


ONLINE DATA SHEET
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# Incremental encoders
# DFS60, Rotary

DFS60E-S4EM00720



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# DFS60, Rotary

**Model Name** > DFS60E-S4EM00720
**Part No.** > 1037795



*Illustration may differ*

## At a glance

- Compact installation depth
- High resolution up to 16 bits
- Optionally programmable: Output voltage, zero pulse position, zero pulse width and number of pulses
- Connection: Radial or axial cable outlet, M23 or M12 connector, axial or radial
- Electrical interfaces: 5V & 24V TTL/RS-422, 24 V HTL/push pull
- Mechanical interfaces: face mount or servo flange, blind or through hollow shaft
- Remote zero set possible

## Your benefits

- Reduced storage costs and downtime due to customer-specific programming
- Variety of different mechanical and electrical interfaces enable the encoder to be optimally adjusted to fit the installation situation
- Excellent concentricity even at high speeds
- High resolution of up to 16 bits ensures precise measurements
- Permanent and safe operation due to a high enclosure rating, temperature resistance and a long bearing lifetime
- Programmability via the PGT-08 programming software and the PGT-10-S display programming tool allow the encoder to be adapted flexibly and quickly according to customer needs
- Programmable zero pulse position simplifies installation

## Performance

| | |
|---|---|
| Error limits: | ± 0.3 ° |
| Measuring step deviation: | ± 0.2 ° |
| Measuring step: | 90 °/electronically/number of lines |
| Initialization time: | 40 ms |
| Pulses per revolution: | 720 |

## Mechanical data

| | |
|---|---|
| Mechanical interface: | Solid shaft, Face mount flange |
| Shaft diameter: | 10 mm x 19 mm |
| Mass: | 0.3 kg |
| Start up torque: | 0.5 Ncm (+20 °C) |
| Operating torque: | 0.3 Ncm (+20 °C) |
| Maximum operating speed: | 10,000 /min |
| Moment of inertia of the rotor: | 6.2 gcm² |


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| | |
|---|---|
| Bearing lifetime: | 3.6 x 10^10 revolutions |
| Max. angular acceleration: | 500,000 rad/s² |
| Permissible shaft loading radial/axial: | 40 N (axial), 80 N (radial) |

## Electrical data

| | |
|---|---|
| Electrical interface: | 10 V ... 32 V, HTL/Push pull, Cable, 8-pin, universal, 5 m |
| Connection type: | Cable, 8-wire, universal, 5 m [1)] |
| Maximum output frequency: | 300 kHz |
| Reference signal, number: | 1 |
| Reference signal, position: | 90 °, electronically, gated with A and B |
| Operating voltage range: | 10 V ... 32 V |
| Load current max.: | 30 mA |
| Power consumption: | 0.5 W (without load) |
| MTTFd: mean time to dangerous failure: | 300 a (EN ISO 13849-1) [2)] |

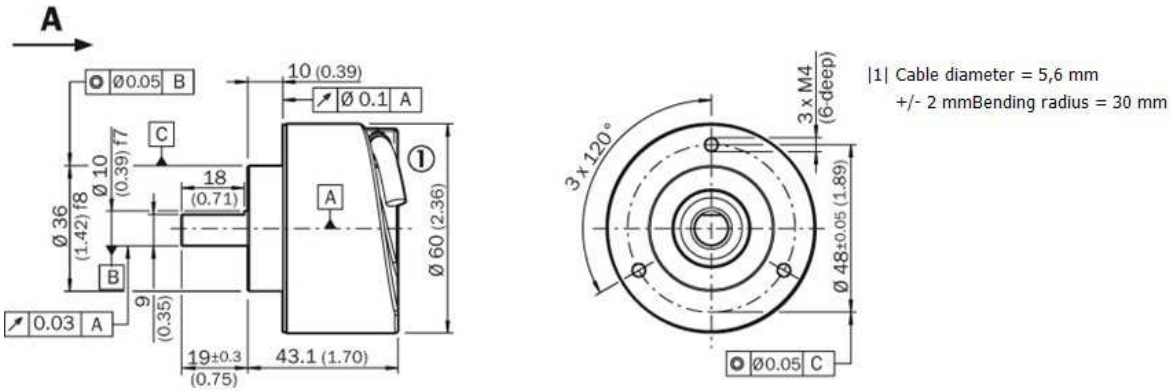
[1)] The universal cable outlet is positioned in such a way, that it is possible to lay the cable in a radial or axial direction without kinking it [2)] This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 40°C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

## Ambient data

| | |
|---|---|
| EMC: | (according to EN 61000-6-2 and EN 61000-6-3) |
| Working temperature range: | 0 °C ... +85 °C |
| Storage temperature range: | -40 °C ... +100 °C, without package |
| Resistance to shocks: | 50 g (according to EN 60068-2-27) |
| Resistance to vibration: | 20 g, 10 Hz ... 2,000 Hz (according to EN 60068-2-6) |
| Enclosure rating: | IP 65 (according to IEC 60529), shaft side, IP 67 (according to IEC 60529), housing side |
| Permissible relative humidity: | 90 % (condensation of the optical scanning not permitted) |


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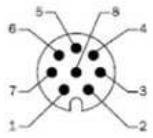
## Dimensional drawing



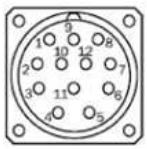

## PIN assignment

**8-core cable**

View of M12 device connector on encoder




View of M23 device connector on encoder




| PIN, 8-pin, M12 connector | PIN, 12-pin, M23 connector | Core colors of encoders with cable outlet | TTL/HTL signal | Explanation |
|---|---|---|---|---|
| 1 | 6 | Brown | $\overline{A}$ | Signal cable |
| 2 | 5 | White | A | Signal cable |
| 3 | 1 | Black | $\overline{B}$ | Signal cable |
| 4 | 8 | Pink | B | Signal cable |
| 5 | 4 | Yellow | $\overline{Z}$ | Signal cable |
| 6 | 3 | Lilac | Z | Signal cable |
| 7 | 10 | Blue | GND | Ground connection of the encoder |
| 8 | 12 | Red | $+U_s$ | Supply voltage (volt-free to housing) |
| – | 9 | – | N.C. | Not assigned |
| – | 2 | – | N.C. | Not assigned |
| – | 11 | – | N.C. | Not assigned |
| – | 7 [1] | – | SET | Zero pulse teach |
| Shield | Shield | Shield | Shield | Shield connected to housing on side of encoder. Connected to ground on side of control. |

[1] Only at 4.5 ... 32 V, TTL/HTL programmable

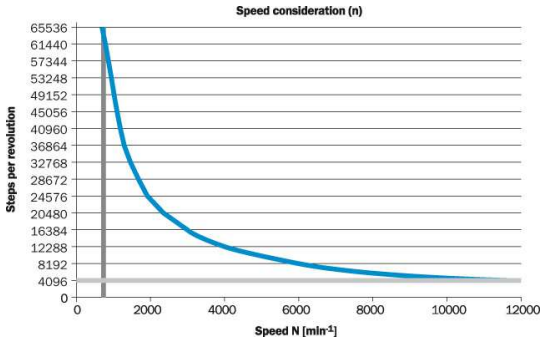
The SET input serves to carry out the zero pulse teach function. If the SET input is applied to $U_s$ for longer than 250 ms, after it has was open for at least 1,000 ms or applied to GND, the current shaft position is assigned the zero pulse signal "Z".


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## Signalausgänge

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## Drehzahlbetrachtung





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