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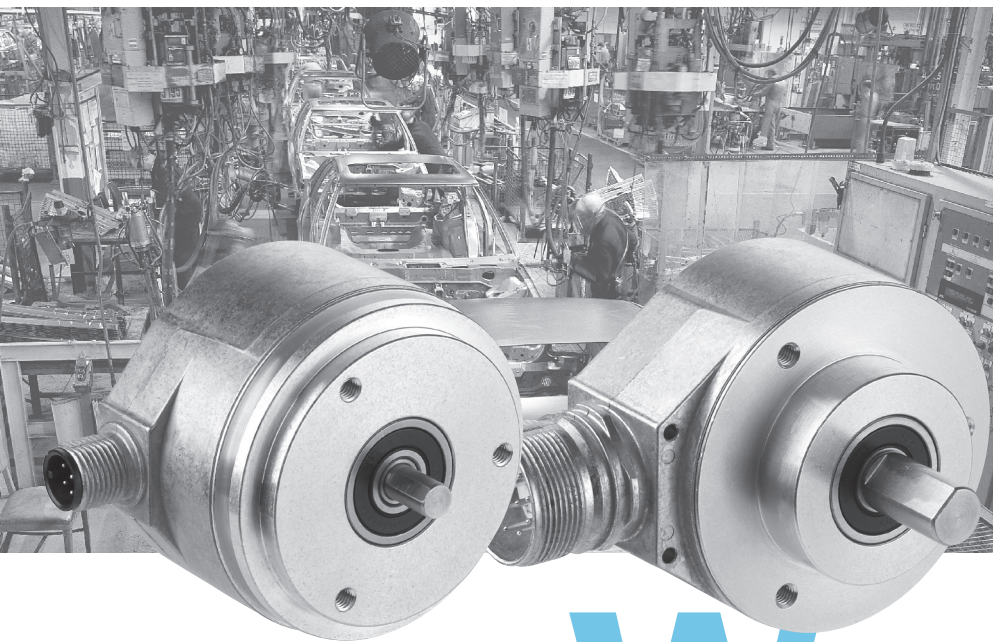
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AFS60: Absolute Encoder Singleturn, SSI

AFM60: Absolute Encoder Multiturn, SSI



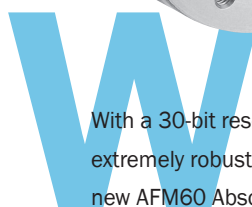
With the addition of a 12-bit multiturn resolution, the encoder reaches a class leading resolution totalling 30 bits.

Thanks to the 30 mm separation of the shaft bearings, the AFM/AFS60 product range offers users a substantially more robust solution than encoders with more conventional bearing arrangements. Even at maximum operating speeds, the increased bearing separation leads to exceptionally smooth operation as well as optimum runout. Despite the large bearing separation, the AFS/AFM60 product ranges have an extremely compact construction enabling use in applications with very limited space.

Both the AFM60 and the AFS60 can be programmed using the same programming tool as used with the DFS60 series of incremental encoders from SICK STEGMANN. For the very first time, incremental, singleturn Absolute and multiturn Absolute encoders can be parametrised using just one universal programming tool.

Product options:

Face mount flange and servo flange, blind hollow shaft and through hollow shaft for singleturn versions
M12 or M23 Connector outlet
1.5 m, 3 m or 5 m cable outlet, radial or axial
Resolution: Singleturn 18 bits max. Multiturn 12 bits



With a 30-bit resolution and an extremely robust construction, the new AFM60 Absolute Encoder Multiturn sets a new benchmark. Even its small brother, the AFS60 Absolute Encoder Singleturn, is impressive, with its high resolution of 18 bits. Consequently, both new product ranges are particularly suitable for harsh operating conditions in all industrial applications where high levels of accuracy and reliability are paramount.

With a maximum singleturn resolution of 18 bits, the AFM60 is among the highest performing encoders in its market segment.

 **Resolution up to 18 bits**
Absolute Encoder Singleturn

 **Resolution up to 30 bits**
Absolute Encoder Multiturn



SICK | STEGMANN



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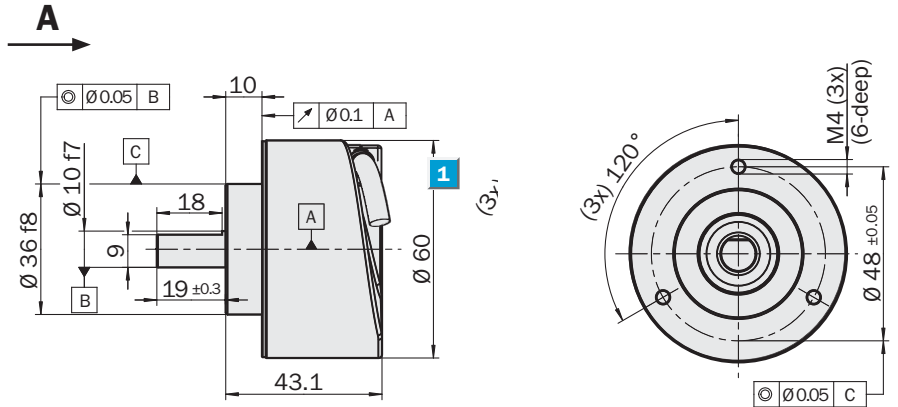
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 **Resolution up to 18 bits**
Absolute Encoder Singleturn

 **Resolution up to 30 bits**
Absolute Encoder Multiturn

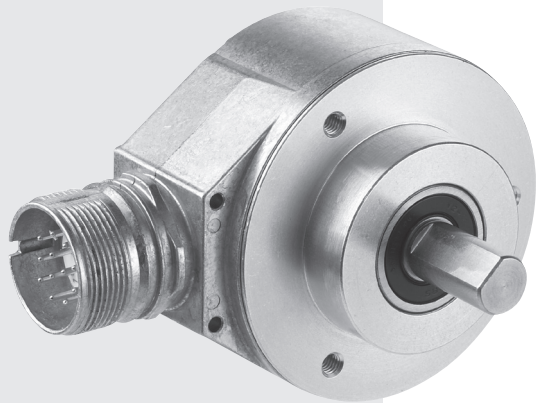
- Connector or cable outlet
- Protection class IP 67
- Electrical interface SSI
- Direction of rotation, zero point, offset and resolution freely programmable

Dimensional drawing face mount flange, cable outlet

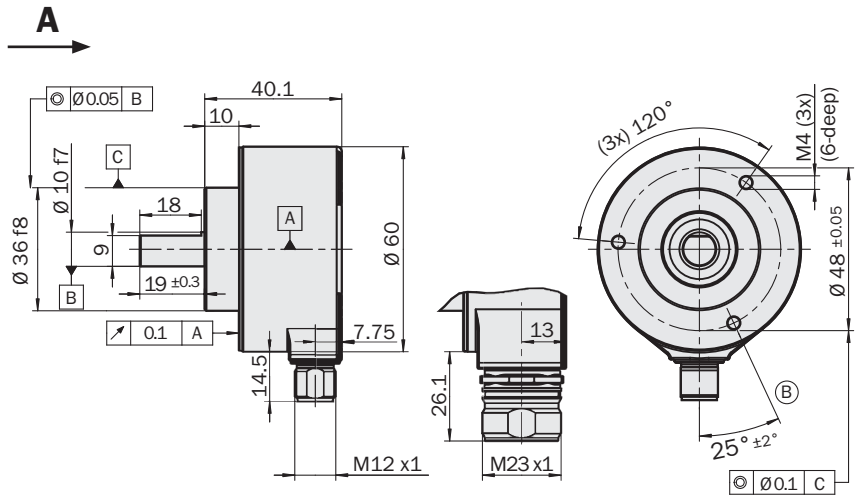


General tolerances according to DIN ISO 2768-mk

- 1** Cable- $\varnothing = 5.6 \pm 0.2$ 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)
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Pin assignment (page 22)



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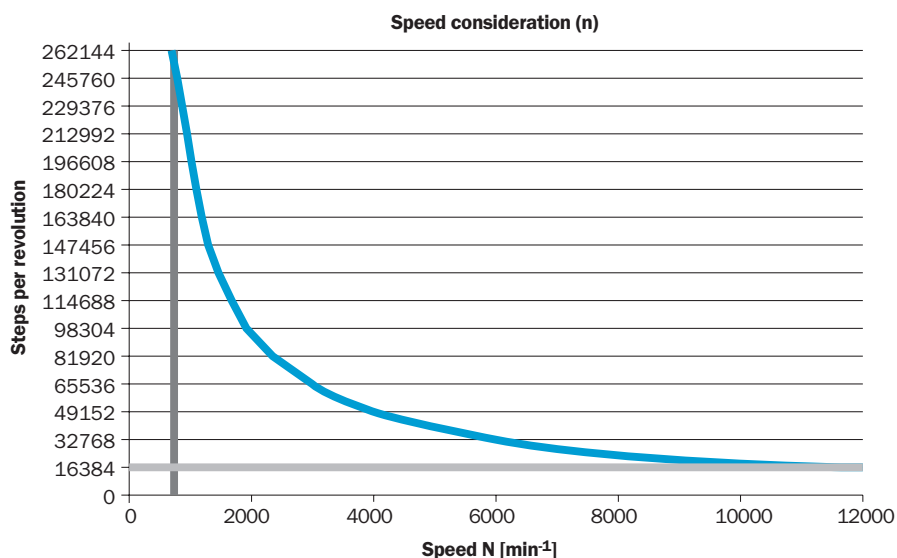
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Site web : www.hvssystem.com

Technical Data to DIN 32878		AFS60/AFM60 face mount flange		
Type		E	B	A
Shaft diameter	10 x 19 mm			
Mass ¹⁾	0.26 kg			
Moment of inertia to the rotor	6.2 gcm ²			
Code type	Gray			
Code sequence adjustable	CW/CCW			
Measuring step	360° number of lines	0.09°	0.01°	0.0014°
Number of steps per revolution max. Singleturn and Multiturn		4096	32768 1	262144 1
Number of lines	4,096 Multiturn (AFM60)			
Error limits		± 0.2°	± 0.05°	± 0.03°
Measuring step deviation	Number of lines per revol. 1 ... 399	± 0.2°	± 0.08°	± 0.04°
	Number of lines per revol. 400 ... 40000	± 0.2°	± 0.01°	± 0.008°
	Number of lines per revol. > 40000			± 0.002°
Repeatability	0.002°			
Operating speed ²⁾	9,000 min ⁻¹			
Position sample time	< 1 µs			
Angular acceleration max.	5 x 10 ⁵ rad/s ²			
Operating torque at 20 °C	0.3 Ncm			
Starting torque at 20 °C	0.5 Ncm			
Permissible shaft movement	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 ... + 85 °C	-20 ... + 100 °C
Storage temperature range (without package)		-40 ... + 100 °C	-40 ... + 100 °C	-40 ... + 100 °C
Permissible relative humidity ³⁾	90 %			
EMC ⁴⁾				
Resistance	To shocks ⁵⁾	50 g/6 ms	70 g/6 ms	60 g/6 ms
	To vibration ⁶⁾	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 ⁷⁾	IP 67	IP 67	IP 67
Housing side	Cable outlet	IP 67	IP 67	IP 67
Operating voltage	4.5 ... 32 V			
Power consumption, no load	0.5 W			
Initialisation time ⁸⁾	50 ms			
Signal line ⁹⁾				
Clock +, Clock -, Data +, Data -	SSI max. clock frequency 2 MHz or min. LOW level (Clock +): 500 ns	1 MHz	2 MHz	2 MHz
SET (electronic adjustment)	H-active (L = 0 - 3 V; H = 4 - U _s V)			
CW/CCW (Counting sequence when turning)	L-active (L = 0 - 1,5 V; H = 2,0 - U _s V)			

1

- ¹⁾ Based on encoders with a connector outlet
- ²⁾ Self-warming 3.3k/1,000 min⁻¹ when applying, note working temperature range
- ³⁾ Condensation of the optical scanning not permitted
- ⁴⁾ To EN 61000-6-2 and EN 61000-6-3
- ⁵⁾ To EN 60068-2-27
- ⁶⁾ To EN 60068-2-6
- ⁷⁾ With mating connector fitted
- ⁸⁾ Valid positional data can be read once this time has elapsed
- ⁹⁾ Signal lines via 12-pin encoder connector, electrically isolated from the housing, ie. 12-core cable

Maximum speed consideration AFS60/AFM60



Order information

AFS60 Absolute Encoder Singleturn, 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	Point 17
A	F	S	6	0		-	S									

Type (cp. technical data page 3)	Mechanical interface Solid shaft, 10 x 19 mm = 4	Electrical interface 4.5 ... 32 V, SSI/Gray = A	Connection type Connector M23, 12-pin, radial = A Connector M12, 8-pin, radial = C 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	Resolution Steps per rev. Selection depending on the type, see below.
E				
B				
A				

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

000256 = 8 bits	001024 = 10 bits	004096 = 12 bits
000512 = 9 bits	002048 = 11 bits	

Type B – Number of lines per revolution

000256 = 8 bits	002048 = 11 bits	016384 = 14 bits
000512 = 9 bits	004096 = 12 bits	032768 = 15 bits
001024 = 10 bits	008192 = 13 bits	

Type A – Number of lines per revolution

000256 = 8 bits	002048 = 11 bits	016384 = 14 bits	131072 = 17 bits
000512 = 9 bits	004096 = 12 bits	032768 = 15 bits	262144 = 18 bits
001024 = 10 bits	008192 = 13 bits	065536 = 16 bits	

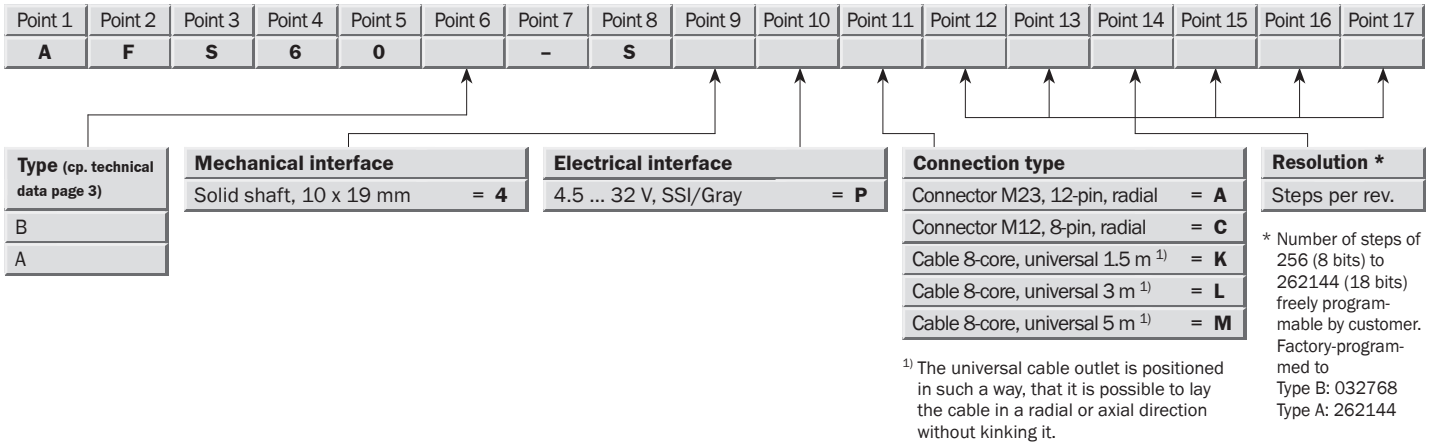
Order example: AFS60 Absolute Encoder Singleturn, type E, solid shaft 10 x 19 mm,

Electrical interface 4.5 ... 32 V, SSI/Gray, connector M12, 8-pin., radial, number of lines 1024 (10 bits)

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	Point 17
A	F	S	6	0	E	-	S	4	A	C	0	0	1	0	2	4

Order information

AFS60 Absolute Encoder Singleturn, face mount flange, programmable version



Order information programmable version	
AFS60 Absolute Encoder Singleturn	
Type B, face mount flange, solid shaft 10 x 19 mm	
Type	Part no.
AFS60B-S4PA032768	1037483
AFS60B-S4PC032768	1037484
AFS60B-S4PK032768	1037485
AFS60B-S4PL032768	1037486
AFS60B-S4PM032768	1037487

Order information programmable version	
AFS60 Absolute Encoder Singleturn	
Type A, face mount flange, solid shaft 10 x 19 mm	
Type	Part no.
AFS60A-S4PA262144	1037488
AFS60A-S4PC262144	1037489
AFS60A-S4PK262144	1037490
AFS60A-S4PL262144	1037491
AFS60A-S4PM262144	1037492

Order information

AFM60 Absolute Encoder Multiturn, 4096 revolutions, 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	Point 17
A	F	M	6	0		-	S									

Type (cp. technical data page 3)	Mechanical interface Solid shaft, 10 x 19 mm = 4	Electrical interface 4.5 ... 32 V, SSI/Gray = A	Connection type Connector M23, 12-pin, radial = A Connector M12, 8-pin, radial = C 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	Resolution Steps per rev. Selection depending on the type, see below.
E				
B				
A				

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 x 4096 (12 bits)

000256 = 8 bits	001024 = 10 bits	004096 = 12 bits
000512 = 9 bits	002048 = 11 bits	

Type B – Number of lines per revolution x 4096 (12 bits)

000256 = 8 bits	002048 = 11 bits	016384 = 14 bits
000512 = 9 bits	004096 = 12 bits	032768 = 15 bits
001024 = 10 bits	008192 = 13 bits	

Type A – Number of lines per revolution x 4096 (12 bits)

000256 = 8 bits	002048 = 11 bits	016384 = 14 bits	131072 = 17 bits
000512 = 9 bits	004096 = 12 bits	032768 = 15 bits	262144 = 18 bits
001024 = 10 bits	008192 = 13 bits	065536 = 16 bits	

Order example: AFM60 Absolute Encoder Multiturn, type E, solid shaft 10 x 19 mm,

Electrical interface 4.5 ... 32 V, SSI/Gray, connector M12, 8-pin., radial, number of lines 1024 (10 bits) x number of revolutions (12 bits)

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	Point 17
A	F	M	6	0	E	-	S	4	A	C	0	0	1	0	2	4

Order information

AFM60 Absolute Encoder Multiturn, 4096 revolutions, face mount flange, programmable version

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	Point 17
A	F	M	6	0		-	S									

Type (cp. technical data page 3)	Mechanical interface	Electrical interface	Connection type	Resolution *
	Solid shaft, 10 x 19 mm = 4	4.5 ... 32 V, SSI/Gray = P	Connector M23, 12-pin, radial = A	Steps per rev.
	B		Connector M12, 8-pin, radial = C	* Number of steps of 256 (8 bits) to 262144 (18 bits) freely programmable by customer. Factory-programmed to Type B: 032768 Type A: 262144

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.

Order information programmable version

AFM60 Absolute Encoder Multiturn, 4096 revolutions, Type B, face mount flange, solid shaft 10 x 19 mm

Type	Part no.
AFM60B-S4PA032768	1037503
AFM60B-S4PC032768	1037504
AFM60B-S4PK032768	1037505
AFM60B-S4PL032768	1037506
AFM60B-S4PM032768	1037507

Order information programmable version

AFM60 Absolute Encoder Multiturn, 4096 revolutions, Type A, face mount flange, solid shaft 10 x 19 mm

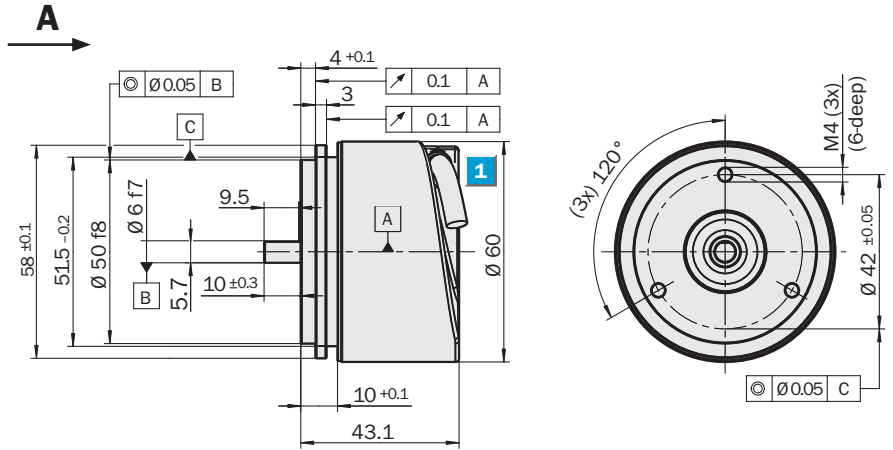
Type	Part no.
AFM60A-S4PA262144	1037508
AFM60A-S4PC262144	1037509
AFM60A-S4PK262144	1037510
AFM60A-S4PL262144	1037511
AFM60A-S4PM262144	1037512

 **Resolution up to 18 bits**
Absolute Encoder Singleturn

 **Resolution up to 30 bits**
Absolute Encoder Multiturn

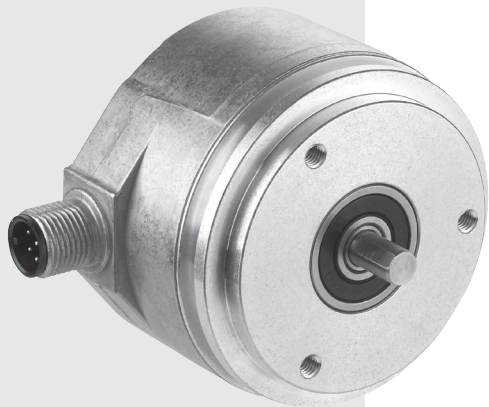
- Connector or cable outlet
- Protection class IP 67
- Electrical interface SSI
- Direction of rotation, zero point, offset and resolution freely programmable

Dimensional drawing servo flange, cable outlet

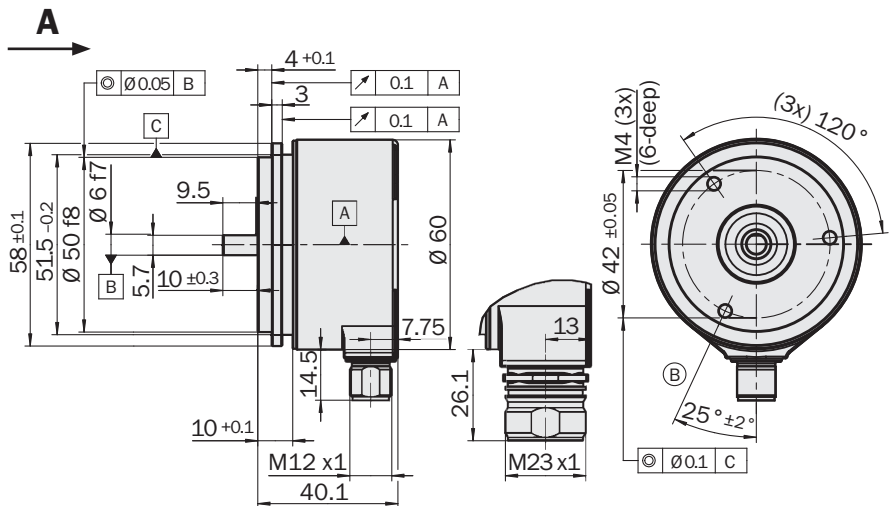


General tolerances according to DIN ISO 2768-mk

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



Dimensional drawing servo flange, connector outlet M12 and M23



General tolerances according to DIN ISO 2768-mk



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

Pin assignment (page 22)



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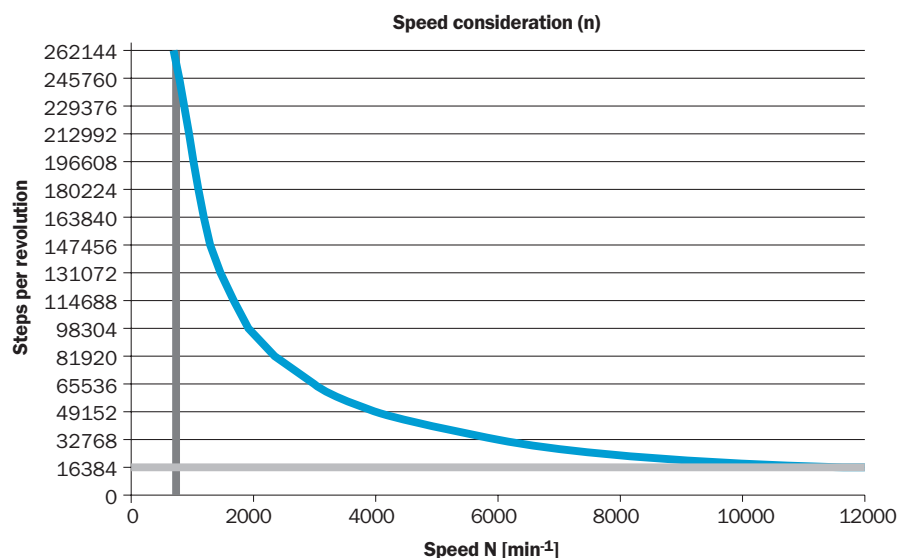
E-mail: hvssystem@hvssystem.com
Site web : www.hvssystem.com

Technical Data to DIN 32878		AFS60/AFM60 servo flange		
Type		E	B	A
Shaft diameter	6 x 10 mm			
Mass ¹⁾	0.26 kg			
Moment of inertia to the rotor	6.2 gcm ²			
Code type	Gray			
Code sequence adjustable	CW/CCW			
Measuring step	360° number of lines	0.09°	0.01°	0.0014°
Number of steps per revolution max. Singleturn and Multiturn		4096	32768 1	262144 1
Number of lines	4,096 Multiturn (AFM60)			
Error limits		± 0.2°	± 0.05°	± 0.03°
Measuring step deviation	Number of lines per revol. 1 ... 399	± 0.2°	± 0.08°	± 0.04°
	Number of lines per revol. 400 ... 40000	± 0.2°	± 0.01°	± 0.008°
	Number of lines per revol. > 40000			± 0.002°
Repeatability	0.002°			
Operating speed ²⁾	9,000 min ⁻¹			
Position sample time	< 1 µs			
Angular acceleration max.	5 x 10 ⁵ rad/s ²			
Operating torque at 20 °C	0.3 Ncm			
Starting torque at 20 °C	0.5 Ncm			
Permissible shaft movement	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 ... + 85 °C	-20 ... + 100 °C
Storage temperature range (without package)		-40 ... + 100 °C	-40 ... + 100 °C	-40 ... + 100 °C
Permissible relative humidity ³⁾	90 %			
EMC ⁴⁾				
Resistance	To shocks ⁵⁾	50 g/6 ms	70 g/6 ms	60 g/6 ms
	To vibration ⁶⁾	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 ⁷⁾	IP 67	IP 67	IP 67
Housing side	Cable outlet	IP 67	IP 67	IP 67
Operating voltage	4.5 ... 32 V			
Power consumption, no load	0.5 W			
Initialisation time ⁸⁾	50 ms			
Signal line ⁹⁾				
Clock +, Clock -, Data +, Data -	SSI max. clock frequency 2 MHz or min. LOW level (Clock +): 500 ns	1 MHz	2 MHz	2 MHz
SET (electronic adjustment)	H-active (L = 0 - 3 V; H = 4 - U _s V)			
CW/CCW (Counting sequence when turning)	L-active (L = 0 - 1,5 V; H = 2,0 - U _s V)			

1

- ¹⁾ Based on encoders with a connector outlet
- ²⁾ Self-warming 3.3k/1,000 min⁻¹ when applying, note working temperature range
- ³⁾ Condensation of the optical scanning not permitted
- ⁴⁾ To EN 61000-6-2 and EN 61000-6-3
- ⁵⁾ To EN 60068-2-27
- ⁶⁾ To EN 60068-2-6
- ⁷⁾ With mating connector fitted
- ⁸⁾ Valid positional data can be read once this time has elapsed
- ⁹⁾ Signal lines via 12-pin encoder connector, electrically isolated from the housing, ie. 12-core cable

Maximum speed consideration AFS60/AFM60



Order information

AFS60 Absolute Encoder Singleturn, 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	Point 17
A	F	S	6	0		-	S									

Type (cp. technical data page 9)	Mechanical interface Solid shaft, 6 x 10 mm = 1	Electrical interface 4.5 ... 32 V, SSI/Gray = A	Connection type Connector M23, 12-pin, radial = A Connector M12, 8-pin, radial = C 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	Resolution Steps per rev. Selection depending on the type, see below.
E				
B				
A				

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

000256 = 8 bits	001024 = 10 bits	004096 = 12 bits
000512 = 9 bits	002048 = 11 bits	

Type B – Number of lines per revolution

000256 = 8 bits	002048 = 11 bits	016384 = 14 bits
000512 = 9 bits	004096 = 12 bits	032768 = 15 bits
001024 = 10 bits	008192 = 13 bits	

Type A – Number of lines per revolution

000256 = 8 bits	002048 = 11 bits	016384 = 14 bits	131072 = 17 bits
000512 = 9 bits	004096 = 12 bits	032768 = 15 bits	262144 = 18 bits
001024 = 10 bits	008192 = 13 bits	065536 = 16 bits	

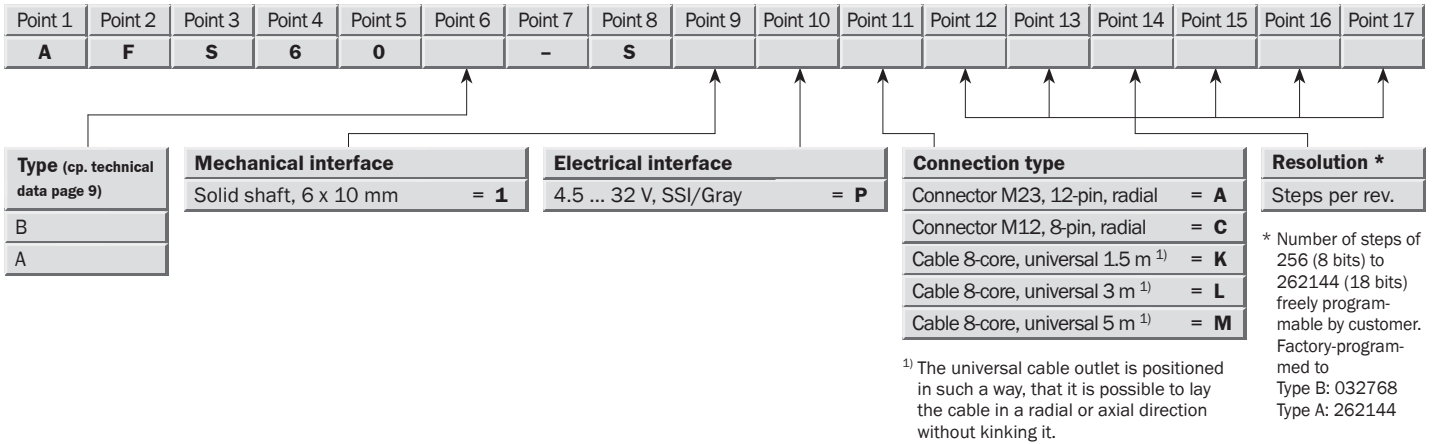
Order example: AFS60 Absolute Encoder Singleturn, type E, solid shaft 6 x 10 mm,

Electrical interface 4.5 ... 32 V, SSI/Gray, connector M12, 8-pin., radial, number of lines 1024 (10 bits)

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	Point 17
A	F	S	6	0	E	-	S	1	A	C	0	0	1	0	2	4

Order information

AFS60 Absolute Encoder Singleturn, servo flange, programmable version



Order information programmable version	
AFS60 Absolute Encoder Singleturn	
Type B, servo flange, solid shaft 6 x 10 mm	
Type	Part no.
AFS60B-S1PA032768	1037493
AFS60B-S1PC032768	1037494
AFS60B-S1PK032768	1037495
AFS60B-S1PL032768	1037496
AFS60B-S1PM032768	1037497

Order information programmable version	
AFS60 Absolute Encoder Singleturn	
Type A, servo flange, solid shaft 6 x 10 mm	
Type	Part no.
AFS60A-S1PA262144	1037498
AFS60A-S1PC262144	1037499
AFS60A-S1PK262144	1037500
AFS60A-S1PL262144	1037501
AFS60A-S1PM262144	1037502

Order information

AFM60 Absolute Encoder Multiturn, 4096 revolutions, 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	Point 17
A	F	M	6	0		-	S									

Type (cp. technical data page 9)	Mechanical interface Solid shaft, 6 x 10 mm = 1	Electrical interface 4.5 ... 32 V, SSI/Gray = A	Connection type Connector M23, 12-pin, radial = A Connector M12, 8-pin, radial = C 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	Resolution Steps per rev. Selection depending on the type, see below.
E				
B				
A				

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 x 4096 (12 bits)

000256 = 8 bits	001024 = 10 bits	004096 = 12 bits
000512 = 9 bits	002048 = 11 bits	

Type B – Number of lines per revolution x 4096 (12 bits)

000256 = 8 bits	002048 = 11 bits	016384 = 14 bits
000512 = 9 bits	004096 = 12 bits	032768 = 15 bits
001024 = 10 bits	008192 = 13 bits	

Type A – Number of lines per revolution x 4096 (12 bits)

000256 = 8 bits	002048 = 11 bits	016384 = 14 bits	131072 = 17 bits
000512 = 9 bits	004096 = 12 bits	032768 = 15 bits	262144 = 18 bits
001024 = 10 bits	008192 = 13 bits	065536 = 16 bits	

Order example: AFM60 Absolute Encoder Multiturn, type E, solid shaft 6 x 10 mm,

Electrical interface 4.5 ... 32 V, SSI/Gray, connector M12, 8-pol., radial, number of lines 1024 (10 Bit) x number of revolutions (12 bits)

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	Point 17
A	F	M	6	0	E	-	S	1	A	C	0	0	1	0	2	4

Order information

AFM60 Absolute Encoder Multiturn, 4096 revolutions, servo flange, programmable version

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	Point 17
A	F	M	6	0		-	S									

Type (cp. technical data page 9) B A	Mechanical interface Solid shaft, 6 x 10 mm = 1	Electrical interface 4.5 ... 32 V, SSI/Gray = P	Connection type Connector M23, 12-pin, radial = A Connector M12, 8-pin, radial = C 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	Resolution * Steps per rev.
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* Number of steps of 256 (8 bits) to 262144 (18 bits) freely programmable by customer. Factory-programmed to Type B: 032768 Type A: 262144

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.

Order information programmable version
AFM60 Absolute Encoder Multiturn, 4096 revolutions,
Type B, servo flange, solid shaft 6 x 10 mm

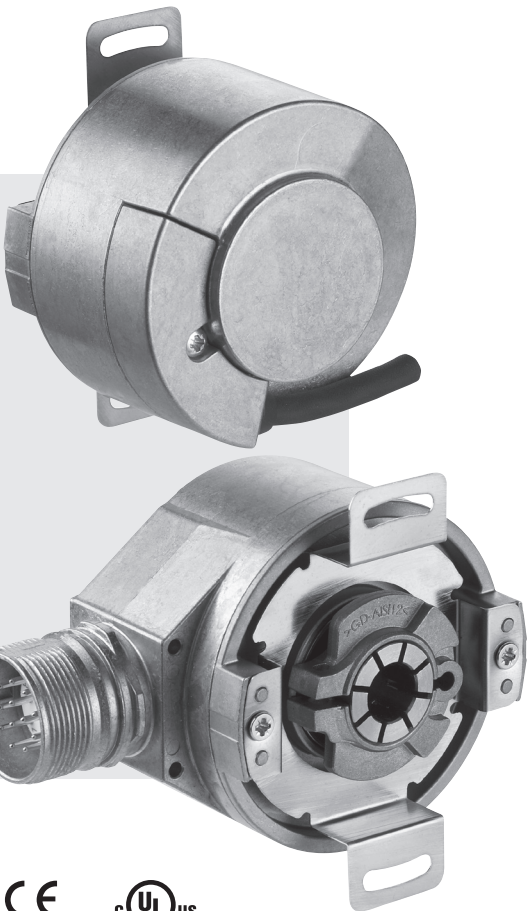
Type	Part no.
AFM60B-S1PA032768	1037513
AFM60B-S1PC032768	1037514
AFM60B-S1PK032768	1037515
AFM60B-S1PL032768	1037516
AFM60B-S1PM032768	1037517

Order information programmable version
AFM60 Absolute Encoder Multiturn, 4096 revolutions,
Type A, servo flange, solid shaft 6 x 10 mm

Type	Part no.
AFM60A-S1PA262144	1037518
AFM60A-S1PC262144	1037519
AFM60A-S1PK262144	1037520
AFM60A-S1PL262144	1037521
AFM60A-S1PM262144	1037522

Resolution up to 18 bits
Absolute Encoder Singleturn

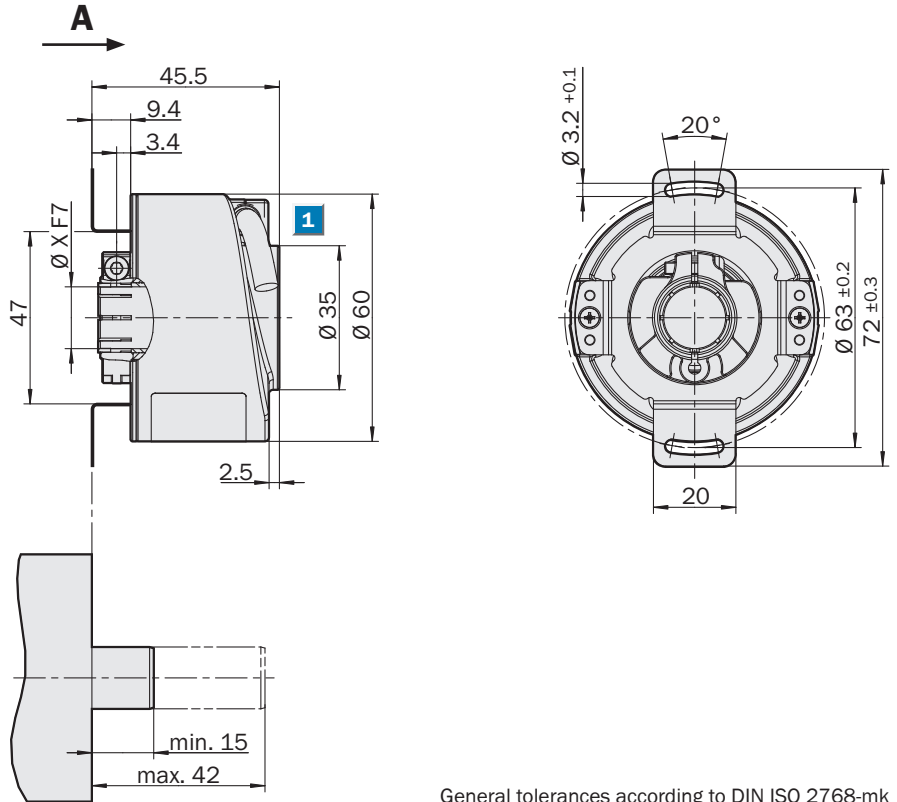
- Connector or cable outlet
- Protection class IP 67
- Electrical interface SSI
- Direction of rotation, zero point, offset and resolution freely programmable



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

Pin assignment (page 22)

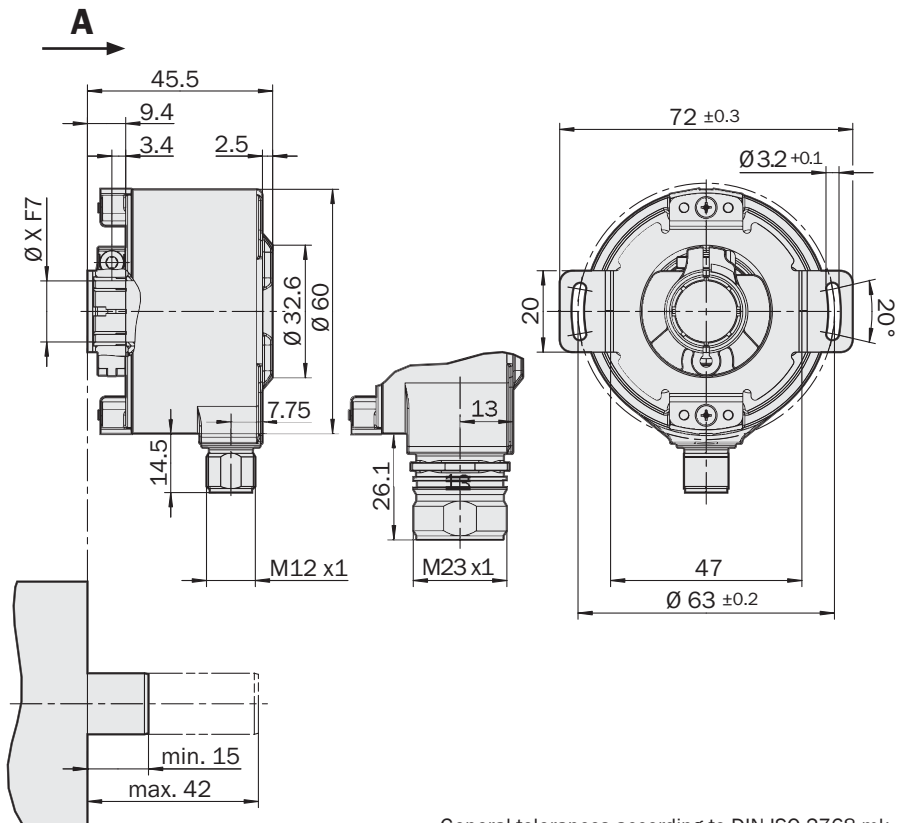
Dimensional drawing blind hollow shaft, cable outlet



General tolerances according to DIN ISO 2768-mk

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

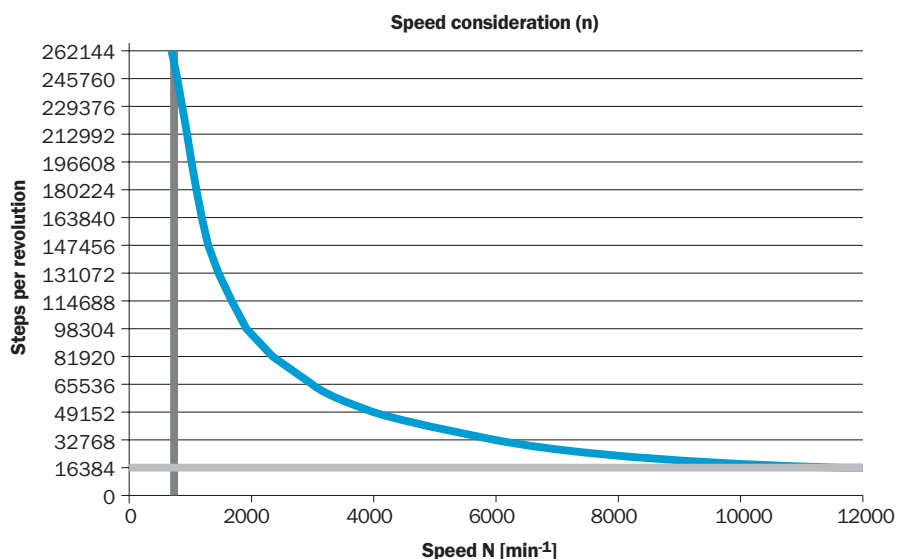
Customer-side

Technical Data acc. to DIN 32878		AFS60 blind hollow shaft		
Type		E	B	A
Shaft diameter	8,10,12,14,15 mm and 3/8", 1/2", 5/8"			
Mass ¹⁾	0.2 kg			
Moment of inertia of the rotor	40 gcm ²			
Code type	Gray			
Code sequence adjustable	CW/CCW			
Measuring step	360° number of lines	0.09°	0.01°	0.0014°
Number of steps per revolution	2 up to 262.144	4096	32768 1	262144 1
Measurement range	1 revolution			
Error limits		± 0.3°	± 0.05°	± 0.03°
Measuring step deviation	Number of lines per revol. 1 ... 399	± 0.2°	± 0.08°	± 0.04°
	Number of lines per revol. 400 ... 40.000	± 0.2°	± 0.01°	± 0.008°
	Number of lines per revol. > 40.000			± 0.002°
Repeatability	0.002°			
Operating speed ²⁾	6.000 min ⁻¹			
Position sample time	< 1 µs			
Angular acceleration max.	5 x 10 ⁵ rad/s ²			
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 ³⁾	90 %			
EMC ⁴⁾				
Resistance	To shocks ⁵⁾	50 g/6 ms	70 g/6 ms	60 g/6 ms
	To vibration ⁶⁾	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 ⁷⁾	IP 67	IP 67	IP 67
Housing side	Cable outlet	IP 67	IP 67	IP 67
Operating voltage	4.5 ... 32 V			
Power consumption, no load	0.5 W			
Initialisation time ⁸⁾	50 ms			
Signal line ⁹⁾				
Clock +, Clock -, Data +, Data -	SSI max. clock frequency 2 MHz or min. LOW level (Clock +): 500 ns	1 MHz	2 MHz	2 MHz
SET (electronic adjustment)	H-active (L = 0 - 3 V; H = 4 - U _s V)			
CW/CCW (Counting sequence when turning)	L-active (L = 0 - 1,5 V; H = 2,0 - U _s V)			

1

- ¹⁾ Based on encoders with a connector outlet
- ²⁾ Self-warming 3.3k/1,000 min⁻¹ when applying, note working temperature range
- ³⁾ Condensation of the optical scanning not permitted
- ⁴⁾ To EN 61000-6-2 and EN 61000-6-3
- ⁵⁾ To EN 60068-2-27
- ⁶⁾ To EN 60068-2-6
- ⁷⁾ With mating connector fitted
- ⁸⁾ Valid positional data can be read once this time has elapsed
- ⁹⁾ Signal lines via 12-pin encoder connector, electrically isolated from the housing, ie. 12-core cable

Maximum speed consideration AFS60/AFM60



Order information

AFS60 Absolute Encoder Singleturn, 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	Point 17
A	F	S	6	0		-	B									

Type (cp. technical data page 15)	Mechanical interface	Electrical interface	Connection type	Resolution
E	Blind hollow shaft 8 mm = B	4.5 ... 32 V, SSI/Gray = A	Connector M23, 12-pin, radial = A	Steps per rev.
B	Blind hollow shaft 3/8" = C		Connector M12, 8-pin, radial = C	Selection depending on the type, see below.
A	Blind hollow shaft 10 mm = D		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

000256 = 8 bits	001024 = 10 bits	004096 = 12 bits
000512 = 9 bits	002048 = 11 bits	

Type B – Number of lines per revolution

000256 = 8 bits	002048 = 11 bits	016384 = 14 bits
000512 = 9 bits	004096 = 12 bits	032768 = 15 bits
001024 = 10 bits	008192 = 13 bits	

Type A – Number of lines per revolution

000256 = 8 bits	002048 = 11 bits	016384 = 14 bits	131072 = 17 bits
000512 = 9 bits	004096 = 12 bits	032768 = 15 bits	262144 = 18 bits
001024 = 10 bits	008192 = 13 bits	065536 = 16 bits	

Order example: AFS60 Absolute Encoder Singleturn, type E, blind hollow shaft,

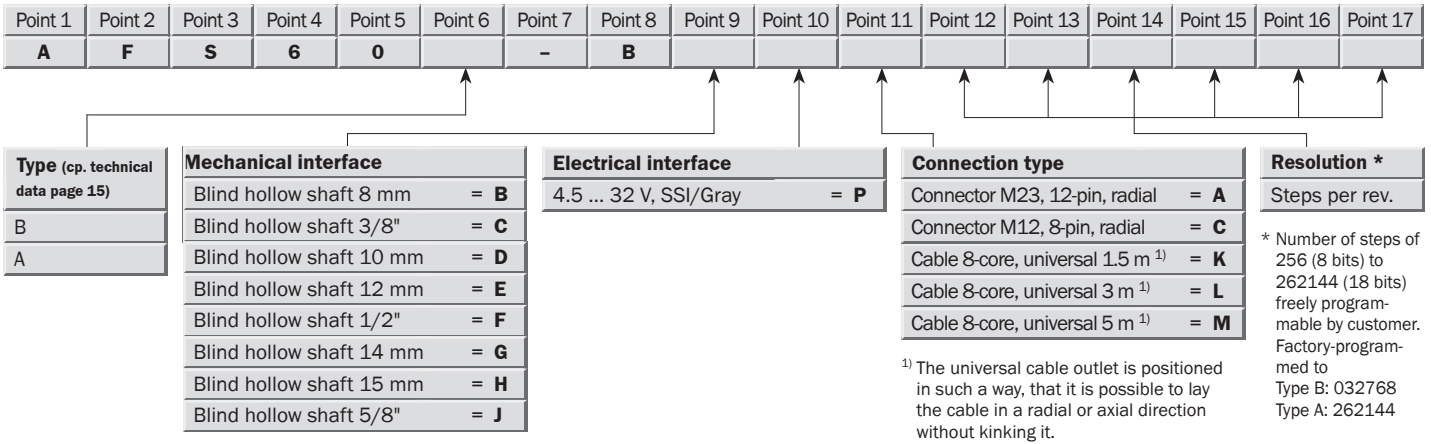
Electrical interface 4.5 ... 32 V, SSI/Gray, connector M12, 8-pin., radial, number of lines 1024 (10 bits)

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	Point 17
A	F	S	6	0	E	-	B	x	A	C	0	0	1	0	2	4

x stands for hollow shaft diameter B to J, put in the corresponding letter at point 9.

Order information

AFS60 Absolute Encoder Singleturn, blind hollow shaft, programmable version



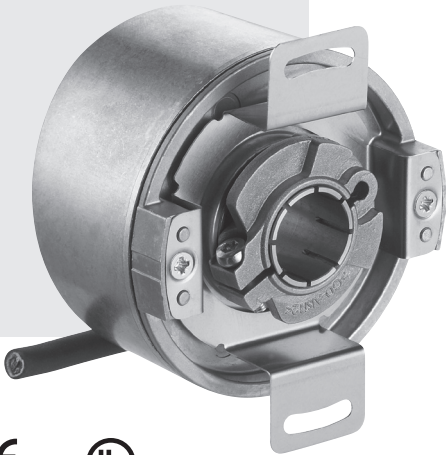
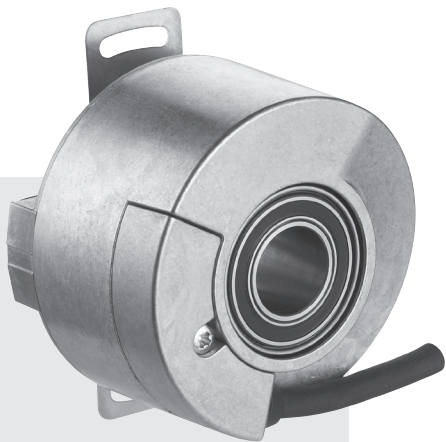
Order information programmable version	
AFS60 Absolute Encoder Singleturn	
Type B, blind hollow shaft	
Type	
AFS60B-BxPA032768	
AFS60B-BxPC032768	
AFS60B-BxPK032768	
AFS60B-BxPL032768	
AFS60B-BxPM032768	

Order information programmable version	
AFS60 Absolute Encoder Singleturn	
Type A, blind hollow shaft	
Type	
AFS60A-BxPA032768	
AFS60A-BxPC032768	
AFS60A-BxPK032768	
AFS60A-BxPL032768	
AFS60A-BxPM032768	

x stands for hollow shaft diameter B to J, put in the corresponding letter at point 9.

Resolution up to 18 bits
Absolute Encoder Singleturn

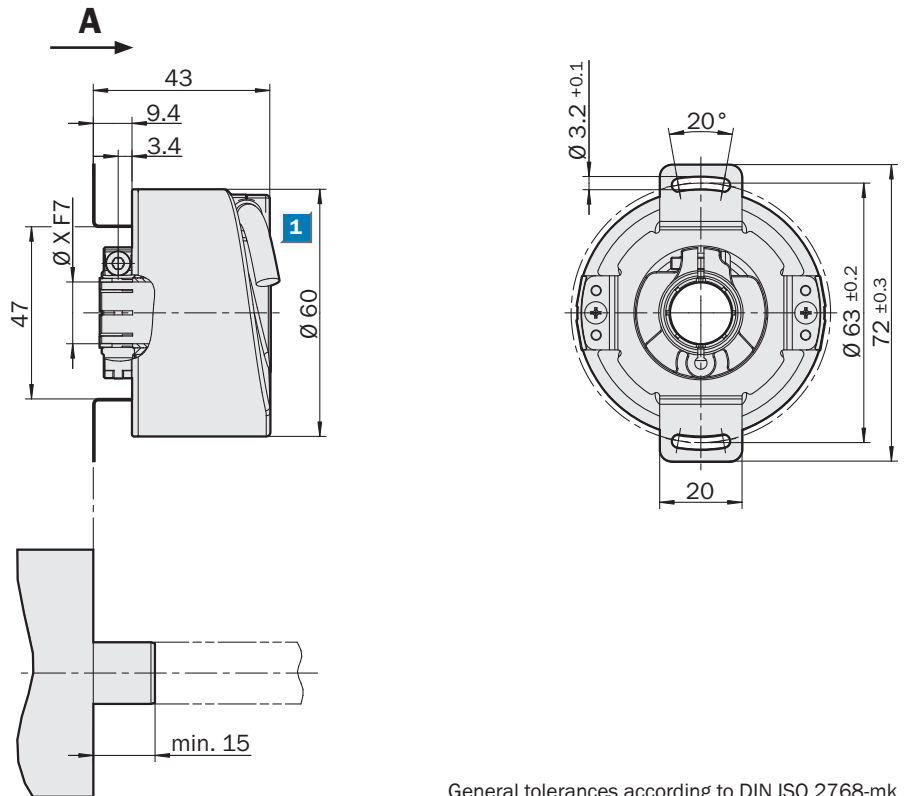
- Connector or cable outlet
- Protection class IP 65
- Electrical interface SSI
- Number of lines, level of output signal and zero pulse width freely programmable



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

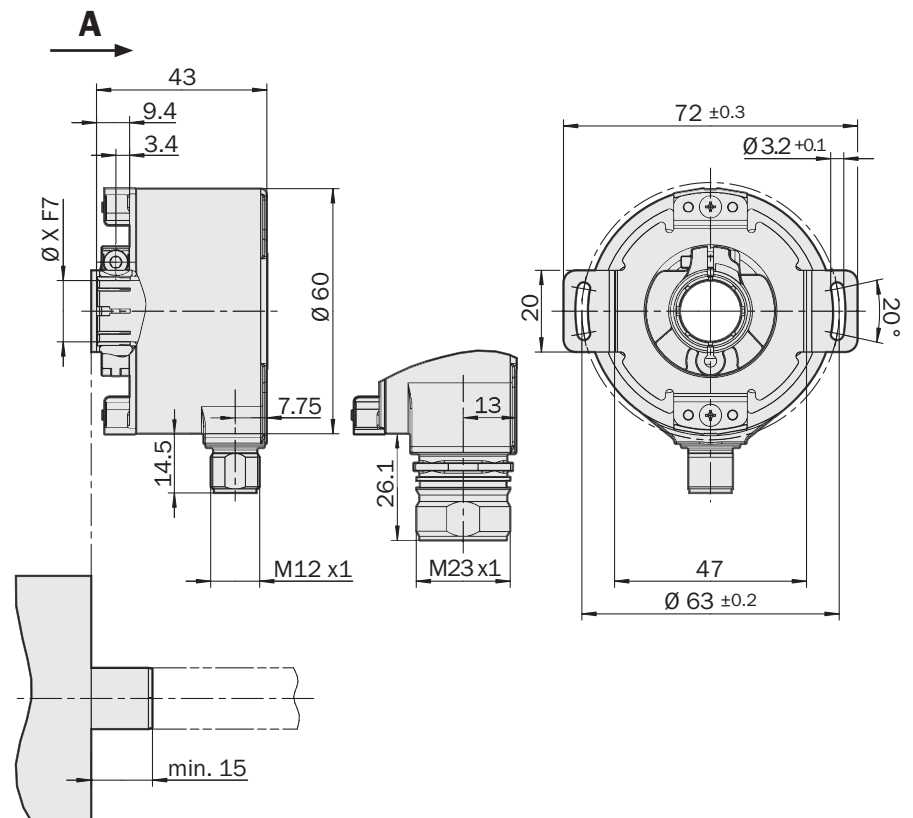


General tolerances according to DIN ISO 2768-mk

Customer-side

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

Dimensional drawing through hollow shaft, connector outlet M12 and M23



General tolerances according to DIN ISO 2768-mk

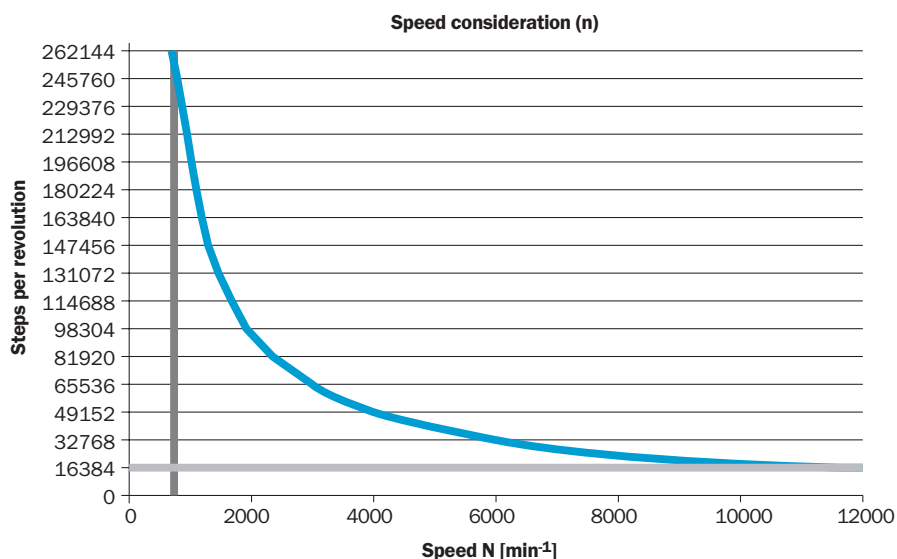
Customer-side

Technical Data acc. to DIN 32878		AFS60 through hollow shaft		
Type		E	B	A
Shaft diameter	8,10,12,14,15 mm and 3/8", 1/2", 5/8"			
Mass ¹⁾	0.2 kg			
Moment of inertia of the rotor	40 gcm ²			
Code type	Gray			
Code sequence adjustable	CW/CCW			
Measuring step	360° number of lines	0.09°	0.01°	0.0014°
Number of steps per revolution	2 up to 262.144	4096	32768 1	262144 1
Measurement range	1 revolution			
Error limits		± 0.3°	± 0.05°	± 0.03°
Measuring step deviation	Number of lines per revol. 1 ... 399	± 0.2°	± 0.08°	± 0.04°
	Number of lines per revol. 400 ... 40.000	± 0.2°	± 0.01°	± 0.008°
	Number of lines per revol. > 40.000			± 0.002°
Repeatability	0.002°			
Operating speed ²⁾	9.000 min ⁻¹			
Position sample time	< 1 µs			
Angular acceleration max.	5 x 10 ⁵ rad/s ²			
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 ³⁾	90 %			
EMC ⁴⁾				
Resistance	To shocks ⁵⁾	50 g/6 ms	70 g/6 ms	60 g/6 ms
	To vibration ⁶⁾	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 ⁷⁾	IP 65	IP 65	IP 65
Housing side	Cable outlet	IP 65	IP 65	IP 65
Operating voltage	4.5 ... 32 V			
Power consumption, no load	0.5 W			
Initialisation time ⁸⁾	50 ms			
Signal line ⁹⁾				
Clock +, Clock -, Data +, Data -	SSI max. clock frequency 2 MHz or min. LOW level (Clock +): 500 ns	1 MHz	2 MHz	2 MHz
SET (electronic adjustment)	H-active (L = 0 - 3 V; H = 4 - U _s V)			
CW/CCW (Counting sequence when turning)	L-active (L = 0 - 1,5 V; H = 2,0 - U _s V)			

1

- ¹⁾ Based on encoders with a connector outlet
- ²⁾ Self-warming 3.3k/1,000 min⁻¹ when applying, note working temperature range
- ³⁾ Condensation of the optical scanning not permitted
- ⁴⁾ To EN 61000-6-2 and EN 61000-6-3
- ⁵⁾ To EN 60068-2-27
- ⁶⁾ To EN 60068-2-6
- ⁷⁾ With mating connector fitted
- ⁸⁾ Valid positional data can be read once this time has elapsed
- ⁹⁾ Signal lines via 12-pin encoder connector, electrically isolated from the housing, ie. 12-core cable

Maximum speed consideration AFS60/AFM60



Order information

AFS60 Absolute Encoder Singleturn, through 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	Point 17
A	F	S	6	0		-	T									

Type (cp. technical data page 19)	Mechanical interface	Electrical interface	Connection type	Resolution
E	Through hollow shaft 8 mm = B	4.5 ... 32 V, SSI/Gray = A	Connector M23, 12-pin, radial = A	Steps per rev.
B	Through hollow shaft 3/8" = C		Connector M12, 8-pin, radial = C	Selection depending on the type, see below.
A	Through hollow shaft 10 mm = D		Cable 8-core, universal 1.5 m ¹⁾ = K	
	Through hollow shaft 12 mm = E		Cable 8-core, universal 3 m ¹⁾ = L	
	Through hollow shaft 1/2" = F		Cable 8-core, universal 5 m ¹⁾ = M	
	Through hollow shaft 14 mm = G			
	Through hollow shaft 15 mm = H			
	Through 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

000256 = 8 bits	001024 = 10 bits	004096 = 12 bits
000512 = 9 bits	002048 = 11 bits	

Type B – Number of lines per revolution

000256 = 8 bits	002048 = 11 bits	016384 = 14 bits
000512 = 9 bits	004096 = 12 bits	032768 = 15 bits
001024 = 10 bits	008192 = 13 bits	

Type A – Number of lines per revolution

000256 = 8 bits	002048 = 11 bits	016384 = 14 bits	131072 = 17 bits
000512 = 9 bits	004096 = 12 bits	032768 = 15 bits	262144 = 18 bits
001024 = 10 bits	008192 = 13 bits	065536 = 16 bits	

Order example: AFS60 Absolute Encoder Singleturn, type E, through hollow shaft,

Electrical interface 4.5 ... 32 V, SSI/Gray, connector M12, 8-pin., radial, number of lines 1024 (10 bits)

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	Point 17
A	F	S	6	0	E	-	T	x	A	C	0	0	1	0	2	4

x stands for hollow shaft diameter B to J, put in the corresponding letter at point 9.

Order information

AFS60 Absolute Encoder Singleturn, through hollow shaft, programmable version

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	Point 17
A	F	S	6	0		-	T									

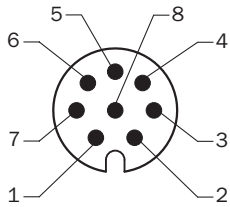
Type (cp. technical data page 19)	Mechanical interface	Electrical interface	Connection type	Resolution *
B	Through hollow shaft 8 mm = B	4.5 ... 32 V, SSI/Gray = P	Connector M23, 12-pin, radial = A	* Number of steps of 256 (8 bits) to 262144 (18 bits) freely programmable by customer. Factory-programmed to Type B: 032768 Type A: 262144
A	Through hollow shaft 3/8" = C		Connector M12, 8-pin, radial = C	
	Through hollow shaft 10 mm = D		Cable 8-core, universal 1.5 m ¹⁾ = K	
	Through hollow shaft 12 mm = E		Cable 8-core, universal 3 m ¹⁾ = L	
	Through hollow shaft 1/2" = F		Cable 8-core, universal 5 m ¹⁾ = M	
	Through hollow shaft 14 mm = G			
	Through hollow shaft 15 mm = H			
	Through 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.

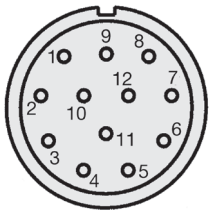
Order information programmable version	
AFS60 Absolute Encoder Singleturn	
Type B, through hollow shaft	
Type	
AFS60B-TxPA032768	
AFS60B-TxPC032768	
AFS60B-TxPK032768	
AFS60B-TxPL032768	
AFS60B-TxPM032768	

Order information programmable version	
AFS60 Absolute Encoder Singleturn	
Type A, through hollow shaft	
Type	
AFS60A-TxPA032768	
AFS60A-TxPC032768	
AFS60A-TxPK032768	
AFS60A-TxPL032768	
AFS60A-TxPM032768	

x stands for hollow shaft diameter B to J, put in the corresponding letter at point 9.



View to the connector M12 fitted to the encoder body



View to the connector M23 fitted to the encoder body

Pin and wire allocation, connector M12, 8-pin

PIN, 8-pin M12 connector	Signal SSI	Explanation
1	Data -	Interface signals
2	Data +	Interface signals
3	cw/ccw	Counting sequence when turning
4	SET	Electronic adjustment
5	Clock +	Interface signals
6	Clock -	Interface signals
7	GND	Ground connection
8	+U _s	Supply voltage

Pin and wire allocation, connector M23, 12-pin

PIN	Signal	Explanation
1	GND	Earth connection
2	Data +	Interface signals
3	Clock +	Interface signals
4	N. C.	Not connected
5	N. C.	Not connected
6	N. C.	Not connected
7	N. C.	Not connected
8	U _s	Supply voltage
9	SET	Electronic adjustment
10	Data -	Interface signals
11	Clock -	Interface signals
12	cw/ccw	Counting sequence when turning
	Screen	Housing potential

Allocation cable outlet, cable 8-core

Colour of wires	Signal	Explanation
Brown	Data -	Interface signals
White	Data +	Interface signals
Black	cw/ccw	Counting sequence when turning
Pink	SET	Electronic adjustment
Yellow	Clock +	Interface signals
Lilac	Clock -	Interface signals
Blue	GND	Earth connection
Red	+ U _s	Supply voltage

CW/CCW Forward/reverse:

This input programs the counting direction of the encoder. If not connected, this input is "HIGH". If the encoder shaft, as viewed on the drive shaft, rotates in the clockwise direction, it counts in an increasing sequence. If it should count upwards when the shaft rotates in the anti-clockwise direction, this connection must be connected permanently to "LOW" level (zero volts).

SET

This input activates the electronic zero set. When the SET line is connected to U_s for more than 100 ms, the current mechanical position is assigned the value 0 or the pre-programmed SET-value.

Programming Tool for AFS60/AFM60 and Incremental Encoder DFS60

Programming Tool

Type	Part no.
PGT-08-S	1036616



For programming SICK STEGMANN Absolute Encoders with M12 or M23 connectors the following adapter cables are appropriate:

Adapter cable for PGT-08-S and AFS/AFM60 Absolute encoders. Consists of male 9-pin connector and M12 8-pin inline cable connector, pre-assembled using 8-core cable, 4 x 2 x 0.08 mm², screened

Type	Part no.
DSL-2D08-GOM5AC2	2048439

Adapter cable for PGT-08-S and AFS/AFM60 Absolute encoders. Consists of male 9-pin SUB-D connector and M23 12-pin inline cable connector, pre-assembled using 8-core cable, 4 x 2 x 0.08 mm², screened

Type	Part no.
DSL-3D08-GOM5AC2	2048440

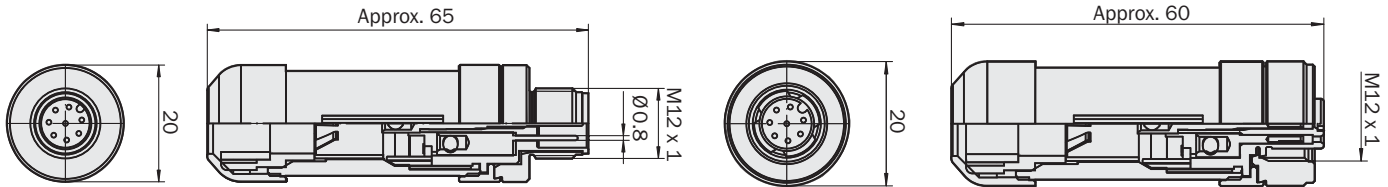
Caution: Attempting to programme an AFS/AFM60 Absolute encoder with the adapter cables intended for use with the DFS60 incremental encoder will cause damage to the Absolute encoder. Please ensure the correct adapter cable is used!

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

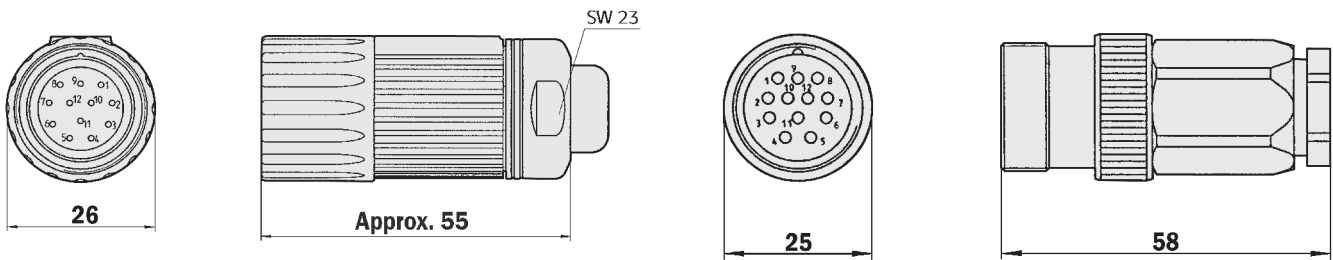
Cable connector M12 female, 8-pin, straight, screened, for field assembly (adapter side)		
Type	Part no.	Contacts/cable diameter
DOS-1208-GA	6028369	8 / 4 ... 8 mm



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

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 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

Dimensional drawings and ordering information

Female connectors

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

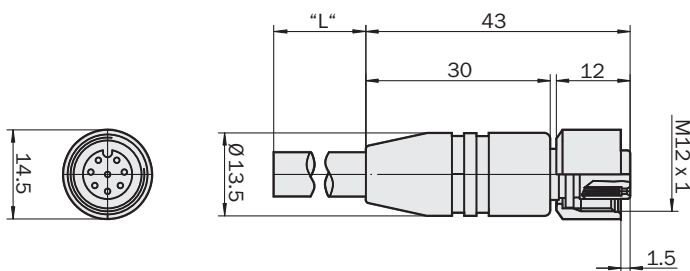
Type	Part no.	Cable length
DOL-0J08-G0M5AA6	2048589	0.5 m
DOL-0J08-G1M5AA6	2048590	1.5 m
DOL-0J08-G03MAA6	2048591	3.0 m
DOL-0J08-G05MAA6	2048593	5.0 m
DOL-0J08-G10MAA6	2048594	10.0 m

Cable connector female M23, 8-core, 4 x 2 x 0.15 mm², cable diameter 5.6 mm

Type	Part no.	Cable length
DOL-2308-G0M5AA6	2048595	0.5 m
DOL-2308-G1M5AA6	2048596	1.5 m
DOL-2308-G03MAA6	2048597	3.0 m
DOL-2308-G05MAA6	2048598	5.0 m
DOL-2308-G10MAA6	2048599	10.0 m

Female connector M12, 8-pin, straight, pre-wired with cable 8-wire, 4 x 2 x 0.25 mm², 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



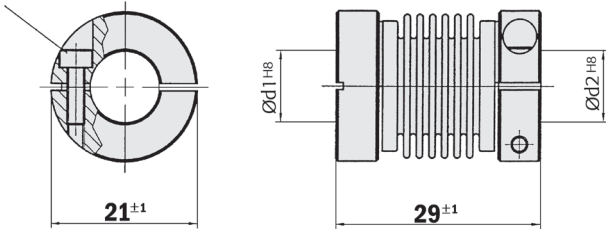
Dimensional drawings and ordering information

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

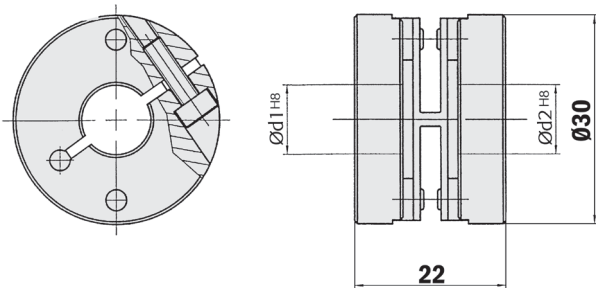
Type	Part no.	Shaft diameter
KUP-0606-B	5312981	6 mm ... 6 mm
KUP-0610-B	5312982	6 mm ... 10 mm
KUP-1010-B	5312983	10 mm ... 10 mm
KUP-1012-B	5312984	10 mm ... 12 mm

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

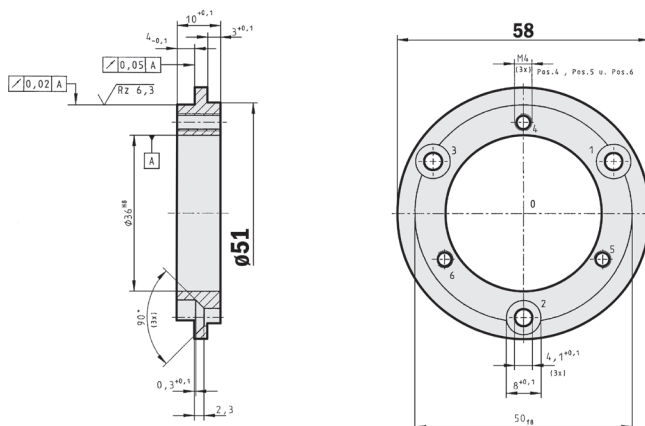
Type	Part no.	Shaft diameter
KUP-0610-F	5312985	6 mm ... 10 mm
KUP-1010-F	5312986	10 mm ... 10 mm



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

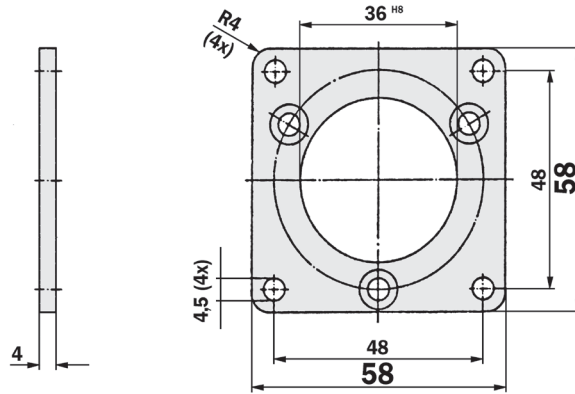


Dimensional drawings and ordering information

Mechanical Adapters

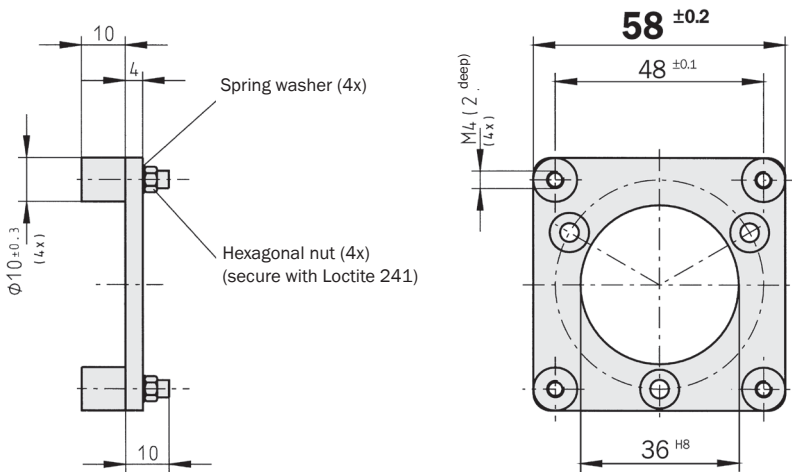
Adapter flange of aluminium for face mount flange, spigot 36 mm

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



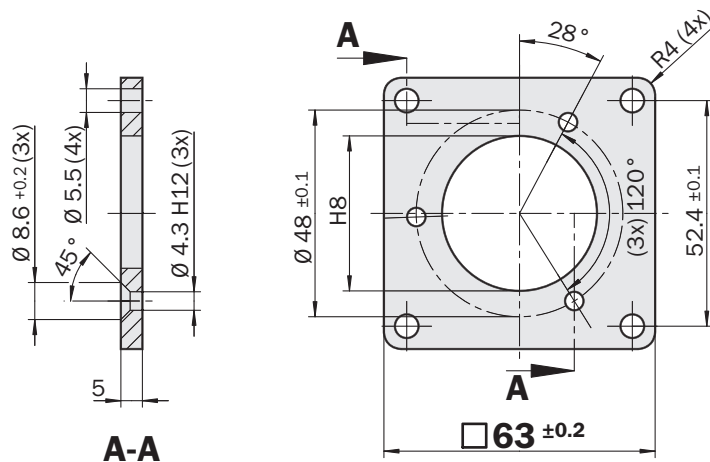
Adapter flange of aluminium for face mount flange, spigot 36 mm

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

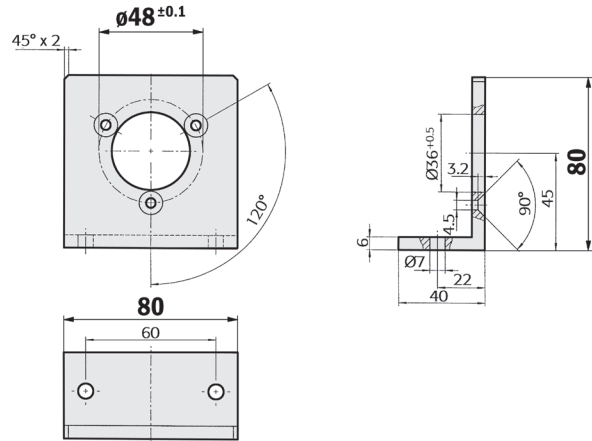
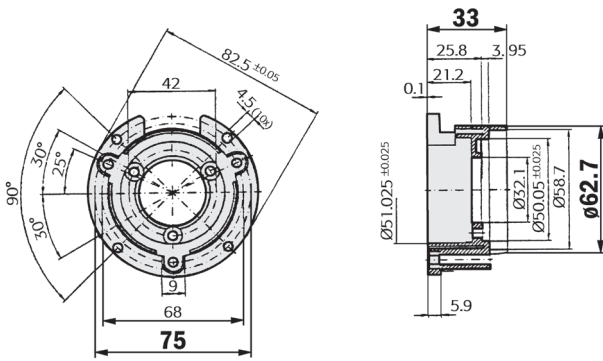
Mechanical Adapters

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

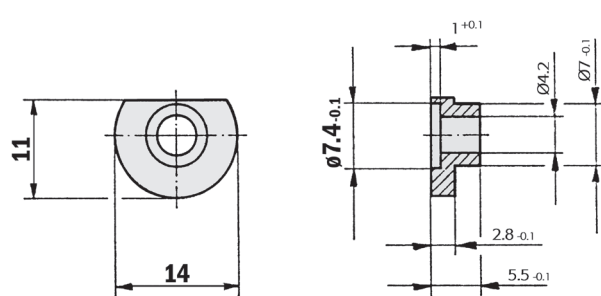
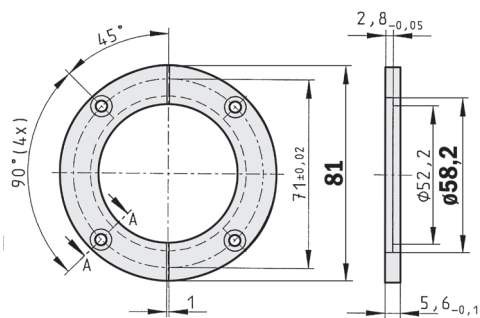


Servo clamps half ring, Set (comprises 2 pieces) for servo flanges with spigot diameter 50 mm

Type	Part no.
BEF-WG-SF050	2029165

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

Type	Part no.
BEF-WK-SF	2029166

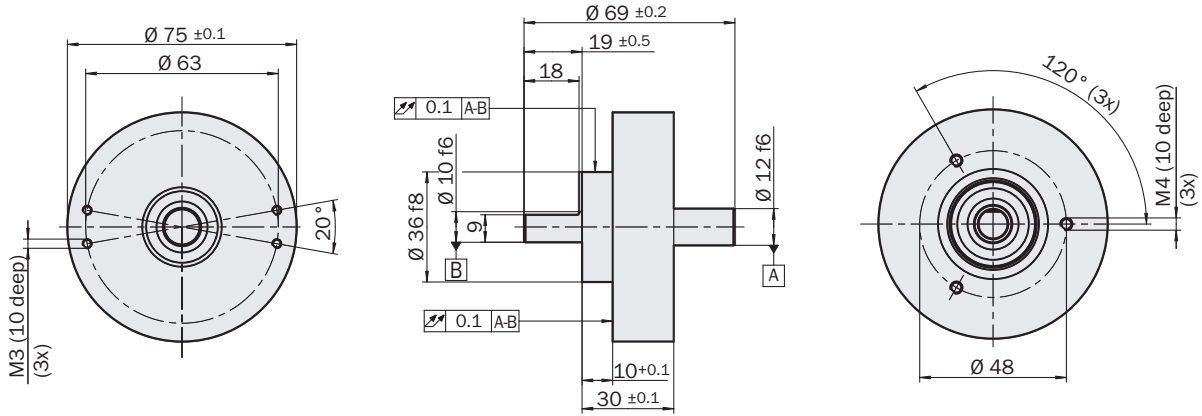


Dimensional drawings and ordering information

Mechanical Adapters

Heavy duty bearing block for very large radial and axial shaft loads

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

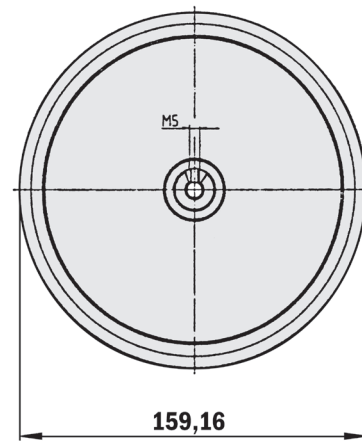
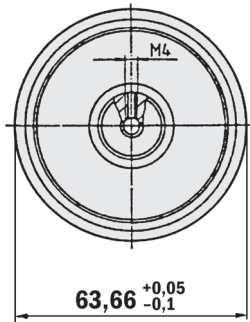


Measuring wheel for encoder shafts with diameter 10 mm, type material plastic (Hytrel), wheel material plastic with aluminium hub

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

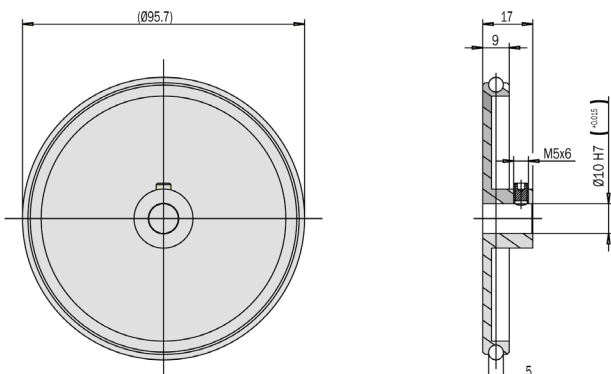
Measuring wheel for encoder shafts with diameter 10 mm, type material plastic (Hytrel), wheel material plastic with aluminium hub

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



Measuring wheel for encoder shafts with diameter 10 mm

Typ	Part no.	Circumference	Surface
BEF-MR-010030	2049278	0.3 m	O-Ring



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