User Guide

Loadsensing Analog 4 channel Datalogger
(LS-G6-ANALOG-4)

Version 1.9

WORLD SENSING

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Before starting to use Analog Data logger

Please read these instructions carefully and ensure that the required conditions specified in this document are met before using the product. Each of our edge devices includes this information inside the packaging

General warnings

- Follow these precautions to avoid a battery explosion or leakage of flammable liquid or gas:
  - Use the correct battery type. Dispose of the batteries according to instructions. Do not dispose of the batteries by throwing them into a fire or a hot oven, or mechanically crush or cut them.
  - Do not leave the batteries in an extremely high-temperature environment.
  - Do not subject the batteries to extremely low air pressure. It may result in an explosion or leakage of flammable liquid or gas.
  - Do not short circuit the batteries. This will blow the protection fuse.
- Batteries and equipment to be connected via the data port must meet IEC 62368-1 ES1 and PS1 requirements.
- Equipment to be installed in restricted access areas.

Symbol	**Description**
	Caution. Do not proceed until the instructions are clearly understood and all required conditions are met.
	Read the instructions for use carefully before using.
	Caution, hot surface.
	According to the European Union WEEE Directive 2012/19/EU, this product and its batteries should not be discarded as unsorted waste. Please send them to separate collection facilities for recovery and recycling. It is your responsibility to dispose of your waste equipment and batteries properly. The correct disposal of your old equipment and batteries will help prevent potential negative consequences for the environment and human health.

Overview of the Loadsensing Analog Devices

This user guide explains the basic procedure for configuring and operating Worldsensing's Loadsensing LS-G6 analog node (LS-G6-ANALOG-4). You can find further technical details in our data sheets.

The Loadsensing analog data logger is a 4-channel low-power, long-range wireless edge device. This logger admits most inputs from analog sensors, such as voltage, 4-20mA, potentiometer, FWB, thermistor or PT100, allowing it to easily connect load cells, strain gauges and pressure cells .

The Loadsensing analog data logger can also be used as a standalone logger for manual monitoring. It can be configured easily and connected with a USB cable and an Android phone.

Loadsensing analog nodes can be used for geotechnical applications in civil works, tunnel construction, landslides and mining and other industrial applications.

Analog Datalogger Specifications

You can check the Analog datalogger specifications here

Equipment provided

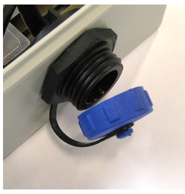
When ordering the code LS-G6-ANALOG-4 the set will contain the following items:

- Analog data logger.
- Antenna.
- Antenna adapter.

The following items are not included:

- A USB-OTG configuration cable.
- Batteries.
- A grounding connector.
- Mounting support .

The analog logger comprises the following parts:

Aluminum alloy case	
An easy to use grounding screw	
Accessible IP68 USB for communications and external powering with mini USB B female connection	
RP N female connector	

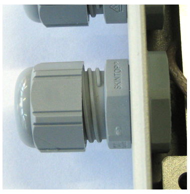
Male RP N connector to RP - SMA male and aerial with RP - SMA male.	
4 Cable glands to connect sensors (clamping range Ø4.5-Ø10mm)	
Gore valve	

Table 1: Summary of the most relevant mechanical parts from the analog logger.

Data Logger Mounting accessories

The accessories that can be used for attaching the analog nodes are available on the Accessories List document in our knowledge base.

Depending on the application and the conditions of the site, the analog node can be mounted:

- On a wall, using a metallic (LS-MEC-MP-001) mounting support.
- On a 35-mm or 50-mm mounting pole, using an aluminum mounting plate (WS-ACC-POLE-PL8). Nuts and U-bolts for pole diameter of less than 35 mm and 50 mm can be also purchased (WS-ACC-U35 and WS-ACC-U50).
- Inside a manhole, with a plastic or metallic cover. No special accessories are available for this type of mounting. Even though the data loggers are IP67 certified, if they are closed following the instructions in the chapter on water

tightness document, we strongly recommend reading the Data Logger Installation in Manholes guide.

Sensor interfaces

Analog datalogger can power sensors at 5/12/24 VDC up to 60 mA and provide compatibility with the following interfaces within the specs presented on the chapter *analog datalogger specifications*:

- Potentiometer
- Full Wheatstone bridge (FWB)
- current loop (2-3 wires)
- voltage
- Thermistor
- PT 100

The node has 4 channels and the first one includes 3 control ports, that are reserved for custom applications, plus eight additional connectors :

- 01
- I/02
- I/01
- ground terminal *AGND*
- *4-20* mA terminal
- Control terminal *CE1N*
- sensor out *CH-*
- sensor out *CH+*
- *CEIP* terminal
- *5V* input terminal
- power input (12/24 VDC) *PWR*

Image 1: Channels and connectors from the analog logger.

The other 3 channels (2,3 and 4) contain the 8 connectors quoted from above.

The data logger has a cable gland for each channel, to allow adjusting different sensors. The clamping range is from Ø4.5 to Ø10mm .

The terminal blocks accept wires prepared by stripping a short length of insulation from the end.

After wiring the sensors to each terminal block, we recommend taking some sensor readings with the Worldsensing App to make sure the connections have been made correctly. This will also help in checking that the sensor is correctly wired to the logger and the sensor wires.

A. Potentiometer/Ratiometric

The recommended sensor input voltage is 5V within a resistance range from 1 K to 10 K.

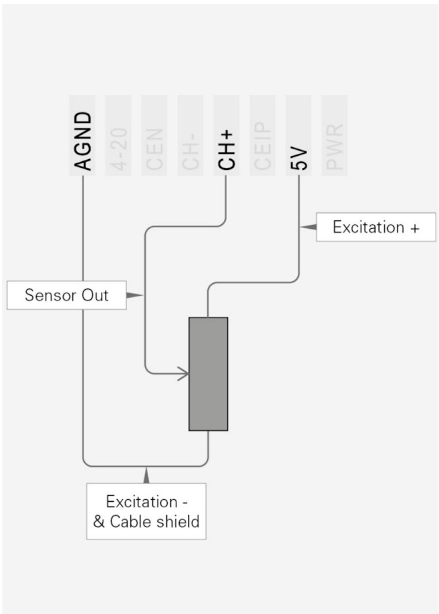


Image 2: Summary of the most relevant mechanical parts from the analog logger.

B. Full Wheatstone Bridge interface

For this interface the output is not influenced by the output excitation variations as it is a ratiometric measurement, but errors due to long cable length are not compensated, so the longer the cable the higher the error. The datalogger specifications are:

- Output excitation 5VDC up to 60 mA . This means that we could power up to 4 FWB sensors from 350 Ohm
- Measurement range: +/-7.8mV/V which equals to +/-39mV@5V excitation voltage.

This interface is prepared to read sensors with the next topology:

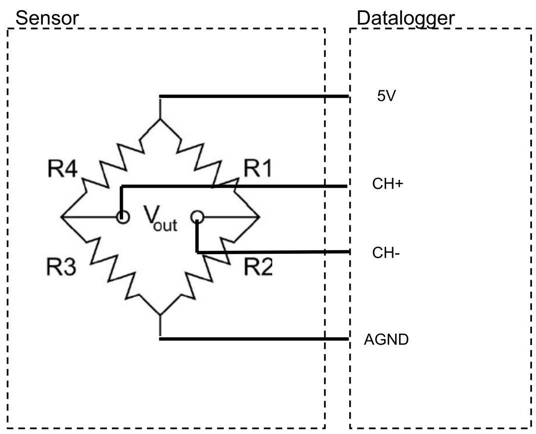


Image 3: FWB sensor and its pinouts

Note: Uncompleted wheatstone bridge sensors can not be read by the Analog node, but the full bridge could be completed externally

6 wires wheatstone bridge could be read as 4 wires but cable length error will not be compensated

Most common sensors with this interface are Load Cells and Strain Gauges.

C. Current Loop (4-20 mA)

This interface has been an Industry standard for more than 50 years, and there is a wide variety of equipment with this output on the market.

As the measured current at any point in the loop is always the same, the precision of this signal is higher than any voltage signal.

This interface is more stable over long distances and more immune to electrical noise, electromagnetic or radio frequency interference.

Loadsensing is compatible with 2 and 3 wires loop

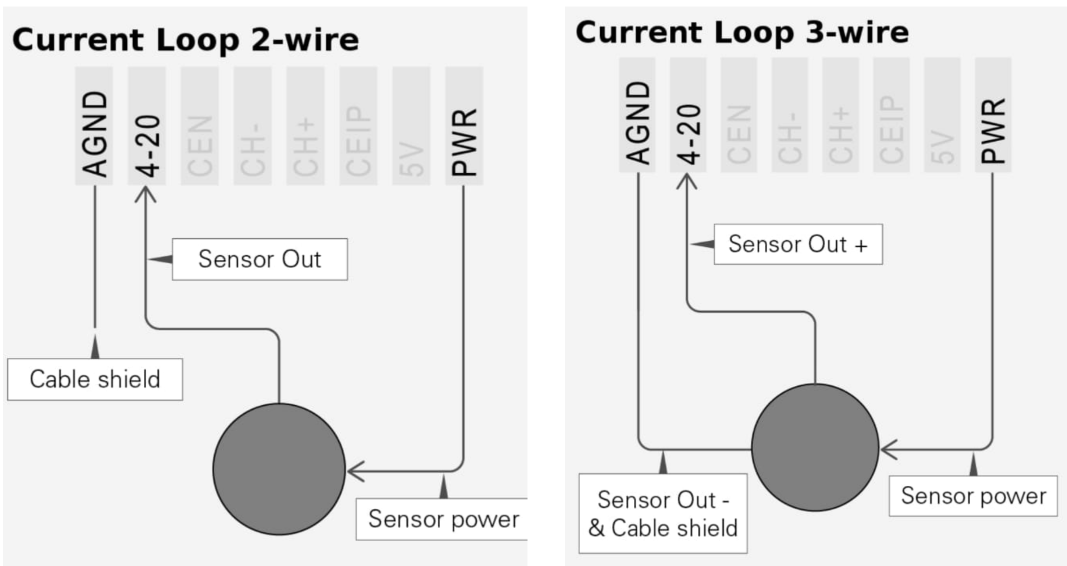


Image 4: Ws App current loop sensor wiring guide according to the number of wires.

Note: Loadsensing does not read HART interface (digital signal over the 4-20 mA), please check if any of the functions provided by Hart are necessary for the application.

Please note that there are 4-20 mA sensors which are required to be read dynamically (i.ex an anemometer that measures the speed of wind). Loadsensing analog datalogger can measure the 4-20mA output but has been designed to read periodic static monitoring signals.

Please note that some sensors output 0mA as a fault alarm and Loadsensing has not been designed to detect those alarms, as it reads within a range of 4-20 mA.

D. Voltage interface

Voltage interface of Loadsensing can measure DC signals within the range of +/-10V and reads with better accuracy smaller ranges.

There are two different inputs that can be measured:

- single ended: which measures the voltage difference between a wire and the ground. This type of input is less protected against noise immunity. To connect a sensor as a single ended voltage on the analog node the negative input needs to be connected to node ground
- differential: this input carries the signal on two wires, a (+) signal wire and a (-) signal wire and has no reference to ground. This type of input is more protected against noise immunity

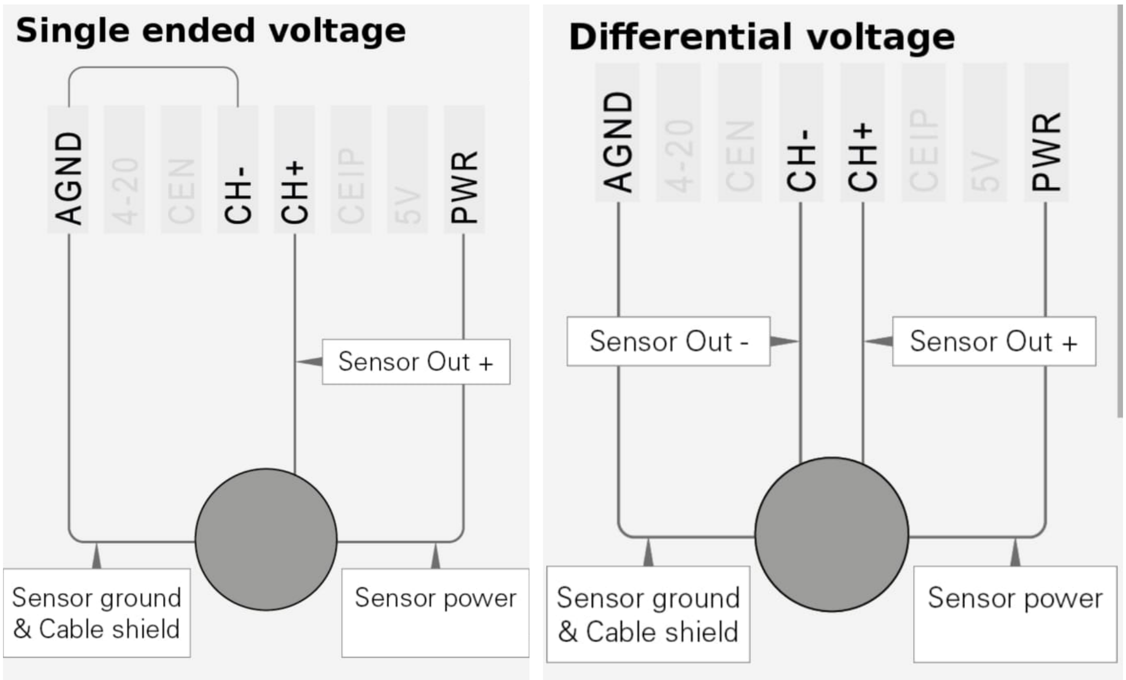


Image 5: Ws App voltage sensors wiring guide.

Note: Loadsensing can not measure 2 single ended input with one differential input

There are sensors on the market that their input signal is too small compared to the Loadsensing measured range. Please note that it is not possible to apply a gain with Loadsensing to adapt the input signal and match the instrument range. We strongly recommend using sensors adapted to the ranges measured by Loadsensing to benefit from the maximum resolution of the data obtained.

E. Thermistor

This interface was designed for reading NTC thermistors from 3K to 10K with an accuracy (0 to +50°C): +/- 0.2°C.

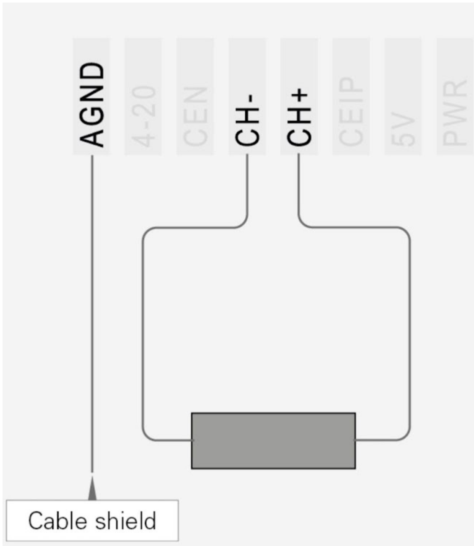


Image 6: Ws App thermistor wiring guide.

F. PT100

PT100 sensors are usually used for precision applications, it is important to have information in advance about the application and the precision needed.

With Loadsensing we can read 2, 3 and 4 wires interface, but only 4 wire connections are recommended to eliminate the wiring error. The circuit is very sensitive to parasitic resistances, as resistance values of the PT100 are small and near to the wiring resistances.

All the testing and specs were done for 4 wire connections.

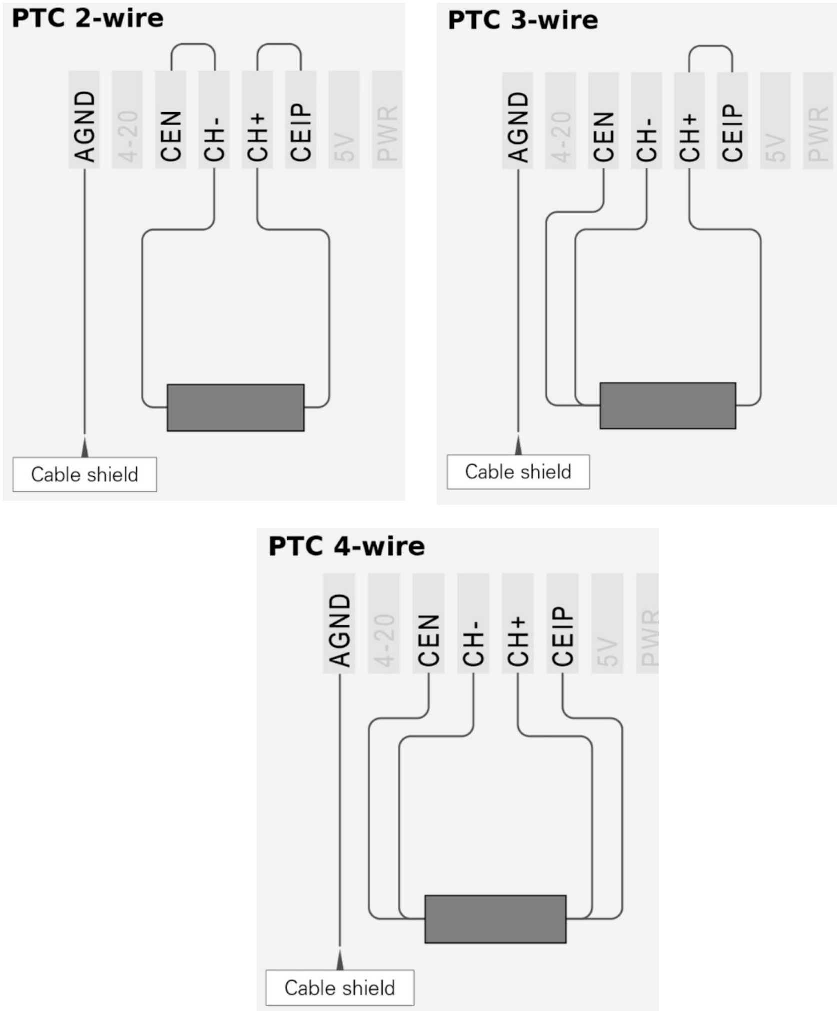


Image 7: Ws App PT100 sensor wiring guide.

G. Reading DGSI Slope Indicator Serial HD IPI through I/O2 and I/O1 interface

Since firmware version 2.35 the analog node is compatible with the serial HD IPI from DGSI only through channel 1.

Some considerations:

- When selecting 'Slope IPI' in channel 1, it will not be possible to connect any other sensor in the other channels.
- The Analog node can read autonomously a chain of up to 16 number of slope IPIs.
- The chain needs to be from uniaxial or biaxial inclinometers, not a combination of them.
- The faster sampling rate available for reading Slope IPIs is 5 minutes.
- Readings from 4 In Place Inclinometer’s segments are sent in each radio message.

Wiring and pinouts can be checked at the scheme from below:

Color	Wiring	Pinouts
Purple+black+shield	GND+shield	AGND
Yellow	sensor out -	CH1 -
Orange	sensor out +	CH1 +
Green	Output power	PWR1
Red	Clock	I/O2
Blue	Reset	I/O1

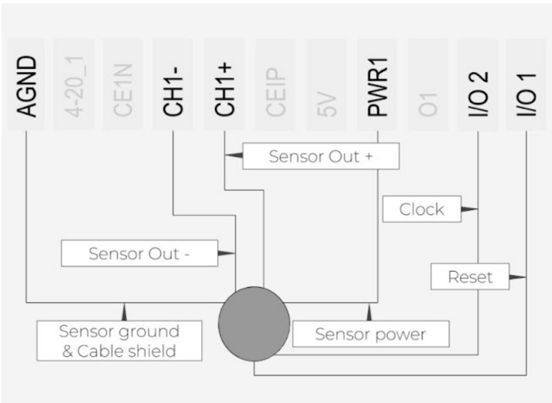


Image 8: Ws App sensor wiring guide for HD IPI DGSI sensors and their pinouts.

Powering the wireless data logger

The Loadsensing vibrating wire nodes are shipped closed, without batteries. To power it up, follow these steps:

1. Open the vibrating wire node using a 2.5 mm Allen key.
2. Insert **C-type batteries** in the battery holders (more batteries will give the logger a longer life for a given configuration). See our LS G6 data logger recommended batteries guide for further information.
   Please note our devices have reverse battery protection but it is not safe to keep batteries reversed in the node for a long time.
   Warning: There is a risk of explosion if you use the wrong batteries. Dispose of batteries according to instructions and refer to the General Warnings from below.

   > Please note that since serial 52594 and above, the ½ AA size battery holder that was present in the datalogger that hosted the RTC battery in order to keep time, have been removed from the battery board to simplify the product installation and maintenance and in line with our thrust to provide more environmentally sustainable products by reducing battery waste.
   > Please take note that this update shall have no impact whatsoever on the performance of the edge device, as since Gateway firmware version 1.12.1 the Gateway is able to check if the node is on time. If it's not, a time synchronization message is sent.

3. As well as batteries, the logger can be powered with external power. There is a power mode switch on the node. Turn it to whichever power mode you are using. Please take a look at the External power options document before using this option.

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General Warnings

- We advise during usage of the batteries to observe the following precautions:
    - Risk of explosion if the battery is replaced with an incorrect type.
    - Disposal of the battery into fire or a hot oven, or mechanically crushing or cutting of a battery, can result in an explosion.
    - Leaving the battery in an extremely high temperature surrounding environment can result in an explosion or the leakage of flammable liquid or gas.
    - The battery subjected to extremely low air pressure that may result in an explosion or the leakage of flammable liquid or gas.
    - Short-circuiting the battery will result in blowing the protection fuse.
- Batteries and equipment to be connected via the data port must meet the requirements of ES1 and PS1 according to the IEC 62368-1.
- Equipment to be installed in restricted access areas.

Loadsensing Device Configuration

We strongly recommend configuring the Loadsensing device on location so you can conduct an on-site radio coverage test at the same time.

Device configuration has to be carried out using the Worldsensing Android app (WS App), which is compatible with USB On-The-Go (OTG) Android devices. Please refer to the Worldsensing app User Guide for more details. To make sure the app works properly, we recommend purchasing one of the mobile phone models in stock from Worldsensing. Please contact the technical support team for more information.

WS App starts up once the Android device is connected to the Loadsensing node using an USB-OTG cable. It does not need to be started up manually.

The whole configuration process takes no more than five minutes. From then on, the Loadsensing node will start taking readings and sending data to the gateway.

The process for configuring the analog is the same as the other nodes and it is detailed in the Worldsensing App user guide.

The user will need to enable the channels where the sensors are connected to and select the interface from the sensor that is going to be configured.

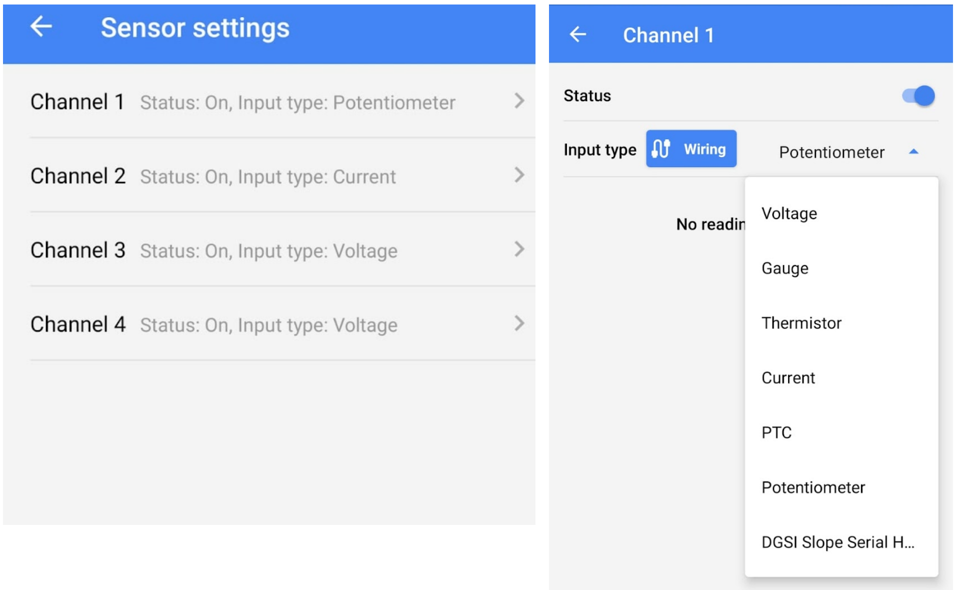

Image 9: Ws App sensor interfaces that can be selected with the analog node.

The wiring is provided on the wiring icon for each interface (also attached on sensor interface chapter)

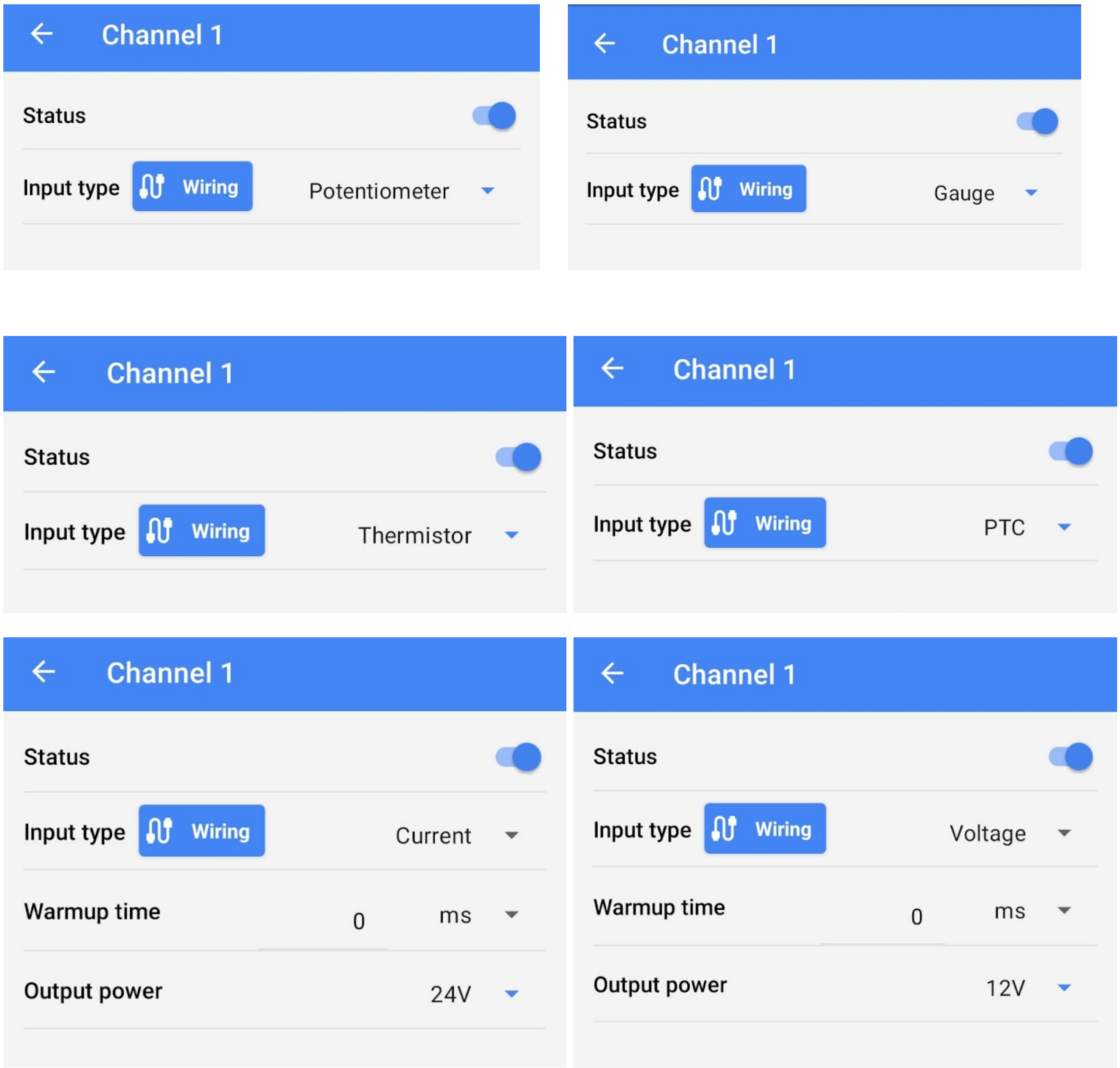

Image 10: Ws App sensor interfaces that can be selected with the analog node and different parameters that need to be selected for its configuration.

There are some configurations and functionalities that are particular for the analog node which are mentioned below.

While configuring the current loop and voltage interfaces the user will be able to select 0 V of power excitation (besides 12 V/ 24 V). This option has been designed for sensors that will be externally powered.

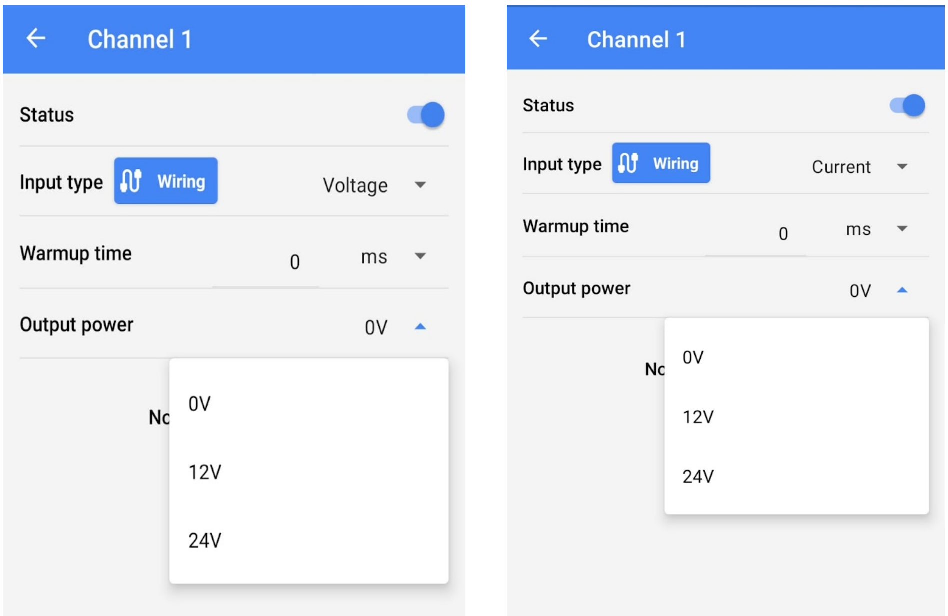

Image 11: Ws App power options when powering voltage and current loop sensors.

Please note that besides the power excitation, voltage and current sensors will require a warm up time for configuration. The WS APP allows the user typing its value and selecting between milliseconds (ms) and seconds (s).

Note: The voltaje interface has not been designed to power sensors at 5V (that is why the option of 5V is not available on the WS App). Although that, is possible to power a voltage sensor through the 5V input terminal by selecting any of the output power and applying the warm up time, if required.

For the DGSI slope serial HD IPI the user is able to configure the number of sensors connected to the chain (up to 16 sensors can be connected to a single chain) and also select the type of sensors that is configured (uniaxial or biaxial).

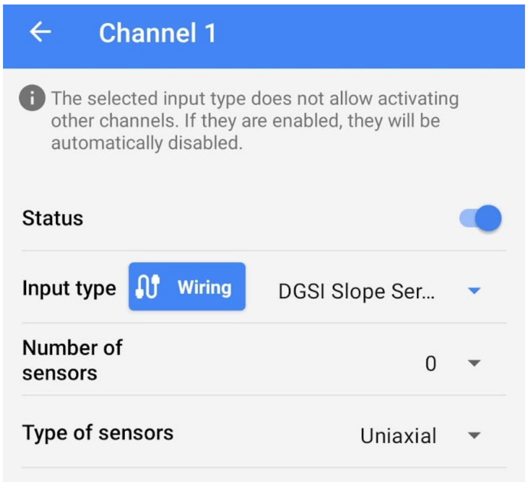

Image 12: Ws App configuring options for DGSI HD IPI sensors.

Engineering units conversion

When connecting the analog node to the CMT, on the last readings and Time series graphs conversion into engineering units will be available on the gear on the right side.

Image 13: CMT engineering units conversion.

On the formula drop down menu, there are several formulae that have been added for all the different compatible interfaces from the logger.

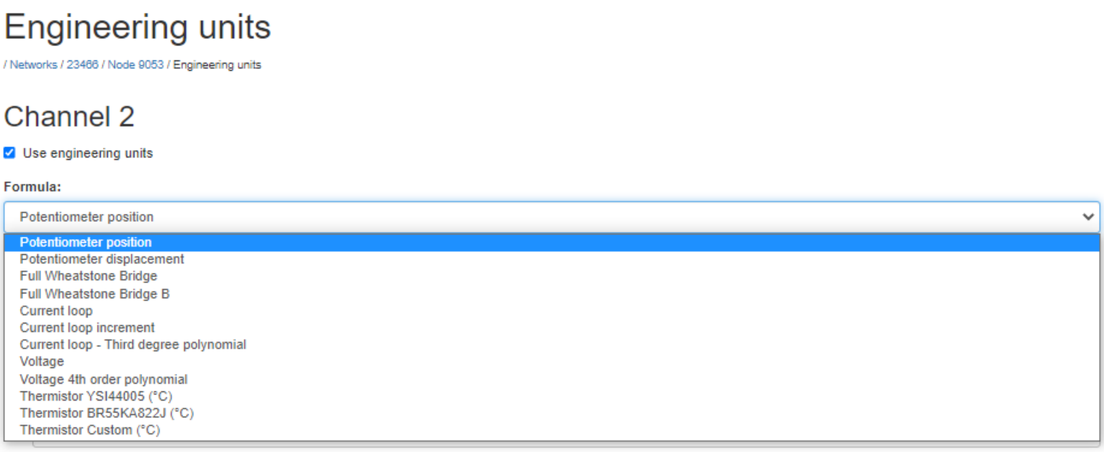

Image 14: Available formulae for engineering units conversion on the analog logger.

The *potentiometer position* formula allows to convert raw data to a reference units by using the full range in units from the sensor

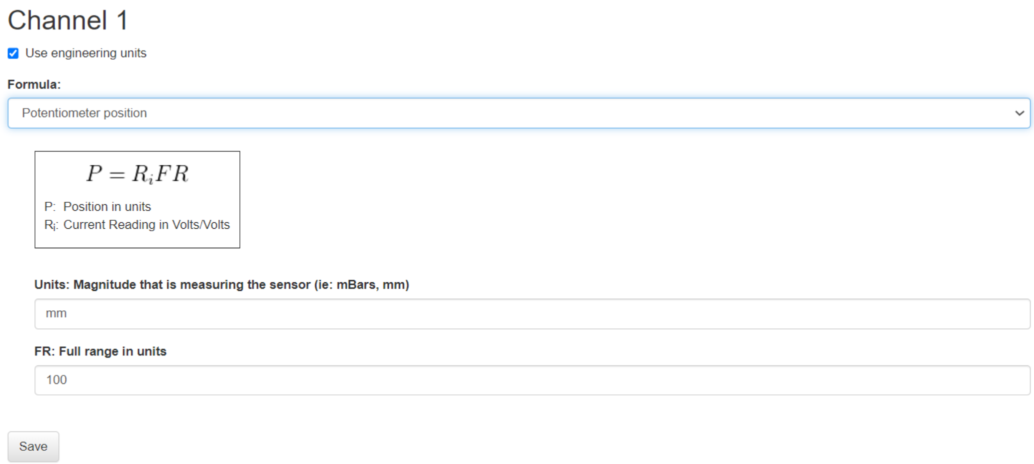

Image 14: Available formula for Potentiometer position conversion engineering units.

The *potentiometer displacement* formula allows to convert raw data to a reference unit by using the full range in units from the sensor and refer this data to an initial reading.

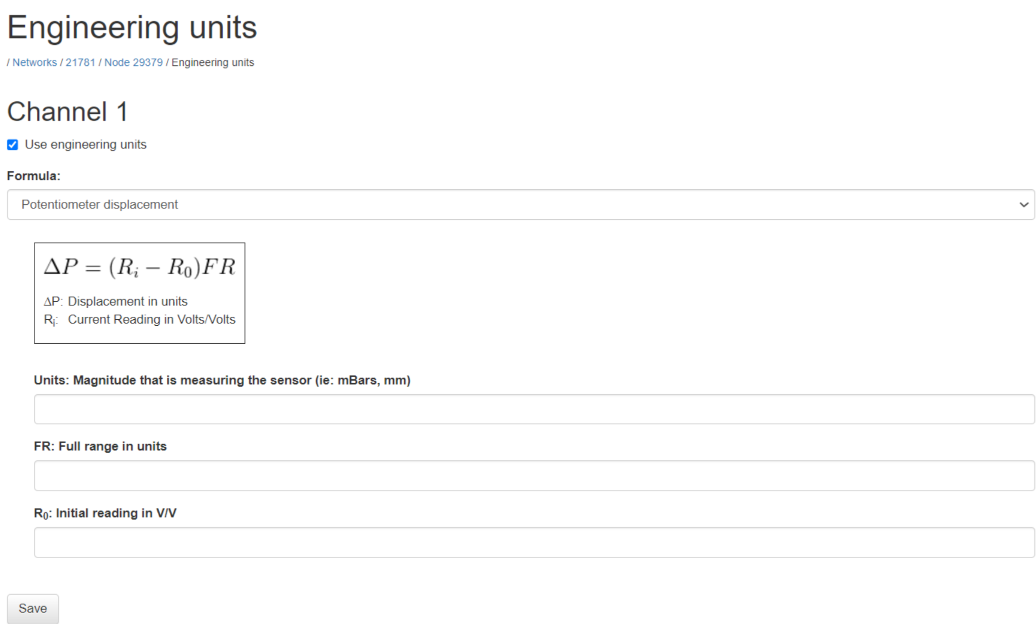

Image 15: Formula for converting potentiometer displacement.

The *Full Wheatstone Bridge* sensor formula has been implemented for Load Cells. It allows converting raw data to Load by multiplying it to the Load Cell capacity and dividing it from the nominal sensitivity or rated output signal full scale, referring it to an initial reading.

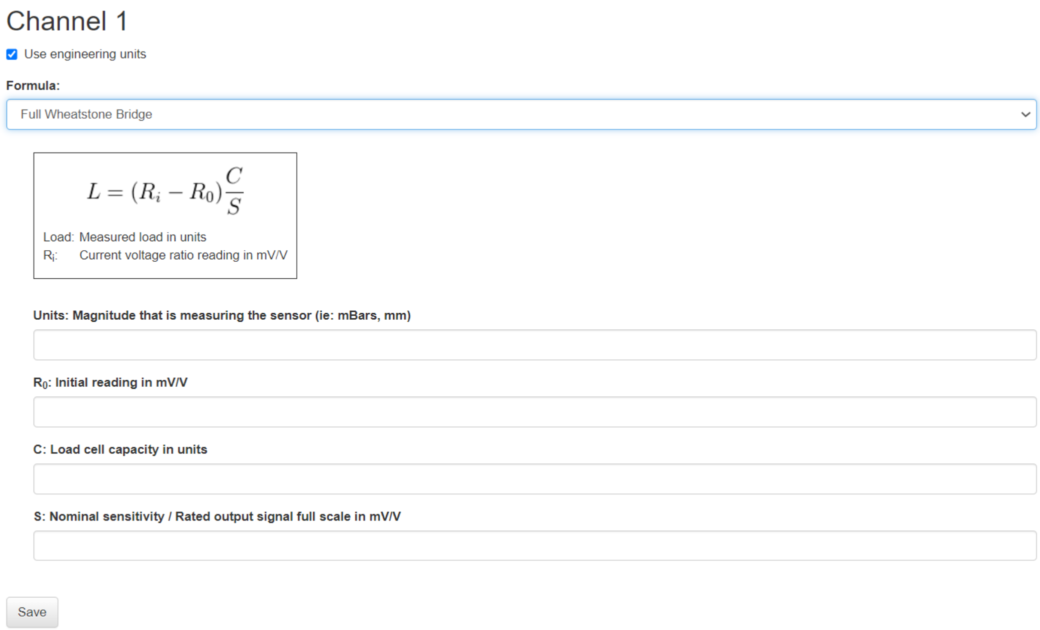

Image 16: Formula for converting Full Wheatstone Bridge sensors.

The *Full Wheatstone Bridge B* sensor formula has been implemented for gauges. It allows converting raw data by multiplying it by a linear gauge factor, referring it to an initial reading and adding the possibility to do an offset.

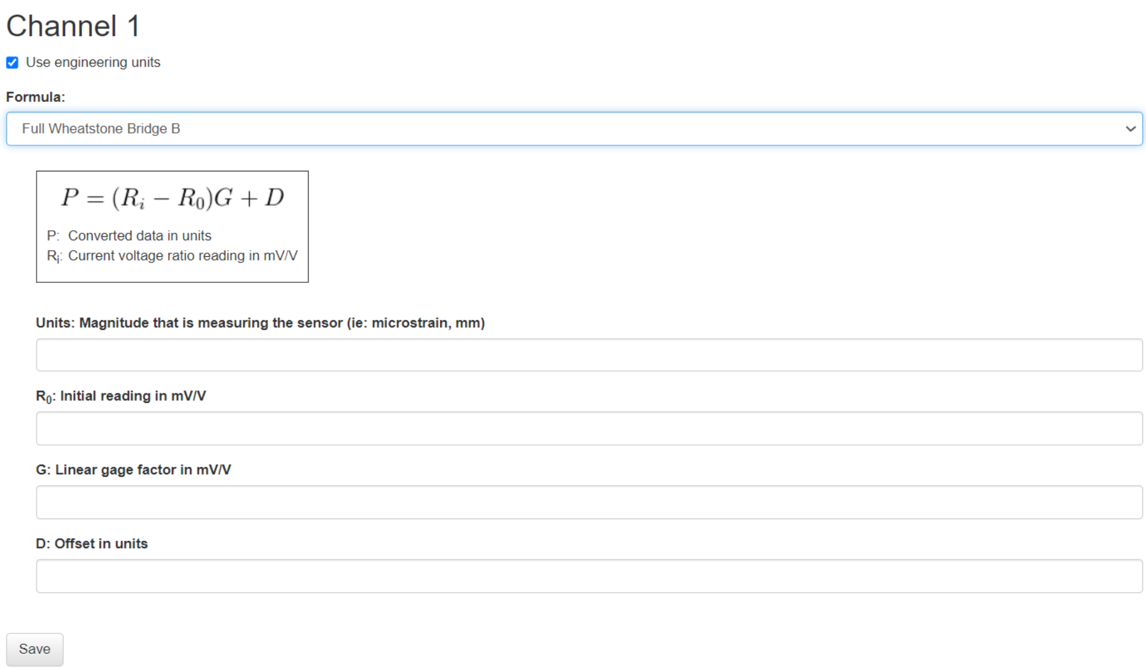

Image 17: Formula for converting Full Wheatstone Bridge sensors.

The current Loop sensor formula allows converting raw data by multiplying it by a linear gauge factor and subtracting the current reading in mA to the measured value.

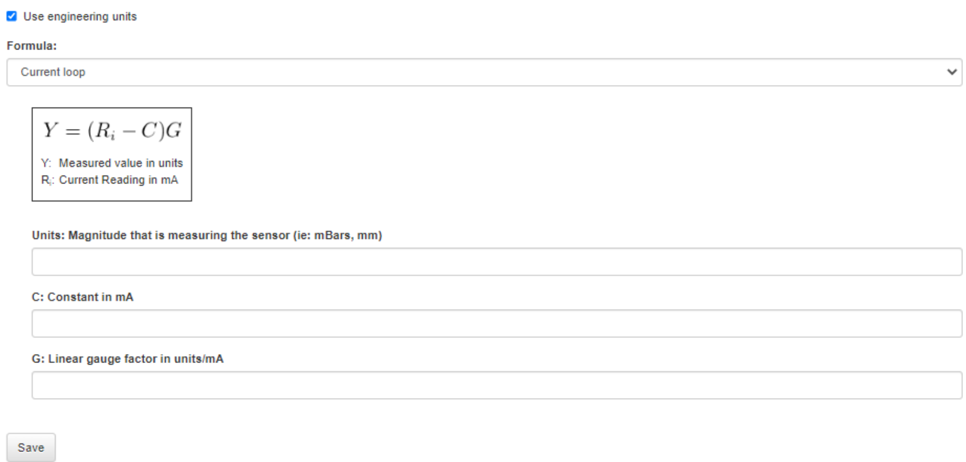

Image 18: Formula for converting Current Loop sensors.

The current Loop increment formula allows converting raw data by multiplying a linear gauge factor to the difference between the measured value and the initial reading in mA.

Image 19: Formula for converting Current Loop sensors.

The current Loop third degree polynomial sensor formula allows applying a polynomial conversion using the polynomial gauge factors provided by the manufacturer. It is also possible to apply an offset.

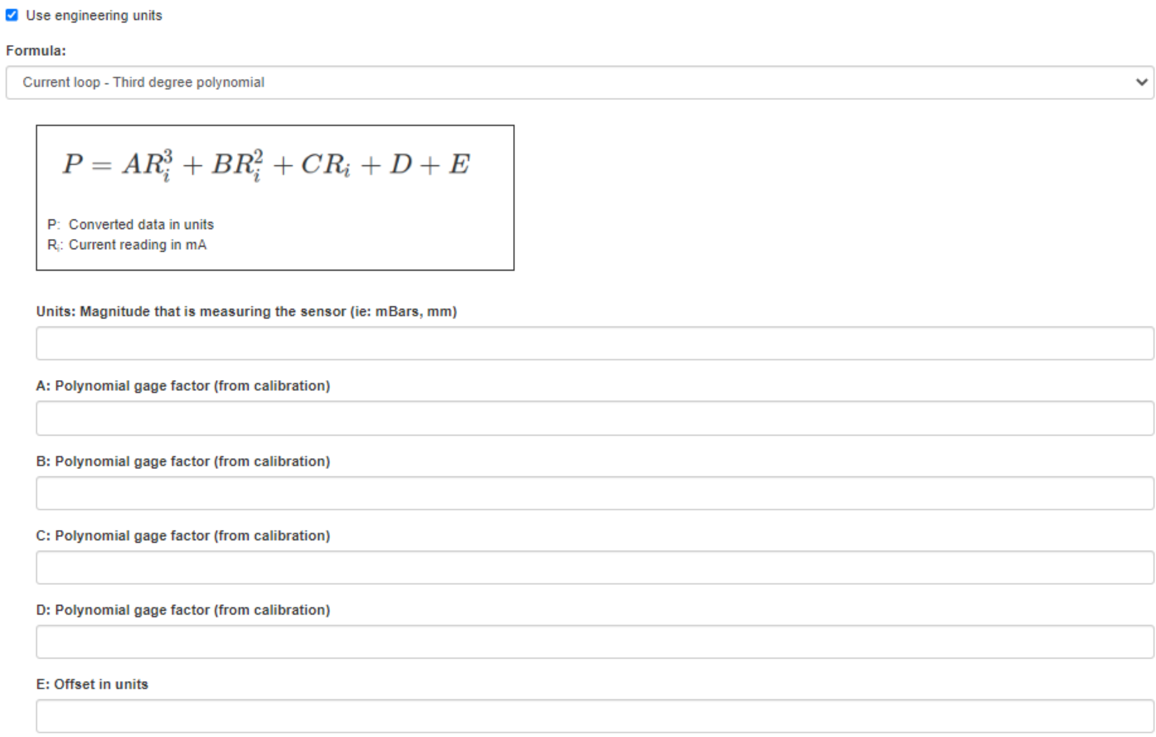

Image 20: polynomial formula for converting Current Loop sensors.

The voltage sensor formula allows converting raw data by multiplying the sensor factor to the difference between the current reading in volts and a constant or initial reading in volts.

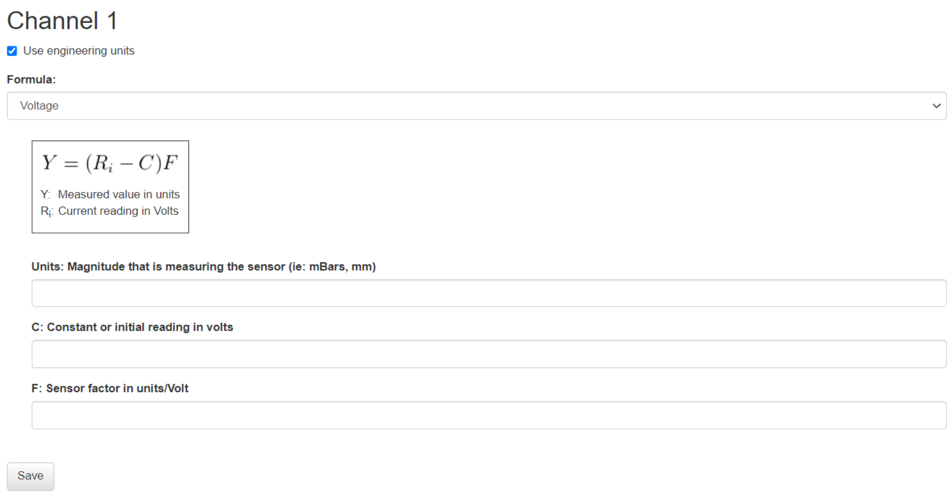

Image 21: Formula for converting voltage sensors.

The voltage 4th order polynomial sensor formula allows applying a polynomial conversion using the polynomial gauge factors provided by the manufacturer. It is also possible to apply an offset.

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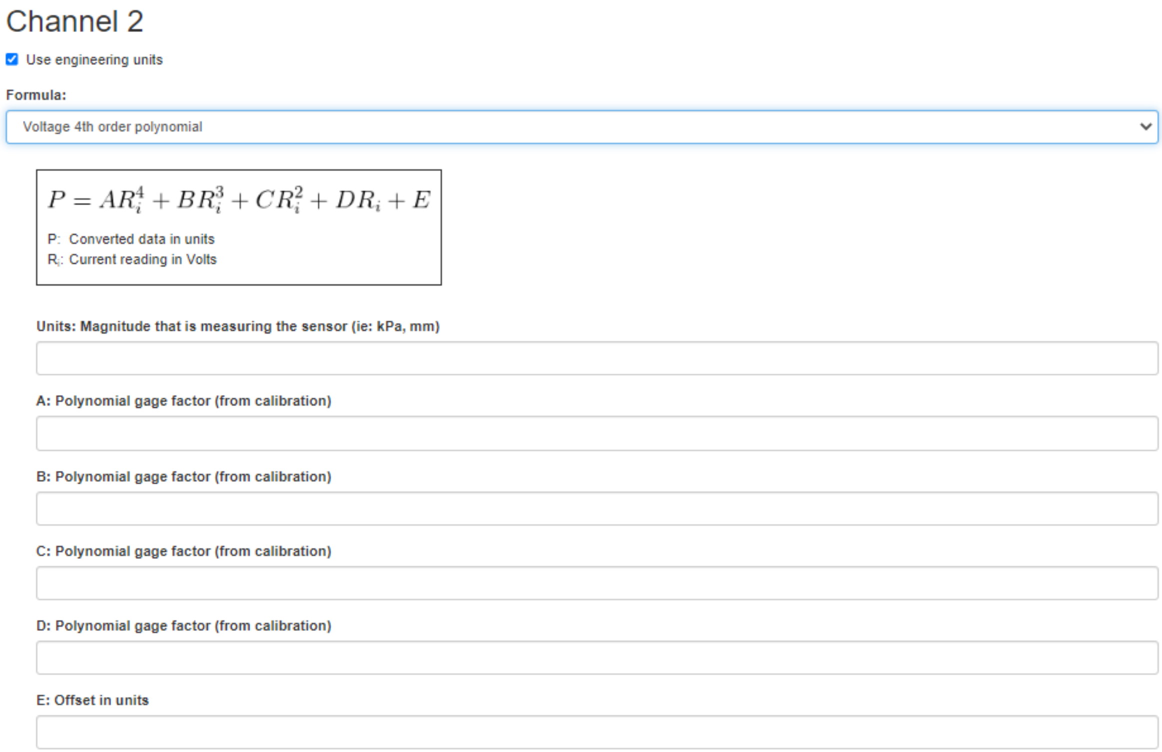

Image 22: 4rth order polynomial formula for converting Current Loop sensors.

The thermistor sensor formula YSI44005 (°C) allows converting resistance raw data by using the formula and factors from below.

Image 23: Formula for converting YSI44005 thermistor sensors.

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The thermistor sensor formula BR55KA822J (°C) allows converting resistance raw data by using the formula and factors from below.

Image 23: Formula for converting BR55KA822J thermistor sensors.

The custom thermistor formula allows converting resistance raw data by using the formula from below, adding custom polynomial factors.

Image 24: Custom formula for converting thermistor sensors.

For the HD IPI serial from DGSI conversion, two different outputs can be obtained: tilt in mm/m by introducing the calibration factors that must be provided by the manufacturer for each sensor and also tilt in degrees by using the previous formula.

For temperature conversion the CMT uses the formula from below on firmware version 1.15 and 2.0:

IPI_Temp=9.3219*Therm(x)ˆ5-54.3038*Therm(x)ˆ4+131.165*Therm(x)ˆ3-161.2568*Therm(x)ˆ2+137.7711*Therm(x)-37.7705

For temperature conversion for CMT firmware versions from and above 1.16 and 2.1, the equation used for conversion is:

IPI_Temp = (1/(A+B*LN((5000/VT)-2000)+(C*LN((5000/VT)-2000)^3)))-273.2

VT = IPI temp in volts
A = 1.401E-03
B = 2.377E-04
C = 9.730E-08

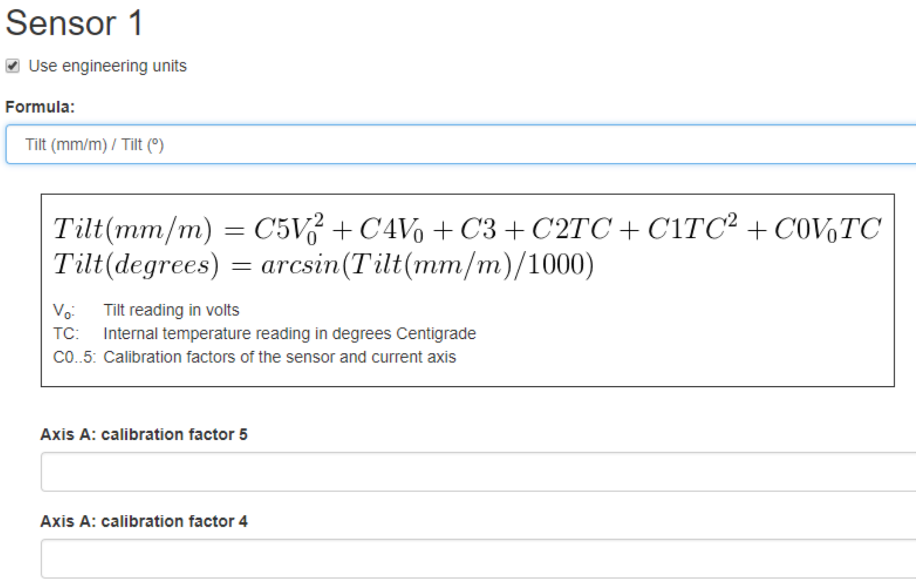

Image 25: Formula for converting HD IPI serial from DGSI .

There is no specific formula conversion included on the CMT for the PT100 interface

Specific features on the CMT - Low battery message

The Analog node measures the voltage when reading the sensor through the PWR pin, which can be configured at 12VDC or 24VDC. If the read voltage is lower than the configured voltage a Low Battery message is shown on the Status Tab.

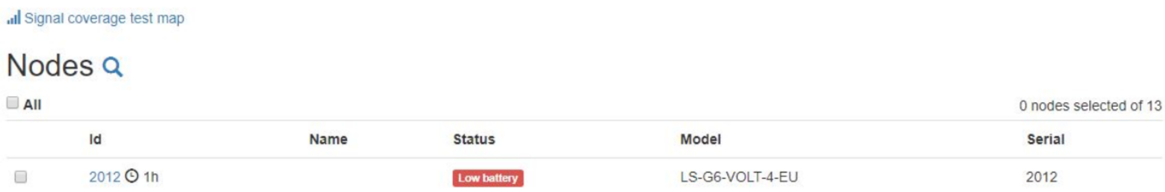

Image 26: Low battery status shown on the CMT .

When powering a 5VDC sensor with the analog node, it needs to be wired to the 5V Pin, which does not measure voltage during reading. In this case it is not possible to receive a low battery message.

Maintenance and troubleshooting

The node is packaged in a rugged aluminum box and should provide many years of trouble-free operation.

Wireless analog dataloggers require no maintenance other than normal cleaning, battery replacement and inspection of the seals. Apart from this maintenance, the devices are not field serviceable.

It is important to avoid any impact that could distort the mechanics of the device, high vibration levels or Water ingress. The wireless node should never be submerged in water. **WATER DAMAGE TO INTERNAL COMPONENTS VOIDS THE WARRANTY.**

In case of doubt regarding the reliability of the readings, first inspect the wireless node. Having verified that the device has not been affected by the cases described before, the user can open a ticket to support@worldsensing.com in our Help Center to request a Return Material Authorization (RMA).

After receiving the device, Worldsensing will inspect the mechanical parts and the node will go through the quality chain to detect potential failures. If this occurs after expiration of the warranty, Worldsensing will repair the equipment at its factory and may require additional charges for parts and labor charges. Worldsensing will provide a quote for repairs, if feasible, for products returned after warranty expiration.

Worldsensing is not liable for damages or erroneous decisions caused by defective units, since it is only responsible for the warranty of the equipment.

Battery Lifespan

Battery consumption varies depending on the number and interface type of sensors, warm up time and sampling rate. The following table provides an estimation of the battery lifespan according also to the number of sensors connected to the channels .

	SF9 14dB			
	@12V@24mA	@12V@24mA	@24V@24mA	@24V@24mA
current sensor	1 s	5s	1s	5s
1 sensor 5 min	6 months	3 months	4 months	2 months
1 sensor 30 min	3 years	1.5 years	2 years	1 years
1 sensor 1 h	5.7 years	3 years	4 years	2 years
1 sensor 6 h	>10 years	>10 years	>10 years	>10 years
4 sensor 5 min	2.2 months	1,7 months	1,4 months	1 month
4 sensor 30 min	1 years	10 months	8.5 months	6 months
4 sensor 1 h	2 years	1.5 years	1.4 years	1 years
4 sensor 6 h	>10 years	8.4 years	7.4 years	5.6 years

Table 2: Battery lifespan per analog channel considering current interface sensors with different warm up time and assuming intermediate environmental conditions for European radio.

	SF8 20dB			
	@12V@24mA	@12V@24mA	@24V@24mA	@24V@24mA
current sensor	1 s	5s	1s	5s
1 sensor 5 min	6 months	3 months	4.3 months	2 months
1 sensor 30 min	3 year	1.5 year	2 year	1 year
1 sensor 1 h	6 year	3 year	4 year	2 year
1 sensor 6 h	>10 year	>10 year	>10 year	>10 year
4 sensor 5 min	2.3 months	1.7 month	2.3 months	1 month
4 sensor 30 min	1 year	10 months	1 year	0.5 year
4 sensor 1 h	2.2 year	1.5 year	2.2 year	1y
4 sensor 6 h	>10 year	8.5 year	>10 year	5.7 year

Table 3 : Battery lifespan per analog channel considering voltage interface sensors with different warm up time and assuming intermediate environmental conditions for FCC radio.

	SF9 14dB	
	@12V@24mA	@12V@24mA
voltage	1 s	5s
1 sensor 5 min	5.5 months	3.4 months
1 sensor 30 min	2.5 years	1.5 years
1 sensor 1 h	5 years	3.2 years
1 sensor 6 h	>10 years	>10 years
4 sensor 5 min	2 months	1.6 month
4 sensor 30 min	1 year	9.6 months
4 sensor 1 h	2 years	1.6 years
4 sensor 6 h	>10 years	8.3 years

Table 4 : Battery lifespan per analog channel considering voltage interface sensors with different warm up time and assuming intermediate environmental conditions for European radio.

	SF8 20dB	
	@12V@24mA	@12V@24mA
voltage	1 s	5s
1 sensor 5 min	6 months	3.5 months
1 sensor 30 min	2.7 years	1.7 years
1 sensor 1 h	5.2 years	3.3 years
1 sensor 6 h	>10 years	>10 years
4 sensor 5 min	2 months	1.6 month
4 sensor 30 min	1 years	9.8 months
4 sensor 1 h	2 years	1.6 years
4 sensor 6 h	>10 years	8.4 years

Table 5: Battery lifespan per analog channel considering voltage interface sensors with different warm up time and assuming intermediate environmental conditions for FCC radio.

	SF9 14dB	
	@5V@305Ohms	@5V@1kOhms
	FWB/Thermistor/PT100	Potentiometer
1 sensor 5 min	1.5 year	1.6 year
1 sensor 30 min	7.8 years	8.4 years
1 sensor 1 h	>10 years	>10 years
1 sensor 6 h	>10 years	>10 years
4 sensor 5 min	3.8 months	5.3 months
4 sensor 30 min	1.8 years	2.5 years
4 sensor 1 h	3.5 years	4.8 years
4 sensor 6 h	>10 years	>10 years

Table 6: Battery lifespan in years per analog channel considering Full Wheatstone bridge, Potentiometer, Thermistor and PT100 interface sensors and assuming intermediate environmental conditions for FCC radio.

	SF8 20dB	
	@5V@305Ohms	@5V@1kOhms
	FWB/Thermistor/PT100	Potentiometer
1 sensor 5 min	1.7 year	2 year
1 sensor 30 min	9.1 year	10 year
1 sensor 1 h	>10 year	>10 year
1 sensor 6 h	>10 year	>10 year
4 sensor 5 min	4 months	6 months
4 sensor 30 min	2 year	2.6 year
4 sensor 1 h	3.5 year	5 year
4 sensor 6 h	>10 year	>10 year

Table 7: Battery lifespan per analog channel considering Full Wheatstone bridge, Potentiometer, Thermistor and PT100 interface sensors and assuming intermediate environmental conditions for European radio.

Notes: These tables are estimates based on Worldsensing model consumption profile based on Saft LSH14 batteries, provided only to assist in project maintenance. Extreme temperatures could cut capacity by 20 to 40%, Check battery specifications.

Please take into consideration that for extreme lower or high sampling rate simulations could not be as accurate due to the fact that there are other variables that can affect the battery lifespan.

Data Storage

The internal node has 4 MB of memory. A 4-channel data logger connected to four sensors stores up to 130,000 readings. Table 3 shows how long data is stored on analog data loggers considering that 4 sensors are connected. When the memory is full, new readings overwrite the earliest ones. As well as sensor data, the device collects health data on battery voltage, internal temperature and node uptime every 7 hours.

Number of sensors	Sampling rate		
	60 minutes	30 minutes	10 minutes
1	more than 10 years	7 years	2.4 years

Table 8: Times of data storage (without overwriting) for LS ANALOG

Data is stored in comma-separated value (CSV) files. You can download readings and health files using the WS App.

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To do this, connect an Android device to the node Mini USB port with a USB-OTG cable. When WS App loads, download data by clicking on the **Download Data** tab. You need to set a start and end date for the data you want to download. The Android device allows these CSV files to be opened with applications such as e-mail or cloud apps. Files are also stored in the device memory, on the SD card in the WS App folder.

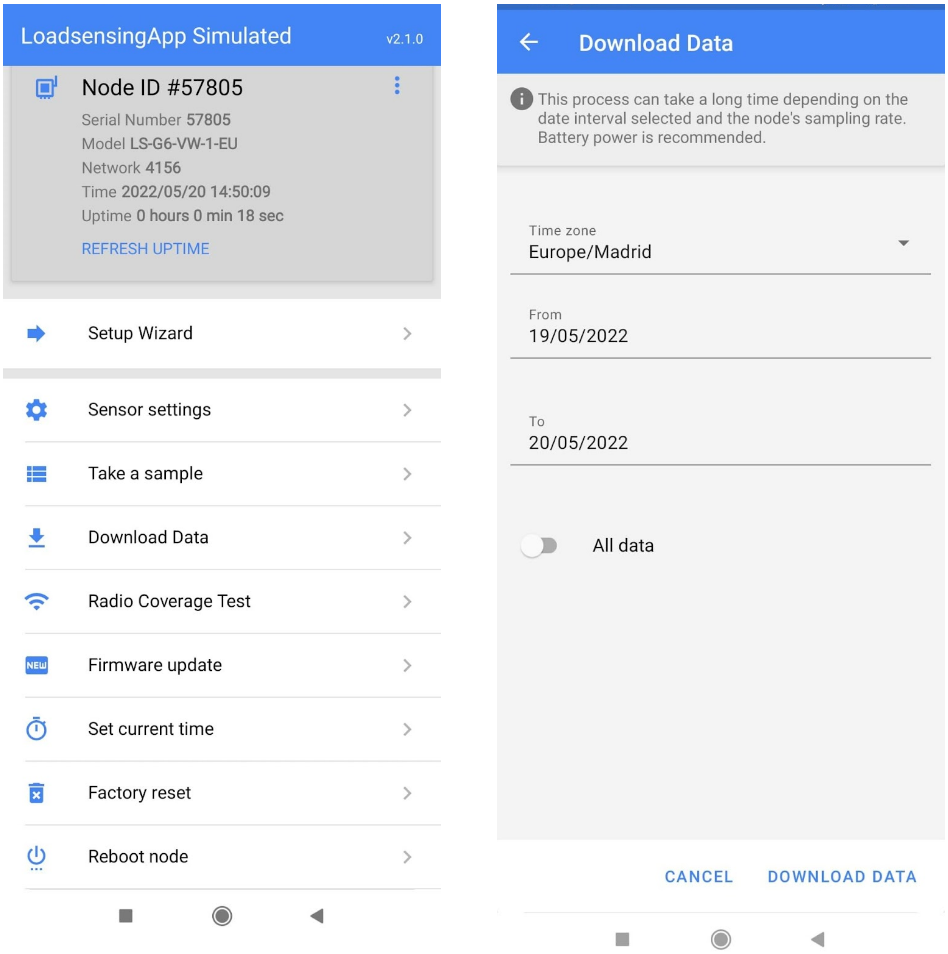

Image 27. How to download readings from the Android device.

Environmental practices

Installation and operation

Please install Worldsensing products in an energy-efficient manner by minimizing power usage for computers, mobile phones or other devices needed for setup and configuration. Minimize the use of small components needed for installation, like mounting brackets and other connection materials. Avoid using toxic materials and/or hazardous substances.

- Set the sampling rate only in the nodes you need.
- When configuring the nodes, use "Set last configuration" whenever possible.
- Remove the batteries if you are not using the node.
- For nodes with switch, use the usb mode when not in operation.

Return Material Authorization (RMA)

In the event of requesting a Return Material Authorization (RMA) please make sure to use the most environmentally friendly mode of transportation possible.

Product End of Life and disposal

Please take the necessary measures to extend the life of the product and reuse it when possible.

Once the product reaches its end of life (EoL) recycling is crucial to divert material from waste streams into new applications.

Electrical and electronic devices, and batteries must be recycled according to the European Union WEEE Directive 2012/19/EU.

Please separate batteries from equipment.

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This product and the batteries it may contain should not be discarded as unsorted waste. Please send them to separate collection facilities for recovery and recycling.

Product packaging

Worldsensing's product packaging is recyclable. Separate the different materials for a correct waste management.

Safety and emergency procedures

Please read the safety sheet that comes with our products before installing them. For safety information on batteries and other materials, as well as instructions in case of emergency please read the safety information available at: https://info.worldsensing.com/safety-information/

In the case of an emergency and after it has been managed, please evaluate the waste generated in order to dispose of it in accordance with current legislation and local regulation.

It is your responsibility to dispose of your waste equipment, batteries and packaging properly to help prevent potential negative consequences for the environment and human health.

The cost of environmental waste management is included in the battery's selling price.

By following these best practices you can help protect the environment. Thank you for your cooperation.

FAQs

Is it possible to apply a gain when configuring a voltage sensors with the WS App in order to adjust the measuring range on the node?

Note that it is not possible to apply a gain to adjust the measuring range from the node to the sensor to improve the resolution on the measuring range.

Please note that the accuracy when measuring voltage sensors within smaller ranges (±2V DC) is higher.

I want to read temperature sensors with the analog node. Which options do I have?

The analog node has two specific interfaces that are used for reading temperature sensors, thermistor and PT100 interface.

The analog node can read NTC thermistors from 3K to 10K by using the Thermistor interface. Please check the specifications from the datasheet for more information.

The node also has a PT100 interface compatible with these types of sensors. Usually, these are being used for precision applications, so it is important to take a look at the analog node specs and see if the specs match with the required ones.

There are also temperature sensors that can have other analog interfaces, such as voltage. It is always important to check if the sensor specifications match with the ones that the analog logger can power and read.

Is the low battery icon displayed for any of the interfaces that the analog node can read?

The Analog node measures the voltage when reading a sensor through the PWR pin, which can be configured at 12VDC or 24VDC. If the read voltage is lower than the configured voltage a Low Battery message is shown on the Status Tab.

When powering a 5VDC sensor with the analog node, it needs to be wired to the 5V Pin, which does not measure voltage during reading. In this case it is not possible to receive a low battery message.

How can I check if an analog sensor is compatible with the analog node?

First check the datasheet from the [analog datalogger] (power specs and interface input), check also this user guide to clarify any other information.

Check the sensor output specifications. Take into account that Loadsensing Analog node has not been designed to power high power requirement sensors and for dynamic acquisition rates.

Externally powering the analog node?

Sometimes due to the project requirements it is not possible to cover its duration by using batteries.

This is the case for scenarios where sampling rate is very high or sensor settings imply high warm up time or even those cases where LS node can not provide the proper current to the sensors.

For those cases we recommend reading the document External power options to understand how to power it by using external sources.

CONTACT WORLDSENSING

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Phone: +34 93 418 05 85 (08.30h - 16.30h UTC)

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