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# General technical data
# absolute encoders WDGA Industrial Ethernet

**Safety instructions**:

a) If a riskless operation can no longer be assured, the unit has to be shut down immediately and be secured against unintended start up.
b) In any case of possible hazard of people or possible damage of equipment if the encoder fail, precautions have to be taken to prevent it before start.

**Absolute encoders WDGA:**

With absolute rotary encoders WDGA, each shaft position is assigned a unique value, so that an absolute position value between 0° and 360° is assigned at each position of the shaft. For devices with multiturn, the number of revolutions is also available. The position value is maintained even if the supply voltage fails and can be queried immediately after the supply voltage is restored. Therefore, a reference run is not necessary. The angle values are transmitted via a digital interface for absolute encoders.

A "position word" is generated from singleturn and multiturn information, which can be output according to the selected interface.

**Magnetic principle**

The absolute rotary encoders WDGA operate with contactless magnetic scanning. A diametrically magnetized magnet is mounted in the stainless steel shaft. When the shaft is turned, the magnetic field changes. This change is detected and processed by our QuattroMag® technology on the opposite board. The evaluation of the signals on a differential basis enables the IC and the following electronics to generate high-precision singleturn information with a resolution of up to 16 bits per 360°.

The WDGA rotary encoders do not require a mechanical gear to measure the number of revolutions. Instead, the revolutions (multiturn) are determined using the functional principle of EnDra® technology for the multiturn encoder: The diametrically magnetized magnet accumulates enough energy in an EnDra® wire to generate the information "revolution" and "direction of rotation" at a defined position. This unleashes so much energy that the evaluation and memory electronics can be operated safely and the necessary processes are feasible. An external power supply, e. g. via a battery, is not required for this. The patented system works absolutely self-sufficient and can count and process up to 8,79 x $10^{12}$ (43 Bit) revolutions.

Our magnetic absolute encoders WDGA are perfectly matched measuring systems, combining precise mechanics, efficient magnetic sensors and powerful electronics with tailor-made software.

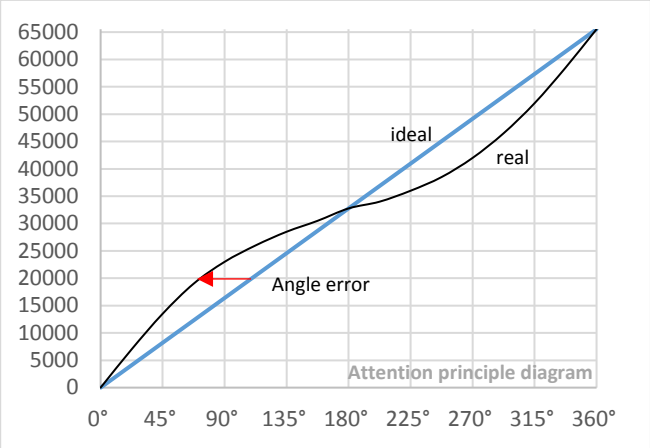
**Accuracy of the absolute encoder WDGA**

For rotary encoders, a distinction is made between resolution and accuracy. The singleturn resolution of an absolute rotary encoder determines in how many individual positions a shaft rotation of 360° is divided into. The multiturn resolution of an absolute encoder determines how many revolutions of the shaft can be counted.

A distinction is made between singleturn accuracy and singleturn repeatability

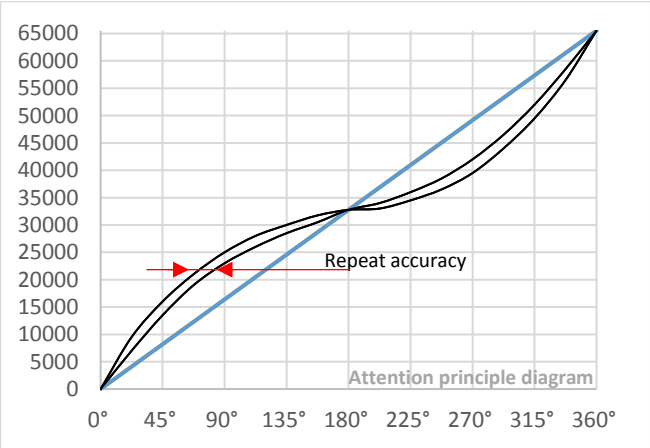
**Singleturn accuracy:**

The singleturn accuracy describes the tolerance of the position of each individual position output by the encoder to the mechanical position (real position) of the shaft in a measuring task. (One-time travel to a point and subsequent measurement at room temperature. There is no summation of the angular errors over several revolutions. The drawing below shows a possible angle error diagram as an example. In reality, this is a maximum of 0.0878°.




**Singleturn repeat accuracy:**

The singleturn repeat accuracy describes the tolerance of the position of the measured and transmitted position value to a reference position or in reverse mode. This means that if the same position or a previously approached reference point is approached several times, the measured and transmitted position value varies with an error in a smaller tolerance band.




**Signal conditioning**

With absolute encoders WDGA with a singleturn resolution of up to 16 bits, the noise of the magnetic sensors caused by the signal conversion is suppressed. The position value is conditioned before output. An internal hysteresis is connected after a digital filter, for example, when the direction of rotation reverses. The conditioning is configured in such a way that no visible influence of the position value occurs. These measures ensure that the position value does not change despite sensor noise when the shaft comes to a standstill. The default values can be used for most applications, but can be customized if required.

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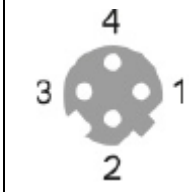
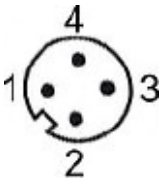
**LED and status indication WDGA IE**

The status LEDs in the bus cover indicate different states of the encoder during operation and supports configuration of the encoder or troubleshooting in the fieldbus. Display of operating status and error message follow the signalling definition of the respective protocol. More detailed information please refer to the appropriate manual at http://www.wachendorff-automation.com/manualwdga

**Pin assignments BI2 - bus cover with 3x M12x1**

The character string "BI2" in the order code identifies a rotary encoder with bus cover. The electrical connection is made to the bus cover via the 2x M12 plug and 1x M12 socket.

| Pin assignments | | | | | |
|---|---|---|---|---|---|
| BI2 | | | | | |
|  | |  | |  | |
| **Socket (Port1)** | **M12x1, 4-pole, D-coded** | **Plug (Power)** | **M12x1, 4-pole, A-coded** | **Socket (Port2)** | **M12x1, 4-pole, D-coded** |
| **Tx+** | **1** | **UB+** | **1** | **Tx+** | **1** |
| **Rx+** | **2** | **n. c.** | **2** | **Rx+** | **2** |
| **Tx-** | **3** | **UB-** | **3** | **Tx-** | **3** |
| **Rx-** | **4** | **n. c.** | **4** | **Rx-** | **4** |

**Environmental data**

*With grounded housing:*

| | |
|---|---|
| ESD (DIN EN 61000-4-2): | 8 kV |
| Burst (DIN EN 61000-4-4): | 2 kV |
| Vibration (IEC 68-2-6): | 50 m/s2 (10-2000 Hz) |
| Shock (IEC 68-2-27): | 1000 m/s2 (6 ms) |
| Design: | appropriate DIN VDE 0160 |

**Protection from Noise Interference**

For effective interference suppression of the complete system we recommend to ground the encoder and the flange.

In certain applications and depending on the grounding concept and the actual interference fields of the entire plant, it may be necessary to take further interference suppression measures. Please check the specifications of the user organizations according to the protocol used.

For normal use, it is sufficient to place the shielding of the encoder cable on earth potential and to ensure that the entire system consisting of encoder and evaluation electronics is only earthed at a single low impedance point (e. g. with a copper braid).

- In any case, the encoder cables should be shielded and laid separately from power lines and interference generating devices and components.
- Sources of interference such as motors, solenoid valves, frequency converters etc. should always be effectively suppressed directly at the source of interference.
- The encoders should not be supplied from the same power supply unit from which interference sources such as contactors or solenoid valves are supplied.