MAINSTREAM MEASUREMENTS

PRODUCT GUIDE

BMI BIO MASS IMPIANTI

flowmeters for open channel & part-filled pipes

- Velocity Transmitter
- AV-Flow Transmitter
- Compact Fixed AV-FlowMeter
- Premier Fixed AV-FlowMeter
- Portable AV-FlowMeter

mainstream™ MEASUREMENTS LTD

WORLD CLASS FLOWMETERS

LEADERS IN OPEN CHANNEL FLOW MEASUREMENT

about mainstream

We are leaders in open channel flow measurement, using ultrasonic technology. The Mainstream flowmeter product range was borne out of the R & D company Croma Developments, a company founded in 1986. Croma was developed as a vehicle for transferring academic research results into commercial applications. The company is now concerned with research, development and design of instrumentation with a heavy emphasis on embedded micro-processors.

The Mainstream product range is noted for high performance, reliability and above all else is cost competitive. Mainstream flowmeters feature a self-monitoring capability which simplifies installation and reduces maintenance by detecting any variation in performance. Ideal for a wide variety of water distribution and wastewater applications.

expertise

A key feature of our approach to sensor design is recognizing the need for built-in sensor integrity monitoring or self-diagnostics. Areas of particular expertise are: low-power electronics; signal processing; novel algorithms and ultrasonics.

A key feature of our approach to sensor design is recognizing the need for built-in sensor integrity monitoring or self-diagnostics

measurement principle

Mainstream uses the area-velocity method to give a continuous or time sample measurement of fluid flow. Mainstream uses a streamlined probe that operates immersed in the flowing liquid. The velocity probe transmits ultrasound into the liquid to create a zone of inspection. Bubbles and solid particles carried through this zone by the flow, even when present in only minute quantities, reflect ultrasound back to the probe.

The received ultrasound signal is processed to produce a histogram of the flow velocities. Analysing this histogram gives the mean flow velocity. Only signals containing verified velocity information are used, thereby ensuring measurement integrity.

Liquid level is measured by a submerged pressure transmitter or ultrasonic sensor. The flow cross-sectional area is deduced from the liquid level measurement and the stored description of the channel or pipe cross section. The flow rate is the flow velocity multiplied by the flow cross-sectional area.

mainstream™
MEASUREMENTS LTD
WORLD CLASS FLOWMETERS

the mainstream difference

- High sensitivity extends applications to “clean” water
- Sophisticated ultrasound processing ignores spurious signals
- Ultrasound signal quality monitor confirms measurement integrity
- Flow measurement for velocities from 10 mm/s to 5 m/s
- Channels or pipes from 150 mm to 3 m wide
- Guaranteed no zero offset or drift
- Probe may be located up to 500 metres from the system unit
- Easy to use PC software simplifies commissioning and product support
- Quick to install – no weirs or flumes

A unique feature for the Mainstream is its signal quality reading. It calculates the percentage of the total signal that contains useful velocity information. This is an invaluable metric for flowmeter condition monitoring.

SIMPLE TO CUSTOMISE FOR YOUR APPLICATIONS

For flow measurement in open channels and part-filled pipes, with liquids from clean water to raw sewage, the Mainstream flowmeters provide the highest quality performance at the most competitive price.

The velocity sensor may be located up to 500 metres from the system unit and measures flow velocities from less than 10 mm/s up to 5 m/s.

The system unit displays liquid level, flow velocity, flow rate and totalized flow. Analog outputs transmit flow information and opto-isolated switches can activate alarms or operate samplers. An integral data logger stores measured and calculated information for graphing or analysis.

Easy to use PC software simplifies commissioning and product support. Features include a point-and-click graphical interface to specify predefined or non-standard pipe and channel cross-sections and remote flowmeter diagnostics via email.

Reliable, high performance and quick to install, Mainstream ultrasonic area-velocity flowmeters have found wide application internationally.

benefits and features

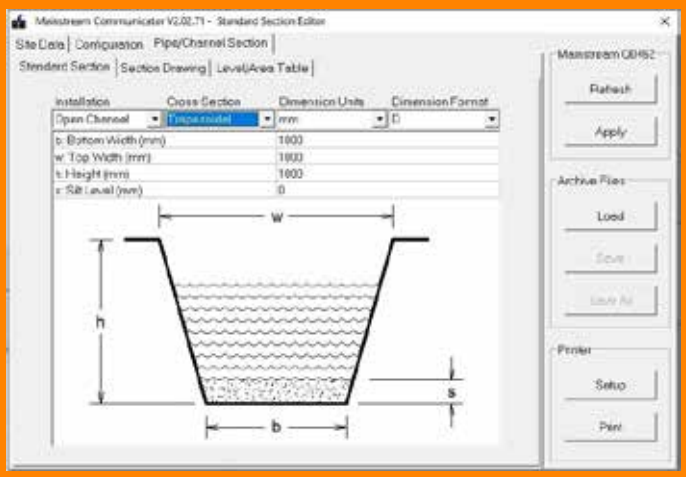
- High sensitivity extends applications to 'clean' water
- Sophisticated ultrasound processing ignores spurious signals
- Ultrasound signal quality monitor confirms measurement integrity
- Real-time processing of velocity signals thereby reducing power consumption
- Smart power saving mode - intelligent use of power saving which automatically reduces the measurement time for high flow velocities and high signal qualities and increases the measurement time for low velocities and low signal qualities
- Quick to install - no weirs or flumes
- Powerful, easy to use PC software simplifies transmitter commissioning
- Streamlined velocity probe eliminates fouling and reduces flow disturbances
- Distances up to 500 meters from system unit to velocity sensor
- ATEX Zone ø velocity sensor, options available

applications

- Effluent Monitoring
- Waste Water Treatment
- Industrial Flow Measurement
- Irrigation Channels & Canals
- River/Stream Flow Measurement
- Water Distribution
- Sewer Flow Measurement (Inflow & Infiltration; CSO Monitoring)
- Portable and Fixed-site Flow Measurement without Weirs & Flumes

mainstream's communicator data

- Intuitive point-and-click user interface with pull-down menus and Communicator's dynamic/distinctive button bar for flowmeter configuration, diagnostics and real-time displays
- Real time display of measurements and velocity histogram
- Backup and restore of the Mainstream configuration



PRODUCT OVERVIEW

MAINSTREAM VELOCITY TRANSMITTER

High reliability velocity transmitter designed for use as a system component within larger applications

MAINSTREAM AV-FLOW TRANSMITTER

High performance flow transmitter for flow measurement

MAINSTREAM COMPACT FIXED AV-FLOWMETER

Designed for basic operations and competitively priced

MAINSTREAM PREMIER FIXED AV-FLOWMETER

Superior performance with extended feature set for complex applications

MAINSTREAM PORTABLE AV-FLOWMETER

Perfect for short term and extended field studies

PRODUCT COMPARISON CHART

Product	24v power	12v low power	12v charger	Level sensor	Velocity sensor	Data Logger	LCD	Switch output	4:20mA output	COMMS RS232/USB	Package
Velocity Transmitter	✓	✓	✗	✗	1	✗	✗	✗	1	✓	220x120x80
Flow Transmitter	✓	✓	✗	1	1	✗	✗	✗	1	✓	220x120x80
Compact Fixed AV-Flowmeter	✓	✓	✗	1	1	✓	✓	2	1	✓	220x120x80
Premier Fixed AV-Flowmeter	12-28v	✓	✓	2	1	✓	✓	2	3	✓	260x160x90
Portable Flowmeter	✓	✓	✓	1	1	✓	✓	2	✗	✓	PELI 1200 Orange

PRODUCT DATASHEETS

MAINSTREAM VELOCITY TRANSMITTER

velocity measurement

Transducer Type :	Submerged ultrasonic sensor containing signal generator, transmitter, receiver and decoder electronics
Method :	Phase Coherence time delay measurement determines the time for tracers carried by the flow to travel a fixed distance (~ 0.75 mm)
Velocity Range :	-5 m/s to -10 mm/s and 10 mm/s to 5 m/s
Resolution :	Better than 1 mm/s
Measurement Integrity :	Ultrasound signal quality monitor gives the percentage of the measurement time that the received ultrasound signal contains useful velocity information
Smart Power Saving :	Each velocity measurement is based on the same quantity of information. Automatically reduces the measurement time for high flow velocities and high signal qualities and increases the measurement time for low velocities and low signal qualities

power supplies

Power Inputs :	Connectors for external 12V and 24V supplies
External 12V supply :	Connection for external 12V
External 24V supply :	Connection for external 24V (required if using 4:20mA output)
Power Supply Monitor :	Power monitoring circuits track supply status. Supply voltages can be viewed via the UI

communications

Local :	RS232 and USB compatible interface with automatic baud rate detection. Supports 1200, 2400, 4800, 9600, 14400, 19200, 38400, 57600 and 115200 baud
Remote :	Optional external SDI or MODBUS device
Software :	Mainstream Communicator UI software for system configuration, diagnostics, real- time measurement. Display and data retrieval. Mainstream Communicator runs on PC platforms under Windows 2000, XP, Vista, 7, 8, 8.1 and 10 with data transmission from device to PC, for data control, processing and export

measurands units and formats

Power Supply Voltage :	V
Signal Quality :	%
Velocity :	Selectable from mm/s, cm/s, m/s, in/s, ft/s, ft/min
Display Format :	Independently configurable display format for each measurement. Options are integer, fixed point with 1 to 6 decimal places, and scientific (E-format). Display defaults to scientific format if data cannot be correctly represented in selected format

4:20mA Outputs

Hardware :	One 4:20 mA output. Configurable to selected measurands. Active mode from 24V supply. Passive mode from 24V or 12V supply

product hardware

velocity sensor

Materials :	Streamlined µPVC moulding and polyurethane cable
Dimensions :	105 mm long x 50 mm wide x 20 mm high
Cable :	8 mm diameter polyurethane cable with Aramid strain cord. Breaking load 45 kg. Minimum static bend radius 52 mm
Weight :	1 kg including standard 10 m cable length
Maximum Cable Length :	500 m
Environmental Protection :	Totally encapsulated to IP 68
Operating Temperature :	-10°C to 80°C
Minimum Operating Depth :	30 mm

system units

Materials :	Ultra pure cast aluminium
Dimensions :	220 mm wide x 120 mm deep x 80 mm high
Weight :	1.5 kg
Environmental Protection :	Enclosure is IP67. Electronic assembly is encapsulated to IP68
Operating Temperature :	-10°C to 70°C

MAINSTREAM AV-FLOW TRANSMITTER

level measurement

Transducer Type :	Any 4:20 mA current loop level sensor
Method :	Pulse activation with configurable sensor warm-up time. Loop current measurement by self-calibrating 16-bit delta-sigma A-D converter
Current Range :	0-30 mA
Resolution :	Better than 1 µA
Transducer Calibration :	Calibration table (maximum 23 points) with built-in interpolator converts loop current into level measurement. Simple transducer calibration tool included in UI software
Interchangability :	Transducers and calibration data directly interchangeable between Mainstream system units

velocity measurement

Transducer Type :	Submerged ultrasonic sensor containing signal generator, transmitter, receiver and decoder electronics
Method :	Phase Coherence time delay measurement determines the time for tracers carried by the flow to travel a fixed distance (~ 0.75 mm)
Velocity Range :	-5 m/s to -10 mm/s and 10 mm/s to 5 m/s
Resolution :	Better than 1 mm/s
Measurement Integrity :	Ultrasound signal quality monitor gives the percentage of the measurement time that the received ultrasound signal contains useful velocity information
Smart Power Saving :	Each velocity measurement is based on the same quantity of information. Automatically reduces the measurement time for high flow velocities and high signal qualities and increases the measurement time for low velocities and low signal qualities

derived measurements

Area :	Flow cross-sectional area calculated from the level measurement and the dimensions of the pipe or channel. Calculation can take into account a specified (constant) silt level. Flow cross-section specification tools included in UI software
Flow Rate :	Fluid flow rate calculated by multiplying cross-sectional area by flow velocity

power supplies

Power Inputs :	Connectors for external 12V and 24V supplies
External 12V supply :	Connection for external 12V
External 24V supply :	Connection for external 24V (required if using Active 4:20mA output)
Power Supply Monitor :	Power monitoring circuits track supply status. Supply voltages can be viewed via the UI

communications

Local :	RS232 and USB compatible interface with automatic baud rate detection. Supports 1200, 2400, 4800, 9600, 14400, 19200, 38400, 57600 and 115200 baud
Remote :	Optional external SDI or MODBUS device
Software :	Mainstream Communicator UI software for system configuration, diagnostics, real- time measurement display and data retrieval. Mainstream Communicator runs on PC platforms under Windows 2000, XP, Vista, 7, 8, 8.1 and 10 with data transmission from device to PC, for data control, processing and export

measurands units and formats

Power Supply Voltage :	V
Signal Quality :	%
Linear (pipe & channel dimensions) :	Selectable from mm, cm, m, in, ft
Level :	Selectable from mm, cm, m, in, ft
Area :	Selectable from m2, cm2, mm2, in2, ft2
Velocity :	Selectable from mm/s, cm/s, m/s, in/s, ft/s, ft/min
Flow Rate :	Selectable from l/s, m3/S, ft3/S, igals/s, USG/S, 1/min, M3/min, ft3/min
Display Format :	Independently configurable display format for each measurement. Options are integer, fixed point with 1 to 6 decimal places, and scientific (E-format). Display defaults to scientific format if data cannot be correctly represented in selected format

4:20mA Outputs

Hardware :	One 4:20mA output. Configurable to selected measurands. Active mode from 24V supply. Passive mode from 24V or 12V supply

product hardware

ptx level sensor

Materials :	Titanium, acetal and polyurethane
Dimensions :	185 mm long x 17.5 mm diameter
Cable :	8 mm diameter vented polyurethane cable with Kevlar strain cord
Weight :	1 kg including standard 10 m cable length
Level Range :	0 to 2 m working. Maximum 8m overrange
Resolution :	Better than 1 mm
Combined Accuracy :	Combined effects of non-linearity, hysterisis and repeatability better than 0.25% best straight line. Non- linearity and offsets removed by transducer calibration
Environmental Protection :	Fully encapsulated to IP68
Operating Temperature :	-20°C to 60°C (temperature compensated 2°C to 30°C)

velocity sensor

Materials :	Streamlined µPVC moulding and polyurethane cable
Dimensions :	105 mm long x 50 mm wide x 20 mm high
Cable :	8 mm diameter polyurethane cable with Aramid strain cord. Breaking load 45 kg. Minimum static bend radius 52 mm
Weight :	1 kg including standard 10 m cable length
Maximum Cable Length :	500 m
Environmental Protection :	Totally encapsulated to IP 68
Operating Temperature :	-10°C to 80°C
Minimum Operating Depth :	30 mm

system unit

Materials :	Ultra pure cast aluminium
Dimensions :	220 mm wide x 120 mm deep x 80 mm high
Weight :	1.65 kg
Environmental Protection :	Enclosure is IP67. Electronic assembly is encapsulated to IP68
Operating Temperature :	-10°C to 70°C”

MAINSTREAM COMPACT FIXED AV-FLOWMETER

level measurement

Transducer Type :	Any 4:20 mA current loop level sensors
Method :	Pulse activation with configurable sensor warm-up time. Loop current measurement by self-calibrating 16-bit delta-sigma A-D converter
Current Range :	0-30 mA
Resolution :	Better than 1 µA
Transducer Calibration :	Calibration table (maximum 23 points) with built-in interpolator converts loop current into level measurement. Simple transducer calibration tool included in UI software
Interchangeability :	Transducers and calibration data directly interchangeable between Mainstream system units

velocity measurement

Transducer Type :	Submerged ultrasonic sensor containing signal generator, transmitter, receiver and decoder electronics
Method :	Phase Coherence time delay measurement determines the time for tracers carried by the flow to travel a fixed distance (~ 0.75 mm)
Velocity Range :	-5 m/s to -10 mm/s and 10 mm/s to 5 m/s
Resolution :	Better than 1 mm/s
Measurement Integrity :	Ultrasound signal quality monitor gives the percentage of the measurement time that the received ultrasound signal contains useful velocity information
Smart Power Saving :	Each velocity measurement is based on the same quantity of information. Automatically reduces the measurement time for high flow velocities and high signal qualities and increases the measurement time for low velocities and low signal qualities

derived measurements

Area :	Flow cross-sectional area calculated from the level measurement and the dimensions of the pipe or channel. Calculation can take into account a specified (constant) silt level. Flow cross-section specification tools included in UI software
Flow Rate :	Fluid flow rate calculated by multiplying cross-sectional area by flow velocity.
Flow Quantity :	Three independent flow totalisers calculate forward only, reverse only, and forward-reverse flow quantities. Each totaliser uses separate elements to accumulate hour quantity and total quantity to prevent round-off errors

power supplies

Power Inputs :	Connectors for external 12V and 24V supplies
External 12V supply :	Connection for external 12V
External 24V supply :	Connection for external 24V (required if using 4:20mA output)
Power Supply Monitor :	Power monitoring circuits track supply status. Supply voltages can be displayed on LCD, viewed via the UI, stored in the data logger, and used to control switch outputs

data logger

File System :	Flash file system with 4 Mbyte capacity and data retention of 20 years
File Content :	Configurable to record any combination of power supply voltages, level sensor loop current, level, area, ultrasound signal quality, velocity and flow rate, plus forward, reverse and total flow quantities
Recording Mode :	Proprietary data compression algorithm for extended logger capacity and rapid data retrieval
Recording Interval :	Configurable from 15 seconds to 1 hour
Data Capacity :	Logger holds more than one year of data when recording all available measurements at one minute intervals
Retrieval Time :	Less than 15 seconds to retrieve one month's data recorded at 1 minute intervals. File synchronization capability for fast update of previously retrieved data files
Retrieved Data Format :	Spreadsheet compatible .csv file with country specific caption text and date/time format for analysis and reports. Flash file image file including complete flowmeter configuration for data archives

communications

Local :	RS232 and USB compatible interface with automatic baud rate detection. Supports 1200, 2400, 4800, 9600, 14400, 19200, 38400, 57600 and 115200 baud
Remote :	Optional external SDI or MODBUS device
Software :	Mainstream Communicator UI software for system configuration, diagnostics, real- time measurement display and data retrieval. Mainstream Communicator runs on PC platforms under Windows 2000, XP, Vista, 7, 8, 8.1 and 10 with data transmission from device to PC, for data control, processing and export

user interfaces

LCD :	Two line x 16 character LCD. Configurable display sequence includes date, time, and any combination of measurement data. Country specific caption text and date/time format. Backlight configurable. LCD always on or activated by front panel push switch; configurable backlight operation

measurands units and formats

Power Supply Voltage :	V
Signal Quality :	%
Linear (pipe & channel dimensions) :	Selectable from mm, cm, m, in, ft
Level :	Selectable from mm, cm, m, in, ft
Area :	Selectable from m2, cm2, mm2, in2, ft2
Velocity :	Selectable from mm/s, cm/s, m/s, in/s, ft/s, ft/min
Flow Rate :	Selectable from l/s, m3/s, ft3/s, igal/s, USG/s, l/min, m3/min, ft3/min, igal/min, USG/min, m3/h, ft3/h, m3/d, Ml/d.

Quantity :	Selectable from l, m3, Ml, ft3, igal, USG
Display Format :	Independently configurable display format for each measurement. Options are integer, fixed point with 1 to 6 decimal places, and scientific (E-format). Display defaults to scientific format if data cannot be correctly represented in selected format

switch outputs

Hardware :	Two opto-isolated switches rated at 60V ac/dc and 200 mA maximum current. Each switch independently configurable for state output or pulse output operation
State Output :	Switch configurable to respond to any item of measured data with separate switch open and switch close settings to provide hysterisis. Applications include power supply monitoring and control, low ultrasound signal quality indication and level, velocity and flow alarms
Pulse Output :	Switch configurable to generate a 2.5 second duration switch closure to indicate a defined flow quantity. Applications include sampler control and remote flow totaliser operation

4:20mA Outputs

Hardware :	One 4:20 mA output. Configurable to selected measurands. Active mode from 24V supply. Passive mode from 24V or 12V supply

product hardware

ptx level sensor

Materials :	Titanium, acetal and polyurethane
Dimensions :	185 mm long x 17.5 mm diameter
Cable :	8 mm diameter vented polyurethane cable with Kevlar strain cord
Weight :	1 kg including standard 10 m cable length
Level Range :	0 to 2 m working. Maximum 8 m overrange
Resolution :	Better than 1 mm
Combined Accuracy :	Combined effects of non-linearity, hysterisis and repeatability better than 0.25% best straight line. Non-linearity and offsets removed by transducer calibration
Environmental Protection :	Fully encapsulated to IP68
Operating Temperature :	-20°C to 60°C (temperature compensated 2°C to 30°C)

velocity sensor

Materials :	Streamlined µPVC moulding and polyurethane cable
Dimensions :	105 mm long x 50 mm wide x 20 mm high
Cable :	8 mm diameter polyurethane cable with Aramid strain cord. Breaking load 45 kg. Minimum static bend radius 52 mm
Weight :	1 kg including standard 10 m cable length
Maximum Cable Length :	500 m; 300 m for ATEX
Environmental Protection :	Totally encapsulated to IP 68
Operating Temperature :	-10°C to 80°C
Minimum Operating Depth :	30 mm

system unit

Materials :	Ultra high cast Aluminium housing
Dimensions :	220 mm wide x 120 mm deep x 80 mm high
Weight :	1.9 kg
Environmental Protection :	Enclosure is IP67. Electronic assembly is encapsulated to IP68
Operating Temperature :	-10°C to 70°C”

MAINSTREAM PREMIER FIXED AV-FLOWMETER

level measurement

Transducer Type :	Dual 4:20 mA current loop level sensors
Method :	Pulse activation with configurable sensor warm-up time. Loop current measurement by self-calibrating 16-bit delta-sigma A-D converter
Current Range :	0-30 mA
Resolution :	Better than 1 µA
Transducer Calibration :	Calibration tables (maximum 23 points) with built-in interpolator convert loop currents into level measurements Simple transducer calibration tool included in UI software
Interchangeability :	Transducers and calibration data directly interchangeable between Mainstream system units

velocity measurement

Transducer Type :	Submerged ultrasonic sensor containing signal generator, transmitter, receiver and decoder electronics
Method :	Phase Coherence time delay measurement determines the time for tracers carried by the flow to travel a fixed distance (~ 0.75 mm)
Velocity Range :	-5 m/s to -10 mm/s and 10 mm/s to 5 m/s
Resolution :	Better than 1 mm/s
Measurement Integrity :	Ultrasound signal quality monitor gives the percentage of the measurement time that the received ultrasound signal contains useful velocity information
Smart Power Saving :	Each velocity measurement is based on the same quantity of information. Automatically reduces the measurement time for high flow velocities and high signal qualities and increases the measurement time for low velocities and low signal qualities

derived measurements

Area :	Flow cross-sectional area calculated from the level measurement and the dimensions of the pipe or channel. Calculation can take into account a specified (constant) silt level. Flow cross-section specification tools included in UI software
Flow Rate :	Fluid flow rate calculated by multiplying cross-sectional area by flow velocity.
Flow Quantity :	Three independent flow totalisers calculate forward only, reverse only, and forward-reverse flow quantities. Each totaliser uses separate elements to accumulate hour quantity and total quantity to prevent round-off errors

power supplies

Power Inputs :	Connectors for external 12V and 24V supplies
External 12V supply :	Connection for external 12V battery pack for extended measurement period
External 24V supply :	Connection for external 15-28V power input compatible with all industrial 24V supplies (required if using Active 4:20mA output)
Battery Charger :	Built-in battery charger maintains external battery using power from the 24V source creating an uninterruptable supply for safe fail operational
Power Supply Monitor :	Power monitoring circuits track supply status. Supply voltages can be displayed on LCD, viewed via the UI, stored in the data logger, and used to control switch outputs.

data logger

File System :	Flash file system with 4 Mbyte capacity and data retention of 20 years
File Content :	Configurable to record any combination of power supply voltages, level sensor loop current, level, area, ultrasound signal quality, velocity and flow rate, plus forward, reverse and total flow quantities
Recording Mode :	Proprietary data compression algorithm for extended logger capacity and rapid data retrieval
Recording Interval :	Configurable from 15 seconds to 1 hour
Data Capacity :	Logger holds more than one year of data when recording all available measurements at one minute intervals
Retrieval Time :	Less than 15 seconds to retrieve one month's data recorded at 1 minute intervals. File synchronization capability for fast update of previously retrieved data files
Retrieved Data Format :	Spreadsheet compatible .csv file with country specific caption text and date/time format for analysis and reports. Flash file image file including complete flowmeter configuration for data archives

communications

Local :	RS232 and USB compatible interface with automatic baud rate detection. Supports 1200, 2400, 4800, 9600, 14400, 19200, 38400, 57600 and 115200 baud
Remote :	Optional external SDI or MODBUS device

user interfaces

Reset Switch :	Push to Reset LCD display
LCD :	Two line x 16 character LCD. Configurable display sequence includes date, time, and any combination of measurement data. Country specific caption text and date/time format. Backlight configurable. LCD always on or activated by front panel push switch; configurable backlight operation

measurands units and formats

Power Supply Voltage :	V
Signal Quality :	%
Linear (pipe & channel dimensions) :	Selectable from mm, cm, m, in, ft
Level :	Selectable from mm, cm, m, in, ft
Area :	Selectable from m2, cm2, mm2, in2, ft2
Velocity :	Selectable from mm/s, cm/s, m/s, in/s, ft/s, ft/min
Flow Rate :	Selectable from l/s, m3/s, ft3/s, igal/s, USG/s, l/min, m3/min, ft3/min, igal/min, USG/min, m3/h, ft3/h, m3/d, Ml/d.

Quantity :	Selectable from l, m3, Ml, ft3, igal, USG
Display Format :	Independently configurable display format for each measurement. Options are integer, fixed point with 1 to 6 decimal places, and scientific (E-format). Display defaults to scientific format if data cannot be correctly represented in selected format

switch outputs

Hardware :	Two opto-isolated switches rated at 60V ac/dc and 200 mA maximum current. Each switch independently configurable for state output or pulse output operation
State Output :	Switch configurable to respond to any item of measured data with separate switch open and switch close settings to provide hysterisis. Applications include power supply monitoring and control, low ultrasound signal quality indication and level, velocity and flow alarms
Pulse Output :	Switch configurable to generate a 2.5 second duration switch closure to indicate a defined flow quantity. Flow totaliser an be forward only, reverse only, or forward- reverse. Applications include sampler control and remote flow totaliser operation

4:20mA Outputs

Hardware :	Three 4:20 mA outputs. Configurable to selected measurands. Active mode from 24V supply. Passive mode from 24V or 12V supply

product hardware

ptx level sensor

Materials :	Titanium, acetal and polyurethane
Dimensions :	185 mm long x 17.5 mm diameter
Cable :	8 mm diameter vented polyurethane cable with Kevlar strain cord
Weight :	1 kg including standard 10 m cable length
Level Range :	0 to 2 m working. Maximum 8 m overrange
Resolution :	Better than 1 mm
Combined Accuracy :	Combined effects of non-linearity, hysterisis and repeatability better than 0.25% best straight line. Non-linearity and offsets removed by transducer calibration
Environmental Protection :	Fully encapsulated to IP68
Operating Temperature :	-20°C to 60°C (temperature compensated 2°C to 30°C)

velocity sensor

Materials :	Streamlined µPVC moulding and polyurethane cable
Dimensions :	105 mm long x 50 mm wide x 20 mm high
Cable :	8 mm diameter polyurethane cable with Aramid strain cord. Breaking load 45 kg. Minimum static bend radius 52 mm
Weight :	1 kg including standard 10 m cable length
Maximum Cable Length :	500 m; 300 m for ATEX Zone 0
Environmental Protection :	Totally encapsulated to IP 68
Operating Temperature :	-10°C to 80°C
Minimum Operating Depth :	30 mm

system unit

Materials :	Ultra high cast Aluminium housing
Dimensions :	260 mm wide x 160 mm deep x 90 mm high
Weight :	2.95 kg
Environmental Protection :	Enclosure is IP67. Electronic assembly is encapsulated to IP68
Operating Temperature :	-10°C to 70°C

MAINSTREAM PORTABLE AV-FLOWMETER

level measurement

Transducer Type :	Any 4:20 mA current loop level sensor
Method :	Pulse activation with configurable sensor warm-up time. Loop current measurement by self-calibrating 16-bit delta-sigma A-D converter
Current Range :	0-30 mA
Resolution :	Better than 1 µA
Transducer Calibration :	Calibration table (maximum 23 points) with built-in interpolator converts loop current into level measurement Simple transducer calibration tool included in UI software
Interchangeability :	Transducers and calibration data directly interchangeable between Mainstream system units

velocity measurement

Transducer Type :	Submerged ultrasonic sensor containing signal generator, transmitter, receiver and decoder electronics
Method :	Phase Coherence time delay measurement determines the time for tracers carried by the flow to travel a fixed distance (~ 0.75 mm)
Velocity Range :	-5 m/s to -10 mm/s and 10 mm/s to 5 m/s
Resolution :	Better than 1 mm/s
Measurement Integrity :	Ultrasound signal quality monitor gives the percentage of the measurement time that the received ultrasound signal contains useful velocity information
Smart Power Saving :	Each velocity measurement is based on the same quantity of information. Automatically reduces the measurement time for high flow velocities and high signal qualities and increases the measurement time for low velocities and low signal qualities

derived measurements

Area :	Flow cross-sectional area calculated from the level measurement and the dimensions of the pipe or channel. Calculation can take into account a specified (constant) silt level. Flow cross-section specification tools included in UI software
Flow Rate :	Fluid flow rate calculated by multiplying cross-sectional area by flow velocity.
Flow Quantity :	Three independent flow totalisers calculate forward only, reverse only, and forward-reverse flow quantities. Each totaliser uses separate elements to accumulate hour quantity and total quantity to prevent round-off errors

power supplies

Power Inputs :	Internal 12V battery. Connectors for external 12V and 24V DC supplies
Internal Battery :	Low cost exchangeable deep discharge 12V 7.5 Ah rechargeable battery. One year endurance when operated at 1 measurement per minute. Weight 2.5 kg
External 12V supply :	Connection for external 12V battery pack for extended measurement period
External 24V supply :	Connection for external 15-28V power input compatible with all industrial 24V supplies
Battery Charger :	Built-in battery charger maintains internal 12V battery using power from external 24V source, enabling power harvesting for indefinite endurance
Power Supply Monitor :	Power monitoring circuits track supply status. Supply voltages and change currents can be displayed on LCD, viewed via the UI, stored in the data logger, and used to control switch outputs. Power supply condition visible on status LED

data logger

File System :	Flash file system with 4 Mbyte capacity and data retention of 20 years
File Content :	Configurable to record any combination of power supply voltages, level sensor loop current, level, area, ultrasound signal quality, velocity and flow rate, plus forward, reverse and total flow quantities
Recording Mode :	Proprietary data compression algorithm for extended logger capacity and rapid data retrieval
Recording Interval :	Configurable from 15 seconds to 1 hour
Data Capacity :	Logger holds more than one year of data when recording all available measurements at one minute intervals
Retrieval Time :	Less than 15 seconds to retrieve one month's data recorded at 1 minute intervals. File synchronization capability for fast update of previously retrieved data files
Retrieved Data Format :	Spreadsheet compatible .csv file with country specific caption text and date/time format for analysis and reports. Flash file image file including complete flowmeter configuration for data archives

communications

Local :	RS232 and USB compatible interface with automatic baud rate detection. Supports 1200, 2400, 4800, 9600, 14400, 19200, 38400, 57600 and 115200 baud
Remote :	Optional external SDI or GPRS device
Software :	Mainstream Communicator UI software for system configuration, diagnostics, real- time measurement display and data retrieval. Mainstream Communicator runs on PC platforms under Windows 2000, XP, Vista, 7, 8, 8.1 and 10 with data transmission from device to PC, for data control, processing and export

user interfaces

On/Off Switch :	Push to start - push to stop. Requires 10 seconds continuous pressure to switch flowmeter off to prevent accidental de-activation
Status LED :	High intensity flashing LED indicates system operation and battery status without opening enclosure or entering manhole. LED also indicates activity on communications port
LCD :	Two line x 16 character LCD. Automatic activation when integral light sensor detects enclosure is open. Configurable display sequence includes date, time, and any combination of measurement data. Country specific caption text and date/time format

measurands units and formats

Power Supply Voltage :	V
Signal Quality :	%
Linear (pipe & channel dimensions) :	Selectable from mm, cm, m, in, ft
Level :	Selectable from mm, cm, m, in, ft
Area :	Selectable from m2, cm2, mm2, in2, ft2
Velocity :	Selectable from mm/s, cm/s, m/s, in/s, ft/s, ft/min
Flow Rate :	Selectable from l/s, m3/s, ft3/s, igal/s, USG/s, l/min, m3/min, ft3/min, igal/min, USG/min, m3/h, ft3/h, m3/d, Ml/d.
Quantity :	Selectable from l, m3, Ml, ft3, igal, USG
Display Format :	Independently configurable display format for each measurement. Options are integer, fixed point with 1 to 6 decimal places, and scientific (E-format). Display defaults to scientific format if data cannot be correctly represented in selected format

switch outputs

Hardware :	Two opto-isolated switches rated at 60V ac/dc and 200 mA maximum current. Each switch independently configurable for state output or pulse output operation
State Output :	Switch configurable to respond to any item of measured data with separate switch open and switch close settings to provide hysterisis. Applications include power supply monitoring and control, low ultrasound signal quality indication and level, velocity and flow alarms
Pulse Output :	Switch configurable to generate a 2.5 second duration switch closure to indicate a defined flow quantity. Applications include sampler control and remote flow totaliser operation

product hardware

ptx level sensor

Materials :	Titanium, acetal and polyurethane
Dimensions :	185 mm long x 17.5 mm diameter
Cable :	8 mm diameter vented polyurethane cable with Kevlar strain cord
Weight :	1 kg including standard 10 m cable length
Level Range :	0 to 2 m working. Maximum 8 m overrange
Resolution :	Better than 1 mm
Combined Accuracy :	Combined effects of non-linearity, hysterisis and repeatability better than 0.25% best straight line. Non-linearity and offsets removed by transducer calibration
Environmental Protection :	Fully encapsulated to IP68
Operating Temperature :	-20°C to 60°C (temperature compensated 2°C to 30°C)

velocity sensor

Materials :	Streamlined µPVC moulding and polyurethane cable
Dimensions :	105 mm long x 50 mm wide x 20 mm high
Cable :	8 mm diameter polyurethane cable with Aramid strain cord. Breaking load 45 kg. Minimum static bend radius 52 mm
Weight :	1 kg including standard 10 m cable length
Maximum Cable Length :	500 m; 300 m for ATEX Zone 0
Environmental Protection :	Totally encapsulated to IP 68
Operating Temperature :	-10°C to 80°C
Minimum Operating Depth :	30 mm

system unit

Materials :	Ultra high impact structural copolymer polypropylene and stainless steel
Dimensions :	280 mm wide x 250 mm deep x 125 mm high
Weight :	5 kg with 7.5 Ah internal battery installed
Environmental Protection :	Enclosure is IP67. Electronic assembly is encapsulated to IP68 and can operate totally submerged with the enclosure lid open
Operating Temperature :	-10°C to 70°C

for more information please contact:

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