

## Small Size Liquid Capacitive Electronic Inclinometer Sensor providing 0..5V DC output.



### Description

The NA inclinometers - NA2-05, NA2-10, NA3-30, NA4-45 and NA4-70 - are liquid capacitive gravity based sensors with integrated electronics. These electronics combine a highly stable, laser-trimmed signal conditioner with electronic compensation for temperature drift; a highly stable supply voltage regulation circuitry; and low-pass filtering of the signal output to eliminate unwanted noise.

The capacitive measurement principle guarantees a very stable, linear relationship between the angle being measured and the normalised output signal.

The sensor electronics require minimal power and, together with the capacitive primary transformer, are characterised by low errors, high signal-to-noise ratio and high long-term stability.

Contrary to measuring inclinations using accelerometers, this measurement principle enables a linear relationship between the inclination to be measured and the output signal, independent of the constant of gravity at the place of measurement, i.e. Independently of where the measurement is taking place, whether in Europe, Australia, on Mount Everest or the Moon.

### Applications

These inclinometers are suitable for applications requiring a small, lightweight analog voltage output sensor for accurate measurement of relatively large inclinations.

Typical areas of application include measuring instruments and inspection systems, vehicle tilt monitoring, automation and safety engineering, scientific devices, medical and communications equipment as well as navigational systems. Commonly used as a component combined with OEM electronics.

### Features

- Small housing, less than 1" dia.
- Lightweight: less than 1 ounce
- Measuring Ranges:  $\pm 5$ ,  $\pm 10$ ,  $\pm 30$ ,  $\pm 45^\circ$ ,  $\pm 70^\circ$
- Linear output characteristics
- Minimal zero offset drift
- Minimal cross sensitivity
- Hysteresis free output signal
- High measurement accuracy
- Very low relative linearity errors
- Integrated sensor electronics including signal conditioner and low-pass filter
- Long-term stability
- Low power consumption
- Temperature compensated Analog 0..5V DC output signal
- Optional 5V reference output
- Highly stable internal voltage regulation
- Hermetically sealed to IP65
- EMC certified / CE certified
- Zero offset mechanically adjustable through 360 within mounting ring
- No interference by ambient electromagnetic fields
- Shockproof to 10,000g - no moving mechanical parts
- Sensor electrically isolated from point of measurement using high quality PBT plastic housing - no ground connections



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# NA Series

## General Specifications Brochure

MECHANICAL CHARACTERISTICS			
Housing	30% Glass Filled PBT Plastic		
Protection Level	IP65		
Mounting	Supplied Mounting Ring		
Mounting Plane	Vertical Surface		
Outline Dimensions	Ø 0.976" (Ø 24.8mm) X .46" (11.7mm) h		
	With Mounting Ring: Ø 1.46" (Ø 37mm) X .46" (11.7 mm) h		
Electrical Connection	4 highly flexible, color-coded wires Ø 0.04" (Ø 1.0mm) x 7.0" (180mm)		
	Optional: 3-wire Shielded cable Ø 0.083" (Ø 2.1mm) x 7.0" (180mm)		
Weight	Approx. 0.87 ounces (24.5 grams)		
Operating Temperature	-40°F to +185°F (-40° to +85°C)		
Storage Temperature	-49°F to +194°F (-45° to +90°C)		
P/N SPECIFICATIONS	NA2-05 (NA2-05C)	NA2-10 (NA2-10C)	
Measuring Range	±5°	±10°	
Resolution	< 0.002°	< 0.005°	
Sensitivity	400mV/°	200mV/°	
Max. Non-linearity	< 0.2% Full Range (< ±0.02°)	< 0.2% Full Range (< ±0.03°)	
Transverse Sensitivity	<1% at 30° tilt		
Response Time	< 0.3 Sec. (<300mSec)		
Temperature Drift of Span	< -0.018% / °C		
Temperature Drift of Zero	< ±0.002 angle degree / °C		
Power Supply	8..30V DC non-regulated		
Zero Offset	2.5 Volt		
Current Consumption	Approx. 1mA		
Reference Output (optional)	5V ±25ppm/K		
P/N SPECIFICATIONS	NA3-30 (NA3-30C)	NA4-45 (NA4-45C)	NA4-70 (NA4-70C)
Measuring Range	±30°	±45°	±70°
Resolution	< 0.007°	< 0.012°	0.014°
Sensitivity	66.6mV/°	44.4mV/°	28.6mV/°
Max. Non-linearity	<0.1% Full Range (<±0.06°)	<0.2% Full Range (< ±0.18°)	<0.2% Full Range (<±0.28°)
Transverse Sensitivity	<1% at 30° tilt		
Response Time	< 0.3 Sec. (<300mSec)		
Temperature Drift of Span	< -0.018% / °C		
Temperature Drift of Zero	< ±0.002 angle degree / °C	< ±0.003 angle degree / °C	
Power Supply	8..30V DC non-regulated		
Zero Offset	2.5 Volt		
Current Consumption	Approx. 1mA		
Reference Output (optional)	5V ±25ppm/K		
WIRING TABLE			
3-, 4-WIRE (default)		SHIELDED CABLE ("C" option)	
RED	+8..+30V DC non-regulated	RED	+8..+30V DC non-regulated
BLACK	Ground	SHIELD	Ground (Inside Shield)
WHITE	Output Signal +0.5..+4.5V	BLUE	Output Signal +0.5..+4.5V
BROWN	(optional) V Ref: 5V	--	--

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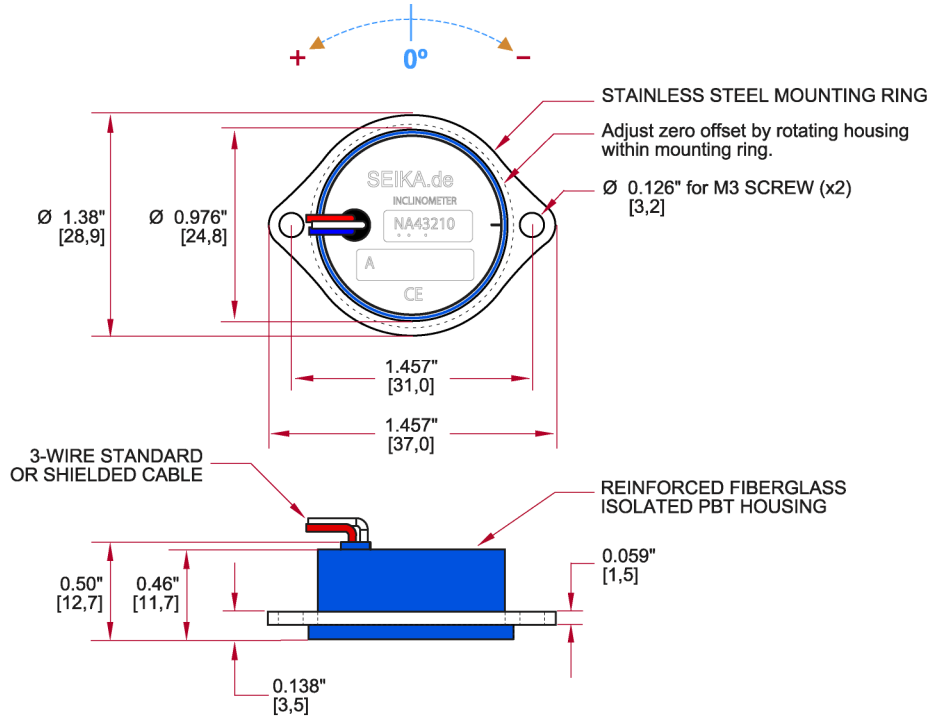


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**Figure 1:** Dimensions and Mounting Position (inches [mm])



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