seika.de® NA2-05, NA2-10, NA3-30, NA4-45, NA4-70

Inclinometers with integrated 0.5 to 4.5 Volt signal conditioner for inclination measurement in the ranges of ±5, ±10, ±30, ±45, ±70 degrees

Features

- **small size light weight**
- **linear output response**
- **high measurement accuracy**
- **small zero drift**
- **small cross sensitivity**
- **high long term stability - virtually infinite lifespan**
- **hysteresis-free output signal**
- **integrated sensor electronics including signal conditioner and low-pass filter**
- **no data memory with memory loss**
- **temperature compensated, conditioned 0.5 ... 4.5 Volt output signal**
- **highly stable internal voltage regulation**
- **optional 5 Volt reference voltage output**
- **unconditioned operating voltage between 9V and 30V**
- **low power consumption**
- **protection against reverse supply voltage polarity**
- **EMC protection, CE certified**
- **no interference by surrounding electromagnetic fields**
- **shockproof as without moving mechanical parts**
- **hermetically sealed**
- **sensor electrically isolated from point of measurement by high quality plastic housing — no ground connection**
- **zero point adjustable through 360° using clamping ring**

Description

The capacitive, dielectric liquid based inclinometers NA2-05, NA2-10, NA3-30, NA4-45 and NA4-70 equipped with integrated sensor electronics developed by SEIKA Mikrosystemtechnik GmbH consists of a highly stable, laser-trimmed signal conditioner with electronic compensation for temperature drift, highly stable supply voltage regulation circuitry and low-pass filtering of the measurement signal to eliminate unwanted noise.

The capacitive measurement principle guarantees a very stable, linear relationship between the inclination 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.

Application

The NA2, NA3 and NA4 can be used for measurements requiring small and light devices, replacability, measurement of relatively large inclinations and a normalised, analogue voltage output signal.

Measurements of inclinations in measuring instruments and inspection equipment, in water, land and air vehicles, in automation and safety technology, on cranes and lifting equipment, on robots, in the manufacture of scientific equipment, in medicine and telecommunication as well as navigation systems are typical examples.

Specifications

Type	NA2-05	NA2-10	NA3-30	NA4-45	NA4-70
Measuring range	±5 degrees	±10 degrees	±30 degrees	±45 degrees	±70 degrees
Resolution	<0.002 degrees	<0.002 degrees	<0.005 degrees	<0.01 degrees	<0.01 degrees
Nominal sensitivity	400 mV/degree	200 mV/degree	66.6.. mV/degree	44.4.. mV/degree	28.57 mV/degree
Output voltage range	2.5V±2V at ±5°	2.5V±2V at ±10°	2.5V±2V at ±30°	2.5V±2V at ±45°	2.5V±2V at ±70°
Linearity deviation over whole measurement range	<±0.02 degrees	<±0.04 degrees	<±0.12 degrees	<±0.18 degrees	<±0.28 degrees
Sensitivity shift over a temperature range -15°C ... 65°C	<2%	<2%	<2%	<2%	<2%
Temperature drift of zero point	±0.002°/K	±0.002°/K	±0.002°/K	±0.003°/K	±0.003°/K

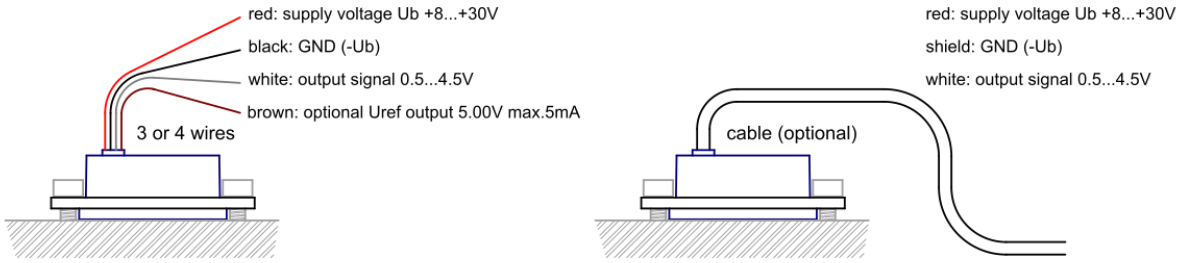
Shared specifications	
standard supply voltage	9V … 30V DC
optional externally regulated supply voltage	+5 Volt (in this configuration the internal reference voltage stabilization is omitted)
Dimensions	see dimension drawing
Current drawn	ca. 2mA
optional reference voltage output	5.00 Volt (only optionally connected for 4 wire terminals)
Temperature drift of the reference voltage	< 25 ppm/K
Current drawn with external supply voltage of 5V	approx. 1mA
Maximum current of the reference voltage output	5mA
Maximum operating temperature	+85°C
Output resistance	ca. 100 Ohm
Minimum Operating Temperature	-40°C
Protection	IP 65
Maximum Storage Temperature	+90°C
Minimum storage temperature	-55°C
Enviromental humidity	0…100% RH
Signal-to-noise ratio at signal output (0… 10kHz)	<150µVss
Electrical signal-to-noise ratio	>85dB
Transverse sensitivity at 45° tilt	<1% of measurement value
Voltage Offset (at zero degree tilt)	2.5 Volt
Settling time to 98% of the actual value after any given rotation	<0.3 s
Maximum output voltage range	0.05V ... 4.95V
Weight (without clamping ring, with approx. 18cm wires)	approx. 24g

Electrical connection	standard: • 3 highly flexible, color-coded wires ø ~1mm, length approx. 18 cm optional: • reference voltage output (+5.00V) with 4 braided wires or • 0.5m strong, flexible, shielded cable, 2 wires + shield, ø2,1mm • special lengths on request

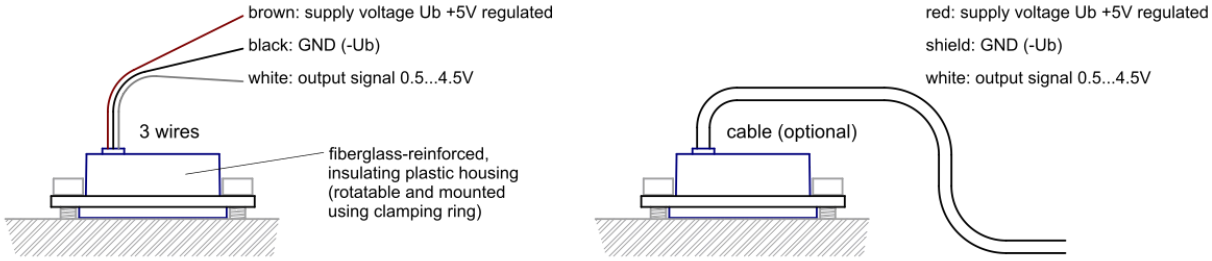
• Each sensor is calibrated after production. It is delivered with an individual calibration record that includes the precise offset and sensitivity values, the static characteristic curve and the linearity deviation curve.

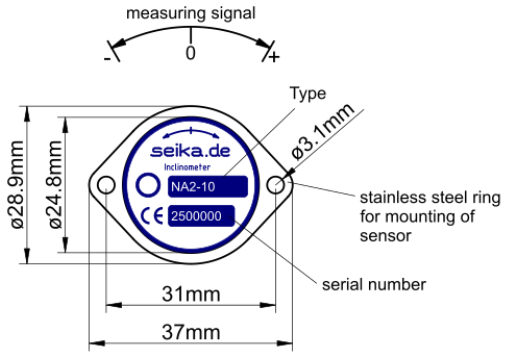
Dimensions (in mm) and Connections

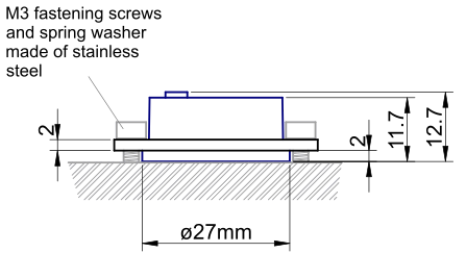
Sensor with internal supply voltage regulation (Type: NAx-xx)



Sensor with external supply voltage regulation (Type: NAx-xx-5V)







Optionally with round cable: +Ub(red), signal voltage (white), GND (shield) — without 5V reference output