



USI

UNIVERSAL
SMART
INSTRUMENT

Intelligent Flow, Level and
Water Quality Monitoring

ONE INSTRUMENT. MULTIPLE APPLICATIONS.

The USI is designed to input several parameters on a single, easy to programme instrument – meaning the user saves on both purchasing and operating costs.

The Universal Smart Instrument (USI) is an innovative monitoring instrument and data logger that delivers multi-parameter measurement in a single device. Several standard instruments can therefore be replaced by a single USI in a wide range of clean water and wastewater applications.

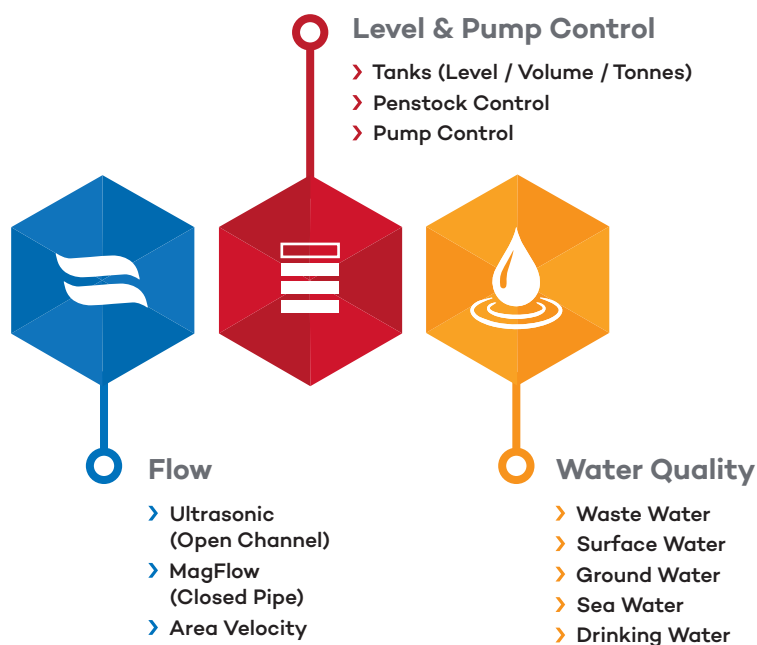
Whilst giving highly accurate and reliable monitoring, the USI sets itself apart from traditional instrumentation by utilising powerful processors (as used in smartphones and satellite navigation) and dynamic software to display real-time data and graphs on its 7 inch high resolution touch screen. This provides the user with unrivalled accessibility and clarity of information.

Based on the robust and reliable industrial version of Windows, the USI is as intuitive and simple to operate as a home computer, which makes both programming and operation simple and efficient. With superior functionality and multiple communication outputs, measurement and control has never been so simple.



The USI is the result of four years research and development. Designed solely with the end user in mind it is the market leader in terms of both functionality and user experience.

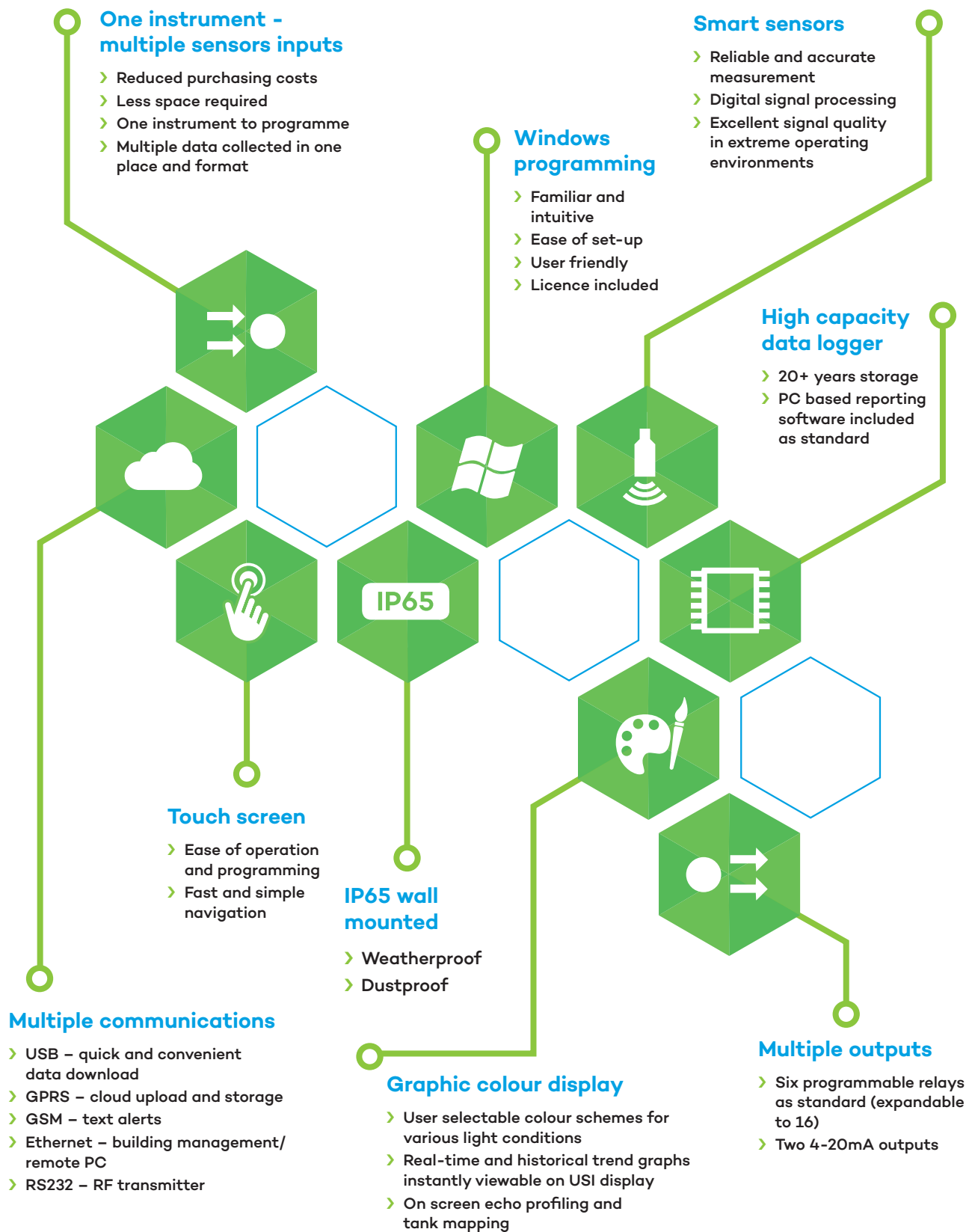
MULTIPLE MEASUREMENTS



WATER AND WASTEWATER SPECIALISTS

Built on its research and advanced capability Smart Storm has always been at the forefront of innovative products for the water and wastewater industries and has won many prestigious UK and European awards for its innovative technology.

FEATURES AND BENEFITS



INFORMATION & DISPLAY FEEDBACK

Smart Storm recognises that most industrial control products are a nightmare to programme and often require specific training or hours of referencing complex user manuals. Confusion and uncertainty often reign when programming such instruments, and small single or multi-line displays give little information feedback to the user.

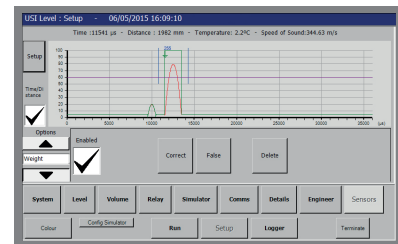
Hence, the USI has been developed to offer a new dimension in intuitive programming and information feedback. The software is wholly consumer orientated and intentionally designed to give the user a positive

programming experience, without confusion and without uncertainty. Programming options are instantly available through intuitive menus and give clear and precise options. Graphics are used to give clear choices when appropriate and parameter selection is simplicity itself. Programming pages are separated on the graphics display and once programmed users can simply and easily review their programme choices on a single display screen.

Just like a smartphone, the USI menus are quick and simple to navigate!



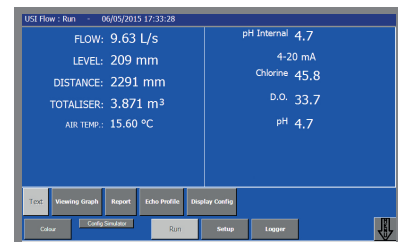
Beautifully Simple – Windows CE is recognised as the most reliable and easy to use operating system.



Echo Profiling

The screenshot shows the 'USI Flow : Setup' screen. It has a 'Method Input' section with a dropdown menu set to 'Flow' and a 'Method Output' section with a dropdown menu set to 'Flow'. Both sections have 'Calibrate' and 'Calibrate m/s' buttons. There are also 'Configure' and 'Calibrate' buttons for 'Chlorine', 'D.O.', and 'pH'. At the bottom are buttons for 'System', 'Device Setup', 'Setup', 'Run', 'Logger', and 'Terminate'.

Input & Output Set-up



Live Flow Data



Stunning touch screen displays

The USI gives an enhanced user experience through its 7 inch full colour TFT touch screen. This delivers sharp images, detailed real-time information and intuitive programming. The user even has the option to change background colours to compensate for different ambient light conditions (examples on opposite page).

Real-time, On-screen Flow Trend Graph

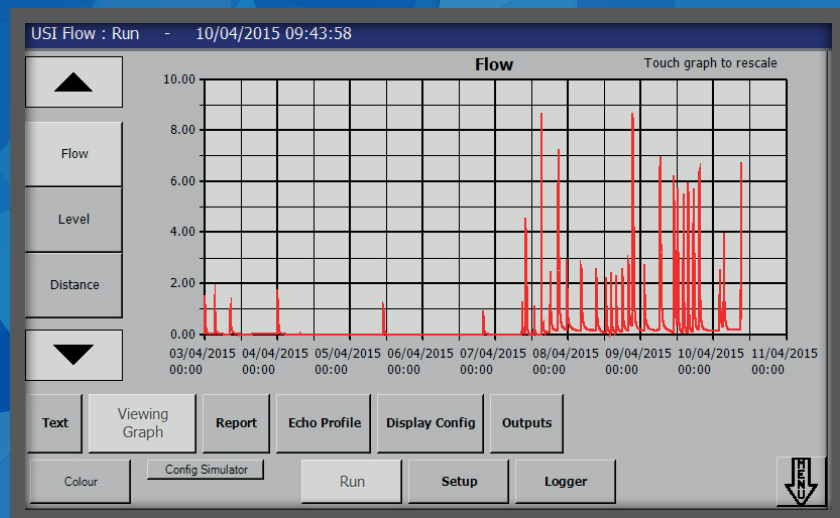
The user can choose to display real-time data as either a running trend graph or as live text fields. Graphs can be scaled by the user to show trends over different time periods. Historical data from the internal data logger can be viewed on screen for instantaneous analysis without the need to download to a PC.

Relay Set-up

The USI excels in its ease of programming; for example, relays can be simply programmed by selecting from a choice of fields accessed via drop down menus. The integral graphical simulator enables the user to simulate filling and emptying tanks, so the user may check his or her control process remotely.

Tank Selection

In level applications, tank shapes are selected from a pre-programmed list and the chosen tank is displayed on screen as a three-dimensional image. All information is clearly displayed, thus avoiding confusion and uncertainty often found when programming other less advanced products.



Flow Trend Graph

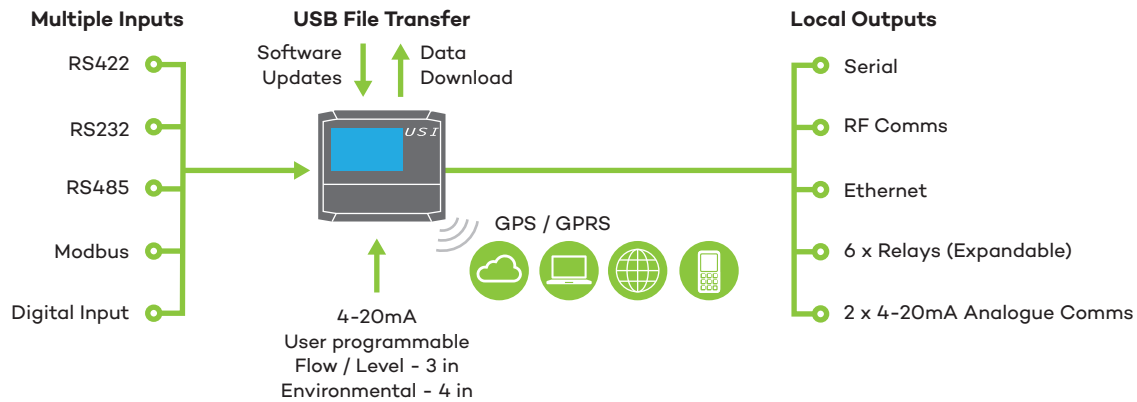
| Relay Control | | | | | Pump | | | Disabled | |
|---------------|--------------|-------|------|-------------|-------------|-------------|-------|-------------------------------------|---|
| Type | Tank | Delay | On | Off | Type | Order | Logic | | |
| R1 | Level | Tank1 | 1.00 | 5000 mm | 1000 mm | Alternate | 1 | <input checked="" type="checkbox"/> | <ul style="list-style-type: none"> Level Volume Temperature Rate of rise Rate of fall Lost echo |
| R2 | Level | Tank1 | 0.00 | 5000 mm | 1000 mm | Alternate | 2 | <input checked="" type="checkbox"/> | |
| R3 | Volume | Tank2 | 0.00 | 8000.000 m³ | 2000.000 m³ | Fixed pump | | | |
| R4 | Volume | Tank2 | 0.00 | 8500.000 m³ | 2000.000 m³ | Duty assist | 1 | <input checked="" type="checkbox"/> | |
| R5 | Rate of fall | Tank1 | 0.00 | 500 mm/s | 0 mm/s | Fixed pump | | | |
| R6 | Disabled | | | | | | | | |

Relay Set-up

Tank Selection

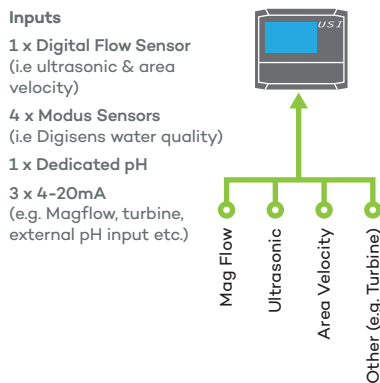
COMMS / USER APPLICATIONS

Universal Communications

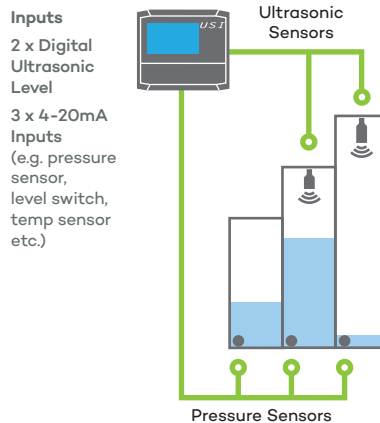


Core Measurement Applications

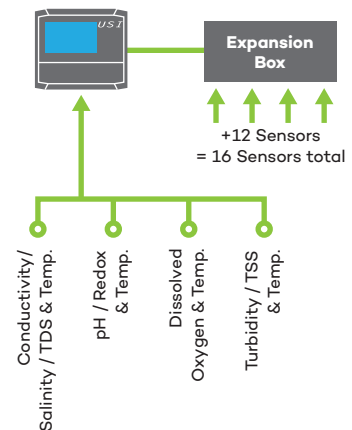
Flow



Tank Level / Volume / Tonnes

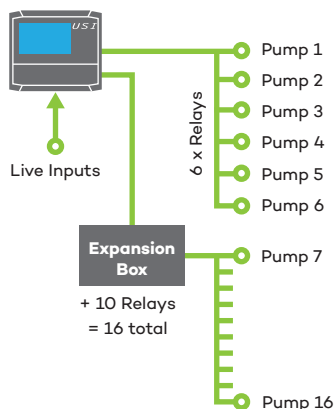


Water Quality

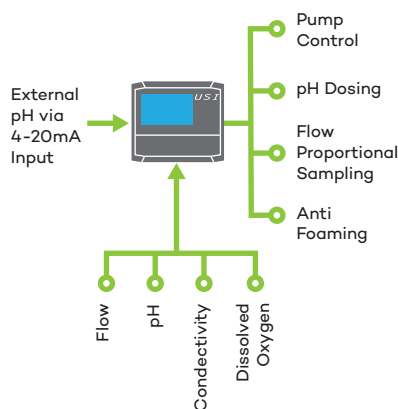


Typical User Applications

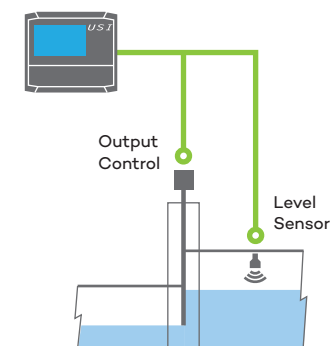
Pump Control



Effluent



Penstock Control



Note: For advice on how the advanced functionality of the US1 can be used in other specific applications please visit our website or contact our engineers.

DIGITAL SENSORS



Ultrasonic Sensors for Level and Flow

Smart Storm has developed the world's most advanced range of ultrasonic sensors which use Field Programmable Array Processors (FPGA) incorporated into the sensor body.

Known for high reliability the FPGA processor can be programmed directly from the USI and parameters such as sensor frequency, firing delay and signal amplitude can all be controlled and adjusted by the user. **All sensors benefit from integrated temperature sensors as standard.** Available in ranges from 3m to 20m the DIGISON range of ultrasonic sensors offer unrivalled performance.

Water Quality Sensors

The DIGISENS range of water quality sensors has been developed with advanced digital signal processing within the sensor body for high accuracy measurement in a range of applications. Designed to be compact and robust, **all sensors benefit from integrated temperature sensors as standard.** With Modbus interface up to 4 sensors of any combination can be connected directly to the USI, or up to 16 via an additional input expansion module.

| WATER QUALITY (DIGISENS SENSORS) | PH / REDOX (ORP) & TEMPERATURE SSPH Sensor Range: pH 0-14 units Radox -1,000 - +1,000 mV | Applications: <ul style="list-style-type: none"> > Pure mountain water > 20 µS/cm > Lakes and rivers 100 – 2000 µS/cm > Seawater > 50 mS/cm > Wastewater > 200 mS/cm  Data Sheet: SSPH | | | | | | | | | | | | | | | |
|----------------------------------|---|---|-------|-----------|-----------|----|--------|-----------|----|-------|------------|-----|-------|------------|-----|-------|--|
| | CONDUCTIVITY / SALINITY & TEMPERATURE SSCS Sensor Range: 0-200 mS/cm | Applications: <ul style="list-style-type: none"> > Urban wastewater treatment > Industrial effluent treatment > Surface water monitoring > Sea water > Drinking water  Data Sheet: SSCS | | | | | | | | | | | | | | | |
| | NEPHELOMETRIC TURBIDITY & TEMPERATURE SSNT Sensor Range: 0-4000 NTU or 0-4500 mg/L | Applications: <ul style="list-style-type: none"> > Urban wastewater treatment (inlets/outlet controls) > Sanitation network > Industrial effluent treatment > Surface water monitoring > Sea water > Drinking water  Data Sheet: SSNT | | | | | | | | | | | | | | | |
| | OPTICAL DISSOLVED OXYGEN & TEMPERATURE SSDO Sensor Range: 0,00-20,00 mg/L, 0,00-20,00 ppm, 0-200% | Applications: <ul style="list-style-type: none"> > Urban wastewater treatment > Industrial effluent treatment > Surface water monitoring > Drinking water  Data Sheet: SSDO | | | | | | | | | | | | | | | |
| LEVEL | <table border="1"> <thead> <tr> <th></th><th>Range</th><th>Frequency</th></tr> </thead> <tbody> <tr> <td>DIGISON 3</td><td>3m</td><td>150kHz</td></tr> <tr> <td>DIGISON 6</td><td>6m</td><td>80kHz</td></tr> <tr> <td>DIGISON 10</td><td>10m</td><td>60kHz</td></tr> <tr> <td>DIGISON 20</td><td>20m</td><td>40kHz</td></tr> </tbody> </table> (All models include temperature sensors) | | Range | Frequency | DIGISON 3 | 3m | 150kHz | DIGISON 6 | 6m | 80kHz | DIGISON 10 | 10m | 60kHz | DIGISON 20 | 20m | 40kHz | Applications: <ul style="list-style-type: none"> > Liquid and solid level > Pump Control > Penstock Control  Data Sheet: DIGISON 3-20 |
| | Range | Frequency | | | | | | | | | | | | | | | |
| DIGISON 3 | 3m | 150kHz | | | | | | | | | | | | | | | |
| DIGISON 6 | 6m | 80kHz | | | | | | | | | | | | | | | |
| DIGISON 10 | 10m | 60kHz | | | | | | | | | | | | | | | |
| DIGISON 20 | 20m | 40kHz | | | | | | | | | | | | | | | |
| FLOW | Open Channel Range Frequency DIGISON 3 3m 150kHz DIGISON 6 6m 80kHz (All models include temperature sensors) Closed Pipes FLOWMAG 3000 Range: 0.028-48858 m³/h Pipe sizes: DN10-1200mm / DN 3/8-48" Liquid temp. 0-150°C | Applications: <ul style="list-style-type: none"> > Open Channel Flow > Closed Channel Flow > Effluent Flow > Process Flow  Data Sheets: DIGISON 3-6 FLOWMAG 3000 | | | | | | | | | | | | | | | |
| AREA VELOCITY | SSAV 60mA / 5 secs Dual-Wave Ultrasonic Doppler technology. High resolution 15PSI stainless steel pressure transducer. Measures flow in channels up to 9m without loss of depth accuracy. | Applications: <ul style="list-style-type: none"> > Open Channel Flow > Surveys > Irrigation control  Data Sheet: SSAV | | | | | | | | | | | | | | | |

Note: Measurement ranges are based on optimum conditions. Please see relevant data sheets for full sensor specifications.

USI SPECIFICATIONS

| STANDARD SPECIFICATIONS | |
|-------------------------|--|
| Display | 7" High Resolution Full Colour TFT LCD Graphics Display 800 x 480 Anti-Glare |
| Programming | Touch Screen or Remote Keypad via USB Port |
| Operating System | Windows CE 6.0 R3 (licence included) |
| PHYSICAL | |
| Dimensions (mm) | 234 (H) x 264 (W) x 142 (D) mm |
| Ratings | IP65/DIN VDE 60529 NEMA 12 |
| Approvals | ABS Lid UL94 HB/1.6 Polyamide Base UL94 VO/1 |
| Mounting | 4 Fixing Holes (optional wall brackets or DIN-rail holder) |
| POWER | |
| Supply (AC) | Universal Power Supply 85 - 264V ~ 15W |
| Supply (DC) | 18 - 36V (optional) |
| ELECTRONIC PERFORMANCE | |
| Processors | Dual Processors with SPARTAN 3AN FPGA and ARM CPU |
| Internet Connectivity | Via Ethernet, GPRS Modem or optional Wi-Fi |
| Logger | 512MB NAND Flash plus Internal SD Card |
| Temperature Range | -20 to +70°C (-4 to +176°F) |

STANDARD FEATURES

- User Selectable Display
- Trend Graph with Zoom Control
- Simple, fast and intuitive programming
- Tab based Menu Selection
- 6 different User Configurable Display Colours for different light conditions
- Up to 20 years Logging Capacity
- Historical Data Viewable on USI Display without the need to download to PC
- USB Data download
- Cloud based Data Retrieval*
- GSM Message Alerts*
- Internal Address Book for GSM Message Alerts
- Windows based Data Presentation Software included for PC Report Generation
- Fault and Event Logging
- Echo Profiling and Tank Mapping**
- Easily modified to meet bespoke programming requirements
- Units: SI and Imperial
- Service Reminder Alarm
- 6 LEDs to indicate Relay Status
- 3 layers of Password Protection

| USI LEVEL | USI FLOW | USI WATER QUALITY |
|---|---|--|
| Dedicated Measurement Inputs | | |
| <ul style="list-style-type: none"> ➤ Ultrasonic Level (2 channels) ➤ Displays Level, Distance, Volume and Tonnes | <ul style="list-style-type: none"> ➤ Ultrasonic Open Channel Flow (single channel) OR ➤ Area Velocity Flow (single channel) | <ul style="list-style-type: none"> ➤ 4 Modbus Sensors (4 channels) in any combination from: pH, ORP, Dissolved Oxygen, Conductivity, Salinity, Turbidity, Suspended Solids, Temperature ➤ Expansion Modules for up to 16 Sensors |
| ➤ pH Sensor (single channel) | ➤ pH Sensor (single channel) | |
| Auxiliary Measurement Inputs | | |
| <ul style="list-style-type: none"> ➤ 4-20mA or 0-20mA - 3 channels (isolation optional) 0.1% resolution ➤ Configurable for numerous inputs from other devices including: Pressure, Specific Gravity, pH, ORP, Dissolved Oxygen, Chlorine, Temperature ➤ 4-20mA channels configurable as Float Switch Inputs | <ul style="list-style-type: none"> ➤ 4-20mA or 0-20mA - 3 channels (isolation optional) 0.1% resolution ➤ Configurable for numerous inputs from other devices including: pH, ORP, Dissolved Oxygen, Chlorine, Temperature, Mag Flow, Turbine Flow ➤ User defined axis over 4-20mA range | <ul style="list-style-type: none"> ➤ 4-20mA or 0-20mA - 4 channels (isolation optional) 0.1% resolution |
| ➤ Digital Input | ➤ Digital Input | ➤ Digital Input |
| Outputs | | |
| <ul style="list-style-type: none"> ➤ 4-20mA or 0-20mA - 2 channels, isolated, expandable to 16 outputs ➤ Configurable to any input | <ul style="list-style-type: none"> ➤ 4-20mA or 0-20mA - 2 channels, isolated ➤ Configurable to any input | <ul style="list-style-type: none"> ➤ 4-20mA or 0-20mA - 2 channels, isolated, expandable to 16 outputs ➤ Configurable to any input |
| ➤ Digital Output | ➤ Digital Output | ➤ Digital Output |
| Comms | | |
| <ul style="list-style-type: none"> ➤ Ethernet: 100BaseT, 10BaseT for Building Management System (BMS) or data retrieval to remote PC ➤ USB External (2 channels) ➤ USB Stick: USB2.0, FAT file system | <ul style="list-style-type: none"> ➤ Ethernet: 100BaseT, 10BaseT for Building Management System (BMS) or data retrieval to remote PC ➤ USB External (2 channels) ➤ USB Stick: USB2.0, FAT file system | <ul style="list-style-type: none"> ➤ Ethernet: 100BaseT, 10BaseT for Building Management System (BMS) or data retrieval to remote PC ➤ USB External (2 channels) ➤ USB Stick: USB2.0, FAT file system ➤ RS232 |
| <ul style="list-style-type: none"> ➤ ModbusRS485*, RTU and ASCII, Baudrate: 9600 or 19200, Parity: none, even or odd, DataBits: 8, StopBits: 1 or 2 | <ul style="list-style-type: none"> ➤ Modbus RS485*, RTU and ASCII, Baudrate: 9600 or 19200, Parity: none, even or odd, DataBits: 8, StopBits: 1 or 2 | <ul style="list-style-type: none"> ➤ Modbus RS485*, RTU and ASCII, Baudrate: 9600 or 19200, Parity: none, even or odd, DataBits: 8, StopBits: 1 or 2 |
| ➤ RS232: GPRS Modem or RF Link | ➤ RS232: GPRS Modem or RF Link | ➤ RS232: GPRS Modem or RF Link |
| Relays | | |
| ➤ 6 Fully Programmable Relays (10A @230Vac) | ➤ 6 Fully Programmable Relays (10A @230Vac) | ➤ 6 Fully Programmable Relays (10A @230Vac) expandable to 16 |
| Additional Features | | |
| <ul style="list-style-type: none"> ➤ Graphical Selection of 9 Tank Shapes ➤ 32-point Lookup Table for non-standard tanks ➤ Fast access to on-screen 7-day Report ➤ Advanced Programmable Pump Control ➤ Pump Control Simulator ➤ Real-time Echo Profiling and Tank Mapping on USI Display ➤ Data Logging of all Parameters ➤ User Naming of Tanks ➤ Differential Level | <ul style="list-style-type: none"> ➤ Real-time Echo Profiling and Tank Mapping on USI Display ➤ Fast access to on-screen 7-day Report ➤ 8 Primary Devices, Manning Formula and 32-point Lookup Table ➤ Penstock Control ➤ Real-time Echo Profiling and Tank Mapping on USI Display ➤ Data Logging of all Parameters | <ul style="list-style-type: none"> ➤ Data Logging of all Parameters ➤ Fast access to on-screen 7-day Report ➤ User Naming of all Measurement Inputs ➤ Integral Temperature Sensors on all Modbus Probes <p>Notes: * Requires external modem ** USI flow and level only *** Via optional daughter board</p> |



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