



Model Number: VibWire-108-RS485

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. 4 Wire Sensor Inputs (x 8) 3. Real Time 7 Segment Display (Frequency) 5. Analogue Outputs - not fitted on RS485 / 485 Models | <ol style="list-style-type: none"> 2. RS-485 / MODBUS Network Connection 4. Device Keyboard |
|---|---|

Introduction

The VibWire-108-SDI 12 is a rugged, versatile, general purpose vibrating wire sensor interface for connection directly to data recorders and acquisition systems across a RS485 network. 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.

Sensor Excitation - Auto Resonance

All of the VibWire-108 range of interfaces utilises an auto-resonance sensor excitation and technique for activating the vibrating wire sensors and taking a reading. This technique has the advantage over pluck systems in that no prior user knowledge of the vibrating wire sensor is required.

Free Windows Application Software

The device can be configured using the free issue Keynes Controls Q-LOG Windows Data Acquisition and Display Software. The software can be used to convert a PC into a vibrating wire sensor logger when using a suitable media converter to talk to the device. Q-LOG enables the sensor configuration data to be entered using a familiar Windows environment screen.

Terminal Port

A terminal port menu system can be used to configure this device. The User can configure the instrument using any of the free terminal port emulator software without the need for any Windows drivers etc.. Ideal for remote location operations. The device can be connected into any computer system supporting RS232 communication and a terminal program such as Hyperterminal. No driver software is typically required for RS232 communications, so product life can be maintained with fear that software will become obsolete. All of the features of the instrument can be configured and test measurements observed.

Engineering Data Values

All of the VibWire-108 models can be used to acquire raw sensor and temperature values for post-processing analysis, or can provide data directly into engineering units. The instrument has the ability to use most different manufacturers' sensors.

Frequency Display

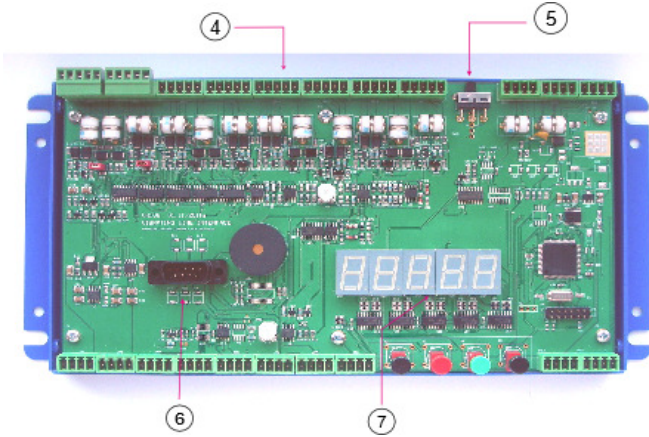
All of the VibWire-108 range of instruments display vibrating wire fundamental frequency for any selected channel on the 7 segment display mounted on the instrument front panel. Use the keyboard to select the desired channel.

Youtube Demo Videos

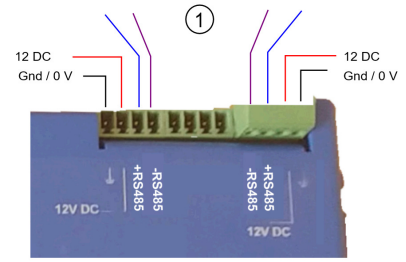
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|--|---|
| <p>VibWire-108 Setup Video - RS485 / RS485 network ID Number:</p> <p>Keynes Controls VibWire-108 Vibrating Wire Sensor Interface Demonstration</p> | <p>https://youtu.be/BmDZvn3WBmQ</p> <p>https://youtu.be/15KI7ES8EsU</p> |
|--|---|

Device Layout

4. 8 x 4 Wire Sensor Inputs



- 4. 4 x Wire Sensor Inputs
- 5. Speaker On / Off Switch.
- 6. 9 Pin Terminal Port Connection.
- 7. Seven Segment Display



- 1. RS-485 / MODBUS Network Port.
- 2. + 12 V DC
- 3. Gnd

RS-485 Network Connection

RS-485 is a common industry standard 4 wire network. There are many 3rd party network products such as wireless networks, repeaters etc...

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 concurrent measurement support

Get data values:

aD0!	Vibrating Wire Inputs	0 - 3
aD1!	Vibrating Wire inputs	4 - 7
aD2!	Temperature Sensors	0 - 3
aD3!	Temperature Sensors	4 - 7

The VibWire-108 interface supports the full 4 X Wire sensor input for most of the different 3rd party sensor manufacturers.

Part numbers:

VW-108-RS485 VibWire-108 with RS485 digital port.
USB-RS485 USB to RS485 media converter.

The device can return Frequency, Digits and Engineering Units for any sensor input channel.

Network Connection & Expansion

The image below shows how the VibWire-108-RS485 units can be used to create a distributed solution across a RS485 digital network. Additional interfaces can be connected to the network by simply connecting the next unit onto the expansion port.

Isolated USB Media Converter



All of the USB-Pro model media converters can directly power the VibWire-108 interfaces and 3rd party sensors. This device protects the PC from any potential damage caused by device failure.

An external power supply can be used when large numbers of units are being used.

Opto isolation between the network and computer.

Part Number: **USB-RS485-Pro**

The VibWire-108 can be connected directly to a wide range of 3rd party RS485 communication systems. The image below shows the instrument connected to a satellite modem for remote access operations.



Remote access Vibrating Wire System

[Youtube Demo](#)

USB-485-Pro Media Converter Demonstration : <https://youtu.be/XuMptEUErwc>



VibWire-108-RS485



8 Channel Vibrating Wire Sensor Interface with RS485

Last Updated Dec 5th 2023

Technical Specifications

Measurement Data:

Number of channels	8 x 4-wire VW inputs - User-selectable
VW sensor coil resistance	to 2 K Ohm (standard):- other ranges on request
Distance of VW sensor to interface	0 .. 10 Km depending on cabling.
Frequency range	400 - 6 KHz (standard) - other ranges on request
Frequency Resolution	32-bit resolution 0.001 Hz
Frequency Measurement Accuracy	0.012 % of reading (typically)
Long term stability	± 0.05 % FS max (per year)
Temperature range	- 50 to 70 deg C
Temperature resolution	0.1 oC +/- 0.2 deg thermistor 10K Ohm standard.
Temperature accuracy	± 0.2 oC / 0.2 oF RS485
Thermistor measurement	A half-bridge ratio-metric measurement . Value returned in mV. Is used for temperature compensation on VW measurements.
Thermistor excitation	2.5 V DC 50 ppm / deg C
Input resistance	10 K Ohm 0.1 % completion resistor (standard) - 3.3 K Ohm on request
Units	Freq (Hz) Temperature (mV), Engineering Units after configuration.
Display only - Resolution	5 digit - 0.1 Hz

Electrical Data:

Voltage supply	RS485 10.5 to 24V DC
Current compensation RS485 Option only	Typical values are @ 12V DC excitation
Idle mode:	1.2 mA
Active / measurement:	8 mA data transmission 58 mA including frequency display
	These values may change slightly between sensors. Use figures as a guide only.

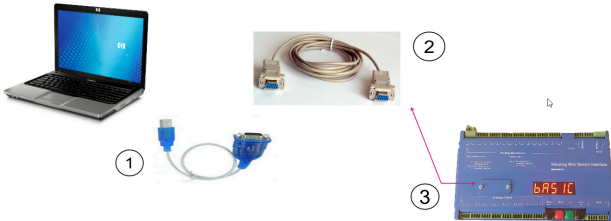
Measuring time	500 ms
warm up:	
response	3 seconds per channel depending on the VW sensor being used (typical)

Length of data lines	0 .. 1000 m Standard - Repeaters and wireless network options.
RS-485 Network	Supports enhanced addressing 0 .. 9 A .. Z
Address mode	

General Data:

Dimensions (mm)	L =260 W = 127 D = 38
Material	Powder coated aluminum
RS485 Digital Port	RS485, 1200 Baud, 7-bit, N stop bit, even parity - other speeds on request
CE Conformity	CE conformity according to EN 61000-6
Weight	400 g
Terminal Port	9-way male - 9600 Baud 8 data, even parity, N stop

Terminal Port Configuration



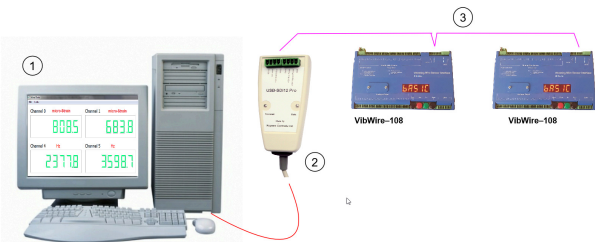
1. RS232 to USB Converter
2. NuLL Modem Cable.
3. Terminal Port Connector

Configuration Made Easy

All of the VibWire-108 family of products can be fully 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. No software drivers required to communicate with the Terminal Port.

Windows PC Data Acquisition System



1. Windows PC running Q-LOG
2. USB-RS485 Media Converter
3. RS-485 Local Network

The Q-LOG software enables and media converter enables simple Windows PC based vibrating wire measurement systems to be created.

Configure the instruments in a Windows environment and observe the measurement process. Full confidence can be obtained in regards to operations before site deployments.

The Q-LOG Software is Free Issue with our instruments.



VibWire-108-RS485

8 Channel Vibrating Wire Sensor Interface with RS485



Last Updated Dec 5th 2023

Q-LOG Data Acquisition, Configuration and Display Software

Q-Log is the Keynes Controls Data Recording and Display software and has been designed solely for use with intelligent sensors and interfaces. The software operates as a stand-alone package and requires the use of an RS485, or RS-485 media converter. Q-LOG enables PC based systems to be created and tested. The software is free issued with the Keynes Controls instrumentation.

Common Keynes Controls device identifier strings.

Product	ID string
VibWire-201-Pro	13KEYNESVWRDOA001
VibWire-101 VW sensor interface	13KEYNESCOVW101A011
VibWire-108 VW sensor interface	13KEYNESCOVW108A016
PIEZO-RM water level sensor	13KEYNESCOPIRESR001
Barom-SDI-12 barometer	13KEYNESCOBAROMR003
I-P-I	13KEYNESCOPIPNCL005
AquaDAT sensor interface	13KEYNESCOAQJUDA008
Single channel strain gage	13KEYNESCOSTRAIN027

Q-LOG Devices List Window.

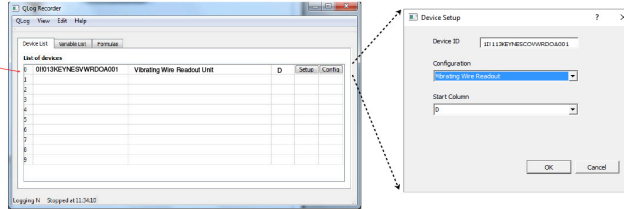


Fig-16

Image opposite demonstrates how the VibWire-301 is identified in Q-LOG. All the devices that are detected on a network are shown here.

Q-LOG can also be used to integrate 3rd party sensors into a single system.

Sensor Configuration

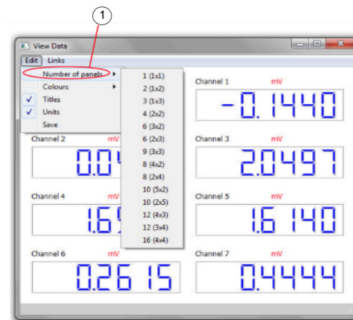
The vibrating wire sensor calibration factors can be written directly into the device.

Property	Value	tool	Set
Therm 2 Steinhart-Hart 3rd order (C)	7.3003E-8	Tool	Set
Chan 0 Therm no	1	Tool	Set
Chan 0 Frequency output	0	Tool	Set
Chan 0 Cal A	-1.26E+02	Tool	Set
Chan 0 Cal B	6.52E-02	Tool	Set
Chan 0 Cal C	3.42E-07	Tool	Set
Chan 0 Cal D	-1.40E-02	Tool	Set
Chan 1 Therm no	1	Tool	Set
Chan 1 Frequency output	0	Tool	Set
Chan 1 Cal A	0.0	Tool	Set
Chan 1 Cal B	1.0000	Tool	Set
Chan 1 Cal C	0.0	Tool	Set
Chan 1 Cal D	0.0	Tool	Set
Chan 2 Therm no	1	Tool	Set
Chan 2 Frequency output	0	Tool	Set
Chan 2 Cal A	0.0	Tool	Set
Chan 2 Cal B	1.0000	Tool	Set
Chan 2 Cal C	0.0	Tool	Set
Chan 2 Cal D	0.0	Tool	Set
Chan 3 Therm no	1	Tool	Set
Chan 3 Frequency output	0	Tool	Set
Chan 3 Cal A	0.0	Tool	Set
Chan 3 Cal B	1.0000	Tool	Set
Chan 3 Cal C	0.0	Tool	Set
Chan 3 Cal D	0.0	Tool	Set

Q-LOG Data Display

The Q-LOG software can be used to:

1. Display Results in - Hz / Digits / Engineering Units
2. Real-time Charts.
3. User Defined Panel meters



Q-LOG Panel Meter Selection Window

Part Number: USB-RS485-Pro (RS485 Network)

The Keynes Controls media converters can power the VibWire-301 directly from a laptop / Desktop USB Port without the use of an external power supply.

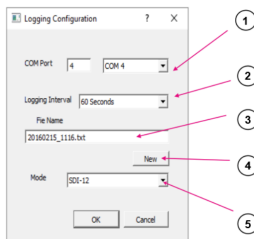
No programming experience is required. The sensor calibration factors can be written directly into the device. There panel meters

Configuration

The measurements are recorded into unique time stamped text files that can be read by a spreadsheet. Information is easy to understand and process.

Data Acquisition and Testing

The Q-LOG software is an ideal tool for testing measurement systems in the workshop before installation on site, Sensors can be configured, test measurements made, results displayed for easy analysis.



Q-LOG Network Configuration Window

Confidence can be made in the measurements before any installation onto data recorders or site wide monitoring systems.

Configuration Settings

1. Enter Comm Port identified for USB media converter
2. Data Recording Sample Rates - (1, 5, 10 Secs, 1 to 10 minutes, 1 and 6 Hours)
3. Time stamp Log Filename
4. New Results File Button - Automatically create a new time stamped log file.
5. Network Type Selection - RS485 / RS-485.

The Q-LOG software can be downloaded at:

http://keynes-controls.com/Download/QLogSetup50_21may2020.zip

Speaker Unit

All of the VibWire-108 range of instruments have a built in speaker to enable the User to listen to the sensor coil tone. This feature is useful in diagnosing sensor faults. A clear tone indicates a sensor is operating correctly.



VibWire-108-RS485



8 Channel Vibrating Wire Sensor Interface with RS485

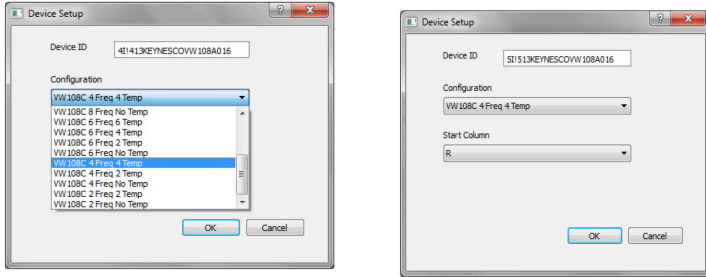
Last Updated Dec 5th 2023

Device Configuration

The VibWire-108 range of interfaces are all fully integrated into the Keynes Controls Q-LOG Data Recording & Display software. Q-LOG is a Windows PC-based application. The software can record measurements, configure instruments and display values in panel meters and traces.

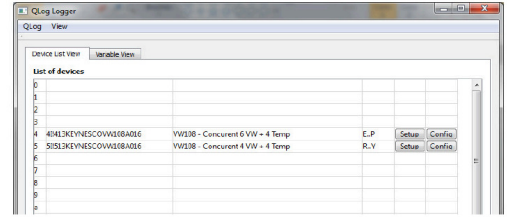
The Q-LOG software can be used to configure the vibrating wire sensor inputs, make measurements, and display the results onto a series of panel meter displays. The results can be set for Hertz, Digits and Engineering Units (SI).

Device Type Selection Window



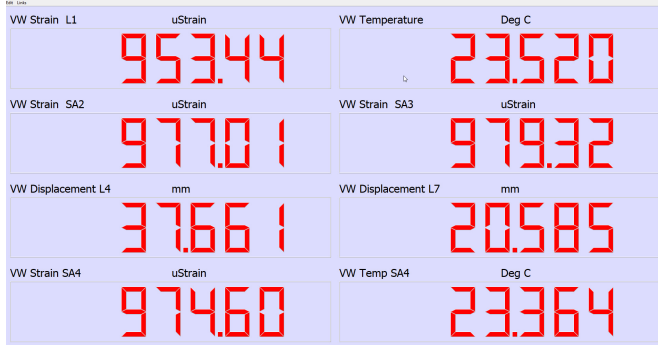
MODBUS Option

Instruments shipped after November 2023 have the facility to switch between RS485 and MODBUS mode of operation. The instrument can be configured and tested using the Q-LOG Software using the standard RS485 network connection, and then switch into MODBUS mode using an option available from the device keyboard.



Q-LOG communicates to the sensors and instruments using the USB media converter attached to the PC.. The software can be configured to use 3rd party sensors not manufactured by Keynes Controls.

Typical 16 Channel 4 X4 Panel Meter Display - VibWire-108



RS485 Network Selection



MODBUS Protocol Selection

The keyboard menu system is used to switch the mode of operation for the instruments.

Standard Vibrating Wire Sensor Equations

The following equations and Coefficients shown in these equations are used in the device menu system and calibration factors.

Vibrating Wire - Digits

Keynes Control uses the following equation to determine 'Digits in all our products.

$$\text{Digits} = \frac{\text{Frequency}^2}{1000} \quad \frac{(\text{Hz})^2}{1000}$$

Vibrating Wire Calibration Factors

All of the VibWire-108 models use the following calibration equation to convert frequency into SI units:

$$X = A + Bd + Cd^2 - Dt \quad \text{where } d = \text{measured frequency in Digits.} \\ \text{and } D = \text{Temperature Correction Coefficient} \\ t = \text{temperature in Deg C}$$

- A = Constant
- B = Linear term
- C = Quadratic terms and all frequency values are in Digits.
- D is for thermal expansion.

The terms A..D are the menu items assigned into the VibWire-108 to configure the frequency sensor input into engineering units.



VibWire-108-RS485



8 Channel Vibrating Wire Sensor Interface with RS485

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7 Segment Display

The device contains a built-in frequency display which can be selected for each sensor input, and to show some system information.

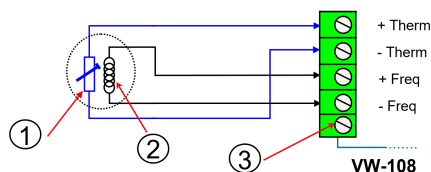


Real-time Frequency Display



Channel Selection Display

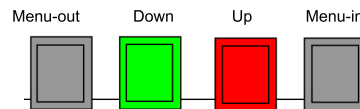
Vibrating Wire Sensor Connection



- 1. Temperature Sensor
- 2. Vibrating Wire Sensor Coil
- 3. Earth

Control Keys

Most of the features of the device can be controlled locally using the control buttons located on the front of the device.



The number of sensor input channels scanned by the device can be set here.

Scan Rate Adjustment

The number of sensor input channels to scan is adjustable on the instruments. It takes 3 seconds to scan a sensor input. The User can select between 1 to 8 channels to scan. The less the number of channels the faster the scan time..

Real-time Frequency Display

The instrument can be configured to display the real-time operating frequency for any sensor input channel.

Instrument Identifier

Each instrument deployed on the multi-drop network must have a unique instrument identifier assigned in order to identify instrument.:

For the RS485 network then the ID number is in the range 0..9 - Additional ID numbers are supported: a .. z.

For Modbus operations the ID number is currently limited to 1 .. 32.

Supported Commands

Description	Command	VW108 Response
Acknowledge active Send ID: provided to complement RS485 protocol	a! !!	a!\r\n a13KEYNESCOVW1080001\r\n Part description assigned by Keynes
Address query: identifies instrument address	?!	A!\r\n
Change address: used to change instrument address	aAb! a = initial address b = new address 0A3! changes ID = 0 to ID = 3	b!\r\n a : b = number 0 - 9 or a - z
Start Measurement Command:	%aM! a = address of instrument	a0308\r\n instrument with address a returns 8 x VW & 8 x temp after 30 seconds
Concurrent measurement: Used for polling multiple instruments on a network to start to make readings. This command frees the network bus for other devices	aC! start measurement instrument address a	A03016\r\n initial response only after receipt of instruction and no response when data ready to be sent.
Send data: Data returned aND! = Vib + Vib + Therm + Therm and has same format for each command	%aD0! aD1! aD2! or aD3! 'aD0!' - Vibrating wire Chans 0 - 3 Hz, Hz2, SI Units 'aD1!' - Vibrating wire Chans 4 - 7 Hz, Hz2, SI Units 'aD2!' - Temp inputs Chans 0 - 3 Deg C, 'aD3!' - Temp inputs Chans 4 - 7 Deg C	+xxxx.x+xxxx.x+xxxx.x+xxxx.x\r\n

Factory Default Settings

Default thermistor type: 2 (Steinhart-Hart)
Default resistance 3000 at 25 Deg C Industry standard for most vibrating wire sensor manufactures temperature sensor

Network Address

ID : 41 (Modbus address 41, SDI12 address '0')

Physical Dimensions