Field Bus Modules
▶GEL 8912x/8913x

for MotionCard **LD 100** and Mulitfunctional
Controls**GEL 82xx**

Operating Instructions
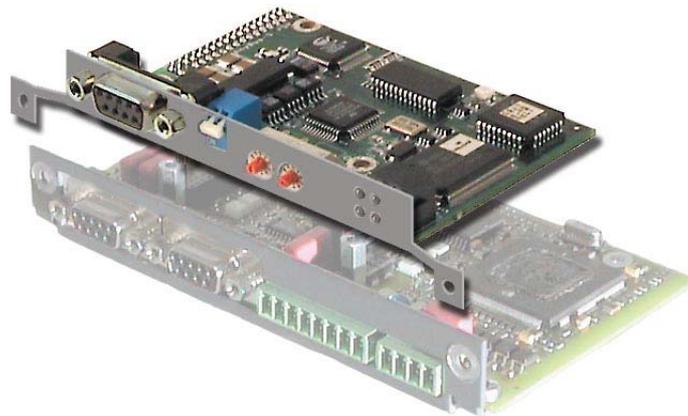
GEL 8912x/8913x

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1   General information

The following description deals with the field bus modules

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● Ethernet (GEL 891x**3**)	
● CANopen (GEL 8913**6**) for MotionController only, in conjunction with customized software	
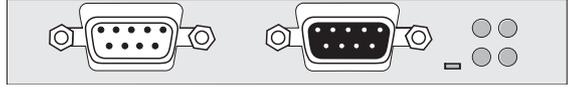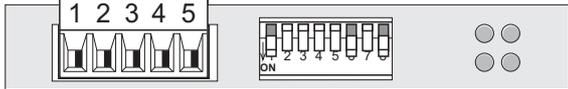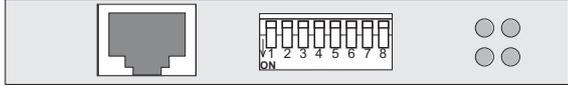
(x = **2** with MotionCard LD 100; x = **3** with MotionController GEL 8230 ... 8236 and MotionPLC GEL 8240 ... 8246)

It contains the connection and configuration data necessary for a correct connection.

Detailed explanations of the individual field bus systems cannot be found in this document; please refer to the extensive technical literature and the Internet.

It is assumed that the service personnel has well-founded specialist field bus and ESD[1] knowledge and experience.

Since certain field bus parameters are adjusted via the software of the connected basic device please familiarise yourself with its documentation, too.

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[1]   Electrostatic Discharge

2   Use

The field bus modules permit the connection and thus operation of certain control components from the firm of LENORD+BAUER to an existing field bus.

The field bus module is addressed and used by the PLC programming in the connected basic device; the relevant application software also allows the (overriding) adjustment of the respective data format.

There is a bicolour watchdog LED located on the circuit board of the module, indicating its status:

● 1 Hz (green): Module initialised and running

● 2 Hz (green): Module not initiated

● 1 Hz (red): RAM check fault

● 2 Hz (red): ASIC and Flash ROM check fault

● 4 Hz (red): Dual port RAM check fault

3 Assembly

The field bus module is plugged onto the MotionCard PCB or the rear housing of the multifunctional control GEL 82xx, respectively.

The PCB is packed in a static-proof bag. After removal and during further work make sure that no electrostatic discharges can occur on the PCB.

3.1 MotionCard LD 100

NOTICE   In order to use a field bus module in connection with the LD 100 the corresponding servo amplifier (LD 2000) must have a pre-punched sheet metal cut-out for the field bus extension (shaded area in the following illustration).
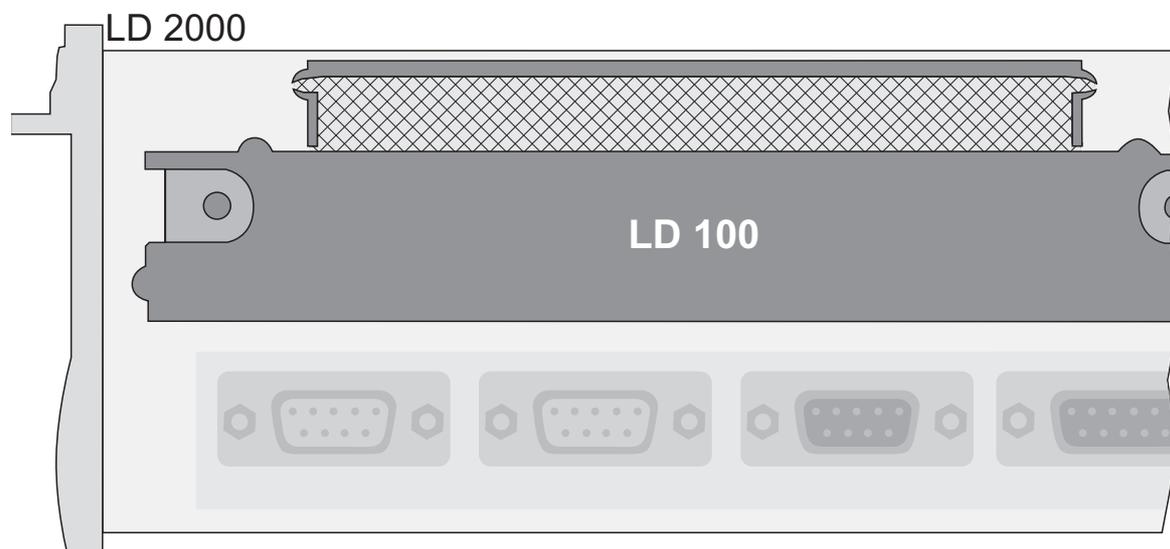
The MotionCard hardware version must be 2 or higher.

The accessories include 3 each of the following

● M3 spacer bolts

● M3 nuts with tooth lock washer

● M3 Phillips screws

Procedure:

▶ Switch off the servo amplifier and assure against resetting.

⚠WARNING   **Danger of electric shock!**

Wait for 5 minutes after switching off to make sure that there are **no dangerous residual** voltages.

▶ Disconnect cable connections on the MotionCard and remove the module.

▶ Insert spacer bolts in the field bus PCB and fasten with the nuts/tooth lock washers (①, ② in the following illustration)
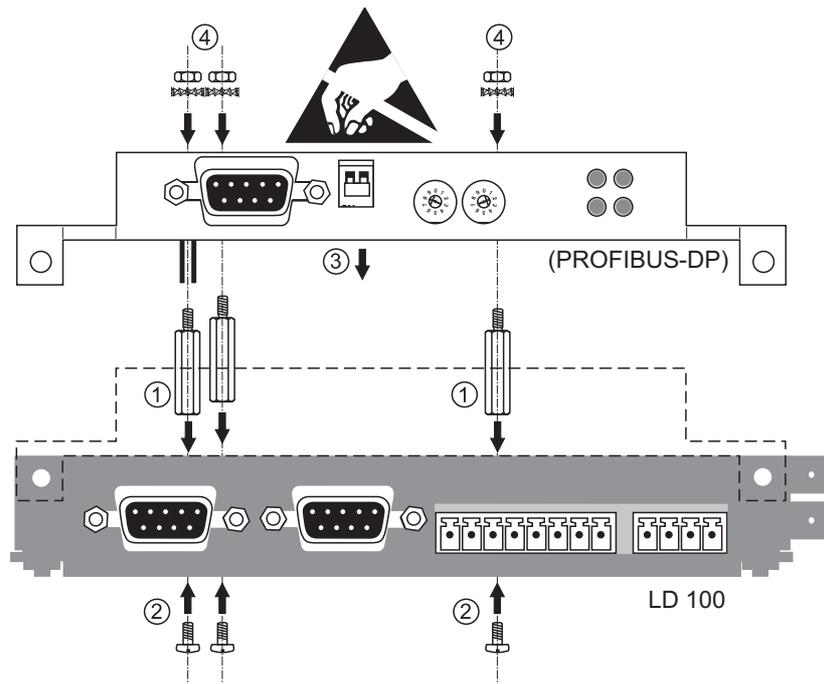
- ▶ Place the field bus PCB on the MotionCard:**make sure that all application con-
  nector pins on the field bus PCB fit correctly in the corresponding socket on
  the MotionCard** (③)

- ▶ Connect the field bus and MotionCard PCB mechanically: screw in 3 Phillips screws
  from the underside of the MotionCard (④)

- ▶ Remove pre-punched sheet metal cut-out from the converter housing: cut the metal
  stays with side nippers or other suitable tool and smooth the edges. Caution:**Do not
  let any filings fall into the shaft.**

- ▶ Insert the MotionCard/field bus assembly and fix it (see the next illustration).

- ▶ Make the necessary cable connections.
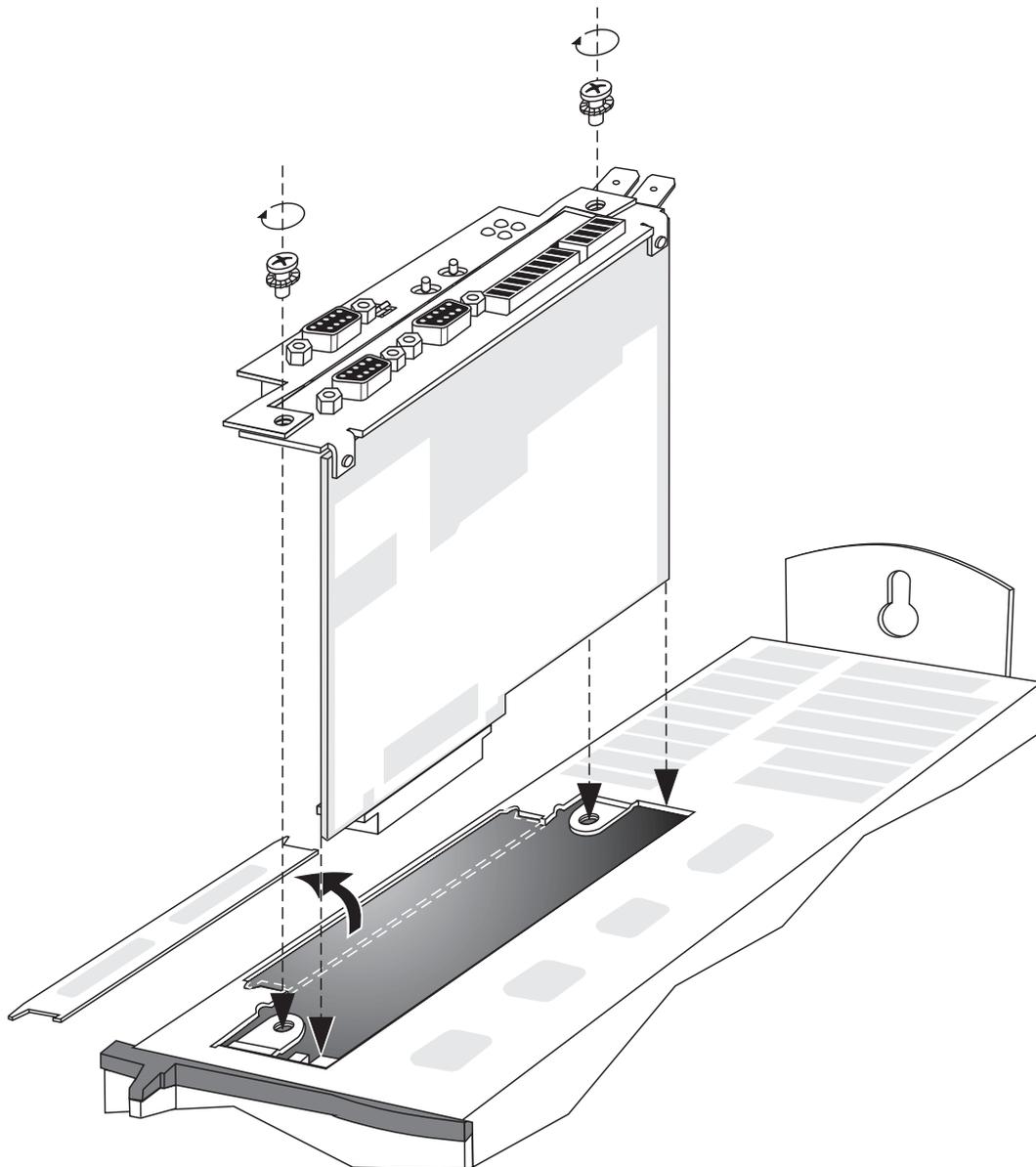
3.2   Multifunctional ControlsGEL 82xx

The accessories include each 3 of the following:

- Spacer bolts, 1x metallic and 2x plastic
- Washers and lock washers
- M3x6 Phillips screws

Procedure (see the next illustration):

▶ De-energise the multifunctional control.

▶ Remove the cap with cable clamps: release the 4 knurled screws.

▶ 3 Screw 3 spacer bolts into the rear panel of the multifunctional control[2]:

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[2]   If the Controller is exposed to vibrations (as in the case with wind power plants) the srew joints must be fixed by glue. We recommend using Loctite 2701. Before mouting, degrease the thread and aplly some glue to it.

| NOTICE | Note the marked positions of the metallic bolt (1) and the plastic bolts (2). |

▶ Insert the field bus PCB with its application connector in the corresponding socket in the rear panel of the multifunctional control: .**make sure that all pins fit correctly in the corresponding bushes**

▶ Fix the PCB on the spacer bolts by means of the 3 screws with lock washer and washer (see also the footer on the previous page). **Do not fasten the screws in the plastic spacer bolts too hard to avoid stripping the spacer.**

▶ Attach the cap with cable clamps again.

▶ Press and tighten the four knurled screws.
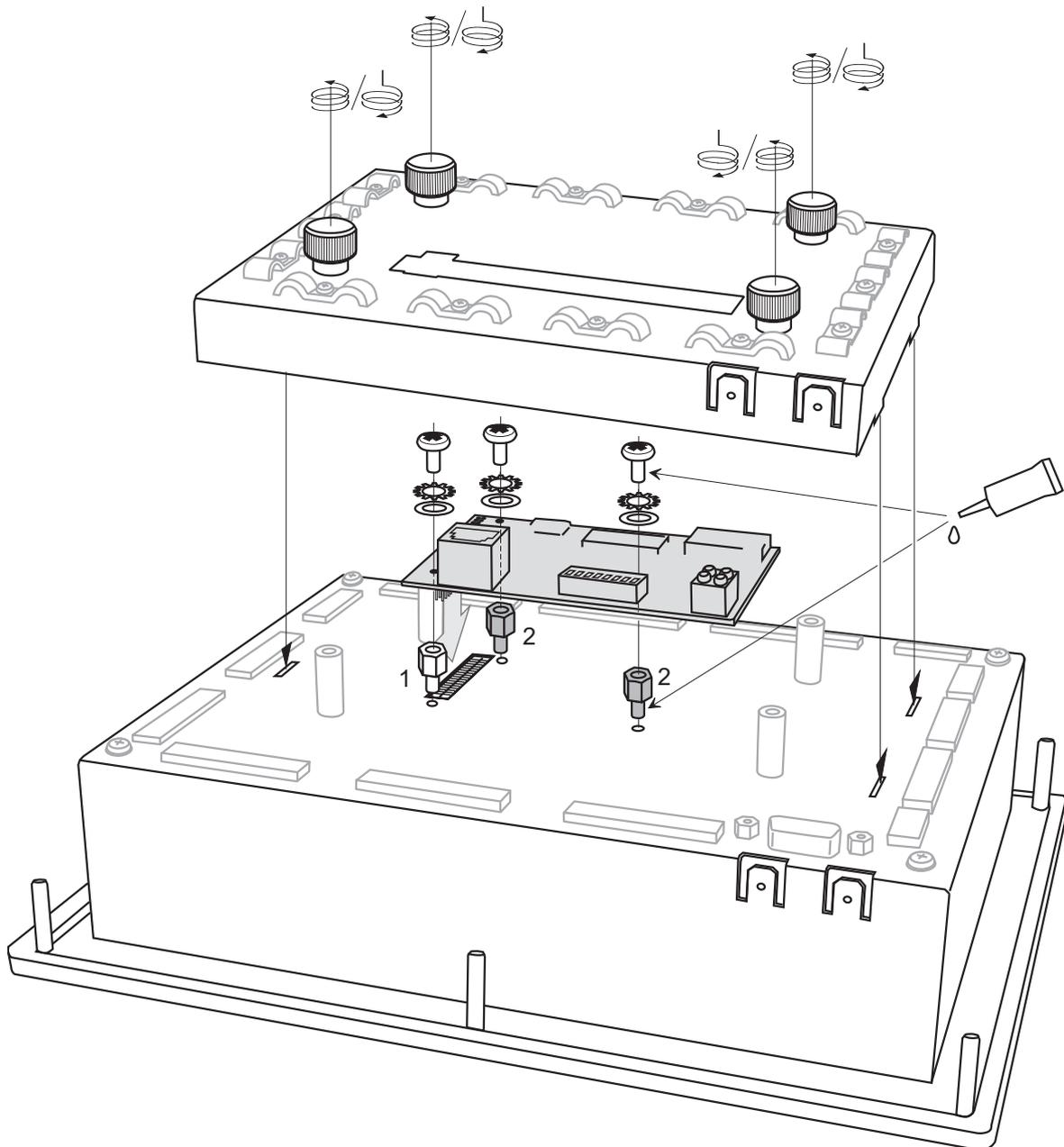
4   PROFIBUS-DP (GEL 891x0)

The PROFIBUS-DP module is a passive Slave node on which a PROFIBUS-DP-Master can read and write. Data transfer is cyclical.

4.1   Module data

4.1.1   Physical interface

- Transfer medium: PROFIBUS bus line type A or B, specified in EN 50170

- Topology: Master-Slave communication

- Field bus connection: 9-pin D-Sub base, socket part

- Cable: shielded copper cable, twisted pair

- Insulation: the bus is insulated from the remaining electronics by a DC/DC converter. The bus signals (A and B line) are separated by an optoelectronic coupler.

4.1.2   Protocol and supported functions

- Field bus type: PROFIBUS-DP acc. to EN 50170 (DIN 19245)

- Protocol version: 1.10

- Automatic baud rate detection in the range from 9.6 kBit to 12 MBit

4.1.3   Configuration and Displays

- Address range: 1...99

- Maximum cyclic I/O data size: 128 bytes each

- Internal switchable bus load

- Indicators: online, offline and field bus diagnosis (see below)

4.2   Connection and adjustment elements
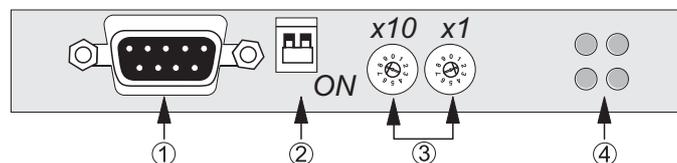
① PROFIBUS-DP-connector, female

② Termination

③ Address selector

④ Indicators

4.2.1   Pinassignment

Pin	Designation	Function
Housing	Schield	Connection to PE
1	*n.c.*	–
2	*n.c.*	–
3	B-Line	RxD/TxD + (acc. RS 485)
4	RTS	Send request[3]
5	GND Bus	GND insulated from RS 485[4]
6	+5V Bus	+5 V insulated from RS 485[5]
7	*n.c.*	–
8	A-Leitung	RxD/TxD (acc RS 485)
9	*n.c.*	–

4.2.2   Indicators

green	n.c.	–
green	Online	ON: Module is online
red	Offline	ON: Module is offline
red	Field bus diagnosis	Indicates certain errors on the field bus: ● Flashing 1 Hz: configuration error The length of the IN or OUT data during initialisation of the module does not correspond to the parameter configured for the network. ● Flashing 2 Hz: error in user parameter data The length or content of the parameter data during initialisation of the module does not correspond to the parameter configured for the network. ● Flashing 4 Hz: error during initialisation of the PROFIBUS communication ASIC
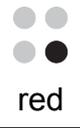
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[3]   (Send request) Only used for special applications (e.g. in connection with fibre optics)

[4]   (GND RS485) Only used for special applications (e.g. in connection with fibre optics)

[5]   (+5V RS485) Only used for special applications (e.g. in connection with fibre optics)

4.3   Installation and configuration

Baud rate

DThe transfer rate in a PROFIBUS-DP network is determined during master configuration; different baud rates are not possible in one network.

The PROFIBUS-DP module contains a function for the automatic detection of the transfer rate used; no configuration is needed by the user.

The following baud rates are supported: 9.6 kBit/s, 19.2 kBit/s, 93.75 kBit/s, 187.5 kBit/s, 500 kBit/s, 1.5 MBit/s, 3 MBit/s, 6 MBit/s, and 12 MBit/s.

Node address

Before configuring the field bus module its address first has to be specified. This is done by means of the two rotary switches in a decimal format on the front (left switch for the tens digits).

Address = (left digit x 10) + right digit

Termination

The end nodes in a PROFIBUS-DP network must be terminated with a bus resistor to prevent reflections on the bus line. There is a terminal switch on the front of the module which greatly simplifies this procedure.

If the module is the one at the beginning or end of the bus the switch must be in the ON position, in all other cases in the opposite position.

GSD file

Every device in the PROFIBUS-DP network has a specific configuration file, the GSD file; this is needed by the network configuration program. The GSD file for the Motion-Card LD 100 - ld100.gsd - can be found on the corresponding CD; it can also be downloaded from the Internet under www.lenord.de (the same also applies for the Multi-functional Controls).

5 InterBUS-S (GEL 891x1)

5.1 General Data

The InterBus-S module is a passive Slave node on which an InterBus Master can read and write.

The I/O data (process data) are transferred very fast and cyclically.

The maximum size of the input and output data is 20 bytes in each case.

The field bus connection is made via a 9-pin D-sub socket for the bus input (male part) and the bus output (female part). The bus cable must contain 2 twisted-pair lines and a GND line.

5.2 Connection and adjustment elements
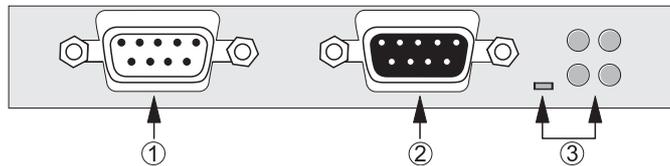
① InterBus-S-input (BUS IN), male

② InterBus-S-output (BUS OUT), female

③ Indicators

5.2.1 Pin assignment

Pin	Designation	Function
Housing	PE	Shield
1	DO1	Output data
2	DI1	Input data
3	GND	Ground
4	*n.c.*	–
5	*n.c.*	–
6	/DO1	inverse output data
7	*/DI1*	inverse input data
8	*n.c.*	–
9	*n.c.*	–

5.2.2   Indicators

red	RBDA	Remote Bus Disable; ON: renmote output bus disabled
green	TR	Transmit/Receive; only in connection with PCP communication (not supported)
green	CC	Cable Check; ON: cable connection OK and Master not in reset
red	BA	Bus Active (monitoring layer 2)
green	U_L	ON: Interface voltage correct

6 DeviceNet (GEL 891x2)

6.1 General Data

The DeviceNet module corresponds to the ODVA (Open DeviceNet Vendor Association) specification for communication adapters (Profile No. 12). It functions as an group two only server.

The following connections are supported:

● 1 Explicit

● 1 Polled I/O

● 1 Bit-Strobed I/O

● 1 Change of State/Cyclic I/O

The baud rate and the Mac ID are set with a DIP switch (see below).

The maximum size of the input and output data is 512 bytes each.

The field bus connection is made via a 5-pin terminal block.

6.2 Connection and adjustment elements
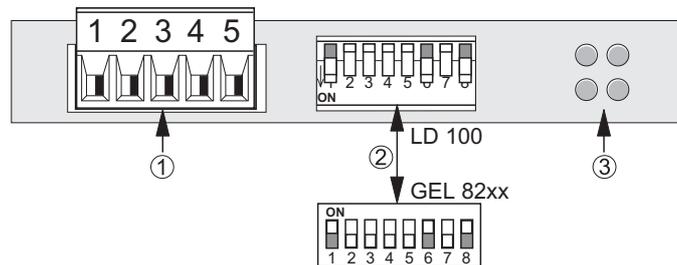
① DeviceNet Connector

② DIP Switch

③ Indicators

6.2.1 Terminal assignment

Terminal	Designation	Function
1	V-	– Bus voltage(GND)
2	CAN_L	Daten -
3	Shield / Bare	Schirm
4	CAN_H	Daten +
5	V+	+ Bus voltage

Bus supply voltage:

24 VDC ± 10%; typ. 25 mA, max. 30 mA

It is strongly recommended to use a separate power supply unit.

6.2.2   Indicators

(●○ / ○○)	no function	–
(○● / ○○) green / red	Networkstatus	• OFF: no voltage or offline • ON green: online and connected • Flashing green: online, but not connected • ON red: critical connection error • Flashing red: connection time out
(○○ / ○●) green / red	Modulestatus	• OFF: no voltage • ON green: operatio • ON red: irrecoverable error • Flashing red: minor error
(○○ / ●○)	no function	–

6.3   Installation and configuration

Every node in a DeviceNet network has a Mac ID (network address); this is in the range 0 to 63 and is binary coded. Every address may only be used once.

The baud rate in the DeviceNet network can be adjusted (see below) and then applies equally for all nodes in the network.

Both settings are made with the DIP switches on the front of the housing:

LD 100

GEL 82xx
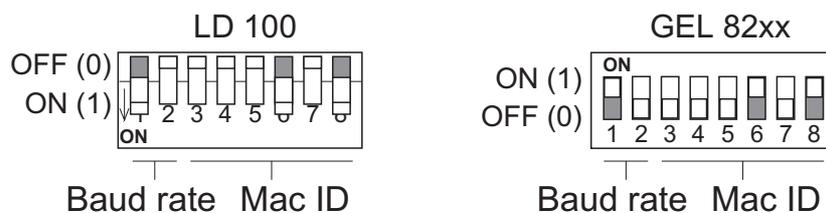
Baud rate

kBit/s	DIP	1	2
125		0	0
250		0	1
500		1	0
reserved		1	1

Mac ID

Address	DIP	3	4	5	6	7	8
0		0	0	0	0	0	0
1		0	0	0	0	0	1
2		0	0	0	0	1	0
3		0	0	0	0	1	1
...		...	...	...	...	...	...
63		1	1	1	1	1	1

Termination

The end nodes in a DeviceNet network must be terminated with an external 121 Ω (bus resistor to prevent reflections on the bus line (terminals 2 and 4).

EDS-File

Every device in the DeviceNet network has a specific configuration file, the EDS file; this is needed by the network configuration program. The EDS file for the MotionCard LD 100 - *ld100.eds* - can be found on the corresponding CD; it can also be downloaded from the Internet under www.lenord.de (the same also applies for the Multifunctional Controls).

7 Ethernet (GEL 891x3)

7.1 General Data

The module is a complete Ethernet/IP adaptor and Modbus/TCP slave. The corresponding protocols can be used simultaneously.

The module supports transmission rates of 10 and 100 MBit/s.

For the Modbus protocol, functions for reading and writing of registers are supported. The maximum input and output data size is 512 bytes each.
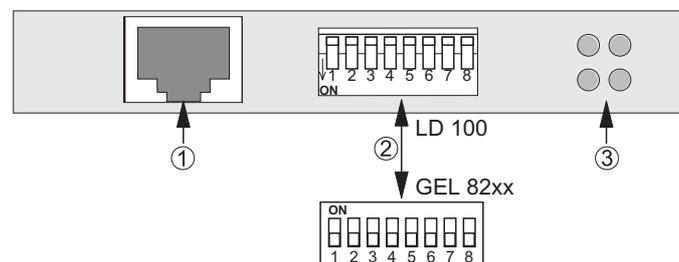
The field bus connection is made via a standardised RJ45 connector.

The IP address may be adjusted either through a central DHCP or ARP server, or via the front-side DIP switch (the last 8 bits) or using a Web browser (see section 7.3).

Additionally, the module contains a web server with 1.4 Mbytes Flash und 1 Mbytes RAM disk as well as a Telnet and FTP server.

For accessing the file system of the module by the controlling (basic) device via PLC programming several function blocks are supplied by the associated library, enabling you to read a directory in the module or to read/write/delete files.

7.2 Connection and adjustment elements

① Ethernet-Connector (RJ45)

② DIP Switch

③ Indicators

	Link	ON: The module has a link
green		
green/red	Module status	• 1 Hz (green): IP address not set using configuration switch • 1 Hz (red): Invalid MAC address (internal error) • 2 Hz (rot): Failed to load Ethernet configuration from Flash • 4 Hz (red): Fatal internal error • ON (red): Duplicate IP address detected
green	Modbus status	Flashing: Number of established Modbus/TCP connections to the module (= number of pulses)
	Activity	Flashes each time a data packet is received or transmitted

7.3   Installation and configuration

After mounting the module and powering on, the IP address has to be adjusted according to the requirements.

Per default, the module uses the IP**192.168.0.x**, where x is the Host ID to be adjusted via DIP switch (1...244). If this configuration is not applicable another IP can be specified using, for example, the web server functionality of the module. This procedure is described in the following for the direct connection of the module to a laptop as an example (cross over cable required).

Procedure:

▶ Set an arbitrary Host ID between 1 and 244 on the DIP switch, e.g. 2 (switch no. 7 ON, all others OFF).

▶ In the laptop, set the Net ID to 192.168.0 (as used by the module) and the Host ID to 1 (for instance) (*Subnet Mask*: 255.255.255.0).

▶ Enter the IP 192.168.0.2 in the Internet Explorer address field. After connection, a configuration menu for the module is shown in the Internet Explorer.

▶ Enter the desired IP und *Subnet Mask* and save the configuration.

▶ De-energize the module and set the DIP switch to 0; thus, the IP from the configuration file will become effective instead of the DIP switch IP when powering on again (the top right LED calls attention to this by flashing green with 1 Hz).

This completes the IP configuration of the module (for reconnecting the module to the laptop the latter must be adapted to the altered IP of the module).

If the module is to be linked to the company's network (keywords DHCP, DNS), please ask the competent system administrator.

8   CANopen (GEL 89136)

The CANopen module is a Slave node on which a CANopen-Master can read and write.

This module can only assembled to the MotionController in conjunction with customized software.

8.1   Module data

● Topology: Master-Slave and Slave-Slave communication

● Field bus connection: 5-pin terminal block, socket part

● CANopen cable: shielded copper cable with one twisted pair and two optional cables for the external power supply

● Insulation: the bus is insulated from the remaining electronics by a DC/DC converter.

● Maximum amount of input and output data: 2 kByte each

● Selectable baudrates from 10kbit / s - 1Mbit/s

8.2   Connection and adjustment elements
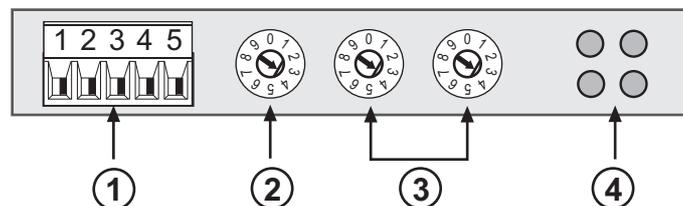
① CANopen connector

② Baud rate selector

③ Address selectors

④ Indicators

8.2.1   Pin assingment

Pin	Designation	Function
1	CAN_V-	Busvoltage – (optional)
2	CAN_L	– Data (low)
3	CAN_SHLD	Shield
4	CAN_H	+ Data (high)
5	CAN_V+	Busvoltage + (optional)

8.2.2   Indicators

The module is equipped with four bicolor watchdog LED's.

green	no function	–
green/red	Module status	• Flashing 1Hz: Module gets prepared • Flashing 2Hz: Module is in prepared mode • ON: Module in operational state • Red: Failure during initialisation of CANopen module
green/red	Bus status	• Flashing 1Hz: bus off / passive • ON: CANopen bus is running • Red, flashing 1Hz: error • OFF: Power off or module not initialised
green	Power supply	Module has power

8.3   Installation and configuration

NOTICE   Baud rate and node address cannot be selected or changed during operation.

Baud rate

The baud rate in the CANopen network can be adjusted by means of the rotary switch.

Switch setting	Baud rate in kBit/s
0	not available
1	10 kBit/s
2	20 kBit/s

Switch setting	Baud rate in kBit/s
3	50 kBit/s
4	125 kBit/s
5	250 kBit/s
6	500 kBit/s
7	800 kBit/s
8	1 MBit/s
9	not available

Node address

Before configuring the field bus module its address first has to be specified. This is done by means of the two rotary switches in a decimal format on the front (left switch for the tens digits).

Address = (left digit x 10) + right digit
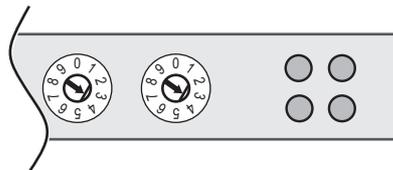
EDS file

Every device in the CANopen network has a specific configuration file, the EDS file; this is needed by the network configuration program. The EDS file for the MotionController can be found on the corresponding CD; it can also be downloaded from the Internet under www.lenord.de.