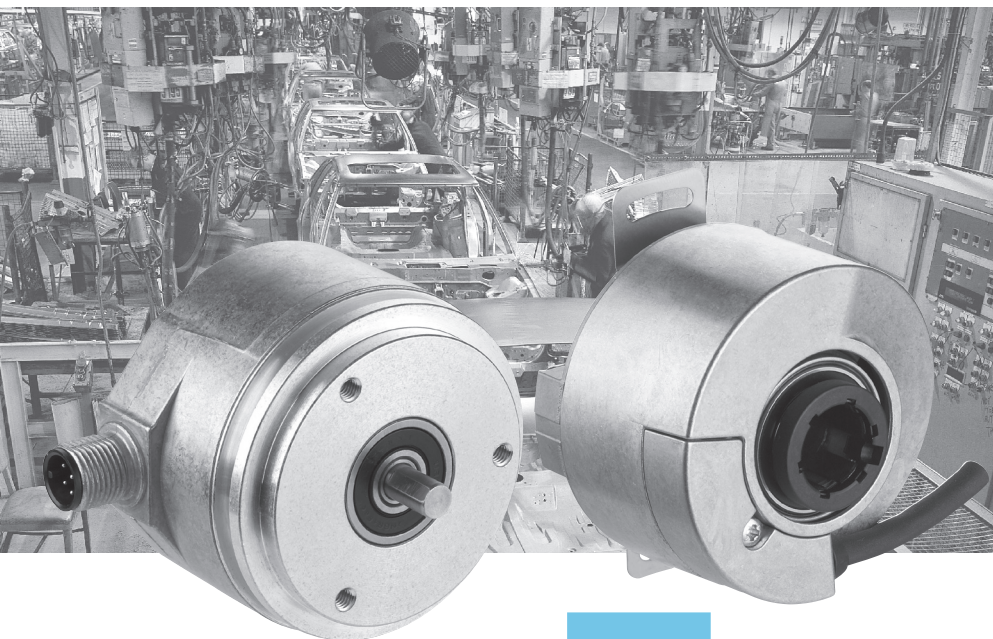


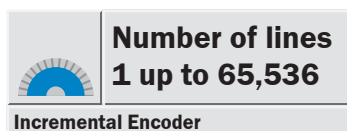
The high-resolution family: DFS60 Incremental Encoders



has a feature which substantially increases interference immunity and reliability. The DFS60 can therefore be used in harsh ambient conditions in any industrial application.

Product options:

- interfaces TTL/RS422,
 HTL/push-pull
- Face mount flange and
 Servo flange
- Blind hollow shaft and
- Through hollow shaft
- Cable outlet 1.5 m;
 3 m and 5 m
- can be used radial or axial
- Connector outlet M12 or M23
- 1 to 65,536 lines, output level of
 the intervaces, zero pulse width
 programmable by customer
- Zero pulse Teach function



T

The DFS60 is a high-resolution incremental hollow shaft Encoder in a 60 mm housing.

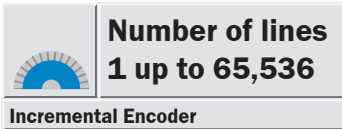
With a maximum of 65,536 lines, the DFS60 is unique in its class.

Excellent concentricity and exceptional robustness are achieved thanks to the large distance between the ball bearings which support the Encoder shaft. With electrical isolation between motor shaft and Encoder, the DFS60 version with through hollow shaft

Due to the options available, applications are diverse, in areas such as:

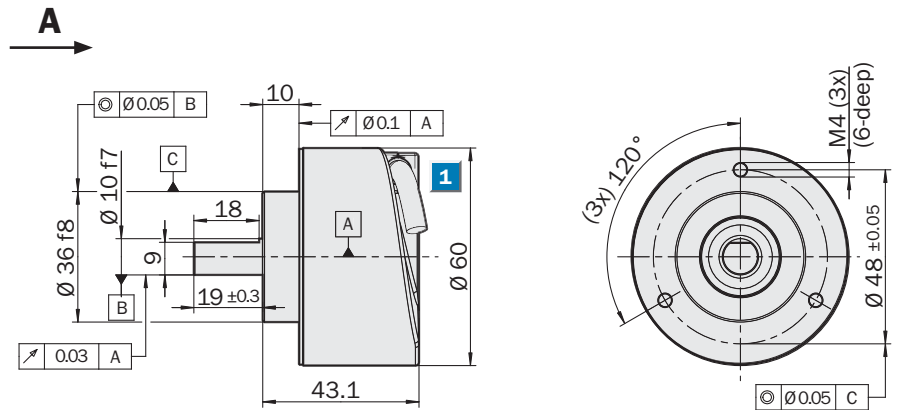
- printing machines
- textile machines
- woodworking machines
- packaging machines

SICK | STEGMANN



- Connector or cable outlet
- Protection class IP 65
- Electrical interfaces
TTL, HTL
- Number of lines, level of
output signal and zero pulse
width freely programmable

Dimensional drawing face mount flange, cable outlet

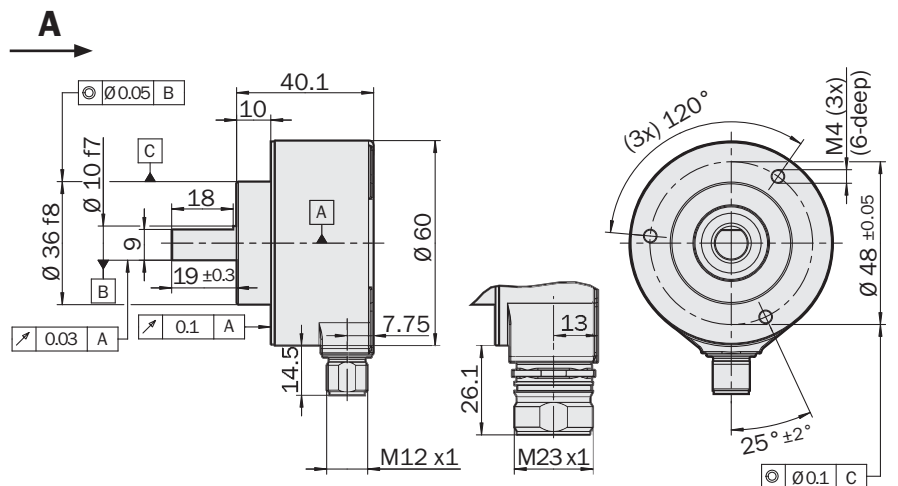


General tolerances according to DIN ISO 2768-mk

- 1** Cable-Ø = 5.6 ± 0.2 mm
Bending radius R = 30 mm



Dimensional drawing face mount flange, connector outlet M12 and M23



General tolerances according to DIN ISO 2768-mk



Accessories

- Connection systems (page 24/25)
- Mounting systems (page 26/27)
- Programming Tool (page 23)

Pin assignment (page 22)

Technical Data to DIN 32878		DFS60 face mount flange		
Type		E	B	A
Shaft diameter	10 x 19 mm			
Electrical interface	4.5 ... 5.5 V, TTL/RS422			
	10 ... 32 V, TTL/RS422			
	10 ... 32 V, HTL/push-pull			
	4.5 ... 32 V, TTL/HTL programmable			
Number of lines per revolution		100 ... 2048	1 ... 10000	1 ... 65536
Mass	0.3 kg			
Moment of inertia to the rotor	6.2 gcm ²			
Measuring step	90° electric/number of lines			
Reference signal	Number	1		
	Position	90° electr., gated with A and B		
Error limits		± 0.3°	± 0.05°	± 0.03°
Measuring step deviation	Number of lines 1 ... 99		± 0.08°	± 0.04°
	Number of lines 100 ... 10,000	± 0.2°	± 0.01°	± 0.008°
	Number of lines > 10,000			± 0.002°
Max. output frequency	TTL/RS422	300 kHz	600 kHz	820 kHz
	HTL/push-pull	300 kHz	600 kHz	820 kHz
	TTL/HTL programmable		600 kHz	820 kHz
Operating speed ¹⁾		10,000 rpm	10,000 rpm	10,000 rpm
Angular acceleration	5 x 10 ⁵ rad/s ²			
Max. Operating torque at 20 °C	0.3 Ncm			
Starting torque at 20 °C	0.5 Ncm			
Permissible shaft loading	radial	80 N	80 N	80 N
	axial	40 N	40 N	40 N
Bearing lifetime	3 x 10 ⁹ revolutions			
Working temperature range		0 ... + 70 °C	-20 ... + 100 °C	-20 ... + 100 °C
Storage temperature range (without package)		-40 ... + 100 °C	-40 ... + 100 °C	-40 ... + 100 °C
Permissible relative humidity ²⁾	90 %			
EMC ³⁾				
Resistance	To shocks ⁴⁾	50 g/6 ms	70 g/6 ms	60 g/6 ms
	To vibration ⁵⁾	20 g/10 ... 2000 Hz	30 g/10 ... 2000 Hz	20 g/10 ... 2000 Hz
Protection class to IEC 60529				
Shaft Side		IP 65	IP 65	IP 65
Housing side	Connector outlet ⁶⁾	IP 67	IP 67	IP 67
Housing side	Cable outlet	IP 67	IP 67	IP 67
Load current	4,5 ... 5,5 V, TTL/RS422	30 mA	30 mA	30 mA
	10 ... 32 V, TTL/RS422	30 mA	30 mA	30 mA
	10 ... 32 V, HTL/push pull	30 mA	30 mA	30 mA
	4,5 ... 32 V, TTL/HTL programmable		30 mA	30 mA
No load operating current	4,5 ... 5,5 V, TTL/RS422	40 mA	40 mA	40 mA
	10 ... 32 V, TTL/RS422	40 mA	40 mA	40 mA
	10 ... 32 V, HTL/push pull	40 mA	40 mA	40 mA
	4,5 ... 32 V, TTL/HTL programmable		60 mA	60 mA
Initialisation time after power	4,5 ... 5,5 V, TTL/RS422	40 ms	40 ms	40 ms
	10 ... 32 V, TTL/RS422	40 ms	40 ms	40 ms
	10 ... 32 V, HTL/push pull	40 ms	40 ms	40 ms
	4,5 ... 32 V, TTL/HTL programmable		max. 30 ms	max. 30 ms

¹⁾ Self-warming 3.3k/1,000 min⁻¹
when applying, note working temperature range

²⁾ Condensation of the optical scanning not permitted

³⁾ To EN 61000-6-2 and EN 61000-6-4

⁴⁾ To EN 60068-2-27

⁵⁾ To EN 60068-2-6

⁶⁾ With mating connector fitted

Order information TTL and HTL interface

DFS60 Incremental Encoder, face mount flange

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14	Point 15	Point 16
D	F	S	6	0		-	S								

Type (cp. technical data page 3)	Mechanical interface	Electrical interface	Connection type	No. of lines
E	Solid shaft, 10 x 19 mm = 4	4.5 ... 5.5 V, TTL/RS422 = A	Connector M23, 12-pin, radial = A	Always 5 characters in clear text
B		10 ... 32 V, TTL/RS422 = C	Connector M12, 8-pin, radial = C	Selection depending on the type, see below.
A		10 ... 32 V, HTL/push-pull = E	Cable 8-core, universal 1.5 m ¹⁾ = K	
			Cable 8-core, universal 3 m ¹⁾ = L	
			Cable 8-core, universal 5 m ¹⁾ = M	

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.

Type E – Number of lines per revolution

00100	00314	00500	01000	02000
00200	00360	00512	01024	02048
00250		00720	01250	

Type B – Number of lines per revolution

00050	00300	00500	01000	02000	04000	07200	Others on request
00100	00314	00512	01024	02048	04096	08192	
00200	00360	00720	01250	02500	05000	10000	
00250				03600			

Type A – Number of lines per revolution

00100	00300	00500	01000	02000	04000	07200	16384
00200	00314	00512	01024	02048	04096	08192	32768
00250	00360	00720	01250	02500	05000	10000	65536
				03600			Others on request

Order information DFS60 Incremental Encoder, type E, solid shaft 10 x 19 mm,

Electrical interface 10 ... 32 V, HTL/push-pull, connector M12, 8-pin, radial, number of lines 1024

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14	Point 15	Point 16
D	F	S	6	0	E	-	S	4	E	C	0	1	0	2	4

Order information TTL or HTL programmable

DFS60 Incremental Encoder, face mount flange

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14	Point 15	Point 16
D	F	S	6	0		-	S								

Type (cp. technical data page 3)	Mechanical interface	Electrical interface	Connection type	No. of lines
B	Solid shaft, 10 x 19 mm = 4	4.5 ... 32 V, TTL/HTL programmable ¹⁾ = P	Connector M23, 12-pin, radial = A	Always 5 characters in clear text
A			Connector M12, 8-pin, radial = C	
			Cable 8-core, universal 1.5 m ²⁾ = K	
			Cable 8-core, universal 3 m ²⁾ = L	
			Cable 8-core, universal 5 m ²⁾ = M	

¹⁾ Preset level of output signal: TTL

²⁾ 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.

Order information		Order information	
DFS60 Incremental Encoder Type B		DFS60 Incremental Encoder Type A	
Face mount flange		Face mount flange	
Solid shaft 10 x 19 mm		Solid shaft 10 x 19 mm	
Type	Part no.	Type	Part no.
DFS60B-S4PA10000	1036720	DFS60A-S4PA65536	1036725
DFS60B-S4PC10000	1036721	DFS60A-S4PC65536	1036726
DFS60B-S4PK10000	1036722	DFS60A-S4PK65536	1036727
DFS60B-S4PL10000	1036723	DFS60A-S4PL65536	1036728
DFS60B-S4PM10000	1036724	DFS60A-S4PM65536	1036729



Number of lines
1 up to 65,536

Incremental Encoder

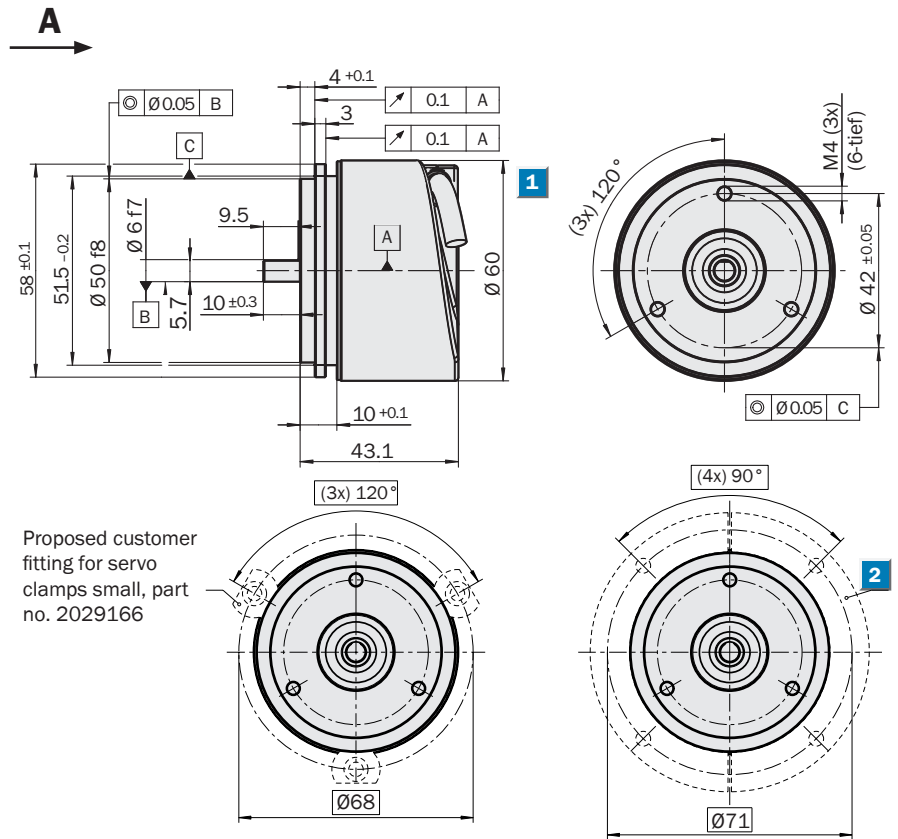
- Connector or cable outlet
- Protection class IP 65
- Electrical interfaces
TTL, HTL
- Number of lines, level of
output signal and zero pulse
width freely programmable



Accessories
Connection systems (page 24/25)
Mounting systems (page 26/27)
Programming Tool (page 23)

Pin assignment (page 22)

Dimensional drawing servo flange, cable outlet

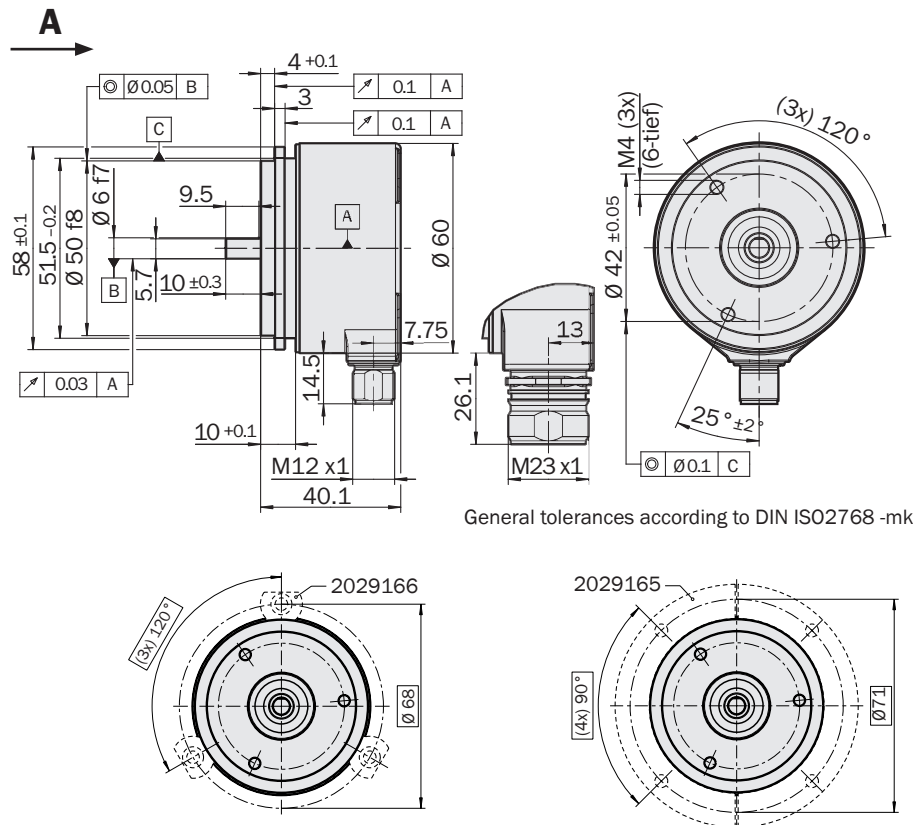


General tolerances according to DIN ISO2768 -mk

1 Cable-Ø = 5.6 ± 0.2 mm
Bending radius R = 30 mm

2 Proposed customer fitting for servo clamps half ring, part no. 2029165

Dimensional drawing servo flange, connector outlet M12 and M23



Proposed customer fitting for servo clamps small, part no. 2029166

Proposed customer fitting for servo clamps half ring, part no. 2029165

Technical Data to DIN 32878		DFS60 servo flange		
Type		E	B	A
Shaft diameter	6 x 10 mm			
Electrical interface	4.5 ... 5.5 V, TTL/RS422			
	10 ... 32 V, TTL/RS422			
	10 ... 32 V, HTL/push-pull			
	4.5 ... 32 V, TTL/HTL programmable			
Number of lines per revolution		100 ... 2048	1 ... 10000	1 ... 65536
Mass	0.3 kg			
Moment of inertia to the rotor	6.2 gcm ²			
Measuring step	90° electric/number of lines			
Reference signal	Number	1		
	Position	90° electr., gated with A and B		
Error limits		± 0.3°	± 0.05°	± 0.03°
Measuring step deviation	Number of lines 1 ... 99		± 0.08°	± 0.04°
	Number of lines 100 ... 10,000	± 0.2°	± 0.01°	± 0.008°
	Number of lines > 10,000			± 0.002°
Max. output frequency	TTL/RS422	300 kHz	600 kHz	820 kHz
	HTL/push-pull	300 kHz	600 kHz	820 kHz
	TTL/HTL programmable		600 kHz	820 kHz
Operating speed ¹⁾		10,000 rpm	10,000 rpm	10,000 rpm
Angular acceleration	5 x 10 ⁵ rad/s ²			
Max. Operating torque at 20 °C	0.3 Ncm			
Starting torque at 20 °C	0.5 Ncm			
Permissible shaft loading	radial	80 N	80 N	80 N
	axial	40 N	40 N	40 N
Bearing lifetime	3 x 10 ⁹ revolutions			
Working temperature range		0 ... + 70 °C	-20 ... + 100 °C	-20 ... + 100 °C
Storage temperature range (without package)		-40 ... + 100 °C	-40 ... + 100 °C	-40 ... + 100 °C
Permissible relative humidity ²⁾	90 %			
EMC ³⁾				
Resistance	To shocks ⁴⁾	50 g/6 ms	70 g/6 ms	60 g/6 ms
	To vibration ⁵⁾	20 g/10 ... 2000 Hz	30 g/10 ... 2000 Hz	20 g/10 ... 2000 Hz
Protection class IEC 60529				
Shaft Side		IP 65	IP 65	IP 65
Housing side	Connector outlet ⁶⁾	IP 67	IP 67	IP 67
Housing side	Cable outlet	IP 67	IP 67	IP 67
Load current	4.5 ... 5.5 V, TTL/RS422	30 mA	30 mA	30 mA
	10 ... 32 V, TTL/RS422	30 mA	30 mA	30 mA
	10 ... 32 V, HTL/push-pull	30 mA	30 mA	30 mA
	4.5 ... 32 V, TTL/HTL programmable		30 mA	30 mA
No-load operating current	4.5 ... 5.5 V, TTL/RS422	40 mA	40 mA	40 mA
	10 ... 32 V, TTL/RS422	40 mA	40 mA	40 mA
	10 ... 32 V, HTL/push-pull	40 mA	40 mA	40 mA
	4.5 ... 32 V, TTL/HTL programmable		60 mA	60 mA
Initialisation time after power on	4.5 ... 5.5 V, TTL/RS422	40 ms	40 ms	40 ms
	10 ... 32 V, TTL/RS422	40 ms	40 ms	40 ms
	10 ... 32 V, HTL/ Push pull	40 ms	40 ms	40 ms
	4.5 ... 32 V, TTL/HTL programmable		max. 30 ms	max. 30 ms

¹⁾ Self-warming 3.3k/1,000 min⁻¹
when applying, note working temperature range

²⁾ Condensation of the optical scanning not permitted

³⁾ To EN 61000-6-2 and EN 61000-6-4

⁴⁾ To EN 60068-2-27

⁵⁾ To EN 60068-2-6

⁶⁾ With mating connector fitted

Order information TTL and HTL interface

DFS60 Incremental Encoder, servo flange

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14	Point 15	Point 16
D	F	S	6	0		-	S								

Type (cp. technical data page 7)	Mechanical interface	Electrical interface	Connection type	No. of lines
E	Solid shaft, 6 x 10 mm = 1	4.5 ... 5.5 V, TTL/RS422 = A	Connector M23, 12-pin, radial = A	Always 5 characters in clear text
B		10 ... 32 V, TTL/RS422 = C	Connector M12, 8-pin, radial = C	Selection depending on the type, see below.
A		10 ... 32 V, HTL/push-pull = E	Cable 8-core, universal 1.5 m ¹⁾ = K	
			Cable 8-core, universal 3 m ¹⁾ = L	
			Cable 8-core, universal 5 m ¹⁾ = M	

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.

Type E – Number of lines per revolution

00100	00314	00500	01000	02000
00200	00360	00512	01024	02048
00250		00720	01250	

Type B – Number of lines per revolution

00050	00300	00500	01000	02000	04000	07200	Others on request
00100	00314	00512	01024	02048	04096	08192	
00200	00360	00720	01250	02500	05000	10000	
00250				03600			

Type A – Number of lines per revolution

00100	00300	00500	01000	02000	04000	07200	16384
00200	00314	00512	01024	02048	04096	08192	32768
00250	00360	00720	01250	02500	05000	10000	65536
				03600			Others on request

Order information: DFS60 Incremental Encoder, type E, solid shaft 6 x 10 mm,

Electrical interface 10 ... 32 V, HTL/push-pull, connector M12, 8-pin, radial, number of lines 1024

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14	Point 15	Point 16
D	F	S	6	0	E	-	S	1	E	C	0	1	0	2	4

Order information TTL or HTL programmable

DFS60 Incremental Encoder, servo flange

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14	Point 15	Point 16
D	F	S	6	0		-	S								

Type (cp. technical data page 7)	Mechanical interface	Electrical interface	Connection type	No. of lines
B	Solid shaft, 6 x 10 mm = 1	4.5 ... 32 V, TTL/HTL programmable ¹⁾ = P	Connector M23, 12-pin, radial = A	Always 5 characters in clear text
A			Connector M12, 8-pin, radial = C	
			Cable 8-core, universal 1.5 m ²⁾ = K	
			Cable 8-core, universal 3 m ²⁾ = L	
			Cable 8-core, universal 5 m ²⁾ = M	

¹⁾ Preset level of output signal: TTL

²⁾ 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.

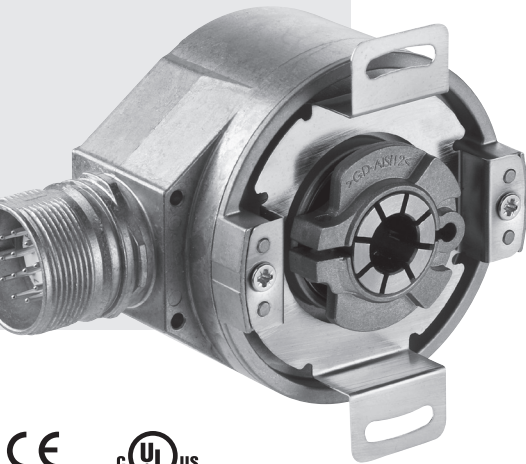
Order information		Order information	
DFS60 Incremental Encoder Type B		DFS60 Incremental Encoder Type A	
Servo flange		Servo flange	
Solid shaft 6 x 10 mm		Solid shaft 6 x 10 mm	
Type	Part no.	Type	Part no.
DFS60B-S1PA10000	1036755	DFS60A-S1PA65536	1036760
DFS60B-S1PC10000	1036756	DFS60A-S1PC65536	1036761
DFS60B-S1PK10000	1036757	DFS60A-S1PK65536	1036762
DFS60B-S1PL10000	1036758	DFS60A-S1PL65536	1036763
DFS60B-S1PM10000	1036759	DFS60A-S1PM65536	1036764



Number of lines
1 up to 65,536

Incremental Encoder

- Connector or cable outlet
- Protection class IP 65
- Electrical interfaces
TTL, HTL
- Number of lines, level of
output signal and zero pulse
width freely programmable

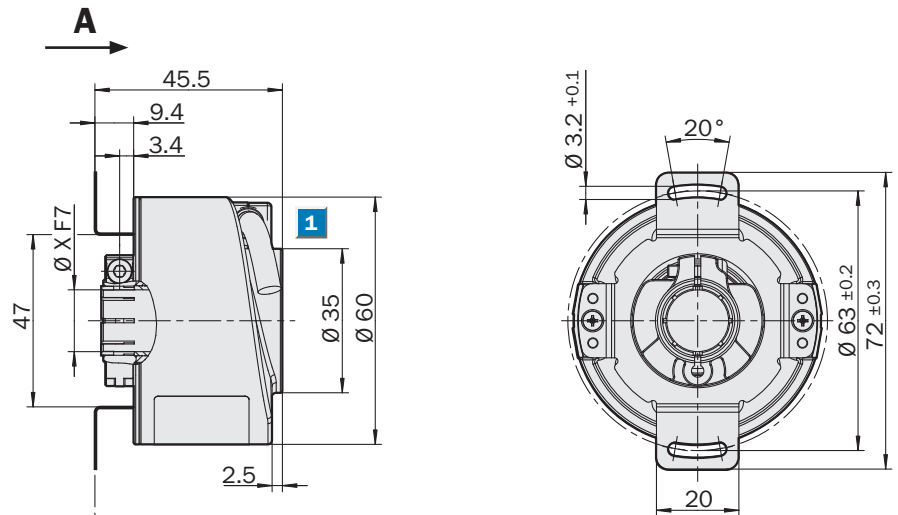


Accessories

- Connection systems (page 24/25)
- Mounting systems (page 26/27)
- Programming Tool (page 23)

Pin assignment (page 22)

Dimensional drawing blind hollow shaft, cable outlet

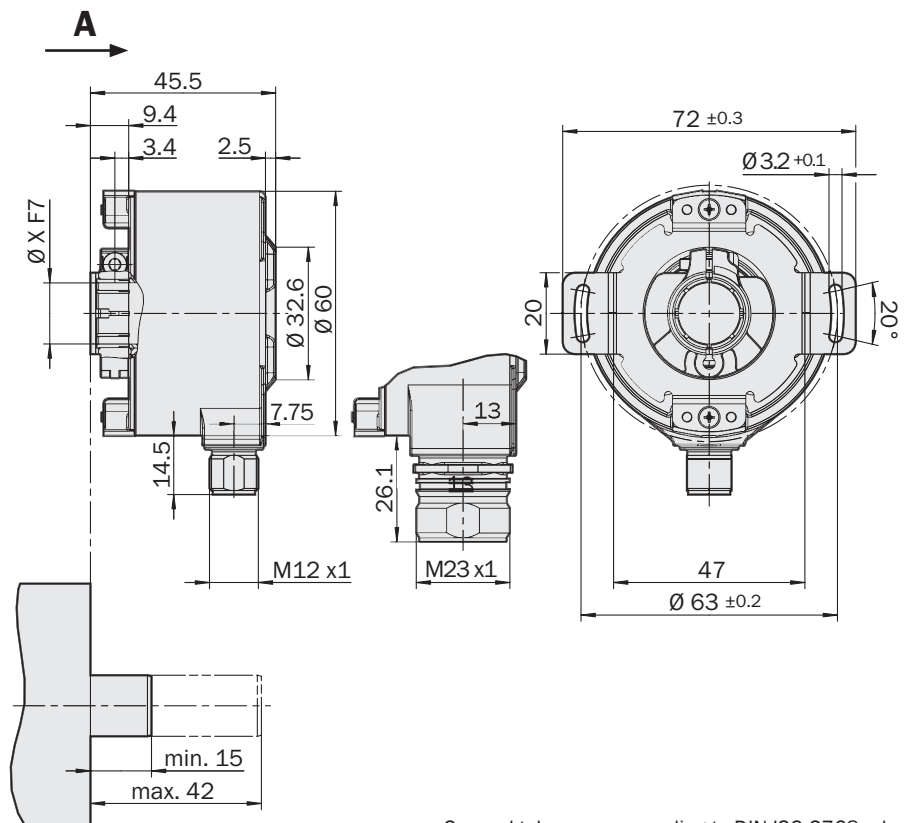


General tolerances according to DIN ISO 2768-mk

Customer-side

- 1** Cable-Ø = 5.6 ± 0.2 mm
Bending radius R = 30 mm

Dimensional drawing blind hollow shaft, connector outlet M12 and M23



General tolerances according to DIN ISO 2768-mk

Customer-side

Technical Data to DIN 32878		DFS60 blind hollow shaft		
Type		E	B	A
Shaft diameter	8, 10, 12, 14, 15 mm a. 3/8", 1/2", 5/8"			
Electrical interface	4.5 ... 5.5 V, TTL/RS422			
	10 ... 32 V, TTL/RS422			
	10 ... 32 V, HTL/push-pull			
	4.5 ... 32 V, TTL/HTL programmable			
Number of lines per revolution		100 ... 2048	1 ... 10000	1 ... 65536
Mass	0.2 kg			
Moment of inertia to the rotor	40 gcm ²			
Measuring step	90° electric/number of lines			
Reference signal	Number	1		
	Position	90° electr., gated with A and B		
Error limits		± 0.3°	± 0.05°	± 0.03°
Measuring step deviation	Number of lines 1 ... 99		± 0.08°	± 0.04°
	Number of lines 100 ... 10,000	± 0.2°	± 0.01°	± 0.008°
	Number of lines > 10,000			± 0.002°
Max. output frequency	TTL/RS422	300 kHz	600 kHz	820 kHz
	HTL/push-pull	300 kHz	600 kHz	820 kHz
	TTL/HTL programmable		600 kHz	820 kHz
Operating speed ¹⁾		6,000 rpm	6,000 rpm	6,000 rpm
Angular acceleration	5 x 10 ⁵ rad/s ²			
Max. Operating torque at 20 °C	0.6 Ncm			
Starting torque at 20 °C	0.8 Ncm			
Permissible movement of the drive element				
radial	Static/dynamic	± 0.3/± 0.1 mm	± 0.3/± 0.1 mm	± 0.3/± 0.05 mm
axial	Static/dynamic	± 0.5/± 0.2 mm	± 0.5/± 0.2 mm	± 0.5/± 0.01 mm
Bearing lifetime	3 x 10 ⁹ revolutions			
Working temperature range		0 ... + 70 °C	-20 ... + 100 °C	-20 ... + 100 °C
Storage temperature range (without package)		-40 ... + 100 °C	-40 ... + 100 °C	-40 ... + 100 °C
Permissible relative humidity ²⁾	90 %			
EMC ³⁾				
Resistance	To shocks ⁴⁾	50 g/6 ms	70 g/6 ms	60 g/6 ms
	To vibration ⁵⁾	20 g/10 ... 2000 Hz	30 g/10 ... 2000 Hz	20 g/10 ... 2000 Hz
Protection class to IEC 60529				
Shaft Side		IP 65	IP 65	IP 65
Housing side	Connector outlet ⁶⁾	IP 67	IP 67	IP 67
Housing side	Cable outlet	IP 67	IP 67	IP 67
Load current	4,5 ... 5,5 V, TTL/RS422	30 mA	30 mA	30 mA
	10 ... 32 V, TTL/RS422	30 mA	30 mA	30 mA
	10 ... 32 V, HTL/push pull	30 mA	30 mA	30 mA
	4,5 ... 32 V, TTL/HTL programmable		30 mA	30 mA
No load operating current	4,5 ... 5,5 V, TTL/RS422	40 mA	40 mA	40 mA
	10 ... 32 V, TTL/RS422	40 mA	40 mA	40 mA
	10 ... 32 V, HTL/push pull	40 mA	40 mA	40 mA
	4,5 ... 32 V, TTL/HTL programmable		60 mA	60 mA
Initialisation time after power on	4,5 ... 5,5 V, TTL/RS422	40 ms	40 ms	40 ms
	10 ... 32 V, TTL/RS422	40 ms	40 ms	40 ms
	10 ... 32 V, HTL/push pull	40 ms	40 ms	40 ms
	4,5 ... 32 V, TTL/HTL programmable		max. 30 ms	max. 30 ms

¹⁾ Self-warming 3.3k/1,000 min⁻¹
when applying, note working temperature range

²⁾ Condensation of the optical scanning not permitted

³⁾ To EN 61000-6-2 and EN 61000-6-4

⁴⁾ To EN 60068-2-27

⁵⁾ To EN 60068-2-6

⁶⁾ With mating connector fitted

Order information TTL and HTL interface

DFS60 Incremental Encoder, blind hollow shaft

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14	Point 15	Point 16
D	F	S	6	0		-	B								

Type (cp. technical data page 11)	Mechanical interface	Electrical interface	Connection type	No. of lines
E	Blind hollow shaft 8 mm = B	4.5 ... 5.5 V, TTL/RS422 = A	Connector M23, 12-pin, radial = A	Always 5 characters in clear text
B	Blind hollow shaft 3/8" = C	10 ... 32 V, TTL/RS422 = C	Connector M12, 8-pin, radial = C	Selection depending on the type, see below.
A	Blind hollow shaft 10 mm = D	10 ... 32 V, HTL/push-pull = E	Cable 8-core, universal 1.5 m ¹⁾ = K	
	Blind hollow shaft 12 mm = E		Cable 8-core, universal 3 m ¹⁾ = L	
	Blind hollow shaft 1/2" = F		Cable 8-core, universal 5 m ¹⁾ = M	
	Blind hollow shaft 14 mm = G			
	Blind hollow shaft 15 mm = H			
	Blind hollow shaft 5/8" = J			

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.

Type E – Number of lines per revolution

00100	00314	00500	01000	02000
00200	00360	00512	01024	02048
00250		00720	01250	

Type B – Number of lines per revolution

00050	00300	00500	01000	02000	04000	07200	Others on request
00100	00314	00512	01024	02048	04096	08192	
00200	00360	00720	01250	02500	05000	10000	
00250				03600			

Type A – Number of lines per revolution

00100	00300	00500	01000	02000	04000	07200	16384
00200	00314	00512	01024	02048	04096	08192	32768
00250	00360	00720	01250	02500	05000	10000	65536
				03600			Others on request

Order information: DFS60 Incremental Encoder, type E, blind hollow shaft, diameter 10 mm,

Electrical interface 10 ... 32 V, HTL/push-pull, connector M12, 8-pin, radial, number of lines 1024

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14	Point 15	Point 16
D	F	S	6	0	E	-	B	D	E	C	0	1	0	2	4

Order information TTL or HTL programmable

DFS60 Incremental Encoder, blind hollow shaft

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14	Point 15	Point 16
D	F	S	6	0		-	B								

Type (cp. technical data page 11)	Mechanical interface	Electrical interface	Connection type	No. of lines
B	Blind hollow shaft 8 mm = B	4.5 ... 32 V, TTL/HTL programmable ¹⁾ = P	Connector M23, 12-pin, radial = A	Always 5 characters in clear text
A	Blind hollow shaft 3/8" = C	¹⁾ Preset level of output signal: TTL	Connector M12, 8-pin, radial = C	Selection depending on the type, see below.
	Blind hollow shaft 10 mm = D		Cable 8-core, universal 1.5 m ²⁾ = K	
	Blind hollow shaft 12 mm = E		Cable 8-core, universal 3 m ²⁾ = L	
	Blind hollow shaft 1 1/2" = F		Cable 8-core, universal 5 m ²⁾ = M	
	Blind hollow shaft 14 mm = G			
	Blind hollow shaft 15 mm = H			
	Blind hollow shaft 5/8" = J			

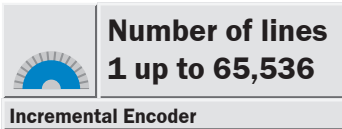
²⁾ The universal cable outlet is positioned in such a way, that it is possible to lay the cable in a radial or axial direction without kinking it.

Order information		Order information		Order information		Order information	
DFS60 Incremental Encoder Type B		DFS60 Incremental Encoder Type B		DFS60 Incremental Encoder Type B		DFS60 Incremental Encoder Type B	
Blind hollow shaft		Blind hollow shaft		Blind hollow shaft		Blind hollow shaft	
Connector M23		Connector M12		Cable 1,5 m		Cable 3 m	
Type	Part no.	Type	Part no.	Type	Part no.	Type	Part no.
DFS60B-BBPA10000	1036765	DFS60B-BBPC10000	1036773	DFS60B-BBPK10000	1036781	DFS60B-BBPL10000	1036789
DFS60B-BCPA10000	1036766	DFS60B-BCPC10000	1036774	DFS60B-BCPK10000	1036782	DFS60B-BCPL10000	1036790
DFS60B-BDPA10000	1036767	DFS60B-BDPC10000	1036775	DFS60B-BDPK10000	1036783	DFS60B-BDPL10000	1036791
DFS60B-BEPA10000	1036768	DFS60B-BEPC10000	1036776	DFS60B-BEPK10000	1036784	DFS60B-BEPL10000	1036792
DFS60B-BFPA10000	1036769	DFS60B-BFPC10000	1036777	DFS60B-BFPK10000	1036785	DFS60B-BFPL10000	1036793
DFS60B-BGPA10000	1036770	DFS60B-BGPC10000	1036778	DFS60B-BGPK10000	1036786	DFS60B-BGPL10000	1036794
DFS60B-BHPA10000	1036771	DFS60B-BHPC10000	1036779	DFS60B-BHPK10000	1036787	DFS60B-BHPL10000	1036795
DFS60B-BJPA10000	1036772	DFS60B-BJPC10000	1036780	DFS60B-BJPK10000	1036788	DFS60B-BJPL10000	1036796

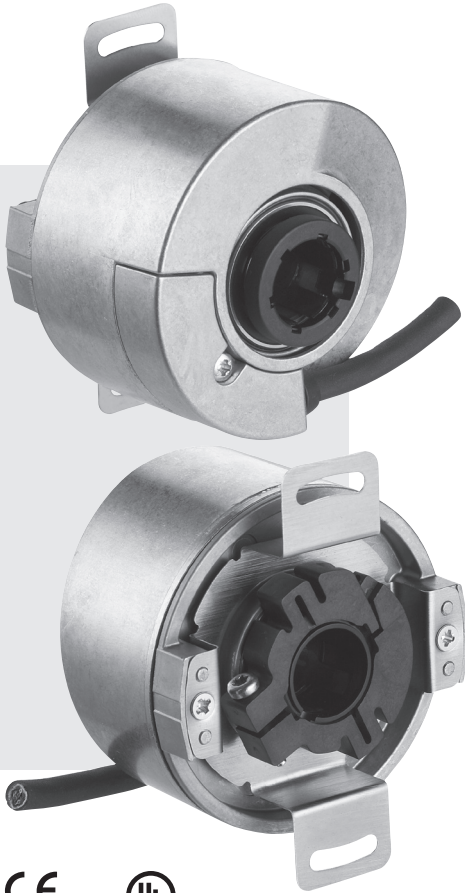
Order information		Order information		Order information		Order information	
DFS60 Incremental Encoder Type B		DFS60 Incremental Encoder Type A		DFS60 Incremental Encoder Type A		DFS60 Incremental Encoder Type A	
Blind hollow shaft		Blind hollow shaft		Blind hollow shaft		Blind hollow shaft	
Cable 5 m		Connector M23		Connector M12		Cable 1,5 m	
Type	Part no.	Type	Part no.	Type	Part no.	Type	Part no.
DFS60B-BBPM10000	1036797	DFS60A-BBPA65536	1036805	DFS60A-BBPC65536	1036813	DFS60A-BBPK65536	1036821
DFS60B-BCPM10000	1036798	DFS60A-BCPA65536	1036806	DFS60A-BCPC65536	1036814	DFS60A-BCPK65536	1036822
DFS60B-BDPM10000	1036799	DFS60A-BDPA65536	1036807	DFS60A-BDPC65536	1036815	DFS60A-BDPK65536	1036823
DFS60B-BEPM10000	1036800	DFS60A-BEPA65536	1036808	DFS60A-BEPC65536	1036816	DFS60A-BEPK65536	1036824
DFS60B-BFPM10000	1036801	DFS60A-BFPA65536	1036809	DFS60A-BFPC65536	1036817	DFS60A-BFPK65536	1036825
DFS60B-BGPM10000	1036802	DFS60A-BGPA65536	1036810	DFS60A-BGPC65536	1036818	DFS60A-BGPK65536	1036826
DFS60B-BHPM10000	1036803	DFS60A-BHPA65536	1036811	DFS60A-BHPC65536	1036819	DFS60A-BHPK65536	1036827
DFS60B-BJPM10000	1036804	DFS60A-BJPA65536	1036812	DFS60A-BJPC65536	1036820	DFS60A-BJPK65536	1036828

Order information	
DFS60 Incremental Encoder Type A	
Blind hollow shaft	
Cable 3 m	
Type	Part no.
DFS60A-BBPL65536	1036829
DFS60A-BCPL65536	1036830
DFS60A-BDPL65536	1036831
DFS60A-BEPL65536	1036832
DFS60A-BFPL65536	1036833
DFS60A-BGPL65536	1036834
DFS60A-BHPL65536	1036835
DFS60A-BJPL65536	1036836

Order information	
DFS60 Incremental Encoder Type A	
Blind hollow shaft	
Cable 5 m	
Type	Part no.
DFS60A-BBPM65536	1036837
DFS60A-BCPM65536	1036838
DFS60A-BDPM65536	1036839
DFS60A-BEPM65536	1036840
DFS60A-BFPM65536	1036841
DFS60A-BGPM65536	1036842
DFS60A-BHPM65536	1036843
DFS60A-BJPM65536	1036844



- Connector or cable outlet
- Protection class IP 65
- Electrical interfaces
TTL, HTL
- Number of lines, level of
output signal and zero pulse
width freely programmable

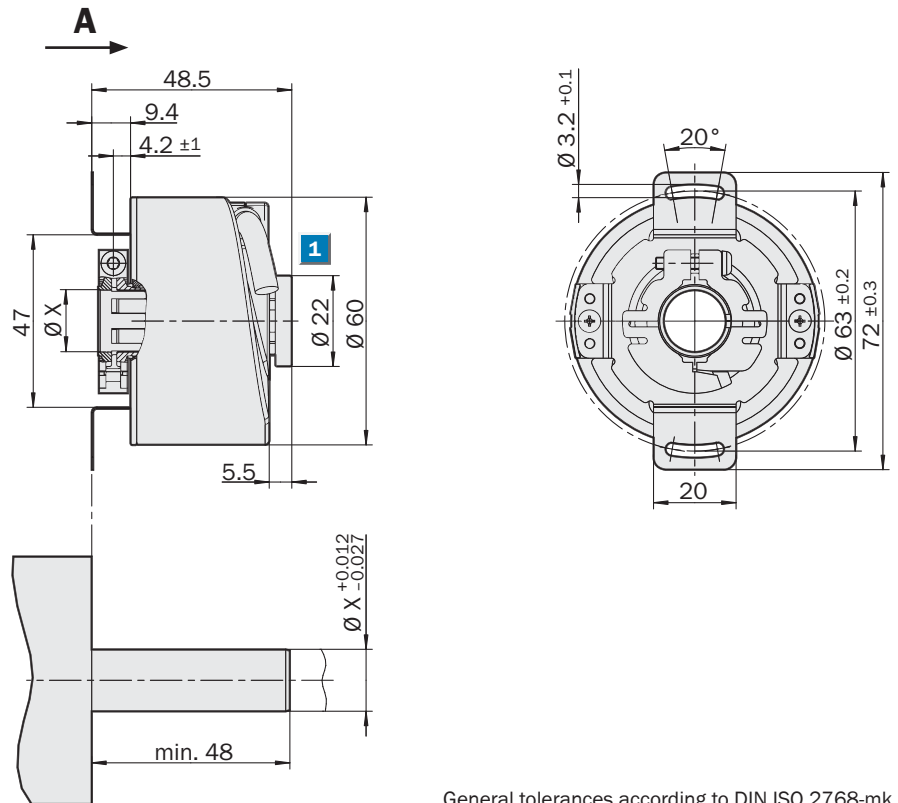


Accessories

- Connection systems (page 24/25)
- Mounting systems (page 26/27)
- Programming Tool (page 23)

Pin assignment (page 22)

Dimensional drawing through hollow shaft plastic, cable outlet

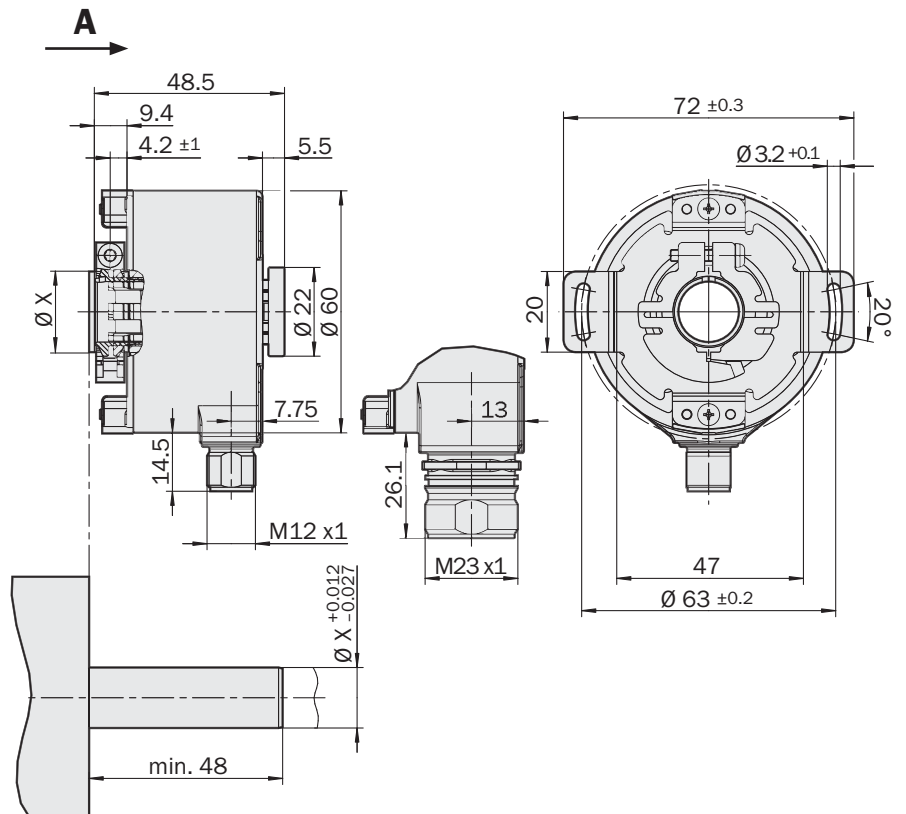


General tolerances according to DIN ISO 2768-mk

Customer-side

- 1** Cable-Ø = 5.6 ± 0.2 mm
Bending radius R = 30 mm

Dimensional drawing through hollow shaft plastic, connector outlet M12 and M23



General tolerances according to DIN ISO 2768-mk

Customer-side

Technical Data to DIN 32878		DFS60 through hollow shaft plastic		
Type		E	B	A
Shaft diameter	10, 12, 14, 15 mm a. 3/8", 1/2"			
Electrical interface	4.5 ... 5.5 V, TTL/RS422			
	10 ... 32 V, TTL/RS422			
	10 ... 32 V, HTL/push-pull			
	4.5 ... 32 V, TTL/HTL programmable			
Number of lines per revolution		100 ... 2048	1 ... 10000	1 ... 65536
Mass	0.2 kg			
Moment of inertia to the rotor	40 gcm ²			
Measuring step	90° electric/number of lines			
Reference signal	Number	1		
	Position	90° electr., gated with A and B		
Error limits		± 0.3°	± 0.05°	± 0.03°
Measuring step deviation	Number of lines 1 ... 99		± 0.08°	± 0.04°
	Number of lines 100 ... 10,000	± 0.2°	± 0.01°	± 0.008°
	Number of lines > 10,000			± 0.002°
Max. output frequency	TTL/RS422	300 kHz	600 kHz	820 kHz
	HTL/push-pull	300 kHz	600 kHz	820 kHz
	TTL/HTL programmable		600 kHz	820 kHz
Operating speed ¹⁾		9,000 rpm	12,000 rpm	12,000 rpm
Angular acceleration	5 x 10 ⁵ rad/s ²			
Max. Operating torque at 20 °C	0.6 Ncm			
Starting torque at 20 °C	0.8 Ncm			
Permissible movement of the drive element				
radial	Static/dynamic	± 0.3/± 0.1 mm	± 0.3/± 0.1 mm	± 0.3/± 0.05 mm
axial	Static/dynamic	± 0.5/± 0.2 mm	± 0.5/± 0.2 mm	± 0.5/± 0.01 mm
Bearing lifetime	3 x 10 ⁹ revolutions			
Working temperature range		0 ... + 70 °C	-20 ... + 100 °C	-20 ... + 100 °C
Storage temperature range (without package)		-40 ... + 100 °C	-40 ... + 100 °C	-40 ... + 100 °C
Permissible relative humidity ²⁾	90 %			
EMC ³⁾				
Resistance	To shocks ⁴⁾	50 g/6 ms	70 g/6 ms	60 g/6 ms
	To vibration ⁵⁾	20 g/10 ... 2000 Hz	30 g/10 ... 2000 Hz	20 g/10 ... 2000 Hz
Protection class to IEC 60529				
Shaft Side		IP 65	IP 65	IP 65
Housing side	Connector outlet ⁶⁾	IP 65	IP 65	IP 65
Housing side	Cable outlet	IP 65	IP 65	IP 65
Load current	4,5 ... 5,5 V, TTL/RS422	30 mA	30 mA	30 mA
	10 ... 32 V, TTL/RS422	30 mA	30 mA	30 mA
	10 ... 32 V, HTL/push pull	30 mA	30 mA	30 mA
	4,5 ... 32 V, TTL/HTL programmable		30 mA	30 mA
No load operating current	4,5 ... 5,5 V, TTL/RS422	40 mA	40 mA	40 mA
	10 ... 32 V, TTL/RS422	40 mA	40 mA	40 mA
	10 ... 32 V, HTL/push pull	40 mA	40 mA	40 mA
	4,5 ... 32 V, TTL/HTL programmable		60 mA	60 mA
Initialisation time after power on	4,5 ... 5,5 V, TTL/RS422	40 ms	40 ms	40 ms
	10 ... 32 V, TTL/RS422	40 ms	40 ms	40 ms
	10 ... 32 V, HTL/push pull	40 ms	40 ms	40 ms
	4,5 ... 32 V, TTL/HTL programmable		max. 30 ms	max. 30 ms

¹⁾ Self-warming 3.3k/1,000 min⁻¹
when applying, note working temperature range

²⁾ Condensation of the optical scanning not permitted

³⁾ To EN 61000-6-2 and EN 61000-6-4

⁴⁾ To EN 60068-2-27

⁵⁾ To EN 60068-2-6

⁶⁾ With mating connector fitted

Order information TTL and HTL interface

DFS60 Incremental Encoder, through hollow shaft plastic

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14	Point 15	Point 16
D	F	S	6	0		-	T								

Type (cp. technical data page 15)	Mechanical interface	Electrical interface	Connection type	No. of lines
	Through hollow shaft	4.5 ... 5.5 V, TTL/RS422 = A	Connector M23, 12-pin, radial = A	Always 5 characters in clear text
E	Plastic 3/8" = 3	10 ... 32 V, TTL/RS422 = C	Connector M12, 8-pin, radial = C	Selection depending on the type, see below.
B	Plastic 10 mm = 4	10 ... 32 V, HTL/push-pull = E	Cable 8-core, universal 1.5 m ¹⁾ = K	
A	Plastic 12 mm = 5		Cable 8-core, universal 3 m ¹⁾ = L	
	Plastic 1/2" = 6		Cable 8-core, universal 5 m ¹⁾ = M	
	Plastic 14 mm = 7			
	Plastic 15 mm = 8			

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.

Type E – Number of lines per revolution

00100	00314	00500	01000	02000
00200	00360	00512	01024	02048
00250		00720	01250	

Type B – Number of lines per revolution

00050	00300	00500	01000	02000	04000	07200	Others on request
00100	00314	00512	01024	02048	04096	08192	
00200	00360	00720	01250	02500	05000	10000	
00250				03600			

Type A – Number of lines per revolution

00100	00300	00500	01000	02000	04000	07200	16384
00200	00314	00512	01024	02048	04096	08192	32768
00250	00360	00720	01250	02500	05000	10000	65536
				03600			Others on request

Order information: DFS60 Incremental Encoder, type E, through hollow shaft plastic, diameter 10 mm,

Electrical interface 10 ... 32 V, HTL/push-pull, connector M12, 8-pin, radial, number of lines 1024

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14	Point 15	Point 16
D	F	S	6	0	E	-	T	4	E	C	0	1	0	2	4

Order information TTL or HTL programmable

DFS60 Incremental Encoder, through hollow shaft plastic

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14	Point 15	Point 16
D	F	S	6	0		-	T								

Type (cp. technical data page 15)	Mechanical interface	Electrical interface	Connection type	No. of lines
	Through hollow shaft	4.5 ... 32 V, TTL/HTL programmable ¹⁾ = P	Connector M23, 12-pin, radial = A	Always 5 characters in clear text
B	Plastic 3/8" = 3	¹⁾ Preset level of output signal: TTL	Connector M12, 8-pin, radial = C	Selection depending on the type, see below.
A	Plastic 10 mm = 4		Cable 8-core, universal 1.5 m ²⁾ = K	
	Plastic 12 mm = 5		Cable 8-core, universal 3 m ²⁾ = L	
	Plastic 1/2" = 6		Cable 8-core, universal 5 m ²⁾ = M	
	Plastic 14 mm = 7			
	Plastic 15 mm = 8			

²⁾ 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.

Order information	Order information	Order information	Order information
DFS60 Incremental Encoder Type B	DFS60 Incremental Encoder Type B	DFS60 Incremental Encoder Type B	DFS60 Incremental Encoder Type B
Through hollow shaft plastic	Through hollow shaft plastic	Through hollow shaft plastic	Through hollow shaft plastic
Connector M23	Connector M12	Cable 1,5 m	Cable 3 m
Type	Type	Type	Type
DFS60B-T3PA10000	DFS60B-T3PC10000	DFS60B-T3PK10000	DFS60B-T3PL10000
1036845	1036851	1036857	1036863
DFS60B-T4PA10000	DFS60B-T4PC10000	DFS60B-T4PK10000	DFS60B-T4PL10000
1036846	1036852	1036858	1036864
DFS60B-T5PA10000	DFS60B-T5PC10000	DFS60B-T5PK10000	DFS60B-T5PL10000
1036847	1036853	1036859	1036865
DFS60B-T6PA10000	DFS60B-T6PC10000	DFS60B-T6PK10000	DFS60B-T6PL10000
1036848	1036854	1036860	1036866
DFS60B-T7PA10000	DFS60B-T7PC10000	DFS60B-T7PK10000	DFS60B-T7PL10000
1036849	1036855	1036861	1036867
DFS60B-T8PA10000	DFS60B-T8PC10000	DFS60B-T8PK10000	DFS60B-T8PL10000
1036850	1036856	1036862	1036868

Order information	Order information	Order information	Order information
DFS60 Incremental Encoder Type B	DFS60 Incremental Encoder Type A	DFS60 Incremental Encoder Type A	DFS60 Incremental Encoder Type A
Through hollow shaft plastic	Through hollow shaft plastic	Through hollow shaft plastic	Through hollow shaft plastic
Cable 5 m	Connector M23	Connector M12	Cable 1,5 m
Type	Type	Type	Type
DFS60B-T3PM10000	DFS60A-T3PA65536	DFS60A-T3PC65536	DFS60A-T3PK65536
1036869	1036875	1036881	1036887
DFS60B-T4PM10000	DFS60A-T4PA65536	DFS60A-T4PC65536	DFS60A-T4PK65536
1036870	1036876	1036882	1036888
DFS60B-T5PM10000	DFS60A-T5PA65536	DFS60A-T5PC65536	DFS60A-T5PK65536
1036871	1036877	1036883	1036889
DFS60B-T6PM10000	DFS60A-T6PA65536	DFS60A-T6PC65536	DFS60A-T6PK65536
1036872	1036878	1036884	1036890
DFS60B-T7PM10000	DFS60A-T7PA65536	DFS60A-T7PC65536	DFS60A-T7PK65536
1036873	1036879	1036885	1036891
DFS60B-T8PM10000	DFS60A-T8PA65536	DFS60A-T8PC65536	DFS60A-T8PK65536
1036874	1036880	1036886	1036892

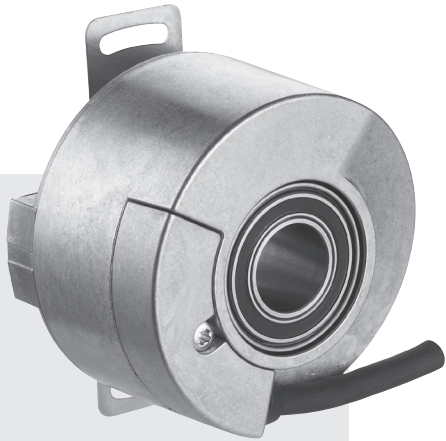
Order information	Order information
DFS60 Incremental Encoder Type A	DFS60 Incremental Encoder Type A
Through hollow shaft plastic	Through hollow shaft plastic
Cable 3 m	Cable 5 m
Type	Type
DFS60A-T3PL65536	DFS60A-T3PM65536
1036893	1036899
DFS60A-T4PL65536	DFS60A-T4PM65536
1036894	1036900
DFS60A-T5PL65536	DFS60A-T5PM65536
1036895	1036901
DFS60A-T6PL65536	DFS60A-T6PM65536
1036896	1036902
DFS60A-T7PL65536	DFS60A-T7PM65536
1036897	1036903
DFS60A-T8PL65536	DFS60A-T8PM65536
1036898	1036904



Number of lines
1 up to 65,536

Incremental Encoder

- Connector or cable outlet
- Protection class IP 65
- Electrical interfaces
TTL, HTL
- Number of lines, level of
output signal and zero pulse
width freely programmable



Accessories

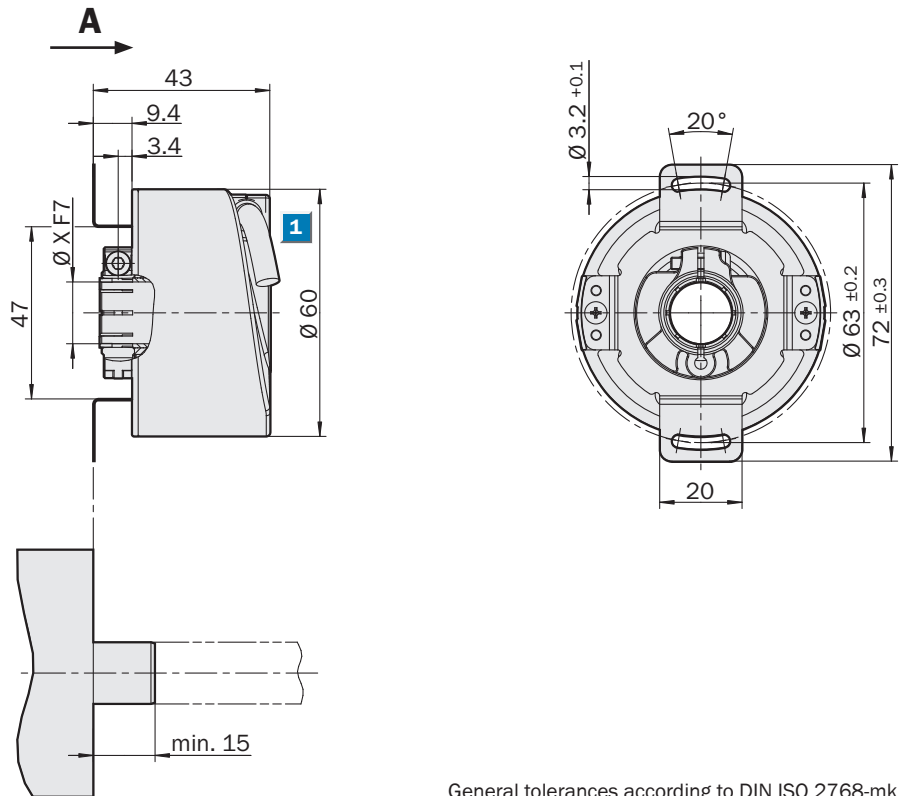
Connection systems (page 24/25)

Mounting systems (page 26/27)

Programming Tool (page 23)

Pin assignment (page 22)

Dimensional drawing through hollow shaft metal, cable outlet

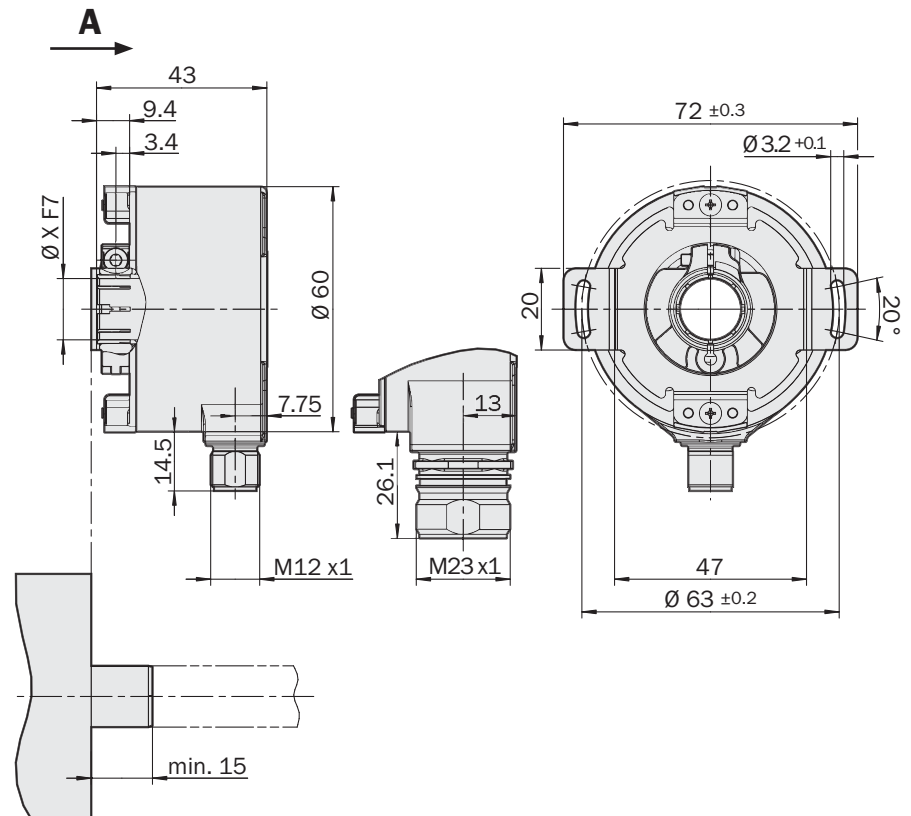


General tolerances according to DIN ISO 2768-mk

Customer-side

- 1** Cable-Ø = 5.6 ± 0.2 mm
Bending radius R = 30 mm

Dimensional drawing through hollow shaft metal, connector outlet M12 and M23



General tolerances according to DIN ISO 2768-mk

Customer-side

Technical Data to DIN 32878		DFS60 through hollow shaft metal		
Type		E	B	A
Shaft diameter	8, 10, 12, 14, 15 mm a. 3/8", 1/2", 5/8"			
Electrical interface	4.5 ... 5.5 V, TTL/RS422			
	10 ... 32 V, TTL/RS422			
	10 ... 32 V, HTL/push-pull			
	4.5 ... 32 V, TTL/HTL programmable			
Number of lines per revolution		100 ... 2048	1 ... 10000	1 ... 65536
Mass	0.2 kg			
Moment of inertia to the rotor	40 gcm ²			
Measuring step	90° electric/number of lines			
Reference signal	Number	1		
	Position	90° electr., gated with A and B		
Error limits		± 0.3°	± 0.05°	± 0.03°
Measuring step deviation	Number of lines 1 ... 99		± 0.08°	± 0.04°
	Number of lines 100 ... 10,000	± 0.2°	± 0.01°	± 0.008°
	Number of lines > 10,000			± 0.002°
Max. output frequency	TTL/RS422	300 kHz	600 kHz	820 kHz
	HTL/push-pull	300 kHz	600 kHz	820 kHz
	TTL/HTL programmable		600 kHz	820 kHz
Operating speed ¹⁾		9,000 rpm	9,000 rpm	9,000 rpm
Angular acceleration	5 x 10 ⁵ rad/s ²			
Max. Operating torque at 20 °C	0.6 Ncm			
Starting torque at 20 °C	0.8 Ncm			
Permissible movement of the drive element				
radial	Static/dynamic	± 0.3/± 0.1 mm	± 0.3/± 0.1 mm	± 0.3/± 0.05 mm
axial	Static/dynamic	± 0.5/± 0.2 mm	± 0.5/± 0.2 mm	± 0.5/± 0.01 mm
Bearing lifetime	3 x 10 ⁹ revolutions			
Working temperature range		0 ... + 70 °C	-20 ... + 100 °C	-20 ... + 100 °C
Storage temperature range (without package)		-40 ... + 100 °C	-40 ... + 100 °C	-40 ... + 100 °C
Permissible relative humidity ²⁾	90 %			
EMC ³⁾				
Resistance	To shocks ⁴⁾	50 g/6 ms	70 g/6 ms	60 g/6 ms
	To vibration ⁵⁾	20 g/10 ... 2000 Hz	30 g/10 ... 2000 Hz	20 g/10 ... 2000 Hz
Protection class to IEC 60529				
Shaft Side		IP 65	IP 65	IP 65
Housing side	Connector outlet ⁶⁾	IP 65	IP 65	IP 65
Housing side	Cable outlet	IP 65	IP 65	IP 65
Load current	4,5 ... 5,5 V, TTL/RS422	30 mA	30 mA	30 mA
	10 ... 32 V, TTL/RS422	30 mA	30 mA	30 mA
	10 ... 32 V, HTL/push pull	30 mA	30 mA	30 mA
	4,5 ... 32 V, TTL/HTL programmable		30 mA	30 mA
No load operating current	4,5 ... 5,5 V, TTL/RS422	40 mA	40 mA	40 mA
	10 ... 32 V, TTL/RS422	40 mA	40 mA	40 mA
	10 ... 32 V, HTL/push pull	40 mA	40 mA	40 mA
	4,5 ... 32 V, TTL/HTL programmable		60 mA	60 mA
Initialisation time after power on	4,5 ... 5,5 V, TTL/RS422	40 ms	40 ms	40 ms
	10 ... 32 V, TTL/RS422	40 ms	40 ms	40 ms
	10 ... 32 V, HTL/push pull	40 ms	40 ms	40 ms
	4,5 ... 32 V, TTL/HTL programmable		max. 30 ms	max. 30 ms

¹⁾ Self-warming 3.3k/1,000 min⁻¹
when applying, note working temperature range

²⁾ Condensation of the optical scanning not permitted

³⁾ To EN 61000-6-2 and EN 61000-6-4

⁴⁾ To EN 60068-2-27

⁵⁾ To EN 60068-2-6

⁶⁾ With mating connector fitted

Order information TTL and HTL interface

DFS60 Incremental Encoder, through hollow shaft metal

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14	Point 15	Point 16
D	F	S	6	0		-	T								

Type (cp. technical data page 19)	Mechanical interface	Electrical interface	Connection type	No. of lines
	Through hollow shaft	4.5 ... 5.5 V, TTL/RS422 = A	Connector M23, 12-pin, radial = A	Always 5 characters in clear text
E	Metal 8 mm = B	10 ... 32 V, TTL/RS422 = C	Connector M12, 8-pin, radial = C	Selection depending on the type, see below.
B	Metal 3/8" = C	10 ... 32 V, HTL/push-pull = E	Cable 8-core, universal 1.5 m ¹⁾ = K	
A	Metal 10 mm = D		Cable 8-core, universal 3 m ¹⁾ = L	
	Metal 12 mm = E		Cable 8-core, universal 5 m ¹⁾ = M	
	Metal 1/2" = F			
	Metal 14 mm = G			
	Metal 15 mm = H			
	Metal 5/8" = J			

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.

Type E – Number of lines per revolution

00100	00314	00500	01000	02000
00200	00360	00512	01024	02048
00250		00720	01250	

Type B – Number of lines per revolution

00050	00300	00500	01000	02000	04000	07200	Others on request
00100	00314	00512	01024	02048	04096	08192	
00200	00360	00720	01250	02500	05000	10000	
00250				03600			

Type A – Number of lines per revolution

00100	00300	00500	01000	02000	04000	07200	16384
00200	00314	00512	01024	02048	04096	08192	32768
00250	00360	00720	01250	02500	05000	10000	65536
				03600			Others on request

Order information: DFS60 Incremental Encoder, type E, through hollow shaft metal, diameter 10 mm,

Electrical interface 10 ... 32 V, HTL/push-pull, connector M12, 8-pin, radial, number of lines 1024

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14	Point 15	Point 16
D	F	S	6	0	E	-	T	D	E	C	0	1	0	2	4

Order information TTL or HTL programmable

DFS60 Incremental Encoder, through hollow shaft metal

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14	Point 15	Point 16
D	F	S	6	0		-	T								

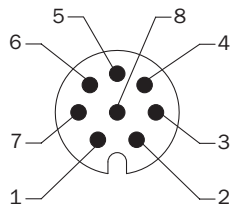
Type (cp. technical data page 19)	Mechanical interface	Electrical interface	Connection type	No. of lines
B	Through hollow shaft	4.5 ... 32 V, TTL/HTL programmable ¹⁾ = P	Connector M23, 12-pin, radial = A	Always 5 characters in clear text
A	Metal 8 mm = B	¹⁾ Preset level of output signal: TTL	Connector M12, 8-pin, radial = C	Selection depending on the type, see below.
	Metal 3/8" = C		Cable 8-core, universal 1.5 m ²⁾ = K	
	Metal 10 mm = D		Cable 8-core, universal 3 m ²⁾ = L	
	Metal 12 mm = E		Cable 8-core, universal 5 m ²⁾ = M	
	Metal 1/2" = F			
	Metal 14 mm = G			
	Metal 15 mm = H			
	Metal 5/8" = J			

²⁾ 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.

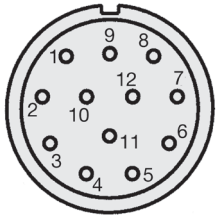
Order information	Order information	Order information	Order information
DFS60 Incremental Encoder Type B	DFS60 Incremental Encoder Type B	DFS60 Incremental Encoder Type B	DFS60 Incremental Encoder Type B
Through hollow shaft metal	Through hollow shaft metal	Through hollow shaft metal	Through hollow shaft metal
Connector M23	Connector M12	Cable 1,5 m	Cable 3 m
Type	Type	Type	Type
Part no.	Part no.	Part no.	Part no.
DFS60B-TBPA10000	DFS60B-TBPC10000	DFS60B-TBPK10000	DFS60B-TBPL10000
1036905	1036913	1036921	1036929
DFS60B-TCPA10000	DFS60B-TCPC10000	DFS60B-TCPK10000	DFS60B-TCPL10000
1036906	1036914	1036922	1036930
DFS60B-TDPA10000	DFS60B-TDPC10000	DFS60B-TDPK10000	DFS60B-TDPL10000
1036907	1036915	1036923	1036931
DFS60B-TEPA10000	DFS60B-TEPC10000	DFS60B-TEPK10000	DFS60B-TEPL10000
1036908	1036916	1036924	1036932
DFS60B-TFPA10000	DFS60B-TFPC10000	DFS60B-TFPK10000	DFS60B-TFPL10000
1036909	1036917	1036925	1036933
DFS60B-TGPA10000	DFS60B-TGPC10000	DFS60B-TGPK10000	DFS60B-TGPL10000
1036910	1036918	1036926	1036934
DFS60B-THPA10000	DFS60B-THPC10000	DFS60B-THPK10000	DFS60B-THPL10000
1036911	1036919	1036927	1036935
DFS60B-TJPA10000	DFS60B-TJPC10000	DFS60B-TJPK10000	DFS60B-TJPL10000
1036912	1036920	1036928	1036936

Order information	Order information	Order information	Order information
DFS60 Incremental Encoder Type B	DFS60 Incremental Encoder Type A	DFS60 Incremental Encoder Type A	DFS60 Incremental Encoder Type A
Through hollow shaft metal	Through hollow shaft metal	Through hollow shaft metal	Through hollow shaft metal
Cable 5 m	Connector M23	Connector M12	Cable 1,5 m
Type	Type	Type	Type
Part no.	Part no.	Part no.	Part no.
DFS60B-TBPM10000	DFS60A-TBPA65536	DFS60A-TBPC65536	DFS60A-TBPK65536
1036937	1036945	1036953	1036961
DFS60B-TCPM10000	DFS60A-TCPA65536	DFS60A-TCPC65536	DFS60A-TCPK65536
1036938	1036946	1036954	1036962
DFS60B-TDPM10000	DFS60A-TDPA65536	DFS60A-TDPC65536	DFS60A-TDPK65536
1036939	1036947	1036955	1036963
DFS60B-TEPM10000	DFS60A-TEPA65536	DFS60A-TEPC65536	DFS60A-TEPK65536
1036940	1036948	1036956	1036964
DFS60B-TFPM10000	DFS60A-TFPA65536	DFS60A-TFPC65536	DFS60A-TFPK65536
1036941	1036949	1036957	1036965
DFS60B-TGPM10000	DFS60A-TGPA65536	DFS60A-TGPC65536	DFS60A-TGPK65536
1036942	1036950	1036958	1036966
DFS60B-THPM10000	DFS60A-THPA65536	DFS60A-THPC65536	DFS60A-THPK65536
1036943	1036951	1036959	1036967
DFS60B-TJPM10000	DFS60A-TJPA65536	DFS60A-TJPC65536	DFS60A-TJPK65536
1036944	1036952	1036960	1036968

Order information	Order information
DFS60 Incremental Encoder Type A	DFS60 Incremental Encoder Type A
Through hollow shaft metal	Through hollow shaft metal
Cable 3 m	Cable 5 m
Type	Type
Part no.	Part no.
DFS60A-TBPL65536	DFS60A-TBPM65536
1036969	1036977
DFS60A-TCPL65536	DFS60A-TCPM65536
1036970	1036978
DFS60A-TDPL65536	DFS60A-TDPM65536
1036971	1036979
DFS60A-TEPL65536	DFS60A-TEPM65536
1036972	1036980
DFS60A-TFPL65536	DFS60A-TFPM65536
1036973	1036981
DFS60A-TGPL65536	DFS60A-TGPM65536
1036974	1036982
DFS60A-THPL65536	DFS60A-THPM65536
1036975	1036983
DFS60A-TJPL65536	DFS60A-TJPM65536
1036976	1036984



View to the connector M12 fitted to the encoder body

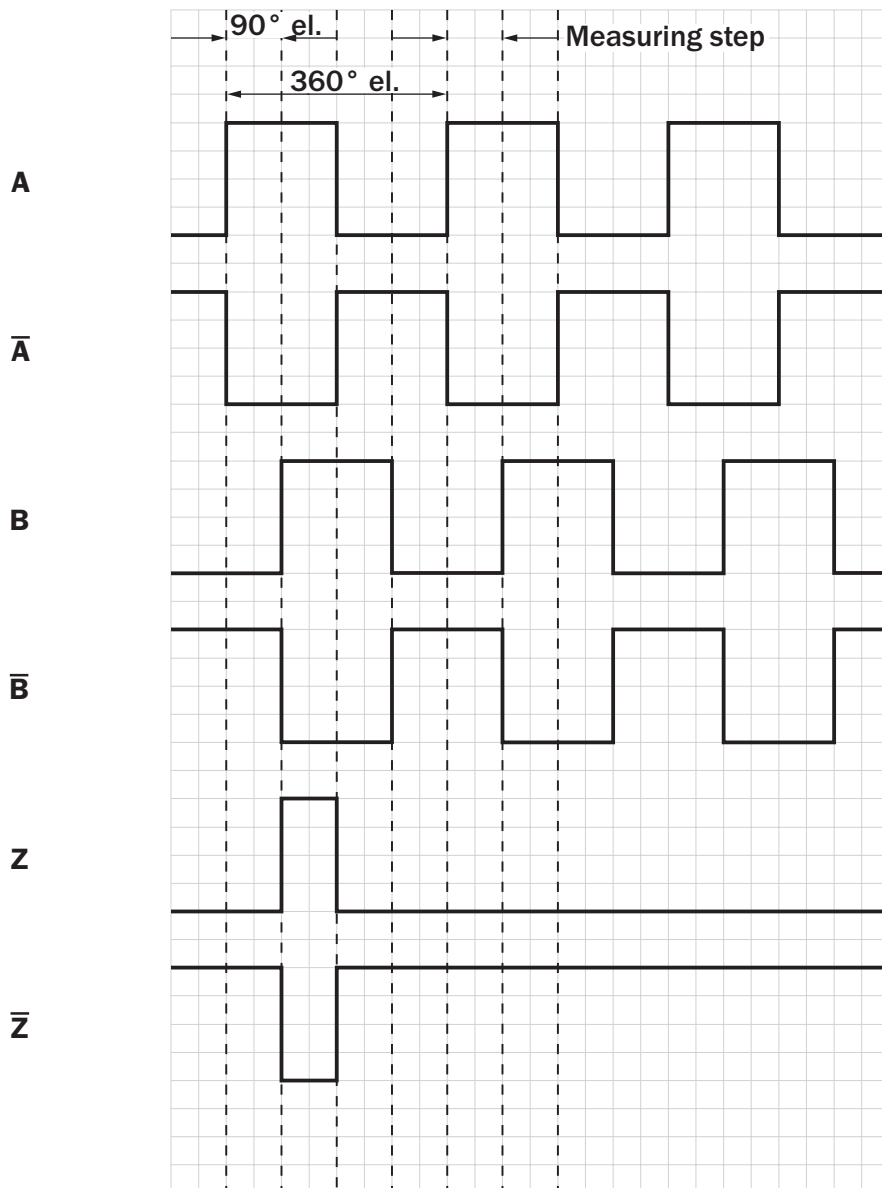


View to the connector M23 fitted to the encoder body

Pin and wire allocation, cable 8-core

PIN, 8-pin	PIN, 12-pin	Colour of wires	Signal	Explanation
M12 Connector	M23 Connector		TTL, HTL	
1	6	Brown	$\bar{A}$	Signal line
2	5	White	A	Signal line
3	1	Black	$\bar{B}$	Signal line
4	8	Pink	B	Signal line
5	4	Yellow	$\bar{Z}$	Signal line
6	3	Lilac	Z	Signal line
7	10	Blue	GND	Ground connection of the encoder
8	12	Rot	+Us	Supply voltage (Potential free to housing)
–	9	–	N. C.	Not connected
–	2	–	N. C.	Not connected
–	11	–	N. C.	Not connected
–	7	–	N. C.	Not connected
Screen	Screen	Screen	Screen	Screen on the encoder side connected to the housing. On the control side connected to earth.

Incremental pulse diagram



CW with view on the encoder shaft in direction "A", see dimensional drawing.

Programming Tool

Programming Tool for DFS60

Type	Part no.
PGT-08-S	1036616



For programming SICK-STEGMANN incremental encoder with M12 or M23 connectors the following adapter cables are appropriate

Adapter cable PGT-08-S incremental with Cable connector SUB-D 9-pin male and cable connector M12 8-pin female, ready-made with cable 8-core, 4 x 2 x 0,08 mm², with screening

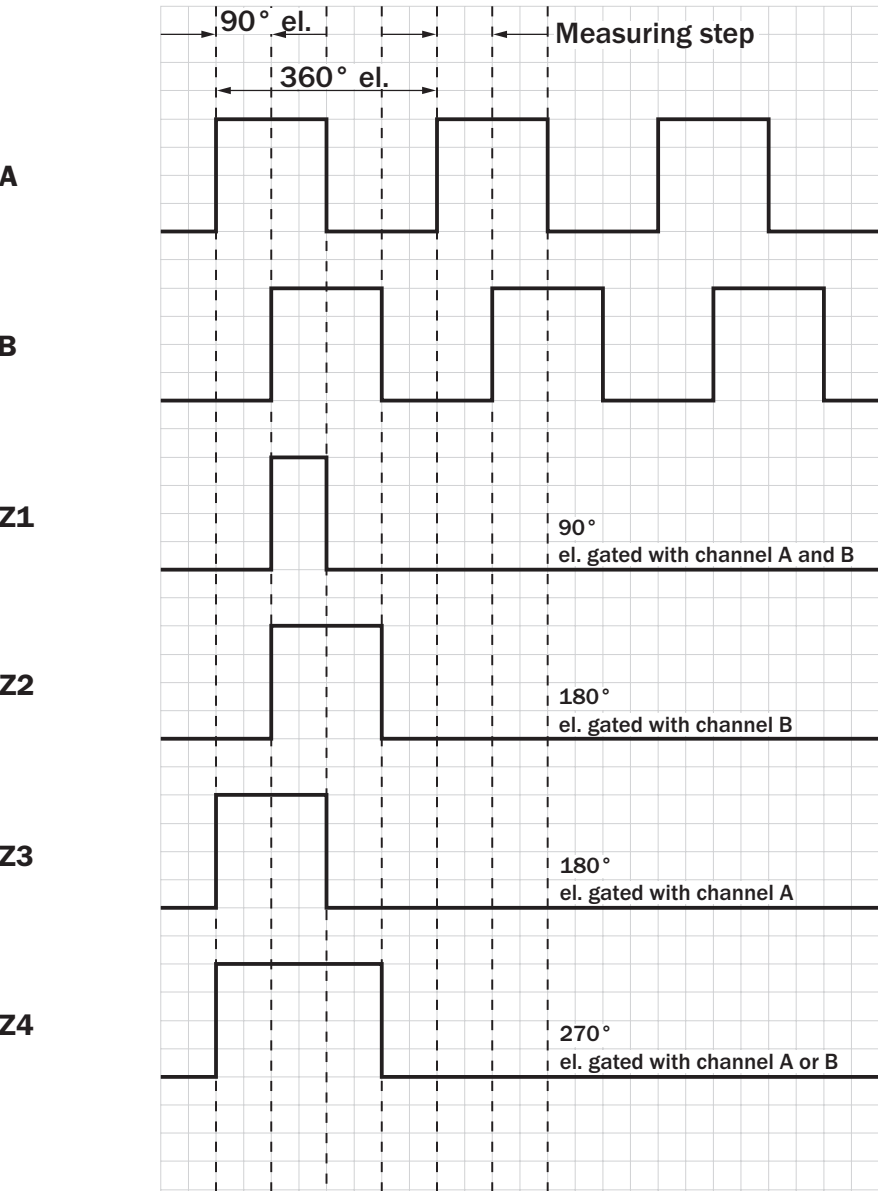
Type	Part no.
DSL-2D08-G0M5AC3	2046579

Adapter cable PGT-08-S incremental with Cable connector SUB-D 9-pin male and cable connector M23 12-pin female, ready-made with cable 8-core, 4 x 2 x 0,08 mm², with screening

Type	Part no.
DSL-3D08-G0M5AC3	2046580

Caution:
Attempting to programme an DFS60 incremental encoder with the adapter cables intended for use with the AFS/AFM60 absolute encoder will cause damage to the incremental encoder. Please ensure the correct adapter cable is used!

Zero pulse width 90°, 180° or 270° programmable



CW with view on the encoder shaft in direction "A"

Dimensional drawings and ordering information

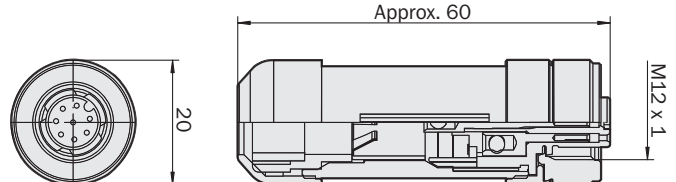
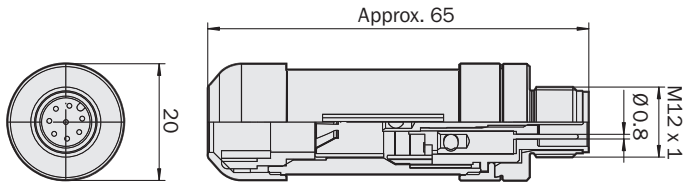
Round screw system M12

Cable connector M12 male, 8-pin, straight, screened, for field assembly (adapter side)

Type	Part no.	Contacts/cable diameter
STE-1208-GA	6028370	8 / 4 ... 8 mm

Cable connector M12 female, 8-pin, straight, screened, for field assembly (adapter side)

Type	Part no.	Contacts/cable diameter
DOS-1208-GA	6028369	8 / 4 ... 8 mm



Cables

Cable 8-core, per metre, 4 x 2 x 0.15 mm², with screening, cable diameter 5.6 mm

Type	Part no.	Wires
LTG-2308-MWENC	6027529	8

Cable 11-core, per metre, 4 x 2 x 0.25 + 2 x 0.5 + 1 x 0.14 mm², with screening, cable diameter 7.5 mm

Type	Part no.	Wires
LTG-2411-MW	6027530	11

Cable 12-core, per metre, 4 x 2 x 0.25 + 2 x 0.5 + 2 x 0.14 mm², with screening, capable of being dragged, cable diameter 7.8 mm

Type	Part no.	Wires
LTG-2512-MW	6027531	12

Cable 12-core, per metre, 4 x 2 x 0.25 + 2 x 0.5 + 2 x 0.14 mm², with screening, capable of being dragged, cable diameter 7.8 mm

Type	Part no.	Wires	Explanation
LTG-2612-MW	6028516	12	UV and salt water resistant

Cable 8-core inc. sealing, 4 x 2 x 0.15 mm², with screening, cable diameter 5.6 mm

Type	Part no.	Cable length
DOL-0J08-G0M5AA3	2046873	0.5 m
DOL-0J08-G1M5AA3	2046874	1.5 m
DOL-0J08-G03MAA3	2046875	3.0 m
DOL-0J08-G05MAA3	2046876	5.0 m
DOL-0J08-G10MAA3	2046877	10.0 m

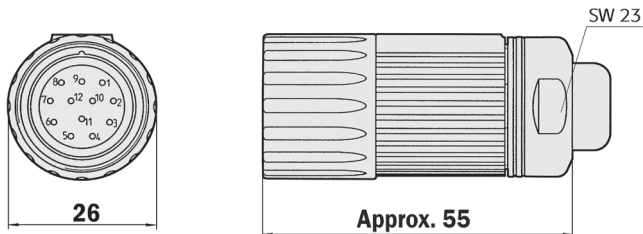


Dimensional drawings and ordering information

Screw-in system M23, 12-pin

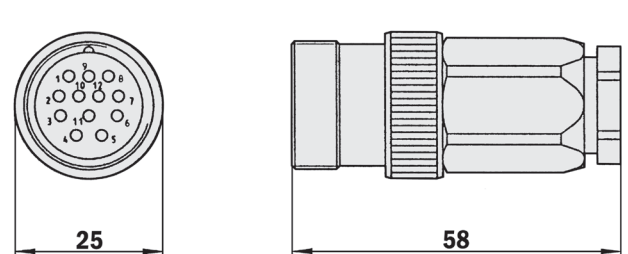
Cable connector M23 female, 12-pin, straight, screened

Type	Part no.	Contacts
DOS-2312-G	6027538	12



Cable connector M23 male, 12-pin, straight, screened

Type	Part no.	Contacts
STE-2312-G	6027537	12



General tolerances according to DIN ISO 2768-mk

General tolerances according to DIN ISO 2768-mk

Cable connector M23 female, 12-pin, straight, cable 11-core, $4 \times 2 \times 0.25 + 2 \times 0.5 + 1 \times 0.14 \text{ mm}^2$ with screening, cable diameter 7.8 mm

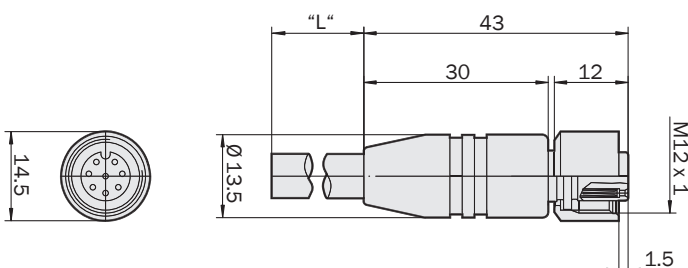
Type	Part no.	Contacts	Cable length
DOL-2312-G02MLA3	2030682	12	2.0 m
DOL-2312-G07MLA3	2030685	12	7.0 m
DOL-2312-G10MLA3	2030688	12	10.0 m
DOL-2312-G15MLA3	2030692	12	15.0 m
DOL-2312-G20MLA3	2030695	12	20.0 m
DOL-2312-G25MLA3	2030699	12	25.0 m
DOL-2312-G30MLA3	2030702	12	30.0 m

Cable connector M23 female, 12-pin, straight, cable 11-core, $4 \times 2 \times 0.25 + 2 \times 0.5 + 2 \times 0.14 \text{ mm}^2$ with screening, capable of being dragged, cable diameter 7.8 mm

Type	Part no.	Contacts	Cable length
DOL-2312-G1M5MA3	2029212	12	1.5 m
DOL-2312-G03MMA3	2029213	12	3.0 m
DOL-2312-G05MMA3	2029214	12	5.0 m
DOL-2312-G10MMA3	2029215	12	10.0 m
DOL-2312-G20MMA3	2029216	12	20.0 m
DOL-2312-G30MMA3	2029217	12	30.0 m

Female connector M12, 8-pin, straight, pre-wired with cable 8-wire, $4 \times 2 \times 0.25 \text{ mm}^2$, screened, flexible (adapter side)

Type	Part no.	Contacts	Cable length
DOL-1208-G02MAC1	6032866	8	2.0 m
DOL-1208-G05MAC1	6032867	8	5.0 m
DOL-1208-G10MAC1	6032868	8	10.0 m
DOL-1208-G20MAC1	6032869	8	20.0 m



Dimensional drawings and ordering information

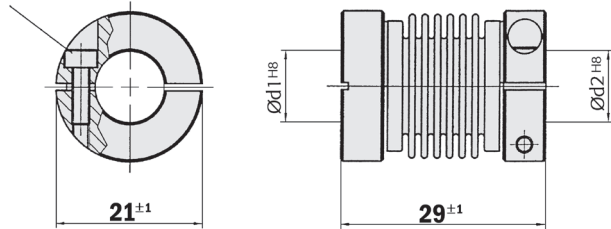
Couplings

Bellows coupling, max. shaft offset radial ± 0.3 mm, axial 0.4 mm, angle ± 4 degrees, torsion spring stiffness 120 Nm/rad,

bellows of stainless steel, hubs of aluminium

Type	Part no.	Shaft diameter
KUP-0606-B	5312981	6 mm ... 6 mm
KUP-0610-B	5312982	6 mm ... 10 mm
KUP-1010-B	5312983	10 mm ... 10 mm
KUP-1012-B	5312984	10 mm ... 12 mm

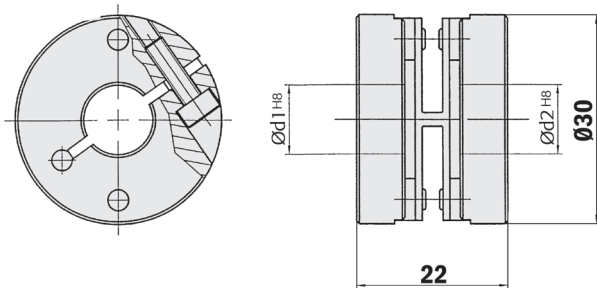
Cheese-head screw
M2.5x8 DIN912 A2



Spring-disc coupling, max. shaft offset radial ± 0.3 mm, axial 0.4 mm, angle ± 2.5 degrees, torsion spring stiffness 50 Nm/rad,

flange of aluminium, spring-discs of glass-fibre-reinforced plastic

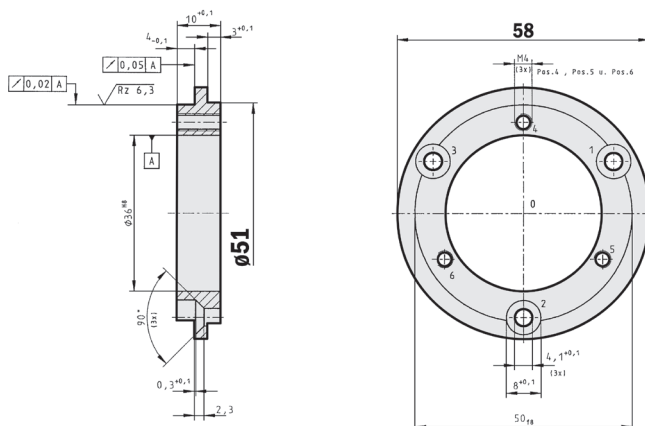
Type	Part no.	Shaft diameter
KUP-0610-F	5312985	6 mm ... 10 mm
KUP-1010-F	5312986	10 mm ... 10 mm



Mechanical Adapters

Adapter flange of aluminium for face mount flange, spigot 36 mm

Type	Part no.	Adaption
BEF-FA-036-050	2029160	To 50 mm servo flange

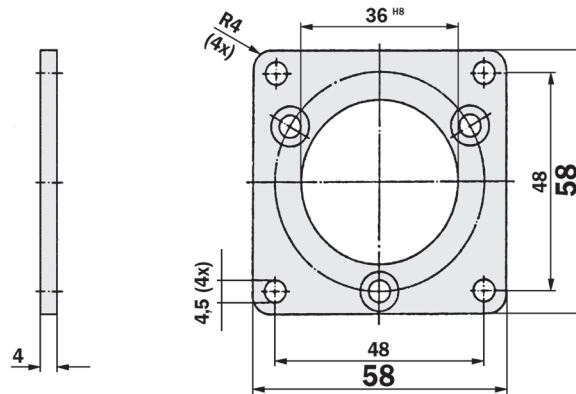


Dimensional drawings and ordering information

Mechanical Adapters

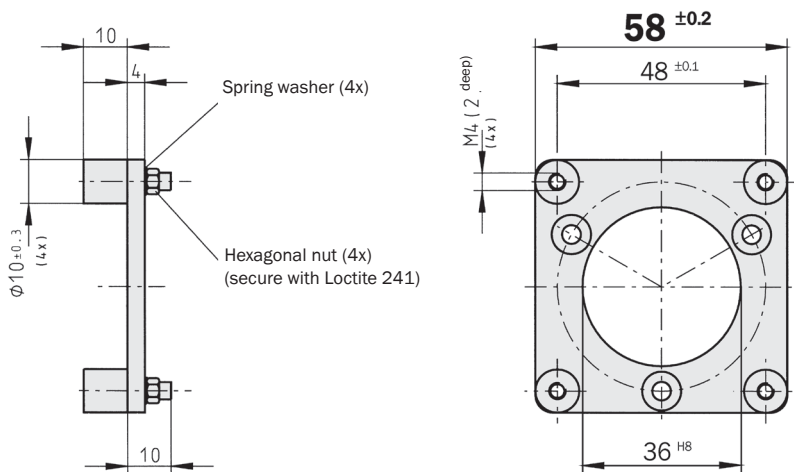
Adapter flange of aluminium for face mount flange, spigot 36 mm

Type	Part no.	Adaption
BEF-FA-036-060REC	2029162	To 60 mm square mounting plate



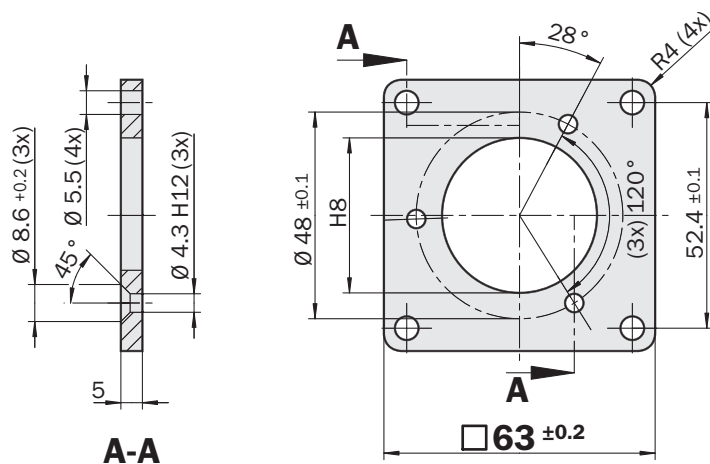
Adapter flange of aluminium for face mount flange, spigot 36 mm

Type	Part no.	Adaption
BEF-FA-036-060RSA	2029163	To 60 mm square mounting plate with shock absorbers



Adapter flange of aluminium for face mount flange, spigot 36 mm

Type	Part no.	Adaption
BEF-FA-036-063REC	2034225	To 63 mm square mounting plate

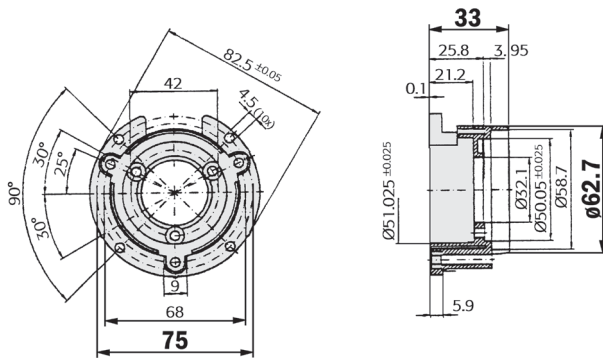


Dimensional drawings and ordering information

Mechanical Adapters

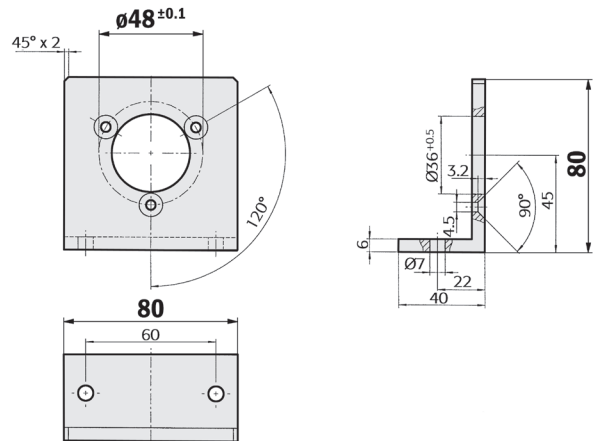
Mounting bell incl. fixing set for encoder with servo flange

Type	Part no.	Flange spigot
BEF-MG-50	5312987	Diameter 50 mm



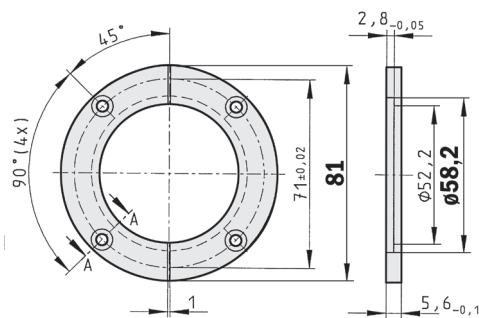
Mounting angle incl. fixing set for encoder with face mount flange

Type	Part no.	Flange spigot
BEF-WF-36	2029164	Diameter 36 mm



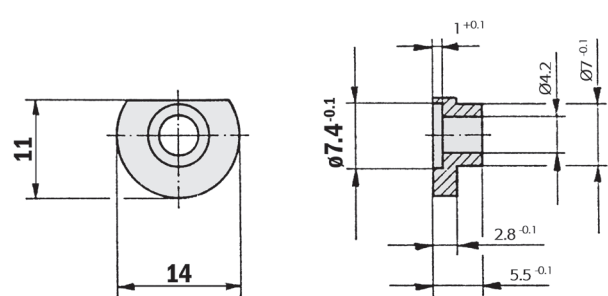
Servo clamps half ring, Set (comprises 2 pieces) for servo flanges with spigot diameter 50 mm

Type	Part no.
BEF-WG-SF050	2029165



Servo clamps small, Set (comprises 3 pieces) for servo flanges

Type	Part no.
BEF-WK-SF	2029166

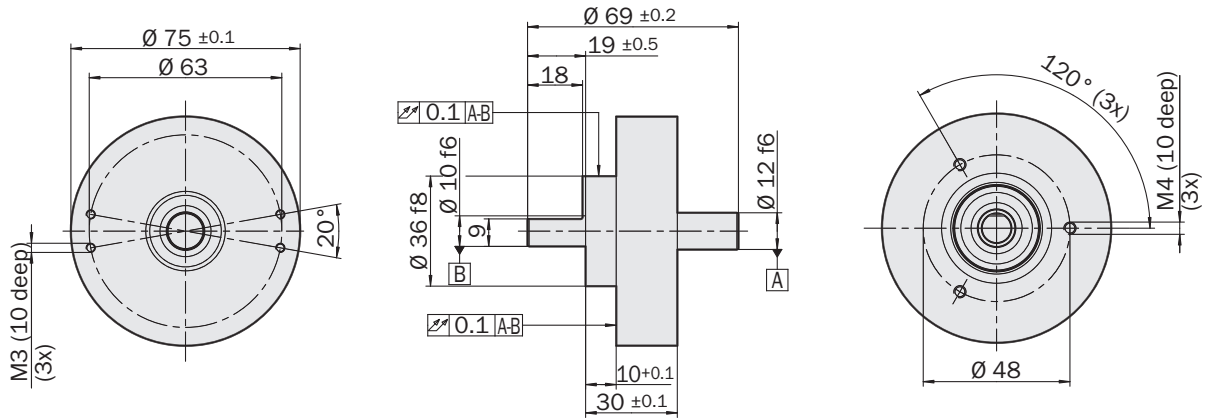


Dimensional drawings and ordering information

Mechanical Adapters

Heavy duty bearing block for very large radial and axial shaft loads
permissible shaft loading radial and axial 100 N

Type	Part no.
BEF-FA-B12-010	2042728

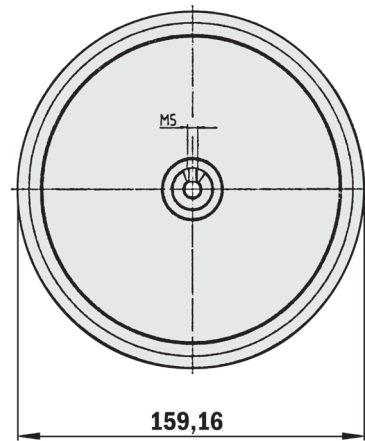
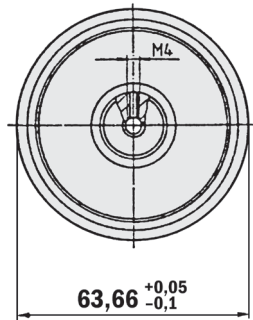


Measuring wheel for encoder shafts with diameter 10 mm, type material plastic (Hytel), wheel material plastic with aluminium hub

Type	Part no.	Circumference	Surface
BEF-MR-010020	5312988	0.2 m	Smooth
BEF-MR-010020G	5318678	0.2 m	Knurled

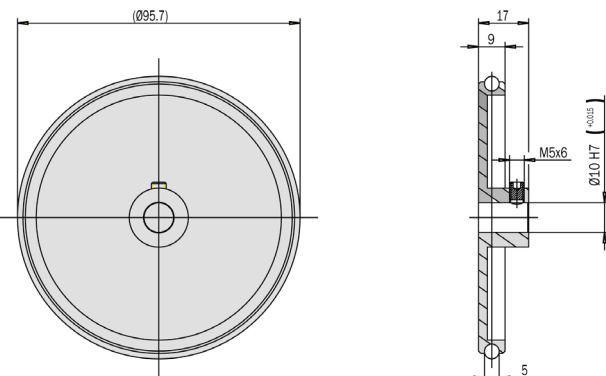
Measuring wheel for encoder shafts with diameter 10 mm, type material plastic (Hytel), wheel material plastic with aluminium hub

Type	Part no.	Circumference	Surface
BEF-MR-010050	5312989	0.5 m	Smooth



Measuring wheel for encoder shafts with diameter 10 mm

Type	Part no.	Circumference	Surface
BEF-MR-010030	2049278	0.3 m	O-ring





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