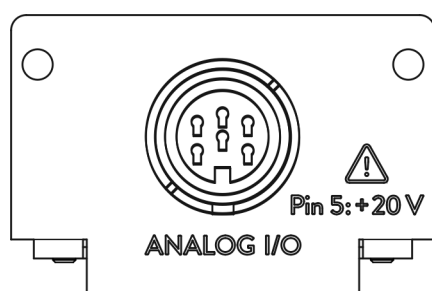


Operation manual

Interface module LRZ 912

Analog module



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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 analog interface module (catalog no. LRZ 912).

Standard signals can be read in and out via the analog interface by way of a current or voltage. The interface functions provided for this purpose are described in chapters ↗ Chapter 7.2.1 “Read commands” on page 18 and ↗ Chapter 7.2.2 “Write commands” on page 19.

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 may only be used in the following areas:

- Production, quality assurance, research and development in an industrial environment

The interface module is an accessory item that is used to control and monitor the LAUDA constant temperature equipment. The interface module is built into the device and connected to the 24 volt supply. 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 on a non-compatible device
- Outdoor operation
- Operation in a potentially explosive area
- Operation after incomplete assembly
- Operation using defective cables or connections or those that do not confirm to standards
- Operation under medical conditions in accordance with DIN EN 60601-1 or IEC 601-1

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 analog 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

Email: 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 26.



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 analog module is designed for installation in constant temperature equipment that supports the analog interface. Standard signals can be read in and out via the analog interface by way of a current or voltage.

4.2 Structure

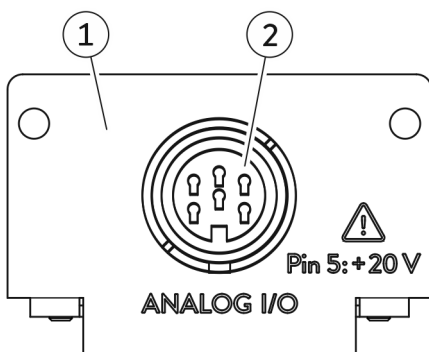


Fig. 1: Analog module

- 1 Cover with holes for M3x10 fastening screws
- 2 6-pin socket, see Chapter 6.1 “Contact assignment” on page 14

The analog module has 2 inputs and 2 outputs, which are adapted to the requirements of the respective constant temperature equipment independently of one another.

4.3 Coding switch

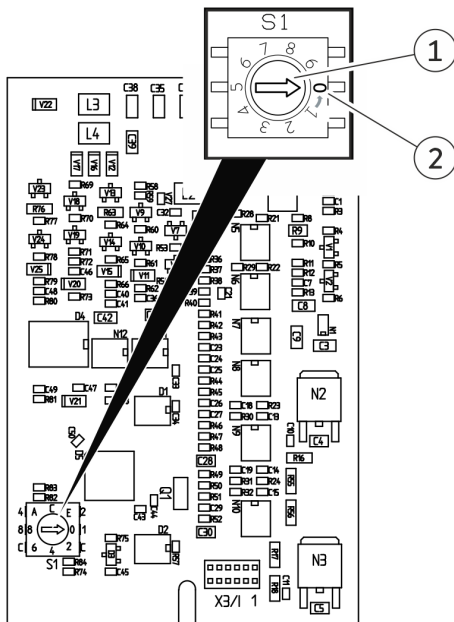


Fig. 2: Analog module coding switch

Valid for analog modules with coding switch:

The printed circuit board of the analog module has a coding switch for internal addressing.

- The adjusting wheel on the analog module must be set to **position 0** (factory setting) in order for the module to operate.



*Check the coding switch setting before installing the analog module in constant temperature equipment. If the adjusting wheel does not indicate **position 0**, change the setting accordingly.*

Change the setting:

1. Use a slotted screwdriver to set the adjusting wheel (1) on the coding switch.
2. Turn the adjusting wheel (1) to **position 0** (2).

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.

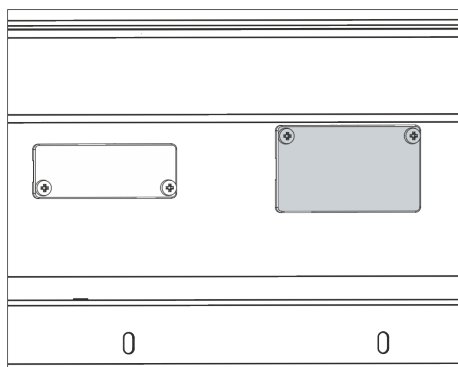


Fig. 3: Removing the cover (schematic diagram)

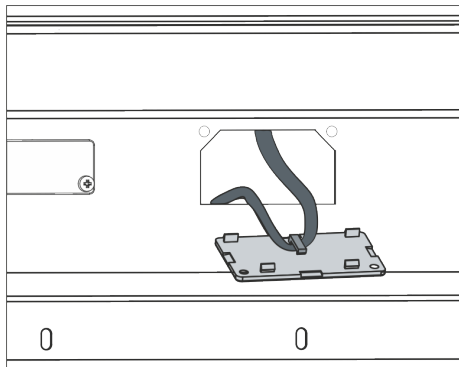


Fig. 4: Detaching the LiBus ribbon cable (schematic diagram)

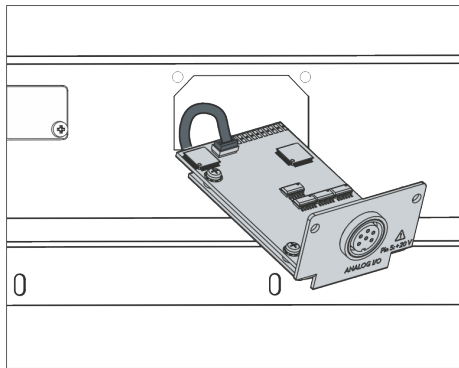


Fig. 5: Connecting the interface module (schematic diagram)

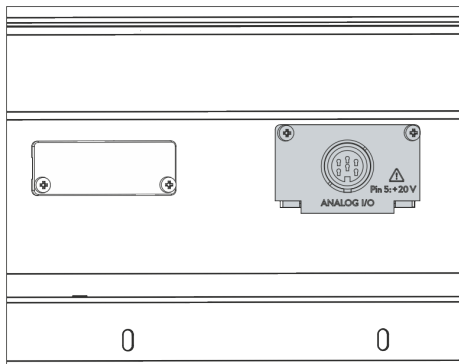


Fig. 6: Securing the cover (schematic diagram)

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

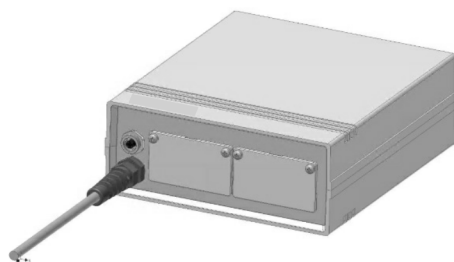


Fig. 7: LiBus module box, catalog no. LCZ 9727

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.

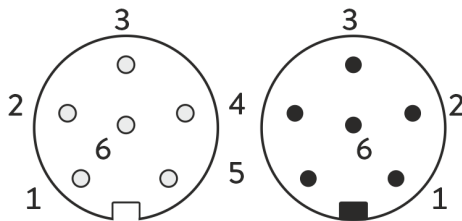


Fig. 8: Socket / plug contacts

The analog interface is designed as a 6-pin circular connector with screw plug.

Table 1: Analog interface contact assignment

Contact	Function
1	Output 1
2	Output 2
3	0 V reference potential
4	Input 1
5	+20 V distribution voltage for external sensor with electronic evaluation unit
6	Input 2

Visit the following link for information on applied resistances ➔ Chapter 13 “Technical data” on page 28.

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

The analog interface is used to specify analog values for the functions of LAUDA constant temperature equipment via the inputs or derive them via the outputs. The relevant settings are configured in the menu of the constant temperature equipment.

7.1 Menu structure



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

The menu for configuring the interface can be accessed from the *Modules* area in the main menu of the relevant constant temperature equipment:

All operating units except the Master

Menu → Modules → Analog interf.

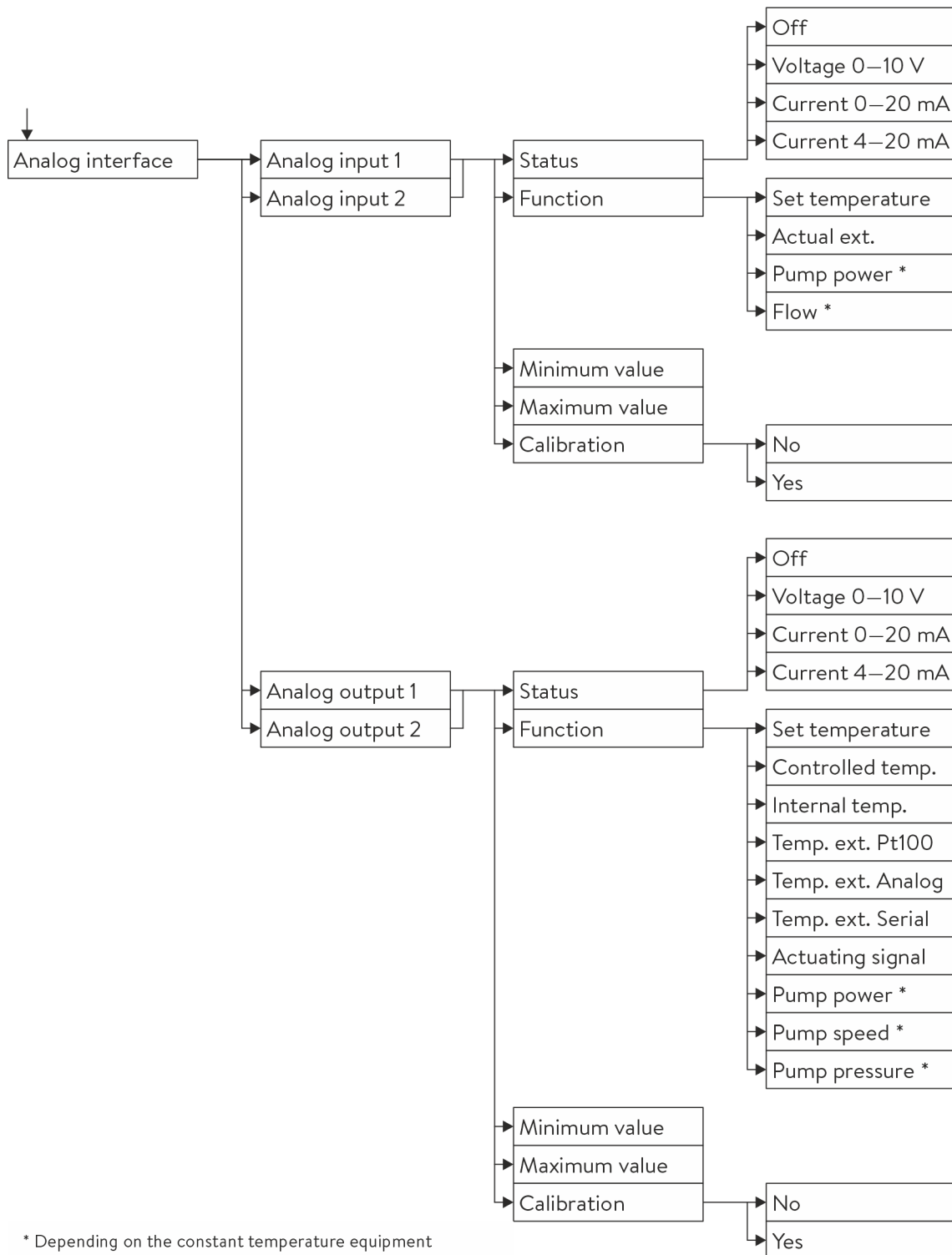


Fig. 9: Analog interface menu

Master operating unit

(Only available for product lines Proline and Integral XT.)

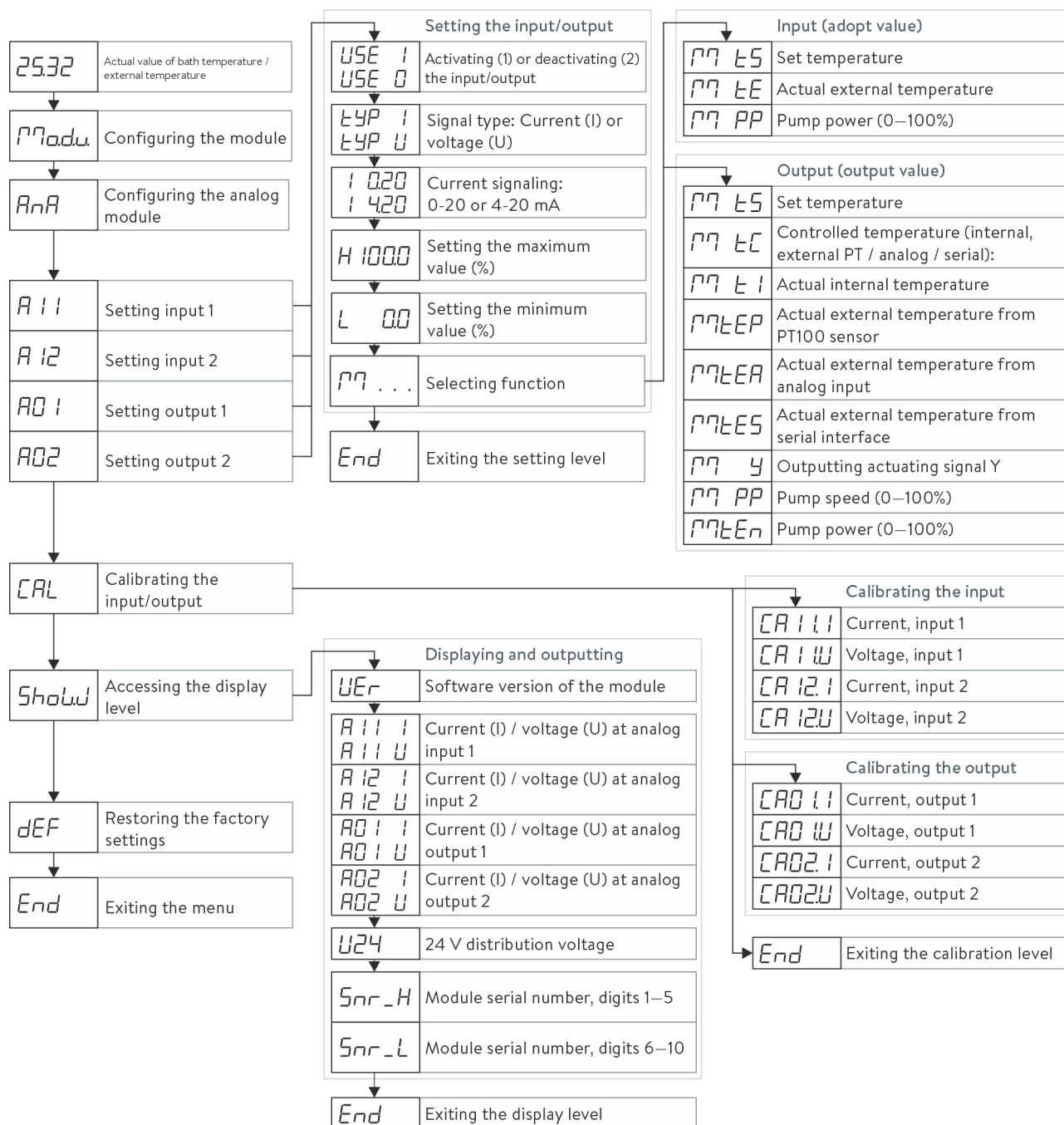


Fig. 10: Analog interface to Master operating unit menu

7.2 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".

7.2.1 Read commands

The analog module recognizes the following read commands, which you can use to query the operating data of the constant temperature equipment:

Table 2: Temperature

ID	Function	Unit
2	Temperature set point	[°C]
4	Bath temperature (outflow temperature)	[°C]
5	Controlled temperature (internal / external Pt / external analog / external serial)	[°C]
14	External temperature TE (Pt)	[°C]
16	Actual value of external temperature (via interface)	[°C]

Table 3: Pump

ID	Function	Unit
6	Outflow pressure / pump pressure, relative to the atmosphere	[bar]
12	Flow rate	[l/min]
20	Pump power	[W]
22	Pump speed	[rpm]

Table 4: Actuating signal

ID	Function	Unit
11	Controller actuating signal	%

7.2.2 Write commands

The analog module recognizes the following write commands, which you can use to transfer values to the constant temperature equipment:

Table 5: Temperature

ID	Function	Unit
1	Temperature set point	[°C]
15	Actual value of external temperature (via interface)	[°C]

Table 6: Pump

ID	Function	Unit
19	Pump power	[W]

7.2.3 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	✓	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	–	–	–	–	✓
11	✓	✓	✓	✓	✓	✓	✓	✓
14	✓	✓	✓	✓	✓	✓	✓	✓
15	✓	✓	✓	✓	✓	✓	✓	✓
16	✓	✓	✓	✓	✓	✓	✓	✓
19	✓	–	–	–	✓	✓	✓	✓
20	✓	–	–	–	✓	✓	✓	✓
22	✓	–	–	–	✓	✓	✓	✓

* Equipment type as per rating label

7.3 Configuring the interface

The inputs and outputs on the analog interface can be controlled using either current values or voltage values. The following signaling parameters are available:

Signaling (<i>status</i>)	Upper limit	Lower limit
0 – 10 V	0 V	10 V
0 – 20 mA	0 mA	20 mA
4 – 20 mA	4 mA	20 mA

The inputs and outputs of the analog interface can be configured independently of one another. The signaling "4 – 20 mA" also allows the detection of signal losses (decrease to 0 mA).

The working range of the selected function can be scaled freely by assigning limit values accordingly:

Example: Analog input 1 with 0 – 20 mA signaling, set temperature function

- *Minimum value* = 0 assigns the value 0 °C as the lower limit.
- *Maximum value* = 100 assigns the value 100 °C as the upper limit.

When this setting is selected, set temperatures between 0 and 100 °C can be configured by changing the current value from 0 to 20 mA. For this sample configuration, the following settings must be selected in the analog interface menu:

Menu → Analog interf. → Analog input 1

1. Select the value *Current 0 – 20 mA* for the *Status* parameter.
2. Select the value *Set temperature* for the *Function* parameter.
3. Enter the value 0 for the *Minimum value* parameter.
4. Enter the value 100 for the *Maximum value* parameter.
5. Configure all other settings in the same way.

7.4 Calibrating the interface

In order to guarantee continued safe operation, the accuracy of the transmitted signals must be checked regularly and the inputs and outputs of the interface recalibrated. After calibration, the inputs and outputs usually deviate by less than 0.1 % of the full-scale value.



The current input 0 – 20 mA and 4 – 20 mA is calibrated at 0 mA and 20 mA.
Calibration at 4 mA is not possible.

Procedure for current input 0 – 20 mA and 4 – 20 mA

Menu → Analog interface → Analog input 1 or 2

1. Connect analog input 1 to a current transmitter.
2. Select the value *Yes* for the *Calibration* parameter in the interface menu.

3. Set the current transmitter to the value displayed for the lower signaling limit (0 mA).
If this is not possible, disconnect the analog input from the current transmitter and short-circuit it (0 mA).
4. Select *OK* to start calibrating the lower limit.
5. Set the current transmitter to the value displayed for the upper signaling limit (20 mA).
6. Select *OK* to start calibrating the upper limit.
7. Proceed in the same way to calibrate other inputs or outputs.

Procedure for voltage input 0 – 10 V

Menu → Analog interface → Analog input 1 or 2

1. Connect analog input 1 to a voltage transmitter.
2. Select the value *Yes* for the *Calibration* parameter in the interface menu.
3. Set the voltage transmitter to the value displayed for the lower signaling limit (0 V).
4. Select *OK* to start calibrating the lower limit.
5. Set the voltage transmitter to the value displayed for the upper signaling limit (10 V).
6. Select *OK* to start calibrating the upper limit.
7. Proceed in the same way to calibrate other inputs or outputs.

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.

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 26 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

The following LAUDA accessories are available for assembling the required connection cables:

Article	Catalog number
LiBus module box; extension of constant temperature equipment by up to two interface modules with large cover	LCZ 9727
Coupling connector, 6-pin	EQS 057

13 Technical data

Feature	Unit	Value / version
Interface module		
Catalog number	[–]	LRZ 912
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]	0.1
Operating voltage	[V DC]	24
Maximum current consumption	[A]	0.1
Number of inputs / outputs	[–]	2 / 2
Connection type	[–]	Circular connector, socket, 6-pin
Distribution voltage (contact 5)		
Version	[–]	Supply of an external sensor with electronic evaluation unit
Voltage	[V]	+20
Maximum current	[A]	0.1
Resistances		
Inputs, current	[Ohm]	< 100
Inputs, voltage	[Ohm]	> 50
Outputs, current (load)	[Ohm]	< 400
Outputs, voltage (load)	[Ohm]	> 10
Ambient conditions		
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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