


ARS 60: Absolute Encoders Singleturn. Modular Design for tailor-made solutions.

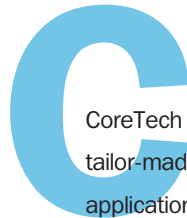


- Excellent price/performance ratio
- Long LED lifetime as a result of automatic light regulation
- Maximum reliability as a result of opto-ASICs with Chip-on-Board technology
- Interchangeable collets for hollow shaft diameters from 6 to 15 mm and 1/4, 3/8, 1/2 inch.

Whether with face mount flange, servo flange, blind or through hollow shaft with connector or cable outlet, SSI or Parallel interface – ARS 60 absolute singleturn encoders will meet virtually any application profile.

| | |
|---|--|
|  | Number of steps 2 to 32,768 |
| Absolute Encoder Singleturn | |

CoreTech[®]
by **SICK** | **STEGMANN**




CoreTech technology permits tailor-made solutions for every application, due to its modular design. ARS 60 absolute encoders singleturn are available with any desired number of steps between 2 und 32,768. Further highlights of this generation of encoders:

- Simple zero adjustment by pressing a button located under a cap on the rear of the encoder or remotely via a signal line.

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

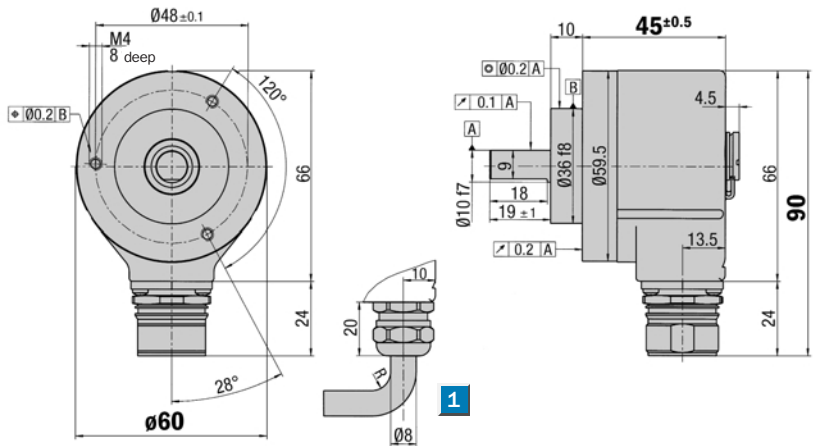
- machine tools
- textile machines
- woodworking machines
- packaging machines

 **Number of steps**
2 to 32,768

Absolute Encoder Singleturn

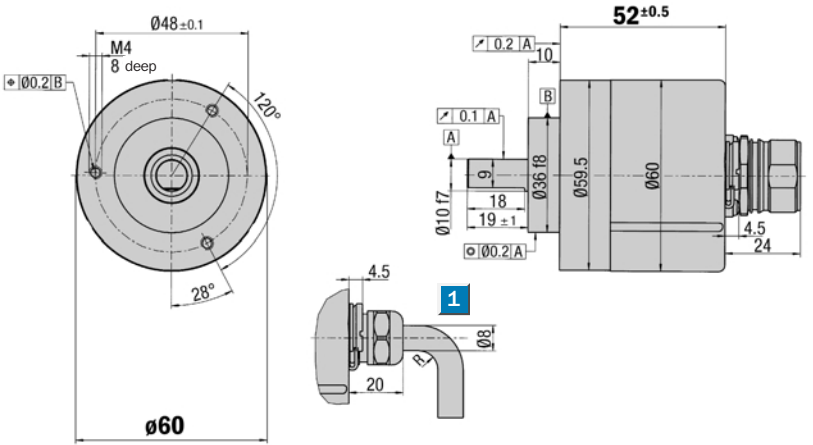
- Connector or cable outlet
- Protection class up to IP 66
- Electrical Interfaces
SSI or Parallel
- Zero adjustment directly on
the encoder or via a remote line

Dimensional drawing face mount flange radial exit



1 R = bending radius min. 40 mm General tolerances according to DIN ISO 2768-mk

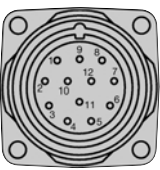
Dimensional drawing face mount flange axial exit



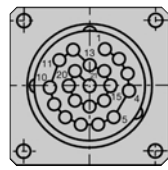
1 R = bending radius min. 40 mm General tolerances according to DIN ISO 2768-mk



PIN and wire allocation see page 18



View of the connector M23 fitted to the encoder body SSI

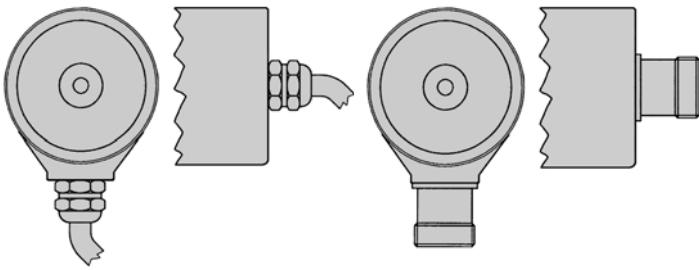


View of the connector M23 fitted to the encoder body Single, Parallel

| Accessories |
|--------------------|
| Connection systems |
| Mounting systems |
| Adaptor modules |

Connection type

| | | | |
|--------------|-------------|------------------|-----------------|
| Radial cable | Axial cable | Radial connector | Axial connector |
|--------------|-------------|------------------|-----------------|



| Technical Data acc. to DIN 32878 | | ARS 60 face mount flange | Flange type | | | | | | | | | | | |
|--|--|--------------------------|-------------|--|--|--|--|--|--|--|--|--|--|--|
| | | | face m. | | | | | | | | | | | |
| Solid shaft | 10 mm | | | | | | | | | | | | | |
| Number of steps per revolution | 00002 ... 32,768, see ordering information | | | | | | | | | | | | | |
| Electrical interfaces | SSI or Parallel | | | | | | | | | | | | | |
| Mass ¹⁾ | Approx. 0.3 kg | | | | | | | | | | | | | |
| Moment of inertia of the rotor | 54 gcm ² | | | | | | | | | | | | | |
| Code direction ²⁾ | CW | | | | | | | | | | | | | |
| Measurement range | 1 revolution | | | | | | | | | | | | | |
| Measuring step | 360°/number of steps | | | | | | | | | | | | | |
| Repeatability | 0.005° | | | | | | | | | | | | | |
| Error limits | | | | | | | | | | | | | | |
| binary number of steps | 0.035° | | | | | | | | | | | | | |
| non-binary number of steps | 0.046° | | | | | | | | | | | | | |
| Measuring step deviation | | | | | | | | | | | | | | |
| binary number of steps | 0.005° | | | | | | | | | | | | | |
| non-binary number of steps | 0.016° | | | | | | | | | | | | | |
| Measured value backlash | 0.005° | | | | | | | | | | | | | |
| Response threshold | 0.003° | | | | | | | | | | | | | |
| Max. angular acceleration | 5 x 10 ⁵ rad/s ² | | | | | | | | | | | | | |
| Max. operating speed | | | | | | | | | | | | | | |
| with shaft seal | 6,000 min ⁻¹ | | | | | | | | | | | | | |
| without shaft seal ³⁾ | 10,000 min ⁻¹ | | | | | | | | | | | | | |
| 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 ... 2000 g/Hz | | | | | | | | | | | | | |
| Protection class acc. IEC 60529 | | | | | | | | | | | | | | |
| connector outlet ⁸⁾ | IP 65 | | | | | | | | | | | | | |
| cable outlet | IP 66 | | | | | | | | | | | | | |
| Operating voltage range (U_s) | 10 ... 32 V | | | | | | | | | | | | | |
| Operating current | | | | | | | | | | | | | | |
| SSI | Typ. 60 mA | | | | | | | | | | | | | |
| Parallel | Typ. 90 mA | | | | | | | | | | | | | |
| Switching level of the control inputs | | | | | | | | | | | | | | |
| | Logic H = 0.7 x U _s | | | | | | | | | | | | | |
| | Logic L = 0 V ... 0.3 x U _s | | | | | | | | | | | | | |
| Operation of zero-set ⁹⁾ | ≥ 100 ms | | | | | | | | | | | | | |
| Initialisation time after power on | 40 ms | | | | | | | | | | | | | |

¹⁾ For an encoder with connector outlet

²⁾ Increasing when viewing the clockwise rotating shaft

³⁾ If the shaft seal has been removed by the customer

⁴⁾ Condensation not permitted

⁵⁾ To DIN EN 61000-6-2 and DIN EN 61000-6-3

⁶⁾ To DIN EN 60068-2-27

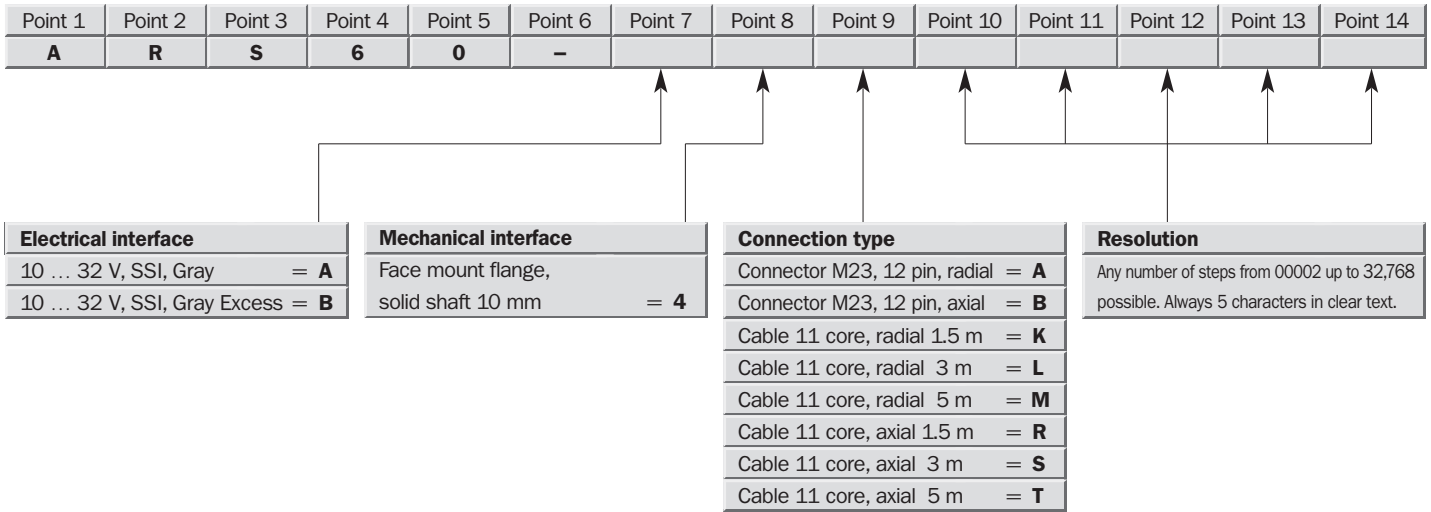
⁷⁾ To DIN EN 60068-2-6

⁸⁾ With mating connector fitted

⁹⁾ Only with shaft stationary (note initialisation time)

Order information SSI interface

Absolute Encoder Singleturn ARS 60 SSI, face mount flange, solid shaft 10 mm



Order example: Absolute Encoder Singleturn ARS 60 SSI

10 ... 32 V, SSI, Gray; face mount flange; connector M23, 12 pin, radial; number of steps: 8,192

| | | | | | | | | | | | | | |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 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 |
| A | R | S | 6 | 0 | - | A | 4 | A | 0 | 8 | 1 | 9 | 2 |

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 |
| A | 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 |
| A | 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 |
| A | R | S | 6 | 0 | - | | | | | | | | |

Order information Parallel interface

Absolute Encoder Singleturn ARS 60 Parallel, face mount flange, solid shaft 10 mm

| | | | | | | | | | | | | | |
|----------|----------|----------|----------|----------|----------|---------|---------|---------|----------|----------|----------|----------|----------|
| 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 |
| A | R | S | 6 | 0 | - | | | | | | | | |

| Electrical interface | |
|----------------------------------|------------|
| 10 ... 32 V, parallel, Gray | = F |
| 10 ... 32 V, parallel, Gray Exc. | = G |
| 10 ... 32 V, parallel, BIN | = H |
| 10 ... 32 V, parallel, BCD | = J |

| Mechanical interface | |
|---|------------|
| Face mount flange, solid shaft 10 mm | = 4 |

| Connection type | |
|-------------------------------|------------|
| Connector M23, 21 pin, radial | = A |
| Connector M23, 21 pin, axial | = B |
| Cable 22 core, radial 1.5 m | = K |
| Cable 22 core, radial 3 m | = L |
| Cable 22 core, radial 5 m | = M |
| Cable 22 core, axial 1.5 m | = R |
| Cable 22 core, axial 3 m | = S |
| Cable 22 core, axial 5 m | = T |

| Resolution | |
|---|--|
| Any number of steps from 00002 up to 32,768 possible, with the following electrical interfaces: | |
| 10 ... 32 V, parallel, Gray | |
| 10 ... 32 V, parallel, Gray Excess | |
| 10 ... 32 V, parallel, BIN | |
| Number of steps from 00002 up to 07999 possible, with the electrical interface: | |
| 10 ... 32 V, parallel, BCD | |
| Always 5 characters in clear text. | |

Order example: Absolute Encoder Singleturn ARS 60 Parallel

10 ... 32 V, Parallel, Gray; face mount flange; connector M23, 21 pin, radial; number of steps: 8,192


| | | | | | | | | | | | | | |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 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 |
| A | R | S | 6 | 0 | - | F | 4 | A | 0 | 8 | 1 | 9 | 2 |

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 |
| A | R | S | 6 | 0 | - | | | | | | | | |

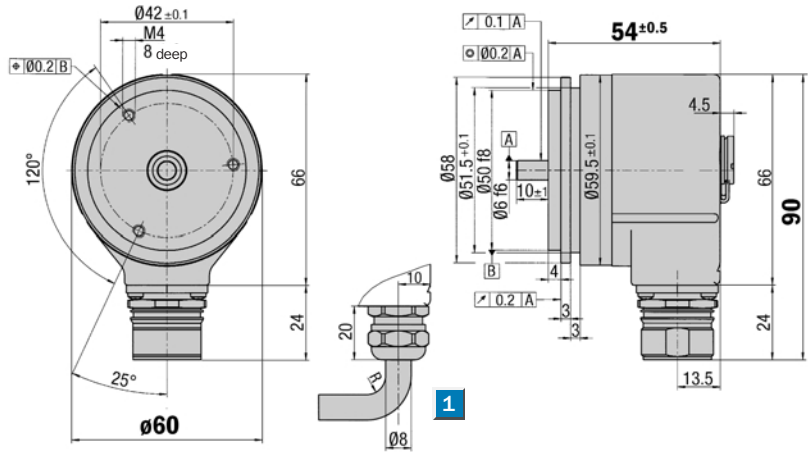
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|----------|----------|----------|----------|----------|----------|---------|---------|---------|----------|----------|----------|----------|----------|
| Point 1 | Point 2 | Point 3 | Point 4 | Point 5 | Point 6 | Point 7 | Point 8 | Point 9 | Point 10 | Point 11 | Point 12 | Point 13 | Point 14 |
| A | R | S | 6 | 0 | - | | | | | | | | |

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|----------|----------|----------|----------|----------|----------|---------|---------|---------|----------|----------|----------|----------|----------|
| 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 |
| A | R | S | 6 | 0 | - | | | | | | | | |

 **Number of steps**
2 to 32,768
Absolute Encoder Singleturn

- Connector or cable outlet
- Protection class up to IP 66
- Electrical Interfaces
SSI or Parallel
- Zero adjustment directly on
the encoder or via a remote line

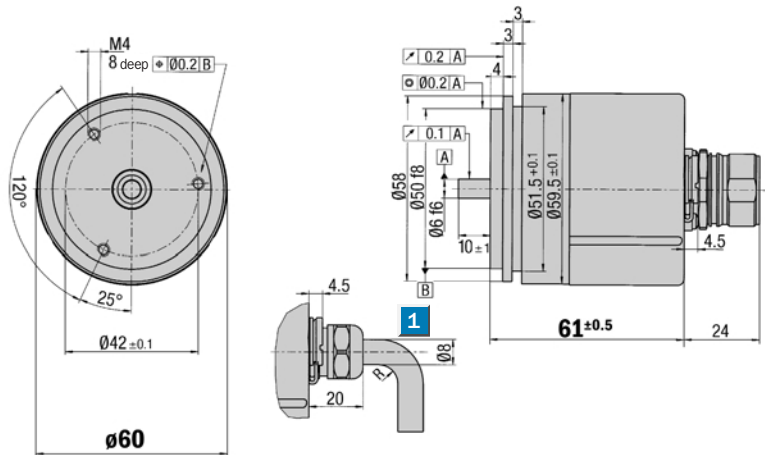
Dimensional drawing servo flange radial exit



1 R = bending radius min. 40 mm

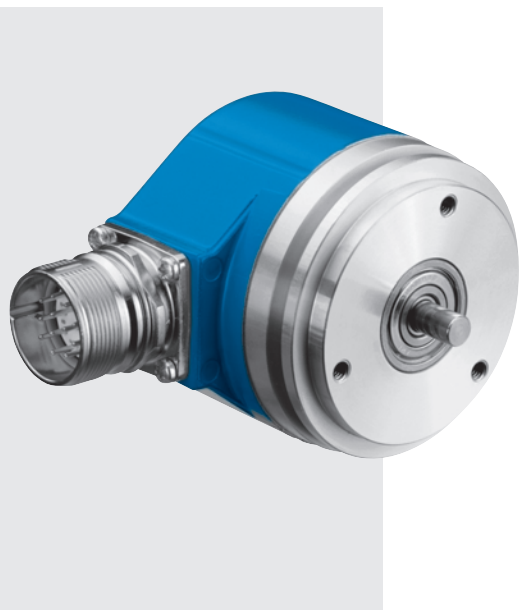
General tolerances according to DIN ISO 2768-mk

Dimensional drawing servo flange axial exit

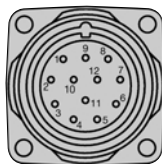


1 R = bending radius min. 40 mm

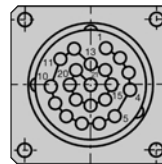
General tolerances according to DIN ISO 2768-mk



PIN and wire allocation see page 18



View of the connector M23 fitted to the encoder body SSI



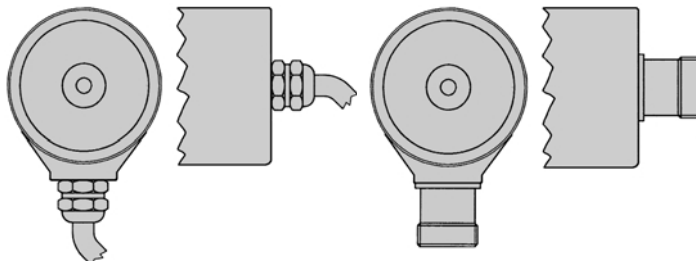
View of the connector M23 fitted to the encoder body Single, Parallel

Accessories

- Connection systems
- Mounting systems
- Adaptor modules

Connection type

- Radial cable
- Axial cable
- Radial connector
- Axial connector



| Technical Data acc. to DIN 32878 | | ARS 60 servo flange | Flange type | | | | | | | | | | | |
|--|--|---------------------|-------------|--|--|--|--|--|--|--|--|--|--|--|
| | | | servo | | | | | | | | | | | |
| Solid shaft | 6 mm | | | | | | | | | | | | | |
| Number of steps per revolution | 00002 ... 32,768, see ordering information | | | | | | | | | | | | | |
| Electrical interfaces | SSI or Parallel | | | | | | | | | | | | | |
| Mass ¹⁾ | Approx. 0.3 kg | | | | | | | | | | | | | |
| Moment of inertia of the rotor | 48 gcm ² | | | | | | | | | | | | | |
| Code direction ²⁾ | CW | | | | | | | | | | | | | |
| Measurement range | 1 revolution | | | | | | | | | | | | | |
| Measuring step | 360°/number of steps | | | | | | | | | | | | | |
| Repeatability | 0.005° | | | | | | | | | | | | | |
| Error limits | | | | | | | | | | | | | | |
| binary number of steps | 0.035° | | | | | | | | | | | | | |
| non-binary number of steps | 0.046° | | | | | | | | | | | | | |
| Measuring step deviation | | | | | | | | | | | | | | |
| binary number of steps | 0.005° | | | | | | | | | | | | | |
| non-binary number of steps | 0.016° | | | | | | | | | | | | | |
| Measured value backlash | 0.005° | | | | | | | | | | | | | |
| Response threshold | 0.003° | | | | | | | | | | | | | |
| Max. angular acceleration | 5 x 10 ⁵ rad/s ² | | | | | | | | | | | | | |
| Max. operating speed | | | | | | | | | | | | | | |
| with shaft seal | 6,000 min ⁻¹ | | | | | | | | | | | | | |
| without shaft seal ³⁾ | 10,000 min ⁻¹ | | | | | | | | | | | | | |
| 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 ... 2000 g/Hz | | | | | | | | | | | | | |
| Protection class acc. IEC 60529 | | | | | | | | | | | | | | |
| connector outlet ⁸⁾ | IP 65 | | | | | | | | | | | | | |
| cable outlet | IP 66 | | | | | | | | | | | | | |
| Operating voltage range (U_s) | 10 ... 32 V | | | | | | | | | | | | | |
| Operating current | | | | | | | | | | | | | | |
| SSI | Typ. 60 mA | | | | | | | | | | | | | |
| Parallel | Typ. 90 mA | | | | | | | | | | | | | |
| Switching level of the control inputs | | | | | | | | | | | | | | |
| | Logic H = 0.7 x U _s | | | | | | | | | | | | | |
| | Logic L = 0 V ... 0.3 x U _s | | | | | | | | | | | | | |
| Operation of zero-set ⁹⁾ | ≥ 100 ms | | | | | | | | | | | | | |
| Initialisation time after power on | 40 ms | | | | | | | | | | | | | |

¹⁾ For an encoder with connector outlet

²⁾ Increasing when viewing the clockwise rotating shaft

³⁾ If the shaft seal has been removed by the customer

⁴⁾ Condensation not permitted

⁵⁾ To DIN EN 61000-6-2 and DIN EN 61000-6-3

⁶⁾ To DIN EN 60068-2-27

⁷⁾ To DIN EN 60068-2-6

⁸⁾ With mating connector fitted

⁹⁾ Only with shaft stationary (note initialisation time)

Absolute Encoder Singleturn ARS 60 SSI and Parallel, servo flange

Order information SSI interface

Absolute Encoder Singleturn ARS 60 SSI, servo flange, solid shaft 6 mm

| | | | | | | | | | | | | | |
|----------|----------|----------|----------|----------|----------|---------|---------|---------|----------|----------|----------|----------|----------|
| 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 |
| A | R | S | 6 | 0 | - | | | | | | | | |

| | | | |
|--|---|--|--|
| Electrical interface | Mechanical interface | Connection type | Resolution |
| 10 ... 32 V, SSI, Gray = A | Servo flange, solid shaft 6 mm = 1 | Connector M23, 12 pin, radial = A | Any number of steps from 00002 up to 32,768 possible. Always 5 characters in clear text. |
| 10 ... 32 V, SSI, Gray Excess = B | | Connector M23, 12 pin, axial = B | |
| | | Cable 11 core, radial 1.5 m = K | |
| | | Cable 11 core, radial 3 m = L | |
| | | Cable 11 core, radial 5 m = M | |
| | | Cable 11 core, axial 1.5 m = R | |
| | | Cable 11 core, axial 3 m = S | |
| | | Cable 11 core, axial 5 m = T | |

Order example: Absolute Encoder Singleturn ARS 60 SSI

10 ... 32 V, SSI, Gray; servo flange; connector M23, 12 pin, radial; number of steps: 8,192

| | | | | | | | | | | | | | |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 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 |
| A | R | S | 6 | 0 | - | A | 1 | A | 0 | 8 | 1 | 9 | 2 |

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 |
| A | R | S | 6 | 0 | - | | | | | | | | |

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|----------|----------|----------|----------|----------|----------|---------|---------|---------|----------|----------|----------|----------|----------|
| 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 |
| A | R | S | 6 | 0 | - | | | | | | | | |

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|----------|----------|----------|----------|----------|----------|---------|---------|---------|----------|----------|----------|----------|----------|
| 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 |
| A | R | S | 6 | 0 | - | | | | | | | | |

Order information Parallel Interface

Absolute Encoder Singleturn ARS 60 Parallel, servo flange, solid shaft 6 mm

| | | | | | | | | | | | | | |
|----------|----------|----------|----------|----------|----------|---------|---------|---------|----------|----------|----------|----------|----------|
| 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 |
| A | R | S | 6 | 0 | - | | | | | | | | |

| Electrical interface | Mechanical interface | Connection type | Resolution |
|---|---|--|--|
| 10 ... 32 V, parallel, Gray = F | Servo flange, solid shaft 6 mm = 1 | Connector M23, 21 pin, radial = A | Any number of steps from 00002 up to 32,768 possible, with the following electrical interfaces: 10 ... 32 V, parallel, Gray 10 ... 32 V, parallel, Gray Excess 10 ... 32 V, parallel, BIN |
| 10 ... 32 V, parallel, Gray Exc. = G | | Connector M23, 21 pin, axial = B | |
| 10 ... 32 V, parallel, BIN = H | | Cable 22 core, radial 1.5 m = K | |
| 10 ... 32 V, parallel, BCD = J | | Cable 22 core, radial 3 m = L | Number of steps from 00002 up to 07999 possible, with the electrical interface: 10 ... 32 V, parallel, BCD Always 5 characters, in clear text. |
| | | Cable 22 core, radial 5 m = M | |
| | | Cable 22 core, axial 1.5 m = R | |
| | | Cable 22 core, axial 3 m = S | |
| | | Cable 22 core, axial 5 m = T | |

Order example: Absolute Encoder Singleturn ARS 60 Parallel

10 ... 32 V, Parallel, Gray; servo flange; connector M23, 21 pin, radial; number of steps: 8,192


| | | | | | | | | | | | | | |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 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 |
| A | R | S | 6 | 0 | - | F | 1 | A | 0 | 8 | 1 | 9 | 2 |

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 |
| A | 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 |
| A | R | S | 6 | 0 | - | | | | | | | | |

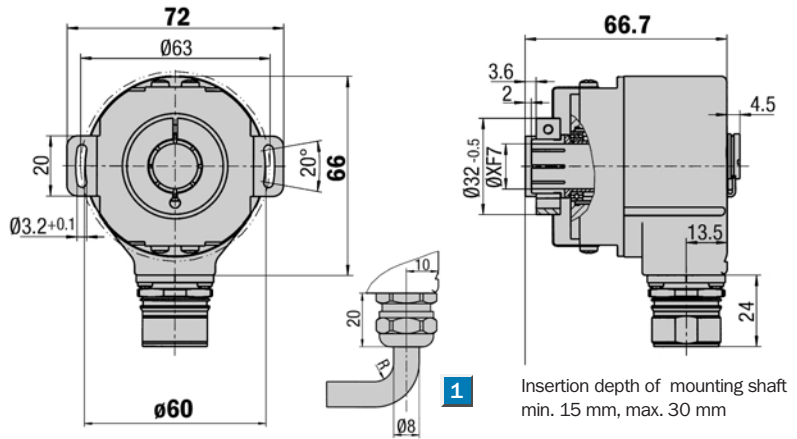
| | | | | | | | | | | | | | |
|----------|----------|----------|----------|----------|----------|---------|---------|---------|----------|----------|----------|----------|----------|
| Point 1 | Point 2 | Point 3 | Point 4 | Point 5 | Point 6 | Point 7 | Point 8 | Point 9 | Point 10 | Point 11 | Point 12 | Point 13 | Point 14 |
| A | R | S | 6 | 0 | - | | | | | | | | |

 **Number of steps**
2 to 32,768

Absolute Encoder Singleturn

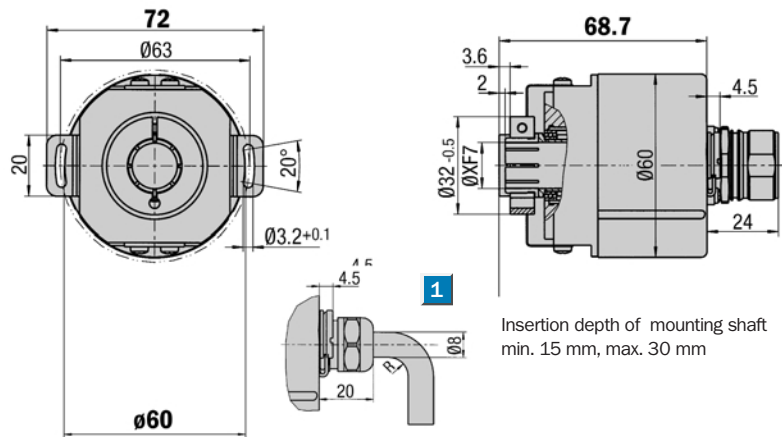
- Connector or cable outlet
- Protection class up to IP 66
- Electrical Interfaces
SSI or Parallel
- Zero adjustment directly on
the encoder or via a remote line

Dimensional drawing blind hollow shaft radial exit



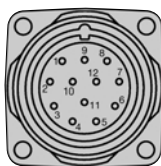
1 R = bending radius min. 40 mm General tolerances according to DIN ISO 2768-mk

Dimensional drawing blind hollow shaft axial exit

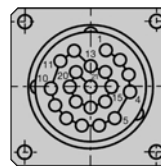


1 R = bending radius min. 40 mm General tolerances according to DIN ISO 2768-mk

PIN and wire allocation see page 18



View of the connector M23 fitted to the encoder body SSI

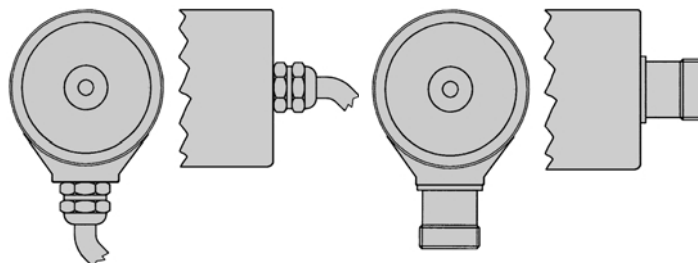


View of the connector M23 fitted to the encoder body Single, Parallel

| Accessories |
|--------------------|
| Connection systems |
| Mounting systems |
| Collets |
| Adaptor modules |

Connection type

- | | | | |
|--------------|-------------|------------------|-----------------|
| Radial cable | Axial cable | Radial connector | Axial connector |
|--------------|-------------|------------------|-----------------|



| Technical Data acc. to DIN 32878 | | ARS 60 blind hollow shaft | | | | | | | | | | Flange type | | | | | | | | | |
|--|--|---------------------------|--|--|--|--|--|--|--|--|--|-------------|--|--|--|--|--|--|--|--|--|
| | | blind | | | | | | | | | | | | | | | | | | | |
| Hollow shaft diameter | 6, 8, 10, 12, 15 mm, 1/4", 3/8", 1/2" | | | | | | | | | | | | | | | | | | | | |
| Number of steps per revolution | 00002 ... 32,768, see ordering information | | | | | | | | | | | | | | | | | | | | |
| Electrical interfaces | SSI or Parallel | | | | | | | | | | | | | | | | | | | | |
| Mass ⁴⁾ | Approx. 0.3 kg | | | | | | | | | | | | | | | | | | | | |
| Moment of inertia of the rotor | See Fig. 1 | | | | | | | | | | | | | | | | | | | | |
| Code direction ²⁾ | CW | | | | | | | | | | | | | | | | | | | | |
| Measurement range | 1 revolution | | | | | | | | | | | | | | | | | | | | |
| Measuring step | 360°/number of steps | | | | | | | | | | | | | | | | | | | | |
| Repeatability | 0.005° | | | | | | | | | | | | | | | | | | | | |
| Error limits | | | | | | | | | | | | | | | | | | | | | |
| binary number of steps | 0.035° | | | | | | | | | | | | | | | | | | | | |
| non-binary number of steps | 0.046° | | | | | | | | | | | | | | | | | | | | |
| Measuring step deviation | | | | | | | | | | | | | | | | | | | | | |
| binary number of steps | 0.005° | | | | | | | | | | | | | | | | | | | | |
| non-binary number of steps | 0.016° | | | | | | | | | | | | | | | | | | | | |
| Measured value backlash | 0.005° | | | | | | | | | | | | | | | | | | | | |
| Response threshold | 0.003° | | | | | | | | | | | | | | | | | | | | |
| Max. angular acceleration | $5 \times 10^5 \text{ rad/s}^2$ | | | | | | | | | | | | | | | | | | | | |
| Max. operating speed | 3,000 min ⁻¹ | | | | | | | | | | | | | | | | | | | | |
| Operating torque | Typ. 0.4 Ncm | | | | | | | | | | | | | | | | | | | | |
| Start up torque | Typ. 0.6 Ncm | | | | | | | | | | | | | | | | | | | | |
| Permissible movement of the drive element | | | | | | | | | | | | | | | | | | | | | |
| radial movement static/dynamic | $\pm 0.3/\pm 0.1 \text{ mm}$ | | | | | | | | | | | | | | | | | | | | |
| axial movement static/dynamic | $\pm 0.5/\pm 0.2 \text{ mm}$ | | | | | | | | | | | | | | | | | | | | |
| Bearing lifetime | $3.6 \times 10^9 \text{ revolutions}$ | | | | | | | | | | | | | | | | | | | | |
| Working temperature range | - 20 ... + 85 °C | | | | | | | | | | | | | | | | | | | | |
| Storage temperature range | - 40 ... + 100 °C | | | | | | | | | | | | | | | | | | | | |
| Permissible relative humidity ³⁾ | 90 % | | | | | | | | | | | | | | | | | | | | |
| EMC ⁴⁾ | | | | | | | | | | | | | | | | | | | | | |
| Resistance | | | | | | | | | | | | | | | | | | | | | |
| to shocks ⁵⁾ | 50/11 g/ms | | | | | | | | | | | | | | | | | | | | |
| to vibration ⁶⁾ | 20/10 ... 2000 g/Hz | | | | | | | | | | | | | | | | | | | | |
| Protection class acc. IEC 60529 | | | | | | | | | | | | | | | | | | | | | |
| connector outlet ⁷⁾ | IP 65 | | | | | | | | | | | | | | | | | | | | |
| cable outlet | IP 66 | | | | | | | | | | | | | | | | | | | | |
| Operating voltage range (Us) | 10 ... 32 V | | | | | | | | | | | | | | | | | | | | |
| Operating current | | | | | | | | | | | | | | | | | | | | | |
| SSI | Typ. 60 mA | | | | | | | | | | | | | | | | | | | | |
| Parallel | Typ. 90 mA | | | | | | | | | | | | | | | | | | | | |
| Switching level of the control inputs | | | | | | | | | | | | | | | | | | | | | |
| | Logic H = $0.7 \times U_s$ | | | | | | | | | | | | | | | | | | | | |
| | Logic L = $0 \text{ V} \dots 0.3 \times U_s$ | | | | | | | | | | | | | | | | | | | | |
| Operation of zero-set ⁸⁾ | $\geq 100 \text{ ms}$ | | | | | | | | | | | | | | | | | | | | |
| Initialisation time after power on | 40 ms | | | | | | | | | | | | | | | | | | | | |

¹⁾ For an encoder with connector outlet

²⁾ Increasing when viewing the clockwise rotating shaft

³⁾ Condensation not permitted

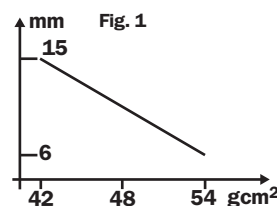
⁴⁾ To DIN EN 61000-6-2 and DIN EN 61000-6-3

⁵⁾ To DIN EN 60068-2-27

⁶⁾ To DIN EN 60068-2-6

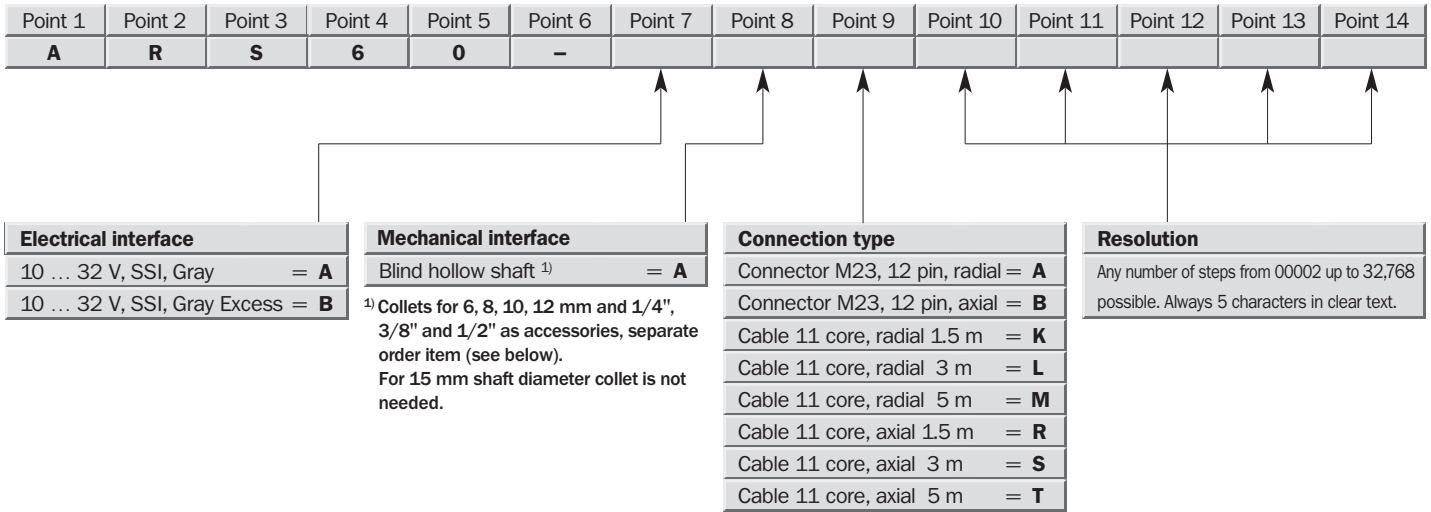
⁷⁾ With mating connector fitted

⁸⁾ Only with shaft stationary (note initialisation time)



Order information SSI Interface

Absolute Encoder Singleturn ARS 60 SSI, blind hollow shaft



Order example: Absolute Encoder Singleturn ARS 60 SSI

10 ... 32 V, SSI, Gray; blind hollow shaft; connector M23, 12 pin, radial; number of steps 8,192

| | | | | | | | | | | | | | |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 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 |
| A | R | S | 6 | 0 | - | A | A | A | 0 | 8 | 1 | 9 | 2 |

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 |
| A | 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 |
| A | 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 |
| A | R | S | 6 | 0 | - | | | | | | | | |

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" |

Order information Parallel Interface

Absolute Encoder Singleturn ARS 60 Parallel, 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 |
| A | R | S | 6 | 0 | - | | | | | | | | |

| | | | |
|--|--|--|---|
| Electrical interface 10 ... 32 V, parallel, Gray = F 10 ... 32 V, parallel, Gray Exc. = G 10 ... 32 V, parallel, BIN = H 10 ... 32 V, parallel, BCD = J | Mechanical interface Blind hollow shaft ¹⁾ = A <small>¹⁾ Collets for 6, 8, 10, 12 mm and 1/4", 3/8" and 1/2" as accessories, separate order item (see below). For 15 mm shaft diameter collet is not needed.</small> | Connection type Connector M23, 21 pin, radial = A Connector M23, 21 pin, axial = B Cable 22 core, radial 1.5 m = K Cable 22 core, radial 3 m = L Cable 22 core, radial 5 m = M Cable 22 core, axial 1.5 m = R Cable 22 core, axial 3 m = S Cable 22 core, axial 5 m = T | Resolution Any number of steps from 00002 up to 32,768 possible, with the following electrical interfaces: 10 ... 32 V, parallel, Gray 10 ... 32 V, parallel, Gray Excess 10 ... 32 V, parallel, BIN Number of steps from 00002 up to 07999 possible, with the electrical interface: 10 ... 32 V, parallel, BCD Always 5 characters, in clear text. |
|--|--|--|---|

Order example: Absolute Encoder Singleturn ARS 60 Parallel

10 ... 32 V, Parallel, Gray; blind hollow shaft; connector M23, 21 pin, radial; number of steps 8,192

| | | | | | | | | | | | | | |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 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 |
| A | R | S | 6 | 0 | - | F | A | A | 0 | 8 | 1 | 9 | 2 |

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 |
| A | 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 |
| A | 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 |
| A | R | S | 6 | 0 | - | | | | | | | | |

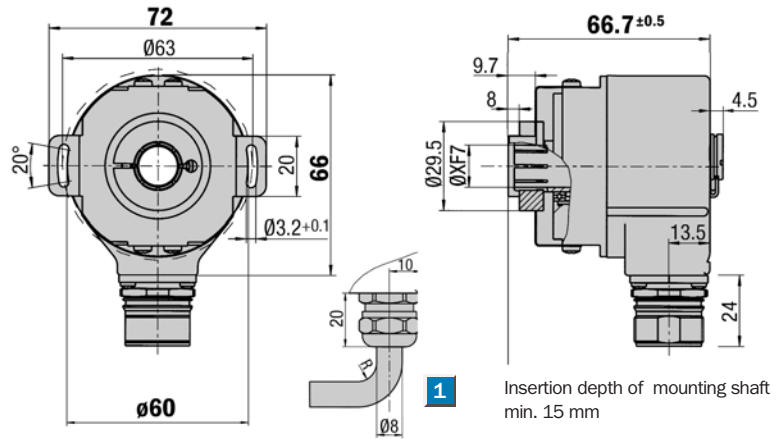
Collets for blind hollow shaft encoder

| 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" |

 **Number of steps**
2 to 32,768
Absolute Encoder Singleturn

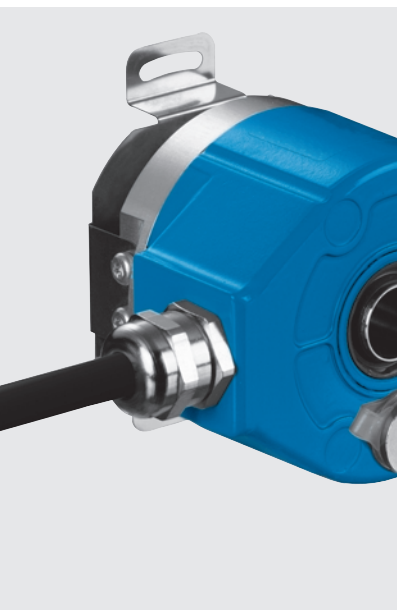
- Connector or cable outlet
- Protection class up to IP 64
- Electrical Interfaces
SSI or Parallel
- Zero adjustment directly on
the encoder or via a remote line

Dimensional drawing through hollow shaft, radial exit

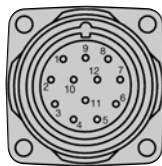


1 R = bending radius min. 40 mm

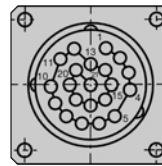
General tolerances according to DIN ISO 2768-mk



PIN and wire allocation see page 18



View of the connector M23 fitted to the encoder body SSI



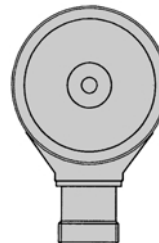
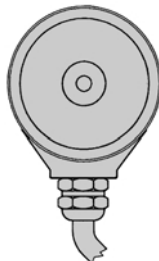
View of the connector M23 fitted to the encoder body Single, Parallel

| Accessories |
|--------------------|
| Connection systems |
| Mounting systems |
| Collets |
| Adaptor modules |

Connection type

Radial cable

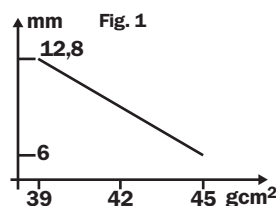
Radial connector



| Technical Data acc. to DIN 32878 | | ARS 60 through hollow shaft | | | | | | | | | | Flange type | | | | | | | | | |
|--|--|-----------------------------|--|--|--|--|--|--|--|--|--|-------------|--|--|--|--|--|--|--|--|--|
| | | through | | | | | | | | | | | | | | | | | | | |
| Hollow shaft diameter | 6, 8, 10, 12 mm, 1/4", 3/8", 1/2" | | | | | | | | | | | | | | | | | | | | |
| Number of steps per revolution | 00002 ... 32,768, see ordering information | | | | | | | | | | | | | | | | | | | | |
| Electrical interfaces | SSI or Parallel | | | | | | | | | | | | | | | | | | | | |
| Mass ⁴⁾ | Approx. 0.3 kg | | | | | | | | | | | | | | | | | | | | |
| Moment of inertia of the rotor | See Fig. 1 | | | | | | | | | | | | | | | | | | | | |
| Code direction ²⁾ | CW | | | | | | | | | | | | | | | | | | | | |
| Measurement range | 1 revolution | | | | | | | | | | | | | | | | | | | | |
| Measuring step | 360°/number of steps | | | | | | | | | | | | | | | | | | | | |
| Repeatability | 0.005° | | | | | | | | | | | | | | | | | | | | |
| Error limits | | | | | | | | | | | | | | | | | | | | | |
| binary number of steps | 0.035° | | | | | | | | | | | | | | | | | | | | |
| non-binary number of steps | 0.046° | | | | | | | | | | | | | | | | | | | | |
| Measuring step deviation | | | | | | | | | | | | | | | | | | | | | |
| binary number of steps | 0.005° | | | | | | | | | | | | | | | | | | | | |
| non-binary number of steps | 0.016° | | | | | | | | | | | | | | | | | | | | |
| Measured value backlash | 0.005° | | | | | | | | | | | | | | | | | | | | |
| Response threshold | 0.003° | | | | | | | | | | | | | | | | | | | | |
| Max. angular acceleration | 5 x 10 ⁵ rad/s ² | | | | | | | | | | | | | | | | | | | | |
| Max. operating speed | 3,000 min ⁻¹ | | | | | | | | | | | | | | | | | | | | |
| Operating torque | Typ. 1.6 Ncm | | | | | | | | | | | | | | | | | | | | |
| Start up torque | Typ. 2.2 Ncm | | | | | | | | | | | | | | | | | | | | |
| Permissible movement of the drive element | | | | | | | | | | | | | | | | | | | | | |
| radial movement static/dynamic | ± 0.3/± 0.1 mm | | | | | | | | | | | | | | | | | | | | |
| axial movement static/dynamic | ± 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 ³⁾ | 90 % | | | | | | | | | | | | | | | | | | | | |
| EMC ⁴⁾ | | | | | | | | | | | | | | | | | | | | | |
| Resistance | | | | | | | | | | | | | | | | | | | | | |
| to shocks ⁵⁾ | 50/11 g/ms | | | | | | | | | | | | | | | | | | | | |
| to vibration ⁶⁾ | 20/10 ... 2000 g/Hz | | | | | | | | | | | | | | | | | | | | |
| Protection class acc. IEC 60529 | | | | | | | | | | | | | | | | | | | | | |
| connector outlet ⁷⁾ | IP 64 | | | | | | | | | | | | | | | | | | | | |
| cable outlet | IP 64 | | | | | | | | | | | | | | | | | | | | |
| Operating voltage range (U_s) | 10 ... 32 V | | | | | | | | | | | | | | | | | | | | |
| Operating current | | | | | | | | | | | | | | | | | | | | | |
| SSI | Typ. 60 mA | | | | | | | | | | | | | | | | | | | | |
| Parallel | Typ. 90 mA | | | | | | | | | | | | | | | | | | | | |
| Switching level of the control inputs | | | | | | | | | | | | | | | | | | | | | |
| | Logic H = 0.7 x U _s | | | | | | | | | | | | | | | | | | | | |
| | Logic L = 0 V ... 0.3 x U _s | | | | | | | | | | | | | | | | | | | | |
| Operation of zero-set ⁸⁾ | ≥ 100 ms | | | | | | | | | | | | | | | | | | | | |
| Initialisation time after power on | 40 ms | | | | | | | | | | | | | | | | | | | | |

¹⁾ For an encoder with connector outlet
²⁾ Increasing when viewing the clockwise rotating shaft
³⁾ Condensation not permitted

⁴⁾ To DIN EN 61000-6-2 and DIN EN 61000-6-3
⁵⁾ To DIN EN 60068-2-27
⁶⁾ To DIN EN 60068-2-6
⁷⁾ With mating connector fitted
⁸⁾ Only with shaft stationary (note initialisation time)



Order information see pages 16/17

Order information SSI Interface

Absolute Encoder Singleturn ARS 60 SSI, 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 |
|----------|----------|----------|----------|----------|----------|---------|---------|---------|----------|----------|----------|----------|----------|
| A | R | S | 6 | 0 | - | | | | | | | | |

| Electrical interface | Mechanical interface | Connection type | Resolution |
|--|--|--|--|
| 10 ... 32 V, SSI, Gray = A | Through hollow shaft ¹⁾ = D | Connector M23, 12 pin, radial = A | Any number of steps from 00002 up to 32,768 possible. Always 5 characters in clear text. |
| 10 ... 32 V, SSI, Gray Excess = 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 | |
| | | Cable 11 core, radial 3 m = L | |
| | | Cable 11 core, radial 5 m = M | |

Order example: Absolute Encoder Singleturn ARS 60 SSI

10 ... 32 V, SSI, Gray; through hollow shaft; connector M23, 12 pin, radial; number of steps 8,192

| 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 |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| A | R | S | 6 | 0 | - | A | D | A | 0 | 8 | 1 | 9 | 2 |

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 |
|----------|----------|----------|----------|----------|----------|---------|---------|---------|----------|----------|----------|----------|----------|
| A | 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 |
|----------|----------|----------|----------|----------|----------|---------|---------|---------|----------|----------|----------|----------|----------|
| A | 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 |
|----------|----------|----------|----------|----------|----------|---------|---------|---------|----------|----------|----------|----------|----------|
| A | R | S | 6 | 0 | - | | | | | | | | |

Collets for blind 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" |

Order information Parallel Interface

Absolute Encoder Singleturn ARS 60 Parallel, 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 |
| A | R | S | 6 | 0 | - | | | | | | | | |

| | | | |
|--|---|--|---|
| Electrical interface 10 ... 32 V, parallel, Gray = F 10 ... 32 V, parallel, Gray Exc. = G 10 ... 32 V, parallel, BIN = H 10 ... 32 V, parallel, BCD = J | Mechanical interface Through hollow shaft ¹⁾ = D <small>¹⁾ Collets for 6, 8, 10, 12 mm and 1/4", 3/8" and 1/2" as accessories, separate order item (see below).</small> | Connection type Connector M23, 21 pin, radial = A Cable 22 core, radial 1.5 m = K Cable 22 core, radial 3 m = L Cable 22 core, radial 5 m = M | Resolution Any number of steps from 00002 up to 32,768 possible, with the following electrical interfaces: 10 ... 32 V, parallel, Gray 10 ... 32 V, parallel, Gray Excess 10 ... 32 V, parallel, BIN Number of steps from 00002 up to 07999 possible, with the electrical interface: 10 ... 32 V, parallel, BCD Always 5 characters, in clear text. |
|--|---|--|---|

Order example: Absolute Encoder Singleturn ARS 60 Parallel

10 ... 32 V, Parallel, Gray; through hollow shaft; connector M23, 21 pin, radial; number of steps 8,192

| | | | | | | | | | | | | | |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 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 |
| A | R | S | 6 | 0 | - | F | D | A | 0 | 8 | 1 | 9 | 2 |

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 |
| A | 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 |
| A | R | S | 6 | 0 | - | | | | | | | | |

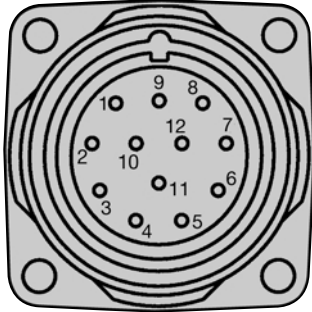
| | | | | | | | | | | | | | |
|----------|----------|----------|----------|----------|----------|---------|---------|---------|----------|----------|----------|----------|----------|
| Point 1 | Point 2 | Point 3 | Point 4 | Point 5 | Point 6 | Point 7 | Point 8 | Point 9 | Point 10 | Point 11 | Point 12 | Point 13 | Point 14 |
| A | R | S | 6 | 0 | - | | | | | | | | |

Collets for blind 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" |

PIN and wire allocation

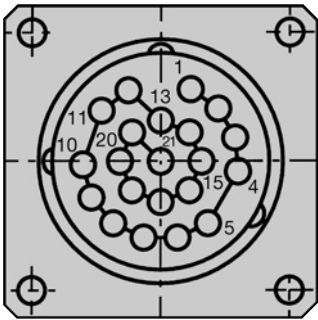
Allocation for encoder with 12 pin connector; Interface



View of the connector M23 fitted to the encoder body SSI

| Signal | 12-pin connector | 11-core cable outlet |
|----------------|---------------------|-------------------------|
| GND | 1 | blue |
| Data (+) | 2 | white |
| Clock (+) | 3 | yellow |
| N. C. | 4 | – |
| CW/CCW | 5 | pink |
| N. C. | 6 | – |
| N. C. | 7 | – |
| U _s | 8 | red |
| SET | 9 | orange |
| Data (-) | 10 | brown |
| Clock (-) | 11 | violet |
| N. C. | 12 | – |

Allocation for encoder with 21 pin connector Single; Parallel Interface



View of the connector M23 fitted to the encoder body Single, Parallel

| PIN | Wire colour by cable outlet | Binary | Gray | BCD | Explanation |
|---------|--------------------------------|----------------|----------------|----------------|------------------------|
| 1 | violet | 2^0 | G_0 | $2^0 v.10^0$ | |
| 2 | white/brown | 2^1 | G_1 | $2^1 v.10^0$ | |
| 3 | white/green | 2^2 | G_2 | $2^2 v.10^0$ | |
| 4 | white/yellow | 2^3 | G_3 | $2^3 v.10^0$ | |
| 5 | white/grey | 2^4 | G_4 | $2^0 v.10^1$ | |
| 6 | white/pink | 2^5 | G_5 | $2^1 v.10^1$ | |
| 7 | white/blue | 2^6 | G_6 | $2^2 v.10^1$ | |
| 8 | white/red | 2^7 | G_7 | $2^3 v.10^1$ | |
| 9 | white/black | 2^8 | G_8 | $2^0 v.10^2$ | |
| 10 | brown/green | 2^9 | G_9 | $2^1 v.10^2$ | |
| 11 | brown/yellow | 2^{10} | G_{10} | $2^2 v.10^2$ | Data lines, outputs |
| 12 | brown/grey | 2^{11} | G_{11} | $2^3 v.10^2$ | |
| 13 | brown/pink | 2^{12} | G_{12} | $2^0 v.10^3$ | |
| 14 | brown/blue | 2^{13} | G_{13} | $2^1 v.10^3$ | |
| 15 | brown/red | 2^{14} | G_{14} | $2^2 v.10^3$ | |
| 16 | green | Parity | Parity | Parity | |
| 17 | pink | Store_ | Store_ | Store_ | |
| 18 | yellow | Enable_ | Enable_ | Enable_ | |
| 19 | brown | CW/CCW_ | CW/CCW_ | CW/CCW_ | |
| *) | grey | SET | SET | SET | |
| 20 | blue | GND | GND | GND | |
| 21 | red | U _s | U _s | U _s | |
| Housing | | Screen | Screen | Screen | |

* Set line only possible with a cable outlet

| | | | |
|----------------|--|---------|---|
| U _s | Supply voltage to the encoder (before commissioning, note must be taken of the type label of the encoder). Zero volt connection to the encoder; electrically isolated from the housing. The voltage referred to GND is U _s . | Enable_ | This input activates the data output driver when a »LOW« level is applied. If not connected, this input is »LOW«. In the case of a »HIGH« level, the outputs are in the tristate mode. |
| GND | 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). | Store_ | This input stores the encoder data in Gray code when a »LOW« level is applied. This avoids a read error if the output data is requested in binary code. If this input is »LOW«, the data at the encoder output is stable, irrespective of whether the input shaft rotates. If not switched, this input is »HIGH«. |
| CW/CCW_ | | Parity | This output supplies a »HIGH« level when the binary checksum of the data bits is even. |
| | | SET | This input serves to set the zero electronically. If the SET line is connected to U _s for more than 100 ms, the mechanical position corresponds to the value 0. |

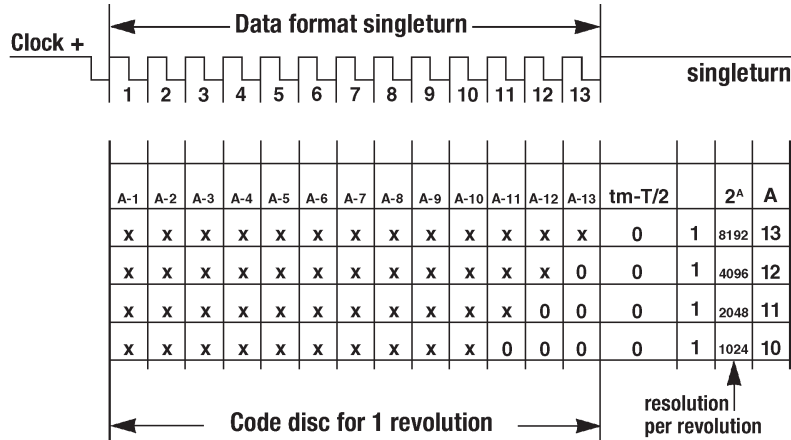
Signal outputs

SSI Data format for resolutions ≤ 8,192 (1-13 bits)

In order to be compatible with the data formats on the market, a distinction is made in the ARS 60 between two data formats.

The first data format applies to the encoder designs with resolutions up to 13 bits.

This is the standard data format for the singleturn absolute encoder.



SSI Data format for resolutions > 8,192 (14 and 15 bits)

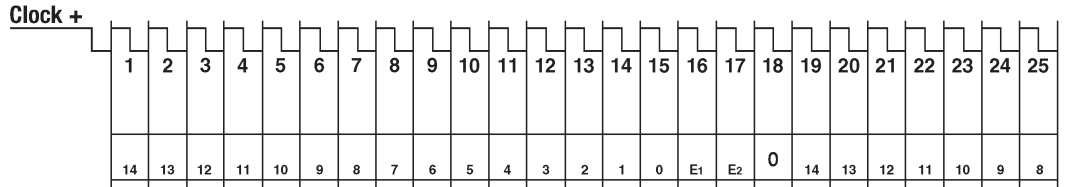
The data transmitted is left-justified. The 15 data bits are followed by two error bits.

Error 1 (E₁) = Position error

During the determination of the position, an error has occurred since the last SSI transmission.

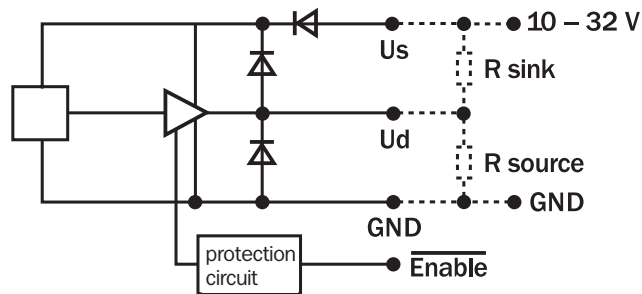
This error bit will be deleted during the next SSI transmission.

Error 2 (E₂) = light source monitoring



Parallel Interface (Output driver 7272 push-pull)

- Tristate capability
- Short-circuit protected
- Protected against reverse polarity
- Integrated transient protection diodes



Technical Data: Parallel interface

| | | | |
|--|--------------------|-------|--------|
| Id_H max. at +85° C 8 nF 6000 min⁻¹ | | | 30 mA |
| Id_L max. at +85° C 8 nF 6000 min⁻¹ | | | 30 mA |
| Output saturation voltage (H-level) | to Id _H | 10 mA | 2.8 V |
| U _S -U _{dH} | | 30 mA | 3.0 V |
| Output saturation voltage (L-level) | to Id _L | 10 mA | 0.4 V |
| U _{dL} | | 30 mA | 2.0 V |
| Position refresh time (dependent upon the encoder resolution and output code) | | | |
| | Parallel Gray-Code | | 60 μs |
| | Parallel BIN-Code | | 60 μs |
| | Parallel BCD-Code | | 200 μs |

Dimensional drawings and order information

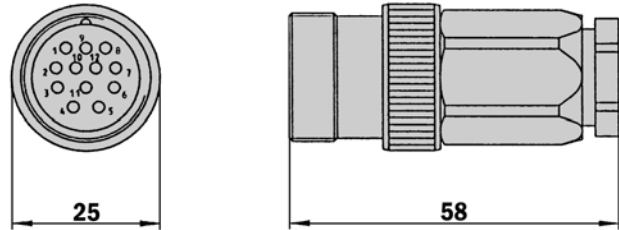
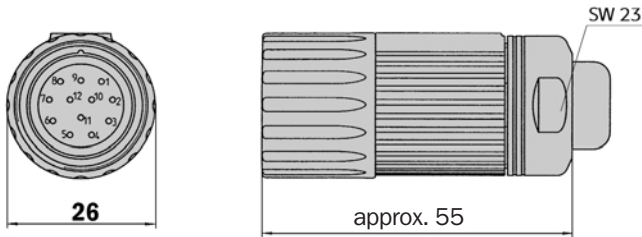
Screw-in system M23, 12 pin

Female connector M23, 12 pin, straight, screened

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

Male connector M23, 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

Female connector M23, 12 pin, straight, cable 12 pin, 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. | Contacts | Cable length |
|------------------|-----------|----------|--------------|
| DOL-2312-G1M5MA2 | 2 029 206 | 12 | 1.5 m |
| DOL-2312-G03MMA2 | 2 029 207 | 12 | 3.0 m |
| DOL-2312-G05MMA2 | 2 029 208 | 12 | 5.0 m |
| DOL-2312-G10MMA2 | 2 029 209 | 12 | 10.0 m |
| DOL-2312-G20MMA2 | 2 029 210 | 12 | 20.0 m |
| DOL-2312-G30MMA2 | 2 029 211 | 12 | 30.0 m |

Cables

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-MWENC | 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 |

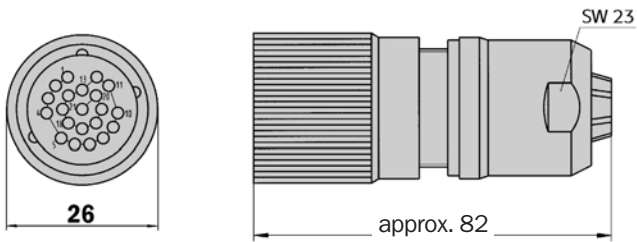
Cable 12 core, per meter, 4 x 2 x 0.25 + 2 x 0.5 + 2 x 0.14 mm²

with screening, capable of being dragged, cable diameter 7.8 mm

| Type | Part no. | Wires | Explanation |
|-------------|-----------|-------|-----------------------------|
| LTG-2512-MW | 6 027 531 | 12 | |
| LTG-2612-MW | 6 028 516 | 12 | UV and salt water resistant |

Dimensional drawings and order information
Screw-in system M23, 21 pin
Female connector M23, 21 pin, straight, screened, capable of being dragged

| Type | Part no. | Contacts |
|------------|-----------|----------|
| DOS-2321-G | 6 027 539 | 21 |



General tolerances according to DIN ISO 2768-mk

Female connector M23, 21 pin, cable 22 core, 20 x 0.14 + 2 x 0.5 mm² with screening, capable of being dragged, cable diameter 7.8 mm

| Type | Part no. | Contacts | Cable length |
|------------------|-----------|----------|--------------|
| DOL-2321-G1M5PA4 | 2 029 218 | 21 | 1.5 m |
| DOL-2321-G03MPA4 | 2 029 219 | 21 | 3.0 m |
| DOL-2321-G05MPA4 | 2 029 220 | 21 | 5.0 m |
| DOL-2321-G10MPA4 | 2 029 221 | 21 | 10.0 m |
| DOL-2321-G20MPA4 | 2 029 222 | 21 | 20.0 m |

Cables
Cable 22 core, per meter, 20 x 0.14 + 2 x 0.5 mm² with screening, cable diameter 7.8 mm

| Type | Part no. | Wires |
|-------------|-----------|-------|
| LTG-2622-MW | 6 027 532 | 22 |

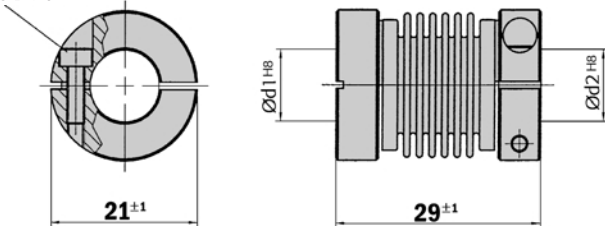
Dimensional drawings and order information

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

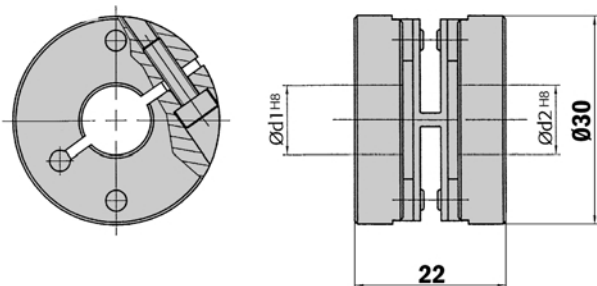
| Type | Part no. | Shaft diameter |
|------------|-----------|-----------------|
| KUP-0606-B | 5 312 981 | 6 mm ... 6 mm |
| KUP-0610-B | 5 312 982 | 6 mm ... 10 mm |
| KUP-1010-B | 5 312 983 | 10 mm ... 10 mm |
| KUP-1012-B | 5 312 984 | 10 mm ... 12 mm |

Cheese-head screw
M2,5x8 DIN912 A2



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 |



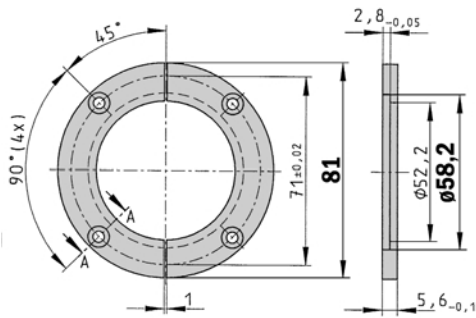
General tolerances according to DIN ISO 2768-mk

Dimensional drawings and order information

Servo clamps

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

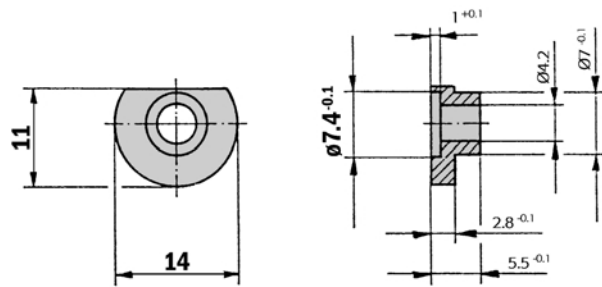
| Type | Part no. |
|--------------|-----------|
| BEF-WG-SF050 | 2 029 165 |



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 |

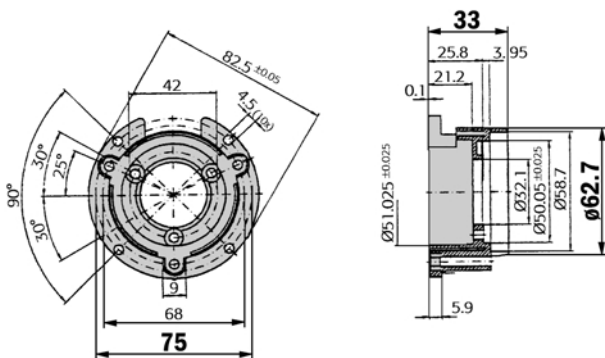


General tolerances according to DIN ISO 2768-mk

Mechanical Adaptors

Mounting bell incl. fixing set for encoder with servo flange

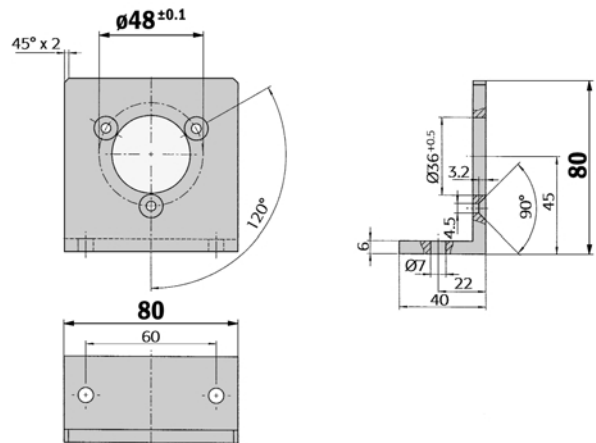
| Type | Part no. | Flange spigot |
|-----------|-----------|----------------|
| BEF-MG-50 | 5 312 987 | Diameter 50 mm |



General tolerances according to DIN ISO 2768-mk

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

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



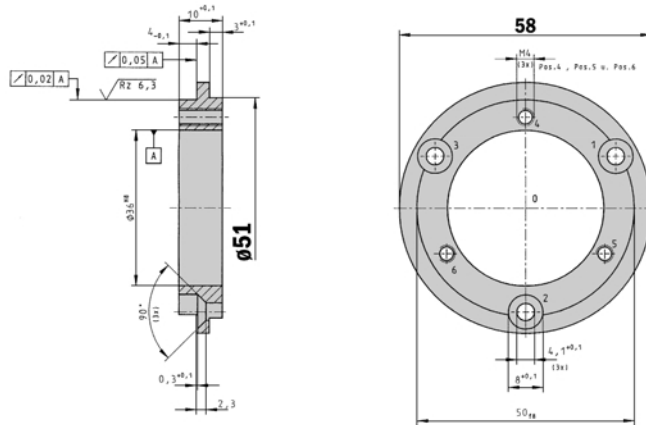
General tolerances according to DIN ISO 2768-mk

Dimensional drawings and order information

Mechanical Adaptors

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

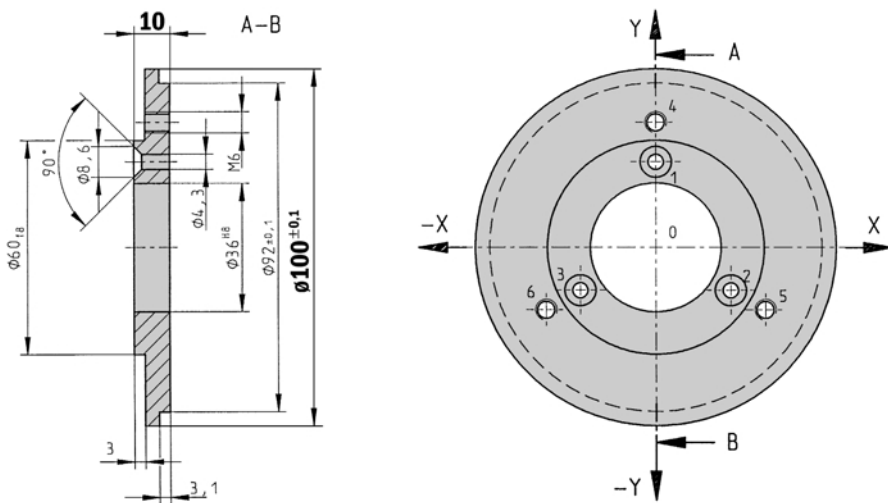
| Type | Part no. | Adaption |
|----------------|-----------|-----------------------|
| BEF-FA-036-050 | 2 029 160 | To 50 mm Servo flange |



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-036-100 | 2 029 161 | To 100 mm servo flange |



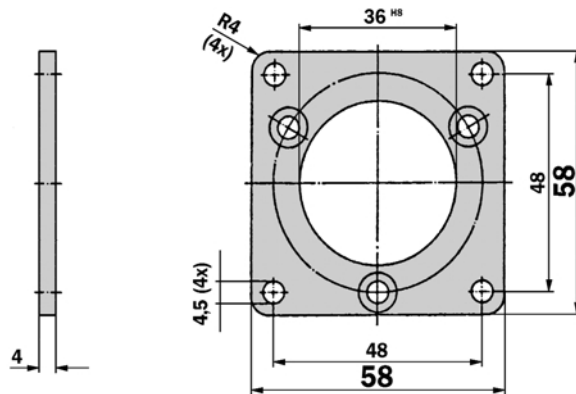
General tolerances according to DIN ISO 2768-mk

Dimensional drawings and order information

Mechanical Adaptors

Adaptor flange of aluminium for face mount flange spigot 36 mm

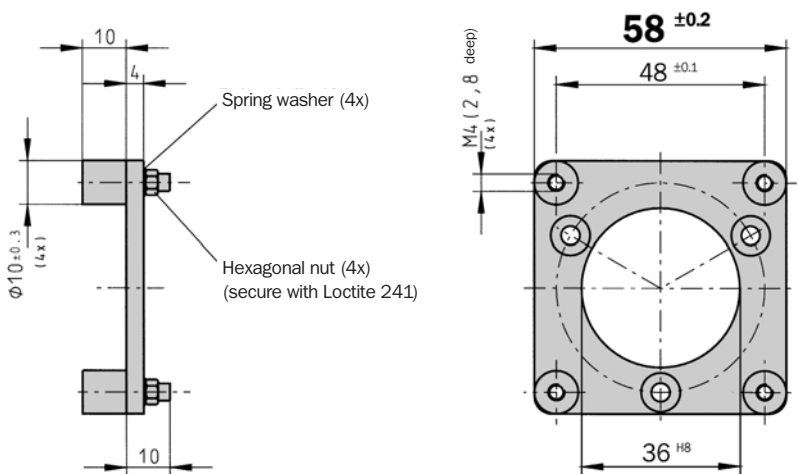
| Type | Part no. | Adaption |
|-------------------|-----------|--------------------------------|
| BEF-FA-036-060REC | 2 029 162 | To 60 mm square mounting plate |



General tolerances according to DIN ISO 2768-mk

Adapter 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

Collets

Collets for blind hollow shaft

| 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

| 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" |

Adaptor modules for SSI Interface

Serial-Parallel Adaptor modules

| Type | Part no. | Description |
|-------------|-----------|--|
| AD-SSIG-PA | 1 030 106 | SSI-Parallel Adaptor module in plastic housing |
| AD-SSI-PA | 1 030 107 | SSI-Parallel Adaptor module without plastic housing |
| AD-SSIPG-PA | 1 030 108 | SSI-Parallel Adaptor module, programmable, in plastic housing |
| AD-SSIPF-PA | 1 030 109 | SSI-Parallel Adaptor module programmable, without plastic housing, with front plate |
| AD-SSIP-PA | 1 030 110 | SSI-Parallel Adaptor module programmable, without plastic housing, without front plate |

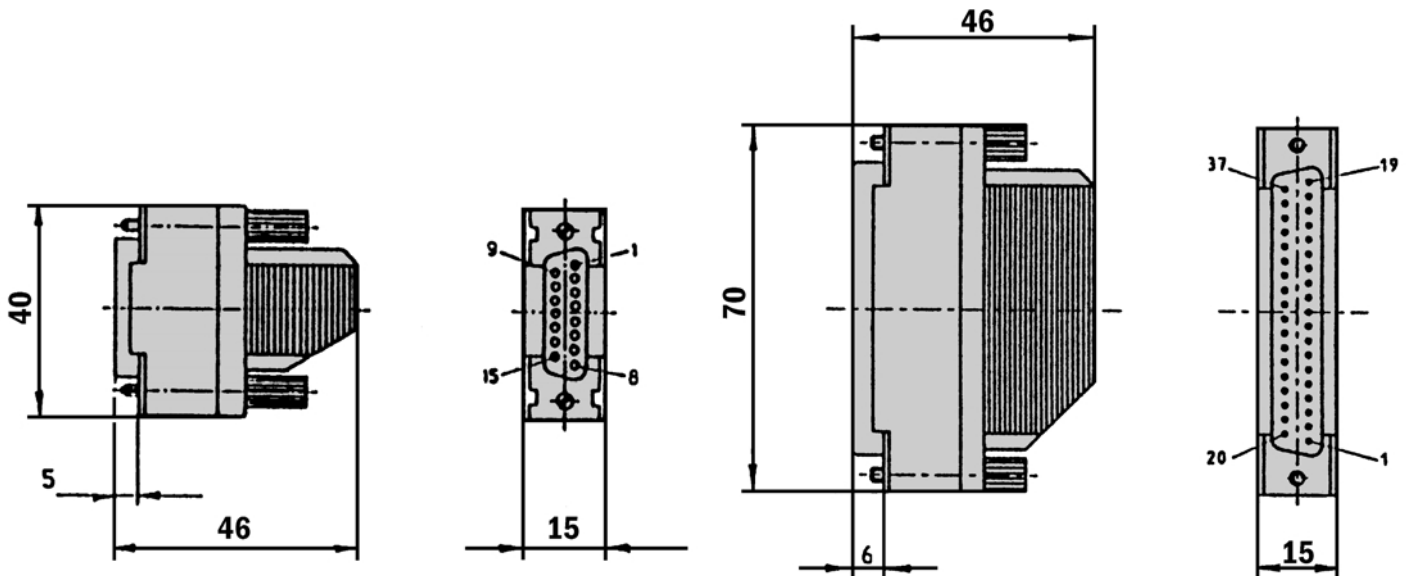
Screw-in systems Sub-D for Adaptor modules

Male connector Sub-D, 15 pin, straight, screened

| Type | Part no. | Contacts |
|------------|-----------|----------|
| STE-0D15-G | 2 029 223 | 15 |

Female connector Sub-D, 37 pin, straight, screened

| Type | Part no. | Contacts |
|------------|-----------|----------|
| DOS-0D37-G | 2 029 224 | 37 |



General tolerances according to DIN ISO 2768-mk

General tolerances according to DIN ISO 2768-mk

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