

# Product Overview

INCLINATION SENSORS

ACCELERATION SENSORS

TILT SWITCHES

ROTARY ENCODERS



# Introduction

## DIS sensors

DIS Sensors (a subsidiary of Roter Holding) has been the supplier of choice for high quality sensor technology. We develop, manufacture and supply sensors for applications of all kinds. Although our sensor range mainly focuses on the measurement of inclination, vibration and acceleration, DIS Sensors is also a leading supplier of rotary encoders.

### Standard or custom

This brochure presents an overview of our wide range of sensors, and primarily describes the standard products. However, because our sensors are all developed and produced in-house, we can also offer custom solutions for specific needs.

Because innovation is in our blood, and know-how in our genes. So it's no surprise to find high-quality components and solutions from DIS Sensors providing reliable measurement in machinery all over the world.

Moreover, the excellent relationships we have built up with selected partners enable us to deliver large series at a highly favourable price/quality ratio.

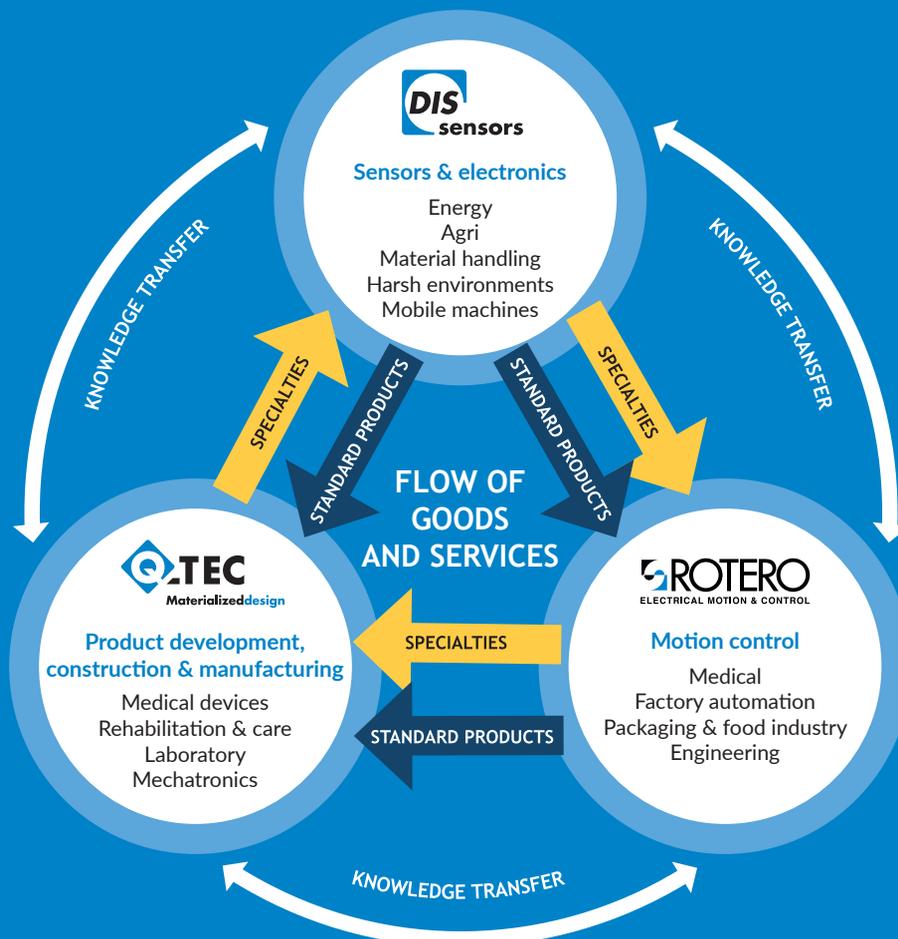
- ISO9001, TÜV, UL and E4 (automotive type approval)
- an R&D department with more than 75 years' experience
- (pre-compliance) EMC measurements
- production department: surface mount and conventional assembly (single- and double-sided), electronics potting, small to medium-sized production runs (50 – 2,000 units/batch), full traceability
- testing department: functional tests, temperature and RH chamber, high precision calibration equipment
- headquarters in Soest (NL)
- regional office in Germany, and a network of experienced distribution partners

## Rotero Holding

DIS Sensors is a subsidiary of Rotero Holding. This holding company consists of 5 independent but fully complementary subsidiaries: DIS Sensors (bv and GmbH), Rotero (Holland bv & Belgium bvba) and Q-Tec bv.

- DIS Sensors is dedicated to the development, production and sale of sensors.
- Rotero Holland and Rotero Belgium specialize in motion control solutions, and also distribute the products of DIS Sensors in their national markets.
- Q-Tec is specialized in the development and production of mechatronic solutions for the health care and related sectors.

Although each business unit has its own market and customer base, they readily support one another with their expertise when necessary. Across Rotero Holding, a total of 50 highly enthusiastic and qualified persons work with just one goal in mind: *the best solution for the customer.*



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### Application example

Boom lifts (or 'cherry pickers') come in all shapes and sizes, but they have one thing in common: every type must be equipped with an inclinometer. First, to verify that the machine is level before raising the boom; then to continuously check for potential instability during operations.

DIS Sensors offers a wide range of inclinometers for this application, including many with SIL2/PLd certificate.

#### Dynamic Inclinometer

Stable real-time measurement, even during rapid movement.

Features of new DIS Sensors dynamic inclinometer:

- Compact, robust sensor housing
- CANopen & J1939 outputs (analog and RS485 coming soon)
- M12 plug or fixed cable connection
- Future-proof hardware and software architecture
- Customization options

#### Inclinometers

Inclinometers measure the angle with respect to the direction of the force of gravity in one or two axes. Inclinometers from the DIS Sensors QG series are based on robust MEMS technology, and their modular design makes it easy to optimize each sensor for a specific application. What's more, for certain models, the handy configurator enables the end customer to easily adjust the sensor according to preference.

#### Specifications:

single axis measurement range:	$\pm 10^\circ$ ; $\pm 30^\circ$ ; $\pm 90^\circ$ ; 0 - $360^\circ$
double axis measurement range:	$\pm 10^\circ$ ; $\pm 30^\circ$ ; $\pm 90^\circ$
energy supply:	5 V dc or 10 - 30 V dc
analogue output:	0.5 - 4.5 V or 4 - 20 mA
digital output:	CANopen (Safety); J1939
level of protection:	IP67, IP68 or IP69K
precision:	depending on model and range: as high as $\pm 0.04^\circ$
programmable:	filtering, measuring range
zeroing possibility:	depends on model
functional safety:	SIL2/PLd (specific models)
housing:	(reinforced) plastic or stainless steel

#### Functions:

levelling, tilt protection, roll and pitch measurement, angle measurement

#### Applications:

concrete pumps, cranes, elevated work platforms, solar panels, air suspension systems, agricultural machinery



## QG series



### Application example

Modern wind turbines are required by law to use accelerometers to monitor swaying of the mast due to wind and (offshore) wave action. When these sensors measure values that exceed a certain threshold, a signal is given to 'feather' the blades, putting the wind turbine into a safe state.

DIS Sensors provides added value to turbine producers in the area of customer-specific filtering and safety circuit interfacing.

#### CANopen safety sensor for safety applications

DIS Sensors offers various inclinometers and accelerometers that are certified compliant with SIL2 (IEC 62061) and PLd (as per EN ISO 13849).

This certification makes these sensors suitable for use in safety applications. The sensors are available in both the standard QG65 reinforced plastic housing and the QG76 stainless steel housing.

#### Acceleration sensors

The acceleration sensors of DIS Sensors measure acceleration in one, two or three axes. These sensors are based on robust MEMS technology and thanks to the modular design easy to adapt to specific requirements. Because these acceleration sensors have a higher bandwidth than inclinometers, they can accurately measure the g-forces of fast movements.

#### Specifications:

measurement range:	$\pm 0.5$ to $\pm 18$ g (1 g = $9.81$ m/s <sup>2</sup> )
bandwidth:	0 - 1,600 Hz
energy supply:	5 V dc or 10 - 30 V dc
analogue output:	0.5 - 4.5 V or 4 - 20 mA
digital output:	CANopen (Safety)
level of protection:	IP67, IP68 or IP69K
precision:	depending on model and range: as high as $\pm 0.04$ g
zeroing possibility:	depends on model
functional safety:	SIL2/PLd (specific models)
housing:	(reinforced) plastic or stainless steel

#### Functions:

measurement of acceleration and vibration, active vibration damping, transport monitoring

#### Applications:

agricultural machinery, wind mills, containers

## QG series



### Application example

The tilt of mobile machinery is usually monitored using inclinometers. An inclinometer designed as a tilt switch can trigger warning and/or alarm signals when one or more pre-programmed angles is exceeded for a certain period of time.

This is also a simple but effective way to prevent abuse of the machines in a rental fleet.

#### SIL1 tilt switch

The QG40N Safety Tilt switch is a non-contact MEMS technology tilt switch for standard & safety applications (the device is SIL1/PLC). It has up to three PNP outputs and is available in both 1-axis  $\pm 170^\circ$  and 2-axis  $\pm 80^\circ$ . This sensor can be customized for a specific application by using the optional configurator tool to modify its factory settings, e.g. switching points, filter/bandwidth and on/off delay timers.

#### Tilt switches

A tilt switch is in fact an inclinometer (a sensor) with a switching output, and with gravity serving as a reference. The tilt switches from DIS Sensors are based on MEMS technology and intelligent microcontroller algorithms. As a result, single or twin axis switches can be implemented with any desired switching angle.

The standard enclosure for these sensors is a QG40 housing. The QG65 variant offers the possibility to incorporate tilt switches with even higher precision and temperature stability.

#### Specifications:

single axis measurement range:	up to $360^\circ$
double axis measurement range:	$\pm 1^\circ$ to $\pm 80^\circ$
energy supply:	5 V dc or 10 - 30 V dc
output:	single or dual NPN/PNP
level of protection:	IP67, IP68 or IP69K
precision:	depending on model and range: as high as $\pm 0.2^\circ$
programmable:	switching angle, on/off delays, filtering
housing:	(reinforced) plastic

#### Functions:

replacement for mercury switches, tilt and tip over protection

#### Applications:

elevated work platforms, agricultural machinery, forklift trucks, stackers



## QR series



### Application example

The contactless incremental encoder is used to measure the direction and speed of rotation of a shaft.

This technology is used in many machines in which a linear displacement is achieved by means of a rotary motor. This sensor is often used as an alternative for two inductive limit switches or expensive optical encoders.

The contactless absolute encoder is used to measure the absolute angle of a rotating shaft that turns through an angle of less than 360°. Typical applications include steering systems, throttle levers and automatic doors.

This rotary encoder is therefore highly suitable for continuous feedback of the shaft position to the controller.

Also available in QR46, as replacement for rotary encoders from other brands. This model has a compatible shaft and mounting bracket.

### Rotary encoders

Our rotary encoders (absolute & incremental) enable contactless measurement of an angular displacement from 0° to 360° without a mechanical stop. We offer three different types: QR30(N), QR40 and QR40EMN. In the QR30(N) and QR40EMN range, the sensor is mounted on the fixed assembly, and the magnet is separately mounted on the rotating shaft.

The maximum distance up to 10 mm (depending on model and magnet) between the magnet and the sensor provides sufficient clearance for mechanical tolerances under extreme conditions. Various outputs are available with a 12-bit resolution and a high repeatability for a wide range of applications.

The QR40 series is supplied complete with output shaft. The bearing is equipped with a fibreglass plain bearing. The QR40 has a zero-input, enabling the device to be zero-calibrated after installation, and making the sensor mounting procedure non-critical. The QR40EMN is available as full-redundant model, what makes it the perfect solution for designs where safety is required.

### Specifications:

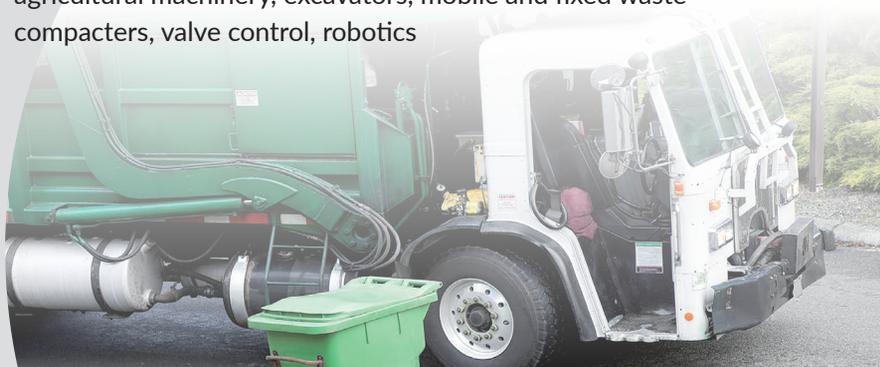
	Absolute	Incremental
measurement range:	0 - 360° (subranges possible)	0 - 360°
energy supply:	5 V dc or 10 - 30 V dc	5 V dc or 10 - 30 V dc
output:	0 - 5 V or 4 - 20 mA (both single & redundant)	A/B pulse (32 - 1,024 ppr) push/pull
level of protection:	IP67 (QR40: IP66)	IP67
resolution:	0.09°	0.09°
housing:	plastic	plastic

### Functions:

replacing potentiometers, measurement of angle, speed and direction

### Applications:

agricultural machinery, excavators, mobile and fixed waste compactors, valve control, robotics





## Cables & accessories

### Cables

#### PVC Cable - 5-pole

M12 with open ended wires - female

Available sizes:

	Part number
1.5 m	11700
5 m	11701
10 m	11702
15 m	11703

#### PUR Cable - 5-pole

M12 with open ended wires - female

Available sizes:

1.5 m	10654
5 m	10657
10 m	11704
15 m	11705

#### PUR Cable - 8-pole

M12 with open ended wires - female

Available sizes:

1.5 m	11706
5 m	11707
10 m	11708
15 m	11709

#### PUR Cable (CAN) - 5-pole

M12 with open ended wires - female

Available sizes:

1.5 m	11711
5 m	11712
10 m	11146
15 m	11713

**Breakout cable for QG40N configurator** 12345

### Connectors

(without cable - with screw terminal)

#### M12 connector

Available in:

	Part number
Male, 5-pole, metal	10218
Male, 5-pole, plastic	11848
Female, 5-pole, metal	10219
Female, 5-pole, plastic	11723
Male, 8-pole, plastic	11716
Female, 8-pole, plastic	11715

#### M12 T-connector

5 pole - 1 x male & 2 x female 11822

### CAN open accessories

M12 bus terminator

5 pole - male	10217
5 pole - female	10194

### External magnets & magnet holders

#### Magnet holder with N-mark - IP67

Stainless steel bolt (size M12 x 1.5 x 20 mm)	11594
Stainless steel bolt (size: M10 x 1 x 20 mm)	12170
Plastic disc (size: Ø30 x 8 mm)	11787
Plastic disc (size Ø43 x 10 mm)	12499

#### Magnet neodymium (rectangular) - with N-mark

Available sizes:

11.2 x 5.5 x 8 mm	11178
20 x 12 x 10 mm	11829

#### Magnet neodymium (circular) - 2-pole axial

Available sizes:

Ø 8 x 5 mm	11178
Ø 15 x 4 mm	11593

### Configurators

QG40N series configurator	12380
DIS configurator set CAN (for QG65D & QG65N2)	12750



## Our Distributors

We work with an extensive network of reliable and skilled distributors. These selected distributors enable DIS Sensors to export every product in our entire range to more than 30 countries worldwide.

### EUROPE

#### Austria

InterTech Handels GmbH  
InterTech Handels GmbH  
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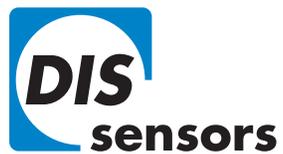
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