Testing and Programming Unit
for sensors with sin/cos output 1 V_{pp}

GEL 211CS0

Technical information

Version 2021-06

General information



- Test of any sensors with sin/cos output 1 V_{pp}, for example MiniCODER
- Transfer of data via Ethernet or WLAN to mobile terminal devices (tablet, PC, etc.)
- Visualization of data in web browser, independent of operating system

- Use to check signals for compliance with adjustable tolerance presets
  - sin/cos signals (amplitude, offset, phase offset)
  - Reference signal (amplitude, offset, position and width)
  - Target wheel (damage, concentricity, toothing quality)
- Setting and saving different tolerance presets

- Use for setting parameters of the MiniCODER with optional extras **P**
  - Automatic adjustment of sin/cos signals
  - Configuring/reading the operating hours meter
  - Storing the 7 configurable rotational speed ranges of the operating hours meter in a record
    Filing multiple records possible in GEL 211CS0

Properties

- Compact and portable device
- Visualization on web-enabled terminal devices

Advantages

- Facilitates assembly:
  Signal analysis is extremely simple thanks to speedy evaluation of the measuring signals, interactive signal correction and graphic evaluation.
- Optimizes maintenance and service work:
  Diagnostics and setting the parameters of the MiniCODER with optional extras **P** is done in assembled state, for example without opening the spindle, which is particularly convenient and efficient.
- Increases reliability:
  Documentation of the spindle histogram and the measured values from the analyses is done automatically by generating a report that can be printed and saved.

Field of application

- Servicing and commissioning of machine tools
- Servicing and commissioning of HSC spindles
- Servicing and commissioning of motors

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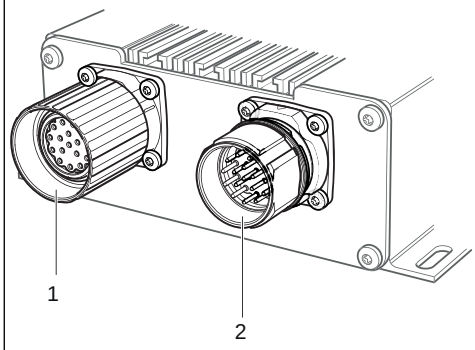
Description

Design

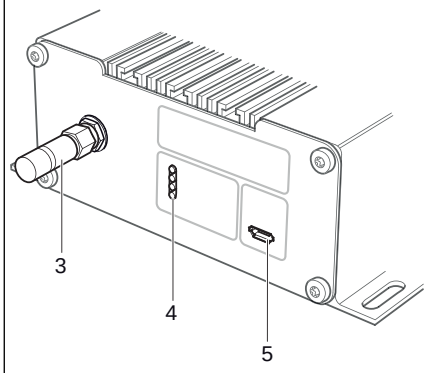
The testing and programming unit can be integrated into an existing measuring circuit/test station or operated separately.

Device overview

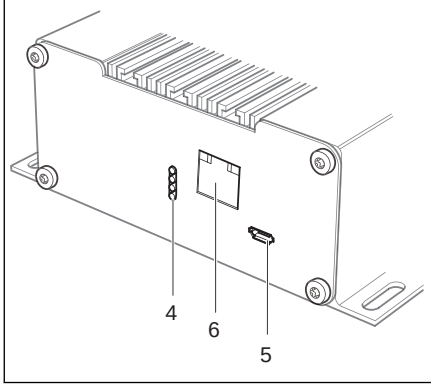
Front



Rear side GEL 211CS0␣W2M (WLAN)



Rear side GEL 211CS0␣E2M (Ethernet)



1 Sensor connection
2 Control connection
- Supply voltage device
- Supply voltage sensor
- Connection control system for inline measurement

3 WLAN aerial
4 Indicators (Power/Comm/Signal/Status)
5 Micro USB connection (type B):
- Integration in an existing radio network
- Firmware update
- Changes to settings (for example, WLAN password)
- Data transmission

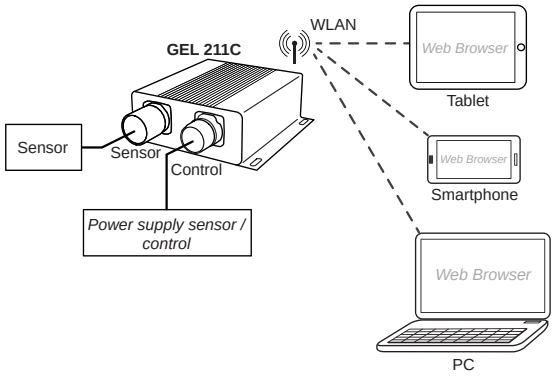
6 Ethernet connection (RJ45 female socket)
- Integration in an existing cable network

For the duration of the analysis and setting of parameters the sensor[(1)] is connected to the sensor connection.
Power supply to the device and the connected sensor is via the control connection.
Using the GEL 211CS0, sensor signals are checked for compliance with the tolerance presets. Various tolerance presets can be stored and invoked for this purpose.

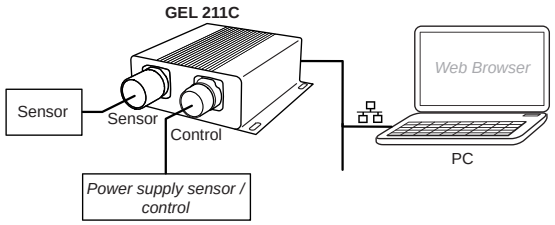
(1) only MiniCODER with optional extras **P**

Example of use

WLAN



Ethernet



Functional description

Function	Description
Signal analysis: SIN/COS	▪ Amplitude (peak-to-peak) of sin/cos signals ▪ Amplitude difference (synchronization error) ▪ Offset of sin/cos signals ▪ Phase deviation between sin and cos signals
Signal analysis: REF	▪ Amplitude of reference signal ▪ Idle level of reference signal ▪ Position and width
Target wheel analysis (1)	▪ Target wheel concentricity and roundness via sin/cos signal fluctuation ▪ Toothing quality and signal quality via the standard deviation of the BQ value ▪ Identification of target wheel damage via the difference between BQ_{min} and BQ_{max}. Damage to the tooth structure is indicated by significant jumps in the analysis curve.
Automatic sensor alignment	▪ Optimization of amplitude synchronism ▪ Step-by-step decrease/increase of the amplitudes of the sin/cos signals ▪ Minimizing the offset of sin/cos signals ▪ Wizard for optimization of installation times with automatic analysis reporting
Analysis reports	▪ Creating a report with the measured values from the SIN/COS and REF signal analysis and target wheel analysis
Spindle histogram	▪ Setting 7 rotational speed ranges ▪ Recalling and saving operating hours ▪ Recalling and saving number of run-ups ▪ Creating an operating hours report
Information about sensor	▪ Reading out spindle number (spindle assignment) ▪ Reading out type code and serial number for sensor identification ▪ Total operating time of sensor ▪ Temperature peaks in sensor: highest and lowest measured temperature
Information about GEL 211CS0	▪ Firmware version ▪ Serial number ▪ WLAN SSID

(1) The target wheel is analyzed using a mathematically determined evaluation quotient (BQ value).

Description

Functionality

The functionality of the testing and programming unit depends on the sensor.

Functionality for MiniCODER with reference signal

Function	MiniCODER			MiniCODER with optional extras P
	GEL 2444K␣R GEL 2444L␣R	GEL 2444K␣1 GEL 2444L␣1	GEL 2444D␣	GEL 2444K␣P GEL 2444L␣P GEL 2449K␣P
Signal analysis: SIN/COS	✓	✓	⛔	✓
Signal analysis: REF	✓	✓	⛔	✓
Target wheel analysis (1)	⛔	✓	⛔	✓
Automatic sensor alignment	⛔	⛔	⛔	✓
Analysis reports	✓	✓	⛔	✓
Spindle histogram	⛔	⛔	✓	✓
Information about sensor	⛔	⛔	✓	✓
Information about GEL 211CS0	✓ depends on the sensor			

Functionality for MiniCODER without reference signal(2)

Function	MiniCODER		MiniCODER with optional extras P
	GEL 2444K-R GEL 2444L-R	GEL 2444K-1 GEL 2444L-1	GEL 2444K-P GEL 2444L-P
Signal analysis: SIN/COS	✓	✓	✓
Signal analysis: REF	⛔	⛔	⛔
Target wheel analysis (1)	⛔	✓	✓
Automatic sensor alignment	⛔	⛔	✓
Analysis reports	✓	✓	✓
Spindle histogram	⛔	⛔	⛔
Information about sensor	⛔	⛔	✓
Information about GEL 211CS0	✓ depends on the sensor		

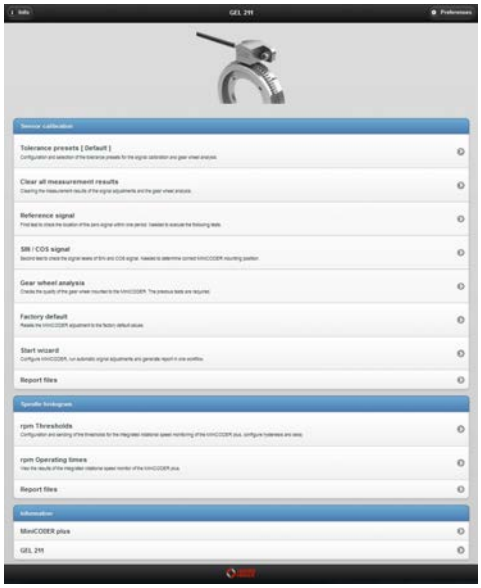
✓ Function usable
⛔ Function not usable

Explanation about sensor type (optional extras as per type code)
R with internal amplitude control
1 without internal control
P parameterizable
␣ Reference mark M, N, Z
- without reference mark

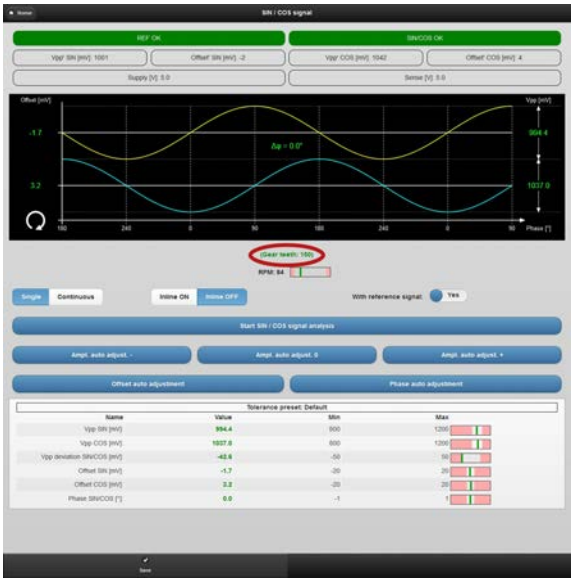
(1) The target wheel is analyzed using a mathematically determined evaluation quotient (BQ value).
(2) Wizard is not available

User interface

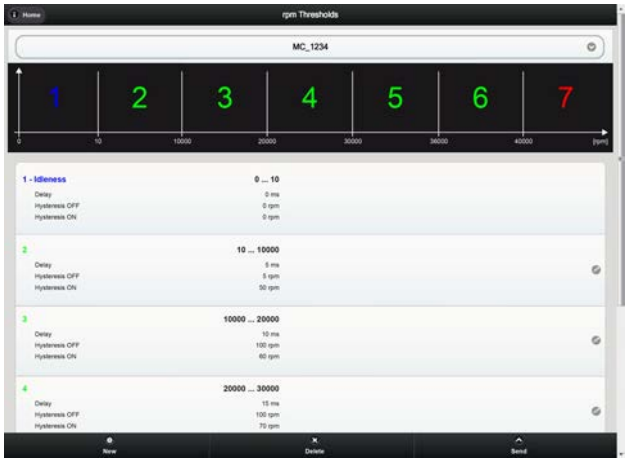
The testing and programming unit communicates via Ethernet or WLAN using a web-enabled client (PC, tablet, etc.) and is controlled via the web interface. It requires a current browser or a current operating system for mobile terminal devices.
The interface can be accessed via the device IP address.
The web interface was developed with mobile terminal devices in mind, so that it can be used even on smaller displays. For optimal operation, a display with a screen diagonal of 7 inches or higher is recommended.



Web interface start screen



Display of the sin/cos signals for signal analysis
Indication of the tooth-to-tooth values and display of mean values over one revolution



*Definition of rotational speed ranges for the MiniCODER with optional extras **P***



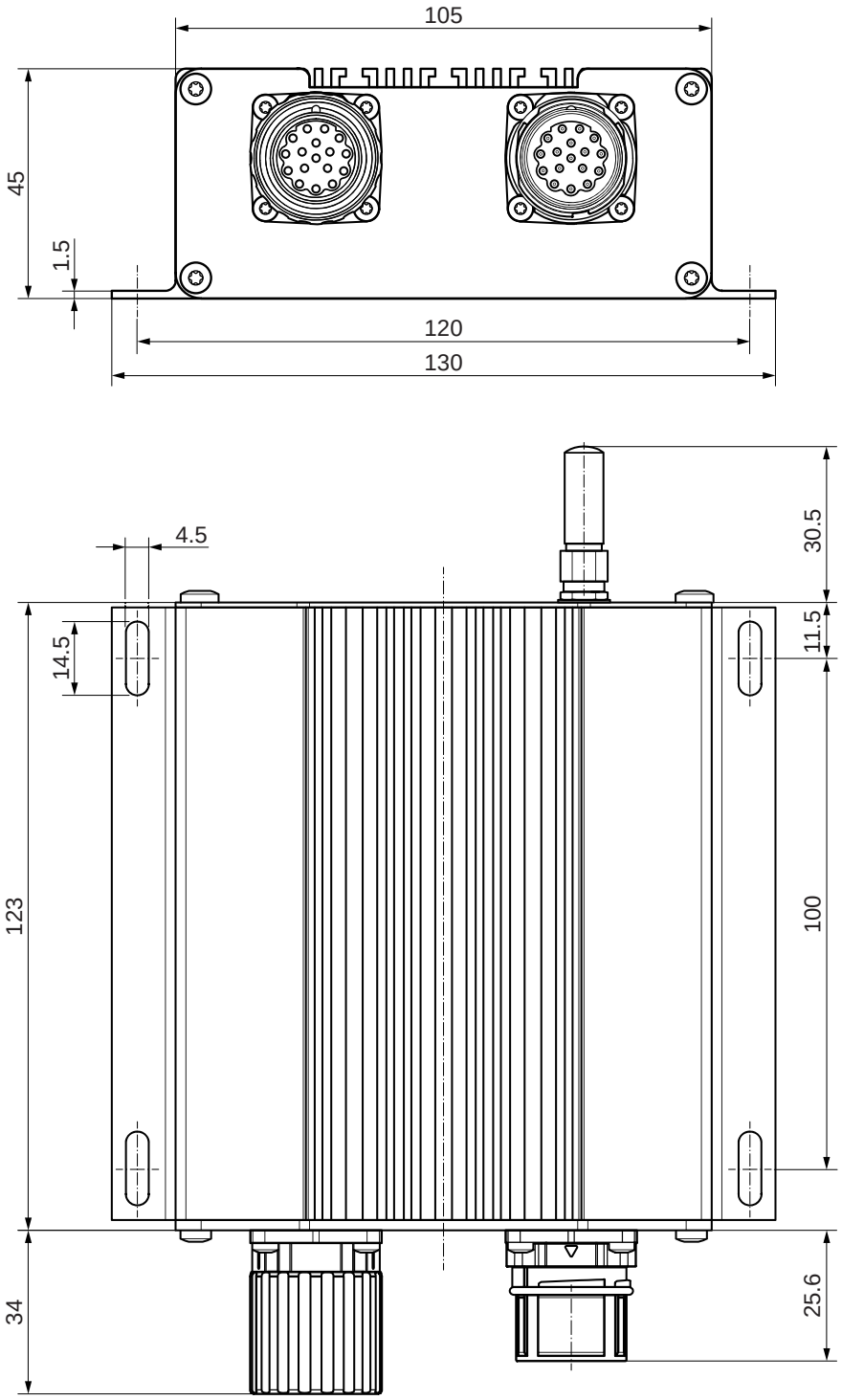
Operating time in different rotational speed ranges
*Visualization of configurable operating hours meter in the MiniCODER with optional extras **P***

Technical data

Electrical data	
Supply voltage U_B	+5 V DC
Current consumption via USB port	≤ 500 mA
Connections	Sensor: M23 female sockets, 17 pin; Control: M23 male pins, 17 pin USB (micro USB, type B) Ethernet (RJ45 female socket, only **GEL 211C␣␣␣E2␣-**)
Data transmission Ethernet	Ethernet Report files: Ethernet or USB
Data transmission WLAN	WLAN Report files: WLAN or USB
Mechanical data	
Housing material	Aluminum anodized, black
Weight	approx. 0.5 kg
Dimensions (without connector/aerial)	130 mm × 123 mm × 45 mm
Ambient data	
Operating temperature range	0 °C to +70 °C
Storage temperature range	-20 °C to 85 °C
Degree of protection	IP 20
Maximum relative air humidity	80%
Condensation	not permitted

WLAN module approvals	
IC ID	21098-ESPWROOM32
Transmission power	< 16 dBm
Frequency range	2412 to 2462 MHz
Application area	European Union Member States and Norway, Switzerland, Iceland, Liechtenstein

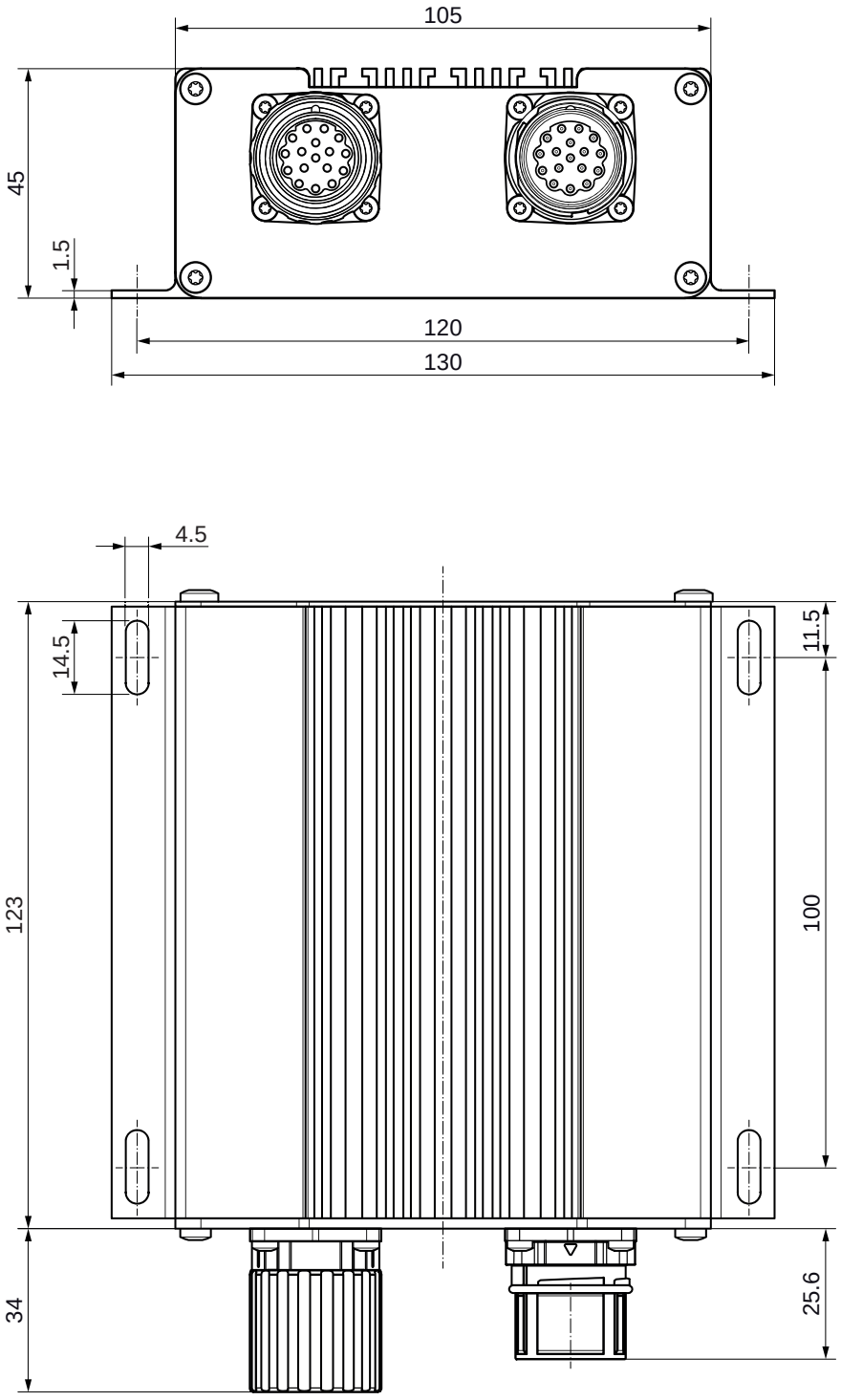
Dimensional drawing GEL 211CS0␣W2M (WLAN)



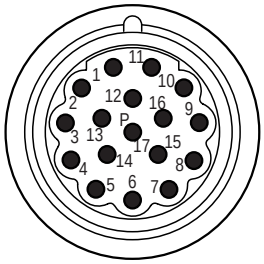
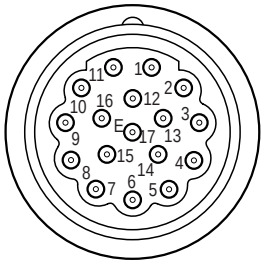
All dimensions in mm
General tolerance ISO 2768-m

Dimensional drawings

Dimensional drawing GEL 211CS0␣E2M (Ethernet)



All dimensions in mm
General tolerance ISO 2768-m

	Pin	Function (evaluated by GEL 211CS0)	
 Female sockets sensor	1	Signal track 1	U_{1+}
	2	Inverse signal track 1	U_{1-}
	3	Signal reference track N	U_{N+}
	7	GND	0 V
	10	+5 V supply voltage	U_B
	11	Signal track 2	U_{2+}
	12	Inverse signal track 2	U_{2-}
	13	Inverse signal reference track N	U_{N-}
 Male sockets control	The pin assignment corresponds to the MiniCODER standard. Input and output connections with the same number (1–9, 11–15, 17) are looped through; sense input 16 is connected to input 10 (supply voltage). Connections not listed are not used by GEL 211CS0.		

If the device is operated with a higher-level control system connected, two operating modes must be differentiated:

- Measurement/Analysis: No restriction of operation
- Configuration/Adjustment: Restriction of operation, as the MiniCODER with optional extras **P** is set temporarily to programming mode in which “Safety integrated” is no longer guaranteed.

Testing and programming units

Product	Testing and Programming Unit	Note
GEL 2444D GEL 2444K GEL 2444L GEL 2449K	GEL 211CS**0**4E2M (Ethernet) GEL 211CS**0**4W2M (WLAN)	Only available as configuration kit PK211C-244XK-E (Ethernet), comprising: ▪ Testing and programming unit GEL 211CS04E2M ▪ Sensor connection cable GG211 ▪ Power supply unit 5 V, ZB211CB ▪ Operating instructions D-71B-211CS0 ▪ Case, XW1303 PK211C-244XK-W (WLAN), comprising: ▪ Testing and programming unit GEL 211CS04W2M ▪ Sensor connection cable GG211 ▪ Power supply unit 5 V, ZB211CB ▪ Operating instructions D-71B-211CS0 ▪ Case, XW1303
GEL 2311B GEL 2444M GEL 2449M	GEL 211CS**T**4E2M (Ethernet) GEL 211CS**T**4W2M (WLAN)	Only available as configuration kit PK211C-244XM-E (Ethernet), comprising: ▪ Testing and programming unit GEL 211CST4E2M ▪ Universal adapter box, ZB2449M4 ▪ Power supply unit 5 V, ZB211CB ▪ Operating instructions, D-71B-211C ▪ Case, XW1303 PK211C-244XM-W (WLAN), comprising: ▪ Testing and programming unit GEL 211CST4W2M ▪ Universal adapter box, ZB2449M4 ▪ Power supply unit 5 V, ZB211CB ▪ Operating instructions, D-71B-211C ▪ Case, XW1303
GEL 2800	GEL 211CS**S**4E2N (Ethernet) GEL 211CS**S**4W2N (WLAN)	Only available as configuration kit PK211C-2800-E (Ethernet), comprising: ▪ Testing and programming unit GEL 211CSS4E2N ▪ Power supply unit 24 V, ZB211CA ▪ Adapter box, 2150A211 ▪ Operating instructions, D-71B-211C ▪ Case, XW1303 PK211C-2800-W (WLAN), comprising: ▪ Testing and programming unit GEL 211CSS4W2N ▪ Power supply unit 24 V, ZB211CA ▪ Adapter box, 2150A211 ▪ Operating instructions, D-71B-211C ▪ Case, XW1303
GEL 247(x)	GEL 211CS**R**4E2D (Ethernet) GEL 211CS**R**4W2D (WLAN)	The encoders may only be connected via the GG211RY001 interface.
GEL 293	GEL 211CS**R**4E2D (Ethernet) GEL 211CS**R**4W2D (WLAN)	The encoders may only be connected via the GG211RY001 interface.

Notes:

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