

# KOIN-4

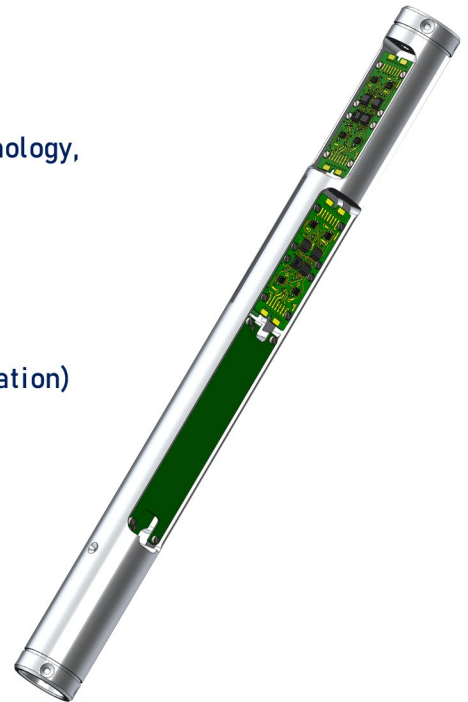
## MWD/LWD Directional Sensor

### Features

- Unique accelerometer-free technology
- The inclination and azimuth sensor manufactured in-house
- The inclination sensor is made using liquid capacitive sensor technology, it has high accuracy, impact resistance, and reliability
- High accuracy:  $\pm 0.1$  for inclination,  $\pm 0.3$  for azimuth
- High shock resistance
- Digital output
- Small size: OD 31 mm
- Low consumption (no more than 0.5 W when all sensors are in operation)
- Compact design

### Applications

- Directional drilling
- Logging while drilling
- Orientation of borehole logging instruments
- Measurement-While-Drilling
- Wireline tools.



When drilling vertical, horizontal, or extended reach wells, obtaining accurate measurements of inclination and azimuth is a fundamental requirement.

To meet these requirements, we have created an inclination sensor that meets the increased requirements of reliability, accuracy, and impact resistance. The sensor design is based on the principle of a liquid capacitive tilt sensor, which allows measurements at high temperatures and vibrations while showing results that are ahead of modern analogs of accelerometers. The compact size of the sensor allows you to place it on a chassis with a diameter of up to 31 mm, which makes it easy to place it in any modern MWD system. The simplicity of the design, the small number of elements and the technical characteristics of the inclination sensor make it safe to put it on a par with accelerometers from companies such as Honeywell and Japan Aviation Electronics (JAE).

Extensive experience in the design of fluxgate magnetometers allowed to create a fluxgate that allows us to achieve nonlinearity is not more than 0.1%. The implementation of this fluxgate allowed us to achieve high accuracy, low noise levels, and stability of readings in an extended range of temperatures. Its high technical performance and compact size allow us to expand the range of applications allowing it to be used in all types of work-related to well drilling.

The KOIN-4 MWD sensor is based on three tilt sensors and a 3-axis fluxgate magnetometer. The output values of KOIN-4 are azimuth, inclination, toolface (roll), three magnetic components, three gravitational components, RPM, and temperature readings. The model can be made on the customer's chassis.

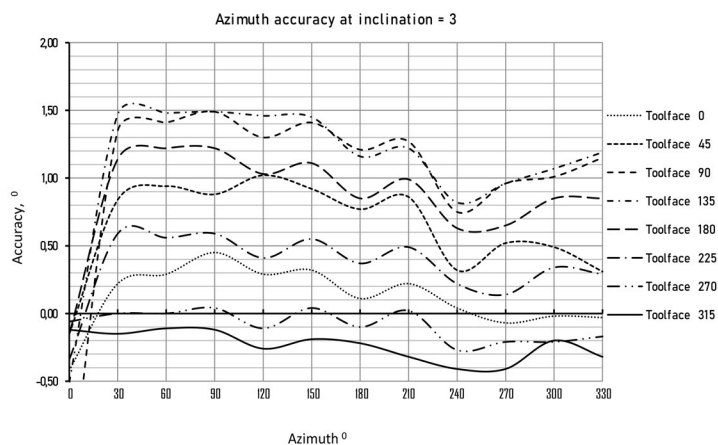
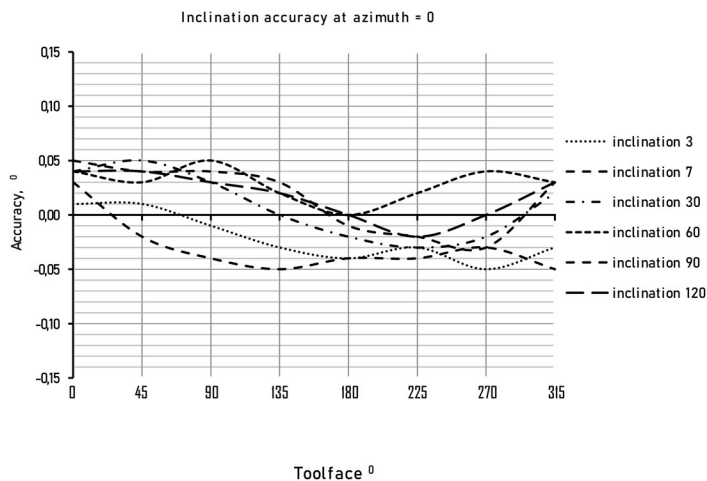
Manufactured in-house using our sensor technology we have created directional modules for easy integration to MWD, LWD and Wireline tools.

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| PHISICAL                                                                                  |     |          |
|-------------------------------------------------------------------------------------------|-----|----------|
| Outside Diameter (OD)                                                                     | mm  | 31       |
| Lenght                                                                                    | mm  | 378      |
| Design                                                                                    |     | (1)      |
| ELECTRICAL                                                                                |     |          |
| Input Voltage Range                                                                       | V   | 5.4...6  |
| Power consumption                                                                         | W   | 0.5      |
| Protocol                                                                                  |     | (2)      |
| ENVIRONMENTAL                                                                             |     |          |
| Temperature Operating                                                                     | °C  | -5...125 |
| Shock survival (0.5 ms, half sine)                                                        | g   | 3500     |
| PERFOMANCE                                                                                |     |          |
| Measuring range of magnetic azimuth                                                       | deg | 0-360    |
| Measuring range of magnetic components                                                    | μT  | ±70      |
| Measuring range of inclination                                                            | deg | 0-180    |
| Measuring range of toolface                                                               | deg | 0-360    |
| Measuring range of temperature                                                            | °C  | 0-125    |
| Toolface (Roll) absolute accuracy                                                         | deg | ±0.5°    |
| Azimut absolute accuracy (Dip<76°)                                                        |     |          |
|                                                                                           |     | ±0.3°    |
|                                                                                           |     | ±1.0°    |
|                                                                                           |     | ±2.0°    |
| Inclination absolute accuracy                                                             | deg | ±0.1°    |
| Temperature absolute accuracy                                                             | °C  | ± 2°     |
| Linearity error of measurement of magnetic components (over the entire temperature range) | %   | <0.1     |

1. Can be placed on the customer,s chassis
2. User selectable

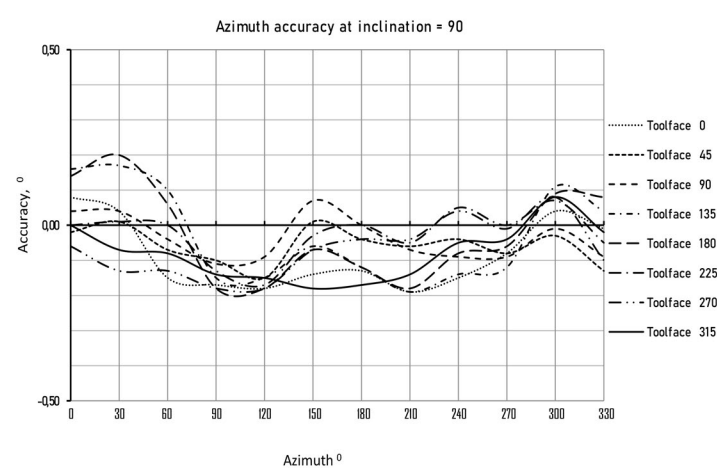
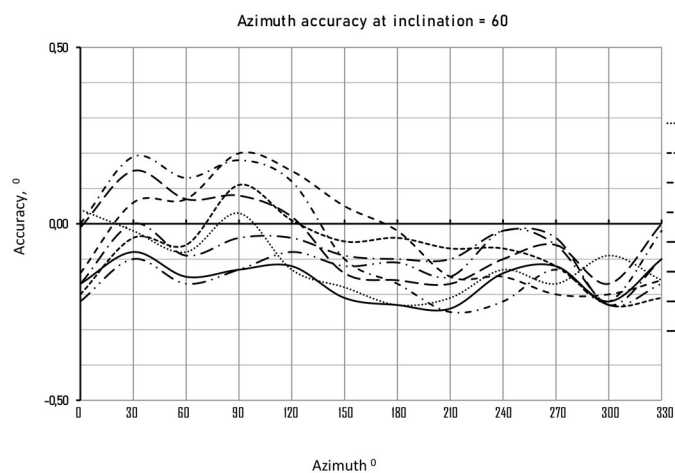
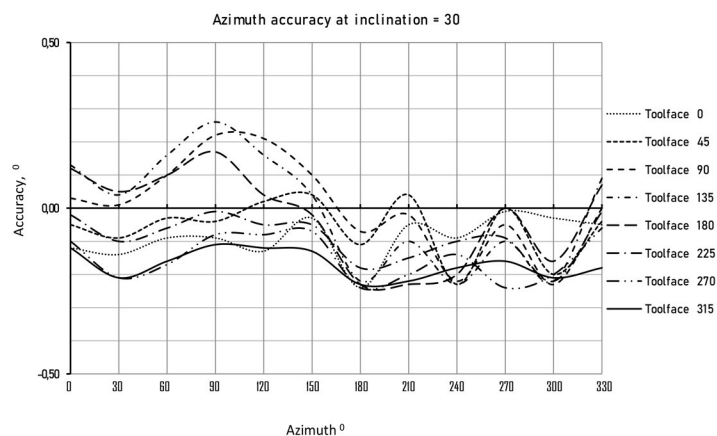
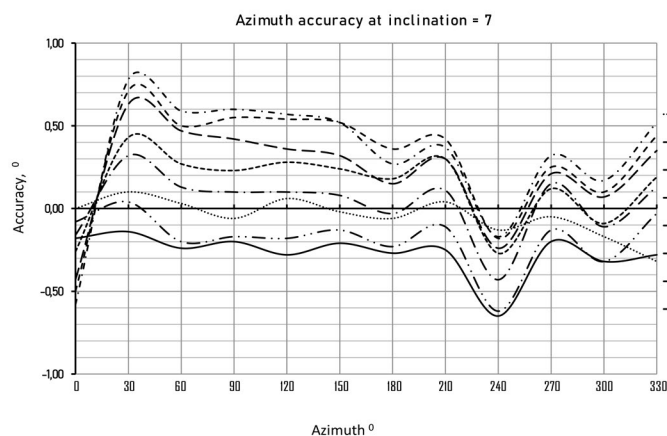
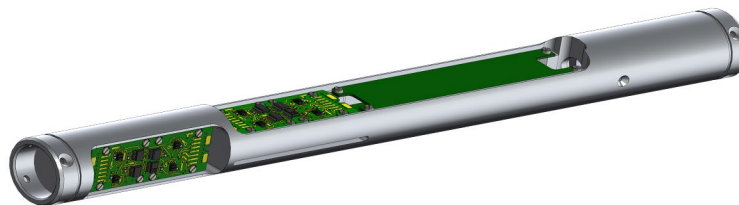




Measure Systems For Gas and Oil Industry

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