

SeGMo-Positioning

Compact positioning drive
for installation situations with little
space

GEL 6109

Technical information

Version 2019-08

General

The SeGMo-Positioning forms a compact mechatronic unit comprising a brushless DCmotor, a 32-bit microprocessor, a compact power amplifier and a powerful gear, as well as a magnetic multiturn encoder.

Active system protection against thermal overload and comprehensive system software allow load-dependent duty cycles well above 25 %.

The rigid aluminium housing with its high degree of protection (IP 67) is suitable for a wide range of applications in various industrial areas.

Features

- Nominal torque
 - Housing size K 2.5 Nm at 70 min⁻¹
(Duty cycle 25 %)
 - Housing size L 5 Nm at 70 min⁻¹
(Duty cycle 25 %)
- Aluminium housing, anodised
- Operating temperature -10 °C to +60 °C
- BLDC motor
- Magnetic multiturn encoder
 - Detection range: 342 turns, also in de-energised state
- Degree of protection IP 67
- CANopen (CiA 402),
further interfaces via SeGMo-Box
- Optionally with cULus component recognition

Advantages

- Extremely compact for installation situations with little space
- Monitoring of important system parameters ensures reliable operation (overload protection)
- Ready for use immediately after power on due to absolute multiturn position detection
- Maintenance-free due to sealed-for-life lubrication

Fields of application

- Packaging machines
- Food and bottling plants
- Wood and plastic working machines
- General mechanical and plant engineering



Description

System concept

The positioning drives belong to the product group SeGMo-Positioning and are a component of the SeGMo-System.

Each positioning drive in the GEL 6109 series is an intelligent adjustment unit for pushing onto the end of a shaft or for attachment to a shaft or spindle.

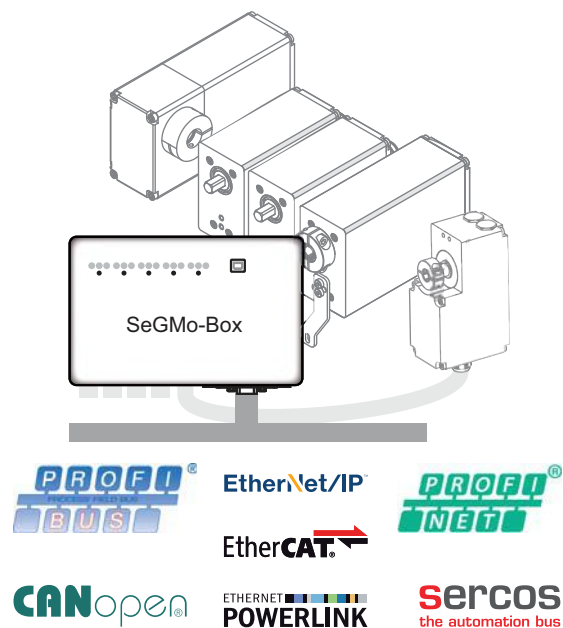
The positioning drive is designed for usage with the SeGMo-Box and can therefore be integrated into a plant control system.

SeGMo-System

The SeGMo-System is suitable for the efficient integration of several positioning drives in a machine or plant. The system consists of the following components:

- SeGMo-Positioning:
Positioning drive for fully automatic format adjustment
- SeGMo-Motion:
Positioning drive for cyclic operation
- SeGMo-Box:
Decentral control unit for up to 5 drives
- SeGMo-Connect:
Single cable concept (hybrid cable suitable for drag chain)
- SeGMo-Lib:
Ready-made function blocks for integration in the machine control system
- SeGMo-Support Tool:
Software for advanced commissioning and configuration

The usage of SeGMo-Box and SeGMo-Connect significantly reduces the cabling effort for the positioning drives. Instead of the usual two separate cables for internal bus communication and a third cable to supply power to the positioning drives, only **ONE** hybrid cable suitable for use in drag chains is connected. In the maximum configuration with 5 positioning drives connected, the number of cables typically reduces from 15 to 5 due to SeGMo-Connect. With the aid of the SeGMo-Box the overall system offers a high degree of flexibility during integration, as it supports all common communication interfaces.



On usage with the SeGMo-Box, all common communication interfaces are available

Construction

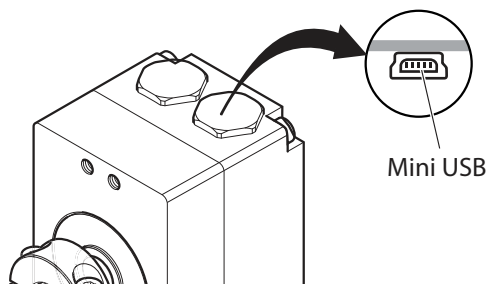
The positioning drive is operated with a supply voltage of 24 V DC and is connected using the hybrid cable SeGMO-Connect.

The hybrid cable SeGMO-Connect provides the bus communication and the power supply to the positioning drive.

The positioning drive communicates with the SeGMO-Box via the system-internal fieldbus profile.

The rigid housing made of anodised aluminium is particularly robust and achieves the degree of protection IP 67 due to the Viton shaft sealing ring.

For manufacturing reasons there are two blanking plugs on the top of the unit: a USB service connector is accessible behind one of these plugs.



Integrated absolute rotary encoder

A magnetic-absolute multiturn rotary encoder makes reference search routines after a power failure or emergency stop unnecessary. Due to the batteryless encoder, the positioning drive detects its position after power on and is immediately ready for use.

In the switched off state the drive shaft can be moved by ± 171 turns without loss of the absolute position.

The absolute rotary encoder withstands high shock/ vibration loads.

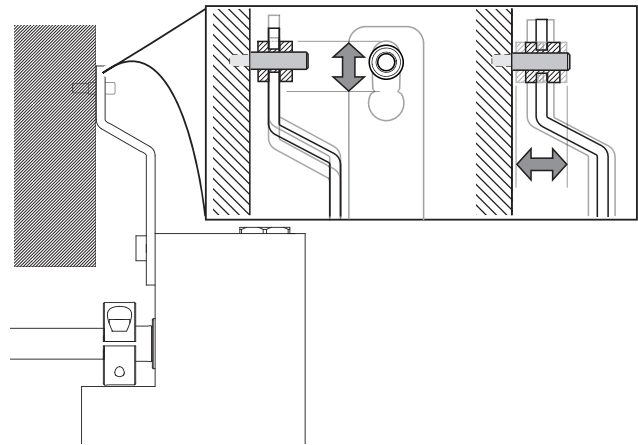
General information on SeGMO-Connect

The hybrid cable SeGMO-Connect is designed for flexible application in drag chains. It is available in the foodgrade, halogen-free and cULus recognised variants. The hybrid cable is screened under the outer sheath. The internal communication cores are fully insulated and multiply screened.

All positioning drives are available with hybrid cable and connectors and can be connected quickly and straightforwardly to the SeGMO-Box via the pre-assembled hybrid connecting cables that can be configured as required. Connectors with a quick-release coupling permit quick connection and disconnection. The positioning drive is therefore reliably and quickly disconnected from the power supply for maintenance and service work in a matter of seconds. Pre-assembled connection cables are available for the connection, see "Technical information BZK".

Assembly

The mounting concept comprises a fixed-moving bearing. The machine shaft supports the weight of the positioning drive via the fixed bearing. For this purpose the positioning drive is mounted directly on the machine shaft using a clamped connection with a shaped fit, for example over a hollow shaft with a clamping ring. The torque support prevents the positioning drive rotating and, as the moving bearing, compensates for any movements that occur on the output axle due to imbalance, if necessary. The shape and design of the torque support are order-specific. Various accessories are available for mounting.



Compensation of movements due to imbalance

Modes of operation

The drive is designed for positioning at nominal torque. The following intervals are valid for a duty cycle (ED) of

- Duty cycle = 25 % at 100 % load torque, positioning mode S2
(base time 4 minutes: ED = 1 minute, PD = 3 minutes)
- Duty cycle ≤ 50 % with reduced load torque, dependent on ambient parameters and application

Other methods of operation are protected by I^2t and temperature monitoring as well as an adjustable current limit. This protection permits a briefly increased breakaway torque.

Reliability

Important parameters such as motor power and device temperature are monitored and in this way the positioning drive actively protected against overload. The following monitoring devices ensure trouble-free operation:

- Soft start and shutdown via acceleration and deceleration ramps
- Over / undervoltage detection on the power circuit supply and logic circuit supply
- Lag error detection (drive shaft in relation to motor shaft)
- Temperature monitoring on the power amplifier and inside the housing
- Motor and power amplifier overload protection via I^2t monitoring and in combination with the box by means of the maximum current.

Technical data

Nominal torque (housing size)	02 (K)		05 (L)	
Electrical data				
Nominal voltage logic circuits	24 V DC -5% / +25%			
Nominal voltage power circuits	24 V DC -5 % / +25% (Attention: max. motor speed is voltage dependent!)			
Nominal current logic circuits	Max. 400 mA			
Nominal current power circuits	1.8 A (max. 4 A)		2.6 A (max. 5 A)	
Duty cycle in % (load-dependent)	Duty cycle = 25 % at 100 % load torque, positioning mode S2 (base time 4 minutes: ED = 1 minute, PD ⁽¹⁾ = 3 minutes) Duty cycle ≤ 50 % with reduced load torque, dependent on ambient parameters and application			
Positioning range	Unlimited ⁽²⁾			
System interface	CANopen (CiA 402)			
Communication interfaces via SeGMo-Box GEL 6505	CANopen, PROFIBUS-DP, PROFINET IO / RT, EtherCAT, EtherNet/IP, Sercos III, POWERLINK			
Dielectric strength	√2 × 500 V DC; as per DIN EN 61439-1:2012-06			
EMC ⁽³⁾	Electromagnetic immunity EN 61000-6-1:2007-10 / EN 61000-6-2:2006-03 Electromagnetic emissions EN 61000-6-3:2011-09 / EN 61000-6-4:2011-09			
Encoder data				
Resolution	1000 increments per 360°			
Detection range of the measuring system	342 turns, also in de-energised state			
Mechanical data				
Nominal torque drive shaft	2.5 Nm at 70 min ⁻¹		5 Nm at 70 min ⁻¹	
Drive shaft	Semi hollow shaft (solid shaft Ø d _w = 8...14 mm); solid shaft Ø d _w = 10 mm); customised shafts upon request			
Housing material	Aluminium AlMgSi			
Weight ⁽⁴⁾	1.0 kg		1.25 kg	
Degree of protection	IP 67, EN 60529:2014-09, shaft sealing ring made of Viton			
Shock resistance	150 m/s ² (approx. 15 g); as per DIN EN 60068-2-27:2010-02			
Vibration resistance	50 m/s ² (approx. 5 g), 10 to 50 Hz; as per DIN EN 60068-2-6:2008-10			
Ambient data				
Assured operating temperature range	0 °C to +60 °C			
Operating temperature range	-10 °C to +60 °C			
Storage temperature range	-20 °C to +85 °C			
Max. relative humidity of air	95%			
Condensation	Not permitted (condensation protection upon request)			

⁽¹⁾ PD length of space

⁽²⁾ If the supply voltage is present, an electronic counter measures the positioning range over the detection range of the measuring system.

⁽³⁾ Use only screened cables.

⁽⁴⁾ Depending on the type of connection and the type of construction

Technical data

Nominal torque (housing size)	02 (K)	05 (L)
UL data (design C)		
cULus recognised component, E196161	UL 61800-5-1 CSA C22.2 No. 274-13	
Input voltage (power circuits)	24 V to 30 V DC	
Input power (power circuits), continuous operation	25 VA	45 VA
Input power (power circuits), ED = 1 minute, PD ⁽¹⁾ = 3 minutes	35 VA	60 VA
Protection class	Type 1	
Assured operating temperature range	0 °C to +55 °C	
Operating temperature range	-10 °C to +55 °C	

⁽¹⁾ PD length of space

Technical data

Connector M23

Type of connection **H1 / H2 / H3**

Technical data – coupling / connector (connector size M23)	
Rated voltage	Max. 30 V AC / DC
Current carrying capacity	According to DIN EN 60512
Contact type (coupling / connector)	Male / female
Housing material coupling / connector	Nickel-plated brass (others upon request)
Union nut material	Nickel-plated brass
Ambient temperature	-20 °C to +130 °C
Degree of protection ⁽¹⁾	IP 66 / IP 67
Mating cycles	> 500
Vibration resistance	≤ 200 m/s ²
Approval	cULus recognised component (no. E247738)

Connector M17

Type of connection **HS / S1 / S2 / S3**

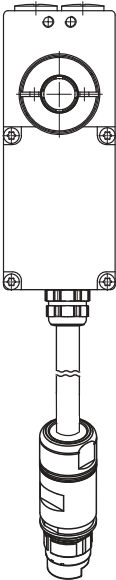
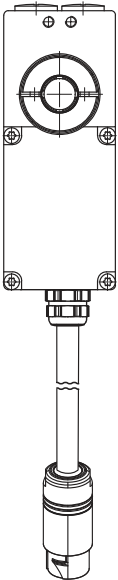
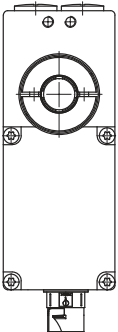
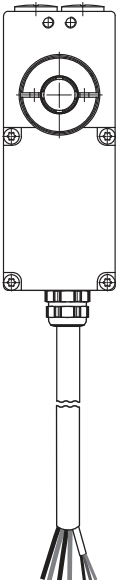
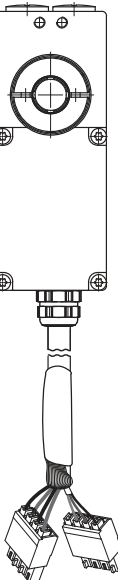
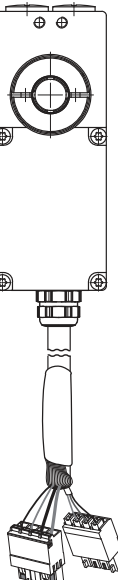
Technical data – coupling / connector (connector size M17)	
Rated voltage	Max. 30 V AC / DC
Current carrying capacity	According to DIN EN 60512
Contact type (coupling / connector)	Male / female
Housing material coupling / connector	Brass, die-cast zinc and encapsulated in plastic
Ambient temperature	-20 °C to +130 °C
Degree of protection ⁽¹⁾	IP 66 / IP 67
Mating cycles	> 500
Approval	cULus recognised component (no. E247738)

Technical data, cables

Hybrid cable	Design 0 (standard)	Design 1 (separate fuse protection)	Design C (cULus recognised component)
Sheath material	PUR, black, glossy	PUR, black, matt	PUR, black, matt
Cable properties	Screened	Screened	Screened
Suitable for drag chains	Yes	Yes	Yes
Food grade	Yes	No	No
Halogen-free	No	Yes	Yes
Cable diameter (d)	9.5 mm	9.5 mm	9.5 mm
Bending radius	Permanently flexible: 10 × d Fixed routing: 5 × d	Permanently flexible: 15 × d Freely moving: 10 × d Fixed routing: 5 × d	Permanently flexible: 15 × d Freely moving: 10 × d Fixed routing: 5 × d
Peak operating voltage	Max. 350 V CAN bus Max. 30 V DC (logic / power)	Max. 300 V CAN bus Max. 30 V DC (logic / power)	Max. 300 V CAN bus Max. 30 V DC (logic / power)
Temperature range	-40 °C to +80 °C	-40 °C to +80 °C	-40 °C to +80 °C

⁽¹⁾ In the screwed-in state, according to DIN EN 60529 / DIN 40050

Device overview — types of connection

H1: Cable length 30 cm H2: Cable length 50 cm H3: Cable length 100 cm	S1: Cable length 30 cm S2: Cable length 50 cm S3: Cable length 100 cm	HS
Cable with M23 connector (coupling with pin contacts)	Cable with M17 connector (coupling with pin contacts)	M17 panel-mounting socket (pin contacts)
		
xx: Cable length can be selected (1 m to 20 m)	Vx: Cable length can be selected (1 m to 20 m)	Vx: Cable length can be selected (1 m to 20 m)
Flying lead	Design 0/1: Cable with spring-cage terminals for the SeGMo-Box connection (Box in design N/U)	Design C: Cable with spring-cage terminals for the SeGMo-Box connection (Box in design C)
		

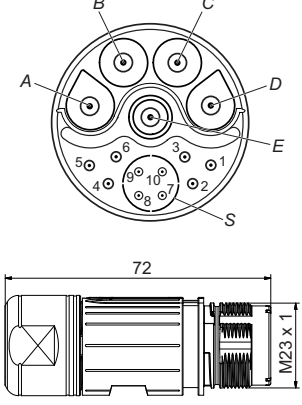
Terminal assignments and accessories

Terminal assignment xx / Vx

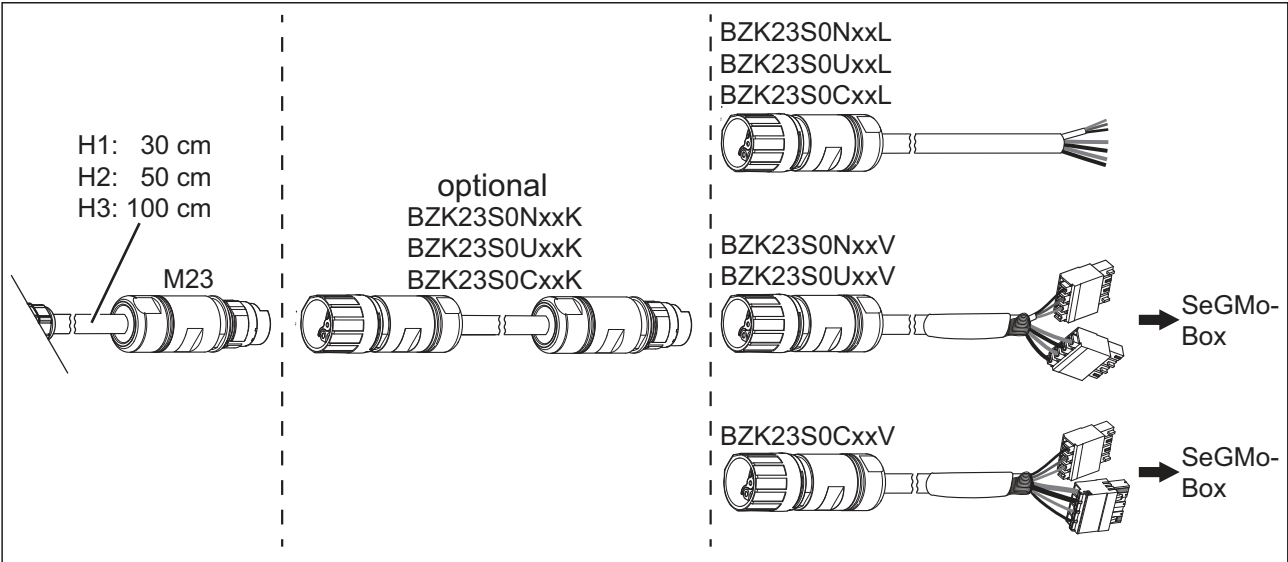
Type of connection xx : flying lead				Type of connection Vx : pre-assembled for the box connection		Signal identifier
Core colour/ core no.	cross-sec- tion Design 0	cross-sec- tion Design 1	cross-sec- tion Design C	4-pole spring-cage terminal (internal positioning drive communication) pin identifier	4-pole spring-cage terminal (position- ing drive power supply) pin identifier	
red/1	0.5 mm ²	0.5 mm ²	0.5 mm ²	–	3	+24 V logic cir- cuits
red/2	1.5 mm ²	1.5 mm ²	2.5 mm ²	–	1	+24 V power cir- cuits
black/2	1.5 mm ²	1.5 mm ²	2.5 mm ²	–	2	GND power cir- cuits
black/1	0.5 mm ²	0.5 mm ²	0.5 mm ²	–	4	GND logic circuits
black	0.14 mm ²	0.14 mm ²	0.14 mm ²	1	–	CAN GND
green	0.25 mm ²	0.25 mm ²	0.25 mm ²	3	–	CAN low
yellow	0.25 mm ²	0.25 mm ²	0.25 mm ²	2	–	CAN high

Terminal assignments and accessories

Pin layout H1 / H2 / H3

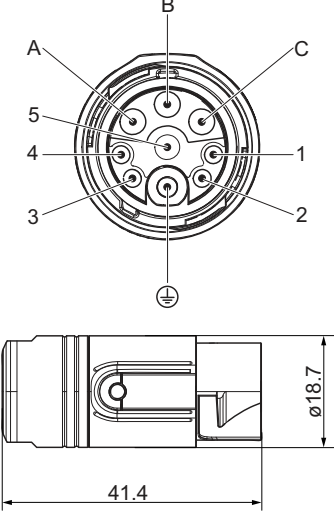
M23 connector		
Coupling with pin contacts	Pin identifier	Signal identifier
	A	+24 V logic circuits
	B	GND logic circuits
	C	GND power circuits
	D	+24 V power circuits
	E	Cable screen
	7	CAN high
	8	CAN GND
	9	CAN low
	S	CAN screen

Connection accessories H1 / H2 / H3 (see Technical information BZK)

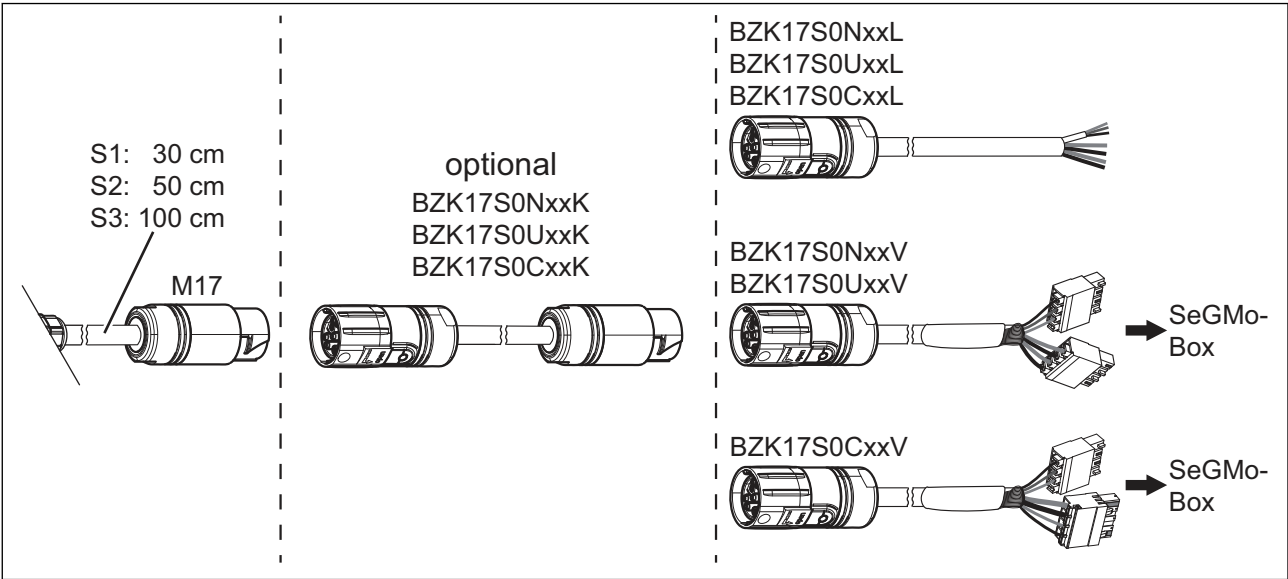


Terminal assignments and accessories

Pin layout S1 / S2 / S3

M17 connector		
Coupling with pin contacts	Pin identifier	Signal identifier
	A	+24 V logic circuits
	B	+24 V power circuits
	C	GND power circuits
	1	GND logic circuits
	2	CAN GND
	3	CAN low
	4	CAN high

Connection accessories S1 / S2 / S3 (see Technical information BZK)



Terminal assignments and accessories

Pin layout HS

M17 connector		
Panel-mounting socket with pin contacts	Pin identifier	Signal identifier
	A	+24 V logic circuits
	B	+24 V power circuits
	C	GND power circuits
	1	GND logic circuits
	2	CAN GND
	3	CAN low
	4	CAN high

Connection accessories HS (see Technical information BZK)

HS

M17

optional

BZK17S0NxxK
BZK17S0UxxK
BZK17S0CxxK

BZK17S0NxxL
BZK17S0UxxL
BZK17S0CxxL

BZK17S0NxxV
BZK17S0UxxV

SeGMo-Box

BZK17S0CxxV

SeGMo-Box

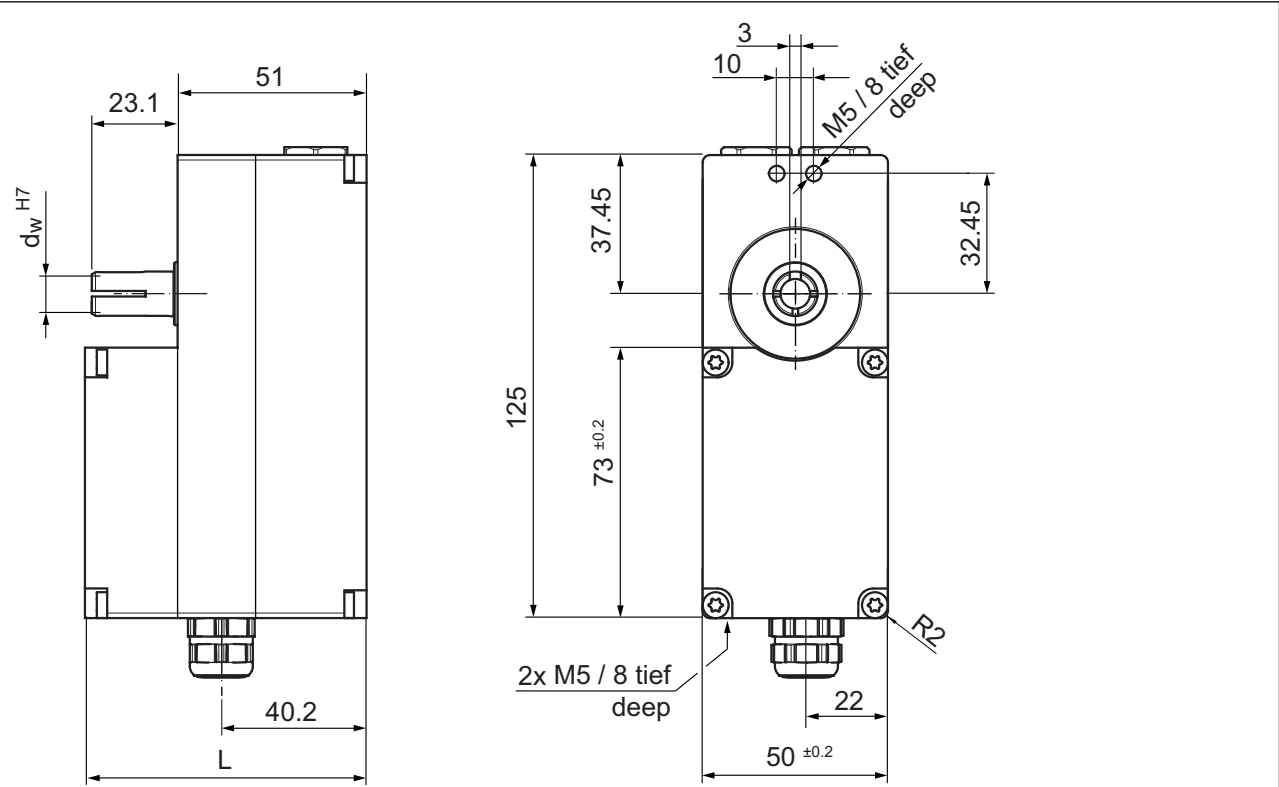
Accessories

Mechanical accessories (not included in the scope of supply)

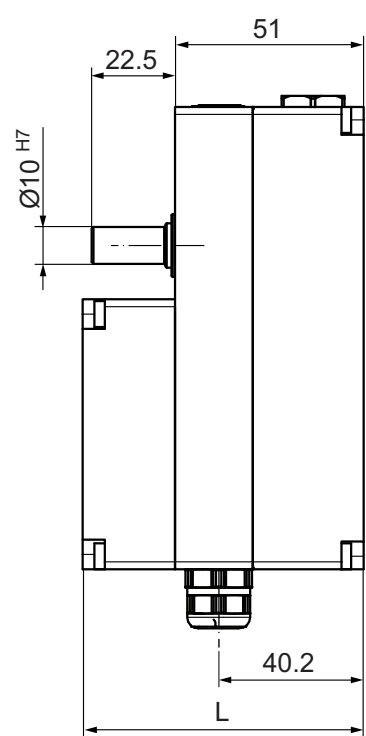
Identifier:	Item no.
Clamping ring for shaft: — A / B / C / D — 8 / 9 / E	MZ1380 MZ1379
Accessories kit for GEL 6110 / GEL 6109 , comprising: <ul style="list-style-type: none">▪ 1 pc. torque support including plain bearing, item no. BG5012▪ 2 pcs. screw M5×8, item no. VS2107▪ 1 pc. headless screw M5×20, item no. VS3412	ZB6100
Plain bearing accessories package (Contents: 5 pcs. plain bearing, item no. OG0001)	ZB61X01
Headless screws accessories package (Contents: 5 pcs. headless screw M5 × 20, item no. VS3412)	ZB61X02
Torque support screws accessories package (Contents: 10 pcs. screw M5 × 8, item no. VS2107)	ZB61X03

Dimensional drawings

Dimensional drawing – GEL 6109 (type of connection H1 / H2 / H3 / S1 / S2 / S3 / Vx / xx)



Shaft **M**



$\varnothing d_w$ Inside diameter as per type code

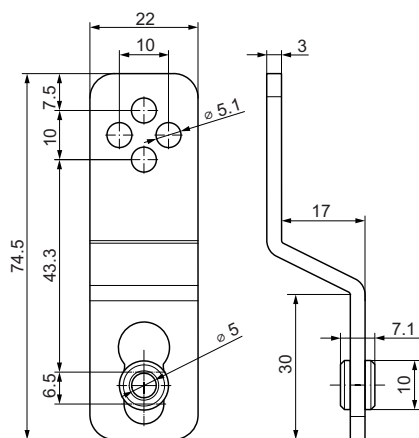
All dimensions stated in mm (\approx approximate dimension)
General tolerance DIN ISO 2768 medium

Housing size		Dimension L
Short	K	76
Long	L	96

Dimensional drawings

All dimensions stated in mm (\approx approximate dimension); General tolerance DIN ISO 2768 medium

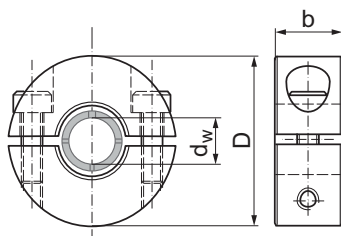
Accessories kit ZB6100



Torque support

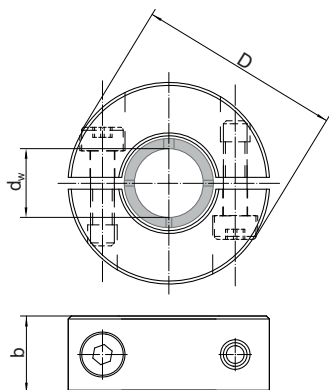
- Metal bracket with plain bearing fitted
- 2 fastening screws M5x8
- Headless screw M5x20

Clamping ring



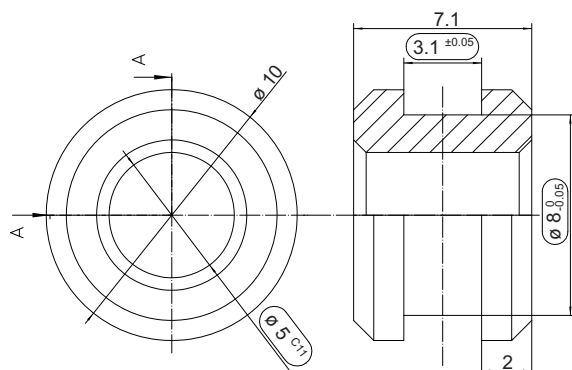
Dimensions / Item no. clamping ring	MZ1379
Shaft $\varnothing d_w$ H7 d[mm] (type code)	10 / 9 / 8 (E / 9 / 8)
D [mm]	28
b [mm]	11
Screw DIN 912	M4

Clamping ring



Dimensions / Item no. clamping ring	MZ1380
Shaft $\varnothing d_w$ H7 [mm] (type code)	11 / 12 / 13 / 14 (D / C / B / A)
D [mm]	34.5
b [mm]	13
Screw DIN 912	M4

Plain bearing OG0001



Section A-A

Type code GEL 6109

Communication interface									
CO	CANopen CiA 402 (system-internal communication, further interfaces via SeGMo-Box)								
	Nominal torque								
02	2.5 Nm / 70 min ⁻¹ at duty cycle 25 % (type of construction K)								
05	5 Nm / 70 min ⁻¹ at duty cycle 25 % (type of construction L)								
	Shaft [d_w in mm]								
A	Semi hollow shaft, inside diameter 14 H7								
B	Semi hollow shaft, inside diameter 13 H7								
C	Semi hollow shaft, inside diameter 12 H7								
D	Semi hollow shaft, inside diameter 11 H7								
E	Semi hollow shaft, inside diameter 10 H7								
9	Semi hollow shaft, inside diameter 9 H7								
8	Semi hollow shaft, inside diameter 8 H7								
M	Solid shaft, diameter 10 h7 ⁽¹⁾								
	Housing material								
A	Aluminium AlMgSi, anodised								
	Housing size								
K	Short								
L	Long								
	Type of connection								
HS	M17 panel-mounting socket with pin contacts (only available with shaft A)								
S1	30 cm hybrid cable and M17 coupling with pin contacts								
S2	50 cm hybrid cable and M17 coupling with pin contacts								
S3	100 cm hybrid cable and M17 coupling with pin contacts								
H1	30 cm hybrid cable and M23 coupling with pin contacts								
H2	50 cm hybrid cable and M23 coupling with pin contacts								
H3	100 cm hybrid cable and M23 coupling with pin contacts								
Vx	Hybrid cable pre-assembled with connection terminals for SeGMo-Box, Cable length V1 = 1 m; V2 = 3 m; V3 = 5 m; V4 = 8 m; V5 = 10 m; V6 = 13 m; V7 = 15 m; V8 = 18 m; V9 = 20 m								
xx	xx m hybrid cable with flying lead, length in m (xx = 01...20; standard: 3 m)								
	Sensor								
M	Magnetic multiturn encoder (342 turns)								
	Design								
0	Standard								
1	Separate fuse protection								
C	cULus recognised component								
	Degree of protection								
3	IP 67 (with shaft sealing ring made of Viton and protection against humidity), design C : additionally UL protection class type 1								
6109	—	—	—	—	—	—	—	—	—

⁽¹⁾ Clamp coupling upon request

Type code GEL 6109

Information on the type of connection

Type of connection **HS / H1 / H2 / H3 / S1 / S2 / S3 / xx / Vx**

The positioning drive is supplied with SeGMo-Connect (hybrid cable) and connected via the SeGMo-Box with the plant control system.

Information on the design

The cULus component recognition (E196161) requires for the usage of the positioning drives in design **C** the usage of the SeGMo-Box (E483619) GEL6505A_____C or GEL6505B_____C in combination with SeGMo-Connect BZK_____. Usage is also limited to the application area in "NFPA 79 - Electrical Standard for Industrial Machinery".

Nominal torque / Housing size

Nominal torque		Housing size (length of housing)
02	2.5 Nm at 70 min ⁻¹	K (76 mm)
05	5 Nm at 70 min ⁻¹	L (96 mm)