



technology for network management and leakage control



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User Manual

NXD200UM/044

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Table of Contents

1	System Overview	5
1.1	XiLog+ Overview	5
1.2	XiLogEco Overview	5
1.3	Model Variants	6
1.4	Specification	6
1.5	Typical Applications	7
1.6	Software	8
2	Communications	9
2.1	SIM Card Installation	9
3	Installation	11
3.1	Program XiLog+	11
3.2	Mounting	11
3.3	Signal Strength Test	12
3.4	Hardware Connections	13
3.4.1	IP68 Sealing	13
3.4.2	XiLog+ Input Connections	14
4	XiLogEco Hardware Setup	15
4.1	XiLogEco Considerations	15
4.2	XiLogEco Plug and Play system (terminated for e-Power turbine and a flow meter)	16
4.3	Wiring e-Power fly lead to Power Management Unit	17
4.4	Wiring e-Flowmeter fly lead to XiLogEco	17
4.5	Installation Checks	18
5	Logger Programming with PrimeWorks	19
5.1	Logger Information	20
5.2	Channels	21
5.2.1	Digital Channel	21
5.2.2	Internal Pressure Transducer	23
5.2.3	Generic Analogue	24
5.2.3.1	Generic Analogue – Current (mA) example	24
5.2.3.2	Generic Analogue – Voltage example	25
5.2.3.3	Generic Analogue – mV example	25
5.3	Alarms	27
5.3.1	Threshold Alarms	27
5.3.2	Profile Alarms	28
5.3.3	Envelope Alarms	30
5.3.4	Alarm Reporting	31
5.4	Remote Data Reporting	31
5.4.1	Data Transmission	32
5.4.2	Optional Receive Frequency Window	33
5.5	Installation Tools	33
5.6	Perform a Signal Strength Test in PrimeWorks	36
5.7	Perform a Network Test in PrimeWorks	37
6	Logger Programming with XiLog+ FastTrack	38
6.1	Transmission	39
6.1.1	SMS Transmission	39
6.1.2	FTP Transmission	39
6.2	Flow Channel	40
6.3	Pressure Channel	41
6.4	Threshold Alarms	42
6.5	Perform a Signal Strength Test in XiLog+ FastTrack	43
6.6	Perform a Network Test in XiLog+ FastTrack	44

7	Battery maintenance	45
7.1	Replacing XiLog+ Internal Batteries	45
7.2	XiLogEco Power Management Unit.....	47
8	XiLog+ 9 Wiring	48
8.1	NXG-302 Input Terminal Box.....	48
8.2	NXG-303 Bare wire cable	49
8.3	Wiring for Current Channels (using NXG-303)	50
8.4	Wiring for Voltage Channels (using NXG-303).....	51
9	APPENDIX 1: XiLog+ Technical Specification.....	52
10	APPENDIX 2: XiLog+ User Information Sheet	55
11	APPENDIX 3: Meter Scaling Tables	56
12	APPENDIX 4: Battery Life	59
13	APPENDIX 5: Lithium batteries contained in equipment	61
14	APPENDIX 6: Declaration Of Conformity	63
15	Index	64

1 System Overview

1.1 XiLog+ Overview

XiLog+ is a telemetry data logger that operates via the GSM cellular radio network using either the SMS or GPRS.

XiLog+ is factory fitted with a quad band antenna, or can be specified to have a connector for an external aerial fitting. The external antenna variant does not contain an internal aerial, and an external aerial cannot be connected to an internal aerial variant. The internal aerial of XiLog+ cannot be changed.



Only the cable part number NXG-881 should be used for communication with XiLog+ and XiLogEco. Previous communication cables for older XiLog data loggers are not compatible.

1.2 XiLogEco Overview

XiLogEco is a specially adapted GPRS data logger that is powered by a turbine. It was especially designed to function with a pressure reducing valve or upon boundary valves; this operates a Cla-Val e-Power* turbine by utilising the pressure differential between the upstream and downstream pressures. This allows a higher resolution of data (i.e. 1 second sampling intervals) and the ability to transmit this data every 15 minutes without compromising performance. It has two channels; one digital and one analogue making it ideal for PRV or boundary valve monitoring.

*Patent Pending



XiLogEco will require certain settings when programming that may differ from XiLog+ normal setup. Please look for XiLogEco information symbol for instruction.

1.3 Model Variants

There are a wide range of XiLog+ variants available to suit most requirements. If unsure please contact Primayer for further assistance.

Model	1P	1F	2	2i	3i	9	Eco
Generic analogue	-	-	1	-	-	7**	-
Digital*	-	1	1	1	1	2	1
Internal pressure transducer	1	-	-	1	2	-	2

*All digital channels are capable of logging dual events, bidirectional flow or two unidirectional flows.

** 4 x voltage and 3 x current

1.4 Specification

Main Features

- Fully submersible to IP68 (to depth of 1 metre)
- Highly tuned underground antenna, or external antenna options
- Quad-band (850/900/1800/1900MHz)
- Built in Signal Tester
- 2GB memory (over 500 million readings)
- USB local communications
- Robust
- Free licensed programming and data viewing software
- Data compatible with corporate software systems
- External supply voltage 8-15V

Logging Features

- 1kHz pulse frequency
- Internal or external pressure transducer
- Auto-calibration (pressure offset)
- Accuracy +/-0.1%
- Current Inputs (Analogue) 0-10mA & 4-20mA
- Voltage Inputs (Analogue) 0-2V, 0-5V, 0-10V
- Logs average data at intervals from 1 second to 24 hours
- Minimum data transmission every 15minutes
- Flexible wakeup regime allowing regular contact with XiLog+
- Choose preferred units of measurement
- Logs meter index value
- Logs all daily, maximum, minimum and average values
- Optional Cyclic logging: allows data collection to continue indefinitely; the latest reading overwrites the oldest record once the memory is full
- Logs from all flow meters e.g. Mechanical, ultrasonic and electromagnetic
- Logs bidirectional flow or unidirectional
- Merge combination meters into one data message
- Backward compatibility for sensors
- Event Logging – change of state monitoring and alarm (for overflow monitoring)
- Choice of threshold, profile and envelope alarms via SMS/GPRS
- Logs directly from combination meters

- Reporting:
 - reporting of logged data via SMS or GPRS
 - reporting of current values as required
 - real-time alarms direct to mobile or email
- Data transmission as often as every 15 minutes
- Accepts a variety of analogue inputs
- Independent logging and SMS Reporting

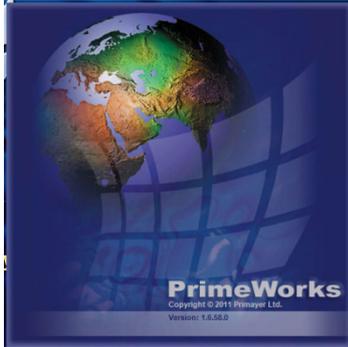


1.5 Typical Applications

Typical applications for the XiLog+ include:

- Network Analysis
- Domestic/commercial consumption
- DMA (Zone) monitoring
- Leakage detection
- Flow monitoring
- Pressure management
- Pipe pressure testing
- Pump monitoring
- Open channel flow
- Overflows
- Reservoir/borehole depths
- Rainfall
- River levels
- Temperature
- Current (mA)
- Voltage (mV and V)

1.6 Software



The PrimeWorks PC software is used to program and read back XiLog+ & XiLogEco. It can also be used to view and report upon data downloaded from these and other Primayer data logging products.



XiLog+ FastTrack is a streamlined version that has basic programming features for quick onsite installation.

User Requirements

In order to install the PrimeWorks software the installer must have sufficient authority to write to the Registry (administration privileges).

Software Requirements

- Windows XP or later
- Microsoft .NET Framework v3.5 SP 1

As with any software application, the higher the specification of the host system, the better the software will operate.

Software Updates

We provide our software licence free and all updates can be located on our users section through www.primayer.com

	<p>Ensure no other Primayer applications are running during the install procedure.</p>
--	--

PrimeWorks Manual

This manual only gives guidance on programming XiLog+ & XiLogEco loggers with PrimeWorks or FastTrack. For PrimeWorks features that concern data viewing and reporting, a user manual can be viewed by looking under the Help > Manual menu option.



2 Communications

For XiLog+ and XiLogEco to communicate via GSM a SIM card needs to be fitted (as used in mobile phones). If you have ordered SIM cards from Primayer, they will be installed in the logger and the phone number will be written on the label on the outside of the logger.

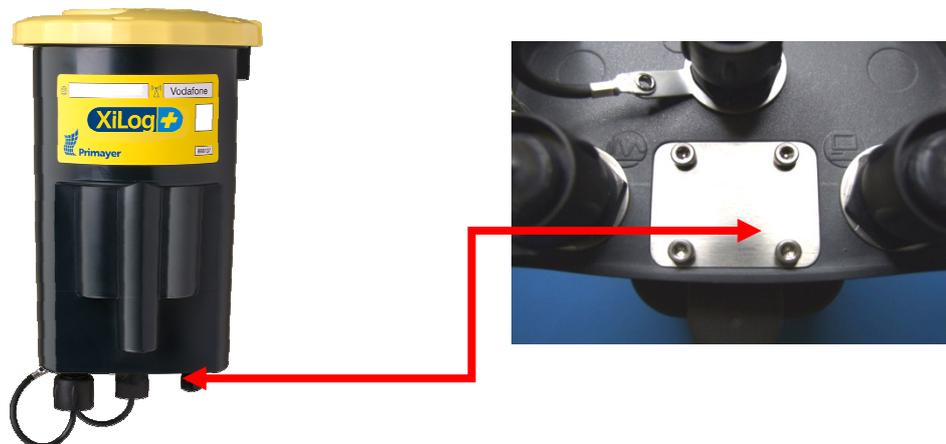
XiLog+ can communicate by SMS or by GPRS. A SIM with the required features enabled must be used in the logger depending on the data connection type to be used.

	<p>If you wish to change your airtime provider, it is important that you contact Primayer before doing so. Technologies and business practices vary from provider to provider; another provider's services may not be compatible.</p>
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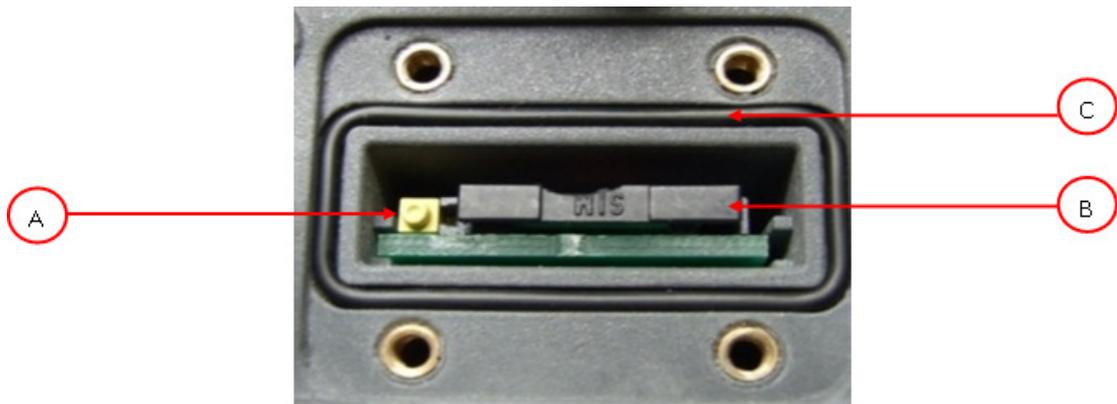
	<p>XiLogEco is specifically designed for GPRS operation, due to the large volume of data it is designed to transmit. A XiLogEco Power Management Unit needs to be used with a XiLogEco.</p>
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2.1 SIM Card Installation

	<p>Do not, except under direct instruction from Primayer Limited, disassemble your XiLog+ datalogger any further than described in the procedure below.</p> <p><i>Doing so will invalidate your warranty with immediate effect.</i></p>
---	--



1. Loosen the 4 captive screws holding the cover plate in position.
2. Remove the cover plate.



3. Push the SIM release button (A), the SIM holder (B) will move out.
4. Pull the SIM holder (B) out and remove from the logger.



5. Insert SIM into holder (B)

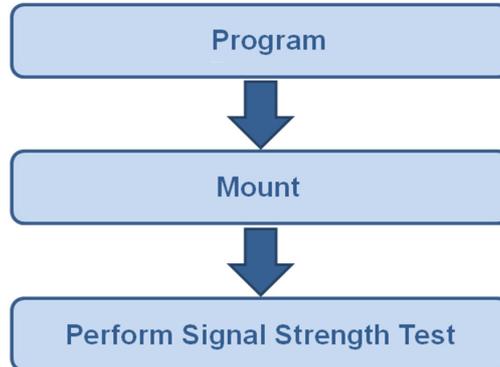
	Be careful not to touch the SIM card contacts (D); this could affect the quality of the communication between the logger and the GSM network.
--	---

	To remove a SIM card from the holder (B), gently push through the hole in the SIM holder until the SIM is removed.
--	--

6. To insert a SIM card into the holder, press the SIM card into the holder (B) and make sure the keyed corner (E) is correctly aligned and the gold contacts (D) face outwards.
7. Carefully replace the SIM holder (B) by sliding it into its housing until a click is felt.
8. Make sure the seal (C) is in the sealing groove and not damaged.
9. Put the cover plate in position and secure with the four captive screws.

3 Installation

When deploying a remote data logger the subsequent steps should be followed, to help ensure best performance.



3.1 Program XiLog+

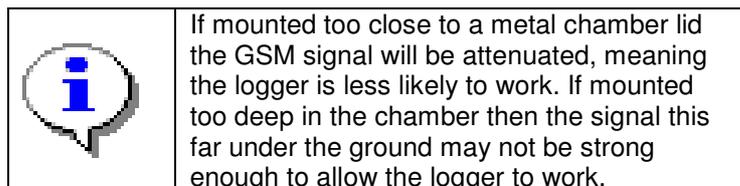
XiLog+ is programmed using with the PrimeWorks or the XiLog+ FastTrack software. Please see chapters 5 or chapter 6 for further information.



3.2 Mounting

To get the best performance from your XiLog+ or XiLogEco it must be positioned correctly to have the best possible chance of communicating with the GSM network.

- Perform a signal strength test to ensure that the logger will have an adequate network to connect to.
- When performing a signal strength test ensure the logger is as it would be when in use, i.e. if it's in a chamber ensure the lid is closed.
- Ensure the logger is upright. For the XiLogEco ensure the power management unit is also upright. The arrows on the label should point upwards.
- If being installed inside a chamber; try to mount the logger approximately 6 inches (15cm) below the chamber lid.





Picture shows XiLogEco in recommended position inside a chamber.

3.3 Signal Strength Test

GSM network coverage can vary considerably, both from day to day and from location to location. In view of this, XiLog+ data loggers are equipped with a GSM Signal Strength test facility; this allows the logger's ability to contact the GSM network to be assessed while on-site, as part of the deployment process.

The test works by deploying the data logger, then measuring the GSM signal strength a set number of times, at set intervals; an average is taken and a result is displayed. The default setting makes 30 measurements, one every 10 seconds, and so five minutes are required to complete the test. These settings may be altered if required.



To perform a signal strength test a portable computer running PrimeWorks or XiLog+ FastTrack is required on site.

3.4 Hardware Connections

3.4.1 IP68 Sealing



The connectors fitted to XiLog+/XiLogEco data loggers is IP68 sealed only when mated with a matching connector or when the captive sealing cap is fitted. All sensors supplied by Primayer Limited are factory-fitted with sealed matching connectors.



To protect the integrity of the data loggers ensure all sealing caps are fitted if the connector is not in use.

If no care is taken in protecting the connectors, moisture can penetrate the main body of the data logger. Data loggers operate at low levels of current; any moisture in the unit can cause a higher current drain, causing damage to the logger. This could affect the integrity of the data stored upon it.

Following this precaution will also protect from foreign matter like dirt. If foreign matter gets inside the connector, it can stop the connectors mating correctly and therefore make the data logger and battery pack vulnerable to water ingress.

Contaminated connectors may be cleaned by scrubbing with a brush doused in industrial alcohol (methylated spirits).

Connectors fit with a bayonet screw action (twist and click). Sensors and cables only fit onto the connector one way, so care must be taken not to force the connectors to avoid any damage.



Do not open your XiLog+/XiLogEco. Doing so will risk damaging the components within and invalidate the warranty with immediate effect.

3.4.2 XiLog+ Input Connections

Installation of XiLog+ is principally a matter of connecting the cables for the inputs. Sensors or cables supplied by Primayer Limited are factory-fitted with the appropriate connector; a connector fitting service is also available. Contact Primayer Sales (sales@primayer.com) for more information. For any other queries about installation then please contact Primayer Support (support@primayer.com) for more information.

All XiLog+ connectors can be identified by logos, which are shown against the appropriate connector, as below:



Digital Inputs

Simply connect the sensor to the digital input; XiLog+ provides the necessary power.

If XiLog+ is started before the sensor is connected, no malfunction will occur. However, the data recorded up to the point of connection will be zero values.

Internal Pressure Transducer

Loggers fitted with an internal pressure transducer have a male quick-release connector mounted on the logger.

The integral pressure transducer is available in ranges of 0-10 Bar or 0-20 Bar. Damage may occur if the transducer is subjected to pressures of more than 150% of its range. The zero point calibration of the transducer may change if the logger is subjected to shocks, but this offset can be compensated by recalibrating the logger.

A hose with male and female connectors is available to connect the logger to the pressure monitoring point.

Care must be taken to avoid pressure shock when connecting to the transducer, as this can damage or destroy the sensing diaphragm.



Communication/Power Input

The communication link is a cable which interfaces directly to a PC port. Communication is via direct USB. XiLog+ must be configured by PC before use.

This connection is also used to supply external power to the unit. Only use Primayer manufactured batteries or power cables.



Analogue Inputs

The analogue input is a general input which may be for voltage or current.

Voltage input range is nominally 0 - 2V DC. Voltages outside this range require a specific cable; standard voltage ranges available are 0 - 5V and 0 - 10V.

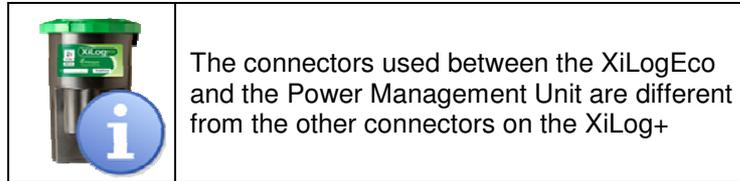
Current input requires a specific cable. This is suitable for 0 - 10mA, 0 - 20mA and 4 - 20mA ranges.

If the logger starts before the sensor is connected, no malfunction will occur but the data up to the time when the sensor was connected will be zero values.

	<p>XiLog+ will only accept an external supply voltage between 8 and 15 Volts. Please adhere to this range; applying a voltage higher than 15 Volts will cause internal damage to the logger.</p>
--	--

4 XiLogEco Hardware Setup

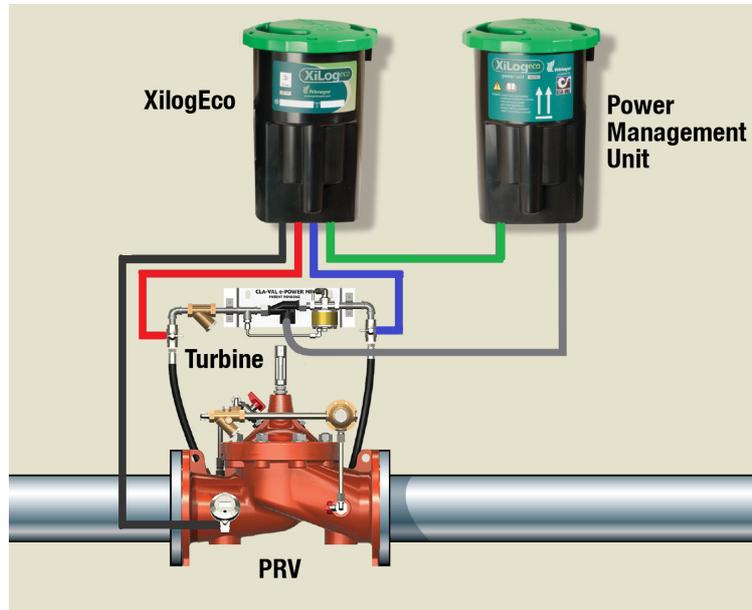
A Cla-Val e-Power (Patent Pending) turbine can be supplied as a plug and play system with a terminated XiLogEco plug or with a fly lead.



4.1 XiLogEco Considerations

- The system requires 18Volts AC output from the turbine to achieve optimum performance, so a minimum differential of 8 meters between upstream and downstream pressure is required.
- Requires a 3/8" BSP connection to connect the turbine to the pressure outlets of a PRV (or boundary valve setup).
- Carry out a signal strength test on the proposed position of XiLogEco before carrying out any wiring preparation or fixing a wall bracket.

4.2 XiLogEco Plug and Play system (terminated for e-Power turbine and a flow meter)



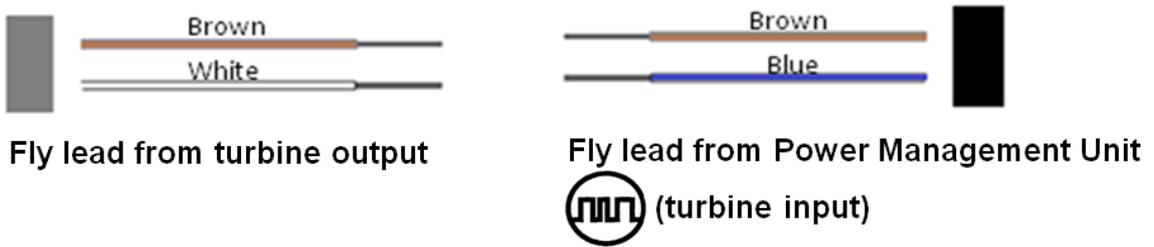
- Power Management Unit  (battery output) to XiLogEco  (battery input)
- Turbine to Power Management Unit  (turbine input)
- Flow meter* to XiLogEco  (digital input)
- Upstream pressure tapping to XiLogEco's channel 1 internal pressure transducer
- Downstream pressure tapping to XiLogEco's channel 2 internal pressure transducer

	<p>XiLogEco can interface to any flow meter; ensure the correct terminated pulse unit is available for connection.</p>
---	--

4.3 Wiring e-Power fly lead to Power Management Unit

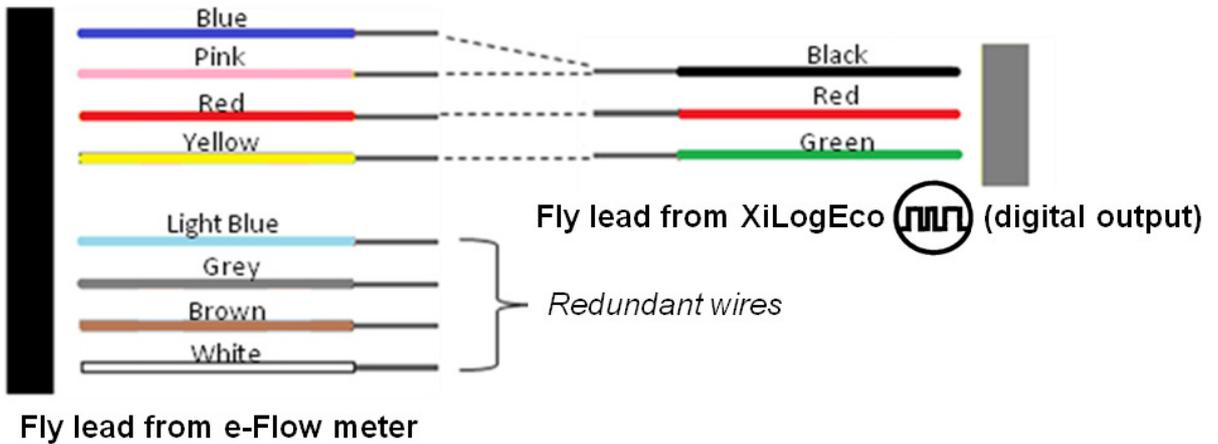
	<p>To avoid personal injury, turn pressure valves off on the inlet and output to switch off the voltage across the turbine before carrying out any wiring.</p>
--	--

The turbine outputs AC voltage so the wiring does not need to be in a certain order when connecting the power management unit.



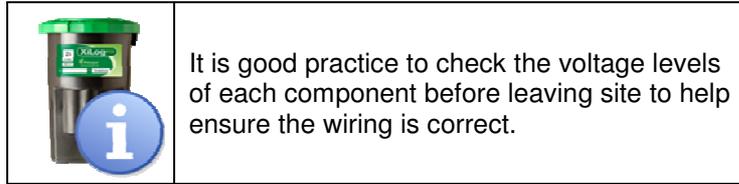
	<p>Ensure that cables are potted to an IP68 standard to protect from water ingress; this should include fitting a sheath.</p>
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4.4 Wiring e-Flowmeter fly lead to XiLogEco



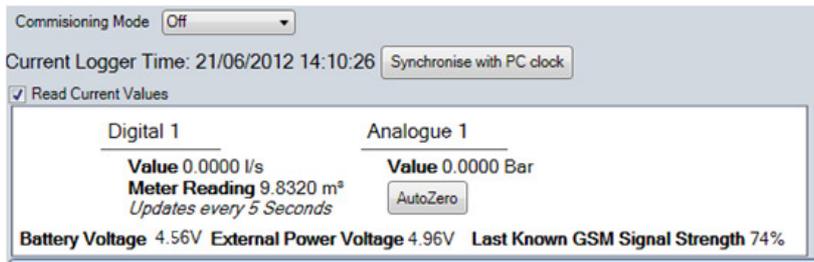
	<p>Ensure that cables are potted to an IP68 standard to protect from water ingress; this should include fitting a sheath.</p>
--	---

4.5 Installation Checks

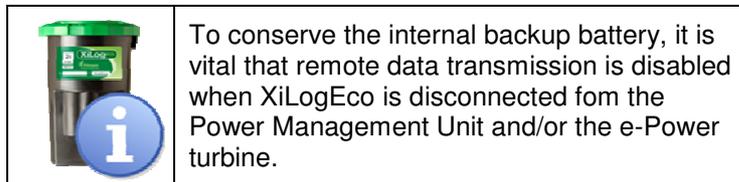


Connect XiLogEco to PC via a USB communication cable and open PrimeWorks:

1. Open the Installation Tool menu and select to Read Current Values:

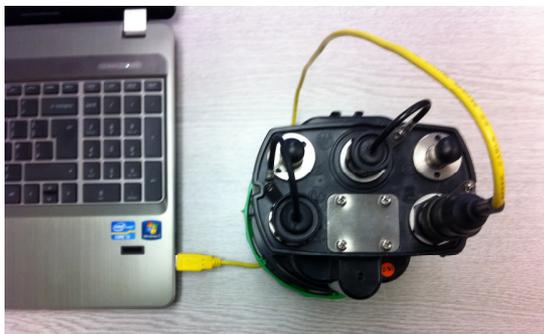


2. Disconnect the power management unit from XiLogEco and check the Battery Voltage is approximately 4.5 - 5V. The External Power Voltage is measuring the USB voltage and can be ignored.
3. Ensure that the turbine output is connected to the power management unit. Then reconnect the power management unit into XiLogEco. The Battery Voltage should increase to between 5.5V and 6V. It will continue to gradually increase as the turbine charges the power management unit, until it reaches the maximum output from the turbine according to the pressure differential.



5 Logger Programming with PrimeWorks

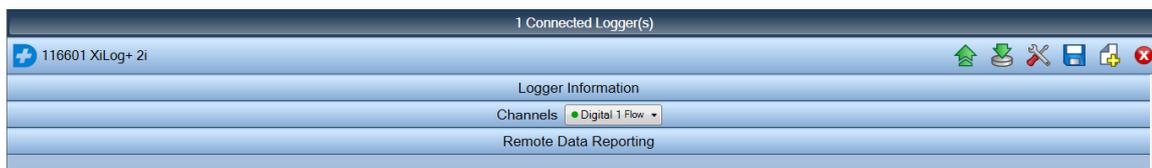
The PrimeWorks software can be used for programming and readback of XiLog+ and XiLogEco; in addition various graphing, reporting and export functions are available for further analysis of the stored data.



To program XiLog+ or XiLogEco, connect the logger to the PC via the local USB communication cable and open PrimeWorks. The configuration will automatically load from the logger and the XiLog+ control panel will be displayed. This contains a series of trays that can be expanded and collapsed as required.



If more than one logger is attached to USB switch between the logger configurations by clicking on the 'X' Connected Loggers bar at the top of the XiLog+ control panel.



Once all logging parameters have been defined for this site, click program to send the parameters to the logger. This supplies two options for programming:

Program All; this will delete all data stored on the logger, load the new configuration and adjust the logger time to match the PC clock.

Program Changes; this will load only changes made to the configuration, leaving any previously logger data still available for download.



To manually download data from the logger via the USB local communication cable, click the readback button.



To view tools that assist in a successful logger deployment, click the installation button.



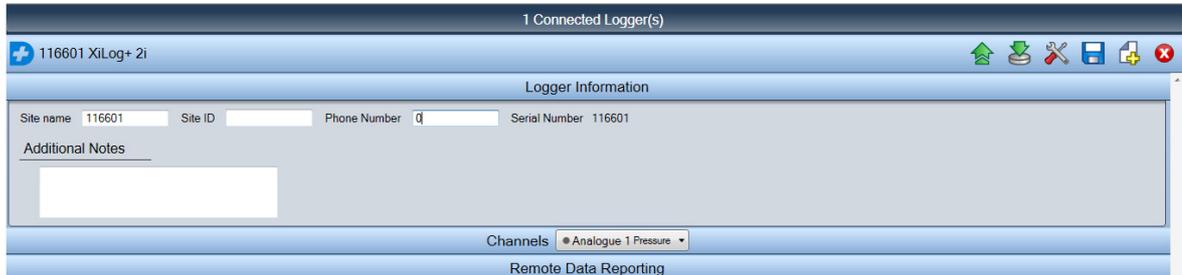
To save current logger parameters to PrimeWorks for reference at a later date, click save configuration button. (This happens automatically if the readback button is pressed)



To close the XiLog+ control panel, click the red cross.

5.1 Logger Information

The logger information tray allows entry of general details about the logger deployment.



The screenshot shows a software window titled "1 Connected Logger(s)" with a sub-header "Logger Information". The window contains several input fields: "Site name" with the value "116601", "Site ID", "Phone Number" with the value "0", and "Serial Number" with the value "116601". Below these fields is a section labeled "Additional Notes" with a large empty text area. At the bottom of the window, there is a "Channels" dropdown menu currently set to "Analogue 1 Pressure" and a "Remote Data Reporting" section.

Site Name

This field is a reference to the location of the logger. This is the name which will appear in the PrimeWorks database for this logger.

Site ID

This field gives the option of entering any site specific reference ID. This can be used for grouping loggers for use within other functions in PrimeWorks.

Phone Number

This is the phone number of the SIM within the logger. Once entered and saved into the logger this does not need to be entered again unless the SIM is changed.

Serial Number

This field shows the serial number of the logger. It cannot be changed.

Additional Notes

Any additional notes can be entered here.

5.2 Channels

The Channels tray allows configuration of each of the channels within the XiLog+. The number of channel trays and the type of the trays available will change depending upon the logger model.

5.2.1 Digital Channel



To program digital channel parameters, select the digital channel from the drop down menu next to the Channel tray title.

Enable Channel

Tick the Enabled option to switch on the channel currently being viewed. Not all channels within a logger will need to be enabled when the logger is in use. Channels which are not enabled will help to conserve the battery.



A green highlight next to the channel name indicates that the channel is enabled and recording data.

Sensor Profile

This drop down menu allows selection of the sensor/pulse unit that will be connected to the logger and predefines the sensor options accordingly. If the pulse unit type is not listed select Custom to manually enter the settings:

Custom Sensor Options		
Sensor Type	From the drop down menu select how the pulses are output by the sensor.	
Pulse Direction	If a bidirectional sensor type is selected then which channels output which pulses needs to be selected from the drop down menu. If selected incorrectly the wrong flow rate will be recorded.	
Data Type	Select the type of data to be logged. Flow will be the default data type.	

Logging Interval

This option selects the measurement interval at which data will be logged. Options between 5 seconds and 24 hours are available.

All data logged on a channel is average data (a number of samples will be taken and an average value derived from these samples). In addition to this average data, each channel will also record the minimum and maximum value within each day. For digital data, a daily volume will also be recorded. If the correct meter index is entered into the Meter Reading field, this will ensure accurate tracking of the site meter reading.

If the logging interval is left at Off, the logging on the channel will be disabled.

Send Data Reports

When this option is checked, the logger will send data reports by SMS or GPRS, at the frequency selected for remote data reporting.

	<p>The minimum logging interval that can be sent via SMS is 1 minute. If a logging interval lower than this is selected, and SMS reporting is selected, the data sent via SMS will be averaged to 1 minute intervals before sending.</p>
	<p>If a logging interval of less than 15 minutes is selected to be sent via SMS, more than one SMS per day will need to be sent per channel. For example sending 1 minute SMS data every day will require 15 SMS to be sent per channel per day.</p>

Units

This defines the flow measurement units to be used within the logger.

Calibration Factor

Enter the litres/pulse value for the meter (FCAL). See Appendix 1: Meter Scaling Table for a list of common meters and their FCAL.

Meter Reading

Enter the site meter reading into the logger. If this is written into the logger on installation, the meter reading in XiLog+ will track the actual meter reading. Meter readings up to 10 digits can be entered, with accuracy to 4 decimal places.

Meter Units

The Meter read entered can be in a variety of units, depending on meter size, and accuracy required.

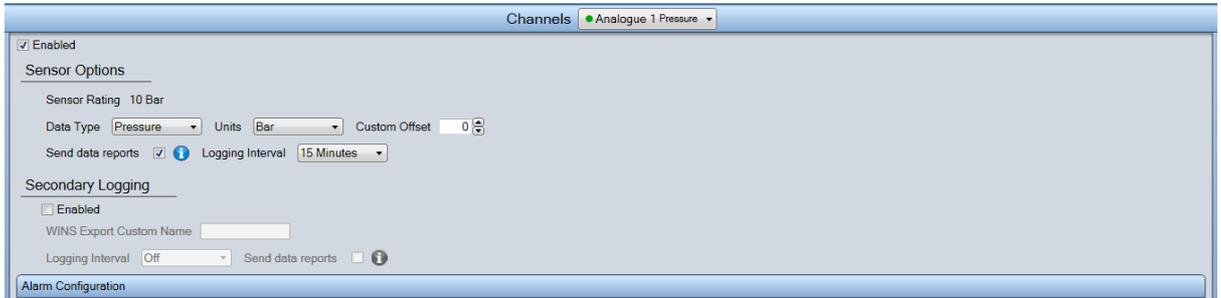
Secondary Logging Interval

This allows logging of the same channel input at a second logging interval. To achieve this ensure Enabled is ticked and enter an alternative logging interval. It is possible for this secondary logging to be reported remotely, or for this data to be logged internally and requested when required.

	<p>For most applications, ensure the secondary logging channel Send data reports box remains un-ticked. If it is ticked then both main and secondary logging on the channel will be transmitted at each reporting time. This could have a detrimental effect on battery life and GPRS data package usage.</p>
---	---

5.2.2 Internal Pressure Transducer

To program internal pressure parameters, select the Analogue channel from the drop down menu next to the Channel tray title.



Enable Channel

Tick the Enabled option to switch on the channel currently being viewed. Not all channels within a logger will need to be enabled when the logger is in use. Channels which are not enabled will help to conserve the battery.



A green highlight next to the channel name indicates that the channel is enabled and recording data.

Sensor Rating

This shows the maximum rating of the internal pressure sensor. This cannot be changed; the logger should not be connected to any pressure higher than this range.

Units

This defines the units of measurement for the pressure channel.

Custom Offset

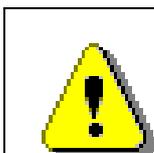
This allows entry of an offset figure, which is added to all readings. For example if a ground level needs to be added to all pressure values it can be entered in here. If a value needs to be removed from every reading, simply enter the value as negative.

Send Data Reports

When this option is checked, the logger will send data reports by SMS or GPRS, at the frequency selected for remote data reporting.



The minimum logging interval that can be sent via SMS is 1 minute. If a logging interval lower than this is selected, and SMS reporting is selected, the data sent via SMS will be averaged to 1 minute intervals before sending.



If a logging interval of less than 15 minutes is selected to be sent via SMS, more than one SMS per day will need to be sent per channel. For example sending 1 minute SMS data every day will require 15 SMS to be sent per channel per day.

Logging Interval

This option sets the measurement interval at which data on this channel will be logged. Options between 1 second and 24 hours are available.

All data logged on a channel is average data (a number of samples will be taken and an average value derived from these samples). In addition to this average data, each channel will also record the minimum and maximum value within each day.

If the logging interval is left at Off, the logging on the channel will be disabled.

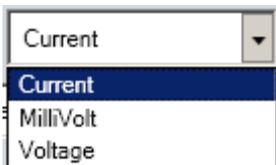
Secondary Logging Interval

This allows logging of the same channel input at a second logging interval. To achieve this ensure Enabled is ticked and enter an alternative logging interval. It is possible for this secondary logging to be reported remotely, or for this data to be logged internally and requested when required.

	<p>For most applications, ensure the secondary logging channel Send data reports box remains un-ticked. If it is ticked then both main and secondary logging on the channel will be transmitted at each reporting time. This could have a detrimental effect on battery life and GPRS data package usage.</p>
---	---

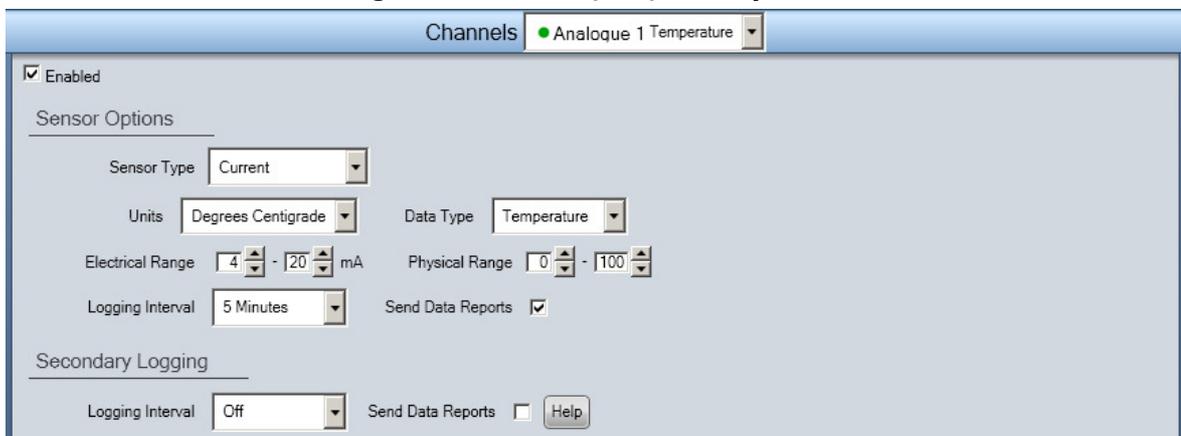
5.2.3 Generic Analogue

This tray is used to program the generic analogue channel, present only on a XiLog+ 2. There are three types of generic analogue channel available, which can be selected from a drop down menu. For the current and voltage channels on a XiLog+ 9 the appropriate option for the channel is pre-selected.



	<p>Each selection requires different wiring between XiLog+ and an analogue sensor.</p>
---	--

5.2.3.1 Generic Analogue – Current (mA) example



5.2.3.2 Generic Analogue – Voltage example

Channels ● Analogue 1 Pressure ▾

Enabled

Sensor Options

Sensor Type Voltage ▾

Units Pounds Per Square Inch ▾ Data Type Pressure ▾ Custom Offset 12 PSI

Electrical Range 0 to 5 V Physical Range 0 - 457 PSI

Logging Interval 5 Minutes ▾ Send Data Reports

Secondary Logging

Logging Interval Off ▾ Send Data Reports Help

5.2.3.3 Generic Analogue – mV example

Channels ● Analogue 1 Pressure ▾

Enabled

Sensor Options

Sensor Type MilliVolt ▾

Sensor Rating 5 Bar ▾ Units Bar ▾ Data Type Pressure ▾

PCAL 50.68 mV Custom Offset 0 Bar

Physical Range 0 - 5 Bar

Logging Interval 1 Minute ▾

Send Data Reports

Enable Channel

Tick the Enabled option to switch on the channel. Not all channels within a logger will need to be enabled when the logger is in use. Channels which are not enabled will help to conserve the battery.



A green highlight next to the channel name indicates that the channel is enabled and recording data.

Sensor Type

Select the sensor type; Current, milliVolt or Voltage. For Voltage or Current, a range selector will then be available allowing selection of the Electrical Range. For current this is up to a maximum of 20mA. For voltage the selection of 0-2V, 0-5V and 0-10V is available. For the voltage and current channels of a XiLog+ 9 this is pre-selected.

Data Type & Units

The data type specifies the type of data to be logged; for example pressure, depth, flow or temperature. Select the required type from the list. As the data type changes, the list of available units will update.

Custom Offset

This option is only available if Pressure, Height or Depth is being measured. It allows entry of an offset figure, which is added to all readings. For example if a ground level needs to be added to all pressure

values it can be entered in here. If a value needs to be removed from every reading, simply enter the value as negative.

Sensor Rating & Physical Range

If the milliVolt option has been selected, the Sensor Rating drop down menu will appear, allowing selection of different ranges of pressure transducer. The Physical Range display will show this converted to the selected units.

If the Current or Voltage option has been selected, the range of the sensor needs to be entered in the Physical Range. The two values entered relate to the range of the input.

	<p>For an input of 0-2 Volts, the values entered in Physical Range are the values at 0 Volts and 2 Volts. For an input of 4-20mA, the values entered in the Physical Range are the values at 4mA and 20mA</p>
---	---

Logging Interval

This option sets the measurement interval at which data on this channel will be logged.

Options between 1 second and 24 hours are available. All data logged on a channel is average data (a number of samples will be taken and an average value derived from these samples). In addition to this average data, each channel will also record the minimum and maximum value within each day.

If the logging interval is left at Off, the logging on the channel will be disabled.

Send Data Reports

When this option is checked, the logger will send data reports by SMS or GPRS, at the frequency selected for remote data reporting.

	<p>The minimum logging interval that can be sent via SMS is 1 minute. If a logging interval lower than this is selected, and SMS reporting is selected, the data sent via SMS will be averaged to 1 minute intervals before sending.</p>
---	--

	<p>If a logging interval of less than 15 minutes is selected to be sent via SMS, more than one SMS per day will need to be sent per channel. For example sending 1 minute SMS data every day will require 15 SMS to be sent per channel per day.</p>
---	--

Secondary Logging Interval

This allows logging of the same channel input at a second logging interval. To achieve this ensure Enabled is ticked and enter an alternative logging interval. It is possible for this secondary logging to be reported remotely, or for this data to be logged internally and requested when required.

	<p>For most applications, ensure the secondary logging channel Send data reports box remains un-ticked. If it is ticked then both main and secondary logging on the channel will be transmitted at each reporting time. This could have a detrimental effect on battery life and GPRS data package usage.</p>
---	---

5.3 Alarms

Within each channel tray there is an option to set up alarms to help monitor data efficiently. Depending upon preference there are three types of alarms to choose from; threshold, profile and envelope alarms.

For using the more complex alarms within XiLog+, select either Profile or Envelope. Profile and Envelope alarms allow each 15 minute section of the day to use a different threshold value for the high and low alarm. So for example the high threshold for generating a flow alarm could be much lower during the night window than it would be during the day.

5.3.1 Threshold Alarms

The screenshot shows the 'Alarm Configuration' window with the following settings:

- Enabled
- Profile Mode: Threshold
- Low Threshold: 25 l/s
- High Threshold: 100 l/s
- Deadband: 5 l/s
- Debounce Delay: 1 Minute
- Report high alarm state 'on' using: SMS
- Report high alarm state 'off' using: SMS
- Report low alarm state 'on' using: None
- Report low alarm state 'off' using: None

Enabled

Select this option to turn on the alarms for this channel.

High Threshold

Enter a value which the logger should trigger a High alarm when data exceeds it.

Low Threshold

Enter a value which the logger should trigger a Low alarm when data is below it.

Deadband

Entering a deadband value creates a buffer around the threshold. A high alarm will be generated when the channel value exceeds the high alarm threshold plus the deadband. It will be cleared when the channel value is lower than the high alarm threshold minus the deadband.

Example: For example if a high threshold of 20l/s is entered, and a deadband of 1l/s entered, the high alarm will be triggered when the flow goes above 21l/s, and will only be cleared when it drops below 19l/s. This is to prevent generation of multiple alarms as values oscillate around a threshold value.

If this feature is not required then leave the deadband at 0.

Debounce Delay

In addition to the above deadband to prevent multiple alarms for one event, it is possible to select a debounce delay. This is a selection of a number of minutes (between 1 minute & 1 hour). To trigger the alarm, the channel value must exceed the threshold (including deadband) for the period of time set by debounce delay time.

Example: If a debounce delay of 5 minutes is selected, to generate a low alarm, the value must be below the low threshold minus the deadband for 5 minutes before an alarm is generated.

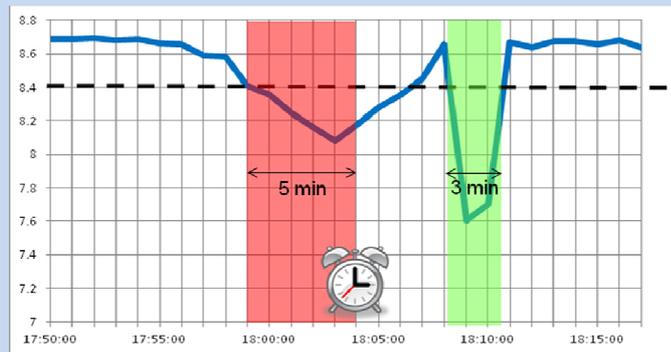
Alarm Configuration

Enabled

Profile Mode Threshold

Low Threshold 8.4 Bar High Threshold 9.5 Bar

Deadband 0 Bar Deadband is percentage Debounce Delay 5 Minutes



Picture above demonstrates an alarm will be triggered after five minutes below the low threshold

	<p>The debounce delay is only used on entering an alarm state. It is not applied when determining whether an alarm has been cleared or not.</p>
---	---

5.3.2 Profile Alarms

Profile Mode Threshold

Low Threshold Profile

When the Profile option is selected, a graph allowing creation and editing of the profile will be displayed.

Import Data

Import sample data from database

Single day Merge multiple days Available Data 15 Minute Average Flow D1a

Start Date 01/01/2000 15 End Date 28/05/2012 15

Load Data Auto Fit

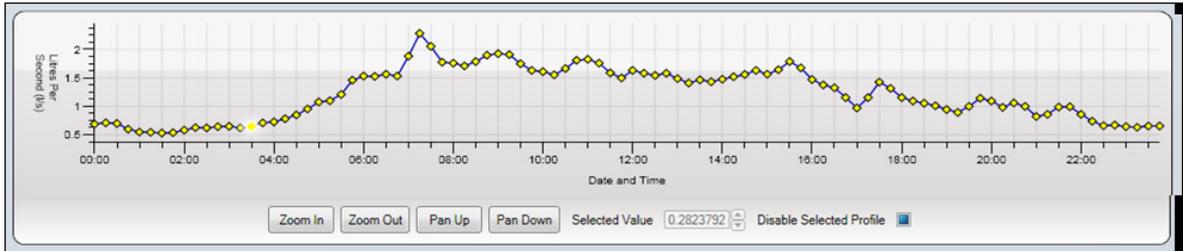
The easiest way to create a profile is to import data already logged at this site. To do this, select the logging function from the available data list. Select to either import a single day by entering the date under the Start Date calendar control or to merge multiple days by entering the start and end date for

the selected data in the appropriate calendar controls. Calendar controls will only allow selection of valid dates for the selected data set.

If multiple days are selected, the data for each time period will be averaged with those of the other days. So for example, to get the profile value for 02:00, every 02:00 data value will be taken and an average of all of them used. Once data has been selected, press the Load Data button to load into the graphical display.

Edit Profile

To edit the profile data, press the Auto Fit button. A marker will be placed on the loaded trace at each 15 minute interval, to allow the value to be changed if required.



Reset

If it is not possible to load any previously logged data, the Reset button can be pressed which will set default values for each profile value, allowing each one to be set independently.

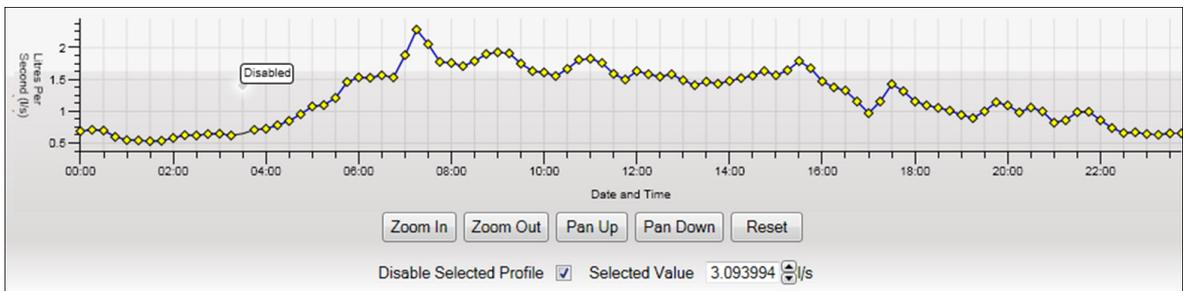
To change a profile value, simply click on the graph marker and drag to a new location on the graph. The zoom & pan buttons can be used to rescale the Y-axis for the data displayed.

	<p>Multiple points can be selected by either dragging a window over the points using the left mouse key, or by holding the shift key when clicking on points.</p>
---	---

When a profile value has been selected, it will appear in a highlighted state. The value of the profile value will be displayed (see Selected Value above). If more accuracy is required an alternative value can be typed into this field.

Disable Selected Profile

It is also possible to disable a profile value. After having selected a value, click on the Disable Selected Profile checkbox. No alarms will then be generated during this 15 minute period.



To enable the alarms for this profile period again, simply uncheck this Disable checkbox.

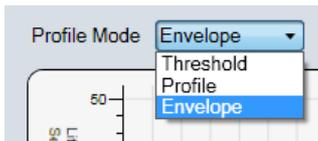
Profile Deadband and Debounce

The deadband around the profile can be either a single value, or a percentage. This sets a buffer zone of which the alarm will be triggered if it is out of the deadband range. A high alarm would be triggered

once the channel value has been above the profile value plus the deadband for the period of time set by debounce delay time.

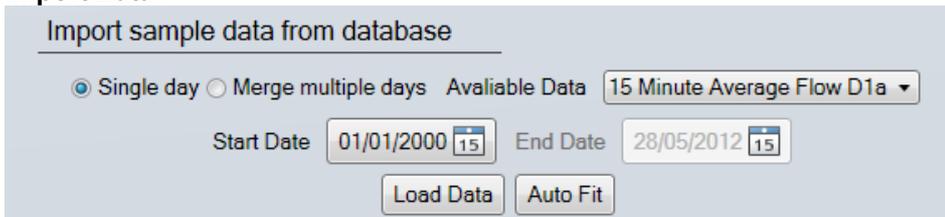
Example: If a flow profile value of 5l/s were in use, with a deadband of 1l/s, a high alarm would be generated in this period above a value of 6l/s and a low alarm would be generated below a value of 4l/s. If the deadband were instead set to 10%, the high alarm would be generated above 5.5l/s, and a low alarm below 4.5l/s.

5.3.3 Envelope Alarms



When the Envelope option is selected, a graph allowing creation and editing of the profile will be displayed.

Import Data

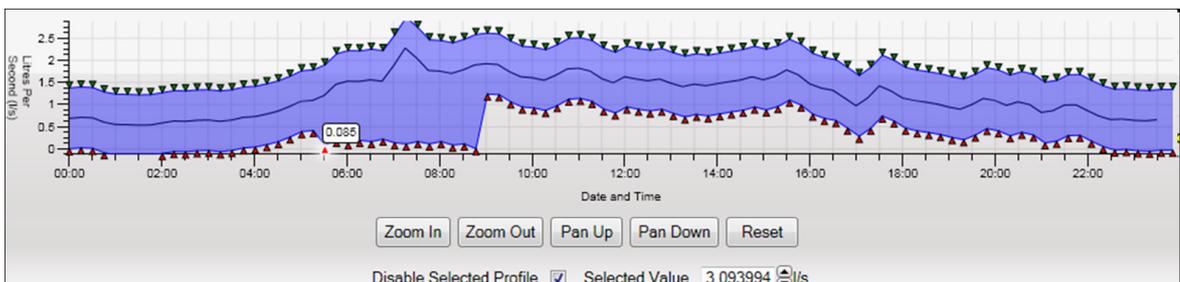


The easiest way to create an envelope is to import data already logged at this site. To do this, select the logging function from the available data list. Select to either import a single day by entering the date under the Start Date calendar control, or to merge multiple days by entering the start and end date for the selected data in the appropriate calendar controls. Calendar controls will only allow selection of valid dates for the selected data set.

If multiple days are selected, the data for each time period will be averaged with those of the other days. So for example, to get the profile value for 02:00, every 02:00 data value will be taken and an average of all of them used. Once data has been selected, press the Load Data button to load into the graphical display.

Edit Envelope

When the AutoFit button is pressed, instead of a single row of markers (like Profile alarms) on the graph which can be edited as required, there are two:



This allows the values which are used to generate the high and low alarms during each period to be changed independently. Specific values can be selected, changed moved and disabled as in the standard profile mode.

5.3.4 Alarm Reporting

Alarms can be reported via SMS or FTP (or both). Different selections for each alarm trigger can be made. Selections for delivery of alarms are independent of delivery selections for logged data. So for example logged data could be sent via FTP, and alarms via SMS.

5.4 Remote Data Reporting

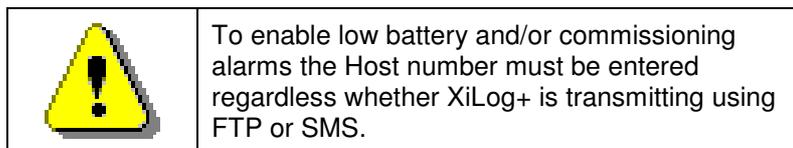
This tray allows setting up of the parameters for remote sending of data from XiLog+.

Messaging Type

XiLog+ can be programmed to send data via either SMS or FTP (using GPRS technology).

If SMS is selected, reports will be sent to up to a maximum of 3 host numbers as entered.

If FTP is selected, data will be transferred via FTP (File Transfer Protocol) to an FTP Server. The details of this server can then be entered.



Combine Flow and Pressure

If using XiLog+ 2i or XiLog+ 3i variant, and sending data via SMS it is possible combine the flow and pressure data into one single SMS. For this to be possible pressure must be logged at a 15 minute interval in metres; flow must be logged at a 15 minute interval in litres/second.

When these criteria are met, this checkbox will become available for selection. If selected a single SMS for these two channels will be sent per day, rather than two SMS.

Host Numbers

All SMS transmitted from XiLog+ will be sent to all the host numbers. Up to three host numbers can be entered, allowing delivery of the data to up to three different offices.

In addition to host numbers, up to two additional alarm numbers can be entered. Any SMS alarms generated within the logger will be sent to these numbers. Data is sent only to the host numbers, whereas alarms are sent to both the host and alarm numbers.

	<p>If using the Primayer XMS system for data delivery, tick the Use XMS host checkbox and select the appropriate network. There is no need to enter any other numbers; distribution of data and alarms is done through the XMS Server.</p>
---	--

FTP Server Address

The address of the FTP server which the logger should contact to transmit the data should be entered. If using Primayer XMS delivery system, the address waterlogger.co.uk should be entered. If using another FTP server, the details entered should be the address, without any FTP prefix.

FTP Username

Enter the username for logon to the FTP server.

FTP Password

Enter the password for this user to logon to the FTP server
If using Primayer XMS system, Primayer's support team will have supplied this information.

Auto GSM Clock Correction

By ticking this box it allows the logger to check its time with the GSM network. If the time differs, then it will incrementally correct the time over a 30 day period to avoid gaps in data.

Ignore Daylight Saving Time

By ticking this box it will not change the logger time by +/- 1 hour for countries that adhere to daylight saving time.

5.4.1 Data Transmission

This tray controls how often logged data is transmitted from XiLog+.

Data Transmission	
<input type="checkbox"/> Transmit Daily	
Transmission Frequency	1 Hour
Data Transmit Order	Newest First
Start	08:00
End	18:00
Active Days	
<input checked="" type="checkbox"/> All Days	<input checked="" type="checkbox"/> Monday <input checked="" type="checkbox"/> Tuesday <input checked="" type="checkbox"/> Wednesday <input checked="" type="checkbox"/> Thursday <input checked="" type="checkbox"/> Friday <input type="checkbox"/> Saturday <input type="checkbox"/> Sunday

If the transmit daily option is selected, a single time can be entered and messages will be transmitted at that time every day. If a different transmit regime is required, a frequency, start and end time and active days can be selected. For example a logger can be programmed to transmit data every hour between 8 am and 6 pm Mon to Fri only. By managing the transmission times, the battery life of the logger can be maximized.

	<p>For the XiLogEco data can be transmitted every 15 minutes without compromising battery life.</p>
---	---

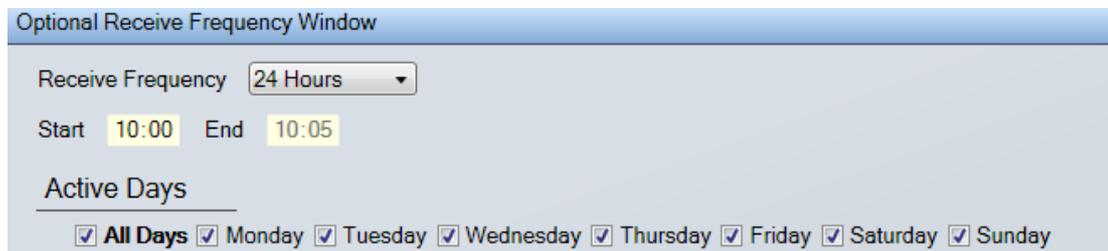
When transmitting data via SMS, XiLog+ will intelligently manage when there is data to be sent, attempting to minimise the SMS costs. Each SMS can contain a maximum of 96 values. XiLog+ will not attempt to send an SMS until it is full, regardless of the frequency selected here.

Example: If 5 minute data is being logged and transmitted via SMS, each 96 value message will contain 8-hours of data. Even if the transmission frequency is set to every hour, XiLog+ will still wait until the full SMS has been formed after 8-hours before sending the SMS. This prevents excessive SMS costs and duplication of data.

When data is transmitted via FTP there are no such restrictions. At each transmission time all new data that has been logged will be sent by FTP.

5.4.2 Optional Receive Frequency Window

This tray controls an optional receive window that will wake the modem to receive data. This allows two way communications to occur during the period set within this tray. These settings are independent of the main data transmission window.



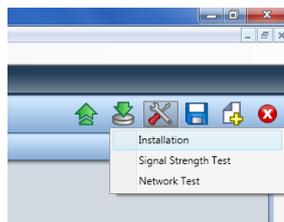
	<p>Any commands which are sent to the logger whilst its modem is off will be stored and answered when the modem next awakes. The length of time messages will be held on the network may vary from provider to provider, but is normally between 24 hours and 3 days. If not delivered within this time the messages will be deleted by the provider.</p>
---	---

5.5 Installation Tools

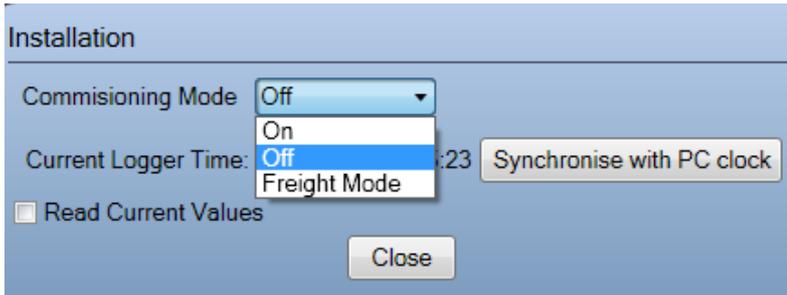
It is best practice after amending logger settings to save them to the logger by selecting the program button (as seen at the start of Chapter 5).



Once programmed, carry out the essential checks found in the Tools menu before leaving site.



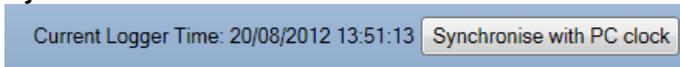
Commissioning Mode



On	Puts the logger into commissioning mode, so that the logger's modem is constantly powered and available to receive messages via the GSM network. If the modem is On this will allow remote two way communication between the logger and the operative.
Off	Turns the logger's modem off. This is the recommended setting for normal use.
Freight Mode	Freight mode ensures that even if the logger is programmed to transmit, because of an alarm for example, it will not attempt this. It is important that this option is selected for air freighting of a logger, even if the SIM is removed. All loggers which have been air freighted from Primayer will be received in Freight mode.

Commissioning Mode will be automatically turned off at 00:00 the following day to conserve battery power. An optional receive window can be activated to allow communication with the logger at a later date (see section 5.4.2)

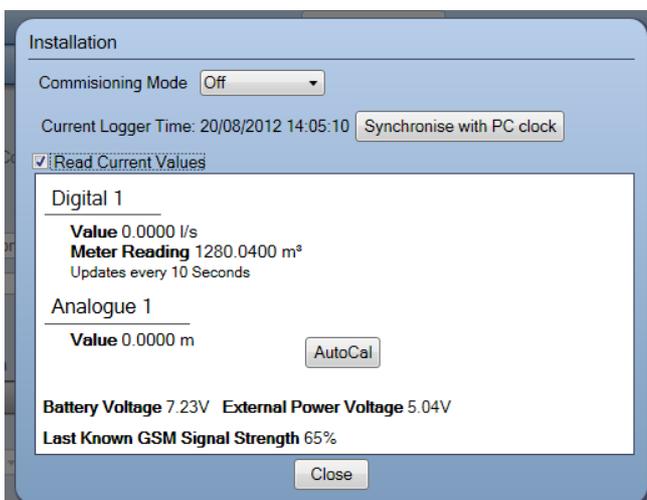
Synchronise with PC clock



This function sets the clock on the logger to match the PC clock. This is useful if Program changes has selected when programming a logger.

Current Values

It is recommended to Read Current Values to confirm a successful logger deployment. To view this data please ensure the Read Current Values box is ticked and logger is connected via a communication cable.



	<p>PrimeWorks will request this data from the logger every second. Pressure and other analogue values will update at this frequency, but flow values may take up to 1 minute to update dependant on the sampling regime programmed into the logger.</p>
---	---

Digital / Analogue

The number of values displayed will vary dependant on the model and the programming of the logger. The current value and units for each channel will be displayed. This provides an opportunity to check if correct values will be logged.

If a channel is not being displayed:

- Check that the channel is enabled within the channels trays

If a channel is reading the wrong value or zero:

- Check the sensor is connected to the logger and measurement point.
- Check the correct measurement units are programmed
- For digital channels check the correct FCAL is programmed
- For analogue channels check the correct offset is programmed.

AutoCal Button

If pressure, depth or height is being logged on an analogue channel, an AutoCal button will be available. Press this button to AutoCal the analogue channel. This will force the channel to read zero or the custom offset.

	<p>This should only be done with the transducer open to atmospheric pressure. Only future data will use this new offset. Any data previously recorded will not be readjusted for this offset.</p>
---	---

Battery Voltage

This shows the measured internal battery voltage (nominally 7.2V). If this battery is low and needs replacing, a warning is displayed when plugging the logger into PrimeWorks.

External Power Voltage

This field shows the external power voltage measured by the logger. If the logger is attached to USB, this will show the USB voltage being supplied to the logger (generally 5V). If requested remotely it will show the power of an externally connected power supply.

GSM Signal Strength

This field shows the GSM signal strength measured by the logger the last time the signal strength test was run. It also indicates whether the results are good, adequate or inadequate.

5.6 Perform a Signal Strength Test in PrimeWorks



It is strongly recommended that this step is performed as part of each logger deployment, even if the site has been successfully used previously. GSM coverage can vary even over short periods.

1. Open Signal strength test from the Installation menu with the logger connected to the PC via the communication cable.
2. Enter the test parameters that you wish to carry out. As a default in PrimeWorks it sets out a recommended duration of 5 minutes.



$$\text{Sample Count} \times \text{Interval Between Samples} = \text{Test duration (seconds)}$$

Sample Count

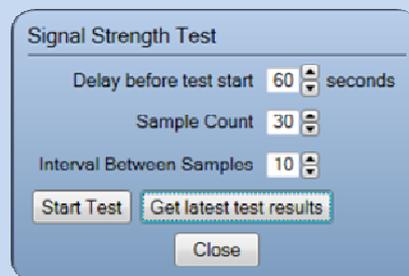
The number of signal checks that it will carry out.

Interval Between Samples

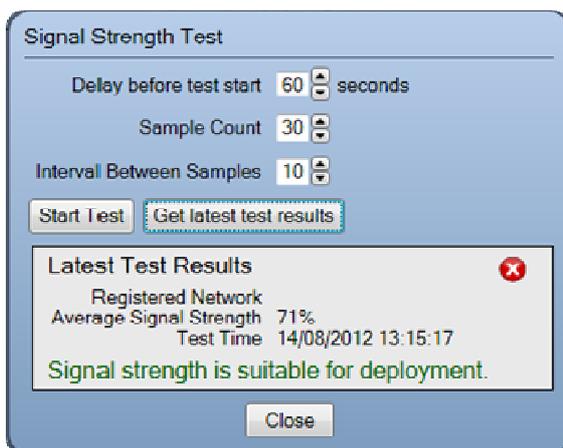
The duration between each signal check.

Delay before test start

The number of seconds the test will start in, to allow the installation of the logger in its permanent location before the test starts.



3. Make a note of the test duration and then click Start Test and deploy logger in its permanent position so that accurate results can be obtained.
4. Retrieve the logger once the allocated test duration has passed and reconnect to PC via USB. To obtain results click Get latest test results.

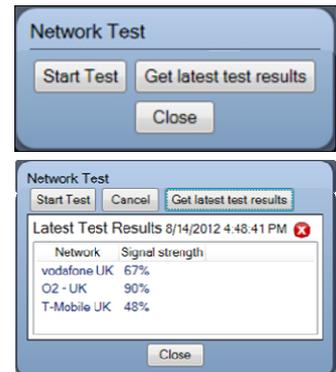


Signal Strength (%)	Deployment
> 25%	Strong signal strength: should be able to regularly logon to the GSM network.
21 – 25 %	Adequate but requires further monitoring; indicates a borderline signal level; communication with the GSM network may fail on occasion. Repeat the test; if the same result is returned, it may be advisable to use an alternative deployment position if one is available. If this is not possible, install XiLog+, but ensure that it is closely monitored.
< 21 %	Is not suitable for deployment: indicate that the signal strength is insufficient for communications cross the GSM network. Repeat the test; if the same result is returned, XiLog+ will not be able to access the GSM network from this deployment position. If possible, try an alternative deployment position or consider using an alternative network provider (See Section 5.7on Network Test).

5.7 Perform a Network Test in PrimeWorks

If the existing SIM network provider fails to achieve adequate signal, one option is to change to a stronger network and therefore increase data transmission reliability. To see which network is most suited to local conditions a Network Test can be carried out.

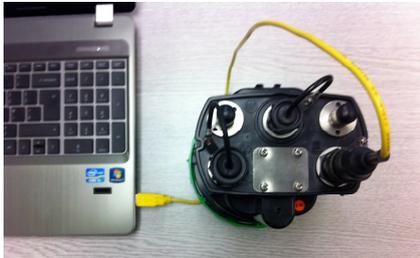
1. Select Network Test from the installation menu.
2. Click Start Test and leave the logger connected to the PC. This test provides an onsite general indication of which network provider is more reliable due to local conditions.
3. Click Get latest test results. This will display all available networks and their signal strength in a percentage. It's advisable to obtain a SIM with the largest signal strength to improve data reliability and update the logger accordingly. (See Chapter 2.1 SIM card installation and 5.1 Logger Information)



	<p>If all network providers return with a signal strength of 21% or less, after moving the location or changing the network provider then consider:</p> <ul style="list-style-type: none"> • Using an external antenna XiLog+ • Upgrading the power supply
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6 Logger Programming with XiLog+ FastTrack

The XiLog+ FastTrack software is used with XiLog+ 1P, 1F, 2i, 3i and XiLogEco for basic programming only. This software is not compatible with logger variants with generic analogue channels.



To program XiLog+ or XiLogEco, connect the logger to the PC via the local USB communication cable and open the XiLog+ FastTrack software.

The configuration is not loaded from the logger. Instead the last configuration used on this PC will be loaded.

Site Name Phone Number

Site Name

This field allows entering the reference to the location of the logger. This is the name which will appear in the PrimeWorks database for this logger.

Phone Number

This is the phone number of the SIM within the logger. Once entered and saved into the logger this does not need to be entered again unless the SIM is changed.

Primayer

Load Config

This updates the FastTrack window with the logger's current configuration file.

Signal Strength

This provides options to test the GSM networks strength. (See Chapter 6.5 Signal Strength for further details)

Start

Once all logger parameters have been defined for the site within FastTrack, click Start to send the parameters to the logger. This will delete all data stored on the logger, replace with new parameters and set the logger time to the PC time.

Changes Only

Alternatively by clicking the down arrow located next to Start, click Changes Only will save any changes made in the logger configuration only and therefore still keeping previous data.

After clicking Start or Changes Only, this will then display real time values to provide as a final check. Any amendments to meter reading or FCAL can be made here, before clicking 'Finish' to confirm logger ready for deployment.

6.1 Transmission

This tray displays the logger's remote data transmission options.

Transmit time

Set the time required for the logger to send its data remotely to XMS or PC that imports all XiLog+ data.

Auto GSM Clock Correction

By ticking this box the logger to check its time with the GSM network. If the time differs, then it will incrementally correct the time over a 30 day period in order to avoid gaps in data.

6.1.1 SMS Transmission

If the SIM inside the logger is setup for SMS then it requires SMS transmission to be selected.

Host Number

Enter the telephone number of the modem receiving the logger's data. Alternatively if using XMS then select the logger's network provider from the XMS host drop down menu and it will then automatically populate the Host number field.

Alarm Number

Enter a mobile telephone number to receive SMS alarm messages from this logger, if required.

6.1.2 FTP Transmission

If the SIM inside the logger is setup for GPRS then it requires FTP transmission to be selected.

Every

This allows the operative to choose how often per day that the logger will transmit its data via FTP. For XiLog+, FastTrack allows a maximum of three transmissions a day i.e. every 8 hours. For XiLogEco selections down to every 15 minutes are allowed.

FTP Server Address

The address of the FTP server which the logger should contact to transmit the data should be entered. If using the Primayer XMS delivery system, the address waterlogger.co.uk should be entered. If using another FTP server, the details entered should be the address, without any FTP prefix.

FTP Username

Enter the username for logon to the FTP server.

FTP Password

Enter the password for this user to logon to the FTP server
If using the Primayer XMS system, Primayer's support team will have supplied the relevant details.

6.2 Flow Channel

This tray allows programming of flow channels only.

Flow Channel 1

Sensor Profile: General Contact Closure FCAL: 10 Litres /pulse

Units: l/s Meter Reading: 0 m³

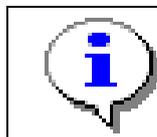
Interval: 15 Minutes

Threshold alarms enabled

Sensor Profile

This drop down menu allows users to select the pulse unit that they are connected to and will predefine the sensor options accordingly.

Option	Type	Pulse Direction
ABB	1 Bidirectional	Forward A, Reverse B
BPG20	1 Bidirectional	Pulse A, Inverse B
Cyble HF	1 Bidirectional	Pulse A, Inverse B
General Contact Closure	1 Unidirectional	Forward A
HRP / LRP	1 Unidirectional	Forward A
Magflow	1 Bidirectional	Forward A
PR7	1 Bidirectional	Pulse A, Inverse B
PrimeMag	1 Bidirectional	Forward A, Reverse B
PrimeProbe2	1 Bidirectional	Forward A, Reverse B



The table above defines each option by its type and pulse direction, so that pulse units with similar type/direction to the manufacturers listed can be identified and selected in FastTrack.

Calibration Factor

Enter the litres/pulse value for the meter (FCAL). See Appendix 1: Meter Scaling Table for a list of common meters and their FCAL.

Units

Defines the flow measurement units to be used within the logger.

Meter Reading

Enter the site meter reading into the logger. If this is written into the logger on installation, the meter reading in XiLog+ will track the actual meter reading. Meter readings up to 10 digits can be entered, with accuracy to 4 decimal places.

Meter Units

The Meter Reading entered can either be in a variety of units, depending on meter size, and accuracy required.

Logging Interval

This option sets the measurement interval at which data on this channel will be logged. All data logged on a channel is average data (a number of samples will be taken and an average value derived from these samples). In addition to this average data, each channel will also record the minimum and maximum value within each day.

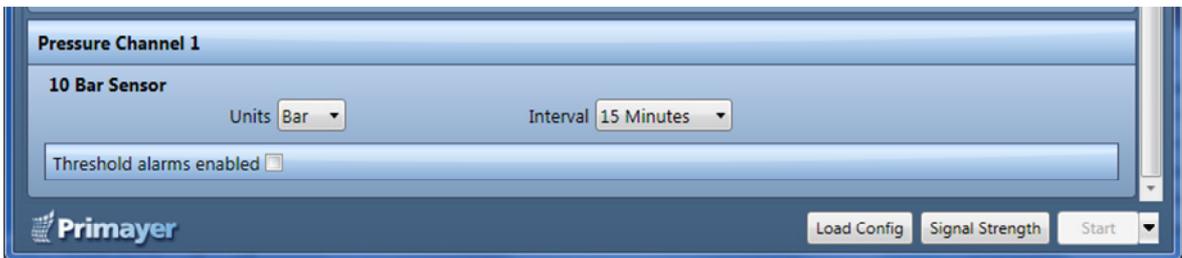
If the logging interval is left at 'Off', the logging on the channel will be disabled.

	<p>XiLog+ FastTrack only allows 5, 10, 15 minute and 1 hour intervals to be programmed. Please use PrimeWorks for accessing the full range of measurement intervals.</p>
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	<p>When connecting XiLogEco to FastTrack, secondary logging with logging intervals of 10 seconds, 30 seconds and 1 minute become available. This secondary channel will not be transmitted; it must be requested from the logger.</p>
---	---

6.3 Pressure Channel

This tray allows programming of pressure channels only.



Units

Defines the pressure measurement units to be used within the logger.

Logging Interval

This option sets the measurement interval at which data on this channel will be logged. All data logged on a channel is average data (a number of samples will be taken and an average value derived from these samples).

If the logging interval is left at Off, the logging on the channel will be disabled.

	<p>XiLog+ FastTrack only allows 5, 10, 15 minute and 1 hour intervals to be programmed. Please use PrimeWorks for accessing the full range of measurement intervals.</p>
---	--

	<p>When connecting XiLogEco to FastTrack, secondary logging with logging intervals of 10 seconds, 30 seconds and 1 minute become available. This secondary channel will not be transmitted; it must be requested from the logger.</p>
---	---

6.4 Threshold Alarms

Threshold alarms enabled

Low Threshold l/s High Threshold l/s Deadband l/s Debounce Delay

Threshold alarms enabled

Select this option to turn on the alarms for either channel.

High Threshold

Enter a value which the logger should trigger a High alarm when data exceeds it.

Low Threshold

Enter a value which the logger should trigger a Low alarm when data is below it.

Deadband

Enter a deadband value creates a buffer around the threshold. A high alarm will be generated when the channel value exceeds the high alarm threshold plus the deadband. It will be cleared when the channel value is lower than the high alarm threshold minus the deadband.

Example: For example if a high threshold of 20l/s is entered, and a deadband of 1l/s entered, the high alarm will be triggered when the flow goes above 21l/s, and will only be cleared when it drops below 19l/s. This is to prevent generation of multiple alarms as values oscillate around a threshold value.

If this feature is not required then leave the deadband at 0.

Debounce Delay

In addition to the above deadband to prevent multiple alarms for one event, it is possible to select a debounce delay. This is a selection of a number of minutes (between 1 minute & 1 hour). To trigger the alarm, the channel value must exceed the threshold (including deadband) for the period of time set by the debounce delay.

Example: if a debounce delay of 5 minutes is selected, to generate a low alarm, the value must be above the high threshold plus the deadband for 5 minutes before an alarm is generated.

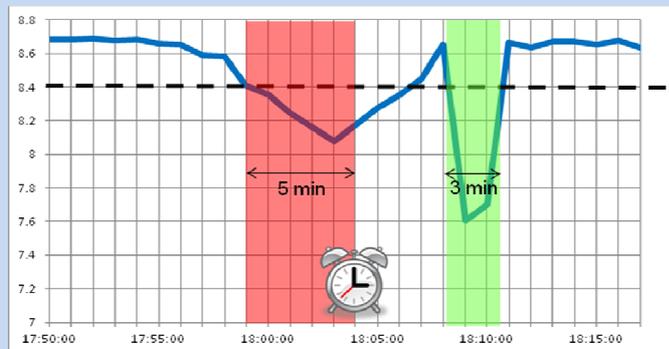
Alarm Configuration

Enabled

Profile Mode

Low Threshold Bar High Threshold Bar

Deadband Bar Deadband is percentage Debounce Delay



Picture above demonstrates an alarm will be triggered after five minutes below the Low threshold



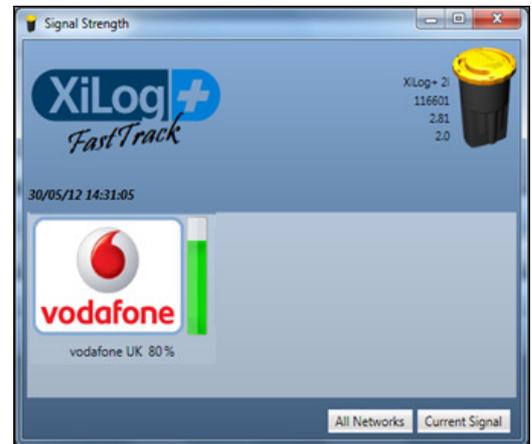
The debounce delay is only used on entering an alarm state. It is not applied when determining whether an alarm has been cleared or not.

6.5 Perform a Signal Strength Test in XiLog+ FastTrack



It is strongly recommended that this step is performed as part of each logger deployment, even if the site has been successfully used previously. GSM coverage can vary even over short periods.

1. Open the Signal Strength window by clicking the button located in the bottom right hand corner.
2. XiLog+ FastTrack has the ability to obtain the current network provider signal strength by clicking Current Signal then Run Test. This will delay the test for 30 seconds, giving time for the logger to be placed in its permanent location and then sample the current provider's signal for 1 minute.
3. Retrieve the logger and reconnect it to the PC with FastTrack running.
4. To obtain the logger's current network provider signal strength, click Current Signal then Get Results

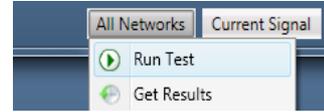


Signal Strength (%)	Deployment
> 25%	Strong signal strength: should be able to regularly logon to the GSM network.
21 – 25 %	Adequate but requires further monitoring; indicates a borderline signal level; communication with the GSM network may fail on occasion. Repeat the test; if the same result is returned, it may be advisable to use an alternative deployment position if one is available. If this is not possible, install XiLog+, but ensure that it is closely monitored.
< 21 %	Is not suitable for deployment: indicate that the signal strength is insufficient for communications cross the GSM network. Repeat the test; if the same result is returned, XiLog+ will not be able to access the GSM network from this deployment position. If possible, try an alternative deployment position or consider using an alternative network provider (See section 6.6 on Network Test).

6.6 Perform a Network Test in XiLog+ FastTrack

If the existing SIM network provider fails to achieve adequate signal, one option is to change to a stronger network and therefore increase data transmission reliability. To see which network is most suited to local conditions a Network Test can be carried out.

1. Click All Networks then Run Test; XiLog+ has the ability to survey all available network providers signal strength. This allows the operative to choose the best network for the logger by changing the SIM accordingly.
2. Click Start Test and leave the logger connected to the PC. As networks are discovered their signal strength will be displayed on screen.
3. If the logger is disconnected from the PC, click Get Results to retrieve the results of the last test.



	<p>If all network providers return with a signal strength of 21% or less, after moving the location or changing the network provider then consider:</p> <ul style="list-style-type: none"> • Using an external antenna XiLog+ • Upgrading the power supply
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7 Battery maintenance



Only replace batteries with approved battery packs purchased from Primayer Limited.

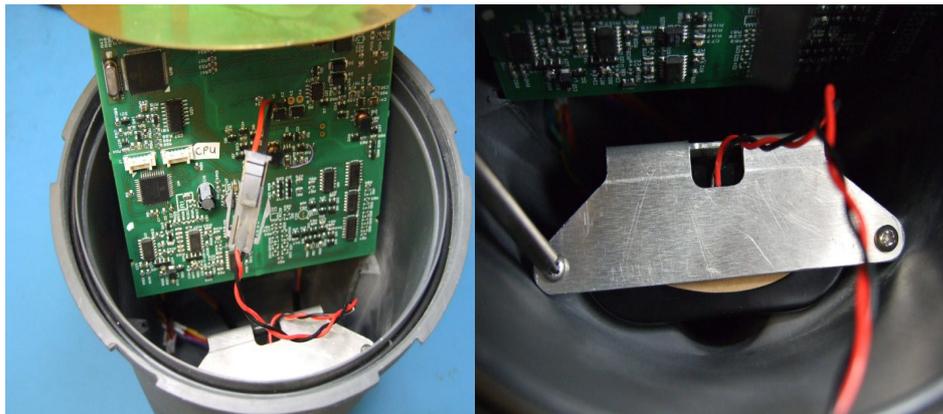


Do not, except under direct instruction from Primayer Limited, disassemble your XiLog+ datalogger any further than described in the procedure below.

Doing so will invalidate your warranty with immediate effect.

7.1 Replacing XiLog+ Internal Batteries

1. Carefully unscrew the yellow cover 1/8 of a turn and pull it off.
2. Carefully pull out the antenna and circuit board.
3. Unplug the battery



4. Remove the screws from the battery holder.
5. Remove the battery holder.



6. Remove the battery from the holder.
7. Feed the new battery cable through the hole in the battery holder.

8. Put the battery into position in the holder.
9. Position the battery holder in XiLog+ and secure with the two screws.
10. Connect the battery connector.
11. Push the circuit board into the rails inside the case.
12. Push the yellow cover into position.
13. Turn the yellow cover clockwise 1/8 of a turn.

7.2 XiLogEco Power Management Unit

XiLogEco Power Management Unit contains a lead acid rechargeable battery; it is designed to be recharged from a turbine that is powered by a minimal 8m pressure differential across a PRV.

Battery Safety



Please ensure the following safety precautions are followed when handling a XiLogEco Power Management Unit.

- It is vital not to allow a XiLogEco Power Management Unit to discharge completely.
- It is important when installing a XiLogEco Power Management Unit that the arrow marked on the label points upwards. It is good practice to use Primayer's double logger bracket screwed into the chamber wall to help ensure the battery stays upright.
- Avoid laying a XiLogEco Power Management Unit upon its side. During storage it can be positioned upon its lid with the arrows pointing downwards.
- A XiLogEco Power Management Unit can release hydrogen gas which can form explosive mixtures in air. It is vital to ensure the vent is not blocked or the battery placed in a sealed chamber.
- Keep all XiLogEco Power Management Units away from sparks or open flames.
- Do not attempt to connect any XiLogEco Power Management Unit to any product other than a XiLogEco and Cla-Val e-Power turbine.
- Do not attempt to open the internal battery pack; care must be taken when handling.
- If the battery pack in a XiLogEco Power Management Unit is damaged please wear clothing that covers skin, gloves and safety goggles when handling.
- All XiLogEco Power Management Units must be recycled at end of life in accordance with local and national laws and regulations.

Battery Consideration



Before installing XiLogEco, ensure its Power Management Unit is stored at room temperature (20°C) for no longer than 1 year; otherwise the internal battery will fully self-discharge and be unable to recharge from the turbine.

8 XiLog+ 9 Wiring

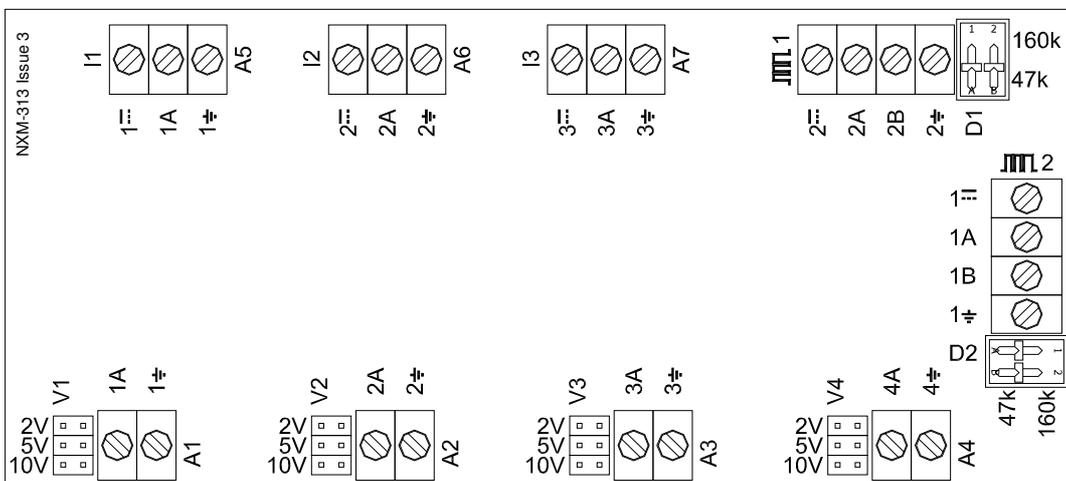
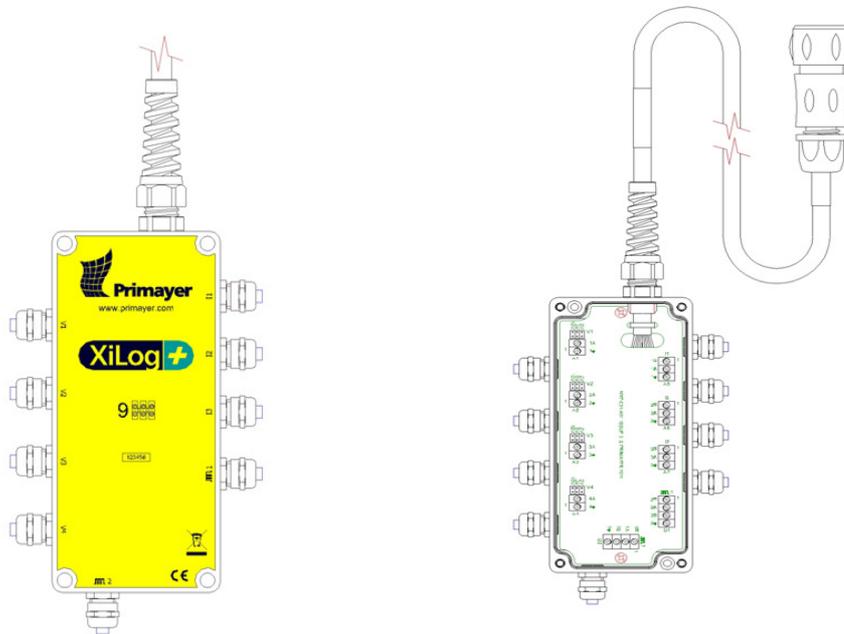
There are two options available for wiring of the outputs of XiLog+ 9.

- NXG-302 Input Terminal Box
- NXG-303 Bare Wire Input Cable

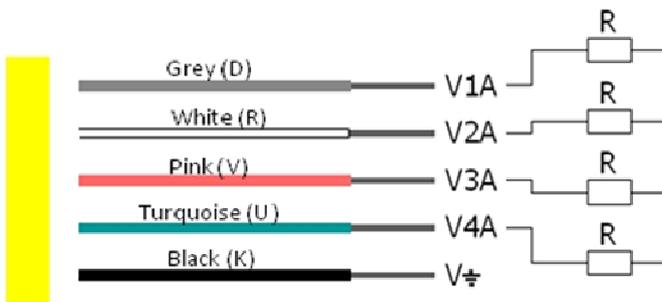
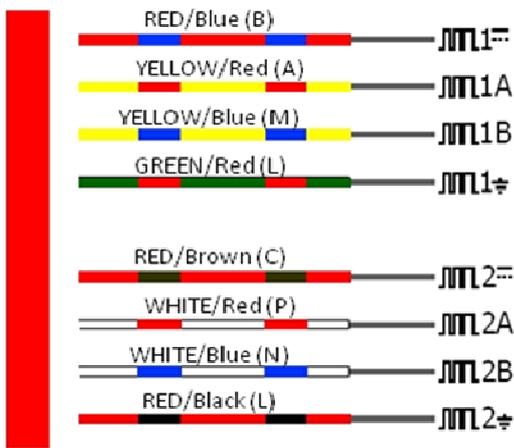
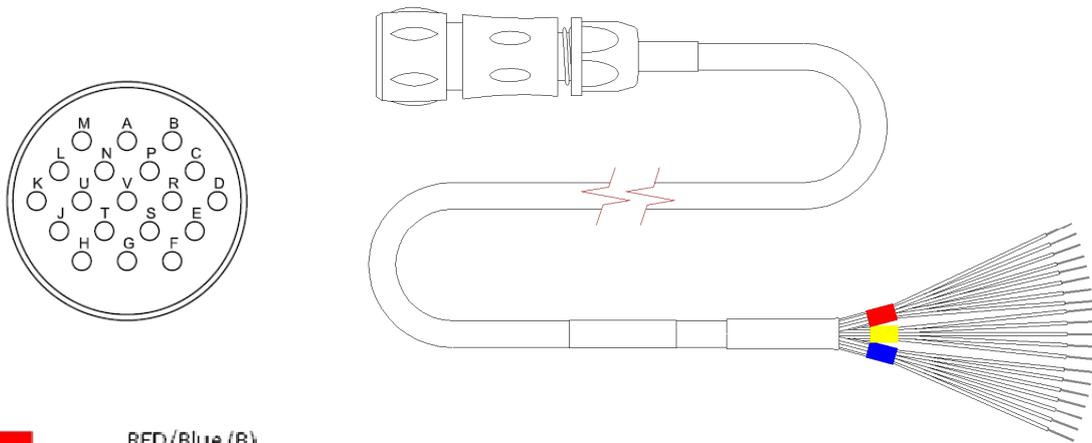
8.1 NXG-302 Input Terminal Box

An expansion box for the wiring is available, connections as outlined below. When any of the connectors on the box are not used, they must be correctly sealed with a blank to prevent damage to the connection box.

	<p>Each of the voltage inputs has a maximum of 2Volts, 5Volts or 10Volts, depending on the position of the jumper next to the appropriate input. Please ensure the correct position is selected as wrong selection could result in damage to the logger.</p>
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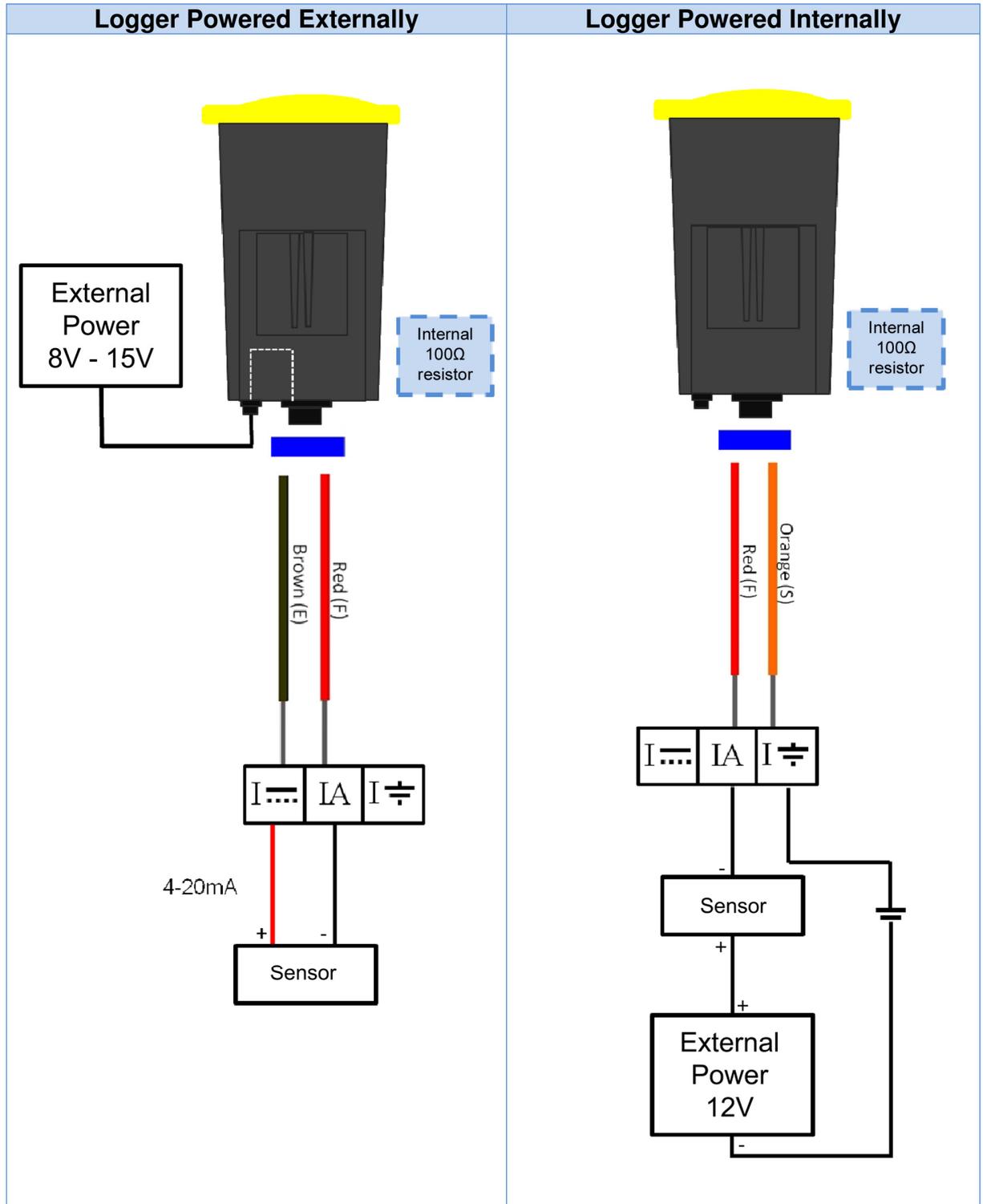
8.2 NXG-303 Bare wire cable



Where R is...
 V = 0-2 Volts; R=0Ω
 V = 0-5 Volts; R=69kΩ, ±0.1%, 25ppm
 V = 0-10 Volts; R=187kΩ, ±0.1%, 25ppm



8.3 Wiring for Current Channels (using NXG-303)



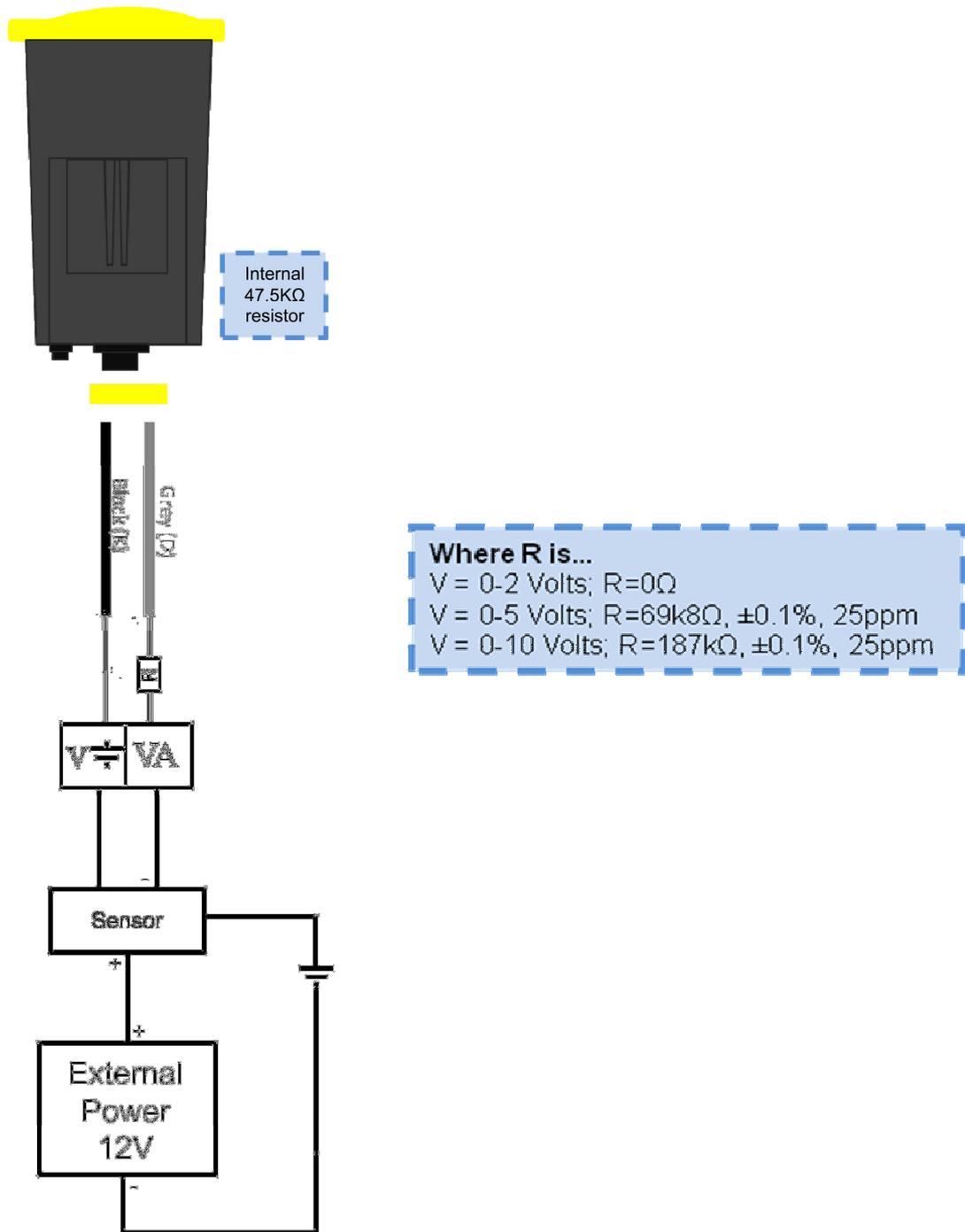
For subsequent current channels use:

- Brown (E) & Yellow (G)
- Brown (E) & Blue (H)

For subsequent current channels use:

- Yellow (G) & Green (T)
- Blue (H) & Violet (J)

8.4 Wiring for Voltage Channels (using NXG-303)



For subsequent voltage channels:

- White (R) & Black (K)
- Pink (V) & Black (K)
- Turquoise (U) & Black (K)

9 APPENDIX 1: XiLog+ Technical Specification

Communication / Transmission	
PC connection	Rapid local USB communication cable
Antenna	Bespoke internal underground antenna or external options (must be specified on purchase)
Operating Frequency	850MHz/900MHz/1800MHz/1900MHz (Europe only 900MHz/1800MHz)
Transmission type	GPRS or SMS
Modem Output power	Class 4 (2W) @ 850MHz/900MHz Class 1 (1W) @ 1800MHz/1900MHz
SIM card holder	Accessible and isolated from main logger housing
Transmission frequency	Every 15 minutes to once per week
Alarms	Threshold, profile or envelope via SMS/GPRS/Email

Logging	
Memory size	2Gb (500 million readings)
Data types	Daily, minimum, maximum and totals
Logging mode	Count and event
Sample intervals	1 second – 24 hours
Secondary logging	Log two measurement intervals on one channel
Data compression	Merge two data channels into one SMS message

Flow Channel	
Meter index	Sends daily meter index values
Combination metering	Option to log two uni-directional meters into one data set
Max. pulse frequency	1000Hz
Ability to power high energy pulse units	Elster (HRP, DRP, BGP100 & PR7), Sensus (OPTO06, OD07, Actaris & Cyble5)

Analogue Channel	
Voltage range	0-1V, 0-5V, 0-10V
Current range	0-10mA, 4-20mA
Accuracy	±0.1% (of full scale)
Resolution	±0.025% (12bit)

Internal Pressure Transducer Channel	
Pressure range	0-10 Bar/0-20Bar
AutoZero function	Yes
Accuracy	±0.1% (of full scale)
Connection	Male quick release

Environmental	
Operating Temperature	0°C to 55°C (internal pressure transducer fitted) -10°C to 55°C (all other variants)
Maximum Humidity	99% RH
Storage Temperature	0°C to 55°C (internal pressure transducer fitted) -10°C to 55°C (all other variants)
Optimal Battery Storage Temperature	30°C
Dimensions	240x145x145mm
Ingress protection	IP68 (fully submersible to a depth of 1 metre)
Weight	835g

Power	
Internal batteries	Nominal 7.2Vdc @1.8A max
Battery chemistry	Lithium-Thionyl Chloride non-rechargeable
Battery shelf life	10 to 15 years @ 20°C nominal temperature
External supply	8-15Vdc @ 1A SELV protected
USB supply (occasional use)	5Vdc (±0.3V) @ 2A SELV protected

Regulatory Compliance

Fully European compliant with the R&TTE Directive 1999/5/EC and the RoHS2 Directive 2011/65/EU. Radio compliance opinion assessed by Notified Body 0889. Restricted for transport class 9 (see Appendix 5).

Technical Note Reference: IXD-627-TN iss2.1

10 APPENDIX 2: XiLog+ User Information Sheet

Please adhere to the following for the safe operation of the Primayer Xilog+ Data Logger

Batteries

Caution: Risk of explosion if battery is replaced with an incorrect type.

Dispose of used batteries according to the instructions.

- The Xilog+ contains Lithium Thionyl Chloride disposable batteries. DO NOT charge these batteries under any circumstances. Correctly used these batteries will allow up to 5 years of normal operation.
- Only replace the batteries if qualified to do so.
- To maximise the life of the batteries store at a constant temperature of 30 °C.
- Do not expose the Xilog+ to temperatures lower than -25 °C or higher than +85 °C under any circumstances. The battery integrity maybe compromised outside of these temperatures.
- When removing the cover, ensure no water or moisture ingress occur.
- Dispose of batteries in accordance with EU and local government regulations.
- This product including the batteries are class 9 restricted for transport.
- The batteries may only be replaced with approved battery packs available from Primayer.

Environmental

- To ensure correct operation of the Xilog+ operate within the recommended temperature range of 0 °C to 55 °C if an internal pressure transducer is fitted or -10 °C to 55 °C for all other models.
- Do not submerge the Xilog+ in water below a depth of 1m.
- Do not drop the Xilog+ from a height of more than 1m and not onto solid ground.

Transmitter

- The Xilog+ contains a radio transmitter. The Electromagnetic Exposure complies with the 20cm rule. Do not operate the Xilog+ with anyone closer than 20cm to the unit or its antenna.

External Power

- External supply (when applicable): 8.0 to 15.0 Volt dc @ 1 Amp SELV protected supply
- USB supply (occasional use): 5 Volt dc (+/-0.3 Volt) @ 2 Amp SELV protected supply

Inputs

- Analogue (model dependent): 0-10mA / 4-20mA / 0-1 Volt dc / 0-5 Volt dc / 0-10 Volt dc. DO NOT exceed any of these ratings.
- Digital input: Volt-free closing contact. Maximum voltage rating 24 Volt dc.

Warranty

- Unauthorised tampering or modification to the Xilog+ will invalidate the warranty.
- Any operation of the Xilog+ outside the specification parameters, this information sheet or the user manual will invalidate any warranty.
- Under normal operation, the Xilog+ is designed to operate unattended for 5 years. The disposable battery pack is excluded from any product warranty.

Technical Note Reference: IXD-636-TN iss1.1

11 APPENDIX 3: Meter Scaling Tables

This is a quick guide for the type of pulse unit and number of litres per pulse (FCAL) required for each flow meter. This list is not comprehensive as it only displays sensors which are supplied and terminated by Primayer. The PrimeLog+ is not limited to these meters; for meters not in this list, the flow meter manufacturer can provide the information. If unsure please contact Primayer's customer support.

Arad (Master Meter)

Meter Type	Size (mm)	Pulse Unit Type	FCAL (l)	FCAL (m ³)
S	15	EV Reed Switch	1/10/100	-
M	15- 25	EF-P Photo Diode	0.1	-
		EV Reed Switch	1/10/100	-
	30 - 50	EF-P Photo Diode	1	-
		EV Reed Switch	10/100	1
P	15 - 20	EV Reed Switch	1/10/100	-
Q	15	EV Reed Switch	1/10/100	-
Woltman WMR WT WST	50 - 80	EF-P Photo Diode	1	-
		EV Reed Switch	10/100	1
	100 – 150 (option 1)	EF-P Photo Diode	10	-
		EV Reed Switch	100	1/10
	100 – 150 (option 2)	EF-P Photo Diode	1	-
		EV Reed Switch	10/100	1
	200 - 300	EF-P Photo Diode	100	-
		EV Reed Switch	-	1/10/100

Cla-Val e-FlowMeter

Size	65 – 150mm	200-600mm
FCAL	100	1000

Elster (Kent)

Meter Type	Size (mm)	Pulse Unit Type	FCAL	
Helix 2000	40 - 80	PU10/LRP	10	
	100 -300		100	
Helix 3000	40 – 100*		10	
	150		100	
Master 2000	40 – 50		1	
	80 -100		10	
Helix 2000	40 – 80		PU100/HRP	1
	100 -300			10
Helix 3000	40 – 100*	1		
	150	10		
Master 2000	40 – 50	0.1		
	80 -100	1		
Helix 4000	80-125	PG100		10/1000
	150-300			100/10000

Elster (Kent)

Meter Type	Size (mm)	Pulse Unit Type	FCAL
PSM-PS15-PS20 (V100)	15 - 20	PSM	0.5 / **5
PSM-PS25-PS30 (V100)	25 - 30		5 / **50
PSM-PS40 (V100)	40		5 / **5
PSM-LT (V100)	15 - 20		0.5
MSM-T (V210)	-	MSM	1
KVM-T (V200)	-		1
MSM-RS	-		10

Optical Pulse Units

Meter Type	Size (mm)	Pulse Unit Type	K=2.5	K=10	K=25
Aquadis	15	CYBLE LF	0.25	1	2.5
Aquadis	15-40		2.5	10	25
P40M (4x4)	15		0.25	1	2.5
P40M	15		2.5	10	25
FlostarM	40-100		25	100	250
Woltex	50-100		25	100	250
	150-300		250	1000	2500
	400-500		2500	10000	25000

Sensus (Socam/Meinecke)

Meter Type	Size (mm)	Pulse Unit Type	FCAL
WP/WS-Dynamic	40-125	RD 01	100/1000
			10/1000
	150-300		1000/10000
			100/10000
510/510PR	15-20	K510	1
501L		K505R	0.5
		K510	10
		K505R	0.5
		K510	100
501LM		K505R	0.5

Sensus (Socam/Meinecke)

Meter Type	Size (mm)	Pulse Unit Type	FCAL
501JM	15-20	K510	1000
		K505R	0.5
	25-30	K510	10
		K505R	5
510/510PR	25-30	K510	100
		K505R	5
Cosmosil	50-125	R01.1	100/1000
	150-250	R01.1	1000/10000
	300-800	R01.1	10000/100000
Cosmos	50-125	RD 01	100

Supplementary Notes for Meter Scaling Tables*Kent Meters:*

* Some earlier 100mm meters require the following:

FCAL = 100(PU10/LRP) or 10(PU100/HRP).

These meters can be distinguished by the centre pointer dial registration = 1000 litres/rev.

** Applies to 7 digit counters only, the other FCAL's apply to the 8 digit counters.

Kent combination meters use a Helix 3000 meter as the main meter and a PSM-T as the secondary meter. Select the appropriate FCAL from the table above for each of the meters.

Socam meters:

The 510 pulse unit is factory fitted and cannot be removed. The FCAL is determined at the factory and the above table shows the values available. The individual meter should be checked before selecting the appropriate FCAL.

12 APPENDIX 4: Battery Life

The table below shows information for typical usage scenarios (with no receive or standby windows).

Measurement Interval	Transmission	Standard Internal Battery	Double Internal Battery	External Battery Pack
≥15 minutes	1/day	Min: 5 years Max: 10 years	10 years	
≥1 minute	1/hour	Min: 4 months Max: 9 months	Min: 8 months Max: 1.5 years	Min: 2.2 years Max: 5 years
≥1 minute	1/30 minutes (10 hours/day)	Min: 4 months Max: 1 year	Min: 8 months Max: 2 years	Min: 2.4 years Max: 5 years
≥1 minute	1/15 minutes	Not recommended unless XiLogEco		Min: 6 months Max: 1.25 years

The XiLog+ is a very flexible data logger allowing configuration with several transmit, receive and standby windows. The above table only shows the effect of selecting different transmission intervals.

The following illustrates the effect on expected battery life of selecting different windows.

Measurement Interval	Transmission	Number of receive windows/day	Standby window length (minutes)	Standard Internal Battery
≥15 minutes	1/day	0	0	Min: 5 years Max: 10 years
≥15 minutes	1/day	1	0	Min: 4.75 years Max: 6.8 years
≥15 minutes	1/day	3	0	Min: 3.1 years Max: 3.8 years
≥15 minutes	1/day	0	60	Min: 1.5 years Max: 1.6 years

Alternative Power Supply Options

Internal battery

- Standard pack
- Double battery pack (NXG-110)

External power options

- External Alkaline battery pack (NXG-254)
- Mains powered (XXG-410) *Specify plug type*
- Solar
- Pressure differential



XiLog+ will only accept an external supply voltage between 8 and 15 Volts. Please adhere to this range; applying a voltage higher than 15 Volts will cause internal damage to the logger.

XiLogEco Power Options



XiLogEco requires a Cla-Val e-Power turbine (Patent Pending) to generate power from a minimum pressure differential of 8 metres, typically this is:

- Across a Pressure Reducing Valve
- Across a Boundary Valve

13 APPENDIX 5: Lithium batteries contained in equipment

Important transport safety data

1. Introduction

Lithium metal batteries are fitted into some Primayer products as single cell or multi-cell batteries. These batteries are classified as *dangerous goods* for the purpose of transportation and must be handled in accordance with the regulations governing air, road and sea transportation (*see section 3 below*). In addition to this transportation requirement, prior to being transported each type of lithium battery (used in the products) must have already successfully been certified to UN test requirements (*see section 4 below*). Primayer specifies only cells that meet the relevant UN certification.

This is a guide and should not be used as an alternative to the official regulations. The regulations are subject to change and this document is not intended to track those changes.

2. Primayer products containing lithium metal batteries

Current and recent Primayer products with lithium metal batteries are listed with lithium content;

Product	Lithium content (grams)
PrimeLog - single and dual channel	2.5
PrimeLog - four channel	5.0
PrimeLog+	5.0
XiLog+	10.0
XiLog+ double battery pack version	20.0
XiLog	10.6
XiLog double battery pack version	20.6
XiLog-S - single, dual and four channel	10.0
XiLogEco	3.0
XiLog.wmr - IP66 and IP68	10.6
Xstream	10.0
Phocus2 / Phocus.sms / Phocus.hr logger	2.5
Enigma logger	3.15
Primeprobe2	10.0
Socrates	20.0
ZetaCorr logger	2.5

3. Transportation

3.1 Applicable Regulations

The primary authorities responsible for issuing dangerous goods regulations are:

- **Air** - International Air Transport Association (IATA), Dangerous Goods Regulations (DGR)
- **Road** - European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR)
- **Sea** - International Maritime Organisation (IMO), International Maritime Dangerous Goods Code (IMDG)

Dangerous goods are assigned to UN numbers and proper shipping names according to their hazard classification. For Primayer's products the lithium metal batteries are contained in the equipment and the regulations identified by UN classification **UN3091 Lithium metal batteries contained in equipment, Class 9, Packing Group II, Packing Instruction 970**

Batteries used in Primayer products must not be transported separately from the equipment. Separate freighting is covered by another UN classification and not covered in this document.

Lithium batteries transported within the United States are subject to additional limitations as specified in the US national dangerous goods regulations contained in Code of Federal Regulations Title 49 (49 CFR). These limitations are not covered in this document.

3.2 Requirements

The person/company wanting to transport the goods is termed *The Shipper* and they must choose a *Freighting Agent* who is familiar with the UN3091 packing instruction. Only qualified personnel are permitted to process the packing and shipping of dangerous goods to ensure the correct packing and labeling are met as follows and as detailed in the applicable regulations.

- Correct packing of product
- Maximum quantity of lithium not exceeded
- Correct labelling of package which should include Class 9 hazard label and markings that identify *UN3091 Lithium metal batteries contained in equipment*
- Completion of a Shipper's Declaration for Dangerous Goods

3.3 Transportation from Primayer

Primayer Limited (UK) holds certification for meeting the above requirement. All new or repaired products leaving Primayer are packed in accordance with the regulations. If the product(s) is to be transported to a second destination (after leaving Primayer) it must be declared as *Dangerous Goods* to the *Freighting Agent* together with the information required by the above regulations. It is the responsibility of *the Shipper* to ensure they are working to the current regulations.

3.4 Transportation other than at 3.3 above

Lithium batteries that have been damaged or have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport. Therefore before equipment is transported it is essential that it is opened and the battery examined. If any sign of battery damage, or ingress of water to the product, is observed then the battery must be removed before transportation. For advice do contact **Primayer Customer Support** (contact details below).

4. UN test requirements and design safety

Primayer specifies Tadiran SL-700 and SL-2700 cells in sizes AA, C and D and Saft LSH20 cells only in battery packs. Tadiran and Saft cells are safety tested in accordance with International Standard IEC 60086-4. Alternatives may be approved only by Primayer Limited (UK).

5. Disposal

All batteries and cells must be disposed in accordance with local regulations.

For further information on air-freighting these products or the air-freighting regulations, please contact Primayer as follows:

Primayer Customer Support
Telephone: +44 (0)23 9225 2228
Email: support@primayer.com

Technical Note Reference: IXD-613-TN iss5

14 APPENDIX 6: Declaration Of Conformity

We: **Primayer Limited**
Of: Primayer House
Parklands Business Park
Denmead
Hampshire
England
PO7 6XP

Declare under our sole responsibility that the product

Product: Xilog+ Data Logger with GPRS

Model Numbers: (1F) NXG 201, (1P) NXG 202, (2) NXG 203,
(2i) NXG 204 and (3i) NXG 205

To which this declaration relates is in conformity with the essential requirements and other relevant requirements of the *R&TTE Directive (1999/5/EC)* & *RoHS 2 Directive (2011/65/EU)*

The product is compliant with the following standards and/or other normative documents:

Specific standards

Safety (article 3.1a) – BS EN 60950-1:2006 +A12:2011
ETSI EN 62479:2010

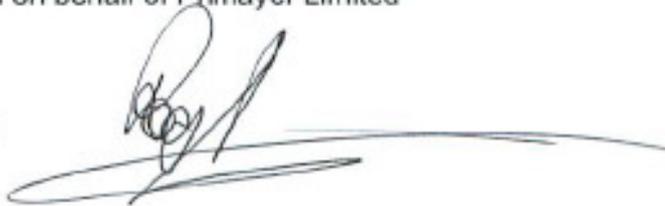
EMC (article 3.1b) – ETSI EN 301 489-7 V1.3.1(2005-11) in accordance with the common technical requirements of ETSI EN 301 489-1 V1.9.2 (2011-09)

Spectrum (article 3.2) - ETSI EN 301 511 V9.0.2 (2003-03)

Technical Construction File reference: TCFs142 Issue 1

Authorised signature for and on behalf of Primayer Limited

Date: 29 August 2013
Name: Roger Ironmonger
Position: Managing Director
Place of issue: UK



15 Index

—A—		Logger Programming	38
Air-freighting	55	Logging Interval	22, 24, 26, 40, 41
Alarm Number	39	Low Threshold	27, 42
Alarm Reporting	31	—M—	
Analogue Inputs	14	Messaging Type	31
Auto GSM Clock Correction	32, 39	Meter Reading	22, 40
AutoCal	35	Meter Scaling Tables	51
—B—		milliVolt	25
Battery	45, 46, 54	Model Variants	6
Battery Life	54	Mounting	11
Battery maintenance	45	—N—	
—C—		Network Test	37, 44
Calibration Factor	22, 40	NXG-302 Input Terminal Box	47
Combine Flow and Pressure	31	NXG-303 Bare wire cable	48
Communication/Power Input	14	—P—	
Communications	9	Phone Number	20, 38
Contaminated connectors	13	Pressure Channel	41
Current	49	PrimeWorks	19
Current (mA)	24	Profile Alarms	28
Custom Offset	23, 25	Program XiLog	11
—D—		—R—	
Data Transmission	32	Receive Window	33
Deadband	27, 29, 42	Remote Data Reporting	31
Debounce	29	—S—	
Debounce Delay	27, 42	Sealing	13
Digital Channel	21	Send Data Reports	22, 23, 26
Digital Inputs	14	Sensor Profile	21, 40
—E—		Sensor Rating	23, 26
Edit Envelope	30	Sensor Type	21, 25
Edit Profile	29	Signal Strength	12, 35, 36, 37, 38, 43
e-FlowMeter wiring	17	Signal Strength Test	12, 36
Enable Channel	21, 23, 25	SIM Card Installation	9
Envelope Alarms	30	Site Name	20, 38
e-Power Wiring	17	Software	8
—F—		System Overview	5
Flow Channel	40	—T—	
FTP Password	32, 39	Technical Specification	6
FTP Server Address	32, 39	Threshold Alarms	27, 42
FTP Username	32, 39	Transmission	39
—G—		Typical Applications	7
Generic Analogue	24	—U—	
—H—		Units	22, 23, 25, 40, 41, 46, 52
Hardware Connections	13	—V—	
High Threshold	27, 42	Voltage	25, 50
Host Number	31, 39	—X—	
—I—		XiLog+ 9 Wiring	47
Ignore Daylight Saving Time	32	XiLog+ Overview	5
Import Data	28, 30	XiLogEco Considerations	15
Input Connections	14	XiLogEco Hardware Setup	15
Installation	11, 33	XiLogEco Overview	5
Installation Checks	18	XiLogEco Plug and Play system	16
Internal Pressure Transducer	14, 23	XiLogEco Power Management Unit	46
—L—			
Logger Information	20		