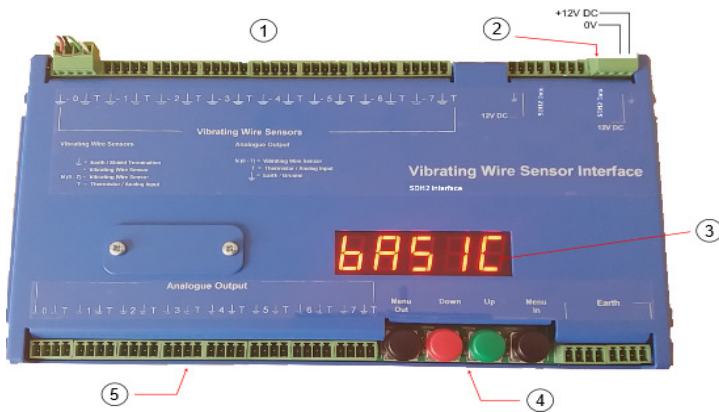


Model Number: VibWire-108-SDI12



Features

Optional USB Interface
 Operating Frequency 400 - 8 KHz
 Free Windows Application Software Configuration
 Terminal Port Configuration.
 Built in Thermistor Calibration factors
 User Selectable Hz, Digits, SI Unit Options.
 Steinhart-Hart Thermistor Linearisation

1. 8 X 4 Wire Sensor Inputs
2. Real Time 7 Segment Display (Frequency)
3. User Set Scan Options
4. SDI-12 Network Port
5. 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 SDI-12 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.

Device Configuration Options

The instrument can be configured using the free issue Keynes Controls Q-LOG Data Acquisition and Display Software. The software can be used to convert a PC into a Vibrating Wire sensor data recorder when using a media converter to communicate with the device. The Q-LOG software also enables the sensor configuration data to be entered easily into the device using a familiar Windows environment.

A terminal port is available to fully configure the instrument without any driver software and with free third party terminal port emulation software and industry standard communications cables. A RS-232 crossover cable and media converter are all that is required to configure the instrument.

Q-LOG Windows PC Data Acquisition & Display Software

A complete version of Q-LOG without any restrictions can be download from:
http://keynes-controls.com/Download/QLogSetup50_21may2020.zip

Temperature Sensor

The VibWire-108 supports the Steinhart-Hart Thermistor temperature calculation to convert the sensor thermistor measurement into SI units of Degree Celcius. User Defined calibration factors are supported for each sensor input. The User can select preset factors should the sensor temperature configuration be unknown.

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 into engineering units. The instrument has the ability to use most different 3rd party manufacturers' sensors. The VW108 family all use the standard vibrating wire sensor conversion formulae as is commonly found with most different manufactured sensors. The formulae can be used in Hz and Digits.

Youtube Product Video

1. How to change the device ID number for RS485 and SDI-12 network Operations
<https://youtu.be/BmDZvn3WBmQ>
2. Real-time demonstration of some of the instrument features and measurement operations
<https://youtu.be/15KI7ES8EsU>



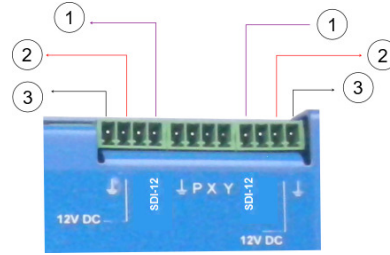
Last Updated: June 2023

VibWire-108-SDI12

8 Channel Vibrating Wire Sensor Interface with SDI12 Comms



VibWire-108 connected to a Data Logger for remote access.



- 1 SDI-12 Data.
- 2. + 12 v DC
- 3. Gnd

SDI-12 Communications Port Connection

SDI-12 is a simple 3 wire network ideal for data loggers and stand-alone low power systems. There is only a single network on the device. Two separate network connectors are available for easy connection to a data logger.

The VibWire-108-SDI12 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

:		
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-SDI12 VibWire-108 with SDI-12 digital port.
USB-SDI12 USB to SDI-12 media converter.

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

Windows PC USB Connection

The image below shows the optional USB media converter available for use with this product. The media converter along with the Q-LOG applications software can be used to configure, make test measurements, display results and store values. The Keynes media converters can be used with the Keynes Controls sensors, sensor interfaces and similar 3rd party products. The media converter can power a VibWire-108 directly from a USB port. Perfect for field applications.

Isolated USB Media Converter



USB Type B Port



Type B USB Expansion Cable



USB-SDI12-Pro fitted to a Windows laptop computer.

Further Note

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.

A Port Status indicator LED is used to show that the USB Port for the host laptop is operating to specification.



VibWire-108-SDI12



8 Channel Vibrating Wire Sensor Interface with SDI12 Comms

Last Updated: June 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 SDI-12
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	SDI-12 10.5 to 24V DC
Current compensation SDI-12 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.

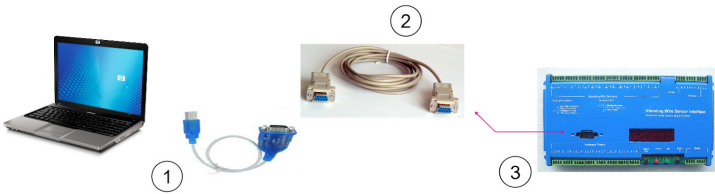
Measuring time	
warm up:	500 ms
response	3 seconds per channel depending on the VW sensor being used (typical)

Length of data lines	
SDI-12	0 .. 100 m
SDI-12 Address mode	Supports enhanced addressing 0 .. 9 A .. Z

General Data:

Dimensions (mm)	L =260 W = 127 D = 38
Material	Powder coated aluminum
SDI-12 Digital Port	SDI-12, 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. S232 to USB Converter
2. NuLL Modem Cable.
3. Terminal Port Connector

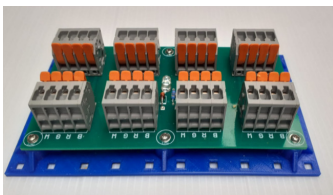
Configuration Made Easy

All of the VibWire-108 family of products can be configured using the in-built terminal port and menu system. The terminal port can be connected to many intelligent devices supporting a RS232 serial port using a standard crossover cable.

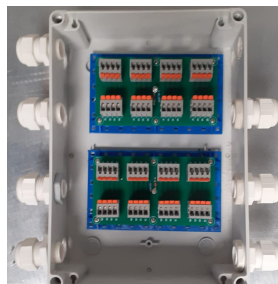
For most common types of laptops a USB to RS232 converter and terminal emulator software is all that is required to communicate to the instrument.

No driver software is required when using the terminal port.

Installation Accessories



Part Number: SEN-PCB-8



8 Port Expansion Block

Part Number: SEN-PCB-8

Keynes Controls manufactures accessories that can be used to simplify the installation of any intelligent sensors. The SEN-PCB-8 PCB can be used to connect multiple sensors together into a single block,

No screw driver required as the connector blocks use spring loaded terminals. Push down the clamp, insert cable and release,

Boards supplied singular or in junction boxes.

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 SDI-12, 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	13KEYNESVWRD0A001
VibWire-101 VW sensor interface	13KEYNESCOVW101A011
VibWire-108 VW sensor interface	13KEYNESCOVW108A016
PIEZO-RM water level sensor	13KEYNESCOOPRESR001
Barom-SDI-12 barometer	13KEYNESCOBAROMR003
I-P-I	13KEYNESCOIPINCL005
AquaDAT sensor interface	13KEYNESCOAQUADAT008
Single channel strain gage	13KEYNESCOSTRAIN027

Q-LOG Devices List Window.

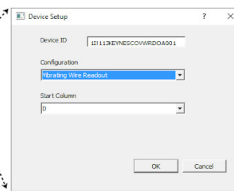
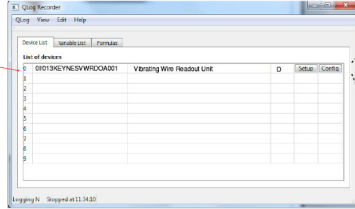


Fig-16

Image opposite demonstrates how the VibWire-108 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

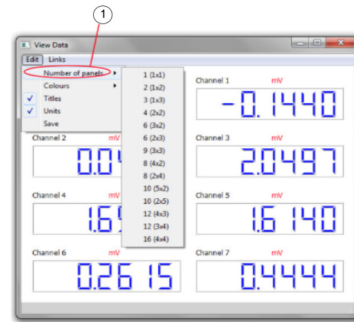
The vibrating wire sensor calibration factors can be written directly into the device.

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	1.22E+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

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



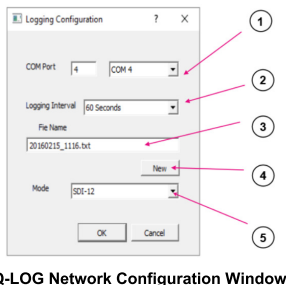
Q-LOG Panel Meter Selection Window

Part Number: USB-SDI12-Pro (SDI12 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.

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.



Q-LOG Network Configuration Window

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

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.

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 - SDI-12 / RS-485.

The VibWire-301 is capable of simultaneous sampling operations for units on a network. The device supports the 'Concurrent' C! Command.

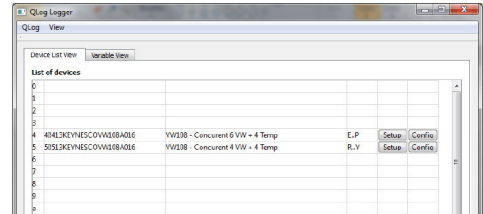
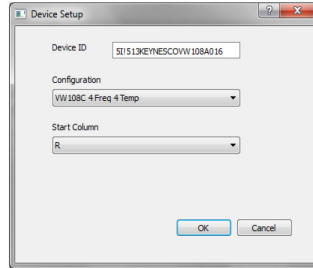
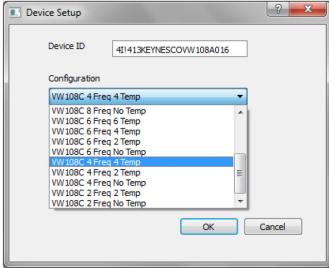
Q-LOG Windows PC Data Acquisition & Display Software

A complete version of Q-LOG without any restrictions can be download from http://keynes-controls.com/Download/QLogSetup50_21may2020.zip

Device Configuration

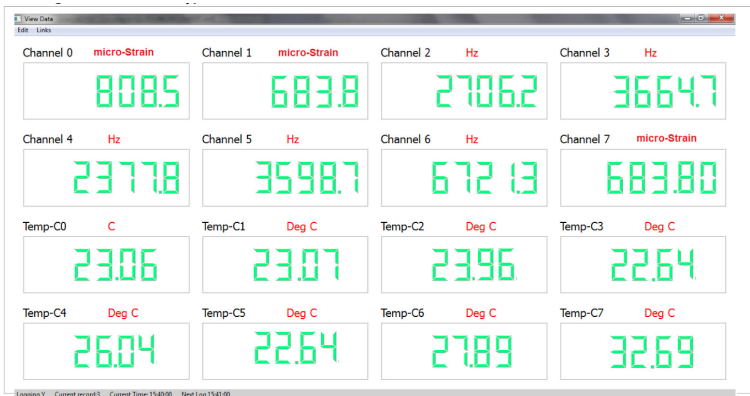
The VibWire-108 range of interfaces are all fully integrated into the Keynes Controls Q-LOG Data Recording & Display software. Q-LOG is a Windows PC-based application. The software can record measurements, configure instruments and display values in panel meters and traces. It is a free issue.

Device Type Selection Window



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



The simple pull-down menu configuration 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.

The screen can be configured

The information in this document is correct at the time of printing. Keynes Controls Ltd withhold the right to make changes without notice. Please contact Keynes Controls Ltd for the latest details regarding this product.

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:

$$X = A + Bd + Cd^2 - Dt \quad \text{where } d = \text{measured frequency in Digits.}$$

and D = Temperature Correction Coefficient
t = 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.

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.

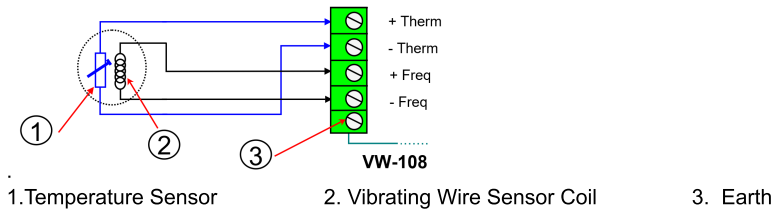


Real-time Frequency Display



Channel Selection Display

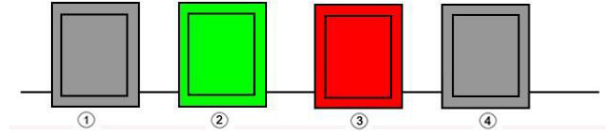
Vibrating Wire Sensor Connection



Control Keys

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

1. Menu-out
2. Down
3. Up
4. Menu-In



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. Scanning of 1 to 8 channels is User Selected.

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 SDI-12 network then the ID number is in the range 0..9 - Additional ID numbers are supported: A .. Z enabling the instruments to be used by the more popular 3rd party data loggers..

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 SDI-12 protocol	a! !!	a!\r\n a13KEYNESCOVW1080001\r\n Part description assigned by Keynes
Address query: identifies instrument address	?! Used to make command set SDI-12 compatible	A!\r\n Where a = number 0 - 9 or a - z
Change address: used to change instrument address from the Factory default setting.	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: instruct an instrument to make Measurement	%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 SDI-12 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 is 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, mV 'aD3! – Temp inputs Chans 4 - 7 deg C, mV	+xxxx.x+xxxx.x+xxxx.x+xxxx.x\r\n

Physical Dimensions

