



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(X)) – for Ex versions, additionally the information provided in the documents in the Package Contents.

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

Maintenance

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 an input module for conductivity measurement with standard analog 2-electrode or 4-electrode sensors.

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

Package Contents

- Measuring module
- Installation Guide
- Test Report 2.2 acc. to EN 10204
- Adhesive label with terminal assignments
 For Ex version COND 3400X-041:
- Appendix to certificates (KEMA 03ATEX2530, IECEx DEK 11.0054)
- EU Declaration of Conformity
- Control Drawings

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).

Headquarters

Beuckestr. 22 • 14163 Berlin
 Germany
 Phone: +49 30 80191-0
 Fax: +49 30 80191-200
info@knick.de
www.knick.de

Local Contacts

www.knick-international.com

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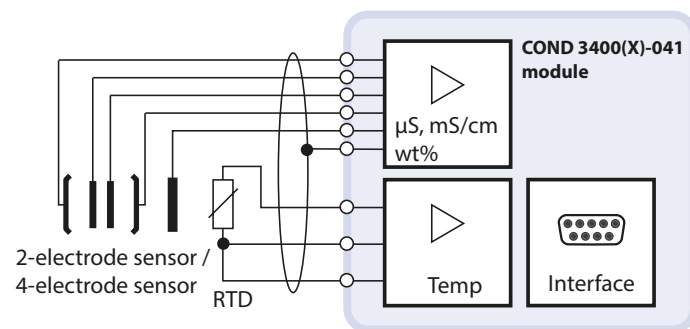
This document was published on November 13, 2020
 The latest documents are available for download on the website under the corresponding product description.



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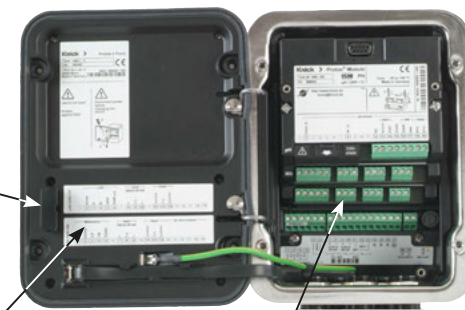
Device Overview/Module Concept



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.

NOTICE! 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 figure on the right.
4. Tighten the module's fastening screws.
5. Connect the sensor and separate temperature probe if necessary, see "Wiring" on the next page.
6. Check whether all connections are correctly wired.
7. Close the device and tighten the screws on the front.
8. Switch on the power supply.

CAUTION! Incorrect parameter settings or adjustments can result in incorrect outputs. Protos II 4400(X) must therefore be commissioned by a system specialist, all its parameters must be set, and it must be fully adjusted.



CAUTION! Risk of losing the specified ingress protection.
 Fasten the cable glands and screw together the housing correctly. Observe the permissible cable diameters and tightening torques (see the specifications of the basic unit). Insert blanking plugs or sealing inserts if necessary.

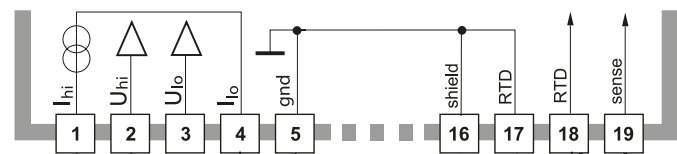
Wiring

(for detailed diagrams, see the user manual)

Note: Be sure to connect the shielding properly.

	4-electrode sensor	2-electrode coax sensor	SE 604 2-electrode coax sensor	SE 610 2-electrode sensor	SE 620 2-electrode sensor	SE 630 2-electrode sensor	4-electrode sensor (SE 600/ SE 603)	InPro 7100 4-electrode sensor/ InPro 7000 2-electrode sensor
1 I _{hi}	Current electrode Hi	] Electrode 1	White	] Brown	Coax core (clear)	Brown	Gray	White/blue
2 U _{hi}	Voltage electrode Hi		Pink		Coax shield (red)	Yellow	Pink	White
3 U _{lo}	Voltage electrode Lo	] Electrode 2	Brown	] White	Gray	Green	Blue	Blue
4 I _{lo}	Current electrode Lo		Gray		Blue	White	Red	Black
5 gnd			Blue				Brown*)	Cable shield
16 shield	Cable shield	Cable shield	Cable shield (black)	Cable shield	Cable shield (yellow/green)	Cable shield (black)	Cable shield (yellow/green)	Shield (transparent)
17 RTD	Temp. probe	Temp. probe	Green	Green	Green	Gray	White/green	Red
18 RTD	Temp. probe	Temp. probe	Red	Yellow	White	Red	Yellow	Green
19 sense	Temp. probe Sense	Temp. probe Sense	Yellow			Pink	Green	

] = insert jumper] = jumper if there is no "Sense" connection *) SE 600: equipotential bonding, brown wire
SE 603: Additional electrode must be installed for equipotential bonding (or jumper 4-5)



Menu Overview for the PH 3400(X)-041 Module

Parameter Setting	
Input filter	Pulse suppression
Sensor data	Select the sensor type, cell constant, temperature detection, Sensocheck
Cal presettings	Select calibration solution (NaCl/KCl), product calibration via conductivity/concentration ¹⁾
TC process medium	Set the temperature compensation (off, linear, EN 27888, ultrapure water ²⁾)
Concentration	With add-on function SW3400-009/FW4400-009
USP function	Monitoring of ultrapure water
Messages	Conductivity, resistivity, concentration, temperature, salinity: off, max. device limits, variable limits

Calibration/Adjustment

Automatic with standard calibration solution
Manual entry of calibration solution
Product calibration/adjustment
Data entry – premeasured sensor
Temperature probe adjustment (with Protos II 4400(X))

- 1) With Protos II 4400(X) and add-on function FW4400-009
- 2) With add-on function SW3400-008/FW4400-008

Maintenance

Sensor monitor	For validation of sensor and complete signal processing
Temperature probe adjustment	(with Protos 3400(X))

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/adj record	Dates of the last adjustment/calibration

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

Error	Message (Diagnostics menu: Message list)	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"
	Measured value does not match expected value.	Wrong sensor selected, wrong cell constant	Adjust the sensor parameter setting
	Sensoface 😞	Sensor not calibrated/adjusted Sensor cable defective	Calibrate and adjust Check the sensor connection Clean and replace the sensor 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)
C010	Conductivity range	No sensor connected, sensor cable defective, sensor connected incorrectly	Connect the sensor, check the sensor cable, and replace if necessary Check the sensor connection
C015	Temperature range		
	Displayed measured value: 0.00 µS		

Specifications (Excerpt)

Cond input	Operation with 2-electrode or 4-electrode sensors
Explosion protection (COND 3400X-041)	For entity parameters, see attachment to certificates or control drawings.
Conductivity	0.000 µS/cm...1999 mS/cm
Resistivity	0.5 Ω cm...999 MΩ cm
Concentration	0.00 ... 100.0 wt%
Salinity	0.0 ... 45.0 g/kg (0...35 °C)
Measuring range	4-electr. sensors: 0.1 µS x c...2000 mS x c ²⁾ 2-electr. sensors: 0.1 µS x c...200 mS x c ²⁾
Display ranges	Resolution is determined by cell constant Cell constant Conductivity resolution < 0.1200 cm ⁻¹ 0.000 µS/cm < 1.200 cm ⁻¹ 00.00 µS/cm < 12.00 cm ⁻¹ 000.0 µS/cm < 120.0 cm ⁻¹ 0.000 mS/cm ≥ 120.0 cm ⁻¹ 00.00 mS/cm
Response time (T ₉₀)	Approx. 1 s
Measurement error ³⁾	< 0.5 % meas. value + 0.2 µS x c ²⁾
Temperature input ¹⁾	Pt100/Pt1000/NTC 30 kΩ/Ni 100 3-wire connection, adjustable
Measuring range	-50...250 °C / -58...482 °F (Pt100/Pt1000) -10...150 °C / 14...302 °F (NTC 30 kΩ) -50...180 °C / -58...356 °F (Ni 100)
Resolution	0.1 °C/°F
Measurement error ³⁾	0.2 % meas. value + 0.5 K

Temperature compensation, media-related ¹⁾	Without Linear characteristic 00.00 ... 199.99 %/K (reference temperature user-defined) NLF Natural waters acc. to EN 27888 Ultrapure water with NaCl traces (0...120 °C) ⁴⁾ Ultrapure water with HCl traces (0...120 °C) ⁴⁾ Ultrapure water with NH ₃ traces (0...120 °C) ⁴⁾ Ultrapure water with NaOH traces (0...120 °C) ⁴⁾
Permissible cell constant	0.0050 ... 199.99 cm ⁻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 ⁵⁾ (EN 55011 Group 1 Class A)
Interference immunity	Industrial applications
Lightning protection	to EN 61000-4-5, Installation class 2
Rated operating conditions (module installed)	
Ambient temperature	Safe area: -20 ... 55 °C / -4 ... 131 °F Ex: -20 ... 50 °C / -4 ... 122 °F
Relative humidity	5 ... 95 %
Climatic class	3K5 according to EN 60721-3-3
Location class	C1 according to EN 60654-1
Transport/storage temperature	-20 ... 70 °C / -4 ... 158 °F
Screw clamp connector	Tightening torque 0.5 ... 0.6 Nm Single or stranded wires 0.2 ... 2.5 mm ² Stripping length max. 7 mm
Wiring	Temperature resistance > 75 °C / 167 °F

- 1) User-definable
- 2) c = 0.0050...199.99 cm⁻¹
- 3) At rated operating conditions, ± 1 count, plus sensor error
- 4) For all waters: Reference temperature 25 °C/77 °F
- 5) This equipment is not designed for domestic use, and is unable to guarantee adequate protection of the radio reception in such environments.