



# WACHENDORFF

The Encoder Experts



## Datasheet

### Draw-wire system **SZG60**

[www.wachendorff-automation.com/szg60](http://www.wachendorff-automation.com/szg60)

#### **Wachendorff Automation**

##### **... systems and encoders**

- Complete systems
- Industrial rugged encoders to suit your application
- Standard range and customer versions
- Maximum permissible loads
- 48-hour express production
- Made in Germany
- Worldwide distributor network

## Rugged draw-wire system SZG60



- Ball bearing drill protection
- Measuring rope (stainless steel)
- Bushing
- Quick and easy mounting

[www.wachendorff-automation.com/szg60](http://www.wachendorff-automation.com/szg60)

Customs tariff number: 90318020  
Country of origin: Germany

### Mechanical Data

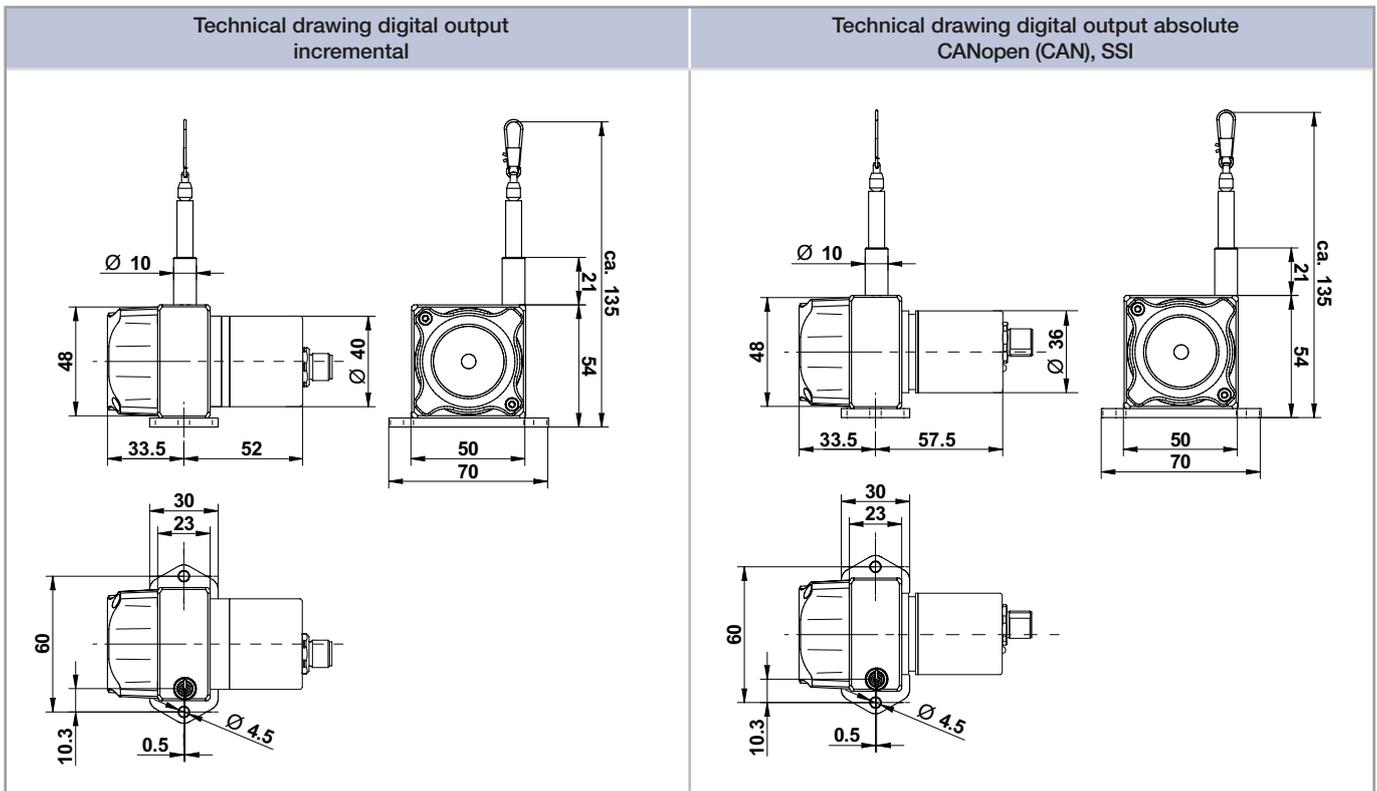
Measurement range [mm]	Extraction force		Speed $V_{max}$ [m/s]	Acceleration $a_{max}$ [m/s <sup>2</sup> ]
	$F_{min}$ [N]	$F_{max}$ [N]		
1250	4.6	5.6	10	300

### Technical data digital output incremental

Measurement range	[mm]	1250
Linearity	[%]	±0.05 (independent of the measurement range)
Disc circumference	[mm]	125
Selectable resolution	[Pulses/mm]	4; 10; 20 (the resolution can be raised by the factor 4 using quadruple edge detection)
Sensor element		Incremental-Encoder with optical code disk
Output signal		A, B pulse (plus inverted pulses /A, /B)
Connection		connector output M12
Humidity		maximum 90 % relative, no condensation
Temperature range	[°C]	-20 °C up to +80 °C
Mechanical data		extraction force, maximum velocity and maximum acceleration see <a href="#">„mechanical data“</a>
Weight	[g]	approx. 400
Housing		aluminium, anodised, spring case PA6
Ordern No:		4 Pulse/mm: SZG60012500500ABR24SB8 10 Pulse/mm: SZG60012501250ABR24SB8 20 Pulse/mm: SZG60012502500ABR24SB8

### Technical data digital output absolute, CANopen (CAN), SSI

		CANopen (CAN)	SSI
Measurement range	[mm]	1250	
Linearity	[%]	±0.05 (independent of the measurement range)	
Disc circumference	[mm]	125	
Standard resolution	[Steps/mm]	32.77 (corresponds to 0.03 mm [12 bit])	
Sensor element		Multiturn-Absolute-Encoder, magnetic	
Connection		connector output M12	
Humidity		max. 90 % relative, no condensation	
Temperature	[°C]	-20 °C up to +85 °C	
Mechanical data		extraction force, maximum velocity and maximum acceleration see <a href="#">„mechanical data“</a>	
Weight	[g]	300 to 500, depending on the measurement range	
Housing		aluminium, anodised, spring case PA6	
Ordern No:		SZG6001251218COAB00CB5	SZG6001251212SIAG01CB8



## WARNING NOTICES

- Don't let the rope snap back. If the rope is retracted freely, this may lead to injuries (whiplash effect) and the device may be damaged. Caution when unhooking and retracting the rope into the sensor.
- Never exceed the specified measurement range when extracting the rope!
- Do not touch the rope when operating the sensor.
- Avoid guiding the rope over edges or corners. Use a deflection pulley instead.
- Do not operate the sensor if the rope is buckled or damaged. A ripping of the rope may lead to injuries or a damaging of the sensor.
- Do not oil or grease the entire wire pull system.
- Do not pull the measuring wire at an angle.
- Attach the measuring cable retracted to the object to be measured.
- Do not try to open the device. The stored energy of the spring drive may lead to injuries when being mishandled.
- A tensioned measuring cable can lead to injuries in the area where operating personnel are present.
- Do not damage the measuring wire.
- Draw-wire displacement sensors are used for displacement and displacement measurement or position detection of components or moving machine components.
- The sensor may only be operated within the values specified in the technical data.
- The sensor must be used in such a way that no persons are endangered or machines and other material goods are damaged in the event of malfunction or total failure of the sensor.

<p><b>Montage nur qualifiziertes Personal.</b> Personal, Assembly only qualified personnel, Montage par qualifié personnel, Montaggio solo personale qualificato, Montaje solamente personal cualificado.</p> <p><b>Sicherheitsmassnahmen/Safety instructions:</b> Einsatz nur in Industrieumgebung und NICHT im sicherheitsrelevanten Bereich. Only for use in industrial environments and NOT for safety-relevant areas. Utilisation uniquement dans un environnement industriel et PAS dans un domaine lié à la sécurité. Utilicelo sólo en entornos industriales y NO en áreas relevantes para la seguridad. Utilizzare solo in ambienti industriali e NON in aree riguardanti la sicurezza.</p>	
<p><b>Power supply:</b> Class 2 only</p>	

## Technical data incremental encoder

### Resolution

Max. pulses per revolution PPR	500, 1250, 2500 ppr
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### Mechanical Data

#### Housing

Flange	Pilot flange
Flange material	aluminum
Housing cap	aluminum, powder coated
Housing	Ø 40 mm
Cam mounting	pitch 51 mm

#### Shaft(s)

Shaft material	stainless steel
Starting torque	approx. 0.2 Ncm at ambient temperature

Shaft	Ø 6 mm
Shaft length	L: 12 mm
Max. Permissible shaft loading radial	80 N
Max. Permissible shaft loading axial	50 N

#### Bearings

Bearings type	2 precision ball bearings
Nominale service life	1 x 10 <sup>9</sup> revs. at 100 % rated shaft load 1 x 10 <sup>10</sup> revs. at 40 % rated shaft load 1 x 10 <sup>11</sup> revs. at 20 % rated shaft load
Max. operating speed	12000 rpm

### Machinery Directive: basic data safety integrity level

MTTF <sub>d</sub>	200 a
Mission time (TM)	25 a
Nominale service life (L10h)	1 x 10 <sup>11</sup> revs. at 20 % rated shaft load and 12000 rpm
Diagnostic coverage (DC)	0 %

### Electrical Data

Power supply VDC	10 - 30 VDC
Current consumption	typ. 70 mA
Signal shape	square-wave
Output circuit	HTL inverted
Channels	AB and inverted signals
Output	push-pull
Load	max. 40 mA / channel
Signal level mA	at 20 mA
Signal level H>	H > Vcc - 2.5 VDC
Signal level L<	L < 2.5 VDC
Output frequency	max. 200 kHz
Circuit protection	yes
Light reserve warning	no

### General Data

Connections	connector outlet M12
Protection rating (EN 60529)	Housing: IP65, shaft sealed: IP65

## Sensor-connector (M12x1) SB, 8-pin

### Description

**SB8** axial, 8-pin, Connector connected to encoder housing

Assignments	
	SB8 8-pin
	
Circuit	R24
GND	1
(+) Vcc	2
A	3
B	4
Light reserve warning	-
A inv.	6
B inv.	7
n. c.	5, 8
Shield	-

## Technical data absolute encoder CANopen

### Mechanical Data

#### Housing

Flange	synchro flange
Flange material	aluminum
Housing cap	steel case chrome-plated, magnetic shielding
Housing	Ø 36 mm

#### Shaft(s)

Shaft material	stainless steel
Starting torque	approx. 0.3 Ncm at ambient temperature

Shaft Ø 6 mm

Shaft length L: 11.5 mm

Max. Permissible shaft loading radial 80 N

Max. Permissible shaft loading axial 50 N

#### Bearings

Bearings type	2 precision ball bearings
Nominal service life	1.4 x 10 <sup>8</sup> revs. at 100 % rated shaft load 2 x 10 <sup>9</sup> revs. at 40 % rated shaft load 1.7 x 10 <sup>10</sup> revs. at 20 % rated shaft load
Max. operating speed	12000 rpm

### Machinery Directive: basic data safety integrity level

MTTF <sub>d</sub>	1000 a
Mission time (TM)	20 a
Nominal service life (L10h)	1.7 x 10 <sup>10</sup> revs. at 20 % rated shaft load and 12000 rpm
Diagnostic coverage (DC)	0 %

### Electrical Data

Power supply/Current consumption	10 VDC up to 32 VDC: typ. 50 mA
Power consumption	max. 0.5 W

### Sensor data

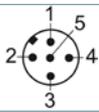
Single-turn technology	innovative hall sensor technology
Single-turn resolution	4096 steps/360° (12 bit)
Single-turn accuracy	< ±0.35°
Single-turn repeat accuracy	< ±0.20°
Internal cycle time	≤ 600 μs

### Connector, M12x1 CB5, 5-pin

#### Description

**CB5** axial, 5-pin, shield connected to encoder housing

#### Assignments

	CB5
	
(+) Vcc	2
GND	3
CANHigh	4
CANLow	5
CANGND shield	1

Multi-turn technology patented EnDra® technology no battery and no gear.

Multi-turn resolution 18 bit

### Environmental data

ESD (DIN EN 61000-4-2):	8 kV
Burst (DIN EN 61000-4-4):	2 kV
includes EMC:	DIN EN 61000-6-2 DIN EN 61000-6-3
Vibration: (DIN EN 60068-2-6)	300 m/s <sup>2</sup> (10 Hz up to 2000 Hz)
Shock: (DIN EN 60068-2-27)	1000 m/s <sup>2</sup> (6 ms)
Design:	according DIN VDE 0160
Turn on time:	<1,5 s

### Interface

<b>Interface:</b>	<b>CAN</b>
Protocol:	CANopen - Communication profil CiA 301 - Device Profile for encoder CiA 406 V3.2 class C2
Node number:	1 up to 127 (default 127)
Baud rate:	10 kBaud up to 1 MBaud with automatic bit rate detection.
Advice:	The standard settings as well as any customization in the software can be changed via LSS (CiA 305) and the SDO protocol, e. g. PDOs, Scaling, Heartbeat, Node-ID, Baud rate, etc.
Programmable CAN transmission modes:	<b>Synchronous mode:</b> when a synchronisation telegram (SYNC) is received from another bus node, PDOs are transmitted independently. <b>Asynchronous mode:</b> a PDO message is triggered by an internal event. (e.g. change of measured valued, internal timer, etc.)

### General Data

Connections	connector outlet M12
Protection rating (EN 60529)	Housing: IP65, shaft sealed: IP65

## Technical data absolute encoder SSI

### Mechanical Data

#### Housing

Flange	synchro flange
Flange material	aluminum
Housing cap	steel case chrome-plated, magnetic shielding
Housing	Ø 36 mm

#### Shaft(s)

Shaft material	stainless steel
Starting torque	approx. 0.3 Ncm at ambient temperature

Shaft Ø 6 mm

Shaft length L: 11.5 mm

Max. Permissible shaft loading radial 80 N

Max. Permissible shaft loading axial 50 N

#### Bearings

Bearings type	2 precision ball bearings
Nominal service life	1.4 x 10 <sup>8</sup> revs. at 100 % rated shaft load 2 x 10 <sup>9</sup> revs. at 40 % rated shaft load 1.7 x 10 <sup>10</sup> revs. at 20 % rated shaft load
Max. operating speed	12000 rpm

### Machinery Directive: basic data safety integrity level

MTTF <sub>d</sub>	1000 a
Mission time (TM)	20 a
Nominal service life (L10h)	1.7 x 10 <sup>10</sup> revs. at 20 % rated shaft load and 12000 rpm
Diagnostic coverage (DC)	0 %

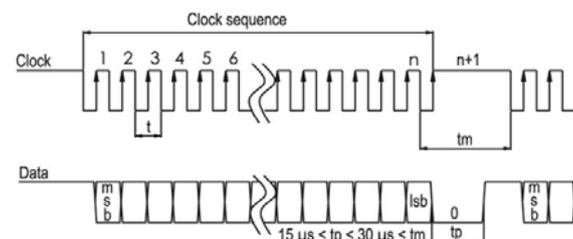
### Electrical Data

Power supply/Current consumption	10 VDC up to 32 VDC: typ. 50 mA
Power consumption	max. 0.5 W

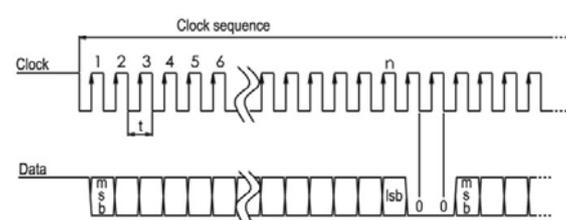
### Sensor data

Single-turn technology	innovative hall sensor technology
Single-turn resolution	4096 steps/360° (12 bit)
Single-turn accuracy	< ±0.35°
Single-turn repeat accuracy	< ±0.20°

### Transmission protocol SSI Single transmission:



### Transmission protocol SSI Multipath transmission:



Internal cycle time	≤ 600 μs
Multi-turn technology	patented EnDra® technology no battery, no gear.
Multi-turn resolution	12 bit.

### Environmental data

ESD (DIN EN 61000-4-2):	8 kV
Burst (DIN EN 61000-4-4):	2 kV
includes EMC:	DIN EN 61000-6-2 DIN EN 61000-6-3
Vibration: (DIN EN 60068-2-6)	50 m/s <sup>2</sup> (10 Hz up to 2000 Hz)
Shock: (DIN EN 60068-2-27)	1000 m/s <sup>2</sup> (6 ms)
Design:	according DIN VDE 0160
Turn on time:	<1,5 s

### Interface

<b>Interface:</b>	<b>SSI</b>
Clock input:	via opto-coupler
Clock frequency:	100 kHz up to 500 kHz
Data output:	RS485/RS422 compatible
Output code:	gray
SSI output:	Angular-/position value
Turn on time:	<1,5 s
<b>Configuration inputs</b>	DIR = GND -> cw DIR = +UB -> ccw
Positive direction of counting: (View on shaft)	
Set to zero:	Set: Preset = +UB for 2 s Deactivate: Preset = GND
At Start / while booting:	- red gleam (< 2.3 s)
Malfunction:	- constant red gleam (> 2.3 s)
Normal function:	- constant green gleam
No supply:	- no gleam

### General Data

Connections	connector outlet M12
Protection rating (EN 60529)	Housing: IP65, shaft sealed: IP65

### Connector, M12x1, CB8, axial, 8-pin

#### Description

**CB8** axial, 8-pin, shield connected to encoder housing

Assignments	CB8
<b>GND</b>	1
<b>(+) Vcc</b>	2
<b>SSI CLK+</b>	3
<b>SSI CLK-</b>	4
<b>SSI DATA+</b>	5
<b>SSI DATA-</b>	6
<b>PRESET</b>	7
<b>DIR</b>	8
<b>Shield</b>	housing

**WACHENDORFF**  
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**Authorized Distributor**

For further information please contact our local distributor.  
Here you find a list of our distributors worldwide.

<https://www.wachendorff-automation.com/contact-sales-en/>

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