



DFS60I-BHMC65536

DFS60

INCREMENTAL ENCODERS

SICK
Sensor Intelligence.



Illustration may differ



Ordering information

Type	Part no.
DFS60I-BHMC65536	1098278

Other models and accessories → www.sick.com/DFS60

Detailed technical data

Safety-related parameters

MTTF_D (mean time to dangerous failure)	300 years (EN ISO 13849-1) ¹⁾
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¹⁾ 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

Pulses per revolution	65,536 ¹⁾
Measuring step	90°, electric/pulses per revolution
Measuring step deviation at binary number of lines	± 0.0015°
Error limits	± 0.03°

¹⁾ See maximum revolution range.

Interfaces

Communication interface	Incremental
Communication Interface detail	TTL / HTL
Factory setting	Factory setting: output level TTL
Number of signal channels	6-channel
0-set function via hardware pin	✓
0-SET function	H-active, L ≙ 0 - 3 V, H ≙ 4.0 - U _S V ¹⁾
Programmable/configurable	✓
Initialization time	32 ms, 30 ms ²⁾
Output frequency	≤ 820 kHz
Load current	≤ 30 mA
Operating current	40 mA (without load)
Power consumption	≤ 0.7 W (without load)
Load resistance	≥ 120 Ω

¹⁾ Only with devices with M12 connector in connection with electrical interfaces M, V and W.

²⁾ With mechanical zero pulse width.

Electronics

Connection type	Male connector, M12, 12-pin, radial
Supply voltage	4.5 ... 32 V
Reference signal, number	1
Reference signal, position	90°, electric, logically gated with A and B
Reverse polarity protection	✓
Short-circuit protection of the outputs	✓ ^{1) 2)}

¹⁾ Programming TTL with ≥ 5.5 V: short-circuit opposite to another channel or GND permissible for maximum 30 s.

²⁾ Programming HTL or TTL with < 5.5 V: short-circuit opposite to another channel, US or GND permissible for maximum 30 s.

Mechanics

Mechanical design	Blind hollow shaft
Shaft diameter	15 mm
Weight	+ 0.5 kg
Shaft material	Stainless steel V2A
Flange material	Stainless steel V2A
Housing material	Stainless steel V2A
Start up torque	1 Ncm (+20 °C)
Operating torque	0.5 Ncm (+20 °C)
Permissible movement static	± 0.3 mm (radial) ± 0.5 mm (axial)
Permissible movement dynamic	± 0.05 mm (radial) ± 0.01 mm (axial)
Operating speed	$\leq 6,000$ min ⁻¹ ¹⁾
Moment of inertia of the rotor	40 gcm ²
Bearing lifetime	3.6×10^{10} revolutions
Angular acceleration	$\leq 500,000$ rad/s ²

¹⁾ Allow for self-heating of 3.3 K per 1,000 rpm when designing the operating temperature range.

Ambient data

EMC	According to EN 61000-6-2 and EN 61000-6-3
Enclosure rating	IP67, housing side (IEC 60529) ¹⁾ IP67, shaft side (IEC 60529)
Permissible relative humidity	90 % (Condensation not permitted)
Operating temperature range	-40 °C ... +100 °C ²⁾ -30 °C ... +100 °C ³⁾
Storage temperature range	-40 °C ... +100 °C, without package
Resistance to shocks	100 g, 6 ms (EN 60068-2-27)
Resistance to vibration	10 g, 10 Hz ... 2,000 Hz (EN 60068-2-6)

¹⁾ With mating connector fitted.

²⁾ Stationary position of the cable.

³⁾ Flexible position of the cable.

Classifications

ECLASS 5.0	27270501
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PIN assignment

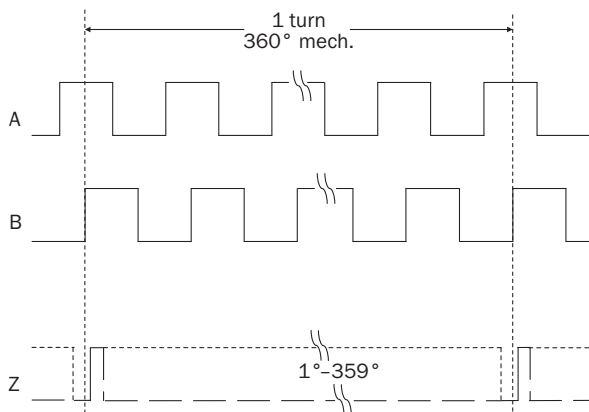


View of M12 male device connector on encoder

Male connector M12, 8-pin	Connector M12, 12-pin	Wire colors (cable connection)	TTL/HTL signal	Sin/Cos 1.0 V _{PP}	Explanation
1	7	Brown	\bar{A}	COS-	Signal wire
2	6	White	A	COS+	Signal wire
3	9	Black	\bar{B}	SIN-	Signal wire
4	8	Pink	B	SIN+	Signal wire
5	4	Yellow	\bar{Z}	\bar{Z}	Signal wire
6	11	Purple	Z	Z	Signal wire
7	12	Blue	GND	GND	Ground connection
8	5	Red	+U _S	+U _S	Supply voltage
-	2	-	N.c.	N.c.	Not assigned
-	3	-	N.c.	N.c.	Not assigned
-	1	-	N.c.	N.c.	Not assigned
-	10 ¹⁾	-	O-SET ¹⁾	N.c.	Set zero pulse ¹⁾
Screen	Screen	Screen	Screen	Screen	Screen connected to housing on encoder side. Connected to ground on control side.

Diagrams

Mechanical zero pulse width 1° to 359° programmable. Width of the zero pulse in relation to a mechanical revolution of the shaft.



Supply voltage	Output
4,5 V ... 32 V	TTL/HTL programmable

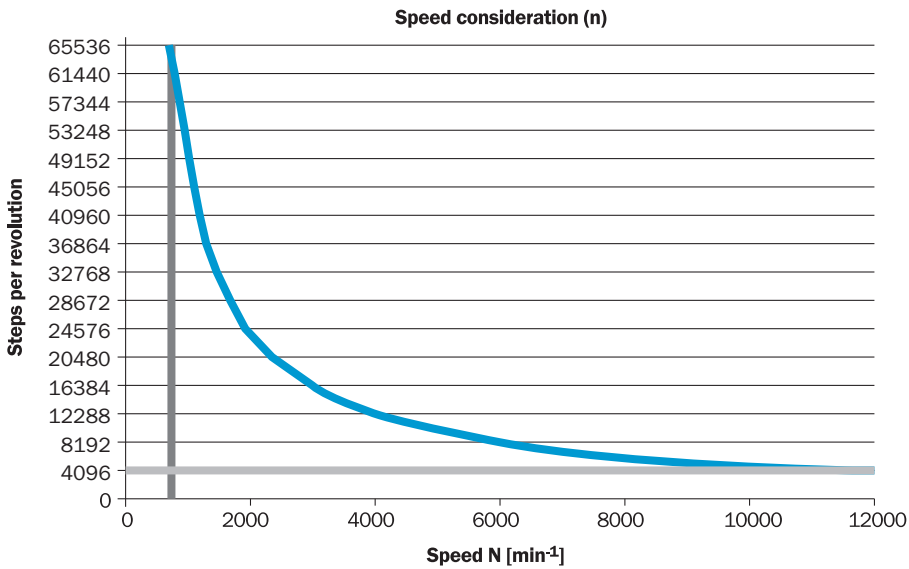
Electrical zero pulse width can be configured to 90°, 180°, or 270°. Width of the zero pulse in relation to a pulse period.



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










Supply voltage	Output
4,5 V ... 32 V	TTL/HTL programmable




Maximum revolution range



Recommended accessories

Other models and accessories → www.sick.com/DFS60

	Brief description	Type	Part no.
Programming and configuration tools			
	USB programming unit, for programmable SICK encoders AFS60, AFM60, DFS60, VFS60, DFV60 and wire draw encoders with programmable encoders	PGT-08-S	1036616
	Programming unit display for programmable SICK DFS60, DFV60, AFS/AFM60, AHS/AHM36 encoders, and wire draw encoder with DFS60, AFS/AFM60 and AHS/AHM36. Compact dimensions, low weight, and intuitive operation.	PGT-10-Pro	1072254
Flanges			
	Standard stator coupling	BEF-DS00XFX	2056812
Others			
	<ul style="list-style-type: none"> • Connection type head A: Male connector, M12, 8-pin, straight, A-coded • Description: Shielded • Connection systems: Screw-type terminals • Permitted cross-section: ≤ 0.5 mm² • Application: Hygienic and washdown zones 	YM12ES8-0050S5586A	2097337
	<ul style="list-style-type: none"> • Connection type head A: Female connector, M12, 8-pin, straight, A-coded • Description: Shielded • Connection systems: Screw-type terminals • Permitted cross-section: 0.25 mm² ... 0.5 mm² • Application: Hygienic and washdown zones 	YF12ES8-0050S5586A	2097334
	<ul style="list-style-type: none"> • Connection type head A: Female connector, M12, 12-pin, straight, A-coded • Connection type head B: Flying leads • Signal type: SSI • Cable: 2 m, 12-wire, PUR, halogen-free • Description: SSI, shielded, Female connector, M12, 12-pin • Note: Drag chain use 	DOL-1212-G02MAC1	6053273
	<ul style="list-style-type: none"> • Connection type head A: Female connector, M12, 12-pin, straight, A-coded • Connection type head B: Flying leads • Signal type: SSI • Cable: 5 m, 12-wire, PUR, halogen-free • Description: SSI, shielded, Female connector, M12, 12-pin, angled, 5 m, PVC, shielded, drilled and twisted pair • Note: Drag chain use 	DOL-1212-G05MAC1	6053274
	<ul style="list-style-type: none"> • Connection type head A: Female connector, M12, 12-pin, straight, A-coded • Connection type head B: Flying leads • Signal type: SSI • Cable: 10 m, 12-wire, PUR, halogen-free • Description: SSI, shielded, Female cable connector, M12, 12-pin • Note: Drag chain use 	DOL-1212-G10MAC1	6053275
	<ul style="list-style-type: none"> • Connection type head A: Female connector, M12, 12-pin, straight, A-coded • Connection type head B: Flying leads • Signal type: SSI • Cable: 20 m, 12-wire, PUR, halogen-free • Description: SSI, shielded, Female connector, M12, 12-pin, angled, 5 m, PVC, shielded, drilled and twisted pair • Note: Drag chain use 	DOL-1212-G20MAC1	6053276
	<ul style="list-style-type: none"> • Connection type head A: Female connector, M12, 12-pin, angled, A-coded • Connection type head B: Flying leads • Signal type: SSI • Cable: 2 m, 12-wire, PUR, halogen-free • Description: SSI, shielded, Head A: female connector, M12, 12-pin, angled Head B: cable Cable: SSI, PUR, halogen-free, shielded, 12 x 0.14 mm², Ø 8.5 mm, suitable for drag chain 	DOL-1212-W02MAC1	6039824

	Brief description	Type	Part no.
	<ul style="list-style-type: none"> • Connection type head A: Female connector, M12, 12-pin, angled, A-coded • Connection type head B: Flying leads • Signal type: SSI • Cable: 5 m, 12-wire, PUR, halogen-free • Description: SSI, shielded, Head A: female connector, M12, 12-pin, angled Head B: cable Cable: SSI, PUR, halogen-free, shielded, 12 x 0.14 mm², Ø 8.5 mm, suitable for drag chain • Note: Drag chain use 	DOL-1212-W05MAC1	6039825
	<ul style="list-style-type: none"> • Connection type head A: Female connector, M12, 12-pin, angled, A-coded • Connection type head B: Flying leads • Signal type: SSI • Cable: 10 m, 12-wire, PUR, halogen-free • Description: SSI, shielded, Head A: female connector, M12, 12-pin, angled Head B: cable Cable: SSI, PUR, halogen-free, shielded, 12 x 0.14 mm², Ø 8.5 mm, suitable for drag chain • Note: Drag chain use 	DOL-1212-W10MAC1	6039826
	<ul style="list-style-type: none"> • Connection type head A: Female connector, M12, 12-pin, angled, A-coded • Connection type head B: Flying leads • Signal type: SSI • Cable: 20 m, 12-wire, PUR, halogen-free • Description: SSI, shielded, Head A: female connector, M12, 12-pin, angled Head B: cable Cable: SSI, PUR, halogen-free, shielded, 12 x 0.14 mm², Ø 8.5 mm, suitable for drag chain • Note: Drag chain use 	DOL-1212-W20MAC1	6039827

SICK AT A GLANCE

SICK is one of the leading manufacturers of intelligent sensors and sensor solutions for industrial applications. A unique range of products and services creates the perfect basis for controlling processes securely and efficiently, protecting individuals from accidents and preventing damage to the environment.

We have extensive experience in a wide range of industries and understand their processes and requirements. With intelligent sensors, we can deliver exactly what our customers need. In application centers in Europe, Asia and North America, system solutions are tested and optimized in accordance with customer specifications. All this makes us a reliable supplier and development partner.

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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