Protos® 3400(X)

User Manual

Latest Product Information:

www.knick.de

79606

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Warranty

Defects occurring within 3 years from delivery date shall be remedied free of charge at our plant (carriage and insurance paid by sender).
Sensors, fittings, and accessories: 1 year.

Return of products under warranty

Please contact our Service Team before returning a defective device. Ship the cleaned device to the address you have been given. If the device has been in contact with process fluids, it must be decontaminated/disinfected before shipment. In that case, please attach a corresponding certificate, for the health and safety of our service personnel.

Disposal

Please observe the applicable local or national regulations concerning the disposal of "waste electrical and electronic equipment".

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CE

EC Declaration of Conformity

Protos 3400(X) Modular Process Analysis System

EG-Konformitätserklärung
EC Declaration of Conformity
Déclaration de Conformité CE

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Dokument-Nr. / Document No. / No. document	**EG90713A**

Aufbewahrung / Keeping / Garde en dépôt
Jürgen Cammin (KB)

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Produktbezeichnung / Product identification / Désignation du produit	**Protos® 3400 C, 3400 S**

auf welche(s) sich diese Erklärung bezieht, mit allen wesentlichen Anforderungen der folgenden Richtlinien des Rates übereinstimmen:
to which this declaration relates is/are in conformity with all essential requirements of the Council Directives relating to:
auquel/auxquels se réfère cette déclaration est/sont conforme(s) aux exigences essentielles de la Directives du Conseil relatives à: *)

EMV-Richtlinie / EMC directive / Directive CEM	**2004/108/EG**
Norm / Standard / Norme	**DIN EN 61326-1 / VDE 0843 Teil 20-1: 2006-10** **DIN EN 61326-2-3 / VDE 0843 Teil 20-2-3: 2007-05**
Niederspannungs-Richtlinie / Low-voltage directive / Directive basse tension	**2006/95/EG**
Harmonisierte Normen / Harmonised Standards / Normes harmonisées	**DIN EN 61010-1 / VDE 0411 Teil 1: 2002-08**

Jahr der Anbringung der CE-Kennzeichnung / Year in which the CE marking was affixed / L'année d'apposition du marquage CE **2001**

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The safety instructions contained in the documentation accompanying the product have to be observed. If the apparatus is modified without having obtained manufacturer's prior consent and/or the safety instructions are not followed, this declaration becomes void. /
Il est impératif de respecter les instructions de sécurité dans la documentation fournie avec le produit.. En cas de modification de l'appareil sans l'accord du fabricant et/ou en cas de non-respect des instructions de sécurité, cette déclaration perd sa vigueur.

Ausstellungsort, -datum / Place and date of issue / Lieu et date d'émission	**Berlin, 13.07.2009**

Knick Elektronische Messgeräte GmbH & Co. KG

Wolfgang Feucht
(Geschäftsführer / C.T.O.)

ppa.
Bernhard Kusig
(Vice President Marketing/Sales)

Table of Contents

Table of Contents

Table of Contents

Table of Contents

Intended Use

The Protos 3400(X) modular process analysis system is preferably used to measure and process electrochemical quantities in liquids. It has a modular design and consists of the BASE power supply unit, the FRONT door and different measuring and communication modules.
Protos 3400X is intended for operation in locations subject to explosion hazards which require equipment of Group II, device category 2(1), gas/dust.
Protos 3400(X) is a flexible measuring system for continuous measurements in the field of liquid analysis. Thanks to its modular design, it can be easily adapted to your measuring task. Flexible use of plug-in modules allows combined measurements as well as later expansions or modifications. The measured variables depend on the measuring modules installed. Communication modules are available for further processing of the output signals. The sturdy enclosure (IP 65) can be wall or pipe mounted or fixed into a control panel. The version with hygienic, polished stainless steel enclosure allows application in the field of biotechnology, food processing, and in the pharmaceutical industry. The Protos version with coated steel enclosure – extremely corrosion resistant – has been developed for application in the chemical industry, environmental engineering, water and waste-water treatment, and for application in power plants.

Caution!
Never expose the display to direct sunlight!
At ambient temperatures below 0°C, the legibility of the LC display may be reduced. This does not impair the device functions.

Package Contents

- Protos 3400(X) basic unit (FRONT and BASE modules)
- Wall-mount kit
- Test Certificate
- This user manual
- CD-ROM with complete documentation (German, English, French)
  - Instruction manuals for all available modules
    incl. EC Declarations of Conformity
  - Excel files for documenting your individual parameter settings
  - Driver files (bus connection)
- For Ex devices (Protos 3400X):
  EC-Type-Examination Certificate (ATEX),
  FM and CSA incl. Control Drawings

Modules as ordered (each in a separate package with Installation Instructions, Test Certificate, EC Declaration of Conformity)

Protos 3400X modular process analysis system
The Protos 3400X modular process analysis system is intended for operation in specific environments and specific fields of application. These are listed in the instruction manual as specifications for environment, installation and commissioning, intended use (= application), assembly and dismantling, and maintenance.

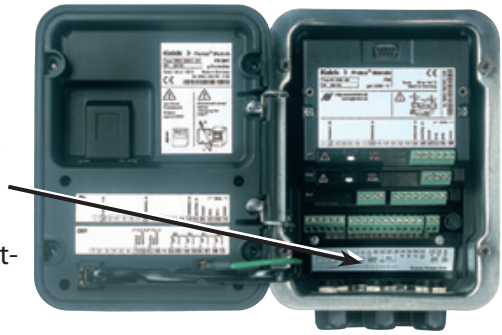
Observe the influences of humidity, ambient temperature, chemicals, and corrosion. If the specifications in the instruction manual are not sufficient for assessing the safety of operation, e.g. because your specific applications are not described, please contact the manufacturer to make sure that the application is possible and safe.
Prerequisite to safe use of the equipment is the observance of the specified ambient conditions and temperature ranges.

When using the Protos 3400X modular process analysis system, you must observe the stipulations for electrical installations in hazardous areas (EN 60079-14). When installing the device outside the range of applicability of the 94/9/EC directive, you must observe the appropriate standards and regulations in the country of use.

The Protos 3400X modular process analysis system has been developed and manufactured in compliance with the applicable European guidelines and standards. Compliance with the European Harmonized Standards for use in hazardous locations is confirmed by the EC-Type-Examination Certificate. Compliance with the European guidelines and standards is confirmed by the EC Declaration of Conformity.
The EC Declaration of Conformity and the EC-Type-Examination Certificate are included in the instruction manual.

There is no particular direct hazard caused by the operation of the device in the specified environment.

Safety Information



During operation, the Protos 3400X modular process analysis system may be opened briefly to replace the SmartMedia card. The mains terminal cover must be opened only when the unit is de-energized.

Installation:

The power supply must be disconnectable near the device by a two-poled switch incorporated in the building installation. This switch must meet the requirements of EN 60947-1 and EN 60947-3, be marked as disconnect device for Protos 3400(X), and be easily accessible by the user.

Information on Commissioning/Start-up

Caution!

- Before commissioning it must be proved that the device may be connected with other equipment.
- Commissioning must only be performed by trained personnel authorized by the operating company!
- The combination of hazardous-area and safe-area modules (mixed configuration) is not permitted.

Whenever it is likely that protection has been impaired, the device shall be made inoperative and secured against unintended operation. The protection is likely to be impaired if, for example:

- the device shows visible damage
- the device fails to perform the intended measurements
- after prolonged storage at temperatures above 70 °C
- after severe transport stresses

Before recommissioning the device, a professional routine test in accordance with EN 61010-1 must be performed. This test should be carried out at the manufacturer's factory.

Conformity with FDA 21 CFR Part 11

In their directive "Title 21 Code of Federal Regulations, 21 CFR Part 11, Electronic Records; Electronic Signatures" the US American health agency FDA (Food and Drug Administration) regulates the production and processing of electronic documents for pharmaceutical development and production. This results in requirements for measuring devices used for corresponding applications. The following features ensure that the Protos 3400(X) modular process analysis system meets the demands of FDA 21 CFR Part 11:

Electronic Signature
Access to the device functions is regulated and limited by individually adjustable codes – "Passcodes". This prevents unauthorized modification of device settings or manipulation of the measurement results. Appropriate use of these passcodes makes them suitable as electronic signature.

Audit Trail Log
Every change of device settings can be automatically recorded and documented in the Audit Trail Log on the SmartMedia card. The recording can be encrypted.

Product Line

Standard version

Device (standard version)		Order No.
PROTOS 3400 S	Basic unit, stainless steel enclosure	3400 S
PROTOS 3400 C	Basic unit, coated steel enclosure	3400 C
PH 3400-032	Module: pH	PH 3400-032
PH 3400-033	Module: pH (Pfaudler probes)	PH 3400-033
PH 3400-035	Module: pH (ISM sensors)	PH 3400-035
COND 3400-041	Module: Conductivity	COND 3400-041
CONDI 3400-051	Module: Electrodeless cond.	CONDI3400-051
OXY 3400-062	Module: Oxygen (standard)	OXY 3400-062
OXY 3400-063	Module: Oxygen (traces)	OXY 3400-063
OXY 3400-065	Module: Oxygen (ISM, standard)	OXY 3400-065
OXY 3400-066	Module: Oxygen (ISM, traces)	OXY 3400-066
OXY 3400-067	Module: Oxygen (ISM, traces)	OXY 3400-067
OUT 3400-071	Module: Output expansion	OUT 3400-071
COMPA 3400-081	Module: Profibus PA	COMPA 3400-081
COMFF 3400-085	Module: Foundation Fieldbus	COMFF 3400-085
PHU 3400-110	Module: UNICAL control module	PHU 3400-110
PID 3400-121	Module: PID Controller	PID 3400-121
CO2 3400-130	Module: CO2	CO2 3400-130
FIU 3400-141	Module: FIU (Radio, Memosens, Unical, Uniclean probe controllers)	FIU 3400-141
MS 3400-160	Module: Memosens sensors	MS 3400-160

Product Line

Hazardous-area version

Device (hazardous-area version)		Order No.
PROTOS 3400X S/VPW	Basic unit, stainless steel enclosure with VariPower power supply unit	3400X S/VPW
PROTOS 3400X S/24V	Basic unit, stainless steel enclosure with 24 V power supply unit	3400X S/24V
PROTOS 3400X C/VPW	Basic unit, coated stainless steel, with VariPower power supply unit, AC	3400X C/VPW
PROTOS 3400X C/24V	Basic unit, standard enclosure with 24 V power supply unit, AC/DC	3400X C/24V
PH 3400X-032	Module: pH	PH 3400X-032
PH 3400X-033	Module: pH (Pfaudler probes)	PH 3400X-033
PH 3400X-035	Module: pH (ISM sensors)	PH 3400X-035
COND 3400X-041	Module: Conductivity	COND 3400X-041
CONDI 3400X-051	Module: Electrodeless conductivity	CONDI 3400X-051
OXY 3400X-062	Module: Oxygen (standard)	OXY 3400X-062
OXY 3400X-063	Module: Oxygen (ISM, standard)	OXY 3400X-063
OXY 3400X-065	Module: Oxygen (ISM, standard)	OXY 3400X-065
OXY 3400X-066	Module: Oxygen (ISM, traces)	OXY 3400X-066
OXY 3400X-067	Module: Oxygen (ISM, traces)	OXY 3400X-067
OUT 3400X-071	Module: Output expansion	OUT 3400X-071
COMPA 3400X-081	Module: Profibus PA	COMPA 3400X-081
COMFF 3400X-085	Module: Foundation Fieldbus	COMFF 3400X-085
PHU 3400X-110	Module: UNICAL control module	PHU 3400X-110
PID 3400X-121	Module: PID controller	PID 3400X-121
CO2 3400X-130	Module: CO2	CO2 3400X-130
FIU 3400X-140X	Module: FIU (Memosens, Unical)	FIU 3400X-140

Product Line

Additional functions and accessories

Additional functions		**Order No.**
KI recorder	TAN	SW 3400-001
Buffer sets to be entered (pH)	TAN	SW 3400-002
ServiceScope (pH)	TAN	SW 3400-004
Tolerance band recorder (pH)	TAN	SW 3400-005
Current characteristic definable	TAN	SW 3400-006
TC ultrapure water (Cond)	TAN	SW 3400-008
Concentration determination (Cond)	TAN	SW 3400-009
Dissolved oxygen measurement in carbonated beverages	TAN	SW 3400-011
ISFET for PH 3400(X)-035 Module	TAN	SW 3400-012
Memosens function for FIU	TAN	SW 3400-013
2nd channel for FIU 3400(X)-140	TAN	SW 3400-014
FIU 3400(X)-140: OXY	TAN	SW 3400-015
FIU 3400(X)-140: OXY traces	TAN	SW 3400-016
5 loadable parameter sets	SMARTMEDIA/TAN	SW 3400-102
Measurement recorder	SMARTMEDIA/TAN	SW 3400-103
Extended logbook	SMARTMEDIA/TAN	SW 3400-104
Software update	SMARTMEDIA/TAN	SW 3400-106
AuditTrail to FDA 21 CFR Part 11	AuditTrail card/TAN	SW 3400-107

Accessories	**Order No.**
SmartMedia card	ZU 0543
Pipe-mount kit	ZU 0544
Panel-mount kit	ZU 0545
Wall-mount kit	ZU 0546
Weather protector	ZU 0548
Input socket for a combination or glass electrode with DIN plug	ZU 0160
SMEK input socket for sensor cable with 1 coax line	ZU 0322
SMEK input socket for sensor cable with 2 coax lines	ZU 0324

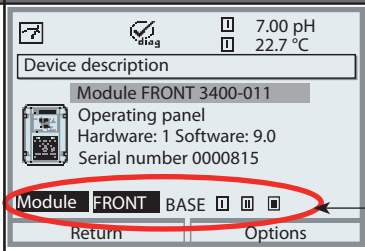
Device Software Protos 3400(X): Version 9.x

Modules (For modules which are not listed here, refer to corresponding module manual.)

Module		Software version
PH	3400-031	1.2 - Production stopped
PH	3400(X)-032	2.0
PH	3400(X)-033	2.0
PH	3400(X)-035	3.0
COND	3400(X)-041	2.0
CONDI	3400(X)-051	2.0
OXY	3400-061	1.4 - Module is not supported any more
OXY	3400(X)-062	2.2
OXY	3400(X)-063	2.2
OXY	3400(X)-065	4.0
OXY	3400(X)-066	4.0
OXY	3400(X)-067	3.0
OUT	3400(X)-071	1.1
COMPA	3400(X)-081	2.2
COMFF	3400(X)-085	1.1
PHU	3400(X)-110	2.1
PID	3400(X)-121	1.1
CO2	3400(X)-130	1.6
FIU	3400X-140, 3400-141	2.0
MS	3400-160	1.0

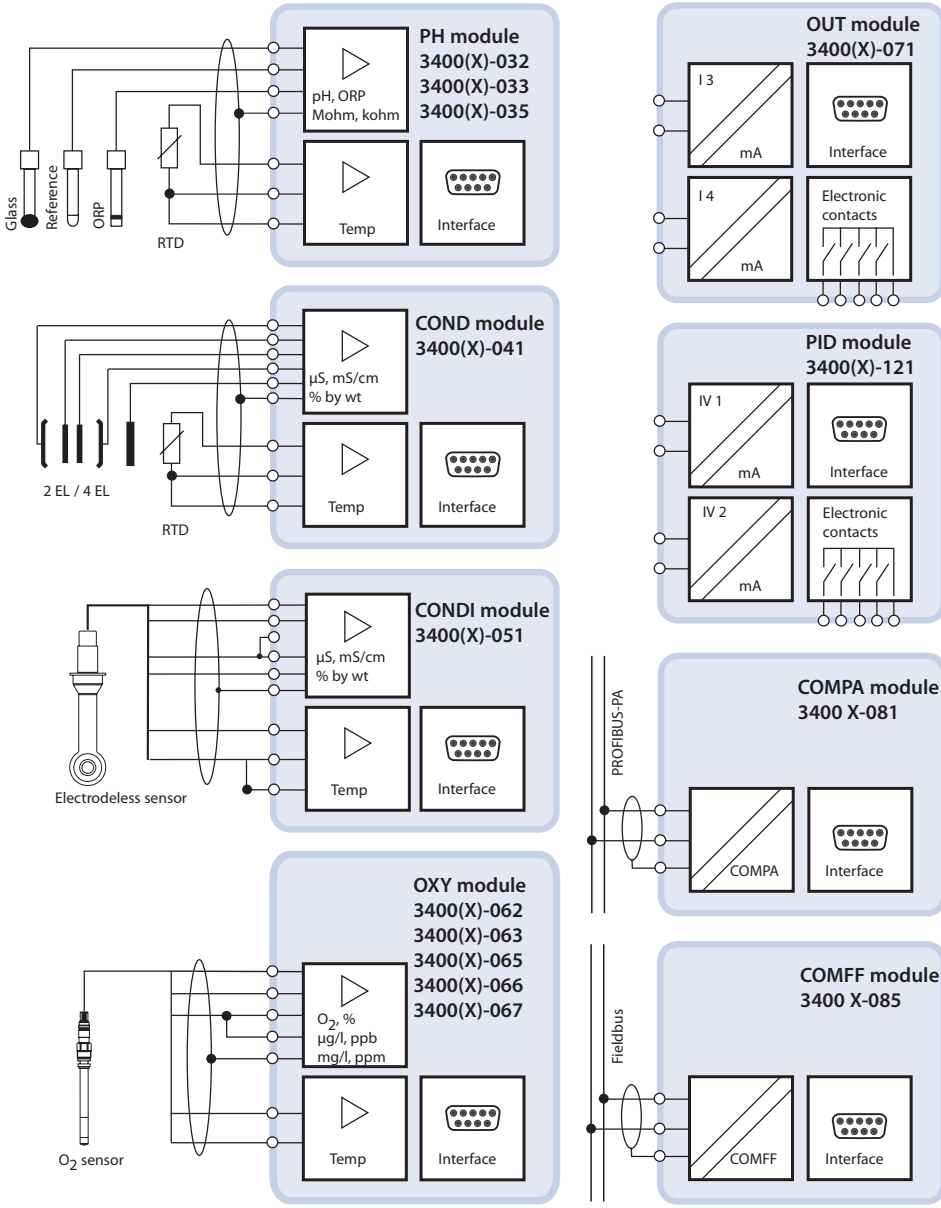
Query actual device/module software

When the analyzer is in measuring mode:
Press **menu** key, open Diagnostics menu.

Menu	Display	Device description
diag		Provides information on all modules installed: Module type and function, serial number, hardware and software version and device options. Select the different modules (FRONT, BASE, slots 1 - 3) using the arrow keys.

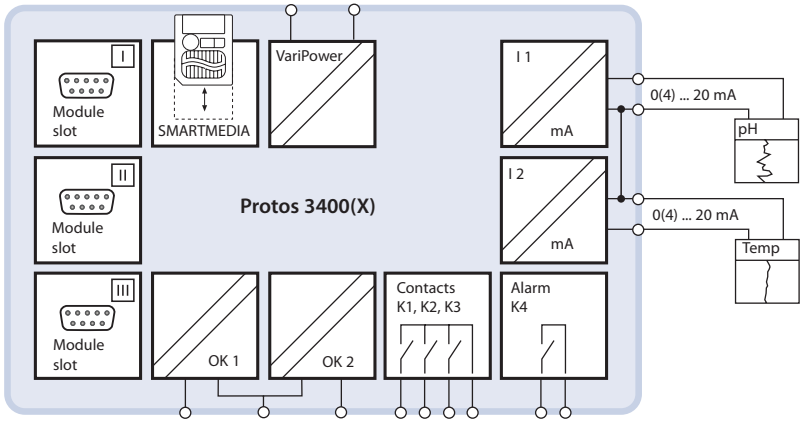
System Overview

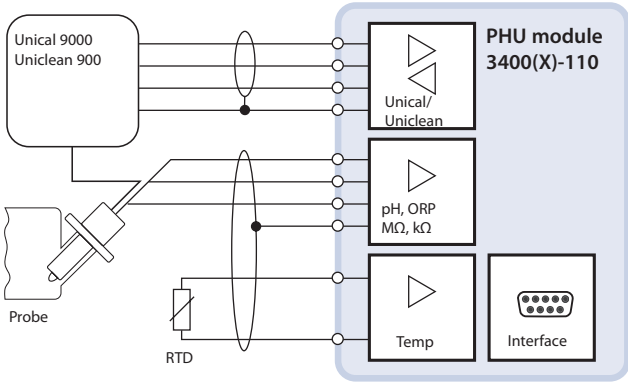
Protos 3400(X) modular process analysis system:
Measuring modules and communication modules

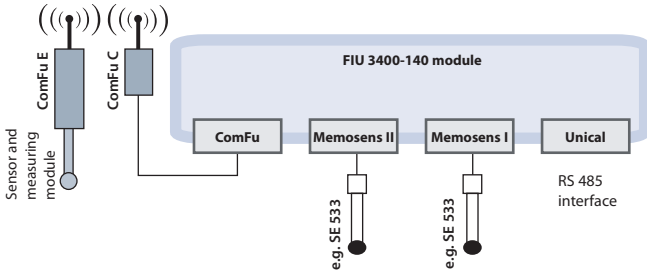


System Overview

Protos 3400(X) modular process analysis system:
Basic unit and controller module for retractable probes





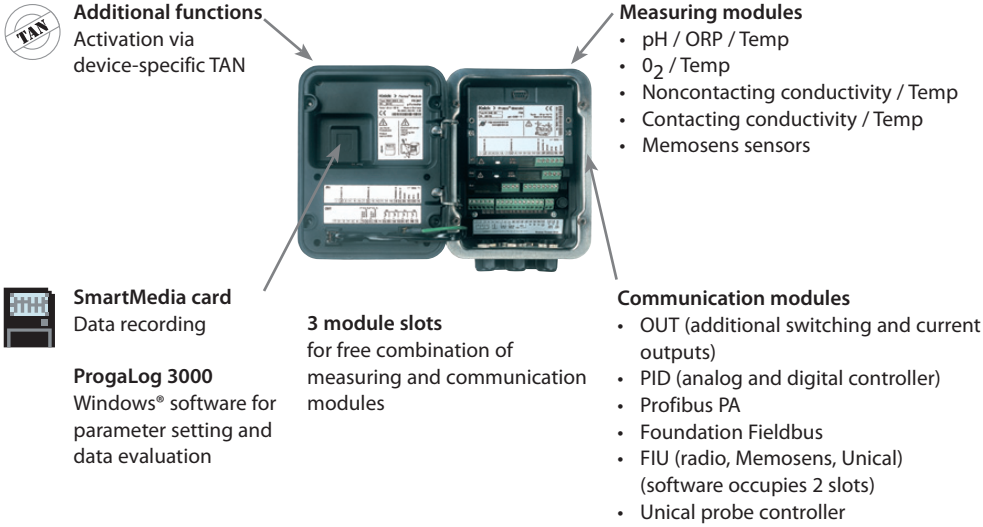


Modular Concept

Basic unit, measuring module, additional functions

The Protos 3400(X) is an expandable modular process analysis system. The basic unit (FRONT and BASE modules) provides three slots which can be equipped by the user with any combination of measuring or communication modules. The software capabilities can be expanded by additional functions (options). Additional functions must be ordered separately. They are supplied with a device-specific TAN for function release.

Protos 3400(X) Modular Process Analysis System



Documentation

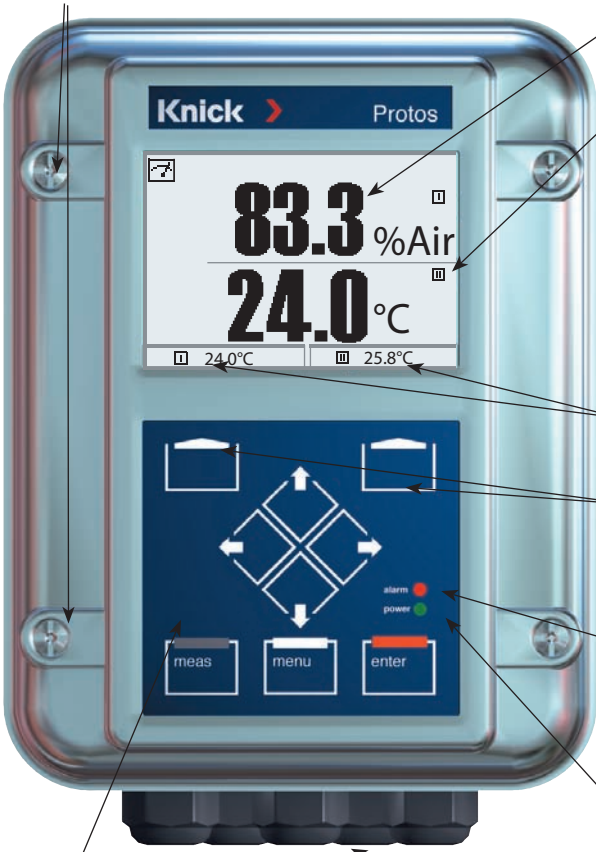
The basic unit is accompanied by a CD-ROM containing the complete documentation.
Latest product information as well as user manuals for earlier software releases are available at
www.knick.de.

Short Description

Short description: FRONT module

4 captive screws
for opening the analyzer
(**Caution!** Make sure that the gasket between FRONT and BASE is properly seated and clean!)

Transflective LC graphic display
(240 x 160 pixels)
white backlighting, high resolution and high contrast.



Measurement display

User interface
with plaintext menus as recommended by NAMUR.
Menu texts can be switched to: German, English, French, Italian, Swedish, and Spanish.
Intuitively acquirable menu logic, based on Windows standards.

Secondary displays

2 softkeys
with context-sensitive functions.

Red LED
signals failure (On) or maintenance request/function check (flashing) according to NE 44.

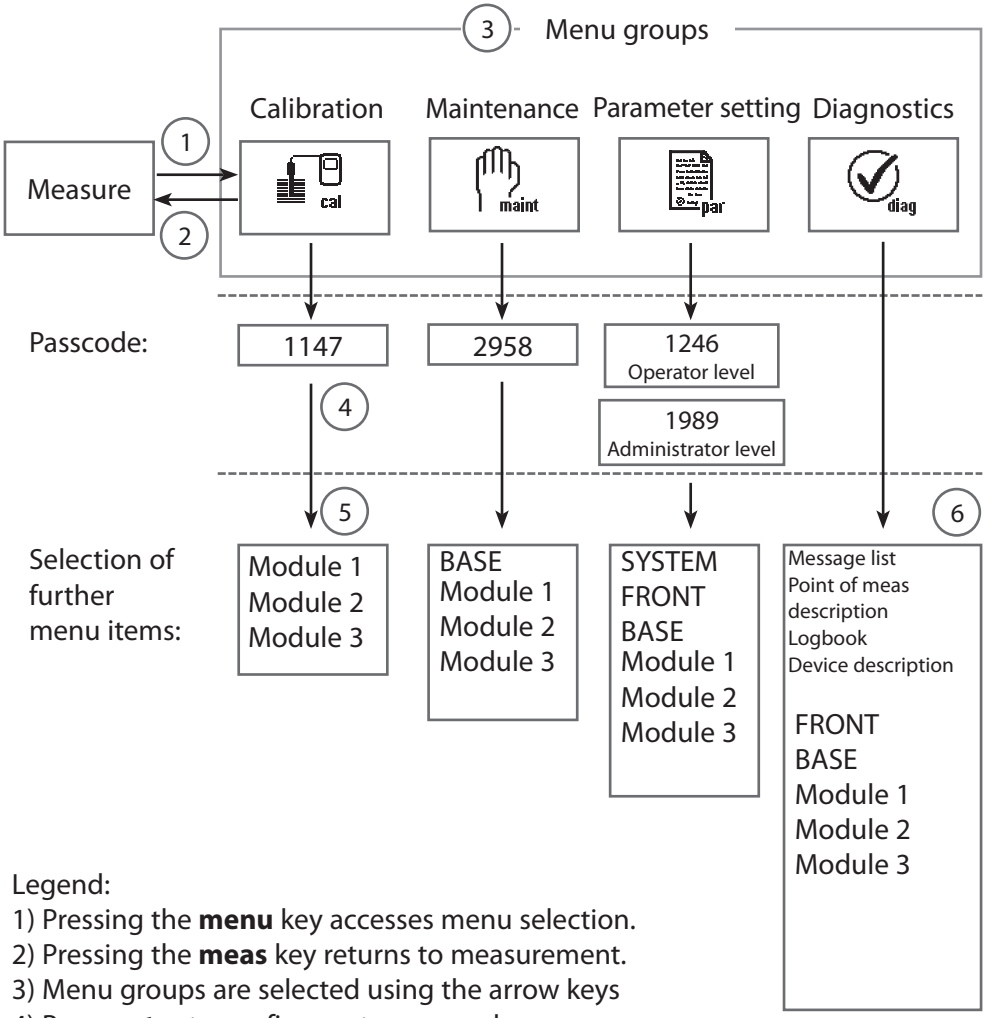
Green LED
Voltage supply okay

Control panel
3 function keys
(menu, meas, enter)
and 4 arrow keys for menu selection and data entry

5 self-sealing cable glands
M20 x 1.5
for entry of voltage supply and signal lines

Short Description: Menu Structure

Basic functions: Calibration, Maintenance, Parameter setting, Diagnostics



Legend:

1) Pressing the **menu** key accesses menu selection.
2) Pressing the **meas** key returns to measurement.
3) Menu groups are selected using the arrow keys
4) Press **enter** to confirm, enter passcode
5) Further menu items are displayed
6) Selected functions of the Diagnostics menu can be recalled via softkey even when in measuring mode

Short Description: FRONT Module

View into the open device (FRONT module)

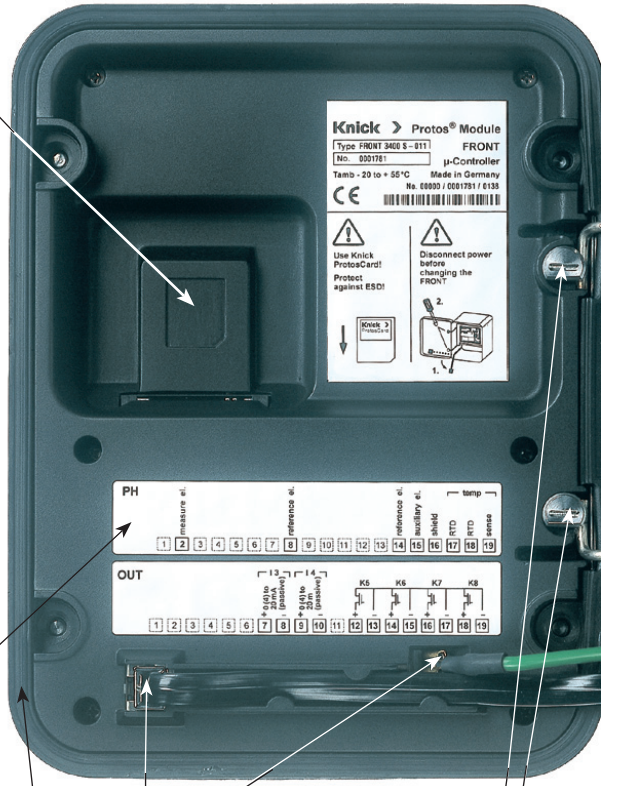
Slot for SmartMedia card

- Data recording
  The SmartMedia card expands the measurement recorder capacity to > 50000 records.

- Exchange of parameter sets
  5 parameter sets can be stored on the SmartMedia card, 2 of them can be loaded simultaneously to the analyzer and be switched by remote control. Parameter sets can be transmitted from one analyzer to the other.

- Function expansions
  are possible with additional software modules, which are released using transaction numbers (TAN).

- Software updates



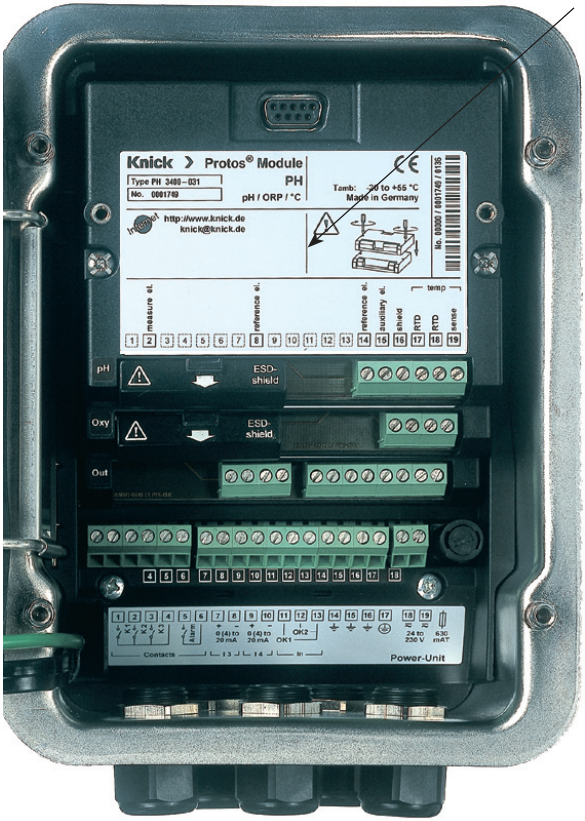
Terminal plates of "hidden" modules
Each module comes with an adhesive label containing the contact assignments. This label should be sticked to the inner side of the front (as shown). Then, the terminal assignments remain visible even if further modules are inserted.

Replacing the front module
Pull off power cord and ground wire.
To separate the FRONT module from the BASE module, turn the retaining screws of the pivot hinge by 90°.

The circumferential sealing
guarantees IP 65 protection and allows spray cleaning / disinfection.
Caution! Keep clean!

Short Description: BASE Module

View into the open device (BASE module, 3 function modules installed)



Module equipment
Module identification: Plug & Play.
Up to 3 modules can be combined as desired. Several input and communication modules are available.

Notice
Only one module can be connected in addition to a FIU 3400(X)-140/141 module.

BASE module
2 current outputs (free assignment of process variable) and 4 relay contacts,
2 digital inputs.
VariPower broad-range power supply unit, 20 ... 265 V AC/DC, suitable for all public mains supplies in the world.

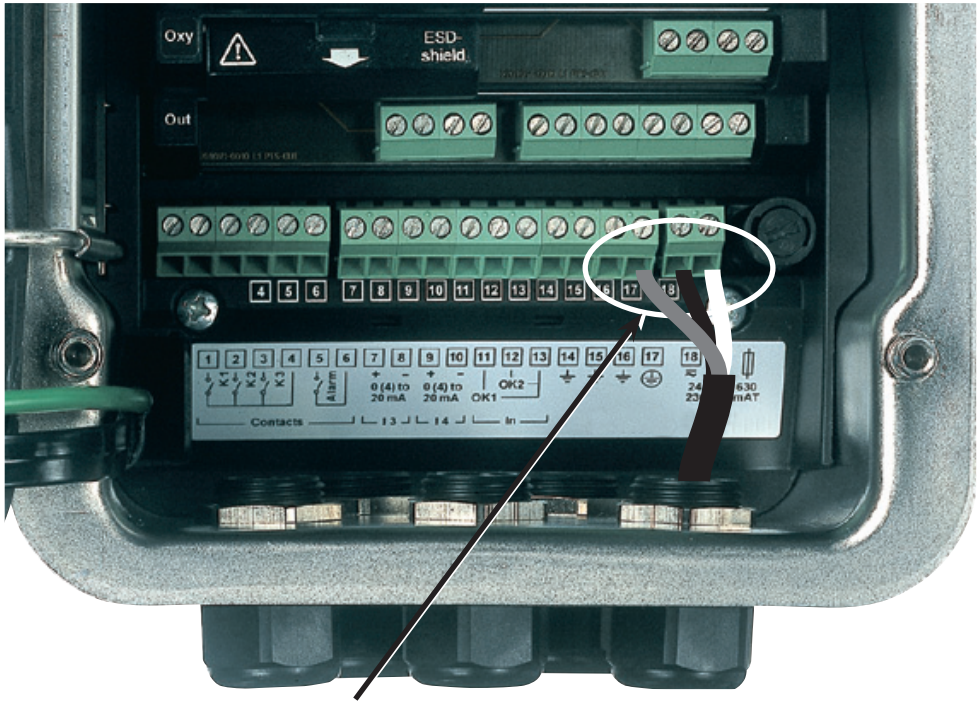
Power supply units, Ex version:
100 ... 230 V AC or
24 V AC/DC

Warning!
Do not touch the terminal compartment, there may be dangerous contact voltages!

Important notice concerning SmartMedia Card
The SmartMedia card may be inserted or replaced with the power supply switched on. Before a memory card is removed, it must be "closed" in the maintenance menu. When closing the device, make sure that the sealing is properly seated and clean.

Connection of Power Supply

BASE 3400-021 Module (Non-Ex)



Connection of power supply (BASE 3400-021 module, non-Ex)

The Protos 3400(X) comes in three different versions.
The terminal plates and wirings are shown on the following pages.

1. **BASE 3400-021 module (standard version, non-Ex)**
   VariPower broad-range power supply unit,
   24 (-15 %) ... 230 (+15 %) V AC/DC
2. **BASE 3400X-025/VPW module (Ex version)**
   VariPower broad-range power supply unit
3. **BASE 3400X-026/24V module (Ex version)**
   24 V power supply unit

1. BASE 3400-021 Module (Non-Ex)

Standard version. Not suitable for hazardous-area applications!

Installation instructions

Caution!

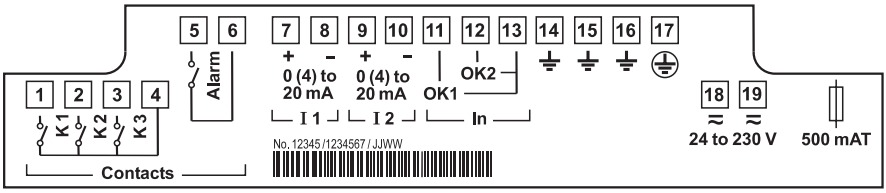
- Installation may only be carried out by trained and qualified personnel in accordance with the instruction manual and as per applicable standards and regulations.
- Be sure to observe the technical specifications and input ratings during installation.
- Be sure not to notch the conductor when stripping the insulation.
- All parameters must be set by a system administrator prior to commissioning.

Connection of power supply

With the VariPower broad-range power supply unit, the analyzer can be operated with a power supply of 24 (-15 %) to 230 (+15 %) V AC/DC making it suitable for all public mains supplies in the world.
The terminals are suitable for single wires and flexible leads up to 2.5 mm^2 (AWG 14).

Terminal plate BASE 3400-021 module

Standard version. Not suitable for hazardous-area applications!
Connection of power supply. Contact assignment of inputs/outputs.



2. BASE 3400X-025/VPW Module (Ex)

Ex version with VariPower power supply unit

Installation instructions

When using the Protos 3400X modular process analysis system, the stipulations for electrical installations in hazardous areas (EN 60079-14) must be observed. When installing the device outside the range of applicability of the 94/9/EC directive, the appropriate standards and regulations in the country of use must be observed.

Caution!

- Installation may only be carried out by trained and qualified personnel in accordance with the instruction manual and as per applicable standards and regulations.
- Be sure to observe the technical specifications and input ratings during installation.
- Be sure not to notch the conductor when stripping the insulation.
- All parameters must be set by a system administrator prior to commissioning.

Connection of power supply

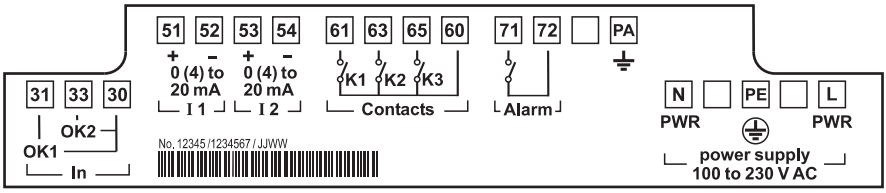
With the VariPower broad-range power supply unit, the analyzer can be operated with a power supply of 100 to 230 V AC (-15 %, +10 %) (EEx em IIC).

The terminals are suitable for single wires and flexible leads up to 2.5 mm^2 (AWG 14).

Terminal plate BASE 3400X-025/VPW module

(Ex version with VariPower power supply unit)

Connection of power supply. Contact assignment of inputs/outputs.



3. BASE 3400X-026/24V Module (Ex)

Ex version with 24 V power supply unit

Installation instructions

When using the Protos 3400X modular process analysis system, the stipulations for electrical installations in hazardous areas (EN 60079-14) must be observed. When installing the device outside the range of applicability of the 94/9/EC directive, the appropriate standards and regulations in the country of use must be observed.

Caution!

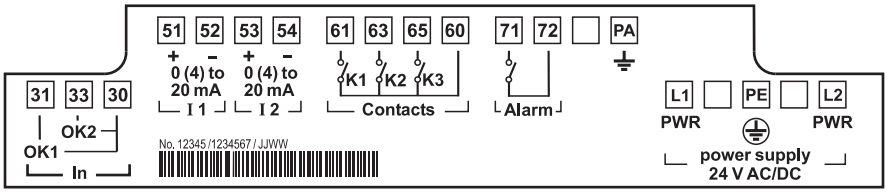
- Installation of the analyzer may only be carried out by trained experts in accordance with this instruction manual and as per applicable local and national codes.
- Be sure to observe the technical specifications and input ratings during installation.
- Be sure not to notch the conductor when stripping the insulation.
- All parameters must be set by a system administrator prior to commissioning.

Connection of power supply

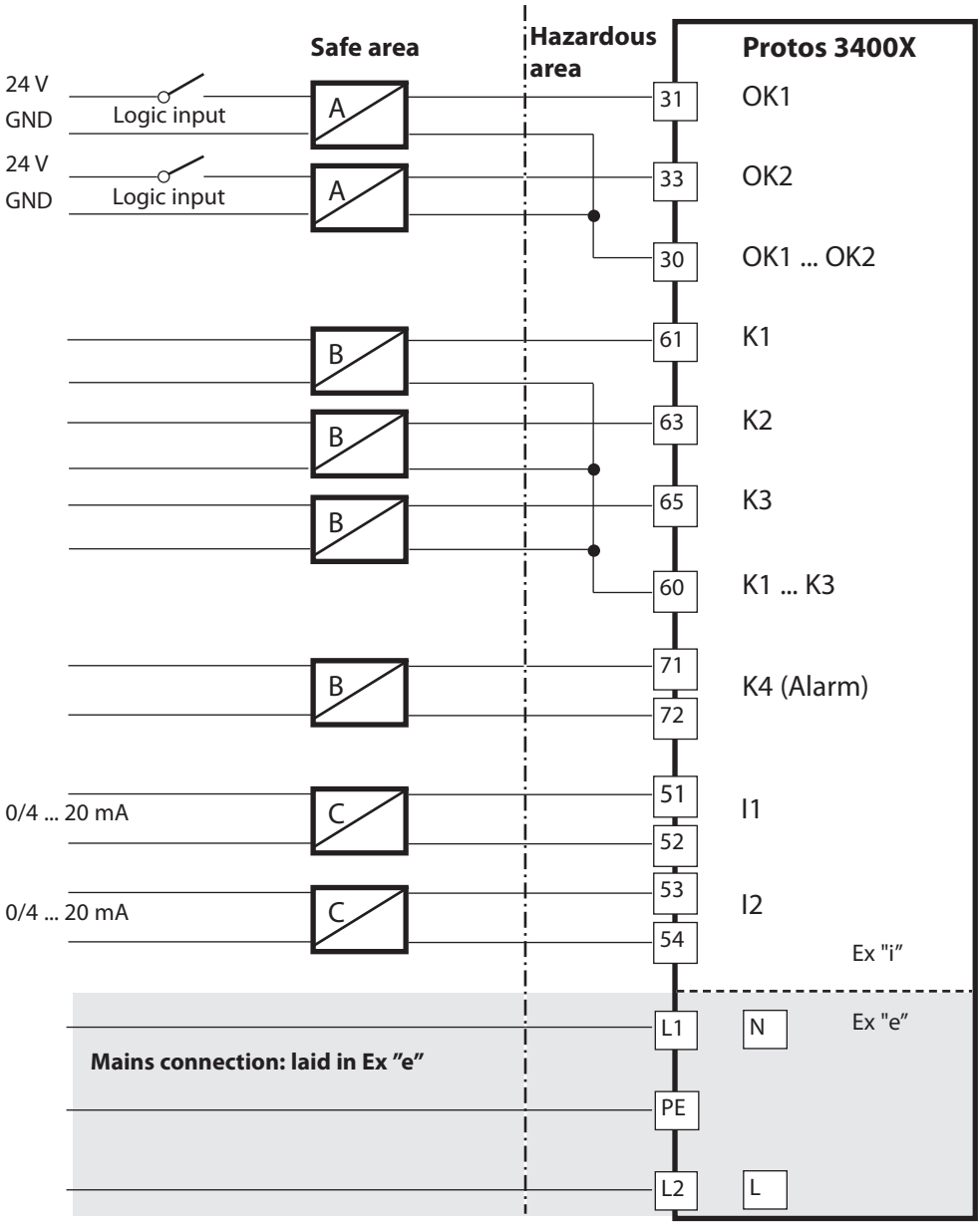
With the power supply unit, the analyzer can be operated with a power supply of 24 V AC (-15 %, +10%) or 24 V DC (-15 %, +20%).
The terminals are suitable for single wires and flexible leads up to 2.5 mm^2 (AWG 14).

Terminal plate BASE 3400X-026/24V module

(Ex version with 24 V power supply unit)
Connection of power supply. Contact assignment of inputs/outputs.



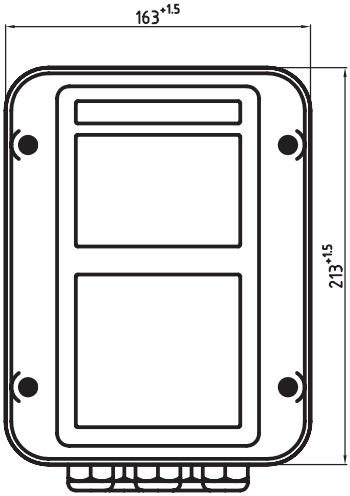
Hazardous-Area Connection to Protos 3400X



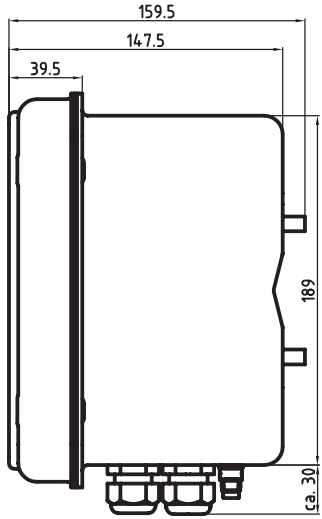
Hazardous-Area Components (Example)

	Designation	Model	Manufacturer
A	Valve control module	KFD2-SL-Ex 1.48****	Pepperl + Fuchs
	Valve control module	MK 72-S17-Ex0/24VDC	TURCK
B	Switch amplifier	KF**-SR2-Ex1.W.**	Pepperl + Fuchs
	Switch amplifier	MK1-22Ex0-R/**	TURCK
C	Loop-powered Isolators	IsoTrans® 36A7	Knick

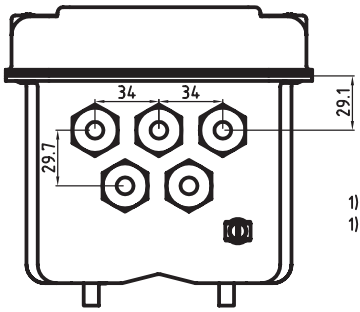
Dimension Drawings



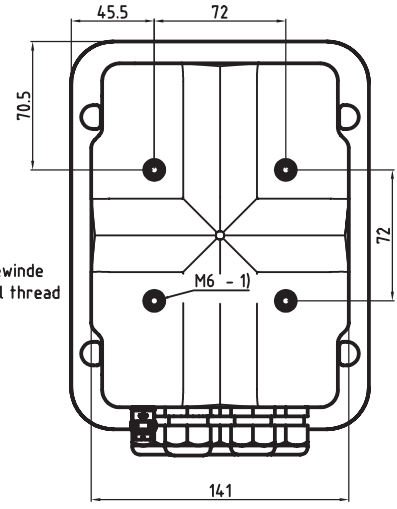
Front view



Side view



Kabelverschraubungen M20x1.5
cable glands M20x1,5



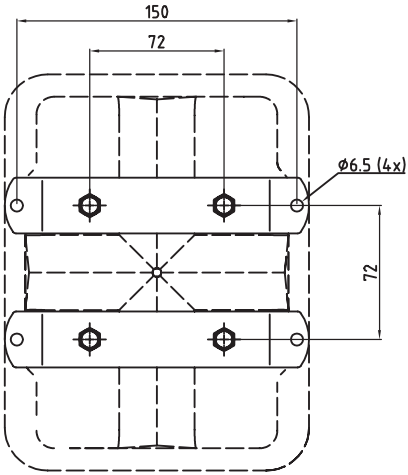
1): Innengewinde
1): Internal thread

Rear view

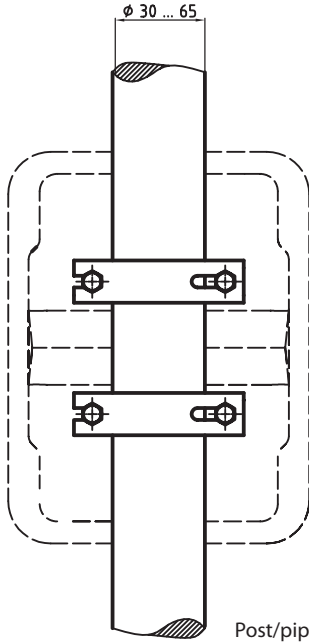
Dimensions in mm

Wall Mounting, Post/Pipe Mounting

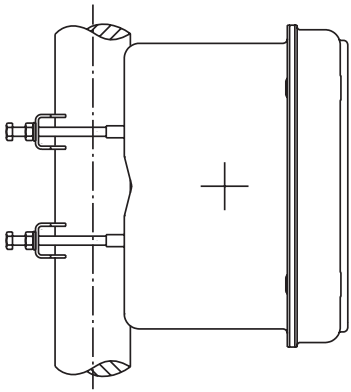
Dimension drawings



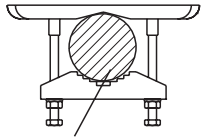
ZU 0546 wall-mount kit



Post/pipe mounting



Ø 30 ... 65 mm
for vertical or horizontal mounting



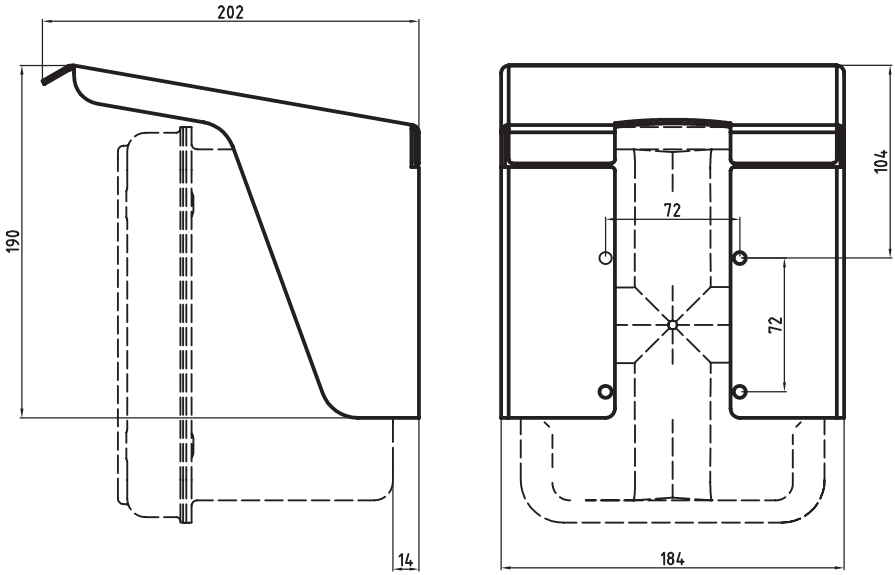
Ø 30 ... 65 mm	M6x50	M6x70
Ø 30 ... 40 mm	X	
Ø 40 ... 62 mm		X
Ø 62 ... 65 mm		X without nut

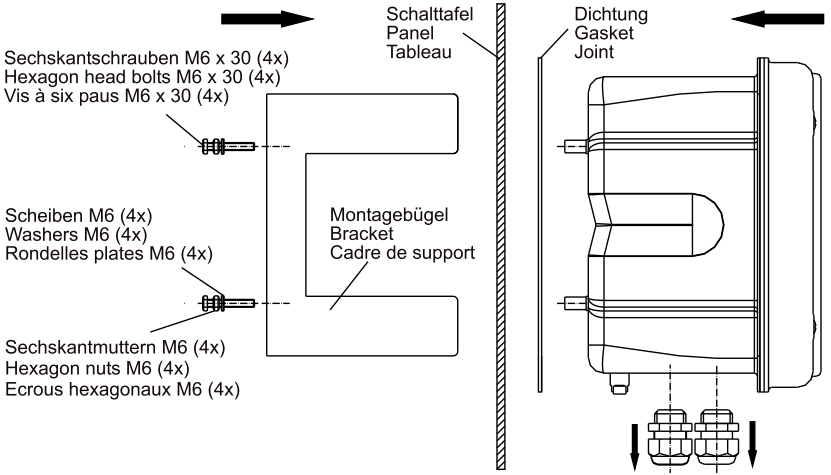
ZU 0544 pipe-mount kit

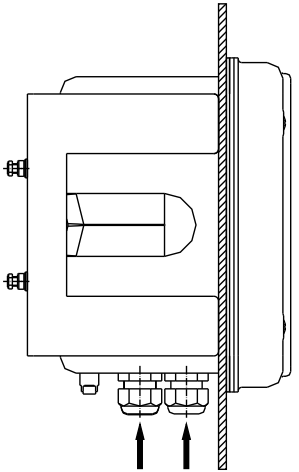
Dimensions in mm

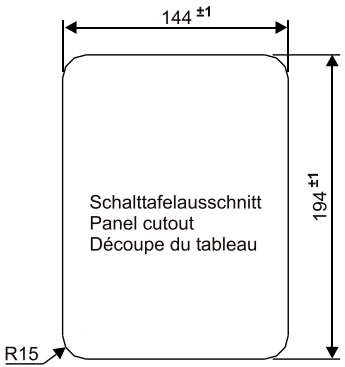
ZU 0548 Weather Protector

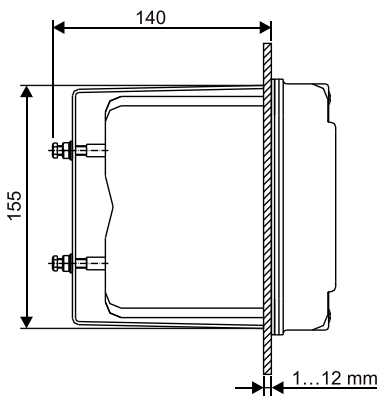
Dimension drawings







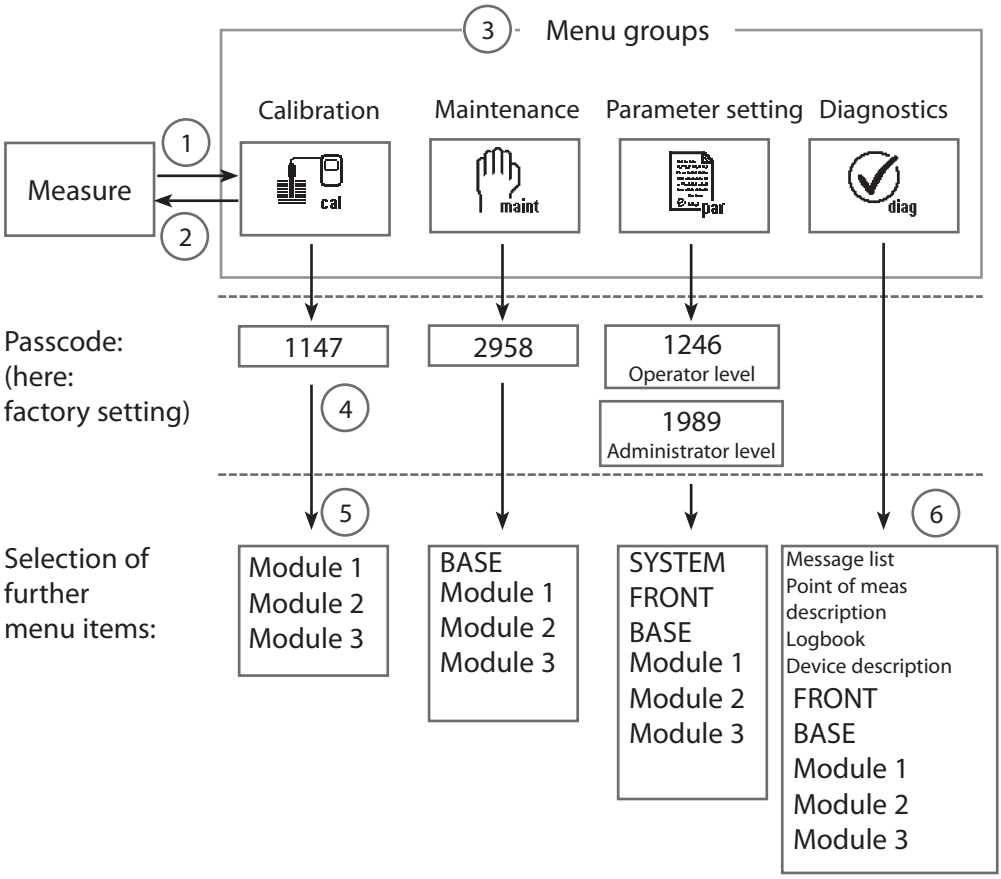




ZU 0545
Schalttafelmontagesatz
Panel-mount kit
Kit de montage sur tableau

Operation (FRONT Module)

Menu structure



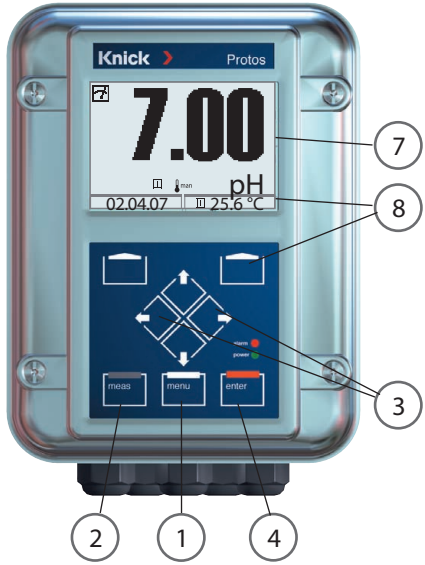
Legend:

1) Pressing the **menu** key accesses menu selection.
2) Pressing the **meas** key returns to measurement.
3) Menu groups are selected using the arrow keys
4) Press **enter** to confirm, enter passcode
5) Further menu items are displayed
6) Selected functions of the Diagnostics menu can be recalled via softkey even when in measuring mode (Pg 39)

Menu Selection

FRONT module

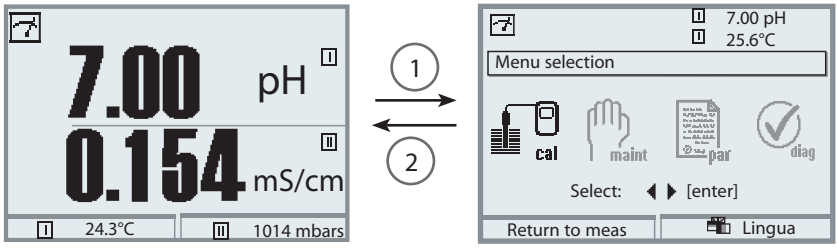
After switching on, the analyzer first performs an internal test routine and automatically detects the number and type of modules installed. Then, the analyzer goes to measuring mode (Pg 39).



- Configure measurement display **(7)** Pg 40
- Secondary displays/softkeys **(8)** Pg 41

Menu selection

1) Pressing the **menu** key accesses menu selection.
2) Pressing the **meas** key returns to measurement.



(Measuring mode) (Menu selection)

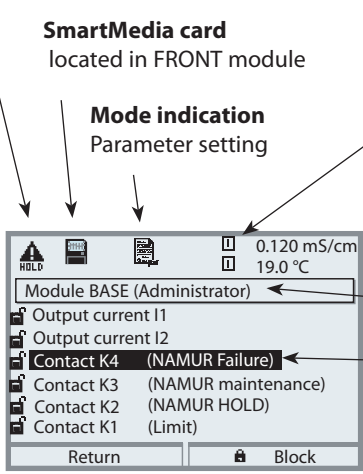
Select the desired menu group using the arrow keys **(3)**.
Press **enter (4)** to confirm your choice.
An overview of the menu structure is given on Pg 34.

Mode Indicators in the Display

Icons

The plain-text user interface is supplemented by icons which provide information on the operating status:

HOLD
The NAMUR "HOLD" mode is active (NAMUR "HOLD" contact (function check));
as delivered, that is the K2 contact of the BASE module (normally open contact).
This setting can be changed as required - the contacts K2 ... K3 are for free programming.
The current outputs behave as configured (you can adjust: last usable value, fixed, 22 mA).



SmartMedia card
located in FRONT module

Mode indication
Parameter setting

Module identification
In the submenus the currently measured values of the respective module are displayed here. (number of module slot, no module designation)

Menu level (Administrator level)

Current selection
The current selection is displayed in reverse video. Gray display lines cannot be edited.

Safety of operation
To ensure increased safety of operation, the device provides three operating levels:

- Administrator level
  Access to all device parameters.
  Settings can be blocked against access from the Operator level.
- Operator level
  Access to all functions which have been released at the Administrator level. Blocked functions are displayed in gray and cannot be edited.
- Viewing level
  Display of all settings.
  No editing possible.

Display	Explanation of display icons
	The analyzer is in measuring mode, an ISM sensor is connected.
	The device is in calibration mode. HOLD mode is active.
	The device is in maintenance mode. HOLD mode is active.
	The device is in parameter setting mode. HOLD mode is active.
	The device is in diagnostics mode.
NAMUR signals 	**HOLD**. The NAMUR "HOLD" contact is active (factory setting: Module BASE, Contact K2, N/O contact). Current outputs as configured: • Current meas.: The currently measured value appears at the current output • Last usable value: The last measured value is held at the current output • Fixed 22 mA: The output current is at 22 mA **Failure**: The NAMUR "failure" contact is active (factory setting: Module BASE, Contact K4, N/C contact). To view error message, call: Diagnostics menu/Message list **Maintenance**: The NAMUR "maintenance request" contact is active (factory setting: Module BASE, Contact K2, N/O contact). To view error message, select: Diagnostics menu/Message list
	Limit indication: Lower / upper range limit exceeded
	The analyzer contains a SmartMedia "memory card". The card is closed and can be removed or enabled in the maintenance menu.
	The analyzer contains an enabled SmartMedia "memory card". During data recording the dot in the icon flashes. Please note: "Close memory card" in the maintenance menu before removing the SmartMedia card.
	The analyzer contains a SmartMedia "update card". You can save the current device software or perform a software update from the SmartMedia card. Be sure to check the configuration after the update is completed.
	The analyzer contains a SmartMedia card of the type "memory card to FDA 21 CFR Part 11". Serves for consistent recording of all operations (SW 3400-107).
	Displayed in plain text, when the analyzer is controlled via PROFIBUS PA. Only in conjunction with a BUS module. Different representation for Foundation Fieldbus.
	Designates the module slot (1, 2 or 3), allowing the clear assignment of measured-value/ parameter displays in the case of identical module types.
	Indicates the active parameter set. (The analyzer provides two parameter sets A and B. Up to 5 sets can be added using additional functions and SmartMedia card.)

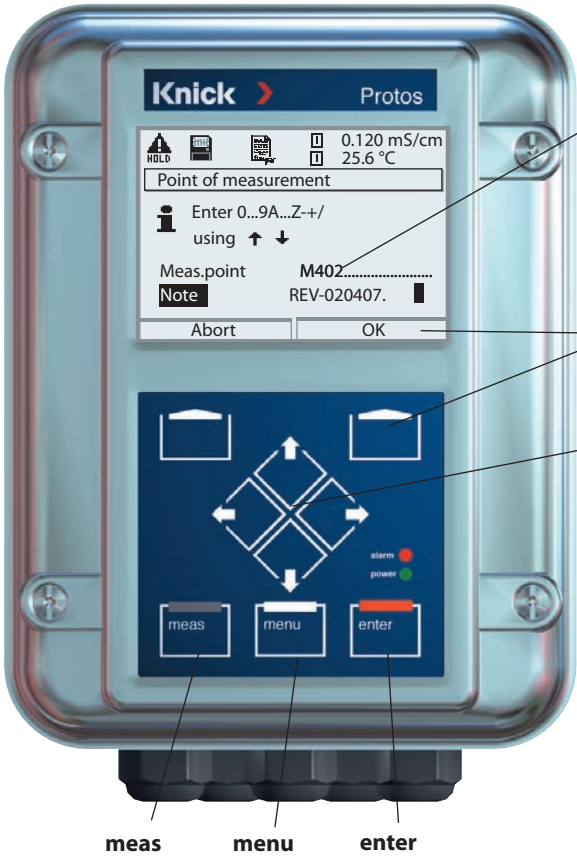
How to Enter Numbers and Text

FRONT Module

Select the position using the **left/right** keys,
then edit the number or letter using the **up/down** keys.
Confirm with **enter**.

Example: Entering a tag number (point of measurement)

- Open the menu selection (**menu**)
- Select parameter setting
- Administrator level, enter passcode
- Select point of measurement:



Point of measurement
You can enter a tag number for the measurement point and notes using the arrow keys.

Function
which is assigned to the softkey underneath.

Arrow keys
For selection of menu lines or entry of letters and numbers.

Configuring the Measurement Display

FRONT module
Select menu: Parameter setting/Module FRONT/Measurement display

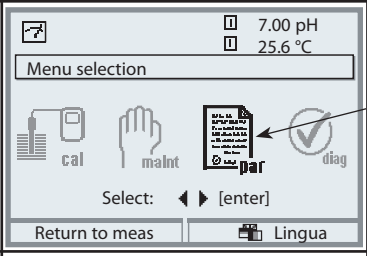
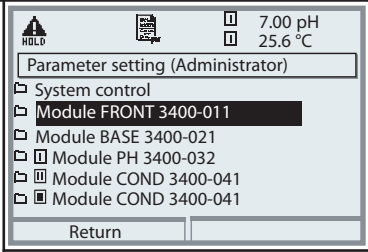
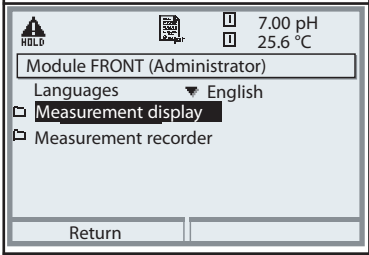
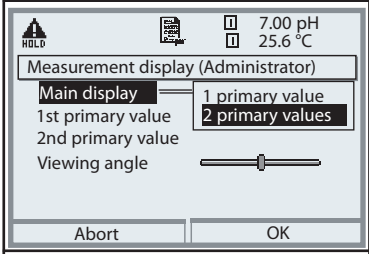
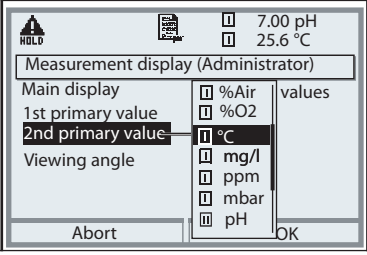
Pressing **meas** returns the analyzer to the measuring mode from any function. (Pressing **meas** in measuring mode, successively displays the activated special functions such as measurement recorder or KI recorder).
All process variables coming from the modules can be displayed. The table on the next page describes how to configure the measurement display.

Measurement display
Typical measurement display (pH, COND modules)

Secondary displays
Additional values, also date and time, can be displayed depending on the modules installed. They are selected using the softkeys (Pg 41).

Softkeys
The softkeys allow selection of values for the secondary displays. In addition, Diagnostics functions which are set as "Favorites" can be called (Pg 42).

If required, you can also change the parameter set via softkey (Pg 42) Furthermore, the softkeys include - self-explaining - context-sensitive functions, e.g. with measurement or KI recorder activated.

Menu	Display	Configure measurement display
		**Configure measurement display** Press **menu** key to Menu selection Select parameter setting using arrow keys, confirm with **enter**. Select: "Administrator level": Passcode 1989
par		Parameter setting: Select "Module FRONT"
		Front module: Select "Measurement display"
		Measurement display: Set the number of primary values (large display) to be displayed
		Select process variable(s) to be displayed and confirm with **enter**. Pressing the **meas** key returns to measurement.

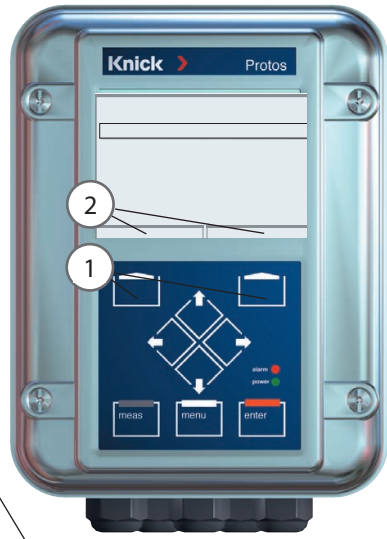
Softkey Function (Function Control)

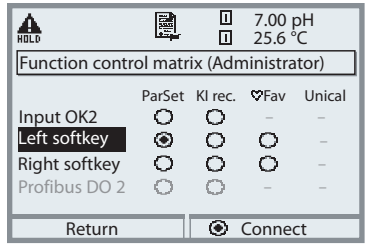
FRONT Module
Select menu: Parameter setting/System control/Function control matrix

In measuring mode you can use the **softkeys (1)** to control functions. The functions are assigned in the function control matrix (Fig.) (Parameter setting/System control).

Softkeys which have not been assigned to a certain function are automatically used for selecting the secondary displays.

Secondary Display (2)
Here, additional values are displayed in the measuring mode. They are selected by pressing the respective softkey. Always active.
You can choose one of the process variables supplied by the modules (and Calculation Blocks) or the date or time.





Example:
"Parameter set" to be selected with "Left softkey".

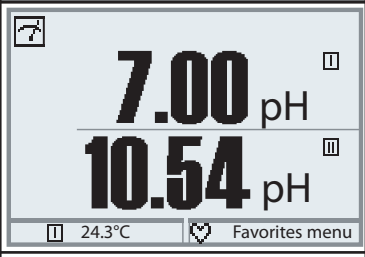
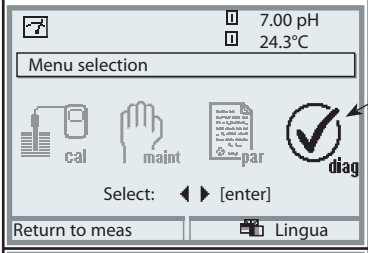
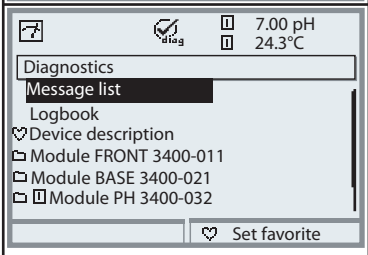
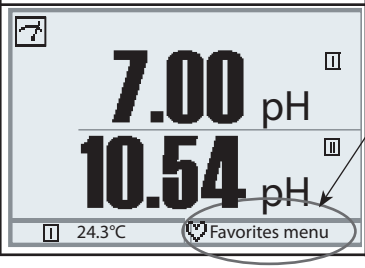
To select a softkey function:
Select the control element ("Left softkey"), then the "ParSet" function. Then press "Connect" softkey and confirm with **enter**.

To deselect a function:
Press "Disconnect" softkey, confirm with **enter**.

Favorites Menu
Selected Diagnostics functions can be called directly from the measuring mode using a softkey. The following table (Pg 42) explains how to select favorites.

Further functions which can be controlled via softkey:

- Parameter set
- Kl recorder start/stop
- Unical probe controller

Menu	Display	Select favorites
		**Favorites menu** Diagnostics functions can be called directly from the measuring mode using a softkey. The "Favorites" are selected in the Diagnostics menu.
diag		**Select favorites** Press **menu** key to select menu. Select diagnostics using arrow keys, confirm with **enter**.
		Set/delete favorite: "Set favorite" allows activation of the selected diagnostic function directly from the measuring mode via softkey. The respective function is marked with a heart icon. (See Softkey Function, Pg 41).
		Pressing the **meas** key returns to measurement. When the softkey has been assigned to "Favorites", "Favorites menu" is read in the secondary display (See Softkey Function, Pg 41).

Notice:
When one of the softkeys has been assigned to the "Favorites menu" function, diagnostic functions which have been set as "Favorite" can be directly called from the measuring mode.

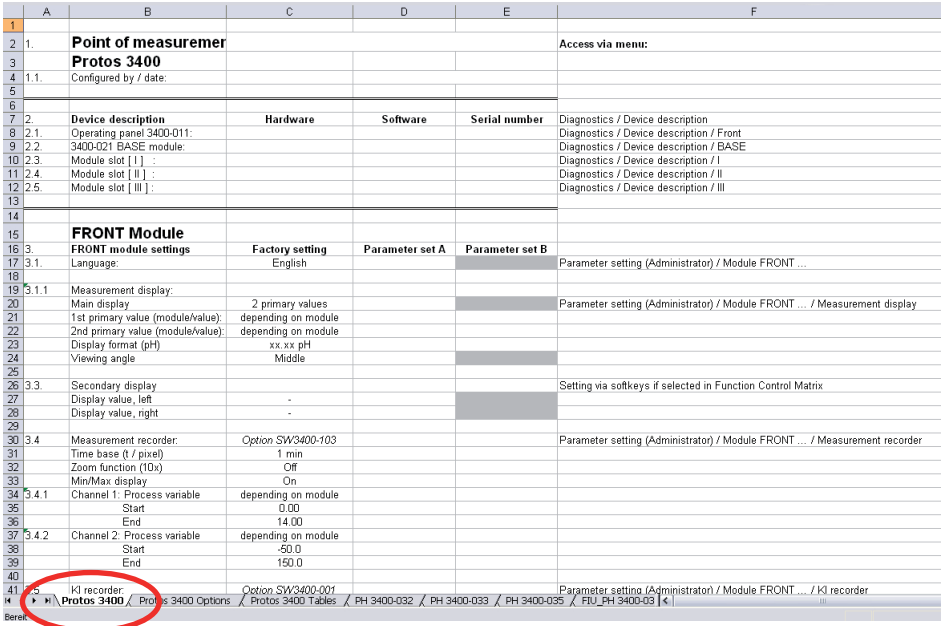
Documenting Parameter Setting

You must reproducibly document all parameter settings in the device to achieve a high level of system and device security according to GLP. For that purpose, an Excel file is provided (on the CD-ROM shipped with the basic device or as download at www.knick.de) to enter the parameter settings.

Fig.: Download area at www.knick.de

The Excel file provides one worksheet for each module with columns for the following parameters: Factory settings, parameter set A, parameter set B. Enter your settings as parameter set A or B.
The gray cells in the parameter set B column cannot be modified since they contain sensor-specific values which cannot be changed by parameter set switchover. Here, the values listed under parameter set A apply.

Documenting Parameter Setting



	A	B	C	D	E	F
1						
2	1.	**Point of measuremer**				**Access via menu:**
3		**Protos 3400**				
4	1.1.	Configured by / date:				
5						
6						
7	2.	**Device description**	**Hardware**	**Software**	**Serial number**	Diagnostics / Device description
8	2.1.	Operating panel 3400-011:				Diagnostics / Device description / Front
9	2.2.	3400-021 BASE module:				Diagnostics / Device description / BASE
10	2.3.	Module slot [I] :				Diagnostics / Device description / I
11	2.4.	Module slot [II] :				Diagnostics / Device description / II
12	2.5.	Module slot [III] :				Diagnostics / Device description / III
13						
14						
15		**FRONT Module**				
16	3.	**FRONT module settings**	**Factory setting**	**Parameter set A**	**Parameter set B**	
17	3.1.	Language:	English			Parameter setting (Administrator) / Module FRONT ...
18						
19	3.1.1	Measurement display:				
20		Main display	2 primary values			Parameter setting (Administrator) / Module FRONT ... / Measurement display
21		1st primary value (module/value):	depending on module			
22		2nd primary value (module/value):	depending on module			
23		Display format (pH)	xx.xx pH			
24		Viewing angle	Middle			
25						
26	3.3.	Secondary display				Setting via softkeys if selected in Function Control Matrix
27		Display value, left	-			
28		Display value, right	-			
29						
30	3.4	Measurement recorder:	*Option SW3400-103*			Parameter setting (Administrator) / Module FRONT ... / Measurement recorder
31		Time base (t / pixel)	1 min			
32		Zoom function (10x)	Off			
33		Min/Max display	On			
34	3.4.1	Channel 1: Process variable	depending on module			
35		Start	0.00			
36		End	14.00			
37	3.4.2	Channel 2: Process variable	depending on module			
38		Start	-50.0			
39		End	150.0			
40						
41	3.5	KI recorder:	*Option SW3400-001*			Parameter setting (Administrator) / Module FRONT ... / KI recorder

Protos 3400 / Protos 3400 Options / Protos 3400 Tables / PH 3400-032 / PH 3400-033 / PH 3400-035 / FIU_PH 3400-03

From the application window of the Excel file, select the worksheet for the module the parameter settings of which you want to document.
Set the parameters of the respective module and enter the selected values in the corresponding cells of the module worksheet.

Caution!

Display	During parameter setting the "HOLD" mode is active.
	HOLD. The NAMUR "HOLD" (function check) contact is active (factory setting: Module BASE, Contact K2, N/O contact). Current output response is user-defined: • Current meas.: The currently measured value appears at the current output • Last usable value: The last measured value is held at the current output • Fixed 22 mA: The output current is at 22 mA

ProgaLog 3000 Software (Option) for Configuration and Documentation

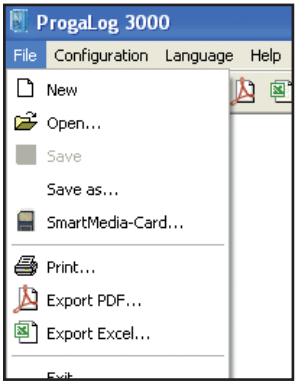
The ProgaLog 3000 software is available for convenient configuration of the Protos 3400(X) process analysis system. The user interface can be switched to the Protos display languages English, German, French, Spanish, Italian, or Swedish. The software comes on CD-ROM. It runs under Windows® XP / Vista / 2000. A card reader for SmartMedia cards is required for transferring the configuration files between PC and Protos 3400.

Configuration with ProgaLog 3000
Insert a SmartMedia card formatted as "memory card" into the analyzer.
First, the configuration data are written to the SmartMedia card.
These data can then be read and edited by the ProgaLog 3000 software.

1. Save the configuration data at the Protos 3400(X)
Parameter setting/System control/Copy configuration.
With "Save" configuration, the complete device configuration (except the passcodes) is written on the memory card.

2. Close and remove the SmartMedia card
Select "Maintenance / Close memory card", then remove the card.

3. Read out SmartMedia card with "ProgaLog 3000"



Open the "File / SmartMediaCard" menu of the ProgaLog 3000 software to read out the configuration data stored on the SmartMedia card.
Now, you can edit all parameters at your PC.
Save the edited configuration file to the SmartMedia card. Then, insert the SmartMedia-Card into the Protos 3400(X) analyzer.

Fig.: ProgaLog 3000 menu: File

4. Edit configuration data using ProgaLog 3000

When the configuration data have been loaded, the software lists the connected modules with all available configuration parameters:

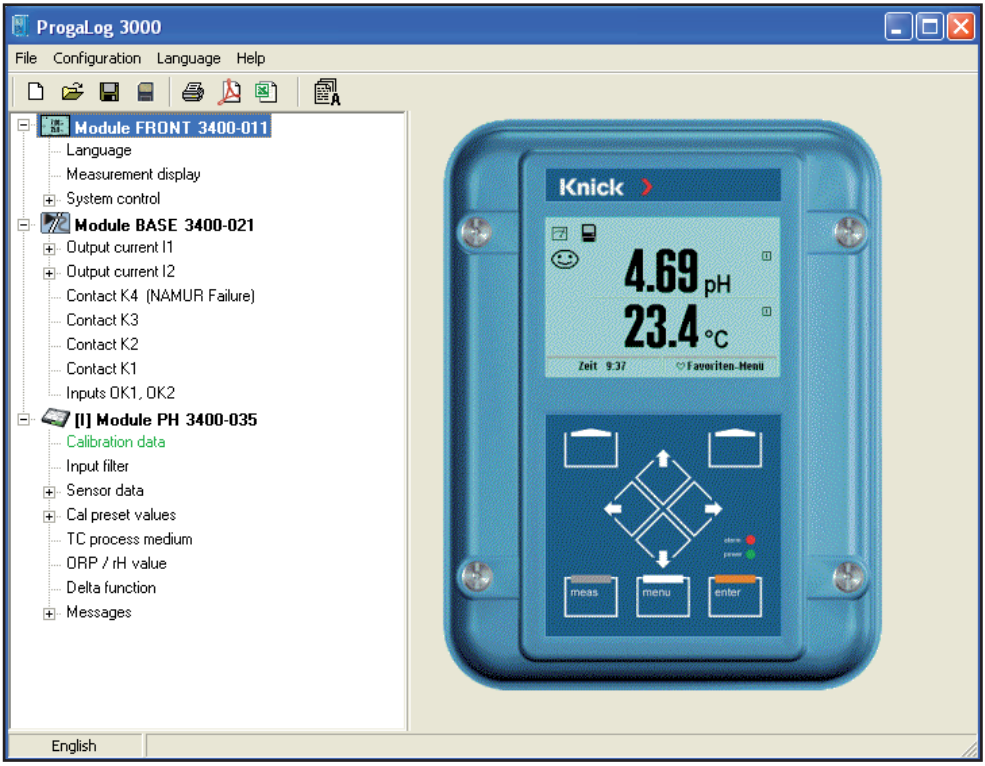
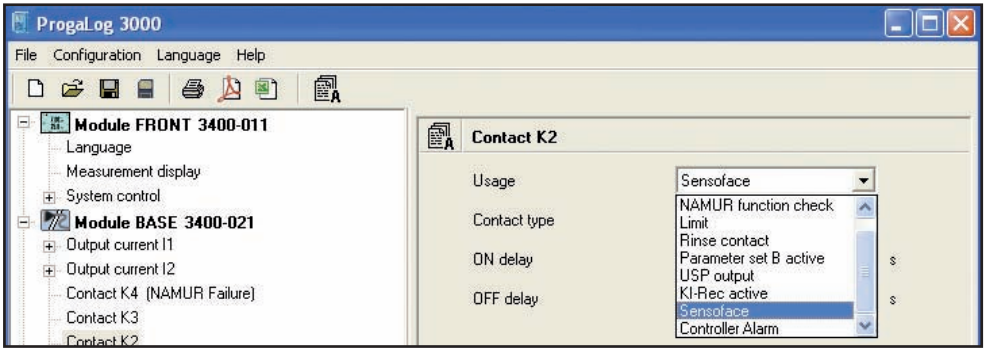


Fig.: ProgaLog 3000 configuration data

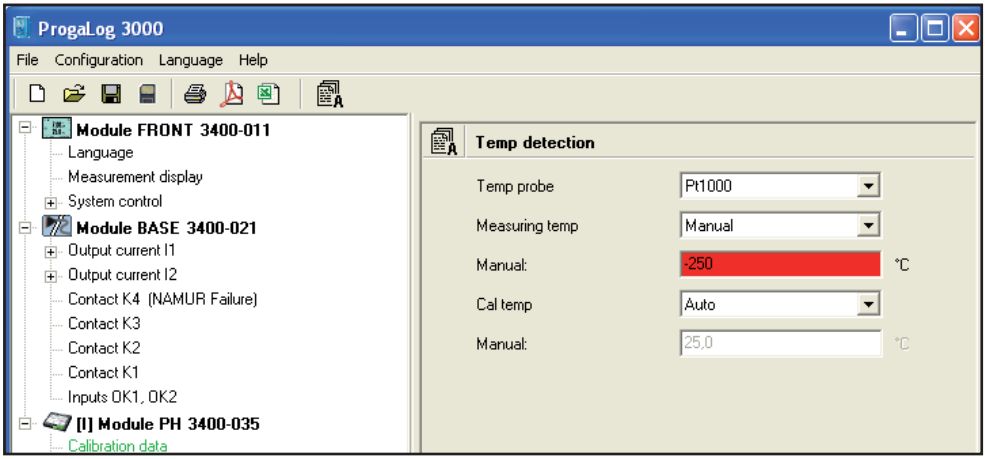
The parameters are listed according to the modular device structure.
All configuration parameters (except the "Sensor data details", which are determined by digital sensors) can be edited at the PC.
After having finished the configuration, save the data to the SmartMedia card.

ProgaLog 3000 Software for Configuration and Documentation

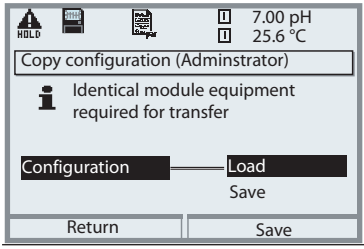
Configuring the parameters, e.g. relay contact usage:



Input errors are indicated by red highlighting:



5. Save the configuration data to SmartMedia card



6. Load the configuration data to the Protos 3400(X)

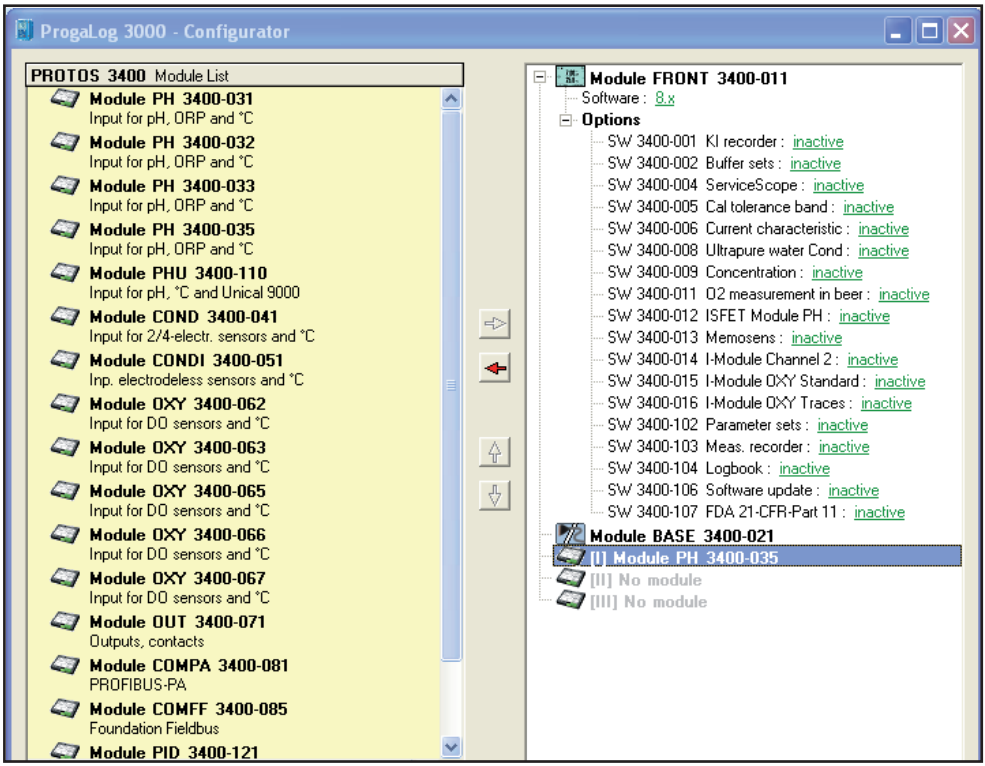
Parameter setting / System control / Copy configuration.

Select "Load configuration" to write the complete device configuration (except the passcodes) to the Protos 3400(X).

ProgaLog 3000 Software for Configuration and Documentation

Configuration using "ProgaLog 3000"

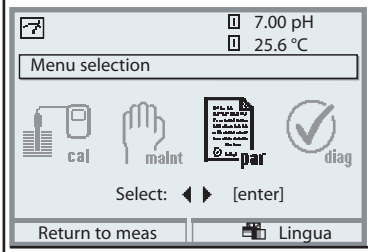
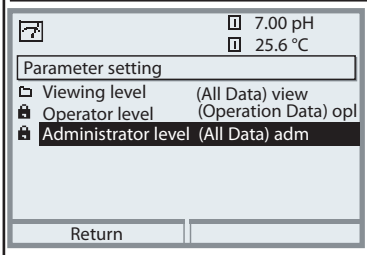
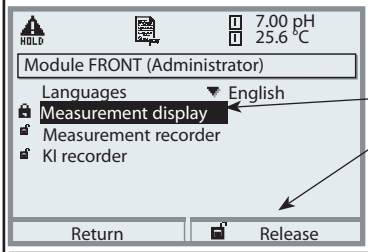
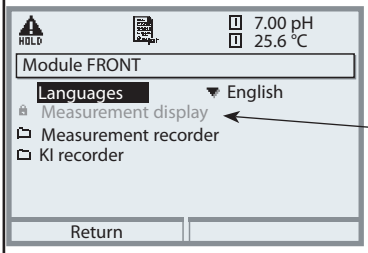
In the "Configurator" menu you can preconfigure a complete Protos 3400(X) process analysis system with up to 3 modules at your PC.



1. Select your configuration from the modular system components offered in the left-hand field.
2. Click the right arrow (-->) to add the components or remove components by clicking (<--).
3. Now configure the parameters for the selected system components.
4. Save the configuration.
   You can save the configuration to a memory card that has been preformatted in the Protos 3400(X) and transfer them to analyzers with identical module configurations.

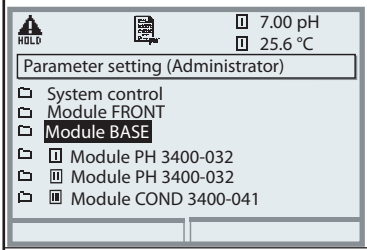
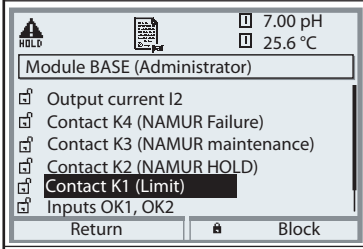
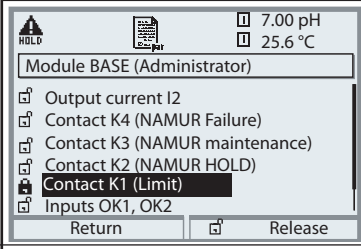
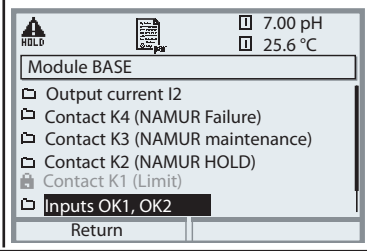
Parameter Setting: Operating Levels

Viewing level, Operator level, Administrator level
Note: HOLD mode active

Menu	Display	Viewing level, Operator level, Administrator level
par		**Open parameter setting** From the measuring mode: Press **menu** key to select menu. Select parameter setting using arrow keys, press **enter** to confirm.
		**Administrator level** Access to all functions, also passcode setting. Releasing or blocking a function for access from the Operator level.
		Functions which can be blocked for the Operator level are marked with the "lock" symbol. The functions are released or blocked using the softkey.
		**Operator level** Access to all functions which have been released at the Administrator level. Blocked functions are displayed in gray and cannot be edited (Fig.). **Viewing level** Display of all settings. No editing possible!

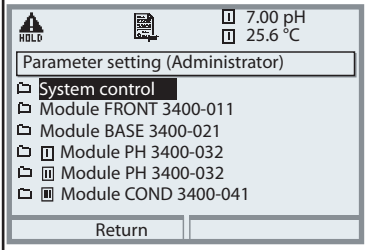
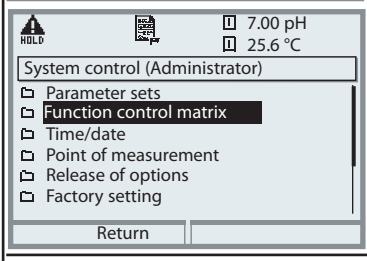
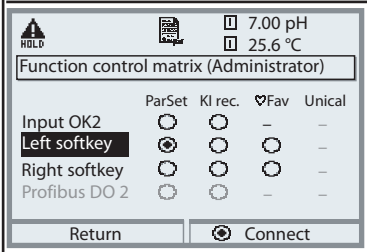
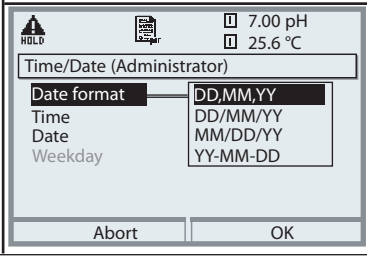
Parameter Setting: Locking a Function

Administrator level: Enabling/locking functions for Operator level
Note: HOLD mode active

Menu	Display	Administrator level: Enabling / locking a function
par		**Example:** Blocking access to the configuration of relay contact K1 (BASE module) from the Operator level **Open parameter setting** Select Administrator level. Enter passcode (1989). Select "Module BASE" using arrow keys, press **enter** to confirm.
		Select "Contact K1" using arrow keys, "Block" with softkey.
		Now, the "Contact K1" line is marked with the "lock" icon. This function cannot be accessed from the Operator level any more. The softkey function changes to "Release".
par		**Open parameter setting** Select Operator level, passcode (1246). Select "Modul BASE". Now, the locked "Contact K1" function is displayed in gray and marked with the "lock" icon.

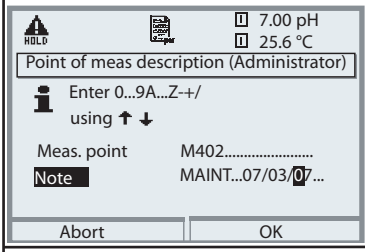
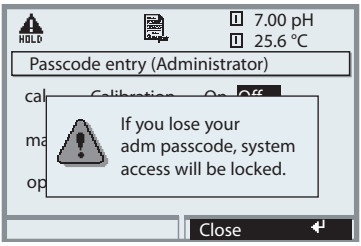
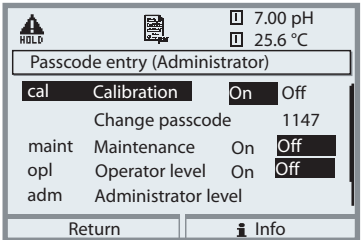
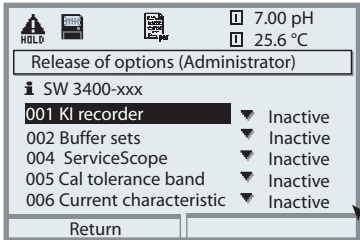
Function Control Matrix, Time/Date

Select menu: Parameter setting/System control
Note: HOLD mode active

Menu	Display	Function control matrix, Time/Date
par		**Activate parameter setting** Select Administrator level. Enter passcode (1989). Select system control using arrow keys, confirm with **enter**. Submenus of system control: • Parameter sets • Function control matrix • Time/date • Point of measurement • Release of options • Factory setting • Passcode entry • Software update ... more, depending on Options.
		
		**Function control matrix** Clear assignment of function (parameter sets, KI recorder, Favorites menu, Unical control) to control element (optocoupler, softkey or Profibus).
		**Time/Date** Selection of date format, entering time and date

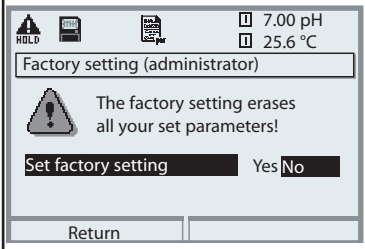
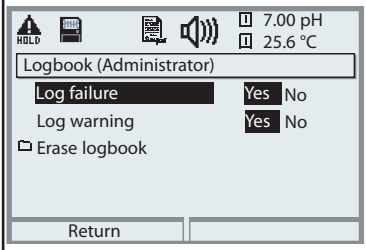
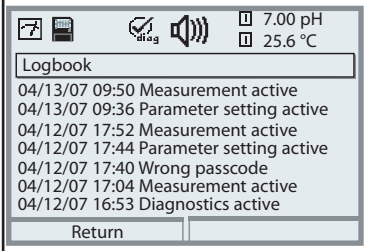
Point of Measurement, Passcodes, Release of Options

Select menu: Parameter setting/System control
Note: HOLD mode active

Menu	Display	Meas point description, Passcodes, Release of options
par		**Point of meas description** You can enter a tag number or notes (e.g. date of last maintenance).
		**Passcode entry** Passcodes (factory settings): Calibration 1147 Maintenance 2958 Operator level 1246 Administrator level 1989
		**Caution** If you lose the Administrator passcode, system access is locked!
		**Release of options** **When you have purchased an option to be released via TAN:** • Parameter setting, Administrator • System control • Select "Release of options" Set option to “active”. Enter the TAN at the prompt. The option is available after the TAN has been entered.

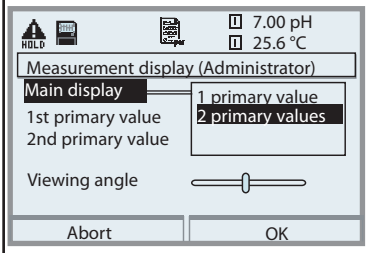
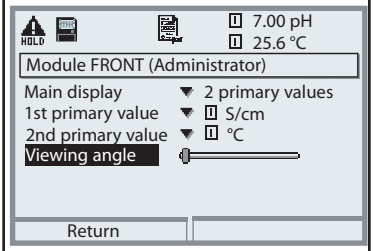
Factory Setting, Logbook

Parameter setting/System control/Logbook
Note: HOLD mode active

Menu	Display	Factory setting, logbook
par		**Factory setting** When this menu is opened, the analyzer displays a warning (Fig.). • For factory settings, see module description (Free download available at: www.knick.de)
		**Logbook** Select which messages are to be logged in the logbook. The last 50 events are recorded with date and time. This permits quality management documentation to ISO 9000 et seq.
		The logbook can be called from the diagnostics menu (Fig.). Additional function SW 3400-104: Extended logbook for recording data on SmartMedia card (TAN).

Language, Measurement Display, Viewing Angle

Parameter setting/Module FRONT
Note: HOLD mode active

Menu	Display	Language, Measurement display, Viewing angle
par		**Language setting** • Open parameter setting • Select "Module FRONT" • Open “Languages”
		**Measurement display** • Open parameter setting • Select "Module FRONT" • Open “Measurement display” • Select number and type of values to be displayed
		**Viewing angle** • Open parameter setting • Select "Module FRONT" • Open “Measurement display” • Adjust display to local light conditions • Confirm with **enter**.

Calculation Blocks (System Control)

Select menu: Parameter setting/System control/Calculation Blocks
Calculation of new variables from measured variables

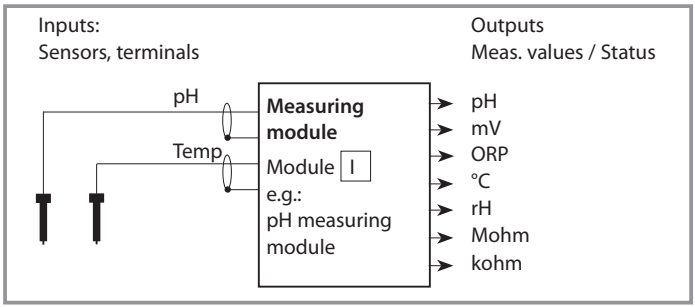
Calculation Blocks

Two measuring modules with all their measured values serve as input for the calculation block. In addition, the general device status (NAMUR signals) is taken into account. The following variables are calculated from the existing values:

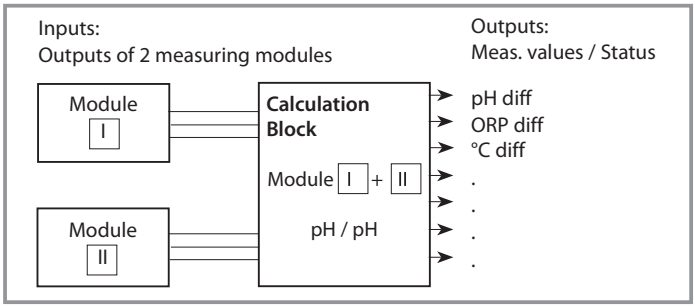
- Ratio
- Pass (passage)
- Reject (rejection)
- Measured-value difference
- Deviation
- pH value calculation by means of dual conductivity measurement

These output variables are then available in the system and can be assigned to the outputs (current, limit values, display ...)

Functionality of Measuring Module



Functionality of Calculation Block



Activating Calculation Blocks

Select menu: Parameter setting/System control/Calculation Blocks
Combining measuring modules to Calculation Blocks

Combining measuring modules
With three measuring modules the following Calculation Block combinations are possible:

I + II , I + III , II + III

Two Calculation Blocks can be activated.

Menu	Display	Activating Calculation Blocks
par	HOLD par 7.10 pH 25.6 °C System control (Administrator) Calculation Blocks Point of measurement Release of options Logbook Buffer table Concentration table Return	**Calculation Blocks** • Open parameter setting • System control • Select "Calculation Blocks"
	HOLD par 7.10 pH 25.6 °C Calculation Blocks (Administrator) Block 1 Off Block 2 I II Calc pH/pH Return	• Depending on the modules installed, the possible combinations for Calculation Blocks are offered.
	HOLD par 7.10 pH 25.6 °C Parameter setting (Administrator) System control Module FRONT 3400-011 Module BASE 3400-021 I Module PH 3400-032 II Module PH 3400-032 I + II Calc pH/pH Return	During parameter setting the Calculation Blocks are displayed like modules.

Overview of Calculation Blocks

Module combinations, Calculation Block, process variables

Module combination	Calculation Block	Variables calculated by the Calculation Block		
pH + pH	Calc pH/pH	Difference Difference Difference		pH ORP °C
Cond + Cond CondI + CondI Cond + CondI	Calc Cond/Cond	Difference Difference Difference Ratio Passage Rejection Deviation	 (Pass) (Reject) (Deviat)	S/cm Ohm*cm °C S/cm [] S/cm[%] S/cm[%] S/cm[%]
Oxy + Oxy	Calc Oxy/Oxy	Difference Difference Difference Difference Difference		%Air %O_2 g/l ppm °C

New process variables and signal processing

Current outputs
All current outputs can be set to output the new process variables formed by the Calculation Blocks.

Measurement display
All new process variables can be displayed as primary or as secondary value.

Controller
Controller functions are not supported.

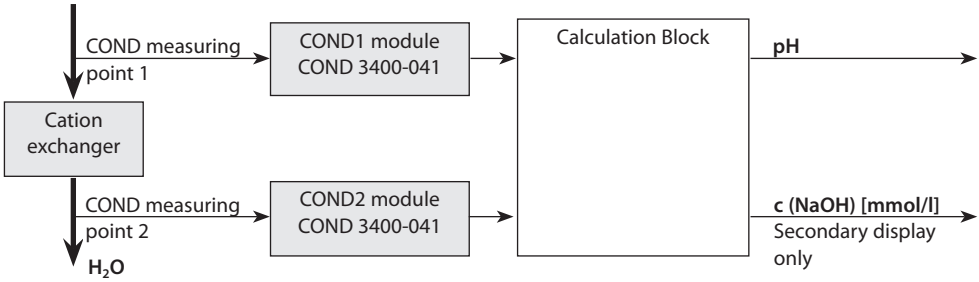
Calculation Formulas

Module combinations, Calculation Block, process variables

Variable	Calculation formula	Range	Span
Difference (selectable in menu)	DIFF = A - B or DIFF = B - A	Variable	Variable
Ratio (selectable in menu)	$RATIO = \frac{A}{B}$	0.00 ... 19.99	0.10
Passage	$PASS = \frac{B}{A} \cdot 100$	0.00 ... 199.9	10 %
Rejection	$REJECT = \left(1 - \frac{B}{A}\right) 100\ \%$	-199.9 ... 199.9	10 %
Deviation	$DEVIAT = \left(\frac{B}{A} - 1\right) 100\ \%$	-199.9 ... 199.9	10 %

pH value calculation by means of dual conductivity measurement

See user manual for COND 3400-041 module. Principle:

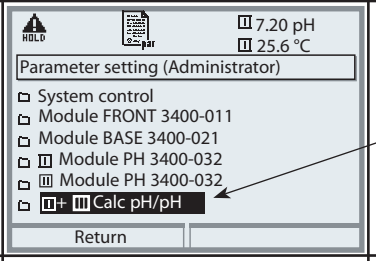
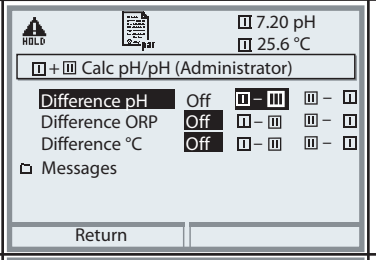
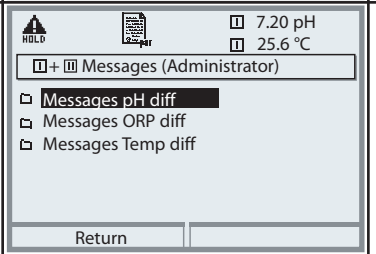
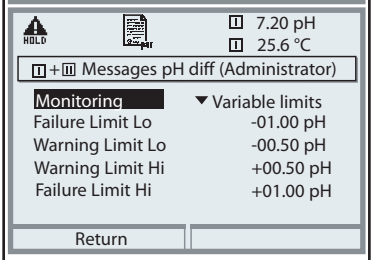


$$c(NaOH) = \frac{COND1 - 1/3\ COND2}{243}$$

$$pH = 11 + \log[c(NaOH)]$$

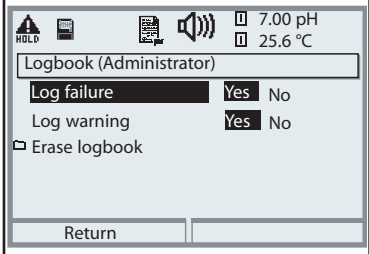
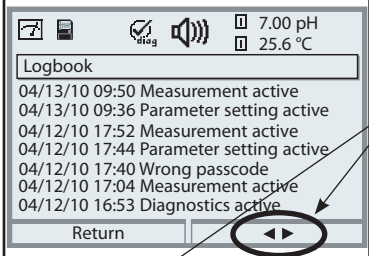
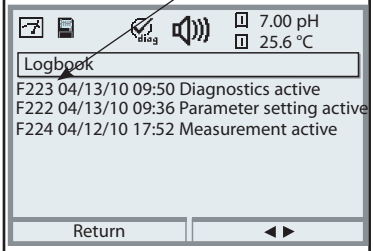
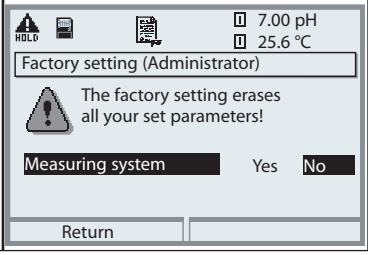
Configuring a Calculation Block

Select menu: Parameter setting/System control/Calculation Blocks
Setting the process variable to be calculated

Menu	Display	Configuring a Calculation Block
par		**Select Calculation Block** • Open parameter setting • System control • Select module
		• Depending on the modules installed, the possible combinations for Calculation Blocks are offered.
	 	**Messages** You can activate messages for the selected variables. Variables which have been set as “Off” cannot be processed further. The measured values which shall release a message are set using the arrow keys (left/right: select position, up/down: edit number). Confirm with **enter**.

Logbook, Factory Setting

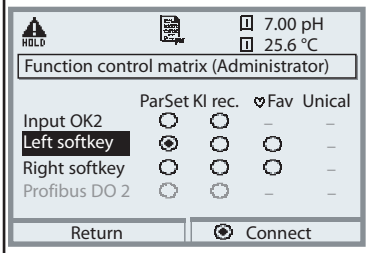
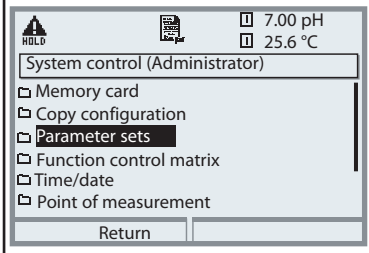
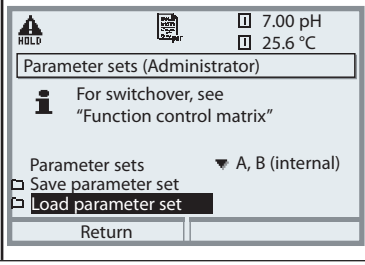
Parameter setting/System control/Logbook
Note: HOLD mode

Menu	Display	Logbook, Factory setting
par		**Logbook** Select which messages are to be logged in the logbook. The last 50 events are recorded with date and time. This permits quality management documentation to ISO 9000 et seq.
		The logbook can be called from the diagnostics menu (Fig.). Pressing the right softkey displays the message identifier.
		Additional function SW 3400-104: Extended logbook for recording data on SmartMedia card (TAN).
		**Factory setting** Allows resetting the parameters to their factory setting. When this menu is opened, the analyzer displays a warning (Fig.).

Switching Between Parameter Sets A, B

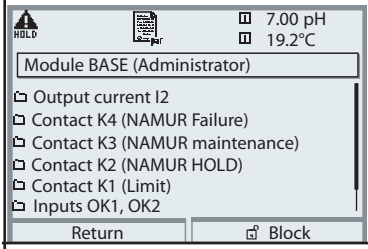
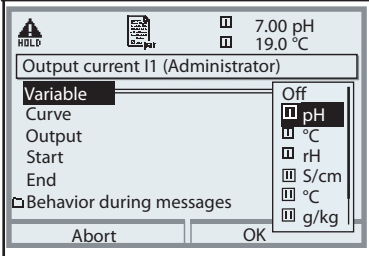
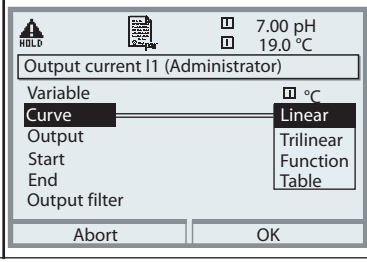
Parameter setting/System control/Parameter sets
Excel "Parameter settings" spreadsheet at www.knick.de: Downloads

Parameter Sets A, B
2 complete parameter sets (A, B) can be stored in the analyzer.
An icon in the measurement display shows which parameter set is active:
A or B
Excel "Parameter settings" spreadsheet at www.knick.de: Downloads.
The control element for switching between the parameter sets (optocoupler, softkey, or PROFIBUS) is selected at "Parameter setting/System control/Function control matrix". The currently activated set can be signaled by a relay contact.

Menu	Display	Parameter sets
par		**Select control element for switching between the parameter sets** • Open menu selection • Parameter setting, Admin. level • Enter passcode • System control: Select "Function control matrix"
		**Parameter sets A, B** • Open menu selection • Parameter setting, Admin. level • Enter passcode • System control • Select "Parameter sets" menu and confirm with **enter**.
		• **Save parameter set** The active parameter set A overwrites the internal parameter set B. • **Load parameter set** Parameter set B is loaded.

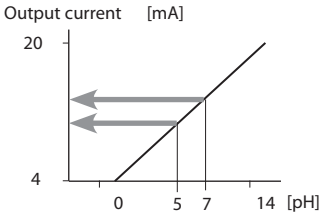
Current Outputs, Contacts, OK Inputs

Select menu: Parameter setting/Module BASE
Note: HOLD mode active

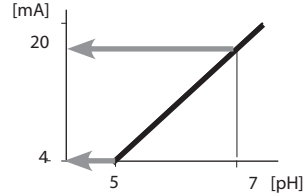
Menu	Display	Parameter setting BASE module
par		**To configure a current output** • Open parameter setting • Enter passcode • Select "Module BASE" • Select "Output current ..."
		• Select measured variable
		• Select Curve, e.g. "linear": The measured variable is represented by a linear output current curve. The desired range of the measured variable is specified by the values for "Start" and "End".

Assigning measured values: Start (4 mA) and End (20 mA)

Example 1: Range pH 0 - 14



Example 2: Range pH 5 - 7
Advantage: Higher resolution in range of interest

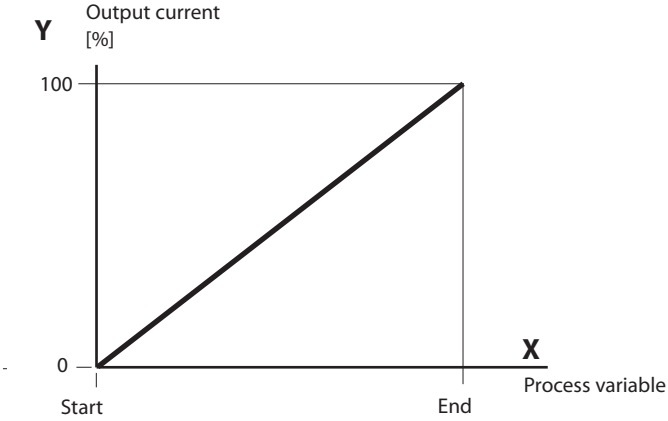


Current Outputs: Characteristics

Select menu: Parameter setting/Module BASE

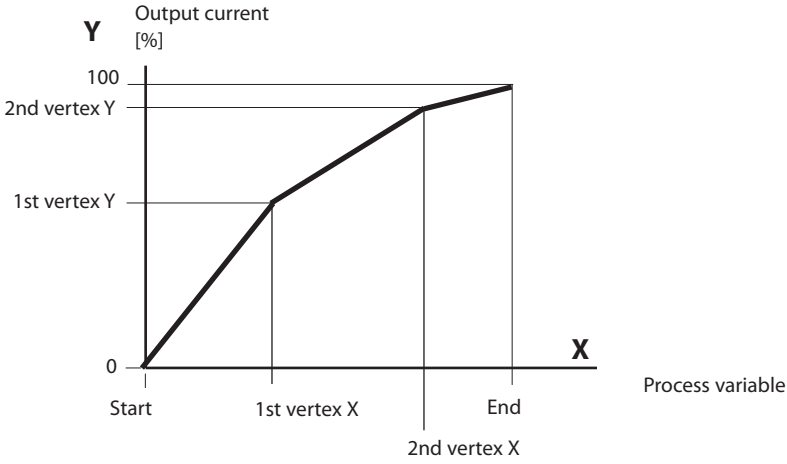
- **Linear characteristic**

  The process variable is represented by a linear output current curve.



- **Trilinear characteristic**

  Two additional vertices must be entered:



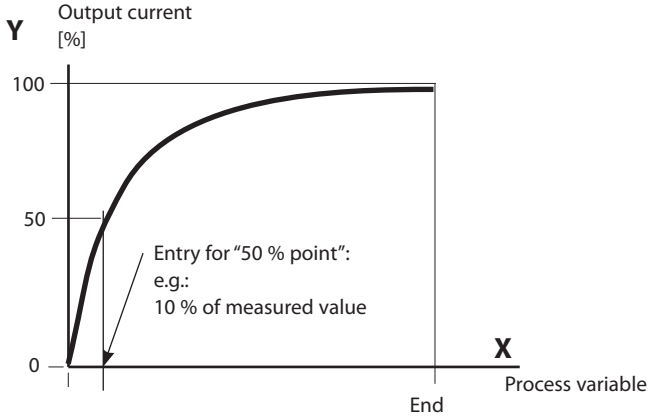
- **Note: Bilinear characteristic**

  For a bilinear characteristic, identical parameters are entered for the two vertices (1st vertex, 2nd vertex).

- **Function characteristic**

  Nonlinear output current characteristic: allows measurements over several decades, e.g. measuring very low values with a high resolution and high values with a low resolution.

  Required: Entering a value for 50 % output current.



Equation

$$\text{Output current (4 to 20 mA)} = \frac{(1+K)x}{1+Kx} 16\text{ mA} + 4\text{ mA}$$

$$K = \frac{E + S - 2 * X50\%}{X50\% - S} \qquad x = \frac{M - S}{E - S}$$

S: Start value at 4 mA
X50%: 50% value at 12 mA (output current range 4 to 20 mA)
E: End value at 20 mA
M: Measured value

Logarithmic output curve over one decade:
S: 10 % of maximum value
X50%: 31.6 % of maximum value
E: Maximum value

Logarithmic output curve over two decades:
S: 1 % of maximum value
X50%: 10 % of maximum value
E: Maximum value

Output Filter

Time interval

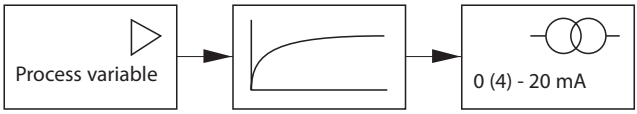
Time averaging filter

To smoothen the current output, a low-pass filter with adjustable time interval can be switched on. When there is a jump at the input (100 %), the output level is at 63 % after the time interval has been reached.

The time interval can be set from 0 to 120 sec. If the time interval is set to 0 sec, the current output follows the input.

Note:

The filter only acts on the current output and the current value of the secondary display, not on the measurement display, the limit values or the controller!

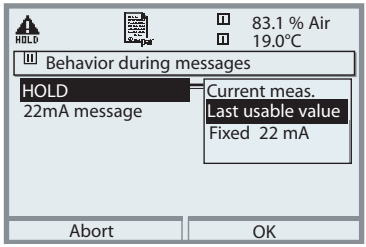


Time interval 0 ... 120 sec

NAMUR Signals: Current Outputs

Behavior during messages: HOLD, 22mA signal

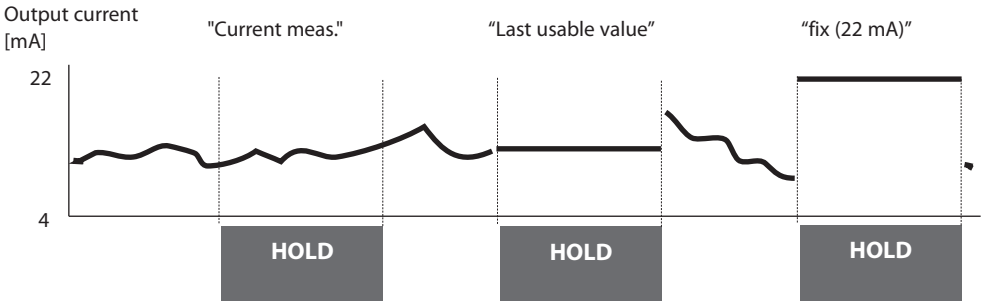
Behavior during messages



Depending on the configuration ("Messages") the current outputs switch to:

- Currently measured value
- Last measured value (HOLD function)
- Fixed value (22 mA)

In the case of a fault a 22 mA signal can be generated for the selected process variable (1st primary value).



Message when the current range is exceeded

As delivered, the "Maintenance request" (Warn) message is generated when the current range is exceeded (< 3.8 mA or > 20.5 mA).
This setting can be changed in the Parameter setting menu of the respective measuring module at "Messages".

To generate a "Failure" message, the limit value monitoring must be set to "Variable limits":
Parameter setting - <measuring module> - Messages - Variable limits - Failure limit ...

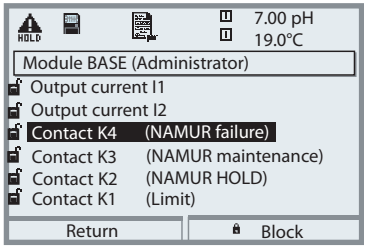
Enter the same values for the failure limits as for the current output:
Parameter setting - Module BASE - Output current - Variable Start / End.

NAMUR Signals: Relay Contacts

Failure, maintenance request, HOLD (function check)

As delivered, the floating relay outputs of the BASE module are assigned to the NAMUR signals:

Failure	Contact K4, normally closed (signaling current failure)
Maintenance request	Contact K3, normally open contact
HOLD	Contact K2, normally open contact



NAMUR signals: Factory setting of contacts
- Select parameter setting
- Administrator level
- Select "Module BASE" (Fig.)
  You can define a delay time for "Maintenance request" and "Failure", resp.
  If an alarm message is released, the contact will only be activated after expiry of this delay time.

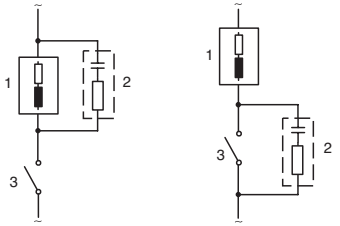
Failure is active
when a value has exceeded (or fallen below, resp.) a preset "Failure Limit Hi" or "Failure Limit Lo", when the measured value is out of range, or in the event of other failure messages. That means that the equipment no longer operates properly or that process parameters have reached a critical value.
Failure is disabled during "HOLD" (Function check).

Maintenance request is active
when a value has exceeded (or fallen below, resp.) a preset "Warning Limit Hi" or "Warning Limit Lo", or when other warning messages have been activated. That means that the equipment is still operating properly but should be serviced, or that process parameters have reached a value requiring intervention.
Warning is disabled during "HOLD" (function check).

HOLD is active:
- during calibration
- during maintenance (current source, meas. point maintenance)
- during parameter setting at the Operator level and the Administrator level
- during an automatic rinsing cycle

Relay Contacts: Protective Wiring

Protective wiring of relay contacts
Relay contacts are subject to electrical erosion. Especially with inductive and capacitive loads, the service life of the contacts will be reduced. For suppression of sparks and arcing, components such as RC combinations, nonlinear resistors, series resistors and diodes should be used.



Typical AC applications with inductive load

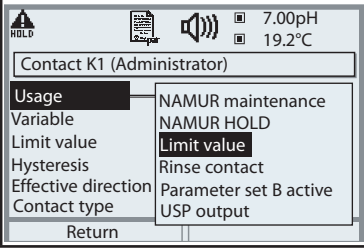
1 Load
2 RC combination, e.g. RIFA PMR 209
Typical RC combinations
e.g.
capacitor 0.1 µF
resistor 100 ohms / 1 W
3 Contact

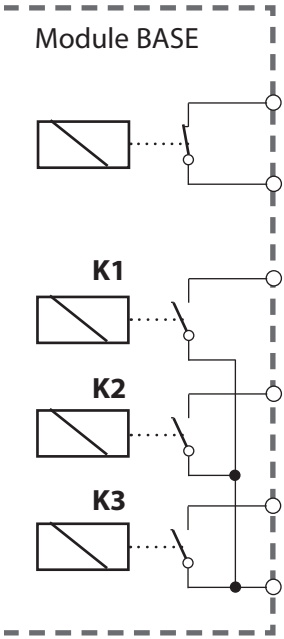
Caution!
Make sure that the maximum ratings of the relay contacts are not exceeded even during switching!

Information concerning relay contacts
As delivered, the relay contacts are suitable for low signal currents (down to approx. 1 mA). If currents above approx. 100 mA are switched, the gold plating is destroyed during the switching process. After that, the contacts will not reliably switch low currents.

Relay Contacts

Parameter setting/Module BASE/Relay contacts

Menu	Display	Setting the relay contacts
par		**Relay contacts, usage** • Open parameter setting • Enter passcode • Select "Module BASE" • Select "Contact ..." • "Usage" (Fig.)



Contact assignment:
See terminal plate of BASE module

The BASE module provides 4 relay contacts (max. AC/DC rating 30 V / 3 A each).
Contact K4 is provided for failure message. The switching behavior (normally open or normally closed), as well as a switch-on or switch-off delay can be defined.

Default settings of the user-definable relay contacts of the BASE module:

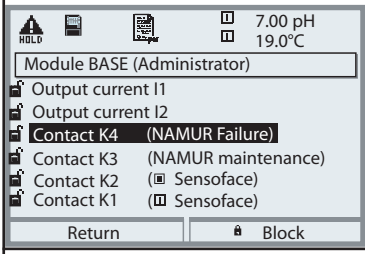
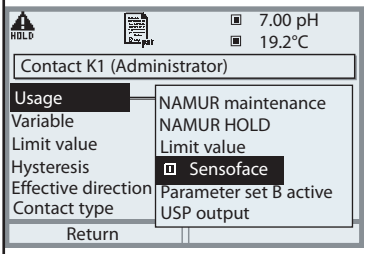
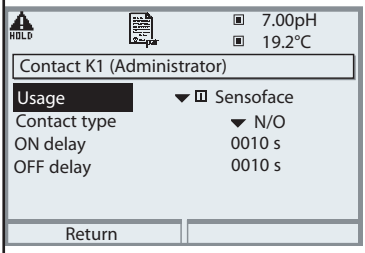
K3: NAMUR maintenance request
K2: NAMUR HOLD (function check)
K1: Limit value

K1-K3 are user definable ("Usage"):

- NAMUR maintenance
- NAMUR HOLD
- Limit value
- Rinse contact
- Parameter set B active
- USP output (COND module only)
- KI rec. active
- Sensoface
- Alarm control

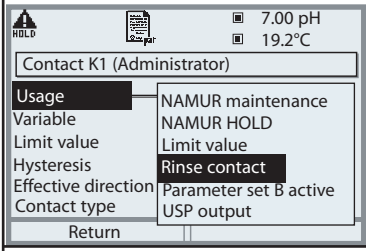
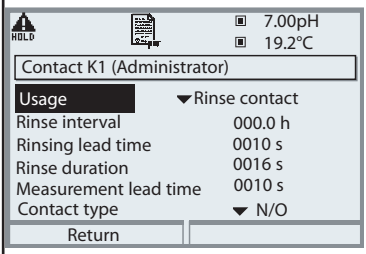
Relay Contacts: Sensoface Messages

Parameter setting/Module BASE/Relay contacts/Usage/Sensoface

Menu	Display	Parameter setting (Sensoface)
par		**Assign Sensoface messages to relay contacts** When more than one measuring module is used, the Sensoface messages of the modules can be assigned to different contacts.
		**Relay contacts, usage** • Open parameter setting • Enter passcode • Select "Module BASE" • Select contact e.g. K1) • Assign Sensoface message of desired measuring module to selected relay contact
		**Set contact parameters** • (e.g. "N/O") • Set ON / OFF delay.

Rinse Contact

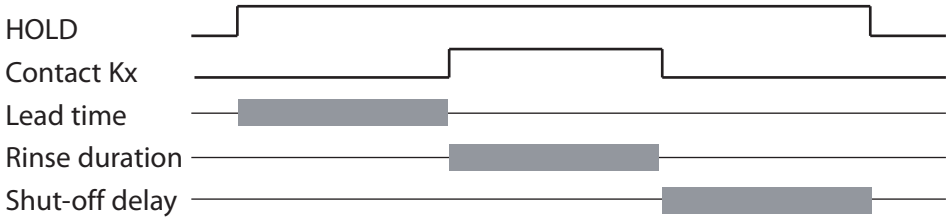
Parameter setting/Module BASE/Relay contacts/Usage/Rinse contact

Menu	Display	Configuring the rinse contact
par		**Relay contacts, usage** • Open parameter setting • Enter passcode • Select “Module BASE” • Select contact e.g. K1) • “Rinse contact” (Fig.)
		**Set rinse contact parameters** • Set rinse interval • Set rinse duration • During the defined "lead time" the "HOLD" mode is active. • Select contact type (e.g. "N/O")

Please note when configuring the "Rinse contact" function

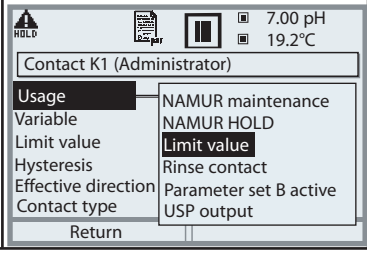
- "HOLD" mode (e.g. during parameter setting) delays the execution of the "Rinse contact" function.
- Up to 3 rinse functions (contacts K1 ... K3) can be configured independently.
- The individual rinse functions are not synchronized with each other.

Time response

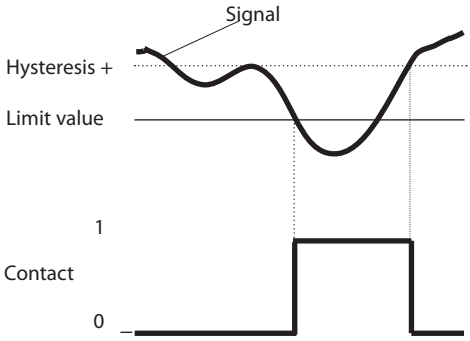


Limit Value, Hysteresis, Contact Type

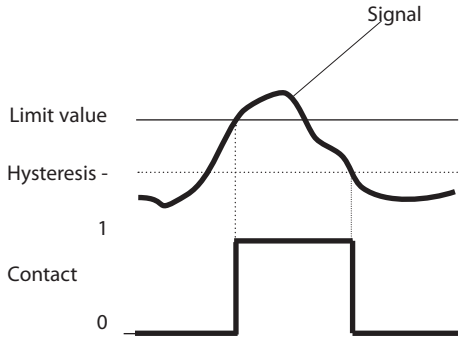
Parameter setting/Module BASE/Relay contacts/Usage

Menu		Usage as limit value
par		**Relay output: Limit value** • Open parameter setting • Enter passcode • Select "Module BASE" • Select "Contact ..." • "Usage: Limit" (Fig.)

Limit value ▼
Effective direction min



Limit value ▲
Effective direction max



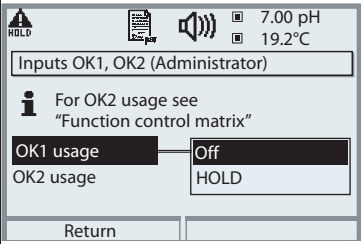
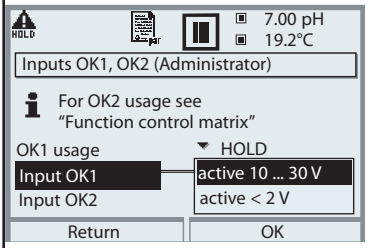
Icons in the measurement display
Measured value exceeds limit: ▲ Measured value falls below limit: ▼

Hysteresis
Tolerance band around the limit value, within which the contact is not actuated. Serves to obtain appropriate switching behavior at the output and suppress slight fluctuations of the measured variable (Fig.)

Contact type
Specifies whether the active contact is closed (N/O) or open (N/C).

OK1, OK2 Inputs: Specify Level

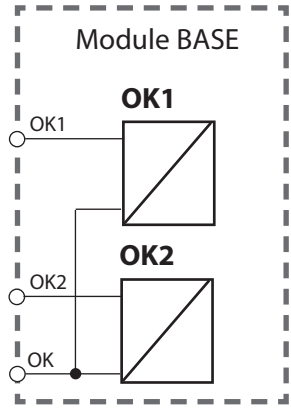
Parameter setting/Module BASE/Inputs OK1, OK2
Note: HOLD mode (Setting: BASE module)

Menu	Display	Setting the OK inputs
par		**OK1 usage** • Open parameter setting • Enter passcode • Select "Module BASE" • Select "Inputs OK1/OK2" • Select "OK1 usage"
		**OK1/OK2 switching level** • Open parameter setting • Enter passcode • Select "Module BASE" • Select "Inputs OK1/OK2" • Specify active switching level

The BASE module provides 2 digital inputs (OK1, OK2). The following functions (depending on the parameter setting) can be started via a control signal:

- OK1: "Off" or "HOLD"
- OK2: Select: System control / Function control matrix. ("Off", "Parameter set A/B", "Start KI recorder")

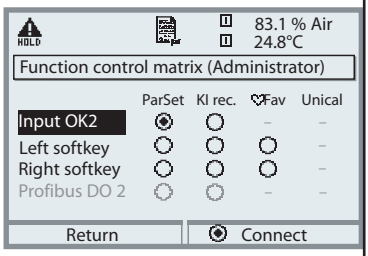
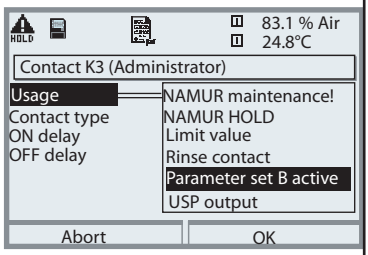
You must specify the switching level for the control signal:
(active 10...30 V or active < 2 V).



Switching Parameter Sets via OK2

Parameter setting / System control / Function control matrix
Note: HOLD mode (Setting: BASE module)

Parameter Sets
2 complete parameter sets (A, B) can be stored in the analyzer.
You can switch between the parameter sets using the OK2 input.
The currently activated set can be signaled by a relay contact.
An icon in the measurement display shows which parameter set is active:
A or B

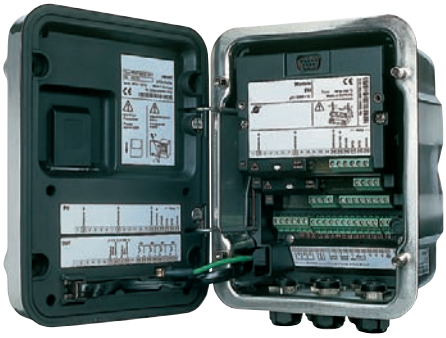
Menu	Display	Parameter sets
par		**Select Parameter Set (A, B) via OK2 Input** • Open parameter setting • System control • Function control matrix • Select "OK2" • Connect "Parameter set A/B"
		**Signaling Active Parameter Set via Relay Contact** • Open parameter setting • BASE module • Select contact • Usage: "Parameter set ...".

Note
The selection has no effect when working on SmartMedia card with SW 3400-102.

Inserting the SmartMedia Card

Please note when inserting the SmartMedia card:
Protect against electrostatic discharge!
The analyzer must be opened to insert or replace the SmartMedia card.
Power can remain on. When closing the device, make sure that the sealing is properly seated and clean.

Warning!
Do not touch the terminal compartment, there may be dangerous contact voltages!

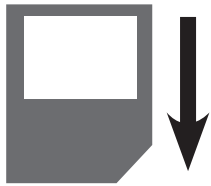


1. Open the analyzer

- Loosen the 4 front screws
- Open the FRONT module at its right side (pivot hinge inside at the left)
- The slit for inserting the SmartMedia card is located at the inner side of the FRONT module

2. Insert SmartMedia card

- Remove SmartMedia card without touching the contact surface from its package
- Insert card in the slit at the inner side of the FRONT module



Inserting the SmartMedia card:
The label must be facing you.

3. Remove SmartMedia card

- To avoid data loss, please open the Maintenance menu.
- Select "Close memory card" to terminate software access to the SmartMedia card. Now the card can be taken out.

SmartMedia Card: Types

Types of SmartMedia cards provided by the manufacturer
The SmartMedia cards are supplied preformatted as:
- Memory Card (SW 3400-102 ... 1xx)
- Software update (SW 3400-106)

SmartMedia card: display icons
When the analyzer has recognized the SmartMedia card, it displays an icon resembling a SmartMedia card:

Memory card (SW 3400-102 ... 1xx)
This type of card allows the storage of data (e.g. configuration, parameter sets, logbook, measurement recorder data).
The icon flashes to indicate active data transmission.

SmartMedia card locked against data access
(type "memory card")
To avoid data loss, a memory card must be "closed" in the Maintenance menu before it is removed.
The icon shown on the left is displayed.
Now the card can be taken out.
(A locked card can be opened in the Maintenance menu.)

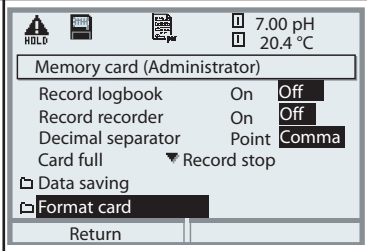
Software update card (additional function SW 3400-106)
This SmartMedia card is specially preformatted and allows a software update. In that case the previous operating program of the analyzer ("firmware") will be replaced by a new version.
An update card can also be used to save older versions of the operating program. You cannot save general data on a SmartMedia card of the type "Update card". By formatting an update card you can generate a "memory card" (irreversible!) Formatting erases the update!

SmartMedia Card: Memory Cards

Formatting commercial SmartMedia cards

Commercially available SmartMedia card as memory card.
The following types of cards are supported: 8 MB, 16 MB, 32 MB, 64 MB, and 128 MB. Externally produced files, such as from a digital camera, are tolerated. Long file names can be read. The Protos 3400(X) generates file names in the 8.3 format (8 characters file name, 3 characters program-specific file name extension).

Formatting a commercial SmartMedia card
Please format a commercial SmartMedia card as Protos memory card before use. Please do NOT format the card in a PC card reader, always use the Protos!

Menu	Display	Formatting commercial SmartMedia cards
		**Format** • Insert SmartMedia card • Open menu selection • Parameter setting, Admin. level • Enter passcode • System control: Memory card ("Memory card" function only available with SmartMedia card inserted!) • Format card

File structure of a memory card

Folder	Typ. file name	Remark
BACKUP	BACKUP01.PAR	BACKUP device configuration
LOGBOOK	L_YYMM00.TXT	Logbook file, YY=year, MM= month
PARASET	SET 1	Parameter set
RECORDER	R_YYMMDD.TXT	Recorder entry, YY=year, MM=month, DD=day

Saving / Loading Device Configuration

Parameter setting/System control/Copy configuration

Saving / Loading the complete device configuration

Parameter setting/System control/Memory card/Copy configuration
"Save" configuration means that the complete device configuration (except the passcodes) is written on the memory card.
"Load" configuration means that the complete device configuration is read from the memory card and pogrammmed.
BACKUP file generated on SmartMedia card: \BACKUP\BACKUP01.PAR

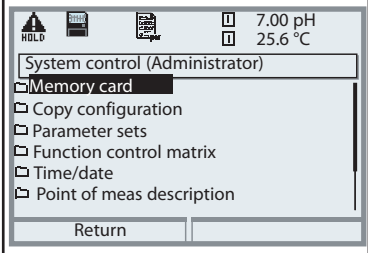
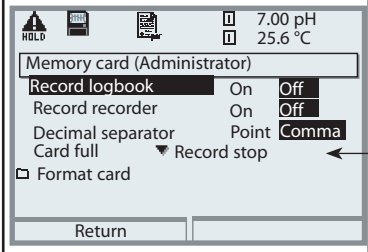
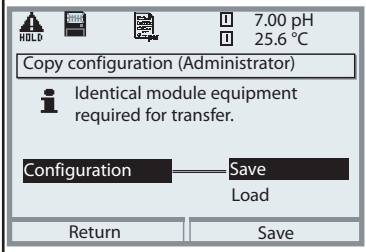
Transferring the complete device configuration from one device to further devices

Prerequisite:
The devices have the same hardware equipment,
the modules are placed in the same slots
(e.g. PH 3400-035 in slot I, COND 3400-041 in slot II etc.).
Options:
All required options must be enabled in the "master device",
the options in the "slave devices" can be a subset of them.
Only the option parameters are transferred, not the option itself.
When an option is enabled in a "slave device" at a later point in time, the parameters of this option are already initialized according to the "master device".

1) Write device configuration of configured device on SmartMedia card:
   Parameter setting/System control/Copy configuration/Save.
2) Change to maintenance menu. Select "Close memory card".
3) Remove the SmartMedia card. Now you can transfer the device configuration to further identically equipped devices.
4) To do so, insert the SmartMedia card containing the configuration in the next device to be configured.
   Select
   Parameter setting/System control/Copy configuration/Load.
5) Change to maintenance menu. Select "Close memory card".
6) Remove the SmartMedia card.

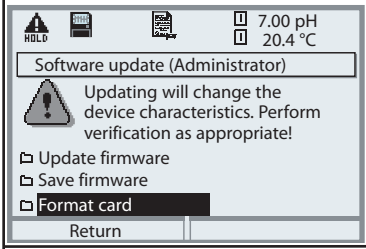
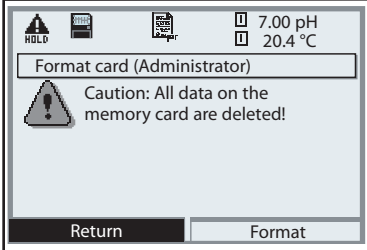
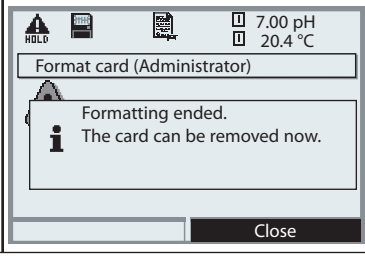
Using the Memory Card

Parameter setting/System control/Memory card

Menu	Display	Using the memory card
par		**To use the memory card** • Insert SmartMedia card • Open menu selection • Parameter setting, Admin. level • Enter passcode • System control: Memory card With SmartMedia card inserted, the display shown on the left appears (The "Memory card" line is displayed only if a memory card is in the slot). • Select "Memory card", confirm with **enter**. The menu is self-explanatory.
		**Behavior when the memory card is full:** Continuous recording (as with a flight recorder) or Stop (card replacement).
		**Copy configuration** • Save: Saving all data on the memory card • Load: Overwriting all device data with the data from the memory card **Caution! "Close" memory card before removing it (Maintenance menu)**

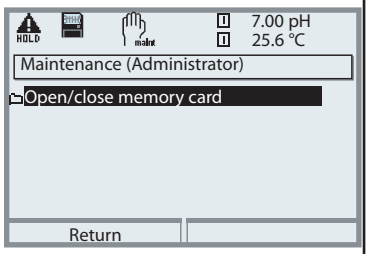
Formatting the Update Card

Parameter setting/System control/Format card
Note: HOLD mode active

Menu	Display	Formatting the update card (generate memory card)
par		**To format the card** • Insert SmartMedia card • Open menu selection • Parameter setting, Admin. level • Enter passcode • System control: Format card
		Formatting an update card generates a memory card. **Caution! This process is irreversible!** Double warning messages protect against faulty operation.
		When formatting is finished, a message will be displayed.

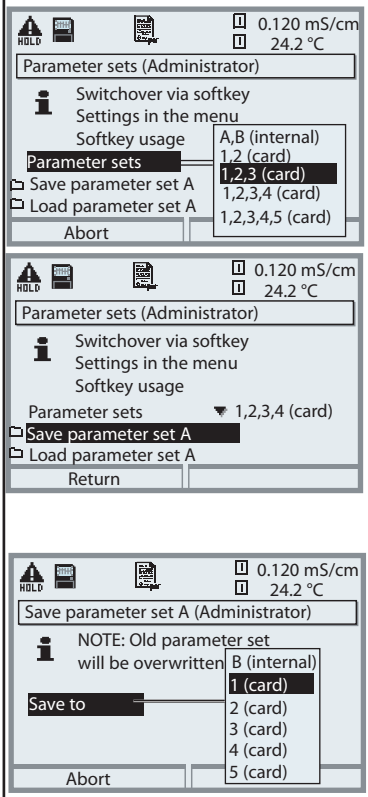
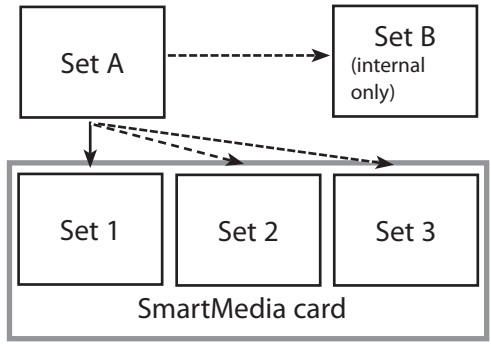
SmartMedia Card: Remove Card

Maintenance/Removing memory card
Note: HOLD mode active

Menu	Display	Close memory card
maint		**Caution!** **"Close" memory card before removing it (Maintenance menu)** Otherwise you risk losing data. **Remove memory card** • Insert SmartMedia card • Open menu selection • Maintenance, Memory card • "Close card" **Close memory card** terminates software access to the SmartMedia card. Must be executed before removing the card from the SmartMedia card slot to prevent data loss. Do not remove the card while the dot in the SmartMedia card icon flashes!

SW 3400-102: Loadable Parameter Sets

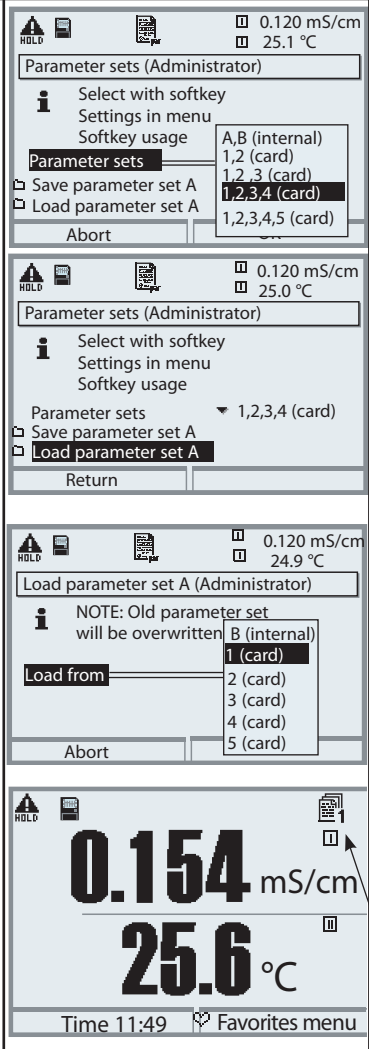
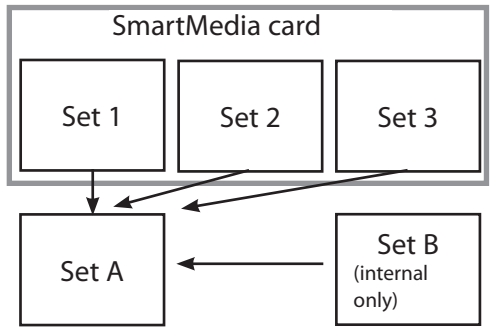
Parameter setting/System control/Parameter sets
Note: Additional function SW 3400-102 required.

Menu	Display	Saving parameter set on SmartMedia card
par		**To save a parameter set on SmartMedia card** • Open parameter setting • System control • Open “Parameter sets” (Fig) The analyzer provides 2 complete parameter sets (A, B). Up to 5 parameter sets can be loaded to the SmartMedia card. To do so, a parameter set (1, 2, 3, 4, or 5) of the SmartMedia card is overwritten by the device-internal parameter set A. • Selecting the parameter set on the SmartMedia card 

Parameter set as file on a memory card:
Stored in "PARASET" folder, typical file name "1.SET".

SW 3400-102: Loadable Parameter Sets

Parameter setting/System control/Parameter sets

Menu	Display	Load parameter set from SmartMedia card
par		**To load a parameter set from SmartMedia card** • Open parameter setting • System control • Open "Parameter sets" (Fig) The analyzer provides 2 complete parameter sets (A, B). 5 parameter sets can be stored on the SmartMedia card. One of those can be saved as parameter set A to the analyzer:  • Select parameter set to be loaded. Activated parameter set is displayed in measuring mode. Note: Remote switching between A and B is possible via the OK2 input.

SW 3400-106: Software Update

For a software update (additional function SW 3400-106), the manufacturer supplies a specially formatted SmartMedia card. The analyzer replaces its own firmware (operating program) by the new version (“Update”).

Caution!
During a software update the analyzer is not operable!
After a software update you should check the configuration.

This icon indicates that a SmartMedia card is inserted in the slot.
The card allows storing of current device software on the card as well as loading of new software into the analyzer.

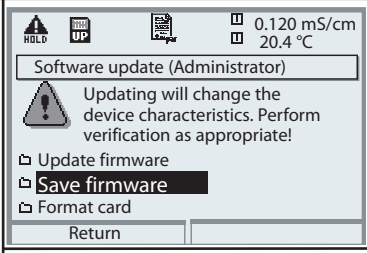
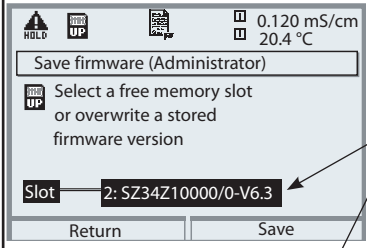
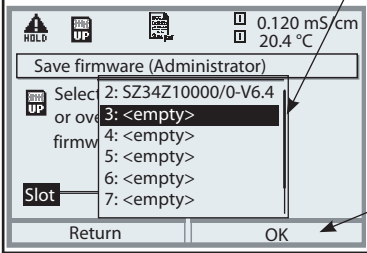
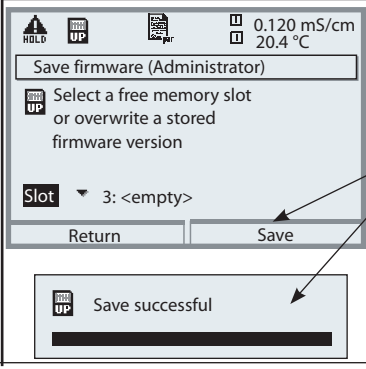
1. Save the firmware currently installed in your analyzer (Pg 85)

2. Load the software update as described on Pg 86.

Notice:
A memory card can be generated by formatting an update card (irreversible!). See introductory chapter to SmartMedia card.

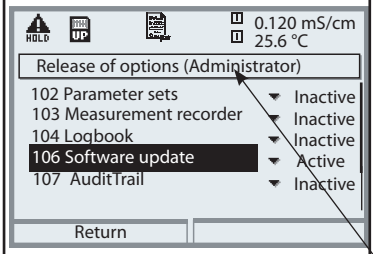
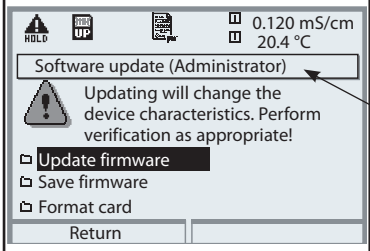
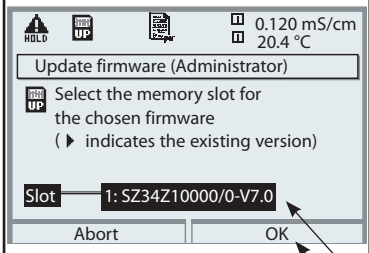
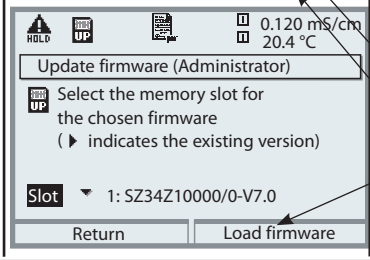
SmartMedia Card: Save Firmware

Parameter setting/System control/Software update/Save firmware

Menu	Display	Save firmware on software update card
par		**Save firmware** • Insert SmartMedia card • Open menu selection • Parameter setting, Admin. level • Enter passcode • System control: Software update
		Select a free memory slot on the card: • Select slot with ▶ key • Select free slot with arrow keys.
		• Confirm slot with “OK”.
		Start with “Save” softkey. Confirm finish message (with “OK” or **enter**). Remove the SmartMedia card. Close the front door.

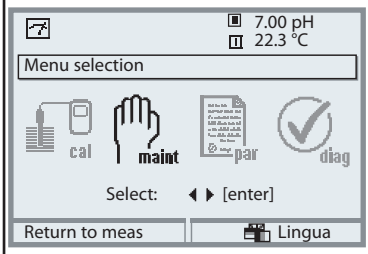
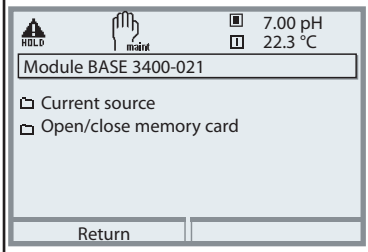
SmartMedia Card: Load Firmware

Parameter setting/System control/Software update/Load firmware

Menu	Display	Software update ("Load firmware")
par		**Software update** • Insert SmartMedia card • Open menu selection • Parameter setting, Admin. level • Enter passcode • Select System control **1: Select Release of options** (Software update SW 3400-106) Set option to "active". Enter the TAN at the prompt. The option is available after the TAN has been entered.
		**2. Select Software update** Check whether your unit really requires a software update. To read the current software version, select: • Diagnostics • Device description • Module FRONT
		**Perform update:** • Parameter setting • System control • Software update • Select slot • Confirm slot with "OK". • Press "Load firmware" softkey to start the software update.
		

Maintenance

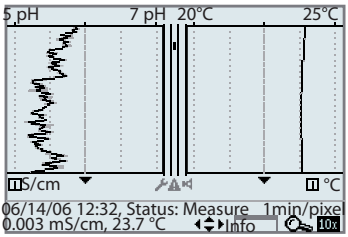
BASE Module
Note: HOLD mode active

Menu	Display	Maintenance
maint	 	**Open Maintenance** From the measuring mode: Press **menu** key to select menu. Select maintenance using arrow keys, confirm with **enter**. Then select "Module BASE". **BASE module: Current source** For testing purposes, the output current can be manually specified (range 0 ... 22 mA). **Open/close memory card** terminates software access to the SmartMedia card. Must be executed before removing the card from the SmartMedia card slot to prevent data loss.

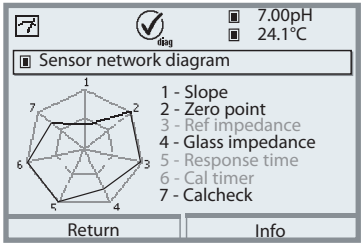
Diagnostics Functions

Overview
Selected diagnostics functions for quality management

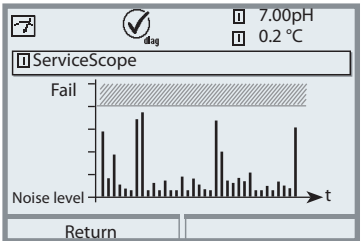
Diagnostics Functions (Quality Management, ISO 9000 et seq.)
To meet the quality management requirements to ISO 9000, Protos provides comprehensive diagnostics and safety functions such as Sensocheck sensor monitoring and CalCheck monitoring of calibration ranges, a logbook for time- and date-stamped recording of function activations, warning and failure messages. Further features are:



2-channel measurement recorder
Can be called directly from the measuring mode.
Allows detailed evaluation of events by placing the cursor on measured values of interest.



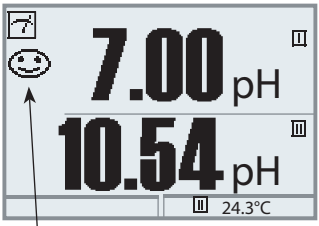
Sensor network diagram
(PH, OXY modules)
Graphical representation of the sensor parameters in a network diagram – with slope, zero, reference impedance, glass impedance, response time, calibration timer, deviation from calibration range.



ServiceScope
(PH module)
Displays the noise levels over the time. Allows distinction of individual disturbances, periodic and broadband disturbances, which is helpful for troubleshooting. An error message is generated if the noise level exceeds the failure limit.

Sensoface

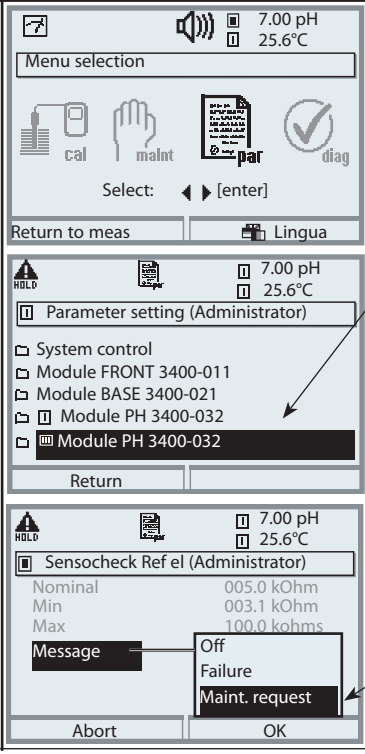
Sensoface is a graphical indication of the sensor condition –
Sensocheck must have been activated during parameter setting.



Sensocheck - Sensor monitoring

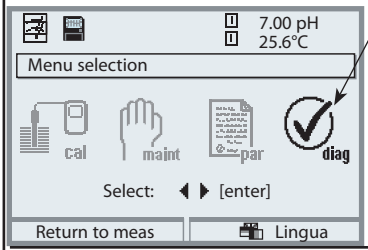
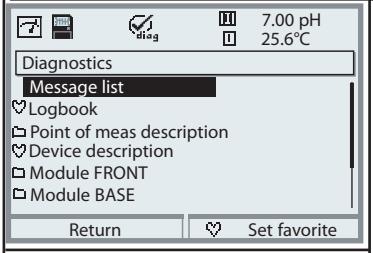
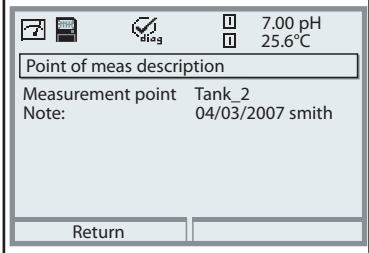
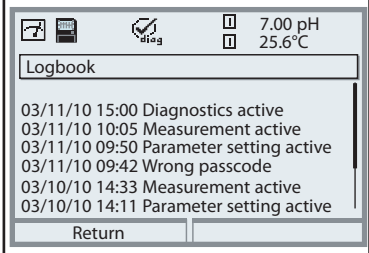
Module	Sensocheck function
OXY:	Monitoring membrane/electrolyte
COND(I):	Information on sensor condition
PH/ORP/ CO_2:	Automatic monitoring of glass and reference electrode

The "smileys" provide information on wear and required maintenance of the sensor ("friendly" - "neutral" - "sad").

Menu	Display	Activate Sensocheck
par		Sensocheck messages can be assigned to a relay contact (Parameter setting / Module BASE / Contact / Usage) **Select parameter setting** Enter passcode (Administrator) Select measuring module (e.g. "PH" or "OXY"). Confirm with **enter** Select "Sensor data". Confirm with **enter**. Then select "Sensocheck Ref el". Assign function and confirm with **enter**.

Diagnostics Functions

General status information of the measuring system
Select menu: Diagnostics - Logbook

Menu	Display	Diagnostics functions
diag		**Access Diagnostics** From the measuring mode: Press **menu** key to select menu. Select Diagnostics using arrow keys, confirm with **enter**.
		The "Diagnostics" menu gives an overview of all functions available. Functions which have been set as "Favorite" can be directly accessed from the measuring mode.
		**Point of meas description** Allows entering a tag number and a note. Select position: left/right arrow key, select character: up/down arrow key. Confirm the entry with **enter**.
		**Logbook** Shows the last 50 events with date and time, e.g. calibrations, warning and failure messages, power failure etc. This permits quality management documentation to ISO 9000 et seq. Extended logbook: SmartMedia card (SW 3400-104)

SW 3400-104: Extended Logbook

Parameter setting/System control/Logbook

Additional Function SW 3400-104: Extended Logbook
The extended logbook saves all entries in a file. The last 50 entries can be displayed on the Protos. A new file is generated for each month. The date is encoded in the file name.
Example for a file generated on SmartMedia card:

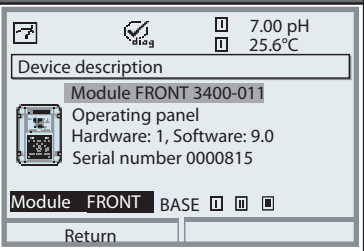
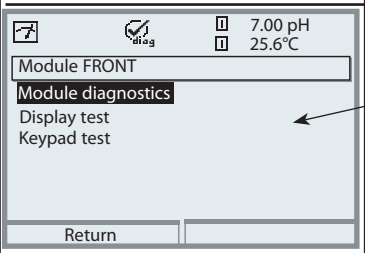
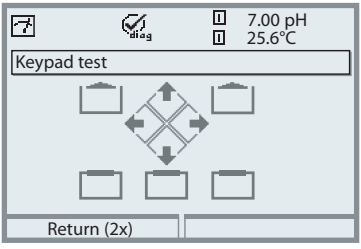
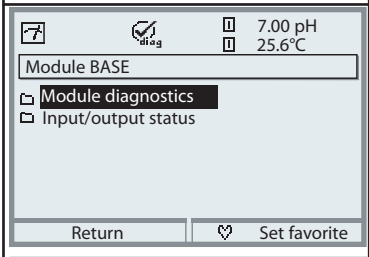
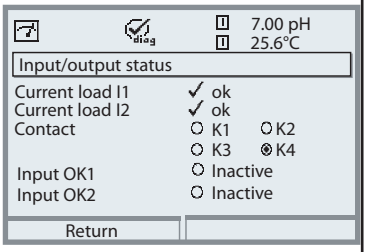
\LOGBOOK\L_YYMM00.TXT	Recorder data of YYMM (YY = year, MM = month)

The data is recorded as ASCII file with the extension .TXT.
The individual columns are separated by tabs. This makes the file readable with word processing or spreadsheet programs (e.g. Microsoft Excel). E
ach time the memory card is inserted in the slot, a "Device Info" consisting of Model number, BASE serial number, and tag number is written. Thus, a memory card can also be used to collect the logbook data of several devices.
Example:

PROTOS 3400 - Logbook

No.	Time Stamp	Status	Message
<< Protos 3400 - Serial 0001760 [DSE KL_001] >>			
F226	21.04.10	19:08:43	Power supply Off
F227	22.04.10	06:02:01	Power supply On
F223	22.04.10	06:09:27	Diagnostics active
F225	22.04.10	06:09:36	Measurement active
B077	23.04.10	16:45:07 (x)	Fail current I2 > 20 mA
F222	23.04.10	18:43:11	Parameter setting active
F225	23.04.10	18:47:38	Measurement active
B077	23.04.10	18:47:38 ( )	Fail current I2 > 20 mA

No.	Message identifier
Time stamp:	Time stamp of logbook entry
Status	(x) - Message activated ( ) - Message deactivated
Message	Message text (in selected operator language)

Menu	Display	Diagnostics functions
diag		**Device description** Provides information about all modules installed: Module type and function, serial number, hardware and software version and device options (Example: FRONT).
		**FRONT module** The module contains the display and keypad control. Test possibilities: • Module diagnostics • Display test • Keypad test
		Example: Module FRONT, Keypad test. Correct functioning of each key can be checked by pressing it down.
		**BASE module** The module generates the standard output signals. Test possibilities: • Module diagnostics • Input/output status
		Example: Module BASE, input/output status.

Setting Diagnostics Messages as Favorite

Select menu: Parameter setting/System control/Function control matrix

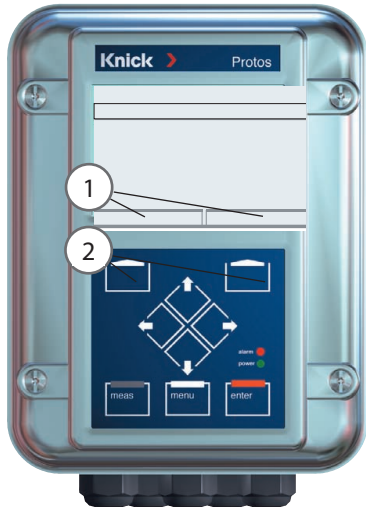
Secondary displays (1)
Here, additional values are displayed in the measuring mode according to the factory setting. When the respective softkey (2) is pressed, the process variables measured by the modules plus date or time are displayed. In addition, you can use the **softkeys (2)** to control functions. To assign a function to a softkey, select

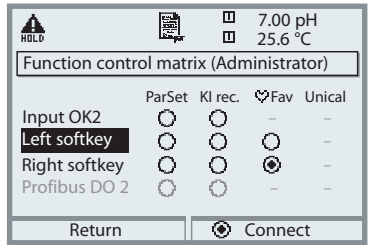
Parameter setting/System control/ Function control matrix

Function which can be controlled by softkeys:

- Parameter set selection
- KI recorder Start/Stop
- Favorites
- Unical (fully automated probe controller)

Favorites
Selected Diagnostics functions can be called directly from the measuring mode using a softkey.
The table on the next page explains how to select favorites.

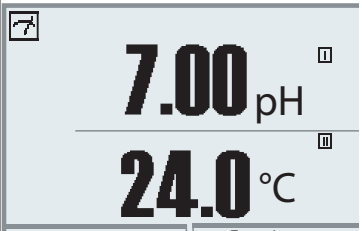
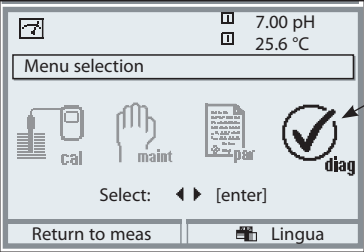
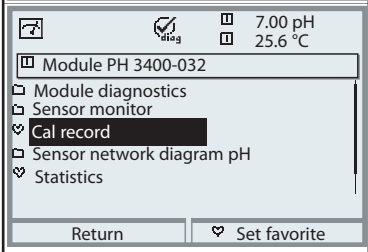
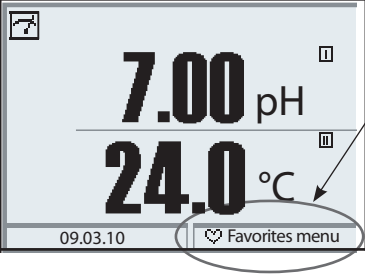




Example:
"Favorites" to be selected with "Right softkey"

To select a softkey function:
Select desired function using arrow keys,
press "Connect" softkey and c onfirm with **enter**.

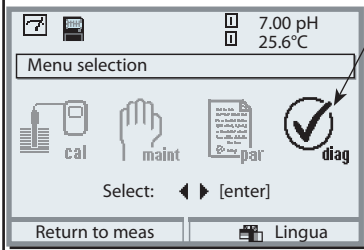
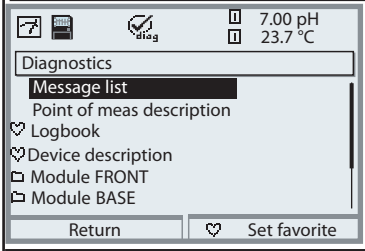
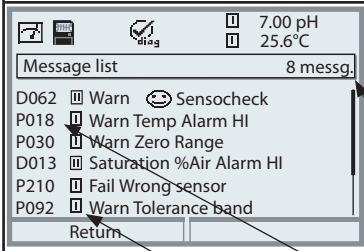
To deselect a function:
Press "Disconnect" softkey, confirm with **enter**.

Menu	Display	Select favorites
		**Favorites menu** Diagnostics functions can be called directly from the measuring mode using a softkey. The "Favorites" are selected in the Diagnostics menu.
diag		**Select favorites** Press **menu** key to select menu. Select diagnostics using arrow keys, confirm with **enter**. Then select module and confirm with **enter**.
		Set/delete favorite: "Set favorite" allows activation of the selected diagnostic function directly from the measuring mode via softkey. The menu line is marked with a heart icon.
		Pressing the **meas** key returns to measurement. When the softkey has been assigned to "Favorites", "Favorites menu" is read in the secondary display (see "Function control matrix").

Notice:
When one of the softkeys has been assigned to the "Favorites menu" function, diagnostic functions which have been set as "Favorite" can be directly called from the measuring mode.

Diagnostics Functions

General status information of the measuring system
Select menu: Diagnostics - Message list

Menu	Display	Diagnostics functions
diag		**Opening the diagnostics menu** From the measuring mode: Press **menu** key to select menu. Select diagnostics using arrow keys, confirm by pressing **enter**.
		The "Diagnostics" menu gives an overview of all functions available. Functions which have been set as "Favorite" can be directly accessed from the measuring mode.
		**Message list** Shows the currently activated warning or failure messages in plain text. **Number of messages** When there are more than 7 messages, a vertical scrollbar appears. Scroll with the up/down arrow keys. **Message identifier** See message list for description. **Module identifier** Specifies the module that has generated the message.

Module FRONT 3400-011
Module FRONT 3400(X)-015

No.	FRONT messages	Message type
F008	Meas. processing (factory settings)	FAIL
F009	Module failure (Firmware Flash check sum)	FAIL
F060	KI process window exceeded (acknowledgeable message)	User-defined
F061	KI recorder parameter	WARN
F080	ComFu®-E Channel 1 – [1] No sensor	
F081	ComFu®-E Channel 1 – [2] No sensor	
F082	ComFu®-E Channel 1 – [1] Communication interrupted	
F083	ComFu®-E Channel 1 – [2] Communication interrupted	
F084	ComFu®-E Channel 1 – [1] Sensor connection	
F085	ComFu®-E Channel 1 – [2] Sensor connection	
F086	ComFu®-E Channel 1 – [1] Battery empty	
F087	ComFu®-E Channel 1 – [2] Battery empty	
F090	ComFu®-E Channel 2 – [2] No sensor	
F091	ComFu®-E Channel 2 – [3] No sensor	
F092	ComFu®-E Channel 2 – [2] Communication interrupted	
F093	ComFu®-E Channel 2 – [3] Communication interrupted	
F094	ComFu®-E Channel 2 – [2] Sensor connection	
F095	ComFu®-E Channel 2 – [3] Sensor connection	
F096	ComFu®-E Channel 2 – [2] Battery empty	
F097	ComFu®-E Channel 2 – [3] Battery empty	
F200	CRC error PAR	FAIL
F201	Communications error (system bus)	FAIL
F202	System failure	FAIL
F210	Device diagnostics (Self test signals error)	WARN
F211	Card error (SmartMedia)	WARN
F212	Time/date	WARN
F213	Module temperature (range exceeded)	WARN
F215	Memory card full	WARN

No.	FRONT messages	Message type
F216	AuditTrail card	FAIL
F220	Calibration active	Text
F221	Maintenance active	Text
F222	Parameter setting active	Text
F223	Diagnostics active	Text
F225	Measurement active	Text
F226	Power supply OFF	Text
F227	Power supply ON	Text
F228	Software update	Text
F229	Wrong passcode	Text
F230	Factory setting	Text
F231	Module configuration changed	Text
F232	Module equipment Ex/non-Ex	FAIL
F233	Module equipment Ex	FAIL

BASE 3400-021 Module
BASE 3400(X)-025/VPW Module
BASE 3400(X)-026/24V Module

No.	BASE messages	Message type
B008	Meas. processing (factory settings)	FAIL
B009	Module failure (Firmware Flash check sum)	FAIL
B070	Current I1 Span	WARN
B071	Current I1 <0/4 mA	WARN
B072	Current I1 > 20 mA	WARN
B073	Current I1 Load	FAIL
B074	Current I1 Parameter	WARN
B075	Current I2 Span	WARN
B076	Current I2 <0/4 mA	WARN
B077	Current I2 > 20 mA	WARN
B078	Current I2 Load	FAIL
B079	Current I2 Parameter	WARN
B200	Rinsing program active	Text
B254	Module reset	Text

PH 3400-031 Module
PH 3400(X)-032, PH 3400(X)-033, PH 3400(X)-035 Modules
PHU 3400(X)-110 Module

No.	PH messages	Message type
P008	Meas. processing (factory settings)	FAIL
P009	Module failure (Firmware Flash check sum)	FAIL
P010	pH Range	FAIL
P011	pH Alarm LO_LO	FAIL
P012	pH Alarm LO	WARN
P013	pH Alarm HI	WARN
P014	pH Alarm HI_HI	FAIL
P015	Temperature Range	FAIL
P016	Temperature Alarm LO_LO	FAIL
P017	Temperature Alarm LO	WARN
P018	Temperature Alarm HI	WARN
P019	Temperature Alarm HI_HI	FAIL
P020	ORP Range	FAIL
P021	ORP Alarm LO_LO	FAIL
P022	ORP Alarm LO	WARN
P023	ORP Alarm HI	WARN
P024	ORP Alarm HI_HI	FAIL
P025	rH Range	WARN
P026	rH Alarm LO_LO	FAIL
P027	rH Alarm LO	WARN
P028	rH Alarm HI	WARN
P029	rH Alarm HI_HI	FAIL
P030	Zero Range	WARN
P035	Slope Range	WARN
P040	Isotherm potential Uis Range	WARN
P045	mV Range	WARN
P046	mV Alarm LO_LO	FAIL

Messages

No.	PH messages	Message type
P047	mV Alarm LO	WARN
P048	mV Alarm HI	WARN
P049	mV Alarm HI_HI	FAIL
P050	Temperature - manual	FAIL
P060	SAD SENSOFACE: Slope	User-defined
P061	SAD SENSOFACE: Zero	User-defined
P062	SAD SENSOFACE: Ref impedance (Sensocheck)	User-defined
P063	SAD SENSOFACE: Glass impedance (Sensocheck)	User-defined
P064	SAD SENSOFACE: Response time	User-defined
P065	SAD SENSOFACE: Cal timer	WARN
P066	SAD SENSOFACE: Calcheck	User-defined
P069	SAD SENSOFACE: Calimatic (Zero/slope)	WARN
P070	SAD SENSOFACE: Sensor wear	User-defined
P071	SAD SENSOFACE: ISFET leakage current	User-defined
P090	Buffer offset (buffer table to be entered):	WARN
P091	Zero offset ORP	WARN
P092	Tolerance band	WARN
P110	CIP counter	User-defined
P111	SIP counter	User-defined
P112	Autoclaving counter	User-defined
P113	Sensor operating time (duration of use)	User-defined
P114	ISFET characteristic	User-defined
P115	Membrane body changes	User-defined
P120	Wrong sensor	FAIL
P121	Sensor (error in factory settings/characteristics)	FAIL
P122	Sensor memory (error in cal data records)	WARN
P123	New sensor, adjustment required	WARN
P130	SIP cycle counted	Text
P131	CIP cycle counted	Text
P200	Noise level at pH input	FAIL
P201	Cal temp	WARN

Messages

No.	PH messages	Message type
P202	Cal: Buffer unknown	Text
P203	Cal: Identical buffers	Text
P204	Cal: Buf interchanged	Text
P205	Cal: Sensor unstable	Text
P206	Cal: Slope	WARN
P207	Cal: Zero	WARN
P208	Cal: Sensor failure (ORP check)	FAIL
P254	Module reset	Text

No.	Calculation Block PH / PH messages	Message type
A010	pH-Diff Range	FAIL
A011	pH-Diff Alarm LO_LO	FAIL
A012	pH-Diff Alarm LO	WARN
A013	pH-Diff Alarm HI	WARN
A014	pH-Diff Alarm HI_HI	FAIL
A015	Temperature-Diff Range	FAIL
A016	Temperature-Diff Alarm LO_LO	FAIL
A017	Temperature-Diff Alarm LO	WARN
A018	Temperature-Diff Alarm HI	WARN
A019	Temperature-Diff Alarm HI_HI	FAIL
A020	ORP-Diff Range	FAIL
A021	ORP-Diff Alarm LO_LO	FAIL
A022	ORP-Diff Alarm LO	WARN
A023	ORP-Diff Alarm HI	WARN
A024	ORP-Diff Alarm HI_HI	FAIL

Unical 9000 with PHU 3400(X)-110 Module

No.	Unical messages	Message type
U190	UNICAL Buffer I almost empty	WARN
U191	UNICAL Buffer II almost empty	WARN
U192	UNICAL Cleaner almost empty	WARN
U194	UNICAL Buffer I empty	FAIL
U195	UNICAL Buffer II empty	FAIL
U196	UNICAL Cleaner empty	FAIL
U219	Firmware Probe control	WARN
U220	UNICAL Switch Compressed air	FAIL
U221	Sensor dismounted	FAIL
U222	Undefined security status	FAIL
U224	UNICAL flooded	FAIL
U225	UNICAL Probe valve defective	FAIL
U226	Probe Limit position switch	FAIL
U227	Probe limit position SERVICE	FAIL
U228	Probe cylinder untight	WARN
U229	Sensor dismount guard defective	WARN
U230	Probe Limit position MEASURE	FAIL
U231	Probe Move time MEASURE	WARN
U232	Proble wear counter	WARN
U233	UNICAL Switch Water pressure	WARN
U234	Probe move time SERVICE	WARN
U235	UNICAL Safety valve defective	WARN
U236	UNICAL No pump I	WARN
U237	UNICAL No pump II	WARN
U238	UNICAL No pump III	WARN
U239	UNICAL No aux. valve 1	WARN
U240	UNICAL No aux. valve 2	WARN
U241	Check Rinse water	WARN

Messages

No.	Unical messages	Message type
U242	Check buffer I	WARN
U243	Check buffer II	WARN
U244	Check cleaner	WARN
U245	Check Add. medium 1	WARN
U246	Check Add. medium 2	WARN
U248	UNICAL Water valve	WARN
U251	UNICAL Calibration error	WARN
U252	UNICAL Communication error	WARN
U253	Probe control	WARN

No.	"System forecast" messages	Cause
U160	SP Pressure loss/Air sensor	Air whistles from the sensor – air sensor defective
U161	SP Probe valve not functioning	Pilot valve and/or probe valve do not switch
U162	SP Air sensor not functioning	Air sensor does not switch
U163	SP Probe valve sluggish	Air sensor switches too late Limit positions switch too late
U164	SP Air sensor sluggish	Air sensor switches late
U165	SP Limit positions interrupted	Both limit positions do not switch (GND missing)
U166	SP Limit positions short-circuited	The two limit positions are short-circuited
U168	SP SERVICE position not functioning	Position switch does not react after start of probe travel
U169	SP PROCESS position not functioning	Position switch does not react after start of probe travel
U170	SP SERVICE position sluggish	Position switch reacts too late after start of probe travel
U171	SP PROCESS position sluggish	Position switch reacts too late after start of probe travel
U172	SP Probe sluggish	
U173	SP Probe jammed	Probe does not move or is stuck during probe travel
U174	SP SERVICE position not functioning	Position switch does not react after end of probe travel
U175	SP PROCESS position not functioning	Position switch does not react after end of probe travel
U176	SP SERVICE position sluggish	Position switch reacts too late after end of probe travel
U177	SP PROCESS position sluggish	Position switch reacts too late after end of probe travel
U188	SP General error	

OXY 3400-061, OXY 3400(X)-062 Module
OXY 3400(X)-063, OXY3400(X)-065 Module
OXY 3400(X)-066, OXY3400(X)-067 Module

No.	OXY messages	Message type
D008	Meas. processing (factory settings)	FAIL
D009	Module failure (Firmware Flash check sum)	FAIL
D010	Saturation %Air Range	FAIL
D011	Saturation %Air Alarm LO_LO	FAIL
D012	Saturation %Air Alarm LO	WARN
D013	Saturation %Air Alarm HI	WARN
D014	Saturation %Air Alarm HI_HI	FAIL
D015	Temperature Range	FAIL
D016	Temperature Alarm LO_LO	FAIL
D017	Temperature Alarm LO	WARN
D018	Temperature Alarm HI	WARN
D019	Temperature Alarm HI_HI	FAIL
D020	Concentration Range	FAIL
D021	Concentration Alarm LO_LO	FAIL
D022	Concentration Alarm LO	WARN
D023	Concentration Alarm HI	WARN
D024	Concentration Alarm HI_HI	FAIL
D025	Part. press. Range	FAIL
D026	Part. press. Alarm LO_LO	FAIL
D027	Part. press. Alarm LO	WARN
D028	Part. press. Alarm HI	WARN
D029	Part. press. Alarm HI_HI	FAIL
D030	Zero Range	WARN
D035	Slope Range	WARN
D040	Air pressure Range	WARN
D041	Air pressure Alarm LO_LO	FAIL

Messages

No.	OXY messages	Message type
D042	Air pressure Alarm LO	WARN
D043	Air pressure Alarm HI	WARN
D044	Air pressure Alarm HI_HI	FAIL
D045	Saturation %O2 Range	FAIL
D046	Saturation %O2 Alarm LO_LO	FAIL
D047	Saturation %O2 Alarm LO	WARN
D048	Saturation %O2 Alarm HI	WARN
D049	Saturation %O2 Alarm HI_HI	FAIL
D050	Air pressure Manual Range	WARN
D060	SAD SENSOFACE: Slope	WARN
D061	SAD SENSOFACE: Zero	WARN
D062	SAD SENSOFACE: Sensocheck	User-defined
D063	SAD SENSOFACE: Response time	WARN
D064	Calibration timer	WARN
D070	SAD SENSOFACE: Sensor wear	User-defined
D080	Range (sensor current)	WARN
D090	Vol% Range (measurement in gases)	WARN
D091	Vol% Alarm LO_LO (measurement in gases)	FAIL
D092	Vol% Alarm LO (measurement in gases)	WARN
D093	Vol% Alarm HI (measurement in gases)	WARN
D094	Vol% Alarm HI_HI (measurement in gases)	FAIL
D095	ppm Range (measurement in gases)	FAIL
D096	ppm Alarm LO_LO (measurement in gases)	FAIL
D097	ppm Alarm LO (measurement in gases)	WARN
D098	ppm Alarm HI (measurement in gases)	WARN
D099	ppm Alarm HI_HI (measurement in gases)	FAIL
D110	CIP counter	User-defined
D111	SIP counter	User-defined
D112	Autoclaving counter	User-defined
D113	Sensor operating time (duration of use)	User-defined
D114	Membrane body changes	User-defined

No.	OXY messages	Message type
D115	Inner body changes	User-defined
D120	Wrong sensor	FAIL
D121	Sensor (error in factory settings/characteristics)	FAIL
D122	Sensor memory (error in cal data records)	WARN
D123	New sensor, adjustment required	WARN
D130	SIP cycle counted	Text
D131	CIP cycle counted	Text
D200	Temp O2 conc/SAT	WARN
D201	Cal temp	Text
D203	Cal: Identical media	Text
D204	Cal: Media interchanged	Text
D205	Cal: Sensor unstable	Text
D254	Module reset	Text

No.	Calculation Block OXY/OXY messages	Message type
H010	%AIR-Diff Range	FAIL
H011	%AIR-Diff Alarm LO_LO	FAIL
H012	%AIR-Diff Alarm LO	WARN
H013	%AIR-Diff Alarm HI	WARN
H014	%AIR-Diff Alarm HI_HI	FAIL
H015	Temperature-Diff Range	FAIL
H016	Temperature-Diff Alarm LO_LO	FAIL
H017	Temperature-Diff Alarm LO	WARN
H018	Temperature-Diff Alarm HI	WARN
H019	Temperature-Diff Alarm HI_HI	FAIL
H020	Concentration-Diff Range	FAIL
H021	Concentration-Diff Alarm LO_LO	FAIL

No.	Calculation Block OXY/OXY messages	Message type
H022	Concentration-Diff Alarm LO	WARN
H023	Concentration-Diff Alarm HI	WARN
H024	Concentration-Diff Alarm HI_HI	FAIL
H045	%O2-Diff Range	FAIL
H046	%O2-Diff Alarm LO_LO	FAIL
H047	%O2-Diff Alarm LO	WARN
H048	%O2-Diff Alarm HI	WARN
H049	%O2-Diff Alarm HI_HI	FAIL
H090	Vol%-Diff Range (measurement in gases)	WARN
H091	Vol%-Diff Alarm LO_LO (measurement in gases)	FAIL
H092	Vol%-Diff Alarm LO (measurement in gases)	WARN
H093	Vol%-Diff Alarm HI (measurement in gases)	WARN
H094	Vol%-Diff Alarm HI_HI (measurement in gases)	FAIL
H095	ppm-Diff Range (measurement in gases)	FAIL
H096	ppm-Diff Alarm LO_LO (measurement in gases)	FAIL
H097	ppm-Diff Alarm LO (measurement in gases)	WARN
H098	ppm-Diff Alarm HI (measurement in gases)	WARN
H099	ppm-Diff Alarm HI_HI (measurement in gases)	FAIL

CO_2 3400(X)-130 Module

No.	CO_2 messages	Message type
G008	Meas. processing (factory settings)	FAIL
G009	Module failure (Firmware Flash check sum)	FAIL
G010	Saturation Range	FAIL / WARN
G011	Saturation Alarm LO_LO	FAIL
G012	Saturation Alarm LO	WARN
G013	Saturation Alarm HI	WARN
G014	Saturation Alarm HI_HI	FAIL
G015	Temperature Range	WARN
G016	Temperature Alarm LO_LO	FAIL
G017	Temperature Alarm LO	WARN
G018	Temperature Alarm HI	WARN
G019	Temperature Alarm HI_HI	FAIL
G020	Concentration Range	WARN
G021	Concentration Alarm LO_LO	FAIL
G022	Concentration Alarm LO	WARN
G023	Concentration Alarm HI	WARN
G024	Concentration Alarm HI_HI	FAIL
G025	Part. press. Range	WARN
G026	Part. press. Alarm LO_LO	FAIL
G027	Part. press. Alarm LO	WARN
G028	Part. press. Alarm HI	WARN
G029	Part. press. Alarm HI_HI	FAIL
G030	Zero Range	WARN
G035	Slope Range	WARN
G045	mV Range	WARN
G046	mV Alarm LO_LO	FAIL

Messages

No.	CO_2 messages	Message type
G047	mV Alarm LO	WARN
G048	mV Alarm HI	WARN
G049	mV Alarm HI_HI	FAIL
G050	Temperature - manual	FAIL
G060	SAD SENSOFACE: Slope	User-defined
G061	SAD SENSOFACE: Zero	User-defined
G062	SAD SENSOFACE: Ref. impedance	User-defined
G063	SAD SENSOFACE: Glass impedance	User-defined
G064	SAD SENSOFACE: Response time	User-defined
G065	SAD SENSOFACE: Cal timer	WARN
G066	SAD SENSOFACE: Calcheck	User-defined
G069	SAD SENSOFACE: Calimatic (Zero/slope)	WARN
G070	SAD SENSOFACE: Sensor wear	User-defined
G110	CIP counter	User-defined
G111	SIP counter	User-defined
G112	Autoclaving counter	User-defined
G113	Sensor operating time (duration of use)	User-defined
G114	Membrane body changes	User-defined
G120	Wrong sensor	FAIL
G121	Sensor (error in factory settings/characteristics)	FAIL
G122	Sensor memory (error in cal data records)	WARN
G123	New sensor, adjustment required	WARN
G130	SIP cycle counted	Text
G131	CIP cycle counted	Text
G200	Noise level at pH input	FAIL
G201	Cal temp	WARN
G202	Cal: Buffer unknown	Text
G203	Cal: Identical buffers	Text
G204	Cal: Buf interchanged	Text
G205	Cal: Sensor unstable	Text

No.	CO_2 messages	Message type
G206	Cal: Slope	WARN
G207	Cal: Zero	WARN
G208	Cal: Sensor failure (ORP check)	FAIL
G254	Module reset	Text

No.	Calculation Block CO_2/CO_2 messages	Message type
K015	Temperature-Diff Range	FAIL
K016	Temperature-Diff Alarm LO_LO	FAIL
K017	Temperature-Diff Alarm LO	WARN
K018	Temperature-Diff Alarm HI	WARN
K019	Temperature-Diff Alarm HI_HI	FAIL

COND 3400(X)-041 module

No.	COND messages	Message type
C008	Meas. processing (factory settings)	FAIL
C009	Module failure (Firmware Flash check sum)	FAIL
C010	Conductivity Range	FAIL
C011	Conductivity Alarm LO_LO	FAIL
C012	Conductivity Alarm LO	WARN
C013	Conductivity Alarm HI	WARN
C014	Conductivity Alarm HI_HI	FAIL
C015	Temperature Range	FAIL
C016	Temperature Alarm LO_LO	FAIL
C017	Temperature Alarm LO	WARN
C018	Temperature Alarm HI	WARN
C019	Temperature Alarm HI_HI	FAIL
C020	Resistivity Range	FAIL
C021	Resistivity Alarm LO_LO	FAIL
C022	Resistivity Alarm LO	WARN
C023	Resistivity Alarm HI	WARN
C024	Resistivity Alarm HI_HI	FAIL
C025	Concentration Range	FAIL
C026	Concentration Alarm LO_LO	FAIL
C027	Concentration Alarm LO	WARN
C028	Concentration Alarm HI	WARN
C029	Concentration Alarm HI_HI	FAIL
C035	Cell constant Range	WARN
C040	Salinity Range	FAIL
C041	Salinity Alarm LO_LO	FAIL
C042	Salinity Alarm LO	WARN
C043	Salinity Alarm HI	WARN

No.	COND messages	Message type
C044	Salinity Alarm HI_HI	FAIL
C045	Conductance Range	FAIL
C050	Temperature - manual	FAIL
C060	SAD SENSOFACE: Polarization	User-defined
C061	SAD SENSOFACE: Cable	User-defined
C090	USP limit value	User-defined
C120	Wrong sensor	FAIL
C121	Sensor	FAIL
C122	Sensor memory	WARN
C123	New sensor, adjustment required	WARN
C130	SIP cycle counted	Text
C131	CIP cycle counted	Text
C200	Reference temperature	WARN
C201	TC correction	WARN
C202	TC range	WARN
C203	TC range	FAIL
C204	Cal: Sensor unstable	Text
C205	Cal: Sensor failure	Text
C254	Module reset	Text

No.	Calculation Block COND/COND messages	Message type
E010	Conductivity-Diff Range	FAIL
E011	Conductivity-Diff Alarm LO_LO	FAIL
E012	Conductivity-Diff Alarm LO	WARN
E013	Conductivity-Diff Alarm HI	WARN
E014	Conductivity-Diff Alarm HI_HI	FAIL
E015	Temperature-Diff Range	FAIL
E016	Temperature-Diff Alarm LO_LO	FAIL
E017	Temperature-Diff Alarm LO	WARN
E018	Temperature-Diff Alarm HI	WARN
E019	Temperature-Diff Alarm HI_HI	FAIL

No.	Calculation Block COND/COND messages	Message type
E020	Resistivity-Diff Range	FAIL
E021	Resistivity-Diff Alarm LO_LO	FAIL
E022	Resistivity-Diff Alarm LO	WARN
E023	Resistivity-Diff Alarm HI	WARN
E024	Resistivity-Diff Alarm HI_HI	FAIL
E030	RATIO Range	FAIL
E031	RATIO Alarm LO_LO	FAIL
E032	RATIO Alarm LO	WARN
E033	RATIO Alarm HI	WARN
E034	RATIO Alarm HI_HI	FAIL
E035	PASSAGE Range	FAIL
E036	PASSAGE Alarm LO_LO	FAIL
E037	PASSAGE Alarm LO	WARN
E038	PASSAGE Alarm HI	WARN
E039	PASSAGE Alarm HI_HI	FAIL
E045	REJECTION Range	FAIL
E046	REJECTION Alarm LO_LO	FAIL
E047	REJECTION Alarm LO	WARN
E048	REJECTION Alarm HI	WARN
E049	REJECTION Alarm HI_HI	FAIL
E050	DEVIATION Range	FAIL
E051	DEVIATION Alarm LO_LO	FAIL
E052	DEVIATION Alarm LO	WARN
E053	DEVIATION Alarm HI	WARN
E054	DEVIATION Alarm HI_HI	FAIL
E055	c(NaOH) Range	FAIL
E060	pH value Range	FAIL
E061	pH value Alarm LO_LO	FAIL
E062	pH value Alarm LO	WARN
E063	pH value Alarm HI	WARN
E064	pH value Alarm HI_HI	FAIL

CONDI 3400(X)-051 Module

No.	CONDI messages	Message type
T008	Meas. processing (factory settings)	FAIL
T009	Module failure (Firmware Flash check sum)	FAIL
T010	Conductivity Range	FAIL / WARN
T011	Conductivity Alarm LO_LO	FAIL
T012	Conductivity Alarm LO	WARN
T013	Conductivity Alarm HI	WARN
T014	Conductivity Alarm HI_HI	FAIL
T015	Temperature Range	FAIL
T016	Temperature Alarm LO_LO	FAIL
T017	Temperature Alarm LO	WARN
T018	Temperature Alarm HI	WARN
T019	Temperature Alarm HI_HI	FAIL
T020	Resistivity Range	FAIL / WARN
T021	Resistivity Alarm LO_LO	FAIL
T022	Resistivity Alarm LO	WARN
T023	Resistivity Alarm HI	WARN
T024	Resistivity Alarm HI_HI	FAIL
T025	Concentration Range	FAIL / WARN
T026	Concentration Alarm LO_LO	FAIL
T027	Concentration Alarm LO	WARN
T028	Concentration Alarm HI	WARN
T029	Concentration Alarm HI_HI	FAIL
T030	Zero Range	WARN
T035	Cell factor Range	WARN
T040	Salinity Range	FAIL / WARN
T041	Salinity Alarm LO_LO	FAIL
T042	Salinity Alarm LO	WARN
T043	Salinity Alarm HI	WARN

Messages

No.	CONDI messages	Message type
T044	Salinity Alarm HI_HI	FAIL
T045	Conductance Range	FAIL
T050	Temperature - manual	FAIL
T060	SAD SENSOFACE: Primary coil	User-defined
T061	SAD SENSOFACE: Secondary coil	User-defined
T062	SAD SENSOFACE: SensoLoop	User-defined
C120	Wrong sensor	FAIL
C121	Sensor	FAIL
C122	Sensor memory	WARN
C123	New sensor, adjustment required	WARN
C130	SIP cycle counted	Text
C131	CIP cycle counted	Text
T200	Reference temperature	WARN
T201	TC correction	WARN
T202	TC range	WARN
T203	TC range	FAIL
T204	Sensor coding	WARN
T205	Cal: Sensor unstable	Text
T254	Module reset	Text

OUT 3400(X)-071 Module

No.	OUT messages	Message type
I008	Meas. processing (factory settings)	FAIL
I009	Module failure (Firmware Flash check sum)	FAIL
I070	Current I3 Span	WARN
I071	Current I3 <0/4 mA	WARN
I072	Current I3 > 20 mA	WARN
I073	Current I3 Load	FAIL
I074	Current I3 Parameter	WARN
I075	Current I4 Span	WARN
I076	Current I4 <0/4 mA	WARN
I077	Current I4 > 20 mA	WARN
I078	Current I4 Load	FAIL
I079	Current I4 Parameter	WARN
I254	Module reset	Text

PID 3400(X)-121 Module

No.	PID messages	Message type
R008	Meas. processing (factory settings)	FAIL
R009	Module failure (Firmware Flash check sum)	FAIL
R014	Feed time Alarm HI_HI (analog controller)	FAIL
R019	Feed time Alarm HI_HI (digital controller)	FAIL
R073	Current IV1 Load	FAIL
R078	Current IV2 Load	FAIL
R200	Control parameters	WARN
R254	Module reset	Text

COMPA 3400(X)-081 Module

No.	COMPA messages	Message type
N008	Meas. processing (factory settings)	FAIL
N009	Module failure (Firmware Flash check sum)	FAIL
N254	Module reset	Text

COMFF 3400(X)-085 Module

No.	FF messages	Message type
N008	Meas. processing (factory settings)	FAIL
N009	Module failure (Firmware Flash check sum)	FAIL
N254	Module reset	Text

Specifications

Specifications Protos 3400(X)

Display*	LC graphic display, white backlighting
Resolution	240 x 160 pixels
Languages	German, English, French, Italian, Spanish, Swedish
Keypad	NAMUR keypad, individual keys, no double assignments [meas] [menu] [cursor keys] [enter] [softkey 1] [softkey 2], NAMUR LEDs red and green.
Logbook	Recording of function activations, appearance and disappearance of warning and failure messages, with date and time
Storage capacity	Approx. 50 entries, without SmartMedia-Card read on display, recording on SmartMedia card
Extended logbook	> 50 000 entries, depending on free memory of SmartMedia card
Measurement recorder	2-channel measurement recorder with marking of events (failure, maintenance request, funtion check, limit values)
Recording medium	SmartMedia card
Recording capacity	> 50 000 entries, depending on free memory of SmartMedia card
Recording	Process variables and span selectable
Recording method	• Snapshot • Min/Max value • Average
Time base	• 10 s ... 10 h/pixel
Zoom function	• 10fold zoom in the event of high rate of change

* Caution! Never expose the display to direct sun light!
Only operate the display within the temperature range of 0 °C up to 50 °C max.

Specifications

KI recorder	Adaptive representation of process flow with monitoring and signaling of critical process parameters	
Device self-test	Test of RAM, FLASH, EEPROM, display, and keypad, Record for QM documentation to ISO 9000	
Clock	Real-time clock with date	
Power reserve	Approx. 1 year (lithium battery)	
Data retention in case of power failure	Parameters and factory settings Logbook, statistics, records Measurement recorder	> 10 years (EEPROM) > 1 year (lithium battery) SmartMedia card
Module slots	3	
Power supply (BASE module 3400-021)	24 (–15 %) ... 230 (+15 %) V AC/DC; approx. 10 VA/10 W	
Overvoltage category	II	
Protection class	I	
Pollution degree	2 (EN 61010-1)	
Wire cross-section	2.5 mm^2	
Power supply (BASE 3400X-025/VPW module) EEx em IIC	100 (–15 %) ... 230 (+10 %) V AC < 15 VA, 48 ... 62 Hz	
or		
Power supply (BASE 3400X-026/24V module)	24 V AC/DC	
EEx em IIC	AC 24 V (- 15 %, + 10 %) < 15 VA, 48 ... 62 Hz DC 24 V (- 15 %, + 20 %) < 8 VA	
Overvoltage category	II	
Protection class	I	
Pollution degree	2 (EN 61010-1)	

Specifications

Wire cross-section	2.5 mm²
Ground wire connection	2.5 mm², M4 screw (EN 61010-1, 6..5.1.2.)
Sensor monitor	Direct display of measured values from sensor for validation
Protection against electric shock	Protective connection according to EN 61010-1, 6.5.1
OK 1 input	Galv. separated (OPTO coupler)
EEx ib IIC	Vi ≤ 30 V, floating, galvanic isolation up to 60 V
Function	Switches device to HOLD mode (user defined)
Switching voltage	0 ... 2 V AC/DC inactive 10 ... 30 V AC/DC active (invertible)
OK 2 input	Galv. separated (OPTO coupler)
EEx ib IIC	Vi ≤ 30 V, floating, galvanic isolation up to 60 V
Function	START/STOP of KI recorder Switch-over to second parameter set
Switching voltage	0 ... 2 V AC/DC inactive 10 ... 30 V AC/DC active (invertible)
Current output I1	0/4 ... 20 mA (22 mA), max. 10 V,
EEx ib IIC	galvanic isolation up to 60 V (galvanically connected with output I2)
Load monitoring	Error message if load is exceeded
Overrange*	22 mA in the case of a message
Measurement error**	< 0.2 % current value + 0.02 mA
Current source	0.00 ... 22.00 mA
Current output I2	0/4 ... 20 mA (22 mA), max. 10 V,
EEx ib IIC	Galvanic isolation up to 60 V (galvanically connected with output I1)

Specifications

Load monitoring	Error message if load is exceeded
Overrange*	22 mA in the case of a message
Measurement error**	< 0.2 % current value + 0.02 mA
Current source	0.00 ... 22.00 mA

Relay contacts*	4 relay contacts K1 ... K4, floating
EEx ib IIC	Galvanic isolation up to 60 V K1, K2, K3 connected on one side
Loadability	DC: < 30 V / < 500 mA, < 10 W
Usage*	K1 - K3, user definable for NAMUR maintenance request/ HOLD, limit value, parameter set B active, rinsing contact, USP contact, KI rec. active, Sensoface, controller alarm (Unical/Uniclean) K4 permanently set as alarm contact (NAMUR failure)

Enclosure	Protos 3400(X) C: Steel, coated Protos 3400(X) S: Stainless steel, polished, 1.4305
Assembly	• Wall mounting • Post/pipe mounting • Panel mounting • Sealed against panel
Dimensions	See dimension drawing
Ingress protection	See dimension drawing
Cable glands	5 times M20 x 1.5
Terminals	Single wires and flexible leads up to 2.5 mm^2
Weight	Approx. 3.2 kg plus approx. 150 g per module

* User-defined

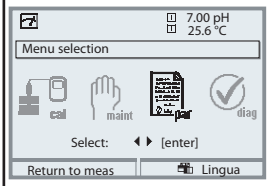
** To IEC 746 Part 1, at nominal operating conditions

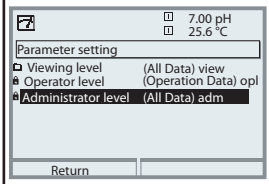
Specifications

General data

Explosion protection (Ex module only)	ATEX: See rating plate: KEMA 03 ATEX 2530 II 2 (1) GD EEx ib [ia] IIC T4 T 70 °C FM: NI, Class I, Div 2, GP A, B, C, D T4 with IS circuits extending into Division 1 Class I, Zone 2, AEx nA, Group IIC, T4 Class I, Zone 1, AEx me ib [ia] IIC, T4 CSA: NI, Class I, Div 2, Group A, B, C, D with IS circuits extending into Division 1 AIS, Class I, Zone 1, Ex ib [ia] IIC, T4 NI, Class I, Zone 2, Ex nA [ia] IIC
EMC Emitted interference Immunity to interference	NAMUR NE 21 and EN 61326 VDE 0843 Part 20 /01.98 EN 61326/A1 VDE 0843 Part 20/A1 /05.99 Class B Industry
Lightning protection	EN 61000-4-5, Installation Class 2
Nominal operating conditions	Ambient temperature: –20 ... +55 °C (Ex: max. +50 °C) Rel. humidity: 10 ... 95 % not condensing
Transport/Storage temperature	–20 ... +70 °C
Screw clamp connector	Single wires and flexible leads up to 2.5 mm^2

Overview of Parameter Setting





Parameter setting

Activated from measuring mode: Press **menu** key to select menu. Select parameter setting using arrow keys, confirm with **enter**.

Administrator level

Access to all functions, also passcode setting. Releasing or blocking functions for access from the Operator level.

Operator level

Access to all functions which have been released at the Administrator level. Blocked functions are displayed in gray and cannot be edited.

Viewing level

Only display, no editing possible!

System control

Memory card (Option) • Record logbook • Register recorder • Decimal separator • Card full • Format	Menu only appears with SmartMedia Card inserted. Make sure that it is a memory card, not an update card. Commercially available SmartMedia cards must be formatted in the analyzer before they can be used as memory card.
Copy configuration	The complete configuration of an analyzer can be written on a SmartMedia card. This allows transferring all device settings to other devices with identical equipment (exception: options and passcodes).
Parameter sets • Load • Save	2 parameter sets (A,B) are available in the analyzer. The currently active parameter set is read on the display. Parameter sets contain all settings except: Sensor type, Options, System control settings Up to 5 parameter sets (1, 2, 3, 4, 5) are available when a SmartMedia card (Option) is used.
Function control matrix • Input OK2 • Left softkey • Right softkey	Selecting the control element for the following functions: - Parameter set selection - KI recorder (start/stop) - Favorites menu (selected diagnostics functions) - Unical (fully automated probe controller)
Time/date	Selecting the display format, entry
Point of meas description	Can be called from the diagnostics menu.
Release of options	A TAN is required to release an Option.
Software update	Software update from SmartMedia card (update card)
Logbook	Selecting events to be recorded
Buffer table	Entering own buffer set for automatic calibration
Factory setting	Resetting all parameters to factory setting
Passcode entry	Editing the passcodes

Parameter Setting Menu

Display settings: FRONT module

Languages

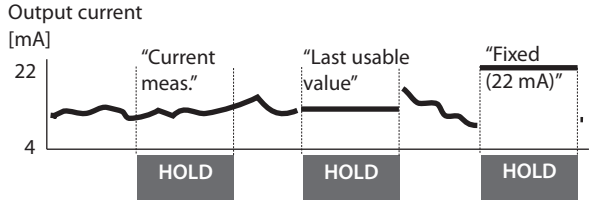
Measurement display • Main display • Display format • Viewing angle	Representation of measured values on the display: - Selecting the number of primary values displayed (one or two) - Decimal places
Measurement recorder • Time base • Zoom function • Min/Max display	Option: 2-channel, selection of process variable, start and end
KI recorder	Option: See more detailed "Options" manual

Signal outputs and inputs, contacts: BASE module

Output current I1, I2
- Variable
- Curve
- Output (0/4 - 20 mA)
- Output filter
- Behavior during messages
  - HOLD
  --- Current meas.
  --- Last usable value
  --- Fixed 22 mA
  - 22 mA message

2 current outputs, separately adjustable

Behavior during messages



Contact K4
- Contact type
- ON delay
- OFF delay

NAMUR failure

Contacts K3, K2, K1
- Usage
- Maintenance request
- HOLD (function check)
- Limit value (adjustable) - Rinse contact (adjustable)
- Parameter set B active
- USP output
- KI recorder active
- Sensoface
- Controller alarm (alarm output Unical/Uniclean)
- Contact type / ON/OFF delay

Factory setting:
K3: Maintenance request, K2: HOLD, K1: Limit

- Variable, limit value, hysteresis, effective direction, ...
- Rinsing interval, lead times, rinse duration, logbook entry, ...

Inputs OK1, OK2
- OK1 usage
  - Signal level

Optocoupler - signal inputs
Off, HOLD (function check)
active level switchable from 10 to 30 V or < 2 V, resp.
For OK2 see System control/Function control matrix

Glossary

Technical terms

Alarm limit
For each process variable, you can define high and low warning and failure limits (NAMUR states: maintenance request, failure). The alarm can be activated individually for each variable.
If an alarm limit is exceeded, an error message appears and the corresponding NAMUR contact is activated.

Calibration/adjustment passcode
Protects access to calibration. Can be set or disabled at the Administrator level.

Cell factor
Mechanical characteristic of electrodeless (toroidal) conductivity sensors.

Cleaning
User-defined time during which the cleaning contact is closed during a rinsing cycle.

Controlled variable
User-defined variable that acts on the controller.

Diagnostics menu
Display of all relevant information on the device status.

Failure
Alarm message and NAMUR contact. Failure means that the equipment no longer operates properly or that a process parameter has reached a critical value. Failure is disabled during "function check".

Feed time alarm
Monitors the time during which the controller output is at 100 %.

Function check
NAMUR contact. Always active when the unit does not output the configured measured value.

Glossary

Technical terms

GLP/GMP
Good Laboratory Practice / Good Manufacturing Practice:
Rules for performance and documentation of measurements.

Interval
The interval extends from the start of one rinsing cycle to the start of the next rinsing cycle, user defined.

Isothermal potential
The isothermal intersection point is the point of intersection between two calibration lines at two different temperatures. The potential difference between the electrode zero point and this intersection point is the isothermal potential "V_{iso}".

Limit contacts
Are controlled by a user-definable process variable. The limit contact is activated if the measured value falls below or exceeds an alarm limit, depending on the user-defined effective direction.

Logbook
The logbook shows the last 50 events with date and time, e.g. calibrations, warning and failure messages, power failure etc. This permits quality management documentation to ISO 9000 et seq.
Longer recordings are possible with the additional function “Extended logbook”.

Main display
Large measured-value display in the measuring mode. You can select which process variable is to be displayed.

Maintenance menu
The Maintenance menu provides all functions for sensor maintenance and signal outputs.

Glossary

Technical terms

Maintenance passcode
Protects access to Maintenance. Can be set or disabled at the Administrator level.

Measuring mode
When no menu function is activated, the unit is in measuring mode. The selected measured value is displayed. Pressing the meas key always returns you to the measuring mode.

Menu structure
The Protos provides a very clear menu structure. Menu selection is called by pressing the **menu** key. Four basic functions can be accessed: Calibration, maintenance, parameter setting, diagnostics. From each of these functions, the individual module blocks (system control, FRONT module (display functions), BASE module (signal outputs)) can be accessed, as well as all added measuring and communication modules.

Message list
The message list shows the number of currently activated messages and the individual warning or failure messages in plain text.

NAMUR
German committee for measurement and control standards in the chemical industry

NAMUR contacts
"HOLD (function check)", "maintenance request", and "failure".
Indicate status of measured variable and measuring system.

Operator level
Menu level of the Parameter Setting menu. You can edit the device settings that have been enabled at the Administrator level.

Glossary

Technical terms

Operator passcode
Protects access to the Operator level. Can be set or disabled at the Administrator level.

Parameter Setting menu
The Parameter Setting menu provides 3 access levels:
Viewing, Operator, and Administrator level.

Passcode protection
Access to the Calibration, Maintenance, Operator, and Administrator levels is protected by passcodes.
The passcodes can be defined or disabled at the Administrator level.

Point of measurement
Can be defined to identify the unit and can be displayed in the Diagnostics menu.

Reference temperature
With temperature compensation activated, the measured value is calculated to the value at the reference temperature (usually 20 oder 25 °C) using the temperature coefficient.

Second rinsing
User-defined time during which the "Rinsing" contact is closed at the end of the rinsing cycle.

Secondary displays
Two small displays located below the main display in measuring mode.
The process variables to be displayed can be selected using the softkeys underneath.

Sensor coding
Here, internal settings for electrodeless sensors are encoded.

Glossary

Technical terms

Slope
The slope of an electrode is the voltage change per pH unit.
For an ideal pH electrode, it lies at -59.2 mV/pH (25 °C).

Viewing level
Menu level of the Parameter Setting menu. Display of all device settings, however no editing possible.

Zero
The zero point refers to the voltage delivered by an electrode at 25 °C and pH = 7.00. For an ideal pH electrode, it lies at 0 mV.
In practice, the real zero point is slightly different.

Index

Index

Index

Index

S

Index

Menu Structure of Basic Unit

Protos 3400(X): FRONT Module, BASE Module

Configuring the System Control

Passcode	Administrator level	1989 (new: .....)
	Operator level	1246 (new: .....)

SmartMedia Card Features

Passcode	Administrator level	1989 (new: .....)
	Operator level	1246 (new: .....)