



### General information

MotionControllers of the serie GEL 823x are optimised for the rough environment of rotor hubs in wind turbines. The MotionController is a compact controller with CPU, LC display, key board, integrated PLC, fieldbus systems and multi axis control with a maximum of 6 controlled axes. A total of up to 64 axes can be controlled via the CAN bus (6 axes with feedback). Additional inputs and outputs permit serveral CAN REMOTE I/Os with up to 64 inputs or outputs per node and up to 64 node addresses.

### Hardware

- ▶ RAM: 1 MByte in total
- ▶ NVRAM: 8 kByte in total
- ▶ Flash: 1 MByte in total
- ▶ Free memory space: 256 kByte

### Advantages

- ▶ Robust controller for up to 6 axes, not affected by shock and vibrations
- ▶ Extended temperature range -20 °C to +70 °C
- ▶ Open to all standard fieldbus systems
- ▶ High noise immunity due to galvanically isolated digital and analogue inputs and outputs
- ▶ Short projecting times due to ready-made functional blocks and pre-configured inputs and outputs

### Field of application

- ▶ Wind energy (onshore, nearshore, offshore)
- ▶ Harsh industrial environments

Features	GEL 8230	GEL 8231	GEL 8232
Digital inputs	22	30	30
Digital outputs	15	15	15
Analogue inputs	1	3	3
PT100 inputs	0	4	4
Analogue outputs	3	3	3
Coated electronics	yes	yes	no

# Description

## Construction and design

The MotionController are delivered with or without Firmware. A device without firmware has a start-up screen function, which displays device information and copyright window. An existing firmware can be installed on the device.

Up to five different communication channels are available, enabling all conventional field bus systems (PROFIBUS-DP, DeviceNet,...) to be used with one interface. The field bus modules can be retrofitted or replaced at any time without modifying the PLC programme.

Connection is made fail-safe using coded terminal strips. The signal states on the digital input and output terminals can be checked via status indications on the rear side of the device. The status indicators are positioned above or under the terminal strips. Termination of CAN bus and serial interface is made using DIP switches on the rear side of the device.

## Firmware

A menu-guided service programme with plain text is an integral part of the firmware. In this menu the axis can be configured userfriendly.

The menu structure and parameter setting depend on the firmware version. After switching on the device, the actual values for the axes and for the inputs and outputs are displayed in different windows.

The menu is divided into the password protected configuration menu and freely accessible areas, e.g. stored failures memory, device information and CAN bus status.

The option texts and the limit values displayed for each parameter ensure easy and fast commissioning via the configuration menu.

## Programming

Programming via the PLC is a further possibility to configure the MotionController. Using PLC programming, the display options and actual values may differ from the menus of the firmware.

The standard CoDeSys programming environment runs in parallel with the multi-axis control and offers full transparency for all parameters. Parametrization of all 6 axes is effected by a PC tool and offers menu-guidance for comfortable setting of the usual parameters.

The standard programming environment in acc. with IEC 61131-3 includes a library of ready-made and powerful technology functions for terminal programming and automatic motion control.

When the PLC start input I3.7 is low the operating parameters of the firmware are displayed. Otherwise, the MotionController is displaying the PLC outputs.

## Integrated positioning controller

A positioning controller and the necessary hardware for up to six axes are already integrated in the controller. Therefore, no additional modules will be needed.

For the traversing of axes, the controller function library offers the following group of modules:

- ▶ Jog mode commands.
- ▶ Commands for automatic referencing.
- ▶ Positioning commands for servo drives ( $\pm 10$  V and CAN bus).
- ▶ Positioning commands for rapid feed/creep feed/stop axes
- ▶ Stop commands.
- ▶ Commands for setting and interrogating information such as the axis status.

## Technical data – integrated positioning controller

Normal scan time	1 ms per activated axis
Ramps	Linear ramp with adjustable jerk limitation
Types of control	In binary from through the rapid feed/creep feed/stop function In analog from through the $\pm 10$ V interface In digital form through the CANopen interface
Controllable axes	6
In analog from through the $\pm 10$ V interface and, alternatively in binary from through the rapid feed/creep feed/stop function	3 axis
In digital from through the CANopen interface	4

# Technical Data

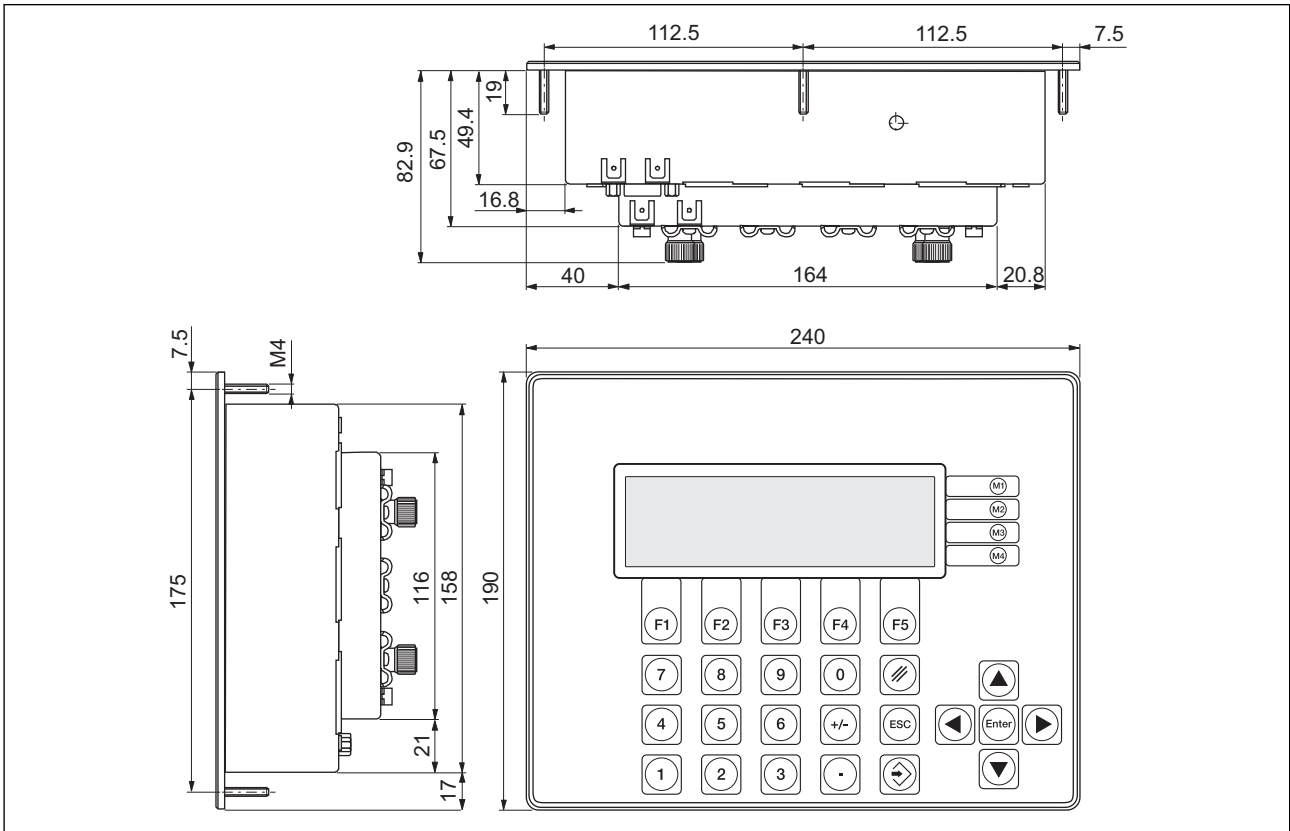
	GEL 8230	GEL 8231	GEL 8232
<b>Electrical data</b>			
Supply voltage $V_S$	19 to 30 V DC		
Power consumption	1 A max. (depending on interface)		
<b>Interfaces</b>			
Serial RS 232	2 (COM1/2), adjustable baud rate, for PC communication/programming; COM1: RS 232 C, COM2: RS 232 C or RS 422/485		
CAN bus	2 x onboard (master / slave)		
Field bus	1 extension slot for PROFIBUS DP, InterBus-S or DeviceNet (others on request)		
<b>Inputs</b>			
Counting inputs	6 x absolute SSI, power supply 24/5 V, 900/600 mA in total, clock frequency 125 kHz		
Digital inputs (galvanically separated)	24 V, green LED status indicators		
	22	30	
Analogue inputs (galvanically separated)	selectable alternatively 0 to 10 V or 0 to 20 mA		
	1	3	
PT100 inputs (galvanically separated)	-40 °C to +215 °C		
	-	4	
<b>Outputs (galvanically separated)</b>			
Digital outputs	9 x 24 V, 30 mA 6 x 24 V, 500 mA red LED status indicators		
Analogue outputs	3 x $\pm 10$ V, max. 10 mA, 2 mV resolution		
<b>PLC</b>			
Memory	programme: 256 KB / data: 128 KB / data backup: 128 KB / NV RAM: 4 KB		
Programming	according to IEC 61131-3, CoDeSys environment		
<b>Ambient data</b>			
Protection class	front side: IP 65, rear side: IP 20		
Operating temperature	-20 °C to +70 °C		
Storage temperature	-40 °C to +70 °C <sup>(1)</sup>	-30 °C to +70 °C	
Relative humidity of air	95 %, non-condensing		
EMC	EN 61000-6-2 and 4 <sup>(2)</sup>		
Vibration resistance (IEC 60068, 2-6)	20 m/s <sup>2</sup> , 9 to 50 Hz		
<b>Display</b>			
Display	LCD 64x240 px with LED backlighting; visible area 133 x 39 mm		
<b>Housing</b>			
Material	galvanized sheet steel		
Front panel	edge-protected aluminium		
Weight	approx. 1.7 kg		
<b>Valid for GEL 823xY001 to 823xY080</b>			
Storage temperature	-30 °C to +70 °C		

(1) From serial number 1230 xxx xxx

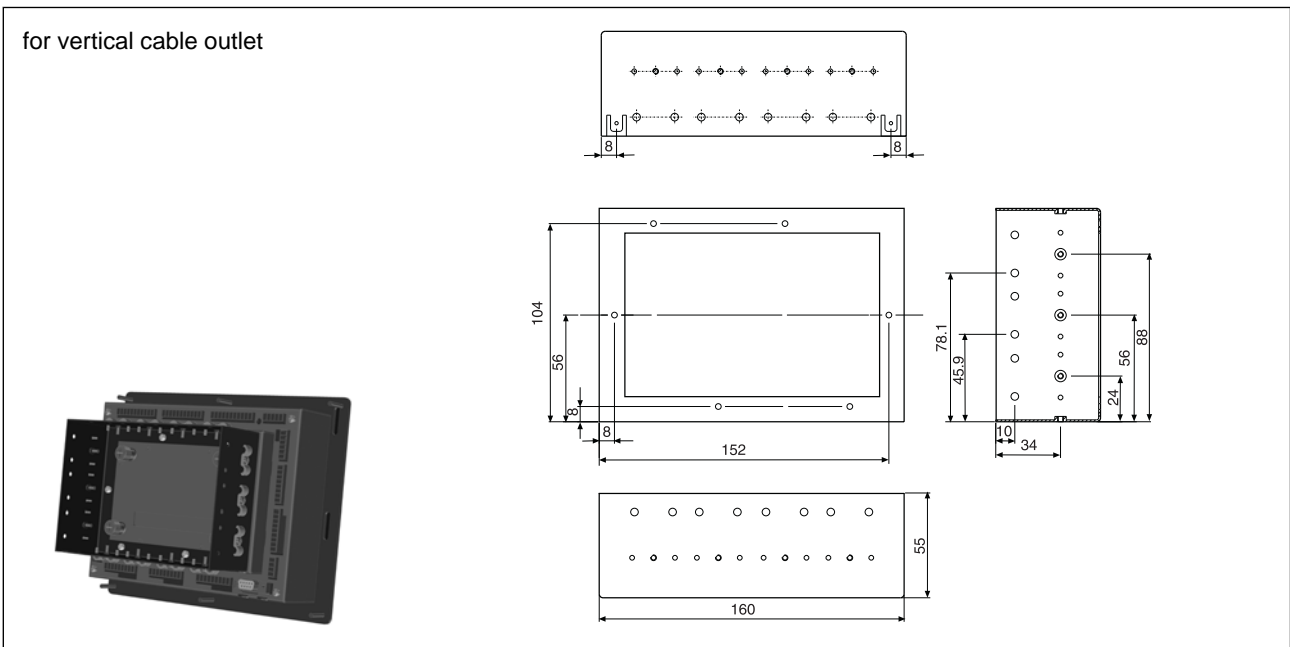
(2) When using the device in residential areas or in commercial or industrial environments the requirements as to electromagnetic emission defined in EN 61000-6-3 can be complied with by applying additional shieldings and filters.

# Dimensional drawing

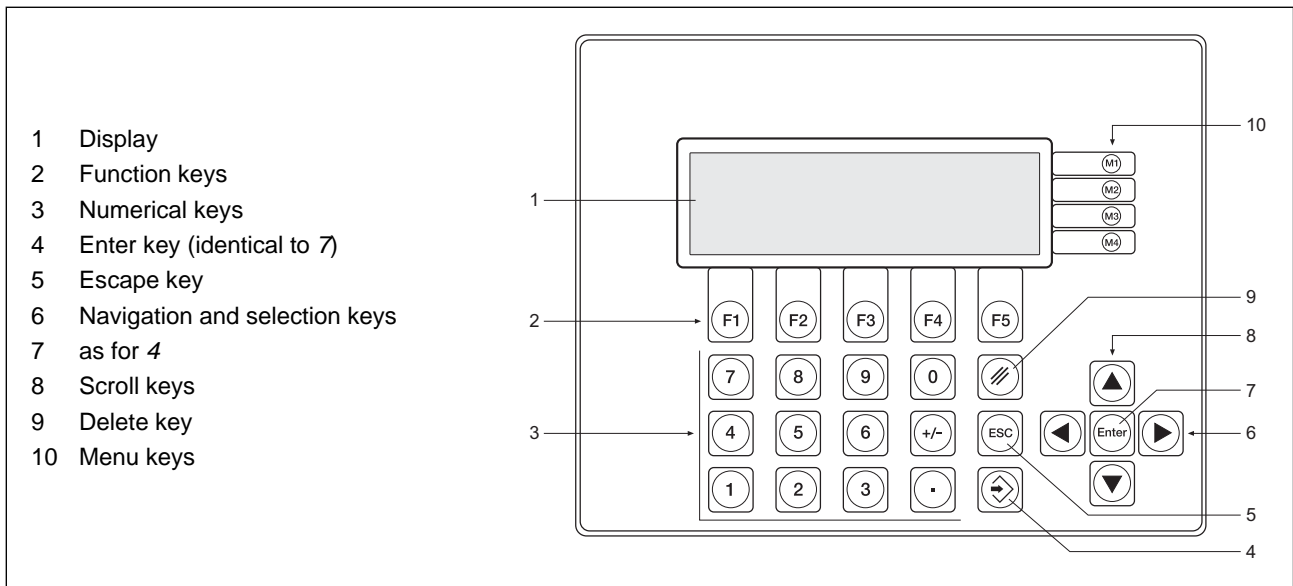
## Dimensional drawing GEL 823x



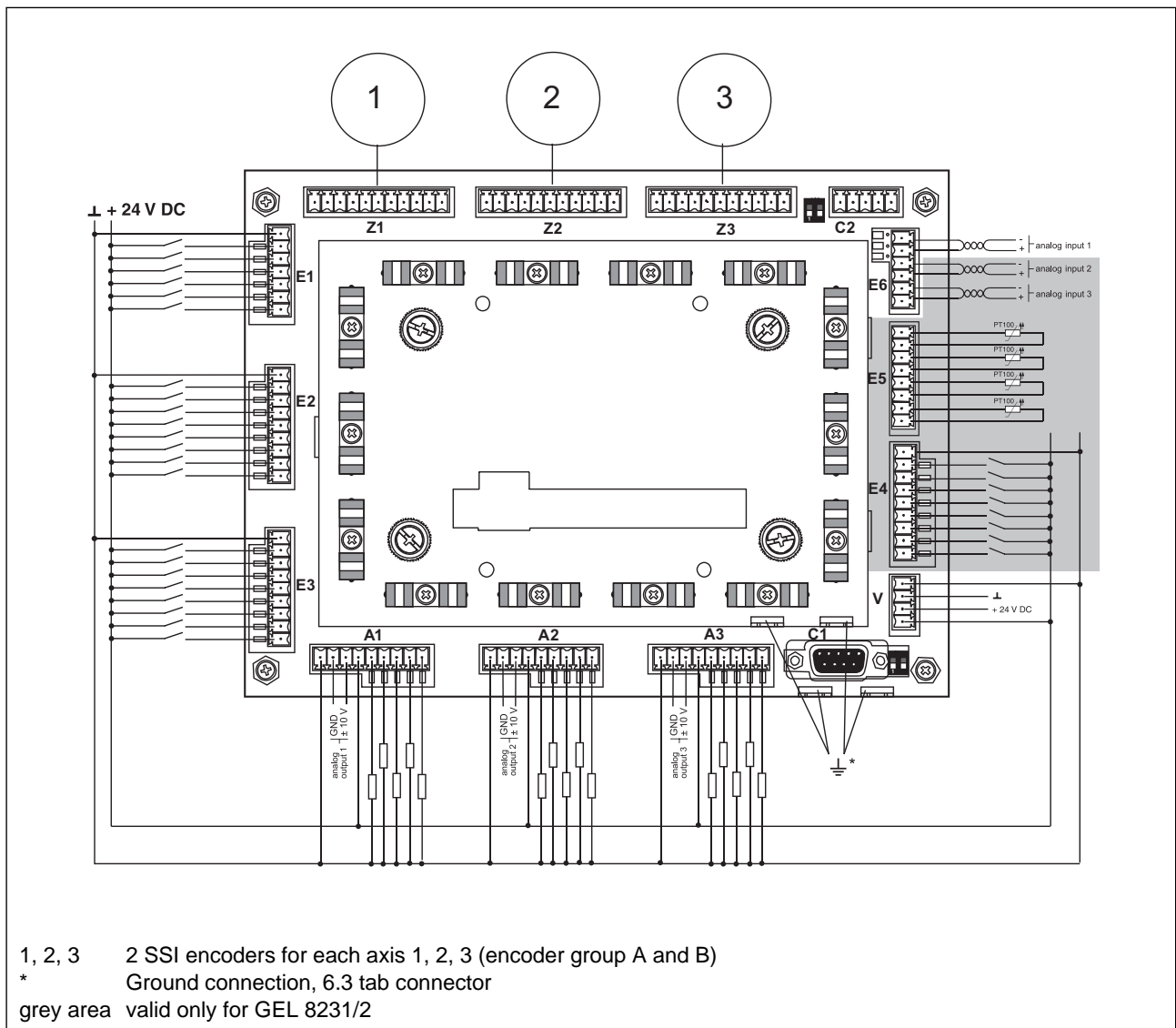
## Dimensional drawing mounting frame GK 2063



## Front view



## Rear side with connection overview



# Connection assignment

## Analogue and digital outputs for axis 1, 2, 3 (terminal strips A1, A2, A3)

A1	A2	A3	Terminal	Signal	Function
⊥ Q1	⊥ Q2	⊥ Q3	1	GND	GND power supply for signals <sup>(1)</sup>
			2	AnalogueX_Out-	Analogue GND <sup>(2)</sup>
QW10	QW20	QW30	3	AnalogueX_Out+	±10 V
24 V DC In	24 VDC In	24 V DC In	4	V <sub>S</sub>	24 VDC power supply signals <sup>(1)</sup>
QX1.0	QX2.0	QX3.0	5	DAX.1	30 mA output <sup>(3)</sup>
QX1.1	QX2.1	QX3.1	6	DAX.2	30 mA output <sup>(3)</sup>
QX1.2	QX2.2	QX3.2	7	DAX.3	30 mA output <sup>(3)</sup>
QX1.3	QX2.3	QX3.3	8	DAX.4	500 mA output
QX1.4	QX2.4	QX3.4	9	DAX.5	500 mA output

## Digital inputs (terminal strips system: E1, axes 1–3: E2, E3, E4<sup>(4)</sup>)

PLC designation				Terminal	Signal	Function
E1	E2	E3	E4 <sup>(4)</sup>			
⊥ I1	⊥ I2	⊥ I3	⊥ I4	1	GND	Optocoupler supply <sup>(1)</sup>
IX1.0	IX2.0	IX3.0	IX4.0	2	DEX.1	<sup>(3)</sup>
IX1.1	IX2.1	IX3.1	IX4.1	3	DEX.2	<sup>(3)</sup>
IX1.2	IX2.2	IX3.2	IX4.2	4	DEX.3	<sup>(3)</sup>
IX1.3	IX2.3	IX3.3	IX4.3	5	DEX.4	<sup>(3)</sup>
IX1.4	IX2.4	IX3.4	IX4.4	6	DEX.5	<sup>(3)</sup>
IX1.5	IX2.5	IX3.5	IX4.5	7	DEX.6	<sup>(3)</sup>
	IX2.6	IX3.6	IX4.6	8	DEX.7	<sup>(3)</sup>
	IX2.7	IX3.7	IX4.7	9	DEX.8	<sup>(3)</sup> ; SPS Start für I3.7

## Analogue inputs terminal strip E5<sup>(4)</sup> (PT100)

E5	PLC	Terminal	Signal	Function
Analogue4_In-		1	/AE 1.4	GND
Analogue4_In+	IW54	2	AE 1.4	PT100
Analogue5_In-		3	/AE 1.5	GND
Analogue5_In+	IW55	4	AE 1.5	PT100
Analogue6_In-		5	/AE 1.6	GND
Analogue6_In+	IW56	6	AE 1.6	PT100
Analogue7_In-		7	/AE 1.7	GND
Analogue7_In+	IW57	8	AE 1.7	PT100

## Analogue inputs terminal strip E6 (current / voltage)

E6	PLC	Terminal	Signal	Function
Analogue1_In-		1	/AE 1.1	Signal-
Analogue1_In+	IW61	2	AE 1.1	Signal+
Analogue2_In-		3	/AE 1.2	Signal- <sup>(4)</sup>
Analogue2_In+	IW62	4	AE 1.2	Signal+ <sup>(4)</sup>
Analogue3_In-		5	/AE 1.3	Signal- <sup>(4)</sup>
Analogue3_In+	IW63	6	AE 1.3	Signal+ <sup>(4)</sup>

Each input can be switched from current to voltage input by a jumper (current 0 to 20 mA / voltage 0 to 10 V).  
Delivery state: current input

(1) Terminal strip not interconnected

(2) Terminal strips interconnected

(3) Assignment (start, stop) defined by technology function selected; can be adapted at any time.

(4) For GEL 8231/2 only

# Connection assignment

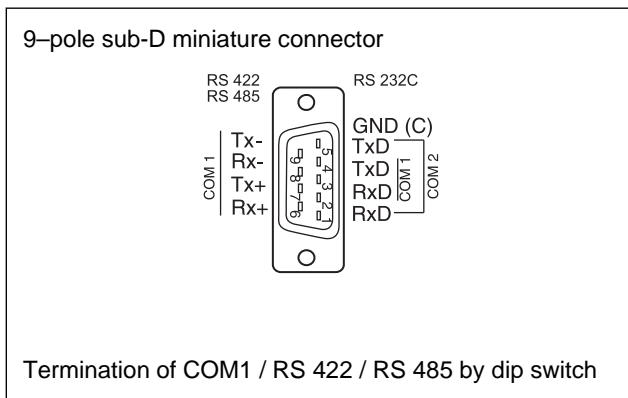
## Power supply ( 24 V; terminal strip V)

Terminal	Signal	Function
1	GND (Z)	GND (encoder)
2	GND	GND
3	24 V DC	Logic power supply
4	24 V DC (Z)	Encoder power supply (terminal strips Z1, Z2, Z3)

## Encoder inputs (actual—value for axis 1, 2 or 3; terminal strip Z1, Z2, Z3)

Klemme	Signal	SSI encoder A	SSI encoder B	Function
1	GND (Z)	x	x	GND encoder <sup>(1)</sup>
2	+5 V DC Out	U <sub>Z</sub>	U <sub>Z</sub>	5 V encoder power supply <sup>(1)</sup> , internally regulated to 5 V
3	+24 V DC Out	U <sub>Z</sub>	U <sub>Z</sub>	24 V encoder power supply <sup>(1)</sup>
4	CLK_SSI+	x	x	Differential clock signal for encoder A and B
5	CLK_SSI-	x	x	
6	Data_SSI_A +	x	-	Differential data signal for encoder A
7	Data_SSI_A -	x	-	
8	Data_SSI_B +	-	x	Differential data signal for encoder B
9	Data_SSI_B -	-	x	
10	Ref_N +	(x)		Reference signal N
11	Ref_N -	(x)		

## Serial interface connector C1



## CAN bus interface (terminal strip C2)

Terminal	Signal
1	GND (C)
2	CAN 1_H
3	CAN 1_L
4	
5	

Termination of CAN bus by dip switch

<sup>(1)</sup> from terminal strip V

# Type code and Accessories

## Type code

<b>GEL 823</b>	<b>0</b>	Standard with LC display (inputs and outputs DE: 22; DA: 15; AE: 1; PT100: 0; AA: 3)
	<b>1</b>	Standard with LC display (inputs and outputs DE: 30; DA: 15; AE: 3; PT100: 4; AA: 3)
	<b>2</b>	Standard with LC display (inputs and outputs DE: 30; DA: 15; AE: 3; PT100: 4; AA: 3)
	<b>Keyboard</b>	
	<b>A</b>	black
	<b>B</b>	grey
	<b>Software version</b>	
	<b>200</b>	CoDeSys 2.3 (3 axis, 6 encoder, CANopen)
	<b>202</b>	without software, only start-up screen function

## Accessories

### Mounting accessories

Item number	Description
GEL 89043	Counter plug set
BG 4622	14 hex screws M3 x 10, 14 cable bride, 2 earthing terminals, 14 toothed lock washers
BG 4623	6 hex screws M4, 6 washers, 6 spring washers, 2 earthing terminals
GK 2063	Mounting frame: 6 hex screws M3 x 10 and 6 toothed lock washers

### Fieldbus accessories

Item number	Description
GEL 89022	Connection cable RS 232 C between PC and MotionController
GEL 89130	Fieldbus module (PROFIBUS-DP)
GEL 89131	Fieldbus module (InterBus-S)
GEL 89132	Fieldbus module (DeviceNet)
GEL 83133	Fieldbus module (Ethernet)

### Documentations

Item number	Description
CD GEL 823x_-	CD-ROM GEL 823x without firmware, including manuals as pdf-files
CD GEL 823x_200	CD-ROM GEL 823x with firmware version 200, including manuals as pdf-files
on request	User manual GEL 823x in German or English (DIN A5, printed)

Subject to technical modifications and typographical errors.  
The latest version can be downloaded at [www.lenord.de](http://www.lenord.de).





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