



# Crack Meter Interface - SDI12 Network

Intelligent single channel potentiometer sensor interface card with SDI-12 digital communications.  
Part No: NP-POTR-1-SDI12



OEM Customised Product

## Introduction

The NP-POTR-1-SDI12 card is one of the range of Keynes Controls intelligence sensor interface cards designed for use with resistive crack meter sensors, potentiometric and draw wire resistance based sensors.

The NP-POTR-1-SDI12 card operates with all other Keynes Control sensor interface cards and intelligent interface units on the same network. A wide range of applications can be created using the range of interface cards available from Keynes Controls. All cards are supported by the **free Q-LOG Data Acquisition & Display Software**.

The card is fully compatible with any SDI-12 based data logger unit and the Keynes Controls range of media converters.

The NP-POTR-1-SDI12 uses the same command set as all of the other Keynes Controls devices and will operate with 3rd party SDI-12 network data loggers.

## FEATURES

- In-built Signal Conditioning
- 16 Bit ADC
- Temperature sensor option
- 1 x SDI-12 Port
- Free Windows applications software.
- Easy Calibration
- Daisy Chained Network Support
- In-built statistical processing
- Raw & Engineering Units Output
- Customised Identifier String

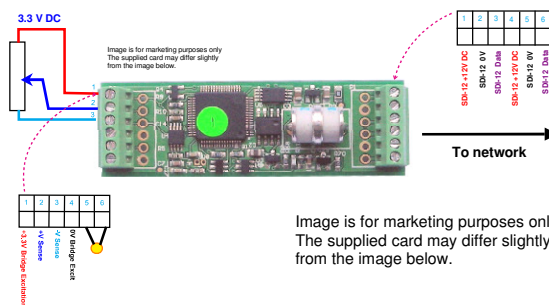
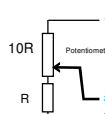
## Download Q-LOG

Download a free copy of Q-LOG at

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

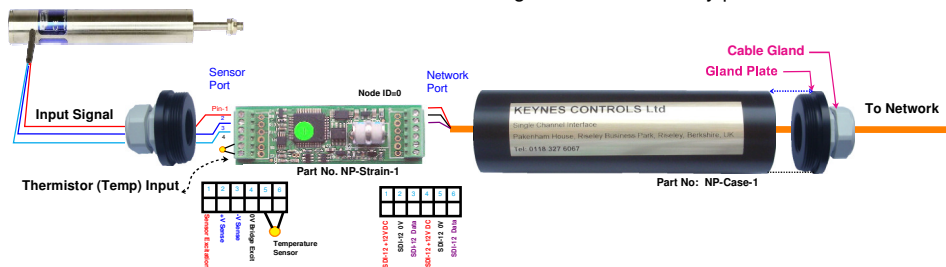
## Potentiometer Sensor Input

The circuit above shows how to connect the sensor to the NP-POTR-1 card.



## Crack Meter Interface fitted into environmental enclosure

The image below demonstrates how the NP-POTR-1 card fits into its custom designed environmentally protected enclosure



## SDI-12 Commands

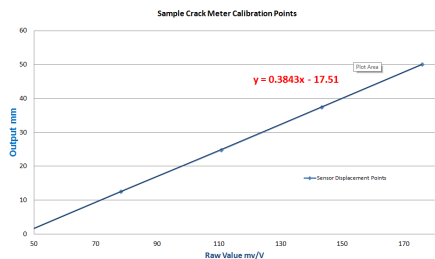
Use the following commands to start a measurement and receive data from the devices.

Simple Measurement Commands:

- 0M! returns 012 - 1 sec response 2 values
- 0D0! returns 0+'Measurement'+temp

## Sample Test Data & Engineering Unit Configuration

The NP-POTR-1 card can be configured to give data values directly in engineering values. This is a simple operation to setup and use. The NP-POTR-1 cards are factory calibrated regarding the analogue measurement operation. Calibration factors are set using standard SDI-12 command operations.



## Sample Test Data

Raw Data mV/V	Calibration Points micro-Strain
45.567	0.0
78.121	12.6
110.676	24.9
143.231	37.5
175.786	50.1

## 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 = **0.3843** and offset = **-17.53**

SDI-12 Commands are **3XC1,0.3843! 3XC0,-17.53!**

Results are now in engineering units.

Output ( Eng Units) = **0.3843** . (Raw value in mV/ V<sub>in</sub> + **520.06**

Part No. USB-SDI12-Pro  
Isolated SDI-12 to USB media converter

Part No. NP-POTR-1-SDI12  
Single channel strain gauge interface with SDI-12 digital network.

## Q-Log Application



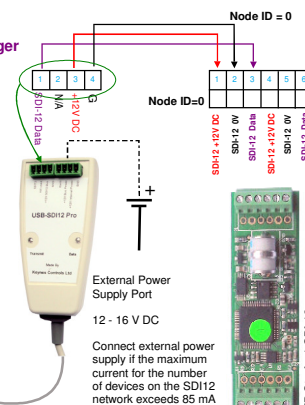
AquaLOG / 3rd Part Logger

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.

Sensor Connection



The following data points were measured under test conditions using a gauge calibrator. The sensor used has a 50 mm range. The calibration factors used in this example are calculated using the above test data.

Use a simple linear regression to determine calibration curve used to convert measured values directly into engineering units. The greater the number of reliable points used, the more accurate the calibration curve will become.

The linear equation 'Y = 0.3843. X - 17.51' is taken from the Excel Plot using the test data values shown in the table above.

## Calibration Factor Calculations

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'.

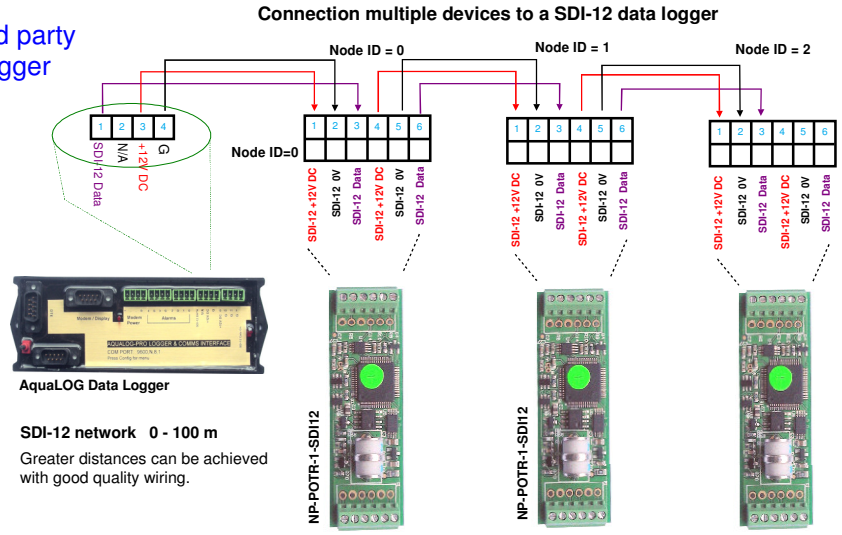
The equation shown is used to convert raw data into engineering units.

## Technical Specifications

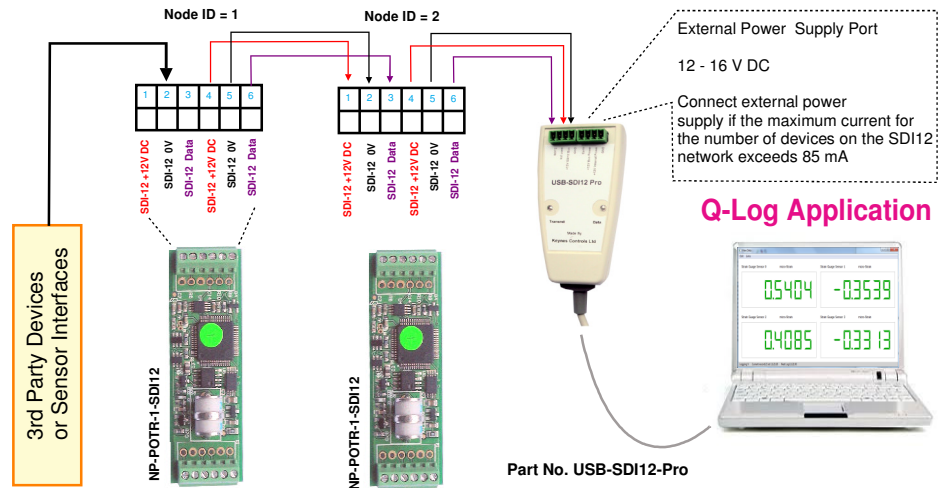
Specifications are accurate at the time of publishing but can be changed without notice.

<b>Power Supply</b>	10 -18 V
<b>Current</b>	2 mA at acquisition 10 uA standby
<b>Input Range</b>	+/- 0 - 2.5 V Other ranges on request
<b>SDI-12 Port</b>	1 x Port Version 1.03
<b>Max update rate</b>	1 sec
<b>Cable Clamp Size</b>	2 mm diameter
<b>Sensor Excitation</b>	3.3 V DC
<b>Raw Value</b>	Raw data mV/V
<b>Engineering Value</b>	mm, m, ft, Inch, cm User defined
<b>Range</b>	User defined, depends on sensor installed
<b>Temp Sensor</b>	Thermistor
<b>Thermistor Type</b>	3 K EC95 F type material 10K 3A1 Betatherm
<b>Calibration</b>	Steinhart-Hart Built Pre-defined Set at manufacture
<b>Accuracy</b>	0.05 Deg -8 to 25 Deg C
<b>Range</b>	-30 to + 60 Deg
<b>Units</b>	Deg C / Deg F user select
<b>RMS Noise</b> (Typical values)	less than 1 uV/V less than 0.01 Deg C
<b>PCB Dimension</b>	
<b>Length</b>	60 mm
<b>Width</b>	19.7 mm
<b>Max depth</b>	11.2 mm
<b>Cable Entry</b>	1 m Screw terminal
<b>Number Channels</b>	1
<b>Gauge Resistance</b>	120 - 1K Ohm
<b>Gauge Factor</b>	User Defined
<b>ADC</b>	16 Bit
<b>Statistics</b>	
<b>Input</b>	Max, Min
<b>Temp</b>	Max, Min

## Any third party Data Logger

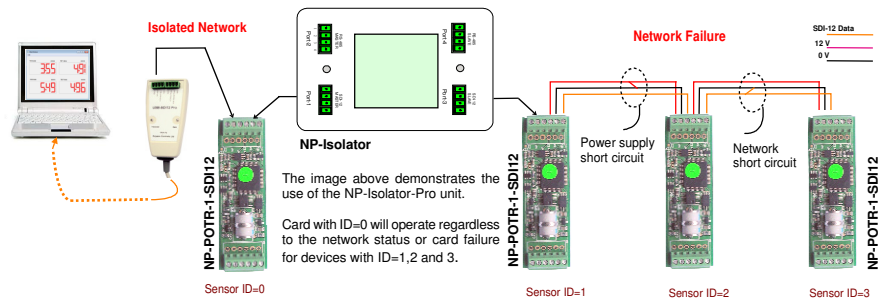


## Connection multiple devices to a USB-SDI12-Pro media converter



## Isolated Network Operations

In applications where the SDI-12 intelligent sensors and interfaces are being used in harsh environments, or hard to access locations, and where long term stand-alone operations are desired, then the NP-Isolator module should be used to protect the NP-POTR-1-SDI12 cards and/or additional devices connected to the network.



## Isolated Network Operations



This device protects intelligent

**Part No. NP-Isolator**

Isolated network and media converter  
Isolated SDI12 - SDI-12 Network Conversion.  
Isolated SDI12 - 485 Network Conversion.  
Isolated RS485 - SDI12 Network Conversion.

This device is powered by directly from the network on to which is connected.

**Download datasheet at:**

<http://www.aquabat.net/downloads/NP-isolatorv1.pdf>



The **USB-SDI12-Pro** media converter connects to a Microsoft Windows laptop or PC, and powers SDI-12 based sensors and interfaces directly from the USB port.

**Part No. USB-SDI12-Pro**

Isolated USB-SDI12 media converter

**Download datasheet at:**

<http://www.aquabat.net/downloads/Installation-USBSDI12-Pro-V1.pdf>

Command	Response	Description
aM!	a0tt2	2 values in time tt given by stats
aD0!	a+0.123+25.5	Raw data/ Engineering value & temperature values
aD1!	a+0.1299+0.1201+25.9+25.0	Statistical values max S, min S, max T, Min T
a!	a13KEYNES COPRESR001	Identification string
aXUTu!	au	Temperature units u=0 → Celsius, u=1 → Fahrenheit with read back
aXCn,xxxx	an,xxxx	Calibration data (No temp compensation - default) E = [0] + [1]*s with read back. s is in mV E is in engineering units
aXFt,nn,xxxx!	at,nn,xxxx	Ensemble Averaging Command t → filter type (should be 0 - mean only) nn → number of filtered values 1 to 12 xxxx → interval between beasurment * 200ms
aXTHMT(0..1)	a+0/1	Thermistor type selection 0 → default = 3.3 K <b>Material type F - Model EC95</b> 1 → 10 K Ohm <b>Model 10K3A1 Betatherm</b>