Forbes Marshall

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Innovative Solutions.

For reliable and continuous measurement of water quality insist on Aqua SMARTPro Transmitters

Energy Conservation | Environment | Process Efficiency

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For over six decades, Forbes Marshall has been building steam engineering and control instrumentation solutions that work for process industry. Today we have evolved into a leader in process efficiency and energy conservation through technology tie-ups and focused investments in manufacturing and research. Our joint ventures with the world's leading names enable us to deliver quality solutions in 14 countries. Forbes Marshall is probably the only company in the world to have extensive expertise in both steam and control instrumentation. The dual expertise has allowed us to engineer industry specific systems that focus on energy efficiency and utilities management for sectors as diverse as textiles, food processing, paper, power and chemicals.

We have also been adjudged one of India's top "25 Best Places to work - 2008" by Economic Times and the Great Places to Work Institute. Our teams are peopled by some of the finest engineers in the land. These highly trained professionals have developed innovative solutions and saved millions of rupees in process costs for our clients. Our business practices and processes have combined into a singular philosophy of being trusted partners who provide innovative solutions. It's a philosophy we are proud to live up to.

For decades, we have partnered with some of the best names in the control instrumentation industry such as Arca, Codel, Krohne and Shinkawa, to develop, design and supply innovative solutions for measurement and monitoring of process parameters. With a combination of specialist knowledge and the latest technology, we provide products and solutions to achieve optimum efficiency. Our products are a unique combination of hardware and software that make them reliable and accurate.

Forbes Marshall, your trusted partner in providing Water Quality analyzers in India, introduces the microcontroller based 2-WIRE HART Transmitter, Field Mount Aqua SMARTPro series which assures reliable and continuous measurement of parameters like pH, Redox, Dissolved Oxygen, Conductivity, Resistivity and Total Dissolved Solids (TDS) which are of vital importance across the entire spectrum of applications.

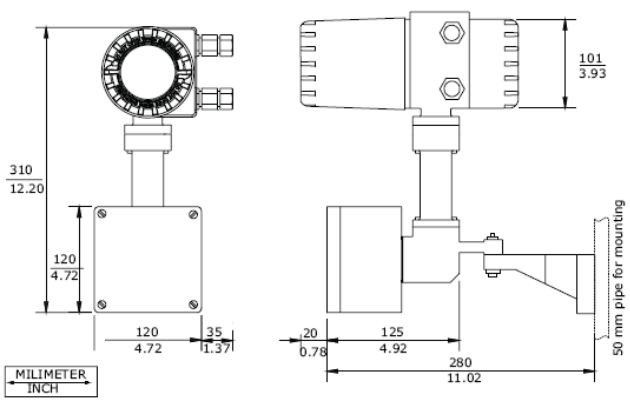
Aqua SMARTPro Series is feature packed with:

- User Friendly, Password Protected Menu-driven program with a simple set-up and ease-of-use.
- Built-in non-volatile memory to ensure that calibration and other information is not erased if power supply fails.
- Push Button for calibration and sensor offset adjustment from the keypad, additional magnetic key for programming.
- Large dual line Display.
- Automatic temperature compensation (ATC).
- Manual temperature compensation setting without ATC probe, with independent setting for calibration and process temperature.
- One galvanically isolated Current output 4…20mA with HART communication Protocol.
- Protection against electromagnetic interference
- Three galvanic isolated open collector output for Over-Range, Under-Range and Error Detection.

Applications :

- DM water
- RO water
- Water treatment
- Chemical / Petrochemical
- Bio Pharma
- Sugar/ Textile / Paper/ Food
- And many more

DIMENSION DRAWING



GENERAL SPECIFICATIONS

Display	
Local Display	2 Line Dot-matrix 10 characters per line LCD display, programmable along with conversion factor.
Display Function	Actual each parameter value programmable for continuous & sequential display of the measured parameters & the error message.
Keypad	
Keypad	Three button keypad and magnetic pin programming with user
	friendly menu interface.
Output	
Communication Protocol	HART 7 compatible
Current Output	4-20 mA DC, galvanically isolated output with accuracy better than 0.3% of full scale
Open Collector Outputs	Three open collector outputs with max load of 100mA @ 24VDC, galvanically isolated from the sensor and the output current for: 1. Error Detection 2. Over Range Detection 3. Under Range Detection
Power Requirements	
Input	12 – 36 VDC with maximum load 600Ω @ 24 VDC
Power Consumption	Less than 42 mW
Mechanical Specifications	
Housing Material	Die-cast aluminum (LM6) with epoxy paint (non-corrosive)
Connection Glands	1 x ½ " NPT – Sensor 2 x M20 Supply and Open Collector Outputs
Weight	4000 Gms
Mounting Type	Wall / 2" Pipe type (Vertical)
Intrinsically safe	Exd [ia] IIC T6
Protection Class	IP 67
Electromagnetic Compliance as per EMC Directive (2004/108/EEC)	
Emitted Interference	Generic Emission & Immunity Standards IEC 61000 – 6 – 2 & IEC 61000 – 6 – 3
Immunity to Radiated Interference	Radiated Immunity as per IEC 61000 – 4 – 3
Electrical Fast Transient or Burst Immunity	As per level 2 – IEC 61000 – 4 – 4
Surge Immunity	As per Level 2 – IEC 61000 – 4 – 5
RF Conducted Susceptibility	As per Level 3 – IEC 61000 – 4 – 6
Immunity to Electrostatic Discharge	As per Level 3 - IEC 61000 - 4 - 2
Environmental Conditions	
Ambient Temperature Operating Range	-20 to +70° C
Maximum Relative Humidity	90% Non-condensating

TECHNICAL SPECIFICATION

pH Transmitter Model – Aquamon SMARTPro 8966

pH	
Range	0 – 14 pH, Programmable Span
Resolution	0.01 pH
Accuracy	+/- 0.01 pH
Span	2pH
mV (ORP)	
Range	+/- 2000 mV
Resolution	+/- 1 mV
Accuracy	+/- 1 mV
Span	200mV
Temperature	
Range	-20° C TO +200° C
Resolution	0.01° C
Accuracy	Better than 0.5 % of FS
Sensor	PT 100/ PT 1000
Compensation	Automatic or Manual
Calibration	
pH Sensor Slope	70% to 110%
pH sensor zero	±2pH
Method	Single / Double Point
Diagnostics	
Measurement Mode	Temperature Sensor Open
	Temperature Sensor Short
Calibration Mode	Percentage Slope Error
	Zero Error
	Calibration Error
Output	
Current Output – pH/mV / HART	Proportional to measured pH/mV. Galvanically isolated from the sensor with accuracy better than 0.3% of full scale

Conductivity Transmitter Model – Aquacon SMARTPro 8967

Conductivity			
Range (with auto range facility)	Measuring Range	Cell Constant K	Resolution
	0 to 10 µS/cm	0.01	0.01
	0 to 100 µS/cm	0.01	0.1
	0 to 1000 µS/cm	0.1	0.1
	0 to 10 mS/cm	1	0.01
	0 to 100 mS/cm	10	0.01
Accuracy	Better than 0.5% of FS of Range		
Span	5% of selected range		
Calibration			
Conductivity	Single point		
Resistivity			
Range (with auto range facility)	Measuring Range	Cell Constant K	Resolution
	100 MΩ.cm to 10 KΩ.cm	0.01	0.01
	10 MΩ.cm to 1 KΩ.cm	0.1	0.1
	1 MΩ.cm to 0.1 KΩ.cm	1	0.01
	0.1 MΩ.cm to 0.01KΩ.cm	10	0.01
Accuracy	Better than 0.5% of FS of Range		

Temperature	
Range	-20° C TO +200° C
Resolution	0.01° C
Accuracy	Better than 0.5 % of FS
Sensor	PT 100/ PT 1000
Compensation	Automatic or Manual
Diagnostics	
Measurement Mode	Sensor Open
	Sensor Short
	Temperature Sensor Open
	Temperature Sensor Short
Calibration Mode	Cell Constant error
Output	
Current Output – Conductivity/HART	Proportional to measured conductivity value. Galvanically isolated
	from the sensor, with accuracy better than 0.3% of full scale.

DO Transmitter Model – AquaDO SMARTPro 8968

DO		
Range (with auto range facility)	Measuring Range	Resolution
	0 to 500%	0.1
	0 to 9999 ppb	1
	0 to 20 mg/l or ppm	0.01
	0 to 50 mg/l or ppm	0.1
Accuracy	Better than 0.5 % of FS	
Temperature		
Range	-10.0 to +150.0 Deg C	
Resolution	0.01° C	
Accuracy	Less than 0.5 % of FS	
Sensor	NTC 22 K Ohm	
Compensation	Automatic or Manual	
Process parameter		
Pressure	0 to 5 bar (User defined)	
Salinity	0 to 50 PPT (User defined)	
Humidity	0 to 100% (User defined)	
Calibration		
DO	Single/Dual point calibration	
Diagnostics		
Measurement Mode	Sensor Short	
	Temperature Sensor Open	
	Temperature Sensor Short	
Calibration Mode	Unstable Current Output Error	
	Range Error	
Output		
Current Output / HART	Proportional to measured conductivity DO value. Galvanically isolated from the sensor with accuracy better than 0.3% of full scale	

TDS Transmitter Model – AquaTDS SMARTPro 8969

TDS			
Range (with auto range facility)	Measuring Range*	Cell Constant K	Resolution
	0 to 10 ppm	0.01	0.01
	0 to 100 ppm	0.01	0.01
	0 to 1000 ppm	0.1	0.1
	0 to 10 ppt	0.1	0.01
	0 to 100 ppt	1	0.1
Accuracy	Better than 0.5 % of FS		
TDS Factor	0.1 to 1.00		
Temperature			
Range	-20° C TO +200° C		
Resolution	0.01° C		
Accuracy	Better than 0.5 % of FS		
Sensor	PT 100/ PT 1000		
Temperature Coefficient	0.0 to 5.0 %		
Compensation	Automatic or Manual		
Diagnostics			
Measurement Mode	Sensor Open		
	Sensor Short		
	Temperature Sensor Open		
	Temperature Sensor Short		
Calibration Mode	Cell Constant error		
Output			
Output / HART	Proportional to measured TDS value. Galvanically isolated from the		
	sensor with accuracy better than 0.3% of full scale.		

*TDS ranges calculated considering TDS factor 1.

Ordering Information

Model Name	Description
Aquamon SMARTPro 8966	pH Transmitter
Aquacon SMARTPro 8967	Conductivity Transmitter
AquaDO SMARTPro 8968	Dissolved Oxygen Transmitter
AquaTDS SMARTPro 8969	TDS Transmitter

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