



Features

- Single axis measurement
- Measurement range options: $\pm 10^\circ$ to $\pm 180^\circ$
- Analogue output: 4-20mA
- Solid state MEMS sensor
- Frequency response 1Hz
- Small size, 46 x 39 x 10.5mm
- Sealed to IP67
- PUR cable rated for continuous outdoor use
- Factory configurable to suit most applications



Applications

- Single axis PV Solar Trackers
- Security systems
- Platform levelling and monitoring
- GPS compensation
- Agricultural and industrial vehicle tilt monitoring
- Telescopic and scissor lift platform monitoring
- Can be readily customised for most applications

Description

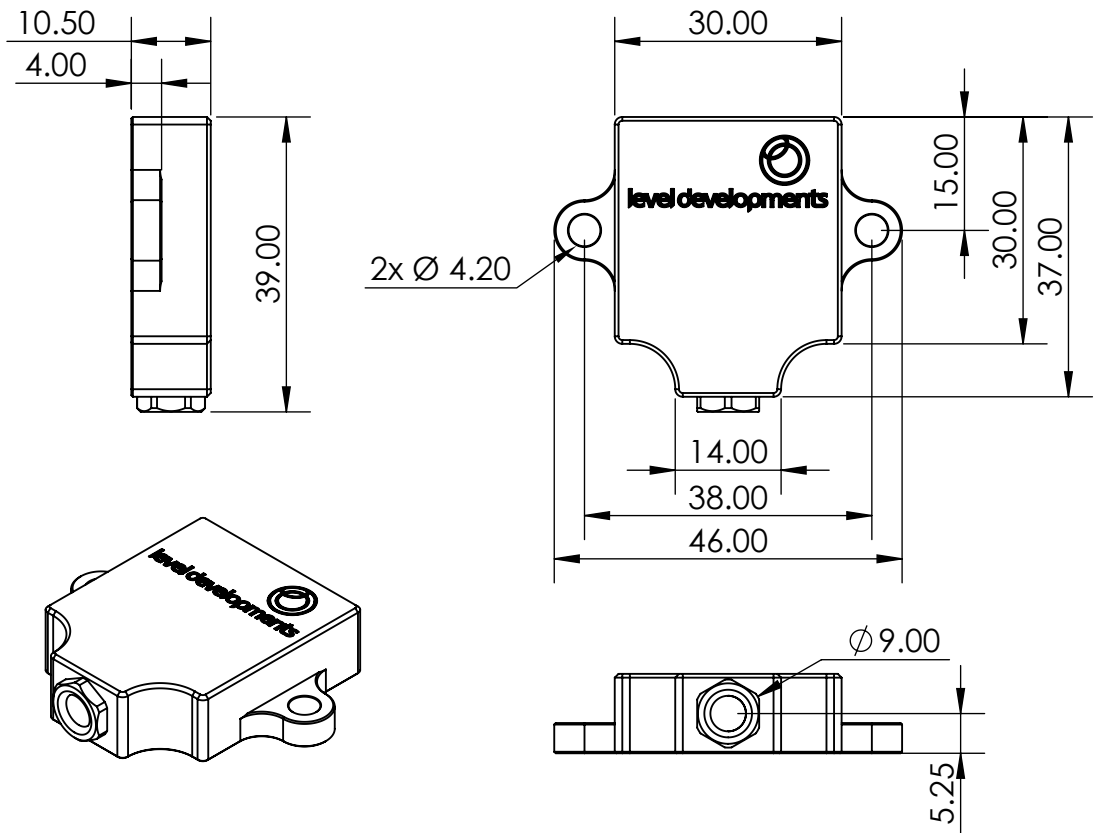
The LCH-A-S-XX-C is a low cost single axis inclinometer supplied in a sealed Aluminium housing. It features an analogue output interface with a 4-20mA output, and is available with a $\pm 10^\circ$ to $\pm 180^\circ$ measurement range. These devices are CE certified & each unit is manufactured, calibrated & tested in our UK factory to guarantee performance to the stated specification.

Specifications

Parameter	Value	Unit	Notes
Supply Voltage	12 to 30	V	Internal circuit protects from transients and reverse polarity, however use of a low noise DC supply is recommended to ensure the best performance.
Operating Current	33	mA	Maximum value when powered with a 24V supply.
Operating Temperature	-40 to 85	$^\circ\text{C}$	Powered continuously
Storage Temperature	-40 to 85	$^\circ\text{C}$	
Size: Width Length Height	46.0 39 10.5	mm	Not including cable
Measuring range	± 45	$^\circ$	
Output: - Full Scale Tilt 0° + Full Scale Tilt	4 12 20	mA	Nominal output current when device is at full scale negative (minimum) Nominal output current when device is at 0° Nominal output current when device is at full scale positive (maximum)
Zero Bias Error	± 0.1	$^\circ$	Maximum zero offset angle when unit is placed on a level surface. For optimum zero point accuracy, the mounting angle of the part can be adjusted.
Accuracy (20°C)	± 0.3 ± 0.5	$^\circ$	up to $\pm 45^\circ$ up to $\pm 180^\circ$ The maximum error between the measured and displayed value at any point in the measurement range at room temperature (20°C)
Zero Bias Temperature Error	0.02	$^\circ/\text{C}$	The maximum change in zero position output per $^\circ\text{C}$ of temperature change
Sensitivity Temperature Error	0.01	$\%/^\circ\text{C}$	% Change in sensitivity per $^\circ\text{C}$ of temperature change
Long Term Stability	0.1	$^\circ$	1 year stability when device is powered continuously at 20°C
Resolution (@1Hz BW)	0.05	$^\circ$	Smallest measurable change in output
Frequency Response	1	Hz	Frequency at which the output is -3dB from input. Filter is 2 pole, and can be factory set to different values on request.
Mechanical shock	3000 (0.5ms)	g	Shock survival limit for MEMS sensor.
Cable Length	2	m	Other lengths available on request
Weight	24	g	Not including cable

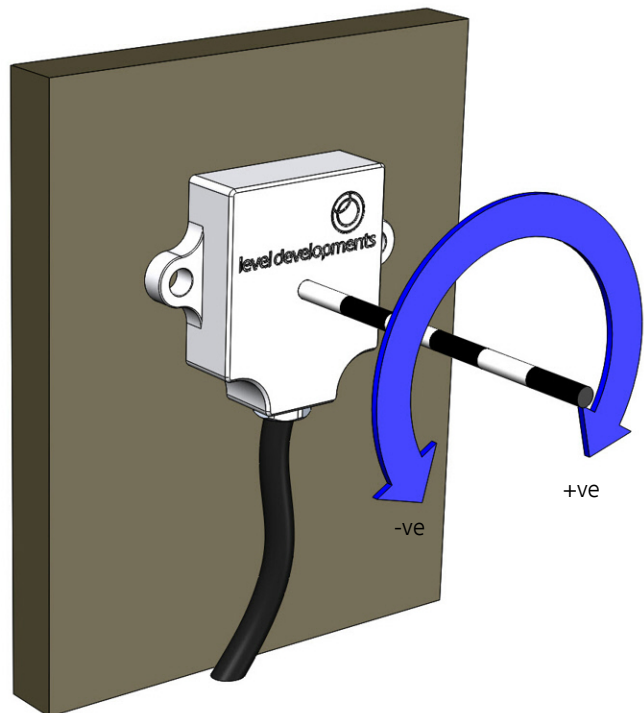


Dimension Drawing



Axis Direction and Mounting Orientation For Single Axis Use

Mounted on Vertical Surface





Current Output Change With Angle

All inclinometers measure a change in the effect of the gravitational field on a proof mass to derive angle. As the inclinometer sensor is rotated, the sensing element is subject to gravitational forces which move the mass, and this movement is measured. In this inclinometer there are two sensing elements mounted perpendicular to one another so that the devices range can extend through the full 360° range. Internally these two sensors are measured and a processor derives the angular position. This angle is then converted to a signal current which is linear with the change in angle.

Using the analogue output:

Angle = (Iout - Ioffset) x SF

Where

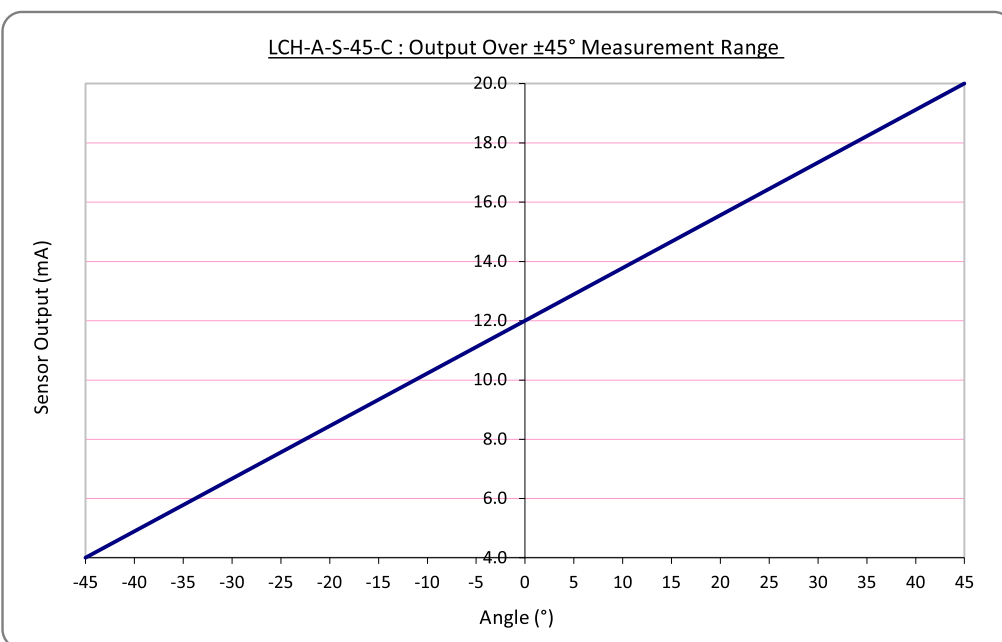
Iout is the measured current from the inclinometer's output

Ioffset is the current at 0° which is 12(mA)

SF is the Scale Factor which is shown in the table below:

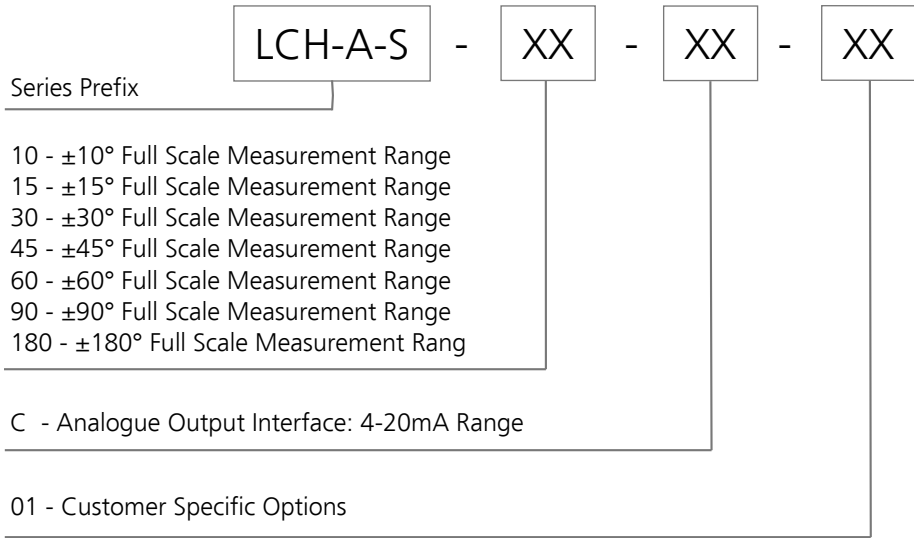
Table with 4 columns: Part Number, Description, Scale Factor (SF), and Zero Output (Ioffset). It lists various models like LCH-A-S-10-C to LCH-A-S-180-C with their respective ranges and scale factors.

4 to 20mA Output vs. Tilt Angle (Example shows a ±45° Model)





Part Numbering



Product Options

1. A range of standard versions is available with Voltage output options.
2. Output Current range can be factory modified to suit most requirements
3. Output Current can be factory modified to be a Sine function of angle.
4. Standard cable length is 2m, others are available on request.
5. Frequency response can be factory adjusted between 0.125 and 32Hz
6. Axis Orientation and directions can be factory modified.
7. Cable can be pre-assembled with mating connector for customers application.

Special order versions are generally only available for volume orders or ongoing requirements.

Certification

The products are type approved to in accordance with the following directive(s):

EMC Directive 2004/108/EC



And it has been designed, manufactured and tested to the following specifications:

BS EN61326-1:2006

Electrical equipment for measurement, control and laboratory use – EMC Requirements

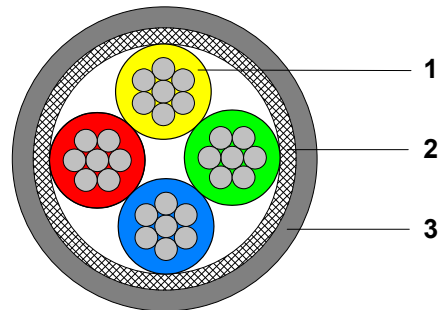
BS EN55011:2007, Group 1 Class B



Connection Details

Standard cable is 2m long. Cables can be supplied in any length up to 100m.

1. Core wires, tin plated copper, 18x0.1mm strands per conductor (26 AWG). 4 conductors, colours red, blue, yellow and green with PVC core insulation.
2. Braided screen of tin copper wire with minimum 85% coverage.
3. Black PUR (Polyurethane) Solar jacket. Flame retardant, reduced smoke generation, zero halogen, excellent for use in water and oil, good for use in acids and fuels, radiation tolerance: 10E6 Gy, UV stable, suitable for continuous outdoor use.



Parameter	Value	Unit	Notes
Approximate Weight	35	g/m	
Operating Temperature	-40 to 85	°C	Static operation
Conductor Resistance	100	Ω/Km	Maximum resistance
Insulation Resistance	1500	MΩ/Km	Minimum resistance
Test Voltage	1.5	KV DC	
Voltage Rating	440	V	
Core Current Rating	1	A	At 40°C air temperature
Individual Core Diameter	1.1	mm	
Overall Diameter	4.6	mm	

Internal Wire Colour	Function
Red	+ve Supply
Blue	Ground
Yellow	Signal Gnd
Green	lout