# Model VW-108-485

## 8 Channel Vibrating Wire Interface

**Product Specification**


## Overview:

The VibWire-108 is a rugged, versatile general purpose vibrating wire sensor interface for connection to data loggers, SCADA applications and PC data acquisition systems. The VibWire-108 range of devices gives third party systems the ability to use vibrating wire sensors even if the original hardware is not designed to do so. The inbuilt digital frequency meter is used to test the sensor inputs without the requirement to undertake a download, or to use a separate read-out device.

The VibWire-108 range of interfaces utilises an auto-resonance technique for activating the vibrating wire sensors. This technique has the advantage over many other systems in that no prior user knowledge of the vibrating wire sensor is required. Auto-resonance sensor excitation minimises the strain on the sensor coil as it always acts to maximise the sensor output signal.

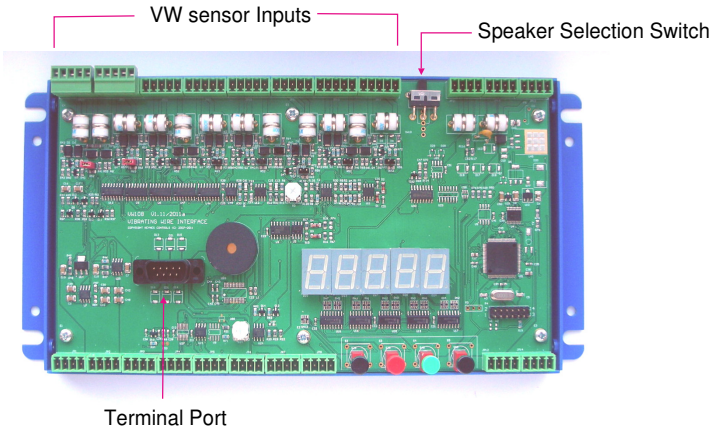
The VibWire-108-485 is fully integrated into the free Q-LOG data acquisition and display software and this enables both small and large scale PC based vibrating wire monitoring systems to be created and maintained.

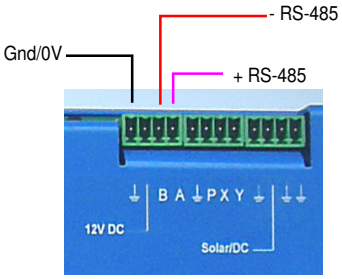
## Features:

- 8 x 4-Wire vibrating wire sensor inputs
- Resolves the VW signal to less than 0.001 Hz (industry standard 0.1 Hz)
- Gas discharge tube sensor protection
- Real-time frequency display - 5 digit
- Audible output
- Auto resonance VW sensor excitation
- RS-485 network support
- Automatic VW sensor configuration
- Digital communications to remove noise sources and errors.
- Simplified configuration and data logger support
- Output - Frequency, Digits, SI Units, Temp degC
- Steinhart-Hart thermistor linearisation
- Integrated polynomial linearisation - quadratic support direct from VW sensor calibration data sheet.
- Terminal port for sensor set-up
- Fully Integrated into Q-LOG Data Acquisition & Display Software

## Specifications:

| **Description:** | | |
|---|---|---|
| Frequency display | 5-segment display | Resolution 0.1 Hz |
| Vibrating wire inputs | 8 x 4-wire inputs | |
| Scan time | 2 - 24 secs | 1 to 8 channels depending on sensor operation. |
| Line resistance | Up to 2K ohms | |
| 8 Analogue inputs | 0 - 2.5V DC<br>3.3K / 10K Ω | 0- 2.5V DC<br>thermistor |
| Lightning protection | Gas discharge tube | |
| VW excitation range | 400 - 6K Hz | |
| VW excitation mode | Auto-resonance | |
| Operating voltage | 9 - 18V DC | |
| Ceramic loudspeaker | VW sensor | Selector switch |
| **Power Consumption:** | | |
| Scanning mode | 10 mA | Duration 24 secs |
| Display mode | 60 mA | Continuous |
| RS-485 mode | 2.2 mA | Continuous while waiting for commands |



RS-485 Network Connection

USB to RS485 media converter

The VibWire-108-RS485 uses a very simple command structure to acquire and return data values:

Start measurement command: aM! aC! where a = ID number
Get data values:

- %**aD0!**' – Vibrating Wire inputs 0 - 3 Hz, Digits (Hz²), SI Units
- %**aD1!**' – Vibrating Wire inputs 4 - 7 Hz, Digits (Hz²), SI Units
- %**aD2!**' – Temp inputs channels 0 - 3 (mV or degC)
- %**aD3!**' – Temp inputs channels 4 - 7 (mV or degC)

The VibWire-108 interfaces supports the full 4-wire gauge input and can use any inbuilt thermistor temperature sensor. All of the vibrating wire sensor interfaces and digital network ports are protected by gas discharge tube in order to prevent damage by local lightning strikes.

| **Measurement Data:** | |
|---|---|
| Number of channels | 8 x 4-wire VW inputs - user-selectable |
| VW sensor coil resistance | to 2K Ohm (standard) - other ranges on request |
| Distance of VW sensor to interface | 0 .. 10Km depending on cabling. |
| Frequency range | 400 - 6KHz (standard) - other ranges on request |
| VW sensor units<br>Temperature sensor | Hz, Digits ( Hz²), SI Units $y = A + B.F + C.F^2 + D.F^3$<br>Deg C, mV |
| Frequency resolution accuracy | 32-bit resolution 0.001 Hz |
| Long-term stability | ± 0.05 % FS max. (per year) |
| Temperature range | - 50 to 70 degC |
| Temperature resolution | 0.1 °C +/- 0.2 deg thermistor 10K Ohm standard 3.3K Ohm on request |
| Temperature accuracy | ± 0.2 °C / 0.2 °F RS-485 |
| Thermistor measurement | A half-bridge ratio-metric measurement . Value returned in mV.<br>Is used for temperature compensation on VW measurements. |
| Thermistor excitation | 2.5V DC 50 ppm /degC |
| Input resistance | 10K Ohm 0.1 % completion resistor (standard) 3.3K Ohm on request |
| Display only - resolution | 5 digit - 0.1Hz |
| **Electrical Data:** | |
| Voltage supply | **RS-485** 10.5 to 16V DC |
| Current compensation (RS-485 option only): | Typical values are @ 12 V DC Excitation |
| idle mode<br>active / measurement | 2.2 mA<br>10 mA data transmission<br>60 mA including frequency display<br>These values may change slightly between sensors. Use figures as a guide only. |
| Measuring time:<br>warm up<br>response | <br>500 ms<br>3 seconds per channel depending on the VW sensor being used (typical) |
| Length of data lines<br>RS-485 | <br>0 .. 1000 m |
| RS-485 address mode | Supports enhanced addressing 0 .. 9 A .. Z |
| **General Data:** | |
| Dimensions (mm) | L =260 W = 127 D = 38 |
| Material | Powder coated aluminium |
| Digital port | RS-485, 9600 Baud, 7-bit, N stop bit, even parity - other speeds on request |
| CE conformity | CE conformity according to EN 61000-6 |
| Terminal port | 9-way male - 9600 Baud 8 data, even parity, N stop , DTE |
| Weight | 400g |

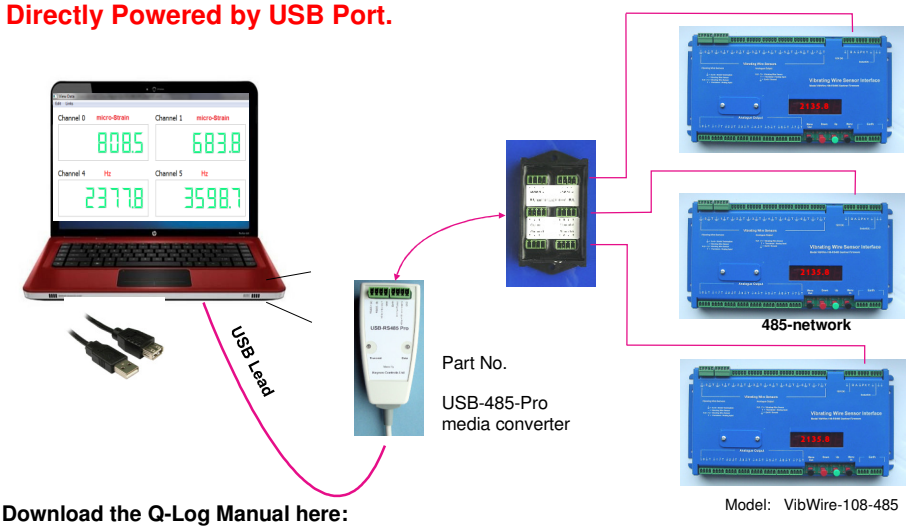
**Part numbers:**

| | |
|---|---|
| **VW-108-RS485** | VibWire-108 with RS485 Digital Port |
| **USB-485-Pro** | USB to RS-485 media converter |

**Option for MODBUS over RS485 available**
**Contact Keynes Controls Ltd for further details.**

Tel: 0044 118 327 6067

# Basic PC based Vibrating Wire Data Acquisition System Directly Powered by USB Port.




The image opposite demonstrates the equipment necessary to create a simple stand-alone vibrating wire sensor data acquisition system.

The USB-485-Pro media converter can power 1 to 3 VibWire units directly from the PC USB port.

The USB-485-Pro media converter isolates the RS485 network from the VW-108 units and this prevents damage to the computer ports.

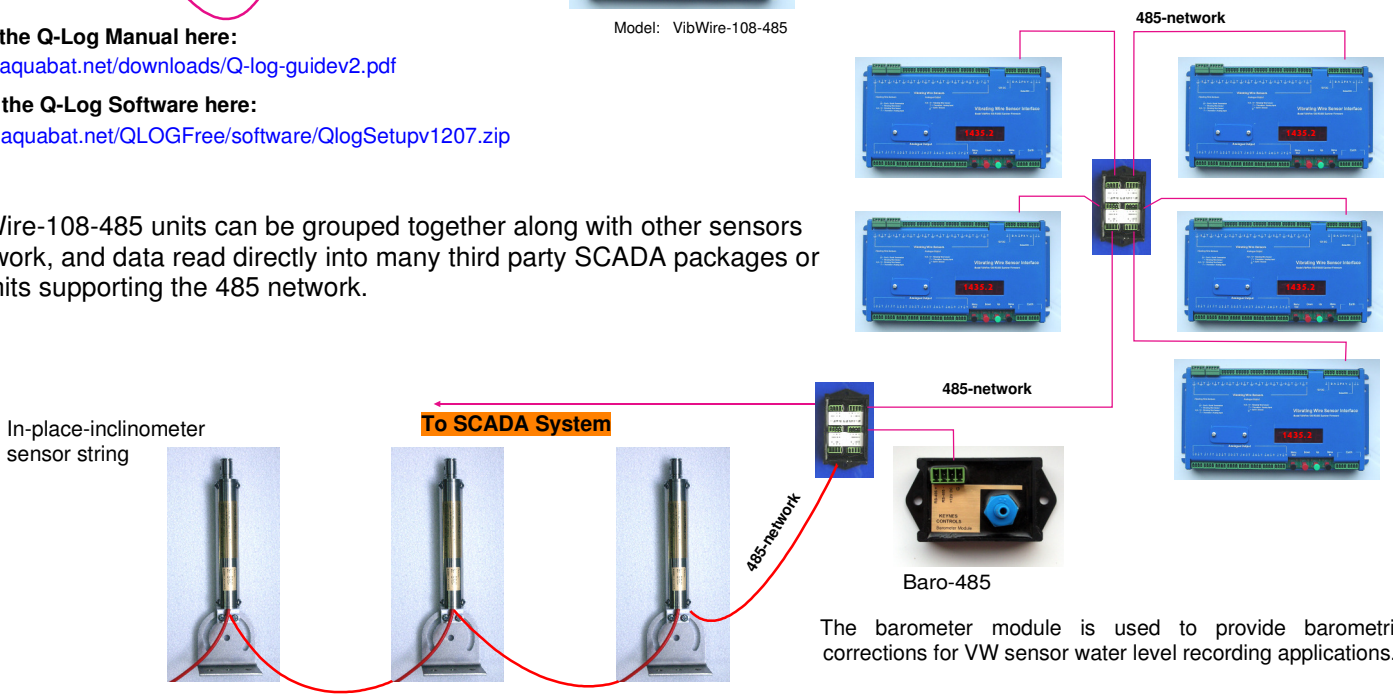
**Download the Q-Log Manual here:**
http://www.aquabat.net/downloads/Q-log-guidev2.pdf

**Download the Q-Log Software here:**
http://www.aquabat.net/QLOGFree/software/QlogSetupv1207.zip

## SCADA Systems

The image below demonstrates a typical a multi-interface system that combines several VW-108 units to other intelligent sensors.

The VibWire-108-485 units can be grouped together along with other sensors on a network, and data read directly into many third party SCADA packages or logger units supporting the 485 network.




The barometer module is used to provide barometric corrections for VW sensor water level recording applications.

| Description | Command | VW108 Response |
|---|---|---|
| Acknowledge active | %a! | a\r\n |
| **Send ID:**<br>Provided to complement SDI-12 protocol | %I! | a13KEYNESCOVW1080001\r\n<br>Part description assigned by Keynes |
| **Address Query:** | %?! | a\r\n |
| Identifies instrument address and is commonly used on single-instrument operations only. | Used to make command set SDI-12 compatible | Where a = number 0 - 9 or a - z |
| **Change Address:** | %aAb! | b\r\n |
| Used to change instrument address from default to new one for network operations | **a** = initial address **b** = new address<br>%0A3! changes ID = 0 to ID = 3 | **a : b** = number 0 - 9 or a - z |
| **Start Measurement:** | %aM! | a0308\r\n |
| Instruct an instrument to make measurement | **a** = address of instrument | Instrument with address a returns 8 x VW & 8 x temp after 30 seconds |
| **Concurrent measurement:** | %aC! | a03016\r\n |
| Used for polling multiple instruments on a network to start to make readings. This command frees RS-485 bus for other devices | start measurement instrument address **a** | Initial response only after receipt of instruction and no response when data ready to be sent. |
| **Send Data:** | %aD0! aD1! aD2! or aD3! | +xxxx.x+xxxx.x+xxxx.x+xxxx.x\r\n |
| Data returned<br>aND! = Vib + Vib + Therm + Therm<br>and has same format for each command | '%**aD0!** -- Vibrating wire chans 0 - 3 Hz, $Hz^2$, SI Units<br>'%**aD1!**'-- Vibrating wire chans 4 - 7 Hz, $Hz^2$, SI Units<br>%**aD2!**'-- Temp inputs chans 0 - 3 Deg C, mV<br>'%**aD3!**' -- Temp inputs chans 4 - 7 Deg C, mV | |

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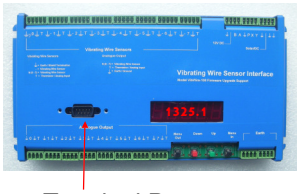
## Engineering Data Values:

The VibWire-108 can be used to acquire raw sensor and temperature values for post-process analysis, or can provide data directly in engineering units. The instrument is fully-configurable using the inbuilt terminal port and menu system to accept most manufacturers' sensors. The VW108 family all use the standard quadratic equation for VW sensor linearisation and the Steinhart-Hart thermistor linearisation for the temperature sensor inputs.

USB-RS232 Converter



Terminal Port

## Configuration Made Easy:

All of the VibWire-108 family of products can be configured using the inbuilt terminal port and menu system. All that is required is a Terminal Emulator package such as the Microsoft HyperTerminal, or any other similar package to talk to the instrument. The inbuilt menu system is straightforward and allows VW sensor configuration parameters to be stored directly into the VibWire-108 without any prior knowledge of programming.

## Q-LOG Application:

The VW-108 range of interfaces are all fully integrated into the Q-LOG data recording and display software. Q-LOG is the Keynes Controls PC-based application that uses a Windows environment to configure, record, and display values from intelligent sensors.

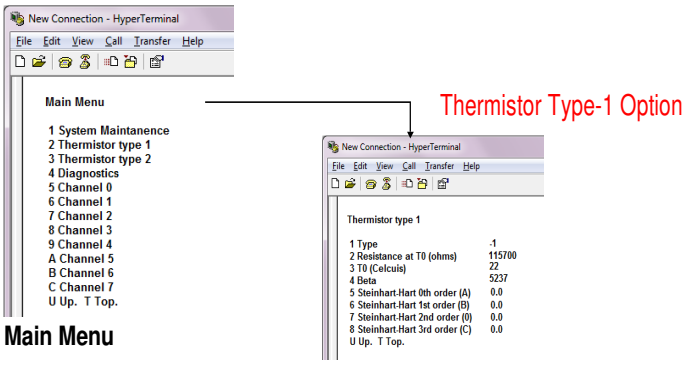
### Terminal Port Menu System

The images below show part of the menu system built into the VibWire-108. On powering up the instrument the Main menu shown below will appear.

Use the terminal emulator software to type the sensor calibration parameters and store them into instrument. Data values from the VibWire-108 can be supplied in raw or SI (Engineering) value format.

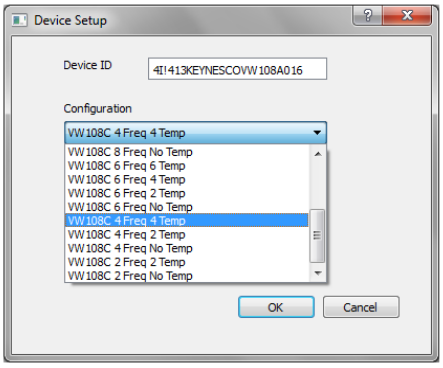
Each VW sensor input channel can be individually configured.

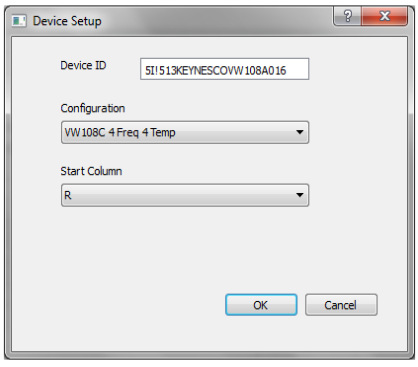
The menu system currently supports 2 different thermistor type configurations.

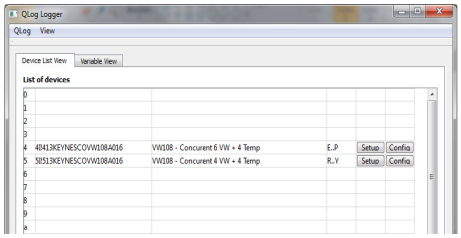



**Main Menu**

The images below show some of the configuration Window options available with Q-LOG for the VibWire-108:



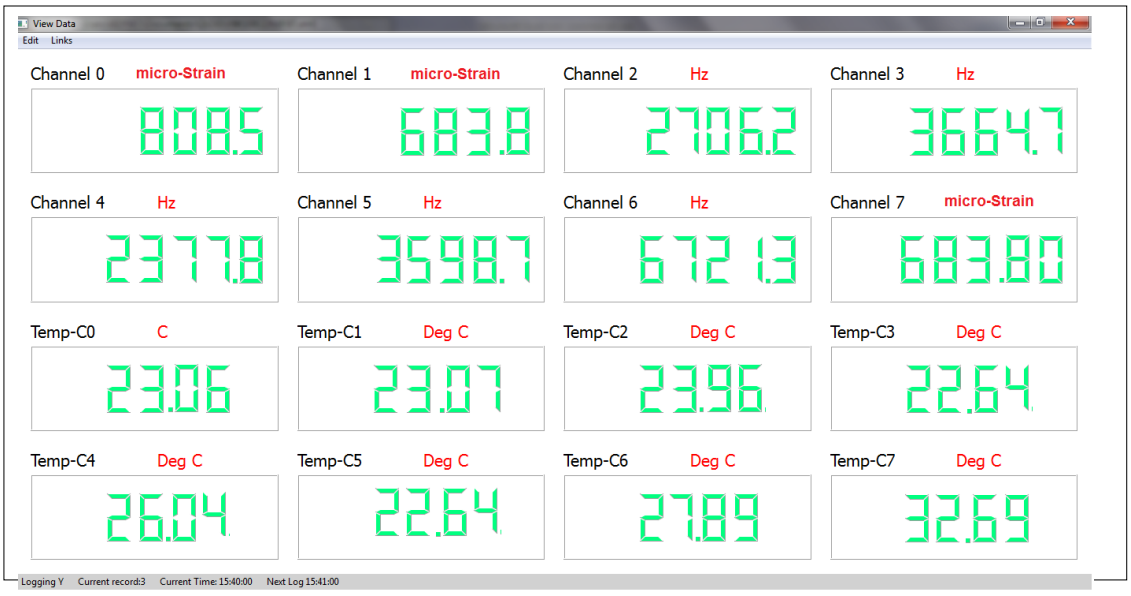



Q-LOG communicates to the sensors and instruments via the USB media converter attached to the PC. See image opposite.

The basic package supports up to 160 inputs and this can be expanded onto additional network inputs by simply installing additional media converters to the USB ports.

The image below shows a typical 16-channel results screen for the VibWire-108:




The simple pull-down menu system means large systems can be deployed and updated without any prior knowledge of programming applications.

The image opposite shows the LCD panel meter display for a single VibWire-108 instrument in Q-Log.