number. Use these numbers to enter the "From" "To" numbers in the top right of the display when exporting. This will help to keep the exported data to a manageable size.

6.4.5 Splash Screen



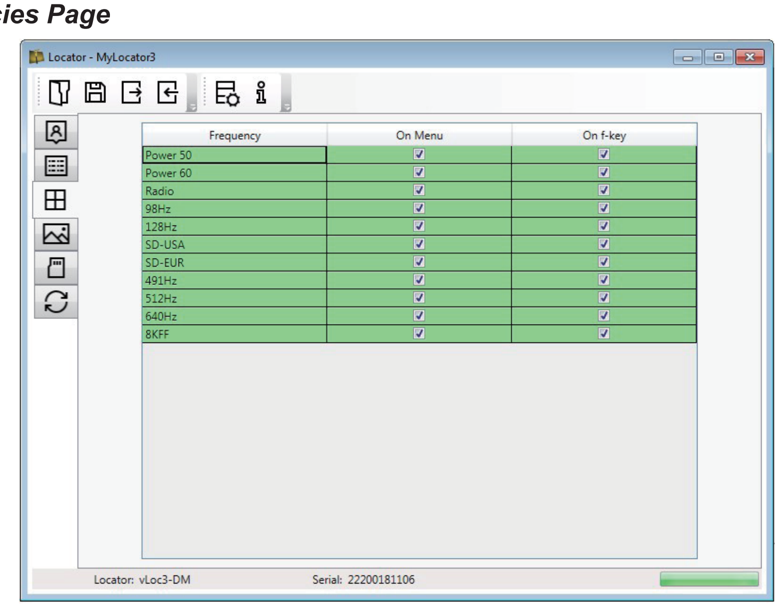
On this page, an image can be loaded which can be used as a splash screen by the locator when it is switched on. The locator has an LCD screen with a resolution of 480 by 272 pixels. The image loaded into MyLocator3 will be scaled to fit the width of the screen. If the scaled image height is less than the LCD height, then the image is centered vertically and white bars are used as padding. If the scaled image height is greater than the LCD height, then the image can be re-positioned vertically by clicking and dragging the left mouse button anywhere on the image.

To insert your own startup screen first click on the “Open” button. Then browse your files to select the picture required as the startup screen. The application is compatible with file formats .jpg/.bmp/.png, and .gif.

The startup screen will be displayed in the application.
The Download button can be used to set the splash screen immediately, or the image can be sent to the locator along with the rest of the configuration by pressing the Write Configuration button.

To remove a startup screen and revert to the default Vivax-Metrotech screen, click on the “Clear” button and download the cleared screen.

6.4.6 Frequencies Page

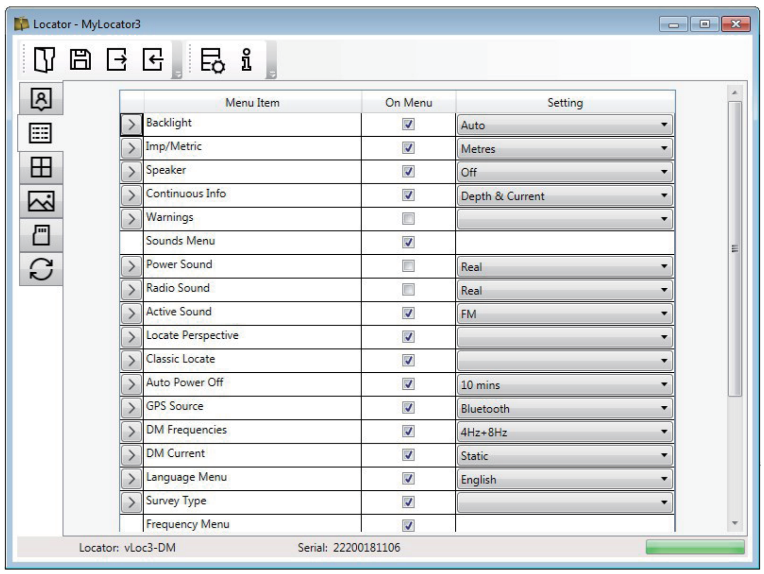


The “Frequencies” page will allow the user to refine which frequency modes are available when the locator F-key is pressed and which frequencies appear on the locator menu.

6.4.7 Menu Settings

The “Menu Settings” page allows the user control over which menu items appear on the locator and also the initial setting of the menu item when the locator is first used after configuration.

The menu items with a right pointing arrow > can be expanded to reveal further sub-menu items.
If the “On-Menu” item is ticked, then the item will appear on the locator menu. The item displayed in the “Setting” column will be the initial locator setting after configuration. If the “Setting” value is not selected, then the locator setting will be unchanged.



6.4.8 Advanced Features

The Advanced Features are available to those users in possession of a USB security dongle. If a dongle is attached to the PC, then its level will be displayed on the MyLocator3 status bar.

6.4.8.1 Supervisor Lockouts

This feature is available to anyone with a dongle (contact Vivax-Metrotech for the purchase of a dongle).When a dongle is connected to your computer via a standard USB socket, the icons for the “Splash Screen” page, “Frequencies” page and the “Menu Settings” page will change color to green. This color indicates the page is unlocked.
The Splash Screen page, Frequencies page, and Menu Settings page can each be individually locked by double-clicking on their page tab icon. If a page is locked, then it can only be accessed by a user with an appropriate security dongle. This will prevent unauthorized users from changing protected locator items. i.e., the “Splash Screen” can be locked to prevent the user from changing it.
The page tab icon will change color from green to amber.
To unlock a tab, with the dongle connected, double click on the tab to unlock.

7. Interpreting Results

7.1 Introduction

Using the vLoc3-DM system can quickly and efficiently assess the general coating of a pipeline network. It can help identify defects and possible shorts to other structures. It can be used as a tool to prioritize and plan work on the network. However, unless care is taken when interpreting the results misinterpretation can lead to unnecessary work and expenses.

7.2 Sources of Error

Most errors are either caused by carelessness in taking readings or by interference or distorted signal field.

7.2.1 Operator Error

It is essential that care is taken when taking readings. Great care should be taken to pinpoint the position of the pipeline before a measurement is taken. The locator must be aligned and held vertically. The measurements are only as good as the care taken to obtain them.

The sensors used to detect the low-frequency vLoc3-DM profiling signal are very sensitive to low frequencies. Moving the instrument whilst the unit is calculating the information will cause the strong earth's magnetic field to induce an interfering signal into the sensors resulting in errors. The vLoc3-DM must be kept absolutely still whilst it is taking measurements.

7.2.2 Interference (Distorted Fields)

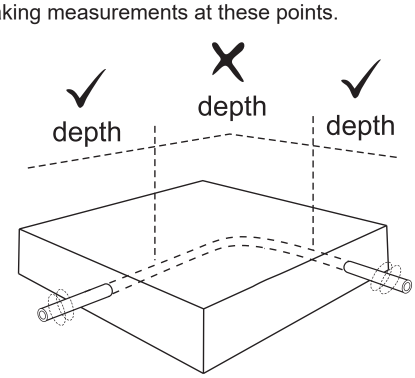
The vLoc3-DM evaluates the electromagnetic field signal radiating from a pipeline to determine the information required. It assumed that the field is radiating from the pipe in a uniform way. Unfortunately, the field is prone to be distorted and this can lead to errors.

7.2.2.1 Source of Interference (Distorted Fields)

There are many sources of field distortion, but this handbook lists some of the more common sources of distortion:

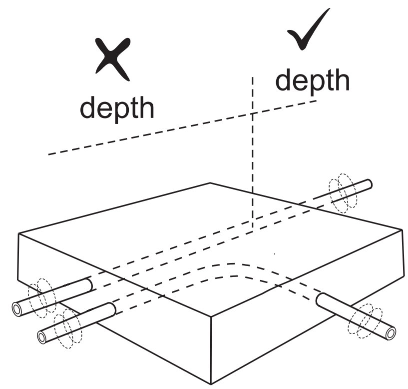
- Changes in Pipeline Direction
- Adjacent Pipes or Cables
- Cross Bonding
- Passing Vehicles
- Pipe Sleeving
- Changes in Pipeline Direction

Whenever there is a change in the pipeline direction, there will be some field distortion. See the diagram below. The sharper the change, the bigger the distortion. Avoid taking measurements at these points.



- **Adjacent Pipes or Cables**

Adjacent pipelines or cables very often have a signal induced onto them by capacitance or inductive effects. These signals will interfere with the signal on the target pipe and will cause distortion. See the diagram below.



- **Cross Bonding**

Pipes can often be cross bonded. This is a deliberate action designed to reduce the number of CP stations and to limit the effects of stray currents.

If the pipes are laid in the same path and are in close proximity, the currents flowing on the two pipes will interfere with each other and cause interference. For best results, the cross bonding should be disconnected for the duration of the survey.

- **Passing Vehicles**

The sensing devices used to detect the 3Hz vLoc3-DM profiling signal are very sensitive to low frequencies. Vehicles passing very close to the receiver will disturb the earth's magnetic field and cause distortion of the received signal. Try to take measurements when there is a gap in passing vehicles.

In areas where traffic is passing, wait until three constant consecutive readings have been shown before saving results.

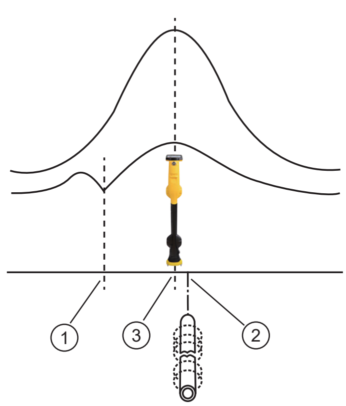
- **Pipe Sleeving**

It is common practice to insert a pipe in a protective steel sleeve. This may distort the signal and cause errors. Take readings before and after the sleeve. If they are the same, the pipeline is well insulated through the sleeve. Sleeves are very often used at road crossings.

7.2.2.2 Checking for Distorted Fields

Check to see if the signal is being distorted by other radiated fields. Locate the pipe, first in the "Peak" mode, and then in the "Null" mode. The two should indicate that the pipe is in the same place. If they do not, the signal field is distorted.

If the antenna mode, "Peak with arrows," is selected, the same can be achieved without having to switch between modes. To do this, first, find the position of the pipe using the largest bar graph reading as above. Then, find the position as indicated by the arrows. The arrows will indicate the same position as the null response of the bar graph. Hence, if the arrows and bar graph indicates the same position, there is unlikely to be significant field distortion.



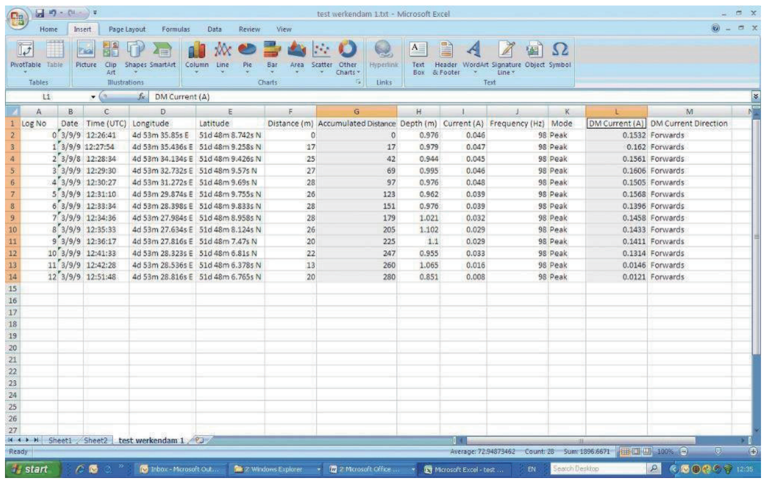
1	Null Position
2	True Position
3	Peak Position

7.3 *Viewing Data*

Upload the data from the vLoc3-DM receiver as described previously in section Upload Data Files. Files can be saved in .txt, .kml, or .shp formats.

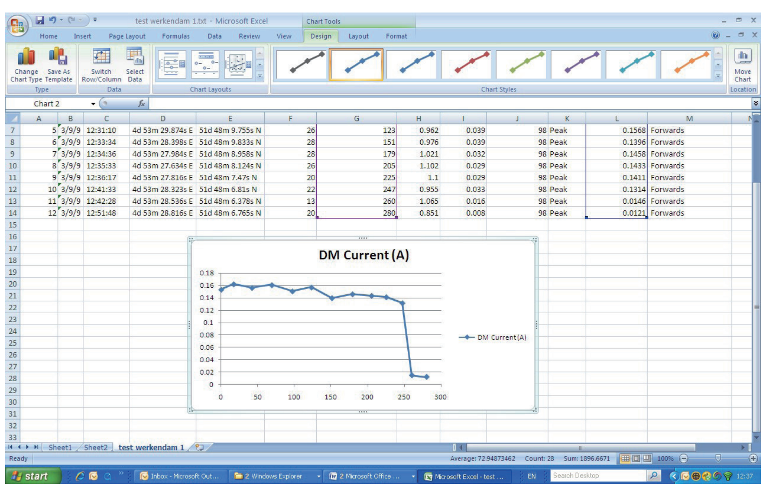
7.3.1 *Viewing. xls Files*

Open an Excel spreadsheet and open the desired file. Something similar to the screen below will be displayed. The data is now in the form of an Excel spreadsheet and can be manipulated to create suitable graphs.

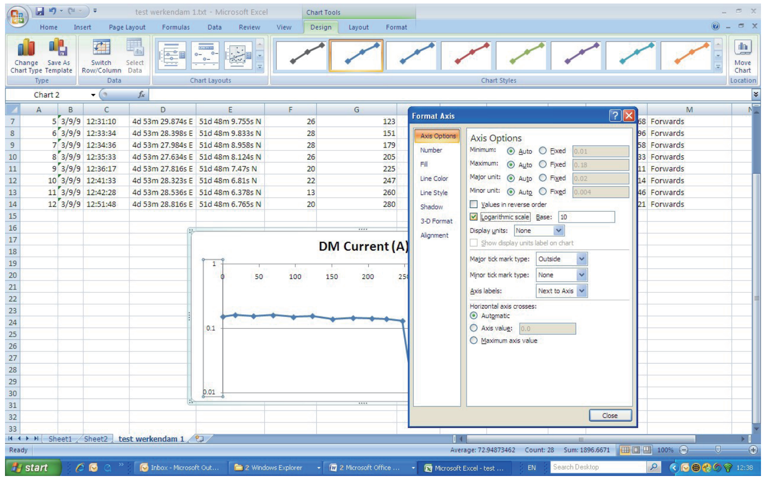


In the example above, the distance column is populated automatically as the GPS option was used when data was collected. If GPS was not used, the distance between measurements would have to be inserted manually.

- It is now possible to generate a graph. Graphs are most commonly done as vLoc3-DM current against distance.
- Highlight the Accumulated Distance records and then press the “Ctrl” key whilst highlighting the vLoc3-DM Current column.
- From the “Insert” tab, select “Scatter Plot.” From the menu, select the desired graph. The graph will then be generated as below.



The graph is drawn with a linear current x-axis. If a logarithmic scale is required, right-click on the x-axis and select logarithmic from the options as below.



7.3.2 Viewing .kml Files

To view .kml files, it is necessary to have Google Earth installed on the host computer. If not already done, please visit the Google Earth Web and install the latest version.

To launch a .kml file, double click on the selected file. If connected to the web and if Google Earth application is installed on the host computer, Google Earth will automatically launch and will zoom to the site location. Pins will indicate survey points. Clicking on a point will show measurement details for that point. (note these details are continually under review and may change without notice)

The map is a typical representation, but note that this feature is under continual development and may change to include new features without notice.

7.4 Interpreting Graphs

There are two types of graphs that can be plotted. These can either be plotted.

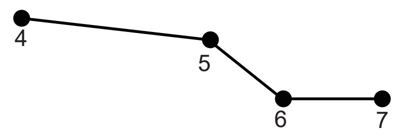
- Linear
- Logarithmic

In either case it is important to look at the trend of the graph rather than individual points. This is because the signals radiating from a pipe can be affected by many external influences such as:

- passing cars
- ground currents from stray currents
- ground currents from the transmitter
- slight movements of the receiver

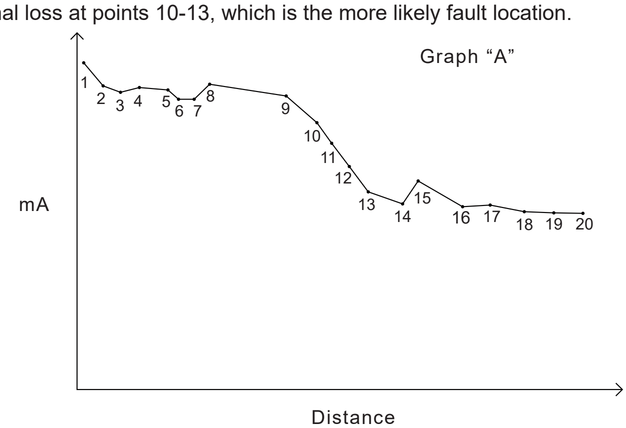
These are just a few examples; the list is probably endless.

The intention is to identify changes in current, which signify a defect. So if we were to look at a small section of the graph it is, incorrectly, possible to interpret fluctuations as a defect. See the diagram below.



Section Points 4-7 of Graph A

Just taking points 4/5/6/7 is possible to think that there is a defect at this point. However, looking at points 1 to 20 shows that there is, in fact, a trend of signal loss at points 10-13, which is the more likely fault location.



Also, note the step response at points 1 to 2. This is typical of readings near the application point and may not represent a fault. The step is very often caused by the concentration of ground currents at the application point or the cable leading to the ground bed. If in doubt, check the section using the A-frame.

Whether Logarithmic or Linear scales are used is a matter of personal preference. However, when looking for defects along a pipe, similar defects, further along, the pipe can appear smaller than those near the application point. This is because there is less pick up at a distance as the signal from the transmitter is reduced. Using a logarithmic scale has the effect of compensating for this effect and is more likely to represent the true magnitude of the defect which is a long way down the pipeline.

8. Care and Maintenance

8.1 Cleaning

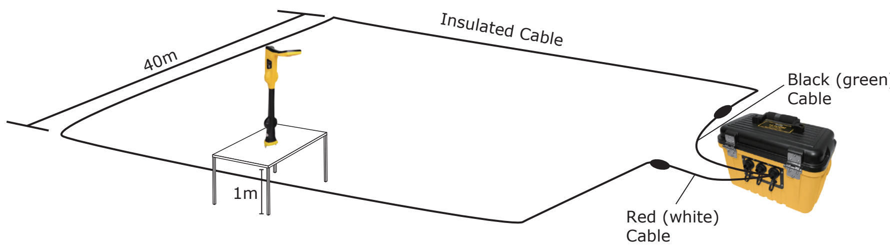
Cleaning can be done with a cloth dampened with warm soapy water. Do not use scouring pads on the casing or display surfaces as this will scratch the device. Do not submerge or pour water over the receiver or transmitter.

Always dry the equipment before storing it.

8.2 Checking Functionality

The vLoc3-DM system can be checked using a simple test procedure. It requires an area clear of pipes and cables and free from metallic structures such as metal tanks, metal railings, and reinforced concrete.

A 40m square loop of wire needs to be set out on the ground with a non-metallic structure placed at 1m above the cable and at the midpoint of one of the straight sections. See the diagram below.



Method:

- Set the transmitter to 128Hz (98Hz if in a 60Hz environment)/3Hz/6Hz, set the current to 100mA.
- Set the locator to receive 128Hz (or 98Hz). Position the locator on the non-metallic structure and carefully align so that it is above and in line with the cable. Set the gain of the locator to read approximately 50%. Check that the line indicator is pointing “North/South” if it is not there could be an interfering signal, or you may be too near to a bend of the loop.
- Hold the locator very still and press the “i” pushbutton. After a few seconds, a result will be displayed on the instrument.
- Check that the arrow is pointing back towards the white (or red) connection lead.
- Check the vLoc3-DM current reading is 100mA +/-10mA (10%).
- Check the depth is 1m +/-7cm.
- Repeat for each of the current settings of the transmitter.
- Successful completion of these tests confirms that both the receiver and transmitter are functional.

9. Glossary

Active Locate	A locate where a transmitter is used to apply a signal to a buried pipe or cable, the position of which is then located by a receiver tuned to the same frequency.
Active Signal	A signal applied by the locator transmitter to a buried line. Typical, this is a very precise frequency.
Attenuation	The reduction of an electromagnetic signal from a pipe or cable.
Clamp (or Coupler)	An accessory used to apply the transmitter signal to an insulated line, removing the need to connect the transmitter signal directly to a conductor or cable sheath.
Compass	Line direction indicator. (Although visually like a compass, this is the only relation to a compass.)
Coupling	The act of signals transferring to lines to which they were not originally applied. The coupling can be “direct” where the target line has an electrical connection to another line, or “induced” where the signal radiates from the target line to another line or lines.
Datalog	Refers to data stored in the memory of the vLoc3 Locator.
Display	The information visually available on the dot matrix display.
Firmware	Permanent software programmed into the vLoc3 read-only memory.
.klm File	Keynote Markup Language (KML) is a file format used to display geographic data in an Earth browser such as Google Earth, Google Maps, and Google Maps.
Line	A generic term for any buried pipe or cable.
Null	A minimum response to a buried line.
MyLocator3	App created to manage software updates and datalog transfers associated with vLoc3 range of cable locators.
Passive Locate	A locate where the receiver searches for a wide range of signals that radiate from buried pipes or cables. These signals come from a variety of sources in the environment and couple to the buried (& overhead) lines. Typical examples 50/60Hz and LF/VLF radio.
Passive signals	A wide range of signals that radiate from buried pipes or cables. These signals come from a variety of sources in the environment and couple to the buried (& overhead) lines. Typical examples 50/60Hz and LF/VLF radio.
Peak	A maximum response to a buried line.
Pinpoint	Using a receiver to identify the exact position of a buried line.
Response	The indication that the receiver gives which is caused by the signals it is receiving. This can be visual, audio, or both. Typically, it is displayed on the locator's dot matrix display and audibly from a loudspeaker in the receiver housing.
Search (sweep)	This describes the act of looking for a buried line within a given area.
shapefile	The shapefile is a grouping of several files formatted to represent different aspects of geodata: • .shp — shape format; the feature geometry itself. • .shx — shape index format; a positional index of the feature geometry to allow seeking forwards and backwards quickly. • .dbf — attribute format; columnar attributes for each shape, in dBase IV format.
Sonde	A small transmitting coil which may be built into a product such as a sewer camera or packaged as a small self-contained battery powered transmitter. A receiver tuned to the same frequency can locate the position of the Sonde and hence whatever it is attached to or in. Frequently used for locating sewer cameras, and the non-metallic pipes.
Target Line	The buried pipe or cable to be located.
.txt Text File	A .txt file is a standard text document that contains unformatted text.
Trace	Using a locator to follow the path of a buried line.

Illustrations used in the preparation of this manual will inevitably show some resemblance to similar illustrations from other manufacturers. Some manufacturers have given permission for the use of their graphics is given credit for these use. This statement is intended to attribute such credit.

Disclaimer: Product and accessory specification and availability information are subject to change without prior notice.

Notes:

Vivax-Metrotech Corporation

3251 Olcott Street, Santa Clara, CA 95054, USA
Toll Free: (800) 446-3392
Phone: +1 (408) 734-1400
Website: www.vivax-metrotech.com