technology for network management and leakage control

User Manual

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1 Introduction

1.1 System Overview

Eureka3 is a high performance leak noise correlator used for the location of leaks in buried water pipes. The system combines sophisticated technology with flexible operation to locate leaks in difficult conditions, e.g. where there is substantial background noise, where only the quietest of leak noise is present, or with a variety of pipe materials.

The Eureka3 system is based around the PrimeTouch™ processor platform. PrimeTouch comprises radio receivers, signal processing electronics and runs the Eureka3 software application.

PrimeTouch, Transport Case, Transmitters and Optional Accelerometers

1.2 System Contents

1.2.1 Standard Package

The Eureka3 standard package comprises:

- Red transmitter with internal accelerometer
- Blue transmitter with internal accelerometer
- Stability plate (x2)
- Transmitter antenna (x2)
- PrimeTouch
- Headphones
- Car charge cable (12Vdc)
- Mains charger
- Transport case

1.2.2 Optional Items

The optional items available are:

- External accelerometer(s)
- Hydrophone(s)
- Sensor extension cable(s)
- Accelerometer grip attachment(s)
- Magnetic vehicle mount antenna

2 Principles of Leak Noise Correlation

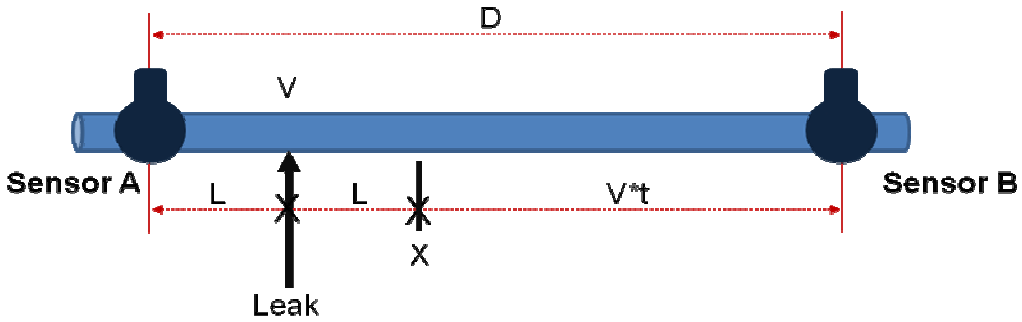
Leak noise correlation is used to detect leaks in pipelines where there is a positive internal pressure, such that a leak causes a loss of fluid to the outside. The movement of fluid through the leak causes rapid pressure changes around the site of the leak such that there is a randomly varying noise source located at the leak. This noise travels in both directions, at the same velocity, from the leak.

(Noise is not a constant frequency like a musical note, but is a random and continually changing mixture of different frequencies. It is this characteristic which enables the correlator to operate.)

2.1 Methods of location

Previous methods of leak location relied on detecting a noise, then tracing it at ground level to find the point of maximum noise, which was assumed to be directly above the position of the leak. The equipment used included listening sticks and stethoscopes, but these were difficult to use if the noise was faint or too loud to be accurately located. Background noise was another problem; electronically-filtered amplifiers were introduced in an attempt to overcome such problems.

A correlator operates by comparing the noise detected at two different points in the pipeline. Noise travels from the leak in both directions along the pipeline at a constant velocity (which depends on various factors), so that if the leak is equidistant between two sensors then these sensors will detect the noise at the same time. Conversely, if the leak is not equidistant then the sensors will detect the same noise at different times, and the difference in time (the time delay) is measured by the correlator. The following diagram illustrates this:



The sensors are located on the valves A and B (convenient access points for underground pipes), and as shown the leak site is closer to A.

By the time a particular noise from the leak has reached A, the same noise heading towards B has only travelled as far as X. The distance from X to B causes a delay t before the noise arrives at B, thus the correlator detects the delay (t) between the arrival of the noise at A and its arrival at B. If the velocity of sound is V and the distance between the sensors is D, then as the distance from X to B = V * t, (velocity x time), then D = (2 * L) + (V * t). This equation may be rearranged to give L, the distance from the nearer sensor to the leak site:

$$L = \frac{D - (V * t)}{2}$$

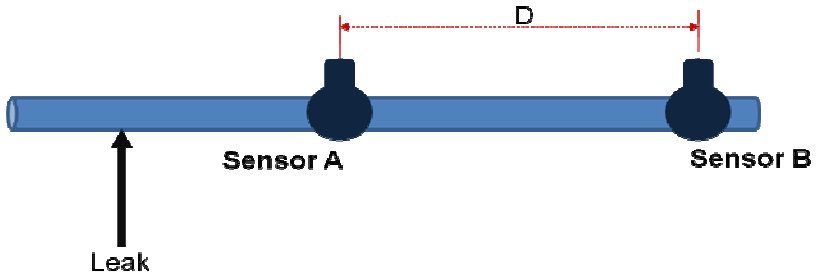
As the sound velocity can be calculated from knowledge of the pipe diameter and material, while the distance between the sensors can be determined by careful measurement, the correlator can calculate and display the location of the leak as a direct distance from the nearer sensor. Alternatively, the correlator may be used to measure the actual velocity of sound in the pipework being examined, so ensuring the highest possible accuracy in locating the leak.

2.2 Sensor Position

Correlator operation depends on having the leak located between the two sensors. There are two situations where this is not the case and one sensor will have to be moved before an accurate correlation can be performed.

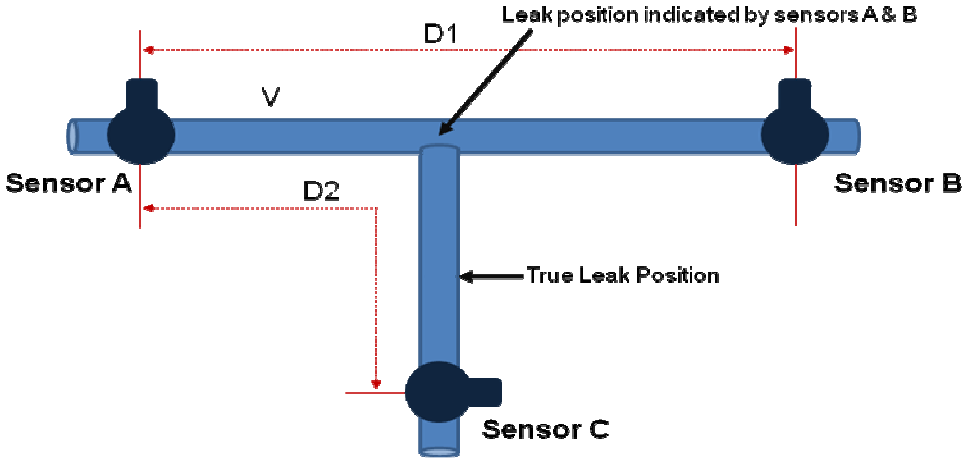
2.2.1 Leak Beyond Sensors

If the leak is located outside the length of pipe between the sensors, then the correlator will ignore the transit time from the leak to the nearest sensor, as this transit time will be the same for both sensors. This will give the result that the leak will appear to be located directly at the sensor nearest to the leak. (This is sometimes termed “out-of-bracket”.) This is an indication that one sensor must be moved to locate the leak position accurately.



2.2.2 Leak on Connecting Pipe

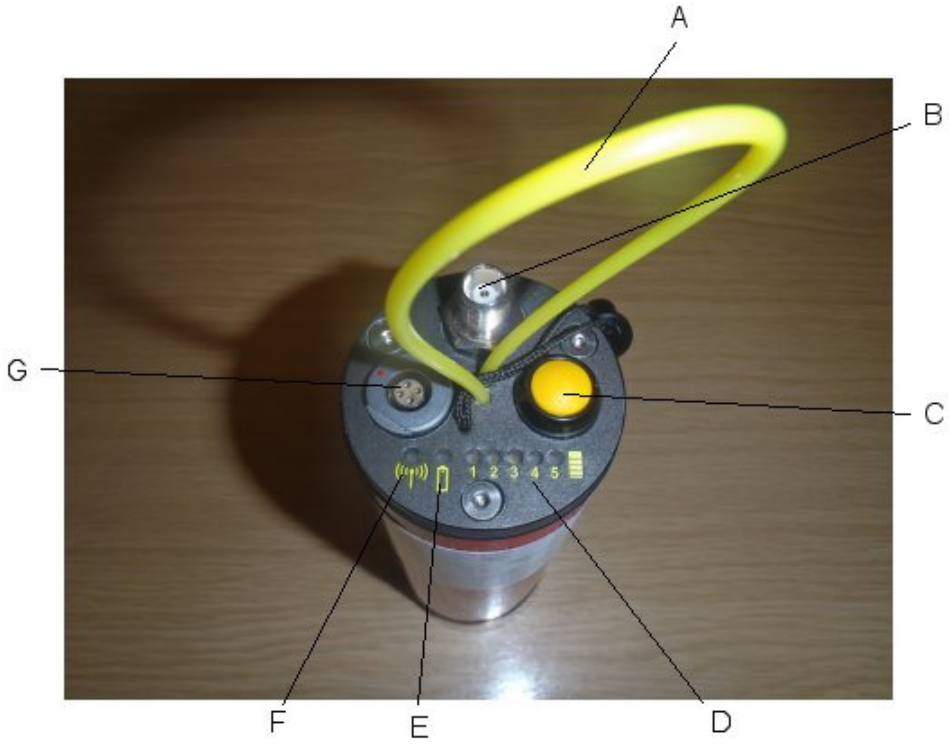
If there is a leak on a pipe that connects to the pipe being sensed, then the noise will appear to spread from the point of connection of the pipes, and so will appear as a leak at that point. It is then necessary to move one sensor to the connecting pipe (in other words, to place the leak between the sensors) in order to locate the leak accurately. A thorough knowledge of the layout of the entire pipe network is required to ensure that the correlator is making measurements on the correct section of pipe and that there is no possibility of leaks on branch pipes causing false readings.



3 System Components

3.1 Transmitters

Eureka3 has two transmitters, one red and one blue. They both listen to noise which is transmitted to PrimeTouch via an internal radio transmitter. The transmission frequency of each transmitter is different to distinguish the different noise signals.



A	Handle
B	Antenna Socket
C	Pushbutton Switch
D	Level Indicator LEDs (5)
E	Battery Indicator
F	Transmit Power Level Indicator
G	External Sensor/Charging Socket

3.1.1 Handle

The handle is a simple plastic loop.

3.1.2 Antenna Socket

The antenna socket allows the connection of the antenna.

3.1.3 Pushbutton Switch

The pushbutton switch has several functions.

When the transmitter is off:

- Short press will show the battery charge on the LED Level Indicator.
- Long press (2 seconds) will turn on the transmitter (the battery charge and transmitter LEDs will come on, then the LED level indicator will show received noise level).

When the transmitter is on:

- Short press will cycle the transmitter between low and high radio power output.
- Long press (2 seconds) will turn off the transmitter (press and hold until all the LEDs come on and go off).

3.1.4 LED Level Indicator

At first switch on, the LED level indicator will give a representative indication of battery charge; full charge is indicated by 5 LEDs and minimum charge by a single LED. After a short while the display will change mode and give an indication of the sound level picked up by the transmitter. A single LED shows a low sound level; all LEDs indicate the highest sound level.

3.1.5 Battery LED

The LED shows green when the transmitter is switched on. The LED will show red when the battery charge is low; the transmitter should then be charged.

3.1.6 Radio Power LED

The radio power LED shows the transmit power setting of the transmitter. Green indicates low power, yellow indicates high power. Low power needs to be used when the transmitter is near PrimeTouch (within 20metres).

3.1.7 External Sensor/Charger Socket

The connector allows the connection of external sensors and also connects the transmitter to the charger when it is in the transport case.

3.1.7.1 External Accelerometer

The external magnetic accelerometer sensor is used where the location of the transmitter does not allow the easy attachment of the internal accelerometer to a pipe or fitting. This also allows the option of placing the transmitter above ground to improve the radio signal between the transmitter and PrimeTouch. A metal plate can be attached to the bottom of the transmitter to provide stability to the unit. External accelerometers from previous Eureka correlation units are compatible with Eureka3 transmitters.

3.1.7.2 Hydrophone

Hydrophones can be purchased separately to improve noise quality for large diameter (typically >300mm) and plastic pipes, or even for sites with excessive background noise. A hydrophone can be attached to the transmitter and directly inserted into the pipe through a hydrant or similar fitting. This option then needs to be selected on PrimeTouch.

	Adhere to local water hygiene regulations when inserting hydrophones into potable water pipes.

	The Eureka3 software must have the correct information about the sensors connected.

3.1.7.3 Transmitter Charging

The transmitters are charged in the transport case. To charge, connect one of the charge leads in the transport case to each transmitter. Connect the transport case to the mains supply using the mains adapter or use the vehicle charge cable (12Vdc).

Whilst charging the LEDs will show the status as below:

State	Battery LED	LED Level Indicators
Normal charging	Green	Charge level display (1-5 LEDs)
Over temperature	Flashing Green	Charge level display (1-5 LEDs)
Charging complete	Green	All on
Fault	Red	Off

The over temperature state may occur when charging in high temperatures. The transmitter electronics will manage this state and continue to charge when possible.
The fault state indicates a problem and the transmitter should be returned to a Primayer Service Centre for further investigation.

	Only Eureka3 charge leads should be used to charge Eureka3 transmitters. DO NOT attempt to use Eureka2 or Eureka Digital charge leads, as damage may occur which will not be covered by warranty.

3.1.7.3.1 Charge Time

Charge time from flat to full is between 3 hours 45 minutes and 4 hours 30 minutes. The charge time will be longer in higher temperatures; there is automatic monitoring in the electronics to prevent the batteries overheating.

3.1.7.3.2 Battery Life

Transmitter battery life is up to 18 hours, depending on usage pattern.

3.1.8 Internal Accelerometer

The internal accelerometer is mounted on the base of the transmitter and is magnetic. A stability plate can be magnetically mounted to increase the area of the base and provide greater stability for use when the internal accelerometer is not used.

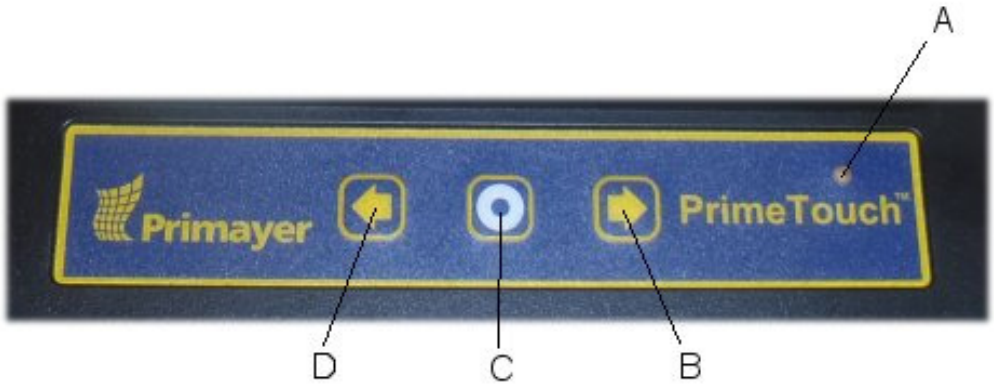
3.2 PrimeTouch

PrimeTouch runs the Eureka3 software which receives and processes the noise data from the radio transmitters to produce a leak noise correlation.

3.2.1 Switch/LED Panel

The Switch/LED Panel has:-

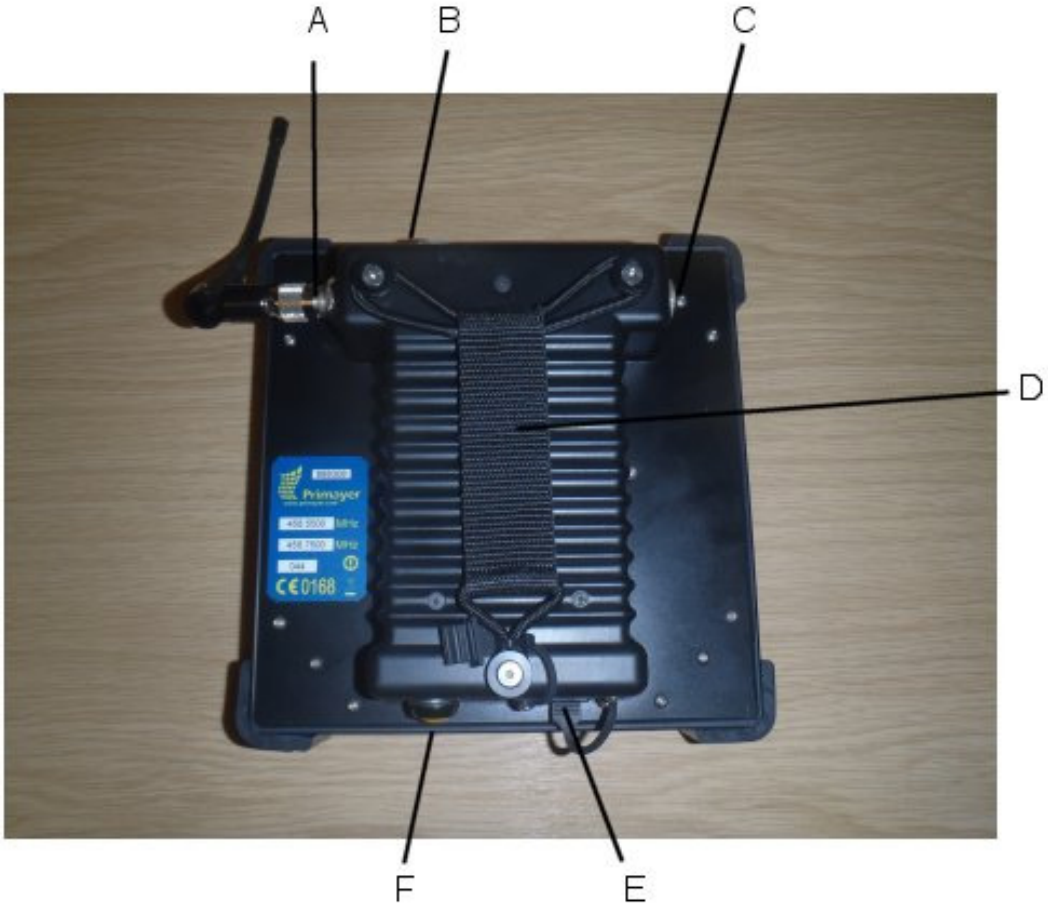
- Pushbuttons
- LED



Key	Description
A	Charging LED
B	Scroll Right Button
C	Home Button and LED
D	Scroll Left Button

The scroll left and right buttons are primarily used to move the cursor (vertical line) on the correlation display to the left or right.

3.2.2 PrimeTouch Rear View



A	Antenna Socket
B	External Sensor/Charge Socket
C	Headphone Socket
D	Hand Strap
E	USB Connector
F	On/Off Switch (Yellow)

3.2.2.1 On/Off Switch

The on/off button has several functions:-

Function	**Operation**
On	A long press of the button when the unit is off will turn the unit on
Off	A long press of the button when the unit is on will turn the unit off
Power Save	A short press of the button when the unit is on will put the unit into power save mode, the home button LED will come on for a few seconds then start to double flash every 5 seconds. A short press of the button when the unit is in power save mode will put the unit back into normal mode, the home button LED will come on for a few seconds.

3.2.2.2 Charging LED

The charging LED is on when PrimeTouch is charging. When charging is complete this light will switch off.

3.2.3 Antenna Socket

The antenna connection allows either the standard antenna or the Magnetic Vehicle Mount antenna to be connected to PrimeTouch.

3.2.4 Touch Screen

The touch sensitive screen shows information and software buttons. The screen works well in all lighting conditions and can be operated wearing gloves if required. The brightness of the display can be adjusted as required.

3.2.5 USB Ports

Two USB ports are provided for the connection of USB devices.

3.2.6 Headphone Jack Socket

The headphone jack allows the connection of the supplied headphones to monitor the sound being received from the transmitters. The sound from the selected sensor is played through both headphone earpieces.

3.2.7 Charging/Direct Sensor Input Socket

The socket allows PrimeTouch to be charged in the transport case and also allows the connection of external sensors. Two types of external sensor are available:

- External accelerometer sensor
- Hydrophone

3.2.8 Power Save

To maximise the battery life, PrimeTouch has a power save function. This reduces the amount of battery power consumed when the unit is inactive. Data is not lost when PrimeTouch enters power save.

Period of Inactivity	Result	Reactive Action
After 60 seconds	Screen dims	Tap the screen to restore normal brightness.
After 5 minutes	PrimeTouch goes into power save	A short press of the On/Off switch or the Home button will return the PrimeTouch to normal operating mode.
After 60 minutes	PrimeTouch beeps for 30 seconds before fully powering off	A short press the On/Off switch or the Home button when PrimeTouch is beeping will stop the unit powering off. The automatic power off will again occur after another period of inactivity lasting 60 minutes.

3.2.9 Charging PrimeTouch

PrimeTouch is charged in the transport case. Connect the charge lead in the transport case to PrimeTouch. Connect the mains adaptor to the main electrical supply or the vehicle charge lead to the vehicle supply (12Vdc).

	Only Eureka3 charge leads should be used to charge the PrimeTouch. DO NOT attempt to use Eureka2 or Eureka Digital charge leads, as damage may occur which will not be covered by warranty.

3.2.9.1 Charge Time

Charge time from flat to full is between 3 hours 45 minutes and 4 hours 30 minutes. The charge time will be longer in higher temperatures; there is automatic monitoring in the electronics to prevent the batteries overheating.

3.2.9.2 Battery Life

Typical discharge time for a full battery is 4 hours continuous use. The power save functions as described above will extend the battery life to at least 8 hours under normal operating conditions.

4 Deployment

4.1 Choosing the Transducer Type

In most cases, accelerometers will be adequate (either built in or external). The accelerometers provide ease and flexibility of deployment.

Consider the (optional) hydrophones for:

- Large diameter pipes (typically >300mm)
- Plastic pipes
- Locations with excessive ambient noise.

4.2 Attach Transducers

4.2.1 Accelerometers

The transmitters have integral magnets in the base and a built in accelerometer; this normally provides good results where the location for the transmitter does not need to be above ground. If the transmitter needs to be on the ground surface for adequate radio reception then a remote accelerometer should be used.

1. Connect the accelerometer to a metal fitting (preferred surface: unpainted, rust-free, clean metal).
2. Ensure a rigid physical contact.
3. Check the connection by listening via headphones (connected to PrimeTouch).

4.2.2 Hydrophones

The standard hydrophone is mounted in a hydrant cap for use with any hydrant fitting. When fitting a hydrophone to a hydrant, follow this procedure.

1. Open the hydrant carefully to ensure there is no debris in the outlet, and clean water flows (the pressure can be assessed at this point).
2. Ensure the hydrant valve is shut.
3. Ensure the seal in the hydrophone is clean.
4. Fit the hydrophone to the hydrant and tighten in place. Tightening is best performed by fitting the adaptor provided onto the castellations on the upper side of the hydrant cap, then using the standard hydrant valve key to tighten the hydrophone assembly.
5. Ensure the bleed valve is closed, and that the fitting is secure.
6. *Slowly* open the hydrant valve, and check that no leakage occurs from the hydrophone.
7. Open the bleed valve *slightly* to allow air to escape.
8. Close the bleed valve when only water is escaping.

When fitted correctly the hydrophone may be connected directly to the transmitter.

	Before removing a hydrophone fitting, it is essential to make sure that the hydrant valve is shut. The bleed valve may then be opened to release the pressure.

	Adhere to local water hygiene regulations when inserting hydrophones into potable water pipes.

4.3 Setup Transmitters

1. Attach antenna
2. Position the transmitter as required
3. Switch on the transmitter by holding down the button for 2 seconds.

4.4 PrimeTouch Sensor Direct Input

A sensor can be connected directly to the PrimeTouch so that only one of the radio transmitters is used.

4.5 Set up PrimeTouch

1. Connect the PrimeTouch antenna. The magnetic vehicle mount antenna is highly recommended if operation is inside a vehicle.
2. Switch PrimeTouch on.
3. Connect headphones if required.

4.6 Radio Range

At manufacture every system is tested over a distance of 100 metres, line-of-sight on ‘low power’ (25 mWatts) and with the portable receiver antenna. Radio range will be considerably increased in the ‘high power’ mode and with the use of a vehicle mount antenna.

4.7 Inter-Transducer Distance

An accurate inter-sensor distance is necessary to achieve accurate leak pinpointing. The accuracy of the correlation result will only be as good as the accuracy of the distance measurement.

When making distance measurements, it is the actual pipe length that must be measured; be aware that water mains do not always run in a straight line or at a uniform depth.

4.8 Velocity

An accurate sound velocity is necessary to obtain accurate leak location from the correlation result. In most cases the sound velocity that is automatically used when entering the pipe diameter and material will be adequate. However, it is always highly recommended to check and correct the sound velocity in the pipe to reduce leak position error. The method of velocity correction is described in section 5.6.

4.9 Filter Settings

The default filter settings will give good results most of the time. Sometimes with difficult leaks adjusting the filters will obtain a more definitive result. Adjustment of the filters and the use of the coherence display are explained in section 5.10.

5 Eureka3 Application

Switch on PrimeTouch; the Eureka3 software will load and after a short time the introduction screen will display.

5.1 Introduction Screen

Key	Description
A	Red transmitter power icon
B	Blue transmitter power icon
C	Battery charge indicator
D	Settings button
E	Correlation button

5.1.1 Red Transmitter Power Icon

This icon shows the received signal strength from the red transmitter. The icon will flash if no signal is received. The larger the icon the stronger the received signal.

5.1.2 Blue Transmitter Power Icon

This icon shows the received signal strength from the blue transmitter. The icon will flash if no signal is received. The larger the icon the stronger the received signal.

5.1.3 Battery Charge Indicator

The indicator shows the charge status of PrimeTouch, the white part of the battery shows the amount of charge remaining.

A lightning symbol is shown in the battery icon when PrimeTouch is charging. If this symbol is flashing when the charger is attached there is a charging issue. This could be due to high temperature. Unplug the charger for at least an hour. If this problem persists then please contact Primayer Customer Support.

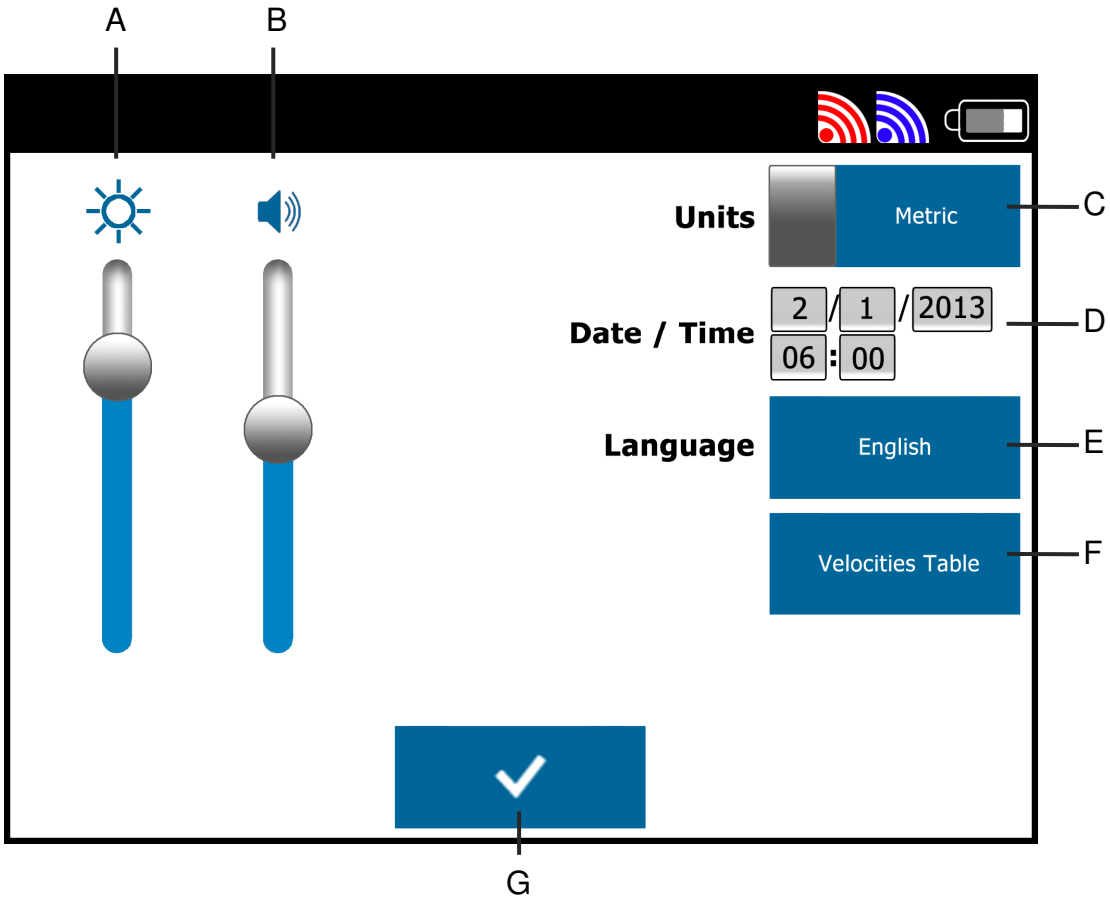
5.1.4 Settings Button

Tapping on the settings button will open the Settings Screen.

5.1.5 Correlation Button

Tapping on the correlation button will open the Correlation Screen.

5.2 Settings Screen



Key	Description
A	Brightness Slider
B	Volume Slider
C	Units
D	Date/Time
E	Language
F	Velocities Table
G	Tick Button

5.2.1 Volume Slider

This slider controls the volume of the sound in the headset. Move the slider up to increase the volume and down to decrease the volume.

5.2.2 Brightness Slider

This slider controls the brightness of the screen. Move the slider up to increase the brightness and down to decrease the brightness. There is a slight delay while the display changes brightness.

5.2.3 Units Button

The units button changes the unit measurement type used by PrimeTouch. The options are Imperial and Metric. Each time the button is tapped the type of units selected will cycle between imperial and metric.

5.2.4 Date/Time Display

This part of the screen shows the system date and time. To change any of the settings tap in the required field, the numeric keyboard will open, tap the values required and then the return key to complete the change. The next data field will be selected; enter the required value or tap return to move onto the next field. When all the fields have been cycled though, the numeric keyboard will disappear. The back space key can be used to delete characters as required.

5.2.5 Language Button

The language button selects the language used by PrimeTouch. To change the language, tap the button and a list of languages is shown on the screen. Tap the required language. The Settings Screen will now be updated to the new language.

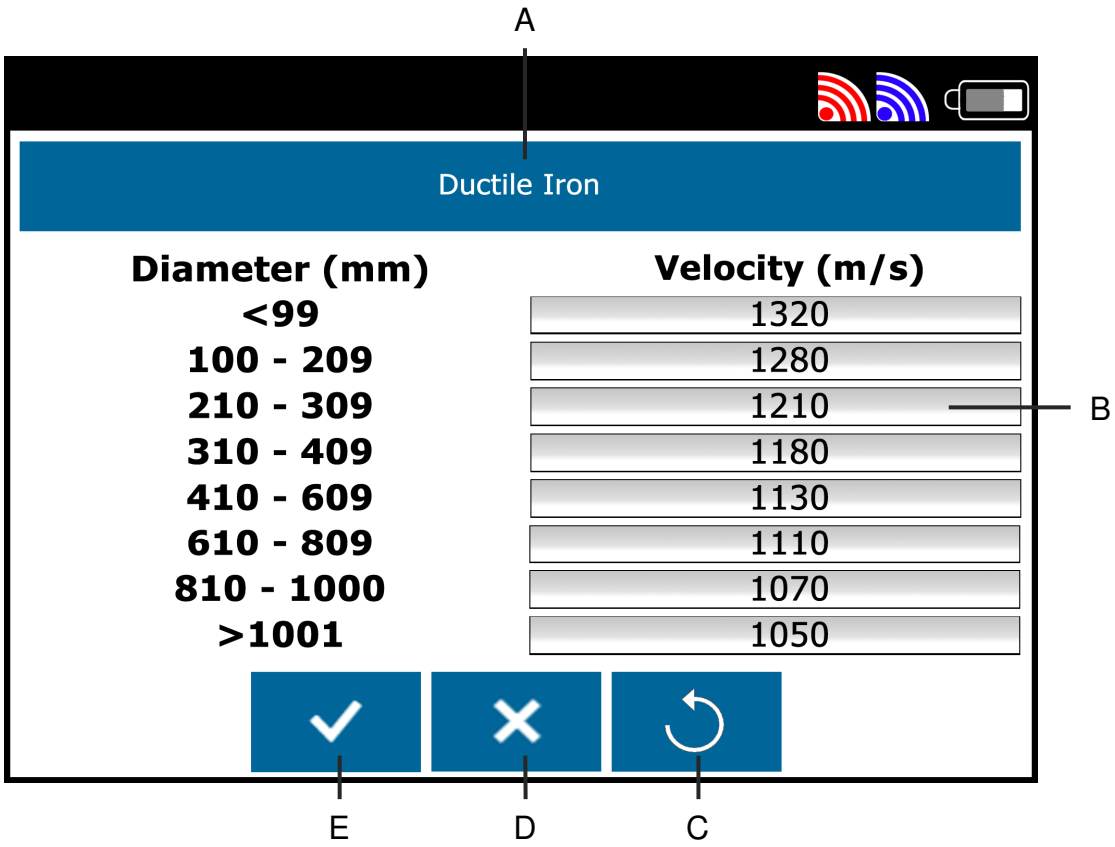
5.2.6 Velocities Table Button

The Eureka3 software allows customisation of the velocity values used for correlation. The tables programmed into the unit have been formulated after many years' experience, and should not be changed without proper thought. Changing the velocity used for a correlation will result in a different leak position.
To access and change the velocities table, tap the velocities table button; this will open the Velocities Table Screen (see section 5.3).

5.2.7 Tick Button

Tap the tick button to return to the Introduction screen.

5.3 Velocities Table Screen



Key	Description
A	Pipe Material
B	Velocity Value
C	Restore Factory Default Button
D	Cross Button
E	Tick Button

5.3.1 Pipe Material

This is the current pipe material (whose velocity data for various pipe diameters is shown). To change this, tap the pipe material and a list of available pipe materials will be shown. Select the required pipe material and the current velocities for that material will be shown.

5.3.2 Velocity Value

This shows the velocity value for the current pipe material and diameter range as shown in the left part of the screen. Tap on the velocity value and the numeric keyboard will be displayed. Tap the required numbers to enter a new velocity. Tap the return button to confirm the changes and return to the table. The backspace/delete key can be used whilst entering data to delete numbers.
If an invalid value is entered, a warning message is displayed and the theoretical minimum or maximum will be placed at this location in the table.

	Note: The only validation on entered velocity values is that they are within the theoretical minimum and maximum. There is no validation that the velocity entered fits between other values in the table.

5.3.3 Restore Factory Default Button

Tap this button to restore all values in the table to the factory defaults. To save these settings tap the tick key.

5.3.4 Cross Button

Tap this button to abandon any changes to the velocities table and return to the previous screen.

5.3.5 Tick Button

Tap this button to confirm and accept changes made to the velocities table.

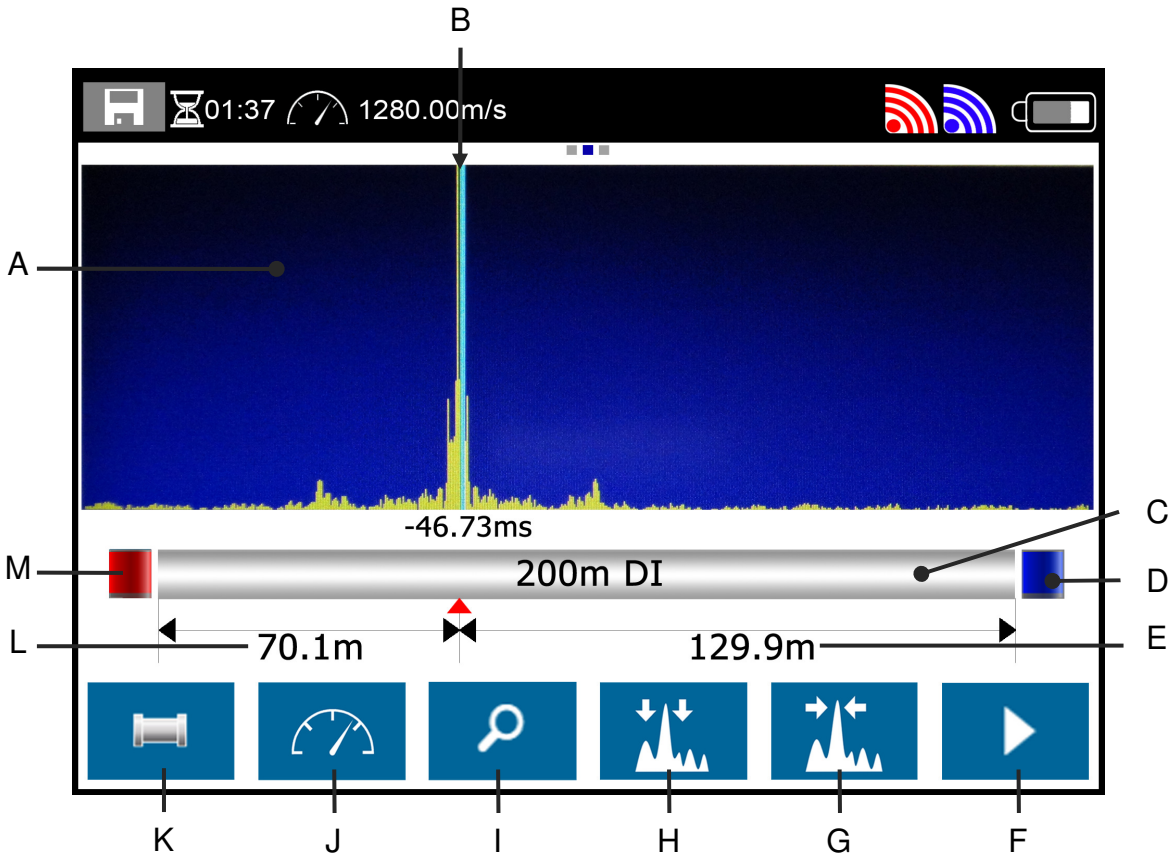
5.4 Correlation Screen

The correlation screen is where the main correlation functionality is controlled and viewed. Two other screens are available; these are accessed by swiping the screen, to the left is the Controls Screen and to the right the Frequency Spectrum.

To exit the correlation screen, press the home button on the keypad.

5.4.1 Swiping

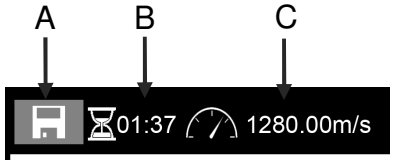
To display the Controls Screen touch the screen and move your finger to the right, this will drag the Controls Screen into view. To return to the Correlation Screen, touch the screen and move your finger to the left. The Frequency Spectrum is brought into view in a similar manner, but by moving your finger in the opposite direction. At the top of each of these screens is a small 3-dot display indicating which of the screens is currently active.



Key	Description
A	Correlation Display
B	Cursor
C	Pipe Model (only one pipe section has been entered in this example)
D	Blue Transmitter Icon
E	Distance between cursor position and blue transmitter
F	Start/Stop Correlate Button
G	Goto Peak Button
H	Noise Suppression Button
I	Zoom Button
J	Velocity Correction Button
K	Pipe Entry Button
L	Distance between cursor position and red transmitter
M	Red Transmitter Icon

5.4.2 Information Display

At the top of the correlation display is an information display; some of the icons on the display also show at the top of other screens.



Key	Description
A	Save data icon
B	Correlation elapsed time indicator
C	Current Velocity. If a multi-section pipe model has been selected this display will show “Multi”.

5.4.3 Start/Stop Correlate Button

To start a correlation, tap the Start Correlate Button. This button will automatically update to become the Stop Correlation button. Whilst a correlation is running, the elapsed time will be shown in the top left of the screen and will increment in seconds. A correlation can continue for a maximum of 5 minutes. If the Stop Correlate button has not been tapped before 5 minutes has elapsed the correlation will stop automatically. To show that the correlation is currently in progress a play icon is shown at the top of the screen. The elapsed time and play icon are still visible when the display is swiped to the Controls or Frequency Spectrum screens.

5.4.4 Goto Peak Button

Tapping this button will move the cursor to the highest peak as determined by the software. The distances displayed under the pipe model will give an estimate of leak position from each transmitter. Use the left or right keypad buttons to move the cursor manually.

	“Out of brackets” indicates the correlation peak is at or beyond one of the sensor positions. Most likely the pipe model has not been entered accurately, or the velocity being used is incorrect. Check the accuracy of the measurement of the pipe model and then perform a Velocity Correction.

5.4.5 Noise Suppression Button

If an area of excess noise is shown on the correlation display it can be suppressed. This could be a known noise from water consumption, a valve, flowmeter etc.

5.4.5.1 Turn Noise Suppression On

To suppress an area of noise tap the Noise Suppression Button, the button will turn yellow to show noise suppression is active. To position the area of noise suppression, touch the screen in the required location, and drag over the noise. The suppressed area will be shown in grey. Only one noise suppression area can be active on each correlation.

5.4.5.2 Turn Noise Suppression Off

To turn off noise suppression tap the Noise Suppression Button, the grey highlight will disappear and the noise suppression button will return to the blue off indication.

5.4.6 Zoom Button

The zoom function can be used to more accurately view the peak position. Tapping the zoom button will display zoom in + and zoom out – buttons at the bottom left of the display; the zoom button will show in yellow to indicate zoom mode is active.
Tap the + or – button to zoom in or out as required. The zoom will be active around the current cursor position, so the Goto Peak button should be used before the zoom function.
A grey area will be shown on the pipe model to indicate the area of the correlation function currently on screen.
To turn zoom off and return the correlation function to the full display, tap the yellow zoom button. The display will return to un-zoomed mode, the zoom in and out buttons will disappear and the zoom button will return to the blue off indication.

5.4.7 Pipe Entry Button

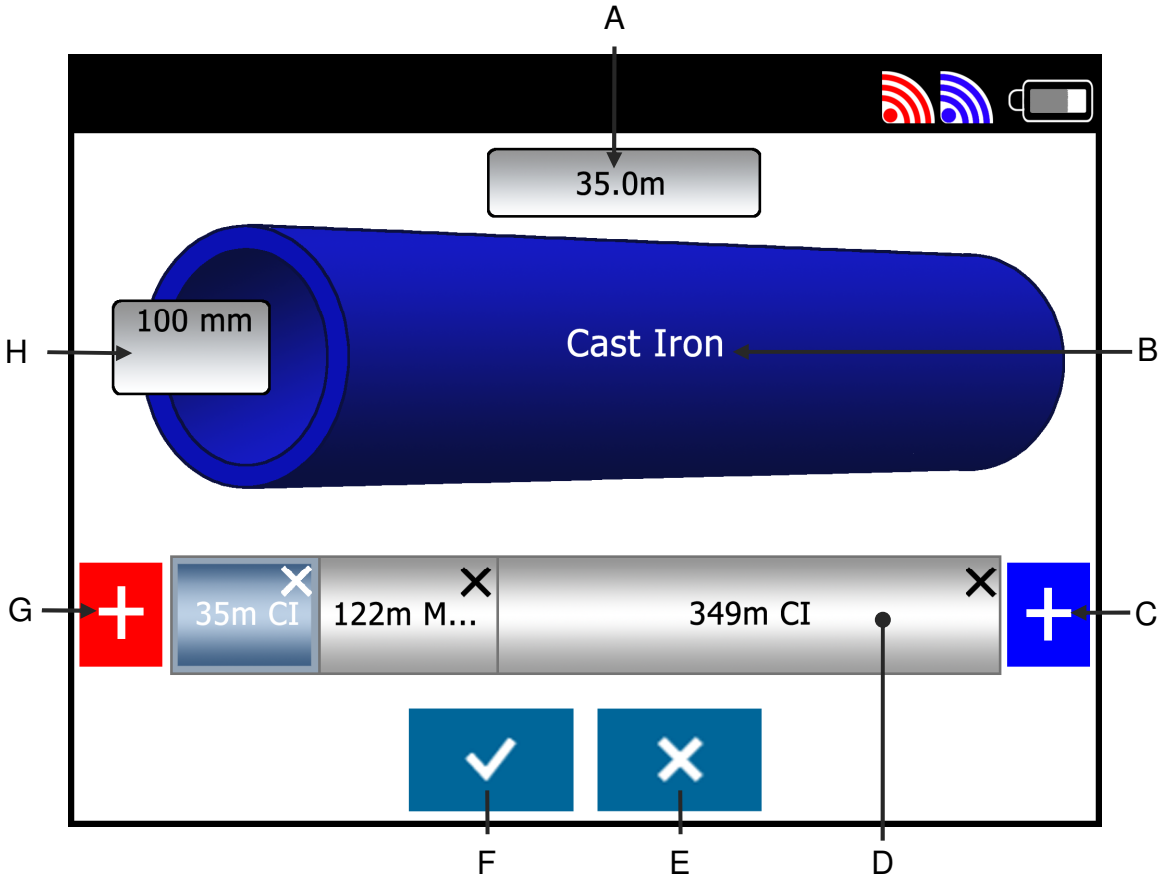
Tap this button to open the Pipe Details screen to enter or edit pipe details.

5.4.8 Transmitter Icon

This is a representation of the red transmitter at the end of the pipe network. Tap the Transmitter Icon to bring up the Transmitter Menu. Each transmitter has its own menu and the options (except swap transmitters) only affect that transmitter.

5.5 Pipe Details

	It is recommended that a measuring wheel is used to accurately measure the length of each section of pipe.
	Initially default values for the length, diameter and pipe material are displayed.



Key	Description
A	Pipe Section Length
B	Pipe Section Material
C	Add Pipe Section (to blue end)
D	Full Pipe Model
E	Cross Button
F	Tick Button
G	Add Pipe Section (to red end)
H	Pipe Section Diameter

It is possible to edit sections of pipe, changing the length, diameter and pipe material. Extra sections of pipe can be added as required. When all pipe data has been entered tap on the tick button to confirm the selected pipe model.

5.5.1 Pipe Length

Tap the value above the pipe section to edit the pipe section length; this will display a numeric keyboard on the screen. Enter the length and tap the return key; the cursor will move to the Pipe Diameter field. Now enter data for the diameter or tap off the keyboard to cancel further data entry. There is no minimum pipe section length; the maximum is 2500metres.

5.5.2 Pipe Diameter

Tap the value to the left of the pipe section to enter the nominal diameter; this will display a numeric keyboard on the screen. Enter the diameter and tap the return key to confirm the diameter data. The minimum pipe diameter is 8mm and the maximum is 2000mm.

5.5.3 Pipe Material Type

Tap on the pipe section to change the type of material; this will list the types of pipe material available; tap to select the appropriate material.

5.5.4 Add Pipe Section

To add a pipe section, tap on either the red or blue + sign at the end of the pipe model. A new section will be created with default length, diameter and material. These can be changed using the actions above. Up to six sections of pipe can make up the pipe model.

5.5.5 Remove Pipe Section

To remove a section of pipe tap on the X button toward the top right of the section; this section will then be removed from the model. A pipe model must consist of at least one section of pipe, so it is not possible to remove the last remaining section.

5.5.6 Tick Button

Tap this button to confirm the changes to the pipe model and return to the correlation screen. Any previous correlation graph displayed will be cleared.

5.5.7 Cross Button

Tap this button to abandon any changes and return to the correlation screen.