Model: VibWire-201-Pro

Hand held Vibrating Wire Sensor Interface & Logger Unit

CE

Features:

The VibWire-201-Pro is capable of reading any Vibrating Wire sensor operating between 400 Hz and 15000 Hz which covers nearly all commercially available Vibrating Wire sensors.

The VibWire-201-Pro Handheld Readout is a portable, lightweight device that can read all Vibrating Wire sensors. It is powered by standard 4 X AA cells, has a long battery life due advanced power management and an automatic switch-off function.

The VibWire-201-pro is a read-out unit, stand-alone data logger and sensor interface for remote data acquisition systems all in one product. The readout unit can be expanded using the MUX-16/32 unit to give 16 x 4 wire or 32 x 2 wire sensor inputs.

The device supports up-to 200 User-defined sensors configuration making it perfect for site survey applications, and is fully integrated into the free Q-LOG data acquisition and display package for remote stand-alone applications.

A simple Windows configuration program enables full User configuration of the device. The Pre-set sensor configurations make site readings simple to Undertake. The large memory capacity means that the device can be left in place to record sensor data for long periods of time to record any important geotechnical event.

Automatic sensor configuration makes measurement and sensor test operations easy.

This instrument is available to hire. Call 0118 327 6067 or e-mail sales@keynes-controls.com to check availability or to place an order.

Easy Use

The VibWire-200-Pro is the latest in a range of Keynes Control vibrating wire sensor interfaces. The device has been designed from the outset for accuracy of measurement, ease of use, flexibility full of modern features.

The auto-resonance sensor excitation removes the requirement to have any prior knowledge of the vibrating sensor operating characteristics. Auto-resonance excitation produces minimum sensor wear while obtaining optimum signal to noise measurements. The VW201 automatically assigns the sensor operating frequency details.

Network Interfaces

The VibWire-201-Pro comes with built SDI-12 and RS-485 slave network ports for direct connect onto digital networks. measurements can be made remotely to a data logger or suitable PC data acquisition or SCADA system.

Fully User Configuration

The VibWire-201-Pro supports full User sensor configuration using the free applications package called VW201Cal. This software runs under the Microsoft Windows operating system and uses the micro-USB port to talk to the device.

VW201Cal is used to setup the frequency measurements into SI units, and to set the temperature sensor calibration factors. The VW201Cal software can also assign the most common thermistor calibration factors used by most sensor manufactures automatically.

PC Based Data Acquisition Solutions

The VibWire-201-Pro is fully integrated into the free Keynes Controls Q-LOG Data Acquisition & Display software enabling the device to be be for remote measurements on a network.

Features

Lightweight, Portable & Rugged

Compatible with most manufactures vibrating wire sensors

Real-time displays Freq (Hz), Digits (Hz^2/1000), SI-Units, Spectra

FFT Spectral based algorithms for interference free measurements

Auto-resonance excitation 400 - 15 K Hz range - minimises sensor stress

Fully configured sensor operations - SI Units Hz Digits - Temp Deg C

Large data storage - 100 million readings - SD Flash Cards to 32 Gb

Fast data recording - 1 sec to 6 hour logging intervals

Automatic Sensor Configuration - auto frequency range selection.

Expandable to 32 channels

In-built SDI-12 and RS-485 ports for remote network connection

Up to 200 User defined sensors for site survey applications.

Firmware up gradable device - load software revisions

No programming experience required -

Fully integrated into free Q-LOG Data Display & Recording Software

Hand Held VW Unit with FFT Analyser

Hardware Features

Device Calibration

The VibWire-201-Pro has an in-built temperature compensated crystal controlled frequency reference system that maintains the device frequency and temperature measurement accuracy for long periods of time.

The device can be used for many years without any requirement for re-calibration making it low support cost item.

Sensor Installation

The VibWire-201-Pro offers 2 x 4 wire sensor ports that can be used with a single sensor. The first port uses the standard sensor port that is common on all Keynes Controls vibrating wire devices.

The second port uses spring loaded terminal posts that enable bare wire sensor connections to the device. Any manufactures sensor can be connected to the device.

Rubber protective boot cover

Carbon fibre reinforced ABS plastic enclosure

Model   VibWire-201-Pro
Vibrating Wire Sensor - Spectrum Analyser

Digits = F² / 1000   Units

FFT Sensor Spectra

0 1 2 3 4 5 6 7 Khz   10 11 12 13 14 15

Selected sensor (0) Undefined

Frq	2534.14	HzRes	991.66	Ohm
Dig	6421.86	DgTem	52.28	C
Val	6421.86	SI		

Manufactured by Keynes Controls Ltd

Day Light Readable LCD Display

The LCD display is clear to read in most lighting conditions. A back light is available for low level light environments. Three levels or display brightness can be 'User' assigned.

Back light - LCD Screen Options for High , Low, Off.

User Defined Sensors - 200 options

Use the Windows Configuration software to assign sensor details.

Real-time Clock

Temperature compensated real-time clock accurate to 50

Menu Control Buttons

Use the Menu-In and Menu-Out buttons to select the different menu systems.

User the 'Up' and 'Down' menu keys to select the menu items.

Menu-Out	Down	Up	Menu-In

Menu-In & Power On/Off Button

Press and hold for 2 seconds the '**Menu Out**' button. The device will power on and the 'Start-up Screen will be displayed. Repeat the operation to power off the device.

Menu-Out
On/Off Button

MUX-16/32 Control Port

A B 12V G   Earth · VW-Sensor · Therm · Therm

MUX-Ctrl   Sensor Port

RS-485
D+ D- 12V G

SDI-12
S   12V G

RS-485 network port

SDI-12 network port

The 4 wire sensor port mounted at the bottom of the instrument is used a general sensor test port. Bare sensor wires can be simply connected directly into the spring terminal posts.

4 Wire Sensor Inputs + Earth

Spring Terminal Post Connectors

Fig-3

Sensor Port - 4 Wire Input

Compatible with the VW101 & VW108 units

SENSOR

Earth	Frequency Port	Temperature Port

Signal connection Posts

The VibWire-201-Pro uses 4 x AA cells to power the device. These are available from many sources and can be easily swapped on site.

Optional Protective waterproof case

Keeps the device safe while travelling and on site and stores all the accessories for easy use.

Spare batteries

4 x AA

micro-USB cable

for device configuration

Spare Flash memory card storage

Calculations

Keynes Controls use the following calculation

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

Spot-weldable vibrating wire strain gauge

Image shows the optional protective case available with the VW201-Pro

Fig-4 Optional Protective Case

Technical Specification

The current technical specification for the VibWire-201-Pro is:

Description	
Physical Size (Excluding boot cover)	Height 184 mm - Width 74 mm - Depth 32 mm
Weight	125 g
Battery	4 x AA - 2000 mA/Hr
Auto-logging no back light	6 mA - standby - 340 Hours continuous use
	20 mA/Hr with display - Low
	50 mA/Hr with display mode - Full brightness
	150 mA/Hr with MUX-16/32 - Peak (Note-1)
Communication Ports	1 x RS-485 Slave - 1200 Baud, 8 data, 1 stop, no parity
	1 x SDI-12 - - 1200 Baud, 8 data, 1 stop, no parity
	1 x micro USB configuration port
External Power Supply	10 - 15V DC @ 100 mA min specification
Vibrating Wire Measurements	
Analogue Input	24 Bit Sigma Delta
	Differential Coil (V+) and Coil(V.) for direct connection of sensor,
	excitation and resonant frequency measurement.
	Digital signal processing for excellent noise rejection.
Sensor Excitation	Auto-resonance - Fully automatic frequency selection
Operating Frequency	400 - 15 KHz
Measurement Resolution	0.001 Hz RMS - 20 to 70 Deg C
Measurement Accuracy	± 0.014% of reading - 20 to 70 Deg C
Spectral Analysis	1024 line Zoom FFT - with data weighting
Resolution	0.001 Hz
Window Function	Hamming
Update Rate	0.25 Sec typical
SI Units	Hz, Digits (Hz^2/1000), Eng Units (Quadratic Cal Factors)
Temperature Measurements	Used for temperature compensated vibrating wire measurements, and stand-alone temperature sensors for Geotechnical applications. Ratio-metric measurement. **See Note 1.**
Analogue Input	24 Bit Sigma Delta
Measurement Range	- 50 to 100 Deg C
Measurement Accuracy	± 0.25 % of reading - 20 to 70 Deg C
SI Units	Deg C
Cal Factors	Steinhart-Hart factors
	Beta Value - lower performance using Beta
Bridge Type	Half Bridge
Expansion Options	1..32 - 2 Wire Freq inputs
1 x MUX-16/32 expansion unit	1..32 - Temp (thermistor) inputs
	1..16 - 4 Wire vibrating wire sensor inputs
Scan rate	2 Sec/Chan - using expansion module
	250 ms update to screen
Memory Expansion	1 x SD Card = 1 .. 32 GB
Storage file format	CSV - Comma Separated Variables
Logging Rates	Internal to flash card
	1s, 10s, 1 Min, 10 Min, 1 Hour, 6 Hours
	MUX-16/32 Expansion
16 x 4 Wire Mode	30 Sec/Chan
32 x 2 Wire	1 minutes
No. Pre-set Sensor Configurations	20 user defined sensors options
File Type Format	DOS
Operating Temp Range	-20 to 75 Deg C
Storage temperature	>5 Deg C with batteries installed.

Note 1. The VibWire-201-Pro automatically assigns thermistor calibration factors to the industry standard temperature sensor type used by most sensor manufacturers.

Part No: MUX-16/32 Expansion Unit

Channel indicator illuminates as a new sensor is selected.

Optional expansion unit offers

32 x 2 Wire - Frequency inputs
32 x 2 Wire - Temperature inputs
16 x 4 Wire - Frequency & Temperature

Stand-alone Data Recording

The VibWire-201-Pro can act as a stand-alone data recorder in '**Single Channel**' and 'Multiplexer' modes.

In '**Single Channel**' mode the VibWire-201-Pro offers high speed data recording capability and has recording intervals from 1 second to 6 hours. The 1 second logging period enables the VibWire-201-Pro to be used for static as well as dynamic measurement applications.

Initial Start-up Screen

Frequency Results - Hz

Frequency Results - Hz² (Digits)

Natural Units (SI)

Spectra (Hz)

Wi-Fi Modem

The device can connect the VibWire-201-Pro to a local Wi-fi network using the RS-485 port mounted on the front of the device. The WiFi modem enables remote cable free operations to be undertaken.
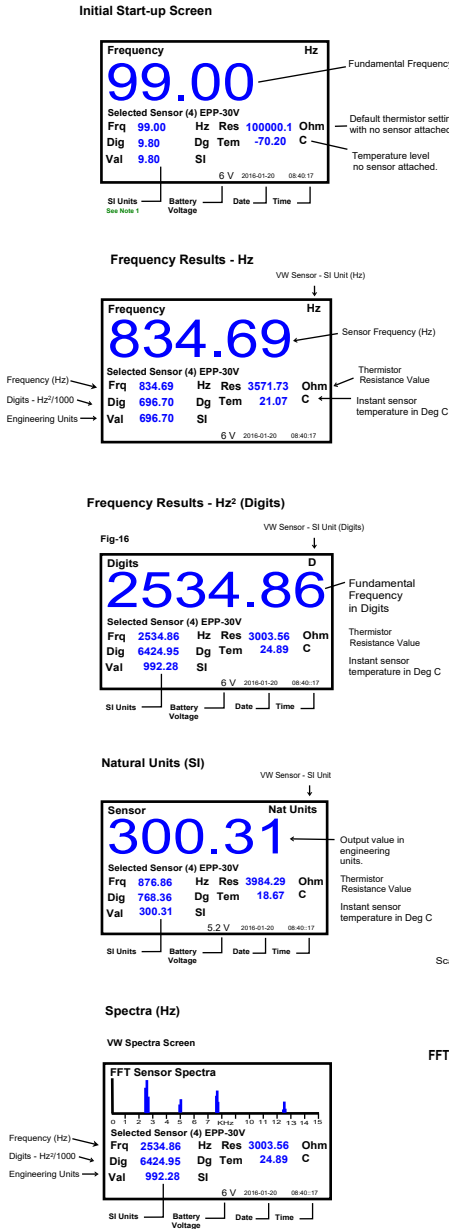
The Wi-Fi modem enables remote data in Q-LOG software.

Connection to a data logger

The VibWire-201-Pro connects to any third party data logger operating as a slave sensor interface on SDI-12 or RS-485 networks.

Fig-4 - Remote Data Transmission unit

Easy Access Results.

The VibWire-201-Pro uses a simple menu system to display the measurements in an easy to understand format.
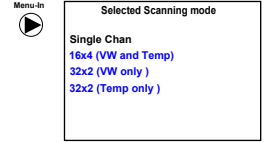
Simply press the [Down ▼] [Up ▲] buttons to from the main display to switch between the different results screens.

Channel Expansion

The VibWire-201-Pro can be expanded to record additional channels using the MUX-16/32 expansion unit, and this has to be attached to the logger

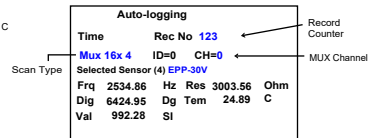From the 'Frequency' Display simply use the menu keys and navigate to the 'Scanning Mode'

menu system as shown above. Simple select the option that matches the application. The MUX-16/32 unit is automatically set to scan in the correct way.

16x4 (VW and Temp) - 16 x Freq + 16 x Thermistor
32x2 (VW only)   - 32 x Frequency
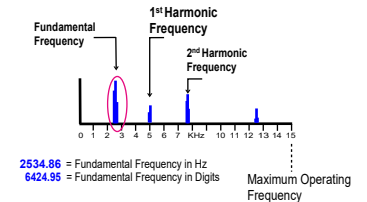**32x2 (Temp only)**   - 32 x Thermistor (Temperature)

Refer to the MUX-16/32 User manual, or the manual for this product for the wiring. Sample wiring harness for the different configurations can be obtained from Keynes Controls.

Stand-alone Data Recording

The image below shows the simple display that is presented to the User when the VibWire-201-Pro is used to record stand-alone measurements.

FFT Sensor Spectra

2534.86 = Fundamental Frequency in Hz
6424.95 = Fundamental Frequency in Digits

As long as the data logger supports the suitable protocol then it can be used with the device.

The image opposite shows the basic SDI-12 data connection to a Keynes Control logger. The connection is the same regardless to which third party

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

All Keynes Controls VW sensor instrumentations uses the digits calculation

SDI-12 / RS-485 Supported Commands

The following commands are supported by the VibWire-201-Pro and are used by data loggers and data acquisition systems. The commands have been included to allow the VibWire-201-Pro to operate easily with third party data loggers that support industry standard SDI-12 command set.

Start Measurement: m0! d0! – is the main command required to start a measurement and return the data to a logger unit or PC data acquisition system.

Description	Master	VibWire-201 Response
Acknowledge active	a!	a\r\n
Send ID: provided to complement SDI-12 protocol	aI!	a13KEYNESVWRDOA001\r\n Part Description assigned by Keynes
Address Query identifies instrument address and commonly used on single instrument operations only.	?! Used to make command set SDI-12 compatible	a\r\n Where a = ID number 0 - 9 (standard) / (a..z) Enhanced SDI-12 0 - 9 / a - z for RS485
Change Address: used to change instrument address from **a** (inital) to **b** new ID for network operations	aAb! **a** = initial address **b** = new address	b\r\n **a : b** = number 0 - 9 or a - z
Start Measurement instruct an instrument to make measurement	aM! **a** = address of instrument example 0M! starts scan for ID 0	a0261\r\n **** instrument with address a returns 1 x 4 wire reading in 1 second.
Concurrent measurement: Used for starting a measurement for all instruments on a network at the same time. This command frees RS-485 bus for other devices	aC! start measurement instrument address '**a**'	a0268\r\n initial response only after receipt of instruct and no response when data ready to be sent.
MUX-16/342 Expansion Unit	32 x 2 Wire Measurements **aM2!** aD0! aD1! aD2! aD3! - 16 x Freq **aM3!** aD0! aD1! aD2! aD3! - 16 x Freq 16 x 4 Wire Measurements **aM2!** aD0! aD1! aD2! aD3! aD4! aD5! aD6! aD7! D0-D4 = Frequency D4-D7 = Temperature	+xxxx.x+xxxx.x+xxxx.x+xxxx.x\r\n
Thermistor 1 & 2	VibWire-201 supports 3 thermistor types	
Thermistor Type 1 Temperature sensor settings Parameters from the sensor calibration sheet	aXT1RE! aXT1T0! = 25 aXT1BET!	Resistance at 25 Deg C T0 - generally 25 Deg C Beta Value
Steinhart-Hart Parameters Thermistor resistance/temp calculation	aXT1ST0! aXT1ST1! aXT1ST2! aXT1ST3!	A in Steinhart-Hart B in Steinhart-Hart C in Steinhart-Hart D in Steinhart-Hart
Thermistor Type 2 Temperature sensor settings Parameters from the sensor calibration sheet	aXT2RE! aXT2T0! = 25 aXT2BET!	Resistance at 25 Deg C T0 - generally 25 Deg C Beta Value
Steinhart-Hart Parameters Thermistor resistance/temp calculation Page 36 of the User Manual shows sample calibration data sheet using these factors	aXT2ST0! aXT2ST1! aXT2ST2! aXT2ST3!	A in Steinhart-Hart B in Steinhart-Hart C in Steinhart-Hart D in Steinhart-Hart
VW Sensor Input Channel Settings Sets the process option for frequency calculations	aXCH0FN! F = Frequency type N = VW Channel 0 .. 7	0 = output in Hz 1 = output in digits = $F^2/1000$ 2 = use formula $A + B*digits + C*digits^2 + D*temperature$ digits = $Frequency^2$ in units of Hz^2
Thermistor Temperature Calculation	aXT1TYn! a = ID n = integer 0 .. 2	0 = resistance ratio - thermistor data sheet (R_t/R_{25}) 1 = Beta value calculation $1/T = 1/T_0 + log(r)/Beta$ where r = R_t/R_{25} 2 = Steinhart-Hart equation $1/T = A + B(Ln\ R_t/R_{25}) + C(Ln\ R_t/R_{25})^2 + D(Ln\ R_t/R_{25})^3$

Additional items commonly used with the VibWire-201-Pro Unit

MUX-16/32 Expansion Unit

This device is used to expand the number of sensor inputs that can be used by the VibWire-201-Pro from a single channel to 32 inputs.

This device can be powered directly from the VibWire-201-Pro for stand-alone measurements.

USB-SDI12-Pro Media Converter

This device is used to connect the VibWire-201-Pro to a Windows PC remotely across the SDI-12 digital network. The USB-SDI12-Pro can be used to power the VibWire-201-Pro for fixed monitoring applications

The device supports all of the Keynes Controls SDI-12 sensor and interfaces, including many 3rd party devices.

The USB-SDI12-Pro isolates the network devices from the Windows PC USB port and protects it against possible damage caused by sensor failures.

USB-485-Pro Media Converter

This device is used to connect RS-485 based intelligent devices including the VibWire-201-Pro a Windows PC.

The device not only can power sensors on the network, but also isolates the PC USB port from any possible device failure in order to prevent damage to the host PC.

The device supports all of the Keynes Controls RS-485 sensor and interfaces, including many 3rd party devices.

RS-485 - WiFi Modem

This device is used to connect the VibWire-201-Pro to a data acquisition solution using a local WiFi network.

The device connects to the VibWire-201-Pro via the RS-485 port

Cable free RS-485 network interface

This device is used to connect the VibWire-201-Pro to a Windows PC running Q-LOG or any other suitable device supporting RS-485 communications.

The device acts a wireless RS-485 network enabling remote systems to be used simply created. The wireless solution is used when it is not cost effective or practical

Sensor Configuration

SI Unit = A + B(R1)+ C(R1)² + D(T)

where R1 = Current Reading
T = Temp Deg C
D = Thermal Factor

Process Option

0 = Frequency,1 = Digits, 2 = SI Units

Thermistor Calibration Factors

Thermistor Type   T0, T1, T2 ..... etc
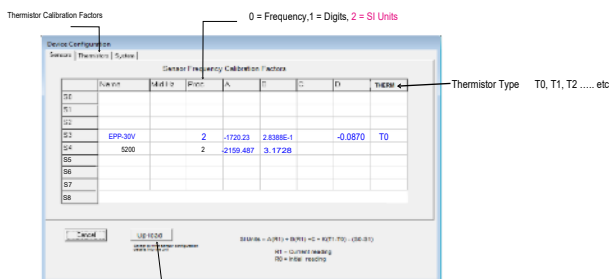
Write configuration details into the device.

Fig-10 - Window shows how the frequency component calibration factors are assigned. Details are taken from the sensor calibration sheet.
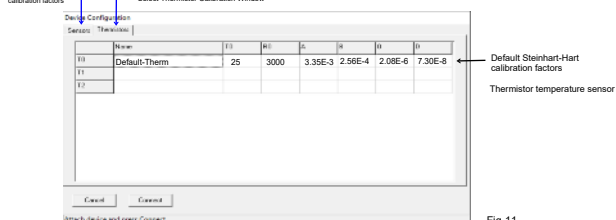
VW sensor calibration factors

Select Thermistor Calibration Window

Default Steinhart-Hart calibration factors

Thermistor temperature sensor

Fig-11

Fig 11 shows the VW201Cal Setup software used for entering the RTD calibration factors for a built in temperature sensor fitted into most vibrating wire sensors.

The VW201Cal software has preset RTD calibration factors for the most popular temperature sensor used by most 3rd party sensor manufacturers. Use this option when no manufacture supplied factors available. The Keynes Controls default factors can often supply temperature measurement results more accurate than offered by the sensor manufacturers.

Calculations

The VibWire-201-Pro can be fully User configured to give measurements in engineering units for any manufactures vibrating wire sensor. The device can be used for precision temperature monitoring using the thermistor sensor built into most manufactures sensors.

To simplify the temperature calculations Keynes Controls have built into the setup software the most common thermistor calibration factors. Simply assign the temperature sensor to the default settings and take the measurement. For many applications the Keynes Controls thermistor factors will provide a more accurate reading. Industry standard factors are automatically assigned simplifying measurement operations.

User Defined Stein-hart-Hart Calibration Factors

The VibWire-201-Pro has the facility to enter User defined Steinhart-Hart calibration factors for thermistor temperature calculations.

The calibration factors are entered into the device using the VW201cal software package. See figure 57 on Page 20. of the User Manual.

Sensor Information

A calibration report should be provided with each vibrating wire sensor and it will contain all the information required to convert Hertz, the frequency value output by the sensor into appropriate SI units (e.g., displacement, pressure etc..)

1. If the values in the Calibration Report are in digits, use the following equation to convert the VibWire-201-Pro frequency values from Hertz to digits.

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

2. Use the gauge factors and polynomial provided in the Calibration Report to calculate SI units.

The VibWire-201-Pro uses:

Calibration equation.   **Natural Units = A(R1)2 + B(R1) + C + K(T1-T0) - (S1-S0)   (Equ 1)**

and this is expanded to: **= C(R1-R0)² + B(R1-R0) + A + K(T1-T0) - (S1-S0)   (Equ 2)**

when initial conditions in the measurements are involved.   where S0 = Initial Condition (SI unit)   S1 = Current reading
T0 = Initial temperature (Deg C)   T1 = Current temperature

The additional terms used in equation 2 only change the constant parameter (A) when used.

Default Settings for the built-in vibrating Wire temperature sensor.

Under most practical applications, the default thermistor calibration factors assigned in the VW201Cal software will give accurate results without the User having to be concerned with understanding of mathematical processes involved.

Simply connect the thermistor output from the sensor to the VibWire-201-Pro and the device will instantly display the temperature.

Calibration Factor Error

Take care when using the calibration factors supplied on a vibrating wire sensor manufactures data sheet. The factors are often given from sample sensors taken from a batch and not necessarily from the individual sensor being used. Where possible ensure that the sensor manufacturer calibrates the sensor and supplies all test data so that the calibration factors can be verified.

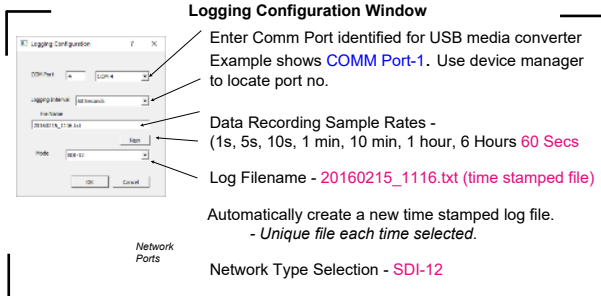## PC connection using the SDI-12 port

Part No:
USB-SDI12-Pro

PC connection using the RS-485 port

Part No.
USB-485-Pro

Cable free - RS-485 network
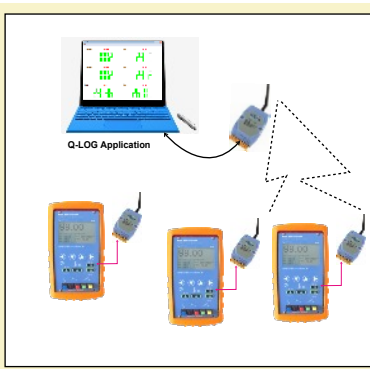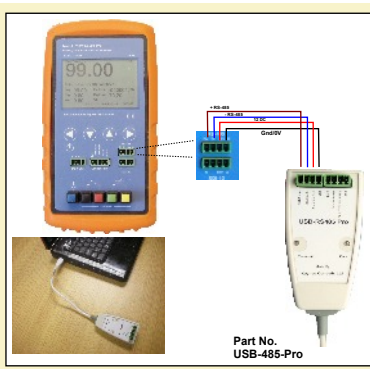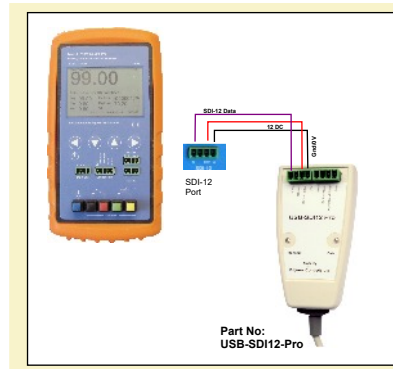
Q-LOG Application

Q-LOG Data Acquisition & Display Software

The VibWire-201-Pro is fully integrated into the Keynes Controls free Q-LOG application software. The Q-LOG software offers the User a Windows environment to control the measurement operations for the device across the RS-485 or SDI-12 networks without any programming experience being required.

Logging Configuration Window

Enter Comm Port identified for USB media converter
Example shows COMM Port-1. Use device manager to locate port no.

Data Recording Sample Rates -
(1s, 5s, 10s, 1 min, 10 min, 1 hour, 6 Hours 60 Secs

Log Filename - 20160215_1116.txt (time stamped file)

Automatically create a new time stamped log file.
- Unique file each time selected.

Network Type Selection - SDI-12
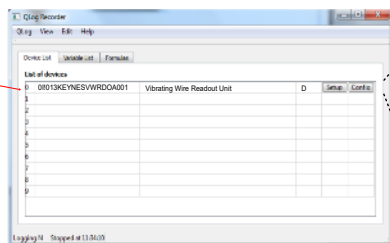
Network Ports

The Q-LOG software supports all the other Keynes Controls intelligent sensors and interfaces. It can also be configured to use 3rd party devices not manufactured by Keynes Controls.

Q-LOG software working in collaboration with the VibWire-201-Pro enables the device to be used easily in laboratory test systems and calibration applications. The recorded data files are uniquely time stamped and open directly into spreadsheet packages such as Microsoft Excel and OpenOffice Calc.
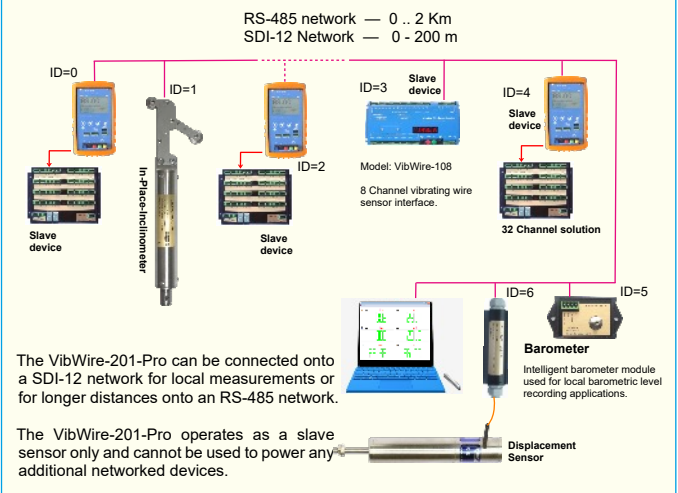
Common Keynes Controls device identifier strings.

Product	ID string
VibWire-201-Pro	13KEYNESVWRDOA001
VibWire-101 VW sensor interface	13KEYNESCOVW101A011
VibWire-108 VW sensor interface	13KEYNESCOVW108A016
PIEZO-RM water level sensor	13KEYNESCOPRESR001
Barom-SDI-12 barometer	13KEYNESCOBAROMR003
I-P-I	13KEYNESCOIPINCL005
AquaDAT sensor interface	13KEYNESCOAQUDAT008
Single channel strain gage	13KEYNESCOSTRAIN027

Q-LOG Devices List Window.

Network Application

RS-485 network — 0 .. 2 Km
SDI-12 Network — 0 - 200 m

ID=0   ID=1   ID=3 Slave device   ID=4 Slave device

In-Place-Inclinometer

ID=2

Model: VibWire-108
8 Channel vibrating wire sensor interface.

Slave device   Slave device   32 Channel solution

ID=6   ID=5

Barometer
Intelligent barometer module used for local barometric level recording applications.

Displacement Sensor

The VibWire-201-Pro can be connected onto a SDI-12 network for local measurements or for longer distances onto an RS-485 network.

The VibWire-201-Pro operates as a slave sensor only and cannot be used to power any additional networked devices.

Downloads for this product

VW201Cal setup software   http://www.aquabat.net/downloads/VW201Cal.zip
Q-LOG Software
User Manual   http://www.aquabat.net/downloads/VW201Pro-manv1.pdf

Figure 16 opposite demonstrates how the VibWire-201 is identified in the Q-LOG data acquisition and display software.

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

Fig-16

Site Survey

The VibWire-201-Pro is an ideal tool to undertake site surveys. Individual projects can be created and the route around a site defined using the sensor identification numbers. The device currently stores up to 20 pre-defined sensor type calibration factors, and up to 200 Individual sensors. A simple to use Windows program enables the sensor types, calibration factors and serial numbers to be grouped together into a project file. Each project file is loaded into the VibWire-201 using the USB port. There is no limit to how many project files that can be created.

Fig-17

Figure 17 shows a sample chamber of a tunnel construction that is to be instrumented for a measurement programme.

Table 3 below shows a summary of the sensor details used in the project. The table shows that 6 different sensor types from different manufactures are in use.

Each of the individual sensor types will have its calibration factors assigned. Figure 18 demonstrates how the individual sensor type calibration factors are assigned into the VW201Cal applications software.
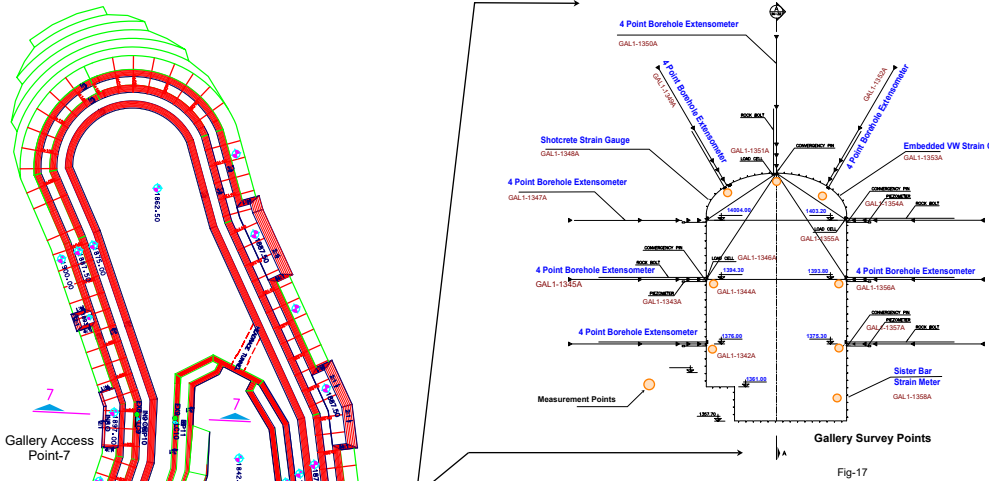
| Description	Manufacturer	Part No.	No Sensor	Site Location
4 Point Borehole Extensometer	Slope Indicator	51836140	4	GAL1-1342A
Piezometer	Encardio	EPP-40V	1	GAL1-1343A
4 Point Borehole Extensometer	Slope Indicator	51836140	4	GAL1-1344A
Load Cell	Encardio	ELC-31V	1	GAL1-1345A
4 Point Borehole Extensometer	Slope Indicator	51836140	4	GAL1-1346A
Embedded Strain Gauge	Encardio	EDS-20V-E	1	GAL1-1347A
Shotcrete Strain Gage	Encardio	EDS-30V	1	GAL1-1348A
Load Cell	Encardio	ELC-31V	1	GAL1-1349A
4 Point Borehole Extensometer	Slope Indicator	51836140	4	GAL1-1350A
4 Point Borehole Extensometer	Slope Indicator	51836140	4	GAL1-1351A
4 Point Borehole Extensometer	Slope Indicator	51836140	4	GAL1-1352A
Embedded Strain Gauge	Encardio	EDS-20V-E	1	GAL1-1353A
Piezometer	Encardio	EPP-40V	1	GAL1-1354A
Load Cell	Encardio	ELC-31V	1	GAL1-1355A
4 Point Borehole Extensometer	Slope Indicator	51836140	4	GAL1-1356A
Piezometer (Low Pressure)	Encardio	EPP-60V	1	GAL1-1357A
Sister Bar Strain Meter	Encardio	EDS-12V	1	GAL1-1358A
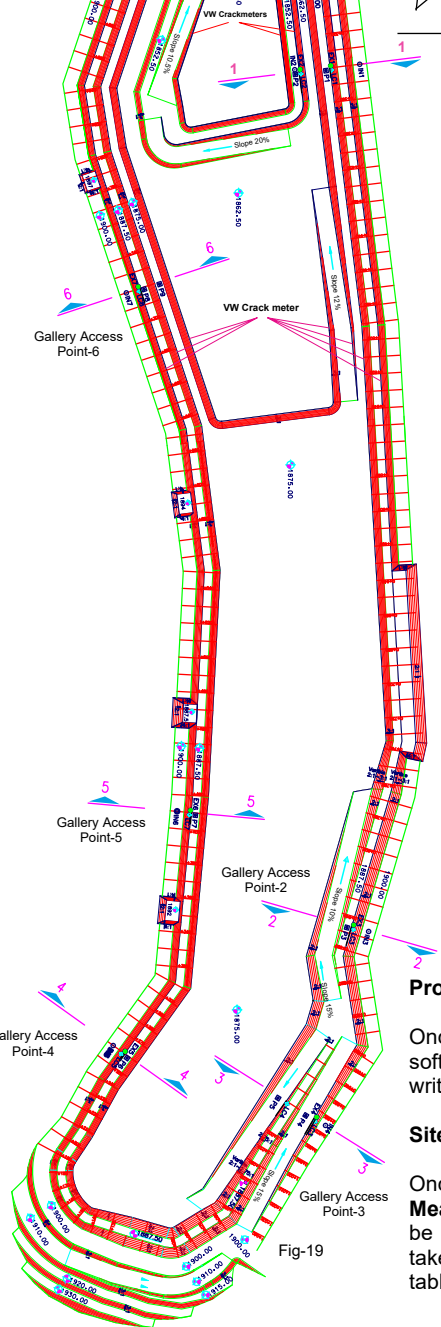
Figure 18 opposite demonstrates the VW201Cal software configured to operate with the sensors shown in the example above.

The calibration factors for each sensor are taken directly off the data sheet supplied by the sensor manufacturer. No programming experience is required, simply type in the factors and load into the device
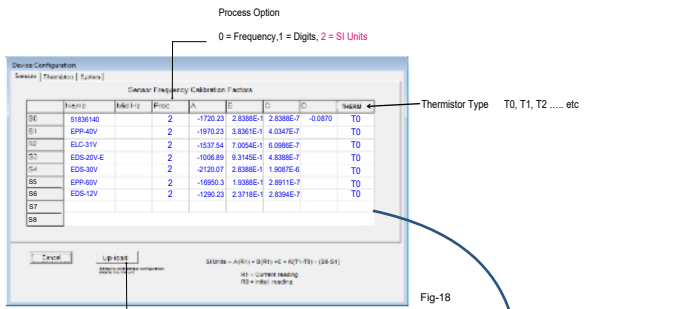

Fig-18

Programming the Device

Once all the sensors are defined into the VW201Cal software use the USB cable supplied with the device to write the site details directly into the device.

Site Measurement Projects

Once the VibWire-201-Pro is configured for '**Single Measurement**' mode the Site measurement projects can be easily undertaken. The sensor measurements are taken in the order they are defined in the device setup table shown in Figure 18.
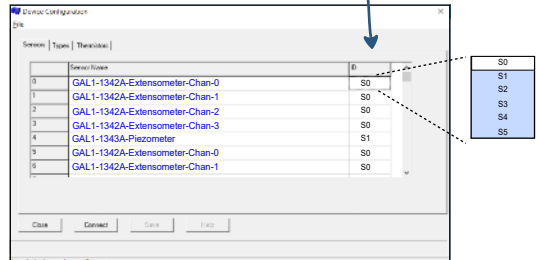

Fig-19

Stand-alone Recording Solution

The VibWire-201-Pro has the ability to be expanded using the MUX-16/32 expansion unit. This interface gives the VW201-Pro the ability to scan single channel, 32 x 2 wire and 16 x 4 wire sensor inputs. The device can be set to record stand-alone measurements making the device suitable for on-site sensor testing applications. The spectral display shows directly if the measurements are noise free and the sensors installed correctly. The device can handle frequency and temperature inputs.