

Read before installation.
 Keep for future use.

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Safety

Read the user manual for the basic unit (FRONT and BASE modules) and the corresponding measuring and communication modules, observe the technical specifications, and follow the safety instructions in the safety guide (package contents for the basic unit Protos II 4400).

The user manual, safety guide, and other product information can be downloaded from www.knick.de.

NOTICE! Potential damage.

Never try to open the module. Protos modules cannot be repaired by the user. For inquiries regarding module repair, please contact Knick Elektronische Messgeräte GmbH & Co. KG at www.knick.de.

Intended Use

The module is used to measure oxygen in liquids and gases using an SE 740 series optical sensor. It measures the partial pressure of oxygen, air pressure, and temperature simultaneously. It is also able to calculate and display the oxygen saturation and concentration as well as volume concentration in gases.

The LDO 3400-170/4400-170 module is not intended for operation in locations subject to explosion hazards.

Note: The specifications on the module's rating plate take precedence.

Package Contents

- Measuring module
- Installation Guide
- Test report 2.2
- Adhesive labels with terminal assignments

Check all components for damage upon receipt. Do not use damaged parts.

Operating states

The function check (HOLD) operating state is active:

- During calibration (only the corresponding channel)
- During maintenance
- During parameter setting
- During the automatic rinse cycle (use of the rinse contact)

The behavior of the current outputs depends on the parameter setting, i.e., they may be frozen at the last measurement or set to a fixed value.

For detailed information, refer to the user manual for the basic unit (FRONT and BASE modules).

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This document was created on August 29, 2019. The latest documents are available on our website below the corresponding product description.

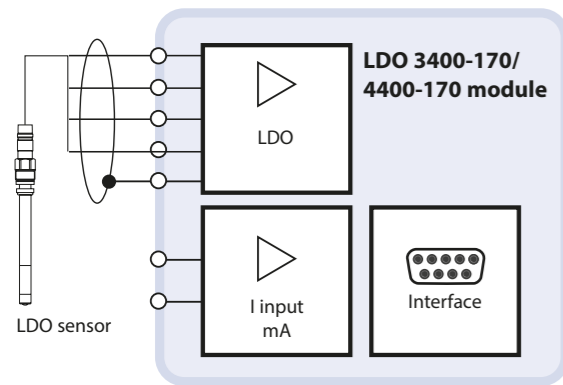
Installation guides can be downloaded in the following languages: German, English, French, Spanish, Portuguese



TI-201.170-KNE02

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Device Overview/Module Concept

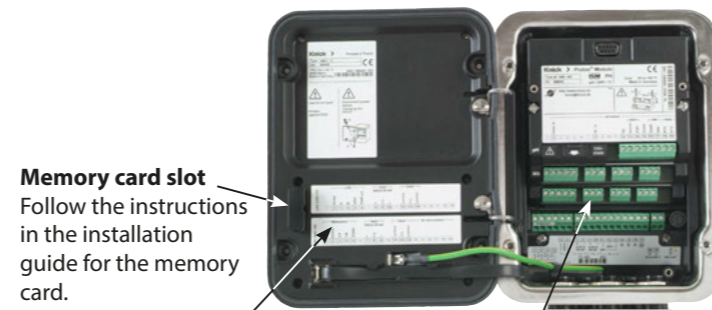


Module Compatibility

	Protos 3400	Protos 3400X	Protos II 4400	Protos II 4400X
Protos LDO 3400-170 module	x	-	x*)	-
Protos LDO 4400-170 module	-	-	x	-

*) Module firmware version 02.01.00 or higher

WARNING! Shock potential. Make sure the device is de-energized before reaching into the terminal compartment.



Memory card slot
 Follow the instructions in the installation guide for the memory card.

Terminal plate adhesive label ("concealed" modules)
 The adhesive labels (Package Contents) for the modules at slot 1 or slot 2 can be affixed here. This simplifies maintenance and service.

Module configuration
 Any combination of up to 3 measuring and communication modules is possible. Module identification: Plug & Play

Inserting the Module

CAUTION! Electrostatic discharge (ESD). The modules' signal inputs are sensitive to electrostatic discharge. Take measures to protect against ESD before inserting the module and wiring the inputs.

Note: Strip the insulation from the wires using a suitable tool to prevent damage.

1. Switch off the power supply to the device.
2. Open the device (loosen the 4 screws on the front).
3. Plug the module into the slot (D-SUB connector); see the figure below.
4. Tighten the module's fastening screws.
5. Connect the sensor cable.
6. Close the device by tightening the screws on the front.
7. Switch on the power supply.
8. Make the parameter settings.

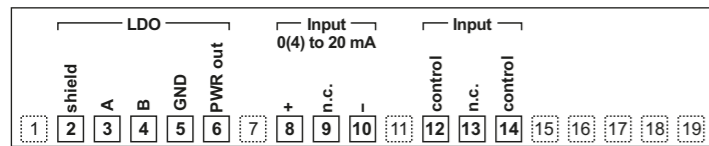


NOTICE! Moisture ingress. Cable glands must be tightly sealed. Insert filler plugs or sealing inserts if necessary.


Wiring

Terminal	Assignment	Wire color
2	Shield	Black
3	RS 485 A	Gray
4	RS 485 B	Pink
5	GND (-)	Brown
6	PWR OUT (+)	White

The signal from an external pressure transmitter can be fed in through the external current input (terminals 8 and 10). This enables automatic pressure correction for oxygen measurement.



Messages/Troubleshooting (for detailed tables, see the user manual)

Error	Message <small>(Diagnostics menu: Message list)</small>	Possible causes	Remedy
	Display is blank	FRONT or BASE power supply interrupted input fuse has tripped Display switch-off is active	Check the power supply Replace the fuse (500 mA T) Deactivate the display switch-off
	No measurement, no error message	Module not plugged in correctly	Install the module correctly Check the measurement display under "Parameter setting / Administrator level / FRONT Module"
	Sensoface 	Sensor not calibrated/adjusted Slope (Stern-Vollmer constant) or zero (phase angle) outside permissible range Sensor wear Sensor cable defective	Calibrate and adjust Calibrate and adjust, replace sensor cap if necessary Check the sensor connection Clean the sensor and replace if necessary Replace the sensor cable
B073/ B078	Current I1/I2, load error	Open current output I1/I2: Current loop not closed, cable interrupted	Check the current loop Deactivate the current outputs
F232	Module configuration Ex/safe area	Ex and safe area modules have been inserted.	Select a uniform configuration (either Ex or safe area)
D010	Saturation %air range	No sensor connected, sensor cable defective Sensor connected incorrectly Wrong operating mode selected	Connect the sensor, check the sensor cable, and replace if necessary Check the sensor connection Adjust the operating mode
D015	Temperature range		
D120	Wrong sensor	Sensor does not match the selected process variable	Replace the sensor, change the process variable
D121	Sensor error	Error in default/specific data, sensor is defective.	Replace the sensor

Menu Overview for the LDO 3400-170/4400-170 Module

Parameter Settings

Input filter	Pulse suppression
Sensor data	Measurement in liquids/gases, Sensoface, sensor monitoring
Cal presettings	Cal saturation/concentration, calibration timer
Pressure correction	External pressure transmitter, current input, pressure during measurement/calibration
Salinity correction	Salinity, chlorinity, conductivity
Messages	Saturation %air, saturation %O ₂ , concentration, partial pressure, air pressure

Calibration/Adjustment

Automatic – Water
Automatic – Air
Product calibration/adjustment:
• Saturation
• Concentration
• Partial pressure
Zero correction

Maintenance

Sensor monitor	For validation of sensor and complete signal processing
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Diagnostics

Message list	List of all messages
Logbook	Shows the last events with date and time
Meas. point description	Shows the tag number and annotation (input in system control)
Device description	Hardware version, serial number, (module) firmware, options
Module diagnostics	Internal function test
Sensor monitor	Shows the values currently measured by the sensor
Cal record	Dates of the last adjustment/calibration
Sensor diagram	Graphic display of the current sensor parameters
Sensor wear monitor	Shows sensor wear

Specifications (Extract)

Input for sensor	SE740 optical oxygen sensor
Display ranges	
Saturation (-10 ... 80 °C)	0.0 ... 999.9 % air 0.00 ... 99.99 % O ₂
Concentration (-10 ... 80 °C)	0.00 ... 99.99 mg/l (ppm)
Volume concentration in gas	0.00 ... 99.99 vol%
Partial pressure	0 ... 9999 mbar
Pressure correction ¹⁾	
Air pressure	
Manual	0 ... 9999 mbar
External	0 ... 9999 mbar (via current input 0(4) ... 20 mA)
Salinity correction	0.0 ... 45.0 g/kg
Temperature input	
Measuring range	-10 ... 130 °C / 14 ... 266 °F
Resolution	0.1 °C/°F
Measurement error ²⁾	0.2 % meas. value + 0.5 K (< 1 K at T > 100 °C / 212 °F)
Current input ¹⁾	0(4) ... 20 mA for absolute or differential pressure transmitter
Pressure range	0 ... 9999 mbar
Current range	0(4) ... 20 mA / 50 Ω Start/end user definable within the pressure range
Resolution	< 1%

RoHS conformity	According to EU directive 2011/65/EU
EMC	EN 61326-1, EN 61326-2-3, NAMUR NE 21
Emitted interference	Industrial applications ³⁾ (EN 55011 Group 1 Class A)
Interference immunity	Industrial applications
Lightning protection	According to EN 61000-4-5, installation class 2
Rated operating conditions	
Ambient temperature	-20 ... 55 °C / -4 ... 131 °F
Relative humidity	10 ... 95%, non-condensing
Transport/storage temperature	-20 ... 70 °C / -4 ... 158 °F
Screw clamp connector	Single or stranded wires up to 2.5 mm ²

- 1) User-defined
- 2) Nominal operating conditions, ± 1 count, plus sensor error
- 3) This equipment is not designed for domestic use, and is unable to guarantee adequate protection of the radio reception in such environments.