



## Tilt sensor N7 dynamic CAN

The N7 dynamic tilt sensor is available in CANopen or SAE J1939 versions. Due to its robust design and high resistance to shock and vibration, it is often used to measure inclination in construction machinery, agricultural machinery, industrial trucks and harsh industrial environments. Enhanced with a highly responsive blend of accelerometer and gyroscope, this combination effectively minimizes the impact of abrupt movements, guaranteeing the delivery of accurate measurement data.

N7 dynamic – developed for even greater safety, reliability, functionality and flexibility.

- High precision, even with fast movements, strong vibrations and shocks
- Inertial Measurement Unit (IMU)
- Output of acceleration, rotation rate and inclination
- Precise signals for dynamic movements thanks to sensor fusion
- EMC standards in accordance with off-highway standards (EN ISO 14982; DIN EN ISO 13766-1; DIN EN 12895)
- Robust design for a long service life: protection class IP6K7 (ISO 20653) / IP6K9K (ISO 20653)
- Temperature-resistant from -20 °C to +85 °C (-40 °C to +85 °C on request)
- Connector types: Deutsch DT04-08PA, 1x M12 5-pin (male) or 2x M12 5-pin (male/female)
- Daisy-Chain – Looping through the CAN signal without additional T-distributors
- Fast installation thanks to efficient 2-point mounting
- Smart variant management thanks to a clever modular system
- E1 type approval for road approval
- Parameter sets customised to the application to increase performance/accuracy (on request)

Technical drawing

IMAGE 1/4

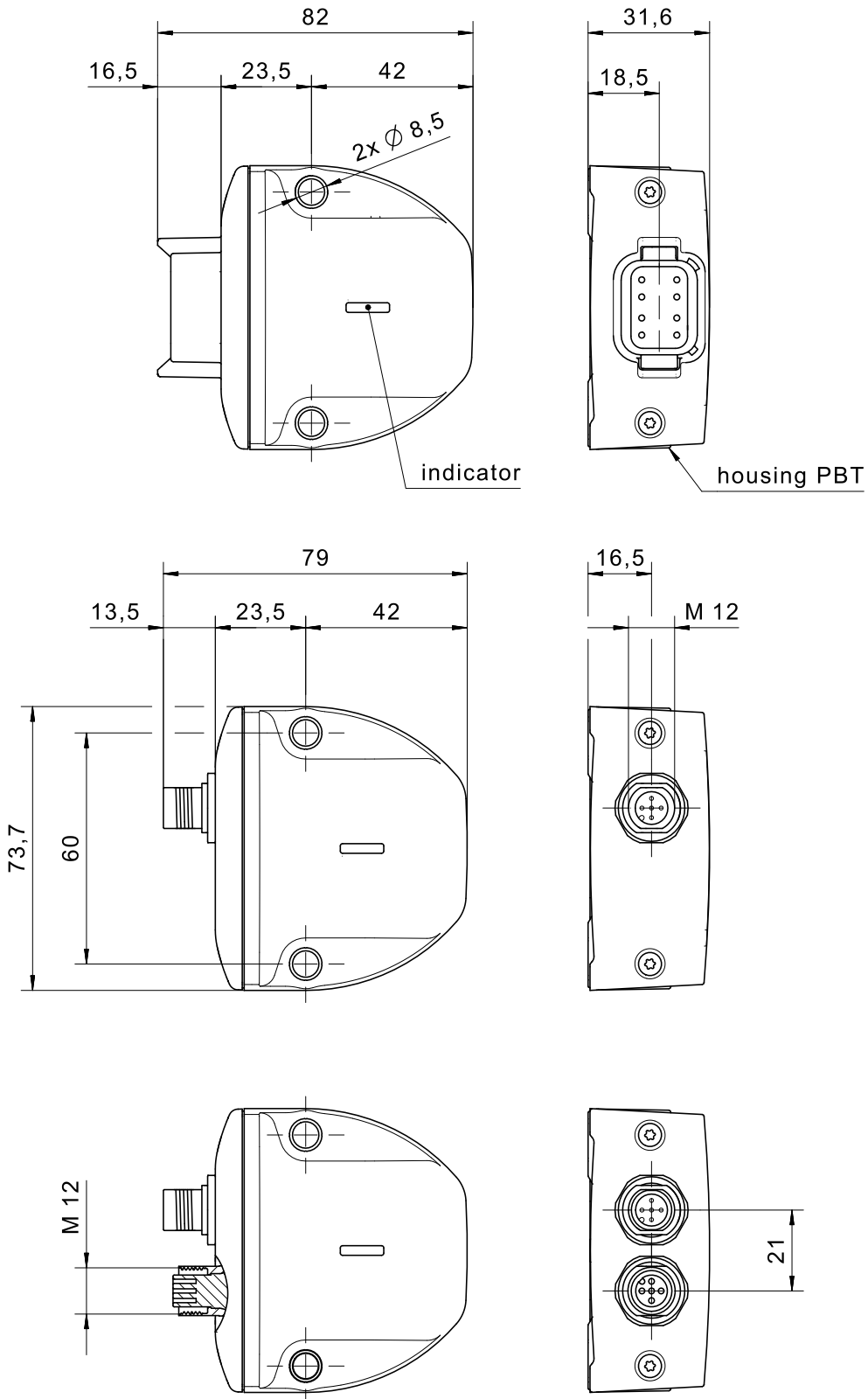
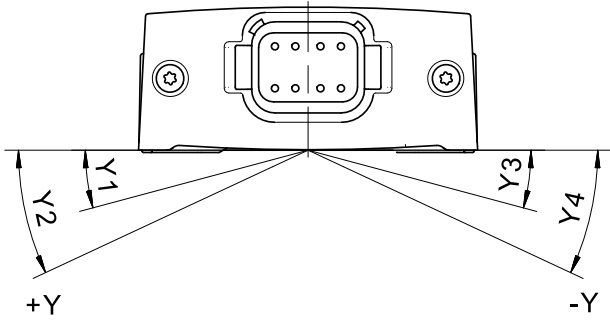


IMAGE 2/4

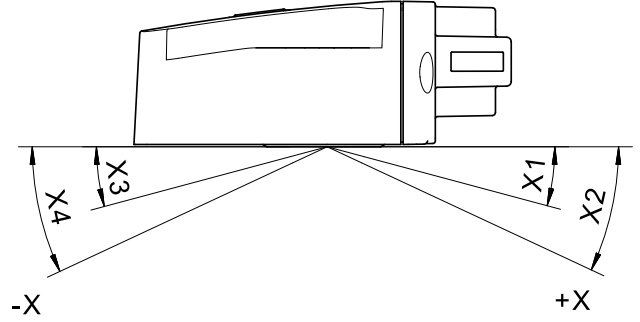
360° ( $\pm 180^\circ$ ) horizontally mounted

Y-axis



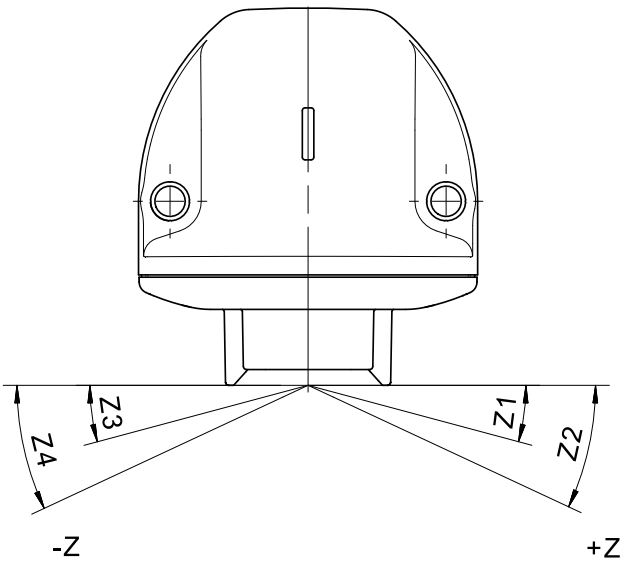
180° ( $\pm 90^\circ$ ) horizontally mounted

X-axis



360° ( $\pm 180^\circ$ ) vertically mounted

Z-axis



180° ( $\pm 90^\circ$ ) vertically mounted

X-axis

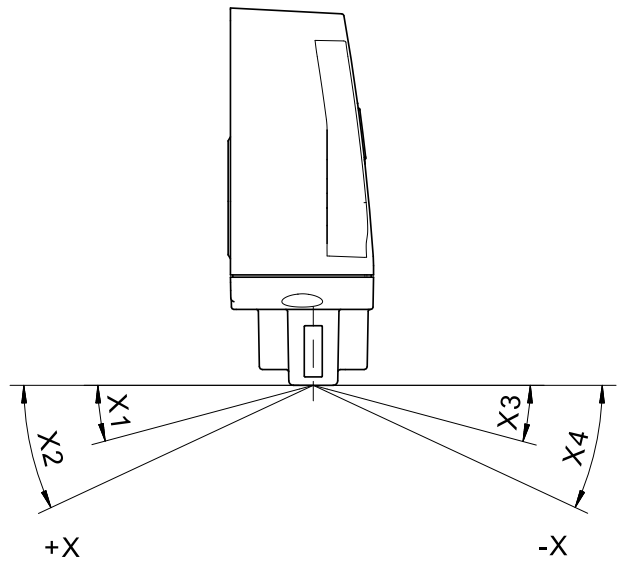
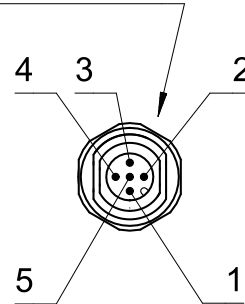


IMAGE 3/4

### M12 - analog

| pin | configuration  | specification     |
|-----|----------------|-------------------|
| 1   | U <sub>B</sub> | operating voltage |
| 2   | Out1           | output 1          |
| 3   | GND            | ground            |
| 4   | Out2           | output 2          |
| 5   | n. c.          | not connected     |

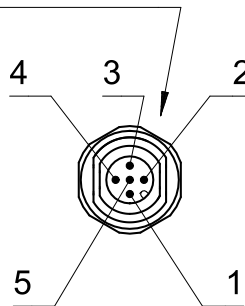
### male M12



### M12 - CAN

| pin | configuration  | specification     |
|-----|----------------|-------------------|
| 1   | n. c.          | not connected     |
| 2   | U <sub>B</sub> | operating voltage |
| 3   | GND            | ground            |
| 4   | CAN_H          | signal line CAN   |
| 5   | CAN_L          | signal line CAN   |

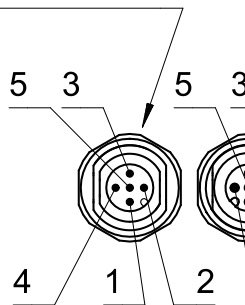
### male M12



### 2x M12 - CAN

| pin | configuration  | specification     |
|-----|----------------|-------------------|
| 1   | n. c.          | not connected     |
| 2   | U <sub>B</sub> | operating voltage |
| 3   | GND            | ground            |
| 4   | CAN_H          | signal line CAN   |
| 5   | CAN_L          | signal line CAN   |

### male M12



### female M12

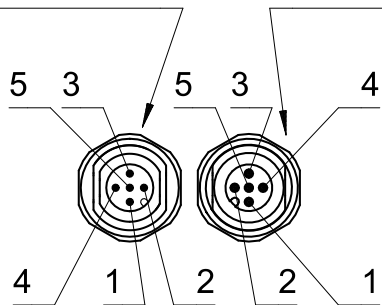
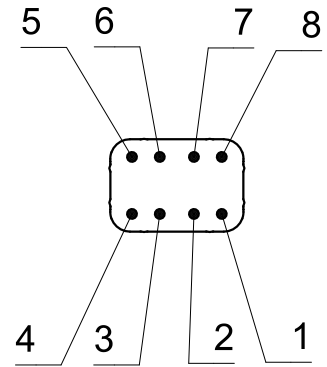


IMAGE 4/4

### Deutsch DT04-08PA - analog

| pin | configuration  | specification     |
|-----|----------------|-------------------|
| 1   | U <sub>B</sub> | operating voltage |
| 2   | GND            | ground            |
| 3   | Out1           | output 1          |
| 4   | Out2           | output 2          |
| 5   | Relay1         | switch output 1   |
| 6   | Relay1         | switch output 1   |
| 7   | Relay2         | switch output 2   |
| 8   | Relay2         | switch output 2   |

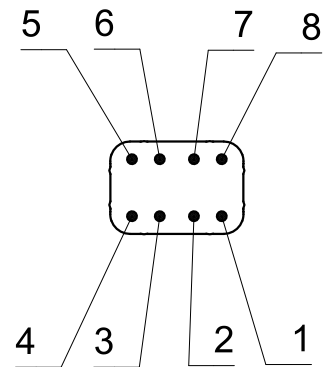
### Deutsch DT04-08PA



### Deutsch DT04-08PA - CAN

| pin | configuration  | specification     |
|-----|----------------|-------------------|
| 1   | U <sub>B</sub> | operating voltage |
| 2   | GND            | ground            |
| 3   | CAN_L          | signal line CAN   |
| 4   | CAN_H          |                   |
| 5   | Relay1         | switch output 1   |
| 6   | Relay1         | switch output 1   |
| 7   | Relay2         | switch output 2   |
| 8   | Relay2         | switch output 2   |

### Deutsch DT04-08PA



**Article characteristics**

| Attribute                          | N7DCC000H2-001 | N7DCC0D2H2-001  | N7DCC0D2V2-001                                       | N7DCC000V2-001 | N7DCC001H2-001 | N7DCC001V2-001 |
|------------------------------------|----------------|---|--|----------------|----------------|----------------|
| Technology                         | MEMS           |   |  |                |                |                |
| Supply voltage                     | +8..+36 V DC   |   |  |                |                |                |
| Polarity reversal protection       | -36 V DC       |   |  |                |                |                |
| Short-circuit protection           | ISO 16750-2    |   |  |                |                |                |
| Current consumption                | 100 mA         |   |  |                |                |                |
| Output signal                      | CANopen        | CANopen + 2x relay (NC)                                       |  | CANopen        |                |                |
| Contact form                       | -              | NC  |  | -              |                |                |
| Protocol                           | CANopen        |   |  |                |                |                |
| UDS ISO 14229 capability           | yes            |   |  |                |                |                |
| Baud rate                          | 250 kBit/s     |   |  |                |                |                |
| Cycle time                         | 10 ms          |   |  |                |                |                |
| Node ID / Source Address           | 32             |   |  |                |                |                |
| Bus terminating resistor           | no             |   |  |                |                |                |
| Connection type (switching output) | -              | Relay 1 = X1/X3 Y1/Y3 (Z1/Z3) / Relay 2 = X2/X4 Y2/Y4 (Z2/Z4) |  | -              |                |                |
| Switching points                   | -              | X1/X3 = 5<br>X2/X4 = 10<br>Y1/Y3 = 5<br>Y2/Y4 = 10 °          | X1/X3 = 5<br>X2/X4 = 10<br>Z1/Z3 = 5<br>Z2/Z4 = 10 ° | -              |                |                |
| Turn-on delay                      | -              | 0s  |  | -              |                |                |
| Turn-off delay                     | -              | 0s  |  | -              |                |                |
| Hysteresis                         | -              | ±0,1°   |  | -              |                |                |
| Max. switching voltage             | -              | 36 V DC   |  | -              |                |                |
| Max. switching current             | -              | 1 A   |  | -              |                |                |
| Max. switching power               | -              | 30 W  |  | -              |                |                |
| Measuring range acceleration max.  | ±8 g           |   |  |                |                |                |
| Measuring range gyroscope max.     | ±250 °/s       |   |  |                |                |                |
| Resolution                         | 0,01 °         |   |  |                |                |                |
| Accuracy dynamically typ.          | ±0,5 °         |   |  |                |                |                |
| Repeating accuracy                 | typ. ±0,2 °    |   |  |                |                |                |
| Temperature coefficient            | max. ±0,015°/K |   |  |                |                |                |
| Sensing rate                       | 100 Hz         |   |  |                |                |                |

**Article characteristics**

| Attribute   | N7DCC000H2-001  | N7DCC0D2H2-001    | N7DCC0D2V2-001                | N7DCC000V2-001       | N7DCC001H2-001                | N7DCC001V2-001                |
|---|---|-------------------|-------------------------------|----------------------|-------------------------------|-------------------------------|
| Initialisation time after power on/start-up time            | 500 ms  |                   |                               |                      |                               |                               |
| Installation  | horizontal  |                   | vertically                    |                      | horizontal                    | vertically                    |
| Zero justification  | ±60°  |                   |                               |                      |                               |                               |
| Number of measurement axes tilt                             | 2   |                   |                               |                      |                               |                               |
| Measuring principle   | dynamic /(fast) moving applications)  |                   |                               |                      |                               |                               |
| Measuring range   | ±90° X-Achse<br>±180° Y-Achse   |                   | ±90° X-Achse<br>±180° Z-Achse |                      | ±90° X-Achse<br>±180° Y-Achse | ±90° X-Achse<br>±180° Z-Achse |
| NMT autostart   | not active  |                   |                               |                      |                               |                               |
| MTTF  | 92 a  |                   |                               |                      |                               |                               |
| Connector type  | 1xM12 5-polig (male)  | Deutsch DT04-08PA |                               | 1xM12 5-polig (male) | 2xM12 5-polig (male/female)   |                               |
| Weight  | 113 g   | 108 g             |                               | 113 g                | 123 g                         |                               |
| Housing material  | PBT   |                   |                               |                      |                               |                               |
| Torque for fastening screws                                 | 10 Nm   |                   |                               |                      |                               |                               |
| Storage temperature   | -40..+85 °C   |                   |                               |                      |                               |                               |
| Protection class  | IP6K7 ISO 20653, IP6K9K ISO 20653   |                   |                               |                      |                               |                               |
| Vibration resistance (Norm)                                 | EN 60068-2-64 (random vibration 7,99g , 5-500Hz, 20,1mm displacement)               |                   |                               |                      |                               |                               |
| Shock resistance (Norm)                                     | EN 60068-2-27 (shock 51g, 11ms)   |                   |                               |                      |                               |                               |
| Operating temperature                                       | -20..+85 °C   |                   |                               |                      |                               |                               |
| Salt spray test   | DIN EN 60068-2-11 (salt spray mist for 96h at 35°C)                                 |                   |                               |                      |                               |                               |
| EMC Agricultural and forestry machines (Norm)               | EN ISO 14982, Load dump Pulse B with Us = 85V, Cranking ISO 16750-2 Level 1-4       |                   |                               |                      |                               |                               |
| EMC Earth-moving and building construction machinery (Norm) | DIN EN ISO 13766-1, Load dump Pulse B with Us = 85V, Cranking ISO 16750-2 Level 1-4 |                   |                               |                      |                               |                               |
| EMC Industrial trucks (Norm)                                | DIN EN 12895  |                   |                               |                      |                               |                               |
| CE  | yes   |                   |                               |                      |                               |                               |
| E1 type approval  | UN ECE Regulation No. 10 No. 10R06/01 9376 00                                       |                   |                               |                      |                               |                               |

### Article characteristics

| Attribute                          | N7DCC002H2-001 | N7DCC002V2-001 | N7DCJ0D2H2-001  | N7DCJ0D2V2-001                                       | N7DCJ000H2-001 | N7DCJ000V2-001 |
|------------------------------------|----------------|----------------|---|--|----------------|----------------|
| Technology                         | MEMS           |                |   |  |                |                |
| Supply voltage                     | +8..+36 V DC   |                |   |  |                |                |
| Polarity reversal protection       | -36 V DC       |                |   |  |                |                |
| Short-circuit protection           | ISO 16750-2    |                |   |  |                |                |
| Current consumption                | 100 mA         |                |   |  |                |                |
| Output signal                      | CANopen        |                | J1939 + 2x relay (NC)   |  | J1939          |                |
| Contact form                       | -              |                | NC  |  | -              |                |
| Protocol                           | CANopen        |                | J1939   |  |                |                |
| UDS ISO 14229 capability           | yes            |                |   |  |                |                |
| Baud rate                          | 250 kBit/s     |                |   |  |                |                |
| Cycle time                         | 10 ms          |                |   |  |                |                |
| Node ID / Source Address           | 32             |                | 226   |  |                |                |
| Bus terminating resistor           | no             |                |   |  |                |                |
| Connection type (switching output) | -              |                | Relay 1 = X1/X3 Y1/Y3 (Z1/Z3) / Relay 2 = X2/X4 Y2/Y4 (Z2/Z4) |  | -              |                |
| Switching points                   | -              |                | X1/X3 = 5<br>X2/X4 = 10<br>Y1/Y3 = 5<br>Y2/Y4 = 10 °          | X1/X3 = 5<br>X2/X4 = 10<br>Z1/Z3 = 5<br>Z2/Z4 = 10 ° | -              |                |
| Turn-on delay                      | -              |                | 0s  |  | -              |                |
| Turn-off delay                     | -              |                | 0s  |  | -              |                |
| Hysteresis                         | -              |                | ±0,1°   |  | -              |                |
| Max. switching voltage             | -              |                | 36 V DC   |  | -              |                |
| Max. switching current             | -              |                | 1 A   |  | -              |                |
| Max. switching power               | -              |                | 30 W  |  | -              |                |
| Measuring range acceleration max.  | ±8 g           |                |   |  |                |                |
| Measuring range gyroscope max.     | ±250 °/s       |                |   |  |                |                |
| Resolution                         | 0,01 °         |                |   |  |                |                |
| Accuracy dynamically typ.          | ±0,5 °         |                |   |  |                |                |
| Repeating accuracy                 | typ. ±0,2 °    |                |   |  |                |                |
| Temperature coefficient            | max. ±0,015°/K |                |   |  |                |                |
| Sensing rate                       | 100 Hz         |                |   |  |                |                |



**Article characteristics**

| Attribute   | N7DCC002H2-001  | N7DCC002V2-001                | N7DCJ0D2H2-001                | N7DCJ0D2V2-001                | N7DCJ000H2-001                | N7DCJ000V2-001                |
|---|---|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| Initialisation time after power on/start-up time            | 500 ms  |                               |                               |                               |                               |                               |
| Installation  | horizontal  | vertically                    | horizontal                    | vertically                    | horizontal                    | vertically                    |
| Zero justification  | ±60°  |                               |                               |                               |                               |                               |
| Number of measurement axes tilt                             | 2   |                               |                               |                               |                               |                               |
| Measuring principle   | dynamic //(fast) moving applications)   |                               |                               |                               |                               |                               |
| Measuring range   | ±90° X-Achse<br>±180° Y-Achse   | ±90° X-Achse<br>±180° Z-Achse | ±90° X-Achse<br>±180° Y-Achse | ±90° X-Achse<br>±180° Z-Achse | ±90° X-Achse<br>±180° Y-Achse | ±90° X-Achse<br>±180° Z-Achse |
| NMT autostart   | not active  |                               |                               |                               |                               |                               |
| MTTF  | 92 a  |                               |                               |                               |                               |                               |
| Connector type  | Deutsch DT04-08PA   |                               |                               |                               | 1xM12 5-polig (male)          |                               |
| Weight  | 108 g   |                               |                               | 180 g                         |                               | 113 g                         |
| Housing material  | PBT   |                               |                               |                               |                               |                               |
| Torque for fastening screws                                 | 10 Nm   |                               |                               |                               |                               |                               |
| Storage temperature   | -40..+85 °C   |                               |                               |                               |                               |                               |
| Protection class  | IP6K7 ISO 20653, IP6K9K ISO 20653   |                               |                               |                               |                               |                               |
| Vibration resistance (Norm)                                 | EN 60068-2-64 (random vibration 7,99g , 5-500Hz, 20,1mm displacement)               |                               |                               |                               |                               |                               |
| Shock resistance (Norm)                                     | EN 60068-2-27 (shock 51g, 11ms)   |                               |                               |                               |                               |                               |
| Operating temperature                                       | -20..+85 °C   |                               |                               |                               |                               |                               |
| Salt spray test   | DIN EN 60068-2-11 (salt spray mist for 96h at 35°C)                                 |                               |                               |                               |                               |                               |
| EMC Agricultural and forestry machines (Norm)               | EN ISO 14982, Load dump Pulse B with Us = 85V, Cranking ISO 16750-2 Level 1-4       |                               |                               |                               |                               |                               |
| EMC Earth-moving and building construction machinery (Norm) | DIN EN ISO 13766-1, Load dump Pulse B with Us = 85V, Cranking ISO 16750-2 Level 1-4 |                               |                               |                               |                               |                               |
| EMC Industrial trucks (Norm)                                | DIN EN 12895  |                               |                               |                               |                               |                               |
| CE  | yes   |                               |                               |                               |                               |                               |
| E1 type approval  | UN ECE Regulation No. 10 No. 10R06/01 9376 00                                       |                               |                               |                               |                               |                               |

### Article characteristics

| Attribute  | N7DCJ001H2-001 | N7DCJ001V2-001 | N7DCJ002H2-001 | N7DCJ002V2-001 |
|--|----------------|----------------|----------------|----------------|
| Technology                                       | MEMS           |                |                |                |
| Supply voltage                                   | +8..+36 V DC   |                |                |                |
| Polarity reversal protection                     | -36 V DC       |                |                |                |
| Short-circuit protection                         | ISO 16750-2    |                |                |                |
| Current consumption                              | 100 mA         |                |                |                |
| Output signal                                    | J1939          |                |                |                |
| Contact form                                     | -              |                |                |                |
| Protocol   | J1939          |                |                |                |
| UDS ISO 14229 capability                         | yes            |                |                |                |
| Baud rate  | 250 kBit/s     |                |                |                |
| Cycle time                                       | 10 ms          |                |                |                |
| Node ID / Source Address                         | 226            |                |                |                |
| Bus terminating resistor                         | no             |                |                |                |
| Connection type (switching output)               | -              |                |                |                |
| Switching points                                 | -              |                |                |                |
| Turn-on delay                                    | -              |                |                |                |
| Turn-off delay                                   | -              |                |                |                |
| Hysteresis                                       | -              |                |                |                |
| Max. switching voltage                           | -              |                |                |                |
| Max. switching current                           | -              |                |                |                |
| Max. switching power                             | -              |                |                |                |
| Measuring range acceleration max.                | ±8 g           |                |                |                |
| Measuring range gyroscope max.                   | ±250 °/s       |                |                |                |
| Resolution                                       | 0,01 °         |                |                |                |
| Accuracy dynamically typ.                        | ±0,5 °         |                |                |                |
| Repeating accuracy                               | typ. ±0,2 °    |                |                |                |
| Temperature coefficient                          | max. ±0,015°/K |                |                |                |
| Sensing rate                                     | 100 Hz         |                |                |                |
| Initialisation time after power on/start-up time | 500 ms         |                |                |                |
| Installation                                     | horizontal     | vertically     | horizontal     | vertically     |
| Zero justification                               | ±60°           |                |                |                |

### Article characteristics

| Attribute   | N7DCJ001H2-001  | N7DCJ001V2-001                | N7DCJ002H2-001                | N7DCJ002V2-001                |
|---|---|-------------------------------|-------------------------------|-------------------------------|
| Number of measurement axes tilt                             | 2   |                               |                               |                               |
| Measuring principle   | dynamic /(fast) moving applications)  |                               |                               |                               |
| Measuring range   | ±90° X-Achse<br>±180° Y-Achse   | ±90° X-Achse<br>±180° Z-Achse | ±90° X-Achse<br>±180° Y-Achse | ±90° X-Achse<br>±180° Z-Achse |
| NMT autostart   | not active  |                               |                               |                               |
| MTTF  | 92 a  |                               |                               |                               |
| Connector type  | 2xM12 5-polig (male/female)   |                               | Deutsch DT04-08PA             |                               |
| Weight  | 123 g   |                               | 108 g                         |                               |
| Housing material  | PBT   |                               |                               |                               |
| Torque for fastening screws                                 | 10 Nm   |                               |                               |                               |
| Storage temperature   | -40..+85 °C   |                               |                               |                               |
| Protection class  | IP6K7 ISO 20653, IP6K9K ISO 20653   |                               |                               |                               |
| Vibration resistance (Norm)                                 | EN 60068-2-64 (random vibration 7,99g , 5-500Hz, 20,1mm displacement)               |                               |                               |                               |
| Shock resistance (Norm)                                     | EN 60068-2-27 (shock 51g, 11ms)   |                               |                               |                               |
| Operating temperature                                       | -20..+85 °C   |                               |                               |                               |
| Salt spray test   | DIN EN 60068-2-11 (salt spray mist for 96h at 35°C)                                 |                               |                               |                               |
| EMC Agricultural and forestry machines (Norm)               | EN ISO 14982, Load dump Pulse B with Us = 85V, Cranking ISO 16750-2 Level 1-4       |                               |                               |                               |
| EMC Earth-moving and building construction machinery (Norm) | DIN EN ISO 13766-1, Load dump Pulse B with Us = 85V, Cranking ISO 16750-2 Level 1-4 |                               |                               |                               |
| EMC Industrial trucks (Norm)                                | DIN EN 12895  |                               |                               |                               |
| CE  | yes   |                               |                               |                               |
| E1 type approval  | UN ECE Regulation No. 10 No. 10R06/01 9376 00                                       |                               |                               |                               |