SeGMo-Positioning Compact positioning drives for confined installation situations

Technical information

Version 2022-08-29

GEL 6129

General

The SeGMo-Positioning is a compact mechatronic unit consisting of a brushless DC motor, a 32-bit microprocessor, a compact power amplifier, a powerful gear and a magnetic-absolute multiturn encoder.

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

With its high degree of protection (IP 65), the plastic housing offers versatile application possibilities in various industrial sectors.

Features

- Nominal torques: 2.5 Nm and 5 Nm
- Plastic housing (ABS)
- Operating temperature range -10 °C to +55 °C
- Brushless DC motor
- Magnetic-absolute multiturn encoder
- Detection range: 342 revolutions, also in de-energized state
- Degree of protection IP 65
- Integrated communication interfaces
 CANopen (CiA 402); EtherCAT; EtherNet/IP; Modbus/TCP;
 POWERLINK; PROFINET IO / RT; Sercos III

Advantages

- Extremely compact for confined installation situations
- Either hybrid cable or connector outlet
- Monitoring equipment to aid trouble-free operation
- Ready for use directly after switching on the power supply due to absolute position detection of the magnetic-absolute multiturn encoder
- Maintenance-free electrical parts
- Maintenance-free gear due to sealed-for-life lubrication

Fields of application

- Packaging machines
- Food and bottling lines
- Wood and plastic processing machines
- General mechanical and systems engineering



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Variable in connection technology and communication interface



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Description of SeGMo system

SeGMo-System

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

- SeGMo-Positioning:
- Positioning drive for fully automatic format setting SeGMo-Motion:
- Positioning drive for cyclic operation
- SeGMo-Box: Decentral control unit for up to 5 positioning drives
- Modular SeGMo-Box: decentral control unit for up to 17 positioning drives or up to 48 positioning displays
- SeGMo-Assist:
 Position display for manual adjustment procedures
- SeGMo-Connect: Single cable concept (hybrid cable suitable for drag chain)
- SeGMo-Lib: Prefabricated function blocks for integration in the higher level control system
- SeGMo-Support Tool:
- Software for extended commissioning and configuration SeGMo-Web:
- Software for real-time transmission of the modular SeGMo-Box
- SeGMo-ImgConv Tool: Tool for converting image files into pictograms for SeGMo-Assist

SeGMo-Positioning:

The positioning drives are complete mechatronic systems with a batteryless multiturn encoder, gear and motor as well as integrated power and control electronics. We also offer these items for standalone use. With nominal torques of up to 15 Nm, they cover the typical power range for secondary axes.

SeGMo-Box:

Up to 5 positioning drives can be connected to the SeGMo-Box. The connection of position displays is not provided. The SeGMo-Box supports all common fieldbus and Industrial Ethernet communication interfaces.

Modular SeGMo-Box:

Every modular SeGMo-Box comprises a basic housing with individually equippable plug-in modules. By combining basic housings, up to 17 positioning drives or up to 48 position displays can be connected. A combination of positioning drives and position displays on a modular SeGMo-Box is possible. The power supply can be provided separately for each equipped plug-in module. The modular SeGMo-Box supports all common Industrial Ethernet communication interfaces.

SeGMo-Assist:

The position displays facilitate manual adjustment procedures by displaying nominal and actual positions. Variants are available for rotary and linear applications. Another variant without a measuring system supports the operator, for example, when changing format parts or tools.

SeGMo-Connect:

By using the positioning drives with a SeGMo-Box the cabling effort is considerably reduced by SeGMo-Connect. Instead of the usual two separate cables for internal bus communication and a third cable for power supply to the positioning drives, only **ONE** hybrid cable is connected. In combination with the SeGMo-Box and 5 connected positioning drives, the SeGMo-Connect typically reduces the number of cables from 15 to 5.

The hybrid cable is designed for moveable use in drag chains. Its variants are food grade quality, halogen-free and available as a cULus recognized component.

SeGMo-Motion:

The positioning drives are complete mechatronic systems with gear and motor as well as integrated power and control electronics for cyclic operation.



Description of positioning drive

General description

The positioning drive belongs to the SeGMo-Positioning product group and is a component of the SeGMo system. It is an intelligent adjustment unit for mounting on a machine shaft end or for attachment to a machine shaft or spindle.

The positioning drive converts the movement commands into a mechanical rotary motion and actuates a machine shaft. Rotation of the positioning drive with the machine shaft is prevented by mounting a torque support.

Product construction

The positioning drive requires two supply voltages of 24 V to 30 V DC. The logic circuit supply voltage supplies the control electronics and the power circuit supply voltage supplies the power electronics for the motor. The positioning drive requires a functional ground cable to be connected. Connection is via a 6.3 mm flat connector.

We recommend a wire cross section of 4 mm² [12 AWG].

Direct connection to a higher level control system

The positioning drive with **ST** or **SW** connection technology is intended for stand-alone use and is connected directly to a higher level control system. It supports Industrial Ethernet protocols.

Indirect connection to a higher level control system

The positioning drive is connected to a SeGMo-Box or a modular SeGMo-Box using SeGMo-Connect. The hybrid cable SeGMo-Connect handles bus communication and the power supply of the positioning drive. The positioning drive communicates with the SeGMo-Box via the system-internal fieldbus profile (communication interface **CO**). It is available as an option with a hybrid cable (connection technology **xx**) or plug connection (connection technology **HS** or **HW**).

The positioning drive can be configured with the SeGMo-Support Tool via the service connector (mini-USB).

Magnetic-absolute multiturn encoder

A magnetic absolute multiturn encoder makes reference search routines superfluous after a power failure or "EMERGENCY STOP". After the power supply is switched on, the positioning drive detects its position via the batteryless multiturn encoder and is ready for operation directly. When switched off, the output shaft can be adjusted by ±171 revolutions without losing the absolute position. The multiturn encoder withstands high shock/vibration loads.

General information about SeGMo-Connect

Accessories for connecting to the SeGMo-Box

The SeGMo-Connect hybrid cable is designed for moveable use in drag chains. Its variants are food grade quality, halogen-free and available as a cULus recognized component. The hybrid cable screen is under the outer sheath. The internal communication line is completely insulated and has multiple screening.

All positioning drives are available with hybrid cables and connectors and can be quickly and easily connected to the SeGMo-Box via the freely configurable and preassembled hybrid cables.

Quick disconnect connectors allow safe and quick disconnection from the power supply during maintenance and service work. Preassembled hybrid cables are available for connection.

Connection accessories for stand-alone use

Mating connectors and cables for power supply are available for stand-alone use of positioning drives.

For more information on SeGMo-Connect connection accessories, please refer to "Technical Information BZK."

Assembly

The mounting concept provides for fixed-moving bearings. The machine shaft bears the weight of the position display via the fixed bearing. The positioning drive is mounted directly onto the machine shaft via a force-fit connection, for example with a semi-hollow shaft and clamping ring. The torque support prevents the positioning drive from rotating and compensates as a moving bearing for any imbalance movements occurring at the output shaft. The form and design of the torque support depend on the application. Various accessories are available for mounting.



Imbalance movements are absorbed at the moving bearing

- 1 Machine shaft
- 2 Plain bearing
- 3 Torque support
- 4 Headless screw

Description of positioning drive

Operating modes

The positioning drive is **not** designed for continuous operation at nominal torque.

The positioning drive is designed for control operation at nominal torque. The following intervals are applicable for a duty cycle (DuCy) of

- DuCy = 25 % at 100 % load torque, duty type S2 (base time 4 minutes: DuCy = 1 minute, BD = 3 minutes)
- DuCy ≤ 50 % at reduced load torque, depending on environmental parameters and application

Other operating modes are secured by l²t- and temperature monitoring and an adjustable current limitation. A briefly increased breakaway torque is permitted within the scope of this protection.

Reliability

Important parameters are monitored, thus actively protecting the positioning drive from overload. The following monitoring devices support trouble-free operation:

- Soft start and stop via acceleration and deceleration ramp
- Over/undervoltage detection of supply voltage (power circuit and logic circuit)
- Lag error detection (output to motor shaft)
- Temperature monitoring of power amplifier and housing interior
- Overload protection of motor and power amplifier by l²t monitoring and in combination with the SeGMo-Box by the maximum current.

Parts named





- 1 Plain bearing
- 2 Torque support
- 3 Screws M5× 8
- 4 Housing: Top
- 5 Housing: Rear side
- 6 Housing: Underside
- 7 Housing: Front
- 8 Output shaft
- 9 Clamping ring
- 10 Warning sign "Rotating parts"
- 11 Warning sign "Hot surface"
- 12 Flat connector 6.3 mm (functional ground)
- 13 Rating plate
- 14 Closing sleeve (service connector mini USB, type B:
- Connection technology **HS/HW/xx** only)
- 15 Status display Communication (LED2) Connection technology **ST/SW** only
- 16 Status display device (LED1) Connection technology **ST/SW** only

Technical data

Nominal torque	02	05	
Electrical data			
Supply voltage logic circuit ⁽¹⁾	24 V to 30 V DC (nominal supply voltage 24 V DC)		
Power circuit supply voltage ⁽¹⁾	24 V to 30 V DC (nominal supply voltage 24 V DC) (① Maximum motor speed depends on voltage!)		
Maximum current consumption logic circuit ⁽²⁾⁽³⁾ - Connection technology HS/HW/xx : - Connection technology ST/SW :	100 mA 200 mA		
Power circuit current consumption ⁽²⁾⁽³⁾ (maximum current consumption power circuit)	1.4 A (4.0 A)	2.4 A (5.0 A)	
Duty cycle (DuCy) in % (load-dependent)	DuCy = 25 % at 100 % load torque, duty type S2 (base time 4 minutes: DuCy = 1 minute, BD ⁽⁴⁾ = 3 minutes) DuCy ≤ 50 % at reduced load torque, depending on environmental parameters and application		
Communication interfaces: Fieldbus	CANopen (CiA 402)		
Communication interfaces: Industrial Ethernet	EtherCAT; EtherNet/IP; Modbus/TCP; POWERLINK; PROFINET IO / RT; Sercos III		
Mechanical data			
Nominal torque output shaft ⁽²⁾	2.5 Nm at 70 min ⁻¹	5 Nm at 70 min ⁻¹	
Output shaft	Semi-hollow shaft		
Housing material	Plastic, ABS		
Weight ⁽⁵⁾ - Connection technology HS/HW/xx : - Connection technology ST/SW :	≈ 640 g ≈ 660 g		
Encoder data			
Resolution	1,000 increments per 360°		
Detection range	342 revolutions, also in de-energized state		
Positioning range	unlimited ⁽⁶⁾		

 $^{^{(1)}\,}$ The supply voltage must be fed via a stabilized power supply unit.

⁽²⁾ At nominal supply voltage

⁽³⁾ External breaker required

⁽⁴⁾ BD break duration

⁽⁵⁾ Depending on type of connection and construction

⁽⁶⁾ When the logic circuit supply voltage is applied, an electronic counter detects the positioning range beyond the measuring system detection range.

Technical data

Nominal torque	02	05	
Ambient data			
Working temperature range	0 °C to +55 °C		
Operating temperature range	-10 °C to +55 °C		
Storage temperature range	-20 °C to +70 °C		
Maximum relative air humidity	< 90 %		
Condensation	not permitted		
Degree of protection ⁽¹⁾	IP 65, shaft sealing ring (material: FKM)		
Dielectric strength	√2× 500 V AC; as per DIN EN 61439-1:2012-06		
EMC ⁽²⁾	Electromagnetic immunity EN IEC 61000-6-1:2019, DIN EN IEC 61000-6-1:2019-11 EN IEC 61000-6-2:2019, DIN EN IEC 61000-6-2:2019-11 Electromagnetic emission EN 61000-6-3:2007 + A1:2011, DIN EN 61000-6-3:2011-09 EN IEC 61000-6-4:2019, DIN EN IEC 61000-6-4:2020-09		
Vibration resistance	5 g, 50 m/s ² @ 10 to 150 Hz, as per DIN EN 60068-2-6:2008-10		
Shock resistance	15 g, 150 m/s ² @ 6 ms, as per DIN EN 60068-2-27:2010-02		
Approvals			
European Economic Area	Conformity in accordance wit EMC Directive 2014/30/EL Machinery Directive 2006/- C E	h J 42/EC	

 ⁽¹⁾ The degree of protection is only maintained when the closing sleeve is inserted and all connectors are screwed together with mating connectors.
 (2) Use only screened cables.

Connector M17

Connection technology HS/HW/ST/SW

Technical data – Coupling/connector (connector size M17)		
Rated voltage	Maximum 30 V AC/DC	
Current carrying capacity	as per DIN EN 60512	
Contact type (coupling/connector)	Male/female	
Housing material coupling/connector	Brass, zinc die casting and plastic coated	
Ambient temperature	-20 °C to +130 °C	
Degree of protection ⁽¹⁾	IP 66/IP 67	
Mating cycles	> 500	
Certification	cULus recognized component (no. E247738)	

Technical data hybrid cable

Connection Technology xx

Hybrid cable	Design 1 (Standard, individual protection)
Sheath material	PUR, black, matte
Cable properties	screened
Suitable for drag chain	yes
Food grade quality	no
Halogen-free	yes
Cable diameter (d)	9.5 mm
Bending radius	permanently flexible: 15 × d free-moving: 10 × d fixed: 5 × d
Maximum peak operating voltage	350 V CAN-Bus 30 V DC (logic/power)
Temperature range	-40 °C to +80 °C

 $^{^{(1)}\,}$ in screwed state, as per DIN EN 60529/DIN 40050 $\,$

Overview — Connection Technologies

Connection technologies for connection with SeGMo-Box GEL 6505 or modular SeGMo-Box GEL 65M (illustration: housing undersides)

HS: M17 panel-mounting socket (pin contacts)	HW: M17 panel-mounting socket (pin contacts), 90° angled
Communication interfaces: CO (CANopen)	Communication interfaces: CO (CANopen)
xx Hybrid cable with flying lead, cable length selectable (1 m to 20 m)	
Communication interfaces: CO (CANopen)	

Connection technologies for direct connection to a higher level control system (illustration: housing undersides)



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Use only screened cables; connect screens on the system side!

Connection technology HS



1 M17 panel-mounting socket: Power supply and communication

Assignment power supply and communication

M17 panel-mounting socket (pin contacts) (plug-in view)	Pin designation	Signal identifier
	А	+24 V logic
В	В	+24 V power
A	С	GND power
5	1	GND logic
	2	CAN-GND
	3	CAN-Low
	4	CAN-High
e e e e e e e e e e e e e e e e e e e	5	unallocated
	Ē	Screen

Pin () is electrically and conductively connected to the connector housing.

Connection accessories hybrid cable BZK/Connection accessories for SeGMo-Boxes



Connection technology HW



1 M17 panel-mounting socket, angled: Power supply and communication

Assignment power supply and communication

M17 panel-mounting socket (pin contacts), 90° angled (plug-in view)	Pin designation	Signal identifier
В	А	+24 V logic
	В	+24 V power
A	С	GND power
5	1	GND logic
	2	CAN-GND
	3	CAN-Low
3	4	CAN-High
	5	unallocated
•	Ē	Screen

 $Pin \oplus is electrically and conductively connected to the connector housing.$

Connection accessories hybrid cable BZK/Connection accessories for SeGMo-Boxes



Connection Technology xx



1 Cable outlet: Power supply and communication

Assignment power supply and communication

Core color/ Core number	Cross section Design 1	Signal identifier
red/1	0.5 mm ² [20 AWG]	+24 V logic
red/2	1.5 mm ² [16 AWG]	+24 V power
black/2	1.5 mm ² [16 AWG]	GND power
black/1	0.5 mm ² [20 AWG]	GND logic
black	0.14 mm ² [26 AWG]	CAN-GND
green	0.25 mm ² [24 AWG]	CAN-Low
yellow	0.25 mm ² [24 AWG]	CAN-High

Connection accessories for SeGMo-Boxes

Designation	Item number:
Hybrid cable assembly for	
SeGMo-Box GEL 6505 in design N/U	89070
Modular SeGMo-Box GEL 65M, design N	ZB65MX01

Connection technology ST



- 1 Power supply connector: Power supply
- 2a M12: Communication interface OUT
- 2b M12: Communication interface IN

Assignment Power supply connector

M17 panel-mounting socket (pin contacts) (plug-in view)	Pin designation	Signal identifier
	А	+24 V logic
В	В	+24 V power
A	С	GND power
5	1	GND logic
	2	unallocated
	3	unallocated
	4	unallocated
÷	5	unallocated
	Ē	Screen

Pin ④ is electrically and conductively connected to the connector housing.

Assignment – Communication interface

Industrial Ethernet EtherCAT; EtherNet/IP; Modbus/TCP; POWERLINK; PROFINET IO / RT; Sercos III		
2 × M12 D-coded (plug-in view)	Pin designation	Signal identifier IN/OUT
	1	Transmission Data+
$\begin{pmatrix} 2^2 & \bullet 3 \\ 1 & \bullet 4 \end{pmatrix}$	2	Receive Data+
	3	Transmission Data-
Switch sockets	4	Receive Data-

Connection accessories

Designation	Item number:
Communication interface	
Industrial Ethernet mating connector input/output, M12, D coded (male)	FS3039
Ethernet network cable, M12 D coded (male) on RJ45, 3 m cable	BK6921
Power supply	
Power supply cable M17 (female) and flying lead (SeGMo-Connect)	BZK17S1AxxL ^(a)
^(a) for xx cable length specify in meters (minimum 3 m/maximum 20 m)	•

Connection technology SW



- 1 Power supply connector, angled Power supply
- 2a M12: Communication interface OUT
- 2b M12: Communication interface IN

Assignment power supply

M17 panel-mounting socket (pin contacts), 90° angled (plug-in view)	Pin designation	Signal identifier
В	А	+24 V logic
	В	+24 V power
A C	С	GND power
5	1	GND logic
	2	unallocated
	3	unallocated
3	4	unallocated
	5	unallocated
٩	Ð	Screen

 $\mathsf{Pin} \bigoplus$ is electrically and conductively connected to the connector housing.

Assignment – Communication interface

Industrial Ethernet EtherCAT; EtherNet/IP; Modbus/TCP; POWERLINK; PROFINET IO / RT; Sercos III				
2 × M12 D-coded (plug-in view)	Pin designation	Signal identifier IN/OUT		
	1	Transmission Data+		
$\begin{pmatrix} 2^2 & \bullet 3 \\ 1 & \bullet 4 \end{pmatrix}$	2	Receive Data+		
	3	Transmission Data-		
Switch sockets	4	Receive Data-		

Connection accessories

Designation	Item number:				
Communication interface					
Industrial Ethernet mating connector input/output, M12, D coded (male) FS3039					
Ethernet network cable, M12 D coded (male) on RJ45, 3 m cable BK6921					
Power supply					
Power supply cable M17 (female) and flying lead (SeGMo-Connect) BZK17S1AxxL ^(a)					
^(a) for xx cable length specify in meters (minimum 3 m/maximum 20 m)					

Mechanical accessories and spare parts

Mechanical accessories

Mechanical accessories (not included in the scope of supply)

Designation	Item number:
Clamping ring for output shaft A/B/C/D	MZ1380
Clamping ring for output shaft 8/9/E	MZ1379
Accessory set for GEL 6129 , comprising: 1 pc. torque support including plain bearing, item number: BG5099 2 pc. screw M5×8, item number VS2107 1 pc. headless screw M5×20, item number VS3412 1 pc. assembly note , item number: D-53H-6129_01	ZB6129
Accessories kit plain bearing (content: 5 pc. plain bearings, item number OG0001)	ZB61X01
Accessories kit headless screws (content: 5 pc. headless screw M5 × 20, item number VS3412)	ZB61X02
Accessories kit screws torque support (content: 10 pc. screw M5×8, item number VS2107)	ZB61X03

Spare parts

Warning stickers

Designation
Warning sign "Warning automatic start-up", lateral length 25 mm, ASR A1.3 / ISO 7010, Warning sign W018
Warning sign "Warning for hot surface", lateral length 25 mm, ASR A1.3 / ISO 7010, Warning sign W017

All dimensions in millimeters

Dimensional drawing - GEL 6129 (connection technology HS) including accessories



Dimensional drawing - GEL 6129 (connection technology HW) including accessories





Dimensional drawing – GEL 6129 (connection technology xx) including accessories

Dimensional drawing - GEL 6129 (connection technology ST) including accessories





Dimensional drawing - GEL 6129 (connection technology SW) including accessories

Dimensional drawing – GEL 6129: Shaft dimensions (example: Connection technology SW without accessories)



All dimensions in millimeters

Accessory set ZB6129 (torque support including plain bearing)



Clamping ring MZ1379



Dimensions/item number clamping ring	MZ1379
Diameter output shaft d _w H7 d[mm] (type code)	8/9/10 (8/9/E)
D [mm]	32
b [mm]	11
Screw DIN 912	M4

Clamping ring MZ1380



Dimensions/item number clamping ring	MZ1380
Diameter output shaft 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



Type code GEL 6129

		Communication interface						
	СО	CANopen CiA 402						
	EC	EtherCAT						
	IP	EtherNet/IP						
	MB	Modbus/TCP						
	PL	PO	NΕ	RLI	NK			
	RT	PRC	DFI	NE	ΓIC) / R1	Γ	
	SC	Ser	cos	Ш				
			No	mi	nal	torq	ue	
		02	2.5	5 Nr	m/7	'0 mir	⁻¹ a	t ED 25 %
		05	51	۷m/	70	min ⁻¹	at	ED 25 %
				Οι	Itp	ut sh	aft	d _w in millimeter]
			Α	14	H7	' Sem	ni-ho	llow shaft
			в	13	H7	' Sem	ni-ho	llow shaft ⁽¹⁾
			С	12	H7	' Sem	ni-ho	llow shaft
			D	11	H7	Sem	i-hc	llow shaft ⁽¹⁾
			Е	10	H7	' Sem	ni-ho	llow shaft
			9	9 H	17 :	Semi	-hol	ow shaft ⁽¹⁾
			8 8 H7 Semi-hollow shaft					
			Housing material					
			K Plastic, ABS					
						Con	stru	ction type
					ĸ	Shor	t	
							Со	nnection Technology
						HS	M1	7 panel-mounting socket (pin contacts)
						HW	M1	7 panel-mounting socket (pin contacts), 90° angled
						ST	Co	nnector (standard): M12 fieldbus, M17 supply)
		SW Connector (standard): M12 fieldbus, M17 supply angled)						
		xx xx m hybrid cable with flying lead,						
		length in meters (xx = 01 to 20; standard: 3 m) ⁽¹⁾						
		Sensor						
							Μ	Magnetic-absolute multiturn encoder (342 revolutions)
								Design
								1 Individual protection
								Degree of protection
								1 IP 65 (with shaft sealing ring)
6129			_	_	_		_	

Restrictions

Connection Technology

The **ST/SW** connection technologies are only available with Industrial Ethernet interfaces (**EC/IP/MB/PL/RT/SC**). The connection technologies **HS/HW/xx** are only available with communication interface **CO** (CANopen).

Customized modifications

Customized special housings and customized shafts are available upon request as per approval drawing.



Customized special designs are assigned a Y-number. A positioning drive marked with Y (example: 6129Yxxx) is a customized design with a special assembly and/or modified technical specifications. Depending on the customized modification, more or other documents may apply.

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