Quick User Guide

OEM Customised Product - Contact Keynes Control Ltd for more details
Tel: 0118 327 6067 or sales@keynes-controls.com

The following document is a quick user guide for the operation of the single channel SDI-12 and RS-485 voltage input cards.

Part No: **NP-Volt-GN-1-'Network'**

where GN = Gain Network = 'SDI12 or RS485'.

The single channel cards can be seamlessly used with the Keynes Controls USB media converters and data loggers, or any third party hardware supporting suitable communications interfaces.

The simplest and lowest cost option for creating a data acquisition system is to use the free Q-LOG data acquisition and display software along with one of the USB-SDI12-Pro or USB-SDI12-Pro media converters.

This guide demonstrates how to install the range of interface cards onto the communication networks, and the basic operation of the Q-LOG software.

The connection of the NP-Volt-1-GN-1 cards to the communication networks is the same, regardless if a keynes Controls product or 3rd party device is used.

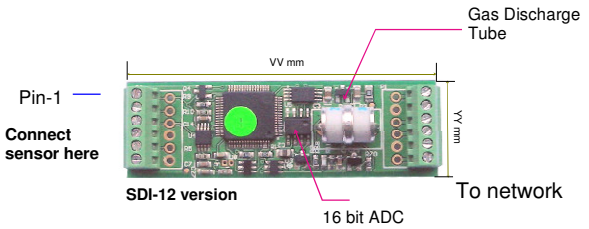


Image is for marketing purposes only
The supplied card may differ slightly from the image below.

Q-Log Application

Download Q-LOG

Download a copy of Q-LOG at

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

AquaLOG / 3rd Part Logger

or

USB-SDI12-Pro

SDI-12 Port

Part No. USB-SDI12-Pro

Isolated USB - SDI12 media converter.

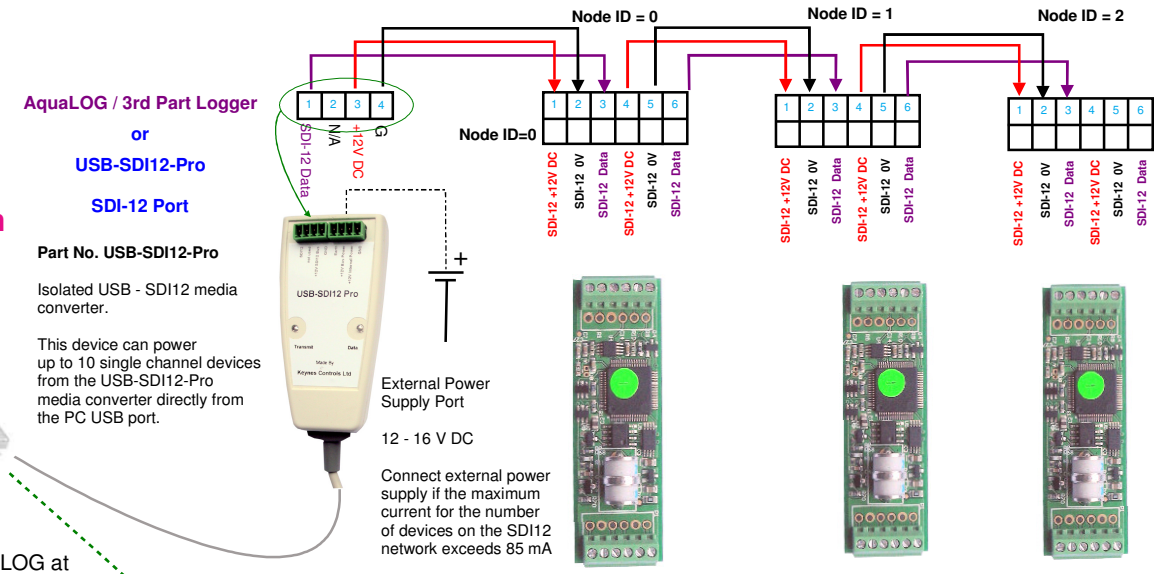
This device can power up to 10 single channel devices from the USB-SDI12-Pro media converter directly from the PC USB port.

External Power Supply Port

12 - 16 V DC

Connect external power supply if the maximum current for the number of devices on the SDI12 network exceeds 85 mA

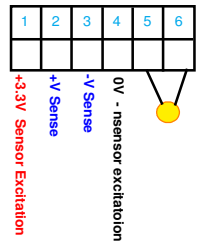
SDI-12 Network connection for multiple devices



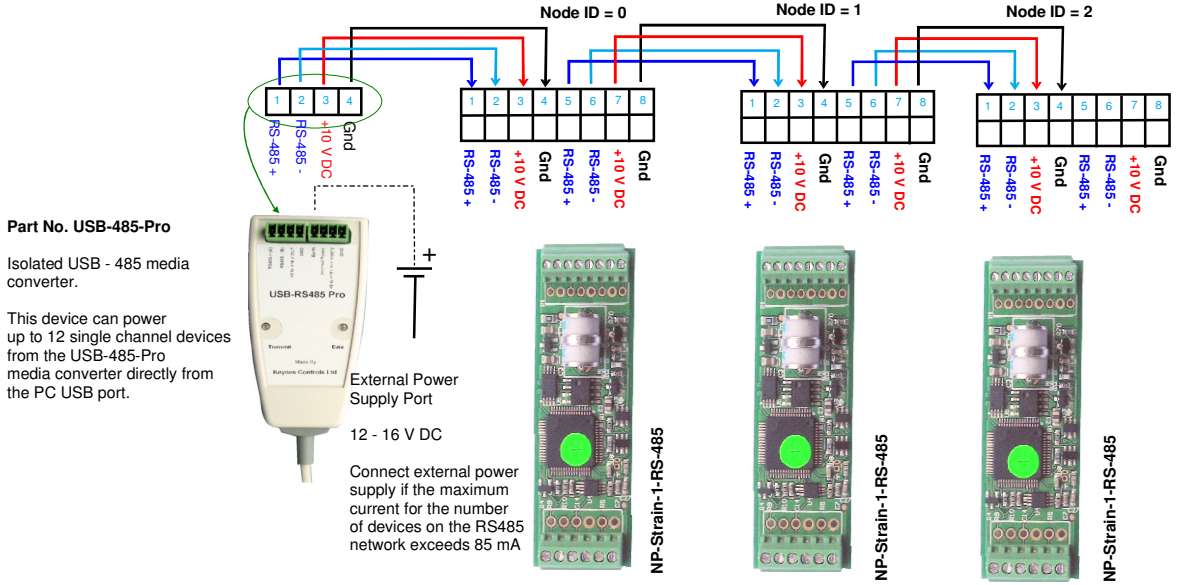
Sensor Connection

voltage Gauge Port Pin-out

View looking into port



RS-485 Network connection for multiple devices



Part No. USB-485-Pro

Isolated USB - 485 media converter.

This device can power up to 12 single channel devices from the USB-485-Pro media converter directly from the PC USB port.

External Power Supply Port

12 - 16 V DC

Connect external power supply if the maximum current for the number of devices on the RS485 network exceeds 85 mA

1. Set the USB-SDI12-Pro COM port

2. Plug the USB-SDI12-Pro media converter into the PC.

3. Identify the active COM port in the operating system using the 'Device Manager'.

The driver software will load automatically if an Internet connection is available. The drivers are often supplied as standard in the Windows Operating Systems.

Supported Operating Systems

The Q-LOG software support is supported on Microsoft Windows XP, 7, 8 operating systems.

1. Download and install a free copy of the Q-LOG software.

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

2. Set the USB-SDI12-Pro COM port

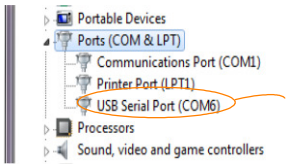
Plug the USB media converter media converter into the PC.

Identify the active **COM port** in the operating system using the '**Device Manager**'.

The driver software will load automatically if an Internet connection is available. and drivers are often supplied as standard in the Windows Operating Systems.

The example in Fig XX shows COM port 6 in use. Remember to check which COM port is in use after removal and re-installation of one of the media converters.

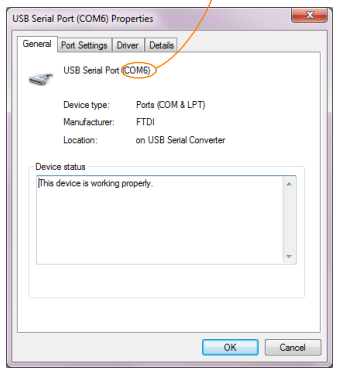
Windows Operating System



COM 6 is shown identified by the operating system as being in use

Windows device manager

COM 6: This is the port number used in the Q-Log setup to identify the media converter dongle port. (Fig XX)



The device manager Window may appear different from the image above and will depend upon the version of the operating system being used.

Part No: USB-SDI12-Pro media converter

Part No: USB-RS485-Pro media converter

Q-Log Application

Download Q-LOG

Download a copy of Q-LOG at

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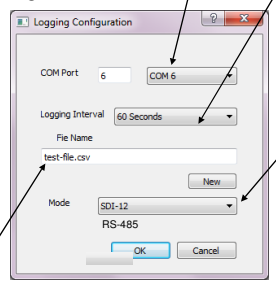
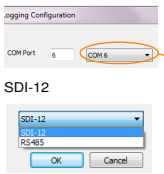
Sample Q-LOG Configuration Window

COM Port Selection List

Sample Rate

Logging Configuration Window





Enter the COM Port number identified in the 'Device Manager' list here.

Select the Network Type

The network type is printed on the label of the media converter

Select: SDI12 for USB-SDI12-Pro or RS-485 for the USB-485-Pro device

Data Log File Name & Storage Location

Installation to a network

1. Connect the network cables and network connections onto the NP-Volt-GN-1 card. See Figures 11 & 12.

2. Slide the sensor gland plate and with attached gland over sensor cabling making sure that the gland opening is wide enough no to interfere with wiring.

3. Attach the network cabling to the network port on the NP-Strain-1 card.**4.** Screw the gland plate into the tube and secure. Lock down the cable glands to grip securely the wiring. This action secures the cards into place and provides the environmental protection and will look like Fig 13 when finally assembled.

Direct Connection to a Windows PC

Each of the single channel cards, regardless of type can be combined into a single system and powered directly from the laptop/PC USB port.

When fitted inside a NP-Case-1 enclosure they remain safe from local environmental effects making them perfect for remote stand-alone applications.

Engineer Units

The NP-Strain-1 range of cards can return data values directly in engineering units

SDI-12 Command: aXCn,value!

$Y = [0] + [1]*S + [2]*S^2 + [4]*t*S + [5]*t*S^2$

where Y = Output Engineering Units
S = Sample reading from device
t = temperature (compensation)

[0] = Offset [1] = Gradient (m)

(Calibration factors for linear interpolation only)

Example - enter linear interpolation values for a device with ID = 5. Offset = 520.06, m = 6.1453

[0] = 520.06 [1] = 6.1453 (m)

Start measurement: **5M!** - get data **5D0!**

ID=5

Set offset [0] with command 5XC0,520.06!

Set Gradient (m) [1] with command 5XC1,6.1453!

Results are now in engineering units Y(Engineer units) = [520.06] + [6.1453]*S

Lasted updated: 17/07/2015

Q-Log Quick User Guide

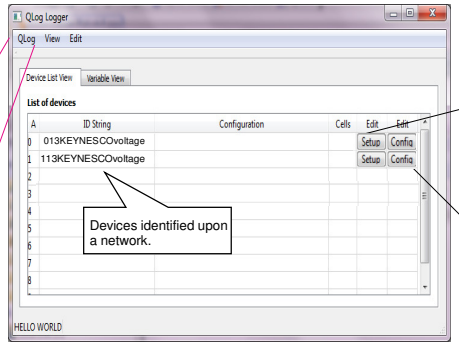
Scan for Devices

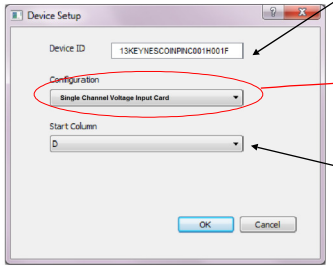
The Q-Log software scans the network and lists the identified instruments automatically.

The network to be scanned is that specified in the '**Device Setup**' Window.

'Q-Log Data Recording' Window:

Display Identified Instrument/sensor list.





Device Identification String
Preset into the sensor or interface

Sensor Option Selection
Enables different sensor options to be used. **Important you use this option**

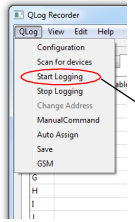
Select 'Single Channel Voltage Card' from pull down list

Assigns the start cell of the sensor data into the data table making up the log file.

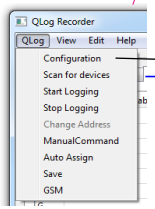
First cell where measurements can be stored is '**Cell D**'

A .. IU - Excel spreadsheet format.

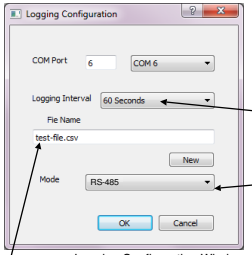
Start Data Acquisition



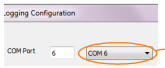
Only start data logging upon identifying instruments on a network.



COM Port Selection List

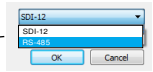


Logging Configuration Window



Enter the COM Port number identified in Device Manager List here.

Sample Rate



Select the Network Type

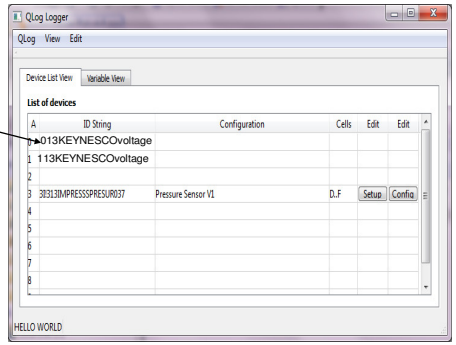
The network type is printed on the label of the media converter

Select: SDI-12

Data Log File
Name & Storage Location

After '**Scan for devices**' option selected the the following Window will be shown.

The sample sensors have ID=0 and ID=1



Sensor ID=0

Once this Window is displayed it means that the USB-SDI12-Pro media converter and the single channel interface cards are installed and operating correctly.

SDI-12 Logger Commands

Use the following commands to start a measurement and receive data from the devices.

Start measurement: 0M! returns 012 - 1 sec response 2 values
0D0! returns 0+'Meaurement' +temp

Engineering Units

All of the voltage gauge cards can be set to give measurements in engineering units. Refer to the manual for details of the setup.

Excel Spreadsheet Data Results

First data cell

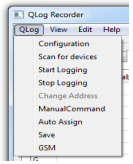
A	B	C	D	E	F
Record No	Date	Time	236.01	323.5	

When a results file is loaded into Excel the file format will be as shown.

Voltage mV Temp Deg C

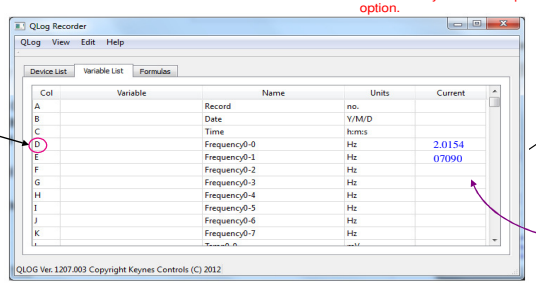
Important Note. To get data from sensor with ID=0 automatically into Cell 'D' press the auto assign option.

Auto-Assign Results Table



Cell D

Press the 'Auto Assign' button so that the data from the sensors fits in consecutive cells in the data table.



Real-time results updates after each acquisition.

IMPORTANT NOTE. This is the default screen that is displayed. Refer to the Q-LOG manual for changing the '**Name**' and '**Units**'

Micro-voltage
ID=0 Temp D

Part Number

Wiring Guide - NP-Volt-1-RS485 Interface Card

The images below demonstrate the complete set single channel signal interface kit available from Keynes Controls Ltd.

The NP-Case-1 forms an environmentally sealed enclosure for all of the Keynes Controls range single channel intelligent of interface cards, and is made from an PVC plastic tube and is sealed using removable cable glands fitted to gland plates. The tubes seal out the effects of the environment such as moisture and the ingress of dust.

For additional protection waterproof gaskets and IP-65 rated cable glands can be used.

Single Channel Voltage Input Card - RS485 Communications

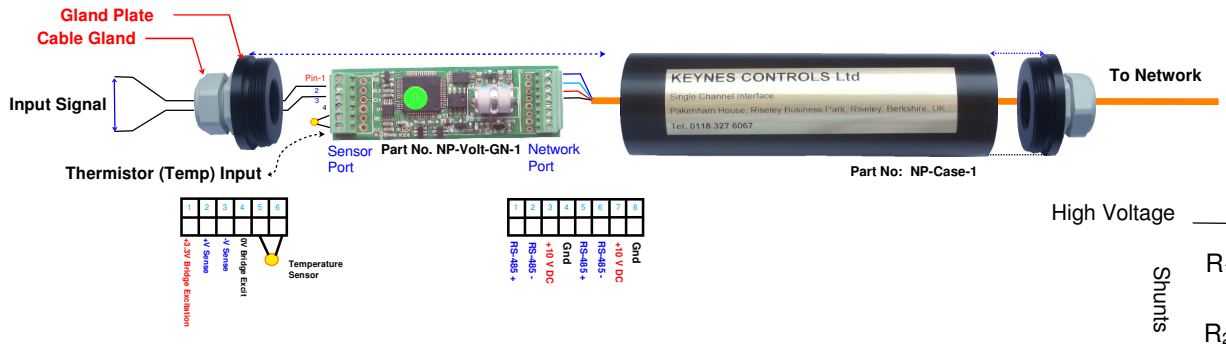


Fig-11

Image below shows the NP-Case-1 sealed for environmental protection.

Fig-13

Single Channel Voltage Input Card - SDI-12 Communications

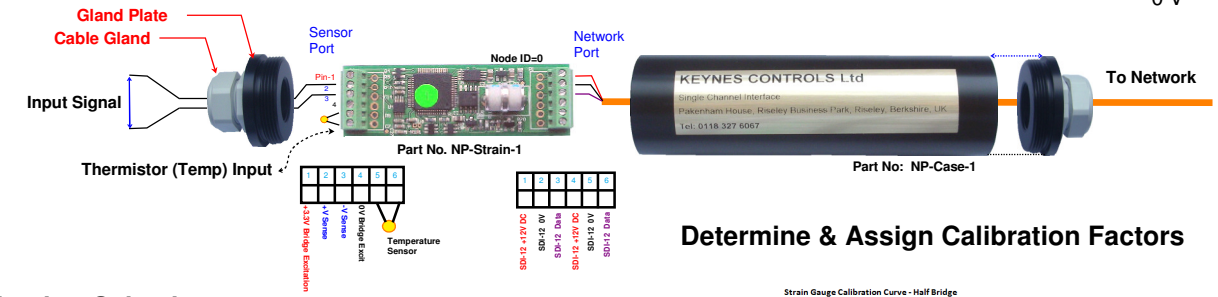
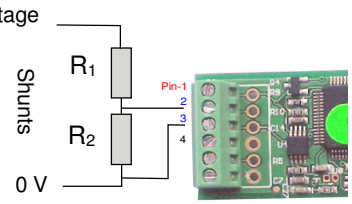


Fig-12



High Voltage Measurements

To measure input signals of higher value than can be directly connected to the cards, then a shunt resistor has to be used.

As a rule of thumb ratio R1:R2 = 10:1

Download Q-LOG

Download a copy of Q-LOG at

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

Part Number Selection

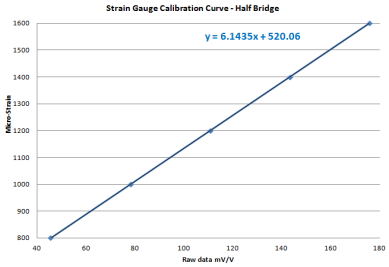
Single channel intelligent voltage input cards.
The standard input range for this product range is ± 5V

NP - Volt- GN- 1 - Network Type

where GN = Gain 1, 10 , 20, 100 Network Type = SDI-12 / RS485

Part No	DESCRIPTION
NP-Volt-1-SDI12	+/- 5V single channel Card - SDI12 network
NP-Volt-10-SDI12	+/- 500 mV full scale single channel - SDI12 network
NP-Volt-20-SDI12	+/- 250 mV full scale single channel - SDI12 network
NP-Volt-100-SDI12	+/- 50 mV full scale single channel - SDI12 network
NP-Volt-1-485	+/- 5V single channel Card - SDI12 network
NP-Volt-10-485	+/- 500 mV full scale single channel - 485 network
NP-Volt-20-485	+/- 250 mV full scale single channel - 485 network
NP-Volt-100-485	+/- 50 mV full scale single channel - 485 network

Determine & Assign Calibration Factors



Example Calibration Commands

aXC0,offset! aXC1,scale!

Example - Using the sample test data above and Set calibration factors for device with ID = 3 to Scale = 6.1435 and offset = 520.06

SDI-12 Commands are 3XC1,6.1435! 3XC0,520.06!

Results are now in engineering units.

Output (Eng Units) = 6.1435. mV/ V_{in} + 520.06

Raw Data mV/V	Calibration Points micro-Strain
45.567	800
78.12175	1000
110.6765	1200
143.2313	1400
175.786	1600

$Y = [0] + [1]*S + [2]*S^2 + [4]*t*S + [5]*t*S^2$

Becomes

Y(Engineer units) = [520.06] + [6.1453]*S Example

The following data points were measured under test conditions using a strain gauge calibrator.

Use a simple linear regression to determine calibration curve used to convert measured values directly into engineering units.

The simplest way to determine the calibration factors is to use a spreadsheet package such as the Microsoft Excel.

Plot the test data into a Scatter Plot and have Excel determine and show the curve parameters.

A worked example of using a Scatter plot the test data shown above is shown in Fig 12.

Calibration Factor Calculations

Paste the test data into a spreadsheet.
Select and display the sample test data in a Microsoft Excel Scatter Chart.
Use the Trend Line format operations and select '**Linear**' and '**Display Equation on Chart**'.

The factors shown in the linear equation is used to convert raw data into engineering units.

A quadratic calibration equation can be used should this be proved suitableRef
Refer to Microsoft Excel User Guide for further details.