

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 multiparameter module is a multifunctional communication unit that provides up to three RS-485 interfaces for simultaneous use. It enables the connection and operation of up to three Memosens sensors for simultaneous measurement of pH, oxidation-reduction potential (ORP), oxygen (add-on function FW4400-015), and conductivity (contacting, inductive) as well as the Unical 9000 electro-pneumatic controller. An analog current input that supplies a pressure transmitter signal is used for oxygen sensor pressure correction during measurement and calibration. The second and third sensor inputs (channels B and C) can be enabled via TAN (channel B: add-on function FW4400-014, channels B+C: add-on function FW4400-018). Channel C is used for Unical actuation. For a description of Unical actuation, see the Unical 9000/Protos II 4400 user manual.

Note: The specifications on the module's terminal 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 MSU4400X-180:
- Attachment 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.

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This document was published on October 11, 2022.
 The latest documents are available for download on the website under the corresponding product description.



TI-201.180-KNEN03

Module Compatibility

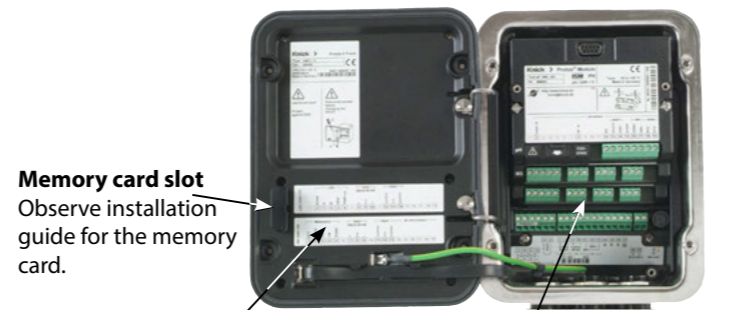
	Protos II 4400 ¹⁾	Protos II 4400X ¹⁾
Protos II MSU4400-180 module	x	-
Protos II MSU4400X-180 module	-	x

1) FRONT firmware version 01.03.xx or higher

information on the firmware version history can be found at www.knick.de.

Device Overview/Module Concept

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



Memory card slot
 Observe installation guide for the memory card.

Terminal plate adhesive label ("concealed" modules)
 The adhesive labels (package contents) for the modules in slots 1 or 2 can be affixed here. This simplifies maintenance and service.

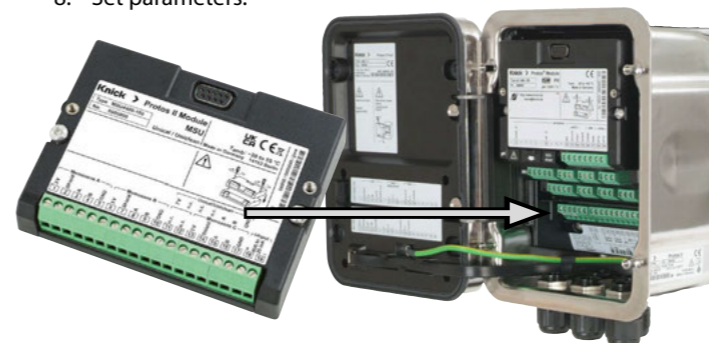
Module configuration
 Any combination of up to 3 measuring and communication modules is possible. Module identification: Plug & Play

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.

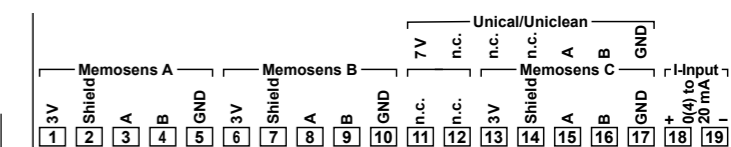
1. Switch off the power supply to the device.
2. Open the device (loosen the 4 screws on the front).
3. Plug the module into the slot (D-SUB connector) – see figure below.
4. Tighten the module's fastening screws.
5. Connect the sensor cable.
6. Close the device and tighten the screws on the front.
7. Switch on the power supply
8. Set parameters.



⚠ 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 basic unit specifications). Insert blanking plugs or sealing inserts if necessary.

Terminal Assignments

Terminal	Memosens Cable Wiring		Wiring Unical	Terminal
	Wire Color			
1	Brown (BN)	Power supply +	Channel A: Memosens	
2	Transparent	Shield		
3	Green (GN)	RS485 (A)		
4	Yellow (YE)	RS485 (B)		
5	White (WH)	Power supply – (GND)	Channel B: Memosens	
6	Brown (BN)	Power supply +		
7	Transparent	Shield		
8	Green (GN)	RS485 (A)		
9	Yellow (YE)	RS485 (B)	Channel C: Memosens/Unical	
10	White (WH)	Power supply – (GND)		
11		N.C.		
12		N.C.		
13	Brown (BN)	Power supply +	Channel C: Memosens/Unical	
14	Transparent	Shield		
15	Green (GN)	RS485 (A)		
16	Yellow (YE)	RS485 (B)		
17	White (WH)	Power supply – (GND)		
18	+	Current input		
19	-	0(4) ... 20 mA		



Menu Overview for the MSU4400(X)-180 Module

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

The process variable, operating mode, and functionality are separately selected for each channel: Parameter Setting menu ► MSU Module...

A connected Memosens sensor is displayed immediately. All typical sensor parameters are transferred to the measuring device automatically. Measuring commences immediately and the measuring temperature is recorded simultaneously without any further parameters having to be set. With "Plug&Measure", premeasured Memosens sensors can immediately be used for measurement without previous calibration.

For a description of the menus for Unical actuation, see the Unical 9000/Protos II 4400 user manual.

Parameter Settings for Memosens pH

Input Filter	Pulse suppression
Sensor Data	Sensoface, sensor monitoring
Cal Presettings	Presetting for calibration mode, calibration timer
TC Process Medium	Set the temperature compensation
Delta Function	(output value = measurement – delta value)
Messages	Option to enter individual values before a message is triggered

Parameter Settings for Memosens Redox

Input Filter	Pulse suppression
Sensor Data	Sensoface, sensor monitoring
Cal Presettings	Presetting for calibration mode
ORP / rH Value	Select reference electrode, conversion to SHE, calculate rH with or without factor
Delta Function	(output value = measurement – delta value)
Messages	Option to enter individual values before a message is triggered

Parameter Settings for Memosens Oxy

FW4400-015: Oxygen measurement

Input Filter	Pulse suppression
Sensor Data	Measurement in liquids/gases, Sensoface, sensor monitoring
Cal Presettings	Presetting for calibration mode, saturation/concentration/partial pressure product calibration, calibration timer
Pressure Correction	Pressure transmitter, current input, pressure during measurement/calibration
Salinity Correction	Salinity, chlorinity, conductivity
Messages	Option to enter individual values before a message is triggered

Parameter Settings for Memosens Cond

Input Filter	Pulse suppression
Sensor Data	Sensoface, sensor monitoring
Cal Presettings	Presetting for calibration mode, 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 FW4400-009
Messages	Option to enter individual values before a message is triggered
USP Function	Monitoring of ultrapure water

CondI Parameter Settings

Input Filter	Pulse suppression off, on
Sensor Data	Sensoface, sensor monitoring
Cal Presettings	Presetting for calibration mode, 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 FW4400-009
Messages	Option to enter individual values before a message is triggered

1) Add-on function FW4400-009

2) Add-on function FW4400-008

Calibration/Adjustment

pH	Calimatic automatic calibration/adjustment, manual, product calibration/adjustment, data entry, temperature probe adjustment
ORP	Date entry, ORP calibration/adjustment, ORP check, temperature probe adjustment
Oxy	Automatic (water/air), data entry, product calibration/adjustment, zero correction, temperature probe adjustment
Cond	Automatic with standard calibration solution, manual, product calibration/adjustment, installation factor, data entry, temperature probe adjustment
CondI	Automatic with standard calibration solution, manual, product calibration/adjustment, zero correction, installation factor, data entry, temperature probe adjustment

Maintenance

Sensor Monitor	For validation of sensor and complete measured value processing
Membrane Body Replacement	With oxygen sensors

Diagnostics

Message List	List of all messages
Logbook	Shows the most recent events with date and time
Device Description	Hardware version, serial number, (module) firmware, options
Meas. Point Description	Shows the tag number and annotation (input in system control)
Module Diagnostics	Internal function test
Further functions dependent on the connected sensor, e.g., sensor monitor, cal/adj record, sensor diagram, sensor wear monitor	

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 in Parameter Setting ► Administrator Level ► FRONT Module
	Sensoface 😞	Sensor not calibrated/adjusted Glass impedance too high, sensor cable faulty Glass impedance too low: Possible glass breakage on sensor, sensor cable faulty	Calibrate and adjust Calibrate and adjust Check the sensor connection Clean and replace the sensor if necessary Replace the sensor cable Replace the sensor 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 Non-Ex modules have been inserted.	Select a uniform configuration (either Ex or safe area)
...010	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
...015	Temperature Range		
...120	Wrong Sensor	Sensor does not match the selected process variable	Replace the sensor, change the process variable
...121	Sensor Error	Error in default/specific data, sensor is defective.	Replace the sensor

Specifications

Memosens I, II, III	Interfaces for Memosens
Power supply	U = 2.99 ... 3.22 V, I _{max} = 6 mA
Explosion protection (MSU4400X-180)	For entity parameters, see attachment to certificates or control drawings.
Interface	RS-485
Transfer rate	9,600 Bd
Max. cable length	100 m
I input	Current input 0/4 ... 20 mA / 100 Ω e.g., for external pressure signal with OXY
Start/end of scale	Can be configured within range
Characteristic curve	Linear
Measurement error	< 1% current value + 0.1 mA (± 1 count, plus sensor error)
RoHS conformity	According to EU directive 2011/65/EU
EMC	EN 61326-1, EN 61326-2-3, NAMUR NE 21
Emitted interference	Industrial applications ¹⁾ (EN 55011 Group 1 Class A)
Immunity to interference	Industrial applications
Lightning protection	to EN 61000-4-5, Installation class 2

1) This equipment is not designed for domestic use, and is unable to guarantee adequate protection of the radio reception in such environments.

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 Temperature resistance > 75 °C / 167 °F
Wiring	
Power supply (KBUS)	6.8 ... 8.0 V / ≤ 75 mA