KEYNES CONTROLS

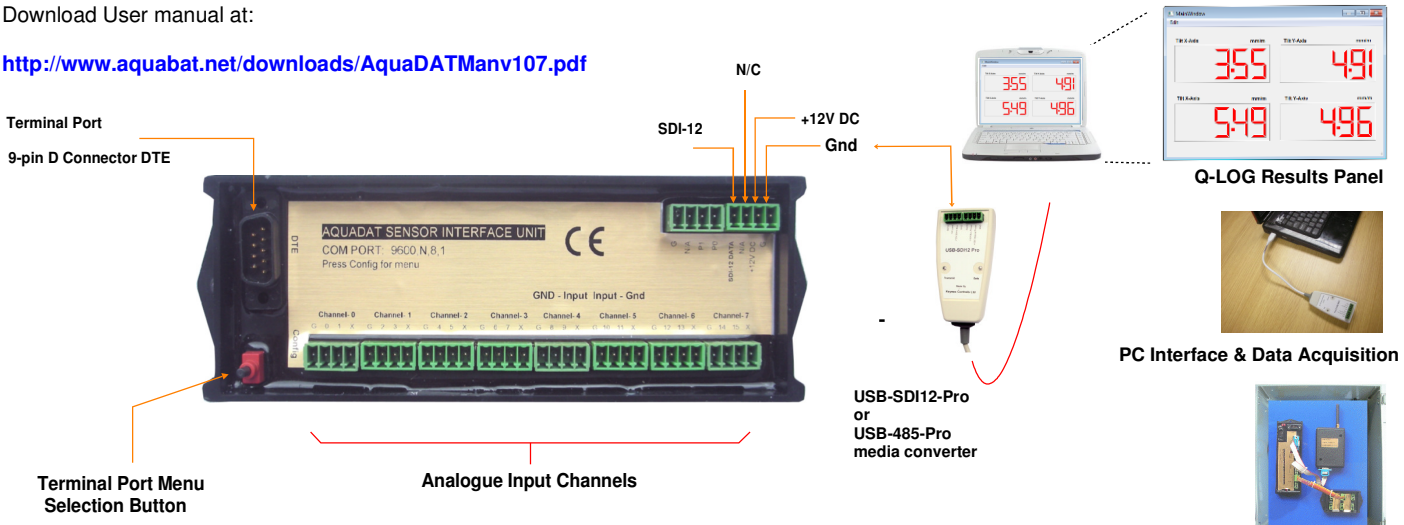
AquaDAT Sensor Interface Module

General Purpose Analogue Sensor Interface

8 x Differential / 16 x Single Ended Inputs - Models: **AquaDAT-485** and **AquaDAT-SDI12**

Download User manual at:

http://www.aquabat.net/downloads/AquaDATManv107.pdf



Overview:

The **AquaDat** is a network data acquisition and control unit, for science, industry and research applications. The product is available in 2 different models for use on the SDI-12 and RS-485 digital networks. The **AquaDAT** takes measurements from a range of sensors and then digitises, processes and stores the results, for transmission across a network. Measurement values can be sent to directly to a data logger such as the Keynes Controls **AquaLOG,** or in fact any data logger or PC supporting a suitable digital networks. The AquaDAT can be directly connected to a Windows laptop or PC using one of the USB media converters

The **AquaDAT** is an analogue expansion module and it is a companion product to all of the Keynes Controls range of products. The AquaDAT is a perfect building block for many different types of systems.

The **AquaDAT** is fully integrated into the free Q-LOG Data Acquisition & Display software and this makes PC based data acquisition a very simple operation. Measurements can be made from a range of different sensors from thermocouples precision PT100/PT1000 temperature sensor strain gauges load cells etc..

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.**
- **SDI-12 / RS-485 digital network options**
- **User defined measurement period - enhanced noise rejection**
- **No programming experience required.**
- **Fully encapsulated.**
- **Terminal port configuration**
- **Engineer unit Conversion**
  - **In built programmable formula translations.**

Download a copy of Q-Log

Further information at:

http://www.aquabat.net/QLOGFree/qlogv2.html

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** is safe from the ingress of dust, sand and moisture.

Terminal Menu System Configuration - no driver software

All of the feature of the AquaDAT are fully configured using a built in terminal menu system. No driver software is required to use this product.

3rd Party Logger Support

The AquaDAT-SDI12 is fully compatible to any logger supporting SDI-12 version 1.03 communication.

PC Data Acquisition System

The AquaDAT can be used to create PC data acquisition systems using the USB-SDI12-Pro and USB-485-Pro range of media converters.

SPECIFICATIONS

Data Access Rate:

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

.SDI-12 Port: SDI12 Ver 1.03

Analogue Inputs

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

Network Port Options:
RS-485 and SDI-12

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:
±15 V_{dc} max.

Input Resistance: 20 M Ohms typical
±0.8℃, -55° to 85℃

Analogue Input Auto-range:
The AquaDATsupports auto-ranging and the user need not have to set the gain levels in order The device operates just like a DVM.

Thermocouple Types: J,K,T (standard) - Others on request

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	2.44 mV
± 2500	1.22 mV
± 250	20 µV
± 25	2 µV
± 10	2.44 µV
± 1	0.24 µV

Accuracy:

Typical accuracies are:

±(0.06% of reading + offset), 0° to 40℃
±(0.11% of reading + offset), -25° to 50℃
±(0.14% of reading + offset), -55° to 85℃

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. Supports PT100/PT1000 sensors.

Ratio Accuracy:

Assuming excitation voltage greater than 1000 mV, not including bridge resistor error.
±(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·Basic Res + 1.1 µV
Offset for DF w/o input reversal = 3· Basic Res + 2.0 µV
Offset for SE = 3·Basic Res + 3.0 µV

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

Maximum Counts per Scan: 18 x10^6

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 kHz
Maximum input voltage: ±15 V
Voltage thresholds: Count upon transition from below 0.85v to 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℃
±(0.10% of setting + 0.8 mV), -25° to 50℃

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

Data

Output measurements in raw and SI units.
User defined formulae table.