

Mode Selection Button

Analogue Input Channels

Overview:

The **AquaDat** is an SDI-12/RS-485 network data acquisition and control unit, for science, industry and research applications. The product is housed in an immersion-proof enclosure making it ideal for use in harsh environments. The **AquaDAT** reads the output of a range of sensors and then digitises, processes and stores the results, prior to transmission across a network. Data can be sent to directly to the **AquaLOG**, or in fact any data logger or PC supporting a suitable digital network.

The **AquaDAT** is an analogue expansion module and it is a companion product to all of the Keynes Controls Aquabat range of products. The interface is configured using the built in terminal interface and can be used with any terminal emulator software supporting VT100.

The **AquaDAT** is a rugged, versatile, lightning-protected device that offers an easy analogue expansion for **AquaLOG** or any data logger requiring precision measurements. It can be used with any third party device to expand measurement capability, at a fraction of the price of large channel loggers. The **AquaDAT** is configured as a fully-encapsulated immersion-proof enclosure as standard, and can be used in the harsh and demanding environments of Civil and Environmental monitoring.

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Typical Analogue Sensors supported:

- Cup, propeller, and sonic anemometers.
- Tipping bucket rain gauges.
- Wind vanes.
- Strain gauges / Load cells.
- Pyranometers.
- Ultrasonic ranging sensor.
- Thermistors, RTDs and thermocouples.
- Barometric pressure sensors.
- RH sensors.
- Cooled mirror.
- Hygrometers.
- Soil Moisture.
- Electrolytic tilt sensors.
- Resistance pressure devices

Features:

- 16 Single-ended or 8 full differential inputs.
- Lightning protected inputs Gas discharge tube.
- Options for SDI-12 / RS-485 network ports.
- Immersion-proof enclosure IP 68.
- Fully encapsulated.
- Terminal port configuration
- Engineer unit Cconversion
 - In built programmable formula translations.

Typical Applications:

The measurement precision, flexibility, long-term reliability, environmental protection and economical price of the AquaDAT make the unit ideal for scientific, commercial, and remote field industrial applications.

- Meteorology.
- Structural Monitoring.
- Agriculture and Agricultural Research.
- Water Services.
- Building Services.
- Soil Moisture.
- Air Quality.
- Geotechnical Monitoring.
- Environmental Monitoring.
- Vehicle Testing.

The **AquaDAT** has been designed from the outset to offer low cost precision measurements in any industrial application and is environmentally protected as standard. Its hardened enclosure makes it robust and versatile for use anywhere. **AquaDAT** will still operate even when immersed in water.

Please see our detailed data sheets on AquaLOG, VW 108 module and SDI-12 Sensors

The Product is fully integrated into the Q-LOG Data acquisition and display software.



SPECIFICATIONS

Data Access Rate:

The AquaDAT returns 8 values in 2 seconds, depending upon the analogue channel configuration in use.

Should ensemble averaging be assigned then this sample rate will be increased.

Analogue Inputs

8 Differential (full) or 16 single-ended individually configured.

Channel expansion by the additional AquaDAT blocks .

Common mode range: ±5 V

DC common mode rejection: >100 dB

Normal mode ejection: 70 dB @ 50 Hz when using 50 Hz rejection

Sustained Input Voltage W/O Damage: $\pm 15~V_{dc}~max.$

Input Resistance: 20 M Ohms typical

±0.8℃, -55° to 85℃

Analogue Input Auto-range:

The analogue inputs are auto-ranging and the user need not have to set the gain levels in order to make a reading. The **AquaDAT** makes a series of readings and adjusts the gain to optimise the results. The device operates just like a DVM.

Ranges and Resolution:

Basic resolution (Basic Res) is the A/D resolution of a single conversion. Resolution of DF measurements with input reversal is half the Basic Res.

Input DF Basic Range (mV)	Resolution	
± 5000 + 2500	2.44 1.22	mV mV
± 250	20	μV
± 25 ± 10	2 2.44	μν μV
± 1	0.24	μV

Accuracy:

Typical accuracies are:

 $\begin{array}{l} \pm(0.06\% \text{ of reading + offset}), 0^\circ\text{to }40^\circ\text{C} \\ \pm(0.11\% \text{ of reading + offset}), -25^\circ\text{ to }50^\circ\text{C} \\ \pm(0.14\% \text{ of reading + offset}), -55^\circ\text{ to }85^\circ\text{C} \end{array}$

Input Noise Voltage:

The AquaDAT unit uses a high speed ADC and makes multiple measurements that are ensemble-averaged automatically before being returned as a value. The user can assign the time period over which the input data is averaged in order to reduce the effects of noise. Common averaging periods are shown below:

1/60 Hz Analogue Integration: ~60 ms 1/50 Hz Analogue Integration: ~20 ms Excitation AC Excitation: 0 to ± 5V over 0 - 100 Hz user-configured

DC Excitation: 0 to ± 5V @ 40 mA

Resistance Measurements:

Ratio-metric measurement operations for 4- and 6-wire full bridges; also 2-,3-, and 4-wire half-bridges. Precise dual polarity excitation using the DAC output switched excitation eliminates any DC errors. Supports 120,300, 500, 1 K Ohm sensors

Ratio Accuracy:

Assuming excitation voltage greater than 1000 mV, not including bridge resistor error.

 \pm (0.04% of voltage reading + offset)/V_x

The sensor and measurement noise are not included and the offsets are the following:

Offset for DF w/input reversal = $1.5 \cdot Basic Res + 1.1 \ \mu V$ Offset for DF w/o input reversal = $3 \cdot Basic Res + 2.0 \ \mu V$ Offset for SE = $3 \cdot Basic Res + 3.0 \ \mu V$

Pulse Counters: Two 24-bit inputs selectable for switch closure, high-frequency pulse, or low-level AC.

Maximum Counts per Scan: 18 x106

Switch Closure Mode:

Minimum switch closed Time:	5 ms
Minimum switch open Time:	6 ms
Max. bounce time:	1 ms open w/o being counted

High-Frequency Pulse Mode:

Maximum input frequency:1 kHzMaximum input voltage:±15 VVoltage thresholds:Count upon transition from below 0.85vto above 2.2 V after input filter with 1.3 μs time constant.

Meets TTL level specification for level detection.

Low - Level AC Mode:

Low level AC signals can be directly connected to the pulse counter input. As long as the signal exceeds the trigger levels for TTL states then it will be counted.

AC offsets up to: ±0.5 V. Input hysteresis: 18 mV @ 1 Hz Maximum AC input voltage: ±15 V Minimum AC input voltage: ±2.2V

Analogue Outputs:

A programmable DAQ output is available to provide sensor excitation for differential input pair, or for 8 channels of single-ended inputs.

Range and Resolution:

Voltage outputs programmable between ±5 V with 0.15 mV resolution.

Maximum Frequency: 5 KHz

Accuracy: ±(0.06% of setting + 0.8 mV), 0° to 40°C ±(0.10% of setting + 0.8 mV), -25° to 50°C

The programmable DAQ output enables switched level readings to remove thermal offset and common mode errors.

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