WACHENDORFF
The Encoder Experts

Online Data sheet

HM 2603

# Encoder WDG 100H

**www.wachendorff-automation.com/wdg100h**

**Wachendorff Automation**

**... systems and encoders**

- Complete systems
- Industrial rugged encoders to suit your application
- Standard range and customer versions
- Maximum permissible loads
- 48-hour express production
- Made in Germany
- Worldwide distributor network

# Encoder WDG 100H

*Illustration similar*

- Rugged and extremely thin thru-bore encoder for extension on power motors
- Thru-Bore, bore size max. 45 mm [1.772"]
- Full connection protection with 10 VDC up to 30 VDC
- Easy mounting
- Meets protection class IP54
- Up to 20,480 PPR
- Optional: -40 °C up to +80 °C [-40 °F up to +176 °F]
  Protection to IP55 all around

**www.wachendorff-automation.com/wdg100h**

| **Resolution** | |
|---|---|
| Pulses per revolution PPR | up to 20480 PPR |

| **Mechanical Data** | |
|---|---|
| Flange | hollow shaft (through-bored) |
| Flange material | aluminum |
| Housing material | aluminum, powder coated |
| Torque supports | incl. 1 torque support WDGDS10001 |
| - 1. Spring plate compensation | axial: ±0.8 mm [0.0315"], radial: ±0.2 mm [0.0079"] |
| Flange diameter | Ø 100 mm [Ø 3.543"] |

| **Shaft(s)** | |
|---|---|
| Shaft material | stainless steel |
| Starting torque | approx. 1.5 Ncm [2.124 in-ozf] at ambient temperature |
| Fixing | 2 x M4, DIN 913;<br>Starting torque: 2,5 Nm |

| | |
|---|---|
| Shaft | Ø 25 mm [Ø 0.984"] |
| Shaft length | L: 42 mm [1.654"] |
| Insertion depth min. | 52 mm [2.047"] |
| Max. Permissible shaft loading radial | 200 N [20.394 kp] |
| Max. Permissible shaft loading axial | 100 N [10.197 kp] |

| | |
|---|---|
| Shaft | Ø 28 mm [Ø 1.102"] |
| Shaft length | L: 42 mm [1.654"] |
| Insertion depth min. | 52 mm [2.047"] |
| Max. Permissible shaft loading radial | 200 N [20.394 kp] |
| Max. Permissible shaft loading axial | 100 N [10.197 kp] |

| | |
|---|---|
| Shaft | Ø 30 mm [Ø 1.181"] |
| Shaft length | L: 42 mm [1.654"] |
| Insertion depth min. | 52 mm [2.047"] |
| Max. Permissible shaft loading radial | 200 N [20.394 kp] |
| Max. Permissible shaft loading axial | 100 N [10.197 kp] |

| | |
|---|---|
| Shaft | Ø 32 mm [Ø 1.26"] |
| Shaft length | L: 42 mm [1.654"] |
| Insertion depth min. | 52 mm [2.047"] |
| Max. Permissible shaft loading radial | 200 N [20.394 kp] |
| Max. Permissible shaft loading axial | 100 N [10.197 kp] |

| | |
|---|---|
| Shaft | Ø 38 mm [Ø 1.496"] |
| Shaft length | L: 42 mm [1.654"] |
| Insertion depth min. | 52 mm [2.047"] |
| Max. Permissible shaft loading radial | 200 N [20.394 kp] |
| Max. Permissible shaft loading axial | 100 N [10.197 kp] |

| | |
|---|---|
| Shaft | Ø 40 mm [Ø 1.575"] |
| Shaft length | L: 42 mm [1.654"] |
| Insertion depth min. | 52 mm [2.047"] |
| Max. Permissible shaft loading radial | 200 N [20.394 kp] |
| Max. Permissible shaft loading axial | 100 N [10.197 kp] |

| | |
|---|---|
| Shaft | Ø 42 mm [Ø 1.654"] |
| Shaft length | L: 42 mm [1.654"] |
| Insertion depth min. | 52 mm [2.047"] |
| Max. Permissible shaft loading radial | 200 N [20.394 kp] |
| Max. Permissible shaft loading axial | 100 N [10.197 kp] |

| | |
|---|---|
| Shaft | Ø 45 mm [Ø 1.772"] |
| Shaft length | L: 42 mm [1.654"] |
| Insertion depth min. | 52 mm [2.047"] |
| Max. Permissible shaft loading radial | 200 N [20.394 kp] |
| Max. Permissible shaft loading axial | 100 N [10.197 kp] |

| **Bearings** | |
|---|---|
| Bearings type | 2 precision ball bearings |
| Nominale service life | 3 x 10'10 revs. at 100 % rated shaft load<br>1 x 10'11 revs. at 40 % rated shaft load<br>1 x 10'12 revs. at 20 % rated shaft load |
| Max. operating speed | 3500 rpm |

| **Machinery Directive: basic data safety integrity level** | |
|---|---|
| $MTTF_d$ | 200 a |
| Mission time (TM) | 25 a |
| Nominale service life (L10h) | 1 x 10'12 revs. at 20 % rated shaft load and 3500 rpm |
| Diagnostic coverage (DC) | 0 % |

| Electrical Data | |
|---|---|
| Power supply/Current consumption | 4,75 VDC up to 5,5 VDC: typ. 70 mA<br>(100 mA only F05, P05) |
| Power supply/Current consumption | 5 VDC up to 30 VDC: typ. 70 mA |
| Power supply/Current consumption | 10 VDC up to 30 VDC: typ. 70 mA<br>(100 mA only F24, P24, 645) |
| Operating principle | optical |
| Output circuit | TTL<br>TTL, RS422 compatible, inv.<br>HTL<br>HTL, inv.<br>1 Vpp sin/cos |
| Pulse frequency | TTL ≤ 5000 ppr: max. 200 kHz<br>HTL ≤ 5000 ppr: max. 200 kHz<br>TTL more than 1200 ppr: max. 2 MHz<br>HTL more than 1200 ppr: max. 600 kHz<br>1 Vpp sin/cos: max. 100 kHz |
| Channels | AB<br>ABN<br>and inverted signals |
| Load | max. 40 mA / channel<br>@ 1 Vpp sin/cos: min. 120 Ohm |
| Circuit protection | circuit type H24 and R24 only |

| Accuracy | |
|---|---|
| Phase offset | 90° ± max. 7.5 % of the period duration |
| pulse-/pause-ratio | ≤5000 ppr: 50 % ± max. 7 %<br>Output circuits F24, P24, F05, P05, 645: 50 % ± max. 10 % |

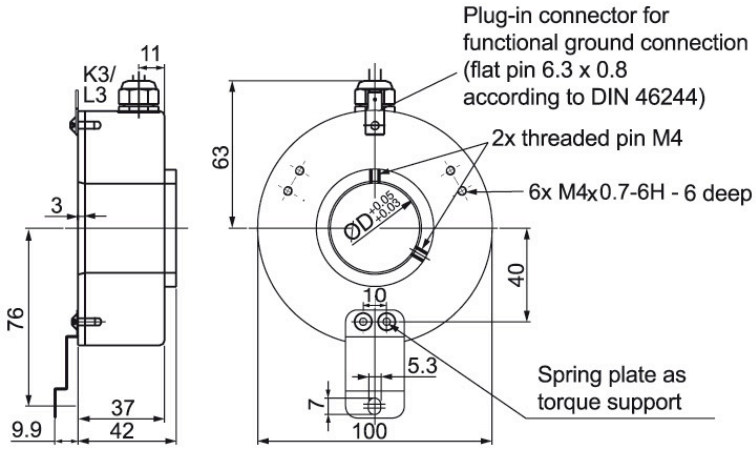
| Environmental data | |
|---|---|
| ESD (DIN EN 61000-4-2): | 8 kV |
| Burst (DIN EN 61000-4-4): | 2 kV |
| includes EMC: | DIN EN 61000-6-2<br>DIN EN 61000-6-3 |
| Vibration:<br>(DIN EN 60068-2-6) | 50 m/s² (10 Hz up to 2000 Hz) |
| Shock:<br>(DIN EN 60068-2-27) | 1000 m/s² (6 ms) |
| Electrial Safety: | according DIN VDE 0160 |

| Duty information | |
|---|---|
| Customs tariff number: | 90318020 |
| Country of origin: | Germany |

| General Data | |
|---|---|
| Weight | approx. 720 g [25.397 oz] |
| Connections | cable or connector, radial |
| Protection rating (EN 60529) | IP54 |
| Operating temperature | -20 °C up to +80 °C<br>[ -4 °F up to +176 °F]<br>1 Vpp: -10 °C up to +70 °C<br>[+14 °F up to +158 °F] |
| Storage temperature | -30 °C up to +80 °C<br>[-22 °F up to 176 °F] |

| More Information |
|---|
| General technical data and safety instructions<br>**http://www.wachendorff-automation.com/gtd** |
| Options<br>**http://www.wachendorff-automation.com/acc** |

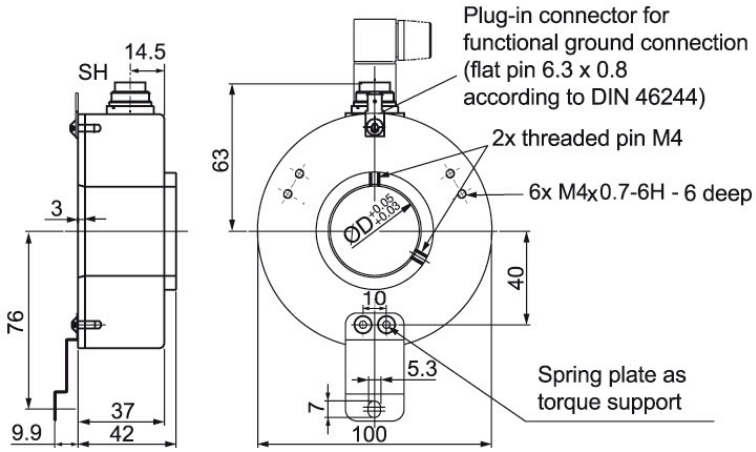
## Cable connection K3, L3 with 2 m cable




| Description | | ABN inv. poss. |
|---|---|---|
| **K3** | radial, shield not connected | • |
| **L3** | radial, shield connected to encoder housing | • |

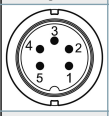
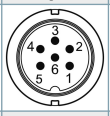
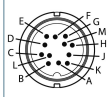
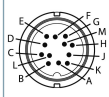
| Assignments | | | |
|---|---|---|---|
| | **K3, L3** | **K3, L3** | **L3** |
| **Circuit** | F05, H05, F24, H24, H30 | P05, R05, P24, R24, 245, 645, R30 | SIN |
| **GND** | WH | WH | WH |
| **(+) Vcc** | BN | BN | BN |
| **A** | GN | GN | GN |
| **B** | YE | YE | GY |
| **N** | GY | GY | BK |
| **-** | - | - | - |
| **A inv.** | - | RD | YE |
| **B inv.** | - | BK, (BU at ACA) | PK |
| **N inv.** | - | VT | VT |
| **Shield** | flex | flex | flex |

## Connector (M16x0.75) SH, 5-, 6-, 8-, 12-pin

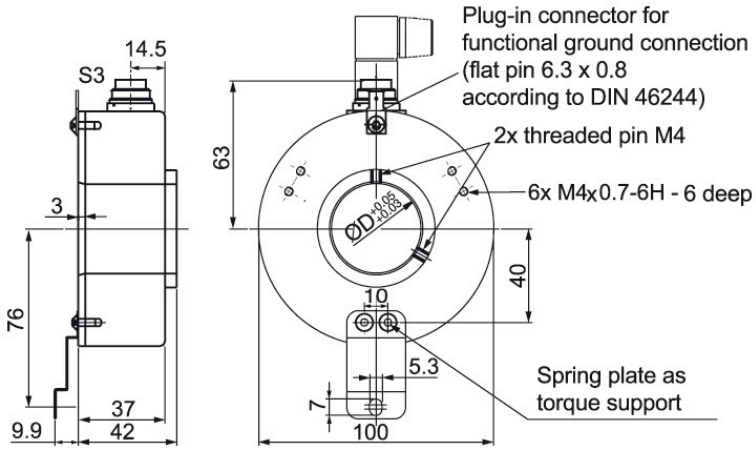



| Description | | ABN inv. poss. |
|---|---|---|
| **SH5** | radial, 5-pin, Connector connected to encoder housing | - |
| **SH6** | radial, 6-pin, Connector connected to encoder housing | - |
| **SH8** | radial, 8-pin, Connector connected to encoder housing | • |
| **SH12** | radial, 12-pin, Connector connected to encoder housing | • |

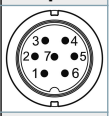
**Assignments**

| | SH5 | SH6 | SH8 | SH8 | SH12 | SH12 |
|---|---|---|---|---|---|---|
| | 5-pin | 6-pin | 8-pin | 8-pin | 12-pin | 12-pin |
| |  |  |  |  |  |  |
| **Circuit** | F05, H05, F24, H24, H30 | F05, H05, F24, H24, H30 | P05, R05, P24, R24, R30, 245, 645 | SIN | P05, R05, P24, R24, 245, 645, R30 | SIN |
| **GND** | 1 | 6 | 1 | 1 | K, L | K, L |
| **(+) Vcc** | 2 | 1 | 2 | 2 | M, B | M, B |
| **A** | 3 | 2 | 3 | 3 | E | E |
| **B** | 4 | 4 | 4 | 4 | H | H |
| **N** | 5 | 3 | 5 | 5 | C | C |
| **-** | - | - | - | - | - | - |
| **A inv.** | - | - | 6 | 6 | F | F |
| **B inv.** | - | - | 7 | 7 | A | A |
| **N inv.** | - | - | 8 | 8 | D | D |
| **n. c.** | - | 5 | - | - | G, J | G, J |
| **Shield** | - | - | - | - | - | - |

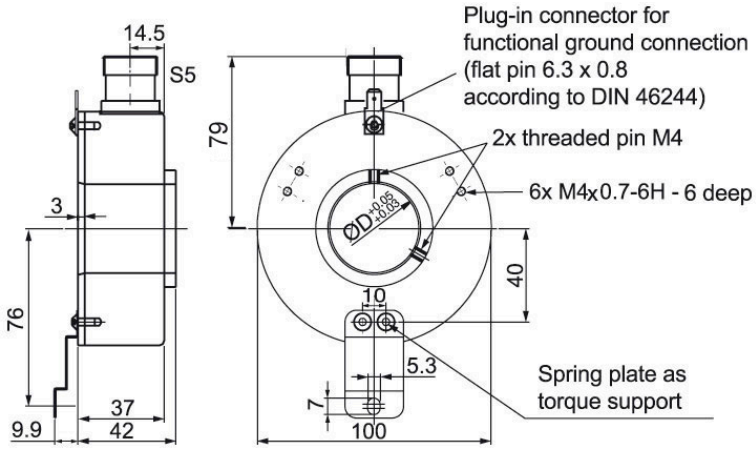
## Connector (M16x0.75) S3, 7-pin



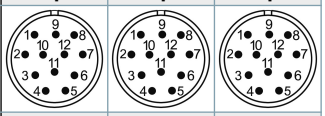

| Description | | ABN inv. poss. |
|---|---|---|
| **S3** | radial, 7-pin, Connector connected to encoder housing | - |

| Assignments | |
|---|---|
| | **S3** |
| | **7-pin** |
| |  |
| **Circuit** | F05, H05, F24, H24, H30 |
| **GND** | 1 |
| **(+) Vcc** | 2 |
| **A** | 3 |
| **B** | 4 |
| **N** | 5 |
| **-** | - |
| **A inv.** | - |
| **B inv.** | - |
| **N inv.** | - |
| **n. c.** | 6, 7 |
| **Shield** | - |

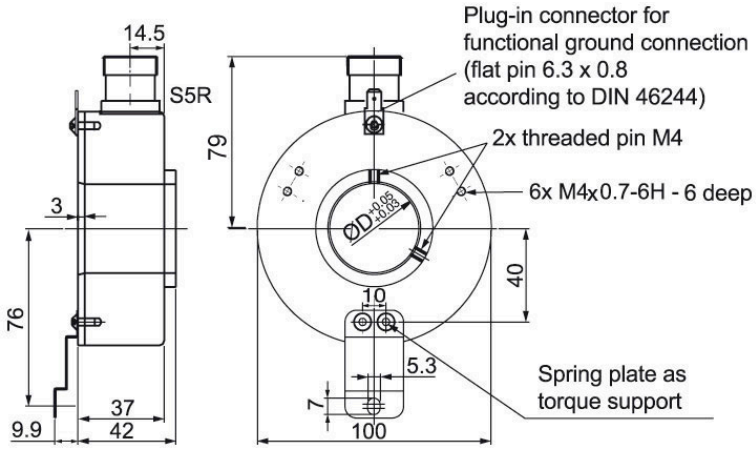
## Connector (M23) S5, 12-pin



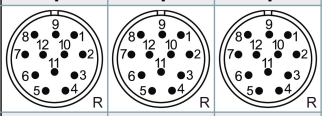

| Description | | ABN inv. poss. |
|---|---|---|
| **S5** | radial, 12-pin, Connector connected to encoder housing | • |

| Assignments | | | |
|---|---|---|---|
| | **S5** | **S5** | **S5** |
| | **12-pin** | **12-pin** | **12-pin** |
| |  | | |
| **Circuit** | F05, H05, F24, H24, H30 | P05, R05, P24, R24, 245, 645, R30 | SIN |
| **GND** | 10 | 10 | 10 |
| **(+) Vcc** | 12 | 12 | 12 |
| **A** | 5 | 5 | 5 |
| **B** | 8 | 8 | 8 |
| **N** | 3 | 3 | 3 |
| **-** | - | - | - |
| **A inv.** | - | 6 | 6 |
| **B inv.** | - | 1 | 1 |
| **N inv.** | - | 4 | 4 |
| **n. c.** | 1, 2, 4, 6, 7, 9, 11 | 2, 7, 9, 11 | 2, 7, 9, 11 |
| **Shield** | - | - | - |

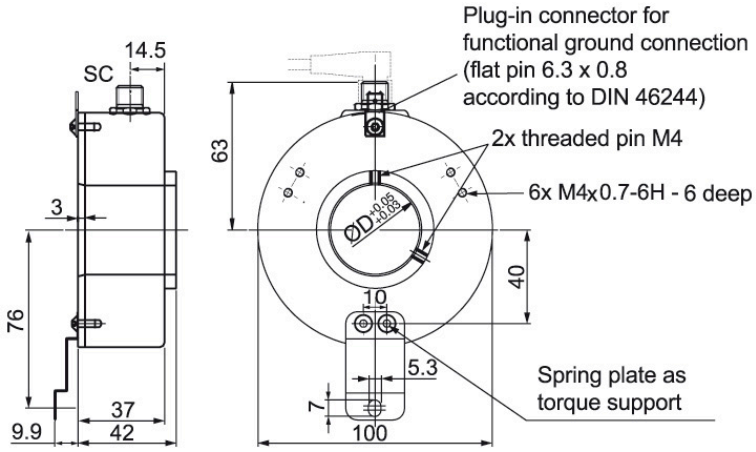
## Connector (M23) S5R, 12-pin (clockwise)



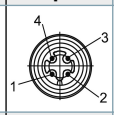
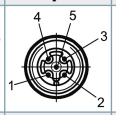
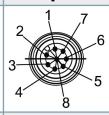
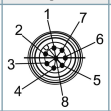
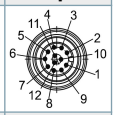

| Description | | ABN inv. poss. |
|---|---|---|
| **S5R** | radial, 12-pin, Connector connected to encoder housing | • |

| Assignments | | | |
|---|---|---|---|
| | **S5R** | **S5R** | **S5R** |
| | **12-pin** | **12-pin** | **12-pin** |
| |  | | |
| **Circuit** | F05, H05, F24, H24, H30 | P05, R05, P24, R24, 245, 645, R30 | SIN |
| **GND** | 10 | 10 | 10 |
| **(+) Vcc** | 12 | 12 | 12 |
| **A** | 5 | 5 | 5 |
| **B** | 8 | 8 | 8 |
| **N** | 3 | 3 | 3 |
| **-** | - | - | - |
| **A inv.** | - | 6 | 6 |
| **B inv.** | - | 1 | 1 |
| **N inv.** | - | 4 | 4 |
| **n. c.** | 1, 2, 4, 6, 7, 9, 11 | 2, 7, 9, 11 | 2, 7, 9, 11 |
| **Shield** | - | - | - |

## Sensor-connector (M12x1) SC, 4-, 5-, 8-, 12-pin




| Description | | ABN inv. poss. |
|---|---|---|
| **SC4** | radial, 4-pin, Connector connected to encoder housing | - |
| **SC5** | radial, 5-pin, Connector connected to encoder housing | - |
| **SC8** | radial, 8-pin, Connector connected to encoder housing | • |
| **SC12** | radial, 12-pin, Connector connected to encoder housing | • |

| Assignments | | | | | |
|---|---|---|---|---|---|
| | **SC4** | **SC5** | **SC8** | **SC8** | **SC12** |
| | **4-pin** | **5-pin** | **8-pin** | **8-pin** | **12-pin** |
| |  |  |  |  |  |
| **Circuit** | F05, H05, F24, H24, H30 | F05, H05, F24, H24, H30 | P05, R05, P24, R24, R30, 245, 645 | SIN | P05, R05, P24, R24, 245, 645, R30 |
| **GND** | 3 | 3 | 1 | 1 | 3 |
| **(+) Vcc** | 1 | 1 | 2 | 2 | 1 |
| **A** | 2 | 4 | 3 | 3 | 4 |
| **B** | 4 | 2 | 4 | 5 | 6 |
| **N** | - | 5 | 5 | 7 | 8 |
| **-** | - | - | - | - | - |
| **A inv.** | - | - | 6 | 4 | 9 |
| **B inv.** | - | - | 7 | 6 | 7 |
| **N inv.** | - | - | 8 | 8 | 10 |
| **n. c.** | - | - | - | - | 2, 5, 11, 12 |
| **Shield** | - | - | - | - | - |

## Options

| Low temperature | Order key |
|---|---|
| The encoder WDG 100H with the output circuit types F24, H24, P24, R24, F05, H05, P05, R05, 245, 645 is also available with the extended temperature range -40 °C up to +80 °C [-40 °F up to +176 °F] (measured at the flange). | **ACA** |

| IP55 all around (not 1 Vpp Sin/Cos) | Order key |
|---|---|
| The encoder WDG 100H can be supplied in a full IP55 version.<br><br>Max. RPM:  1500 rpm<br>Permitted Shaft-Loading, axial: 100 N [10.197 kp]<br>Permitted Shaft-Loading, radial: 120 N [12.236 kp]<br>Max. PPR:  20480 ppr<br>Starting-torque: approx. 5 Ncm [7.081 in-ozf] at ambient temperature | **ACP** |

| Cable length | Order key |
|---|---|
| The encoder WDG 100H can be supplied with more than 2 m cable.  The maximum cable length depends on the supply voltage and the frequency; see https://www.wachendorff-automation.com/download-gtd-incremental-encoders/<br>Please extend the standard order code with a three figure number, specifying the cable length in decimetres.<br>Example: 5 m cable = 050 | **XXX = Decimeter** |

| Example Order No. | Type | Your encoder |
|---|---|---|
| WDG 100H | WDG 100H | WDG 100H |

| | Bore size | |
|---|---|---|
| 25 | 25; 28; 30; 32; 38; 40; 42; 45 | |

| | Pulses per revolution PPR: | |
|---|---|---|
| 1024 | 512, 1024, 2048, 2500, 3600, 4096, 4500, 5000, 8192, 10240, 16384, 20480<br>1 Vpp Sin/Cos only 1024, 2048<br>Other PPRs on request | |

| | Channels: | |
|---|---|---|
| ABN | AB, ABN | |

| | Output circuit | | | | | |
|---|---|---|---|---|---|---|
| H24 | Resolution PPR | Power supply VDC | Output circuit | - | Order key | |
| | up to 2500 | 5 - 30 | HTL (TTL at 5 VDC) | - | H30 | |
| | | 5 - 30 | HTL, inv. (TTL/RS422 comp. at 5 VDC) | - | R30 | |
| | up to 5000 | 4.75 - 5.5 | TTL | - | H05 | |
| | | 4.75 - 5.5 | TTL, RS422 comp., inverted | - | R05 | |
| | | 10 - 30 | HTL | - | H24 | |
| | | 10 - 30 | HTL inverted | - | R24 | |
| | | 10 - 30 | TTL, RS422 comp., inverted | - | 245 | |
| | 8192 up to 20480 | 4.75 - 5.5 | TTL | - | F05 | |
| | | 4.75 - 5.5 | TTL, RS422 comp., inverted | - | P05 | |
| | | 10 - 30 | HTL | - | F24 | |
| | | 10 - 30 | HTL inverted | - | P24 | |
| | | 10 - 30 | TTL, RS422 comp., inverted | - | 645 | |
| | 1024, 2048 | 4.75 - 5.5 | 1 Vpp sin/cos | - | SIN | |

| | Electrical connections | | | |
|---|---|---|---|---|
| K3 | Description | | ABN inv. poss. | Order key |
| | **Cable: length (2 m standard, WDG 58T: 1 m)** | | | |
| | radial, shield not connected | | • | K3 |
| | radial, shield connected to encoder housing | | • | L3 |
| | **Connector: (shield connected to encoder housing)** | | | |
| | connector, M16x0.75, 5-pin, radial | | - | SH5 |
| | connector, M16x0.75, 6-pin, radial | | - | SH6 |
| | connector, M16x0.75, 8-pin, radial | | • | SH8 |
| | connector, M16x0.75, 12-pin, radial | | • | SH12 |
| | connector, M16x0.75, 7-pin, radial | | - | S3 |
| | connector, M23, 12-pin, radial | | • | S5 |
| | connector, clockwise pin count, M23, 12-pin, radial | | • | S5R |
| | sensor-connector, M12x1, 4-pin, radial | | - | SC4 |
| | sensor-connector, M12x1, 5-pin, radial | | - | SC5 |
| | sensor-connector, M12x1, 8-pin, radial | | • | SC8 |
| | sensor-connector, M12x1, 12-pin, radial | | • | SC12 |

| | Options | |
|---|---|---|
| | Description | Order key |
| | Low temperature | ACA |
| | IP55 | ACP |
| | Without option | Empty |
| | Cable length | XXX = Decimeter |

| Example Order No.= | WDG 100H | 25 | 1024 | ABN | H24 | K3 | | WDG 100H | | | | | | | Your encoder |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|