

# BTF/PRF: Absolute and incremental wire draw encoders for measuring lengths up to 50 m.



The combination of the wire draw mechanism and absolute or incremental encoders manufactured by SICK-STEGMANN enables made-to-measure solutions for almost any application profile.

To comply with the exacting demands of automation technology, these wire draw encoders offer the correct interface for every application:

- SSI, Profibus, CANopen or DeviceNet field bus technology for absolute encoders
- HTL or TTL interfaces for incremental encoders.

For example, this product can be utilised in many applications including:


- Crane, drilling and excavator systems
- Presses, punching and injection machines
- Weir systems and locks
- High-bay shelving and theatre stages
- Woodworking and stone processing machines
- Machinery construction, medical technology and many other industries.


## W

Wire draw encoders consist of wire draw mechanism and an encoder.


The rotation of the drum is proportional to the length being measured. This movement is counted by an encoder and converted to a measuring signal. This provides high-resolution position or distance information for linear measurement paths, even under difficult ambient conditions.

Precise linear guidance, as required for other length measurement systems, is not necessary.

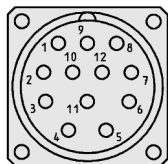
	<p><b>Resolution up to 0.025 mm</b></p> <p><b>Absolute Wire Draw Encoders</b></p>
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	<p><b>Resolution up to 0.025 mm</b></p> <p><b>Incremental Wire Draw Encoders</b></p>
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# SICK | STEGMANN

 **Resolution up to 0.025 mm**  
Absolute Wire Draw Encoders

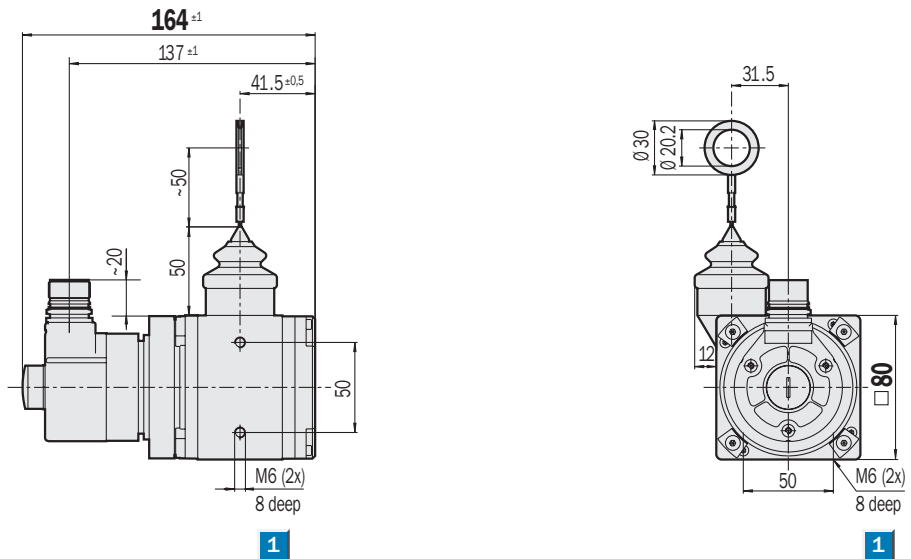
- Linear path measurement using a wire draw mechanism
- High resolution
- Easy to mount
- High-precision measurement drum
- Extremely stable spring return
- Highly flexible steel wire
- Dirt remover made of steel



View of the connector M23 fitted to the encoder body

Accessories
Wire draw mechanisms
Mounting systems
Connection systems
Adaptor modules

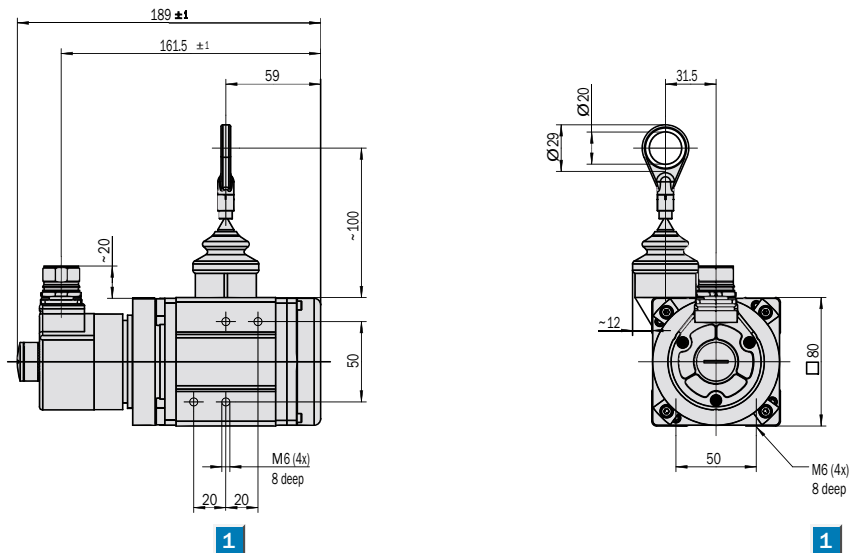
## Dimensional drawing wire draw encoder BTF08 SSI, measuring length 2 m



1 Threaded blind hole for mounting

General tolerances to DIN ISO 2768-mk

## Dimensional drawing wire draw encoder BTF08 SSI, measuring length 3 m



1 Threaded blind hole for mounting

General tolerances to DIN ISO 2768-mk

## PIN and wire allocation

PIN	Signal	Wire colours (cable outlet)	Explanation
1	GND	blue	Earth connection
2	Data +	white	Interface signals
3	Clock +	yellow	Interface signals
4	R x D +	grey	RS422 programming line
5	R x D -	green	RS422 programming line
6	T x D +	pink	RS422 programming line
7	T x D -	black	RS422 programming line
8	U <sub>s</sub>	red	Supply voltage
9	SET	orange	Electronic adjustment
10	Data -	brown	Interface signals
11	Clock -	lilac	Interface signals
12	N. C.	orange/black	Not connected
	Screen		Housing potential

Caution! PINs labelled "N. C." must not be connected.

Technical data		BTF08	SSI 2m	SSI 3m									
<b>Drum housing</b>	Anodised Aluminium												
<b>Spring housing</b>	Die-cast zinc												
<b>Measuring wire (stainless)</b>	Highly flexible stranded steel, Ø 1.35 mm												
<b>Measuring length</b>	2 m max.												
	3 m max.												
<b>Mass</b>	1.8 kg approx.												
	2.0 kg approx.												
<b>Code type</b>	25 bit/Gray												
<b>Code sequence</b>	Increasing in direction of measurement												
<b>Measuring step</b>	0.025 mm												
<b>Linearity</b>	0.05 % typ.												
<b>Repeatability</b>	± 1 measuring step												
<b>Operating speed</b>	4 m/sec.												
<b>Position forming time</b>	0.15 ms												
<b>Spring return force (typ.)</b>													
start/finish <sup>1)</sup>	6 N/14 N												
<b>Working temperature range</b>	- 20 ... + 70 °C												
<b>Storage temperature range</b>	- 40 ... + 100 °C												
<b>Life of wire draw mechanism <sup>2)</sup></b>	1 million cycles												
<b>EMC <sup>3)</sup></b>													
<b>Resistance</b>													
to shocks <sup>4)</sup>	100/6 g/ms												
to vibration <sup>5)</sup>	20/10 ... 2,000 g/Hz												
<b>Protection to IEC 60529</b>	IP 64 (wire draw mechanism)												
	IP 67 (encoder)												
<b>Operating voltage range (U<sub>s</sub>)</b>	10 ... 32 V												
<b>Power consumption max.</b>	0.8 W												
<b>Initialisation time <sup>6)</sup></b>	1,050 ms												
<b>Interface signals</b>													
Clock +, Clock -, Data +, Data - <sup>7)</sup>	SSI max. clock frequency 1 MHz i.e. min. duration LOW level (Clock +): 500 ns												
T x D +, T x D -, R x D +, R x D -	RS422												
SET (electronic adjustment)	H-active (L ≙ 0 - 4.7 V; H ≙ 10 - U <sub>s</sub> V)												

<sup>1)</sup> These values were measured at an ambient temperature of 25 °C.  
The values may be different at other temperatures.

<sup>2)</sup> Average values, which depend on the loading.  
At high operating speeds over long lengths, this figure can decrease; at slow operating speeds over short lengths, it can increase.

<sup>3)</sup> To DIN EN 61000-6-2 and DIN EN 61000-6-3


<sup>4)</sup> To DIN EN 60068-2-27

<sup>5)</sup> To DIN EN 60068-2-6

<sup>6)</sup> From the moment the supply voltage is applied, this is the time which elapses before the data word can be correctly read in.

<sup>7)</sup> For higher clock frequencies, choose synchronous SSI.

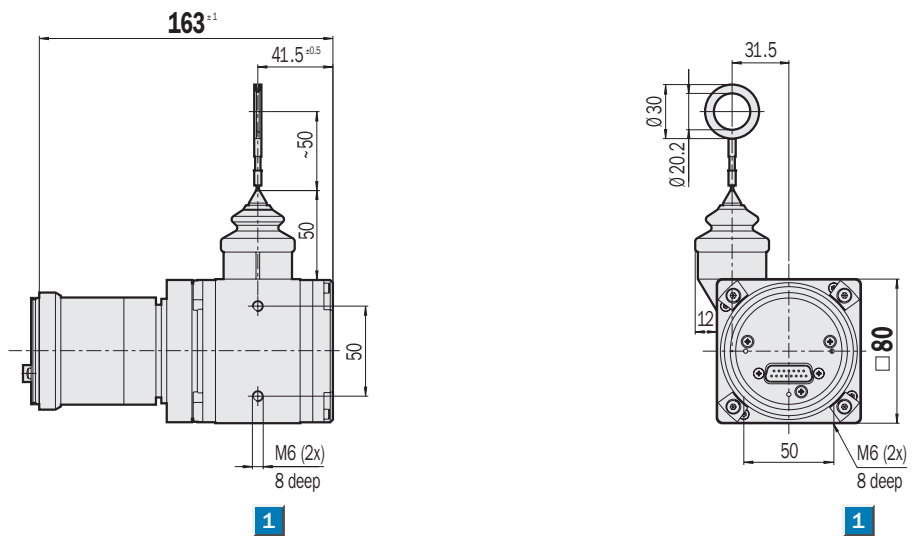
Order information		
<b>BTF08; U<sub>s</sub> 10 ... 32 V; connector M23, 12 pin</b>		
<b>25 bit SSI, Gray-Code, Set = 1,000</b>		
Type	Part no.	Description
BTF08-A1AM0240	1034299	SSI, measuring length 2 m
BTF08-A1AM0340	1034892	SSI, measuring length 3 m

 **Resolution up to 0.025 mm**  
**Absolute Wire Draw Encoders**

- Linear path measurement using a wire draw mechanism
- High resolution
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- Highly flexible steel wire
- Dirt remover made of steel



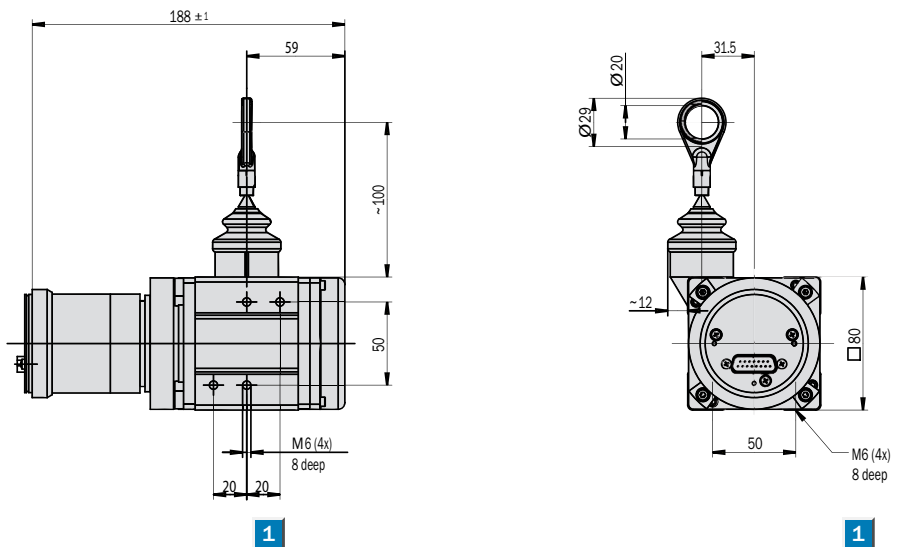
**Dimensional drawing wire draw encoder BTF08 Profibus, CANopen, DeviceNet, measuring length 2 m**



**1** Threaded blind hole for mounting

General tolerances to DIN ISO 2768-mk

**Dimensional drawing wire draw encoder BTF08 Profibus, CANopen, DeviceNet, measuring length 3 m**



**1** Threaded blind hole for mounting

General tolerances to DIN ISO 2768-mk

Accessories
Bus adaptors
Wire draw mechanisms
Mounting systems
Connection systems

<b>Profibus adaptor with PIN and wire allocation see pages 18 / 19</b>
<b>CANopen adaptor with PIN and wire allocation see pages 20 / 21</b>
<b>DeviceNet adaptor with PIN and wire allocation see pages 22 to 24</b>

Technical data		BTF08			PB	CO	DN	PB	CO	DN				
					2m	2m	2m	3m	3m	3m				
<b>Drum housing</b>	Anodised Aluminium													
<b>Spring housing</b>	Die-cast zinc													
<b>Measuring wire (stainless)</b>	Highly flexible stranded steel, Ø 1.35 mm													
<b>Measuring length</b>	2 m max.													
	3 m max.													
<b>Mass</b>	1.9 kg approx.													
	2.1 kg approx.													
<b>Measuring step (recommended)</b>	0.025 mm <b>1</b>													
<b>Linearity</b>	0.05 % typ.													
<b>Repeatability</b>	± 1 measuring step													
<b>Operating speed</b>	4 m/sec.													
<b>Position forming time</b>	0.25 ms													
<b>Spring return force (typ.)</b>														
start/finish <sup>1)</sup>	6 N/14 N													
<b>Working temperature range</b>	- 20 ... + 70 °C													
<b>Storage temperature range</b>	- 40 ... + 100 °C													
<b>Life of wire draw mechanism <sup>2)</sup></b>	1 million cycles													
<b>EMC <sup>3)</sup></b>														
<b>Resistance</b>														
to shocks <sup>4)</sup>	100/6 g/ms													
to Vibration <sup>5)</sup>	20/10 ... 2,000 g/Hz													
<b>Protection to IEC 60529</b>	IP 64 (wire draw mechanism)													
	IP 67 (encoder)													
<b>Operating voltage range (U<sub>s</sub>)</b>	10 ... 32 V													
<b>Power consumption max.</b>	2.0 W													
<b>Initialisation time <sup>6)</sup></b>	1,250 ms													
<b>Bus interface</b>														
<b>Electronic adjustment (Number SET)</b>	Via PRESET switch or protocol													
<b>Bus termination <sup>7)</sup></b>	Via DIP switch													
<b>Electrical connection</b>	Connection adaptor													
<b>Electrical interface <sup>8)</sup></b>	RS485													
<b>Electrical interface <sup>9)</sup></b>	ISO-DIS 11898													
<b>Protocol</b>	Profile for encoders (07 <sub>hex</sub> ) – Class 2													
	Communication Profile DS 301 V4.0													
	Device Profile DSP 406 V2.0													
	DeviceNet Specification, Release 2.0													
<b>Address setting (node no.)</b>	0 ... 127 (DIP switch or protocol)													
<b>Address setting (Node ID)</b>	0 ... 63 (DIP switch or protocol)													
<b>Data transmission rate (Baud rate) <sup>10)</sup></b>	9.6 kBaud ... 12 MBaud													
(DIP switch or protocol)	(10, 20, 50, 125, 250, 500) kB, 1 MB													
(DIP switch or protocol)	(125, 250, 500) kB													
<b>Status information</b>	Running (LED green), bus activity (LED red)													
	2-coloured LED for CAN Controller Status													
	Network status LED (NS), 2-coloured													

<sup>1)</sup> These values were measured at an ambient temperature of 25 °C. The values may be different at other temperatures.

<sup>2)</sup> Average values, which depend on the loading. At high operating speeds over long lengths, this figure can decrease; at slow operating speeds over short lengths, it can increase.

<sup>3)</sup> To DIN EN 61000-6-2 and DIN EN 61000-6-3

<sup>4)</sup> To DIN EN 60068-2-27

<sup>5)</sup> To DIN EN 60068-2-6

<sup>6)</sup> From the moment the supply voltage is applied, this is the time which elapses before the data word can be correctly read in.

<sup>7)</sup> Connection for terminal device only

<sup>8)</sup> To EN 50 170-2 (DIN 19245 parts 1-3), galvanically separated using an opto-coupler

<sup>9)</sup> (CAN High Speed) and CAN specification 2.0 B, galvanically separated

<sup>10)</sup> Automatic detection


**1** When the customer configures the encoder to 8,000 steps x 16 revolutions, via the Bus Master. (Factory entry in GSD or EDS file: 8,192 steps x 8,192 revolutions).

**Order information**

**BTF08; U<sub>s</sub> 10 ... 32 V; field buses**

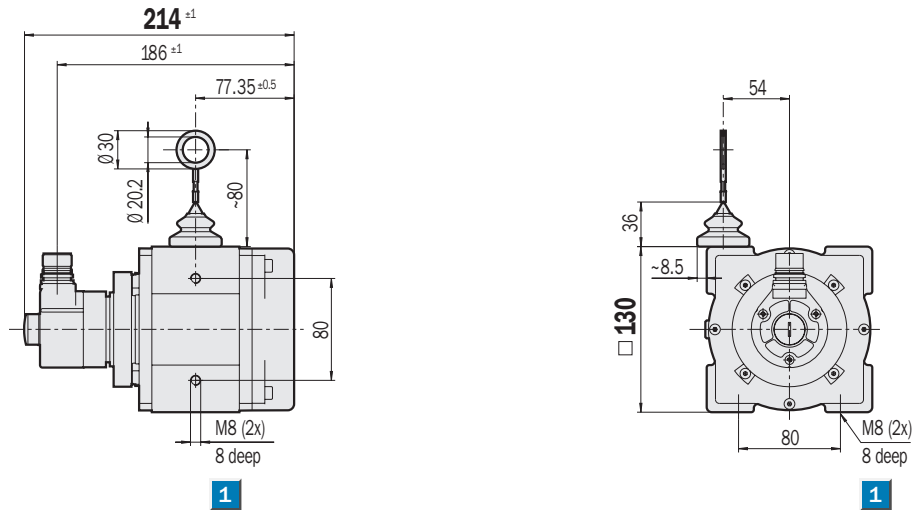
Type	Part no.	Description
BTF08-P1HM0241	1034305	Profibus, measuring length 2 m
BTF08-D1HM0241	1034311	DeviceNet, measuring length 2 m
BTF08-C1HM0241	1034317	CANopen, measuring length 2 m
BTF08-P1HM0341	1034893	Profibus, measuring length 3 m
BTF08-D1HM0341	1034894	DeviceNet, measuring length 3 m
BTF08-C1HM0341	1034895	CANopen, measuring length 3 m

**Please note: connection adaptor must be ordered separately (see pages 18 to 24)**

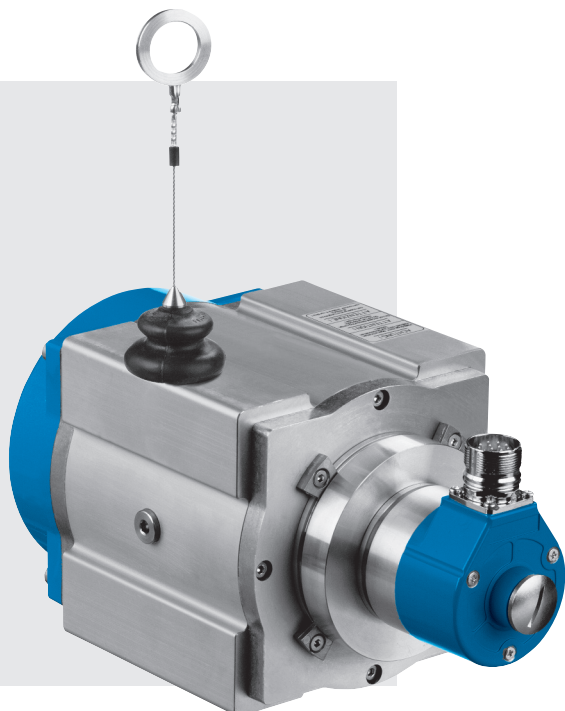
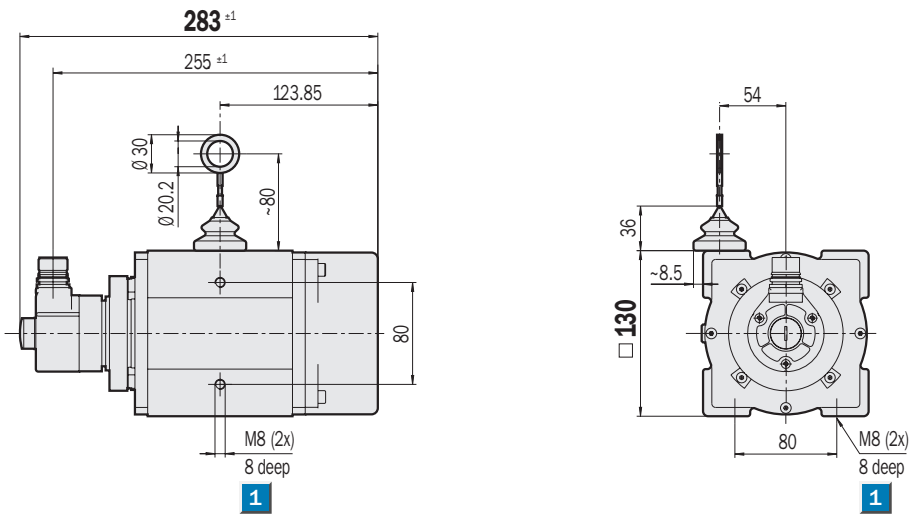
 **Resolution up to 0.025 mm**  
Absolute Wire Draw Encoders

- Linear path measurement using a wire draw mechanism
- High resolution
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Dimensional drawing wire draw encoder BTF13 SSI, measuring length 5 m



Dimensional drawing wire draw encoder BTF13 SSI, measuring length 10 m

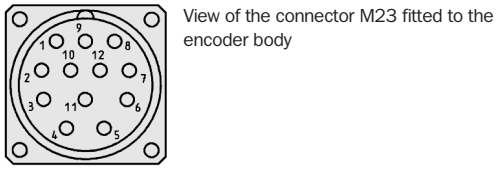


**1** Threaded blind hole for mounting General tolerances to DIN ISO 2768-mk

**PIN and wire allocation**

PIN	Signal	Wire colours (cable outlet)	Explanation
1	GND	blue	Earth connection
2	Data +	white	Interface signals
3	Clock +	yellow	Interface signals
4	R x D +	grey	RS422 programming line
5	R x D -	green	RS422 programming line
6	T x D +	pink	RS422 programming line
7	T x D -	black	RS422 programming line
8	U <sub>s</sub>	red	Supply voltage
9	SET	orange	Electronic adjustment
10	Data -	brown	Interface signals
11	Clock -	lilac	Interface signals
12	N. C.	orange/black	Not connected
	Screen		Housing potential

Caution! PINs labelled "N. C." must not be connected.



**Accessories**

Wire draw mechanisms
Mounting systems
Connection systems
Adaptor modules

Technical data		BTF13	SSI 5m	SSI 10m									
<b>Drum housing</b>	Anodised Aluminium												
<b>Spring housing</b>	Plastic												
<b>Measuring wire (stainless)</b>	Highly flexible stranded steel, Ø 1.35 mm												
<b>Measuring length</b>	5 m max.												
	10 m max.												
<b>Mass</b>	3.3 kg approx.												
	4.0 kg approx.												
<b>Code type</b>	25 bit/Gray												
<b>Code sequence</b>	Increasing in direction of measurement												
<b>Measuring step</b>	0.05 mm												
<b>Linearity</b>	0.05 % typ.												
<b>Repeatability</b>	± 1 measuring step												
<b>Operating speed</b>	4 m/sec.												
<b>Position forming time</b>	0.15 ms												
<b>Spring return force (typ.)</b>													
start/finish <sup>1)</sup>	15 N/20 N												
start/finish <sup>1)</sup>	10 N/20 N												
<b>Working temperature range</b>	- 20 ... + 70 °C												
<b>Storage temperature range</b>	- 40 ... + 100 °C												
<b>Life of wire draw mechanism <sup>2)</sup></b>	1 million cycles												
<b>EMC <sup>3)</sup></b>													
<b>Resistance</b>													
to shocks <sup>4)</sup>	100/6 g/ms												
to vibration <sup>5)</sup>	20/10 ... 2,000 g/Hz												
<b>Protection to IEC 60529</b>	IP 64 (wire draw mechanism)												
	IP 67 (encoder)												
<b>Operating voltage range (U<sub>s</sub>)</b>	10 ... 32 V												
<b>Power consumption max.</b>	0.8 W												
<b>Initialisation time <sup>6)</sup></b>	1,050 ms												
<b>Interface signals</b>													
Clock +, Clock -, Data +, Data - <sup>7)</sup>	SSI max. clock frequency 1 MHz i.e. min. duration LOW level (Clock +): 500 ns												
T x D +, T x D -, R x D +, R x D -	RS422												
SET (electronic adjustment)	H-active (L ≙ 0 - 4.7 V; H ≙ 10 - U <sub>s</sub> V)												

<sup>1)</sup> These values were measured at an ambient temperature of 25 °C. The values may be different at other temperatures.

<sup>2)</sup> Average values, which depend on the loading. At high operating speeds over long lengths, this figure can decrease; at slow operating speeds over short lengths, it can increase.

<sup>3)</sup> To DIN EN 61000-6-2 and DIN EN 61000-6-3

<sup>4)</sup> To DIN EN 60068-2-27

<sup>5)</sup> To DIN EN 60068-2-6

<sup>6)</sup> From the moment the supply voltage is applied, this is the time which elapses before the data word can be correctly read in.

<sup>7)</sup> For higher clock frequencies, choose synchronous SSI.

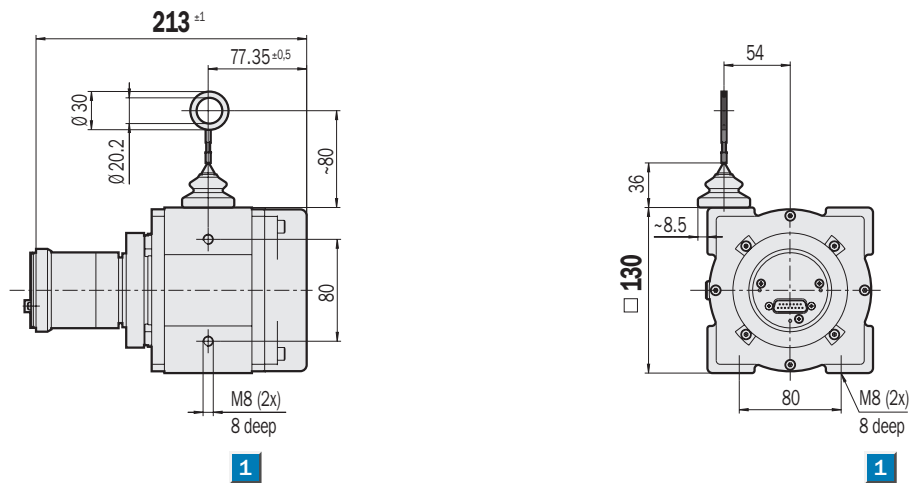
Order information		
<b>BTF13; U<sub>s</sub> 10 ... 32 V; connector M23, 12 pin</b>		
<b>25 bit SSI; Gray-Code, Set = 1,000</b>		
Type	Part no.	Description
BTF13-A1AM0520	1034300	SSI, measuring length 5 m
BTF13-A1AM1020	1034301	SSI, measuring length 10 m

Resolution up to 0.025 mm

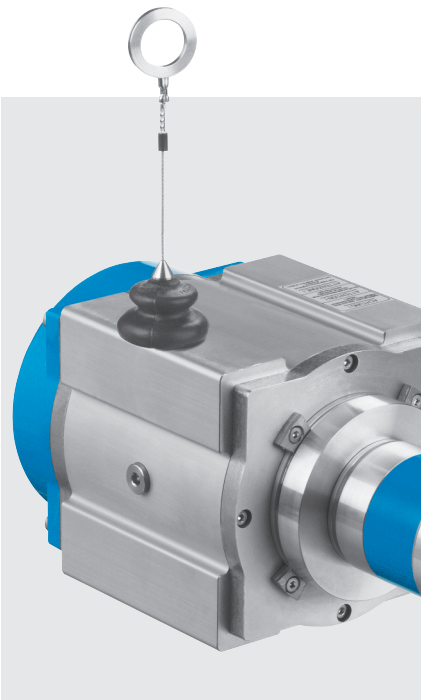
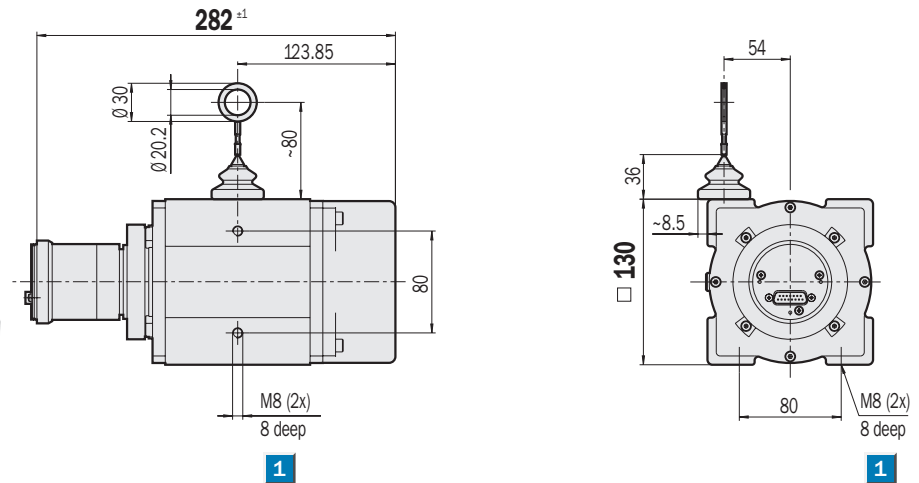
Absolute Wire Draw Encoders

- Linear path measurement using a wire draw mechanism
- High resolution
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- Dirt remover made of steel

Dimensional drawing wire draw encoder BTF13 Profibus, CANopen, DeviceNet, measuring length 5 m



Dimensional drawing wire draw encoder BTF13 Profibus, CANopen, DeviceNet, measuring length 10 m



1 Threaded blind hole for mounting

General tolerances to DIN ISO 2768-mk

Accessories
Bus adaptors
Wire draw mechanisms
Mounting systems
Connection systems

Profibus adaptor with PIN and wire allocation see pages 18 / 19
CANopen adaptor with PIN and wire allocation see pages 20 / 21
DeviceNet adaptor with PIN and wire allocation see pages 22 to 24



Technical data		BTF13					
		PB	CO	DN	PB	CO	DN
		5m	5m	5m	10m	10m	10m
<b>Drum housing</b>	Anodised Aluminium						
<b>Spring housing</b>	Plastic						
<b>Measuring wire (stainless)</b>	Highly flexible stranded steel, Ø 1.35 mm						
<b>Measuring length</b>	5 m max.						
	10 m max.						
<b>Mass</b>	3.4 kg approx.						
	4.1 kg approx.						
<b>Measuring step (recommended)</b>	0.05 mm <b>1</b>						
<b>Linearity</b>	0.05 % typ.						
<b>Repeatability</b>	± 1 measuring step						
<b>Operating speed</b>	4 m/sec.						
<b>Position forming time</b>	0.25 ms						
<b>Spring return force (typ.)</b>							
start/finish <sup>1)</sup>	15 N/20 N						
start/finish <sup>1)</sup>	10 N/20 N						
<b>Working temperature range</b>	- 20 ... + 70 °C						
<b>Storage temperature range</b>	- 40 ... + 100 °C						
<b>Life of wire draw mechanism <sup>2)</sup></b>	1 million cycles						
<b>EMC <sup>3)</sup></b>							
<b>Resistance</b>							
to shocks <sup>4)</sup>	100/6 g/ms						
to vibration <sup>5)</sup>	20/10 ... 2,000 g/Hz						
<b>Protection to IEC 60529</b>	IP 64 (wire draw mechanism)						
	IP 67 (encoder)						
<b>Operating voltage range (U<sub>s</sub>)</b>	10 ... 32 V						
<b>Power consumption max.</b>	2.0 W						
<b>Initialisation time <sup>6)</sup></b>	1,250 ms						
<b>Bus interface</b>							
<b>Electronic adjustment (Number SET)</b>	Via PRESET switch or protocol						
<b>Bus termination <sup>7)</sup></b>	Via DIP switch						
<b>Electrical connection</b>	Connection adaptor						
<b>Electrical interface <sup>8)</sup></b>	RS485						
<b>Electrical interface <sup>9)</sup></b>	ISO-DIS 11898						
<b>Protocol</b>	Profile for encoders (07 <sub>hex</sub> ) – Class 2						
	Communication Profile DS 301 V4.0						
	Device Profile DSP 406 V2.0						
	DeviceNet Specification, Release 2.0						
<b>Address setting (node no.)</b>	0 ... 127 (DIP switch or protocol)						
<b>Address setting (Node ID)</b>	0 ... 63 (DIP switch or protocol)						
<b>Data transmission rate (Baud rate) <sup>10)</sup></b>	9.6 kBaud ... 12 MBaud						
(DIP switch or protocol)	(10, 20, 50, 125, 250, 500) kB, 1 MB						
(DIP switch or protocol)	(125, 250, 500) kB						
<b>Status information</b>	Running (LED green), bus activity (LED red)						
	2-coloured LED for CAN Controller Status						
	Network status LED (NS), 2-coloured						

<sup>1)</sup> These values were measured at an ambient temperature of 25 °C. The values may be different at other temperatures.

<sup>2)</sup> Average values, which depend on the loading. At high operating speeds over long lengths, this figure can decrease; at slow operating speeds over short lengths, it can increase.

<sup>3)</sup> To DIN EN 61000-6-2 and DIN EN 61000-6-3

<sup>4)</sup> To DIN EN 60068-2-27

<sup>5)</sup> To DIN EN 60068-2-6

<sup>6)</sup> From the moment the supply voltage is applied, this is the time which elapses before the data word can be correctly read in.

<sup>7)</sup> Connection for terminal device only

<sup>8)</sup> To EN 50 170-2 (DIN 19245 parts 1-3), galvanically separated using an opto-coupler

<sup>9)</sup> (CAN High Speed) and CAN specification 2.0 B, galvanically separated

<sup>10)</sup> Automatic detection


**1** When the customer configures the encoder to 6,680 steps x 32 revolutions, via the Bus Master. (Factory entry in GSD or EDS file: 8,192 steps x 8,192 revolutions).

**Order information**

**BTF13; U<sub>s</sub> 10 ... 32 V; field buses**

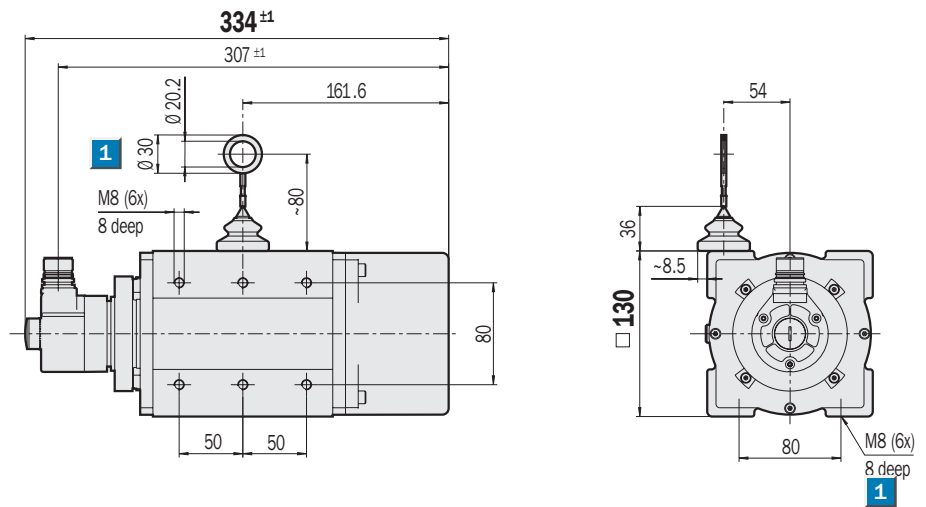
Type	Part no.	Description
BTF13-P1HM0525	1 034 306	Profibus, measuring length 5 m
BTF13-D1HM0525	1 034 312	DeviceNet, measuring length 5 m
BTF13-C1HM0525	1 034 318	CANopen, measuring length 5 m
BTF13-P1HM1025	1 034 307	Profibus, measuring length 10 m
BTF13-D1HM1025	1 034 313	DeviceNet, measuring length 10 m
BTF13-C1HM1025	1 034 319	CANopen, measuring length 10 m

**Please note: connection adaptor must be ordered separately (see pages 18 to 24)**

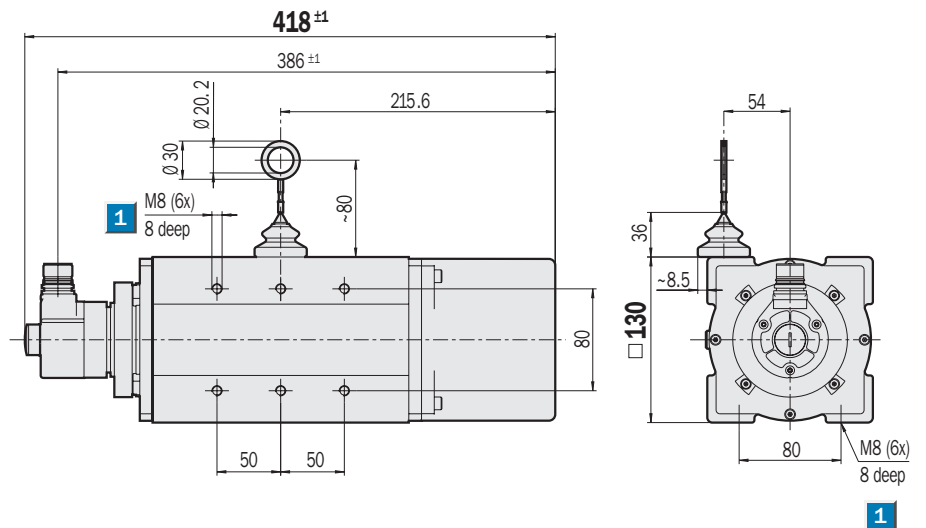
 **Resolution up to 0.025 mm**  
**Absolut-Seilzugencoder**

- Linear path measurement using a wire draw mechanism
- High resolution
- Easy to mount
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- Dirt remover made of steel

Dimensional drawing wire draw encoder BTF13 SSI, measuring length 20 m



Dimensional drawing wire draw encoder BTF13 SSI, measuring length 30 m



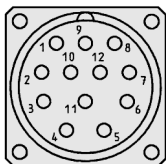
**1** Threaded blind hole for mounting

General tolerances to DIN ISO 2768-mk

**PIN and wire allocation**

PIN	Signal	Wire colours (cable outlet)	Explanation
1	GND	blue	Earth connection
2	Data +	white	Interface signals
3	Clock +	yellow	Interface signals
4	R x D +	grey	RS422 programming line
5	R x D -	green	RS422 programming line
6	T x D +	pink	RS422 programming line
7	T x D -	black	RS422 programming line
8	U <sub>s</sub>	red	Supply voltage
9	SET	orange	Electronic adjustment
10	Data -	brown	Interface signals
11	Clock -	lilac	Interface signals
12	N. C.	orange/black	Not connected
	Screen		Housing potential

Caution! PINs labelled "N. C." must not be connected.



View of the connector M23 fitted to the encoder body

**Accessories**

Wire draw mechanisms
Mounting systems
Connection systems
Adaptor modules

Technical data		BTF13	SSI 20m	SSI 30m									
<b>Drum housing</b>	Anodised Aluminium												
<b>Spring housing</b>	Plastic												
<b>Measuring wire (stainless)</b>	Highly flexible stranded steel, Ø 0.81 mm												
<b>Measuring length</b>	20 m max.												
	30 m max.												
<b>Mass</b>	5.3 kg approx.												
	6.5 kg approx.												
<b>Code type</b>	25 bit/Gray												
<b>Code sequence</b>	Increasing in direction of measurement												
<b>Measuring step</b>	0.05 mm												
<b>Linearity</b>	0.05 % typ.												
<b>Repeatability</b>	± 1 measuring step												
<b>Operating speed</b>	4 m/sec.												
<b>Position forming time</b>	0.15 ms												
<b>Spring return force (typ.)</b>													
start/finish <sup>1)</sup>	10 N/20 N												
<b>Working temperature range</b>	- 20 ... + 70 °C												
<b>Storage temperature range</b>	- 40 ... + 100 °C												
<b>Life of wire draw mechanism <sup>2)</sup></b>	1 million cycles												
<b>EMC <sup>3)</sup></b>													
<b>Resistance</b>													
to shocks <sup>4)</sup>	100/6 g/ms												
to vibration <sup>5)</sup>	20/10 ... 2,000 g/Hz												
<b>Protection to IEC 60529</b>	IP 64 (wire draw mechanism)												
	IP 67 (encoder)												
<b>Operating voltage range (U<sub>s</sub>)</b>	10 ... 32 V												
<b>Power consumption max.</b>	0.8 W												
<b>Initialisation time <sup>6)</sup></b>	1,050 ms												
<b>Interface signals</b>													
Clock +, Clock -, Data +, Data - <sup>7)</sup>	SSI max. clock frequency 1 MHz i.e. min. duration LOW level (Clock +): 500 ns												
T x D +, T x D -, R x D +, R x D -	RS422												
SET (electronic adjustment)	H-active (L $\Delta$ 0 - 4.7 V; H $\Delta$ 10 - U <sub>s</sub> V)												

<sup>1)</sup> These values were measured at an ambient temperature of 25 °C.  
The values may be different at other temperatures.

<sup>2)</sup> Average values, which depend on the loading.  
At high operating speeds over long lengths, this figure can decrease; at slow operating speeds over short lengths, it can increase.

<sup>3)</sup> To DIN EN 61000-6-2 and DIN EN 61000-6-3

<sup>4)</sup> To DIN EN 60068-2-27

<sup>5)</sup> To DIN EN 60068-2-6

<sup>6)</sup> From the moment the supply voltage is applied, this is the time which elapses before the data word can be correctly read in.

<sup>7)</sup> For higher clock frequencies, choose synchronous SSI.

#### Order information

**BTF13; U<sub>s</sub> 10 ... 32 V; connector M23, 12 pin**

**25 bit SSI; Gray-Code, Set = 1,000**

Type	Part no.	Description
BTF13-A1AM2020	1034302	SSI, measuring length 20 m
BTF13-A1AM3020	1034303	SSI, measuring length 30 m

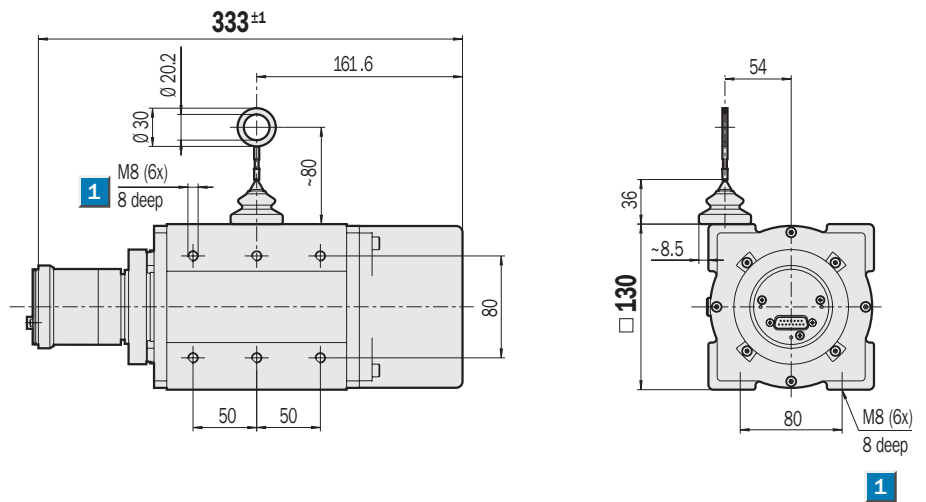
Resolution up to 0.025 mm

Absolute Wire Draw Encoders

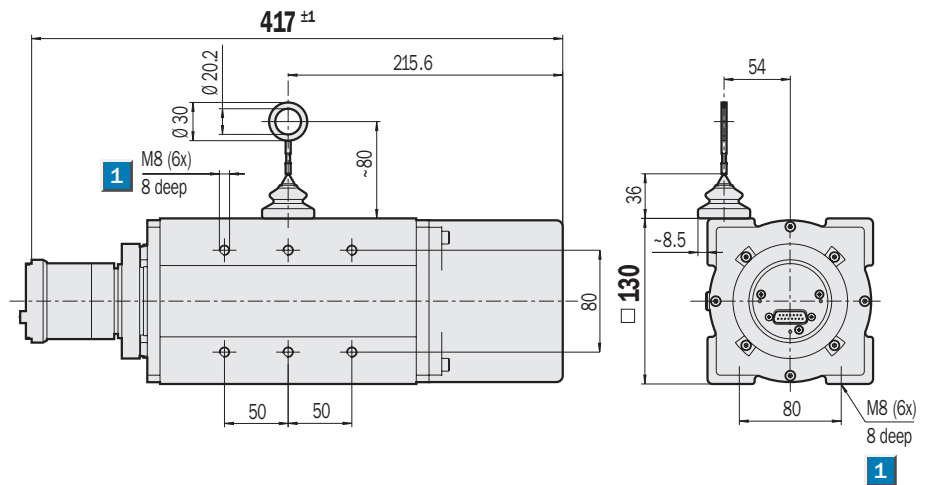
- Linear path measurement using a wire draw mechanism
- High resolution
- Easy to mount
- High-precision measurement drum
- Extremely stable spring return
- Highly flexible steel wire
- Dirt remover made of steel



Dimensional drawing wire draw encoder BTF13 Profibus, CANopen, DeviceNet, measuring length 20 m



Dimensional drawing wire draw encoder BTF13 Profibus, CANopen, DeviceNet, measuring length 30 m



1 Threaded blind hole for mounting

General tolerances to DIN ISO 2768-mk

Accessories
Bus adaptors
Wire draw mechanisms
Mounting systems
Connection systems

Profibus adaptor with PIN and wire allocation see pages 18 / 19
CANopen adaptor with PIN and wire allocation see pages 20 / 21
DeviceNet adaptor with PIN and wire allocation see pages 22 to 24

Technical data		BTF13			PB	CO	DN	PB	CO	DN				
					20m	20m	20m	30m	30m	30m				
<b>Drum housing</b>	Anodised Aluminium													
<b>Spring housing</b>	Plastic													
<b>Measuring wire (stainless)</b>	Highly flexible stranded steel, Ø 0.81 mm													
<b>Measuring length</b>	20 m max.													
	30 m max.													
<b>Mass</b>	5.4 kg approx.													
	6.6 kg approx.													
<b>Measuring step (recommended)</b>	0.05 mm <sup>1</sup>													
<b>Linearity</b>	0.05 % typ.													
<b>Repeatability</b>	± 1 measuring step													
<b>Operating speed</b>	4 m/sec.													
<b>Position forming time</b>	0.25 ms													
<b>Spring return force (typ.)</b>														
start/finish <sup>1)</sup>	10 N/20 N													
<b>Working temperature range</b>	- 20 ... + 70 °C													
<b>Storage temperature range</b>	- 40 ... + 100 °C													
<b>Life of wire draw mechanism <sup>2)</sup></b>	1 million cycles													
<b>EMC <sup>3)</sup></b>														
<b>Resistance</b>														
to shocks <sup>4)</sup>	100/6 g/ms													
to vibration <sup>5)</sup>	20/10 ... 2,000 g/Hz													
<b>Protection to IEC 60529</b>	IP 64 (wire draw mechanism)													
	IP 67 (encoder)													
<b>Operating voltage range (U<sub>s</sub>)</b>	10 ... 32 V													
<b>Power consumption max.</b>	2.0 W													
<b>Initialisation time <sup>6)</sup></b>	1,250 ms													
<b>Bus interface</b>														
<b>Electronic adjustment (Number SET)</b>	Via PRESET switch or protocol													
<b>Bus termination <sup>7)</sup></b>	Via DIP switch													
<b>Electrical connection</b>	Connection adaptor													
<b>Electrical interface <sup>8)</sup></b>	RS485													
<b>Electrical interface <sup>9)</sup></b>	ISO-DIS 11898													
<b>Protocol</b>	Profile for encoders (07 <sub>hex</sub> ) – Class 2													
	Communication Profile DS 301 V4.0													
	Device Profile DSP 406 V2.0													
	DeviceNet Specification, Release 2.0													
<b>Address setting (node no.)</b>	0 ... 127 (DIP switch or protocol)													
<b>Address setting (Node ID)</b>	0 ... 63 (DIP switch or protocol)													
<b>Data transmission rate (Baud rate) <sup>10)</sup></b>	9.6 kBaud ... 12 MBaud													
(DIP switch or protocol)	(10, 20, 50, 125, 250, 500) kB, 1 MB													
(DIP switch or protocol)	(125, 250, 500) kB													
<b>Status information</b>	Running (LED green), bus activity (LED red)													
	2-coloured LED for CAN Controller Status													
	Network status LED (NS), 2-coloured													

<sup>1)</sup> These values were measured at an ambient temperature of 25 °C. The values may be different at other temperatures.

<sup>2)</sup> Average values, which depend on the loading. At high operating speeds over long lengths, this figure can decrease; at slow operating speeds over short lengths, it can increase.

<sup>3)</sup> To DIN EN 61000-6-2 and DIN EN 61000-6-3

<sup>4)</sup> To DIN EN 60068-2-27

<sup>5)</sup> To DIN EN 60068-2-6

<sup>6)</sup> From the moment the supply voltage is applied, this is the time which elapses before the data word can be correctly read in.

<sup>7)</sup> Connection for terminal device only

<sup>8)</sup> To EN 50 170-2 (DIN 19245 parts 1-3), galvanically separated using an opto-coupler

<sup>9)</sup> (CAN High Speed) and CAN specification 2.0 B, galvanically separated

<sup>10)</sup> Automatic detection


<sup>1</sup> When the customer configures the encoder to 6,646 steps x 128 revolutions, via the Bus Master. (Factory entry in GSD or EDS file: 8,192 steps x 8,192 revolutions).

**Order information**

**BTF13; U<sub>s</sub> 10 ... 32 V; field buses**

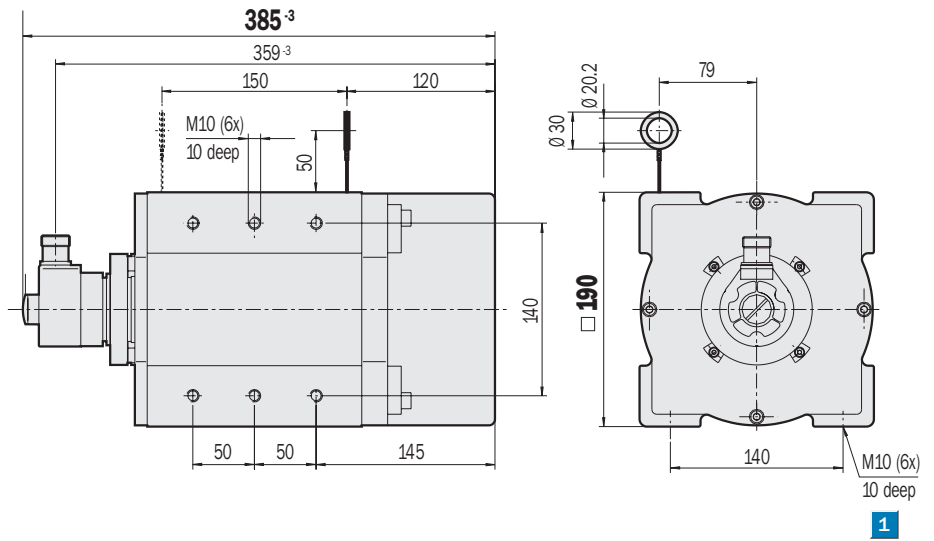
Type	Part no.	Description
BTF13-P1HM2025	1034308	Profibus, measuring length 20 m
BTF13-D1HM2025	1034314	DeviceNet, measuring length 20 m
BTF13-C1HM2025	1034320	CANopen, measuring length 20 m
BTF13-P1HM3025	1034309	Profibus, measuring length 30 m
BTF13-D1HM3025	1034315	DeviceNet, measuring length 30 m
BTF13-C1HM3025	1034321	CANopen, measuring length 30 m

**Please note: connection adaptor must be ordered separately (see pages 18 to 24)**

 **Resolution up to 0.025 mm**  
Absolute Wire Draw Encoders

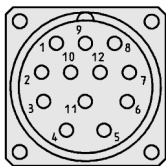
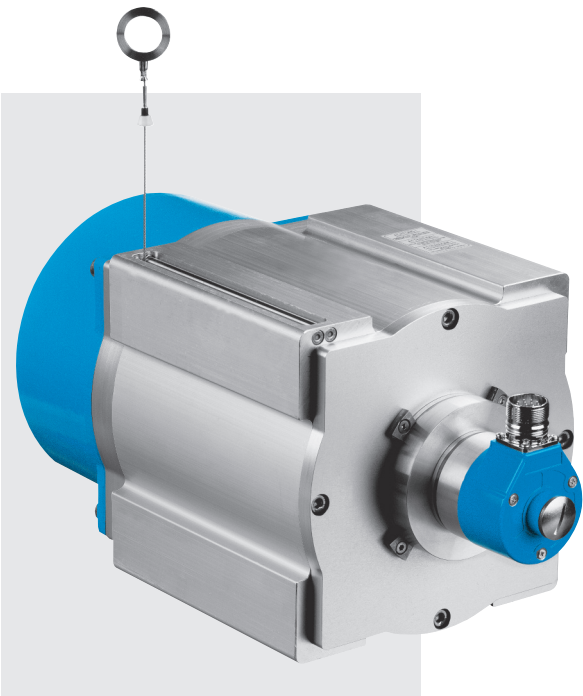
- Linear path measurement using a wire draw mechanism
- High resolution
- Easy to mount
- High-precision measurement drum
- Extremely stable spring return
- Highly flexible steel wire

Dimensional drawing wire draw encoder BTF19 SSI, measuring length 50 m



1 Threaded blind hole for mounting

General tolerances to DIN ISO 2768-mk



View of the connector M23 fitted to the encoder body

Accessories
Wire draw mechanisms
Mounting systems
Connection systems
Adaptor modules

PIN and wire allocation

PIN	Signal	Wire colours (cable outlet)	Explanation
1	GND	blue	Earth connection
2	Data +	white	Interface signals
3	Clock +	yellow	Interface signals
4	R x D +	grey	RS422 programming line
5	R x D -	green	RS422 programming line
6	T x D +	pink	RS422 programming line
7	T x D -	black	RS422 programming line
8	U <sub>s</sub>	red	Supply voltage
9	SET	orange	Electronic adjustment
10	Data -	brown	Interface signals
11	Clock -	lilac	Interface signals
12	N. C.	orange/black	Not connected
	Screen		Housing potential

Caution! PINs labelled "N. C." must not be connected.

Technical data		BTF19	SSI										
			50m										
<b>Drum housing</b>	Anodised Aluminium												
<b>Spring housing</b>	Die-cast zinc												
<b>Measuring wire (stainless)</b>	Highly flexible stranded steel, Ø 1.35 mm												
<b>Measuring length</b>	50 m max.												
<b>Mass</b>	16.8 kg approx.												
<b>Code type</b>	25 bit/Gray												
<b>Code sequence</b>	Increasing in direction of measurement												
<b>Measuring step</b>	0.1 mm												
<b>Linearity</b>	0.05 % typ.												
<b>Repeatability</b>	± 1 measuring step												
<b>Operating speed</b>	4 m/sec.												
<b>Position forming time</b>	0.15 ms												
<b>Spring return force (typ.)</b>													
start/finish <sup>1)</sup>	18 N/37 N												
<b>Working temperature range</b>	- 20 ... + 70 °C												
<b>Storage temperature range</b>	- 40 ... + 100 °C												
<b>Life of wire draw mechanism <sup>2)</sup></b>	1 million cycles												
<b>EMC <sup>3)</sup></b>													
<b>Resistance</b>													
to shocks <sup>4)</sup>	100/6 g/ms												
to vibration <sup>5)</sup>	20/10 ... 2,000 g/Hz												
<b>Protection to IEC 60529</b>													
	IP 31 (wire draw mechanism)												
	IP 67 (encoder)												
<b>Operating voltage range (U<sub>s</sub>)</b>	10 ... 32 V												
<b>Power consumption max.</b>	0.8 W												
<b>Initialisation time <sup>6)</sup></b>	1,050 ms												
<b>Interface signals</b>													
Clock +, Clock -, Data +, Data - <sup>7)</sup>	SSI max. clock frequency 1 MHz i.e. min. duration LOW level (Clock +): 500 ns												
T x D +, T x D -, R x D +, R x D -	RS422												
SET (electronic adjustment)	H-active (L ≙ 0 - 4.7 V; H ≙ 10 - U <sub>s</sub> V)												

<sup>1)</sup> These values were measured at an ambient temperature of 25 °C.  
The values may be different at other temperatures.

<sup>2)</sup> Average values, which depend on the loading.  
At high operating speeds over long lengths, this figure can decrease; at slow operating speeds over short lengths, it can increase.

<sup>3)</sup> To DIN EN 61000-6-2 and DIN EN 61000-6-3

<sup>4)</sup> To DIN EN 60068-2-27

<sup>5)</sup> To DIN EN 60068-2-6

<sup>6)</sup> From the moment the supply voltage is applied, this is the time which elapses before the data word can be correctly read in.


<sup>7)</sup> For higher clock frequencies, choose synchronous SSI.

#### Order information

**BTF19; U<sub>s</sub> 10 ... 32 V; connector M23, 12 pin**

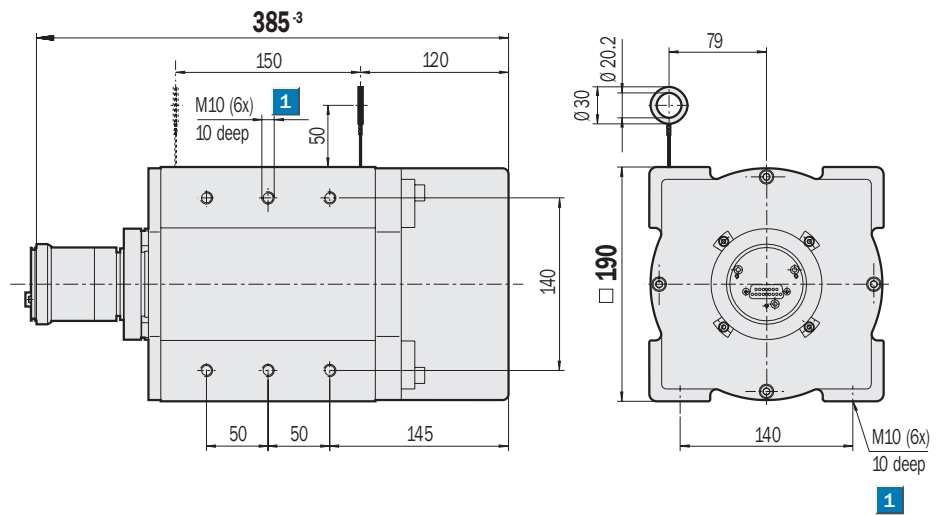
**25 bit SSI, Gray-Code, Set = 1,000**

Type	Part no.	Description
BTF19-A1AM5010	1034304	SSI, measuring length 50 m

 **Resolution up to 0.025 mm**  
Absolute Wire Draw Encoders

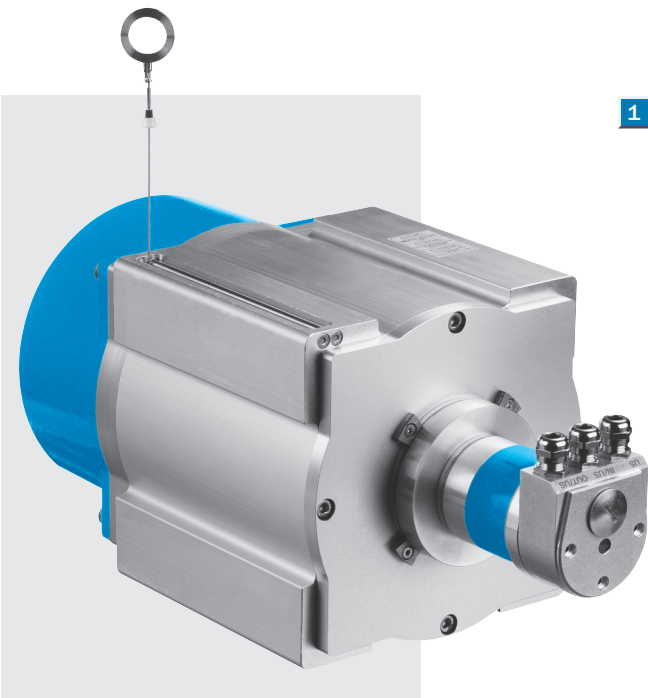
- Linear path measurement using a wire draw mechanism
- High resolution
- Easy to mount
- High-precision measurement drum
- Extremely stable spring return
- Highly flexible steel wire

Dimensional drawing wire draw encoder BTF19 Profibus, CANopen, DeviceNet, measuring length 50 m



**1** Threaded blind hole for mounting

General tolerances to DIN ISO 2768-mk



Accessories
Bus adaptors
Wire draw mechanisms
Mounting systems
Connection systems

Profibus adaptor with PIN and wire allocation see pages 18 / 19
CANopen adaptor with PIN and wire allocation see pages 20 / 21
DeviceNet adaptor with PIN and wire allocation see pages 22 to 24



Technical data		BTF19			PB	CO	DN							
					50m	50m	50m							
<b>Drum housing</b>	Anodised Aluminium													
<b>Spring housing</b>	Die-cast zinc													
<b>Measuring wire (stainless)</b>	Highly flexible stranded steel, Ø 1.35 mm													
<b>Measuring length</b>	50 m max.													
<b>Mass</b>	16.9 kg approx.													
<b>Measuring step (recommended)</b>	0.1 mm <b>1</b>													
<b>Linearity</b>	0.05 % typ.													
<b>Repeatability</b>	± 1 measuring step													
<b>Operating speed</b>	4 m/sec.													
<b>Position forming time</b>	0.25 ms													
<b>Spring return force (typ.)</b>														
start/finish <sup>1)</sup>	18 N/37 N													
<b>Working temperature range</b>	- 20 ... + 70 °C													
<b>Storage temperature range</b>	- 40 ... + 100 °C													
<b>Life of wire draw mechanism <sup>2)</sup></b>	1 million cycles													
<b>EMC <sup>3)</sup></b>														
<b>Resistance</b>														
to shocks <sup>4)</sup>	100/6 g/ms													
to vibration <sup>5)</sup>	20/10 ... 2,000 g/Hz													
<b>Protection to IEC 60529</b>	IP 31 (wire draw mechanism)													
	IP 67 (encoder)													
<b>Operating voltage range (U<sub>s</sub>)</b>	10 ... 32 V													
<b>Power consumption max.</b>	2.0 W													
<b>Initialisation time <sup>6)</sup></b>	1,250 ms													
<b>Bus interface</b>														
<b>Electronic adjustment (Number SET)</b>	Via PRESET switch or protocol													
<b>Bus termination <sup>7)</sup></b>	Via DIP switch													
<b>Electrical connection</b>	Connection adaptor													
<b>Electrical interface <sup>8)</sup></b>	RS485													
<b>Electrical interface <sup>9)</sup></b>	ISO-DIS 11898													
<b>Protocol</b>	Profile for encoders (07 <sub>hex</sub> ) – Class 2													
	Communication Profile DS 301 V4.0													
	Device Profile DSP 406 V2.0													
	DeviceNet Specification, Release 2.0													
<b>Address setting (node no.)</b>	0 ... 127 (DIP switch or protocol)													
<b>Address setting (Node ID)</b>	0 ... 63 (DIP switch or protocol)													
<b>Data transmission rate (Baud rate) <sup>10)</sup></b>	9.6 kBaud ... 12 MBaud													
(DIP switch or protocol)	(10, 20, 50, 125, 250, 500) kB, 1 MB													
(DIP switch or protocol)	(125, 250, 500) kB													
<b>Status information</b>	Running (LED green), bus activity (LED red)													
	2-coloured LED for CAN Controller Status													
	Network status LED (NS), 2-coloured													

<sup>1)</sup> These values were measured at an ambient temperature of 25 °C. The values may be different at other temperatures.

<sup>2)</sup> Average values, which depend on the loading. At high operating speeds over long lengths, this figure can decrease; at slow operating speeds over short lengths, it can increase.

<sup>3)</sup> To DIN EN 61000-6-2 and DIN EN 61000-6-3

<sup>4)</sup> To DIN EN 60068-2-27

<sup>5)</sup> To DIN EN 60068-2-6

<sup>6)</sup> From the moment the supply voltage is applied, this is the time which elapses before the data word can be correctly read in.

<sup>7)</sup> Connection for terminal device only

<sup>8)</sup> To EN 50 170-2 (DIN 19245 parts 1-3), galvanically separated using an opto-coupler

<sup>9)</sup> (CAN High Speed) and CAN specification 2.0 B, galvanically separated

<sup>10)</sup> Automatic detection

**1** When the customer configures the encoder to 4,900 steps x 128 revolutions, via the Bus Master. (Factory entry in GSD or EDS file: 8,192 steps x 8,192 revolutions).

**Order information**

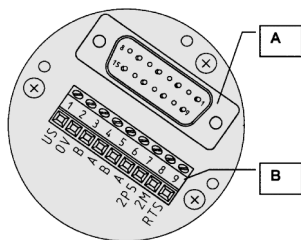
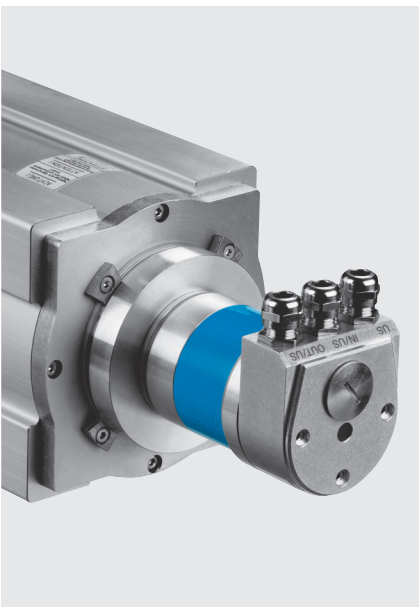
**BTF19; U<sub>s</sub> 10 ... 32 V; field buses**

Type	Part no.	Description
BTF19-P1HM5017	1034310	Profibus, measuring length 50 m
BTF19-D1HM5017	1034316	DeviceNet, measuring length 50 m
BTF19-C1HM5017	1034322	CANopen, measuring length 50 m

Please note: connection adaptor must be ordered separately (see pages 18 to 24)

Resolution up to 0.025 mm  
Absolute Wire Draw Encoders

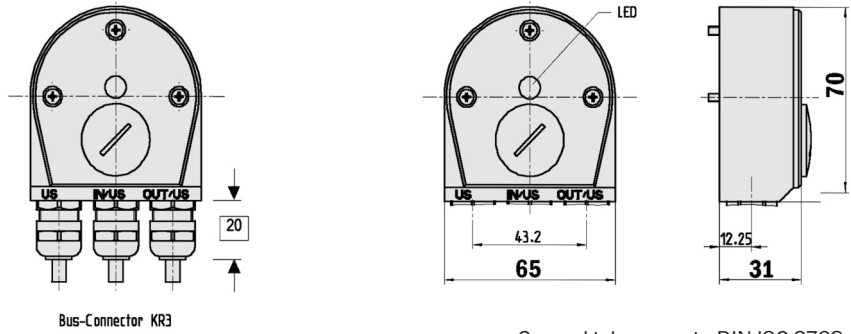
- Linear path measurement using a wire draw mechanism
- High resolution
- Easy to mount
- High-precision measurement drum
- Extremely stable spring return
- Highly flexible steel wire
- Dirt remover made of steel



A Internal plug connection to the encoder  
B External connection to the bus

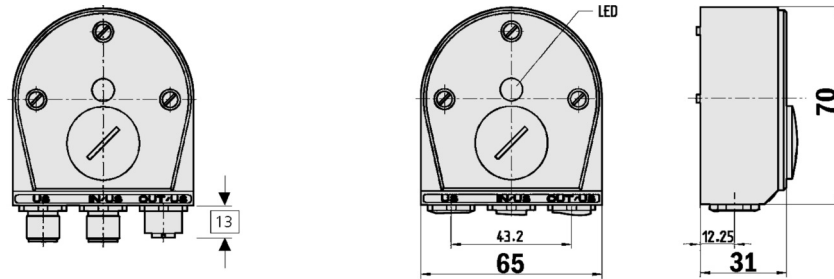
1 Encoders with a Profibus adaptor have a terminal strip for connecting the bus and supply lines. In order to connect the lines, the Profibus adaptor is unscrewed from the complete device. The figure shows the pin allocation within the bus connection.

## Dimensional drawing Profibus adaptor KA3



General tolerances to DIN ISO 2768-mk

## Dimensional drawing Profibus adaptor SR3



General tolerances to DIN ISO 2768-mk

Order information		
BTF Profibus adaptor		
Type	Part no..	Description
AD-ATM60-KA3PR	2029225	Bus adaptor KA3, 3 x PG
AD-ATM60-SR3PR	2031985	Bus adaptor SR3, 1 x M12, 4 pin 2 x M12, 5 pin

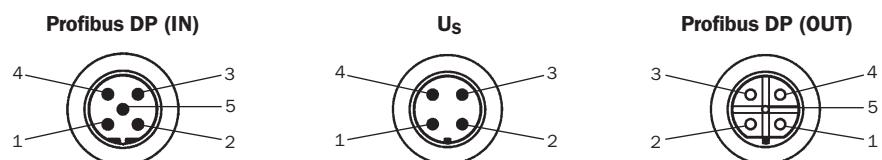
## 1 PIN and wire allocation for Profibus adaptor

Terminal strip	Connector 4 pin	Connector 5 pin	Conn. female 5 pin	Signal	Explanation
1	1	-	-	U <sub>s</sub> (24 V)	Supply voltage 10 ... 32 V
2	3	-	-	0 V (GND)	Ground (0 V)
3	-	-	4	B	Profibus DP B line (out)
4	-	-	2	A	Profibus DP A line (out)
5	-	4	-	B	Profibus DP B line (in)
6	-	2	-	A	Profibus DP A line (in)
7	-	-	1	2P5 <sup>1)</sup>	+ 5 V (DC isolated)
8	-	-	3	2M <sup>1)</sup>	0 V (DC isolated)
9	-	-	-	RTS <sup>2)</sup>	Request To Send
-	2	1	-	N. C.	-
-	4	3	-	N. C.	-
-	-	5	5	Screen	Housing potential

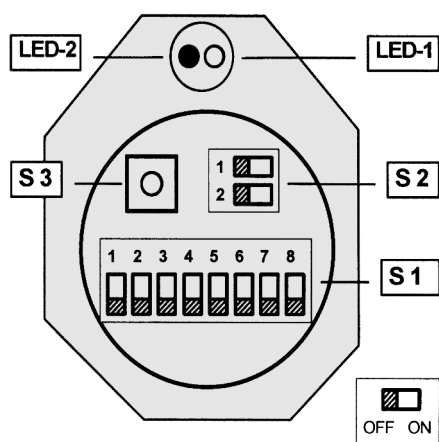
<sup>1)</sup> Use for external bus termination or to supply the transmitter/receiver of an optical transmission link.

<sup>2)</sup> Signal is optional, used to detect the direction of an optical connection.

## Connector M12 (at Bus adaptor)



## Switch settings

**Switch settings**

Access to the switches is gained by opening the removable screw cap (PG) on the rear of the bus adaptor. Use of the following elements.

S 1 (1-7)	Address setting (0 ... 127)
S 1 (8-8)	Counting direction (CW/CCW)
S 2	Bus termination
S 3	Preset push button (Number SET)

**Status information via LEDs**

LED-1	Operating voltage (green)
LED-2	Bus activity (red)

## Implementation

**DP Functionalities**

in accordance with the Profibus DP basic functions

## DP services

- Data interchange (Write\_Read\_Data)
- Address allocation (Set\_Slave\_Address)
- Control commands (Global\_Control)
- Read the inputs (Read\_Inputs)
- Read the outputs (Read\_Outputs)
- Read diagnostic data (Slave\_Diagnosis)
- Send configuration data (Set\_Param)
- Check configuration data (Chk\_Config)

## Communication

- Cyclic master – slave data traffic

## Protective mechanisms

- Data transfer with HD = 4
- Time monitoring of the data traffic

**Configuration**

Settings in accordance with Encoder Profile

- Counting direction (CW, CCW)
- Class-2 functionality (ON, OFF)
- Scaling function (ON, OFF)
- Steps per turn (1 ... 8192)
- Total resolution (GA) -- 1 ... 67,108,864 steps, with  $GA = 2^n \times SpU$ . -- ( $n=0 \dots 13$ )
- "Activation of SSA-service" <sup>2)</sup>
- Selection of the station address <sup>2)</sup>

**Configuration**

Setting the formats (IN/OUT) for the cyclic data interchange via configuration byte (K-1)

2 words IN/OUT data (I-1/O-1) <sup>1)</sup>

4 words IN/OUT data (I-1, I-2, I-3/O-1) <sup>2)</sup>

**Data interchange: - Input Data (IN)**

I-1	Position value <sup>1)</sup>	4 bytes
I-2	Speed (rev/min) <sup>2)</sup>	2 bytes
I-3	Time stamp <sup>2)</sup>	2 bytes

**Data interchange: - Output data (OUT)**

O-1	PRESET Value <sup>1)</sup>	4 bytes
-----	----------------------------	---------

**Diagnostic information**

- Station-related diagnosis (63 bytes in acc. with Encoder Profile Class 2)

**Setting: - PRESET value**

The PRESET function is used for set into operation and to allocate a specific position value to the current physical angular position.

The following settings are possible:

- by hardware (PRESET push button: S3)
- by software: -- (see Output data)

**Setting: - Counting direction**

- by hardware via DIP switch S1-(8)
- by software via Telegram

Counting direction increasing:

Rotation of the shaft in the clockwise direction (CW) as viewed on the shaft

**Setting: - Station address**

- by hardware via DIP switch S1
- by software via Telegram

The setting by software is carried out only if the "SSA-service" has been previously activated.

**Setting: - Bus termination**

The 2-way DIP switch (S2) permits an internal bus termination to be switched in and out (ON/OFF).

If the bus is terminated externally, switch S2 must be in the OFF position.

**Device-specific file (GS.)**

For the purpose of automatic set into operation of the encoder, use is made of the GS file.

All the characteristic features of the device are defined in it.

STEG 5952.GSD German  
STEG 5952.GSE English

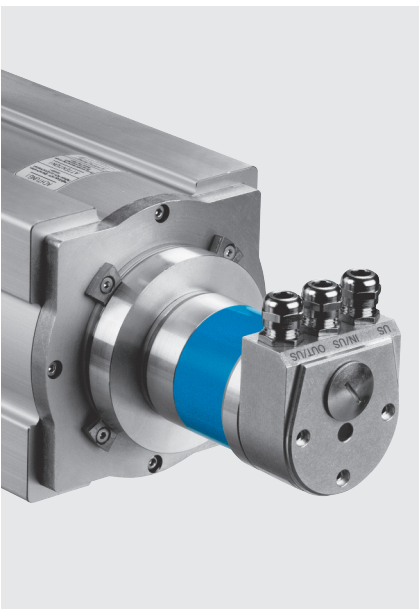
<sup>1)</sup> As per Encoder Profile

<sup>2)</sup> Manufacturer specific function

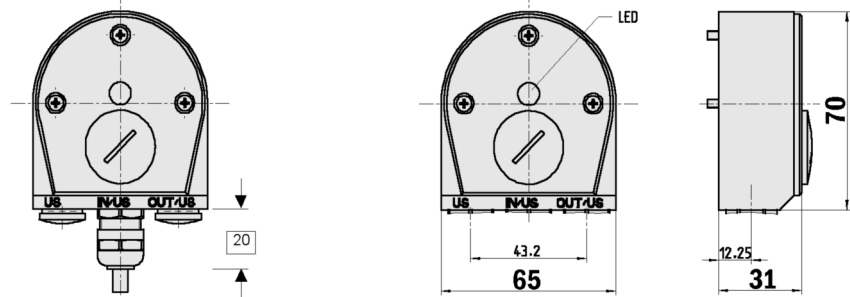
# CANopen adaptor with PIN and wire allocation

Resolution up to 0.025 mm  
Absolute Wire Draw Encoders

- Linear path measurement using a wire draw mechanism
- High resolution
- Easy to mount
- High-precision measurement drum
- Extremely stable spring return
- Highly flexible steel wire
- Dirt remover made of steel

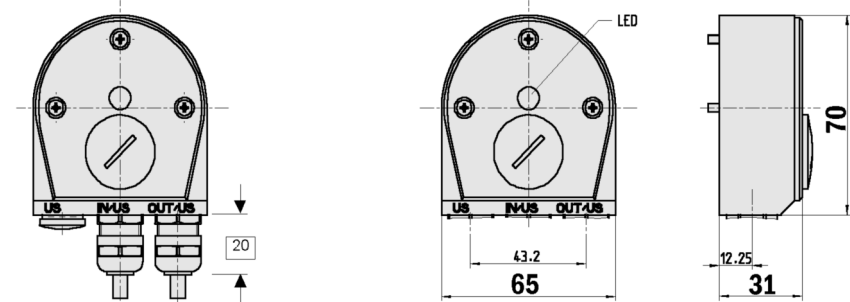


Dimensional drawing CANopen adaptor KR1



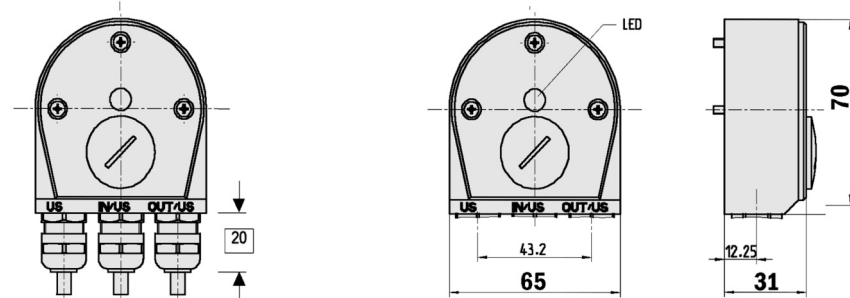
General tolerances to DIN ISO 2768-mk

Dimensional drawing CANopen adaptor KR2



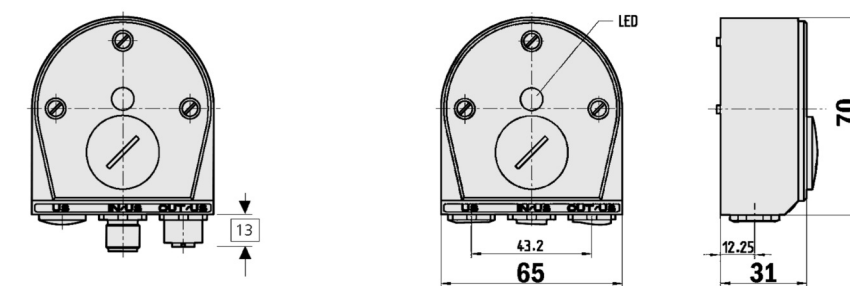
General tolerances to DIN ISO 2768-mk

Dimensional drawing CANopen adaptor KR3

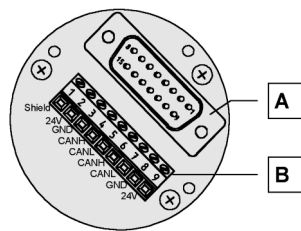


General tolerances to DIN ISO 2768-mk

Dimensional drawing CANopen adaptor SR2

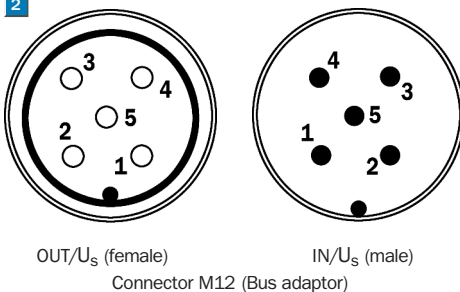


General tolerances to DIN ISO 2768-mk



A Internal plug connection to the encoder  
B External connection to the bus

2



## Order information

### BTF CANopen adaptor

Type	Part no.	Description
AD-ATM60-KR1CO	2029230	Bus adaptor KR1, 1 x PG
AD-ATM60-KR2CO	2029231	Bus adaptor KR2, 2 x PG
AD-ATM60-KR3CO	2029232	Bus adaptor KR3, 3 x PG
AD-ATM60-SR2CO	2020935	Bus adaptor SR2, 2 x M12, 5 pin

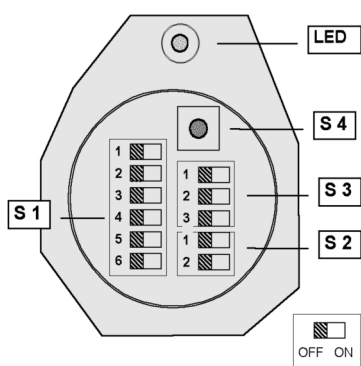
**1 PIN and wire allocation for CANopen adaptor**

Terminal Strip	Connector	Signal	Explanation
1	1	Shield	Screen
2	2	U <sub>s</sub> (24 V)	Supply voltage 10 ... 32 V
3	3	GND (COM)	0 V (Gnd)
4	4	CAN <sub>H</sub>	CAN-Bus-Signal HIGH
5	5	CAN <sub>L</sub>	CAN-Bus-Signal LOW
6		CAN <sub>H</sub>	CAN-Bus-Signal HIGH
7		CAN <sub>L</sub>	CAN-Bus-Signal LOW
8		GND (COM)	0 V (Gnd)
9		U <sub>s</sub> (24 V)	Supply voltage 10 ... 32 V

**1** Encoders with a CANbus adaptor have a terminal strip for connecting the bus and supply lines. In order to connect the lines, the CANbus adaptor is unscrewed from the complete device. The figure shows the pin allocation within the bus connection.

**2** See page 20 below

**Schaltereinstellungen**



**Switch settings**

Access to the switches is gained by opening the removable screw cap (PG) on the rear of the bus adaptor. Use of the following elements.

- S 1 Address setting (Node ID)
- S 2 Bus termination
- S 3 Baud rate setting (Data Rate)
- S 4 Preset push button (Number zero SET)

**Status information via LED**

LED 2-colour red/green CAN Controller status

**Implementation**

**CANopen Functionality**

Predefined Connection Set

- Sync Object
- Emergency Object
- NMT Network Object (Error Control services, Boot-Up service)
- One Service Data Object (SDO)
- Two Process Data Object (PDO)

I/O-Operating Modes

- Synchronic: -- Depends on Sync Object
- Asynchronous. -- No reference to Sync Object. Triggered by "Timer" (Cyclic) or by event (COS)
- Remote Transmission (RTR)

**Encoder Parameters**

according the Device Profile for Encoders:

- Code direction (CW, CCW)
- Scaling function (ON, OFF)
- PRESET value
- Steps per revolution (CPR) - 1 ... 8,192
- Total resolution (TR) -- 1 ... 67,108,864 steps, with TR = 2<sup>n</sup> x CPR -- (n=0 ... 13)
- Limits for the working range
- Cycle Timer for asynchronous PDOs
- 8 programmable cams with HIGH/LOW limits and hysteresis
- General Diagnostic parameters (Offset Value, Alarms, Warnings, version of profile and software)

Manufacturer specific Profile:

- Node commissioning. -- Location and values for Node-ID and Baud rate
- Hysteresis to position change required for Async PDOs with COS mode
- Limits and display format for the speed and acceleration values

**PDO Data Mapping**

Mapping of up to four data objects to each of the two Transmit PDOs. The resulting data length within one PDO is limited to 8 Byte.

- (1) Object 1/Pos Val<sup>1)</sup> I-1
- (n) Object 2 ... Object 4 I-1 to I-7

**Input Data Objects**

- I-1 Position value [Pos Val] 4 Byte
- I-2 Status of cam 1 Byte
- I-3 Status of working range 1 Byte
- I-4 Alarms 1 Byte
- I-5 Warnings 1 Byte
- I-6 Speed value 4 Byte
- I-7 Acceleration value 4 Byte

**Setting: - Address (Node ID)**

0 to 63 by Hardware (DIP Switch) or EEPROM

**Setting: - Baud rate**

10kb, 20kb, 50kb, 125kb, 250kb, 500kb, 1 MB by Hardware (DIP Switch) or EEPROM

**Setting: - Bus Termination**

The DIP-Switch (S2) is used to switch on/ off an internal bus termination (ON/OFF). Not used (OFF) in case of using an external termination of the network

**Setting: - PRESET Value**

The Preset function supports adaptation of the encoder zero point to the mechanical zero point of the encoder system. The factory PRESET value is zero [0]. The adjustment is carried out in 2 ways:

- by Hardware (PRESET push button)
- by Software (CANopen Protocol)

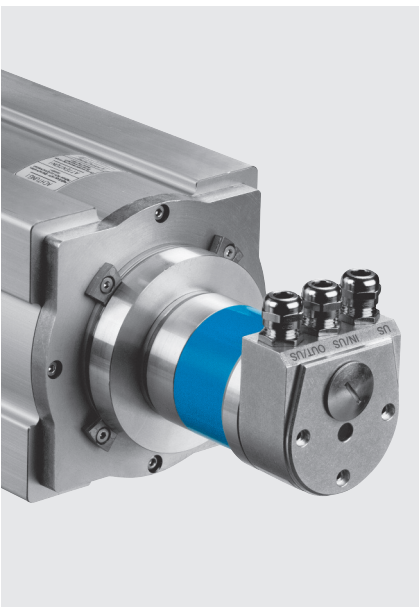
**Equipment Configuration**

Configuring parameters of the encoder can be achieved by a configuration tool in conjunction with an EDS file (Electronic Data Sheet). It contains all the characteristics of the encoder.

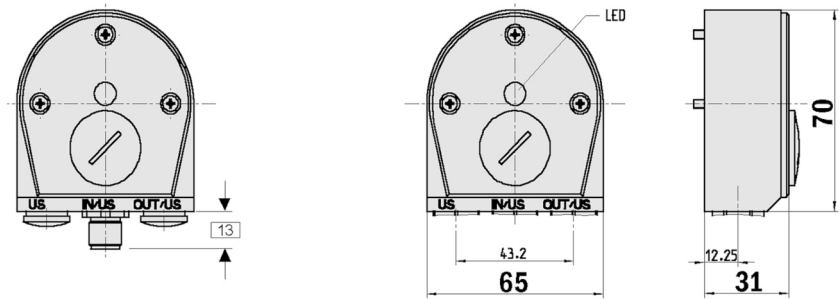
<sup>1)</sup> Setting cannot be changed

Resolution up to 0.025 mm  
Absolute Wire Draw Encoders

- Linear path measurement using a wire draw mechanism
- High resolution
- Easy to mount
- High-precision measurement drum
- Extremely stable spring return
- Highly flexible steel wire
- Dirt remover made of steel

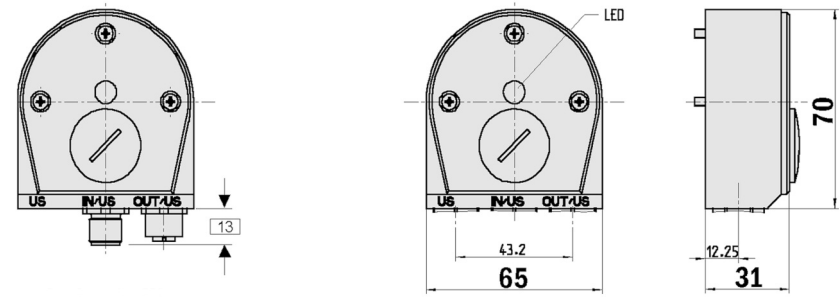


Dimensional drawing DeviceNet adaptor SR1



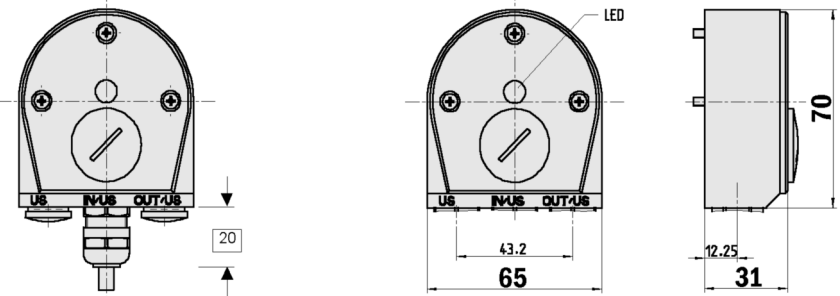
General tolerances to DIN ISO 2768-mk

Dimensional drawing DeviceNet adaptor SR2



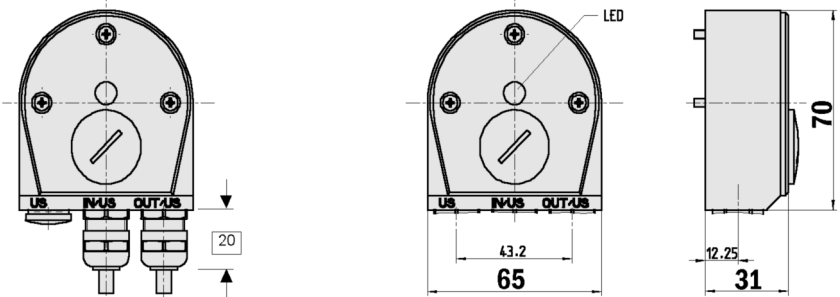
General tolerances to DIN ISO 2768-mk

Dimensional drawing DeviceNet adaptor KR1



General tolerances to DIN ISO 2768-mk

Dimensional drawing DeviceNet adaptor KR2



General tolerances to DIN ISO 2768-mk

Order information

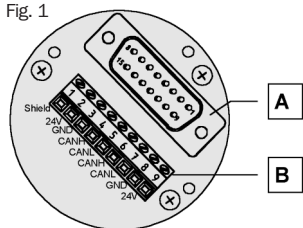
BTF DeviceNet adaptor

Type	Part no.	Description
AD-ATM60-SR1DN	2029226	Bus adaptor SR1, 1 x M12, 5 pin
AD-ATM60-SR2DN	2029227	Bus adaptor SR2, 1 x M12, 5 pin
AD-ATM60-KR1DN	2029228	Bus adaptor KR1, 1 x PG
AD-ATM60-KR2DN	2029229	Bus adaptor KR2, 2 x PG

**1 PIN and wire allocation for DeviceNet adaptor**

Terminal Strip	Connector	Signal	Explanation
1	1	Shield	Screen
2	2	U <sub>s</sub> (24 V)	Supply voltage 10 ... 32 V
3	3	GND (COM)	0 V (Gnd)
4	4	CAN <sub>H</sub>	CAN-Bus signal HIGH
5	5	CAN <sub>L</sub>	CAN-Bus signal LOW
6		CAN <sub>H</sub>	CAN-Bus signal HIGH
7		CAN <sub>L</sub>	CAN-Bus signal LOW
8		GND (COM)	0 V (Gnd)
9		U <sub>s</sub> (24 V)	Supply voltage 10 ... 32 V

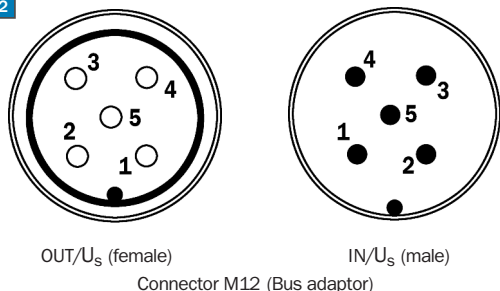
Fig. 1



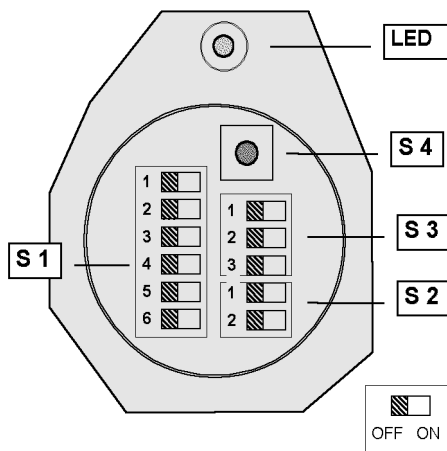
**1** Encoders with a DeviceNet adaptor have a terminal strip for connecting the bus and supply lines. In order to connect the lines, the DeviceNet adaptor is unscrewed from the complete device. The figure shows the pin allocation within the bus connection.

- A** Internal plug connection to the encoder
- B** External connection to the bus

**2**



## Switch settings



### Switch settings

Access to the switches is gained by opening the removable screw cap (PG) on the rear of the bus adaptor. Use of the following elements.

S 1	Address setting (Node ID)
S 2	Bus termination
S 3	Baud rate setting (Data Rate)
S 4	Preset push button (Number zero SET)

### Status information (NS) via LED

LED	2-colour red/green
	Network communication status

## Implementation

### DN Functionality

Object model

- Identity Object
- Message Router Object
- DeviceNet Object
- Assembly Object
- Connection Object
- Acknowledge Handler Object
- Encoder Object

I/O-Operating Modes

- Polling
- Change of State/Cyclic
- Bits Strobe

### Encoder Parameters

according the Device Profile for Encoders:

- Code direction (CW, CCW)
- Scaling function (ON, OFF)
- PRESET value
- Hysteresis to position change of required for COS communication
- Steps per revolution (CPR) - 1 ... 8,192
- Total resolution (TR) -- 1 ... 67,108,864 steps, with  $TR = 2^n \times CPR$  -- ( $n=0 \dots 13$ )
- Limits for the working range (software limit switches)
- Limits and display format for the speed and acceleration values
- 8 programmable cams with HIGH/LOW limits and hysteresis
- General Diagnostic parameters (Offset Value, Alarms, Warnings, version of profile and software)

Manufacturer specific parameters:

- Assignment of the I/O Data Assembly to the different I/O operating modes
- Diagnostic data indicating the current maximum results of the encoder

- Device-specific data

### I/O Data Assembly

1)	Pos Val (Position Value) <sup>1)</sup>	I-1
2)	Pos Val + Flag	I-1, I-2
3)	Pos Val + Speed	I-1, I-3
4)	Pos Val + Status of Cam	I-1, I-4

### Input Data Objects

I-1	Position value [Pos Val]	4 Byte
I-2	Flag (Alarm, Warning)	1 Byte
I-3	Speed	4 Byte
I-4	Status of cam	1 Byte

### Setting: - Address (Node ID)

0 to 63 by Hardware (DIP Switch)

### Setting: - Baud rate

125kb, 250kb, 500kb by Hardware (DIP Switch)

### Setting: - Bus Termination

The DIP Switch (S2) is used to switch on/off an internal bus termination (ON/OFF). Not used (OFF) in case of using an external termination of the network

### Setting: - PRESET Value

The Preset function supports adaptation of the encoder zero point to the mechanical zero point of the encoder system. The factory PRESET value is zero [0]

The adjustment is carried out in 2 ways:

- by Hardware (PRESET push button)
- by Software (DeviceNet Protocol)

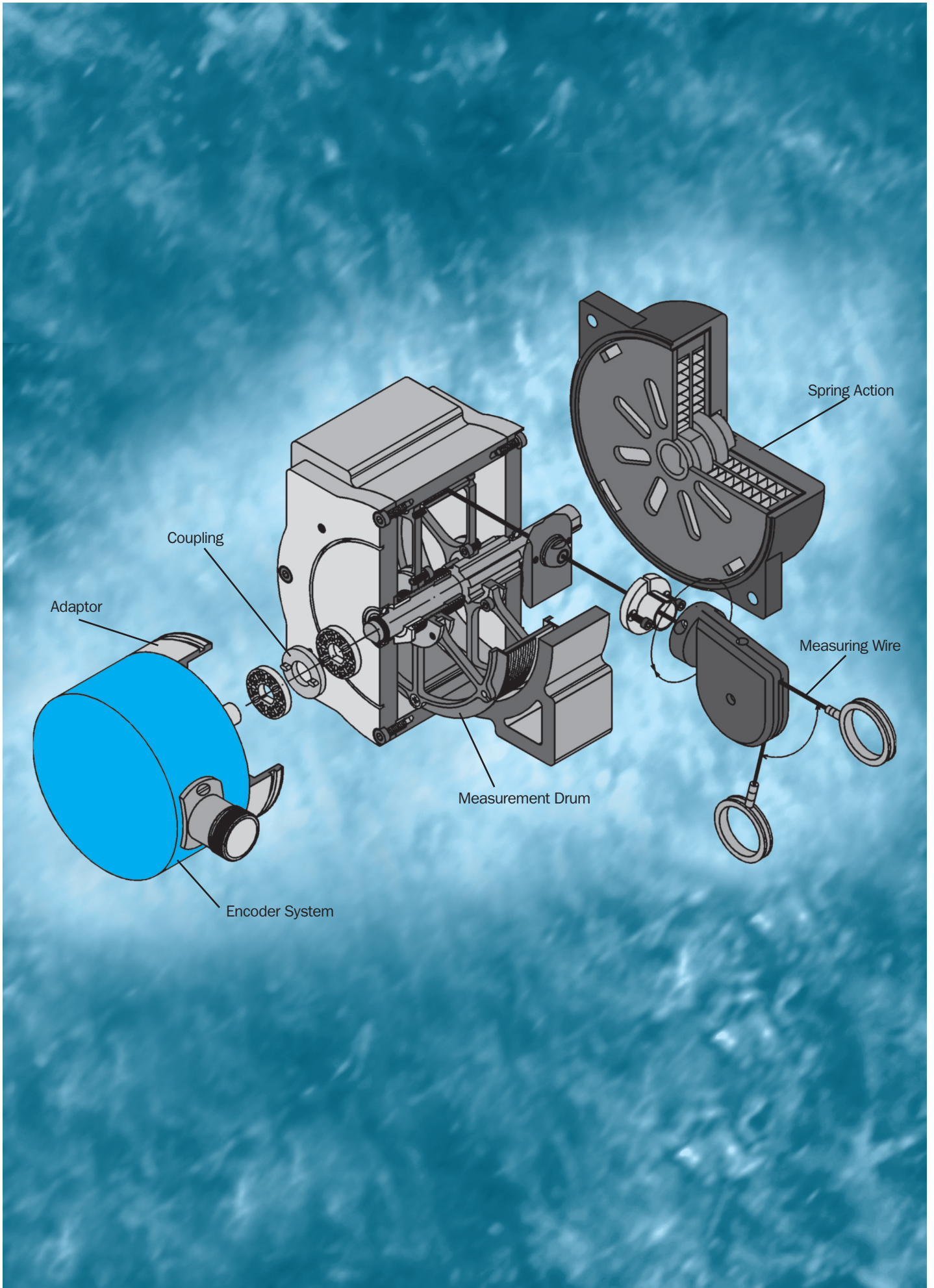
### Equipment Configuration

Configuring parameters of the encoder can be achieved by a configuration tool in conjunction with an EDS file (Electronic Data


Sheet). It contains all the characteristics of the encoder.

<sup>1)</sup> Setting cannot be changed



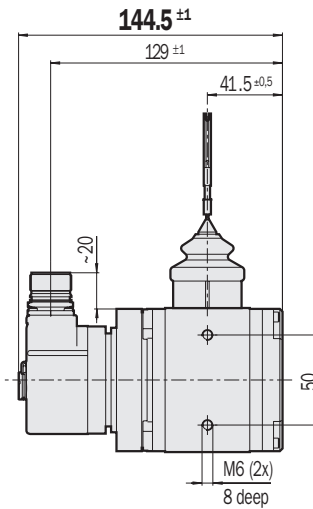


# Incremental wire draw encoder PRF08 TTL, HTL, measuring lengths up to 3 m

 **Resolution up to 0.025 mm**  
Incremental Wire Draw Encoders

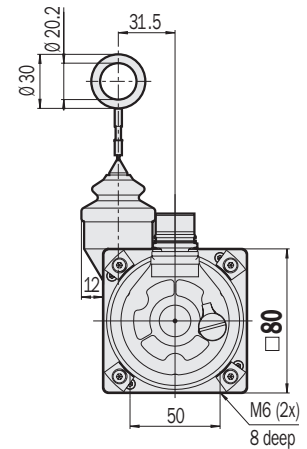
- Linear path measurement using a wire draw mechanism
- High resolution
- Easy to mount
- High-precision measurement drum
- Extremely stable spring return
- Highly flexible steel wire
- Dirt remover made of steel

## Dimensional drawing wire draw encoder PRF08 TTL, HTL, measuring length 2 m



1

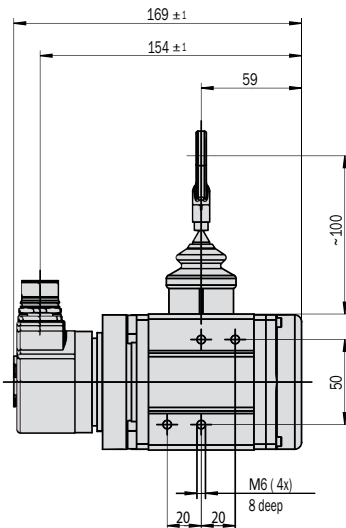
1 Threaded blind hole for mounting



1

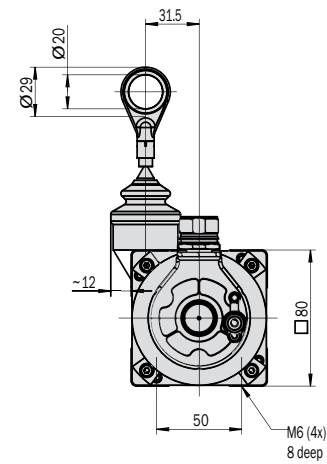
General tolerances to DIN ISO 2768-mk

## Dimensional drawing wire draw encoder PRF08 TTL, HTL, measuring length 3 m



1

1 Threaded blind hole for mounting



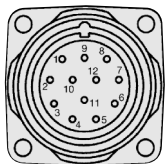
1

General tolerances to DIN ISO 2768-mk

## PIN and wire allocation

PIN	Signal	Wire colours (cable outlet)	Explanation
1	$\bar{A}$	black	Signal line
2	Sense +	grey	Connected internally to $U_s$
3	Z	lilac	Signal line
4	$\bar{Z}$	yellow	Signal line
5	B	white	Signal line
6	$\bar{B}$	brown	Signal line
7	N. C.		Not connected
8	A	pink	Signal line
9	Screen		Housing potential
10	GND	blue	Earth connection
11	Sense -	green	Connected internally to GND
12	$U_s$	red	Supply voltage <sup>1)</sup>

<sup>1)</sup> Volt-free to the housing  
N. C. = Not connected



View of the connector M23 fitted to the encoder body

Accessories
Wire draw mechanisms
Mounting systems
Connection systems

Technical data		PRF08	TTL 2m	TTL 2m	HTL 2m	TTL 3m	TTL 3m	HTL 3m				
<b>Drum housing</b>	Anodised Aluminium											
<b>Spring housing</b>	Die-cast zinc											
<b>Measuring wire (stainless)</b>	Highly flexible stranded steel, Ø 1.35 mm											
<b>Measuring length</b>	2 m max.											
	max. 3 m											
<b>Mass</b>	1.6 kg approx.											
	ca. 1,8 kg											
<b>Electrical Interfaces</b>	TTL/RS422, 6 channels											
	HTL/push-pull, 6 channels											
<b>Measuring step</b>	0.025 mm <sup>1</sup>											
<b>Reference signal</b>	Number: 1/position 90°											
<b>Linearity</b>	0.05 % typ.											
<b>Repeatability</b>	± 1 measuring step											
<b>Operating speed</b>	4 m/sec.											
<b>Spring return force (typ.)</b>												
start/finish <sup>1)</sup>	6 N/14 N											
<b>Working temperature range</b>	- 20 ... + 70 °C											
<b>Storage temperature range</b>	- 40 ... + 100 °C											
<b>Life of wire draw mechanism <sup>2)</sup></b>	1 million cycles											
<b>EMC <sup>3)</sup></b>												
<b>Resistance</b>												
to shocks <sup>4)</sup>	50/11 g/ms											
to vibration <sup>5)</sup>	20/10 ... 150 g/Hz											
<b>Protection to IEC 60529</b>	IP 64 (wire draw mechanism)											
	IP 65 (encoder)											
<b>Operating voltage range (U<sub>s</sub>)</b>												
load	TTL/RS422, 4.5 ... 5.5 V	20 mA max.										
current	TTL/RS422, 10 ... 32 V	20 mA max.										
	HTL/push-pull, 10 ... 32 V	60 mA max.										
<b>Operating current, no load</b>												
at 5 V		120 mA typ.										
at 10 ... 32 V		100 mA typ.										
<b>Operating Set button <sup>6)</sup></b>		≥ 100 ms										
<b>Initialisation time after power on</b>		40 ms										

<sup>1)</sup> These values were measured at an ambient temperature of 25 °C. The values may be different at other temperatures.

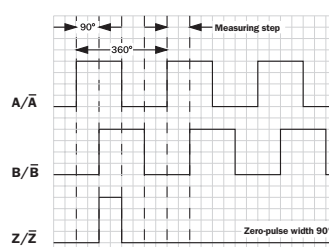
<sup>2)</sup> Average values, which depend on the loading. At high operating speeds over long lengths, this figure can decrease; at slow operating speeds over short lengths, it can increase.

<sup>3)</sup> To DIN EN 61000-6-2 and DIN EN 61000-6-3

<sup>4)</sup> To DIN EN 60068-2-27


<sup>5)</sup> To DIN EN 60068-2-6

<sup>6)</sup> For stationary shaft only.

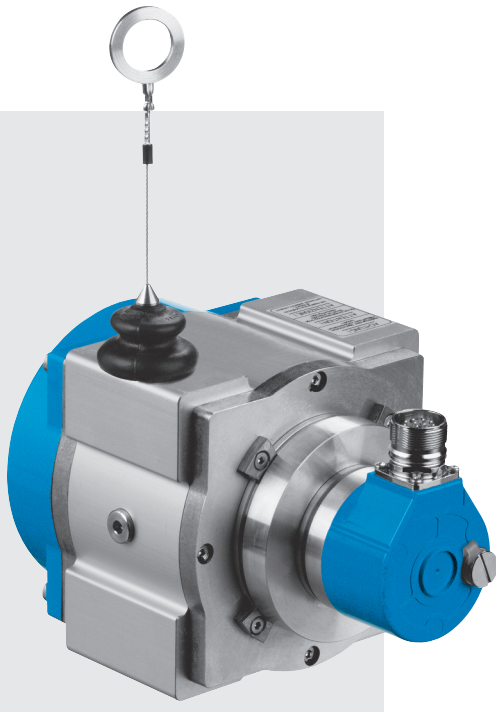


<sup>1</sup> Based on the control/counter evaluating the flanks of the A+B pulses.

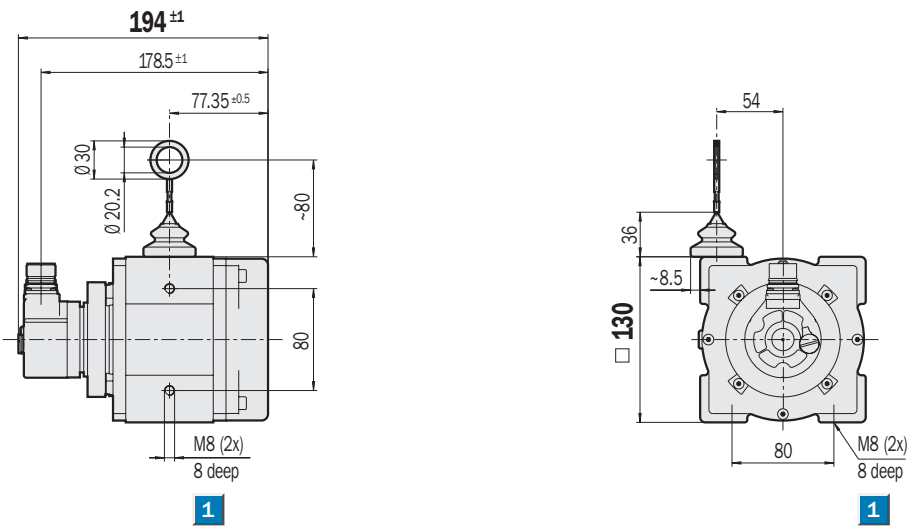
Order information		
PRF08; connector M23, 12 pin		
Type	Part no.	Description
PRF08-A1AM0240	1034323	TTL 4.5 ... 5.5 V; measuring length 2 m
PRF08-C1AM0240	1034329	TTL 10 ... 32 V; measuring length 2 m
PRF08-E1AM0240	1034335	HTL 10 ... 32 V; measuring length 2 m
PRF08-A1AM0340	1034896	TTL 4.5 ... 5.5 V; measuring length 3 m
PRF08-C1AM0340	1034897	TTL 10 ... 32 V; measuring length 3 m
PRF08-E1AM0340	1034898	HTL 10 ... 32 V; measuring length 3 m

 **Resolution up to 0.025 mm**  
Incremental Wire Draw Encoders

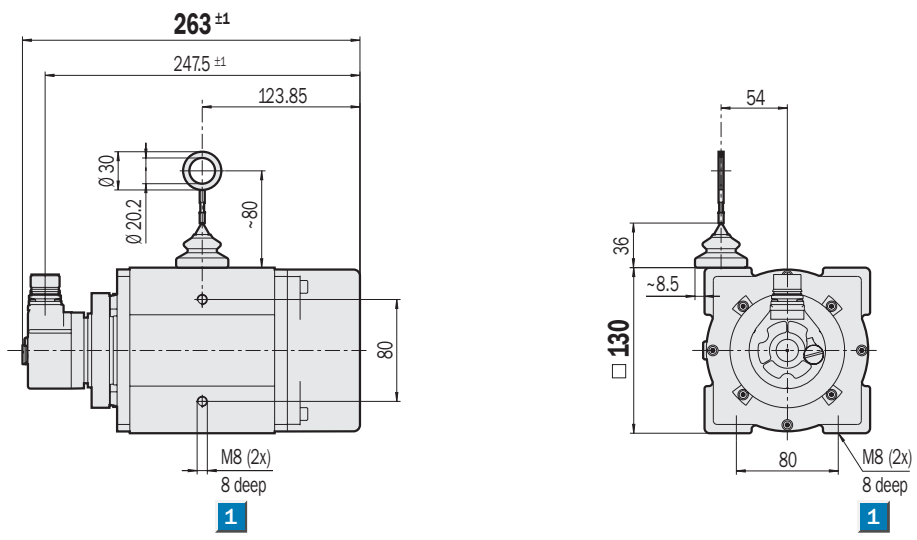
- Linear path measurement using a wire draw mechanism
- High resolution
- Easy to mount
- High-precision measurement drum
- Extremely stable spring return
- Highly flexible steel wire
- Dirt remover made of steel



Dimensional drawing wire draw encoder PRF13 TTL, HTL, measuring length 5 m

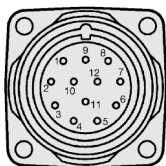


Dimensional drawing wire draw encoder PRF13 TTL, HTL, measuring length 10 m



**1** Threaded blind hole for mounting

General tolerances to DIN ISO 2768-mk



View of the connector M23 fitted to the encoder body

**PIN and wire allocation**

PIN	Signal	Wire colours (cable outlet)	Explanation
1	$\bar{A}$	black	Signal line
2	Sense +	grey	Connected internally to $U_s$
3	Z	lilac	Signal line
4	$\bar{Z}$	yellow	Signal line
5	B	white	Signal line
6	$\bar{B}$	brown	Signal line
7	N. C.		Not connected
8	A	pink	Signal line
9	Screen		Housing potential
10	GND	blue	Earth connection
11	Sense -	green	Connected internally to GND
12	$U_s$	red	Supply voltage <sup>1)</sup>

<sup>1)</sup> Volt-free to the housing  
N. C. = Not connected

**Accessories**

Wire draw mechanisms
Mounting systems
Connection systems

Technical data		PRF13	TTL 5m	TTL 5m	HTL 5m	TTL 10m	TTL 10m	HTL 10m				
<b>Drum housing</b>	Anodised Aluminium											
<b>Spring housing</b>	Plastic											
<b>Measuring wire (stainless)</b>	Highly flexible stranded steel, Ø 1.35 mm											
<b>Measuring length</b>	5 m max.											
	10 m max.											
<b>Mass</b>	3.1 kg approx.											
	3.8 kg approx.											
<b>Electrical Interfaces</b>	TTL/RS422, 6 channels											
	HTL/push-pull, 6 channels											
<b>Measuring step</b>	0.05 mm <sup>1</sup>											
<b>Reference signal</b>	Number: 1/position 90°											
<b>Linearity</b>	0.05 % typ.											
<b>Repeatability</b>	± 1 measuring step											
<b>Operating speed</b>	4 m/sec.											
<b>Spring return force (typ.)</b>												
start/finish <sup>1)</sup>	15 N/20 N											
start/finish <sup>1)</sup>	10 N/20 N											
<b>Working temperature range</b>	- 20 ... + 70 °C											
<b>Storage temperature range</b>	- 40 ... + 100 °C											
<b>Life of wire draw mechanism <sup>2)</sup></b>	1 million cycles											
<b>EMC <sup>3)</sup></b>												
<b>Resistance</b>												
to shocks <sup>4)</sup>	50/11 g/ms											
to vibration <sup>5)</sup>	20/10 ... 150 g/Hz											
<b>Protection to IEC 60529</b>	IP 64 (wire draw mechanism)											
	IP 65 (encoder)											
<b>Operating voltage range (U<sub>s</sub>)</b>												
load	TTL/RS422, 4.5 ... 5.5 V 20 mA max.											
current	TTL/RS422, 10 ... 32 V 20 mA max.											
	HTL/push-pull, 10 ... 32 V 60 mA max.											
<b>Operating current, no load</b>												
at 5 V	120 mA typ.											
at 10 ... 32 V	100 mA typ.											
<b>Operating Set button <sup>6)</sup></b>	≥ 100 ms											
<b>Initialisation time after power on</b>	40 ms											

<sup>1)</sup> These values were measured at an ambient temperature of 25 °C. The values may be different at other temperatures.

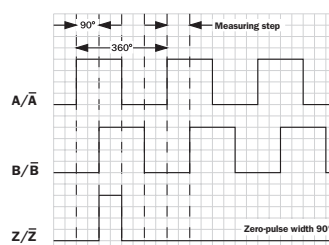
<sup>2)</sup> Average values, which depend on the loading. At high operating speeds over long lengths, this figure can decrease; at slow operating speeds over short lengths, it can increase.

<sup>3)</sup> To DIN EN 61000-6-2 and DIN EN 61000-6-3

<sup>4)</sup> To DIN EN 60068-2-27


<sup>5)</sup> To DIN EN 60068-2-6

<sup>6)</sup> For stationary shaft only.



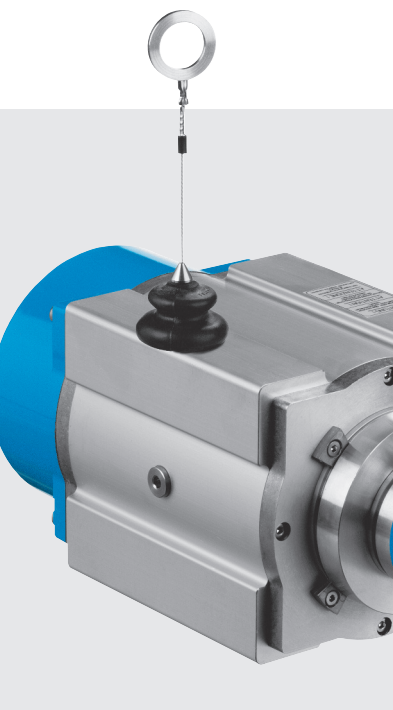
<sup>1</sup> Based on the control/counter evaluating the flanks of the A+B pulses.

Order information		
PRF13; connector M23, 12 pin		
Type	Part no.	Description
PRF13-A1AM0520	1034324	TTL 4.5 ... 5.5 V; measuring length 5 m
PRF13-C1AM0520	1034330	TTL 10 ... 32 V; measuring length 5 m
PRF13-E1AM0520	1034336	HTL 10 ... 32 V; measuring length 5 m
PRF13-A1AM1020	1034325	TTL 4.5 ... 5.5 V; measuring length 10 m
PRF13-C1AM1020	1034331	TTL 10 ... 32 V; measuring length 10 m
PRF13-E1AM1020	1034337	HTL 10 ... 32 V; measuring length 10 m

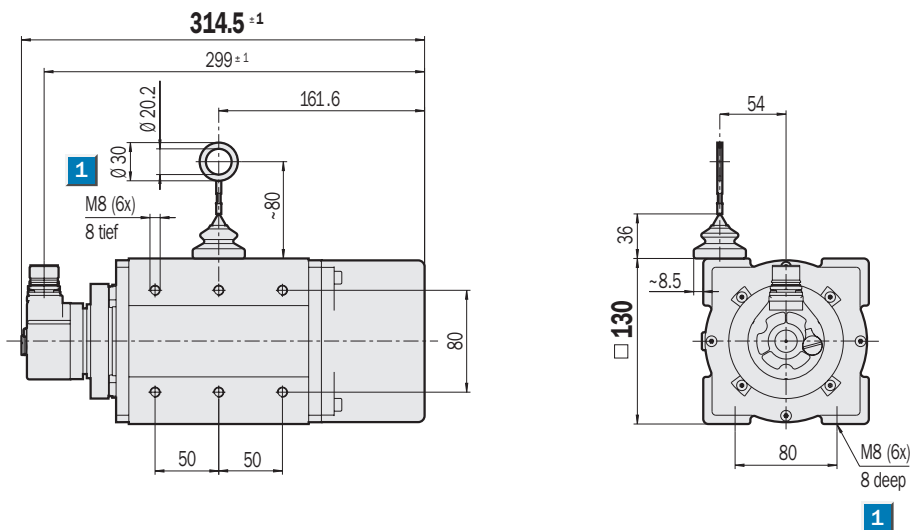
 **Resolution up to 0.025 mm**

Incremental Wire Draw Encoders

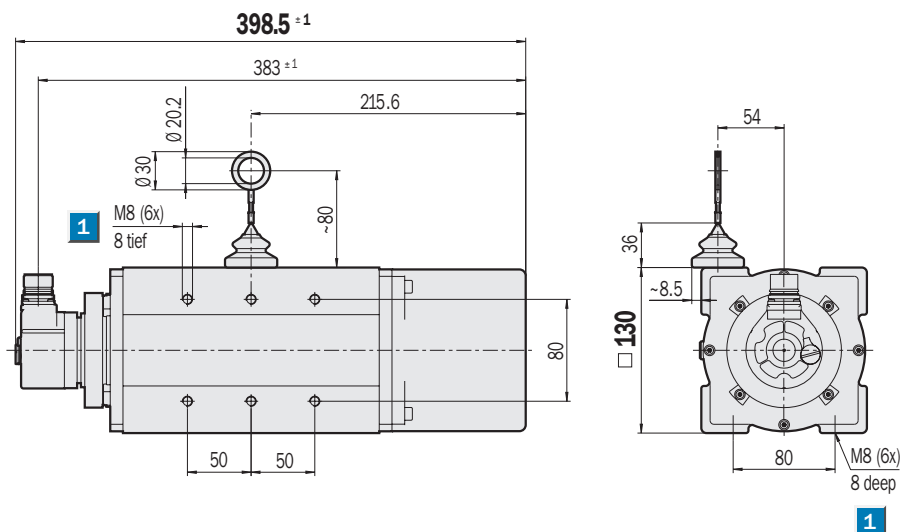
- Linear path measurement using a wire draw mechanism
- High resolution
- Easy to mount
- High-precision measurement drum
- Extremely stable spring return
- Highly flexible steel wire
- Dirt remover made of steel



Dimensional drawing wire draw encoder PRF13 TTL, HTL, measuring length 20 m



Dimensional drawing wire draw encoder PRF13 TTL, HTL, measuring length 30 m



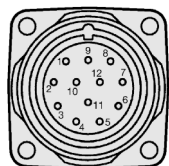
**1** Threaded blind hole for mounting

General tolerances to DIN ISO 2768-mk

**PIN and wire allocation**

PIN	Signal	Wire colours (cable outlet)	Explanation
1	$\bar{A}$	black	Signal line
2	Sense +	grey	Connected internally to $U_s$
3	Z	lilac	Signal line
4	$\bar{Z}$	yellow	Signal line
5	B	white	Signal line
6	$\bar{B}$	brown	Signal line
7	N. C.		Not connected
8	A	pink	Signal line
9	Screen		Housing potential
10	GND	blue	Earth connection
11	Sense -	green	Connected internally to GND
12	$U_s$	red	Supply voltage <sup>1)</sup>

<sup>1)</sup> Volt-free to the housing  
N. C. = Not connected



View of the connector M23 fitted to the encoder body

**Accessories**

- Wire draw mechanisms
- Mounting systems
- Connection systems

Technical data		PRF13	TTL 20m	TTL 20m	HTL 20m	TTL 30m	TTL 30m	HTL 30m				
<b>Drum housing</b>	Anodised Aluminium											
<b>Spring housing</b>	Plastic											
<b>Measuring wire (stainless)</b>	Highly flexible stranded steel, Ø 0.81 mm											
<b>Measuring length</b>	20 m max.											
	30 m max.											
<b>Mass</b>	5.3 kg approx.											
	6.5 kg approx.											
<b>Electrical Interfaces</b>	TTL/RS422, 6 channels											
	HTL/push-pull, 6 channels											
<b>Measuring step</b>	0.05 mm <sup>1</sup>											
<b>Reference signal</b>	Number: 1/position 90°											
<b>Linearity</b>	0.05 % typ.											
<b>Repeatability</b>	± 1 measuring step											
<b>Operating speed</b>	4 m/sec.											
<b>Spring return force (typ.)</b>												
start/finish <sup>1)</sup>	10 N/20 N											
<b>Working temperature range</b>	- 20 ... + 70 °C											
<b>Storage temperature range</b>	- 40 ... + 100 °C											
<b>Life of wire draw mechanism <sup>2)</sup></b>	1 million cycles											
<b>EMC <sup>3)</sup></b>												
<b>Resistance</b>												
to shocks <sup>4)</sup>	50/11 g/ms											
to vibration <sup>5)</sup>	20/10 ... 150 g/Hz											
<b>Protection to IEC 60529</b>	IP 64 (wire draw mechanism)											
	IP 65 (encoder)											
<b>Operating voltage range (U<sub>s</sub>)</b>												
load	TTL/RS422, 4.5 ... 5.5 V	20 mA max.										
current	TTL/RS422, 10 ... 32 V	20 mA max.										
	HTL/push-pull, 10 ... 32 V	60 mA max.										
<b>Operating current, no load</b>												
at 5 V		120 mA typ.										
at 10 ... 32 V		100 mA typ.										
<b>Operating Set button <sup>6)</sup></b>		≥ 100 ms										
<b>Initialisation time after power on</b>		40 ms										

<sup>1)</sup> These values were measured at an ambient temperature of 25 °C. The values may be different at other temperatures.

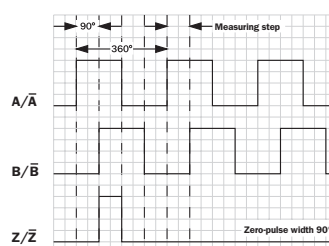
<sup>2)</sup> Average values, which depend on the loading.  
At high operating speeds over long lengths, this figure can decrease; at slow operating speeds over short lengths, it can increase.

<sup>3)</sup> To DIN EN 61000-6-2 and DIN EN 61000-6-3

<sup>4)</sup> To DIN EN 60068-2-27


<sup>5)</sup> To DIN EN 60068-2-6

<sup>6)</sup> For stationary shaft only.

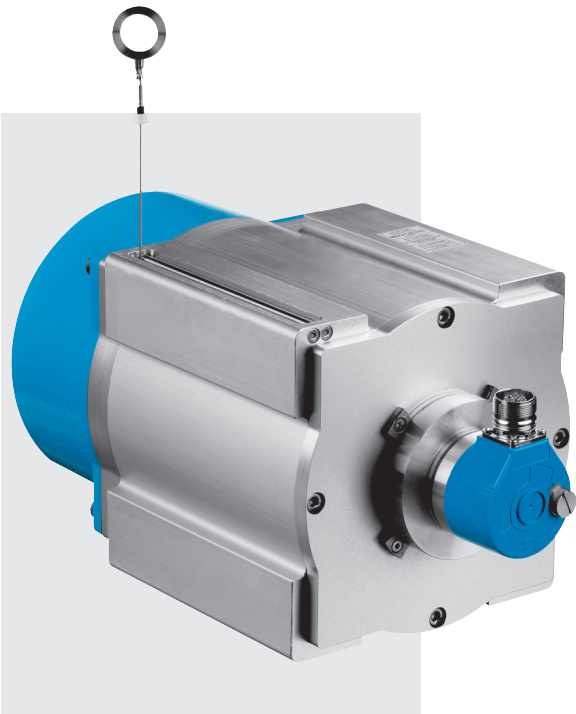


<sup>1</sup> Based on the control/counter evaluating the flanks of the A+B pulses.

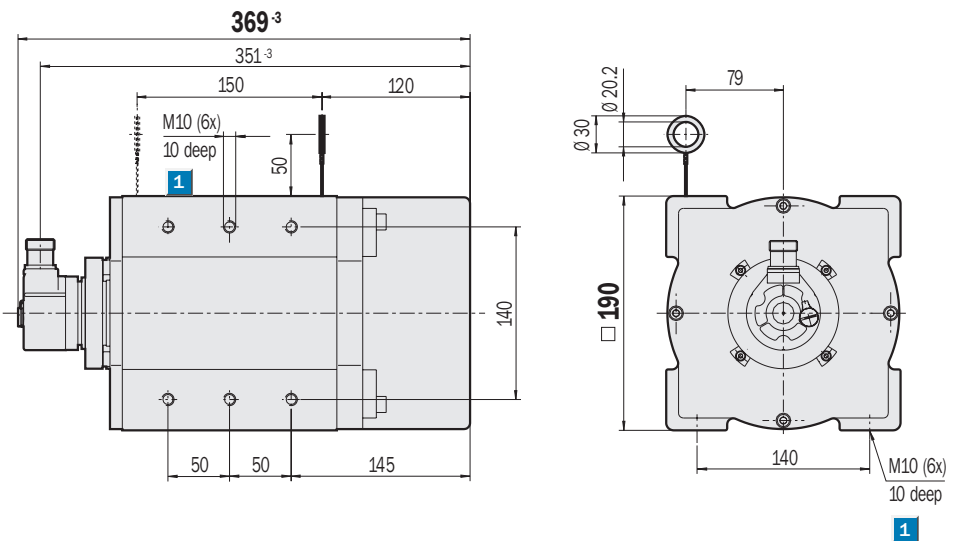
Order information		
PRF13; connector M23, 12 pin		
Type	Part no.	Description
PRF13-A1AM2020	1034326	TTL 4.5 ... 5.5 V; measuring length 20 m
PRF13-C1AM2020	1034332	TTL 10 ... 32 V; measuring length 20 m
PRF13-E1AM2020	1034338	HTL 10 ... 32 V; measuring length 20 m
PRF13-A1AM3020	1034327	TTL 4.5 ... 5.5 V; measuring length 30 m
PRF13-C1AM3020	1034333	TTL 10 ... 32 V; measuring length 30 m
PRF13-E1AM3020	1034339	HTL 10 ... 32 V; measuring length 30 m

 **Resolution up to 0.025 mm**  
Incremental Wire Draw Encoders

- Linear path measurement using a wire draw mechanism
- High resolution
- Easy to mount
- High-precision measurement drum
- Extremely stable spring return
- Highly flexible steel wire

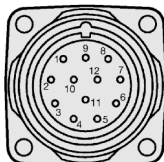


**Dimensional drawing wire draw encoder PRF19 TTL, HTL, measuring length 50 m**



**1** Threaded blind hole for mounting

General tolerances to DIN ISO 2768-mk



View of the connector M23 fitted to the encoder body

**PIN and wire allocation**

PIN	Signal	Wire colours (cable outlet)	Explanation
1	$\bar{A}$	black	Signal line
2	Sense +	grey	Connected internally to $U_s$
3	Z	lilac	Signal line
4	$\bar{Z}$	yellow	Signal line
5	B	white	Signal line
6	$\bar{B}$	brown	Signal line
7	N. C.		Not connected
8	A	pink	Signal line
9	Screen		Housing potential
10	GND	blue	Earth connection
11	Sense -	green	Connected internally to GND
12	$U_s$	red	Supply voltage <sup>1)</sup>

<sup>1)</sup> Volt-free to the housing  
N. C. = Not connected

**Accessories**

Wire draw mechanisms
Mounting systems
Connection systems



Technical data		PRF19	TTL 50m	TTL 50m	HTL 50m							
<b>Drum housing</b>	Anodised Aluminium											
<b>Spring housing</b>	Die-cast zinc											
<b>Measuring wire (stainless)</b>	Highly flexible stranded steel, Ø 1.35 mm											
<b>Measuring length</b>	50 m max.											
<b>Mass</b>	16.8 kg approx.											
<b>Electrical Interfaces</b>	TTL/RS422, 6 channels											
	HTL/push-pull, 6 channels											
<b>Measuring step</b>	0.1 mm <sup>1</sup>											
<b>Reference signal</b>	Number: 1/position 90°											
<b>Linearity</b>	0.05 % typ.											
<b>Repeatability</b>	± 1 measuring step											
<b>Operating speed</b>	4 m/sec.											
<b>Spring return force (typ.)</b>												
start/finish <sup>1)</sup>	18 N/37 N											
<b>Working temperature range</b>	- 20 ... + 70 °C											
<b>Storage temperature range</b>	- 40 ... + 100 °C											
<b>Life of wire draw mechanism <sup>2)</sup></b>	1 million cycles											
<b>EMC <sup>3)</sup></b>												
<b>Resistance</b>												
to shocks <sup>4)</sup>	50/11 g/ms											
to vibration <sup>5)</sup>	20/10 ... 150 g/Hz											
<b>Protection to IEC 60529</b>	IP 31 (wire draw mechanism)											
	IP 65 (encoder)											
<b>Operating voltage range (U<sub>s</sub>)</b>												
load	TTL/RS422, 4.5 ... 5.5 V	20 mA max.										
current	TTL/RS422, 10 ... 32 V	20 mA max.										
	HTL/push-pull, 10 ... 32 V	60 mA max.										
<b>Operating current, no load</b>												
at 5 V		120 mA typ.										
at 10 ... 32 V		100 mA typ.										
<b>Operating Set button <sup>6)</sup></b>		≥ 100 ms										
<b>Initialisation time after power on</b>		40 ms										

<sup>1)</sup> These values were measured at an ambient temperature of 25 °C. The values may be different at other temperatures.

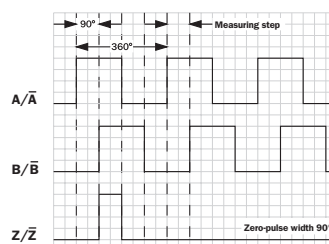
<sup>2)</sup> Average values, which depend on the loading. At high operating speeds over long lengths, this figure can decrease; at slow operating speeds over short lengths, it can increase.

<sup>3)</sup> To DIN EN 61000-6-2 and DIN EN 61000-6-3

<sup>4)</sup> To DIN EN 60068-2-27

<sup>5)</sup> To DIN EN 60068-2-6

<sup>6)</sup> For stationary shaft only.

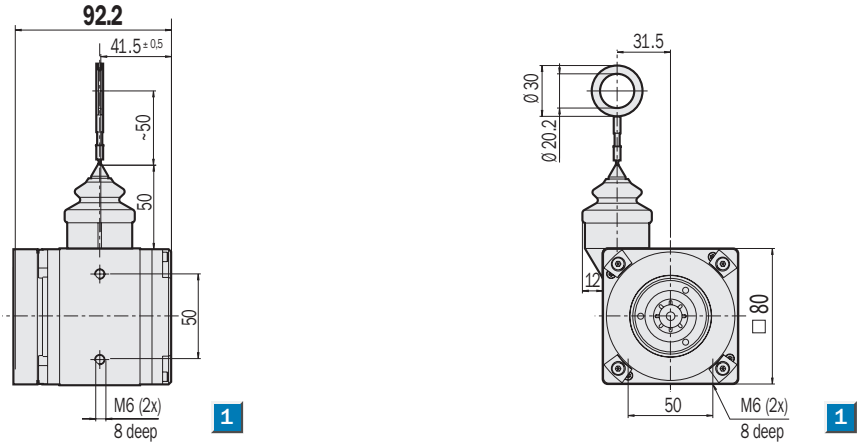


<sup>1</sup> Based on the control/counter evaluating the flanks of the A+B pulses.

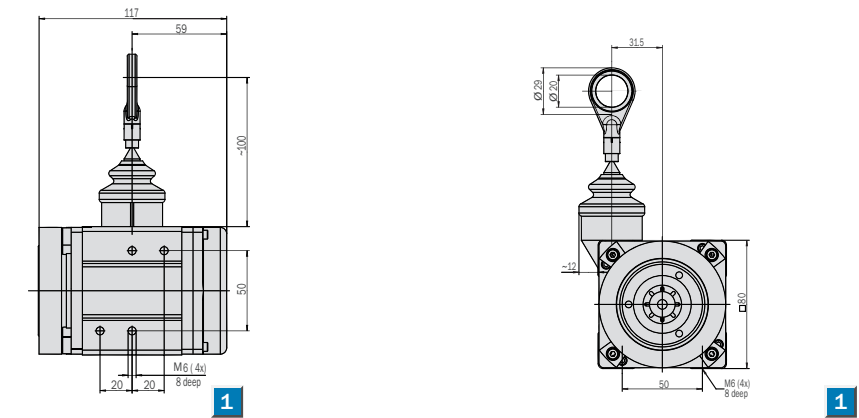
Order information		
PRF19; connector M23, 12 pin		
Type	Part no.	Description
PRF19-A1AM5010	1034328	TTL 4.5 ... 5.5 V; measuring length 50 m
PRF19-C1AM5010	1034334	TTL 10 ... 32 V; measuring length 50 m
PRF19-E1AM5010	1034340	HTL 10 ... 32 V; measuring length 50 m

- Linear path measurement using a wire draw mechanism
- Easy mounting of the encoder
- High-precision measurement drum
- Extremely stable spring return
- Highly flexible steel wire
- Dirt remover made of steel

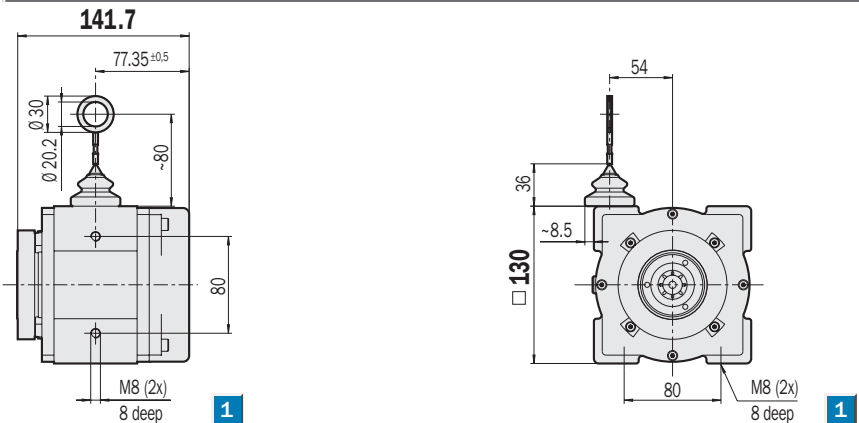
Dimensional drawing wire draw mechanism 2 m; measuring wire Ø 1.35 mm, servo flange



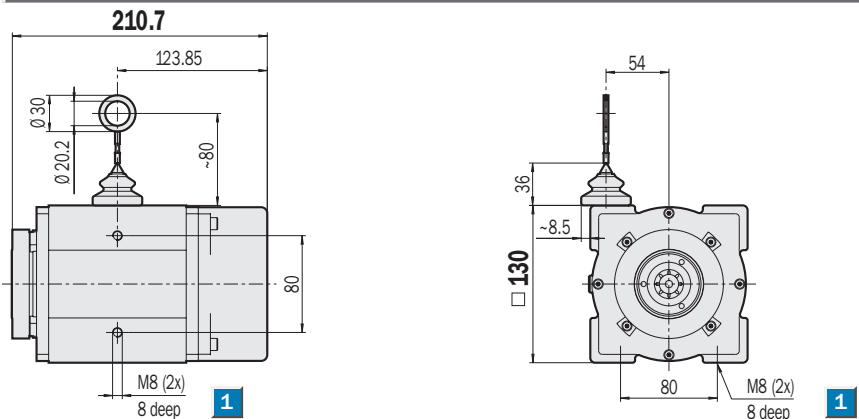
Dimensional drawing wire draw mechanism 3 m; measuring wire Ø 1.35 mm, servo flange



Dimensional drawing wire draw mechanism 5 m; measuring wire Ø 1.35 mm, servo flange



Dimensional drawing wire draw mechanism 10 m; measuring wire Ø 1.35 mm, servo flange



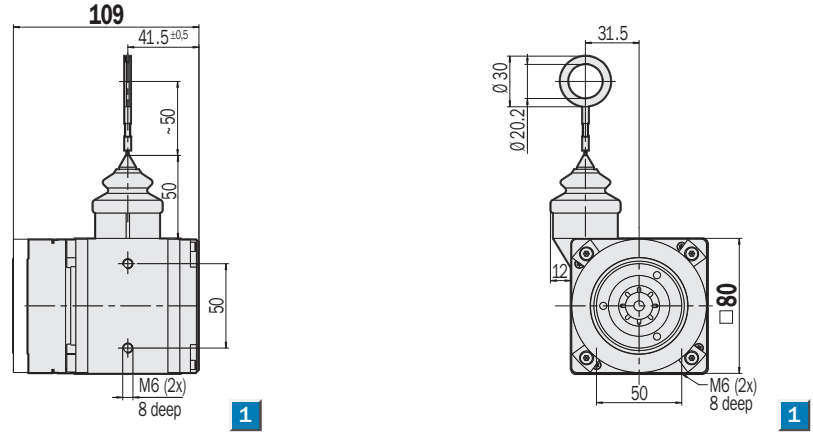
1 Threaded blind hole for mounting

General tolerances to DIN ISO 2768-mk

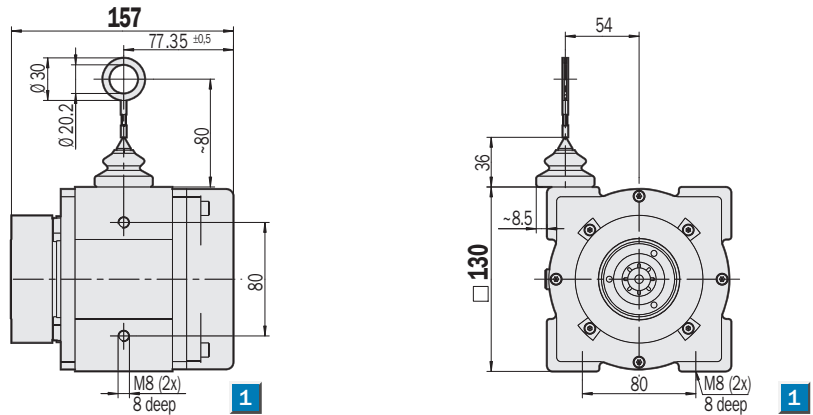


Accessories to suit this unit matching this:  
Wire guiding rollers and spare parts kit  
(page 40)

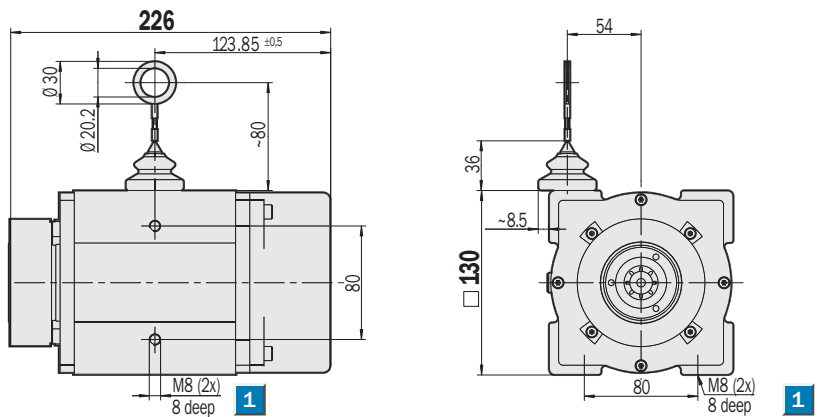
**Dimensional drawing wire draw mechanism 2 m; measuring wire  $\varnothing$  1.35 mm, Face mount flange**



**Dimensional drawing wire draw mechanism 5 m; measuring wire  $\varnothing$  1.35 mm, Face mount flange**



**Dimensional drawing wire draw mechanism 10 m; measuring wire  $\varnothing$  1.35 mm, Face mount flange**



**1** Threaded blind hole for mounting

General tolerances to DIN ISO 2768-mk

Accessories to suit this unit matching this:  
Wire guiding rollers and spare parts kit  
(page 40)

Technical data	Wire draw mechanism	Measuring length							
		2 m	3 m	5 m	10 m				
Measuring wire (stainless)	Highly flexible stranded steel, Ø 1.35 mm								
Drum housing	Anodised Aluminium								
Spring housing	Die-cast zinc								
	Plastic								
Drum diameter	62.31 mm								
	105 mm								
Number of turns for full extension	10 approx.								
	15 approx.								
	30 approx.								
Drum precision	0.05 %								
Operating speed	4 m/sec.								
Spring return force (typ.)									
start/finish <sup>1)</sup>	6 N/14 N								
start/finish <sup>1)</sup>	15 N/20 N								
start/finish <sup>1)</sup>	10 N/20 N								
Working temperature range	- 20 ... + 70 °C								
Protection to IEC 60529	IP 64								
Life <sup>2)</sup>	1 million cycles								
Masse	1.3 kg								
	1.5 kg								
	2.8 kg								
	3.5 kg								

<sup>1)</sup> These values were measured at an ambient temperature of 25 °C. The values may be different at other temperatures.

<sup>2)</sup> Average values, which depend on the loading.  
At high operating speeds over long lengths, this figure can decrease;  
at slow operating speeds over short lengths, it can increase.

**Absolute encoders: determining the matching number of steps of the encoder for the required linear resolution**

$$\text{No. of encoder steps per revolution} = \frac{3.1416 \times (\text{drum diameter} + \text{wire diameter})}{\text{Linear resolution per measuring step}}$$

Example: required linear resolution 0.05 mm; wire draw mechanism 5 m

$$\text{No. of encoder steps per revolution} = \frac{3.1416 \times (105 \text{ mm} + 1.35 \text{ mm})}{0.05 \text{ mm}} = 6682$$

**Incremental encoders: determining the matching number of pulses of the encoder for the required linear resolution**

$$\text{No. of encoder pulses per revolution} = \frac{3.1416 \times (\text{drum diameter} + \text{wire diameter})}{4 \times \text{Linear resolution per measuring step}} \quad \text{1}$$

Example: required linear resolution 0.025 mm; wire draw mechanism 2 m

$$\text{No. of encoder pulses per revolution} = \frac{3.1416 \times (62.31 \text{ mm} + 1.35 \text{ mm})}{4 \times 0.025 \text{ mm}} = 2000$$

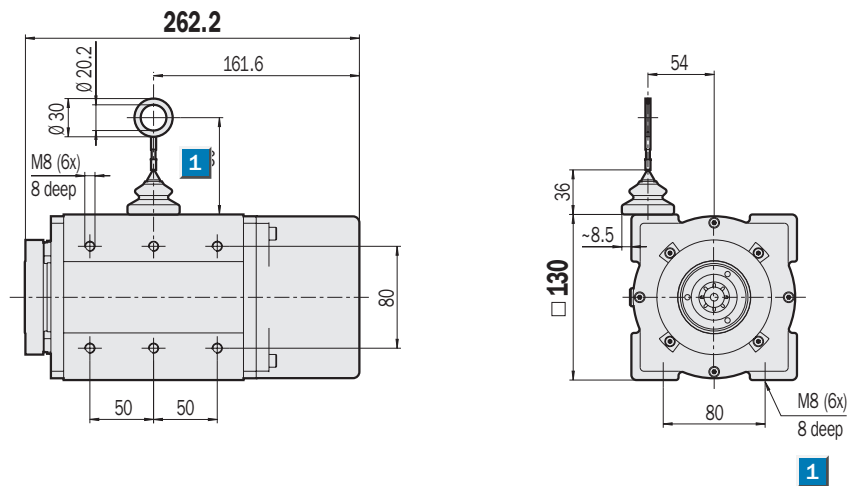
**1** Based on the control/counter evaluating the flanks of the A+B pulses.

Order information		
MRA-F wire draw mechanism for attaching encoders with servo flange (or compatible flanges)		
Type	Part no.	Description
MRA-F080-102D2	6028625	measur. length 2 m
MRA-F080-103D2	6030125	measur. length 3 m
MRA-F130-105D2	6028626	measur. length 5 m
MRA-F130-110D2	6028627	measur. length 10 m

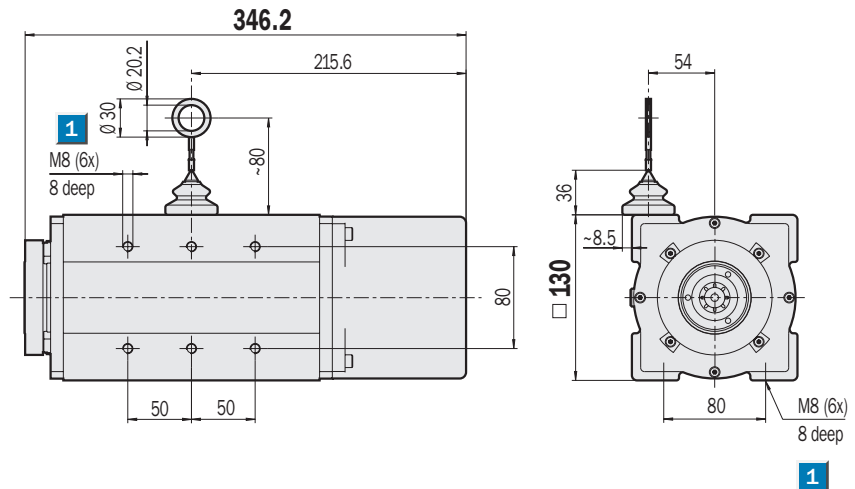
Order information		
MRA-F wire draw mechanism for attaching encoders with face mount flange (or compatible flanges)		
Type	Part no.	Description
MRA-F080-402D2	6029788	measur. length 2 m
MRA-F130-405D2	6029789	measur. length 5 m
MRA-F130-410D2	6029790	measur. length 10 m

- Linear path measurement using a wire draw mechanism
- Easy mounting of the encoder
- High-precision measurement drum
- Extremely stable spring return
- Highly flexible steel wire
- Dirt remover made of steel

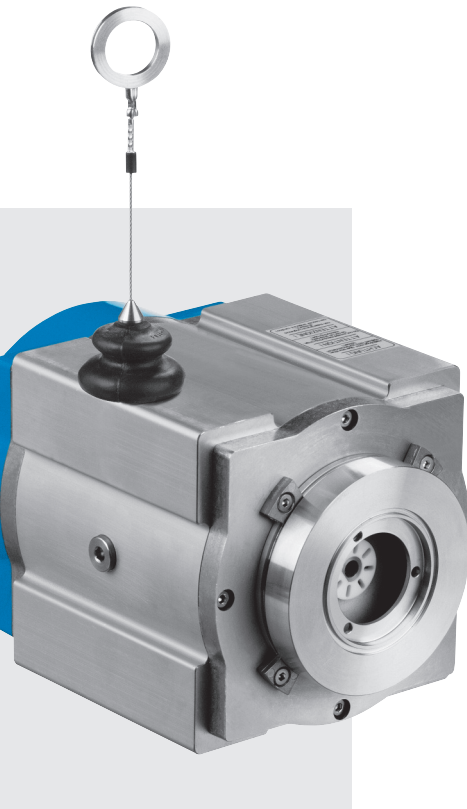
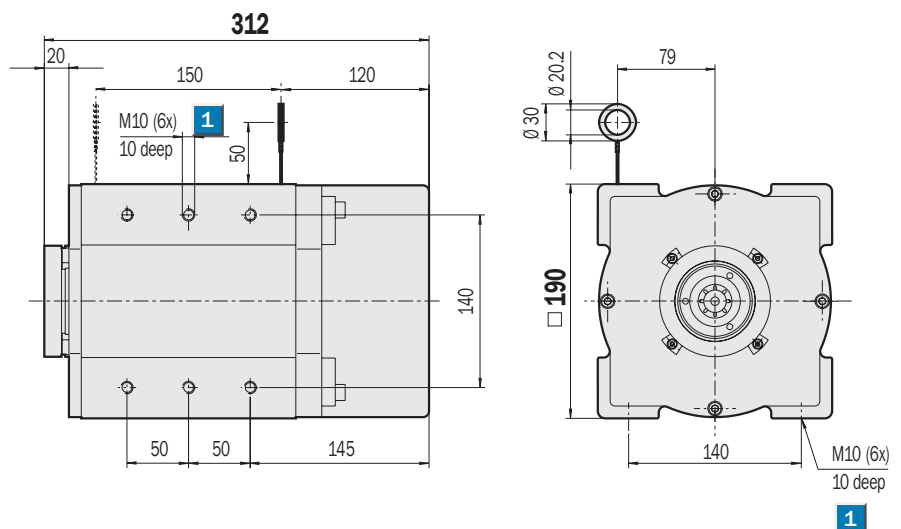
Dimensional drawing wire draw mechanism 20 m; measuring wire  $\varnothing$  0.81 mm, servo flange



Dimensional drawing wire draw mechanism 30 m; measuring wire  $\varnothing$  0.81 mm, servo flange



Dimensional drawing wire draw mechanism 50 m; measuring wire  $\varnothing$  1.35 mm, servo flange

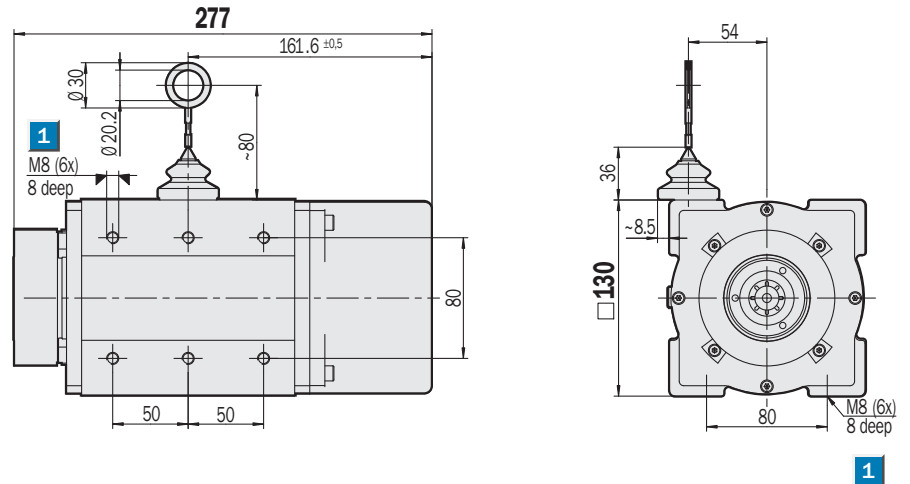


Accessories to suit this unit matching this:  
Wire guiding rollers and spare parts kit  
(page 40)

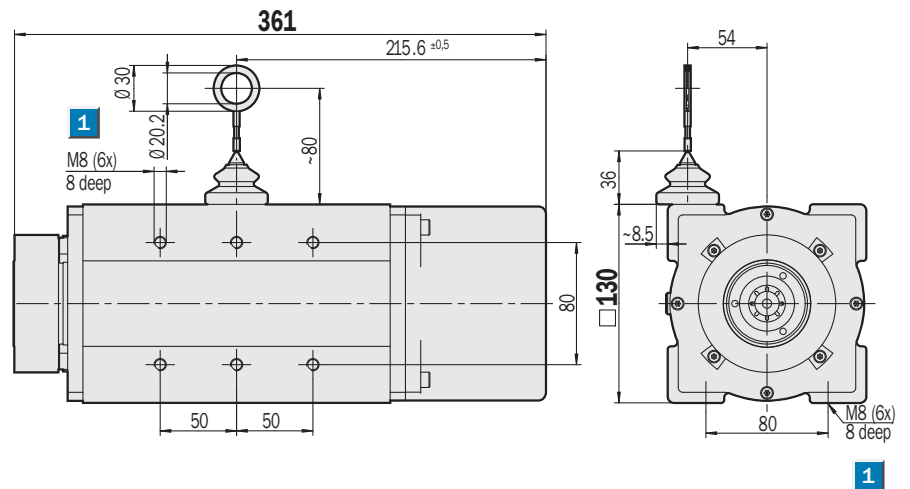
1 Threaded blind hole for mounting

General tolerances to DIN ISO 2768-mk

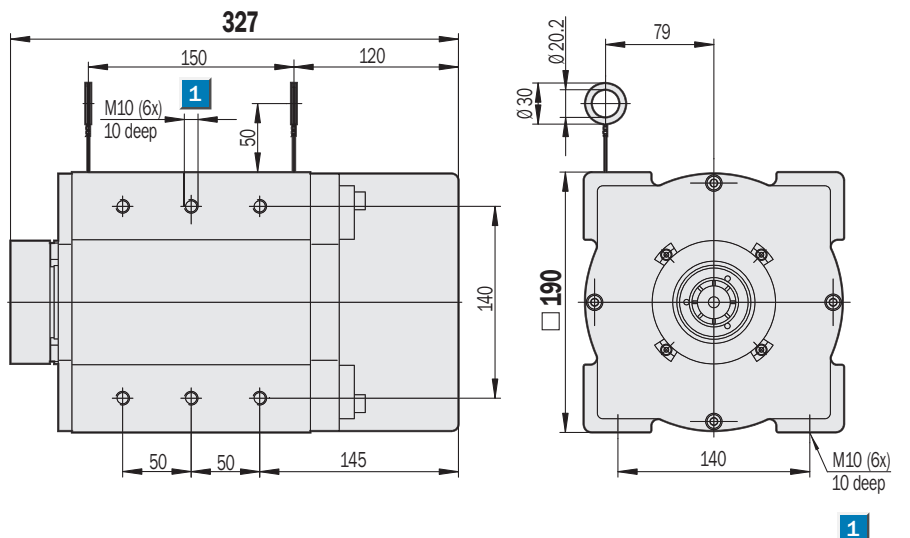
Dimensional drawing wire draw mechanism 20 m; measuring wire  $\varnothing$  0.81 mm, Face mount flange



Dimensional drawing wire draw mechanism 30 m; measuring wire  $\varnothing$  0.81 mm, Face mount flange



Dimensional drawing wire draw mechanism 50 m; measuring wire  $\varnothing$  0.81 mm, Face mount flange



Accessories to suit this unit matching this:  
Wire guiding rollers and spare parts kit  
(page 40)

**1** Threaded blind hole for mounting

General tolerances to DIN ISO 2768-mk

Technical data	Wire draw mechanism	Measuring length							
		20 m	30 m	50 m					
<b>Measuring wire (stainless)</b>	Highly flexible stranded steel, Ø 0.81 mm								
	Highly flexible stranded steel, Ø 1.35 mm								
<b>Drum housing</b>	Anodised Aluminium								
<b>Spring housing</b>	Plastic								
	Die-cast zinc								
<b>Drum diameter</b>	105 mm								
	155.1 mm								
<b>Number of turns for full extension</b>	61 approx.								
	91 approx.								
	102 approx.								
<b>Drum precision</b>	0.05 %								
<b>Operating speed</b>	4 m/sec.								
<b>Spring return force (typ.)</b>									
start/finish <sup>1)</sup>	10 N/20 N								
start/finish <sup>1)</sup>	18 N/37 N								
<b>Working temperature range</b>	- 20 ... + 70 °C								
<b>Protection to IEC 60529</b>	IP 64								
	IP 31								
<b>Life <sup>2)</sup></b>	1 million cycles								
<b>Mass</b>	5.0 kg								
	6.2 kg								
	16.5 kg								

<sup>1)</sup> These values were measured at an ambient temperature of 25 °C. The values may be different at other temperatures.

<sup>2)</sup> Average values, which depend on the loading.  
At high operating speeds over long lengths, this figure can decrease;  
at slow operating speeds over short lengths, it can increase.

**Absolute encoders: determining the matching number of steps of the encoder for the required linear resolution**

$$\text{No. of encoder steps per revolution} = \frac{3.1416 \times (\text{drum diameter} + \text{wire diameter})}{\text{Linear resolution per measuring step}}$$

Example: required linear resolution 0.05 mm; wire draw mechanism 30 m

$$\text{No. of encoder steps per revolution} = \frac{3.1416 \times (105 \text{ mm} + 0.81 \text{ mm})}{0.05 \text{ mm}} = 6648$$

**Incremental encoders: determining the matching number of pulses of the encoder for the required linear resolution**

$$\text{No. of encoder pulses per revolution} = \frac{3.1416 \times (\text{drum diameter} + \text{wire diameter})}{4 \times \text{Linear resolution per measuring step}} \quad \text{1}$$

Example: required linear resolution 0.05 mm; wire draw mechanism 20 m

$$\text{No. of encoder pulses per revolution} = \frac{3.1416 \times (105 \text{ mm} + 0.81 \text{ mm})}{4 \times 0.05 \text{ mm}} = 1662$$

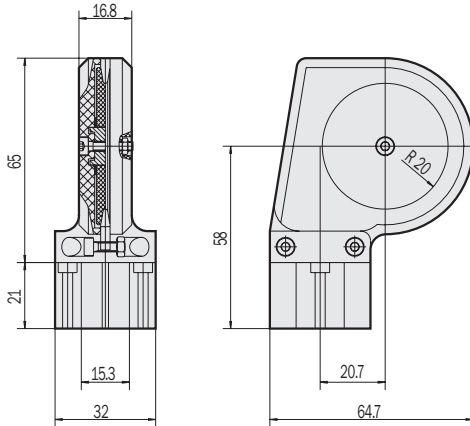
<sup>1</sup> Based on the control/counter evaluating the flanks of the A+B pulses.

Order information			Order information		
MRA-F wire draw mechanism for attaching encoders with servo flange (or compatible flanges)			MRA-F wire draw mechanism for attaching encoders with face mount flange (or compatible flanges)		
Type	Part no.	Description	Type	Part no.	Description
MRA-F130-120D1	6028628	measur. length 20 m	MRA-F130-420D1	6029791	measur. length 20 m
MRA-F130-130D1	6028629	measur. length 30 m	MRA-F130-430D1	6029792	measur. length 30 m
MRA-F190-150D2	6028630	measur. length 50 m	MRA-F190-450D2	6029793	measur. length 50 m

## Dimensional drawings and order information

### Wire guiding roller for wire draw mechanism 2 m and 3 m

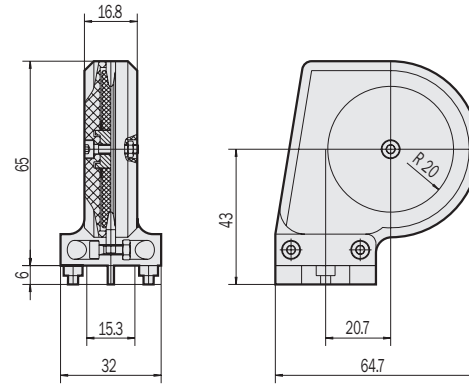
Type	Part no.
MRA-F080-R	6028632



General tolerances to DIN ISO 2768-mk

### Wire guiding roller for wire draw mechanisms 5 m, 10 m, 20 m and 30 m

Type	Part no.
MRA-F130-R	6028631



General tolerances to DIN ISO 2768-mk

### Spare parts kit for all versions of wire draw mechanisms

Type	Part no.	Description
MRA-F-K	6028633	Assembly fittings: 4 servo clamps + screws, 3 screws M4 x 8, coupling 2 sealing rings to suit wire drive mechanisms for attaching encoders with servo flange
MRA-F-L	6030124	Assembly fittings: 4 servo clamps + screws, 3 screws M4 x 8, coupling 2 sealing rings to suit wire drive mechanisms for attaching encoders with face mount flange



Dimensional drawings and order information

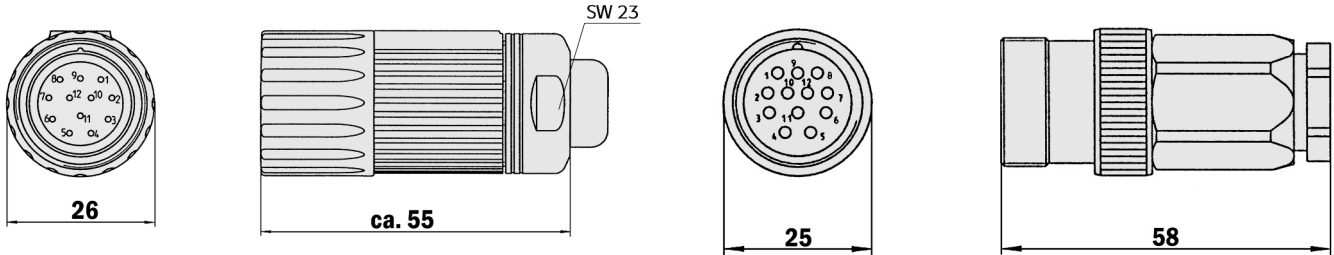
Round screw-in system M23, 12 pin for wire draw encoder BTF with SSI interface

Connector M23 female, 12 pin, straight, screened

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

Connector M23 male, 12 pin, straight, screened

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



Connector M23 female, 12 pin, straight, cable 12 cores, 4 x 2 x 0.25 + 2 x 0.5 + 2 x 0.14 mm<sup>2</sup> screened, capable of being dragged, cable diameter 7.8 mm for wire draw encoders BTF with SSI interface

Type	Part no.	Contacts	Cable length
DOL-2312-G1M5MA1	2029200	12	1.5 m
DOL-2312-G03MMA1	2029201	12	3.0 m
DOL-2312-G05MMA1	2029202	12	5.0 m
DOL-2312-G10MMA1	2029203	12	10.0 m
DOL-2312-G20MMA1	2029204	12	20.0 m
DOL-2312-G30MMA1	2029205	12	30.0 m

Cable, 8 core, per metre, 4 x 2 x 0.15 mm<sup>2</sup> with screen, cable diameter 5.6 mm for wire draw encoder BTF with SSI interface

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

Cable, 11 cores, per metre, 4 x 2 x 0.25 + 2 x 0.5 + 1 x 0.14 mm<sup>2</sup> with screen, cable diameter 7.5 mm for wire draw encoder BTF with SSI interface

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

Cable, 12 cores, per metre, 4 x 2 x 0.25 + 2 x 0.5 + 1 x 0.14 mm<sup>2</sup> with screen, capable of being dragged, cable diameter 7.8 mm for wire draw encoder BTF with SSI interface

Type	Part no.	Wires	Description
LTG-2512-MW	6027531	12	
LTG-2612-MW	6028516	12	UV- and salt water resistant

## Dimensional drawings and order information

### adaptor modules for wire draw encoder BTF with SSI interface

#### Serial Parallel Adaptors

Type	Part no.	Description
AD-SSIG-PA	1030106	SSI Parallel adaptor module, in plastic housing
AD-SSI-PA	1030107	SSI Parallel adaptor module, without plastic housing
AD-SSIPG-PA	1030108	SSI Parallel adaptor module, programmable, in plastic housing
AD-SSIPF-PA	1030109	SSI Parallel adaptor module, programmable, without plastic housing, with front plate
AD-SSIP-PA	1030110	SSI Parallel adaptor module, programmable, without plastic housing, without front plate

#### Programming tool for programmable serial parallel adaptor

Type	Part no.
PGT-02-S	1030112

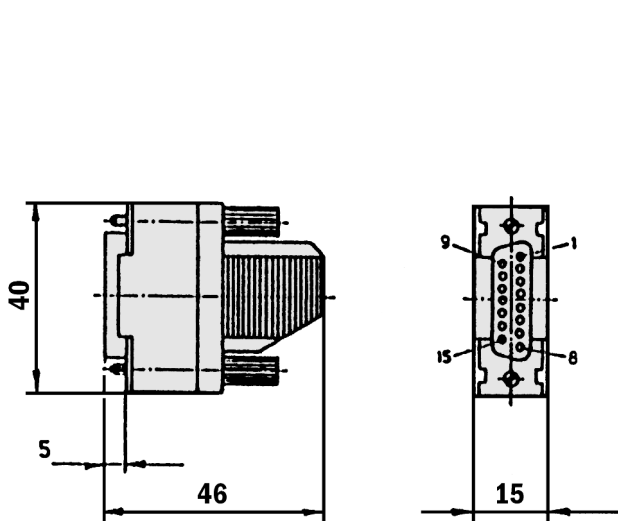
### Plug-in system Sub-D connectors for serial parallel adaptor

#### Cable connector Sub-D male, 15 pin, straight, screened

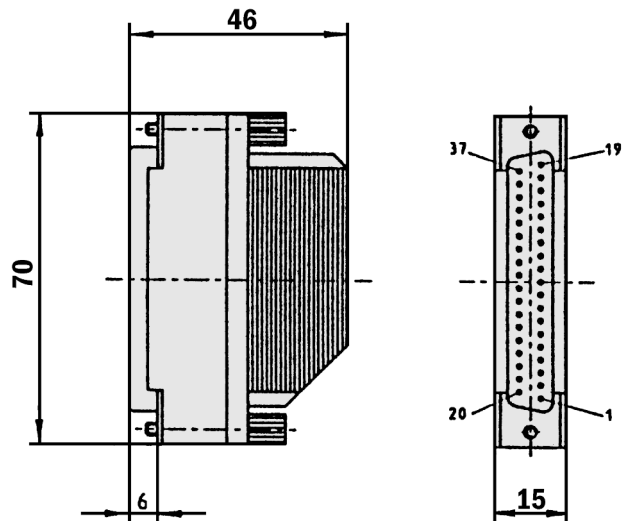
Type	Part no.	Contacts
STE-0D15-G	2029223	15

#### Cable connector Sub-D female, 37 pin, straight, screened

Type	Part no.	Contacts
DOS-0D37-G	2029224	37



General tolerances to DIN ISO 2768-mk



General tolerances to DIN ISO 2768-mk

**Dimensional drawings and order information**

**Screw-in system M12 for BTF wire draw encoder with Profibus Interface**

**SENSICK circular connector M12, can be wired for operating voltage (BTF with Profibus Interface)**

Type	Part no.	Contacts	Description
DOS-1204-G	6007302	4	Female connector, M12, 4 pin, straight

**SENSICK circular connector M12, can be wired for bus cable (BTF with Profibus Interface)**

Type	Part no.	Description
PR-DOS-1205-G	6021353	Profibus-female connector, M12, 5 pin, straight, shielded, B-coding
PR-STE-1205-G	6021354	Profibus-male connector, M12, 5 pin, straight, shielded, B-coding

**SENSICK pre-wired female M12 connector, 4 pin, straight for operating voltage (BTF with Profibus Interface)**

Type	Part no.	Description
DOL-1204-G05M	6009866	Cable 5 m, PVC

**SENSICK pre-wired female M12 connector, 5 pin, straight, 2 core cable, with screening for wire draw encoder BTF with Profibus Interface**

Type	Part no.	Description
DOL-12PR-G05M	6026006	Profibus cable 5 m, B-coding
DOL-12PR-G10M	6026007	Profibus cable 10 m, B-coding

**SENSICK pre-wired male M12 connector, 5 pin, straight, 2 core cable, with screening for wire draw encoder BTF with Profibus Interface**

Type	Part no.	Description
STL-12PR-G05M	6026005	Profibus cable 5 m, B-coding
STL-12PR-G10M	6026008	Profibus cable 10 m, B-coding

**Bus cable 2 core, per metre, with screening, for BTF with Profibus interface**

Type	Part no.	Wires
LTG-2102-MW	6021355	2

**Screw-in system M23, 5 pin for BTF wire draw encoder with DeviceNet interface**

**Cable connector M12 female, 5 pin, straight, screened**

Type	Part no.	Contacts
DOS-1205-G	6027534	5

**Cable connector M12 male, 5 pin, straight, screened**

Type	Part no.	Contacts
STE-1205-G	6027533	5

## Accessories connection systems for PRF with TTL/HTL interface

### Dimensional drawings and order information

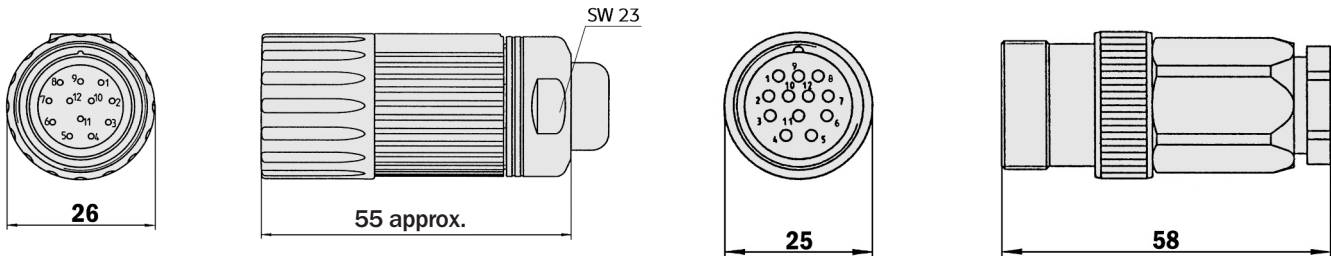
#### Round screw-in system M23, 12 pin for wire draw encoder PRF with TTL/HTL interface

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

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

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

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



#### Cable connector M23 female, 12 pin, straight, Cable 12 core, 4 x 2 x 0.25 + 2 x 0.5 + 2 x 0.14 mm<sup>2</sup> with screen, capable of being dragged, cable diameter 7.8 mm for wire draw encoder PRF with TTL/HTL interface

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

#### Cable, 8 core, per metre, 4 x 2 x 0.15 mm<sup>2</sup> with screen, cable diameter 5.6 mm for wire draw encoder PRF with TTL/HTL interface

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

#### Cable, 11 core, per metre, 4 x 2 x 0.25 + 2 x 0.5 + 1 x 0.14 mm<sup>2</sup> with screen, cable diameter 7.5 mm for wire draw encoder PRF with TTL/HTL interface

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

#### Cable, 12 core, per metre, 4 x 2 x 0.25 + 2 x 0.5 + 1 x 0.14 mm<sup>2</sup> with screen, capable of being dragged, cable diameter 7.8 mm for wire draw encoder PRF with TTL/HTL interface

Type	Part no.	Wires	Description
LTG-2512-MW	6027531	12	
LTG-2612-MW	6028516	12	UV- and salt water resistant



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