



# DFS20A-A2D2E000048

DFS2x

INCREMENTAL ENCODERS

**SICK**  
Sensor Intelligence.



Illustration may differ



### Ordering information

Type	Part no.
DFS20A-A2D2E000048	1116907

Other models and accessories → [www.sick.com/DFS2x](http://www.sick.com/DFS2x)

### Detailed technical data

#### Safety-related parameters

<b>MTTF<sub>D</sub> (mean time to dangerous failure)</b>	330 years (EN ISO 13849-1) <sup>1)</sup>
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<sup>1)</sup> 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.

#### Performance

<b>Pulses per revolution</b>	48
<b>Measuring step</b>	± 90°, electric/pulses per revolution
<b>Measuring step deviation</b>	± 0.04° pulses 1 ... 99
<b>Error limits</b>	± 0.03°

#### Interfaces

<b>Communication interface</b>	Incremental
<b>Communication Interface detail</b>	Open Collector
<b>Number of signal channels</b>	6-channel
<b>0-set function via hardware pin</b>	✓
<b>0-SET function</b>	H-active, L = 0 - 3 V, H = 4,0 - U <sub>s</sub> V
<b>Initialization time</b>	40 ms <sup>1)</sup>
<b>Output frequency</b>	150 kHz
<b>Load current</b>	30 mA
<b>Power consumption</b>	0.7 W (without load)

<sup>1)</sup> Valid positional data can be read once this time has elapsed.

#### Electronics

<b>Connection type</b>	Male connector, MS, 7-pin, radial
<b>Supply voltage</b>	8 ... 30 V
<b>Reference signal, number</b>	1

<sup>1)</sup> Short-circuit opposite to another channel or GND permissible for maximum 30 s.

<b>Reference signal, position</b>	90°, electric, logically gated with A and B
<b>Reverse polarity protection</b>	✓
<b>Short-circuit protection of the outputs</b>	✓ <sup>1)</sup>

<sup>1)</sup> Short-circuit opposite to another channel or GND permissible for maximum 30 s.

## Mechanics

<b>Mechanical design</b>	Solid shaft, Square flange
<b>Shaft diameter</b>	3/8" With face
<b>Shaft length</b>	16 mm
<b>Weight</b>	+ 0.4 kg <sup>1)</sup>
<b>Shaft material</b>	Stainless steel 1,4305
<b>Flange material</b>	Aluminum
<b>Housing material</b>	Aluminum
<b>Start up torque</b>	0.5 Ncm (+20 °C)
<b>Operating torque</b>	0.3 Ncm (+20 °C)
<b>Permissible shaft loading</b>	80 N (radial) 40 N (axial)
<b>Operating speed</b>	≤ 9,000 min <sup>-1</sup>
<b>Moment of inertia of the rotor</b>	15 gcm <sup>2</sup>
<b>Bearing lifetime</b>	3.6 x 10 <sup>9</sup> revolutions
<b>Angular acceleration</b>	≤ 500,000 rad/s <sup>2</sup>

<sup>1)</sup> Based on encoder with MS male connector.

## Ambient data

<b>EMC</b>	According to EN 61000-6-2 and EN 61000-6-3
<b>Enclosure rating</b>	IP65, shaft side (IEC 60529) IP67, housing side (IEC 60529)
<b>Permissible relative humidity</b>	90 % (Condensation not permitted)
<b>Operating temperature range</b>	-30 °C ... +85 °C
<b>Storage temperature range</b>	-40 °C ... +100 °C, without package
<b>Resistance to shocks</b>	100 g, 11 ms (EN 60068-2-27)
<b>Resistance to vibration</b>	30 g, 10 Hz ... 2,000 Hz (EN 60068-2-6)

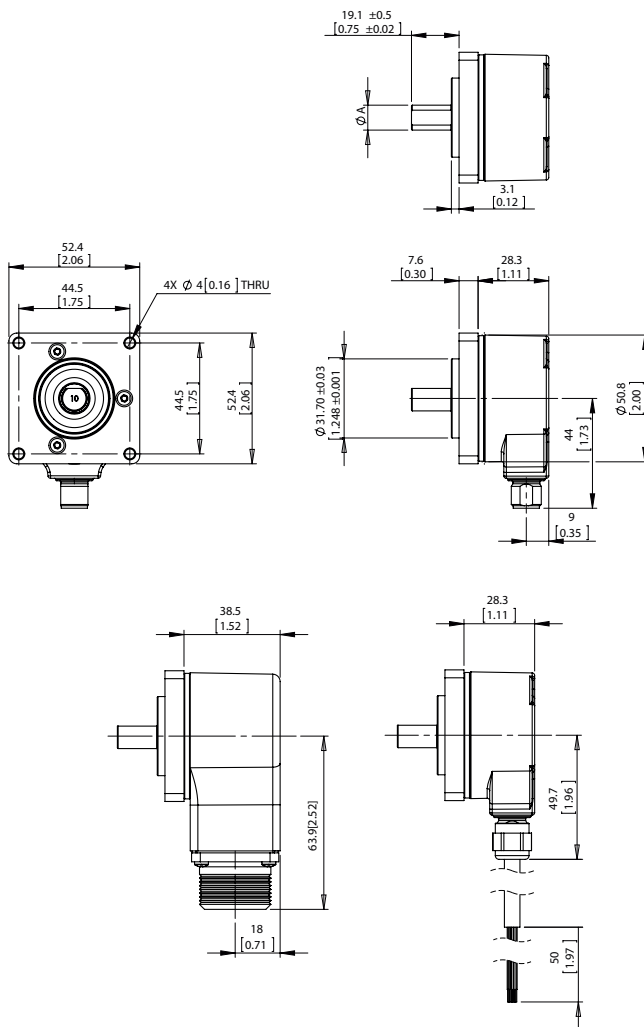
## Classifications

<b>ECLASS 5.0</b>	27270501
<b>ECLASS 5.1.4</b>	27270501
<b>ECLASS 6.0</b>	27270590
<b>ECLASS 6.2</b>	27270590
<b>ECLASS 7.0</b>	27270501
<b>ECLASS 8.0</b>	27270501
<b>ECLASS 8.1</b>	27270501
<b>ECLASS 9.0</b>	27270501
<b>ECLASS 10.0</b>	27270501

<b>ECLASS 11.0</b>	27270501
<b>ECLASS 12.0</b>	27270501
<b>ETIM 5.0</b>	EC001486
<b>ETIM 6.0</b>	EC001486
<b>ETIM 7.0</b>	EC001486
<b>ETIM 8.0</b>	EC001486
<b>UNSPSC 16.0901</b>	41112113

### Dimensional drawing (Dimensions in mm (inch))

DFS20 square flange mount, radial connector outlet M12 and MS, cable outlet

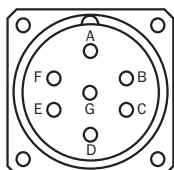


Type	Shaft diameter A
DFS2x-x1xxxxxxxx	1/4"
DFS2x-x2xxxxxxxx DFS2x-xCxxxxxxxx	3/8"
DFS2x-xFxxxxxxxx	1/2"

Type	Shaft diameter A
DFS2x-x3xxxxxxx	6 mm
DFS2x-x4xxxxxxx	10 mm

### PIN assignment

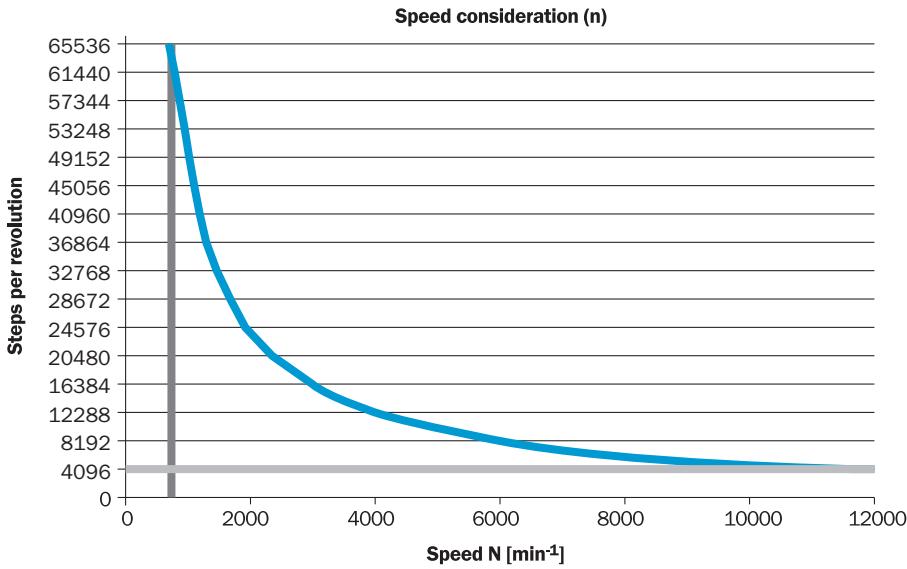
View of MS male device connector on encoder



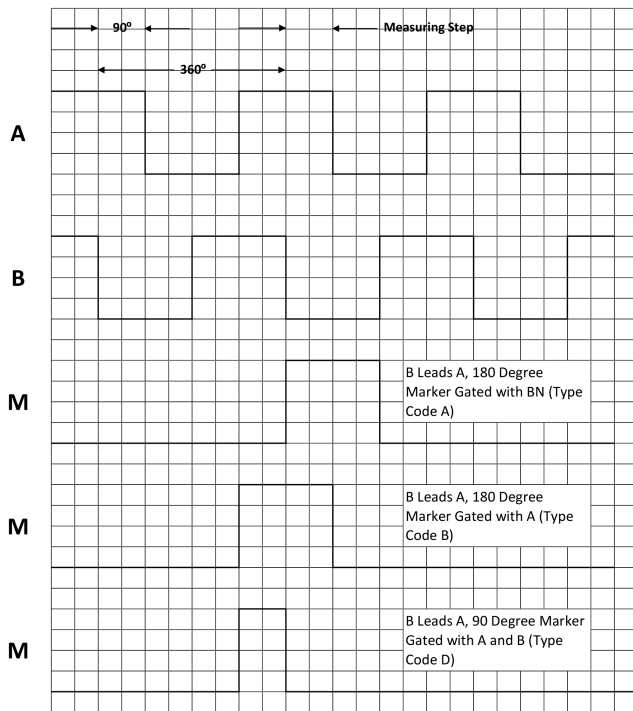
M12, 8-pin	MS, 10-pin	MS, 7-pin	MS, 6-pin	Cable, 9-wire	Signal	Description
1	H	-	-	Brown	$\bar{A}$	Signal wire
2	A	A	E	White	A	Signal wire
3	I	-	-	Black	$\bar{B}$	Signal wire
4	B	B	D	Pink	B	Signal wire
5	J	-	-	Yellow	$\bar{Z}$	Signal wire
6	C	C	C	Purple	Z	Signal wire
7	F	F	A	Blue	GND	GND
8	D	D	B	Red	Us	Supply voltage
-	E	E	-	Orange	O-SET	Input signal
-	G	G	F	-	Housing	Electrically connected to the housing potential
-	-	-	-	Blank	Drain wire	Bare wire parallel to the braided screen
-	-	-	-	Screen	Screen	Screen connected to housing on encoder side

Diagrams

Maximum revolution range

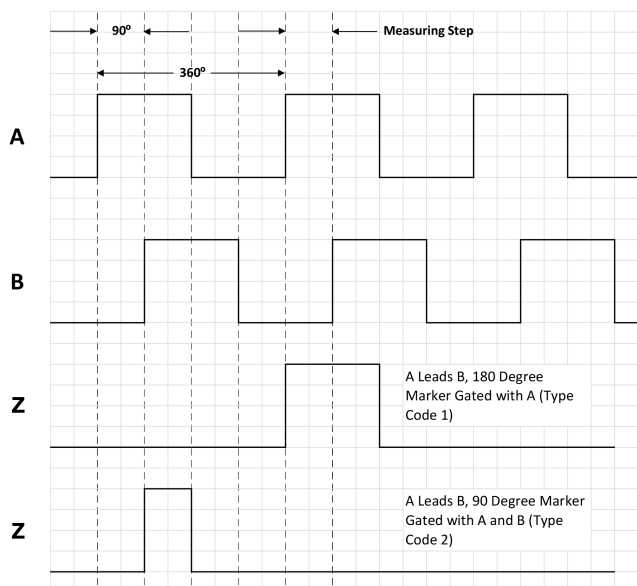


Signal Outputs with Counter Clock-wise Counting Direction Option Selected (B leads A for clock-wise rotation). Complement signals AN, BN and ZN are not shown.



Cw with view on the encoder shaft in direction "A", compare dimensional drawing.

Signal Outputs with Clock-wise Counting Direction Option Selected (A leads B for clock-wise rotation). Complement signals AN, BN and ZN are not shown.



Cw with view on the encoder shaft in direction "A", compare dimensional drawing.

### Recommended accessories

Other models and accessories → [www.sick.com/DFS2x](http://www.sick.com/DFS2x)

Brief description	Type	Part no.
Others		
<ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Female connector, MS/07, 7-pin, straight</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Cable:</b> 3 m, 11-wire</li> <li>• <b>Description:</b> Shielded</li> </ul>	DOL-MS07-G03MMA2	7102145
<ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Female connector, MS/07, 7-pin, straight</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Cable:</b> 5 m, 11-wire</li> <li>• <b>Description:</b> Shielded</li> </ul>	DOL-MS07-G05MMA2	7102146
<ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Female connector, MS/07, 7-pin, straight</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Cable:</b> 1.5 m, 11-wire</li> <li>• <b>Description:</b> Shielded</li> </ul>	DOL-MS07-G1M5MA2	7102144
<ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Female connector, MS/07, 7-pin, straight</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Cable:</b> 10 m, 11-wire</li> <li>• <b>Description:</b> Shielded</li> </ul>	DOL-MS07-G10MMA2	7102147
<ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Female connector, MS/07, 7-pin, straight</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Cable:</b> 20 m, 11-wire</li> <li>• <b>Description:</b> Shielded</li> </ul>	DOL-MS07-G20MMA2	7102148

Brief description	Type	Part no.
<ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Female connector, MS/07, 7-pin, straight</li> <li>• <b>Connection type head B:</b> Flying leads</li> <li>• <b>Cable:</b> 30 m, 11-wire</li> <li>• <b>Description:</b> Shielded</li> </ul>	DOL-MS07-G30MMA2	7102149
<ul style="list-style-type: none"> <li>• <b>Connection type head A:</b> Female connector, MS/07, 7-pin, straight, A-coded</li> <li>• <b>Description:</b> Unshielded</li> </ul>	DOS-MS07-G	7102143



## SICK AT A GLANCE

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Comprehensive services complete our offering: SICK LifeTime Services provide support throughout the machine life cycle and ensure safety and productivity.

For us, that is “Sensor Intelligence.”

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