M 700(X)

Instruction manual

M 700

☺ **10.54** TC ♨man ☐
mS/cm

7.00 △ ☐
pH

☐ man 25.1 °C Ausg I1 4.37 mA

METTLER TOLEDO

Alarm ●
Power ●

Meas Menu Enter

Order number: 52 121 216

METTLER TOLEDO

70334

Warranty

Defects occurring within 1 year from delivery date shall be remedied free of charge at our plant (carriage and insurance paid by sender).
©2005   Subject to change without notice

Return of products under warranty

Please contact Mettler-Toledo 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".

Registered trademarks

The following registered trademarks are used in this instruction manual without further marking

CalCheck
Calimatic
Sensocheck
Sensoface
ServiceScope
VariPower

SMARTMEDIA®
is a registered trademark of Toshiba Corp., Japan

InPro®
is a registered trademark of Mettler-Toledo GmbH, Switzerland

Declaration of conformity
Konformitätserklärung
Déclaration de conformité

$\mathsf{C} \mathsf{E}$

We/Wir/Nous

Mettler-Toledo GmbH, Process Analytics
Im Hackacker 15
8902 Urdorf
Switzerland

declare under our sole responsibility that the product,
erklären in alleiniger Verantwortung, dass dieses Produkt,
déclarons sous notre seule responsabilité que le produit,

Description
Beschreibung/Description

M 700 C / M 700 S

to which this declaration relates is in conformity with the following standard(s) or other normative document(s).
auf welches sich diese Erklärung bezieht, mit der/den folgenden Norm(en) oder Richtlinie(n) ¸bereinstimmt.
auquel se réfère cette déclaration est conforme à la (aux) norme(s) ou au(x) document(s) normatif(s).

Low-voltage directve/Nieder-spannungs-Richtlinie/
Directive basse tension

73/23/EWG

Norm/Standard/Standard		
EN 60529 / 10.91	/ VDE 0470 Teil 1:	1992-11
EN 61010 Teil 1 / 03.93	/ VDE 0411 Teil 1:	1994-03
EN 61010-1 / A2 / 07.95	/ VDE 0411 Teil 1 / A1:	1996-05

EMC Directive/EMV-Richtlinie
Directive concernant la CEM

89/336/EWG

Norm/Standard/Standard		
EN 61326	/ VDE 0843 Teil 20:	1998-01
EN 61326 / A1	/ VDE 0843 Teil 20 / A1:	1999-05

Place and Date of issue
Ausstellungsort/ - Datum
Lieu et date d'émission

Urdorf, August 28, 2003

Mettler-Toledo GmbH, Process Analytics

Waldemar Rauch
General Manager PO Urdorf

Christian Zwicky
Head of Marketing

METTLER TOLEDO

Mettler-Toledo GmbH
Process Analytics

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Bank	Credit Suisse First Boston, Zürich (Acc. 0835-370501-21-90)

Declaration of conformity
Konformitätserklärung
Déclaration de conformité

CE 0344

We/Wir/Nous

Mettler-Toledo GmbH, Process Analytics
Im Hackacker 15
8902 Urdorf
Switzerland

declare under our sole responsibility that the product,
erklären in alleiniger Verantwortung, dass dieses Produkt,
déclarons sous notre seule responsabilité que le produit,

Description
Beschreibung/Description   **M 700XC / M 700XS**

to which this declaration relates is in conformity with the following standard(s) or
other normative document(s).
auf welches sich diese Erklärung bezieht, mit der/den folgenden Norm(en) oder
Richtlinie(n) übereinstimmt.
auquel se réfère cette déclaration est conforme à la (aux) norme(s) ou au(x)
document(s) normatif(s).

Explosion protection
Explosionsschutzrichtlinie   **94/9/EG**
Prot. contre les explosions   **KEMA 04 ATEX 2056**
                                      NL-6812 AR Arnhem, KEMA 0344

Low-voltage directive
Niederspannungs-Richtlinie
Directive basse tension   **73/23/EWG**

EMC Directive
EMV-Richtlinie
Directive concernant la CEM   **89/336/EWG**

Place and Date of issue
Ausstellungsort / - Datum
Lieu et date d'émission   **Urdorf, July 16, 2004**

Mettler-Toledo GmbH, Process Analytics

Waldemar Rauch
General Manager Ingold

Christian Zwicky
Head of Marketing

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Norm/Standard/Standard	94/9/EG:	EN 50014	
		EN 50019	
		EN 50020	
		EN 50028	
		EN 50281-1-1	
	73/23/EWG:	DIN EN 61010-1 / VDE 0411 Teil 1:	2002-08
	89/336/EWG:	DIN EN 61326 / VDE 0843 Teil 20:	2002-03

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Contents

for the M 700(X) modular process analysis system

Contents

for the M 700(X) modular process analysis system

Software version

Device software M 700(X)
Software version 6.x

Modules supported
For modules which are not listed here, refer to corresponding module instruction manual.

Module	Software version
pH 2700 (X)	2.x
pH 2700i (X)	1.x
Cond 7700(X)	2.x
Cond Ind 7700(X)	2.x
O2 4700(X)	2.x
O2 4700(X) ppb	2.x
O2 4700i(X)	1.x
O2 4700i(X) ppb	1.x
Out 700(X)	1.x
PID 700(X)	1.x
PA 700(X)	1.x
EC 700(X)	1.x

Query actual device/module software
When the analyzer is in measuring mode: press **menu** key, open Diagnostics menu.

Menu	Display	Device description
✓ diag	Device description Module FRONT M 700-011 Operating panel M 700 Hardware: 2, Software: 6.0 Serial number: 0000815 Module FRONT BASE Ⅰ Ⅱ Ⅲ Return Options 0.003 mS/cm 22.7 °C	Provides information about 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.

6

Modular concept and instruction manuals

Instruction manuals for basic unit, measuring module, additional functions.

The M 700(X) is an expandable modular process analysis system.
The basic unit (M 700(X) FRONT and M 700(X) BASE) 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.

M 700(X) modular process analysis system

Additional functions
Activation via device-specific TAN

Measuring modules
- pH / ORP / Temp
- O_2/Temp
- Noncontacting conductivity / Temp
- Contacting conductivity / Temp

SmartMedia card
Data recording

3 module slots
for free combination of
measuring and
communication modules

Communication modules
- Out 700 (additional switching and current outputs)
- PID 700 (analog and digital controller)
- PA 700 (Profibus PA)

- **The instruction manual for the M 700(X)** describes how to install, commission and operate the basic unit.
- **The instruction manual for the measuring or communication module** describes all functions required for commissioning and working with the respective measuring or communication module.
- **Additional functions** are supplied with a function description.

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System overview

M 700(X) modular process analysis system:
Measuring modules and communication modules

pH 2700(X) module
pH, ORP
MΩ, kΩ
Temp
Interface

Glass
Reference
ORP
RTD

Cond 7700(X) module
µS, mS/cm
% by wt
Temp
Interface

2 EL / 4 EL
RTD

Cond Ind 7700(X) module
µS, mS/cm
% by wt
Temp
Interface

Electrodeless sensor

O2 4700(X)
O2 4700(X) ppb module
O2, %
µg/l, ppb
mg/l, ppm
Temp
Interface

O2 sensor

Out 700(X) module
I 3   mA
Interface
I 4   mA
Electronic contacts

PID 700(X) module
IV 1   mA
Interface
IV 2   mA
Electronic contacts

PA 700(X) module
PROFIBUS-PA
COMPA
Interface

System overview

M 700(X) modular process analysis system:
Basic unit and control module for retractable housings
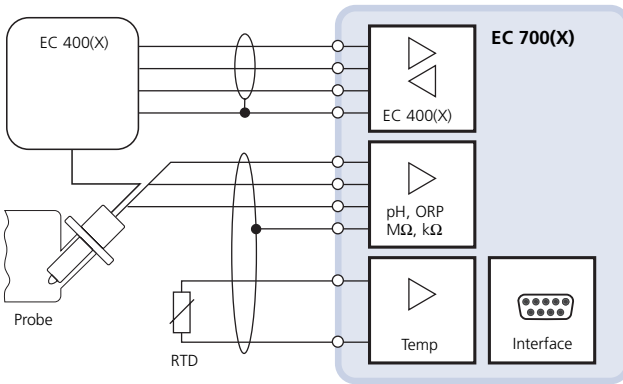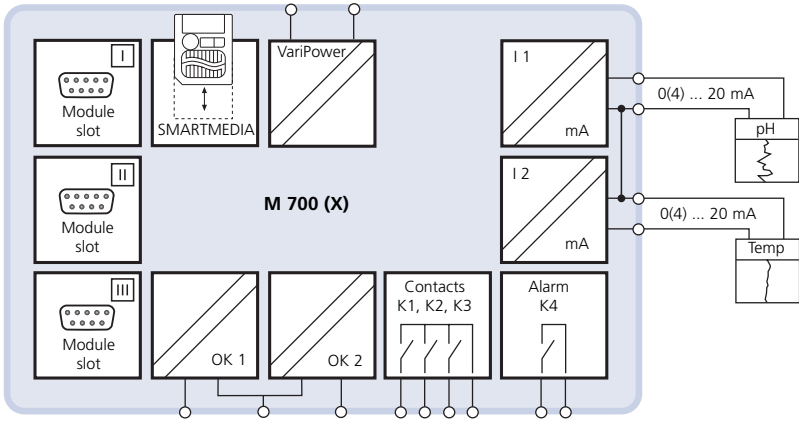
Latest product information

The M 700(X) is an expandable modular process analysis system.
For latest product information, please refer to:

www.mtpro.com

Additional functions
A current version of the respective function description is available as pdf for
download.
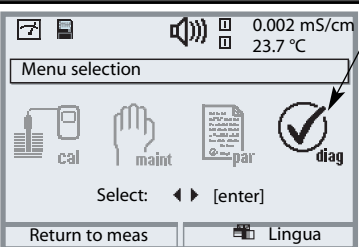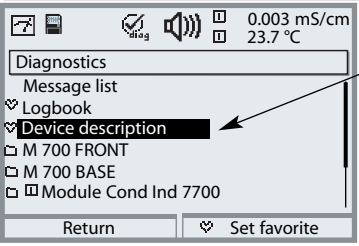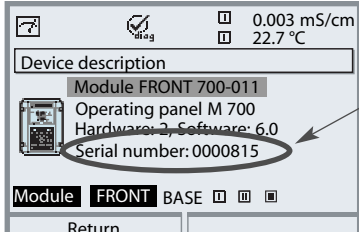
How to order an additional function

Device-specific TAN (transaction number)

Additional functions expand the device capabilities.
The additional functions are device-specific. When ordering an additional function, you therefore have to specify the serial number and hardware version of your FRONT module in addition to the respective order number. The manufacturer then supplies a TAN (transaction number) to release the additional function.

Serial number M 700 FRONT

Menu	Display	Serial number M 700 FRONT
	0.002 mS/cm 23.7 °C Menu selection cal maint par diag Select: ◀ ▶ [enter] Return to meas Lingua	**Menu selection** Call up diagnostics. From the measuring mode: Press **menu** key to select menu. Select diagnostics using arrow keys, confirm with **enter**.
diag	0.003 mS/cm 23.7 °C Diagnostics Message list Logbook Device description M 700 FRONT M 700 BASE Module Cond Ind 7700 Return Set favorite	**Diagnostics** Select Device description using arrow keys, confirm with **enter**.
	0.003 mS/cm 22.7 °C Device description Module FRONT 700-011 Operating panel M 700 Hardware: 2, Software: 6.0 Serial number: 0000815 Module FRONT BASE Return	**Device description** Please specify this serial number and the hardware version when ordering an additional function.

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Intended use

The M 700(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.
The M 700X is intended for operation in locations subject to explosion hazards which require equipment of Group II, device category 2(1), gas/dust.
The M 700(X) is a flexible measuring system for continuous measurements in the field of liquid analysis. Thanks to its modular design, the M 700(X) can easily be 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 rugged enclosure (IP 65) can be wall or pipe mounted or fixed into a control panel. The M 700 version with hygienic, polished stainless steel enclosure allows application in the field of biotechnology, food processing, and in the pharmaceutical industry. The M 700 version with coated steel enclosure – extremely corrosion resistant – has been developed for application in the chemical industry, environmental engineering, water and wastewater treatment, and for application in power plants .
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.

Package contents

- M 700(X) basic unit (FRONT and BASE)
- Wall-mount kit
- Test Certificate
- This instruction manual
- EC Declaration of Conformity
- EC-Type-Examination Certificate (M 700X)

Modules as ordered (each in a separate package with Instruction Manual, Test Certificate, EC Declaration of Conformity):

Safety information

Application in hazardous locations

M 700X modular process analysis system

The M 700X 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 M 700X 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.

The module 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 M 700(X) 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 using a 2-pole disconnect switch installed near the M700(X). This switch must meet the requirements of EN 60947-1 and EN 60947-3, be marked as disconnecting device for M 700(X) and be easily accessible by the user.
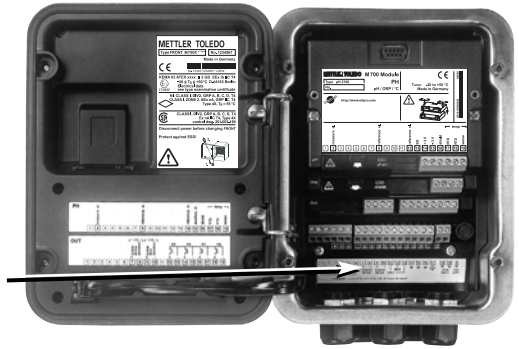
Information on commissioning/start-up

Caution!
- Before commissioning it must be proved that the device may be connected with other equipment.
- Commissioning must only be performed by authorized and trained personnel!
- 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 by the manufacturer.

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 M 700(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 encoded.

Product line

Device (Standard version)

		Order No.
M 700 S	Basic unit, stainless steel enclosure	52121174
M 700 C	Basic unit, coated steel enclosure	52121171
pH 2700	Module: pH	52121182
pH 2700i	Module: pH, ISM	52121161
Cond 7700	Module: Conductivity	52121184
Cond Ind 7700	Module: Electrodeless cond.	52121186
O_2 4700	Module: Oxygen (standard)	52121188
O_2 4700 ppb	Module: Oxygen (traces)	52121190
O_2 4700i	Module: Oxygen (standard, ISM)	52121163
O_2 4700i ppb	Module: Oxygen (traces, ISM)	52121165
Out 700	Module: Output expansion	52121177
PA 700	Module: Profibus PA	52121210
PID 700	Module: PID controller	52121179

Device (hazardous-area version)

		Order No.
M 700X S/VPW	Basic unit, stainless steel enclosure with VariPower power supply unit	52121175
M 700X S/24V	Basic unit, stainless steel enclosure with 24 V power supply unit	52121176
M 700X C/VPW	Basic unit, coated steel enclosure with VariPower power supply unit, AC	52121172
M 700X C/24V	Basic unit, standard enclosure with 24 V power supply unit, AC/DC	52121173
pH 2700X	Module: pH	52121183
pH 2700X	Module: pH	52121162
Cond 7700X	Module: Conductivity	52121185
Cond Ind 7700X	Module: Electrodeless cond.	52121187
O_2 4700X	Module: Oxygen (standard)	52121189
O_2 4700X ppb	Module: Oxygen (traces)	52121191
O_2 4700iX	Module: Oxygen (standard, ISM)	52121164
O_2 4700iX ppb	Module: Oxygen (traces, ISM)	52121166
Out 700X	Module: Output expansion	52121178
PA 700X	Module: Profibus PA	52121181
PID 700X	Module: PID controller	52121180

Additional functions

		Order No.
KI recorder	TAN SW 700-001	52121198
Buffer sets to be entered (pH)	TAN SW 700-002	52121199
Adaptive cal timer (pH)	TAN SW 700-003	52121200
ServiceScope (pH)	TAN SW 700-004	52121201
Tolerance band recorder (pH)	TAN SW 700-005	52121202
Current characteristic definable	TAN SW 700-006	52121203
TC ultrapure water (Cond)	TAN SW 700-008	52121204
Concentration determination (Cond)	TAN SW 700-009	52121205
High CO_2 compensation (O_2)	TAN SW 700-011	52121250
ISFET for module pH 2700i(X)	TAN SW 700-012	52121274
5 loadable parameter sets	TAN SW 700-102	52121192
Measurement recorder	TAN SW 700-103	52121193
Extended logbook	TAN SW 700-104	52121194
Software update	TAN SW 700-106	52121195
AuditTrail to FDA 21 CFR Part 11	AuditTrail card/TAN, SW 700-107	52121196

Accessories

		Order No.
SmartMedia card	ZU 0543	52121207
Pipe-mount kit	ZU 0544	52121208
Panel-mount kit	ZU 0545	52121209
VP input socket		52201114

Short description: M 700 FRONT

M 700
Modular hardware and software system for liquid analysis.

4 captive scews
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
For parameter setting, see Pg 35

User interface
with plaintext menus as recom-
mended by NAMUR.
Menu texts can be switched to:
German, English, French, Italian,
Swedish, and Spanish.
Intuitively acquirable menu logic,
based on Windows standards.
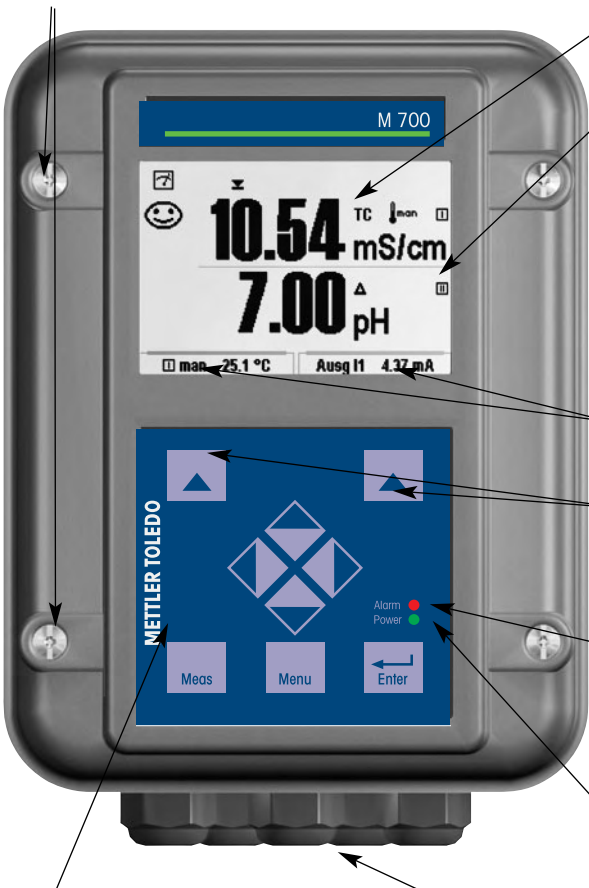
Secondary displays
For parameter setting, see Pg 36

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
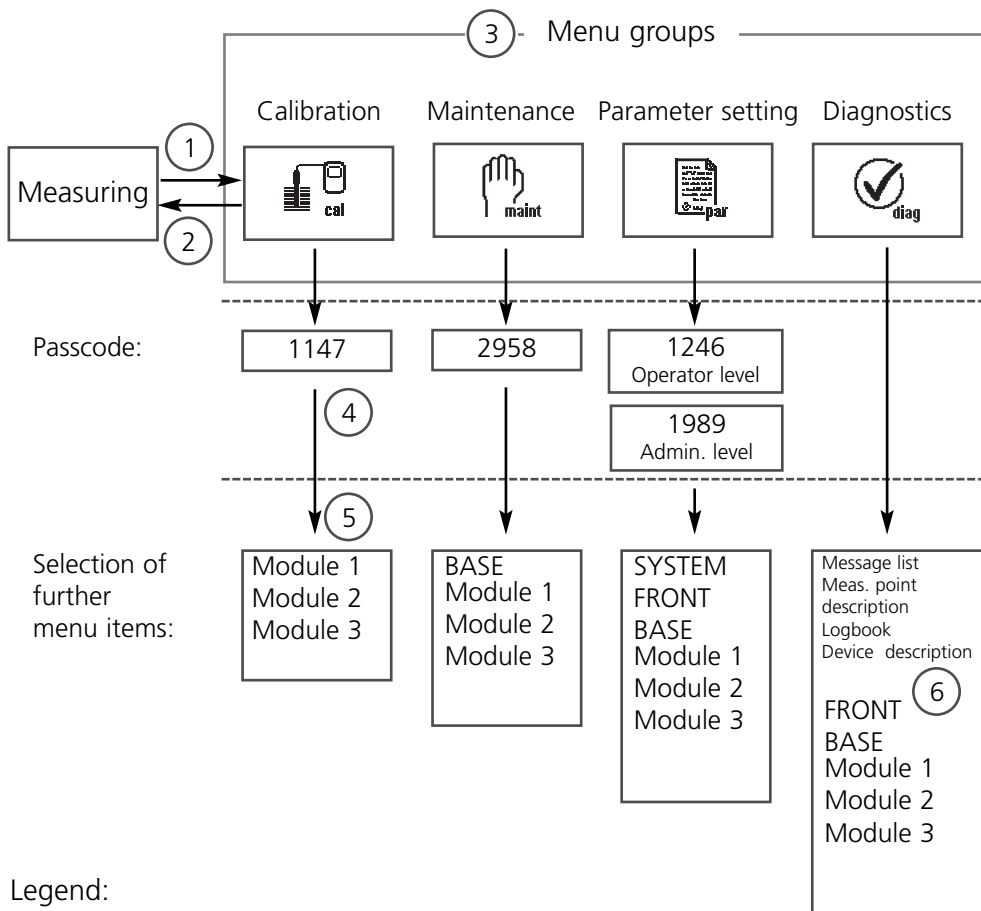*and data entries*

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

Short description: Menu structure

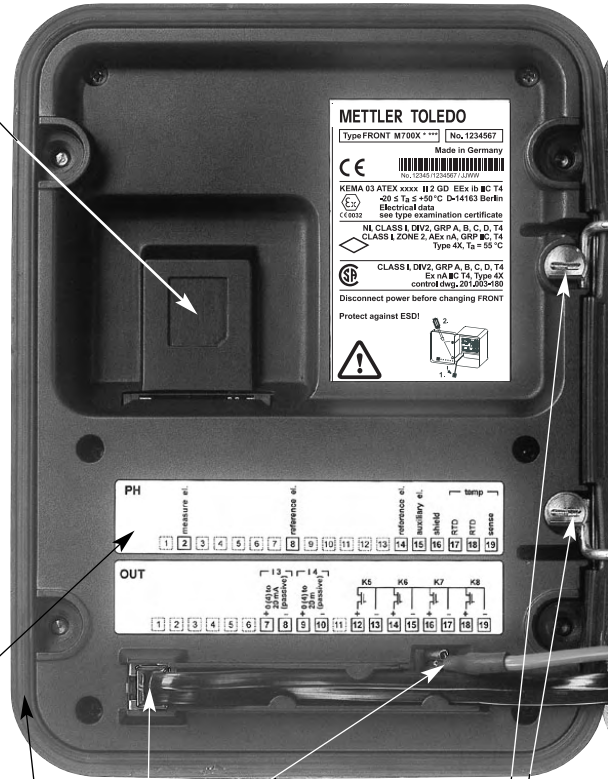Basic functions: Calibration, maintenance, parameter setting, diagnostics

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 (Pg 34)

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Short description: M 700 FRONT

M 700
View into the open device (M 700 FRONT)

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 to the M 700 and switched by remote control. Configurations can be transferred from one M 700 to the other.

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

- *Software updates*

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Type FRONT M700X * *** | No. 1234567

Made in Germany

No. 12345/1234567 /JJWW

KEMA 03 ATEX xxxx II 2 GD EEx ib IIC T4
-20 ≤ Ta ≤ +50°C D-14163 Berlin
Electrical data
see type examination certificate

NI, CLASS I, DIV2, GRP A, B, C, D, T4
CLASS I, ZONE 2, AEx nA, GRP IIC, T4
Type 4X, Ta = 55 °C

CLASS I, DIV2, GRP A, B, C, D, T4
Ex nA IIC T4, Type 4X
control dwg. 201.203-180

Disconnect power before changing FRONT

Protect against ESD!

PH

OUT

Terminal plates
of "hidden" modules

Each module comes with an adhesive label containing the contact assignments. This label should be stuck 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 M 700 FRONT from the M 700 BASE, turn the retaining screws of the pivot hinge by 90°.
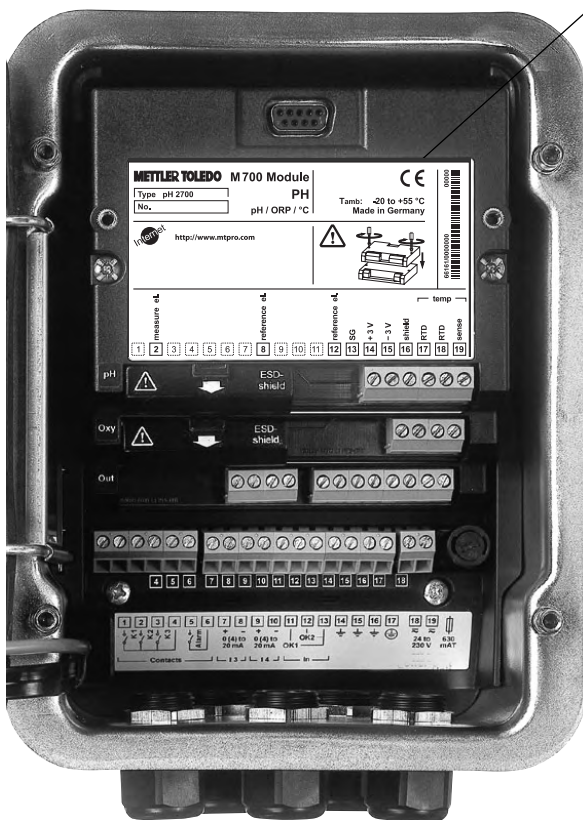
The circumferential sealing

guarantees IP 65 protection and allows spray cleaning / disinfection.
Caution! *Keep clean!*

Short description: M 700 BASE

M 700
View into the open device (M 700 BASE, 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
(Overview on Page 16)

M 700 BASE
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, IS version:
*100 ... 230 V AC or*
24 V AC/DC

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

Important note 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

Module M 700 C / M 700 S (non-IS)
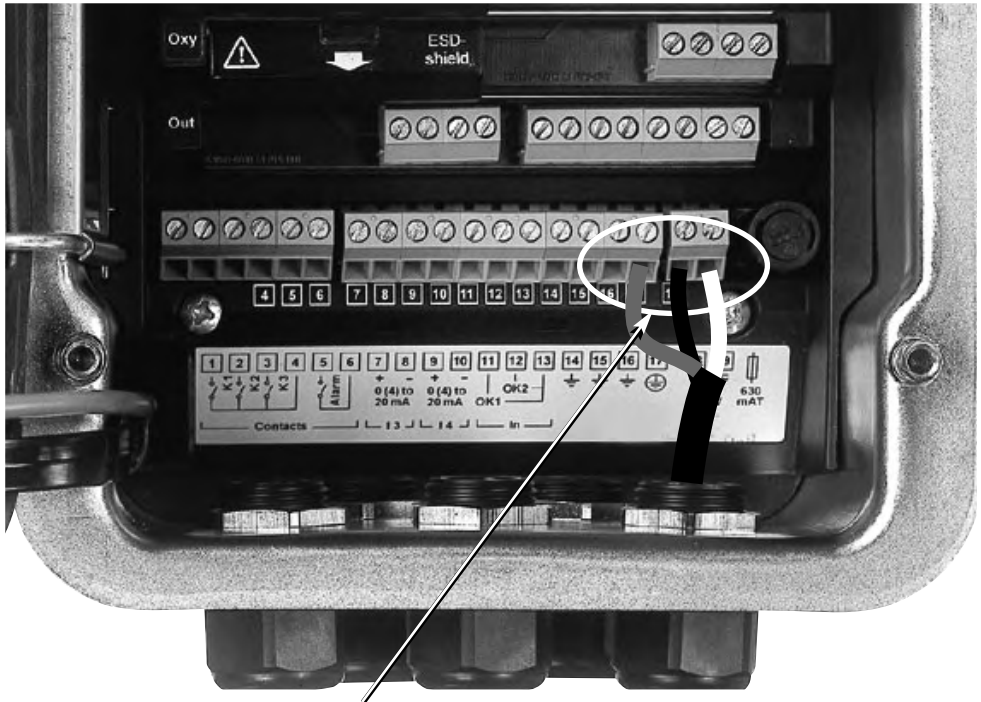
Connection of power supply (BASE M 700 C / M 700 S, non-IS)

The M 700(X) comes in three different versions.
The terminal plates and wirings are shown on the following pages.

1. **BASE M 700 C / M 700 S (standard version, non-IS)**
   VariPower broad-range power supply unit, 24 (-15 %) ... 230 (+15%) V AC/DC

2. **BASE M 700X C/VPW / M 700X S/VPW (IS version)**
   VariPower broad-range power supply unit

3. **BASE M 700X C/24V / M 700X S/24V (IS version)**
   24 V power supply unit

1. BASE M 700 C / M 700 S (non-IS)

Standard version. Not suitable for hazardous-area applications!

Information on installation

Caution!
• Installation may only be carried out by trained and authorized 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.
• Be sure not to notch the conductor when stripping the insulation.
• All parameters must be set by the system administrator prior to commissioning.
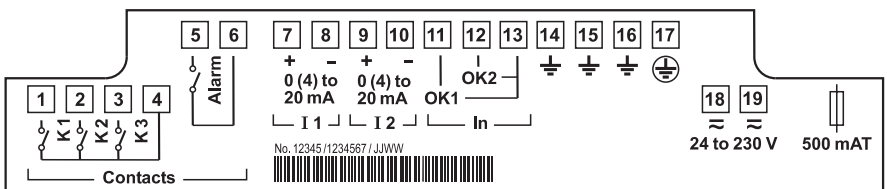
Connection of power supply
With the VariPower broad-range power supply unit, the analyzer can be operated with a power supply of 24 (-15 %) to 230 (+15 %) V AC/DC making it suitable for all public mains supplies in the world.
The terminals are suitable for single wires and flexible leads up to 2.5 mm² (AWG 14).

Terminal plate BASE M 700
Standard version. Not suitable for hazardous-area applications!
Connection of power supply. Contact assignment of inputs/outputs.

2. BASE M 700X C/VPW / M 700X S/VPW

IS version with VariPower power supply unit

Information on installation

When using the M 700X 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 authorized 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.
• Be sure not to notch the conductor when stripping the insulation.
• All parameters must be set by the 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 M 700X C/VPW / M 700X S/VPW

(IS version with VariPower power supply unit)
Connection of power supply. Contact assignment of inputs/outputs.
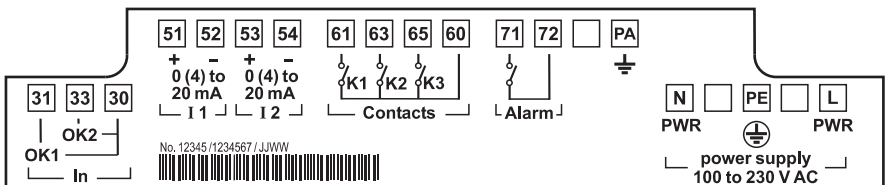
3. BASE M 700X C/24V / M 700X C/24V

IS version with 24 V power supply unit

Information on installation
When using the M 700X 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 authorized 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.
• Be sure not to notch the conductor when stripping the insulation.
• All parameters must be set by the system administrator prior to commissioning.
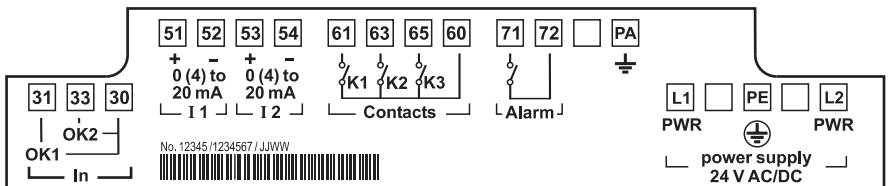
Connection of power supply
With the power supply unit, the analyzer can be operated with a power supply of 24 V AC (-15 %, +10%) or 24 V DC (-15 %, +20%). The terminals are suitable for single wires and flexible leads up to 2.5 mm^2 (AWG 14).
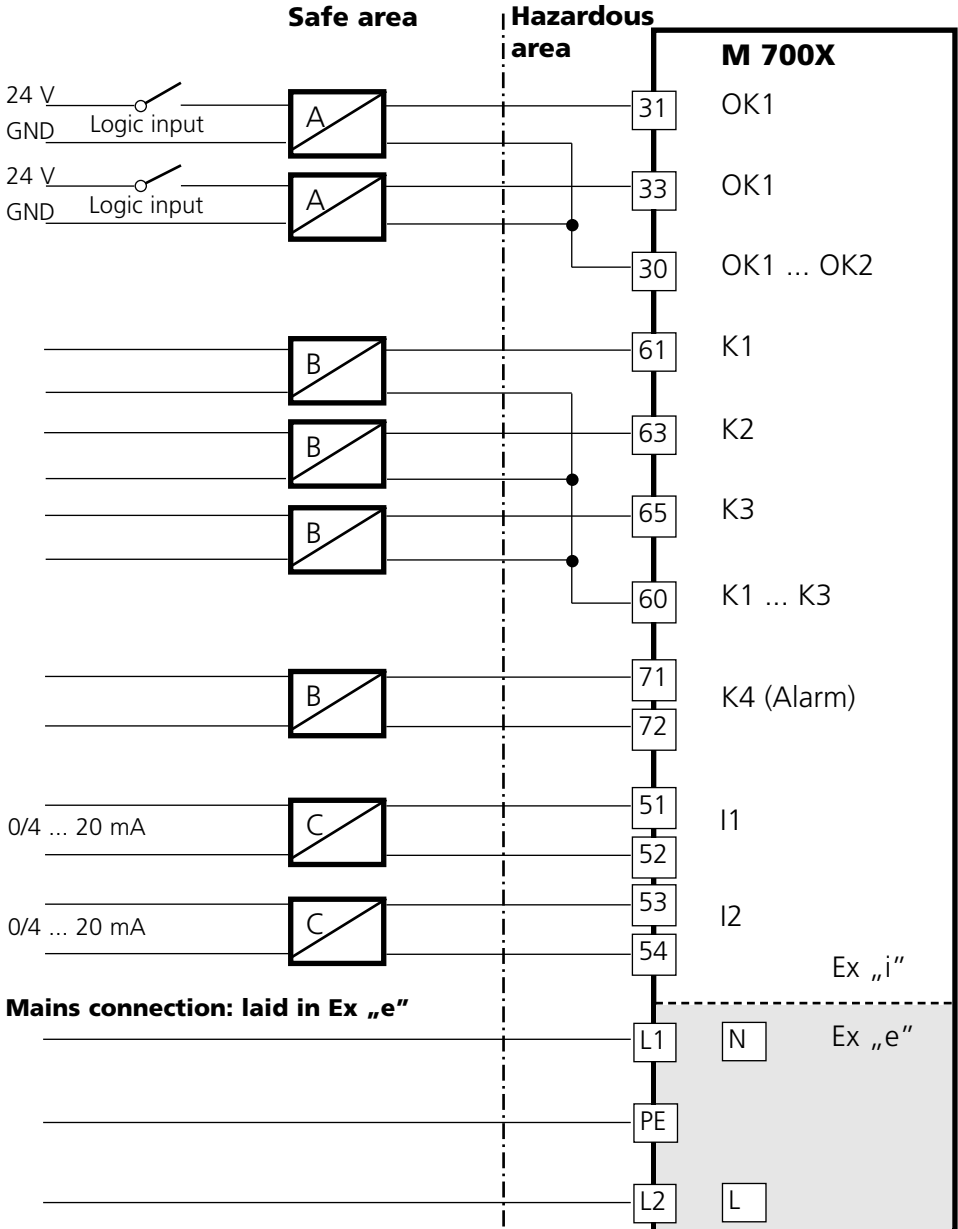
Terminal plate BASE M 700X (C/S)/24V
(IS version with 24 V power supply unit)
Connection of power supply. Contact assignment of inputs/outputs.
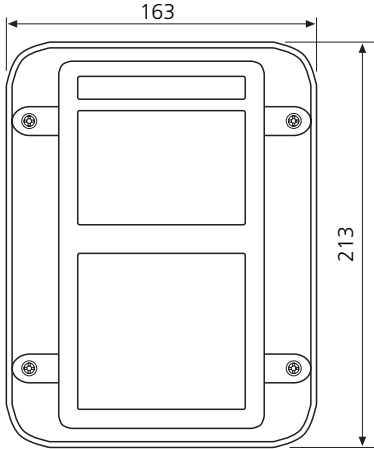
Hazardous-area connection M 700X

	Safe area		Hazardous area	M 700X	

24 V / GND — Logic input — A — | 31 | OK1

24 V / GND — Logic input — A — | 33 | OK1

| 30 | OK1 ... OK2

B — | 61 | K1

B — | 63 | K2

B — | 65 | K3

| 60 | K1 ... K3

B — | 71 | K4 (Alarm)
| 72 |

0/4 ... 20 mA — C — | 51 | I1
| 52 |

0/4 ... 20 mA — C — | 53 | I2
| 54 |

Ex „i"

Mains connection: laid in Ex „e"

| L1 | N | Ex „e"

| PE |

| L2 | L

Hazardous-area control modules (examples)

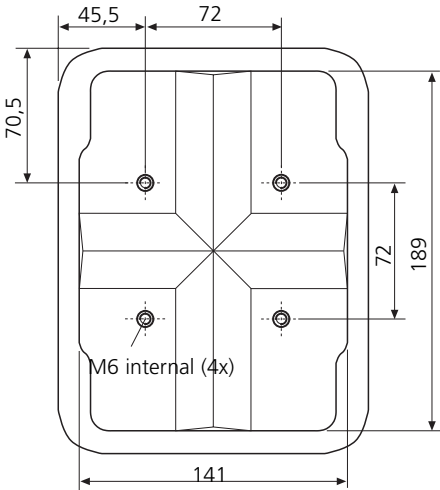|	Designation	Model	Manufacturer
A	Valve control module	KFD2-SL-Ex 1.48****	Pepperl + Fuchs
	Valve control module	MK 72-S17-Ex0/24VDC	TURCK
B	Switch amplifier	KF**-SR2-Ex1.W.**	Pepperl + Fuchs
	Switch amplifier	MK1-22Ex0-R/**	TURCK
C	Loop-powered isolator	IsoTrans® 36A7	Knick

Panel mounting

Dimension drawings

Front view

Side view

M6 internal (4x)

Rear view

r15 ± 3

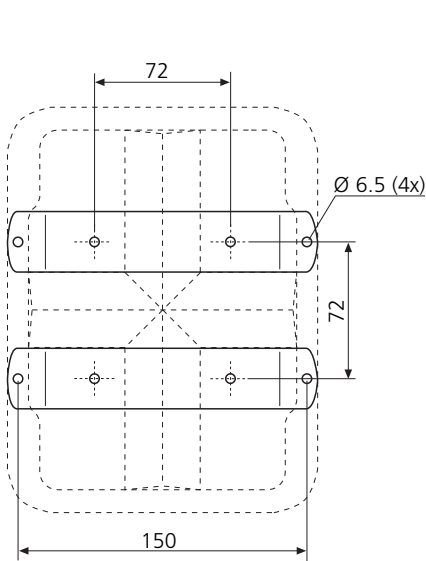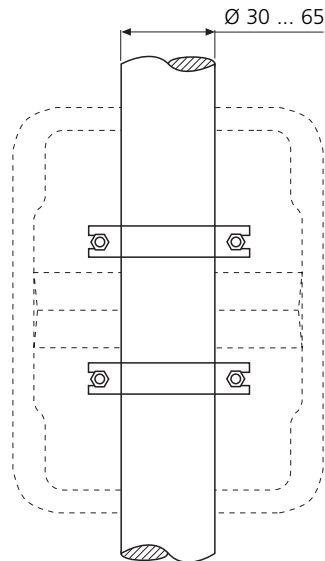Contour of enclosure

Control panel cutout

Contour of enclosure front
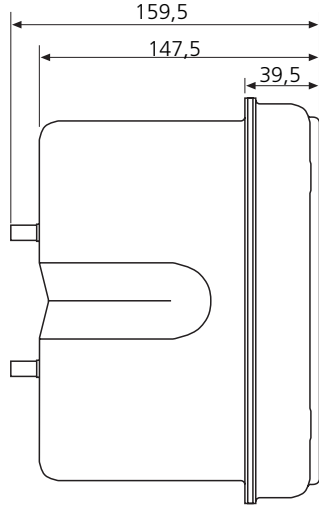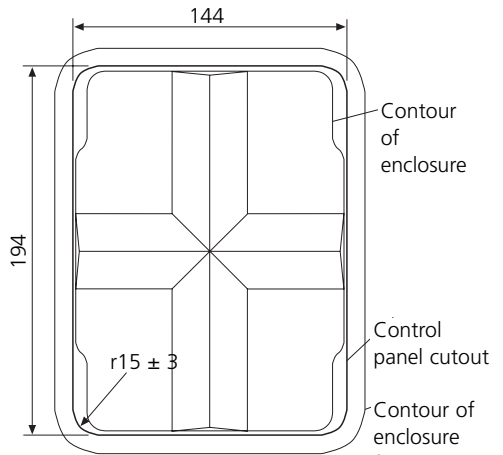
Control panel cutout

Wall mounting, pipe mounting

Dimension drawings
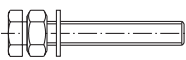
72

Ø 6.5 (4x)

72

150

Wall mounting

Ø 30 ... 65

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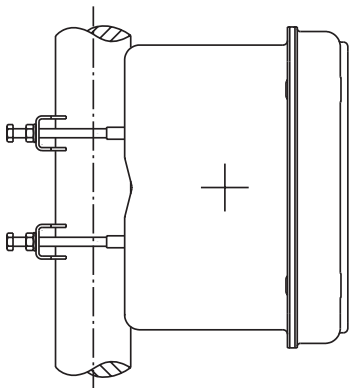
Ø 30 ... 65 mm
for vertical or horizontal mounting

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
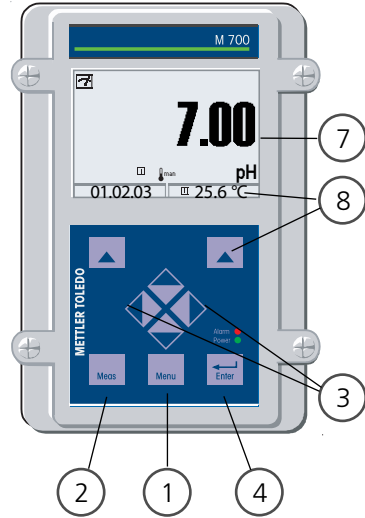
Menu structure

M 700 FRONT
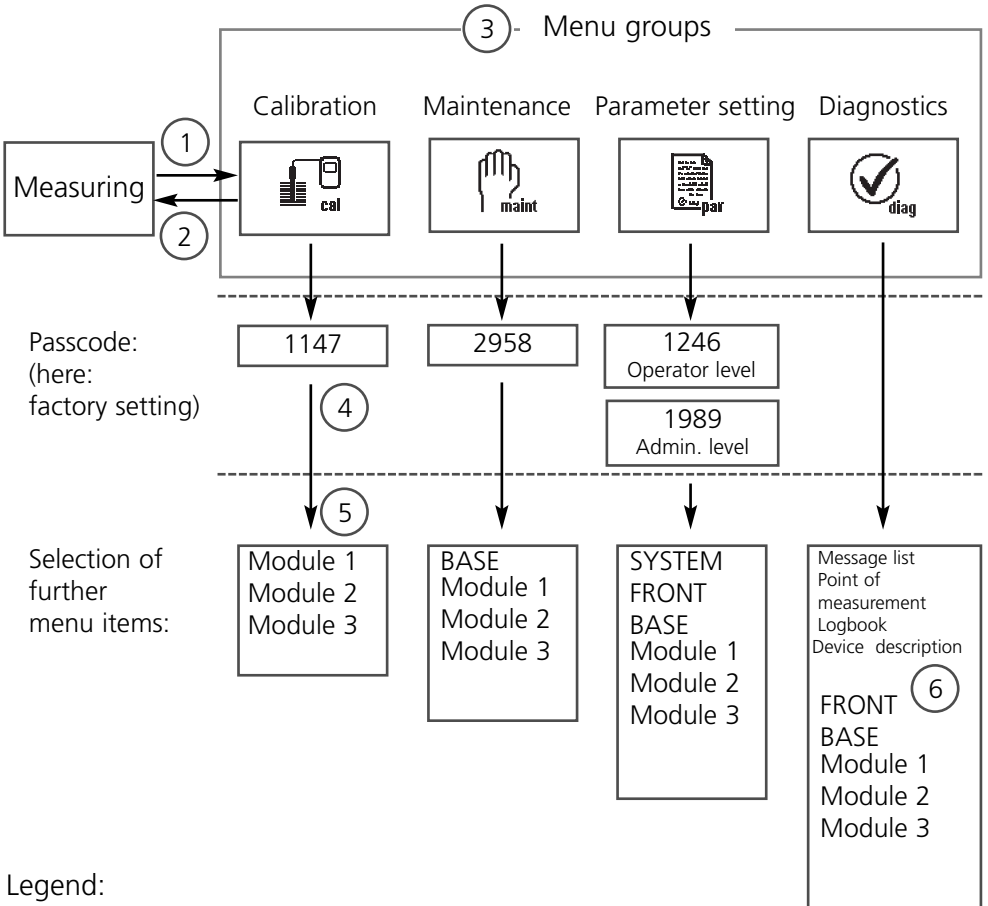
Legend:
(1) Pressing the **menu** key accesses menu selection
(2) Pressing the **meas** key returns to measurement
(3) Menu groups are selected using the arrow keys
(4) Press **enter** to confirm, enter passcode
(5) Further menu items are displayed
(6) Selected functions of the Diagnostics menu can be
    recalled via softkey even when in measuring mode (Pg 34)

Menu selection

M 700 FRONT

After switching on, the M 700 performs an internal test routine and automatically detects the number and type of modules installed. Then, the M 700 goes to measuring mode (Pg 34).

- Configure measurement display **(7)** Pg 34
- Secondary displays/softkeys **(8)** Pg 36

Menu selection

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

(Measuring mode)

(Menu selection)
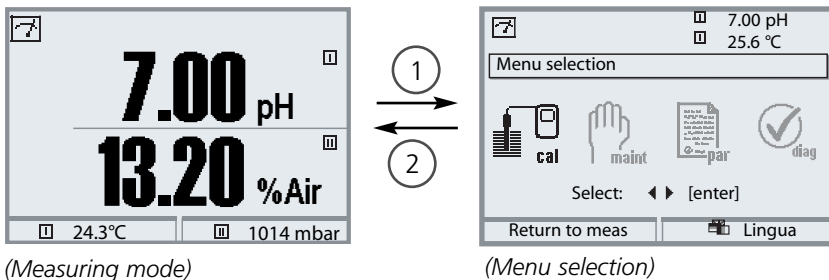
Select the desired menu group using the arrow keys **(3)**.
Press **enter (4)** to confirm your choice.
An overview of the menu structure is given on Pg 30.

Mode indicators in the display

Icons

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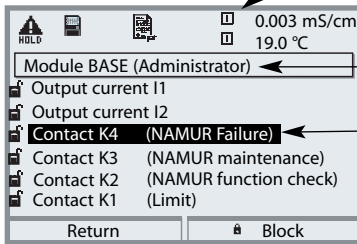information on the operating status:

HOLD
Function check is active

SmartMedia card
located in M 700 FRONT

Mode indicator
Parameter setting

Module identification
*After a menu has been called up, the current-
ly measured values of the respective modules
are displayed here. (number of module slot,
no module designation)*

```
⚠   💾      📇      Ⅰ   0.003 mS/cm
HOLD              Ⅱ   19.0 ℃
 Module BASE (Administrator)  ◄
🔓 Output current I1
🔓 Output current I2
🔓 Contact K4    (NAMUR Failure)   ◄
🔓 Contact K3    (NAMUR maintenance)
🔓 Contact K2    (NAMUR function check)
🔓 Contact K1    (Limit)
        Return          🔒 Block
```

Menu level (Administrator level)

Current selection
*is displayed in reverse video.
(Parameters represented in gray cannot be
edited, they have been blocked at the
Administrator level.)*

Safety of operation
*To ensure increased safety of operation, the
M 700 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.
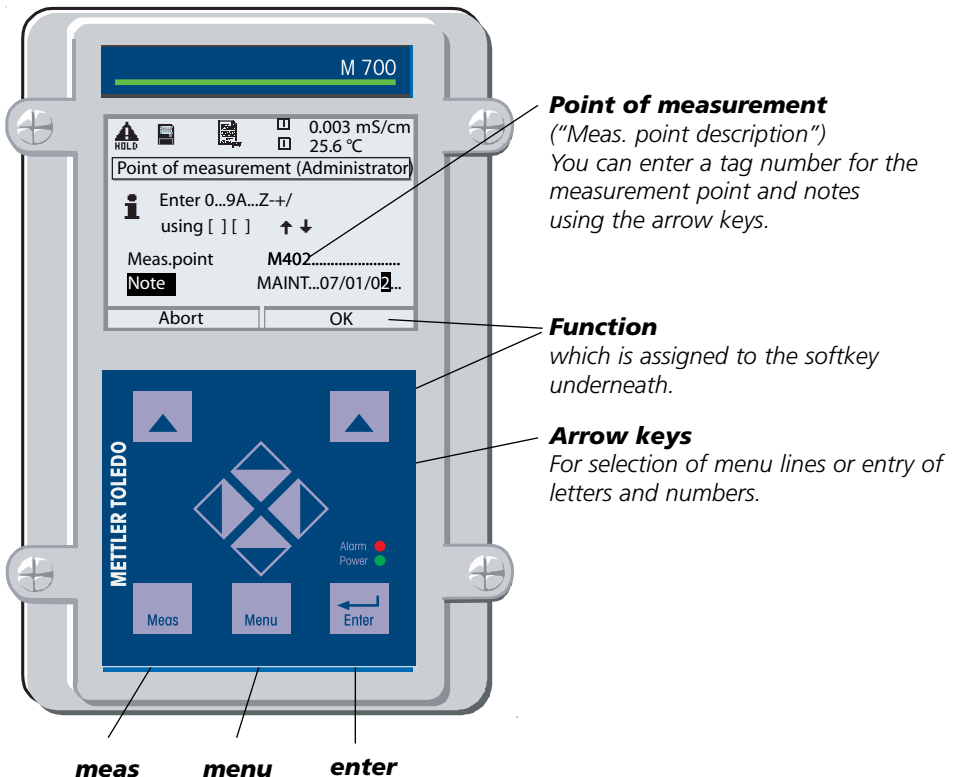 No editing possible.*

How to enter numbers and text

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
("Meas. point description")
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.

M 700

0.003 mS/cm
25.6 ℃
Point of measurement (Administrator)
Enter 0...9A...Z-+/
using [ ] [ ] ↑ ↓
Meas.point   **M402**...................
Note   MAINT...07/01/0**2**...
Abort   OK

Alarm
Power

METTLER TOLEDO

Meas   Menu   Enter

meas   *menu*   *enter*

METTLER TOLEDO   **33**

Configuring the measurement display

Select menu: Parameter setting/M 700 FRONT/Measurement display

Pressing **meas (1)** returns the M 700 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.
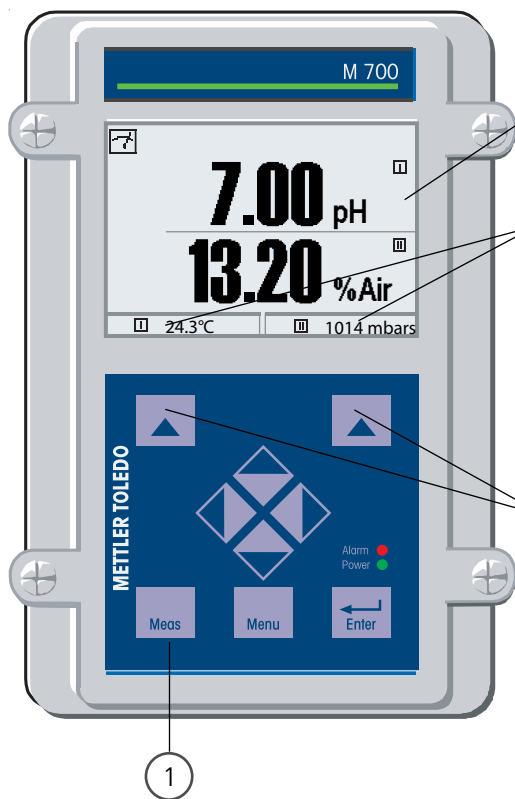
Measurement display
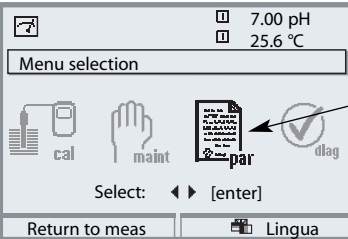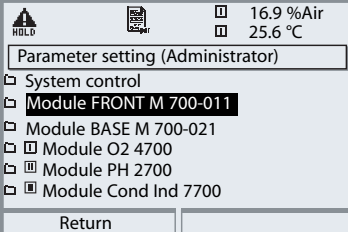*Typical measurement display*
(O_2, pH modules)
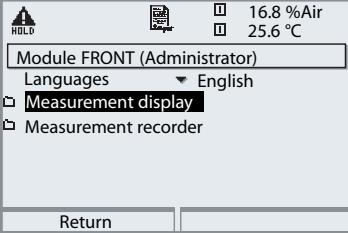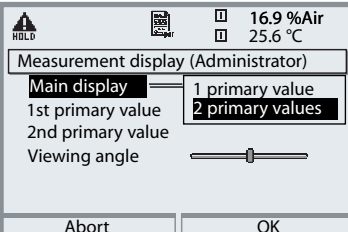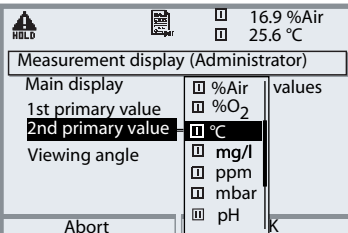
Secondary displays
Additional values, also date and time, can be displayed depending on the modules installed. They are selected using the softkeys (Pg 36).

Softkeys
The softkeys allow selection of values for the secondary displays. In addition, Diagnostics functions which are set as "Favorites" can be called up.
(Pg 37)
If required, you can also change the parameter set via softkey (Pg 37)
Furthermore, the softkeys include self-explaining, context-sensitive functions, e.g. with measurement or KI recorder activated.

Menu	Display	Configure measurement display
	□ 7.00 pH □ 25.6 °C Menu selection cal maint par diag Select: ◀ ▶ [enter] Return to meas ▪ Lingua	**Configure meas. display** Press **menu** key to select menu. Select parameter setting using arrow keys, confirm with **enter**. Select: "Administrator level": Passcode 1989 (For passcodes, see Pg 55)
par	⚠ HOLD 📄 □ 16.9 %Air □ 25.6 °C Parameter setting (Administrator) ▱ System control ▱ Module FRONT M 700-011 ▱ Module BASE M 700-021 ▱ □ Module O2 4700 ▱ ▥ Module PH 2700 ▱ ▤ Module Cond Ind 7700 Return	Parameter setting: Select "M 700 FRONT"
	⚠ HOLD 📄 □ 16.8 %Air □ 25.6 °C Module FRONT (Administrator) Languages ▾ English ▱ Measurement display ▱ Measurement recorder Return	M 700 FRONT: Select "Measurement display"
	⚠ HOLD 📄 □ **16.9 %Air** □ 25.6 °C Measurement display (Administrator) Main display — 1 primary value 1st primary value 2 primary values 2nd primary value Viewing angle ▭ Abort OK	Measurement display: Set the number of primary values (large display) to be displayed
	⚠ HOLD 📄 □ 16.9 %Air □ 25.6 °C Measurement display (Administrator) Main display □ %Air values 1st primary value □ %O₂ 2nd primary value □ °C Viewing angle □ mg/l □ ppm □ mbar □ pH Abort K	Select process variable(s) to be displayed and confirm with **enter**. Pressing the **meas** key returns to measurement.

METTLER TOLEDO **35**

Softkey function (function control)

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
<u>function control matrix</u> (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)
Display of additional values in the measur-
ing mode when the respective softkey is
pressed. Always active.
You can choose one of the process
variables supplied by the modules (and
Calculation Blocks) or the date or time.

Favorites menu
Selected Diagnostics functions can be
called up directly from the measuring
mode using a softkey. The following table
(Pg 37) explains how to select favorites.

Further functions which can be controlled
via softkey:
• Parameter set
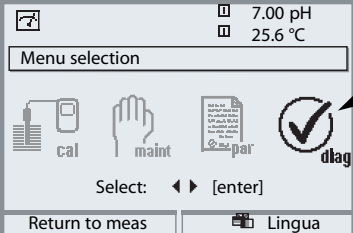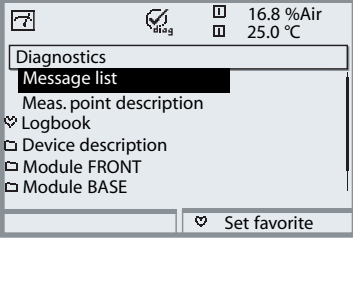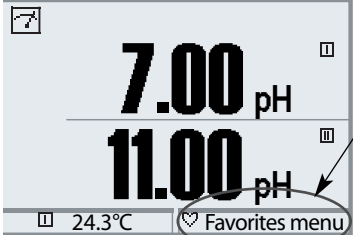• KI recorder
• EasyClean 400
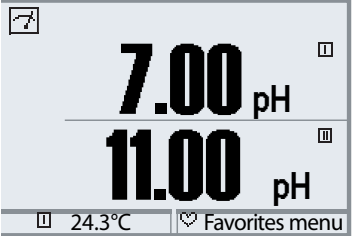
Example:
"Parameter set" to be selected with
"Left softkey"

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

Deselect function:
Press "Disconnect" softkey,
confirm with **enter**.

| Menu	Display	Select favorites
	7.00 pH **11.00** pH 24.3°C ♡ Favorites menu	**Favorites menu** Diagnostics functions can be called up directly from the measuring mode using a softkey. The "Favorites" are selected in the Diagnostics menu.
✓ diag	7.00 pH 25.6 °C Menu selection cal maint par ✓ diag Select: ◀ ▶ [enter] Return to meas 🏳 Lingua	**Select favorites** Press **menu** key to select menu. Select diagnostics using arrow keys, confirm with **enter**.
	16.8 %Air 25.0 °C Diagnostics Message list Meas. point description ♡ Logbook ▭ Device description ▭ Module FRONT ▭ Module BASE ♡ Set favorite	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 usage, Pg 36)
	7.00 pH **11.00** pH 24.3°C ♡ Favorites menu	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 usage, Pg 36).

Note:
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 up from the measuring mode.

METTLER TOLEDO **37**

Diagnostics functions: Overview

Selected diagnostics functions for quality management

Diagnostics functions (quality management, ISO 9000)

To meet the quality management requirements to ISO 9000, the M 700 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:
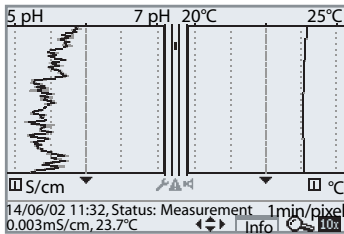

2-channel measurement recorder
Can be called up directly from the measuring mode. Allows detailed evaluation of events by placing the cursor on measured values of interest.
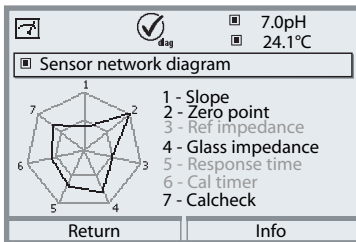
Sensor network diagram
(pH 2700, O_2 4700 modules)
Graphical representation of the sensor parameters in a network diagram – with slope, zero, reference impedance, glass impedance, response time, calibration timer, deviation from calibration range (Calcheck).
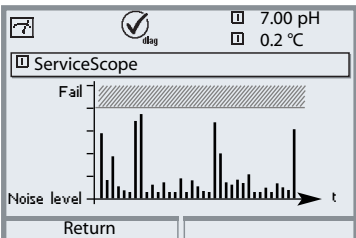

ServiceScope
(pH module)
Displays the noise levels over the time. Allows distinction of individual disturbances, periodic and broadband disturbances, which is helpful for troubleshooting.
An error message is generated if the noise level exceeds the failure limit.

Diagnostics functions: Sensoface ☺
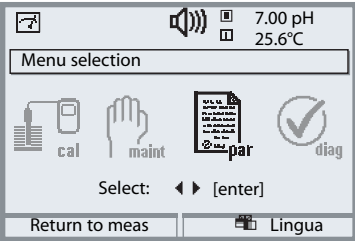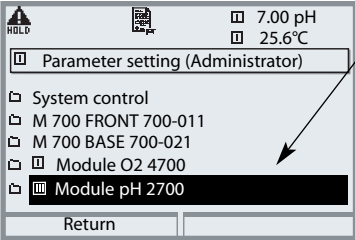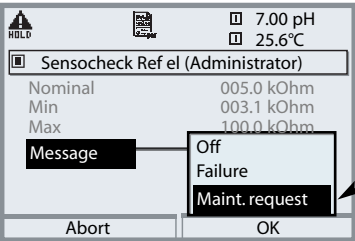
Graphical indication of sensor condition
Sensocheck must have been activated during parameter setting
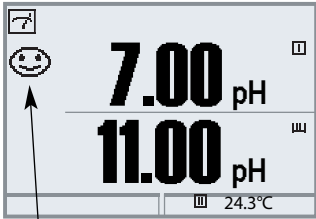
Sensocheck - Sensor monitoring

Module	Sensocheck function
O_2 4700:	Monitoring membrane/electrolyte
Cond 7700:	Information on sensor condition
Cond Ind 7700:	Information on sensor condition
pH 2700:	Automatic monitoring of glass and reference electrode
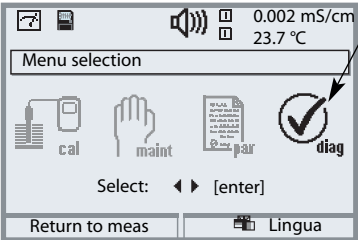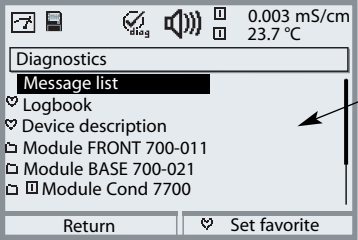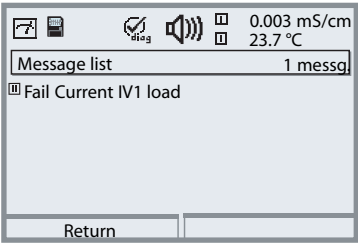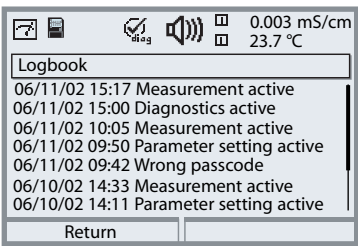
The "smileys" provide information on wear and required maintenance of the sensor ("friendly" – "neutral" – "sad").
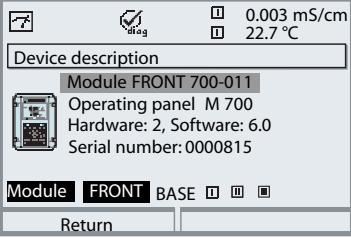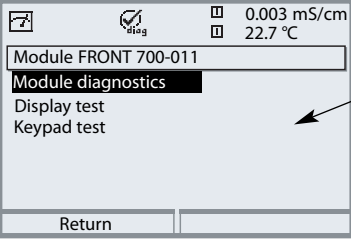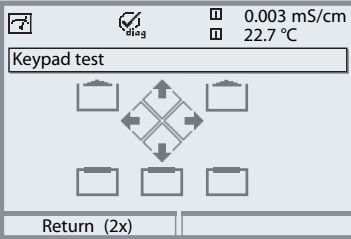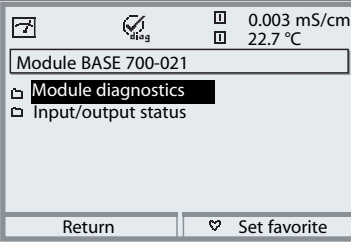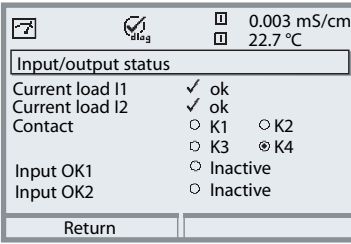
Menu	Display	Activate Sensocheck
		Open menu selection Select parameter setting Enter passcode (Administrator)
		Select module ("pH 2700" or "O2 4700") Confirm with **enter.**
		Select "Sensor data". Confirm with **enter.** Then select "Sensocheck Ref el" (Fig.) Assign function and confirm with **enter.**

METTLER TOLEDO

Diagnostics functions

General status information of the measuring system
Select menu: Diagnostics
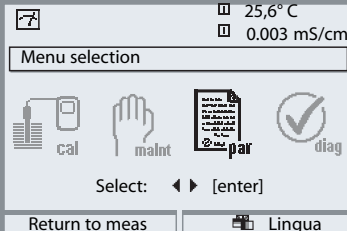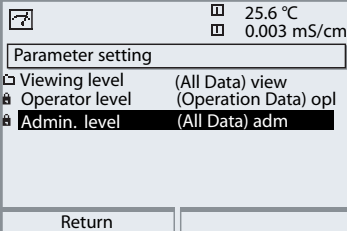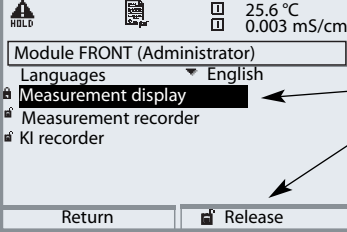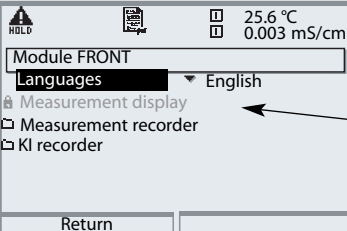
Menu	Display	Diagnostics functions
✓ diag	🗗 🖫 ◁))) □ 0.002 mS/cm 23.7 °C Menu selection cal maint par ✓ diag Select: ◀ ▶ [enter] Return to meas Lingua	**Call up diagnostics** From the measuring mode: Press **menu** key to select menu. Select diagnostics using arrow keys, confirm with **enter**.
	🗗 🖫 ✓ diag ◁))) □ 0.003 mS/cm 23.7 °C Diagnostics Message list ♡ Logbook ♡ Device description ▭ Module FRONT 700-011 ▭ Module BASE 700-021 ▭ Module Cond 7700 Return ♡ Set favorite	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 (see Pg 37).
	🗗 🖫 ✓ diag ◁))) □ 0.003 mS/cm 23.7 °C Message list 1 messg. ▭ Fail Current IV1 load Return	**Message list** Shows the currently activated warn- ing or failure messages in plain text.
	🗗 🖫 ✓ diag ◁))) □ 0.003 mS/cm 23.7 °C Logbook 06/11/02 15:17 Measurement active 06/11/02 15:00 Diagnostics active 06/11/02 10:05 Measurement active 06/11/02 09:50 Parameter setting active 06/11/02 09:42 Wrong passcode 06/10/02 14:33 Measurement active 06/10/02 14:11 Parameter setting active Return	**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. Extended logbook: SmartMedia card (SW 700-104)

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Menu	Display	Diagnostics functions
diag	0.003 mS/cm 22.7 °C Device description Module FRONT 700-011 Operating panel M 700 Hardware: 2, Software: 6.0 Serial number: 0000815 Module FRONT BASE Return	**Device description** Provides information about all modules installed: Module type and function, serial number, hardware and software version and device options (Example: FRONT).
	0.003 mS/cm 22.7 °C Module FRONT 700-011 Module diagnostics Display test Keypad test Return	**M 700 FRONT** The module the display and keypad control. Test possibilities: • Module diagnostics • Display test • Keypad test Example: M 700 FRONT, keypad test. Correct functioning of each key can be checked by pressing it down.
	0.003 mS/cm 22.7 °C Keypad test Return (2x)	
	0.003 mS/cm 22.7 °C Module BASE 700-021 Module diagnostics Input/output status Return ♥ Set favorite	**M 700 BASE** The module generates the standard output signals. Test possibilities: • Module diagnostics • Input/output status Example: M 700 BASE, input/output status.
	0.003 mS/cm 22.7 °C Input/output status Current load I1 ✓ ok Current load I2 ✓ ok Contact ○ K1 ○ K2 ○ K3 ◉ K4 Input OK1 ○ Inactive Input OK2 ○ Inactive Return	

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Parameter setting: Operating levels
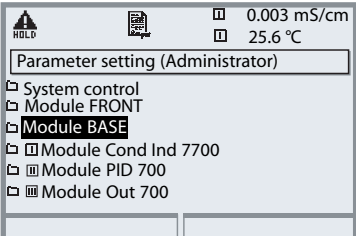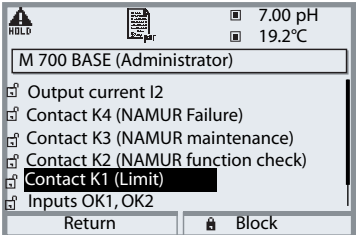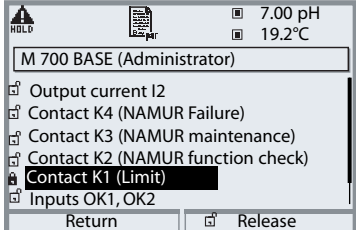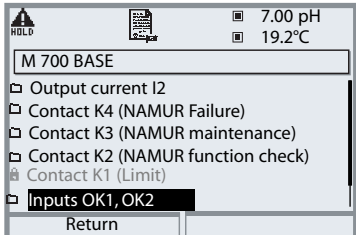
Viewing level, Operator level, Administrator level
Note: Function check active

Menu	Display	Viewing level, Operator level, Administrator level
	  25,6° C 0.003 mS/cm Menu selection cal maInt par diag Select: ◀ ▶ [enter] Return to meas Lingua	**Call up parameter setting** From the measuring mode: Press **menu** key to select menu. Select parameter setting using arrow keys, confirm with **enter**.
	25.6 °C 0.003 mS/cm Parameter setting Viewing level (All Data) view Operator level (Operation Data) opl Admin. level (All Data) adm Return	**Administrator level:** Access to all functions, also passcode setting. Releasing or blocking a function for access from the Operator level.
	HOLD 25.6 °C 0.003 mS/cm Module FRONT (Administrator) Languages ▾ English Measurement display Measurement recorder KI recorder Return Release	Functions which can be blocked for the Operator level are marked with the "lock" symbol. The functions are released or blocked using the softkey.
	HOLD 25.6 °C 0.003 mS/cm Module FRONT Languages ▾ English Measurement display Measurement recorder KI recorder Return	**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: Lock functions

Administrator level: Enable / lock functions for Operator level
Note: Function check active
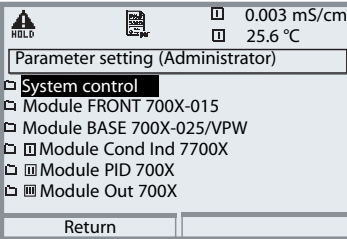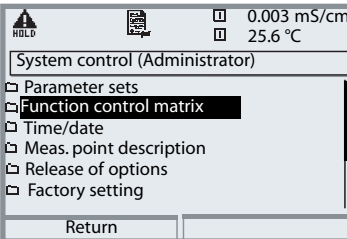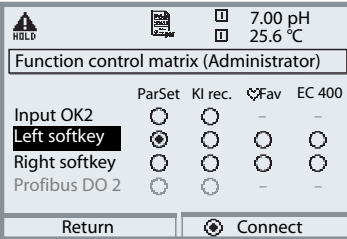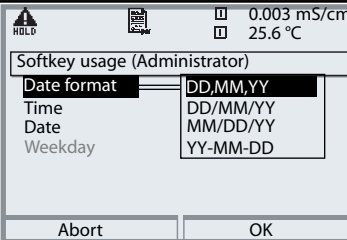
Menu	Display	Administrator level: Enable / lock functions
	⚠ HOLD 📃 🔲 0.003 mS/cm 🔲 25.6 °C Parameter setting (Administrator) 🗁 System control 🗁 Module FRONT 🗁 **Module BASE** 🗁 🔲 Module Cond Ind 7700 🗁 Ⅲ Module PID 700 🗁 Ⅲ Module Out 700	*Example:* *Blocking access to the configuration of relay contact K1 (M 700 BASE) from the Operator level* **Call up parameter setting** Select Administrator level. Enter passcode (1989). Select "M 700 BASE" with arrow keys, confirm with **enter**.
	⚠ HOLD 📃 🔲 7.00 pH 🔲 19.2°C M 700 BASE (Administrator) 🖵 Output current I2 🖵 Contact K4 (NAMUR Failure) 🖵 Contact K3 (NAMUR maintenance) 🖵 Contact K2 (NAMUR function check) 🖵 **Contact K1 (Limit)** 🖵 Inputs OK1, OK2 Return 🔒 Block	Select "Contact K1" with arrow keys, "Block" with softkey.
	⚠ HOLD 📃 🔲 7.00 pH 🔲 19.2°C M 700 BASE (Administrator) 🖵 Output current I2 🖵 Contact K4 (NAMUR Failure) 🖵 Contact K3 (NAMUR maintenance) 🖵 Contact K2 (NAMUR function check) 🔒 **Contact K1 (Limit)** 🖵 Inputs OK1, OK2 Return 🖵 Release	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".
	⚠ HOLD 📃 🔲 7.00 pH 🔲 19.2°C M 700 BASE 🗁 Output current I2 🗁 Contact K4 (NAMUR Failure) 🗁 Contact K3 (NAMUR maintenance) 🗁 Contact K2 (NAMUR function check) 🔒 Contact K1 (Limit) 🗁 **Inputs OK1, OK2** Return	**Call up parameter setting** Select Operator level, passcode (1246), select "M 700 BASE". The locked "Contact K1" function is displayed in gray and marked with the lock icon.

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Function control matrix, time/date
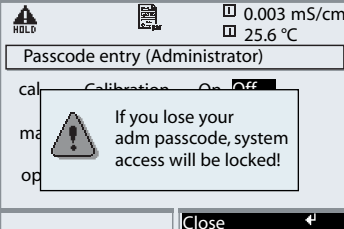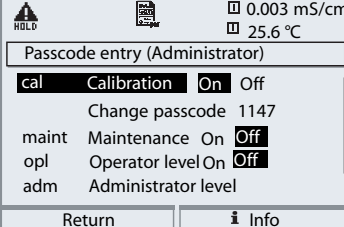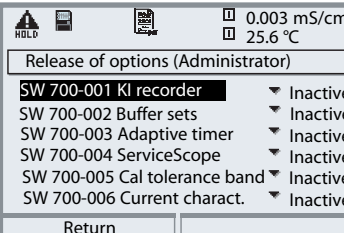
Select menu: Parameter setting/System control
Note: Function check active

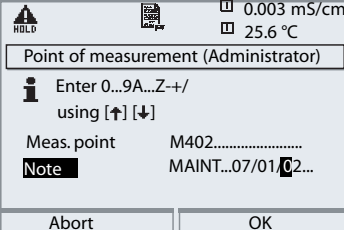| Menu	Display	Function control matrix, time/date
	HOLD △ 0.003 mS/cm / 25.6 °C Parameter setting (Administrator) System control Module FRONT 700X-015 Module BASE 700X-025/VPW Module Cond Ind 7700X Module PID 700X Module Out 700X Return HOLD △ 0.003 mS/cm / 25.6 °C System control (Administrator) Parameter sets Function control matrix Time/date Meas. point description Release of options Factory setting Return	**Call up 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 • Meas. point description (Point of measurement) • Release of options • Factory setting • Passcode entry • Software update ... more, depending on Options.
	HOLD △ 7.00 pH / 25.6 °C Function control matrix (Administrator) ParSet KI rec. Fav EC 400 Input OK2 Left softkey Right softkey Profibus DO 2 Return Connect	**Function control matrix** Clear assignment of function (parameter sets, KI recorder, Favorites menu control) to control element (optocoupler, softkey or Profibus).
	HOLD △ 0.003 mS/cm / 25.6 °C Softkey usage (Administrator) Date format DD,MM,YY Time DD/MM/YY Date MM/DD/YY Weekday YY-MM-DD Abort OK	**Time/date** Selection of date format, adjustment of time and date

Point of measurement, passcodes, release of options

Select menu: Parameter setting/System control
Note: Function check active

Menu	Display	Point of measurement, passcode entry, release of options
[icon] par	⚠ HOLD ☒ 0.003 mS/cm 25.6 °C Point of measurement (Administrator) ℹ Enter 0...9A...Z-+/ using [↑] [↓] Meas. point M402..................... Note MAINT...07/01/02... Abort OK	**Point of measurement** You can enter a tag number or notes (e.g. date of last maintenance).
	⚠ HOLD ☒ 0.003 mS/cm 25.6 °C Passcode entry (Administrator) cal Calibration On Off ⚠ If you lose your adm passcode, system access will be locked! op Close ↵ ⚠ HOLD ☒ 0.003 mS/cm 25.6 °C Passcode entry (Administrator) cal Calibration On Off Change passcode 1147 maint Maintenance On Off opl Operator level On Off adm Administrator level Return ℹ Info	**Passcode entry** When this menu is opened, the analyzer displays a warning (Fig.). Passcodes (factory settings): Calibration (cal) 1147 Maintenance (maint) 2958 Operator level (opl) 1246 Administrator level (adm) 1989 **Caution** If you lose the Administrator passcode, system access is locked!
	⚠ HOLD ☒ 0.003 mS/cm 25.6 °C Release of options (Administrator) SW 700-001 KI recorder ▼ Inactive SW 700-002 Buffer sets ▼ Inactive SW 700-003 Adaptive timer ▼ Inactive SW 700-004 ServiceScope ▼ Inactive SW 700-005 Cal tolerance band ▼ Inactive SW 700-006 Current charact. ▼ Inactive Return	**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.

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Inserting the SmartMedia card

To release an additional function via TAN, see Pg 45, Release of options

Please note when inserting the SmartMedia card:
The SmartMedia card may be inserted or replaced with the power supply switched on. Protect against electrostatic discharge! 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!

To open the analyzer
- Loosen the 4 front screws
- Open the M 700 FRONT 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 M 700 FRONT

To insert the SmartMedia card
- Remove SmartMedia card from its package <u>without touching the contact surface</u>
- Insert card in the slit at the inner side of the M 700 FRONT

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Inserting the SmartMedia card:

The label must be facing you.

To remove the SmartMedia card
- <u>"Close memory card"</u> (Maintenance menu) To avoid data loss, please call up the Maintenance menu.
  "Close memory card" to terminate software access to the SmartMedia card.
  Now the card can be taken out.

SmartMedia card: Application

Use as memory card in combination with additional functions.
Additional functions must be ordered separately (release via TAN).

Types of SmartMedia cards
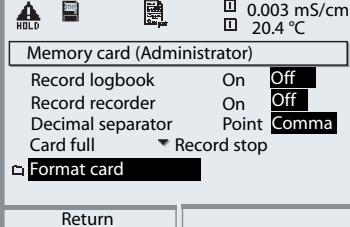The SmartMedia cards are delivered from the manufacturer as
• <u>Software update</u> (SW 700-106, see Pg 52)
• <u>Memory card</u> (additional function SW 700-1xx, see Pg 56)

Using commercially available SmartMedia cards
Commercially available SmartMedia cards can be used as <u>memory card</u>
(<u>Software updates</u> are supplied by the manufacturer and are device-specific).
The following types of cards are supported: 8 MB, 16 MB, 32 MB, 64 MB
and 128 MB storage capacity. Externally produced files, such as from a
digital camera, are tolerated. Long file names can be read. The M 700
generates file names in the 8.3 format (8 characters file name, 3 characters
program-specific file name extension).

Formatting a commercial SmartMedia card
Some devices (e.g. digital cameras, scanners) cause a formatting of the
SmartMedia card which does not correspond to the SSFDC specification or
the SmartMedia Interface Library (SMIL). The manufacturer therefore recom-
mends to format a commercial SmartMedia card as M 700 memory card
prior to first use.

| Menu	Display	Formatting a SmartMedia card
		Format card • Insert SmartMedia card (Pg 46) • Open menu selection • Parameter setting, Admin. level • Enter passcode • System control: Memory card (The "Memory card" function is only available with the SmartMedia Card inserted!) • Format card

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System control: Parameter sets A, B

Parameter setting/System control/Parameter sets

Parameter sets A, B

2 complete parameter sets (A, B) can be stored in the analyzer.
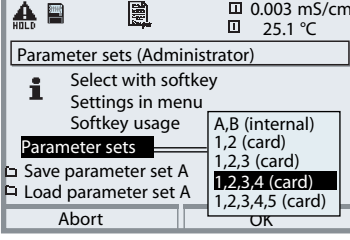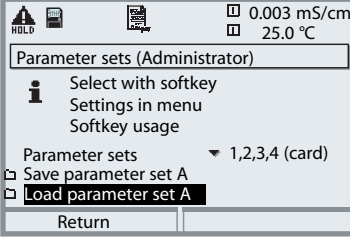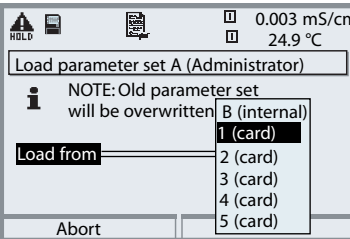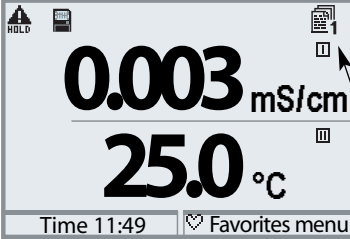An icon in the measurement display shows which parameter set is active:

📱ₐ   or   📱ᵦ
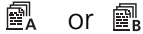
Select "Parameter setting/System control/function control matrix"to select
the control element for switching between the parameter sets (optocoupler,
softkey or PROFIBUS). The currently activated set can be signaled by a relay
contact (see Pg 69).

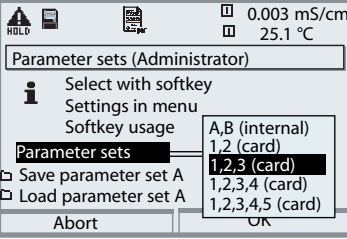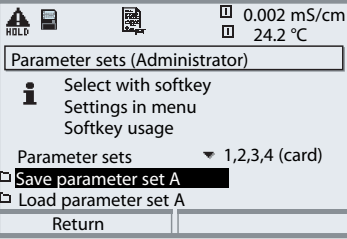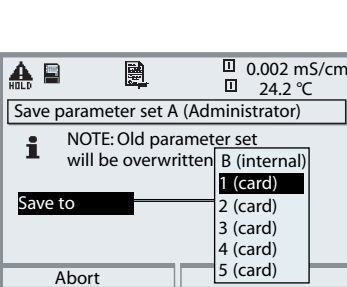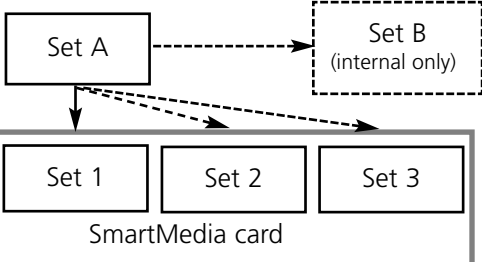| Menu	Display	Parameter sets
📄 par	**△** HOLD 📱 7.00 pH / 25.6 °C Function control matrix (Administrator) 　　　　　ParSet　KI rec　♡Fav Input OK2　　○　　○　　–　　– Left softkey　◉　　○　　○　　– Right softkey　○　　○　　○　　– Profibus DO 2　○　　○　　–　　– 　Return　　　◉ Connect	**Select control element for switching between the parameter sets** • Call up Menu selection • Select Parameter setting, Administrator level • Enter passcode • System control • Select "Function control matrix"
	△ HOLD 📱 7.00 pH / 25,6 °C System control (Administrator) 📂 Memory card 📂 Copy configuration 📂 Parameter sets 📂 Function control matrix 📂 Time/date 📂 Point of measurement 　Return	**Parameter sets A, B** • Call up Menu selection • Select Parameter setting, Administrator level • Enter passcode • System control • Select "Parameter sets", confirm with **enter**.
	△ HOLD 📱 7.00 pH / 25,6 °C Parameter sets (Administrator) ⓘ　For switchover see "Function control matrix" Parameter sets　　▼ A, B (internal) 📂 Save parameter set 📂 Load parameter set 　Return	• **Save parameter set** The active parameter set A overwrites the internal parameter set B • **Load parameter set** Parameter set B is loaded

SmartMedia card: Parameter sets

Parameter setting/System control/Parameter sets
Note: Additional function SW 700-102 required.

Menu	Display	Load parameter set from SmartMedia card
		Loading a parameter set from SmartMedia card • Call up parameter setting • System control • Call up "Parameter sets" (Fig) The M 700(X) 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.

Display panel 1 (Parameter sets (Administrator)):
⚠ HOLD   0.003 mS/cm   25.1 °C
Parameter sets (Administrator)
ℹ Select with softkey
Settings in menu
Softkey usage
Parameter sets
▢ Save parameter set A
▢ Load parameter set A
Abort / OK
A,B (internal)
1,2 (card)
1,2,3 (card)
1,2,3,4 (card)
1,2,3,4,5 (card)

Display panel 2 (Parameter sets (Administrator)):
⚠ HOLD   0.003 mS/cm   25.0 °C
Parameter sets (Administrator)
ℹ Select with softkey
Settings in menu
Softkey usage
Parameter sets   ▼ 1,2,3,4 (card)
▢ Save parameter set A
▢ Load parameter set A
Return

Display panel 3 (Load parameter set A (Administrator)):
⚠ HOLD   0.003 mS/cm   24.9 °C
Load parameter set A (Administrator)
ℹ NOTE: Old parameter set will be overwritten
Load from
B (internal)
1 (card)
2 (card)
3 (card)
4 (card)
5 (card)
Abort

Measuring mode display:
⚠ HOLD   📄1
0.003 mS/cm
25.0 °C
Time 11:49   ♡ Favorites menu

SmartMedia card diagram:
SmartMedia card
Set 1   Set 2   Set 3
Set A   Set B (internal only)

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SmartMedia card: Parameter sets

Parameter setting/System control/Parameter sets (Table: www.mt.com/M700)
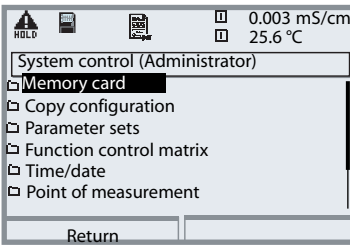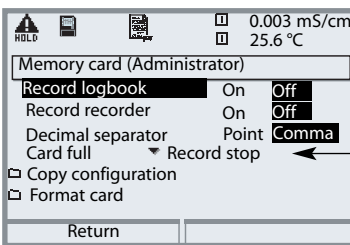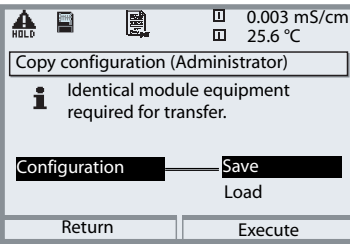Note: Additional function SW 700-102 required.

Menu	Display	Saving parameter set on SmartMedia card
		For parameter settings, refer to www.mtpro.com. **To save a parameter set on SmartMedia card** • Call up parameter setting • System control • Call up "Parameter sets" (Fig) The M 700(X) 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 over-written by the M 700(X) parameter set A. • Select parameter set on SmartMedia card

Copying parameter sets (for similarly equipped M 700)
Parameter sets can be generated with the M700 and then be copied from the PC to further SmartMedia cards, thus being available for further M 700 units.

SmartMedia card: Memory card

Parameter setting/System control/Memory card

Menu	Display	Using the memory card
		To use the memory card • Insert SmartMedia card • Open menu selection • Parameter setting, Admin. level • Enter passcode • System control: Memory card
		Caution! "Close" memory card before removing it (Maintenance menu)
	⚠ ▤ 🗎 ⊡ 0.003 mS/cm ⊡ 25.6 °C System control (Administrator) ▭ Memory card ▭ Copy configuration ▭ Parameter sets ▭ Function control matrix ▭ Time/date ▭ Point of measurement 　　Return	With SmartMedia card inserted, the display shown on the left appears (The "Memory card" line is displayed only if there really is a memory card in the slot). • Select "Memory card", confirm with **enter**. The menu is self-explanatory.
	⚠ ▤ 🗎 ⊡ 0.003 mS/cm HOLD ⊡ 25.6 °C Memory card (Administrator) Record logbook On Off Record recorder On Off Decimal separator Point Comma Card full ▾ Record stop ◄ ▭ Copy configuration ▭ Format card 　　Return	**Behavior when the memory card is full:** Continuous recording (as with a flight recorder) or Stop (card replacement).
	⚠ ▤ 🗎 ⊡ 0.003 mS/cm HOLD ⊡ 25.6 °C Copy configuration (Administrator) ⓘ Identical module equipment required for transfer. Configuration Save Load 　　Return Execute	**Copy configuration (see Pg 52)** • Save: Saving all data on the memory card • Load: Overwriting all device data with the data from the memory card

Copy configuration

Parameter setting/System control/Copy configuration

Copy configuration from one M 700 to further M 700 units
Prerequisite:
The devices must have the same hardware.The module equipment must be absolutely identical – the same modules in the same slots!
Options:
All required options must be enabled on the "master device", this is not required for the"slave devices".
It is the parameters of the options that are transferred, not the option itself. When an option will be enabled on a "slave device" at a later point in time, the parameters of this option will be preset corresponding to the "master device".

SmartMedia card: Software update

Parameter setting/System control/Release of options
Additional functions must be ordered separately (release via TAN).

Additional function SW 700-106: Software update

For a software update (additional function SW 700-106), the manufacturer supplies a specially formatted SmartMedia card. The M 700 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.

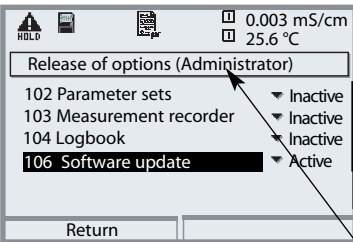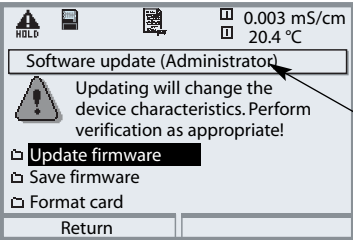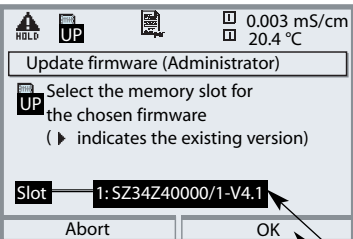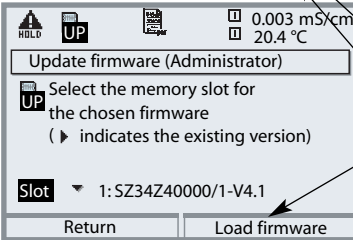This icon indicates that a SmartMedia card is inserted in the slot. The update card allows loading of new software into the device as well as storing of current device software on the card.

A memory card can be generated by formatting an update card (irreversible!). Formatting erases the update.

SmartMedia-Card: Software update

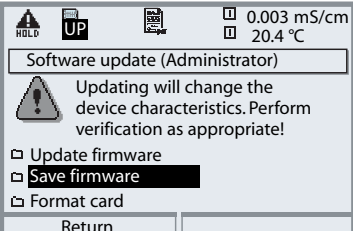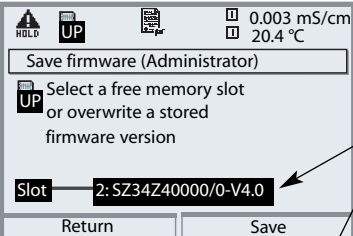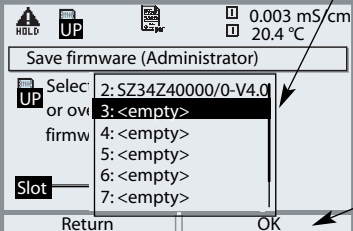Parameter setting/System control/Software update/Load firmware
Note: Function check active
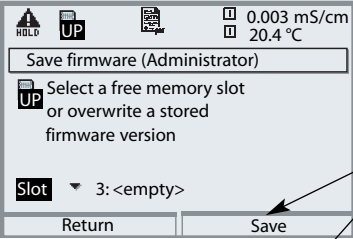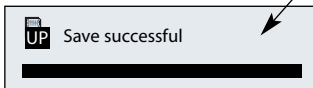
Menu	Display	Software update ("Load firmware")
	△ 🗎 🗎 ▯ 0.003 mS/cm HOLD ▯ 25.6 °C Release of options (Administrator) 102 Parameter sets ▾ Inactive 103 Measurement recorder ▾ Inactive 104 Logbook ▾ Inactive 106 Software update ▾ Active Return **△** 🗎 🗎 ▯ 0.003 mS/cm HOLD ▯ 20.4 °C Software update (Administrator) ⚠ Updating will change the device characteristics. Perform verification as appropriate! 🗁 Update firmware 🗁 Save firmware 🗁 Format card Return **△** UP 🗎 ▯ 0.003 mS/cm HOLD ▯ 20.4 °C Update firmware (Administrator) UP Select the memory slot for the chosen firmware (▶ indicates the existing version) Slot 1:SZ34Z40000/1-V4.1 Abort OK **△** UP 🗎 ▯ 0.003 mS/cm HOLD ▯ 20.4 °C Update firmware (Administrator) UP Select the memory slot for the chosen firmware (▶ indicates the existing version) Slot ▾ 1:SZ34Z40000/1-V4.1 Return Load firmware	**Software update** • Insert SmartMedia card (Pg 46) • Open menu selection • Parameter setting, Admin. level • Enter passcode • Select System control **1: Select "Release of options"** (Software update SW 700-106) 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 • M 700 FRONT **Perform update:** • Parameter setting • System control • Software update • Select slot • Confirm slot with "OK". • Press "Load firmware" softkey to start software update.

METTLER TOLEDO   53

SmartMedia card: Save firmware

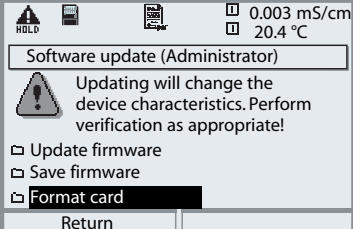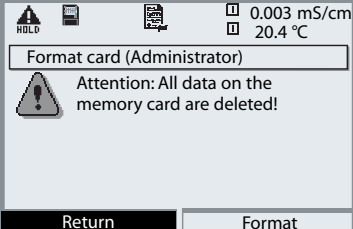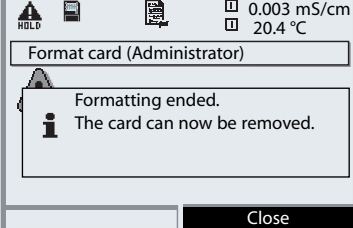Parameter setting/System control/Software update/Save firmware
Note: Function check active

Menu	Display	Save firmware on software update card
📄 par	⚠️ HOLD 📟 UP 🖼️ ☐ 0.003 mS/cm ☐ 20.4 °C Software update (Administrator) ⚠️ Updating will change the device characteristics. Perform verification as appropriate! ▢ Update firmware ▢ Save firmware ▢ Format card Return	**Save firmware** • Insert SmartMedia card (Pg 46) • Open menu selection • Parameter setting, Admin. level • Enter passcode • System control: Software update
	⚠️ HOLD 📟 UP 🖼️ ☐ 0.003 mS/cm ☐ 20.4 °C Save firmware (Administrator) 📟 UP Select a free memory slot or overwrite a stored firmware version Slot — 2: SZ34Z40000/0-V4.0 Return　　Save	Select a free memory slot on the card: • Select slot with ▶ key • Select free slot with arrow key.
	⚠️ HOLD 📟 UP 🖼️ ☐ 0.003 mS/cm ☐ 20.4 °C Save firmware (Administrator) 📟 UP Selec: 2: SZ34Z40000/0-V4.0 or ov 3: <empty> firmw 4: <empty> 5: <empty> Slot 6: <empty> 7: <empty> Return　　OK	• Confirm slot with "OK".
	⚠️ HOLD 📟 UP 🖼️ ☐ 0.003 mS/cm ☐ 20.4 °C Save firmware (Administrator) 📟 UP Select a free memory slot or overwrite a stored firmware version Slot ▼ 3: <empty> Return　　Save 📟 UP Save successful	Start with "Save" softkey. Confirm finish message (with "OK" or **enter**). Remove the SmartMedia card. Close the front door.

SmartMedia card: Format card

Parameter setting/System control/Format card
Note: Function check active

Menu	Display	Format card (Generate memory card)
	⚠ HOLD ▯ 0.003 mS/cm ▯ 20.4 °C Software update (Administrator) ⚠ Updating will change the device characteristics. Perform verification as appropriate! ▭ Update firmware ▭ Save firmware ▭ Format card Return	**To format the card** • Insert SmartMedia card (Pg 46) • Open menu selection • Parameter setting, Admin. level • Enter passcode • System control: Format card
	⚠ HOLD ▯ 0.003 mS/cm ▯ 20.4 °C Format card (Administrator) ⚠ Attention: All data on the memory card are deleted! Return Format	**Caution!** Formatting an update card generates a memory card. Refer to "SmartMedia card", Pg 47. This process is irreversible! Double warning messages protect against faulty operation. Finish message. The memory card is ready for recording.
	⚠ HOLD ▯ 0.003 mS/cm ▯ 20.4 °C Format card (Administrator) ℹ Formatting ended. The card can now be removed. Close	

▼ 🗁 LOGBOOK
   L_021000.TXT
▼ 🗁 PARASET
   SET 1
   SET 2
▼ 🗁 RECORDER
   R_031211.TXT
   R_031212.TXT
   R_031213.TXT
   R_031214.TXT
   R_031215.TXT
   R_031216.TXT

Figure:
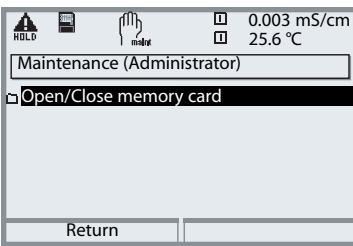File structure of a memory card (example)

Note:
The SmartMedia card must always be formatted in the M 700.
Correct functioning of a SmartMedia card with different formatting cannot be guaranteed.

METTLER TOLEDO
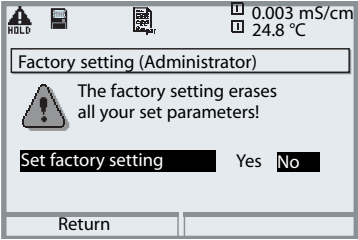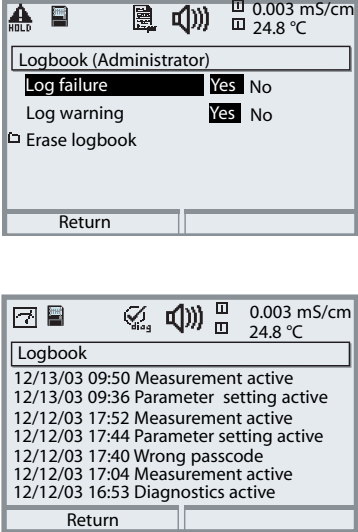
SmartMedia card: Remove card

Maintenance/removing memory card
Note: Function check active

Menu	Display	Close memory card
   🖐 maint	 ⚠ 🖪 🖐 ⊡ 0.003 mS/cm HOLD maint ⊡ 25.6 °C ━━━━━━━━━━━━━━━━ Maintenance (Administrator) ▭ Open/Close memory card ━━━━━━━━━━━━━━━━ Return	**Caution!** **"Close" memory card** **before removing it** **(Maintenance menu)** Otherwise you risk losing data. **Remove memory card** • Insert SmartMedia card (Pg 46) • Open menu selection • Maintenance, Open/close memory card "Close" memory 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.

Factory setting, logbook
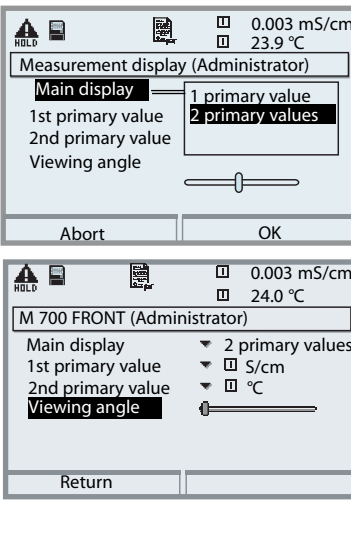
Parameter setting/System control/Logbook
Note: Function check active

Menu	Display	Factory setting, logbook
	⚠ 🖫 🖳 □ 0.003 mS/cm □ 24.8 °C HOLD Factory setting (Administrator) ⚠ The factory setting erases all your set parameters! Set factory setting Yes No Return	**Factory setting** When this menu is opened, the analyzer displays a warning (Fig.). • For factory settings, see module description (Free download available at: www.mtpro.com)
	⚠ 🖫 🖳 ◁))) □ 0.003 mS/cm □ 24.8 °C HOLD Logbook (Administrator) Log failure Yes No Log warning Yes No ☐ Erase logbook Return	**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. The logbook can be called up from the diagnostics menu (Fig.). Additional function SW 700-104: Extended logbook for recording data on SmartMedia card (TAN).
	☐ 🖫 🖳diag ◁))) □ 0.003 mS/cm □ 24.8 °C Logbook 12/13/03 09:50 Measurement active 12/13/03 09:36 Parameter setting active 12/12/03 17:52 Measurement active 12/12/03 17:44 Parameter setting active 12/12/03 17:40 Wrong passcode 12/12/03 17:04 Measurement active 12/12/03 16:53 Diagnostics active Return	

Language, measurement display, viewing angle
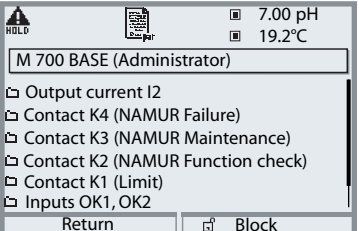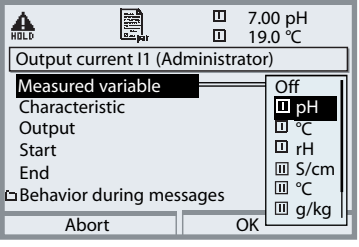
Select menu: Parameter setting/M 700 FRONT
Note: Function check active

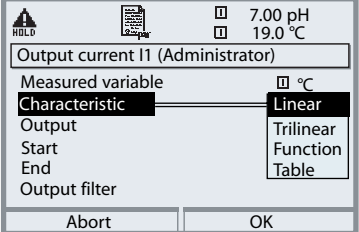| Menu	Display	Language, measurement display, viewing angle
par	⚠ 🖥 📇 □ 0.003 mS/cm HOLD □ 24.0 ℃ M 700 FRONT (Administrator) **Languages** German Measurement display **English** Measurement recorder Français KI recorder Italiano Svenska Español Abort OK	**Language setting** • Call up parameter setting • Select M 700 FRONT • Call up "Language"
	⚠ 🖥 📇 □ 0.003 mS/cm HOLD □ 23.9 ℃ Measurement display (Administrator) **Main display** 1 primary value 1st primary value **2 primary values** 2nd primary value Viewing angle ⊖ Abort OK	**Measurement display** • Call up parameter setting • Select M 700 FRONT • Call up "Measurement display" • Select number and type of values to be displayed
	⚠ 🖥 📇 □ 0.003 mS/cm HOLD □ 24.0 ℃ M 700 FRONT (Administrator) Main display ▼ 2 primary values 1st primary value ▼ □ S/cm 2nd primary value ▼ □ ℃ **Viewing angle** ⊖ Return	**Viewing angle** • Call up parameter setting • Select M 700 FRONT • Call up "Measurement display" • Adjust display to local light conditions • Confirm with **enter**

Current outputs, contacts, OK inputs

Select menu: Parameter setting/M 700 BASE
Note: Function check active

Menu	Display	Parameter setting M 700 BASE
⬛ par	⚠ HOLD ▤ par ▣ 7.00 pH ▣ 19.2°C M 700 BASE (Administrator) ◻ Output current I2 ◻ Contact K4 (NAMUR Failure) ◻ Contact K3 (NAMUR Maintenance) ◻ Contact K2 (NAMUR Function check) ◻ Contact K1 (Limit) ◻ Inputs OK1, OK2 Return 🗐 Block	• Call up parameter setting • Enter passcode • Select M 700 BASE • Select "Output current ..."
	⚠ HOLD ▤ ▣ 7.00 pH ▣ 19.0 °C Output current I1 (Administrator) **Measured variable** Off Characteristic ▣ pH Output ▣ °C Start ▣ rH End ▣ S/cm ◻ Behavior during messages ▣ °C Abort OK ▣ g/kg	• Select measured variable
	⚠ HOLD ▤ ▣ 7.00 pH ▣ 19.0 °C Output current I1 (Administrator) Measured variable ▣ °C **Characteristic** Linear Output Trilinear Start Function End Table Output filter Abort OK	• Select Characteristic, 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".

Assignment of measured values: Start (4 mA) and end (20 mA)

Example 1: Range pH 0 - 14

Output current   [mA]

Example 2: Range pH 5 - 7
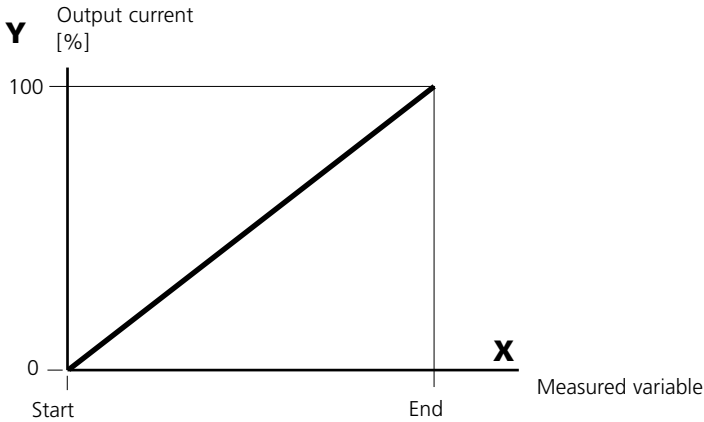Advantage: Higher resolution in range of interest
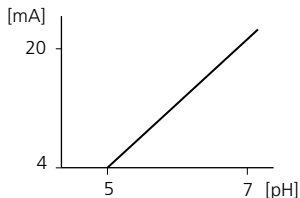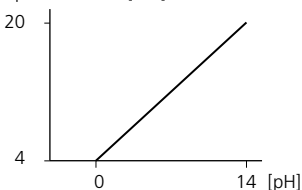
Current outputs: Current output curves

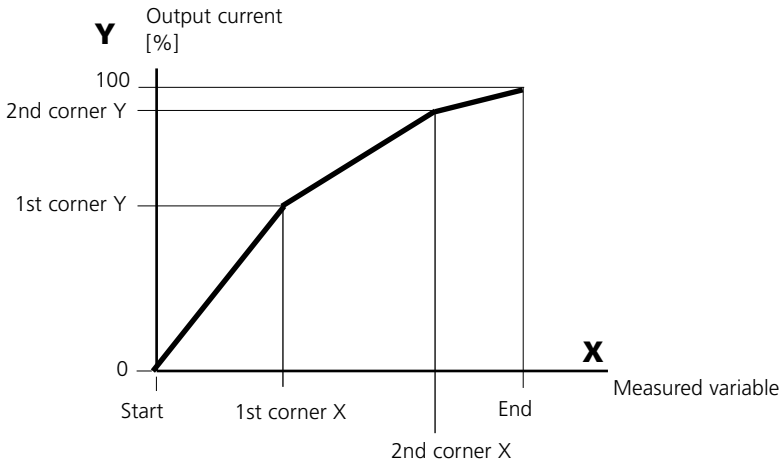Select menu: Parameter setting/M 700 BASE

- **Linear characteristic**
  The measured variable is represented by a linear output current curve.

- **Trilinear characteristic**
 Two additional corner points must be entered:

- **Note: Bilinear characteristic**
  For a bilinear characteristic, identical parameters are entered
  for the two corner points (1st corner, 2nd corner).

• **Function characteristic**
Nonlinear output current characteristic: allows measurements over several decades, e.g. for measuring very low values with a high resolution and high values with a low resolution.
Required: Entering a value for 50 % output current.
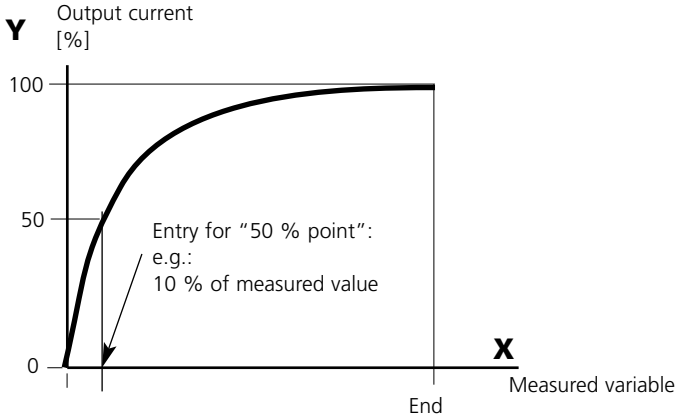
Equation

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

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

I: *Initial 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:
I: *10 % of maximum value*
X50%:   *31.6 % of maximum value*
E: *Maximum value*

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

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Output filter

Time constant.

Time constant of output filter

To smoothen the current output, a low-pass filter with adjustable time constant can be switched on. When there is a jump at the input (100 %), the output level is at 63 % after the time constant has been reached. The time constant can be set from 0 to 120 sec. If the time constant is set to 0 s, the current output follows the input.
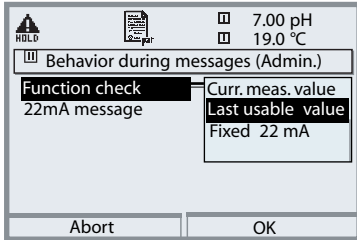
Note:

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 constant 0 to 120 sec
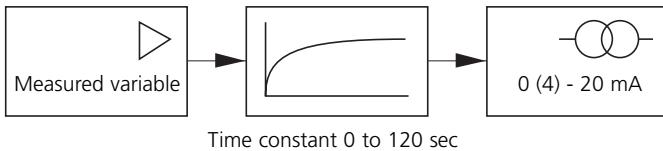
NAMUR signals: Current outputs

Behavior during messages: Function check, 22 mA signal

Behavior during messages

Depending on the parameter setting ("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).
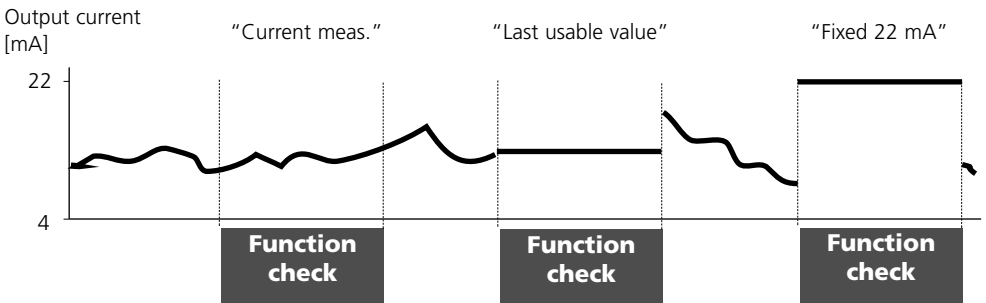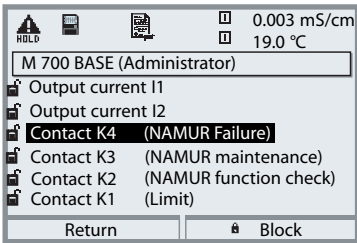
NAMUR signals: Relay contacts

Failure, maintenance request, function check

As delivered, the floating relay outputs of the M 700 BASE are assigned to the NAMUR signals:
• Failure: Contact K4, normally closed contact (signaling current failure)
• Maintenance request: Contact K3, normally open contact
• Function check: Contact K2, normally open contact

```
⚠       🖥         🖳        ▥  0.003 mS/cm
HOLD                        ▥  19.0 ℃
┌─────────────────────────────────┐
│ M 700 BASE (Administrator)      │
├─────────────────────────────────┤
🔓 Output current I1
🔓 Output current I2
🔓 Contact K4    (NAMUR Failure)
🔓 Contact K3    (NAMUR maintenance)
🔓 Contact K2    (NAMUR function check)
🔓 Contact K1    (Limit)
├─────────────────────────────────┤
│    Return      │  🔒  Block      │
└─────────────────────────────────┘
```

NAMUR signals: *Factory setting of contacts*
• *Select parameter setting*
• *Select Administrator level*
• *Select M 700 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 "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 "Function check".

Function check 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 subjected 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.
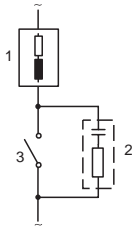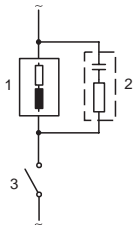
Typical AC applications with inductive load

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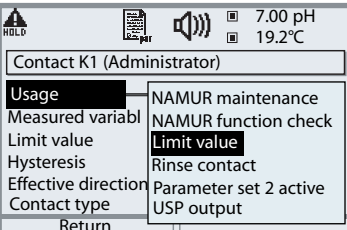
Warning!
Make sure that the maximum ratings of the relay contacts are not exceeded even during switching!

Information concerning relay contacts
As delivered, the relay contacts are suitable for low signal currents (down to approx. 1mA). 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/M 700 BASE/Relay contacts

Menu	Display	Setting the relay contacts
	▲ HOLD 📠 ◁))) □ 7.00 pH □ 19.2°C Contact K1 (Administrator) **Usage** / NAMUR maintenance Measured variabl / NAMUR function check Limit value / **Limit value** Hysteresis / Rinse contact Effective direction / Parameter set 2 active Contact type / USP output Return	**Relay contacts, usage** • Call up parameter setting • Enter passcode • Select M 700 BASE • Select "Contact ..." • "Usage" (Fig.)

M 700 BASE

Alarm (K4)

K1

K2

K3
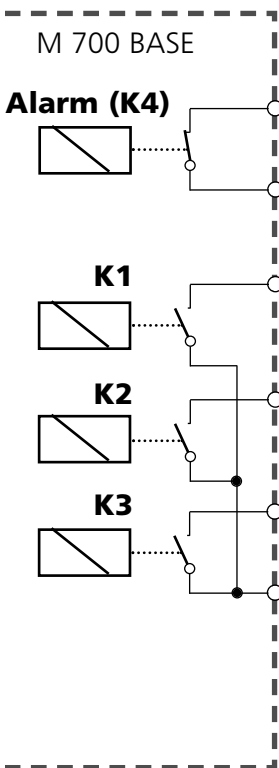
The M 700 BASE provides 4 relay contacts (max. AC/DC rating 30 V / 3 A each). Contact K4 is provided for failure message. The switching behavior (normally open or normally closed), as well as a switch-on or switch-off delay can be defined.

Default settings of the user-definable relay contacts of the M 700 BASE:
K3: NAMUR maintenance request
K2: NAMUR function check
K1: Limit value
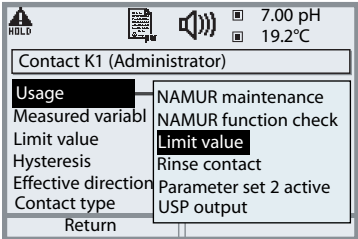
The contact assignment K1 - K3 is user defined ("Usage"):
• NAMUR maintenance request
• NAMUR function check
• Limit value
• Rinse contact
• Parameter set 2 active
• USP output (COND 7700 module only)

**Contact assignment:** See terminal plate M 700 BASE

Limit value, hysteresis, contact type

Parameter setting/M 700 BASE/Relay contacts/Usage

Menu	Display	Usage as limit value
	⚠ HOLD 📋 🔊)) ▣ 7.00 pH ▣ 19.2°C Contact K1 (Administrator) **Usage** — NAMUR maintenance Measured variabl NAMUR function check Limit value **Limit value** Hysteresis Rinse contact Effective direction Parameter set 2 active Contact type USP output Return	**Relay output: Limit value** • Call up parameter setting • Enter passcode • Select M 700 BASE • Select "Contact ..." • "Usage: Limit value" (Fig.)

Limit value
Effective direction min
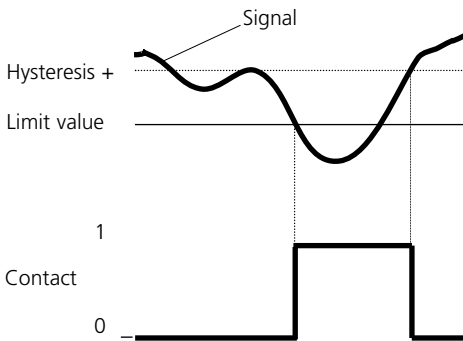
Limit value
Effective direction max
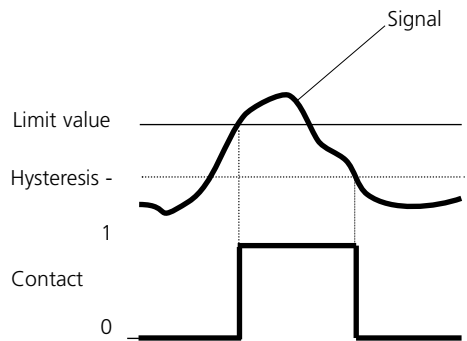
Hysteresis
Tolerance band around the limit value, within which the contact is not actu-
ated. Serves to obtain appropriate switching behavior at the output and
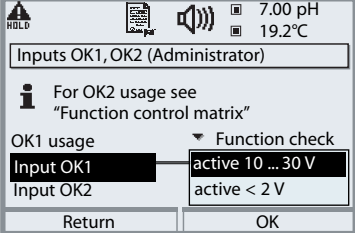suppress slight fluctuations of the measured variable (Fig.)
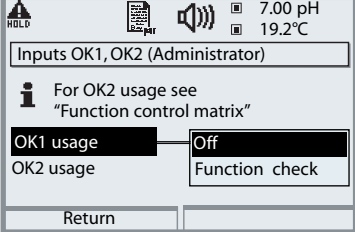
Contact type
Specifies whether the active contact is closed (N/O) or open (N/C).

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# OK1, OK2 inputs: Specify level

Parameter setting/M 700 BASE/Inputs OK1, OK2
Note: Function check active

Menu	Display	Setting the OK inputs
		OK1 usage • Call up parameter setting • Enter passcode • Select M 700 BASE • Select "Inputs OK1/OK2" • Select "OK1 usage"
		OK1/OK2 switching level • Call up parameter setting • Enter passcode • Select M 700 BASE • Select "Inputs OK1/OK2" • Specify active switching level

The M 700 BASE provides 2 digital inputs (OK1, OK2). The following functions (depending on the parameter setting) can be started via a control signal:

- OK1: "Off" or "Function check"
- OK2: For selection, see Pg 36, System control menu/Function control matrix.
  ("Off", "Parameter set A/B", "Start KI recorder")

The switching level for the control signal must be specified:
(active 10...30 V or active > 2 V).
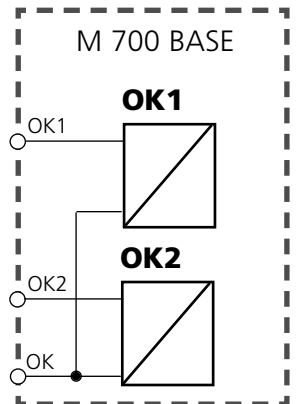
Contact assignment:
See terminal plate
M 700 BASE

Switching parameter sets via OK2

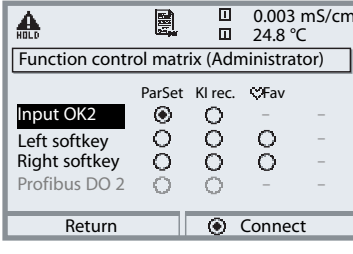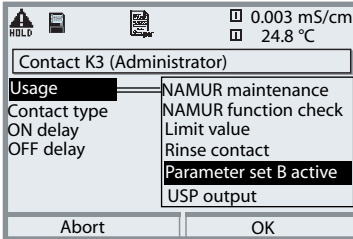Parameter setting / System control / Function control matrix
Note: Function check active

Parameter sets
2 complete parameter sets (A, B) can be stored in the M 700.
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	⚠ HOLD 📖 □ 0.003 mS/cm □ 24.8 °C Function control matrix (Administrator) ParSet Kl rec. ♥Fav **Input OK2** ◉ ○ – – Left softkey ○ ○ ○ – Right softkey ○ ○ ○ – Profibus DO 2 ○ ○ – – Return ◉ Connect	**Select parameter set (A, B) via input OK2** • Call up parameter setting • System control • Function control matrix • Select "OK2" • Connect "Parameter set A/B"
	⚠ 📄 HOLD 📖 □ 0.003 mS/cm □ 24.8 °C Contact K3 (Administrator) **Usage** NAMUR maintenance Contact type NAMUR function check ON delay Limit value OFF delay Rinse contact Parameter set B active USP output Abort OK	**Signal active parameter set via relay contact** • Call up parameter setting • M 700 BASE • Select contact • Usage: "Parameter set ...".

Note
The selection has no effect when working on SmartMedia card
with SW 700-102.

Calculation Blocks

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:
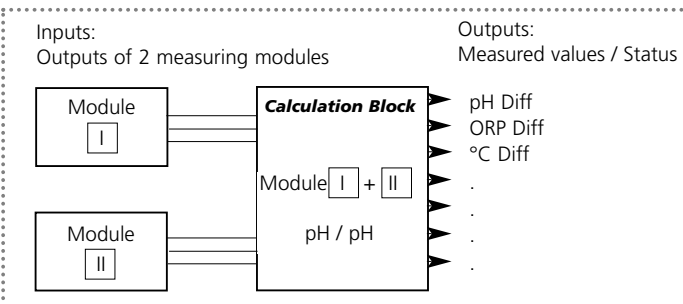• Ratio
• Pass (passage)
• Reject (rejection)
• Measured-value difference
• Deviation
• pH value calculation by means of dual conductivity measurement
These output variables are then available in the system and can be assigned to the outputs (current, limit values, display ...)

Functionality of measuring module
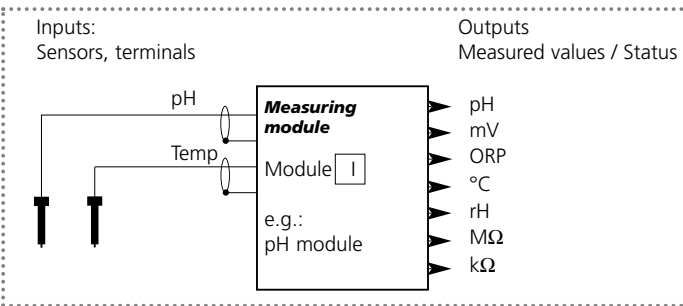
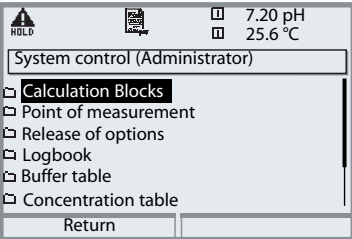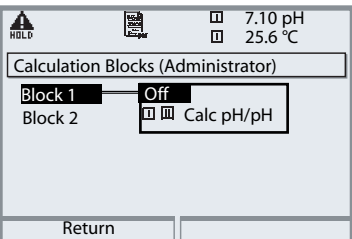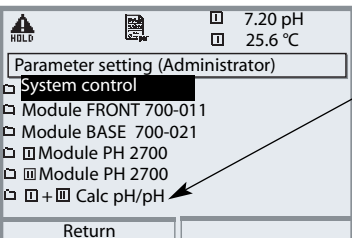### Functionality of Calculation Block

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: $\boxed{I}$ + $\boxed{II}$, $\boxed{I}$ + $\boxed{III}$, $\boxed{II}$ + $\boxed{III}$

Two Calculation Blocks can be activated.

Menu	Display	Activate Calculation Blocks
	⚠ HOLD ▨ 🔲 7.20 pH 🔲 25.6 °C System control (Administrator) ▭ Calculation Blocks ▭ Point of measurement ▭ Release of options ▭ Logbook ▭ Buffer table ▭ Concentration table Return	**Calculation Blocks** • Call up parameter setting • System control • Select "Calculation Blocks"
	⚠ HOLD ▨ 🔲 7.10 pH 🔲 25.6 °C Calculation Blocks (Administrator) Block 1 ──── Off Block 2 🔲 🔳 Calc pH/pH Return	• Depending on modules installed, the possible combinations for Calculation Blocks are offered
	⚠ HOLD ▨ 🔲 7.20 pH 🔲 25.6 °C Parameter setting (Administrator) ▭ System control ▭ Module FRONT 700-011 ▭ Module BASE 700-021 ▭ 🔲 Module PH 2700 ▭ 🔳 Module PH 2700 ▭ 🔲 + 🔳 Calc pH/pH Return	During parameter setting the Calculation Blocks are displayed like modules.

Calculation Blocks: Overview

Module combinations, Calculation Block, process variables

Module combination	Calculation Block	Variables calculated by the Calculation Block	
pH + pH	Calc pH/pH	Difference	pH
		Difference	ORP
		Difference	°C
Cond + Cond Cond Ind + Cond Ind Cond + Cond Ind	Calc Cond/Cond	Difference	S/cm
		Difference	Ω*cm
		Difference	°C
		Ratio	S/cm []
		Passage (Pass)	S/cm [%]
		Rejection (Reject)	S/cm [%]
		Deviation (Deviat)	S/cm [%]
		c(NaOH)	pH
$O_2 + O_2$	Calc O_2/O_2	Difference	%Air
		Difference	% O2
		Difference	g/l
		Difference	ppm
		Difference	°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

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

pH value calculation by means of dual conductivity measurement

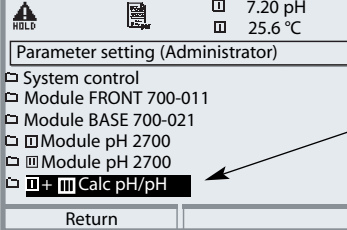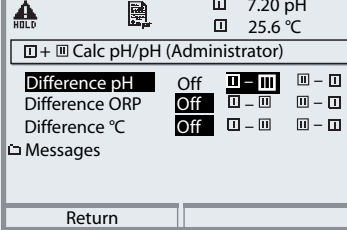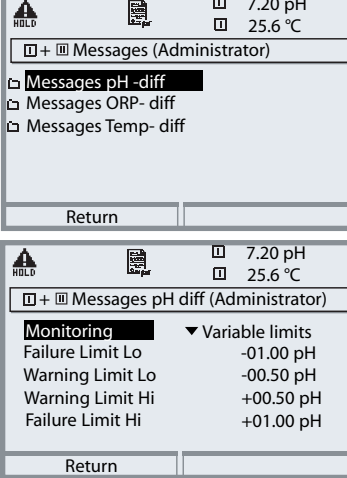See instruction manual for Cond 7700 module. Principle:
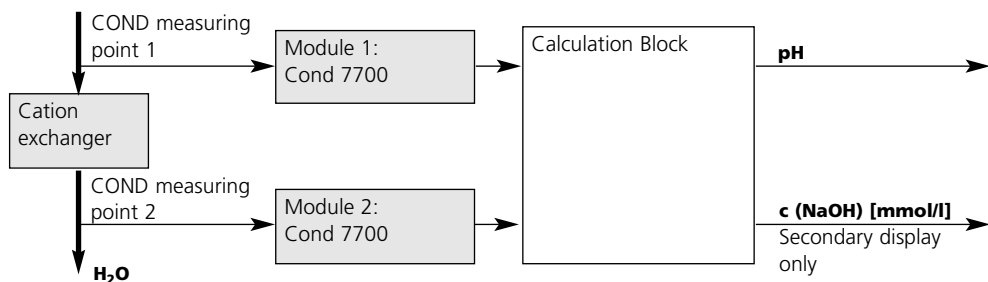
$$c(NaOH) = \frac{COND1 - 1/3\ COND2}{243} \qquad pH = 11 + \log[c(NaOH)]$$
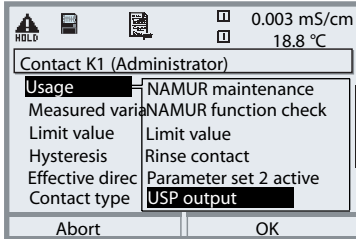
Configuring a Calculation Block

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

Menu	Display	Configure Calculation Block
	⚠ HOLD 🖩 ① 7.20 pH ① 25.6 ℃ Parameter setting (Administrator) ▭ System control ▭ Module FRONT 700-011 ▭ Module BASE 700-021 ▭ ① Module pH 2700 ▭ ② Module pH 2700 ▭ ①+ ③ Calc pH/pH Return	**Select Calculation Block** • Call up parameter setting • System control • Select module
	⚠ HOLD 🖩 ① 7.20 pH ① 25.6 ℃ ①+ ③ Calc pH/pH (Administrator) Difference pH Off ①–③ ③–① Difference ORP Off ①–③ ③–① Difference ℃ Off ①–③ ③–① ▭ Messages Return	• Depending on modules installed, the possible combinations for Calculation Blocks are offered
	⚠ HOLD 🖩 ① 7.20 pH ① 25.6 ℃ ①+ ③ Messages (Administrator) ▭ Messages pH -diff ▭ Messages ORP- diff ▭ Messages Temp- diff Return ⚠ HOLD 🖩 ① 7.20 pH ① 25.6 ℃ ①+ ③ Messages pH diff (Administrator) Monitoring ▼ Variable limits Failure Limit Lo -01.00 pH Warning Limit Lo -00.50 pH Warning Limit Hi +00.50 pH Failure Limit Hi +01.00 pH Return	**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**.

USP function

Monitoring of ultrapure water in the pharmaceutical industry
(To configure: Select Parameter setting COND 7700 module)

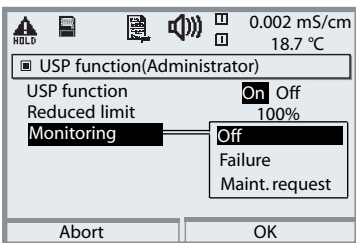|	
⚠ 🖥 📋 ⊡ 0.003 mS/cm HOLD ⊡ 18.8 ℃ Contact K1 (Administrator) Usage ⌐ NAMUR maintenance Measured varia NAMUR function check Limit value Limit value Hysteresis Rinse contact Effective direc Parameter set 2 active Contact type USP output Abort OK	***USP function, define switching output*** *When a COND 7700 module is installed, one of the floating relay outputs of the BASE module (K1, K2 or K3) can be assigned to the USP function.* *• Select parameter setting:* *• Administrator level (function check active!)* *• M 700 BASE* *• Define contact "Usage" (Fig.)*

According to the "USP" directive (U.S. Pharmacopeia), Appendix 5, Section 645 "Water Conductivity" the conductivity of pharmaceutical waters can be monitored online.
To do so, the conductivity is measured without temperature compensation and compared with limit values. The water is usable without further test steps when the conductivity is below the USP limit.
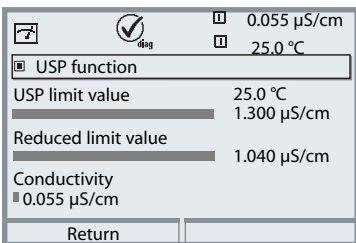
Reduced limit:
The USP limit can be reduced down to 10 % (Parameter setting).

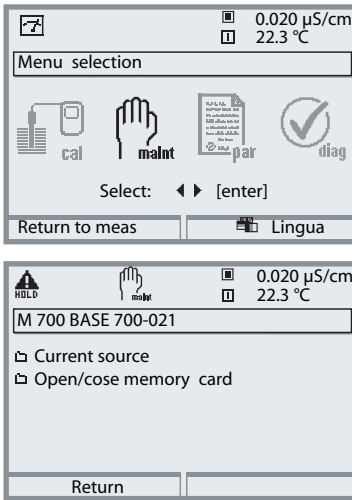|	

⚠ 🖥 📋 🔊 ⊡ 0.002 mS/cm
HOLD   ⊡ 18.7 ℃
▣ USP function(Administrator)
USP function   On   Off
Reduced limit   100%
Monitoring   Off
               Failure
               Maint. request
    Abort   OK
	Select USP function
	• Select parameter setting:
	• Administrator level (function check active!)
	• Select "Module COND"
	• Select USP function (Fig.)

📝   ✅diag   ⊡ 0.055 µS/cm
              ⊡ 25.0 ℃
▣ USP function
USP limit value   25.0 ℃
                 1.300 µS/cm
Reduced limit value
                 1.040 µS/cm
Conductivity
▌0.055 µS/cm
    Return
	USP function. Diagnostics
	• Select diagnostics
	• Select "Module COND"
	• Select USP function:
	Display of USP limit, reduced limit, conductivity

Maintenance

M 700 BASE
Note: Function check active

Menu	Display	Maintenance
![maint icon] maint	(display showing Menu selection screen with 0.020 µS/cm, 22.3 °C, cal, maint, par, diag icons, Select: ◀ ▶ [enter], Return to meas, Lingua) (display showing HOLD, maint, 0.020 µS/cm, 22.3 °C, M 700 BASE 700-021, Current source, Open/cose memory card, Return)	**Call up Maintenance** From the measuring mode: Press **menu** key to select menu. Select maintenance using arrow keys, confirm with **enter**. Then select M 700 BASE **Current source** For testing purposes, the output current can be manually specified (range 0 ... 22 mA). **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.

Specifications

Specifications

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] [→] [↑] [↓] [←] [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 measured value recorder with marking of
	events (failure, maintenance request, function 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 to 10 h / pixel
Zoom function	— 10fold zoom in the event of
	high rate of change
KI recorder	Adaptive representation of process flow with
	monitoring and signaling of critical process parameters

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

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Specifications

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	>10 years (EEPROM)
	Logbook, statistics, records	>1 year (lithium battery)
	Measurement recorder:	SmartMedia card

Module slots	3

Power supply (M 700 C/S)	24 (–15 %) to 230 (+15 %) V AC/DC appr. 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 (M 700 (C/S)/VPW) EEx em IIC or	100 (–15 %) ... 230 (+10 %) V AC < 15 VA, 48 ... 62 Hz
Power supply (M 700 (C/S)/24V) EEx em IIC	24 V AC/DC
	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)
Wire cross-section	2.5 mm^2
Ground wire connection	2.5 mm^2, M4 screw (EN 61010-1, 6..5.1.2.)

Sensor monitor	Direct display of measured values from sensor for validation

Protection against electrical shock	Protective connection according to EN 61010-1, 6.5.1

Specifications

Input OK 1	Galv. separated (OPTO coupler)
EEx ib IIC	Vi ≤ 30 V, floating, galvanic isolation up to 60 V
Function	Switches device to HOLD mode
	(function check)
Switching voltage	0 ... 2 V AC/DC inactive 10 ... 30 V AC/DC active
	(invertible)

Input OK 2	Galv. separated (OPTO coupler)
EEx ib IIC	Vi ≤ 30 V, floating, galvanic isolation up to 60 V
Function	START / STOP 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 messages
Measurement error[**]	< 0.25 % current value + 0.05 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)
Load monitoring	Error message if load is exceeded
Overrange[*]	22 mA in the case of messages
Measurement error[**]	< 0.25 % current value + 0.05 mA
Current source	0,00 ... 22.00 mA

Switching contacts[*)]	4 relay contacts K1 to 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/
	function check, limit values, parameter set 2
	active, rinsing contact, USP contact,
	K4 permanently set as alarm contact (NAMUR failure)

Specifications

General data

Explosion protection	II 2 G D EEx em ib IIC T4 KEMA 04 ATEX 2056
EMC	NAMUR NE 21 and EN 61326 VDE 0843 Part 20 /01.98 EN 61326/A1 VDE 0843 Part 20/A1 /05.99
Emitted interference	Class B
Immunity to interference	Industry
Lightning protection	EN 61000-4-5, Installation Class 2
Nominal operating conditions	Ambient temperature –20 ... +55 °C (IS: max. +50 °C) Relative humidity 10 to 95 % not condensing Power supply 24 (–15 %) to 230 (+15%) V AC/DC Frequency AC 45 ... 65 Hz
Transport/ Storage temperature	–20 ... +70 °C
Enclosure	M 700 C: Steel, coated M 700 S: Stainless steel, polished, 1.4305
Assembly	— Wall mounting — Post/pipe mounting — Panel mounting — Sealed against panel
Dimensions	See dimension drawing.
Ingress protection	IP 65 / NEMA 4 X
Cable glands	5 times M20 x 1.5
Terminals	Single wires and flexible leads up to 2.5 mm^2 (AWG 14)
Weight	Approx. 3.2 kg plus approx. 150 g per module

* User-defined
** To IEC 746 Part 1, at nominal operating conditions

Glossary

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.
When 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 %.

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Glossary

Glossary

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

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. etc. This permits quality management documentation to ISO 9000. 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.

Glossary

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

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 analyzer provides a very clear menu structure. Menu selection is called up by pressing the menu key. Four basic functions can be accessed: Calibration (cal), Maintenance (maint), Parameter setting (par), and Diagnostics (diag). From each of these functions, the individual module blocks (system control, M 700 FRONT (display functions), M 700 BASE (signal outputs) can be accessed, as well as all added measuring and communication modules. See Pg 30.

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
"Funcion check", "maintenance request" and "failure".
Indicate status of measured variable and measuring system.

Glossary

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

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 (Tag number)
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.

Glossary

Glossary

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 (Cond Ind module).

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 point
The zero point is the voltage value 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.

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Menu structure of basic unit

M 700(X): M 700 FRONT, M 700 BASE

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: ....)

Order number: 52 121 216