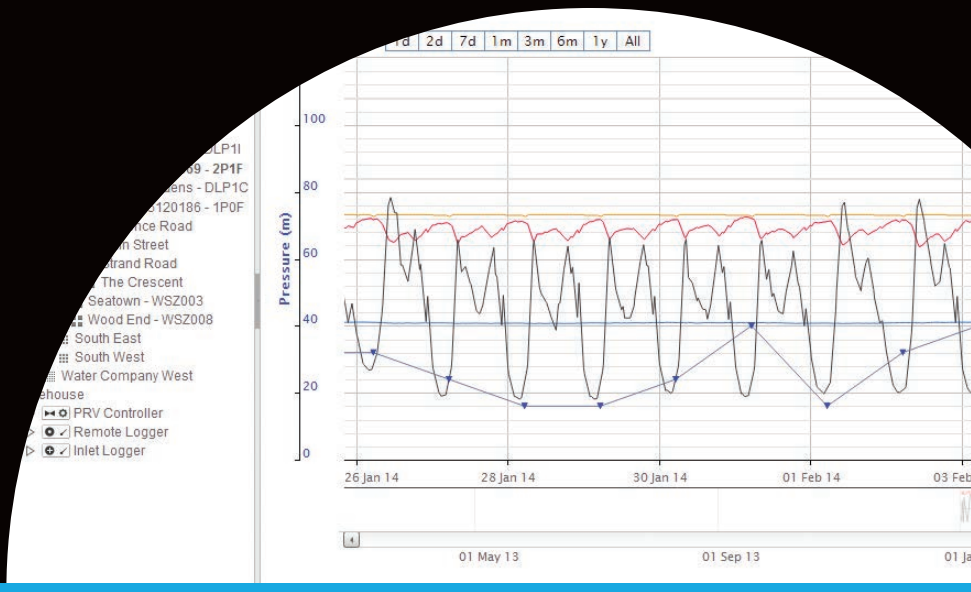
LOGGERS



Product brief

LOGGERS

CONTENTS

1

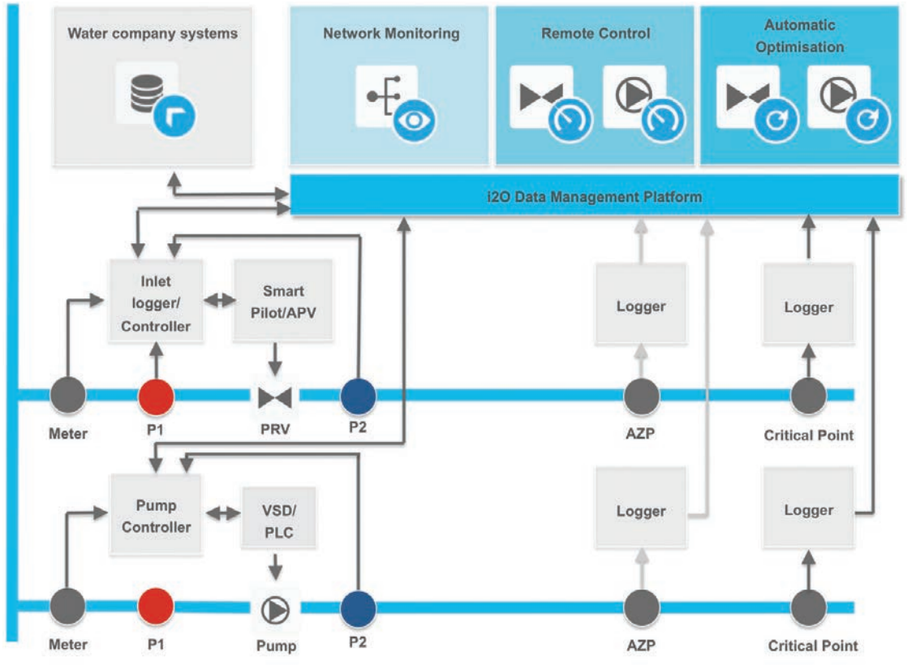
LOGGERS

Page

1. INTRODUCTION

i2O's Loggers are compact, robust and reliable.

They capture precise network data providing a high quality feed into monitoring and decision-making systems including native support for integration into i2O's portfolio of Smart Pressure Management enterprise software solutions. The loggers are smart through their on board network data processing capabilities and their unique extensible design. The extensible design enables i2O's loggers to have new smart software features remotely installed to add network intelligence to the data and to provide support for new hardware sensors and control accessories.



2. LOGGER TYPES

i2O offers a number of variants of loggers with different combinations of pressure transducers and flow channels. The loggers are primarily grouped into smart Inlet Loggers and Remote Loggers. The Inlet Loggers are designed to be located at the inlet to Pressure Managed Areas (PMAs) or District Metering Areas (DMAs). The Remote Loggers are designed for placement within the network in locations such as at critical points, Average Zone Points (AZPs) and at significant users.

2.1 Inlet Loggers

There are several variations of i2O Inlet Loggers to suit applications ranging from the most basic DMA inlet logger fitted with a single pressure transducer and two flow inputs, to the most sophisticated variant with three pressure transducers and two flow inputs.

The most sophisticated loggers are for PRV and meter equipped PMAs where in addition to flow, upstream and downstream logging, the PRV control space is also logged to enable PRV condition monitoring.

All variants of i2O Inlet Logger are fitted with a smart expansion port, which enables the logger to be upgraded to support additional external transducers, external batteries, external power sources or the i2O Smart Pilot to enable PRV control.

High-speed sampling can be configured to detect and capture the statistics of damaging pressure transients and surges.

External antenna kits can be supplied to provide flexibility of antenna placement to improve reception in poor signal areas.

Using the smart expansion port, an i2O Inlet Logger can be upgraded to become a PRV Controller by installing the i2O Smart Pilot and applying the appropriate control license in the i2O Data Management Platform. This unlocks functionality ranging from basic remote PRV outlet pressure control to sophisticated PRV pressure optimisation capabilities. Please refer to the PRV Remote Control & Automatic Optimisation product brief for full details.

Type	Configuration	Description
Inlet EXP	1 Pressure 2 Flow	Inlet Logger with one internal pressure transducer, internal batteries and smart expansion port
Inlet EXP	2 Pressure 2 Flow	Inlet Logger with two internal pressure transducers, internal batteries and smart expansion port
Inlet EXP	3 Pressure 2 Flow	Inlet Logger with three internal pressure transducers, internal batteries and smart expansion port

2. LOGGER TYPES

2.2 Remote Loggers

i2O Remote Loggers are designed to be placed at strategic points within the water network. This could be at pressure critical points, average zone points (AZPs), key customers or generally deployed to provide broader remote network visibility.

There are two variants of the i2O Remote Logger. The basic Remote Logger is fitted with a single pressure transducer only. The advanced Remote Logger has a smart expansion port which enables the logger to be upgraded to support additional external transducers, external batteries and external power sources.

High-speed sampling can be configured to detect and capture the statistics of damaging pressure transients and surges.

External antenna kits can be supplied to provide flexibility of antenna placement to improve reception in poor signal areas.

Type	Configuration	Description
Remote	1 Pressure 0 Flow	Remote pressure logger with internal batteries
Remote EXP	1 Pressure 0 Flow	Remote pressure logger with internal batteries and smart expansion port

3. LOGGER FUNCTIONALITY

i2O Loggers have a number of features which ensure longevity and reliability in use and accurate data recording, storage and transmission.

3.1 General

- Smallest high precision GPRS logger available
- Smart hardware expansion socket
- Over The Air upgradeable and extensible software
- Ultra low power consumption
- Up to 80Ah internal battery capacity
- External power option
- Free device and data management software functionality (Data Management Platform)
- Hardware configurations backed up on software platform enabling hot swap

3.2 Enclosure

- Robust enclosure
- IP68 submersible to 4m
- Compact ergonomic design
- Field serviceable battery and SIM
- Field installable external antenna kit

3.3 Logging

- High precision built-in pressure transducers
- Configurable acquisition and logging frequency from 10Hz to 1/day *
- True mathematical mean average logging of acquisition samples
- Optional remote configuration to log pressure acquisition statistics including minimum, maximum and standard deviation pressures *
- Combining 10Hz acquisition with statistics logging provides pressure transient and surge detection
- Optional external pressure transducers through the smart expansion port
- Logging of battery voltage
- Logging of temperature at the pressure transducer
- 4Mb non-volatile memory storage

** Enabling high frequency acquisition and logging will affect battery life*

3. LOGGER FUNCTIONALITY

3.4 Communications

- GSM quad band GPRS
- Remotely configurable multiple dial-up *
- Roaming SIM support
- High performance custom optimised internal antenna
- Optional external antenna kit
- Remotely configurable ‘High High’ and ‘Low Low’ SMS alarms *
- Remotely configured mobile number for SMS alarms
- Alarm initiated upload of logged data
- 2048 bit encryption and unique authentication credentials
- Full and selective firmware Over The Air (OTA) upgrade

** Enabling multiple dial-ups and SMS alarms will affect battery life*

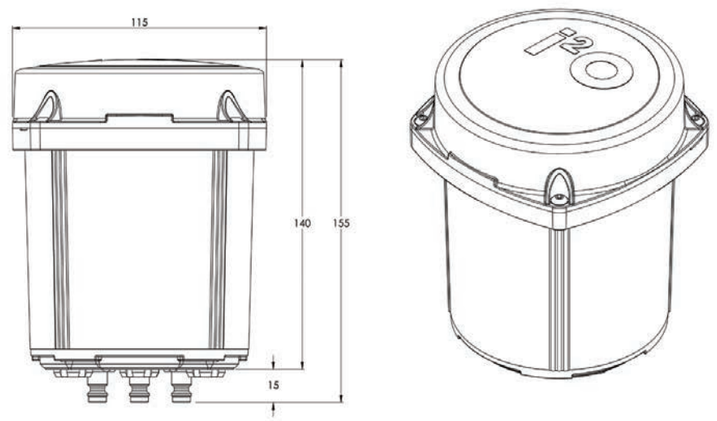
3.5 Deployment

The device can be easily deployed in the field by activation through a USB enabled Man Machine Interface (MMI). Once activated, it connects to the Data Management Platform and receives its configuration for logging, alarms and communications. The operator uses functionality on the Data Management Platform to associate the device to a location in the network providing easy access to viewing the data and remote configuration of the device. The association also links the data to a location reference used for data export to customers telemetry systems, thus providing a more robust feed of quality data when devices are changed or moved in the field.

4. LOGGER DESIGN

4.1 Enclosure

The enclosure is manufactured from a thick-walled durable composite, which provides robust mechanical and environmental protection for extended life in demanding environments. The unit is environmentally sealed with double IP68 seals, providing fail-safe sealing to prevent ingress of water to a depth of 4m. The lid is field removable exposing access for battery and SIM card replacement and installation of the external antenna kit. Transducer and electrical connections are easily accessed on the base of the unit.



4.2 Power management

The need to conserve battery life in remote locations is paramount and therefore the new range of i2O Loggers has been designed from component level to ensure that power consumption is as low as possible.

Communication efficiency has been optimised to minimise the power consumption, whilst delivering exceptional performance. A 40Ah twin pack of batteries is supplied as standard and typically provides more then 5 years of battery life. A second 40Ah pack can be fitted in order to support non-standard configurations, to extend battery life or to provide continuity in the event of the first battery depleting.

High speed sampling, high speed logging, high frequency GSM activity or other non-standard configurations impact power consumption and will reduce battery life. In these circumstances, it is recommended that an external battery or micro-turbines be installed.

4. LOGGER DESIGN

4.3 Battery and sim replacement

The i2O Loggers have been designed to allow field replacement of the internal batteries and SIM cards. Batteries and SIMs can be quickly and easily replaced without exposing sensitive circuit boards to the environment.

5. DATA INTEGRATION AND EXPORT

The i2O Data Management Platform includes a data export API which can be configured to interface to customers systems (e.g. telemetry systems). The data is available in standard CSV and XML formats through the API data export interface in real-time when the device uploads log files.

The i2O Data Management Platform automatically links the logged data to the location reference and provides data through the API using the location reference instead of a device serial number. Devices are therefore de-coupled from location data. Passing the data through with a location reference only significantly reduces maintenance since the interface referencing can be automatically configured at both ends when additional locations are created. The interface also responds robustly and automatically to field devices of different serial numbers being installed or replaced.

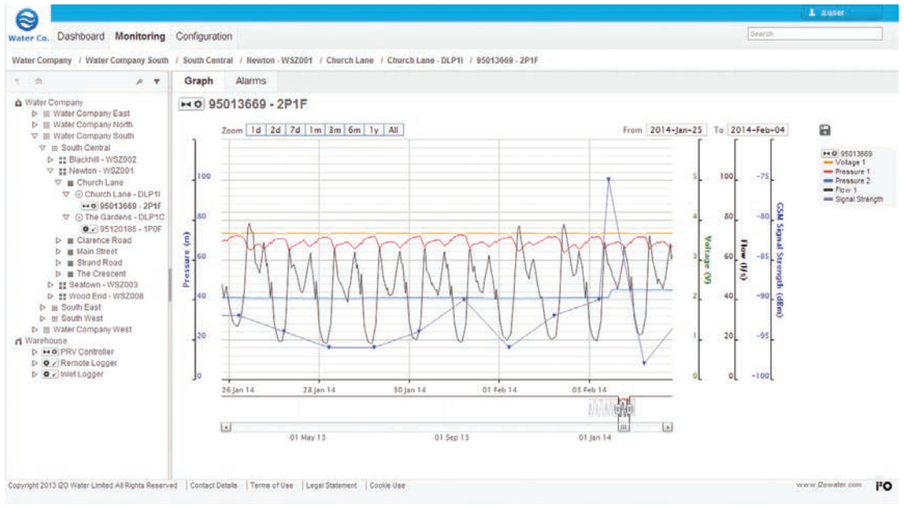
Using the i2O data export API, high quality network data can be seamlessly integrated with customers telemetry systems with minimum on-going support and maintenance of the interface.

Data can also be downloaded by users in CSV format via the secure Data Management Platform software.

6. DATA MANAGEMENT PLATFORM SOFTWARE

6.1 Data visualisation

The Data Management Platform provides an easy to use visualisation of logged data. At the asset level a user can visualise asset condition data, such as GSM signal strength and battery voltages. At the location level, individual pressure, flow and temperature channels relevant to that location are shown.

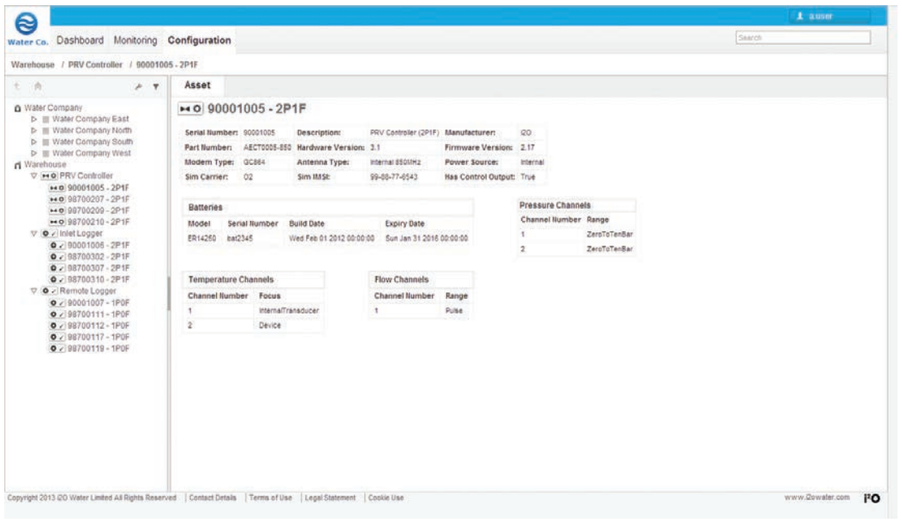


Graphical Data for an i2O Inlet Logger

6.2 Asset management

The platform provides simple and easy to use asset management tools that are used to track deployed and un-deployed loggers in the network. Un-deployed loggers are stored in a virtual ‘Warehouse’ and organised by asset type. From the Warehouse loggers can be simply deployed to the physical locations in the hierarchical network using drag and drop functionality.

Configuration of devices is managed at a location level. Locations automatically have a default configuration enabled with company standard logging intervals and dial up times. This means that devices automatically inherit their configuration when the logger is deployed (plug and play). When configurations are adjusted, for example hardware alarm thresholds, these are retained at the location level when a device is changed providing the additional benefit of hot-swap functionality.

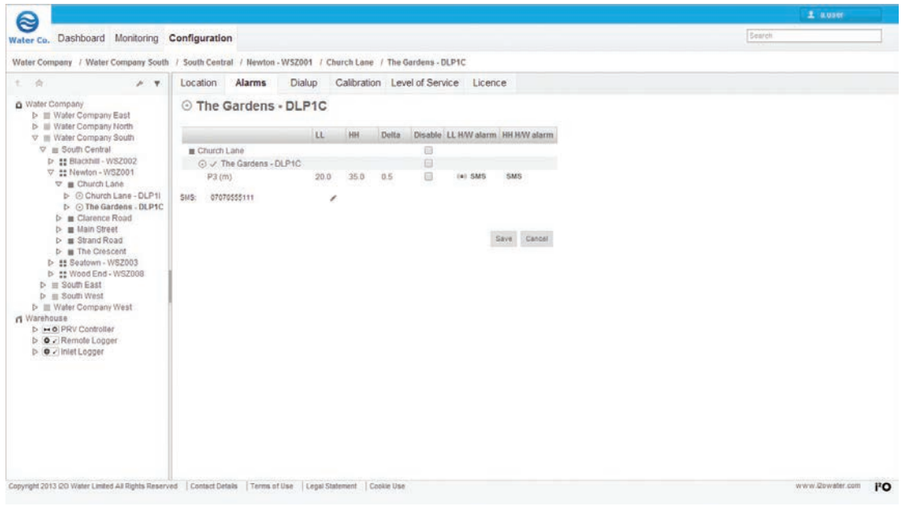


Information for Assets in Warehouse

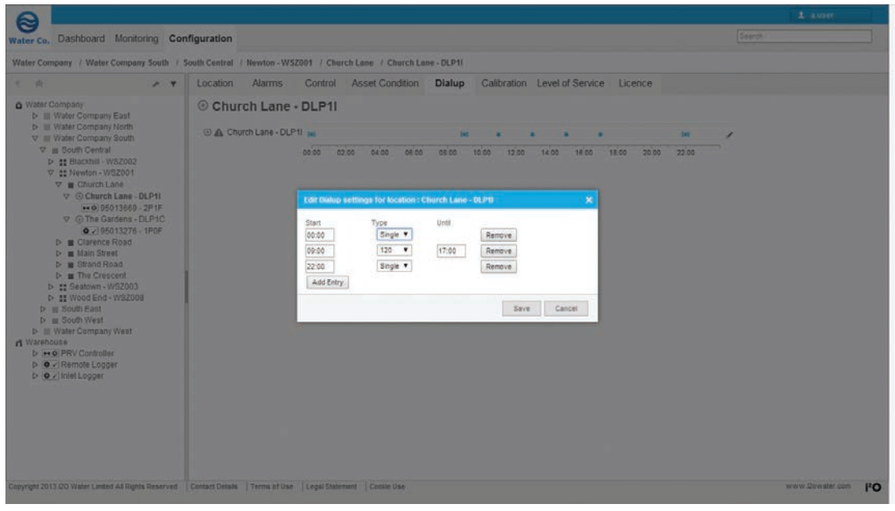
6. DATA MANAGEMENT PLATFORM SOFTWARE

6.3 Asset configuration

All configuration can be carried out remotely through the Data Management Platform. Dial up times can be configured at specific times, or to dial up at set intervals for periods of the day. Flow calibration and pressure offsets can be remotely adjusted to accommodate logger elevation and flow meter changes. Hardware alarms and SMS mobile numbers can be remotely set to give real time information on network issues such as low pressures or increased flows due to leakage.



Hardware alarm configurations



Remote dial up configurations

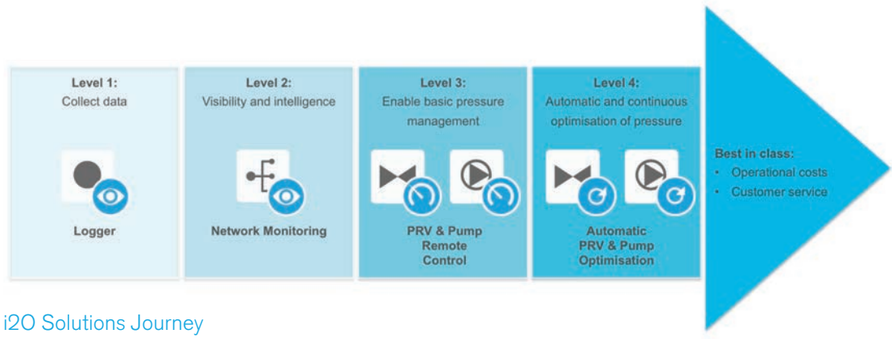
6.4 Smart Pressure Management platform

i2O has built and deployed an innovative enterprise wide software platform delivered over the web which facilitates a variety of network management solutions. The Data Management Platform is provided free of charge to users with i2O Loggers. It receives, manages and interprets data provided by logging devices in the network and presents it in a secure and user-friendly graphical interface. This can be easily and remotely upgraded to i2O's Network Monitoring solution to add the intelligence needed for network management. Further upgrades to i2O's Remote Control and Automatic Optimisation solutions enable a range of pressure control options.

Data visualisation

7. i2O JOURNEY

The i2O approach to Smart Pressure Management is to build from a foundation of high quality and reliable network data. This foundation is the basis for collated data, network visibility and intelligent network information through the i2O Network Monitoring software. This provides greater understanding of how the water distribution network performs.



i2O Solutions Journey

This foundation of loggers and Network Monitoring facilitates the targeting of pressure management in the water network. i2O offers different levels of functionality from its enterprise software platform, enabling users to apply different pressure management strategies for different areas of the network. These solutions can be deployed in a flexible way to meet the varying demands of complex water distribution networks over time. i2O's Remote Control solutions provide a range of classic pressure control options such as fixed outlet, timed, and manually programmed flow modulation.

Automatic Optimisation delivers i2O's market leading capabilities to automatically and continuously optimise pressures to achieve the best possible performance in an area of the network. This approach utilises flexible and smart hardware with a single software platform that allows for easy upgrade between different levels of control. This provides a highly adaptable and customisable Smart Pressure Management solution that can be tailored to fit the water network. Upgrade is governed through licensing in the i2O software and applied out over the air with no need to replace hardware or visit site.

7.0 Technical Data

Pressure input(s)	0-10Bar (20Bar optional), Linearity +/-0.15 %FS Total error +/- 0.2 %FS
Digital input(s)	2 flow pulse sensing inputs, polarity protected, passive or active
Expansion	Optional expansion port for additional sensors, external batteries, external power supplies and the i2O smart pilot valve
Antenna	Internal (External kit optionally available)
Dimensions	115mm wide, 115mm deep, 155mm tall (including hydraulic Quick Release Connections)
Weight(s)	TBA
IP Protection	IP68 4m
Operating temperatures	-20°C to +60°C
Power supply	2 internal 40Ah battery packs (2nd pack is optional) Expansion port supports 6-15.5 volts for external battery packs or power supply
Memory	4MB
Recording intervals/sampling rate(s)	100ms to 24 hours (user defined)
GSM Modem	Auto switching Quad Band GPRS
Data transmission	SSL Encrypted (rate dependent on signal strength, automatically optimized speed/reliability)

8. SUMMARY

i2O's Loggers provide a unique platform for building a smart water distribution network.

They robustly capture high quality data, are easy to deploy, maintain and data integrate. The smart expansion port and extensible software enable the Loggers to generate increasing value as customers decide to implement advanced monitoring and control functions into the network.

i2O's Logger and Data Management Platform software provide some unique capabilities that enables them to be rapidly deployed, activated and maintained at strategic locations throughout the water network. The i2O Loggers all share the same compact, ergonomic and robust enclosure design, which is one of the smallest GPRS loggers commercially available and therefore ensures ease of installation, even in very tight spaces. The design consideration is further demonstrated by the ease of access to the internal batteries and SIM card slot, which ensures rapid battery swap out times. They are also designed to withstand very harsh environmental conditions, have been sealed to IP68 and are moulded from a very tough, UV stabilised composite.

Only high precision componentry has been used throughout and this ensures very accurate data and exceptional power management. The i2O Loggers are uniquely supported by web enabled software functionality, which provides network and data visibility in an intuitive user interface. This enterprise class software platform also provides access to a range of smart water applications, which can be selected through the same user interface.

Visibility and intelligence into network performance provide the foundations for reduced leakage and bursts, consistent service level delivery, and efficient operations. i2O's Loggers and Data Management Platform software provides a cost-effective, easy to use solution for network management, regardless of whether customers are at an early stage of network monitoring or have advanced back-end data consolidation systems. Beyond the native capabilities of the product it has the additional advantage of being easily upgradeable, either in part or fully, to deliver remote control or full automatic optimisation of Pumps or PRVs.

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