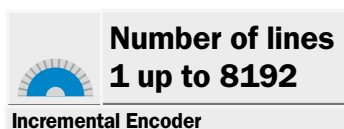


DRS 60: Incremental Encoders with Zero-Pulse-Teach



- Long LED lifetime as a result of automatic light regulation
- Maximum reliability as a result of opto-ASICs with Chip-on-Board technology
- Interchangeable collets for hollow shaft diameters from 6 to 15 mm and 1/4, 3/8, 1/2 inch.

Whether with face mount flange, servo flange, blind or through hollow shaft with connector or cable outlet, TTL or HTL interface - DRS 60 encoders will meet virtually any application profile.



CoreTech®
by **SICK** | **STEGMANN**

C

CoreTech technology permits tailor-made solutions for every application, due to its modular design. DRS 60 incremental encoders are available with any desired number of lines between 1 and 8,192. Further highlights of this generation of encoders:

- Simple zero-pulse-teach by pressing a button located under a cap on the rear of the encoder
- Excellent price/performance ratio

Thanks to this wide variety of products, there are numerous possible uses, for example in:

- machine tools
- textile machines
- woodworking machines
- packaging machines

SICK | **STEGMANN**

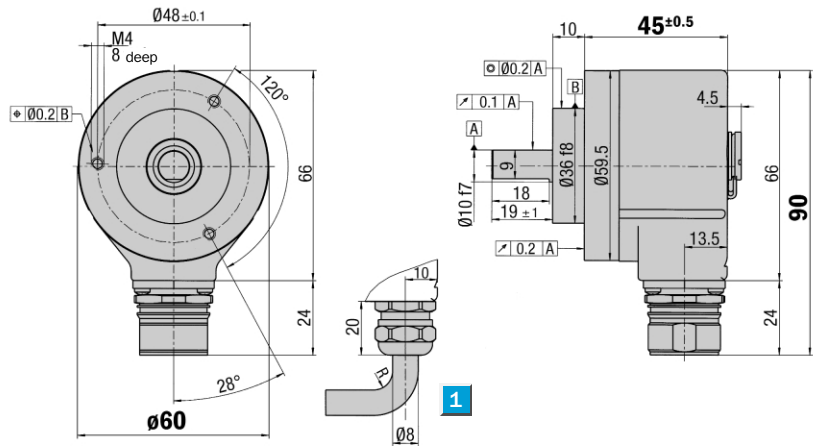


Number of lines
1 up to 8192

Incremental Encoder

- Connector or cable outlet
- Protection class up to IP 66
- Electrical Interfaces
TTL and HTL
- Zero-Pulse-Teach via pressing a button

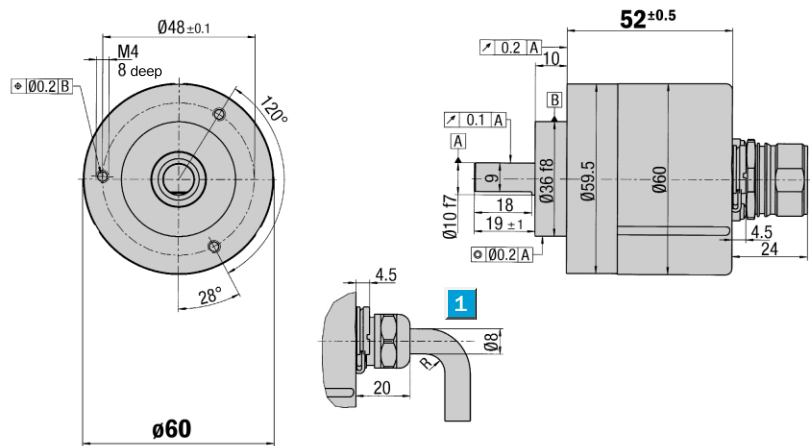
Dimensional drawing face mount flange radial



1 R = bending radius min. 40 mm

General tolerances according to DIN ISO 2768-mk

Dimensional drawing face mount flange axial

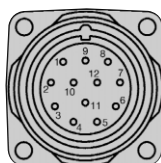


1 R = bending radius min. 40 mm

General tolerances according to DIN ISO 2768-mk

PIN- and wire allocation

PIN	Signal	Wire colour (Cable outlet)	Explanation
1	$\bar{B}$	black	Signal line
2	Sense +	grey	Connected internally to Us
3	Z	lilac	Signal line
4	$\bar{Z}$	yellow	Signal line
5	A	white	Signal line
6	$\bar{A}$	brown	Signal line
7	N.C.		Not connected
8	B	pink	Signal line
9	Screen		Housing potential
10	GND	blue	Zero volt connected to the encoder
11	Sense -	green	Connected internally to GND
12	Us	red	Supply voltage to the encoder ¹⁾



View of the connector M 23 fitted to the encoder body

¹⁾ Potential free to housing

Accessories

- Connection systems
- Mounting systems



Technical Data		DRS 60 face mount flange	Flange type									
			face m.									
Solid shaft	10 mm											
Number of lines per revolution	00001 up to 08192 see order info											
Electrical Interface	TTL / RS 422, 6-channel											
	HTL / push-pull, 6-channel											
Mass ¹⁾	approx. 0.3 kg											
Moment of inertia of the rotor	54 gcm ²											
Measuring step	90° / number of lines											
Reference signal												
Number	1											
Position ²⁾	90° or 180°											
Error limits												
binary number of lines	0.035°											
non-binary number of lines	0.046°											
Measuring step deviation												
binary number of lines	0.005°											
non-binary number of lines	0.016°											
Max. output frequency												
TTL	820 kHz											
HTL	200 kHz											
Operating torque max.												
with shaft seal	6,000 min ⁻¹											
without shaft seal ³⁾	10,000 min ⁻¹											
Max. angular acceleration	5 x 10 ⁵ rad/s ²											
Operating torque	typ. 0.3 Ncm											
Start up torque	typ. 0.4 Ncm											
Permissible shaft loading												
Radial	20 N											
Axial	10 N											
Bearing lifetime	3.6 x 10 ⁹ Revolutions											
Working temperature range	- 20° ... + 85° C											
Storage temperature range	- 40° ... + 100° C											
Permissible relative humidity ⁴⁾	90 %											
EMC ⁵⁾												
Resistance												
to shocks ⁶⁾	50 / 11 g/ms											
to vibration ⁷⁾	20 / 10 ... 150 g/Hz											
Protection class IEC 60529												
Connector outlet ⁸⁾	IP 65											
Cable outlet	IP 66											
Operating voltage range												
Load current TTL / RS 422, 4.5 ... 5.5 V	max. 20 mA											
TTL / RS 422, 10 ... 32 V	max. 20 mA											
HTL / push-pull, 10 ... 32 V	max. 60 mA											
No-load operating current												
at 10 ... 32 V	typ. 100 mA											
at 5 V	typ. 120 mA											
Operation of zero-set ⁹⁾	≥ 100 ms											
Initialisation time after power on	40 ms											

¹⁾ Concerning encoder with connector²⁾ electrical, logically linked to A and B³⁾ In case, that shaft seal has been removed by customer⁴⁾ Condensation not permitted⁵⁾ to DIN EN 61000-6-4 and DIN EN 61000-6-1⁶⁾ to DIN IEC 68 part 2-27⁷⁾ to DIN IEC 68 part 2-6⁸⁾ With mating connector fitted⁹⁾ only with shaft stationary



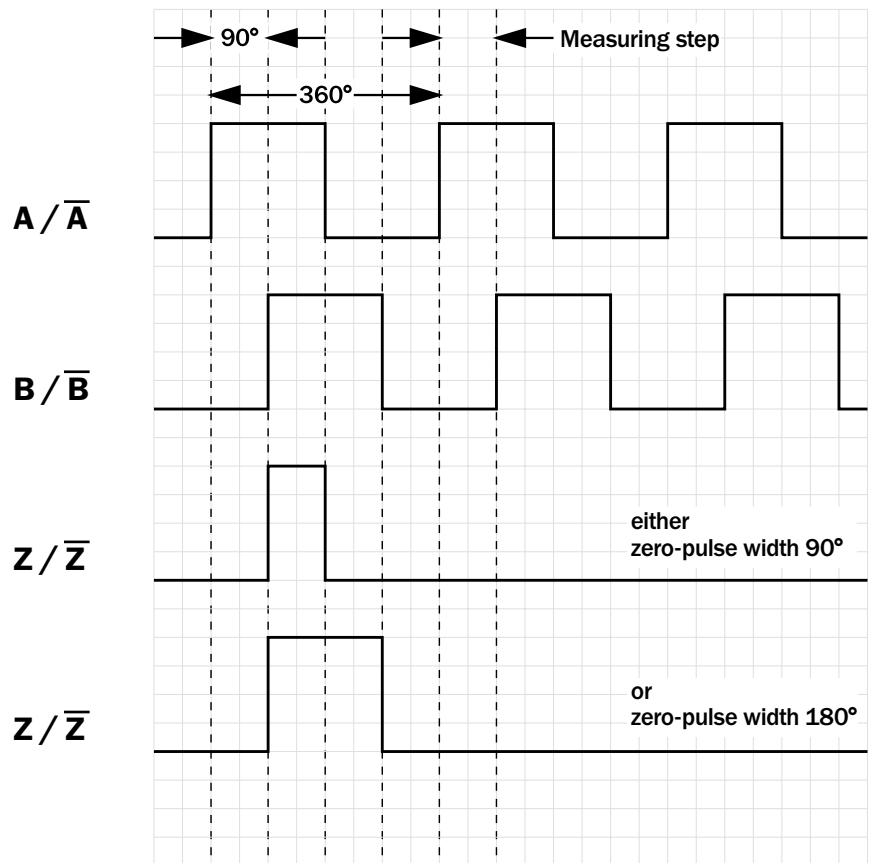
Number of lines
1 up to 8192

Incremental Encoder

- Connector or cable outlet
- Protection class up to IP 66
- Electrical Interfaces
TTL and HTL
- Zero-Pulse-Teach via pressing a button



Incremental pulse diagram

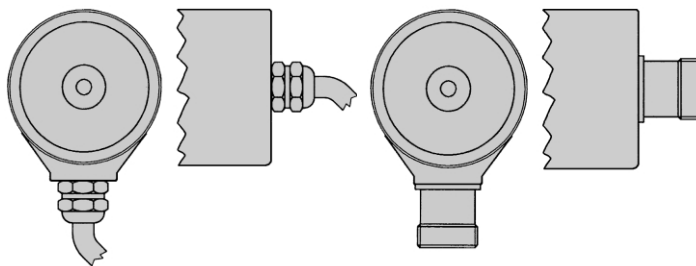


Electrical Interface

Supply voltage	4.5 ... 5.5 V	10 ... 32 V	10 ... 32 V
Interfaces/drivers	TTL (RS 422)	TTL (RS 422)	HTL (push-pull)

Connection type

Cable radial	Cable axial	Connector radial	Connector axial
--------------	-------------	------------------	-----------------



Accessories

- Connection systems
- Mounting systems



Order Information

Incremental Encoder DRS 60, face mount flange, solid 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
D	R	S	6	0	–								

Electrical Interface	Mechanical Interface	Connection type	Number of lines
4.5 ... 5.5 V, TTL/RS 422 Zero-pulse width 90° = A	Face mount flange, solid shaft 10 mm = 4	Connector M23, 12 pin, radial = A	Each number of lines from 00001 up to 08192 possible. Always 5 characters in clear text
4.5 ... 5.5 V, TTL/RS 422 Zero-pulse width 180° = B		Connector M23, 12 pin, axial = B	
10 ... 32 V, TTL/RS 422 Zero-pulse width 90° = C		Cable 11 core, radial 1.5 m = K	
10 ... 32 V, TTL/RS 422 Zero-pulse width 180° = D		Cable 11 core, radial 3 m = L	
10 ... 32 V, TTL/RS 422 Zero-pulse width 180° = D		Cable 11 core, radial 5 m = M	
10 ... 32 V, HTL/push-pull Zero-pulse width 90° = E		Cable 11 core, axial 1.5 m = R	
10 ... 32 V, HTL/push-pull Zero-pulse width 180° = F		Cable 11 core, axial 3 m = S	
		Cable 11 core, axial 5 m = T	

Order example Incremental Encoder DRS 60

4.5 ... 5.5 Volt, TTL/RS 422 zero-pulse width 90°; face mount flange; connector M23, 12 pin, radial; number of lines: 360

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
D	R	S	6	0	–	A	4	A	0	0	3	6	0

Please enter your individual encoder here

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
D	R	S	6	0	–								

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
D	R	S	6	0	–								

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
D	R	S	6	0	–								

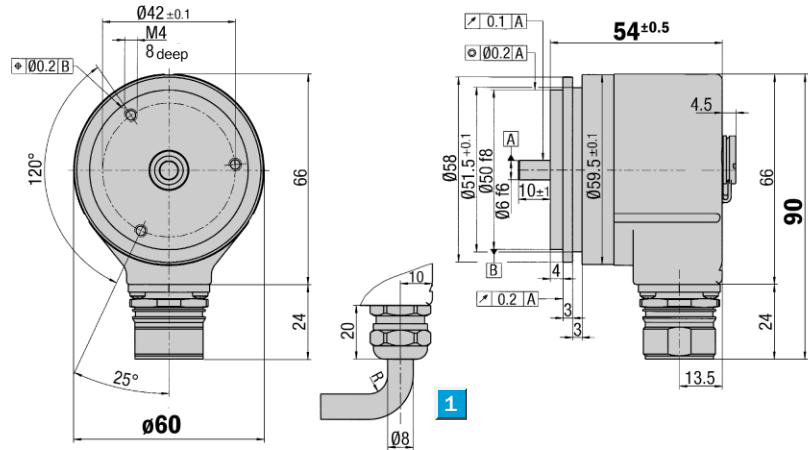


Number of lines
1 up to 8192

Incremental Encoder

- Connector or cable outlet
- Protection class up to IP 66
- Electrical Interfaces
TTL and HTL
- Zero-Pulse-Teach via pressing a button

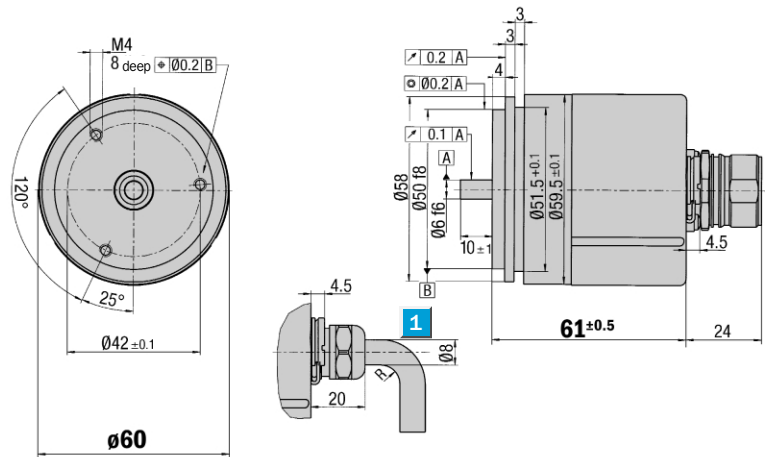
Dimensional drawing servo flange radial



1 R = bending radius min. 40 mm

General tolerances according to DIN ISO 2768-mk

Dimensional drawing servo flange axial

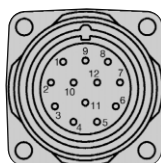


1 R = bending radius min. 40 mm

General tolerances according to DIN ISO 2768-mk

PIN- and wire allocation

PIN	Signal	Wire colour (Cable outlet)	Explanation
1	$\bar{B}$	black	Signal line
2	Sense +	grey	Connected internally to Us
3	Z	lilac	Signal line
4	$\bar{Z}$	yellow	Signal line
5	A	white	Signal line
6	$\bar{A}$	brown	Signal line
7	N.C.		Not connected
8	B	pink	Signal line
9	Screen		Housing potential
10	GND	blue	Zero volt connected to the encoder
11	Sense -	green	Connected internally to GND
12	Us	red	Supply voltage to the encoder ¹⁾



View of the connector M 23 fitted to the encoder body

¹⁾ Potential free to housing



Accessories

- Connection systems
- Mounting systems

Technical Data		DRS 60 servo flange		Flange type									
				servo									
Solid shaft	6 mm												
Number of lines per revolution	00001 up to 08192 see order info												
Electrical Interface	TTL / RS 422, 6-channel												
	HTL / push-pull, 6-channel												
Mass ¹⁾	approx. 0.3 kg												
Moment of inertia of the rotor	48 gcm ²												
Measuring step	90° / number of lines												
Reference signal													
Number	1												
Position ²⁾	90° or 180°												
Error limits													
binary number of lines	0.035°												
non-binary number of lines	0.046°												
Measuring step deviation													
binary number of lines	0.005°												
non-binary number of lines	0.016°												
Max. output frequency													
TTL	820 kHz												
HTL	200 kHz												
Operating torque max.													
with shaft seal	6.000 min ⁻¹												
without shaft seal ³⁾	10.000 min ⁻¹												
Max. angular acceleration	5 x 10 ⁵ rad/s ²												
Operating torque	typ. 0.2 Ncm												
Start up torque	typ. 0.25 Ncm												
Permissible shaft loading													
Radial	20 N												
Axial	10 N												
Bearing lifetime	3.6 x 10 ⁹ Revolutions												
Working temperature range	- 20° ... + 85° C												
Storage temperature range	- 40° ... + 100° C												
Permissible relative humidity ⁴⁾	90 %												
EMC ⁵⁾													
Resistance													
to shocks ⁶⁾	50 / 11 g/ms												
to vibration ⁷⁾	20 / 10 ... 150 g/Hz												
Protection class IEC 60529													
Connector outlet ⁸⁾	IP 65												
Cable outlet	IP 66												
Operating voltage range													
Load current TTL / RS 422, 4.5 ... 5.5V	max. 20 mA												
TTL / RS 422, 10 ... 32V	max. 20 mA												
HTL / push-pull, 10 ... 32V	max. 60 mA												
No-load operating current													
at 10 ... 32 V	typ. 100 mA												
at 5 V	typ. 120 mA												
Operation of zero-set ⁹⁾	≥ 100 ms												
Initialisation time after power on	40 ms												

¹⁾ Concerning encoder with connector²⁾ electrical, logically linked to A and B³⁾ In case, that shaft seal has been removed by customer⁴⁾ Condensation not permitted⁵⁾ to DIN EN 61000-6-4 and DIN EN 61000-6-1⁶⁾ to DIN IEC 68 part 2-27⁷⁾ to DIN IEC 68 part 2-6⁸⁾ With mating connector fitted⁹⁾ only with shaft stationary



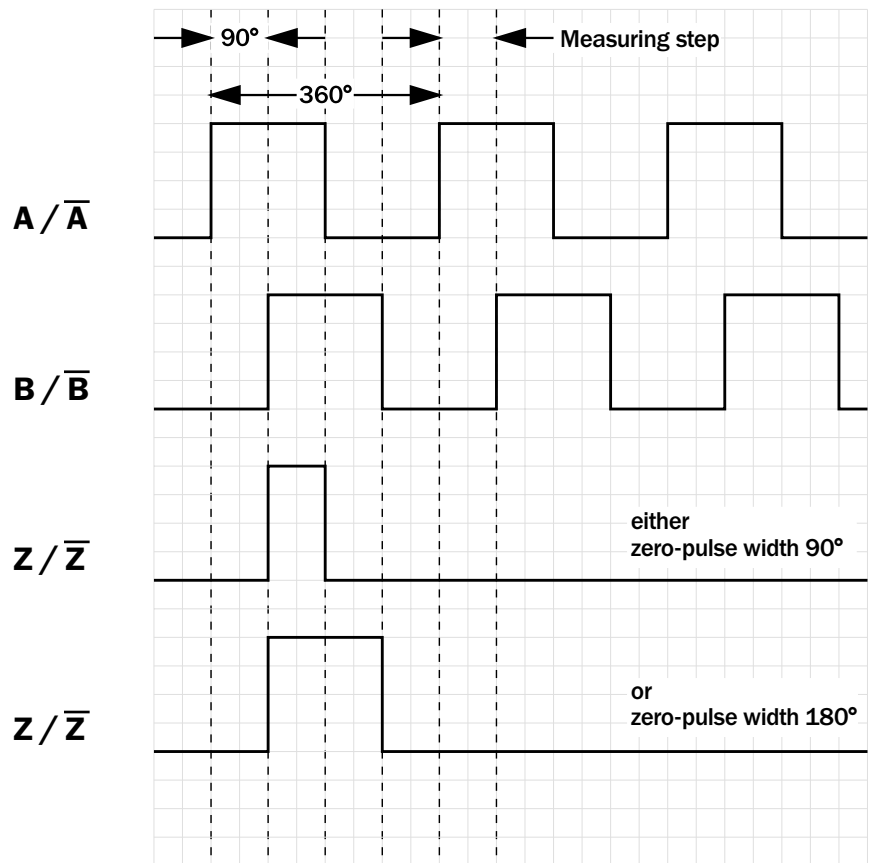
Number of lines
1 up to 8192

Incremental Encoder

- Connector or cable outlet
- Protection class up to IP 66
- Electrical Interfaces
TTL and HTL
- Zero-Pulse-Teach via pressing a button



Incremental pulse diagram

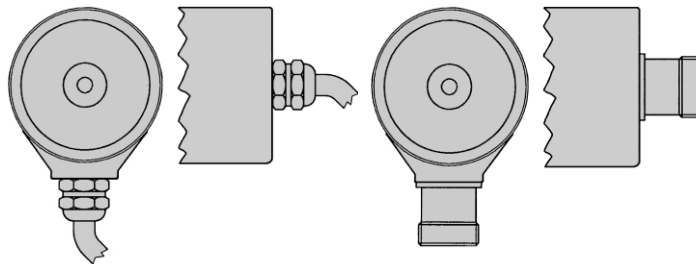


Electrical Interface

Supply voltage	4.5 ... 5.5 V	10 ... 32 V	10 ... 32 V
Interfaces/drivers	TTL (RS 422)	TTL (RS 422)	HTL (push-pull)

Connection type

Cable radial	Cable axial	Connector radial	Connector axial
--------------	-------------	------------------	-----------------



Accessories

- Connection systems
- Mounting systems



Order information

Incremental Encoder DRS 60, servo flange, solid 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
D	R	S	6	0	–								

Electrical Interface	Mechanical Interface	Connection type	Number of lines
4.5 ... 5.5 V, TTL/RS 422 Zero-pulse width 90° = A	Servo flange, solid shaft 6 mm = 1	Connector M23, 12 pin, radial = A	Each number of lines from 00001 up to 08192 possible. Always 5 characters in clear text
4.5 ... 5.5 V, TTL/RS 422 Zero-pulse width 180° = B		Connector M23, 12 pin, axial = B	
10 ... 32 V, TTL/RS 422 Zero-pulse width 90° = C		Cable 11 core, radial 1.5 m = K	
10 ... 32 V, TTL/RS 422 Zero-pulse width 180° = D		Cable 11 core, radial 3 m = L	
10 ... 32 V, TTL/RS 422 Zero-pulse width 180° = D		Cable 11 core, radial 5 m = M	
10 ... 32 V, HTL/push-pull Zero-pulse width 90° = E		Cable 11 core, axial 1.5 m = R	
10 ... 32 V, HTL/push-pull Zero-pulse width 90° = E		Cable 11 core, axial 3 m = S	
10 ... 32 V, HTL/push-pull Zero-pulse width 180° = F		Cable 11 core, axial 5 m = T	

Order example Incremental Encoder DRS 60

4.5 ... 5.5 Volt, TTL/RS 422 zero-pulse width 90°; servo flange; connector M23, 12 pin, radial; number of lines: 360

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
D	R	S	6	0	–	A	1	A	0	0	3	6	0

Please enter your individual encoder here

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
D	R	S	6	0	–								

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
D	R	S	6	0	–								

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
D	R	S	6	0	–								

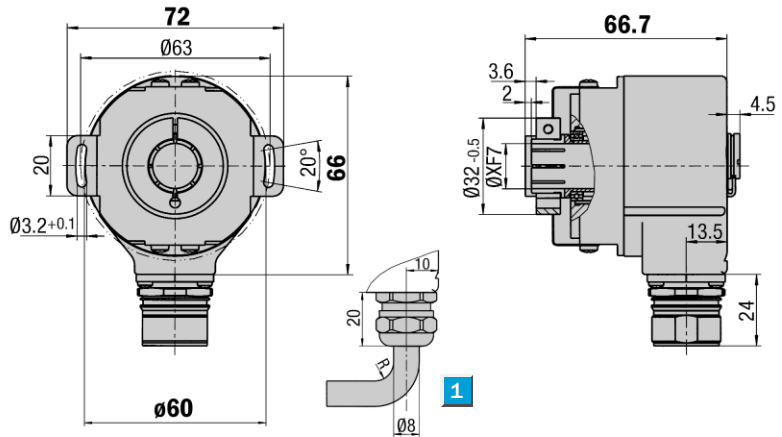


Number of lines
1 up to 8192

Incremental Encoder

- Connector or cable outlet
- Protection class up to IP 66
- Electrical Interfaces
TTL and HTL
- Zero-Pulse-Teach via pressing a button

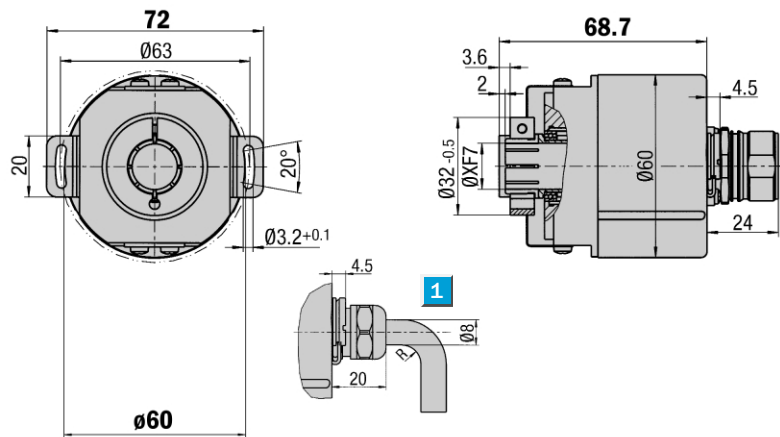
Dimensional drawing blind hollow shaft radial



1 R = bending radius min. 40 mm

General tolerances according to DIN ISO 2768-mk

Dimensional drawing blind hollow shaft axial

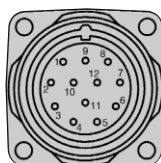


1 R = bending radius min. 40 mm

General tolerances according to DIN ISO 2768-mk

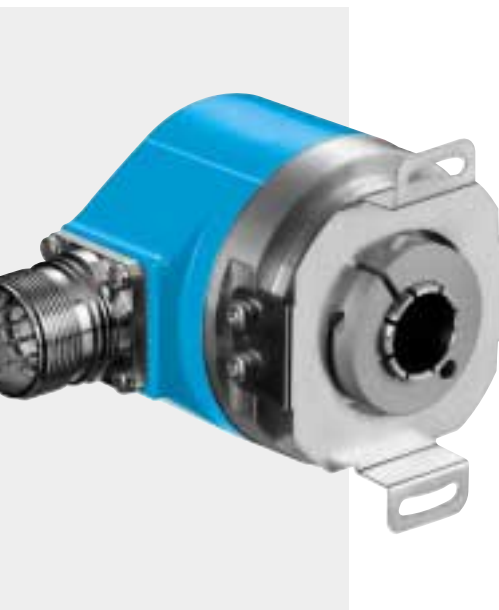
PIN- and wire allocation

PIN	Signal	Wire colour (Cable outlet)	Explanation
1	$\bar{B}$	black	Signal line
2	Sense +	grey	Connected internally to Us
3	Z	lilac	Signal line
4	$\bar{Z}$	yellow	Signal line
5	A	white	Signal line
6	$\bar{A}$	brown	Signal line
7	N.C.		Not connected
8	B	pink	Signal line
9	Screen		Housing potential
10	GND	blue	Zero volt connected to the encoder
11	Sense -	green	Connected internally to GND
12	Us	red	Supply voltage to the encoder ¹⁾



View of the connector M 23 fitted to the encoder body

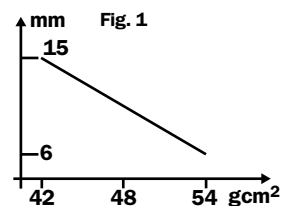
¹⁾ Potential free to housing



Accessories

- Connection systems
- Mounting systems
- Collets

Technical Data		DRS 60 blind hollow shaft									
		Flange type									
		blind									
Hollow shaft diameter	6, 8, 10, 12, 15 mm, 1/4", 3/8", 1/2"										
Number of lines per revolution	00001 up to 08192 see order info										
Electrical Interface	TTL / RS 422, 6-channel										
	HTL / push-pull, 6-channel										
Mass ¹⁾	approx. 0.3 kg										
Moment of inertia of the rotor	see Fig. 1										
Measuring step	90° / number of lines										
Reference signal											
Number	1										
Position ²⁾	90° or 180°										
Error limits											
binary number of lines	0.035°										
non-binary number of lines	0.046°										
Measuring step deviation											
binary number of lines	0.005°										
non-binary number of lines	0.016°										
Max. output frequency											
TTL	820 kHz										
HTL	200 kHz										
Operating torque max.	3.000 min ⁻¹										
Max. angular acceleration	5 x 10 ⁵ rad/s ²										
Operating torque	typ. 0.4 Ncm										
Start up torque	typ. 0.6 Ncm										
Permissible movement of the drive element											
Radial static / dynamic movement	± 0.3 / ± 0.1 mm										
Axial static / dynamic movement	± 0.5 / ± 0.2 mm										
Bearing lifetime	3.6 x 10 ⁹ Revolutions										
Working temperature range	- 20° ... + 85° C										
Storage temperature range	- 40° ... + 100° C										
Permissible relative humidity ⁴⁾	90 %										
EMC ⁴⁾											
Resistance											
to shocks ⁶⁾	50 / 11 g/ms										
to vibration ⁷⁾	20 / 10 ... 150 g/Hz										
Protection class IEC 60529											
Connector outlet ⁷⁾	IP 65										
Cable outlet	IP 66										
Operating voltage range											
Load current TTL / RS 422, 4.5 ... 5.5V	max. 20 mA										
TTL / RS 422, 10 ... 32V	max. 20 mA										
HTL / push-pull, 10 ... 32V	max. 60 mA										
No-load operating current											
at 10 ... 32 V	typ. 100 mA										
at 5 V	typ. 120 mA										
Operation of zero-set ⁹⁾	≥ 100 ms										
Initialisation time after power on	40 ms										

¹⁾ Concerning encoder with connector²⁾ electrical, logically linked to A and B³⁾ Condensation not permitted⁴⁾ to DIN EN 61000-6-4 and DIN EN 61000-6-1⁵⁾ to DIN IEC 68 part 2-27⁶⁾ to DIN IEC 68 part 2-6⁷⁾ With mating connector fitted⁸⁾ only with shaft stationary



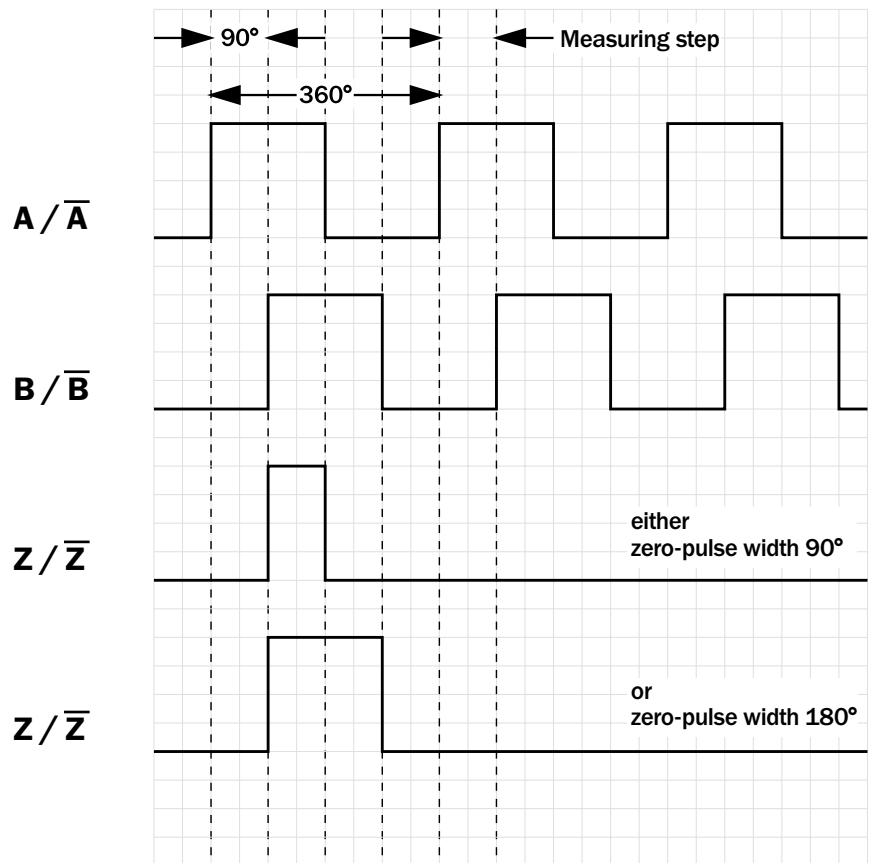
Number of lines
1 up to 8192

Incremental Encoder

- Connector or cable outlet
- Protection class up to IP 66
- Electrical Interfaces
TTL and HTL
- Zero-Pulse-Teach via pressing a button



Incremental pulse diagram

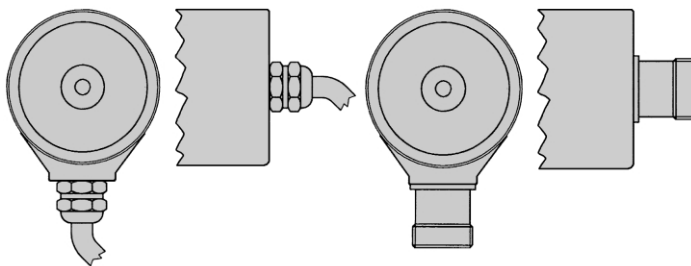


Electrical Interface

Supply voltage	4.5 ... 5.5 V	10 ... 32 V	10 ... 32 V
Interfaces/drivers	TTL (RS 422)	TTL (RS 422)	HTL (push-pull)

Connection type

Cable radial	Cable axial	Connector radial	Connector axial
--------------	-------------	------------------	-----------------



Accessories

- Connection systems
- Mounting systems
- Collets



Order information

Incremental Encoder DRS 60, 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
D	R	S	6	0	-								

Electrical Interface	Mechanical Interface	Connection type	Number of lines
4.5 ... 5.5 V, TTL/RS 422 Zero-pulse width 90° = A	Blind hollow shaft ¹⁾ = A	Connector M23, 12 pin, radial = A	Each number of lines from 00001 up to 08192 possible. Always 5 characters in clear text
4.5 ... 5.5 V, TTL/RS 422 Zero-pulse width 180° = B	¹⁾ Collets for 6, 8, 10, 12 mm and 1/4", 3/8" and 1/2" as accessories, separate order item (see below). For 15mm shaft diameter, collet is not needed.	Connector M23, 12 pin, axial = B	
10 ... 32 V, TTL/RS 422 Zero-pulse width 90° = C		Cable 11 core, radial 1.5 m = K	
10 ... 32 V, TTL/RS 422 Zero-pulse width 180° = D		Cable 11 core, radial 3 m = L	
10 ... 32 V, HTL/push-pull Zero-pulse width 90° = E		Cable 11 core, radial 5 m = M	
10 ... 32 V, HTL/push-pull Zero-pulse width 180° = F		Cable 11 core, axial 1.5 m = R	
		Cable 11 core, axial 3 m = S	
		Cable 11 core, axial 5 m = T	

Order example Incremental Encoder DRS 60

4.5 ... 5.5 Volt, TTL/RS 422 zero-pulse width 90°; blind hollow shaft; connector M23, 12 pin, radial; number of lines: 360

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
D	R	S	6	0	-	A	A	A	0	0	3	6	0

Please enter your individual encoder here

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
D	R	S	6	0	-								

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
D	R	S	6	0	-								

Point 1	Stelle 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
D	R	S	6	0	-								

Blind hollow shaft collets

Type	Part no.	Shaft diameter
SPZ-006-AD-A	2 029 174	6 mm
SPZ-1E4-AD-A	2 029 175	1/4"
SPZ-008-AD-A	2 029 176	8 mm
SPZ-3E8-AD-A	2 029 177	3/8"
SPZ-010-AD-A	2 029 178	10 mm
SPZ-012-AD-A	2 029 179	12 mm
SPZ-1E2-AD-A	2 029 180	1/2"

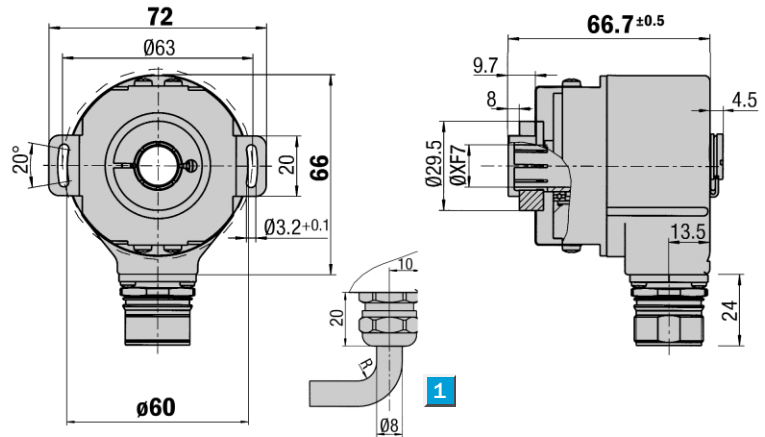


Number of lines
1 up to 8192

Incremental Encoder

- Connector or cable outlet
- Protection class up to IP 64
- Electrical Interfaces
TTL and HTL
- Zero-Pulse-Teach via pressing
a button

Dimensional drawing through hollow shaft radial



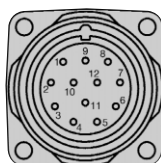
1 R = bending radius min. 40 mm

General tolerances according to DIN ISO 2768-mk



PIN- and wire allocation

PIN	Signal	Wire colour (Cable outlet)	Explanation
1	$\bar{B}$	black	Signal line
2	Sense +	grey	Connected internally to Us
3	Z	lilac	Signal line
4	$\bar{Z}$	yellow	Signal line
5	A	white	Signal line
6	$\bar{A}$	brown	Signal line
7	N.C.		Not connected
8	B	pink	Signal line
9	Screen		Housing potential
10	GND	blue	Zero volt connected to the encoder
11	Sense -	green	Connected internally to GND
12	Us	red	Supply voltage to the encoder ¹⁾



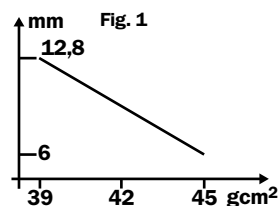
View of the connector M 23 fitted to the encoder body

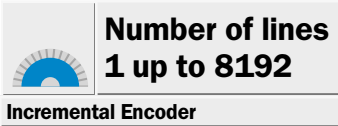
¹⁾ Potential free to housing

Accessories
Connection systems
Mounting systems
Collets



Technical Data		DRS 60 through hollow shaft									
		Flange type									
		through									
Hollow shaft diameter	6, 8, 10, 12 mm sowie 1/4", 3/8", 1/2"										
Number of lines per revolution	00001 up to 08192 see order info										
Electrical Interface	TTL / RS 422, 6-channel										
	HTL / push-pull, 6-channel										
Mass ¹⁾	approx. 0.3 kg										
Moment of inertia of the rotor	see Fig. 1										
Measuring step	90° / number of lines										
Reference signal											
Number	1										
Position ²⁾	90° or 180°										
Error limits											
binary number of lines	0.035°										
non-binary number of lines	0.046°										
Measuring step deviation											
binary number of lines	0.005°										
non-binary number of lines	0.016°										
Max. output frequency											
TTL	820 kHz										
HTL	200 kHz										
Operating torque max.	3.000 min ⁻¹										
Max. angular acceleration	5 x 10 ⁵ rad/s ²										
Operating torque	typ. 1.6 Ncm										
Start up torque	typ. 2.2 Ncm										
Permissible movement of the drive element											
Radial static / dynamic movement	± 0.3 / ± 0.1 mm										
Axial static / dynamic movement	± 0.5 / ± 0.2 mm										
Bearing lifetime	3.6 x 10 ⁹ Revolutions										
Working temperature range	- 20° ... + 85° C										
Storage temperature range	- 40° ... + 100° C										
Permissible relative humidity ⁴⁾	90 %										
EMC ⁴⁾											
Resistance											
to shocks ⁶⁾	50 / 11 g/ms										
to vibration ⁷⁾	20 / 10 ... 150 g/Hz										
Protection class IEC 60529											
Connector outlet ⁷⁾	IP 64										
Cable outlet	IP 64										
Operating voltage range											
Load current TTL / RS 422, 4.5 ... 5.5V	max. 20 mA										
TTL / RS 422, 10 ... 32V	max. 20 mA										
HTL / push-pull, 10 ... 32V	max. 60 mA										
No-load operating current											
at 10 ... 32 V	typ. 100 mA										
at 5 V	typ. 120 mA										
Operation of zero-set ⁹⁾	≥ 100 ms										
Initialisation time after power on	40 ms										

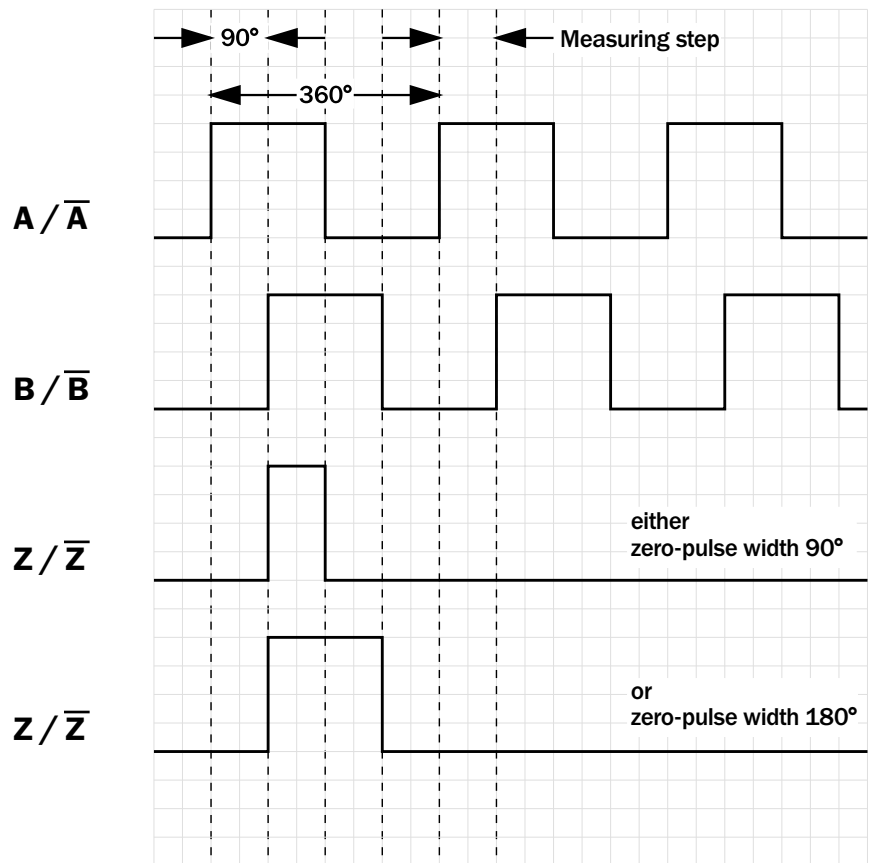
¹⁾ Concerning encoder with connector²⁾ electrical, logically linked to A and B³⁾ Condensation not permitted⁴⁾ to DIN EN 61000-6-4 and DIN EN 61000-6-1⁵⁾ to DIN IEC 68 part 2-27⁶⁾ to DIN IEC 68 part 2-6⁷⁾ With mating connector fitted⁸⁾ only with shaft stationary



- Connector or cable outlet
- Protection class up to IP 64
- Electrical Interfaces
TTL and HTL
- Zero-Pulse-Teach via pressing
a button



Incremental pulse diagram



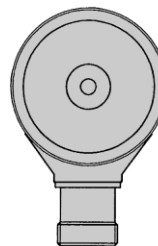
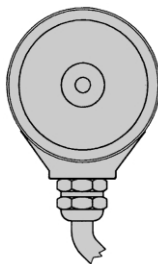
Electrical Interface

Supply voltage	4.5 ... 5.5 V	10 ... 32 V	10 ... 32 V
Interfaces/drivers	TTL (RS 422)	TTL (RS 422)	HTL (push-pull)

Connection type

Cable radial

Connector radial



Accessories

- Connection systems
- Mounting systems
- Collets



Order information

Incremental Encoder DRS 60, through hollow shaft

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point	Point 9	Point 10	Point 11	Point 12	Point 13	Point 14
D	R	S	6	0	–								

Electrical Interface	Mechanical Interface	Connection type	Number of lines
4.5 ... 5.5 V, TTL/RS 422 Zero-pulse width 90° = A	Through hollow shaft ¹⁾ = D	Connector M23, 12 pin, radial = A	Each number of lines from 00001 up to 08192 possible.
4.5 ... 5.5 V, TTL/RS 422 Zero-pulse width 180° = B	¹⁾ Collets for 6, 8, 10, 12 mm and 1/4", 3/8" and 1/2" as accessories, separate order item (see below).	Cable 11 core, radial 1.5 m = K	Always 5 characters in clear text
10 ... 32 V, TTL/RS 422 Zero-pulse width 90° = C		Cable 11 core, radial 3 m = L	
10 ... 32 V, TTL/RS 422 Zero-pulse width 180° = D		Cable 11 core, radial 5 m = M	
10 ... 32 V, HTL/push-pull Zero-pulse width 90° = E			
10 ... 32 V, HTL/push-pull Zero-pulse width 180° = F			

Order example Incremental Encoder DRS 60

4.5 ... 5.5 Volt, TTL/RS 422 Zero-pulse width 90°; through hollow shaft; connector M23, 12 pin, radial; number of lines: 360

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
D	R	S	6	0	–	A	D	A	0	0	3	6	0

Please enter your individual encoder here

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
D	R	S	6	0	–								

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
D	R	S	6	0	–								

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
D	R	S	6	0	–								

Through hollow shaft collets

Type	Part no.	Shaft diameter
SPZ-006-AD-D	2 029 192	6 mm
SPZ-1E4-AD-D	2 029 193	1/4"
SPZ-008-AD-D	2 029 194	8 mm
SPZ-3E8-AD-D	2 029 195	3/8"
SPZ-010-AD-D	2 029 196	10 mm
SPZ-012-AD-D	2 029 197	12 mm
SPZ-1E2-AD-D	2 029 198	1/2"

Dimensional drawings and order information

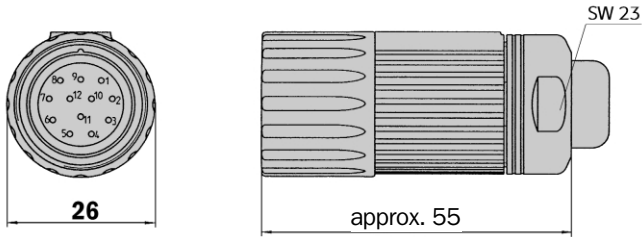
Screw-in system M 23, 12 pin

Cable connector M 23 female, 12-pin, straight, screened

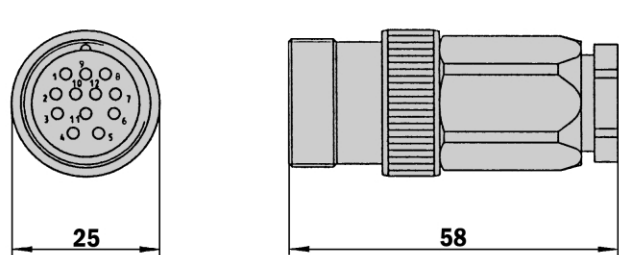
Type	Part no.	Contacts
DOS-2312-G	6 027 538	12

Cable connector M 23 , 12 pin, straight, screened

Type	Part no.	Contacts
STE-2312-G	6 027 537	12



General tolerances according to DIN ISO 2768-mk



General tolerances according to DIN ISO 2768-mk

Connector M 23 female, 12-pin, straight, cable 12-cores, 4x2x0.25 + 2x0.5 + 2x0.14 mm² with screening, capable of being dragged, cable diameter 7.8 mm

Type	Part no.	Contacts	Cable length
DOL-2312-G1M5MA3	2 029 212	12	1.5 m
DOL-2312-G03MMA3	2 029 213	12	3.0 m
DOL-2312-G05MMA3	2 029 214	12	5.0 m
DOL-2312-G10MMA3	2 029 215	12	10.0 m
DOL-2312-G20MMA3	2 029 216	12	20.0 m
DOL-2312-G30MMA3	2 029 217	12	30.0 m

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

Type	Part no.	Wires
LTG-2308-MW	6 027 529	8

Cable 11-core, per meter, 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	6 027 530	11

Cable 12 core, per meter, 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	6 027 531	12

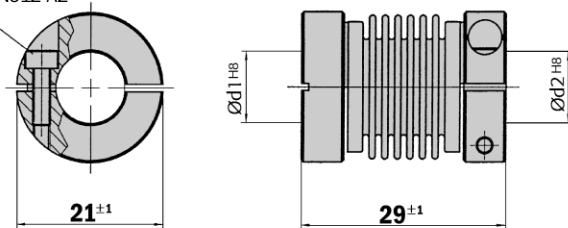
Dimensional drawings and order information

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	5 312 981	6 mm - 6 mm
KUP-0610-B	5 312 982	6 mm - 10 mm
KUP-1010-B	5 312 983	10 mm - 10 mm
KUP-1012-B	5 312 984	10 mm - 12 mm

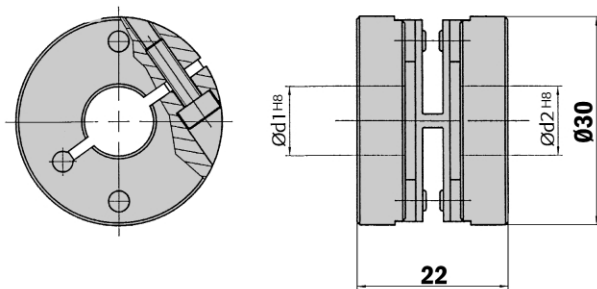
cheese-head screw
M2,5x8 DIN912 A2



General tolerances according to DIN ISO 2768-mk

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	5 312 985	6 mm - 10 mm
KUP-1010-F	5 312 986	10 mm - 10 mm



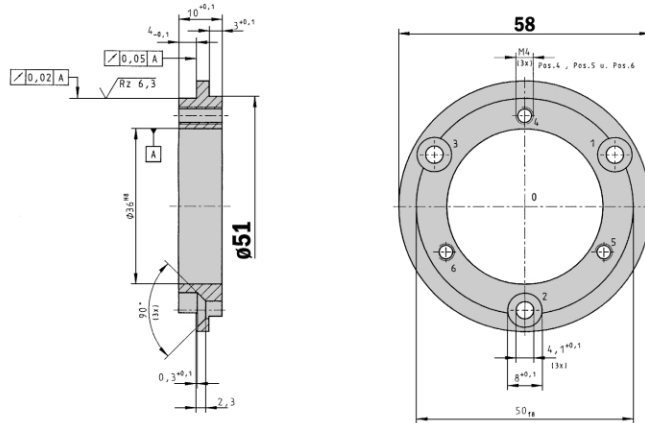
General tolerances according to DIN ISO 2768-mk

Dimensional drawings and order information

Mechanical Adaptors

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

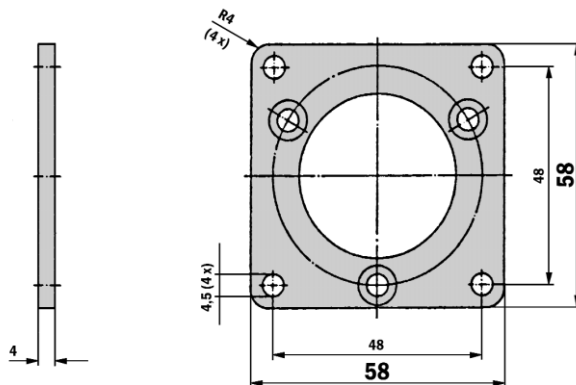
Type	Part no.	Adaption
BEF-FA-036-050	2 029 160	to 50 mm servo flange



General tolerances according to DIN ISO 2768-mk

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

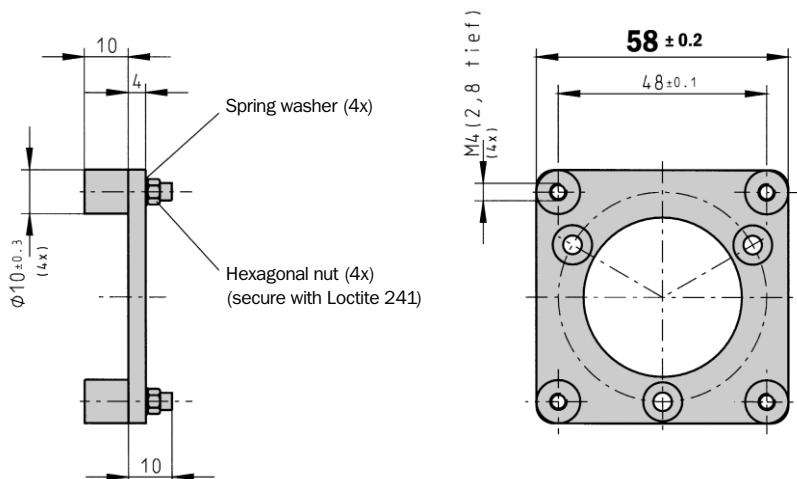
Type	Part no.	Adaption
BEF-FA-036-060REC	2 029 162	to 60 mm square mounting plate



General tolerances according to DIN ISO 2768-mk

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

Type	Part no.	Adaption
BEF-FA-036-060RSA	2 029 163	to 60 mm square mounting plate with shock absorbers



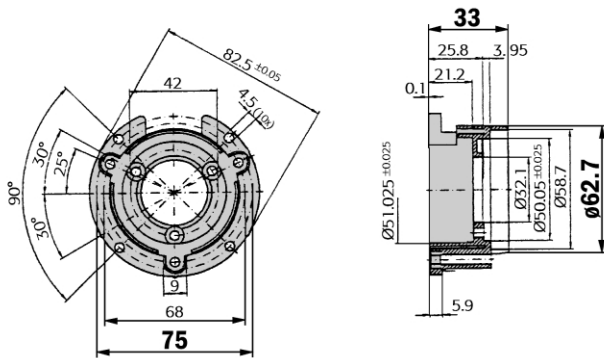
General tolerances according to DIN ISO 2768-mk

Dimensional drawings and order information

Mechanical Adaptors

Mounting bell incl. fixing set for encoder with servo flange

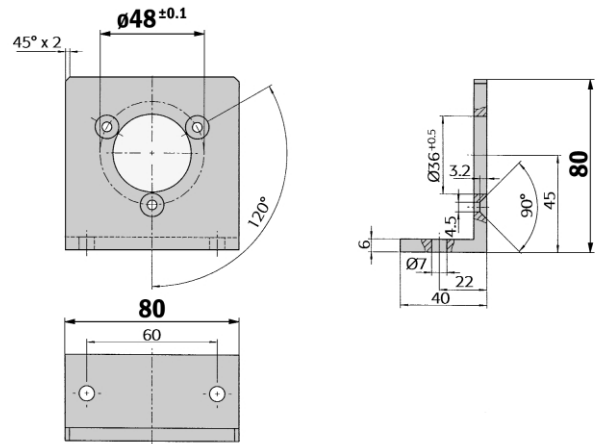
Type	Part no.	Flange spigot
BEF-MG-50	5 312 987	Diameter 50 mm



General tolerances according to DIN ISO 2768-mk

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

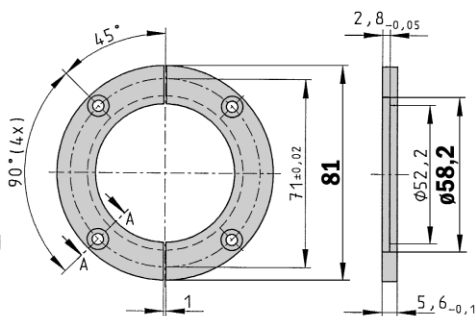
Type	Part no.	Flange spigot
BEF-WF-36	2 029 164	Diameter 36 mm



General tolerances according to DIN ISO 2768-mk

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

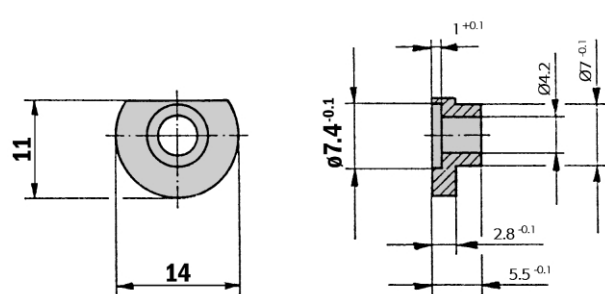
Type	Part no.
BEF-WG-SF050	2 029 165



General tolerances according to DIN ISO 2768-mk

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

Type	Part no.
BEF-WK-SF	2 029 166



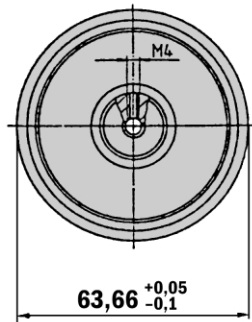
General tolerances according to DIN ISO 2768-mk

Dimensional drawings and order information

Mechanical Adaptors

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

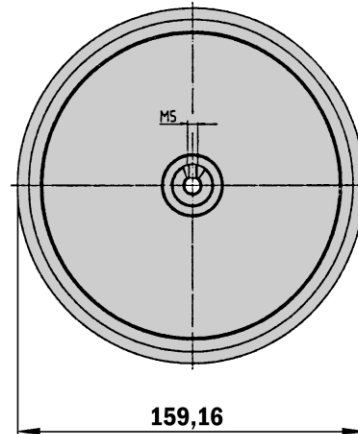
Type	Part no.	Circumference
BEF-MR-010020	5 312 988	0.2 m



General tolerances according to DIN ISO 2768-mk

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

Type	Part no.	Circumference
BEF-MR-010050	5 312 989	0.5 m



General tolerances according to DIN ISO 2768-mk

Collets

Collets for blind hollow shaft encoder

Type	Part no.	Shaft diameter
SPZ-006-AD-A	2 029 174	6 mm
SPZ-1E4-AD-A	2 029 175	1/4"
SPZ-008-AD-A	2 029 176	8 mm
SPZ-3E8-AD-A	2 029 177	3/8"
SPZ-010-AD-A	2 029 178	10 mm
SPZ-012-AD-A	2 029 179	12 mm
SPZ-1E2-AD-A	2 029 180	1/2"

Collets for through hollow shaft encoder

Type	Part no.	Shaft diameter
SPZ-006-AD-D	2 029 192	6 mm
SPZ-1E4-AD-D	2 029 193	1/4"
SPZ-008-AD-D	2 029 194	8 mm
SPZ-3E8-AD-D	2 029 195	3/8"
SPZ-010-AD-D	2 029 196	10 mm
SPZ-012-AD-D	2 029 197	12 mm
SPZ-1E2-AD-D	2 029 198	1/2"

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