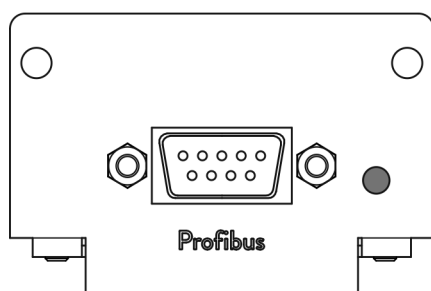


# Operation manual

## Interface module LRZ 917

Profibus module



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Translation of the original operation manual  
Q4DA-E\_13-014, 1, en\_US 7/15/2022 © LAUDA 2021  
replaces issue V1R52

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## 1 General

Many types of LAUDA constant temperature equipment have vacant module slots for installing additional interfaces. The number, size and arrangement of the module slots vary depending on the device and are described in the operating manual accompanying the constant temperature equipment. Two additional module slots available as accessories can be fitted to a LiBus module box, which is then connected as an external casing to the LiBus interface on the constant temperature equipment.

This operating manual describes how to install and configure the Profibus interface module (catalog no. LRZ 917).

The Profibus interface is designed for activating constant temperature equipment via the LAUDA command set. The interface functions provided for this purpose are described in chapters ↗ Chapter 7.4.1 “Read commands (Profibus controller input data)” on page 19 and ↗ Chapter 7.4.2 “Write commands (Profibus controller output data)” on page 23.

### 1.1 Intended use

The interface module can only be operated as intended and under the conditions specified in this operating manual.

The interface module is an accessory that increases the connections options of LAUDA constant temperature equipment. It may only be installed in constant temperature equipment that supports the interface provided. Refer to the chapter “Compatibility” in this operating manual for a list of compatible product lines.

Operation of the interface module is also permitted in combination with the LiBus module box (LAUDA catalog no. LCZ 9727). This operating manual also contains a description of how to install and connect up the module box.

#### Reasonably foreseeable improper use

- Operation after incomplete assembly
- Operation on incompatible constant temperature equipment
- Operation using cables or connections that are defective or do not confirm to standards

### 1.2 Compatibility

The interface module is available as an accessory for the following LAUDA product lines:

- ECO
- Integral XT
- Integral IN
- PRO
- Proline
- Variocool
- Variocool NRTL



#### ***Operating interfaces of the same type:***

*Only one Profibus interface can be used for each item of constant temperature equipment.*

### **1.3 Technical changes**


All technical modifications are prohibited without the written consent of the manufacturer. Damage resulting from a failure to observe this condition will void all warranty claims.

However, LAUDA reserves the right to make general technical modifications.

### **1.4 Warranty conditions**

LAUDA grants a standard warranty of one year.

### **1.5 Copyright**

This operating manual was written in German, checked and approved. If the content of other language editions deviates from the German edition, the information in the German edition shall take precedence. If you notice any discrepancies in the content, please contact LAUDA Service, see  Chapter 1.6 “Contact LAUDA” on page 6.

Company and product names mentioned in the operating manual are usually registered trademarks of the respective companies and are therefore subject to brand and patent protection. Some of the images used may also show accessories that are not included in the delivery.

All rights reserved, including those relating to technical modifications and translations. This operating manual or parts thereof may not be modified, translated or used in any other capacity without the written consent of LAUDA. Violation of this may obligate the violator to the payment of damages. Other claims reserved.

### **1.6 Contact LAUDA**

Contact the LAUDA Service department in the following cases:

- Troubleshooting
- Technical questions
- Ordering accessories and spare parts

Please contact our sales department for questions relating to your specific application.

#### **Contact information**

LAUDA Service

Phone: +49 (0)9343 503-350

Fax: +49 (0)9343 503-283

Email: [service@lauda.de](mailto:service@lauda.de)

## 2 Safety

### 2.1 General safety information and warnings



- Read this operating manual carefully before use.
- Keep the operating manual in a place within easy reach of the interface module.
- This operating manual is part of the interface module. If the interface module is passed on, the operating manual must be kept with it.
- This operating manual is applicable in combination with the operating manual of the constant temperature equipment in which the interface module is installed.
- Manuals for LAUDA products are available for download on the LAUDA website: <https://www.lauda.de>
- The warnings and safety instructions in this operating manual must be observed without fail.
- There are also certain requirements for personnel, see ➤ Chapter 2.3 “Personnel qualification” on page 8.

#### Structure of warnings

Warning signs	Type of danger
	Warning – danger zone.
Signal word	Meaning
DANGER!	This combination of symbol and signal word indicates an imminently dangerous situation that will result in death or serious injury if it is not avoided.
WARNING!	This combination of symbol and signal word indicates a potentially dangerous situation that can result in death or serious injury if it is not avoided.
NOTICE!	This combination of symbol and signal word indicates a potentially dangerous situation that can result in material and environmental damage if it is not avoided.

## 2.2 Information about the interface module

- Always disconnect the constant temperature equipment from the power supply before installing the interface module or connecting interfaces.
- Always take the recommended safety measures against electrostatic discharge before handling interface modules.
- Avoid touching the circuit board with metallic tools.
- Do not start up the constant temperature equipment before installation of the interface module is complete.
- Store any unused interface modules in their packaging in accordance with the specified ambient conditions.
- Use only suitable cables of sufficient length for cable connections.
- Make sure that the protective screen on the cables and connectors complies with EMC regulations. LAUDA recommends using pre-assembled cables.
- Always lay cables correctly so that they do not pose a tripping hazard. Secure the laid cables and make sure that they cannot be damaged during operation.
- Check the condition of the cables and interfaces prior to each operation.
- Immediately clean any soiled parts, in particular unused interfaces.
- Make sure that the signals transmitted via the interface correspond to the permitted operating parameters of the interface module.

## 2.3 Personnel qualification

### Specialized personnel

Only specialized personnel are permitted to install interfaces modules. Specialized personnel are personnel whose education, knowledge, and experience qualify them to assess the function and risks associated with the device and its use.



## 3 Unpacking



### **DANGER!** Transport damage

#### Electric shock

- Closely inspect the device for transport damage prior to commissioning!
- Never operate a device that has sustained transport damage!



### **NOTICE!** Electrostatic discharge

#### Material damage

- Always observe safety measures against electrostatic discharge.

Please observe the following installation sequence:

1. Remove the interface module from its packaging.
2. If you want to store the interface module at the installation location, use the outer packaging. This packaging is protected against static charging.
3. After installing the equipment, dispose of the packaging materials in line with environmental regulations, see ➤ “Packaging” on page 35.



*If you discover any damage on the interface module, contact LAUDA Service immediately, see ➤ Chapter 1.6 “Contact LAUDA” on page 6.*

## 4 Device description

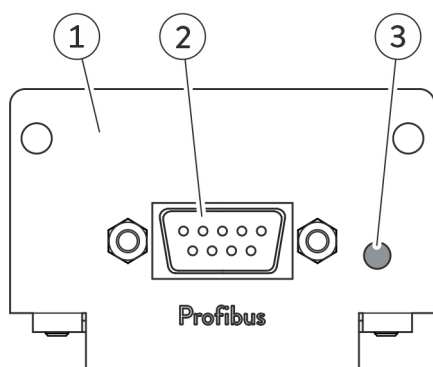
### 4.1 Purpose

The Profibus module is designed for installation in constant temperature equipment that supports the Profibus interface. The Profibus interface allows the user to activate constant temperature equipment via the LAUDA command set (for example, control station).



*Combining the Profibus interface with an RS 232/485 interface is only permitted in conjunction with the Command remote control, whose RS 232/485 interface can be used independently.*

### 4.2 Structure



- 1 Cover with holes for fastening screws
- 2 D-Sub socket, 9-pin
- 3 Red LED \*

\* The red LED indicates that the interface module has detected an error on the Profibus.


Refer to  Chapter 6.1 “Contact assignment” on page 14 for more information on contact assignment.

Fig. 1: Profibus module

## 5 Before starting up

### 5.1 Installing the interface module

The interface module is connected to an internal LiBus ribbon cable and inserted into a vacant module slot. The number and arrangement of the module slots vary depending on the device. The module slots are protected by a cover that is screwed onto the casing or attached to the slot opening.



**WARNING!**  
Touching live parts

#### Electric shock

- Disconnect the device from the power supply before starting any installation work.
- Always observe safety measures against electrostatic discharge.



*The module installation description essentially applies to all LAUDA constant temperature equipment; the example diagrams here show the installation of an analog module in constant temperature equipment from the Variocool product line.*

*Please note that an interface module with a small cover can only be installed in a low module slot. The fitted cover must cover the opening on the module slot completely.*

*You will require two M3 x 10 screws and a suitable screwdriver to secure the interface module.*

Please observe the following installation sequence:

1. Turn off the constant temperature equipment and pull out the mains plug.
2. If necessary, remove the screws from the cover on the relevant module slot. If necessary, use a slotted screwdriver to prise off the cover.

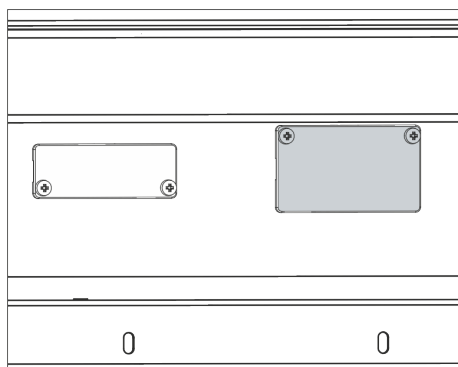


Fig. 2: Removing the cover (schematic diagram)

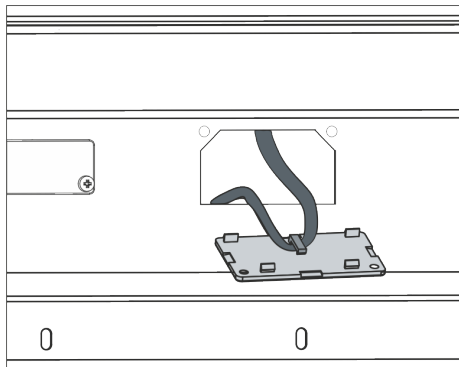


Fig. 3: Detaching the LiBus ribbon cable (schematic diagram)

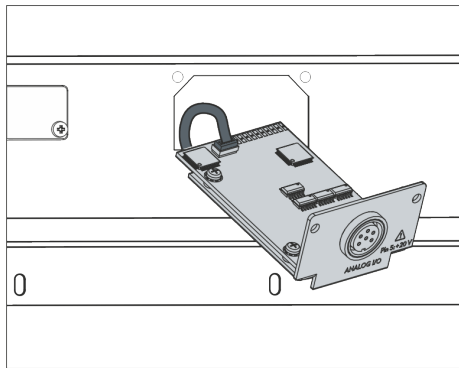


Fig. 4: Connecting the interface module (schematic diagram)

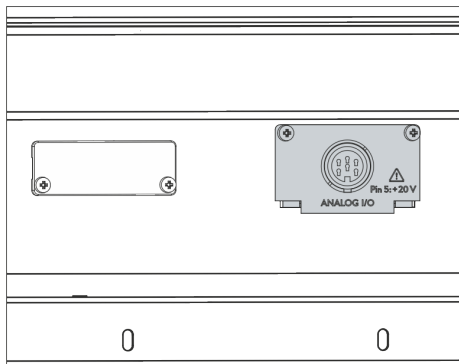


Fig. 5: Securing the cover (schematic diagram)

3. Remove the cover from the module slot.
  - The module slot is open. The LiBus ribbon cable is attached to the inside of the cover and is easily accessible.
4. Disconnect the LiBus ribbon cable from the cover.
5. Connect the red plug on the LiBus ribbon cable to the red socket on the circuit board of the interface module. Plug and socket are reverse polarity protected: Make sure that the lug on the plug is aligned with the recess in the socket.
  - The interface module is correctly connected to the constant temperature equipment.
6. Slide the LiBus ribbon cable and the interface module into the module slot.
7. Secure the cover to the casing using two M3 x 10 screws.
  - The new interface on the constant temperature equipment is ready for operation.

## 5.2 Using the module box

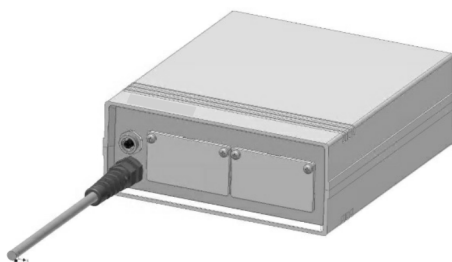


Fig. 6: LiBus module box, catalog no. LCZ 9727

You can extend LAUDA constant temperature equipment by two additional module slots using the LiBus module box. The module box is designed for interface modules with a large cover and is connected to constant temperature equipment via a vacant LiBus socket.

The socket on the constant temperature equipment bears the label **LiBus**.

Please observe the following installation sequence:

1. Switch off the constant temperature equipment.
2. Disconnect the cable on the module box from the constant temperature equipment.
  - The module box is disconnected from the power supply.
3. Check which interfaces are already present on the constant temperature equipment and module box.



*Observe the information on interface module compatibility. Only install an interface module with the same type of interface if operation with several of these interfaces is permitted.*

4. Install the required interface module in the module box. Please read the information on installing the module box in the constant temperature equipment, see chapter "Installing the interface module".
5. Position the module box close to the constant temperature equipment.
6. Connect the cable on the module box to the LiBus socket on the constant temperature equipment.
  - The interfaces on the module box are ready for operation.

## 6 Commissioning

### 6.1 Contact assignment



If you have assembled the cables yourself, please note the following:

- Statutory EMC requirements also apply to the cable connections. Use only shielded connection lines with shielded plugs/sockets.
- Reliably isolate all equipment connected to the extra-low voltage inputs and outputs according to DIN EN 61140 to safeguard against dangerous contact voltages. For example, use double or reinforced insulation according to DIN EN 60730-1 or DIN 60950-1.

The use of standard Profibus cables is recommended to avoid high contact resistances.

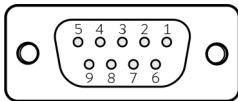


Fig. 7: Profibus socket

The Profibus interface is designed as a 9-pin D-Sub socket. Data is transferred according to the RS 485 standard.

Table 1: Contact assignment of Profibus interface

Contact	Signal	Function
1	–	Reserved *
2	–	Reserved *
3	B	Data line +
4	CNTR-P	Control signal for repairs
5	GND	Supply termination - and data reference potential
6	5 V	Supply termination +
7	–	Reserved *
8	A	Data line -
9	–	Reserved *
Casing	Shield	Shield

\* Reserved contacts must not be connected.

### 6.2 Software update

Older software installed on constant temperature equipment may have to be updated for the new interface to work.

1. Switch on the constant temperature equipment after installing the new interface.
2. Check whether a software warning appears on the display:
  - Warning *SW too old*: Please contact LAUDA Service, see Chapter 1.6 “Contact LAUDA” on page 6.
  - No software warning: Operate the constant temperature equipment as normal.

## 7 Operation

### 7.1 Profibus basics

#### Abbreviations

Abbreviation	Meaning
GSD	General Station Description; data format for Profibus and Profinet devices
ASIC	Application-Specific Integrated Circuit

#### GSD file and identification number

Name of GSD file:	LPBM0A2B.GSD
Identification number	0x0A2B

A ZIP archive containing a GSD file and a graphic in bitmap format (\*.bmp) is provided for configuration of the Profibus system. The GSD file provides the Master with device information required for project planning. The bitmap file contains a symbol that shows the LAUDA logo. The Profibus project planning software can use the file to display a clear graphic representation of the overall system in certain situations. The bitmap file and GSD file must be stored in the same file, however.

#### Baud rate

The Profibus interface automatically detects the transmission speed used by the Master. Transmission speeds of up to 12 Mbaud are supported.

#### Addressing

The address of the Profibus interface is either entered on the constant temperature equipment or assigned via the Profibus.

Before the Profibus network is started up, each connected Profibus device must be assigned a unique address within a range of 1 – 125. Each Profibus interface is assigned the address 126 in the factory, which enables the new address to be assigned via the Profibus.

### 7.2 Interface protocols

One of the following two protocols is used for communication between Profibus Master and Profibus Slave (constant temperature equipment):

*Large* - 7 bytes are periodically sent from the Master to the Profibus interface and 6 bytes are sent in the opposite direction, see [Chapter 7.2.1 “Large protocol”](#) on page 16.

*Short* - Periodic exchange of 32 bytes between the Master and Profibus interface, see [Chapter 7.2.2 “Short protocol”](#) on page 18.

The planning tool is used to determine which of the two protocols is used. During initialization, the Profibus master first sends special telegrams containing parameterization and configuration data to the Profibus interface (Slave) as well as specifying the defined protocol. Only then can the Master and Slave exchange user data via the Profibus.

## 7.2.1 Large protocol

### Syntax

When the *Large* protocol is used, 7 bytes are sent periodically from the Master to the Profibus interface (Slave) and 6 bytes are sent in the opposite direction:

Table 2: Master >> Slave (7 bytes)

Byte	Content / function
1	Toggle info
2	Command (Cmd)
3	Command number (Cmd No)
4 – 7	Value

Table 3: Slave >> Master (6 bytes)

Byte	Content / function
1	Toggle info
2	Command (Cmd)
3 – 6	Value

### Toggle info

The integrated toggle byte is used to identify queries sent multiple times in succession by the Master, as well as the response times of the Slave. The Master therefore changes the toggle byte when it sends a new command. In order to assign its responses unambiguously, the Slave includes the received toggle byte unchanged in the response.

### Command and command number

The combination of command and command number defines the type and content of the Master request, see ↗ Chapter 7.4.1 “Read commands (Profibus controller input data)” on page 19 and ↗ Chapter 7.4.2 “Write commands (Profibus controller output data)” on page 23.

The slave includes the command in the request (byte 2) in its response to clearly identify its reaction.

### Value

Numerical values are always transmitted in 4-digit format at a resolution of 1:1000. This also applies to integer settings such as status values.

**Example:** The constant temperature equipment should be switched to standby mode. The status value 1 required to switch to this mode is transmitted by the numerical value 1000.

### Responses from the constant temperature equipment

The constant temperature equipment (Slave) sends the following responses in reply to the read and write commands from the Profibus Master. In every response from the Slave to a read command from the Master, bytes 3 - 6 contain the status value that must be transmitted in the required unit. In responses to write commands, bytes 3 - 6 only contain a value if the response applies to a specific parameter.



Table 4: Responses to write commands

Cmd (byte 2)	Value (bytes 3 – 6)	Meaning
0	0	Communication successful
0xFF	Error number	Communication error, see table below for error type

Table 5: Responses to read commands

Cmd (byte 2)	Value (bytes 3 – 6)	Meaning
Command in request	Requested data values	Response to request sent
0xFF	Error number	Communication error, see table below for error type

If the slave responds with an error message, the transmitted value (bytes 3 - 6) contains an error number, which indicates one of the following errors:

Table 6: Overview of error numbers

Error number	Meaning
0x02	Internal communication error
0x03	Wrong command
0x05	Syntax error in value
0x06	Impermissible value
0x08	Interface or value not available
0x30	Programmer: All segments occupied
0x31	Not possible to specify set point value: Analog set point value input is activated
0x32	TiH <= TiL
0x33	External sensor missing
0x34	Analog value not present
0x35	Automatically configured
0x36	Not possible to specify set point value: Programmer is running or paused
0x37	Not possible to start the programmer: Analog set point value input is activated

## 7.2.2 Short protocol

### Syntax

When the *Short* protocol is used, 32 bytes are exchanged periodically between the Master and the Profibus interface (Slave). How these bytes are assigned depends on the transmission direction (output data/input data, see below).

For the "Short" protocol, the following rules apply to the syntax and sequence of the commands:

- Temperatures are transmitted in ASCII fixed point format (syntax `XXX.XX / -XX.XX`; output `000.00` means that the associated value does not exist).
- The Slave can only report a change in value by the Master (set temperature, standby) when the constant temperature equipment has accepted the new value. The value is changed in the input data with a corresponding delay.

See chapters ↗ Chapter 7.4.1 "Read commands (Profibus controller input data)" on page 19 and ↗ Chapter 7.4.2 "Write commands (Profibus controller output data)" on page 23 for a list of interface functions that can be used with the *Short* protocol.

## 7.3 Menu structure



*The menu only ever shows functions that are available for the current constant temperature equipment.*

The menu for configuring the interface is integrated in the main menu of the relevant constant temperature equipment:

All operating units

Menu → Modules → Profibus

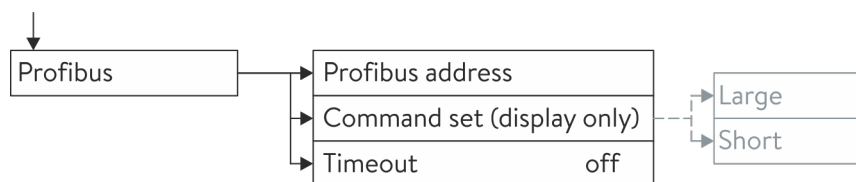


Fig. 8: Profibus interface menu

The command set used is specified by the Profibus Master.

## 7.4 Interface functions

Interface functions such as read and write commands make it possible to read out the current operating parameters of constant temperature equipment and predefine specific settings and process values.

The interface functions supported by this interface are presented briefly below. They are sorted by topic according to the component affected and assigned a unique ID. Depending on the technical configuration of your constant temperature equipment, the number and scope of the interface functions actually available may vary from the list shown here, see chapter "Availability of the interface functions".

### 7.4.1 Read commands (Profibus controller input data)

The Profibus module recognizes the following read commands, which can be used to query the operating data of the constant temperature equipment:

Table 7: Temperature

ID	Function	Unit, resolu- tion	Large protocol		Short protocol	
			Cmd (byte 2)	Cmd No. (byte 3)	Byte	Meaning
2	Temperature set point	[°C]	12	0	0 – 5	ASCII: XXX.XX / -XX.XX
3	Bath temperature (outflow tem- perature)	[°C], 0.01 °C	11	0	6 – 11	ASCII: XXX.XX / -XX.XX
5	Controlled temperature (internal / external Pt / external analog / external serial)	[°C]	11	1		–
7	External temperature TE (Pt)	[°C]	11	3	18 – 23	ASCII: XXX.XX / -XX.XX
8	External temperature TE (analog input)	[°C]	11	4		–
25	Overtemperature turn off point T_Max	[°C]	12	3		–
27	Limitation of outflow tem- perature TiH (upper limit)	[°C]	12	4		–
29	Limitation of outflow tem- perature TiH (lower limit)	[°C]	12	5		–

Table 8: Pump

ID	Function	Unit	Large protocol		Short protocol	
			Cmd (byte 2)	Cmd No. (byte 3)	Byte	Meaning
6	Outflow pressure / pump pres- sure, relative to the atmosphere	[bar]	11	2		–
18	Pump power stage	[–]	12	1		–
31	Outflow pressure set point / pump pressure (for pressure control settings)	[bar]	12	6		–
37	Through-flow control set point	[l/min]	12	9		–
71	Status of through-flow control: 0 = off / 1 = on	[–]	14	5		–
154	Outflow pressure of through- flow control, relative to the atmosphere	bar	11	9		--

Table 9: Fill level

ID	Function	Unit	Large protocol		Short protocol	
			Cmd (byte 2)	Cmd No. (byte 3)	Byte	Meaning
9	Bath level (fill level)	[-]	11	5	-	

Table 10: Actuating signal

ID	Function	Unit, resolution	Large protocol		Short protocol	
			Cmd (byte 2)	Cmd No. (byte 3)	Byte	Meaning
11	Controller actuating signal	[%], 0.1 %	11	6	-	
136	Controller actuating signal	[%]	-		12 – 17	ASCII: 00-100 = 000100

Table 11: Control parameters

ID	Function	Unit	Large protocol		Short protocol	
			Cmd (byte 2)	Cmd No. (byte 3)	Byte	Meaning
39	Control parameter Xp	[K]	13	0	-	
41	Control parameter Tn	[s]	13	1	-	
43	Control parameter Tv	[s]	13	2	-	
45	Control parameter Td	[s]	13	3	-	
47	Control parameter KpE	[-]	13	4	-	
49	Control parameter TnE	[s]	13	5	-	
51	Control parameter TvE	[s]	13	6	-	
53	Control parameter TdE	[s]	13	7	-	
55	Correction limitation	[K]	13	9	-	
57	Control parameter XpF	[-]	13	10	-	
61	Control parameter Prop_E	[K]	13	15	-	

Table 12: Control

ID	Function	Unit	Large protocol		Short protocol	
			Cmd (byte 2)	Cmd No. (byte 3)	Byte	Meaning
59	Set point offset	[K]	13	14		–
67	Control in control variable X: 0 = internal / 1 = external Pt / 2 = external analog / 3 = external serial / 5 = external Ethernet / 6 = external EtherCAT / 7 = external Pt 2	[–]	14	1		–
69	Offset source X for set point: 0 = normal / 1 = external Pt / 2 = external analog / 3 = external serial / 5 = external Ethernet / 6 = external EtherCAT / 7 = external Pt 2	[–]	14	4		–

Table 13: Rights

ID	Function	Unit	Large protocol		Short protocol	
			Cmd (byte 2)	Cmd No. (byte 3)	Byte	Meaning
63	Status of Master keyboard: 0 = free / 1 = blocked	[–]	14	0		–
65	Status of keyboard (remote control): 0 = free / 1 = blocked	[–]	14	3		–

Table 14: Status

ID	Function	Unit	Large protocol		Short protocol	
			Cmd (byte 2)	Cmd No. (byte 3)	Byte	Meaning
75	Status of standby: 0 = Device is switched on / 1 = Device is switched off	[-]	14	2	30	Standby mode: 0 = off, 1 = on
130	Device status: 0 = OK, 1 = fault (error, alarm or warning)	[-]	15	0	31	HEX: 0x00 = OK, 0xFF = fault
137	Error status: 0 = OK, 1 = error	[-]	15	1	–	
138	Alarm status: 0 = OK, 1 = alarm	[-]	15	2	–	
139	Warning status: 0 = OK, 1 = warning	[-]	15	3	–	

Table 15: Software version

ID	Function	Unit	Large protocol		Short protocol	
			Cmd (byte 2)	Cmd No. (byte 3)	Byte	Meaning
108	Control system	[-]	16	0	–	
109	Protection system	[-]	16	1	–	
110	Remote control (command)	[-]	16	2	–	
111	Cooling system	[-]	16	3	–	
112	Analog interface module	[-]	16	4	–	
113	Through-flow control	[-]	16	22	–	
114	Interface module RS 232/485 or Profibus /Profinet/CAN	[-]	16	5	–	
115	Ethernet interface module	[-]	16	18	–	
116	EtherCAT interface module	[-]	16	19	–	
117	Contact interface module	[-]	16	6	–	
118	Solenoid valve for cooling water	[-]	16	7	–	
119	Solenoid valve for automatic filling device	[-]	16	8	–	
121	Solenoid valve, shut off valve 1	[-]	16	10	–	
122	Solenoid valve, shut off valve 2	[-]	16	11	–	

ID	Function	Unit	Large protocol		Short protocol	
			Cmd (byte 2)	Cmd No. (byte 3)	Byte	Meaning
123	High-temperature cooler	[–]	16	16		–
124	Pump 1	[–]	16	12		–
125	Pump 2	[–]	16	13		–
126	Heating system 1	[–]	16	14		–
127	Heating system 2	[–]	16	15		–
128	External Pt interface 1	[–]	16	17		–
129	External Pt interface 2	[–]	16	20		–
142	Remote control Base	[–]	16	21		--

#### 7.4.2 Write commands (Profibus controller output data)

The Profibus module recognizes the following write commands, which can be used to transfer values to the constant temperature equipment:

Table 16: Temperature

ID	Function	Unit	Large protocol		Short protocol	
			Cmd (byte 2)	Cmd No. (byte 3)	Byte	Meaning
1	Temperature set point	[°C]	2	0	0 – 5	ASCII: XXX.XX / -XX.XX
15	Actual value of external temperature (via interface)	[°C]	1	0		–
26	Limitation of outflow temperature TiH (upper limit)	[°C]	2	4		–
28	Limitation of outflow temperature TiH (lower limit)	[°C]	2	5		–

Table 17: Pump

ID	Function	Unit	Large protocol		Short protocol	
			Cmd (byte 2)	Cmd No. (byte 3)	Byte	Meaning
17	Pump power stage (1 – 6 or 1 – 8)	[–]	2	1		–
30	Set pressure (for pressure control settings)	[bar]	2	6		–

ID	Function	Unit	Large protocol		Short protocol	
			Cmd (byte 2)	Cmd No. (byte 3)	Byte	Meaning
36	Through-flow control set point	[l/min]	2	9		–
70	Activate through-flow control: 0=Switch = switch off / 1 = switch on	[–]	4	5		–

Table 18: Control parameters

ID	Function	Unit	Large protocol		Short protocol	
			Cmd (byte 2)	Cmd No. (byte 3)	Byte	Meaning
38	Control parameter Xp	[K]	3	0		–
40	Control parameter Tn	[s]	3	1		–
42	Control parameter Tv	[s]	3	2		–
44	Control parameter Td	[s]	3	3		–
46	Control parameter KpE	[–]	3	4		–
48	Control parameter TnE	[s]	3	5		–
50	Control parameter TvE	[s]	3	6		–
52	Control parameter TdE	[s]	3	7		–
54	Correction limitation	[K]	3	9		–
56	Control parameter XpF	[–]	3	10		–
60	Control parameter Prop_E	[K]	3	15		–



Table 19: Control

ID	Function	Unit	Large protocol		Short protocol	
			Cmd (byte 2)	Cmd No. (byte 3)	Byte	Meaning
58	Set point offset	[K]	3	14		–
66	Control in control variable X: 0 = internal / 1 = external Pt / 2 = external analog / 3 = external serial / 5 = external Ethernet / 6 = external EtherCAT / 7 = external Pt 2	[–]	4	1		–
68	Offset source X for set point: 0 = normal / 1 = external Pt / 2 = external analog / 3 = external serial / 5 = external Ethernet / 6 = external EtherCAT / 7 = external Pt 2	[–]	4	4		–

Table 20: Rights

ID	Function	Unit	Large protocol		Short protocol	
			Cmd (byte 2)	Cmd No. (byte 3)	Byte	Meaning
62	Master keyboard (equivalent to "KEY"): 0 = unlock / 1 = lock	[–]	4	0		–
64	Remote control keyboard Command: 0 = unlock / 1 = lock	[–]	4	3		–

Table 21: Status

ID	Function	Unit	Large protocol		Short protocol	
			Cmd (byte 2)	Cmd No. (byte 3)	Byte	Meaning
74	Switch equipment on / off (standby)	[-]	4	2	6	Standby mode: 0 = off, 1 = on

### 7.4.3 Availability of the interface functions

The following table shows the read and write commands that the interface module provides for all compatible product lines of constant temperature equipment.



*Special functions (for example, "[ID 6] outflow pressure / pump pressure") are only available if the constant temperature equipment is equipped accordingly. Optional accessories may have to be connected correctly and ready for operation.*

ID	Integral IN		Variocool		PRO	ECO	Proline, Proline Kryomats	Integral XT *
	IN...XT *	IN...T *	VC NRTL	VC				
1	✓	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓	✓
6	✓	–	–	–	–	–	–	✓
7	✓	✓	✓	✓	✓	✓	✓	✓
8	✓	✓	✓	✓	✓	✓	✓	✓
9	✓	✓	✓	✓	✓	–	✓	✓
11	✓	✓	✓	–	–	–	–	–
15	✓	✓	✓	✓	✓	✓	✓	✓
17	✓	–	–	–	✓	✓	✓	✓
18	✓	–	–	–	✓	✓	✓	✓
25	✓	✓	✓	✓	✓	✓	✓	✓
26	✓	✓	✓	✓	✓	✓	✓	✓
27	✓	✓	✓	✓	✓	✓	✓	✓
28	✓	✓	✓	✓	✓	✓	✓	✓
29	✓	✓	✓	✓	✓	✓	✓	✓

\* Equipment type as per rating label

ID	Integral IN		Variocool		PRO	ECO	Proline, Proline Kryomats	Integral XT *
	IN...XT *	IN...T *	VC NRTL	VC				
30	✓	–	–	–	–	–	–	✓
31	✓	–	–	–	–	–	–	✓
36	✓	✓	✓	–	–	–	–	✓
37	✓	✓	✓	–	–	–	–	✓
38	✓	✓	✓	✓	✓	✓	✓	✓
39	✓	✓	✓	✓	✓	✓	✓	✓
40	✓	✓	✓	✓	✓	✓	✓	✓
41	✓	✓	✓	✓	✓	✓	✓	✓
42	✓	✓	✓	✓	✓	✓	✓	✓
43	✓	✓	✓	✓	✓	✓	✓	✓
44	✓	✓	✓	✓	✓	✓	✓	✓
45	✓	✓	✓	✓	✓	✓	✓	✓
46	✓	✓	✓	✓	✓	✓	✓	✓
47	✓	✓	✓	✓	✓	✓	✓	✓
48	✓	✓	✓	✓	✓	✓	✓	✓
49	✓	✓	✓	✓	✓	✓	✓	✓
50	✓	✓	✓	✓	✓	✓	✓	✓
51	✓	✓	✓	✓	✓	✓	✓	✓
52	✓	✓	✓	✓	✓	✓	✓	✓
53	✓	✓	✓	✓	✓	✓	✓	✓
54	✓	✓	✓	✓	✓	✓	✓	✓
55	✓	✓	✓	✓	✓	✓	✓	✓
56	✓	✓	✓	✓	✓	✓	✓	✓
57	✓	✓	✓	✓	✓	✓	✓	✓
58	✓	✓	✓	✓	✓	✓	✓	✓
59	✓	✓	✓	✓	✓	✓	✓	✓
60	✓	✓	✓	✓	✓	✓	✓	✓
61	✓	✓	✓	✓	✓	✓	✓	✓
62	✓	✓	✓	✓	✓	✓	✓	✓
63	✓	✓	✓	✓	✓	✓	✓	✓
64	✓	✓	✓	✓	✓	✓	✓	✓
65	✓	✓	✓	✓	✓	✓	✓	✓

\* Equipment type as per rating label

ID	Integral IN		Variocool		PRO	ECO	Proline, Proline Kryomats	Integral XT *
	IN...XT *	IN...T *	VC NRTL	VC				
66	✓	✓	✓	✓	✓	✓	✓	✓
67	✓	✓	✓	✓	✓	✓	✓	✓
68	✓	✓	✓	✓	✓	✓	✓	✓
69	✓	✓	✓	✓	✓	✓	✓	✓
70	✓	✓	✓	–	–	–	–	–
71	✓	✓	✓	–	–	–	–	–
74	✓	✓	✓	✓	✓	✓	✓	✓
75	✓	✓	✓	✓	✓	✓	✓	✓
108	✓	✓	✓	✓	✓	✓	✓	✓
109	✓	✓	✓	✓	✓	✓	✓	✓
110	✓	✓	✓	✓	✓	✓	✓	✓
111	✓	✓	✓	✓	✓	✓	✓	✓
112	✓	✓	✓	✓	✓	✓	✓	✓
113	✓	✓	✓	–	–	–	–	–
114	✓	✓	✓	✓	✓	✓	✓	✓
115	✓	✓	✓	✓	✓	✓	✓	✓
116	✓	✓	✓	✓	✓	✓	✓	✓
117	✓	✓	✓	✓	✓	✓	✓	✓
118	–	✓	–	–	✓	✓	–	–
119	–	–	–	–	✓	–	✓	–
121	–	–	–	–	–	✓	✓	–
122	–	–	–	–	–	–	✓	–
123	✓	–	–	–	–	–	–	✓
124	✓	–	–	–	–	–	–	✓
125	✓	–	–	–	–	–	–	✓
126	✓	✓	✓	–	–	–	–	–
127	✓	–	–	–	–	–	–	–
128	✓	✓	✓	✓	✓	✓	✓	✓
129	✓	✓	✓	–	–	–	–	–
130	✓	✓	✓	✓	✓	✓	✓	✓
136	–	–	–	✓	✓	✓	✓	✓
137	✓	✓	✓	✓	✓	✓	✓	✓

\* Equipment type as per rating label

ID	Integral IN		Variocool		PRO	ECO	Proline, Proline Kryomats	Integral XT *
	IN...XT *	IN...T *	VC NRTL	VC				
138	✓	✓	✓	✓	✓	✓	✓	✓
139	✓	✓	✓	✓	✓	✓	✓	✓
142	–	–	–	–	✓	–	–	–
154	–	–	–	✓	✓	✓	✓	✓

\* Equipment type as per rating label

## 8 Maintenance

The interface module is maintenance-free.

Any dust and dirt deposits should be cleaned from the connections on the interface module on a regular basis, especially if the interfaces are not being used.



### WARNING!

Live parts in contact with cleaning agent

Electric shock, material damage

- Disconnect the device from the mains supply before starting any cleaning work.
- Water and other fluids should not be allowed to enter the device.



### NOTICE!

Repairs performed by unauthorized persons

Material damage

- Only specialized personnel are permitted to carry out repairs.

1. Use a damp cloth or brush to remove any dust and dirt deposits.
2. When using compressed air: Always set a low working pressure to prevent mechanical damage to the connections.



*If you have any questions about technical modifications, please contact LAUDA Service, see ↗ Chapter 1.6 “Contact LAUDA” on page 6.*

## 9 Faults

If a fault occurs, the interface distinguishes between different message types, e.g. alarms, errors and warnings. The procedure for rectifying a fault depends on the device. Follow the corresponding instructions in the operating manual accompanying the constant temperature equipment.



*If you are unable to rectify a fault, please contact LAUDA Service, see ↗ Chapter 1.6 “Contact LAUDA” on page 6.*

### 9.1 Error messages

If an error occurs on the Profibus module, the error number is sent to the Master as an external diagnostic byte.

The Profibus interface recognized the following error types:

- Error - Errors are reported continuously on the constant temperature equipment; the LED on the interface lights up. In this case, the Profibus is not in the "Data Exchange" state.
- Warning - Warnings are displayed on the constant temperature equipment for a period of 1 minute for information purposes. The LED on the interface does not light up; data transfer is still possible.

Table 22: Profibus error messages

Number	Type	Error	Measures
0	Reserved		
1	Error	Hardware error	Switch the constant temperature equipment off and on again.  If the error message appears again, replace the interface or have it repaired.
2	Error	EEPROM error	
3	Error	Internal memory error	
4	Error	Fieldbus hardware error or incorrect fieldbus ID	
5	Error	Script error	
6	Reserved		
7	Warning	RS transmit buffer overflow	Warnings are reset automatically after 1 minute.
8	Warning	RS receive buffer overflow	
9	Warning	RS timeout	
10	Warning	General fieldbus error	
11	Warning	Parity error	
12	Reserved		
13	Warning	Configuration error on Profibus Master	
14	Warning	Fieldbus buffer overflow	
15	Reserved		

## 9.2 Troubleshooting

If Profibus communication errors occur, the following information provides initial guidance:

### Error source: Profibus configuration

- The address preset on the Profibus interface does not match the address assigned in the Master.
- There are too many Masters on the bus (e.g. parameterization tools). The individual Master does not have sufficient time on the bus to control the system correctly.
- There are large gaps between the assigned addresses. It takes longer to transfer tokens between two masters if there are large gaps.
- Too many devices are connected to the Profibus segment of the constant temperature equipment. A maximum of 32 devices per segment are permitted when transmitting according to the RS485 standard.
- A device with a different transmission technology was connected to the Profibus segment (e.g. current-modulated transmission technology according to IEC 61158-2, H1, Profibus PA).

### Error source: Bus line

- The bus line was not connected to the Profibus interface. Data lines A and B (or + and -) were mixed up.
- One bus line is inadequate (high contact resistances) or faulty. The use of standard Profibus cables is recommended.
- The bus line is too long. The maximum length depends on the selected transmission speed.
- The bus line type is not suitable:
  - Type B cables are only suitable for transmission speeds up to 1.5 Mbaud and shorter bus lengths.
  - Type A cables can be used for speeds of up to 12 Mbaud and achieve longer maximum bus lengths than type B cables, even at transmission speeds below 1.5 Mbaud.
- The bus line was laid near to high-current cables.
- The branch lines used were too long. The branch lines cause reflections that can falsify signals. Avoid using branch lines wherever possible.

### Error source: Cable shield

- The bus lines used were not shielded.
- The braided shield and the foil shield underneath, if available, are not connected to the protective earth at both ends (e.g. connector shell).
- EMC interference disrupts the transmission momentarily or permanently due to the inadequate shielding of the bus line.
- An equalizing current may flow through the shield connected at both ends due to potential differences between the grounding points. An additional equipotential bonding line can be used between the connected devices to minimize the consequential effects.
- The integral bus termination of a Profibus device has been set incorrectly.



**Error source: Bus termination**

- The Profibus is not terminated at both ends by active bus terminations.
- The resistors of the active bus terminations are not switched on. They must be activated on the first and last device of a Profibus segment.
- There is no voltage supply to the active bus terminations.
- A bus termination at the center of the Profibus segment is switched on.
- The integral bus termination of a Profibus device has been set incorrectly.

## 10 Decommissioning



**WARNING!**  
Touching live parts

Electric shock

- Disconnect the device from the power supply before starting any installation work.
- Always observe safety measures against electrostatic discharge.

Decommission the interface module by removing it from the constant temperature equipment:

1. Observe the information in ↗ Chapter 5.1 “Installing the interface module” on page 11. Proceed in reverse order to remove.
2. Always attach the LiBus connecting cable to the inside of the module slot cover.
3. Fit the cover to the vacant module slot to protect the constant temperature equipment against the ingress of dirt.
4. Protect the interface module against static charging before placing it in storage. The storage location must meet the ambient conditions specified in the technical data.
5. If you intend to dispose of the module, please read the information in ↗ “Old device” on page 35 first.

## 11 Disposal

### Packaging

The packaging normally consists of environmentally friendly materials that can be easily recycled when properly disposed of.

1. Dispose of packaging materials in accordance with the applicable disposal guidelines in your region.
2. Comply with the requirements of Directive 94/62/EC (packaging and packaging waste) if disposing of the product in a member state of the EU.

### Old device



The device must be properly decommissioned and disposed of at the end of its life cycle.

1. Dispose of the device in accordance with the applicable disposal guidelines in your region.
2. Comply with Directive 2012/19/EU (WEEE Waste of Electrical and Electronic Equipment) if disposing of the product takes place in a member state of the EU.

## 12 Accessories

Complete connection cables and plugs are available for assembling cables.

Table 23: Accessories

Item	Catalog number
LiBus module box; extension of constant temperature equipment by up to two interface modules with large cover	LCZ 9727
D-Sub 9 socket, complete	EKS 210
RS 232 cable, shielded, 2 m in length	EKS 037
RS 232 cable, shielded, 5 m in length	EKS 057

## 13 Technical data

Feature	Unit	Value / version
<b>Interface module</b>		
Catalog number	[–]	LRZ 917
Size of module slot, W x H	[mm]	51 x 27
External dimensions (excluding connectors), W x H x D	[mm]	56 x 37 x 82
Weight	[kg]	0.12
Operating voltage	[V DC]	24
Maximum current consumption	[A]	0.2
Connection type	[–]	D-Sub socket, 9-pin
<b>Ambient conditions</b>		
Air humidity	[%]	Maximum relative air humidity 80 % at 31 °C and up to 40 °C, 50 % with linear decrease.
Ambient temperature range	[°C]	5 – 40
Temperature range for storage	[°C]	5 – 50

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