pH 2700i(X) module

Instruction manual

ISM
INTELLIGENT SENSOR MANAGEMENT

METTLER TOLEDO M 700 Module

Type pH 2700i X

No.

ISM PH

pH / ORP / °C

Tamb: **-20 to +50 °C**
Made in Germany

KEMA 04 ATEX 2056
II 2(1) GD EEx ib [ia] IIC T4 T 70 °C
Electrical data see
EC–Type Examination Certificate
CH‑8902 Urdorf   Schweiz

CE 0499

pH sensor

meas. el.						ref. el.				SG	ISFET			ISM		temp	
											source	drain	shield	DGND	data	RTD	RTD
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
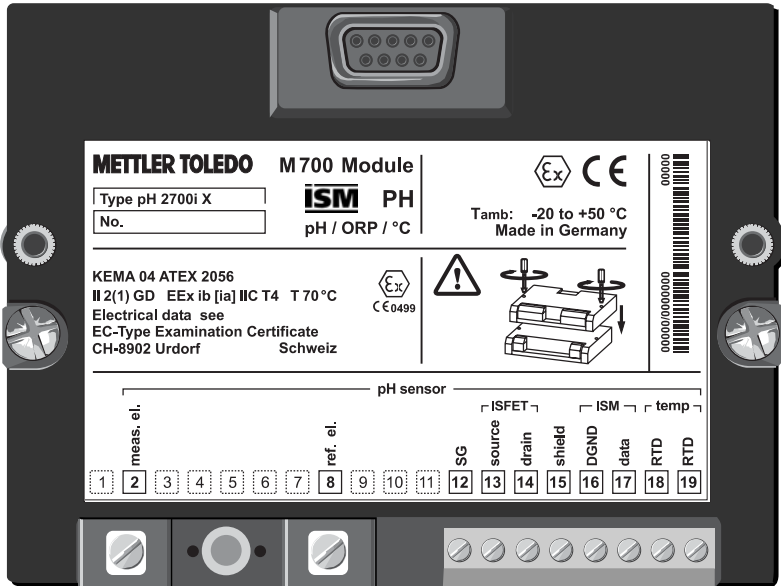
Order number: 52 121 276

METTLER **TOLEDO**

69904

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 your local Mettler-Toledo representative 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

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

$C \in$

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

pH 2700i

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) normative(s).

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

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

Place and Date of issue/
Ausstellungsort/ - Datum
Lieu et date d'émission   **Urdorf, September 15, 2005**

Mettler-Toledo GmbH, Process Analytics

Waldemar Rauch
General Manager PO Urdorf

Thomas Hösli
Head of Operations and R&D

Norm/ Standard/ Standard   **EN 61326 / VDE 0843 Teil 20**
          EN 61010-1 / VDE 0411 Teil 1

METTLER TOLEDO

CE_M700_Modul_pH_2700i.doc

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Intended use

The module is used for simultaneous pH, ORP, and temperature measurement with glass electrodes, ISFET sensors, or sensors with ISM technology (Intelligent Sensor Management). The use of ISFET sensors is an additional function which can be enabled by a separately orderable TAN.

The pH 2700iX module is intended for operation in locations subject to explosion hazards which require equipment of Group II, device category 2(1), gas/dust.

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.

Safety information

Caution!
Never try to open the module! If a repair should be required, return the module to our factory.

If the specifications in the instruction manual are not sufficient for assessing the safety of operation, please contact the manufacturer to make sure that your intended application is possible and safe.

Be sure to observe during installation:
• Switch off power supply before replacing or inserting a module.
• Protect the signal inputs of the modules against electrostatic discharge.
• Before commissioning it must be proved that the device may be connected with other equipment.
• Observe correct shielding: To avoid interferences, the cable shielding must be completely covered by the ESD shielding cap.

Application in hazardous locations:
pH 2700iX module
When using the M 700 module pH 2700iX, 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.

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

METTLER TOLEDO

Software version

pH 2700i(X) module

Device software M 700(X)
The pH 2700i module is supported by software version 6.2 or higher.
The pH 2700iX module is supported by software version 6.2 or higher.
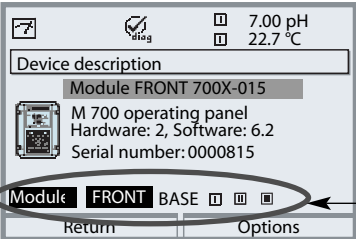
Module software pH 2700i(X)
Software version 1.0   xx.xx.2005   pH module with ISM functionality.

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

Menu	Display	Device description
✓ diag	↗ ✓diag □ 7.00 pH □ 22.7 °C Device description Module FRONT 700X-015 M 700 operating panel Hardware: 2, Software: 6.2 Serial number: 0000815 Module FRONT BASE □ □ □ Return Options	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.

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 FRONT and 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
For an overview, see www.mtpro.com

Measuring modules
- pH / ORP / Temp (also ISM)
- O_2/Temp (also ISM)
- Noncontacting conductivity / Temp
- Contacting conductivity / Temp

SmartMedia card
Data recording
For an overview, see www.mtpro.com.

3 module slots
for free combination of measuring and communication modules

Communication modules
- Out (additional switching and current outputs)
- PID (analog and digital controller)
- 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.

METTLER TOLEDO   11

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 36

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
see Pg 24

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*
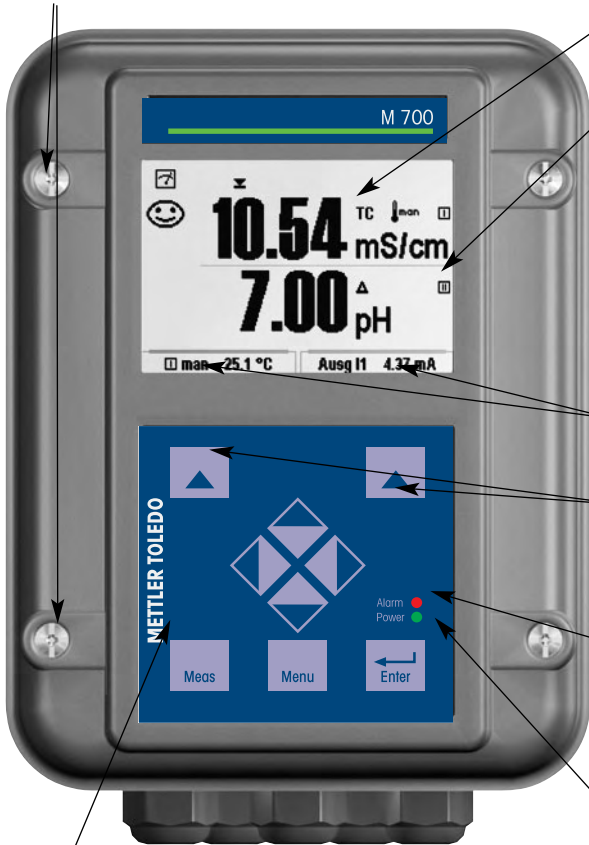
Short description: Menu structure

Basic functions: Calibration, maintenance, parameter setting, diagnostics
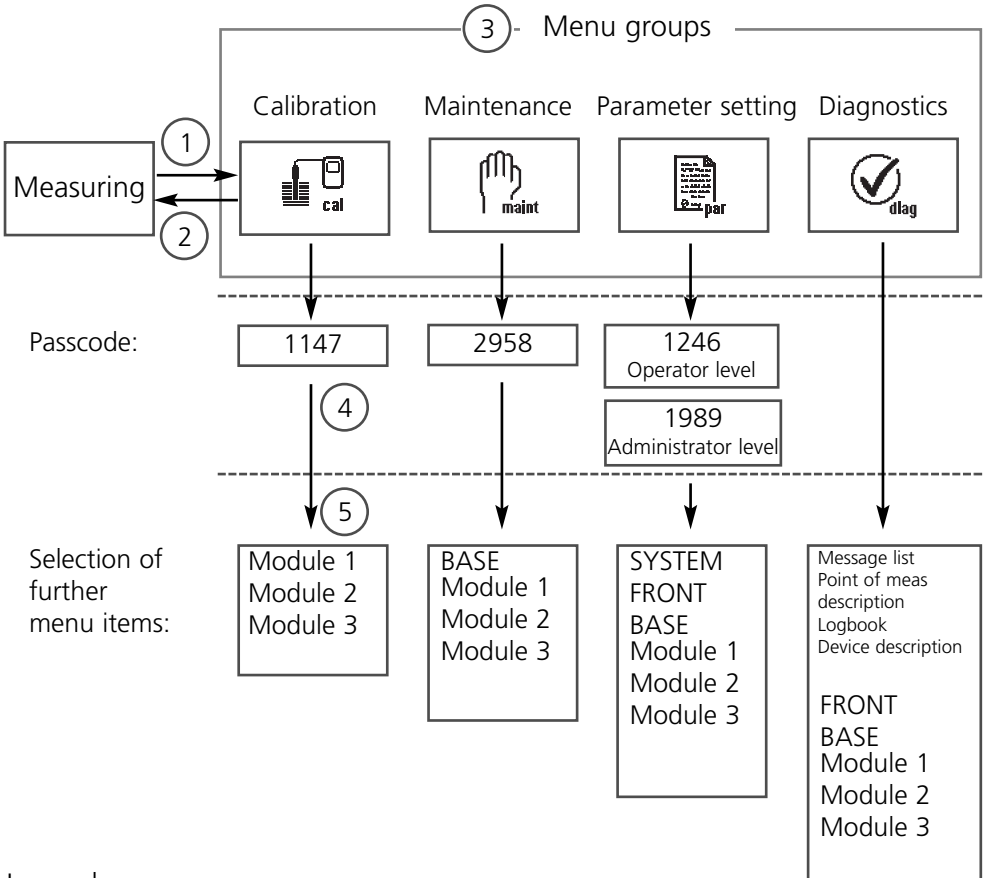
Legend:
(1) Pressing the **menu** key accesses menu selection
(2) Pressing the **meas** key returns to measurement
(3) Menu groups are selected using the arrow keys
(4) Press **enter** to confirm, enter passcode
(5) Further menu items are displayed
(6) Selected functions of the Diagnostics menu can be recalled via softkey even when in measuring mode ("Favorites", Pg 24)

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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 transmitter to the other.

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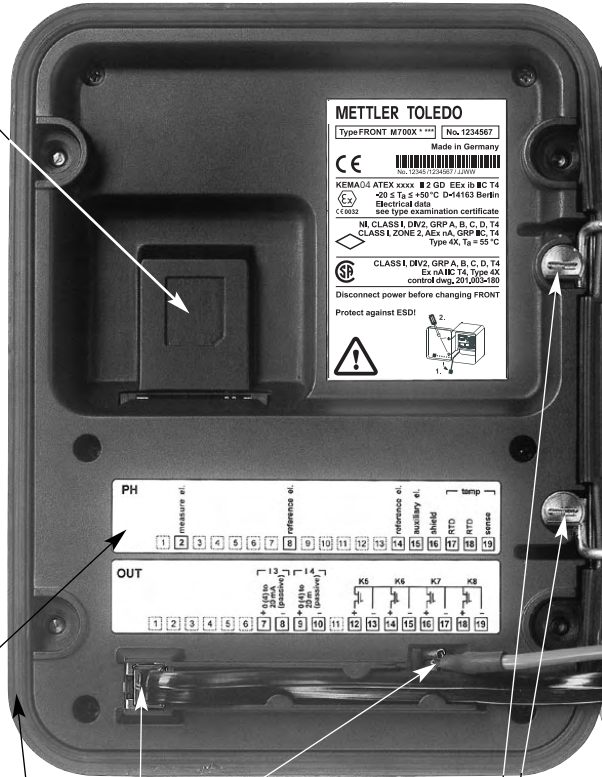
- *Software updates*

METTLER TOLEDO

Type FRONT M700X * *** | No. 1234567
Made in Germany

CE

No. 12345/1234567/JJWW

KEMA 04 ATEX xxxx ▮ 2 GD EEx ib ▮C 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 ▮C, T4
Type 4X, Ta = 55 °C

CLASS I, DIV2, GRP A, B, C, D, T4
Ex nA ▮C T4, Type 4X
control dwg. 201,003–180

Disconnect power before changing FRONT

Protect against ESD!

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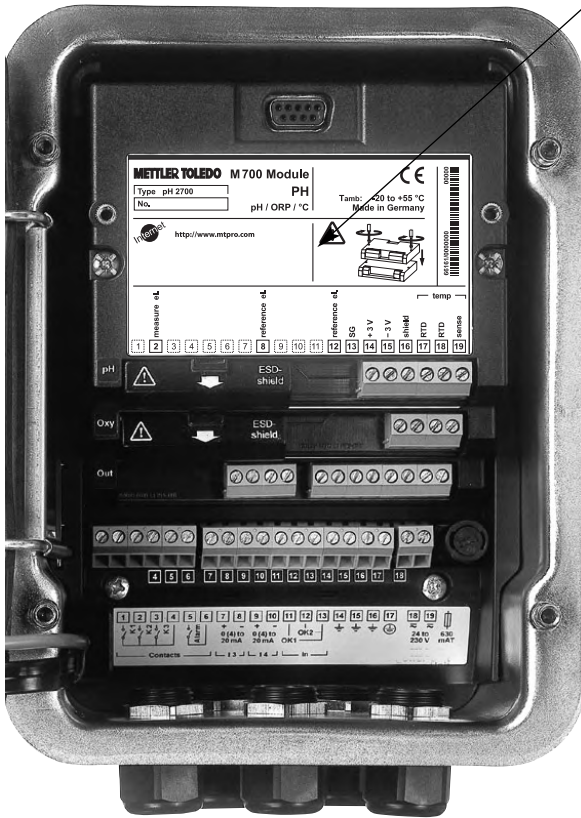
The circumferential sealing
guarantees IP 65 protection and allows spray cleaning / disinfection.
Caution! *Keep clean!*

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.

M 700 BASE
2 current outputs (free assignment of process variable) and 4 relay contacts, 2 digital inputs.
VariPower broad-range power supply, 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.

Parameter tables (Excel): www.mtpro.com

Parameter tables (Excel)

2 complete parameter sets can be stored in the basic device M 700(X). You can document the parameter settings of your complete measuring point in an Excel table that can be downloaded from our website.

The complete documentation is available in the download area of our website **www.mtpro.com**.

ISM – Intelligent Sensor Management

The pH 2700i(X) module allows the connection of sensors with ISM technology.
ISM is an open system that is compatible to existing VarioPin (VP) connection systems and permits the use of conventional sensors. ISM is not restricted to pH measurement. Sensors from different manufacturers can be connected. During pH measurement it is still possible to continuously monitor the glass and reference electrode.

ISM sensors have an "electronic datasheet" which allows the storage of additional operating parameters such as calibration date and settings directly in the sensor.

An ISM sensor is immediately identified due to the "Plug & Measure" concept. This ensures the clear assignment of a sensor to a measuring point. The risk of confusing the sensors is eliminated. The sensors can be precalibrated in the lab. On-site calibration/adjustment is no more required.
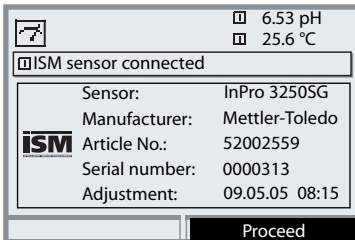
Information available in the ISM sensor
Each sensor is clearly identified by the unalterable factory data. They consist of information concerning manufacturer, production date, sensor description, application data, and original calibration data, as well as information on predictive maintenance, such as the maximum load index and maximally permitted number of CIP/SIP cycles.
Statistical data inform on the product life cycle of the sensor: data of the last 3 calibrations, adjustment record, buffer values, voltages, temperature, response time, glass and reference impedance.
This allows a comprehensive diagnostic:
- Calculation of the individual load index
- Wear indication
- Adaptive calibration timer

ISM – Plug and Measure

Thanks to the "Plug & Measure" method, an ISM sensor is immediately identified after being connected:

☐ 6.53 pH	
☐ 25.6 °C	
☐ ISM sensor connected	
Sensor:	InPro 3250SG
Manufacturer:	Mettler-Toledo
iSM Article No.:	52002559
Serial number:	0000313
Adjustment:	09.05.05 08:15
	Proceed

All sensor-typical parameters are automatically sent to the analyzer.

These are, for example, the measurement range, zero and slope of the sensor, but also the type of temperature probe. Without any further parameter setting, measurement starts at once, the measuring temperature is simultaneously detected.

With "Plug & Measure", premeasured ISM sensors can immediately be used for measurement without previous calibration.

6.53 pH

**25.6** °C

Date 09/06/05 — Parameter set
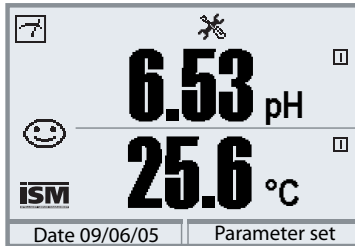
The ISM logo is displayed as long as an ISM sensor is connected.

When the ISM sensor has not been adjusted, the "maintenance request" icon is displayed.

		☐ 6.53 pH
		☐ 25.6 °C
☐ Message list		1 messg.
Warn New sensor, adjustment required		
Return		
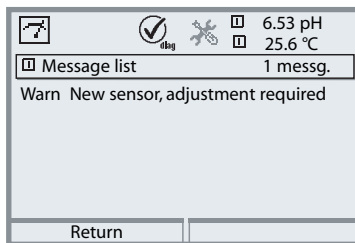
A new entry is added to the message list of the Diagnostics menu:
Warn New sensor, adjustment required

16.53 pH

125.6 °C

Date 09/06/05 — Parameter set
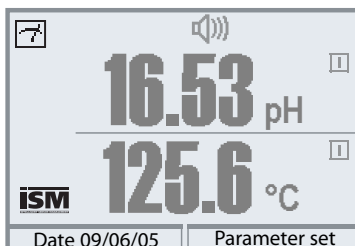
Failure message (incorrect meas. values)

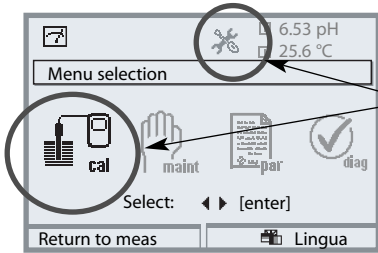Measured value, alarm icon, and module slot identifier are flashing.
The flashing means:
Caution! The displayed value is no "valid" measured value!

ISM
First Calibration

It is possible to use a new sensor without previous calibration. However, a FIrst Calibration is recommended to achieve optimum measurement results.

Call up calibration
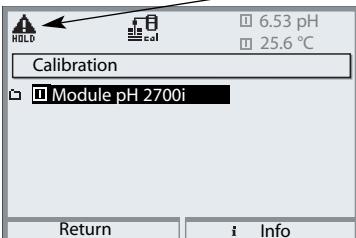Press **menu** key to select menu.
The "maintenance request" and "calibration" icons are flashing to indicate that calibration is recommended. An entry is made in the message list.

Select calibration using arrow keys, confirm with **enter**. Passcode: 1147.
(To change passcode: Parameter setting/System control/Passcode entry) After passcode entry, the system is in function check mode: Current outputs and relay contacts behave as configured* and supply either the last measured value or a fixed value until the Calibration menu is exited.
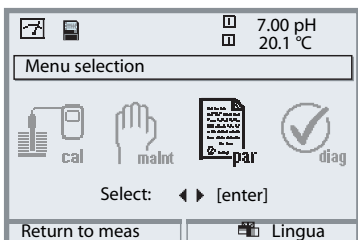
* The current outputs / relay contacts are configured in the M 700 BASE or the communication modules (Out, PID).

The "function check" mode is indicated by the "Hold" icon (upper left of display).

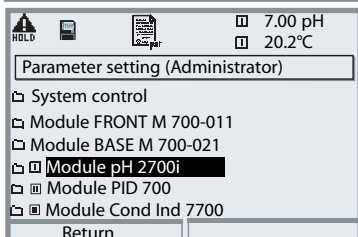Select module using arrow keys, confirm with **enter**.

Configuring an ISM sensor is considerably safer and easier than configuring a conventional sensor. Since ISM sensors have an "electronic datasheet", many parameters are already provided by the sensor and automatically taken over by the analyzer.

To enter the process-related parameters, select:

- **Parameter setting**
- **Module selection**
- **Sensor data**
- **Sensor monitoring details**

Sensor monitoring details (Pg 60)

When an ISM sensor is connected, the values for slope, zero, reference impedance, glass impedance (pH electrodes), and response time are automatically read by the module*. Additional specifications are required for sensor wear, CIP/SIP counter, autoclaving counter, and sensor operating time. The tolerance limits are displayed in gray.

* Individual specifications are <u>not</u> overwritten by ISM electrode data.

Menu selection

Menu selection

cal	maint	par	diag

Select: ◀ ▶ [enter]

Return to meas   Lingua

7.00 pH
20.2℃
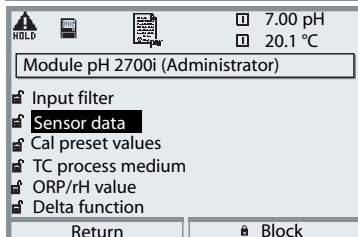
Parameter setting (Administrator)

▭ System control
▭ Module FRONT M 700-011
▭ Module BASE M 700-021
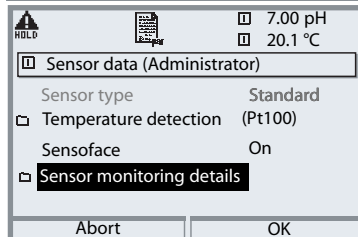▭ Module pH 2700i
▭ Module PID 700
▭ Module Cond Ind 7700

Return

7.00 pH
20.1 ℃

Module pH 2700i (Administrator)

▪ Input filter
▪ Sensor data
▪ Cal preset values
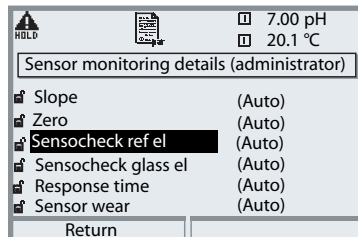▪ TC process medium
▪ ORP/rH value
▪ Delta function

Return   Block

7.00 pH
20.1 ℃

Sensor data (Administrator)

Sensor type   Standard
▭ Temperature detection   (Pt100)
Sensoface   On
▭ Sensor monitoring details

Abort   OK

7.00 pH
20.1 ℃

Sensor monitoring details (administrator)

▪ Slope   (Auto)
▪ Zero   (Auto)
▪ Sensocheck ref el   (Auto)
▪ Sensocheck glass el   (Auto)
▪ Response time   (Auto)
▪ Sensor wear   (Auto)

Return

ISM
Predictive maintenance

ISM

INTELLIGENT SENSOR MANAGEMENT

⚠ HOLD	🤚 manual	⊡ 7.00 pH
		⊡ 22.3 ℃

⊡ Module pH 2700i

📂 Sensor monitor
📂 Adjust temp probe
📂 Autoclaving counter
📂 Membrane body changes
📂 Inner body changes

Return	

ISM sensors provide important tools for predictive maintenance.
The settings are made in the

• **Maintenance menu / Module selection**

⚠ HOLD	🤚 manual	⊡ 7.00 pH
		⊡ 22.3 ℃

⊡ Sensor monitor

pH input	-56 mV
ORP input	200 mV
RTD	1100 Ω
Temperature	25 ℃
Impedance glass (25 ℃)	880.5 MΩ
Impedance ref (25 ℃)	086.5 kΩ

Return	

Sensor monitor
for validation of sensor and complete measured-value processing.

⚠ HOLD	🤚 manual	⊡ 7.00 pH
		⊡ 22.3 ℃

⊡ Adjust temp probe

● Probe tolerance and lead adjustment
ℹ Enter measured process temp

Installation adjustment   On **Off**
Process temp: 22.3 ℃

Return	

Temp probe adjustment
This function is used for compensating for the individual tolerance of the temperature probe and the influence of the lead resistances. Adjustment may only be carried out after the process temperature is precisely measured using a calibrated reference thermometer. The measurement error of the reference thermometer should be less than 0.1 °C. Adjustment without precise measurement might result in considerable deviations of the measured value display!

⚠ HOLD	🤚 manual	⊡ 7.00 pH
		⊡ 22.3 ℃

⊡ Autoclaving counter

ℹ Max. cycles	050
ℹ Count cycles	007

Return	Cycles+1

Autoclaving counter (ISM only)
When setting the sensor data, the maximum number of autoclaving procedures permitted must be specified. Then, each cycle can be recorded in the Maintenance menu. This shows how many autoclaving cycles are still permitted.

22

Sensor wear monitor (ISM only)

The Diagnostics menu provides single-glance information on the current sensor wear.
In addition, the sensor operating time, the number of executed autoclaving, CIP, or SIP cycles, as well as the max. process temperature are indicated.

Sensor network diagram

• Slope
• Zero
• Reference impedance
• Glass impedance
• Response time
• Calibration timer
• Sensor wear

"Outer circle"
Value within tolerance

Critical range –
"inner circle"
Value out of tolerance
The tolerance can be
modified as required!
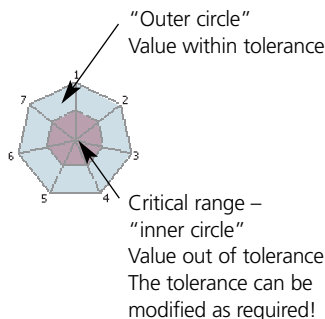
The measured values are continuously monitored during the measurement process. The sensor network diagram provides at-a-glance information about critical parameters. If a tolerance limit has been exceeded, the respective parameter is flashing.
Values in gray: Monitoring switched off.

Statistics

Indication of sensor data for the First Calibration (adjustment) and the last 3 calibrations compared to the First Calibration (date and time of First Calibration, zero and slope, impedance of glass and reference electrode, response time).
For ISM, the data are stored in the sensor.

Setting diagnostics messages as favorite

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

Secondary displays (1)

Here, additional values are displayed in the measuring mode according to the factory setting. When the respective softkey (2) is pressed, the process variables measured by the modules plus date or time are displayed.

In addition, you can use the **softkeys (2)** to control functions. To assign a function to a softkey, select

• **Parameter setting/System control/**
• **Function control matrix** (Fig.):

Function which can be controlled by soft-keys:
• Parameter set selection
• KI recorder Start/Stop
• Favorites
• EC 400 (fully automated probe controller)

Favorites

Selected Diagnostics functions can be called up directly from the measuring mode using a softkey.
The following table (Pg 25) explains how to select favorites.

	ParSet	KI rec.	♡Fav	EC 400
Input OK2	○	○	–	–
Left softkey	○	○	○	–
Right softkey	○	○	◉	–
Profibus DO 2	○	○	–	–

Return   ◉ Connect
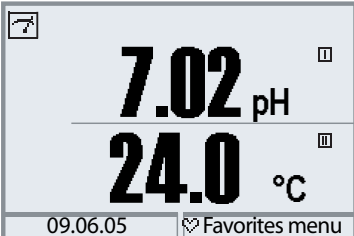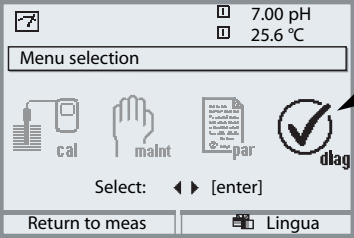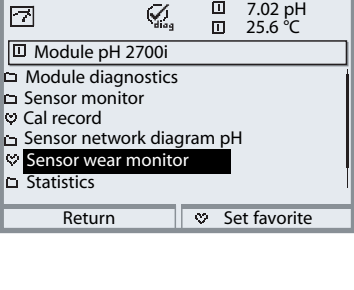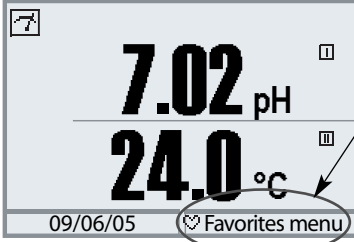
Example:
"Favorites" to be selected with "Right softkey"

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
	7.02 pH **24.0** °C 09.06.05 ♡ 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**. Then select module and confirm with **enter**.
	7.02 pH 25.6 °C Module pH 2700i ▭ Module diagnostics ▭ Sensor monitor ♡ Cal record ▭ Sensor network diagram pH ♡ Sensor wear monitor ▭ Statistics Return ♡ 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 24).
	7.02 pH **24.0** °C 09/06/05 ♡ 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 "Function control matrix", Pg 24).

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.

Practical advantages of ISM sensors (e.g. in biotech applications)

CIP (Cleaning in Place) / SIP (Sterilize in Place)

CIP/SIP cycles are used for cleaning or sterilizing the process-wetted parts in the process. They are performed for biotech applications, for example. Depending on the application, one (hot acid, water) or more media (hot acid, water, hot alkaline solution, water) are used. The temperatures for CIP are around 80 °C, for SIP around 110 °C.
This procedure extremely stresses the sensors.
ISM sensors can release a message when a preset number of permitted CIP/SIP cycles is exceeded. This allows replacing the sensor in time.
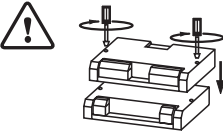
Example of CIP cycle:
The device automatically recognizes the CIP and SIP cycles and correspondingly increments the counter. The user can specify the max. number of cycles and decide whether a message is to be generated when this number is exceeded. These data are not overwritten even after sensor replacement. The number of CIP cycles is shown in the sensor wear monitor of the Diagnostics menu when an individual max value has been specified.
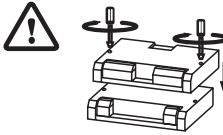
```
┌─────────────────────────────────────────┐
│ 🏭         ✓diag        🗓 7.00 pH        │
│                         🗓 22.3 °C        │
│ 🗓 Sensor wear monitor                    │
├─────────────────────────────────────────┤
│ Sensor wear          ████████▌           │
│ Sensor operating time   335 d            │
│ Autoclaving cycles      1 of 2           │
│ CIP cycles              1 of 5           │
│ SIP cycles              0 of 3           │
│ Max. temperature        120 °C  09/01/05 │
├──────────────────┬──────────────────────┤
│      Return      │                      │
└──────────────────┴──────────────────────┘
```

Terminal plate pH 2700i(X) module

Terminal plate pH 2700i module:

METTLER TOLEDO   M 700 Module   CE   00000

Type

No.

ISM **PH**

pH / ORP / °C

Tamb: -20 to +55 °C
Made in Germany

Internet   http://www.mt.com

00000/0000000

											pH sensor							
													ISFET			ISM		temp
meas. el.						ref. el.				SG	source	drain	shield	DGND	data	RTD	RTD
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Terminal plate pH 2700iX module:

METTLER TOLEDO   M 700 Module   ⟨Ex⟩ CE   00000

Type pH 2700i X

No.

ISM **PH**

pH / ORP / °C

Tamb: -20 to +50 °C
Made in Germany

KEMA 04 ATEX 2056
II 2(1) GD   EEx ib [ia] IIC T4   T 70 °C
Electrical data see
EC-Type Examination Certificate
CH-8902 Urdorf   Schweiz

⟨Ex⟩ CE 0499

00000/0000000

											pH sensor							
													ISFET			ISM		temp
meas. el.						ref. el.				SG	source	drain	shield	DGND	data	RTD	RTD
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Attaching the terminal plates

The terminal plates of the lower modules can be
sticked to the inner side of the door.
This facilitates maintenance and service.

Inserting the module

Note: Be sure to connect the shielding properly!

Terminals 2 and 8 are covered
by an ESD shield.
To connect the sensor cable,
just pull it back.

Make sure that the cable
glands are tightly closed to
protect against humidity.

1. Switch off power supply
2. Open the device (loosen the 4 screws at the front)
3. Place module in slot (D-SUB connector)
4. Tighten fastening screws of the module
5. Open ESD shielding cap (covering terminals 2 and 8)
6. Connect sensor cable.
   To avoid interferences, the cable shielding must be completely
   covered by the ESD shielding cap.
7. Close ESD shielding cap (covering terminals 2 and 8)
8. Close device, tighten screws at the front
9. Switch on power supply
10. Set parameters (Pg 59)

Wiring example 1

pH/ORP measurement with glass electrode and ISM;
VP8 connection, Sensocheck of glass and reference electrode

pH 2700i(X)
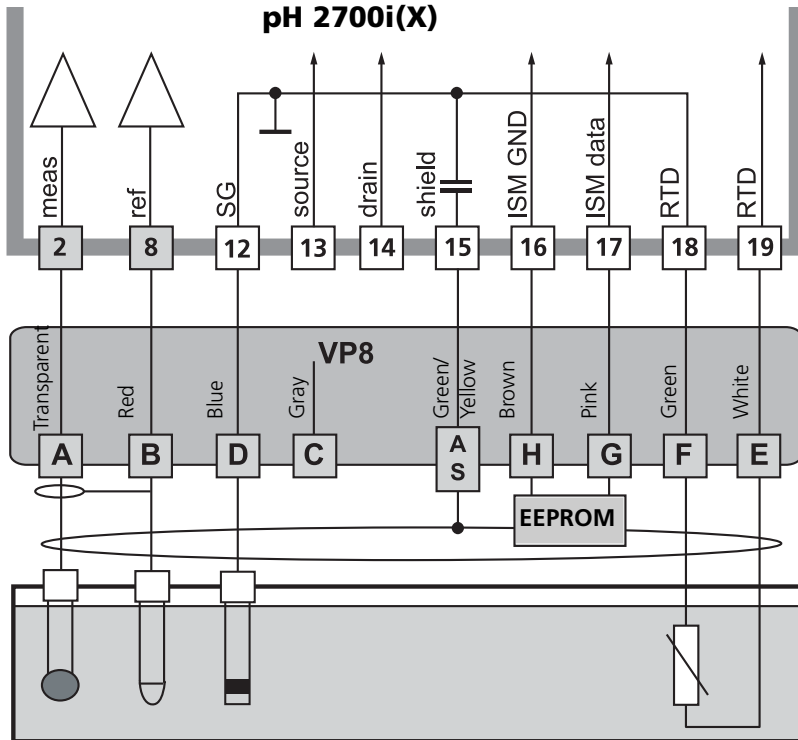
Note:
Compatible to connection with VP6 (without ISM functionality).

Wiring example 2

pH measurement with InPro 3300 ISFET sensor

pH 2700i(X)

| 2 | 8 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |

meas · ref · SG · source · drain · shield · RTD · RTD

Jumper

VP8

Transparent · Red · Gray · Blue · Green/Yellow · Green · White

| A | B | C | D | A S | H | G | F | E |
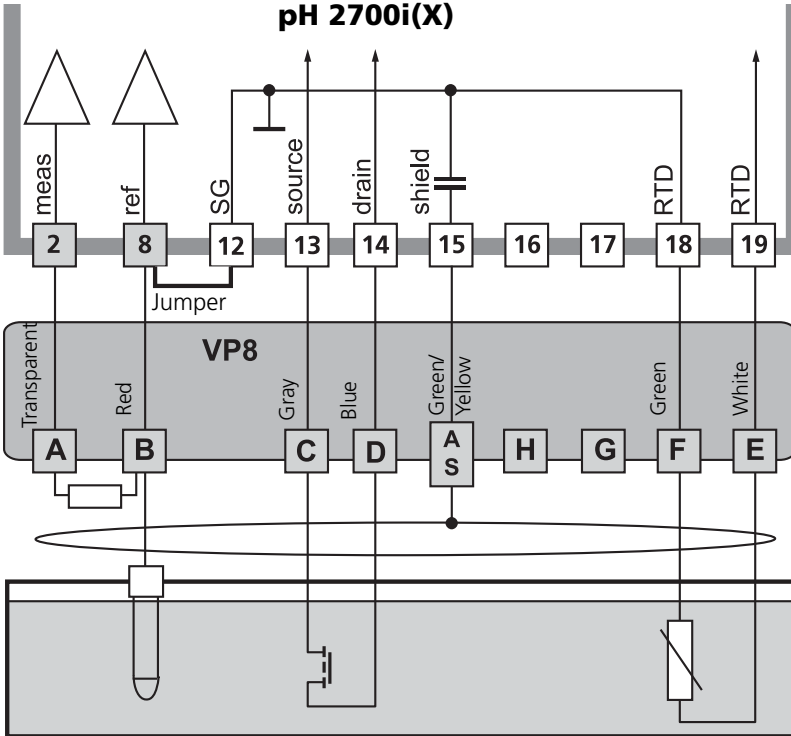
Note:
Each time a new sensor is connected, an ISFET zero point adjustment must be performed.
After that, you should perform one of the following calibration methods:
• Calimatic: automatic calibration
• Manual: entry of buffer values
• Data entry: premeasured electrodes

Wiring example 3

pH measurement with Sensocheck of glass electrode

pH 2700i(X)

meas	ref	SG	source	drain	shield	ISM GND	ISM data	RTD	RTD
2	8	12	13	14	15	16	17	18	19
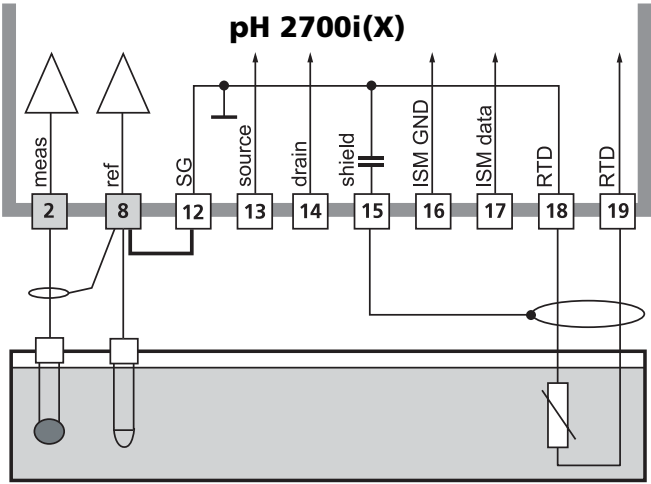
Wiring example 4

Simultaneous pH and ORP measurement with Sensocheck of glass and reference electrode

pH 2700i(X)

meas	ref	SG	source	drain	shield	ISM GND	ISM data	RTD	RTD
2	8	12	13	14	15	16	17	18	19

METTLER TOLEDO
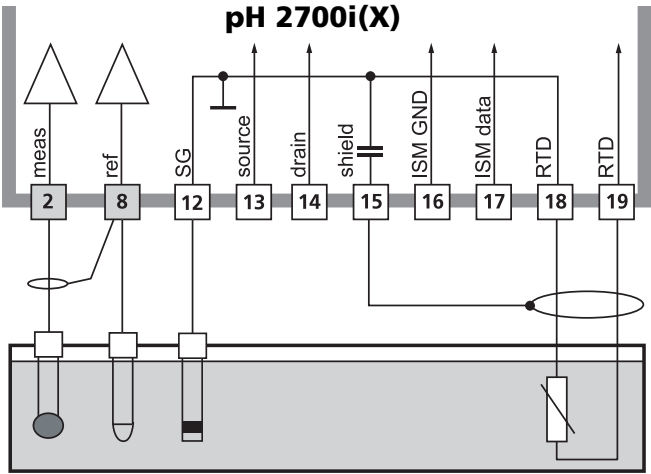
Wiring example 5

Wiring example ORP measurement
with Sensocheck of reference electrode

pH 2700i(X)

meas	ref	SG	source	drain	shield	ISM GND	ISM data	RTD	RTD
2	**8**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**

Jumper

Core   Shield
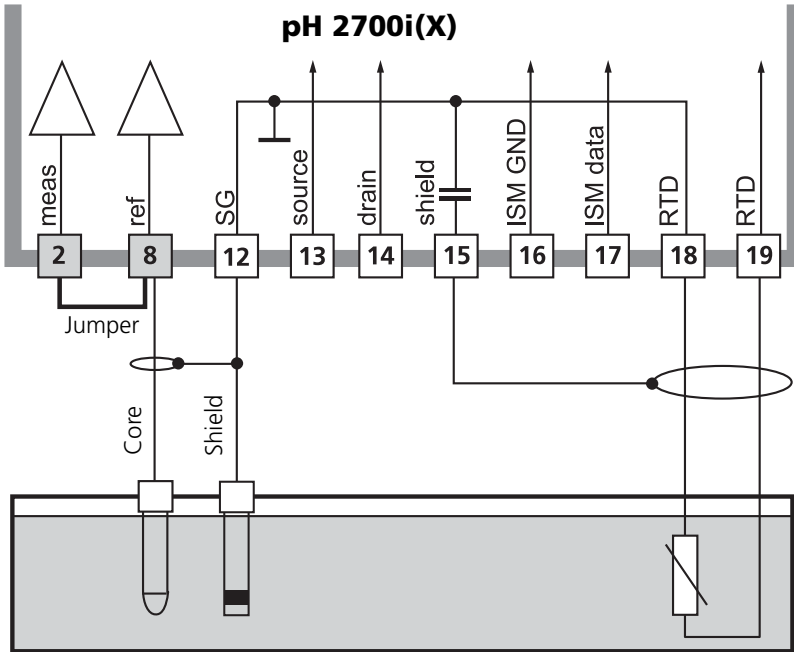
Menu selection

After switching on, the analyzer performs an internal test routine and auto-matically detects the number and type of modules installed.
Then, the analyzer goes to measuring mode.
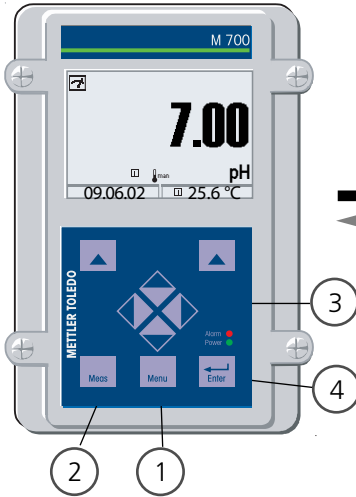
1 Pressing the **menu** key accesses menu selection.
2 Pressing the **meas** key returns to measurement.
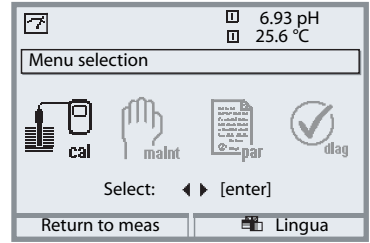
3 Arrow keys for selecting a menu group
4 enter key for confirming a selection

Menu structure

	Calibration	Maintenance	Parameter setting	Diagnostics
Measuring	cal	maint	par	diag
Passcode (as delivered)	1147	2958	1246 Operator level	
			1989 Administrator level	
Selection of further menu items:				
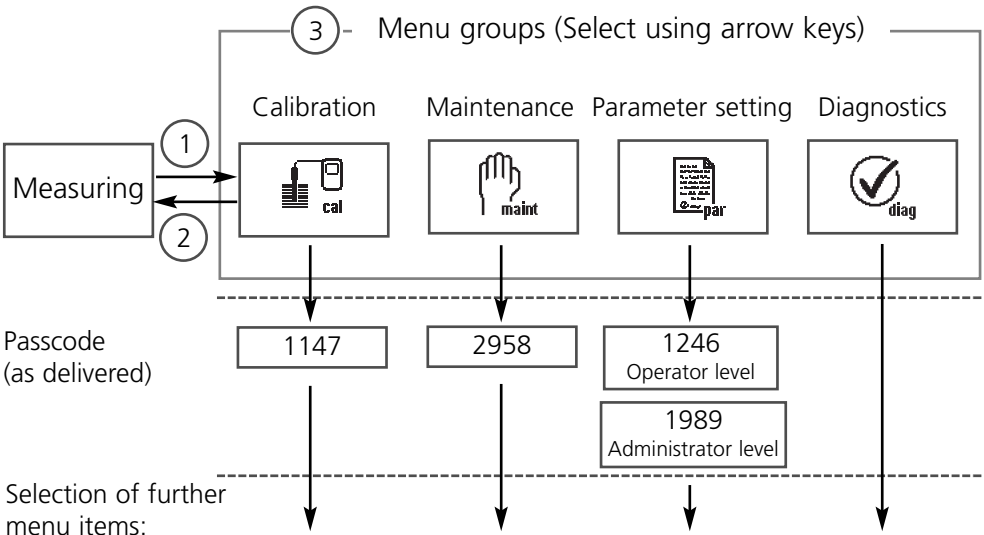
Passcode entry

Enter passcode:
Select the position using the left/right keys,
then edit the number using the up/down keys.
When all numbers have been entered, confirm with **enter**.

To change a passcode
• Open the menu selection (**menu** key)
• Select parameter setting
• Administrator level, enter passcode
• Select System control: Passcode entry

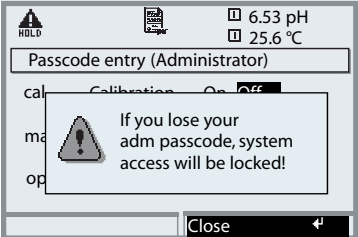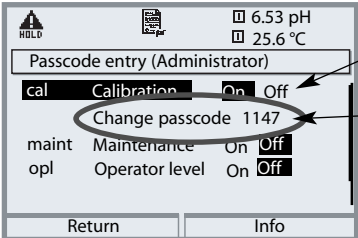| Menu	Display	System control: Passcode entry
	6.53 pH **25.6 °C** Passcode entry (Administrator) cal Calibration On Off ma If you lose your adm passcode, system access will be locked! op Close	**Changing a passcode:** **"Passcode entry"** menu When this menu is opened, the analyzer displays a warning (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! Please consult our technical support!
	6.53 pH **25.6 °C** Passcode entry (Administrator) cal Calibration On Off Change passcode 1147 maint Maintenance On Off opl Operator level On Off Return Info	To change a passcode, select "On" using the arrow keys. Confirm with **enter**. Select the position using the **left/right** keys, then edit the number using the **up/down** keys. When all numbers have been entered, confirm with **enter**.

Configuring the measurement display

Select menu: Parameter setting/Module FRONT/Measurement display

Pressing **meas (1)** returns the analyzer to the measuring mode from any function.
All process variables coming from the modules can be displayed. The table on the next page describes how to configure the measurement display.
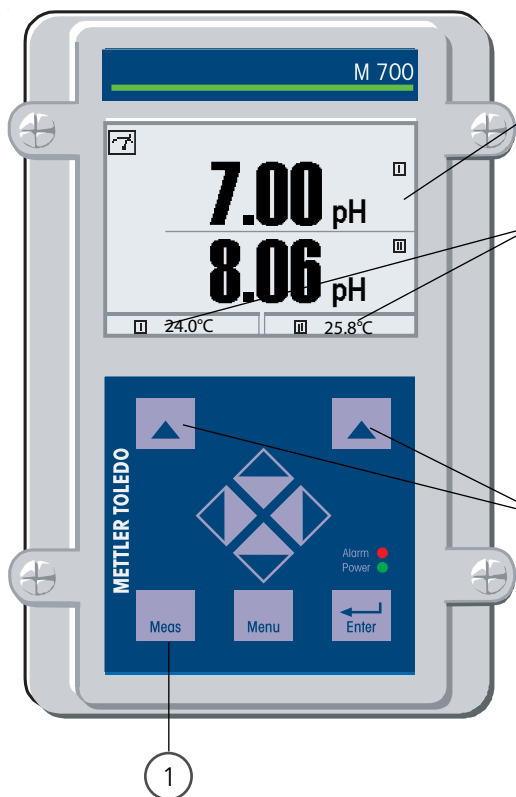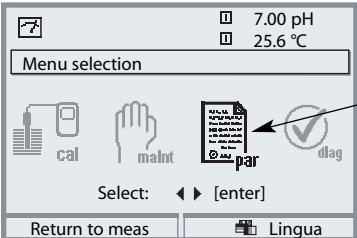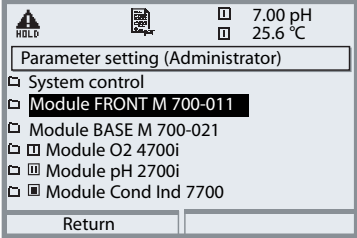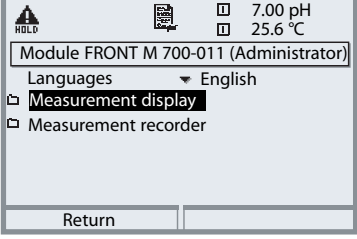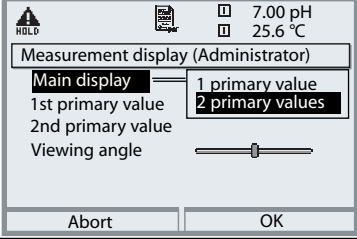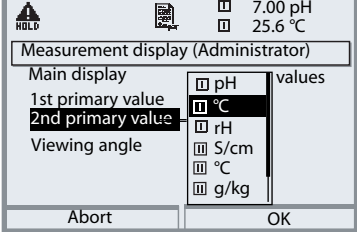
Measurement display
*Typical display for
2 pH measuring points*

Secondary displays
Additional values, also tag description, date, and time, can be displayed depending on the modules installed. They are selected using the softkeys.

Softkeys
In measuring mode, the softkeys allow selection of values for the secondary displays or control of functions (user defined).

Menu	Display	Configure measurement display
	⟨icon⟩ 🔲 7.00 pH 🔲 25.6 ℃ Menu selection cal maint par diag Select: ◀ ▶ [enter] Return to meas 🌐 Lingua	**Configure measurement 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 35)
⟨par icon⟩	⚠ HOLD 🔲 7.00 pH 🔲 25.6 ℃ Parameter setting (Administrator) ▢ System control ▢ Module FRONT M 700-011 ▢ Module BASE M 700-021 ▢ 🔲 Module O2 4700i ▢ Ⅲ Module pH 2700i ▢ ▣ Module Cond Ind 7700 Return	Parameter setting: Select "Module FRONT"
	⚠ HOLD 🔲 7.00 pH 🔲 25.6 ℃ Module FRONT M 700-011 (Administrator) Languages ▼ English ▢ Measurement display ▢ Measurement recorder Return	Module FRONT: Select "Measurement display"
	⚠ HOLD 🔲 7.00 pH 🔲 25.6 ℃ 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 🔲 7.00 pH
	    🔲 25.6 ℃
	Measurement display (Administrator)
	Main display 🔲 pH values
	1st primary value 🔲 ℃
	2nd primary value 🔲 rH
	Viewing angle Ⅲ S/cm
	           Ⅲ ℃
	           🔲 g/kg
	Abort OK
		Select process variable(s) to be
		displayed
		and confirm with **enter**.
		
		Pressing the **meas** key returns to
		measurement.

METTLER TOLEDO   **37**

Calibration / adjustment

Note: Function check active
Current outputs and relay contacts behave as configured

- **Calibration:**   Detecting deviations **without** readjustment
- **Adjustment:**   Detecting deviations **with** readjustment

Caution:

Without adjustment every pH meter delivers an imprecise or wrong output value! Every pH electrode has its individual zero point and its individual slope. Both values are altered by aging and wear.
To determine the correct pH value, the pH meter must be adjusted to the electrode. The M 700 corrects the voltage delivered by the electrode with regard to electrode zero and slope and displays it as the pH value.
Be sure to perform an adjustment after having replaced the electrode!

Procedure

First, a calibration is performed to detect the deviations of the electrode (zero, slope). To do so, the electrode is immersed in buffer solutions whose pH value is exactly known. The measuring module measures the electrode voltages and the buffer solution temperature and automatically calculates the electrode zero and slope. These data are stored in a calibration record. By "Adjustment" the determined calibration data can be used for correction (see following page).

Parameters determined by calibration

- Zero   is the pH value at which the pH electrode outputs the voltage 0 mV. It is different for each electrode and changes with age and wear.
- Temperature of the process solution must be detected since pH measurement is temperature-dependent. Many electrodes have an integrated temperature probe.
- Slope   of an electrode is the voltage change per pH unit. For an ideal pH electrode, it lies at -59.2 mV/pH.

Adjustment

See also additional function "Tolerance adjustment" SW700-005, Pg 64.

Adjustment

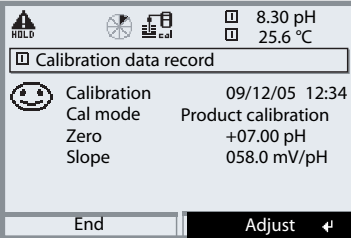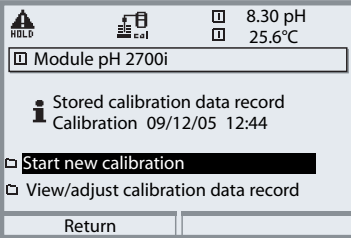means that the values determined by a calibration are taken over.
The values determined for zero and slope are entered in the calibration record. (Cal record can be called up in the Diagnostics menu for the pH 2700i(X) module, see Pg 93).
These values are only effective for calculating the measured variables when the calibration has been terminated with an adjustment.
A passcode ensures that an adjustment can only be performed by an authorized person (Administrator).
The Operator can check the current sensor data by a calibration and inform the Administrator when there are deviations.
You can use the additional function SW 700-107 for granting access rights (passcodes) and for AuditTrail (continuous data recording and backup according to FDA 21 CFR Part 11).

Menu	Display	Adjustment after calibration
	8.30 pH · 25.6 °C — Calibration data record — Calibration 09/12/05 12:34 — Cal mode Product calibration — Zero +07.00 pH — Slope 058.0 mV/pH — End / Adjust	**Administrator** With the corresponding access rights, the device can immediately be adjusted after calibration. The calibration values are taken over for calculating the measured variables.
	8.30 pH · 25.6°C — Module pH 2700i — Stored calibration data record — Calibration 09/12/05 12:44 — Start new calibration — View/adjust calibration data record — Return	**Operator** (without administrator rights) After calibration, change to measuring mode. Inform Administrator. When opening the menu (Calibration, respective module), the Administrator sees all data of the last calibration and can take over the values or perform a new calibration.

METTLER TOLEDO

Calibration / adjustment

Calibration methods

One-point calibration

The electrode is calibrated with one buffer solution only.

Here, only the electrode zero point is detected and taken into account by the M 700. One-point calibration is appropriate and permissible whenever the measured values lie near the electrode zero point so that slope changes do not have much of an impact.

Two-point calibration

The electrode is calibrated with two buffer solutions.

In that case, zero point and slope of the electrode can be detected and taken into account by the M 700. Two-point calibration is required if

• the electrode has been replaced
• the measured pH values cover a wide range,
• there is great difference between the measured pH value and the electrode zero,
• the pH measurement must be very accurate,
• the electrode is exposed to extreme wear.

Three-point calibration

The electrode is calibrated with three buffer solutions.

Zero and slope are calculated using a line of best fit according to DIN 19268.

Sensor replacement – First Calibration

A First Calibration must be performed each time the electrode is replaced. During First Calibration, the electrode data together with the electrode type and serial number are stored as reference values for electrode statistics. The "Statistics" menu of Diagnostics (Pg 93) shows the deviations of zero, slope, glass and reference impedance, and response time of the last three calibrations with respect to the reference values of the First Calibration. This allows evaluation of the drift behavior and aging of the electrode.

Product calibration (calibration with sampling) See Pg 48

Calibration / adjustment
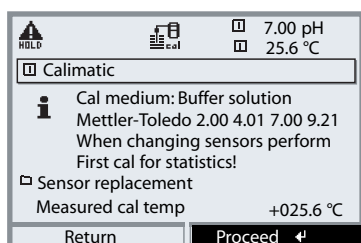
Temperature compensation during calibration

There are two important reasons for determining the temperature of the buffer solution:
The slope of the pH electrode is temperature-dependent. Therefore the measured voltage must be corrected by the temperature influence.
The pH value of the buffer solution is temperature-dependent. For calibration, the buffer solution temperature must therefore be known in order to choose the actual pH value from the buffer table.
During parameter setting you define whether cal temperature is measured automatically or must be entered manually:
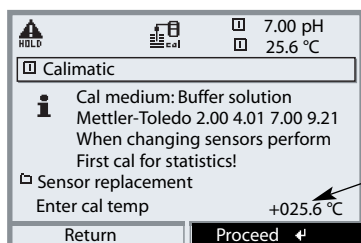
Automatic temperature compensation

⚠ HOLD 🔲 ⊟cal 🔳 7.00 pH / 25.6 °C	For automatic cal temp detection, the M 700 measures the temperature of the buffer solution with a temperature probe (Pt 100 /
🔳 Calimatic	

⚠ HOLD · 🔳 7.00 pH · 🔳 25.6 °C

🔳 Calimatic

ℹ Cal medium: Buffer solution
Mettler-Toledo 2.00 4.01 7.00 9.21
When changing sensors perform
First cal for statistics!
▢ Sensor replacement
Measured cal temp   +025.6 °C

Return   Proceed ↵

For automatic cal temp detection, the M 700 measures the temperature of the buffer solution with a temperature probe (Pt 100 / Pt 1000 / NTC 30 kΩ / NTC 8.55 kΩ). If you work with automatic temperature compensation during calibration, a temperature probe connected to the temperature input of the M 700 must be in the buffer solution!

Otherwise, you must select manual entry of calibration temperature. When "Cal temp automatic" is set, "Measured cal temp" appears in the menu.

Manual temperature compensation

⚠ HOLD · 🔳 7.00 pH · 🔳 25.6 °C

🔳 Calimatic

ℹ Cal medium: Buffer solution
Mettler-Toledo 2.00 4.01 7.00 9.21
When changing sensors perform
First cal for statistics!
▢ Sensor replacement
Enter cal temp   +025.6 °C

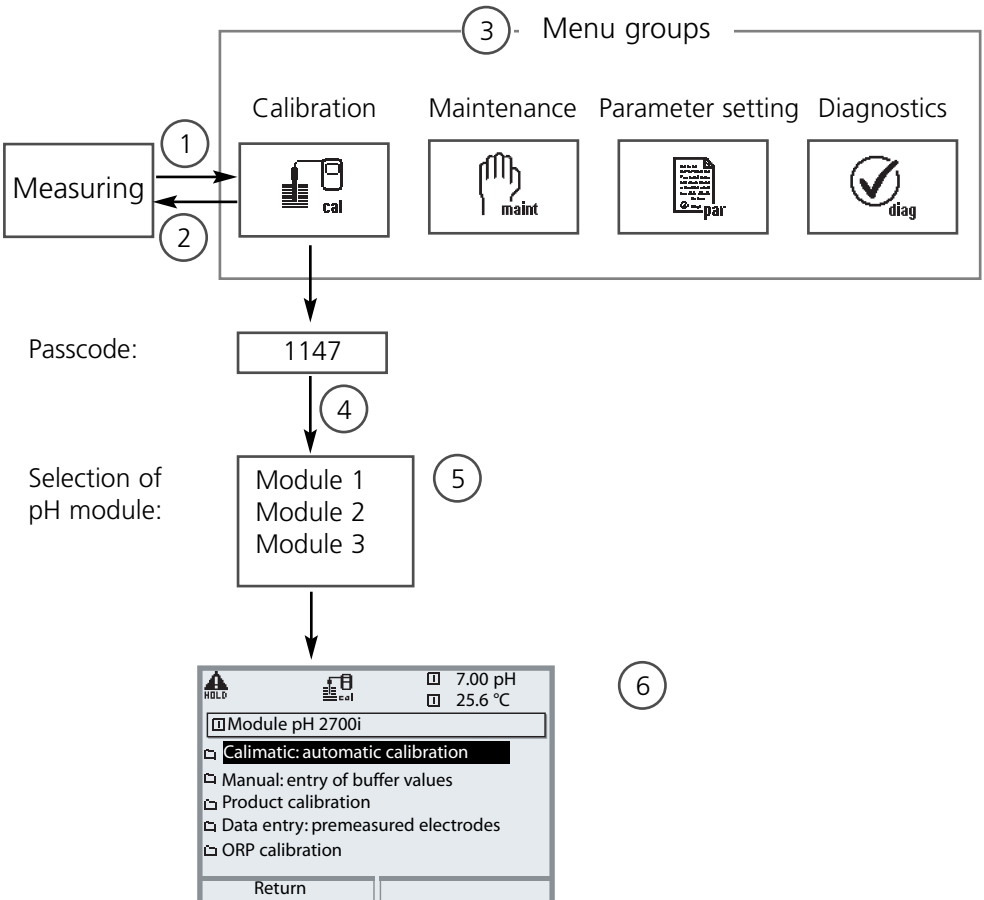Return   Proceed ↵

The temperature of the buffer solution must be entered manually in the Calibration menu. Temperature measurement is performed using a glass thermometer, for example. When "Cal temp manual" is set, "Enter cal temp" appears in the menu.

METTLER TOLEDO
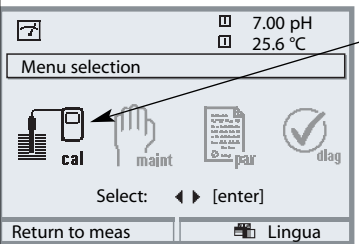
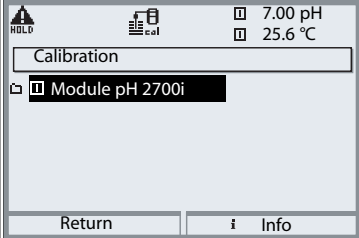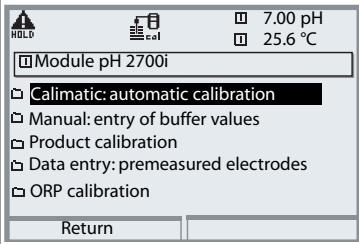# Calibration / adjustment

Select calibration method

Calibration pH module: Select calibration method
(1) Pressing the **menu** key accesses menu selection
(2) Pressing the **meas** key returns to measurement
(3) Select Calibration menu group using the arrow keys
(4) Press **enter** to confirm, enter passcode
(5) Select "Module pH", confirm with **enter**
(6) Select calibration method

Menu	Display	Select calibration method (pH)
	7.00 pH 25.6 °C Menu selection cal maint par diag Select: ◀ ▶ [enter] Return to meas Lingua	**Call up calibration** Press **menu** key to select menu. Select calibration using arrow keys, confirm with **enter**, passcode 1147 (To change passcode: Parameter setting/System control/Passcode entry) After passcode entry, the system is in function check mode: Current outputs and relay contacts behave as configured (BASE, Out, PID) until the Calibration menu is exited.
cal	HOLD cal 7.00 pH 25.6 °C Calibration ▭ Module pH 2700i Return i Info	Calibration: Select "Module pH"
	HOLD cal 7.00 pH 25.6 °C Module pH 2700i ▭ Calimatic: automatic calibration ▭ Manual: entry of buffer values ▭ Product calibration ▭ Data entry: premeasured electrodes ▭ ORP calibration Return	Select calibration method: • Automatic buffer recognition (Pg 44) • Manual entry of buffer values (Pg 46) • Product calibration (Pg 48) (calibration with sampling) • Data entry of premeasured (Pg 50) electrodes • ORP calibration (Pg 52) • ISFET zero adjustment (Pg 54) When you open the Calibration menu, the M 700 automatically proposes the previous calibration method. If you do not want to calibrate, press the "Return" softkey or the **meas** key.

METTLER TOLEDO

Calibration / adjustment

Calimatic automatic buffer recognition

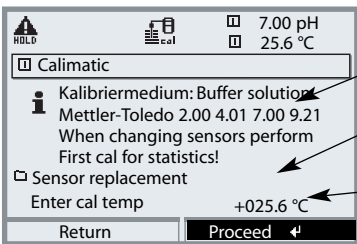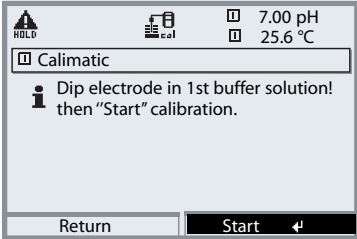## Automatic buffer recognition (Calimatic)

Automatic calibration using Calimatic is performed with one, two, or three buffer solutions. The M 700 automatically detects the nominal buffer value on the basis of the electrode potential and the measured temperature. Any sequence of buffer solutions is possible, but they must belong to the buffer set defined during parameter setting (Pg 64).
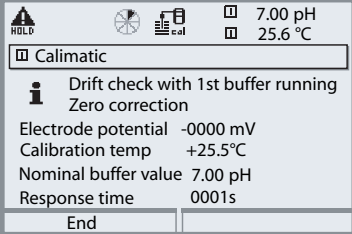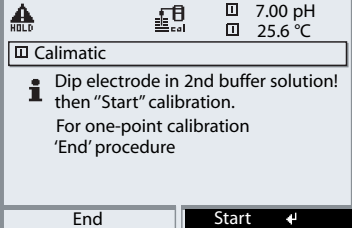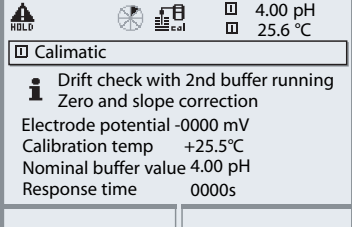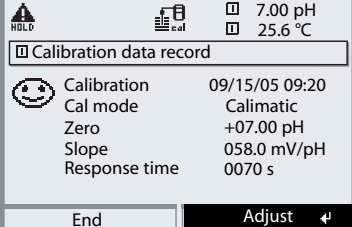
The Calimatic takes the temperature dependence of the buffer value into account. All calibration data is converted using a reference temperature of 25 °C.

During calibration the M 700 is in function check mode. Current outputs and relay contacts behave as configured (BASE, Out, PID modules).

Caution!

Only ever use fresh, undiluted buffer solutions which belong to the selected buffer set (Pg 64)!

Menu	Display	Automatic buffer recognition
 cal	HOLD · 7.00 pH · 25.6 °C Calimatic i Kalibriermedium: Buffer solution Mettler-Toledo 2.00 4.01 7.00 9.21 When changing sensors perform First cal for statistics! Sensor replacement Enter cal temp +025.6 °C Return / Proceed ↵	**Select: Calimatic (Pg 43)** Display of selected buffer set (Pg 64) Select: Sensor replacement (see Pg. 40) Enter calibration temp (Pg 41) Proceed with softkey or **enter**
	HOLD · 7.00 pH · 25.6 °C Calimatic i Dip electrode in 1st buffer solution! then "Start" calibration. Return / Start ↵	Remove and rinse the electrode (**Caution**: Do not rub! Electrostatic hazard!), then immerse it in the first buffer solution. Start with softkey or **enter**

Menu	Display	Automatic buffer recognition
▮▮▮ cal	⚠ HOLD ✇ ⏚cal 🔲 7.00 pH 🔲 25.6 °C 🔲 Calimatic ℹ Drift check with 1st buffer running Zero correction Electrode potential -0000 mV Calibration temp +25.5°C Nominal buffer value 7.00 pH Response time 0001s End	Display of nominal buffer value. You can press "End" to reduce the waiting time before stabilization of the electrode potential (reduced accuracy of calibration values). From the response time, you see how much time the electrode needs for the potential to stabilize. If the electrode potential or the measured temperature fluctuate greatly, the calibration procedure is aborted after 2 min.
	⚠ HOLD ⏚cal 🔲 7.00 pH 🔲 25.6 °C 🔲 Calimatic ℹ Dip electrode in 2nd buffer solution! then "Start" calibration. For one-point calibration 'End' procedure End Start ↵	For a one-point calibration, press "End" softkey. For two-point calibration: Rinse electrode thoroughly! Immerse it in the second buffer solution. Start with softkey or **enter**
	⚠ HOLD ✇ ⏚cal 🔲 4.00 pH 🔲 25.6 °C 🔲 Calimatic ℹ Drift check with 2nd buffer running Zero and slope correction Electrode potential -0000 mV Calibration temp +25.5°C Nominal buffer value 4.00 pH Response time 0000s	Calibration is performed with the second buffer. Three-point calibration is performed correspondingly with the third buffer.
	⚠ HOLD ⏚cal 🔲 7.00 pH 🔲 25.6 °C 🔲 Calibration data record ☺ Calibration 09/15/05 09:20 Cal mode Calimatic Zero +07.00 pH Slope 058.0 mV/pH Response time 0070 s End Adjust ↵	**Adjustment** Press "Adjust" to take over the values determined during calibration for calculating the measured variables. See Pg 39.

METTLER TOLEDO

Calibration / adjustment

Calibration with manual entry of buffer values

Calibration with manual entry of buffer values

Calibration with manual entry of buffer values is performed with one, two, or three buffer solutions.

The M 700 displays the measured temperature.

You must then enter the temperature-corrected buffer values. To do so, refer to the buffer table (e.g. on the bottle) and enter the buffer value belonging to the displayed temperature.

Intermediate values must be interpolated.
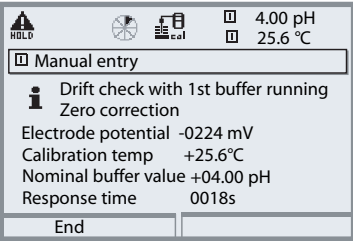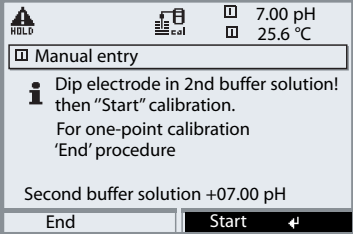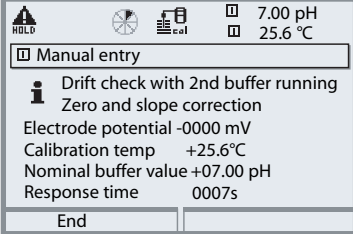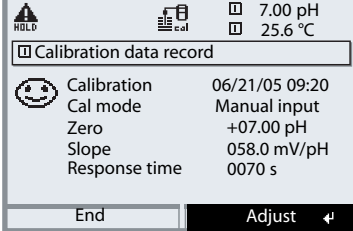
All calibration data is converted using a reference temperature of 25 °C.

During calibration the M 700 is in function check mode. Current outputs and relay contacts behave as configured (BASE, Out, PID modules).

Caution!

Only ever use fresh, undiluted buffer solutions!

Menu	Display	Manual entry
	🔺 HOLD 🔋cal ⊡ 7.00 pH ⊡ 25.6 °C ⊡ Manual entry ⓘ Cal medium: Buffer solution When changing sensors perform First cal for statistics! ▭ Sensor replacement Cal temp +025.6 °C First buffer solution +04.00 pH Return Proceed ↵	**Select: Manual entry (Pg 43)** Select: Sensor replacement (see Pg. 40) Display: Calibration temp (Pg 41) Enter 1st buffer value Proceed with softkey or **enter**
	🔺 HOLD 🔋cal ⊡ 7.00 pH ⊡ 25.6 °C ⊡ Manual entry ⓘ Dip electrode in 1st buffer solution! then "Start" calibration. Return Start ↵	Remove and rinse the electrode (**Caution**: Do not rub! Electrostatic hazard!), then immerse it in the first buffer solution. Start with softkey or **enter**

Menu	Display	Manual entry

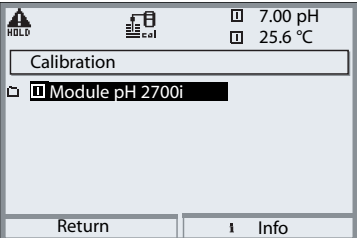| | **4.00 pH** / **25.6 °C**
HOLD ⊗ ⚡cal
Manual entry
ⓘ Drift check with 1st buffer running
Zero correction
Electrode potential -0224 mV
Calibration temp +25.6°C
Nominal buffer value +04.00 pH
Response time 0018s
End | Calibration with first buffer solution. You can press "End" to reduce the waiting time before stabilization of the electrode potential (reduced accuracy of calibration values). From the response time, you see how much time the electrode needs for the potential to stabilize. If the electrode potential or the measured temperature fluctuate greatly, the calibration procedure is aborted after 2 min. |
	7.00 pH / **25.6 °C** HOLD ⚡cal Manual entry ⓘ Dip electrode in 2nd buffer solution! then "Start" calibration. For one-point calibration 'End' procedure Second buffer solution +07.00 pH End	Start ↵	One-point calibration: "End". Two-point calibration: Rinse electrode thoroughly! Enter 2nd buffer value for correct temperature. Immerse it in the second buffer solution. Start with softkey or **enter**
	7.00 pH / **25.6 °C** HOLD ⊗ ⚡cal Manual entry ⓘ Drift check with 2nd buffer running Zero and slope correction Electrode potential -0000 mV Calibration temp +25.6°C Nominal buffer value +07.00 pH Response time 0007s End	Calibration is performed with the second buffer. Three-point calibration is performed correspondingly with the third buffer.
	7.00 pH / **25.6 °C** HOLD ⚡cal Calibration data record ☺ Calibration 06/21/05 09:20 Cal mode Manual input Zero +07.00 pH Slope 058.0 mV/pH Response time 0070 s End	Adjust ↵	**Adjustment** Press "Adjust" to take over the values determined during calibration for calculating the measured variables. See Pg 39.

METTLER TOLEDO

Calibration / adjustment

Product calibration

Product calibration (calibration with sampling)
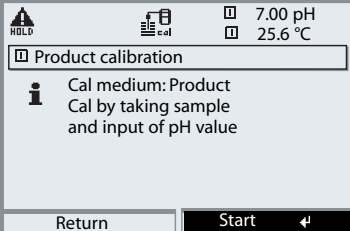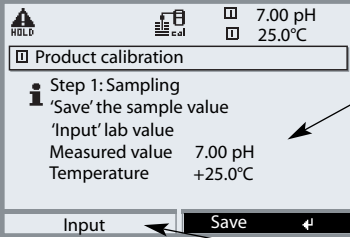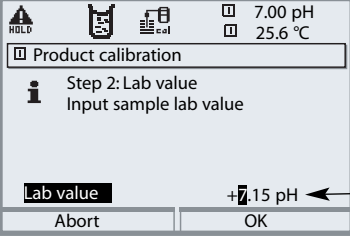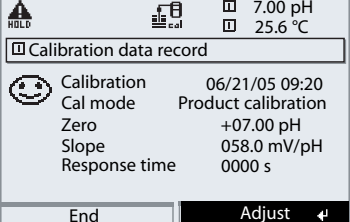
When the electrode cannot be removed – e.g. for sterility reasons – its zero point can be determined with "sampling". To do so, the currently measured process value is stored by the analyzer. Immediately afterwards, you take a sample from the process. The pH value of the sample is measured in the lab or directly on the site using a portable pH meter. The reference value is entered into the measuring system. From the difference between measured value and reference value, the electrode zero point is calculated (this method only allows one-point calibration).

During calibration the M 700 is in function check mode. Current outputs and relay contacts behave as configured (BASE, Out, PID).

Caution!

The pH value of the sample is temperature-dependent. Therefore, the reference measurement should be performed at the sample temperature shown in the display. Transport the sample in an insulated container. The pH value may also be altered due to escaping of volatile substances.

Menu	Display	Product calibration
	⚠ HOLD 📟cal 7.00 pH 25.6 °C Calibration ▭ Module pH 2700i Return Info	**Select module: pH 2700i** The M 700 is in function check mode. Current outputs and relay contacts behave as configured (BASE, Out, PID). Confirm with **enter**.
	⚠ HOLD 📟cal 7.00 pH 25.6 °C ▭ Module pH 2700i ▭ Calimatic: automatic calibration ▭ Manual: entry of buffer values ▭ Product calibration ▭ Data entry: premeasured electrodes ▭ ORP calibration Return	Select calibration mode "Product calibration" Confirm with **enter**.

Menu	Display	Product calibration

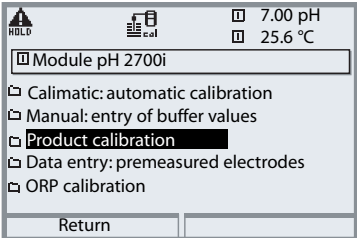|		
cal	**HOLD** ⚠ 📶cal 🔲 7.00 pH 🔲 25.6 °C 🔲 Product calibration ℹ Cal medium: Product Cal by taking sample and input of pH value Return Start ↵	**Product calibration** Product calibration is performed in 2 steps. Prepare sampling, start with softkey or **enter**.
	HOLD ⚠ 📶cal 🔲 7.00 pH 🔲 25.0°C 🔲 Product calibration ℹ Step 1: Sampling 'Save' the sample value 'Input' lab value Measured value 7.00 pH Temperature +25.0°C Input ◄ Save ↵	**Step 1** Take sample. Store measured value and tempera- ture at the moment of sampling ("Save" softkey or **enter**) Press **meas** to return to measure- ment. **Exception:** Sample value can be measured on the site and be entered immediately. To do so, press "Input" softkey.
	HOLD ⚠ 🥤 📶cal 🔲 7.00 pH 🔲 25.6 °C 🔲 Product calibration ℹ Step 2: Lab value Input sample lab value Lab value +7.15 pH ◄ Abort OK	**Step 2** Lab value has been measured. When you open the Product calibra- tion menu again, the display shown on the left appears: Enter reference value ("Lab value"). Confirm with OK or repeat calibra- tion.
	HOLD ⚠ 📶cal 🔲 7.00 pH 🔲 25.6 °C 🔲 Calibration data record 😊 Calibration 06/21/05 09:20 Cal mode Product calibration Zero +07.00 pH Slope 058.0 mV/pH Response time 0000 s End Adjust ↵	**Adjustment** Press "Adjust" to take over the val- ues determined during calibration for calculating the measured variables. See Pg 39.

METTLER TOLEDO

Calibration / adjustment

Calibration by entering data from premeasured electrodes

Data entry of premeasured electrodes
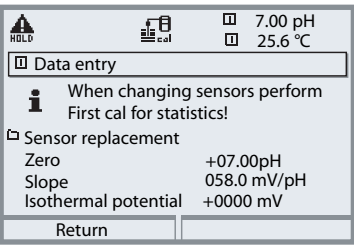
Entry of values for zero point, slope, and isothermal potential of a pH electrode. The values must be known, e.g. determined beforehand in the laboratory.

Caution! Input of an isothermal potential V_{iso} also applies to the calibration methods

- Calimatic
- Manual entry
- Product calibration

For an explanation of the isothermal potential, refer to Pg 51.

During calibration the M 700 is in function check mode. Current outputs and relay contacts behave as configured (BASE, Out, PID modules).

Menu	Display	Manual entry
	⚠ HOLD 🔋cal 7.00 pH 25.6 °C □ Data entry ℹ When changing sensors perform First cal for statistics! ▫ Sensor replacement Zero +07.00pH Slope 058.0 mV/pH Isothermal potential +0000 mV Return	**Select: Data entry of premeasured electrodes (Pg 40)** Remove electrode and connect premeasured electrode. Call up "Sensor replacement". Enter the values for • Zero • Slope • Isothermal potential Return with softkey. Return to measurement with **meas**

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}".

It may cause measurement errors depending on the temperature.
These errors can be compensated for by defining the "V_{iso}" value.

Measurement errors are avoided by calibrating at measuring temperature or at a controlled and stable temperature.
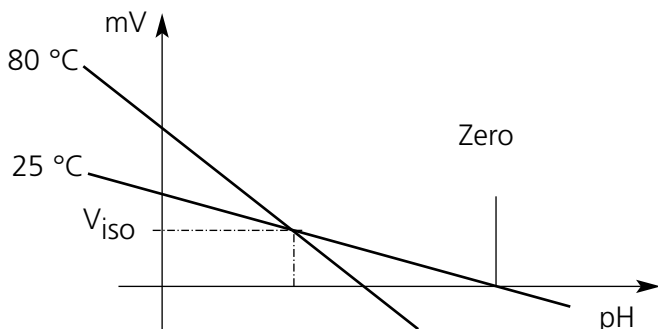
Monitoring functions for calibration

The M 700 provides comprehensive functions for monitoring proper calibration performance and the electrode condition. This allows documentation for quality management to ISO 9000 and GLP/GMP.

- Sensocheck monitors the electrode condition by measuring the glass and reference electrode impedances.
- Regular calibration can be monitored by the cal timer (see Pg 67).
- Adaptive cal timer - automatically reduces the calibration interval when the electrode is subjected to high stress
- The calibration record (GLP/GMP) provides all relevant data of the last calibration and adjustment.
- The statistics show the behavior of the electrode parameters during the last three calibrations compared to the First Calibration.
- The logbook shows the time and date of a performed calibration

Calibration / adjustment

ORP adjustment
The potential of a redox electrode is calibrated using a redox (ORP) buffer solution. In the course of that, the difference between the measured potential and the potential of the calibration solution is determined. This potential difference is printed on the calibration solution bottle and is defined as the voltage across the redox electrode and a reference electrode.

Examples: 220 mV   Pt against Ag/AgCl, KCl 3 mol/l
               427 mV   Pt against SHE

During measurement this difference is added to the measured potential.

$$mV_{ORP} = mV_{meas} + \Delta mV$$

mV_{ORP} = displayed oxidation-reduction potential (measured ORP)
mV_{meas} = direct electrode potential (ORP input, see Sensor monitor)
ΔmV = delta value, determined during calibration

ORP related to the standard hydrogen electrode (SHE)
The oxidation-reduction potential can also be calibrated automatically with respect to the standard hydrogen electrode (SHE). To do so, you must first select the reference electrode used (see parameter setting Pg 68).
The temperature behavior of the reference electrode is automatically taken into account.

You can choose from the following types of reference electrodes:

Ag/AgCl, KCl 1 mol/l   (Silver/silver chloride)
Ag/AgCl, KCl 3 mol/l   (Silver/silver chloride)
Hg, Tl/TlCl, KCl 3.3 mol/l   (Thalamid)
Hg/Hg_2SO_4, K_2SO_4 saturated   (Mercury sulfate)

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Menu	Display	ORP adjustment
	200 mV / **25.6 °C** / ORP adjustment / Reference electrode Ag/AgCl,KCl 1m / Temperature +25.5°C / ORP input +200 mV / **ORP setpoint** +200 mV / Return	The type of reference electrode is selected during parameter setting (Pg 68). Immerse electrode in calibration medium and wait until the ORP value has stabilized. Enter the nominal ORP value (bottle). Be sure to observe the correct reference! (as configured)
	200 mV / **25.6 °C** / ORP adjustment / Reference electrode Ag/AgCl,KCl 1m / Temperature +25.5°C / ORP input +200 mV / **ORP setpoint** +220 mV / Abort OK	Confirm with "OK".
	220 mV / **25.6 °C** / ORP adjustment / Reference electrode Ag/AgCl,KCl 1m / Temperature +25.5°C / ORP input +200 mV / ORP setpoint +220 mV / Return End	End adjustment with softkey or **enter**

Temp dependence of commonly used reference systems measured against SHE

Temperature [°C]	Ag/AgCl/KCl 1 mol/l [ΔmV]	Ag/AgCl/KCl 3 mol/l [ΔmV]	Thalamid [ΔmV]	Mercury sulfate [ΔmV]
0	249	224	-559	672
10	244	217	-564	664
20	240	211	-569	655
25	236	207	-571	651
30	233	203	-574	647
40	227	196	-580	639
50	221	188	-585	631
60	214	180	-592	623
70	207	172	-598	613
80	200	163	-605	603

METTLER TOLEDO

Calibration / adjustment

ISFET zero adjustment
When measuring with an ISFET sensor (e.g. InPro 3300), the nominal zero point must be adjusted each time a new sensor is connected (to adjust the operating point). The adjustment for that sensor remains stored in the analyzer.
Afterwards, you should perform a two-point calibration using one of the following methods:
• Calimatic: automatic calibration
• Manual: entry of buffer values
• Data entry: premeasured electrodes
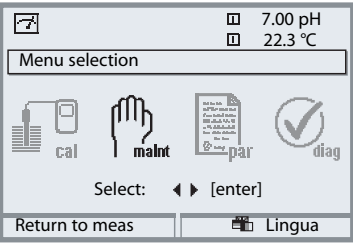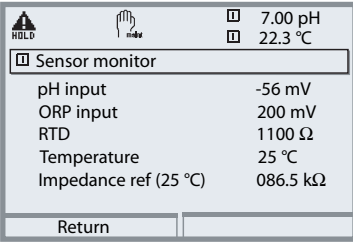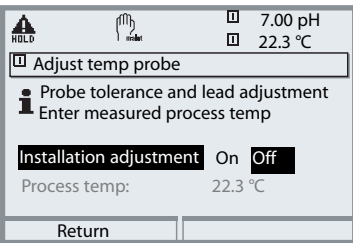
During calibration the M 700 is in function check mode. Current outputs and relay contacts behave as configured (BASE, Out, PID modules).

Menu	Display	ISFET zero adjustment
	⚠ HOLD 🔳cal 🔲 7.00 pH 🔲 25.6°C 🔲 ISFET zero adjustment • Dip sensor in buffer solution! ℹ Enter temperature-corrected pH in the range pH 6.5...7.5 then 'Start' calibration Enter cal temp +025.6°C Buffer +07.00 pH Return Start ↵	Immerse sensor in a zero point buffer (6.5 ... 7.5). Enter temperature-corrected pH value (see buffer table). Start zero adjustment.
	⚠ HOLD 🔳cal 🔲 7.00 pH 🔲 25.6°C 🔲 ISFET zero adjustment ℹ Drift check running Zero correction Electrode potential 122 mV **Calibration temp** 25.6 °C Nominal buffer value 7.00 pH Response time 10 s End	To abort, you can press the "End" softkey. However, this reduces adjustment accuracy. (Zero error of sensor up to max. ±200 mV possible)
	⚠ HOLD 🔳cal 🔲 7.00 pH 🔲 25.6 °C 🔲 Calibration data record ☺ Active adjustment 24.11.03 09:20 Cal mode ISFET zero ISFET zero +0122 mV Response time 0070 s End ↵	At the end of the adjustment procedure the ISFET zero (based on 25 °C) is displayed. However, this is not the real sensor value! The actual values must be determined afterwards by a complete two-point calibration.

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Maintenance

Sensor monitor, temperature probe adjustment
Note: Function check active
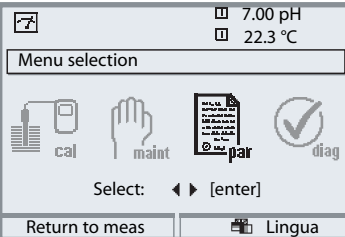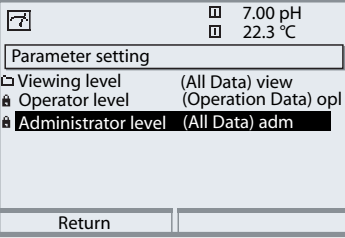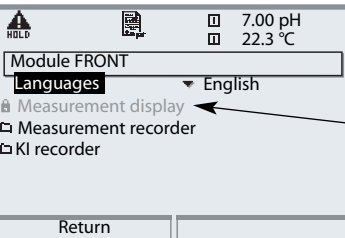
Menu	Display	Maintenance
 maint	☑ 7.00 pH 22.3 ℃ **Menu selection** cal maint par diag Select: ◀ ▶ [enter] Return to meas 🔲 Lingua	**Call up Maintenance** From the measuring mode: Press **menu** key to select menu. Select maintenance using arrow keys, confirm with **enter**. Passcode 2958 (For passcodes, see Pg 35) Then select "Module pH".
	⚠ maint ☑ 7.00 pH HOLD 22.3 ℃ 🔲 Sensor monitor pH input -56 mV ORP input 200 mV RTD 1100 Ω Temperature 25 ℃ Impedance ref (25 ℃) 086.5 kΩ Return	**Sensor monitor** for validation of sensor and complete measured-value processing.
	⚠ maint ☑ 7.00 pH HOLD 22.3 ℃ 🔲 Adjust temp probe ℹ Probe tolerance and lead adjustment Enter measured process temp Installation adjustment On **Off** Process temp: 22.3 ℃ Return	**Temp probe adjustment** This function allows you to compensate for the individual temperature probe tolerance and the influence of the lead resistances to increase accuracy of temperature measurement. Adjustment may only be carried out when the process temperature is precisely measured using a calibrated reference thermometer! The measurement error of the reference thermometer should be less than 0.1 °C. Adjustment without precise measurement might result in considerable deviations of the measured value display!

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Parameter setting: Operating levels
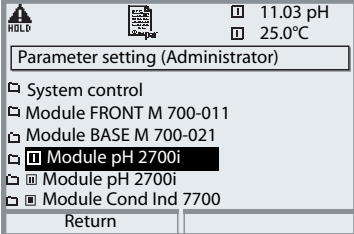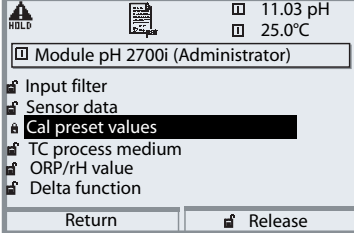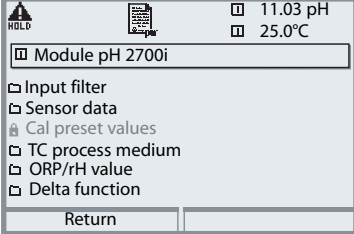
Viewing level, Operator level, Administrator level
Note: Function check active (Parameter setting: BASE, Out, PID modules)

Menu	Display	Viewing level, Operator level, Administrator level
	7.00 pH / **22.3 °C** 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**.
	7.00 pH / **22.3 °C** Parameter setting ◻ Viewing level (All Data) view 🔒 Operator level (Operation Data) opl 🔒 Administrator level (All Data) adm Return	**Administrator level** Access to all functions, also passcode setting. Releasing or blocking function for access from the Operator level.
	⚠ HOLD **7.00 pH** / **22.3 °C** 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 **7.00 pH** / **22.3 °C** 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!

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Parameter setting: Lock functions

Administrator level: Enable / lock functions for Operator level
Note: Function check active (Parameter setting: BASE, Out, PID modules)
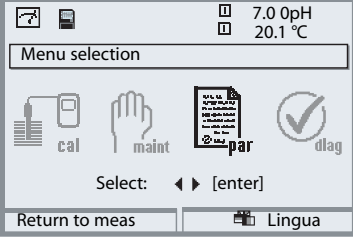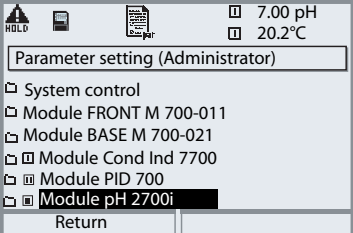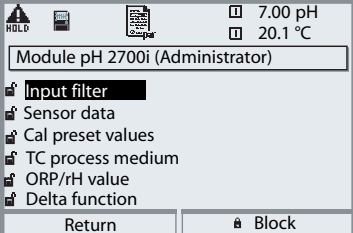
Menu	Display	Administrator level: Enable / lock functions
		Example: *Blocking access to the calibration adjustments from the Operator level*
	HOLD — 11.03 pH / 25.0°C — Parameter setting (Administrator) — System control — Module FRONT M 700-011 — Module BASE M 700-021 — Module pH 2700i — Module pH 2700i — Module Cond Ind 7700 — Return	**Call up parameter setting** Select Administrator level. Enter passcode (1989). Select "Module pH" using arrow keys, confirm with **enter**.
	HOLD — 11.03 pH / 25.0°C — Module pH 2700i (Administrator) — Input filter — Sensor data — Cal preset values — TC process medium — ORP/rH value — Delta function — Return — Block	Select "Cal preset values" using arrow keys. "Block" with softkey.
	HOLD — 11.03 pH / 25.0°C — Module pH 2700i (Administrator) — Input filter — Sensor data — Cal preset values — TC process medium — ORP/rH value — Delta function — Return — Release	Now, the "Cal preset values" 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 — 11.03 pH / 25.0°C — Module pH 2700i — Input filter — Sensor data — Cal preset values — TC process medium — ORP/rH value — Delta function — Return	**Activating parameter setting** Select Operator level, passcode (1246). Select "Module pH". Now, the locked function is displayed in gray and marked with the "lock" icon.

58   pH 2700i(X)

Setting the module parameters

Activating parameter setting
Note: Function check active (Parameter setting: BASE, Out, PID modules)

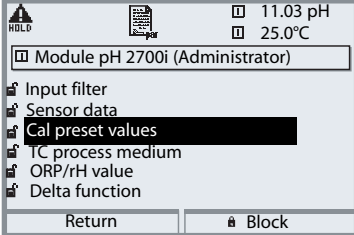| Menu	Display	Parameter setting
 par	⬜ 📄 ⊞ 7.0 0pH ⊞ 20.1 ℃ Menu selection cal maint par dlag Select: ◀ ▶ [enter] Return to meas · Lingua	**Call up parameter setting** From the measuring mode: Press **menu** key to select menu. Select parameter setting using arrow keys, confirm with **enter**. Passcode 1989 (For passcodes, see Pg 35)
	⚠ HOLD 📄 📄 ⊞ 7.00 pH ⊞ 20.2℃ Parameter setting (Administrator) ◻ System control ◻ Module FRONT M 700-011 ◻ Module BASE M 700-021 ◻ ⊞ Module Cond Ind 7700 ◻ ⊞ Module PID 700 ◻ ▣ Module pH 2700i Return	Select "Module pH", confirm with **enter**.
	⚠ HOLD 📄 📄 ⊞ 7.00 pH ⊞ 20.1 ℃ Module pH 2700i (Administrator) ◪ Input filter ◪ Sensor data ◪ Cal preset values ◪ TC process medium ◪ ORP/rH value ◪ Delta function Return · 🔒 Block	Select parameter using arrow keys, confirm with **enter**.

Function check

During parameter setting the M 700 is in "function check" mode:
Current outputs and relay contacts behave as configured.
See instruction manuals of BASE, Out, PID communication modules.
(Free download at www.mtpro.com).
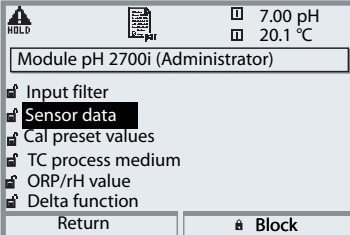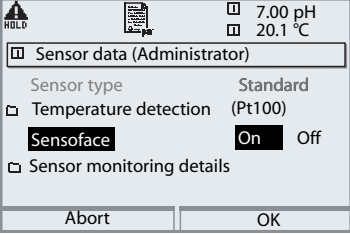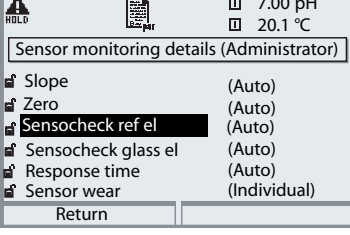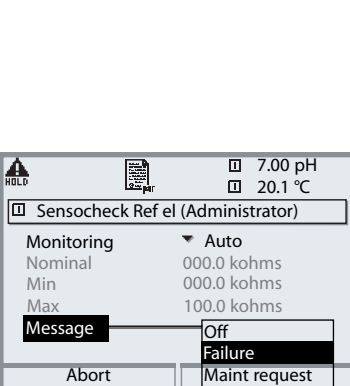
Setting the sensor data parameters

Sensor data / Sensor monitoring details
Note: Function check active

Menu	Display	Parameter selection
	Module pH 2700i (Administrator) □ Input filter □ Sensor data □ Cal preset values □ TC process medium □ ORP/rH value □ Delta function Return — Block	**Sensor data** (see Pg 62) Sensor data are preset depending on the sensor type. Gray display lines cannot be edited.
	□ Sensor data (Administrator) Sensor type Standard □ Temperature detection (Pt100) Sensoface On Off □ Sensor monitoring details Abort — OK	**Sensoface** provides information on the sensor condition (evaluating the sensor data). Great deviations are signaled. Sensocheck can be switched off.
	Sensor monitoring details (Administrator) □ Slope (Auto) □ Zero (Auto) □ Sensocheck ref el (Auto) □ Sensocheck glass el (Auto) □ Response time (Auto) □ Sensor wear (Individual) Return	**Sensor monitoring details** The following parameters are monitored: Slope, zero, reference impedance, glass impedance (pH electrodes), and response time, for ISM sensors also sensor wear, CIP/SIP counter, autoclaving counter, and sensor operating time. For "Auto", the tolerance limits are displayed in gray. For "Individual", the settings can be specified by the user.
	□ Sensocheck Ref el (Administrator) Monitoring ▼ Auto Nominal 000.0 kohms Min 000.0 kohms Max 100.0 kohms Message ── Off Failure Abort — Maint request	**ISM** ISM sensors automatically provide most of the default settings. Individual settings are not overwritten. **Message:** See Pg 73.

Sensoface ☺

Sensoface is a graphic indication of the sensor condition.
Prerequisite: Sensocheck must have been activated during parameter setting.
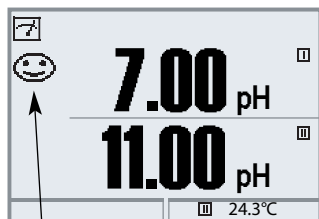
Sensocheck:
Automatic monitoring of glass and
reference electrode

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

Sensoface criteria

Parameter	Auto*	Standard electrodes
Slope	59.2	< 53.3 or > 61
Zero	7.00	< 6.00 or > 8.00
Reference impedance	Rcal **	< 0.3 Rcal or > 3.5 Rcal
Glass impedance	Rcal **	< 0.6 Rcal or > 100 KΩ + 0.5 Rcal
Response time Fine Medium Coarse		120 sec 80 sec 60 sec
Cal timer		when 80 % expired
Sensor wear		as specified (ISM sensors only)

* Valid for standard electrodes with pH = 7.00.
** Rcal is determined during calibration

Settings of sensor data

With "Auto", the tolerance limits for the monitoring criteria are determined by the analyzer. They are then displayed in gray.
With "Individual", these tolerances can be adjusted.
Note: Function check active. Gray values (display) cannot be edited.

Parameter	Default	Selection / Range / Notes
Input filter		
• Pulse suppression	Off	Off, On (suppression of fast transients at the input)
Sensor data		
• Sensor type	Standard	Standard, Other, ISFET (SW 700-012), ISM (automatically identified)
• Temperature detection		
Temperature probe	Pt 1000	Pt100, Pt1000, NTC30 kΩ, NTC 8.55 kΩ
Sensor monitoring details		
• Slope		
Monitoring	Auto	Auto, Individual
Nominal	59.2 mV/pH	
Min	53.3 mV/pH	
Max	61.0 mV/pH	
Message	Maint. request	Off, failure, maintenance request
• Zero		
Monitoring	Auto	Auto, Individual
Nominal	06.95 pH	
Min	05.95 pH	
Max	07.95 pH	
Message	Maint. request	Off, failure, maintenance request
• Sensocheck Ref el		
Monitoring	Auto	Auto, Individual
Nominal	025.5 kΩ	
Min	015.9 kΩ	
Max	112.8 kΩ	
Message	Off	Off, failure, maintenance request (not for sensor type ISFET)
• Sensocheck Glass el		
Monitoring	Auto	Auto, Individual
Nominal	305.0 MΩ	
Min	087.1 MΩ	
Max	999.9 MΩ	
Message	Off	Off, failure, maintenance request
• Response time		
Monitoring	Auto	Auto, Individual
Response time Max	0080 s	
Message	Off	Off, failure, maintenance request

Parameter	Default	Selection / Range / Notes
• Sensor wear*		
Monitoring	Auto	Off, Auto, Individual
Measurement quality**	Normal	High, Normal, Low
Message	Maint. request	Off, failure, maintenance request
• CIP counter*		
Monitoring	Off	Off, Individual
Max. cycles	000	
Message	Maint. request	Off, failure, maintenance request
• SIP counter*		
Monitoring	Off	Off, Individual
Max. cycles	000	
Message	Maint. request	Off, failure, maintenance request
• Autoclaving counter*		
Monitoring	Off	Off, Individual
Max. cycles	000	
Message	Maint. request	Off, failure, maintenance request
• Sensor operating time*		
Monitoring	Off	Off, Individual
Max. operating time	0000 d	
Message	Maint. request	Off, failure, maintenance request
• ISFET leakage current***		
Monitoring	Auto	Auto, Individual
Max.	1000 nA	(For ISM: default value from electrode)
Message	Maint. request	Off, failure, maintenance request

ISM ISM sensors automatically provide most of the default settings. Individual entries are <u>not</u> overwritten by the ISM sensor.

*   Only for ISM
** Measurement quality allows the user to take account of the influence of the individual process conditions on the sensor wear.
*** Only available with ISFET additional function (SW 700-012)

Setting the cal preset values

Cal preset values
Note: Function check active

Parameter	Default	Selection / Range
Cal preset values		
• Calimatic buffer	Mettler-Toledo	Mettler-Toledo: 2.00 4.01 7.00 9.21 Merck/Riedel: 2.00 4.00 7.00 9.00 12.00 DIN 19267: 1.09 4.65 6.79 9.23 12.75 NIST standard: 4.006 6.865 9.180 NIST technical: 1.68 4.00 7.00 10.01 12.46
• Drift check	Standard	Fine: 1.2 mV/min (Abort after 180 s) Standard: 2.4 mV/min (Abort after 120 s) Coarse: 3.75 mV/min (Abort after 90 s)

• Cal timer
  Monitoring
  Cal timer
  Adaptive cal timer
	
	Auto
	168 h
	0000h (Off)
		
		Auto, Off, Individual
		Off, entry
		Off, On

• Tolerance band check
  (SW 700-005)
	Off	Tolerance adjustment: Off, On
		  Tolerance band zero +00.20 pH (entry)
		  Tolerance band slope +002.0 mV/pH (entry)

Tolerance adjustment

(Additional function SW 700-005)
During calibration the tolerance band checks zero and slope and automatically performs an adjustment when the tolerance band is exceeded. The parameters are stored in the tolerance band recorder (Diagnostics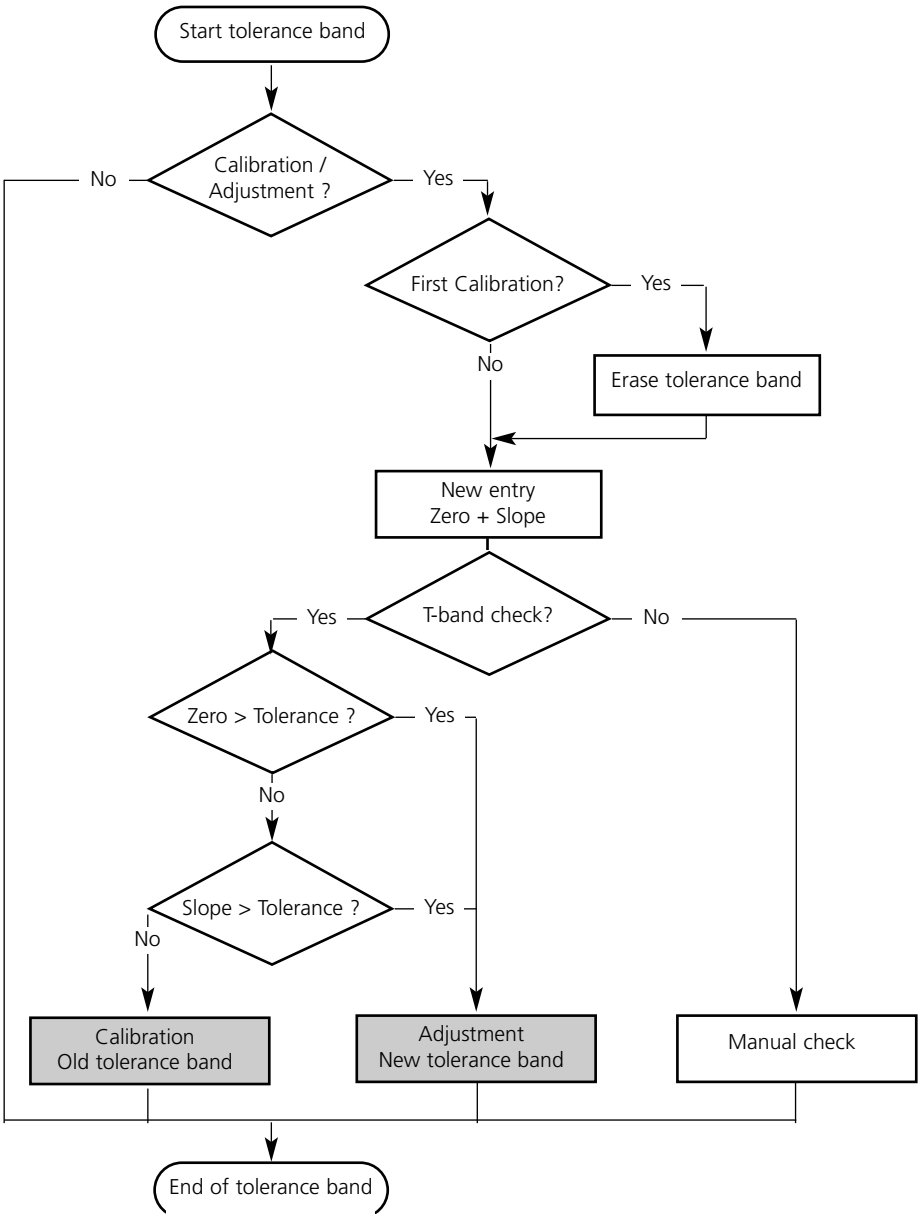 menu). The additional function SW 700-005 is device-specific. When ordering an additional function, you therefore have to specify the serial number of your M 700 FRONT in addition to the respective order number.
(The M 700 FRONT contains the M 700 system control).
The manufacturer then supplies a TAN (transaction number) to release the additional function in the system control menu (see Pg 66).
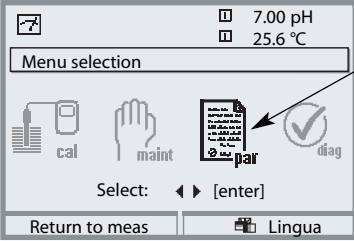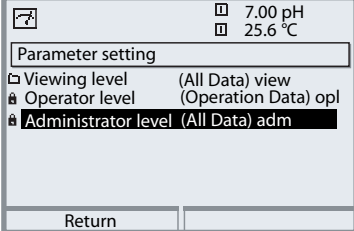
SW 700-005: Tolerance adjustment
Program flow

```
                    ┌──────────────────────┐
                    │ Start tolerance band │
                    └──────────┬───────────┘
                               │
                               ▼
              ◇────────────────────────────◇
    No  ──────◇    Calibration /           ◇────── Yes
              ◇    Adjustment ?            ◇
              ◇────────────────────────────◇
                               │
                               ▼
                    ◇────────────────────◇
                    ◇  First Calibration? ◇────── Yes ──┐
                    ◇────────────────────◇              │
                               │                        ▼
                              No           ┌──────────────────────┐
                               │           │ Erase tolerance band │
                               │           └──────────┬───────────┘
                               ▼◄─────────────────────┘
                    ┌──────────────────────┐
                    │     New entry        │
                    │   Zero + Slope       │
                    └──────────┬───────────┘
                               ▼
              ◇────────────────────────────◇
    Yes ──────◇      T-band check?         ◇────── No ──┐
              ◇────────────────────────────◇            │
               │                                         │
               ▼                                         │
    ◇──────────────────────◇                            │
    ◇   Zero > Tolerance ?  ◇──── Yes ──┐               │
    ◇──────────────────────◇            │               │
               │                         │               │
              No                         │               │
               ▼                         │               │
    ◇──────────────────────◇            │               │
    ◇   Slope > Tolerance ? ◇──── Yes ──┤               │
    ◇──────────────────────◇            │               │
    No         │                         │               │
    │          ▼                         ▼               ▼
 ┌──────────────┐         ┌──────────────────┐   ┌──────────────┐
 │ Calibration  │         │   Adjustment     │   │ Manual check │
 │ Old tolerance│         │ New tolerance    │   │              │
 │ band         │         │ band             │   │              │
 └──────┬───────┘         └────────┬─────────┘   └──────┬───────┘
        │                          │                    │
        └──────────────────────────┼────────────────────┘
                               ▼
                    ┌──────────────────────┐
                    │ End of tolerance band│
                    └──────────────────────┘
```

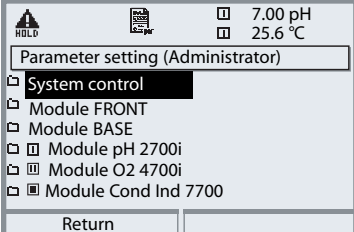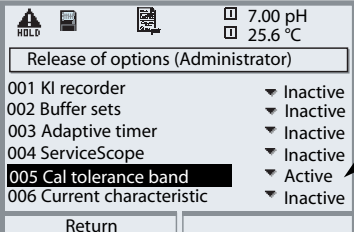**METTLER TOLEDO**   **65**

Activating the tolerance adjustment

Select menu: Parameter setting/System control/Release of options
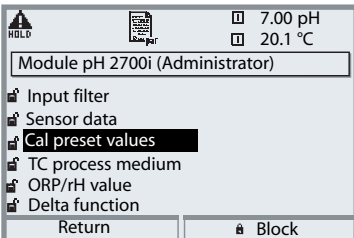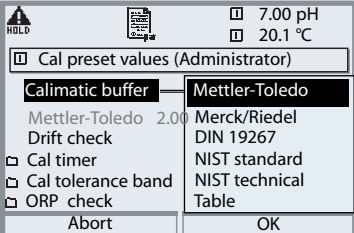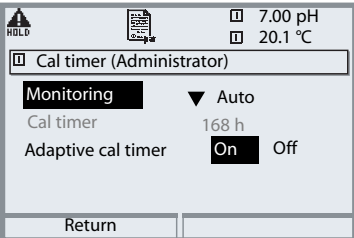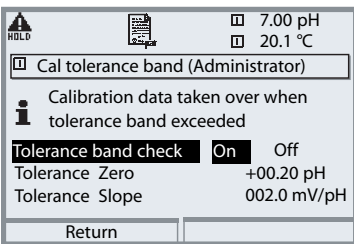**Note:** The TAN for releasing an additional function is only valid for the
device with the corresponding serial number!

Menu	Display	Activate additional function
		Menu selection Call up parameter setting. From the measuring mode: Press **menu** key to select menu. Select parameter setting using arrow keys, confirm with **enter**. **Parameter setting** Select Administrator level using arrow keys, confirm with **enter**. Enter passcode and confirm (Passcode as delivered: 1989). Select System control using arrow keys, confirm with **enter**. Then select Release of options using arrow keys, confirm with **enter**. **Release of options** Select the additional function to be released ("Cal tolerance band"). Set option to "active". Enter the TAN at the prompt. (Note: The TAN is only valid for the device with the corresponding serial number, see previous page.) The option is available after the TAN has been entered.

Setting the cal preset values

Cal preset values: Calimatic buffer, cal timer, cal tolerance band
Note: Function check active

Menu	Display	Cal preset values
	⚠ HOLD 📄 ⏱ 7.00 pH / ⏱ 20.1 ℃ Module pH 2700i (Administrator) 🔒 Input filter 🔒 Sensor data 🔒 Cal preset values 🔒 TC process medium 🔒 ORP/rH value 🔒 Delta function Return 🔒 Block ⚠ HOLD 📄 ⏱ 7.00 pH / ⏱ 20.1 ℃ ⏱ Cal preset values (Administrator) Calimatic buffer Mettler-Toledo Mettler-Toledo 2.00 Merck/Riedel Drift check DIN 19267 ⤓ Cal timer NIST standard ⤓ Cal tolerance band NIST technical ⤓ ORP check Table Abort OK	**Calimatic buffer** For automatic calibration, you must define the buffer set you want to use. For calibration, you must then use buffer solutions from this buffer set in any order. The selected buffer set with the nominal values of the individual buffer solutions is displayed in gray. The "Calimatic buffer" menu shows all buffer sets available. Select buffer set with **enter**.
	⚠ HOLD 📄 ⏱ 7.00 pH / ⏱ 20.1 ℃ ⏱ Cal timer (Administrator) Monitoring ▼ Auto Cal timer 168 h Adaptive cal timer On Off Return	**Cal timer** Entry of the time interval until the next due calibration. **Adaptive cal timer** When the electrode is exposed to high stress (temperature, extreme pH values), the time until the next due calibration is reduced.
	⚠ HOLD 📄 ⏱ 7.00 pH / ⏱ 20.1 ℃ ⏱ Cal tolerance band (Administrator) ℹ Calibration data taken over when tolerance band exceeded Tolerance band check On Off Tolerance Zero +00.20 pH Tolerance Slope 002.0 mV/pH Return	**Cal tolerance band** If the measured value leaves the tolerance band specified here for zero and slope, an adjustment is automatically performed during calibration.

Parameter setting
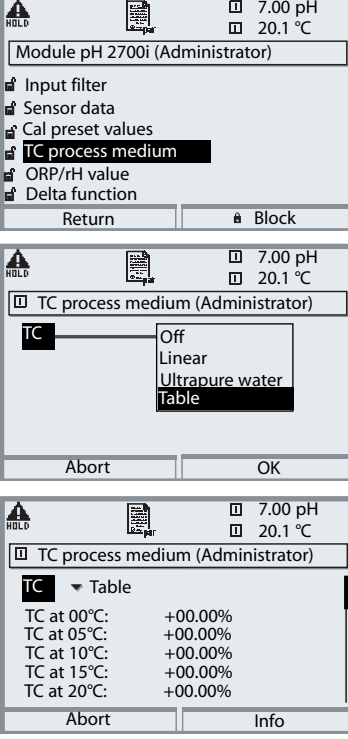
Default settings and selection range
Note: Function check active

Parameter	Default	Selection / Range
TC process medium • TC correction	Off	Off, linear, ultrapure water, table, Linear: enter temperature factor +XX.XX %/K
ORP/rH value • Reference electrode • ORP conversion to SHE • Calculate rH with factor	Ag/AgCl,KCl 3mol/l No No	Ag/AgCl,KCl 3mol/l Hg, Tl/TlCl, KCl 3.3 mol/l Hg/Hg$_2$SO$_4$, K$_2$SO$_4$ sat No, Yes No, Yes, entry of factor
Delta function • Delta function	Off	Off, pH, mV+ORP or rH: entry of delta value

Parameter setting

TC process medium
Note: Function check active

Menu	Display	TC process medium (Parameter selection Pg 68)
		TC process medium You can choose from: • Linear (input of TC coefficient) • Ultrapure water • Chart When measuring media with a known temperature behavior, the output pH value can be corrected using a chart. TC can be entered in 5 °C steps for temperatures between 0 and +95 °C. Then, the output pH value is corrected by the corresponding TC value depending on the measuring temperature. Intermediate values are linearly inter-polated. In the case of lower or higher temperatures (< 0 °C or > +95 °C), the last chart value is used for calculation. If the delta function has been activated (see Pg 68) simultaneously with temperature compensation, the tem-perature is compensated first and then the delta value is subtracted. When the TC correction for process medium is switched on, "TC" appears in the display in measuring mode.

Parameter setting

TC process medium – Linear temperature compensation of process medium

Temperature compensation of process medium

LInear temperature compensation, reference temp fixed at 25 °C

$$pH_{(25\ °C)} = pH_M + TC/100\ \%\ (25\ °C - T_M)$$

$pH_{(25\ °C)}$ = pH value compensated to 25 °C
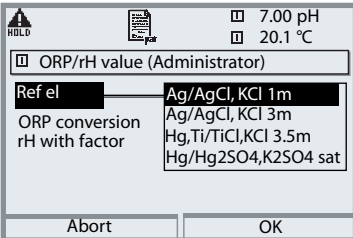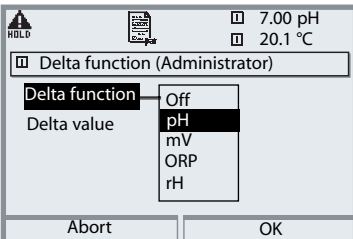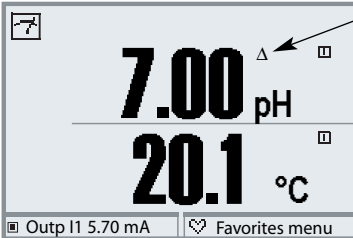pH_M = measured pH value (temperature-corrected)
TC = Temperature factor [%/K]
T_M = Measured temperature [° C]

Parameter setting

ORP/rH value, delta function, messages
Note: Function check active

| Menu	Display	ORP/rH value, delta function, messages (Selection Pg 64)
		ORP/rH value • Select type of reference electrode: Ag/AgCl, KCl 1 mol/l (Silver/silver chloride) Ag/AgCl, KCl 3 mol/l (Silver/silver chloride) Hg, Tl/TlCl, KCl 3.3 mol/l (Thalamid) Hg/Hg_2SO_4, K_2SO_4 saturated (mercury sulfate) • ORP conversion to SHE • Calculate rH with factor
		Delta function When a delta value is entered, the analyzer calculates the difference Output value = measured value – delta value The output value controls all outputs and is shown on the display. If the delta function has been activated simultaneously with temperature compensation, the temperature is compensated first and then the delta value is subtracted. When delta function is switched on, "Δ" appears in the display in measuring mode.

METTLER TOLEDO

Setting the message parameters

Messages: Default settings and selection range
Note: Function check active

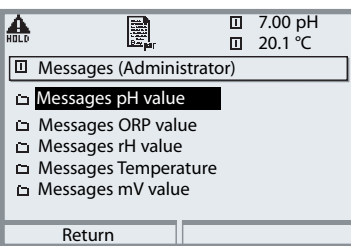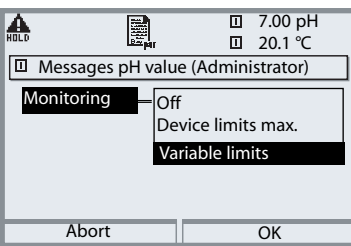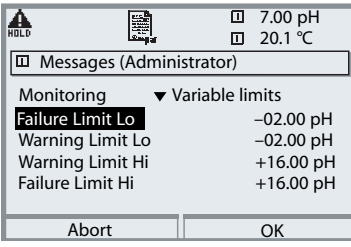| Parameter	Default	Selection / Range

Messages
• pH value
• ORP value
• rH value
• Temperature
• mV value
	Limits max
	Off
	Off
	Limits max
	Off
		Off, device limits max., variable limits*
		Off, device limits max., variable limits*
		Off, device limits max., variable limits*
		Off, device limits max., variable limits*
		Off, device limits max., variable limits*
		
		*) With "Variable limits" selected,
		   the following parameters can be edited:
		   • Failure Limit Lo
		   • Warning Limit Lo
		   • Warning Limit Hi
		   • Failure Limit Hi
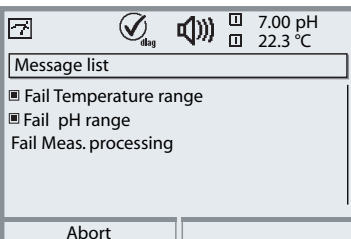
Device limits
• Device limits max.   Maximum measurement range of device
• Variable limits: Range limits specified

Device limits max.

+16.00 pH

Variable limits

–02.00 pH
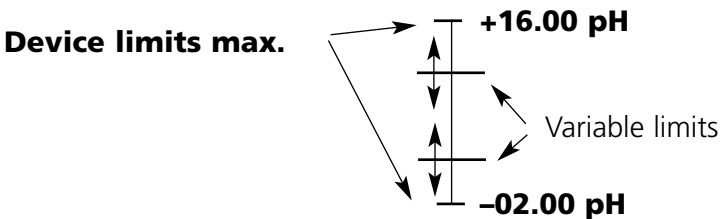
Setting the message parameters
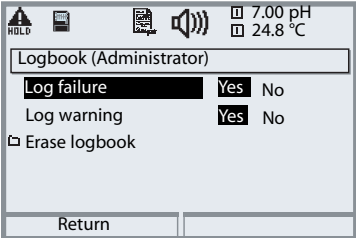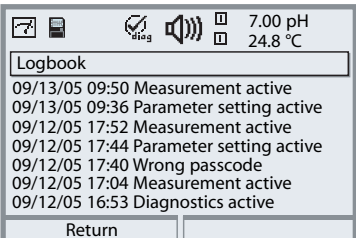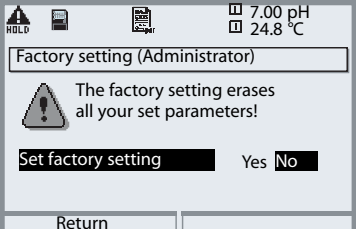
Messages
Note: Function check active

Menu	Display	Messages
⬛ par	⚠ HOLD 📋 par ① 7.00 pH ① 20.1 °C ① Messages (Administrator) 🗁 Messages pH value 🗁 Messages ORP value 🗁 Messages rH value 🗁 Messages Temperature 🗁 Messages mV value Return ⚠ HOLD 📋 par ① 7.00 pH ① 20.1 °C ① Messages pH value (Administrator) Monitoring — Off Device limits max. Variable limits Abort OK ⚠ HOLD 📋 par ① 7.00 pH ① 20.1 °C ① Messages (Administrator) Monitoring ▼ Variable limits Failure Limit Lo –02.00 pH Warning Limit Lo –02.00 pH Warning Limit Hi +16.00 pH Failure Limit Hi +16.00 pH Abort OK	**Messages** All parameters determined by the measuring module can generate messages. **• Device limits max.:** Messages are generated when the process variable (e.g. pH) is outside the measurement range. The "Failure" icon is displayed, the NAMUR failure contact is activated (M 700 BASE, factory setting: contact K4, N/C contact). The current outputs can signal a 22 mA message (user defined). **• Variable limits:** For the "failure" and "warning" messages you can define upper and lower limits for message generation. **• Message icons:** 🔊 Failure (Failure limit HiHi/LoLo) ⚒ Maintenance (Warning limit Hi/Lo)
✓ diag	🗐 ✓ diag 🔊 ① 7.00 pH ① 22.3 °C Message list ▣ Fail Temperature range ▣ Fail pH range Fail Meas. processing Abort	**Diagnostics menu** If the "Maintenance" or "Failure" icons are flashing in the display, you should call up the Diagnostics menu. The messages are displayed in the "Message list".

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Logbook, factory setting

Parameter setting/System control/Logbook
Note: Function check active
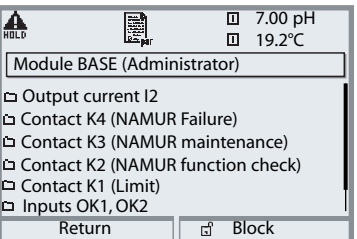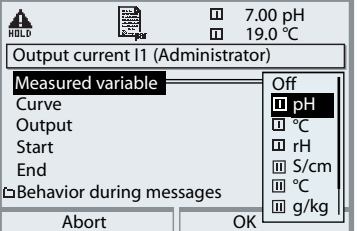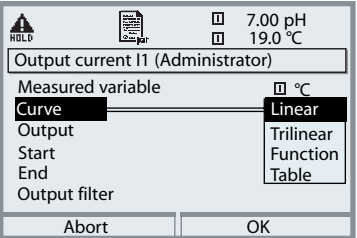
Menu	Display	Logbook, factory setting
par	⚠ HOLD 🗎 🗐 🔊 🔲 7.00 pH 🔲 24.8 °C Logbook (Administrator) Log failure **Yes** No Log warning **Yes** No ▷ Erase logbook Return 🗹 🗎 🌀diag 🔊 🔲 7.00 pH 🔲 24.8 °C Logbook 09/13/05 09:50 Measurement active 09/13/05 09:36 Parameter setting active 09/12/05 17:52 Measurement active 09/12/05 17:44 Parameter setting active 09/12/05 17:40 Wrong passcode 09/12/05 17:04 Measurement active 09/12/05 16:53 Diagnostics active Return ⚠ HOLD 🗎 🗐 🔲 7.00 pH 🔲 24.8 °C Factory setting (Administrator) ⚠ The factory setting erases all your set parameters! Set factory setting Yes **No** 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). **Factory setting** Allows resetting the parameters to their factory setting. When this menu is opened, the analyzer displays a warning (Fig.).

Current outputs, contacts, OK inputs

Select menu: Parameter setting/Module BASE
Note: Function check active

| Menu	Display	Parameter setting M 700 BASE
☐ par	**7.00 pH** / **19.2℃** — Module 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	**Configure current output** • Call up parameter setting • Enter passcode • Select "Module BASE" • Select "Output current ..."
	7.00 pH / **19.0 ℃** — Output current I1 (Administrator) — Measured variable / Curve / Output / Start / End / Behavior during messages — Off / pH / ℃ / rH / S/cm / ℃ / g/kg — Abort / OK	• Select measured variable
	7.00 pH / **19.0 ℃** — Output current I1 (Administrator) — Measured variable / Curve / Output / Start / End / Output filter — ℃ / Linear / Trilinear / Function / Table — Abort / OK	• Select Curve, e.g. "Linear": The measured variable is represented by a linear output current curve. The desired range of the measured variable is specified by the values for "Start" and "End".

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

Example 1: Range pH 0 - 14
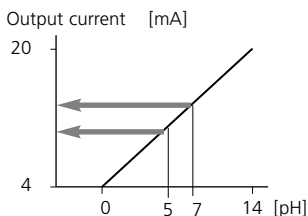
Example 2: Range pH 5 - 7
Advantage: Higher resolution in range of interest

Output current [mA]

[mA]

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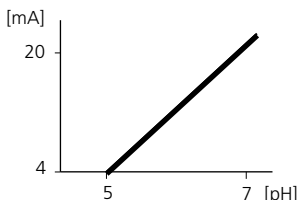
Current outputs: Current output curves

Select menu: Parameter setting/Module BASE

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

Y Output current [%]

100 —

0 —

X Measured variable

Start

End
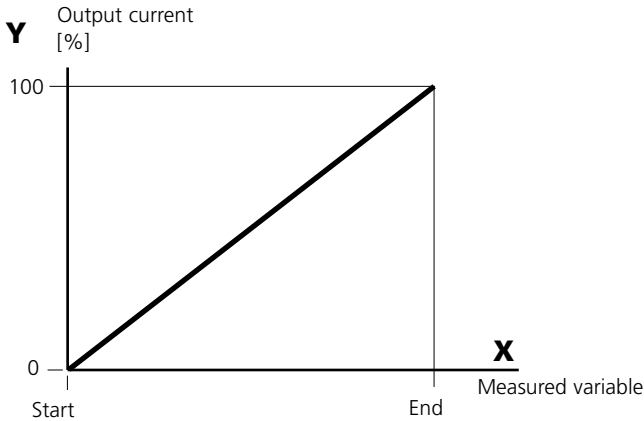
• Trilinear characteristic
Two additional corner points must be entered:

Y Output current [%]

100 —

2nd corner Y —

1st. corner Y —

0 —

X Measured variable

Start

1st corner X

End
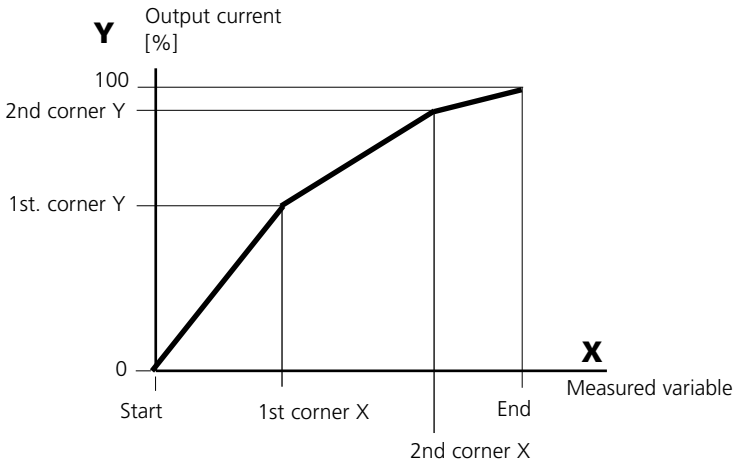
2nd corner X

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

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• Function characteristic

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

Equation

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

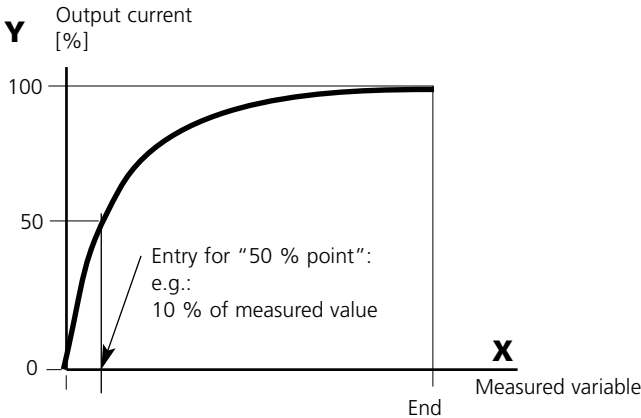$$K = \frac{E + I - 2 * X50\%}{X50\% - I} \qquad\qquad x = \frac{M - I}{E - I}$$

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

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
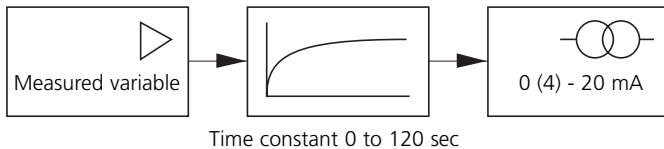
NAMUR signals: Current outputs

Behavior during messages: Function check, 22 mA signal

Behavior during messages

Depending on the parameter setting ("Messages"), the current outputs switch to:
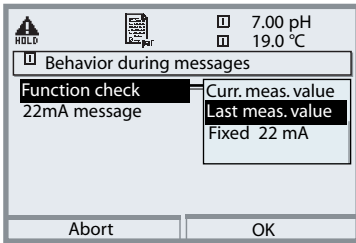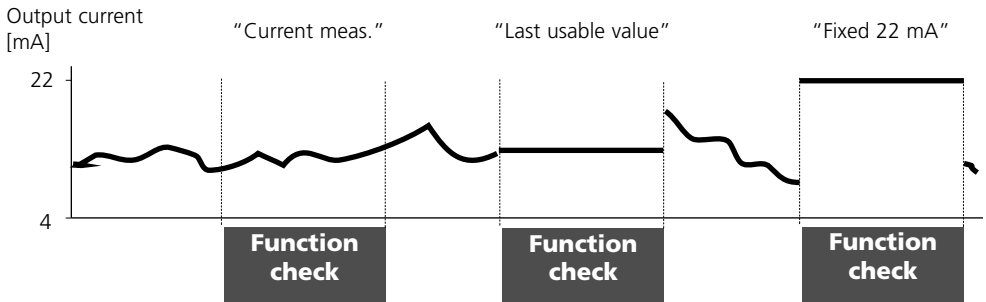
• Currently measured value
• Last measured value (HOLD function)
• Fixed value (22 mA)

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

Output current [mA]

"Current meas."   "Last usable value"   "Fixed 22 mA"

22

4

Function check   Function check   Function check

Message when the current range is exceeded

As delivered, the "Maintenance request" (Warn) message is generated when the current range is exceeded (< 3.8 mA or > 20.5 mA).

This setting can be changed in the Parameter setting menu of the respective measuring module at "Messages".

To generate a "Failure" message, the limit value monitoring must be set to "Variable limits":

Parameter setting - <measuring module> - Messages - Variable limits - Failure limit ...

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

NAMUR signals: Relay contacts

Failure, maintenance request, 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)
- Maint. request   Contact K3, normally open contact
- Function check   Contact K2, normally open contact
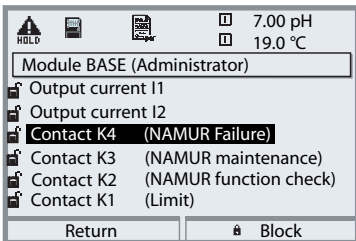
NAMUR signals: Factory setting of contacts
- *Select parameter setting*
- *Administrator level*
- *Select "Module BASE" (Fig.)*

You can define a delay time for "Maintenance request" and "Failure", resp. If an alarm message is released, the contact will only be activated after expiry of this delay time.

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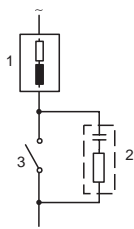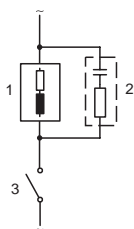
Typical AC applications with inductive load

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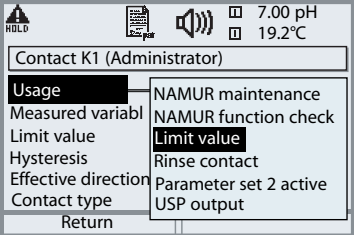**Make sure that the maximum ratings of the relay contacts are not exceeded even during switching!**

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

Relay contacts

Parameter setting/Module BASE/Relay contacts

Menu	Display	Setting the relay contacts
	⚠️ 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 "Module BASE" • Select "Contact ..." • "Usage" (Fig.)

M 700 BASE

Alarm (K4)

K1

K2

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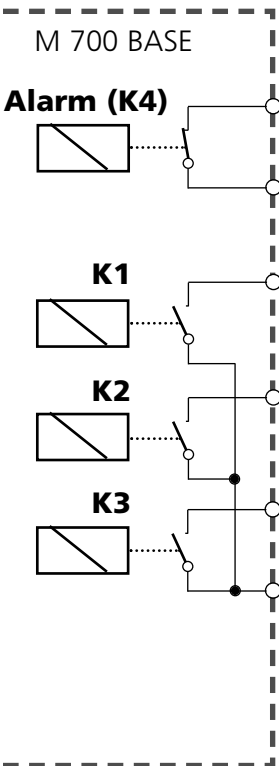
The M 700 BASE provides 4 relay contacts (max. AC/DC rating 30 V / 3 A each). Contact K4 is provided for failure message. The switching behavior (normally open or normally closed), as well as a switch-on or switch-off delay can be defined.

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 module only)

Contact assignment: See terminal plate of M 700 BASE
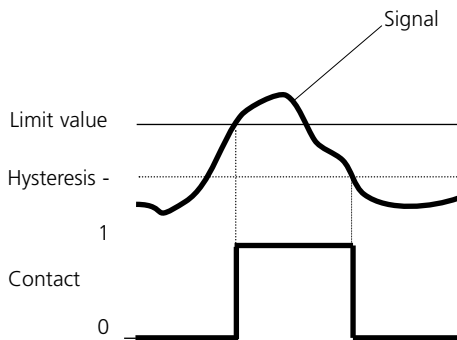
Limit value, hysteresis, contact type

Parameter setting/Module BASE/Relay contacts/Usage

Menu	Display	Usage as limit value
🗎 par	⚠ HOLD 📋 🔊 🔲 7.00 pH 🔲 19.2℃ 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 "Module BASE" • Select "Contact ..." • "Usage: Limit" (Fig.)

Limit value ▼
Effective direction min
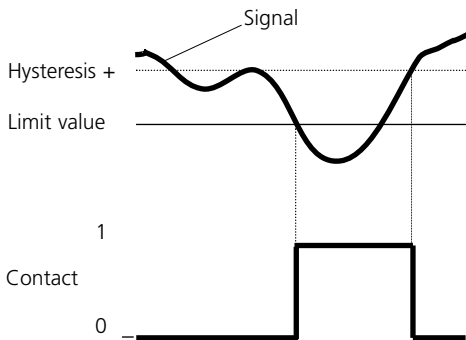
Limit value ▲
Effective direction max

Icons in the measurement display:

Measured value exceeds limit: ▲   Measured value falls below limit: ▼

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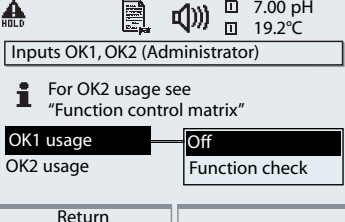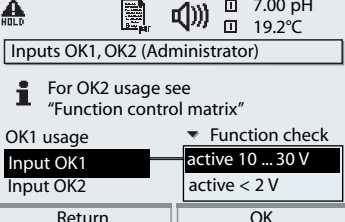
Contact type
Specifies whether the active contact is closed (N/O) or open (N/C).

OK1, OK2 inputs: Specify level

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

Menu	Display	Setting the OK inputs
	⚠ HOLD · 📋 · 🔊))) · 7.00 pH · 19.2°C Inputs OK1, OK2 (Administrator) ⓘ For OK2 usage see "Function control matrix" OK1 usage — Off OK2 usage — Function check Return	**OK1 usage** • Call up parameter setting • Enter passcode • Select "Module BASE" • Select "Inputs OK1/OK2" • Select "OK1 usage"
	⚠ HOLD · 📋 · 🔊))) · 7.00 pH · 19.2°C Inputs OK1, OK2 (Administrator) ⓘ For OK2 usage see "Function control matrix" OK1 usage ▾ Function check Input OK1 — active 10 ... 30 V Input OK2 — active < 2 V Return · OK	**OK1/OK2 switching level** • Call up parameter setting • Enter passcode • Select "Module 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: Select: System control /
      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).
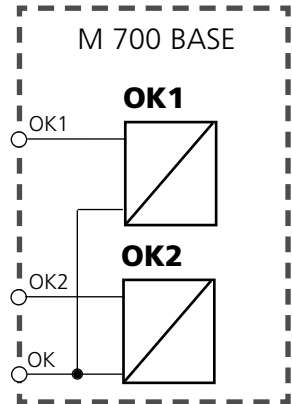
Contact assignment: See terminal plate of M 700 BASE

Switching parameter sets via OK2

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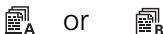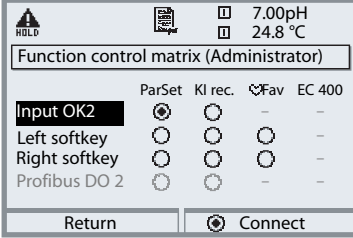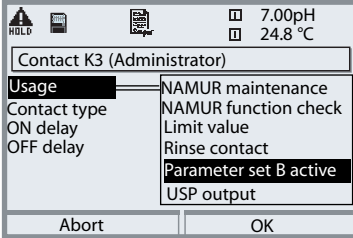**Note:** Function check active

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 📖 🔲 7.00pH 🔲 24.8 °C **Function control matrix (Administrator)** ParSet KI rec. ♥Fav EC 400 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 🗒 📖 🔲 7.00pH 🔲 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	**Signaling active parameter set via relay contact** • Call up parameter setting • Select "Module BASE" • Select contact • Usage: "Parameter set ...".

Note

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

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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 analyzer calculates the differences between the existing values.

Current outputs
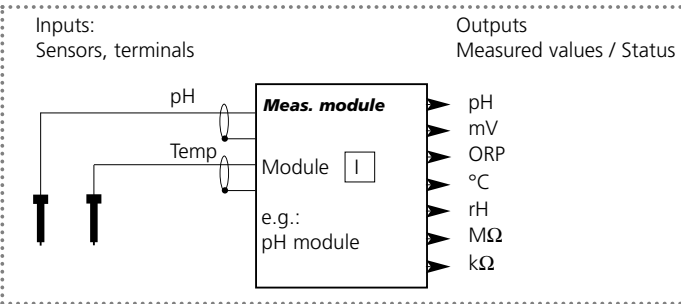All current outputs can be set to output the new process variables formed by the Calculation Blocks.
Measurement display
All new process variables can be displayed as primary or as secondary value.
Controller
Controller functions are not supported.

Functionality of measuring module

Inputs:
Sensors, terminals

Outputs
Measured values / Status

pH

Meas. module

Module   I

e.g.:
pH module

Temp

pH
mV
ORP
°C
rH
MΩ
kΩ

Functionality of Calculation Block
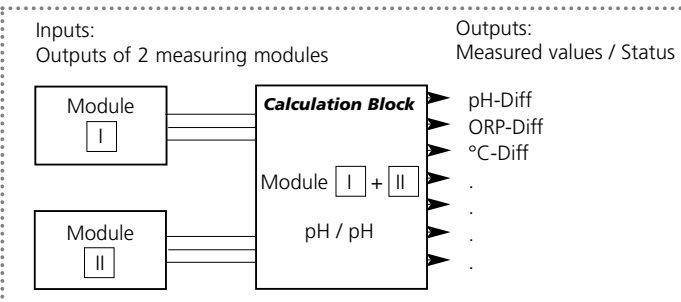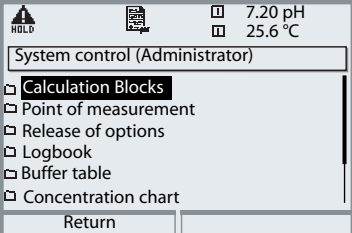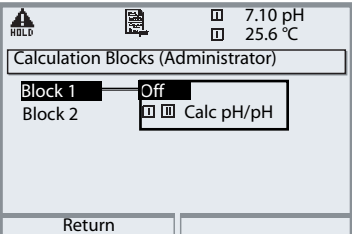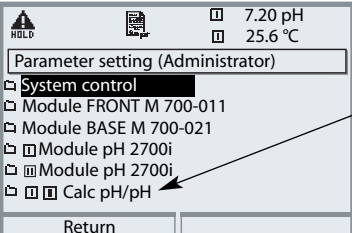
Inputs:
Outputs of 2 measuring modules

Outputs:
Measured values / Status

Module
I

Module
II

Calculation Block

Module I + II

pH / pH

pH-Diff
ORP-Diff
°C-Diff
.
.
.
.

Activating Calculation Blocks

Select menu: Parameter setting/System control/Calculation Blocks
Combining measuring modules to Calculation Blocks
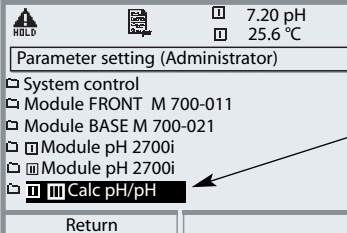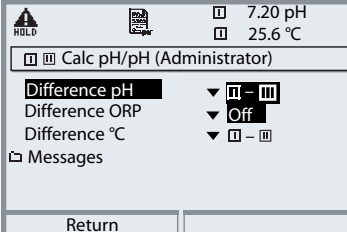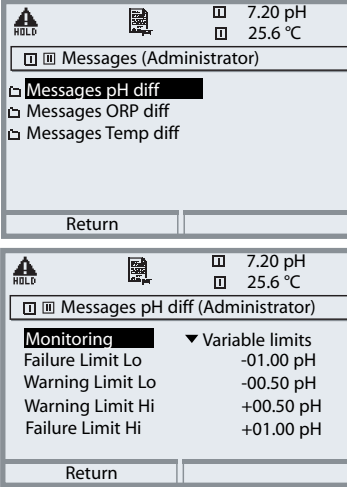
Combining measuring modules
With three measuring modules the following Calculation Block combinations are possible: $\boxed{I}$ + $\boxed{II}$, $\boxed{I}$ + $\boxed{III}$, $\boxed{II}$ + $\boxed{III}$

Two Calculation Blocks can be activated.

Menu	Display	Activating Calculation Blocks
par	HOLD ▲ ☰ ▢ 7.20 pH ▢ 25.6 ℃ System control (Administrator) ▢ Calculation Blocks ▢ Point of measurement ▢ Release of options ▢ Logbook ▢ Buffer table ▢ Concentration chart Return	**Calculation Blocks** • Call up parameter setting • System control • Select "Calculation Blocks"
	HOLD ▲ ☰ ▢ 7.10 pH ▢ 25.6 ℃ 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 ℃ Parameter setting (Administrator) ▢ System control ▢ Module FRONT M 700-011 ▢ Module BASE M 700-021 ▢ ▢ Module pH 2700i ▢ ▢ Module pH 2700i ▢ ▢ ▢ Calc pH/pH Return	During parameter setting the Calculation Blocks are displayed like modules.

Configuring a Calculation Block
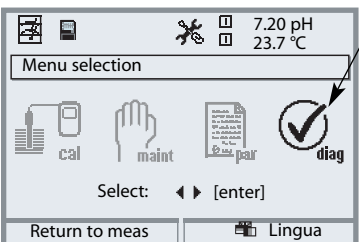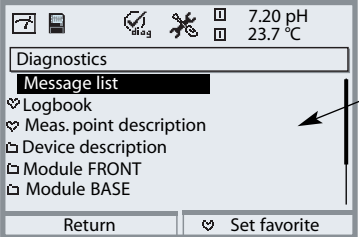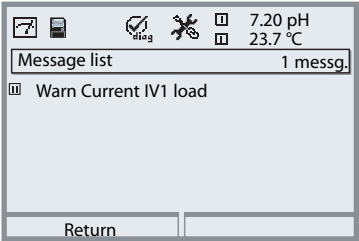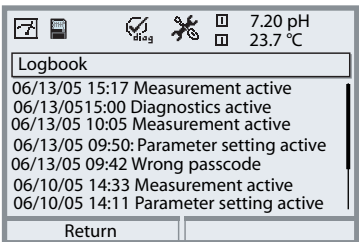
Select menu: Parameter setting/System control/Select Calculation Block
Setting the process variable to be calculated
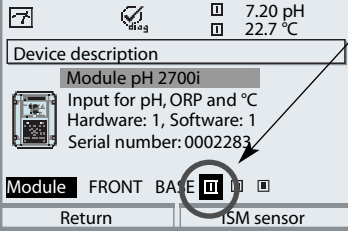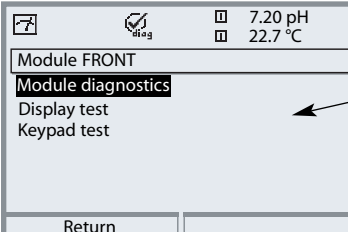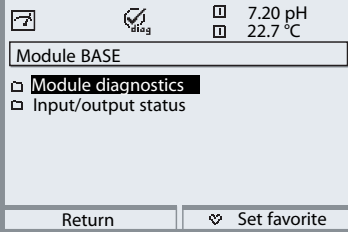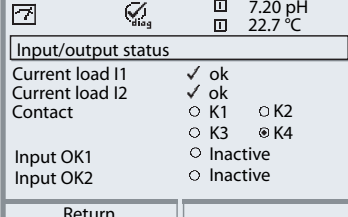
Menu	Display	Configuring a Calculation Block
	HOLD □ 7.20 pH □ 25.6 °C Parameter setting (Administrator) ▫ System control ▫ Module FRONT M 700-011 ▫ Module BASE M 700-021 ▫ □ Module pH 2700i ▫ Ⅲ Module pH 2700i ▫ □ Ⅲ Calc pH/pH Return	**Select Calculation Block** • Call up parameter setting • System control • Select module
	HOLD □ 7.20 pH □ 25.6 °C □ Ⅲ Calc pH/pH (Administrator) Difference pH ▼ □ – Ⅲ Difference ORP ▼ Off Difference °C ▼ □ – Ⅲ ▫ Messages Return	• Depending on modules installed, the possible combinations for Calculation Blocks are offered
	HOLD □ 7.20 pH □ 25.6 °C □ Ⅲ Messages (Administrator) ▫ Messages pH diff ▫ Messages ORP diff ▫ Messages Temp diff Return HOLD □ 7.20 pH □ 25.6 °C □ Ⅲ 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**.

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Diagnostics functions

General status information of the measuring system
Select menu: Diagnostics
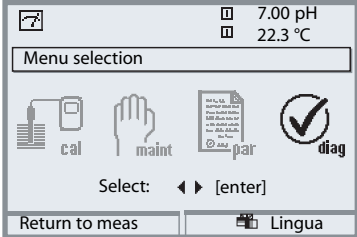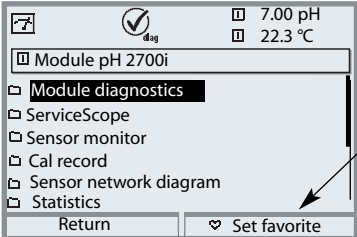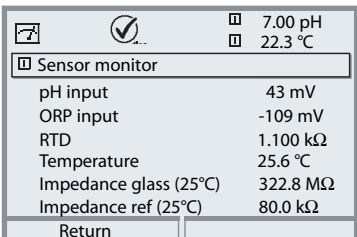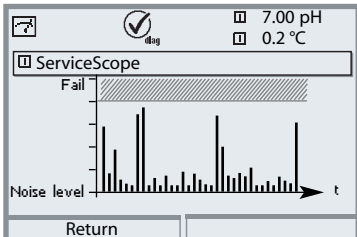
Menu	Display	Diagnostics functions
	▦ ▤　　　　✖ □ 7.20 pH 　　　　　　　□ 23.7 ℃ Menu selection 📟　✋　📄　✓diag cal　maint　par　diag Select: ◀ ▶ [enter] Return to meas　　　📖 Lingua	**Call up diagnostics** From the measuring mode: Press **menu** key to select menu. Select diagnostics using arrow keys, confirm with **enter**.
✓diag	▣ ▤　　✓diag ✖ □ 7.20 pH 　　　　　　　□ 23.7 ℃ Diagnostics Message list ♡ Logbook ♡ Meas. point description ▭ Device description ▭ Module FRONT ▭ Module BASE 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 24).
	▣ ▤　　✓diag ✖ □ 7.20 pH 　　　　　　　□ 23.7 ℃ Message list　　　　　1 messg. □ Warn Current IV1 load Return	**Message list** Shows the currently activated warn- ing or failure messages in plain text.
	▣ ▤　　✓diag ✖ □ 7.20 pH 　　　　　　　□ 23.7 ℃ Logbook 06/13/05 15:17 Measurement active 06/13/0515:00 Diagnostics active 06/13/05 10:05 Measurement active 06/13/05 09:50: Parameter setting active 06/13/05 09:42 Wrong passcode 06/10/05 14:33 Measurement active 06/10/05 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	7.20 pH / 22.7 °C — Device description — Module pH 2700i, Input for pH, ORP and °C, Hardware: 1, Software: 1, Serial number: 0002283 — Module FRONT BASE I II — Return / ISM sensor	**Device description** Select module using arrow keys: Provides information about all modules installed: Function, serial number, hardware and software version and device options.
	7.20 pH / 25.6 °C — ISM sensor connected — Sensor: InPro 3250SG, Manufacturer: Mettler-Toledo, **ISM** Article No.: 52002559, Serial number: 0000313, Adjustment: 09.05.05 08:15 — Return	**ISM sensor description** Information on sensor type, manufacturer, article no., serial number, date of last adjustment
	7.20 pH / 22.7 °C — Module FRONT — Module diagnostics, Display test, Keypad test — Return	**Module FRONT** The module the display and keypad control. Test possibilities: • Module diagnostics • Display test • Keypad test
	7.20 pH / 22.7 °C — Module BASE — Module diagnostics, Input/output status — Return / Set favorite	**Module BASE** The module generates the standard output signals. Test possibilities: • Module diagnostics • Input/output status
	7.20 pH / 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	Example: Module BASE, input/output status.
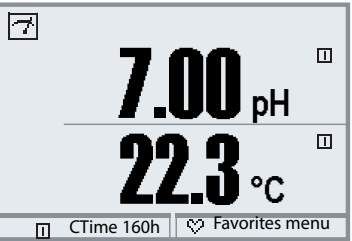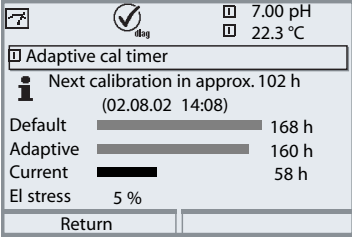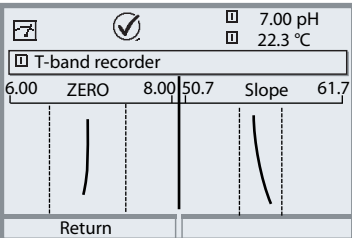
Module diagnostics

Module diagnostics, sensor monitor, ServiceScope

Menu	Display	Module diagnostics, sensor monitor, ServiceScope
diag	7.00 pH / 22.3 ℃ — 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**. Then select "Module pH".
	7.00 pH / 22.3 ℃ — Module pH 2700i — **Module diagnostics** / ServiceScope / Sensor monitor / Cal record / Sensor network diagram / Statistics — Return / Set favorite	The Diagnostics menu gives an overview of all diagnostics functions available. <u>Messages set as "Favorite"</u> can be called up directly from the measuring mode using a softkey. To configure: Parameter setting / System control / Function control matrix.
	7.00 pH / 22.3 ℃ — Sensor monitor — pH input 43 mV / ORP input -109 mV / RTD 1.100 kΩ / Temperature 25.6 ℃ / Impedance glass (25℃) 322.8 MΩ / Impedance ref (25℃) 80.0 kΩ — Return	**Sensor monitor (Fig.)** Shows the values currently measured by the sensor. Important function for diagnostics and validation! (cf Maintenance)
	7.00 pH / 0.2 ℃ — ServiceScope — Fail ... Noise level ... t — Return	**ServiceScope (SW 700-004)** Monitors the pH input signal. Displays the noise levels over the time. An error message is generated if the noise level exceeds the failure limit.

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Module diagnostics

Calibration timer, Tolerance adjustment, Cal record, Sensor network diagram, Statistics

Menu	Display	Calibration timer, tolerance adjustment
⬚	**7.00** pH **22.3** °C CTime 160h ♡ Favorites menu	**Cal timer** After expiration of a presettable interval (Parameter setting, Module pH, Cal preset values), the calibration timer generates a warning message as a reminder that calibration is required. The remaining time can be indicated in the measuring mode by pressing a softkey (secondary display: "CTime").
⊘ diag	7.00 pH 22.3 °C Adaptive cal timer ℹ Next calibration in approx. 102 h (02.08.02 14:08) Default ▬▬▬▬▬ 168 h Adaptive ▬▬▬▬ 160 h Current ▬▬ 58 h El stress 5 % Return	**Adaptive calibration timer** The time until the next due calibration is automatically reduced depending on the electrode stress (temperature, pH value), i.e. old electrode = timer expires sooner.
	7.00 pH 22.3 °C T-band recorder 6.00 ZERO 8.00 50.7 Slope 61.7 Return	**Tolerance adjustment** (Additional function SW 700-005) Records the tolerance ranges for zero and slope over the time. If the values determined by a calibration exceed the tolerance limits, the calibration is taken over as adjustment. Display can be graphical or as a listing. The tolerance band (zero, slope) is configured during parameter setting (Module pH, Cal preset values).

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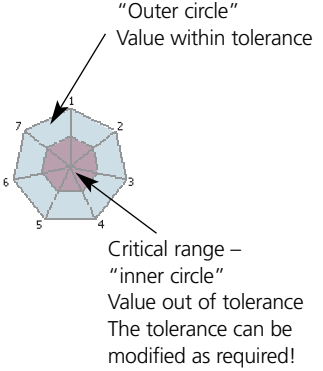| Menu	Display	Cal record, sensor network diagram, statistics
✓ diag	☑ 7.00pH / 24.2°C ☐ Cal record Active adjustment 25.05.05 15:35 Sensor type InPro3200SG Serial number 00150313 Cal mode Calimatic Zero 6.95 pH Slope 058.7 mV/pH Return · Calibration data	**Cal record** Data of last adjustment/calibration, suitable for documentation to ISO 9000 and GLP/GMP (Date, time, calibration method, zero and slope, isothermal potential, information concerning calibration buffers and response times)

Sensor network diagram

☑ 7.00pH / 24.1°C
☐ Sensor network diagram pH

1 - Slope
2 - Zero
3 - Ref impedance
4 - Glass impedance
5 - Response time
6 - Cal timer
7 - Sensor wear

Return

Graphical representation of the sensor parameters. Tolerance limit violations can be seen at a glance. Critical parameters are flashing. Parameters displayed in gray have been disabled during parameter setting or do not apply to the currently selected sensor.
The tolerance limits (radius of "inner circle") can be modified as desired. See Parameter setting/ Module pH/Sensor data/ Sensor monitoring details, Pg 62

"Outer circle"
Value within tolerance

Critical range –
"inner circle"
Value out of tolerance
The tolerance can be modified as required!

☐ Statistics	**Statistics**

☑ 7.00pH / 20.2°C
☐ Statistics
Zero
  1st Cal +07.00 pH 01/07/05 10:03
  Diff +00.03 pH 01/08/0517:24
  Diff +00.02 pH 12/08/05 09:14
  Diff +00.03 pH 28/08/05 11:47
Slope
Return
	Indication of sensor data for the First Calibration (adjustment) and the last 3 calibrations compared to the First Calibration.
	(Date and time of First Calibration, zero and slope, impedance of glass and reference electrode, response time. For ISM, the data are stored in the sensor)

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Specifications

Specifications M 700 pH 2700i(X)

pH/ORP input	Simultaneous measurement of pH and ORP
(EEx ia IIC)	with glass electrodes or ISFET (InPro 3300),
	control of ISM sensors
	Input for glass electrode
	Input for reference electrode
	Input for redox (ORP) electrode or solution GND (SG)
	Input for ISFET

Measurement range (MR)	pH value	-2.00 ... +16.00
	ORP value	-2000 ... +2000 mV
	rH value	0.0 ... 42.5

Adm. voltage ORP + pH [mV]	2000 mV	
Adm. cable capacitance	< 2 nF (cable length max. 20 m)	
Glass electrode input [**]	Input resistance	> 1 x 10^{12} Ω
	Input current	< 1 x 10^{-12} A [****]
	Impedance range	0,5 ... 1000 MΩ
Reference electrode input [**]	Input resistance	> 1 x 10^{10} Ω
	Input current	< 1 x 10^{-10} A [****]
	Impedance range	0,5 ... 200 kΩ
Measurement error [***]	pH value	< 0.02 TC < 0.001 pH/K
(Display)	ORP value	< 1 mV TC < 0.05 mV/K

Temperature input	2-wire connection, adjustable	
(EEx ia IIC)	Pt 100	-50 ... +150 °C / -58 ... 302 °F
Measurement range (MR)	Pt 1000	-50 ... +150 °C / -58 ... 302 °F
	NTC 30 kohms	-20 ... +150 °C / -4 ... 302 °F
	NTC 8.55 kohms	-10 ... +130 °C / 14 ... 266 °F
Resolution	0.1 °C / 1 °F	
Measurement error[***]	0.2 % meas.val. + 0.5 K (< 1 K with NTC > 100 °C)	

Temp compensation	Reference temp 25 °C
media-dependent	– Linear temperature coefficient,
	user-defined from 00.00 ... 19.99%/K
	– Ultrapure water 0 ... 150 °C
	– Table 0 to 95 °C, user-defined in 5 K steps

ORP [*]	Automatic conversion to standard hydrogen electrode SHE when type of reference electrode is entered
ORP calibration [*]	Zero adjustment -200 ... +200 mV

ISFET	ISFET sensor standardization
(Additional function SW 700-012)	Automatic determination of zero offset
	adm. range -1800 mV to 0

pH sensor standardization [*]	1-/2-/3-point calibration (best fit lines)
	Operating modes:
	– Calimatic automatic buffer recognition
	– Input of individual buffer values
	– Product calibration
	– Data entry of premeasured electrodes
Drift check[*]:	fine / standard / coarse
Calimatic buffer sets: [*]	– Fixed buffer sets:

    1 Mettler-Toledo   2.00 / 4.01 / 7.00 / 9.21
    2 Merck/Riedel   2.00 / 4.00 / 7.00 / 9.00 / 12.00
    3 DIN 19267   1.09 / 4.65 / 6.79 / 9.23 / 12.75
    4 NIST standard   4.006 / 6.865 / 9.180
    5 Techn. buffers to NIST   1.68 / 4.00 / 7.00 / 10.01 / 12.46
– Manually enterable buffer set with max. three buffer tables
(Additional function SW 700-002)

Nom. zero [*]	pH 0 ... 14; calibration range ΔpH = ± 1
Nom. slope (25 °C) [*]	25 ... 61 mV/pH; calibration range 80 ... 103 %
V_{iso} [*]	-1000 to +1000 mV

Calibration record	Recording of: zero, slope, V_{iso}, response time, calibration method with date and time

Statistics	Recording of:
	zero, slope, V_{iso}, response time, glass and reference impedance with date and time of the last three calibrations and the First Calibration

Sensocheck	Glass electrode:
	Automatic monitoring of glass and reference electrode, message can be switched off
	ISFET electrode:
	Monitoring of ISFET parameters and reference electrode

Sensoface	Provides information on the sensor condition:
	Zero/slope, response time, calibration interval, Sensocheck, sensor wear (ISM only)

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Specifications

Sensor network diagram	Graphical representation of sensor parameters in a network diagram: slope, zero, reference impedance, glass impedance, response time, cal timer, sensor wear (ISM only)
Sensor monitor	Direct display of measured values from sensor for validation pH input / ORP input / glass el. impedance / ref. el. impedance / RTD / temperature
Wear monitor	Display of wear parameters Sensor load / sensor operating time / autoclaving cycles / CIP cycles / SIP cycles / maximum process temperature
ISM	**Intelligent Sensor Management** Plug & Measure Display of sensor data: manufacturer, production date, calibration date, wear data Enhanced diagnostic capabilities
KI recorder (Additional function SW 700-001)	Adaptive representation of a process sequence with monitoring and signaling of critical parameters
Adaptive calibration timer *	Automatic adjustment of calibration interval (Sensoface signal), depending on measured values
ServiceScope * (Additional function SW 700-004)	Monitoring of glass / reference electrode inputs for overdrive, graphical representation
Tolerance adjustment (Additional function SW 700-005)	Tolerant calibration/adjustment, tolerance limits adjustable graphical representation of zero and slope for the last 40 calibrations/adjustments

*)   User-defined
**)   To IEC 746 Part 1, at nominal operating conditions
***)   ± 1 count, plus sensor error
****)   at 20 °C, doubles every 10 K

Specifications

General data

Explosion protection (Module pH 2700iX only)	See rating plate: KEMA 04 ATEX 2056
	ATEX: II 2 (1) GD EEx ib [ia] IIC T4 T 70 °
	FM: IS, Class I, Div 1, Group A, B, C, D T4
	NI, Class I, Div 2, Group A, B, C, D T4
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 (Ex: max. +50 °C)
	Relative humidity 10 ... 95 % not condensing
Transport/ Storage temperature	-20 ... +70 °C
Terminals	Single wires and flexible leads up to 2.5 mm^2 (AWG 14)

Annex:
Minimum measuring spans for current outputs

The pH 2700i(X) module is a measuring module. It does not provide current outputs. Current outputs are provided by the M 700 BASE (basic device) or by communication modules (e.g. Out, PID). The corresponding parameters must be set there.

The **minimum current span** shall prevent that the resolution limit of the measurement technology (± 1 count) is seen in the current.

pH 2700i(X) module

pH	1.00
ORP	100.0
°C	10.0
mV	100.0
rH	1.00
°F	10.0

Calculation Block pH/pH

Diff pH	1.00
Diff ORP	100.0
Diff °C	10.0

Puffertabellen / Buffer tables / Tables des tampons

Mettler-Toledo

°C	pH			
0	2,03	4,01	7,12	9,52
5	2,02	4,01	7,09	9,45
10	2,01	4,00	7,06	9,38
15	2,00	4,00	7,04	9,32
20	2,00	4,00	7,02	9,26
25	**2,00**	**4,01**	**7,00**	**9,21**
30	1,99	4,01	6,99	9,16
35	1,99	4,02	6,98	9,11
40	1,98	4,03	6,97	9,06
45	1,98	4,04	6,97	9,03
50	1,98	4,06	6,97	8,99
55	1,98	4,08	6,98	8,96
60	1,98	4,10	6,98	8,93
65	1,99	4,13	6,99	8,90
70	1,99	4,16	7,00	8,88
75	2,00	4,19	7,02	8,85
80	2,00	4,22	7,04	8,83
85	2,00	4,26	7,06	8,81
90	2,00	4,30	7,09	8,79
95	2,00	4,35	7,12	8,77

Puffertabellen / Buffer tables / Tables des tampons

Merck/Riedel

°C	pH				
0	2,01	4,05	7,13	9,24	12,58
5	2,01	4,04	7,07	9,16	12,41
10	2,01	4,02	7,05	9,11	12,26
15	2,00	4,01	7,02	9,05	12,10
20	**2,00**	**4,00**	**7,00**	**9,00**	**12,00**
25	2,00	4,01	6,98	8,95	11,88
30	2,00	4,01	6,98	8,91	11,72
35	2,00	4,01	6,96	8,88	11,67
40	2,00	4,01	6,95	8,85	11,54
45	2,00	4,01	6,95	8,82	11,44
50	2,00	4,00	6,95	8,79	11,33
55	2,00	4,00	6,95	8,76	11,19
60	2,00	4,00	6,96	8,73	11,04
65	2,00	4,00	6,96	8,72	10,97
70	2,01	4,00	6,96	8,70	10,90
75	2,01	4,00	6,96	8,68	10,80
80	2,01	4,00	6,97	8,66	10,70
85	2,01	4,00	6,98	8,65	10,59
90	2,01	4,00	7,00	8,64	10,48
95	2,01	4,00,	7,02	8,64	10,37

pH 2700i(X)

DIN 19267

°C	pH				
0	1,08	4,67	6,89	9,48	13,95*
5	1,08	4,67	6,87	9,43	13,63*
10	1,09	4,66	6,84	9,37	13,37
15	1,09	4,66	6,82	9,32	13,16
20	1,09	4,65	6,80	3,27	12,96
25	**1,09**	**4,65**	**6,79**	**9,23**	**12,75**
30	1,10	4,65	6,78	9,18	12,61
35	1,10	4,65	6,77	9,13	12,45
40	1,10	4,66	6,76	9,09	12,29
45	1,10	4,67	6,76	9,04	12,09
50	1,11	4,68	6,76	9,00	11,98
55	1,11	4,69	6,76	8,96	11,79
60	1,11	4,70	6,76	8,92	11,69
65	1,11	4,71	6,76	8,90	11,56
70	1,11	4,72	6,76	8,88	11,43
75	1,11	4,73	6,77	8,86	11,31
80	1,12	4,75	6,78	8,85	11,19
85	1,12	4,77	6,79	8,83	11,09
90	1,13	4,79	6,80	8,82	10,99
95	1,13*	4,82*	6,81*	8,81*	10,89*

* extrapoliert / extrapolated / extrapolée

NIST Standard (DIN 19266 : 2000-01)

°C	pH			
0				
5	1.668	4.004	6.950	9.392
10	1.670	4.001	6.922	9.331
15	1.672	4.001	6.900	9.277
20	1.676	4.003	6.880	9.228
25	**1.680**	**4.008**	**6.865**	**9.184**
30	1,685	4.015	6.853	9.144
37	1,694	4.028	6.841	9.095
40	1.697	4.036	6.837	9.076
45	1.704	4.049	6.834	9.046
50	1.712	4.064	6.833	9.018
55	1.715	4.075	6.834	9.985
60	1.723	4.091	6.836	8.962
70	1.743	4.126	6.845	8.921
80	1.766	4.164	6.859	8.885
90	1.792	4.205	6.877	8.850
95	1.806	4.227	6.886	8.833

Note:
The table above only serves for orientation purposes.
The actual pH values of the individual batches of the reference materials are documented in a certificate of an accredited laboratory. This certificate is supplied with the respective buffers.

Puffertabellen / Buffer tables / Tables des tampons

Techn. Puffer nach NIST / According to NIST / Suivant NIST

°C	pH			
0	4.00	7.14	10.30	
5	4.00	7.10	10.23	
10	4.00	7.04	10.11	
15	4.00	7.04	10.11	
20	4.00	7.02	10.05	
25	4.01	7.00	10.00	
30	4.01	6.99	9.96	
35	4.02	6.98	9.92	
40	4.03	6.98	9.88	
45	4.05	6.98	9.85	
50	4.06	6.98	9.82	
55	4.07	6.98	9.79	
60	4.09	6.99	9.76	
65	4.09 *	6.99 *	9.76 *	
70	4.09 *	6.99 *	9.76 *	
75	4.09 *	6.99 *	9.76 *	
80	4.09 *	6.99 *	9.76 *	
85	4.09 *	6.99 *	9.76 *	
90	4.09 *	6.99 *	9.76 *	
95	4.09 *	6.99 *	9.76 *	

* Values complemented

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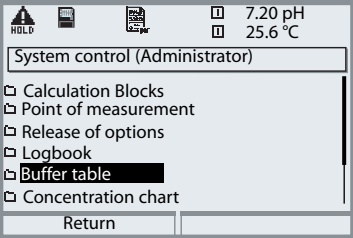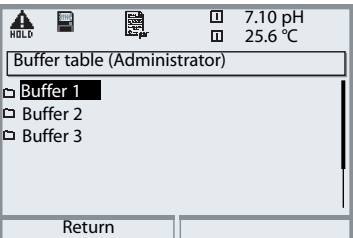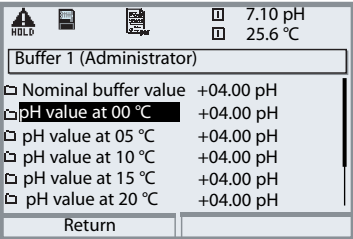
Buffer sets to be entered: SW 700-002

Select menu: Parameter setting/System control/Buffer table
Individual buffer set (with 3 buffer solutions) for pH measurement

Buffer table
You can enter an individual buffer set. To do so, you enter 3 complete buffer
solutions in ascending order (e.g. pH 4, 7, 10) for the correct temperature
(range 0 ... 95 °C, 5 °C steps).
<u>Distance between buffers in the whole temperature range</u>: min. 2 pH units.
Then this buffer set is available as "Table" in addition to the permanently set
standard buffer solutions.

Menu	Display	Buffer table: Entering values
	⚠ 🔋 📟 □ 7.20 pH **HOLD □ 25.6 °C** System control (Administrator) ▢ Calculation Blocks ▢ Point of measurement ▢ Release of options ▢ Logbook ▢ Buffer table ▢ Concentration chart Return	**Enter buffer set** • Call up parameter setting • System control • Select "Buffer table"
	⚠ 🔋 📟 □ 7.10 pH **HOLD □ 25.6 °C** Buffer table (Administrator) ▢ Buffer 1 ▢ Buffer 2 ▢ Buffer 3 Return	• Select buffer to be entered 3 complete buffer solutions must be entered in ascending order (e.g. pH 4, 7, 10). Mininum distance: 2 pH units
	⚠ 🔋 📟 □ 7.10 pH **HOLD □ 25.6 °C** Buffer 1 (Administrator) ▢ Nominal buffer value +04.00 pH ▢ pH value at 00 °C +04.00 pH ▢ pH value at 05 °C +04.00 pH ▢ pH value at 10 °C +04.00 pH ▢ pH value at 15 °C +04.00 pH ▢ pH value at 20 °C +04.00 pH Return	• Enter nominal buffer value and all other values for the correct temperature (right/left arrow keys to select position, up/down arrow keys to edit number, confirm with **enter**.)

The special buffer set is selected as follows:
Parameter setting/Module pH/Cal preset values/Calimatic buffer/Table.

METTLER TOLEDO

Parameter setting menu

| | 25.6 ℃ |
| Select menu | 7.00 pH |

cal · maint · par · diag

Select: ◀ ▶ [enter]

| Return to meas | Lingua |

	25.6 ℃
Parameter setting	7.00 pH
Viewing level	(All Data) view
Operator level	(Operation Data) opl
Administrator level	(All Data) adm

| Return | |
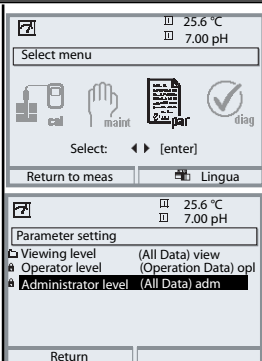
Parameter setting

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

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

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

Viewing level
Only display, no editing possible!

System control

Memory card (Option) • Register Logbook • Register recorder • Decimal separator • Card full • Formatting	Menu only appears with SmartMedia Card inserted. Make sure that it is a <u>memory card</u>, not an <u>update</u> card. Commercially available SmartMedia cards must be formatted before they can be used as memory card.
Copy configuration	The complete configuration of an analyzer can be written on a SmartMedia card. This allows transferring all device settings - except options and passcodes - to other devices with identical equipment.
Parameter sets • Load • Save	2 parameter sets (A,B) are available in the analyzer. The currently active parameter set is read on the display. Parameter sets contain all settings except: Sensor type, Options, System control settings Up to 5 parameter sets (1, 2, 3, 4, 5) are available when a SmartMedia card (Option) is used.
Function control matrix • Input OK2 • Left softkey • Right softkey	Selecting the control element for the following functions: - Parameter set selection - KI recorder (Start/Stop) - Favorites menu (selected diagnostics functions) - EC 400 (fully automated probe controller)
Time/date	Selecting the display format, entry
Meas. point description	Can be called up in the diagnostics menu.
Release of options	A TAN is required to release an Option.
Software update	Software update from SmartMedia card (update card)
Logbook	Selecting events to be recorded
Buffer table	Entering own buffer set for automatic calibration
Factory setting	Resetting all parameters to factory setting
Passcode entry	Editing the passcodes

pH 2700i(X)

Parameter setting menu

Display settings: FRONT module

Languages

Measurement display	Representation of measured values on the display:
• Main display	- Selecting the number of primary values displayed (one or two)
• Display format	- Decimal places
• Viewing angle	

Measurement recorder	Option. 2-channel, selection of process variable, start and end
• Time base	
• Zoom function	
• Min/Max display	

KI recorder	Option. See more detailed "Options" manual

Signal outputs and inputs, contacts: BASE module

Output current I1, I2 — 2 current outputs, separately adjustable
• Process variable
• Characteristic
• Output (0/4 - 20 mA)
• Output filter
• Behavior during messages
- Function check
--- Currently meas. value
--- Last meas. value
--- Fixed 22 mA
- 22 mA message

Behavior during messages

Output current [mA]

Contact K4	NAMUR Failure
• Contact type	
• ON delay	
• OFF delay	

Contacts K3, K2, K1 — Factory setting:
• Usage — K3: Maintenance request, K2: Function check, K1: Limit value
- Maintenance request
- Function check
- Limit value (adjustable) — - Variable, limit value, hysteresis, effective direction, ...
- Rinse contact (adjustable) — - Rinsing interval, lead times, rinse duration, logbook entry, ...
- Parameter set B active
- USP output
- KI recorder active
• Contact type
• ON delay
• OFF delay

Inputs OK1, OK2 — Optocoupler - signal inputs
• OK1 usage — Off, function check
- Signal level — active level switchable from 10 to 30 V or < 2 V, resp.
For OK2 see System control/Function control matrix

METTLER TOLEDO

Parameter setting menu

pH 2700i(X) module

Input filter

Sensor data	Representation of measured values on the display:
• Sensor type	- Selection (automatic for ISM)
• Temperature detection	- Selection (automatic for ISM) for meas / cal
• Sensoface	
• Sensor monitoring	
Details	
- Slope	
- Zero	
- Sensocheck ref. el.	
- Sensocheck glass el.	
- Response time	
- Sensor wear	
- CIP counter	
- SIP counter	
- Autoclaving counter	
- Sensor operating time	

Cal preset values
- Calimatic buffer
  - Mettler-Toledo
  - Merck/Riedel
  - DIN 19267
  - NIST standard
  - NIST technical
  - Table
- Drift check
- Calibration timer
- Cal tolerance band
- ORP check

TC process medium	Selection: Off, linear, ultrapure water, table

ORP/rH value
- Reference electrode
- ORP conversion to SHE
- Calculate rH with factor

Delta function

Messages
- pH value
- ORP value
- rH value
- Temperature
- mV value

Devaluate ISM sensor

Calibration menu

pH 2700i(X) module

Calimatic
Entry of buffer values
Product calibration
Data entry
ORP calibration

Maintenance menu

BASE module

Current source	Output current definable 0 ... 22 mA

pH 2700i(X) module

Sensor monitor	pH / ORP input, RTD, Temp, Impedance glass + ref. el.
Temp probe adjustment	Compesating for lead length

Diagnostics menu

Message list	List of all warning and failure messages
Meas. point description	
Logbook	
Device description	Hardware version, Serial no., (Module) Firmware, ISM, Options

FRONT module

Module diagnostics
Display test
Keypad test

BASE module

Module diagnostics
Input/output status

pH 2700i(X) module

Module diagnostics	Internal function test
Servicescope	pH input signal: Displays the noise levels over the time
Sensor monitor	Shows the values currently measured by the sensor
Cal record	Data of last adjustment / calibration
Cal record ORP	Data of last ORP adjustment / calibration
Sensor network diagram pH	Graphical representation of the sensor parameters
Sensor wear monitor	Current sensor wear, No. of CIP/SIP/autoclaving cycles
Statistics	Displays first calibration and deviations of last 3 calibrations

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Icon	Explanation of icons important for this module
☑ **ISM**	The analyzer is in measuring mode, an ISM sensor is connected.
⛭cal ▲HOLD	The analyzer is in calibration mode. Function check is active.
✋maint ▲HOLD	The analyzer is in maintenance mode. Function check is active.
▤par ▲HOLD	The analyzer is in parameter setting mode. Function check is active.
✅dia	The analyzer is in diagnostics mode.
NAMUR signals ▲HOLD 🔊)) ✖	**Function check**. The NAMUR "function check" contact is active (factory setting: BASE module, contact K2, N/O contact). Current outputs as configured: • Currently meas. value: The currently measured value appears at the current output • Last measured value: The last measured value is held at the current output • Fix 22 mA: The output current is at 22 mA **Failure**: The NAMUR "failure" contact is active (factory setting: BASE module, contact K4, N/C contact). To view error message, call up: Diagnostics menu/Message list **Maintenance**: The NAMUR "maintenance request" contact is active (factory setting: BASE module, contact K2, N/O contact). To view error message, call up: Diagnostics menu/Message list
🌡 man	Temperature detection by manual input
✵	Calibration is performed
🗒	Calibration - Step 1 of product calibration has been executed. The analyzer is waiting for the sample value.
TC	Calibration: Temperature compensation for process medium is active (Linear/Ultrapure water/Chart)
Δ	Delta function is active (Output value = measured value – delta value)
🗀	In the plaintext display in front of a menu line: Access to next menu level with **enter**
🔒	In the plaintext display in front of a menu line when it has been blocked by the Administrator against access from the Operator level.
⬚	Designates the module slot (1, 2 or 3), allowing the clear assignment of measured-value/parameter displays in the case of identical module types.
▤B	Indicates the active parameter set (The analyzer provides two parameter sets A and B. Up to 5 sets can be added using additional functions and SmartMedia card.)

METTLER TOLEDO

Menu selection