

PowerDRIVE-Positioning

GEL 6109

Compact positioning drive
for installation situations with limited space



Technical information

Version 2014-09



General

The PowerDRIVE-Positioning GEL 6109 forms a compact mechatronic unit comprising a brushless DC motor, a 32-bit microprocessor, a compact power amplifier as well as a spur gear.

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

This positioning drive is equipped with a robust, magnetic-absolute multiturn encoder.

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

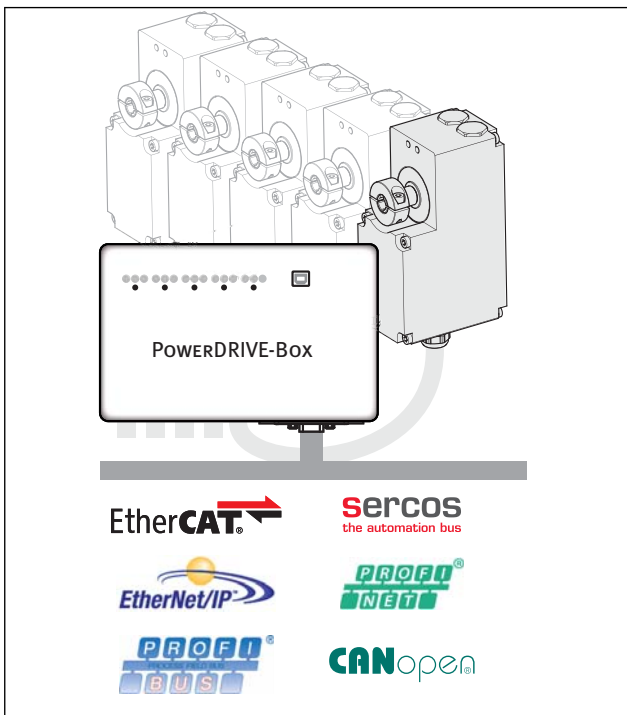
- ▶ Nominal torque
 - Design K 2.5 Nm at 70 min⁻¹ (duty cycle 25 %)
 - Design L 5 Nm at 70 min⁻¹ (duty cycle 25 %)
- ▶ Aluminium housing, anodised
- ▶ Operating temperature 0 °C to +60 °C
- ▶ BLDC motor
- ▶ Magnetic multiturn encoder
 - Accuracy: ±1.8°
 - Detection range: 342 turns
- ▶ Hybrid cable outlet, PUR sheath
- ▶ CANopen CiA 402, further interfaces via PowerDRIVE-Box
- ▶ Degree of protection: IP 67 / rotary shaft seal (Viton)
- ▶ Gear service life: 3000 h

Advantages

- ▶ For installations with limited space due to extremely compact design
- ▶ Onboard joystick for straightforward commissioning
- ▶ 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



On usage with the PowerDRIVE-Box all common interfaces are available

Description

System concept

The positioning drives in the PowerDRIVE-Positioning series are intelligent adjustment units for pushing onto the end of a shaft or for attachment to a shaft or spindle.

The PowerDRIVE-Positioning is equipped with PowerDRIVE-Connect and is designed for connection to the PowerDRIVE-Box. The system communicates internally via CANopen.

Due to the usage of PowerDRIVE-Connect and PowerDRIVE-Box, the cabling effort for the positioning drive is significantly reduced.

Furthermore the overall system offers more flexible bus communication. The PowerDRIVE-Box supports all common fieldbus profiles (see [Technical data](#)). Pre-defined function blocks and software modules are available for integration into different machine control systems.

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.

Construction

The rigid housing made of anodised aluminium is particularly robust. Equipped with a rotary shaft seal made of Viton, the positioning drive achieves degree of protection IP 67.

A USB service connector is accessible on the top of the device. Correct function can be tested in the set-up mode using a joystick without the need for prior PLC programming.

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

The PowerDRIVE-Positioning is operated with a supply voltage of 24 V DC and supports the system-internal fieldbus profile via CANopen CiA 402.

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 output shaft can be moved by ± 171 turns without loss of the absolute position.

The absolute rotary encoder withstands high shock/ vibration loads.

Designs

A brushless DC motor in design K or L can be combined with the compact spur gear. As a result there are different housing lengths and drive torques.

Overview of design and nominal torque

Design	Length of housing	Nominal torque	
K	short	02	2.5 Nm at 70 min ⁻¹
L	long	05	5 Nm at 70 min ⁻¹

K / L Design option as per type code
02 / 05 Nominal torque option as per type code

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 % at 50 % 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 PowerDRIVE 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 drive and logic supply
- ▶ Lag error detection (output shaft 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 PowerDRIVE-Box by means of the maximum current.

Technical data

Electrical data	
Nominal voltage control system	24 V DC -5 % / +20 %
Nominal voltage motor	24 V DC -5 % / +20 % (Attention: max. motor speed is voltage dependent!)
Nominal current control system	Max. 400 mA, internal fuse, self-resetting
Nominal current motor	3 A, maximum current 5 A, external fuse required
Duty cycle mark (ED)/space (PD) ratio (load-dependent)	Duty cycle = 25 % at 100 % load torque, positioning mode S2 (base time 4 minutes: ED = 1 minute, PD = 3 minutes) Duty cycle = 50 % at 50 % load torque, dependent on ambient parameters and application
System interface	CANopen (CiA 402)
Interfaces via PowerDRIVE-Box GEL 6505	EtherCAT, PROFIBUS-DP, PROFINET I/O, EtherNet/IP, sercosIII, CANopen
Resolution	1000 increments per 360°
Positioning accuracy	±1.8°
Detection range of the measuring system	342 turns, also in de-energised state
Positioning range	Unlimited ⁽¹⁾
Dielectric strength (DIN EN 60439-1)	500 V DC/AC
EMC ⁽²⁾	Electromagnetic immunity EN 61000-6-1 and -2 electromagnetic emissions EN 61000-6-4
Mechanical data	
Output shafts	Semi hollow shaft (Ø D _i 8 to 14 mm), customised shaft upon request
Nominal torque drive shaft ⁽³⁾ 02 05	2.5 Nm at 70 min ⁻¹ 5 Nm at 70 min ⁻¹
Service life with nominal load (for nominal torque) 02, 05	3000 h
Max. shaft load (axial/radial)	30 N / 50 N
Housing material	Aluminium AlMgSi
Weight (dependent on the design K / L) 02 05	1.0 kg 1.25 kg
Degree of protection (EN 60529)	IP 67 rotary shaft seal (Viton)
Shock resistance (DIN EN 60068-2-27)	150 m/s ² (approx. 15 g)
Vibration resistance (DIN EN 60068-2-6)	50 m/s ² (approx. 5 g), 10 to 50 Hz
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⁾ If the supply voltage is present, an electronic counter measures the positioning range over the detection range of the measuring system.

⁽²⁾ Use only screened cables.

⁽³⁾ Designation as per type code

Connection

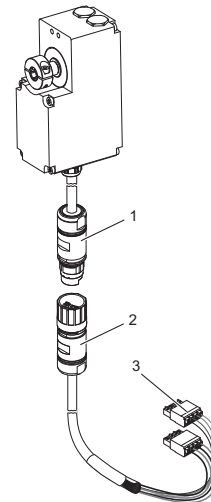
PowerDRIVE-Connect

The hybrid cable PowerDRIVE-Connect is designed for flexible application in drag chains and reaches a permissible dynamic bending radius of ten times the cable diameter in a temperature range of -40 °C to +80 °C. The diameter of the cable is 9.5 mm. The hybrid cable is screened under the PUR outer sheath. The internal communication cores are fully insulated and multiply screened.

The positioning drive is available with hybrid cable and connector. PowerDRIVE and PowerDRIVE-Box can be quickly and easily connected with pre-assembled field attachable hybrid connection cables.

The M23 quick-acting coupling of the plug connection permits a rapid connection and disconnection of the devices. In this manner, the positioning drive can be safely isolated from the power supply within seconds for maintenance and service work.

Configurable connection cables are available for the connection, see "Technical information 61BZK".



The perfect connection solution: PowerDRIVE-Positioning and configurable connection cable "61BZK"

- 1 Positioning drive with hybrid cable and M23 connector
- 2 M23 connector with female contacts
- 3 Connection terminals for PowerDRIVE-BOX

Pin layout

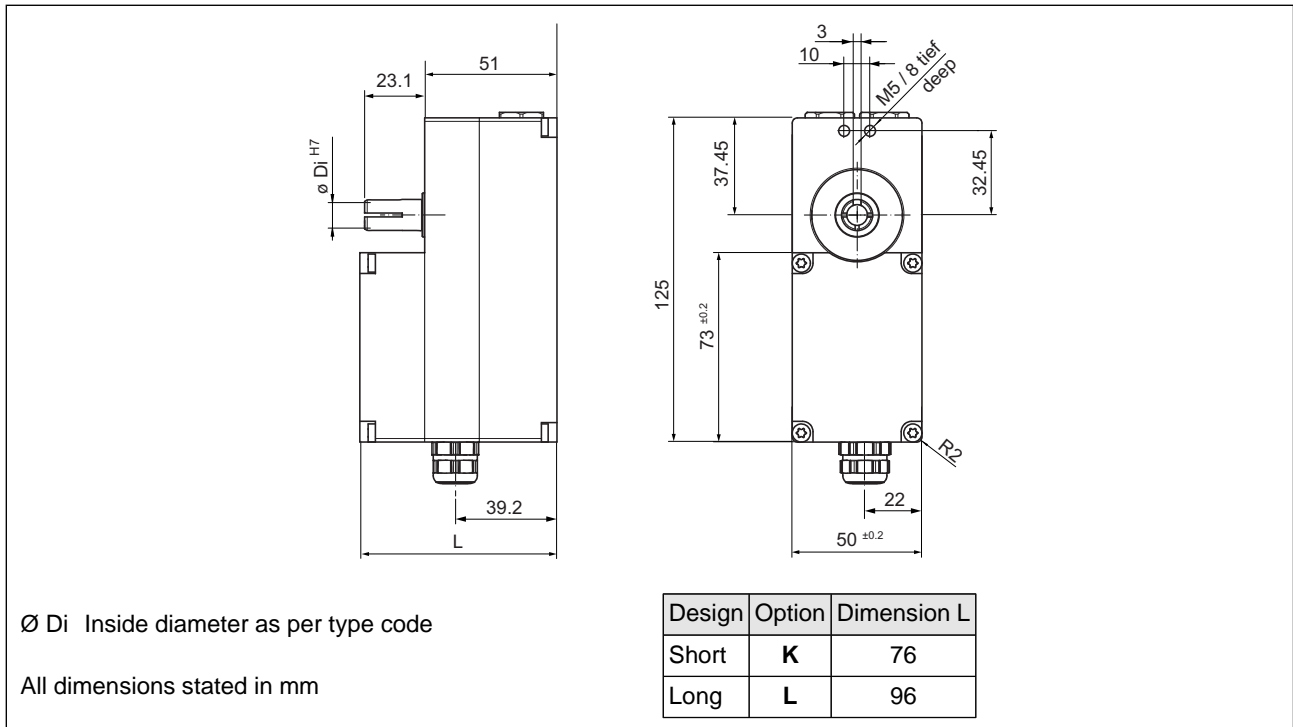
With M23 connector/option H1 - Hx		Flying lead/option xx		Assignment
Male coupling	Pin	Core colour	Cross-section [mm ²]	
	A	red	0.5	+24 V control system
	B	black	0.5	GND control system
	C	black	1.5	GND motor
	D	red	1.5	+24 V motor
	E	–	–	Cable screen
	7	yellow	0.25	CAN_H
	8	black	0.14	CAN GND
	9	green	0.25	CAN_L
	S	–	–	CAN screen

Technical data

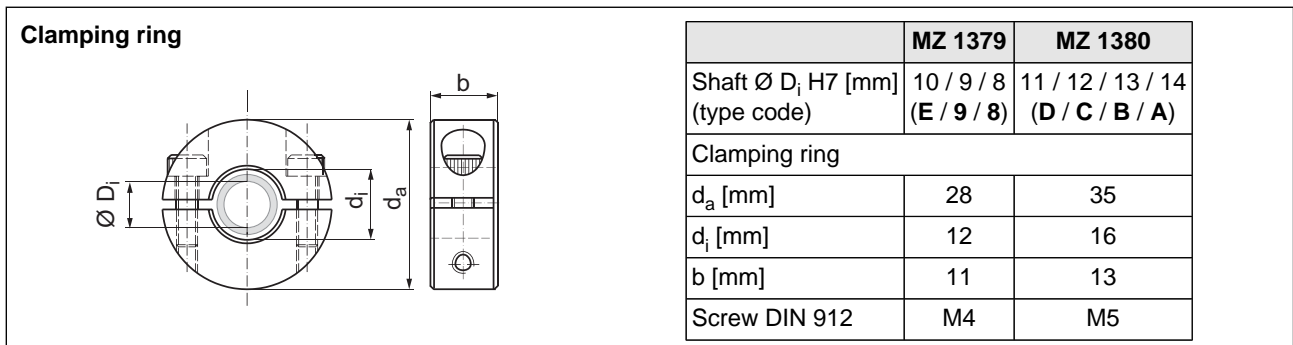
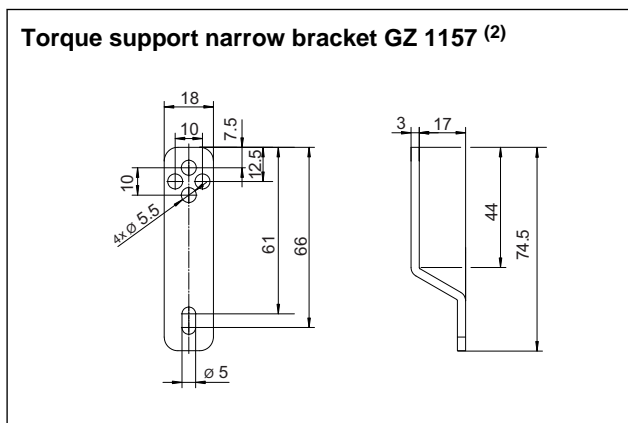
Technical data – hybrid cable	
Jacket material	PUR, black
Cable properties	screened, drag chain-suitable
Cable diameter (d)	9.5 mm
Bending radius	permanently flexible, 10 x d
Peak operating voltage	max. 350 V CAN bus max. 30 V DC (control system / motor)
Temperature range	-40 °C to +80 °C
Certification	UL / CSA compliant (applies to version UL/CSA-hybrid cable)

Dimensional drawings

Dimensional drawing – PowerDRIVE-Positioning GEL 6109



Mounting accessories (1)



(1) Further mounting material (centring pins, flange plates etc.) upon request.

(2) Mounting on site using precision screw (art. no. VS 3304) or clamping bushing set (upon request)

Type code GEL 6109

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Interfaces	
CO	CANopen CiA 402 (system internal communication, further interfaces via PowerDRIVE-Box)
Nominal torque	
02	2.5 Nm / 70 min ⁻¹ at duty cycle 25 %
05	5 Nm / 70 min ⁻¹ at duty cycle 25 %
Shaft type [D_i 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
Housing material	
A	Aluminium AlMgSi, anodised
Design	
K	Short (is defined by the nominal torque)
L	Long (is defined by the nominal torque)
Hybrid cable/connector	
xx	Hybrid cable with flying lead, length of the cable in m, 03 minimum length 3 m, 20 maximum length 20 m
H1	Hybrid cable (length 30 cm) with M23 connector, male coupling ⁽¹⁾
H2	Hybrid cable (length 50 cm) with M23 connector, male coupling ⁽¹⁾
H3	Hybrid cable (length 100 cm) with M23 connector, male coupling ⁽¹⁾
Hx	Hybrid cable (length xx cm) with M23 connector, male coupling ⁽¹⁾
sensor	
M	Magnetic multiturn encoder (±1.8° / 342 turns)
Version	
0	With standard components
1	With UL/CSA hybrid cable
Protection	
3	IP 67 (with rotary shaft seal made of Viton and protection against humidity)
6109	__ __ __ __ __ __ __ __ __ __

Interfaces

The following interfaces are supported by the PowerDRIVE-Box:

EtherCAT, PROFIBUS-DP, PROFINET I/O, EtherNet/IP, sercosIII, CANopen

⁽¹⁾ Configurable connection cables are available for the connection, see "Technical information 61BZK".

Your notes:



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