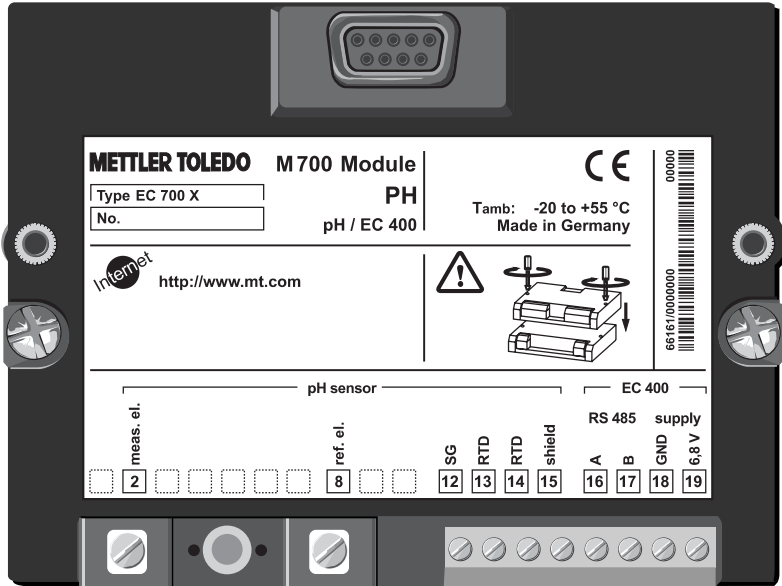


# EC 700(X) module

Instruction manual



Order number: 52 121 259

**METTLER TOLEDO**



69343

## 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

CalCheck  
Calimatic  
Sensocheck  
Sensoface  
ServiceScope  
VariPower

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

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

---

Mettler-Toledo GmbH, Process Analytics, Industrie Nord,  
CH-8902 Urdorf, Tel. +41 (44) 736 22 11 Fax +41 (44) 736 26 36  
Subject to technical changes. Mettler-Toledo GmbH, 07/05.  
Printed in Germany.

## Mettler-Toledo GmbH

Process Analytics

Adresse Im Hackacker 15 (Industrie Nord), CH-8902 Urdorf, Schweiz  
Briefadresse Postfach, CH-8902 Urdorf  
Telefon 01-736 22 11  
Telefax 01-736 26 36  
Internet www.mt.com  
Bank Credit Suisse First Boston, Zürich (Acc. 0835-370501-21-90)

# Declaration of conformity Konformitätserklärung Déclaration de conformité



**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**

**EasyClean EC700**

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/EG**

**Place and Date of issue/**

**Ausstellungsart/ - Datum**

**Lieu et date d'émission**

**Urdorf, July 6th, 2005**

Mettler-Toledo GmbH, Process Analytics

Waldemar Rauch  
General Manager PO Urdorf

Thomas Hösl  
Head of Operations and R&D

**Norm/ Standard/ Standard**

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

**METTLER TOLEDO**

CE\_EasyClean\_EC700\_int.doc



## Mettler-Toledo GmbH

Process Analytics

Adresse Im Hackacker 15 (Industrie Nord), CH-8902 Urdorf, Schweiz  
Briefadresse Postfach, CH-8902 Urdorf  
Telefon 01-736 22 11  
Telefax 01-736 26 36  
Internet www.mt.com  
Bank Credit Suisse First Boston, Zürich (Acc. 0835-37050)-21-90)

# Declaration of conformity Konformitätserklärung Déclaration de conformité

CE 0344

### We/ Wir/Nous

**Mettler-Toledo GmbH, Process Analytics**

Im Hackacker 15  
8902 Urdorf  
Switzerland

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

### Description

#### Beschreibung/Description

**EasyClean EC700X**

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).

Explosion protection/  
Explosionsschutzrichtlinie/  
Prot. contre les explosions EMC

**94/9/EG  
KEMA 04 ATEX 1134  
NL-6812 AR Arnhem, KEMA 0344**

EMC Directive/  
EMV-Richtlinie/  
Directive concernant la CEM

**89/336/EWG**

Low-voltage directive/  
Niederspannungs-Richtlinie/  
Directive basse tension

**73/23/EG**

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

**Urdorf, July 6th, 2005**

Mettler-Toledo GmbH, Process Analytics



Waldemar Rauch  
General Manager PO Urdorf



Thomas Hösl  
Head of Operations and R&D

Norm/ Standard/ Standard

**EN 61010-1 / VDE 0411 Teil 1  
EN 61326 / VDE 0843 Teil 2  
EN 50014 EN 50020  
EN 50281-1-1 EN 50284**

**METTLER TOLEDO**

CE\_EasyClean\_EC700X\_int.doc

# Contents

---

Warranty .....	2
Registered trademarks .....	2
EC Declaration of Conformity .....	3
Intended use .....	8
Safety information .....	9
Software version .....	10
<b>Modular concept and instruction manuals .....</b>	<b>11</b>
System overview .....	12
EC 700(X) module .....	13
Short description: M 700 FRONT .....	14
Short description: Menu structure .....	15
Short description: M 700 BASE .....	17
Short description: System components .....	14
Start up .....	19
<b>Inserting the module .....</b>	<b>20</b>
<b>Wiring examples .....</b>	<b>21</b>
Multisense electrode with solution ground .....	21
Multisense electrode without solution ground .....	22
EasyClean 400(X) connection .....	23
<b>Quick start:</b>	
Menu selection, menu structure .....	24
Passcode entry .....	25
Configuring the measurement display .....	26
Setting diagnostics messages as favorite .....	28
<b>Calibration / Adjustment .....</b>	<b>30</b>
Adjustment .....	31
Calibration methods .....	32
Temperature compensation .....	33
Automatic electrode calibration .....	34
Manual electrode calibration .....	36

# Contents

---

Calimatic automatic buffer recognition .....	38
Calibration with manual entry of buffer values .....	40
Product calibration (calibration with sampling) .....	42
Data entry of premeasured electrodes .....	44
Monitoring functions for calibration .....	45
ORP calibration .....	46
Temperature dependence of commonly used reference systems .....	47
ISFET zero adjustment .....	48
<b>Maintenance of EC 700(X) .....</b>	<b>50</b>
Probe maintenance via M 700(X) .....	51
Manual control via M 700(X) .....	52
<b>Parameter setting of EC 700(X) .....</b>	<b>53</b>
Operating levels .....	54
Enable / lock functions .....	55
Input filter, sensor data .....	56
Sensoface .....	58
Cal preset values .....	60
- Tolerance adjustment: Program flow .....	61
- Activating the Cal tolerance band .....	62
TC process medium .....	64
ORP/rH value .....	67
Delta function .....	67
Messages .....	68
<b>Parameter setting: Logbook (System control) .....</b>	<b>70</b>
Logbook .....	70
Factory Setting .....	70
<b>Parameter setting: System control, inputs and outputs (BASE) .....</b>	<b>71</b>
Current outputs .....	71
Output filter .....	74

# Contents

---

NAMUR signals: Current outputs - behavior during messages - .....	75
NAMUR signals: Relay contacts (Failure, Maintenance request, Function check).....	76
Relay contacts: protective wiring.....	77
Setting the relay contacts .....	78
Limit value, hysteresis, contact type .....	79
<b>Setting the optocoupler inputs (BASE)</b>	
OK1 usage, OK1/OK2 switching level (BASE) .....	80
Switching parameter sets via OK2 (System control).....	81
<b>Measurement procedures .....</b>	<b>82</b>
Start-up program.....	82
<b>Parameter setting of EasyClean 400(X) .....</b>	<b>83</b>
Functional capabilities.....	83
Parameter setting: Program flows .....	86
Parameter setting: Wait position .....	89
Parameter setting: Service program .....	94
Parameter setting: Installation.....	97
Parameter setting: External control via DCS .....	98
Parameter setting: Configuring media monitoring .....	102
Parameter setting: Start-up.....	103
Parameter sets for copy .....	104
<b>Overview of icons .....</b>	<b>112</b>
<b>Diagnostics of EC 700(X).....</b>	<b>114</b>
Message list.....	114
Logbook .....	114
Device description.....	115
M 700 FRONT.....	115
M 700 BASE .....	115
Module diagnostics.....	116



# Contents

---

Sensor monitor.....	116
ServiceScope.....	116
Calibration timer.....	117
Adaptive calibration timer.....	117
Tolerance adjustment.....	117
Cal record.....	118
Sensor network diagram.....	118
Statistics .....	118
<b>Diagnostics of EasyClean 400(X) .....</b>	<b>119</b>
EC 400 status .....	119
EC 400 network diagram.....	119
Error messages of EasyClean 400(X) .....	120
<b>Specifications .....</b>	<b>124</b>
<b>Appendix</b>	
Minimum measuring spans for current outputs .....	128
Buffer tables.....	129
Buffer sets to be entered (option SW 700-002) .....	134
<b>Parameter setting menu (Overview of all setting possibilites) .....</b>	<b>135</b>
<b>Index.....</b>	<b>141</b>

# Intended use

---

The module is used for simultaneous pH, ORP, and temperature measurement with glass electrodes. It allows connection of the EasyClean 400(X) probe controller for fully automatic pH measurement, cleaning, and calibration.

The M 700 module EC 700X 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

(Additional function SW 700-107)

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:**

### **EC 700X module**

When using the EC 700X module, 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.

# Software version

EC 700(X) module

## Device software M 700(X)

The EC 700(X) module is supported by software version 6.0 or higher.


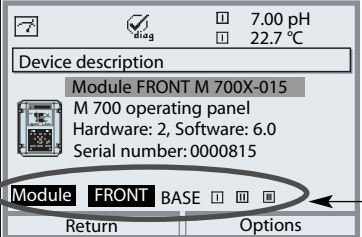
## Module software EC 700(X)

Software version 1.0 July 2005

## Query actual device/module software

When the M 700 is in measuring mode:

Press **menu** key, open Diagnostics menu.

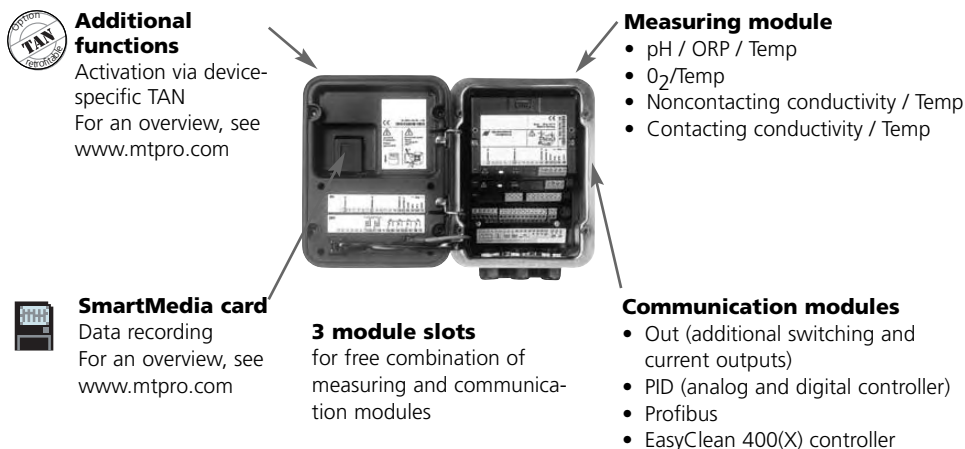
Menu	Display	Device description
		<p>Provides information about all modules installed: Module type and function, serial number, hardware and software version, and device options.</p> <p>Select the different modules (Front, Base, slots 1 - 3) using the arrow keys.</p>

# 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 (Front and Base modules) provides three slots which can be equipped by the user with any combination of measuring or communication modules. The software capabilities can be expanded by additional functions (options). Additional functions must be ordered separately. They are supplied with a device-specific TAN for function release.

## M 700(X) modular process analysis system

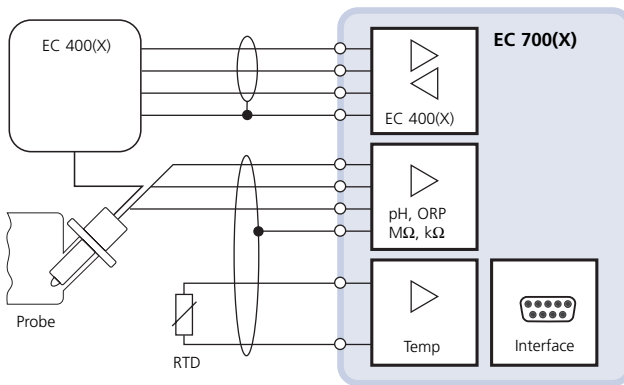
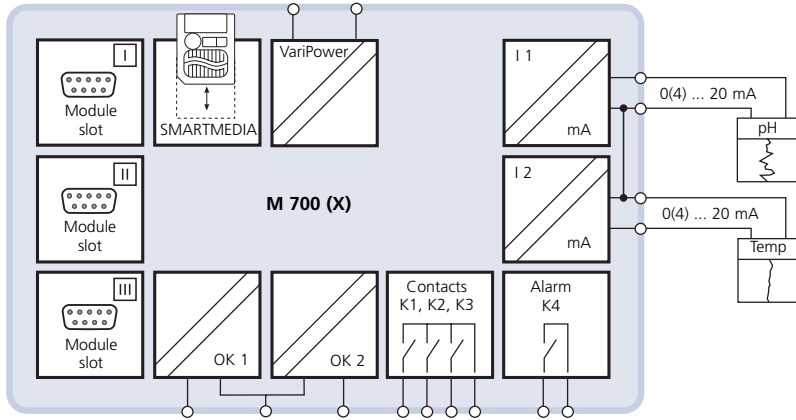


- **The instruction manual for the M 700(X)** describes how to install, commission, and operate the basic unit.
- **The instruction manual for the measuring or communication module** describes all functions required for commissioning and working with the respective measuring or communication module.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

# System overview

M 700(X) modular process analysis system:

Basic unit and control module for retractable housings



# EC 700(X) module

---

Measuring circuit and probe control function blocks

**For a direct access to the function descriptions related to the EasyClean 400(X) probe controller, please refer to the overview on the back page of this manual.**

**A table (original for copy) where you can enter your specific settings for the EasyClean 400(X) probe controller can be found on Pg 104.**

## **“Measuring circuit” and “probe control” function blocks**

The EC 700(X) module allows connection of the EasyClean 400 probe controller for fully automated pH measurement, cleaning, and calibration.

Even without the EasyClean 400(X), the EC 700(X) module is a fully fledged pH measuring module for simultaneous pH, ORP, and temperature measurement with glass electrodes.

This instruction manual describes the whole functionality of the EC 700(X) module corresponding to the different menu groups:

- Calibration
- Maintenance
- Parameter setting
- Diagnostics

M 700 is an expandable modular measuring system.  
For latest product information, please refer to:

**[www.mtpro.com](http://www.mtpro.com)**

# Short description: M 700 FRONT

M 700

Modular hardware and software system for liquid analysis.

## 4 captive screws

for opening the analyzer

**(Caution!** Make sure that the gasket between FRONT and BASE is properly seated and clean!)

## Transflective LC graphic display

(240 x 160 pixels)

white backlighting, high resolution, and high contrast.

## Measurement display

For parameter setting, see Pg 27

## User interface

with plaintext menus as recommended by NAMUR.

Menu texts can be switched to: German, English, French, Italian, Swedish, and Spanish.

Intuitively acquirable menu logic, based on Windows standards.

## Secondary displays

For parameter setting, see Pg 28

## 2 softkeys

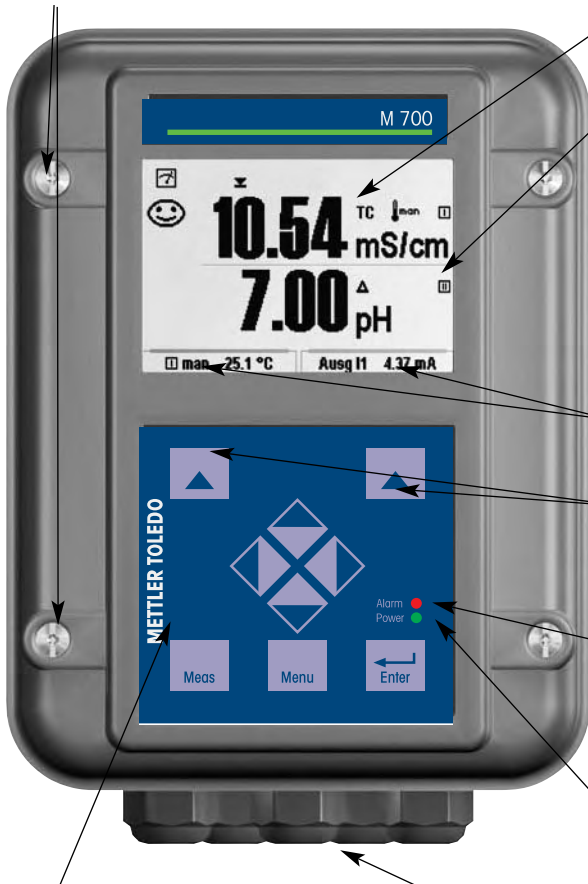
with context-sensitive functions.

## Red LED

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

## Green LED

Voltage supply okay



## Control panel

3 function keys

(menu, meas, enter)

and 4 arrow keys for menu selection and data entries

## 5 self-sealing cable glands

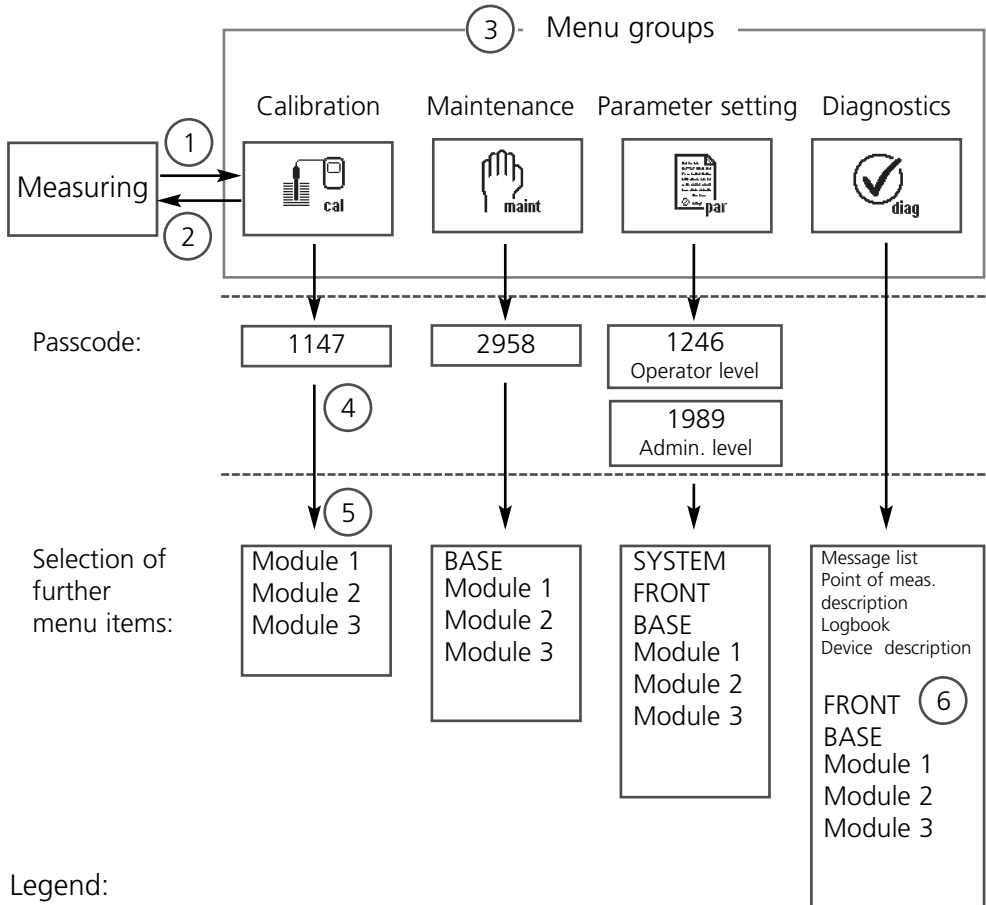
M20 x 1.5

for entry of voltage supply and signal lines



# Short description: Menu structure

Basic functions: Calibration, maintenance, parameter setting, diagnostics



Legend:

- (1) Pressing the **menu** key accesses menu selection
- (2) Pressing the **meas** key returns to measurement
- (3) Menu groups are selected using the arrow keys
- (4) Press **enter** to confirm, enter passcode
- (5) Further menu items are displayed
- (6) Selected functions of the Diagnostics menu can be recalled via softkey even when in measuring mode (Pg 28)

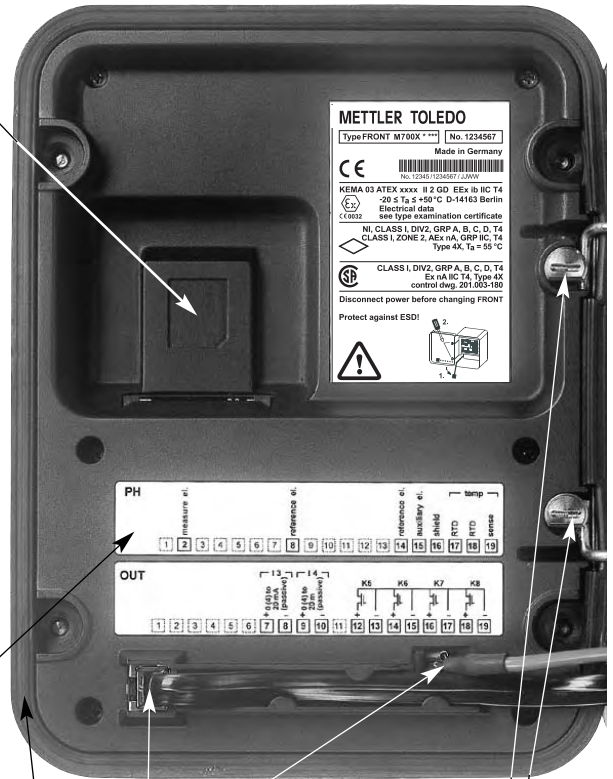
# Short description: M 700 FRONT

M 700

View into the open device (M 700 FRONT)

## Slot for SmartMedia card

- **Data recording**  
*The SmartMedia card expands the measurement recorder capacity to > 50000 records.*
- **Exchange of parameter sets**  
*5 parameter sets can be stored on the SmartMedia card, 2 of them can be loaded to the M 700 and switched by remote control. Configurations can be transferred from one M 700 to the other.*
- **Function expansions**  
*are possible with additional software modules which are released using transaction numbers (TAN).*
- **Software updates**



## 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

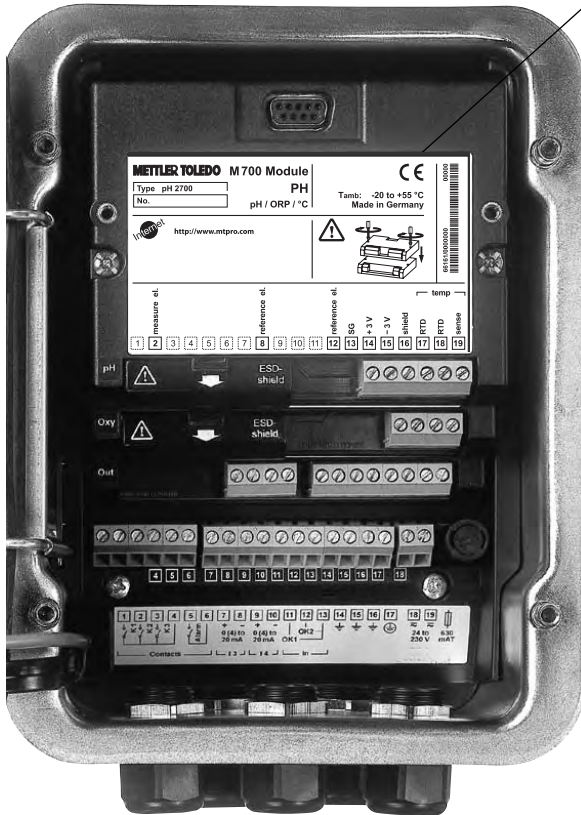
guarantees IP 65 protection and allows spray cleaning / disinfection.

**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 unit, 20 ... 265 V AC/DC, suitable for all public mains supplies in the world.

## Power supply units, IS version:

100 ... 230 V AC or  
24 V AC/DC

## Warning!

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

## Important note concerning SmartMedia card

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

# Short description: System components

Fully automatic process analysis system

The manufacturer offers the following optimally matched components which form a fully automatic process analysis system

- M 700(X) (Modular process analysis system)
- EasyClean 400(X) (Automatic control of retractable probes)
- Retractable housing and cables
- pH sensor

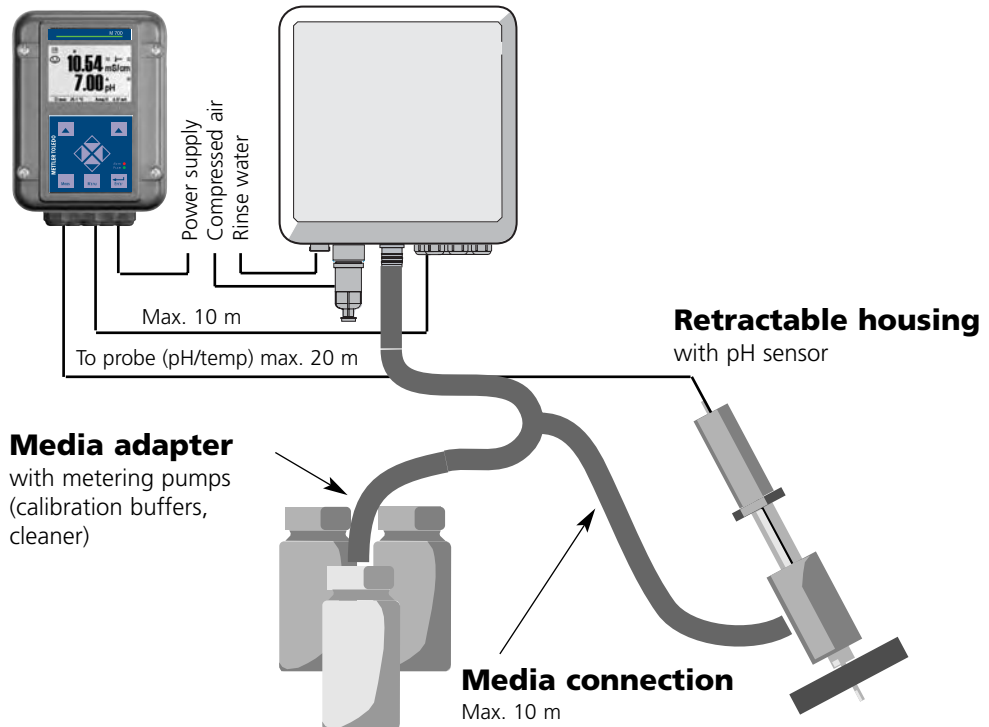
The system is operated from the M 700(X). Four operating modes are provided: calibration, parameter setting, maintenance, diagnostics.

The EC 700(X) module consists of 2 functional groups:

- Measuring circuit
- EC 400(X) probe controller

## M 700(X)

## EasyClean 400(X)



# Start-up

---

## Prerequisite

Mechanical and electrical installation of the components has been performed according to the separately enclosed operating and installation instructions (free download at **www.mtpro.com**):

- M 700(X)
- EasyClean 400(X)
- Retractable probe

## Procedure



### Caution!

Be sure to execute the following steps in the specified order!

- 1.)** Inserting the EC 700(X) module .....Page 20
- 2.)** Connecting sensor cable and EasyClean 400(X) .....Page 21

Configuring the EC 700(X) module in 2 steps:

- 3.)** EC 700(X) (electrode parameters).....Page 53
- 4.)** EasyClean 400(X) (probe control parameters).....Page 83
- 5.)** Manual electrode calibration .....Page 36

## Warning!

Before working on the retractable probe, it must be moved into SERVICE position. Be sure to read and observe the instruction manual of the retractable probe!

# 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.

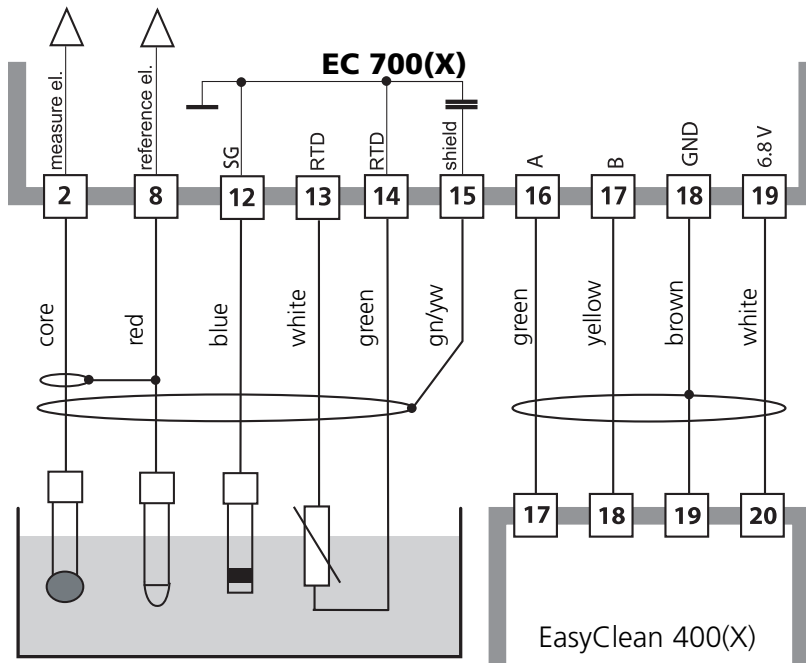
Make sure that the cable glands are tightly closed to protect against humidity.

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 53)

# Wiring example 1

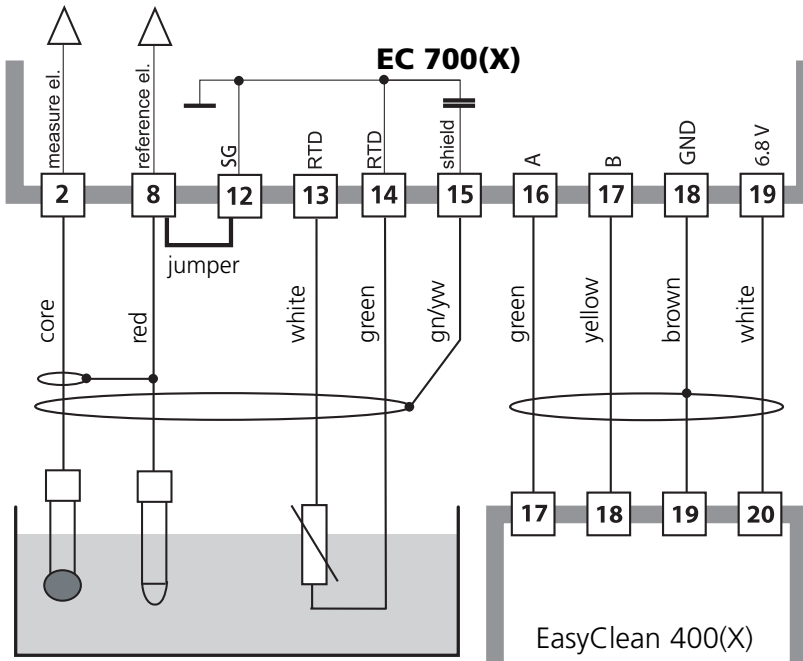
Wiring example InPro 3200SG

Simultaneous pH and ORP measurement  
with Sensocheck of glass and reference electrode (pH/ORP/temp)  
with solution ground (SG)



# Wiring example 2

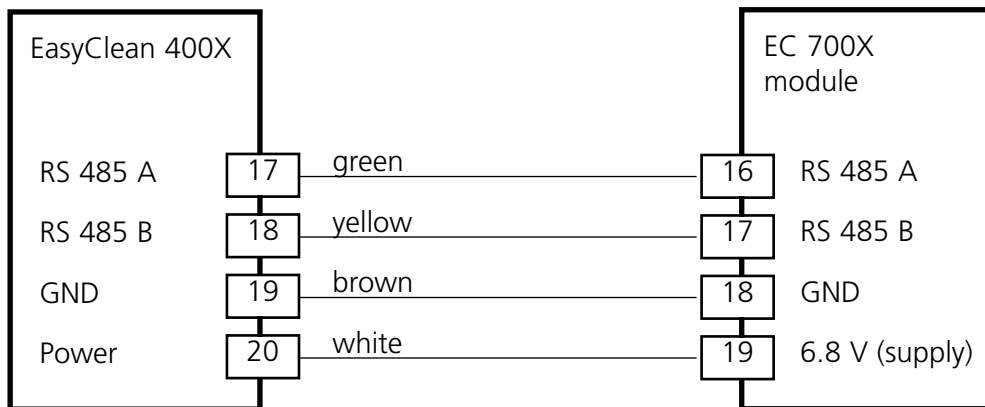
Wiring example  
pH measurement (pH/temp) with Sensocheck of glass electrode





# Connecting the EasyClean 400(X)

Probe controller for fully automatic measurement, cleaning, and calibration

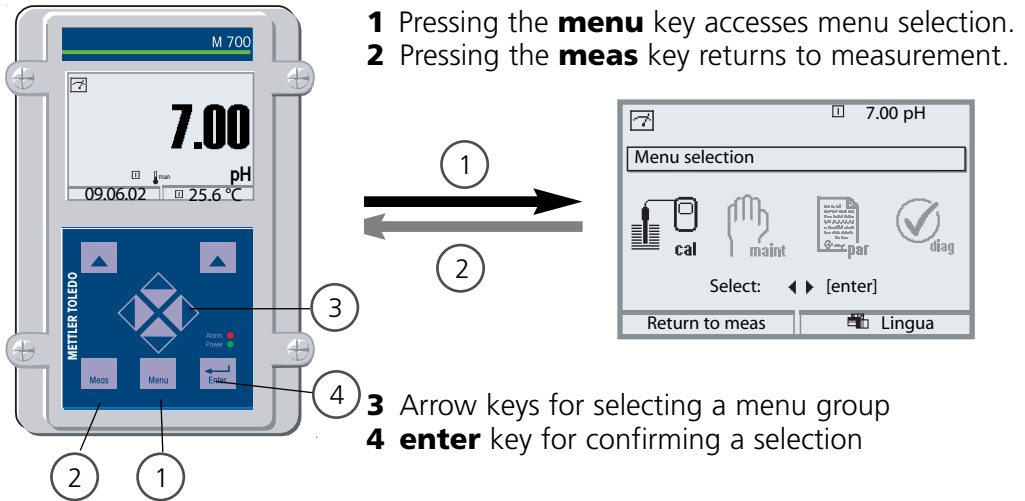


## EasyClean 400(X) controller

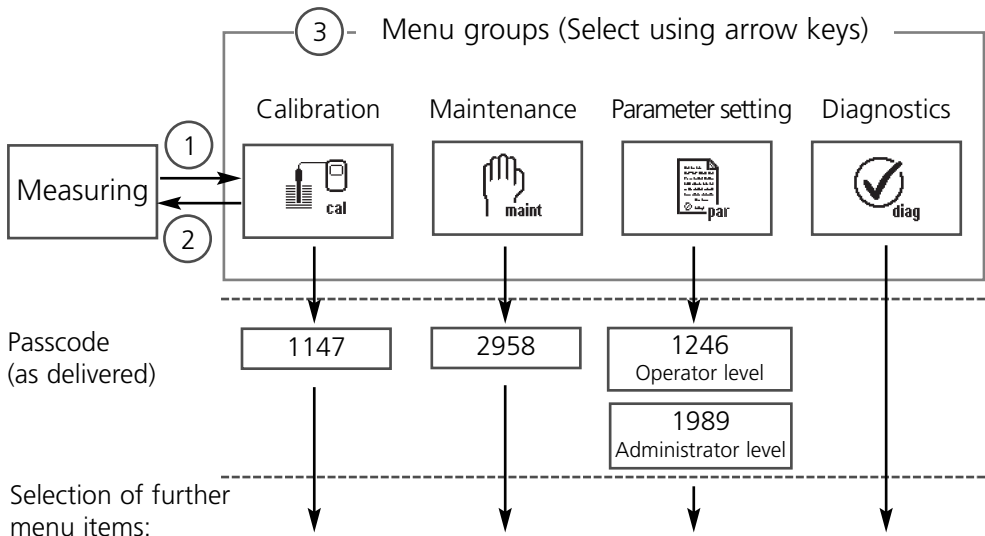
The EasyClean 400(X) probe controller is accompanied by an installation manual (free download at [www.mtpro.com](http://www.mtpro.com)).

# Menu selection

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



# Menu structure




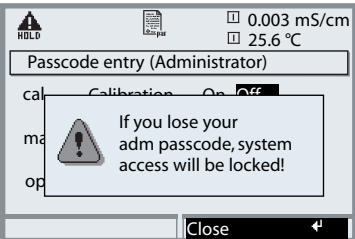
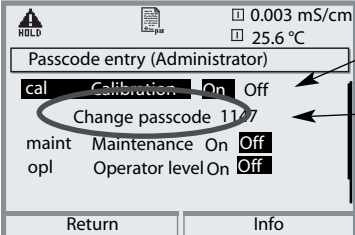
# Passcode entry

## 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

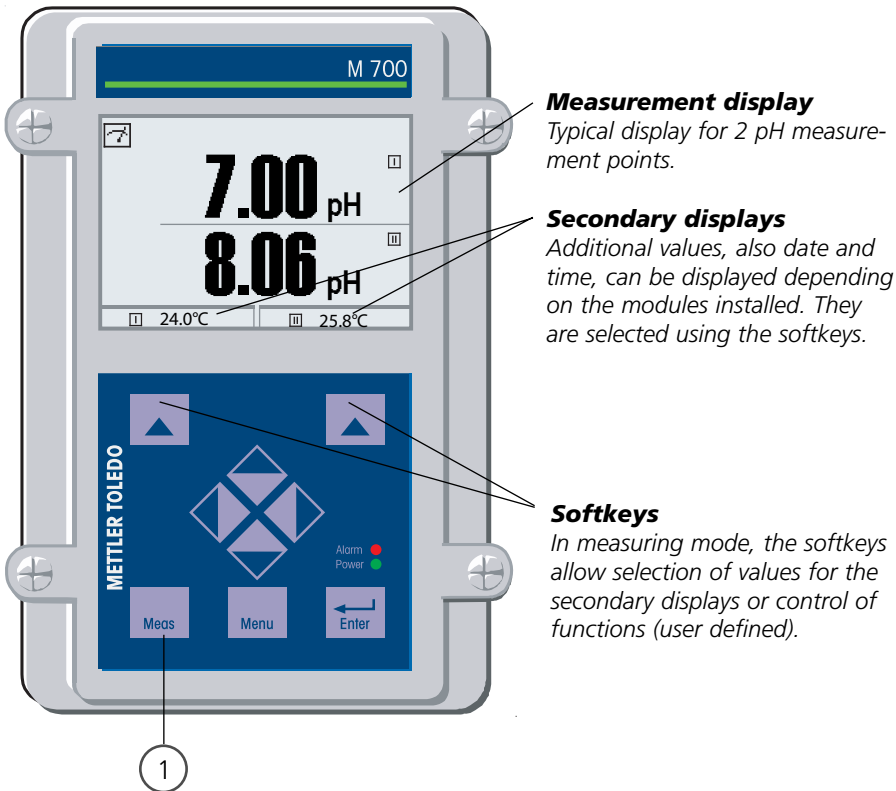
Menu	Display	System control: Passcode entry												
	 	<p><b>Changing a passcode:</b>  <b>"Passcode entry"</b> menu</p> <p>When this menu is opened, the M 700 displays a warning (Fig.). Passcodes (factory settings):</p> <table border="0"> <tr> <td>Calibration</td> <td>(cal)</td> <td>1147</td> </tr> <tr> <td>Maintenance</td> <td>(maint)</td> <td>2958</td> </tr> <tr> <td>Operator level</td> <td>(opl)</td> <td>1246</td> </tr> <tr> <td>Administrator level</td> <td>(adm)</td> <td>1989</td> </tr> </table> <p><b>Caution</b>            If you lose the Administrator passcode, system access is locked! Please consult our technical support!</p> <p>To change a passcode, select "On" using the arrow keys. Confirm with <b>enter</b>. Select the position using the <b>left/right</b> keys, then edit the number using the <b>up/down</b> keys. When all numbers have been entered, confirm with <b>enter</b>.</p>	Calibration	(cal)	1147	Maintenance	(maint)	2958	Operator level	(opl)	1246	Administrator level	(adm)	1989
Calibration	(cal)	1147												
Maintenance	(maint)	2958												
Operator level	(opl)	1246												
Administrator level	(adm)	1989												

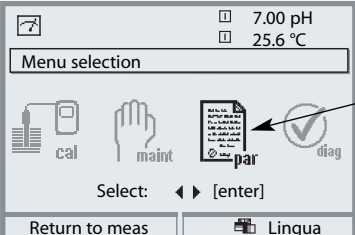
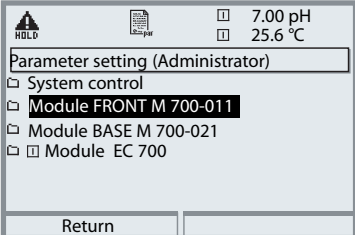
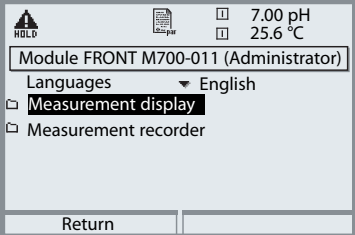
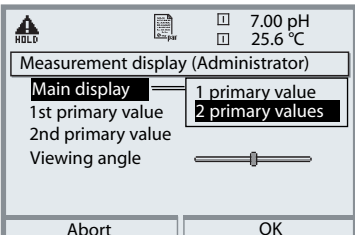
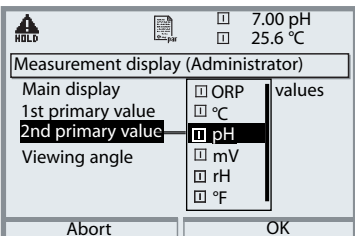
# Configuring the measurement display

Select menu: Parameter setting/Module Front/Measurement display

Pressing **meas (1)** returns the M 700 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.



Menu	Display	Configure measurement display
		<p><b>Configure measurement display</b>  Press <b>menu</b> key to select menu  Select parameter setting using arrow keys, confirm with <b>enter</b>. Select:  “Administrator level”: Passcode 1989  (For passcodes, see Pg 25)</p>
		<p>Parameter setting:  Select “Module FRONT”</p>
		<p>Front module:  Select “Measurement display”</p>
		<p>Measurement display:  Set the number of primary values  (large display) to be displayed</p>
		<p>Select process variable(s) to be displayed and confirm with <b>enter</b>.  Pressing the <b>meas</b> key to measurement.</p>

# 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.):

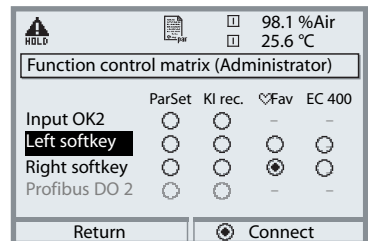
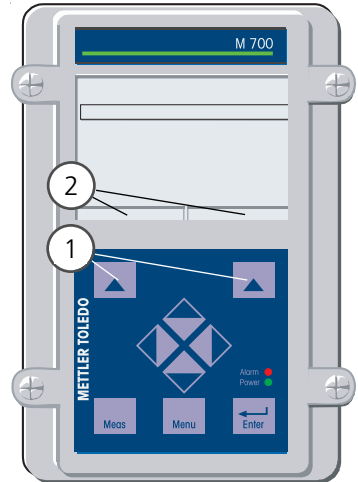
Function which can be controlled by softkeys:

- 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 29) explains how to select favorites.



### Example:

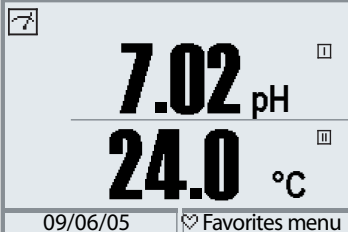

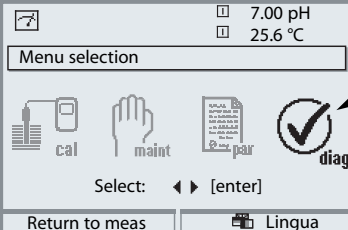
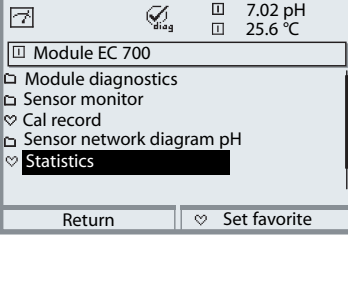
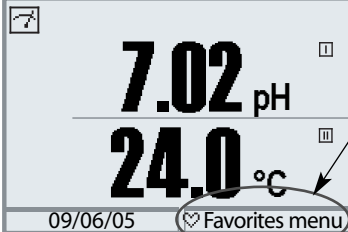
“Favorites” to be selected with “Right softkey”

### To select a softkey function:

Select desired function using arrow keys, press “Connect” softkey and confirm with **enter**.

### Deselect function:

Press “Disconnect” softkey, confirm with **enter**.

Menu	Display	Select favorites
		<p><b>Favorites menu</b></p> <p>Diagnostics functions can be called up directly from the measuring mode using a softkey.</p> <p>The "Favorites" are selected in the Diagnostics menu.</p>
		<p><b>Select favorites</b></p> <p>Press <b>menu</b> key to select menu.</p> <p>Select diagnostics using arrow keys, confirm with <b>enter</b>. Then select module and confirm with <b>enter</b>.</p>
		<p>Set/delete favorite:</p> <p>"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 28).</p>
		<p>Pressing the <b>meas</b> 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 28).</p>

**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.

# 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 point 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

## 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 EC 700(X) module, see Pg 118).

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 pH 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
 cal	  <div style="float: right;"> <input type="checkbox"/> 8.30 pH  <input type="checkbox"/> 25.6 °C         </div> <hr/> <input type="checkbox"/> Calibration data record   Calibration 28.12.04 12:34 Cal mode Product calibration Zero point +07.00 pH Slope 058.0 mV/pH  <div style="display: flex; justify-content: space-between;"> <span>End</span> <span>Adjust ↵</span> </div>	<p><b>Administrator</b></p> <p>With the corresponding access rights, the device can immediately be adjusted after calibration. The calibration values are taken over for calculating the measured variables.</p>
	  <div style="float: right;"> <input type="checkbox"/> 8.30 pH  <input type="checkbox"/> 25.6 °C         </div> <hr/> <input type="checkbox"/> Module EC 700   Stored calibration data record Calibration 28.12.04 12:44  <input checked="" type="checkbox"/> Start new calibration <input type="checkbox"/> View/adjust calibration data record  <div style="display: flex; justify-content: space-between;"> <span>Return</span> <span></span> </div>	<p><b>Operator</b> (without administrator rights)</p> <p>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.</p>

# Manual 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 after an adjustment. 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 after an adjustment. 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 (only for manual 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 118) 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 42

# Calibration / adjustment

## Temperature compensation

### Temperature compensation during calibration

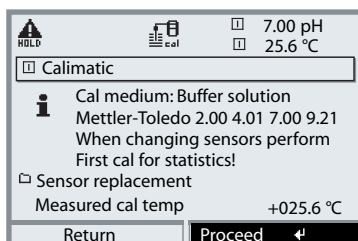
There are two important reasons for determining the temperature of the buffer solution:

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:

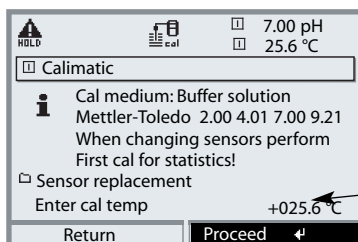
### Automatic temperature compensation



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 k $\Omega$  / NTC 8.55 k $\Omega$ ). 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



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.

# Automatic calibration

---

EasyClean 400(X) probe controller

## **Calibration procedures**

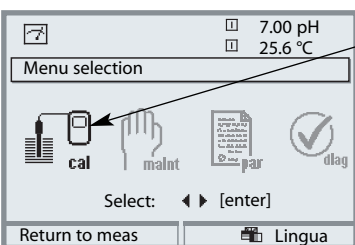

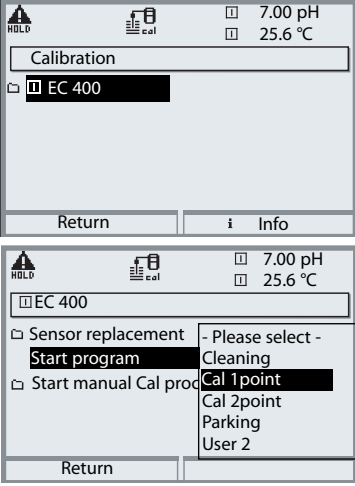
The EasyClean 400(X) probe controller allows automatic execution of calibrations either at fixed intervals or according to a week program. The week program is defined in the "Parameter setting" menu. It can start up to 10 programs flows for each weekday (see Pg 85).

## **Program flows for one- and two-point calibration**

The program flows for one- and two-point calibrations are preset but can be modified in the "Parameter setting" menu.

## **Starting EasyClean 400(X) programs**

The EasyClean 400(X) programs can be started directly from the "Calibration" menu, see Pg 35.

Menu	Display	EasyClean 400 - Start program
		<p><b>Call up calibration</b></p> <p>Press <b>menu</b> key to select menu. Select calibration using arrow keys, confirm with <b>enter</b>, passcode 1147 (To change passcode, select: 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. Select "EC 400".</p>
		<p>"Start program" opens a pull-down menu with different programs which have been defined in the "Parameter setting" menu.</p>

# Manual electrode calibration

EasyClean 400(X) probe controller


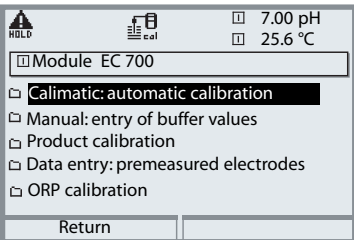
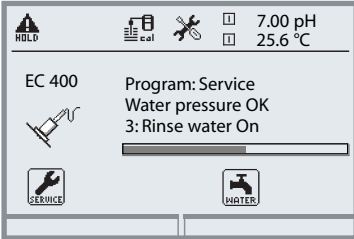
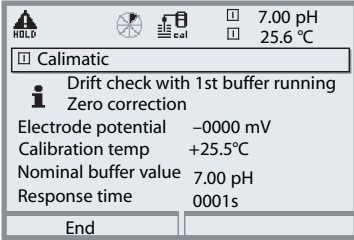

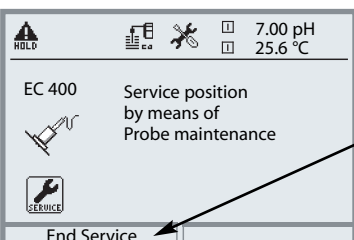
Manual electrode calibration (zero, slope) must be performed with the electrode dismounted. For that purpose, the retractable probe automatically moves into SERVICE position when the calibration menu is called up. The EasyClean 400(X) probe controller is in maintenance mode.



## Warning!

Before working on the retractable probe, it must be moved into SERVICE position. Be sure to read and observe the instruction manual of the retractable probe!

Menu	Display	Start manual cal process
		<p><b>Call up calibration</b>            Press <b>menu</b> key to select menu. Select calibration using arrow keys, confirm with <b>enter</b>, passcode 1147 (To change passcode, select: 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. Select "EC 400".</p>
		<p>Select "Start manual cal process" and confirm with <b>enter</b>.</p>

Menu	Display	Probe in SERVICE position
 cal	 <p>Module EC 700</p> <ul style="list-style-type: none"> <li>Calimatic: automatic calibration</li> <li>Manual: entry of buffer values</li> <li>Product calibration</li> <li>Data entry: premeasured electrodes</li> <li>ORP calibration</li> </ul> <p>Return</p>	<p><b>Select calibration method</b>          (For descriptions see Pg 38 to 49).          When you call up calibration, the M 700 automatically proposes the previous calibration method. (If you do not want to calibrate, press the "Return" softkey or the <b>meas</b> key.)</p>
	 <p>EC 400</p> <p>Program: Service          Water pressure OK          3: Rinse water On</p> <p>SERVICE WATER</p>	<p><b>Probe in SERVICE position</b>          With the EC 400 "SERVICE" program, the probe is moved into SERVICE position. The individual program steps are indicated in the display.</p>
	 <p>Calimatic</p> <p>Drift check with 1st buffer running          Zero correction</p> <p>Electrode potential -0000 mV          Calibration temp +25.5°C          Nominal buffer value 7.00 pH          Response time 0001s</p> <p>End</p>	<p><b>Remove electrode</b>          Make sure that the probe is in SERVICE position. Then proceed as described in the instruction manual of the retractable probe.</p> <p><b>Start calibration</b>          Follow the instructions given in the display. After end of calibration reinstall the electrode.</p>
 maint	 <p>EC 400</p> <p>Service position by means of Probe maintenance</p> <p>SERVICE</p> <p>End Service</p>	<p><b>End calibration</b>          Open the Maintenance menu (EC 400 / Probe maintenance). After having terminated the servicing work, press the "End Service" softkey to move the probe back to "Measuring" position (PROCESS).</p>

# Calibration / Adjustment

## Calimatic automatic buffer recognition

### Automatic buffer recognition (Calimatic)


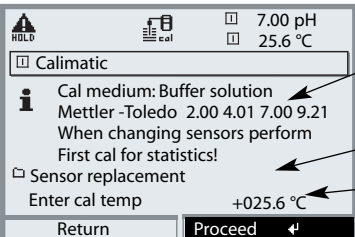
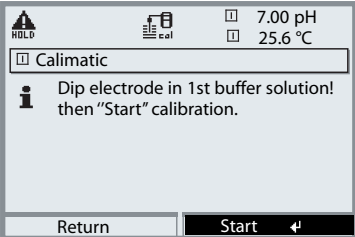
Automatic calibration using Calimatic is performed with one, two, or three buffer solutions. The M 700 automatically detects the nominal buffer value on the basis of the electrode potential and the measured temperature. Any sequence of buffer solutions is possible, but they must belong to the buffer set defined during parameter setting (Pg 60). The Calimatic takes the temperature dependence of the buffer value into account. All calibration data is converted using a reference temperature of 25 °C.

**Note:** in the Parameter setting / EC 400 / Cal preset values menu you can also specify fixed buffers (Cal buffer 1, Cal buffer 2) instead of using Calimatic. In that case, these buffers must be used for calibration!


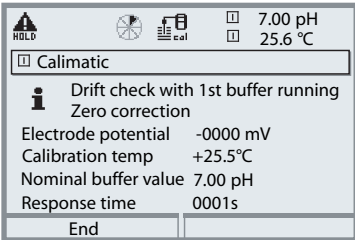
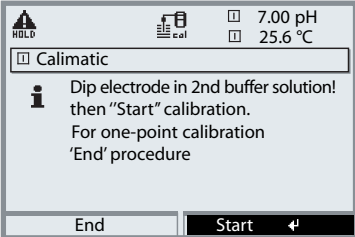
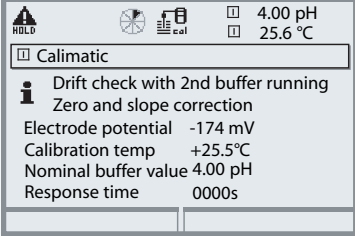
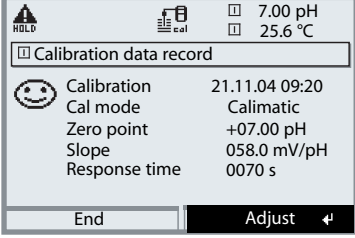
**During calibration the M 700 is in function check mode.** Current outputs and relay contacts behave as configured (Base, Out, PID modules).

### Caution!

Only ever use fresh, undiluted buffer solutions which belong to the selected buffer set (Pg 60)!

Menu	Display	Automatic buffer recognition
	 <p>The display shows the Calimatic menu with options: Cal medium: Buffer solution (Mettler-Toledo 2.00 4.01 7.00 9.21), Sensor replacement (First cal for statistics!), and Enter cal temp (+025.6 °C). Buttons for Return and Proceed are visible.</p>	<p><b>Select: Calimatic (Pg 37)</b>            Display of selected buffer set (Pg 60)            Select: Sensor replacement (see Pg 32)            Enter calibration temp (Pg 33)            Proceed with softkey or <b>enter</b></p>
	 <p>The display shows the Calimatic menu with the instruction: Dip electrode in 1st buffer solution! then "Start" calibration. Buttons for Return and Start are visible.</p>	<p>Remove and rinse the electrode (<b>Caution:</b> Do not rub! Electrostatic hazard!), then immerse it in the first buffer solution.            Start with softkey or <b>enter</b></p>



Menu	Display	Automatic buffer recognition
	 <p>Calimatic</p> <p>Drift check with 1st buffer running Zero correction</p> <p>Electrode potential -0000 mV Calibration temp +25.5°C Nominal buffer value 7.00 pH Response time 0001s</p> <p>End</p>	<p>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.</p>
	 <p>Calimatic</p> <p>Dip electrode in 2nd buffer solution! then "Start" calibration. For one-point calibration 'End' procedure</p> <p>End Start</p>	<p>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 <b>enter</b></p>
	 <p>Calimatic</p> <p>Drift check with 2nd buffer running Zero and slope correction</p> <p>Electrode potential -174 mV Calibration temp +25.5°C Nominal buffer value 4.00 pH Response time 0000s</p>	<p>Calibration is performed with the second buffer.</p> <p>Three-point calibration is performed correspondingly with the third buffer.</p>
	 <p>Calibration data record</p> <p>Calibration 21.11.04 09:20 Cal mode Calimatic Zero point +07.00 pH Slope 058.0 mV/pH Response time 0070 s</p> <p>End Adjust</p>	<p><b>Adjustment</b></p> <p>Press "Adjust" to take over the values determined during calibration for calculating the measured variables. See Pg 31.</p>

# 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.

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.


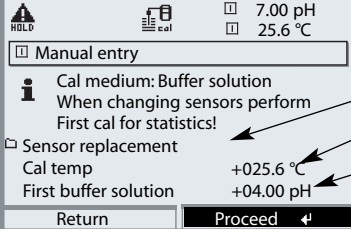
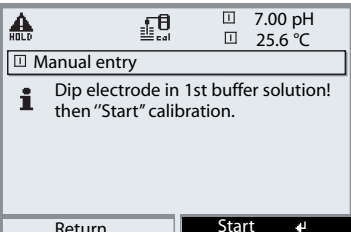
Intermediate values must be interpolated.


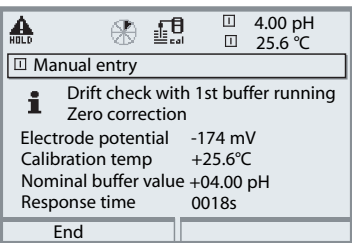
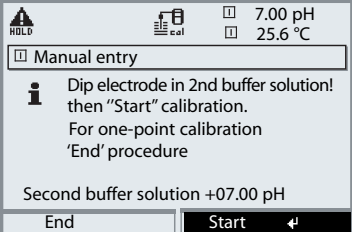
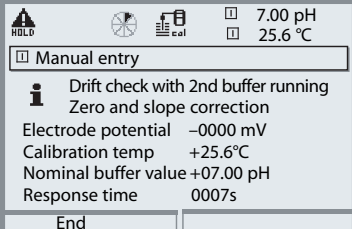
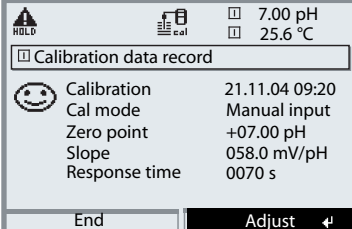
All calibration data is converted using a reference temperature of 25 °C.

**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
		<p><b>Select: Manual entry (Pg 37)</b></p> <p>Select: Sensor replacement (see Pg 32)</p> <p>Display: Calibration temp (Pg 33)</p> <p>Enter 1st buffer value</p> <p>Proceed with softkey or <b>enter</b></p>
		<p>Remove and rinse the electrode (<b>Caution:</b> Do not rub! Electrostatic hazard!), then immerse it in the first buffer solution.</p> <p>Start with softkey or <b>enter</b></p>

Menu	Display	Manual entry
		<p>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.</p>
		<p>One-point calibration: "End". Two-point calibration: Rinse electrode thoroughly! Enter 2nd buffer value for correct temperature. Immerse electrode in the second buffer solution. Start with softkey or <b>enter</b>.</p>
		<p>Calibration is performed with the second buffer.  Three-point calibration is performed correspondingly with the third buffer.</p>
		<p><b>Adjustment</b> Press "Adjust" to take over the values determined during calibration for calculating the measured variables. See Pg 31.</p>

# Calibration / Adjustment

## Product calibration


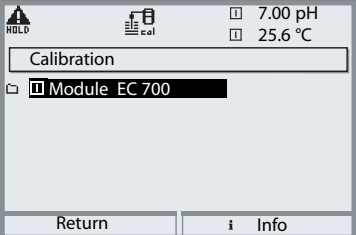
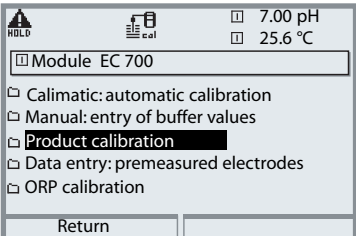
### Product calibration (calibration with sampling)


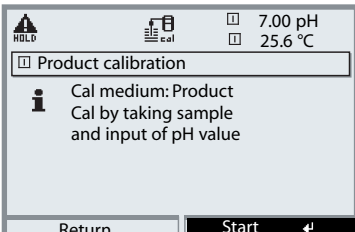
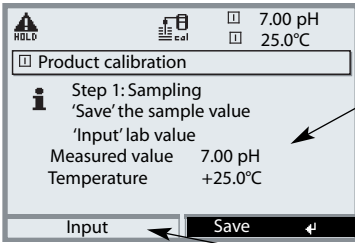
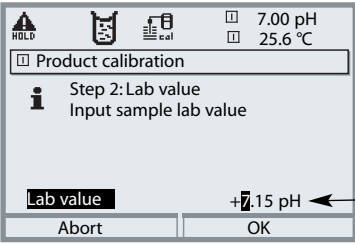
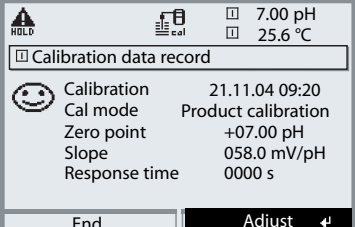
When the electrode cannot be removed – e.g. for sterility reasons – its zero point can be determined with “sampling”. To do so, the currently measured process value is stored by the M 700. Immediately afterwards, you take a sample from the process. The pH value of the sample is measured in the lab or 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 M 700 calculates the electrode zero point (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
		<p><b>Select module: EC 700</b></p> <p>The M 700 is in function check mode. Current outputs and relay contacts behave as configured (Base, Out, PID). Confirm with <b>enter</b>.</p>
		<p>Select calibration mode “Product calibration”</p> <p>Confirm with <b>enter</b>.</p>

Menu	Display	Product calibration
	 <p>Product calibration</p> <p>Cal medium: Product Cal by taking sample and input of pH value</p> <p>Return      Start</p>	<p><b>Product calibration</b></p> <p>Product calibration is performed in 2 steps. Prepare sampling, start with softkey or <b>enter</b>.</p>
	 <p>Step 1: Sampling 'Save' the sample value 'Input' lab value</p> <p>Measured value 7.00 pH Temperature +25.0°C</p> <p>Input      Save</p>	<p><b>Step 1</b></p> <p>Take sample. Store measured value and temperature at the moment of sampling ("Save" softkey or <b>enter</b>) Press <b>meas</b> to return to measurement.</p> <p><b>Exception:</b> Sample value can be measured on the site and be entered immediately. To do so, press "Input" softkey.</p>
	 <p>Step 2: Lab value Input sample lab value</p> <p>Lab value      +7.15 pH</p> <p>Abort      OK</p>	<p><b>Step 2</b></p> <p>Lab value has been measured. When you open the Product calibration menu again, the display shown on the left appears: Enter reference value ("Lab value"). Confirm with OK or repeat calibration.</p>
	 <p>Calibration data record</p> <p>Calibration 21.11.04 09:20 Cal mode Product calibration Zero point +07.00 pH Slope 058.0 mV/pH Response time 0000 s</p> <p>End      Adjust</p>	<p><b>Adjustment</b></p> <p>Press "Adjust" to take over the values determined during calibration for calculating the measured variables. See Pg 31.</p>

# Calibration / Adjustment

Calibration by entering data from premeasured electrodes (EC 400 = Off)

## Data entry of premeasured electrodes


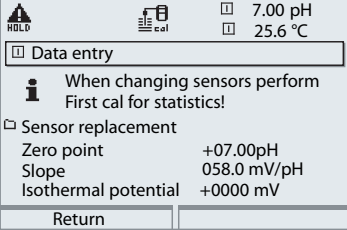
Entry of values for zero point, slope, and isothermal potential of a pH electrode. The values must be known, e.g. determined beforehand in the laboratory.

**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 45.

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

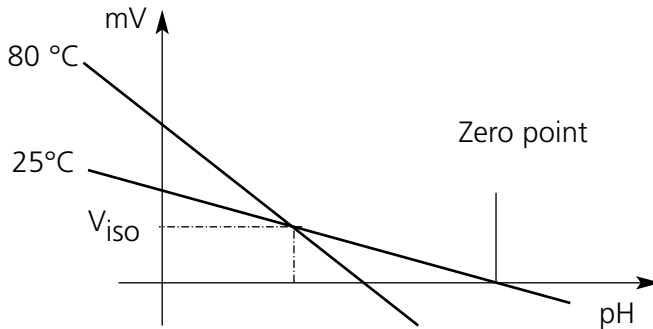
Menu	Display	Manual entry
		<p><b>Select: Data entry of premeasured electrodes (Pg 32)</b></p> <p>Remove electrode and connect premeasured electrode. Call up "Sensor replacement". Enter the values for</p> <ul style="list-style-type: none"> <li>• Zero point</li> <li>• Slope</li> <li>• Isothermal potential</li> </ul> <p>Return with softkey. Return to measurement with <b>meas.</b></p>

## 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 63).
- 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 (EC 400 = Off)

## 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.

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

$mV_{\text{ORP}}$  = displayed oxidation-reduction potential (measured ORP)

$mV_{\text{meas}}$  = direct electrode potential (ORP input, see Sensor monitor)

$\Delta mV$  = 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 64).

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<sub>2</sub>SO<sub>4</sub>, K<sub>2</sub>SO<sub>4</sub> saturated      (Mercury sulfate)



Menu	Display	ORP adjustment
 cal	  200 mV 25.6 °C <input type="checkbox"/> ORP adjustment Reference electrode Ag/AgCl,KCl 1m Temperature +25.5°C ORP input +200 mV <b>ORP setpoint</b> +200 mV Return	<p>The type of reference electrode is selected during parameter setting (Pg 53 et seq).            Immerse electrode in calibration medium and wait until the ORP value has stabilized.            Enter the nominal ORP value (bottle).</p>
	  200 mV 25.6 °C <input type="checkbox"/> ORP adjustment Reference electrode Ag/AgCl,KCl 1m Temperature +25.5°C ORP input +200 mV <b>ORP setpoint</b> +220 mV Abort OK	<p>Be sure to observe the correct reference! (as configured)            Confirm with "OK".</p>
	  220 mV 25.6 °C <input type="checkbox"/> ORP adjustment Reference electrode Ag/AgCl,KCl 1m Temperature +25.5°C ORP input +200 mV ORP setpoint +220 mV <b>Return</b> End	<p>End adjustment with softkey or <b>enter</b></p>

**Temperature 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

# Calibration / Adjustment

---

ISFET zero adjustment

## ISFET zero adjustment


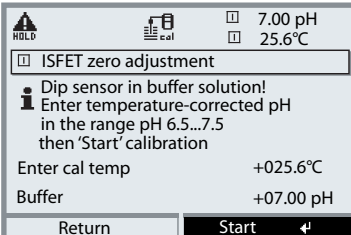
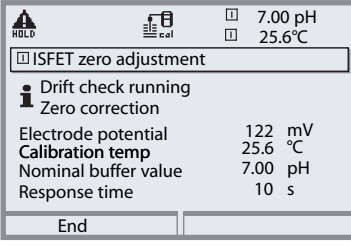
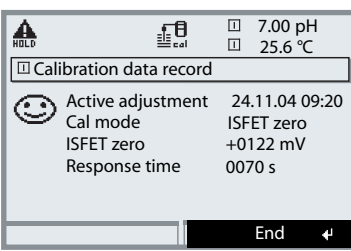
### Note

The EC 700(X) module does not supply the power for operating the ISFET adapter. For that purpose, a pH 2700 module is required.

When measuring with an ISFET sensor (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 M 700. 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


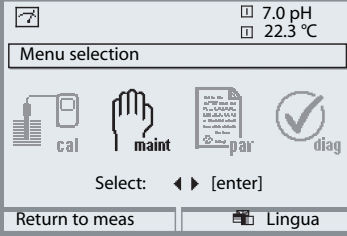
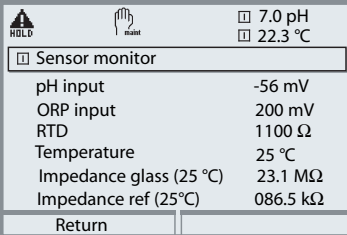
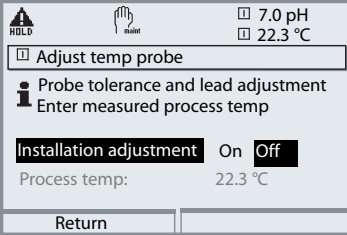
**During calibration the M 700 is in function check mode.** Current outputs and relay contacts behave as configured (Base, Out, PID modules).

Menu	Display	ISFET zero adjustment
	 <p>ISFET zero adjustment</p> <p>Dip sensor in buffer solution! Enter temperature-corrected pH in the range pH 6.5...7.5 then 'Start' calibration</p> <p>Enter cal temp           +025.6°C Buffer                    +07.00 pH</p> <p>Return                    Start ←</p>	<p>Immerse sensor in a zero point buffer (6.5 ... 7.5). Enter temperature-corrected pH value (see buffer table). Start zero adjustment.</p>
	 <p>Drift check running Zero correction</p> <p>Electrode potential    122 mV Calibration temp      25.6 °C Nominal buffer value   7.00 pH Response time          10 s</p> <p>End</p>	<p>To abort, you can press the "End" softkey. However, this reduces adjustment accuracy. (Zero error of sensor up to max. ±200 mV possible)</p>
	 <p>Calibration data record</p> <p>Active adjustment    24.11.04 09:20 Cal mode              ISFET zero ISFET zero            +0122 mV Response time         0070 s</p> <p>End ←</p>	<p>At the end of the adjustment procedure the slope and zero (based on 25 °C) are displayed. These are not the real sensor values! The actual values must be determined afterwards by a complete two-point calibration.</p>

# Maintenance of EC 700(X)

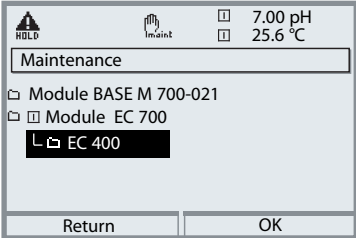


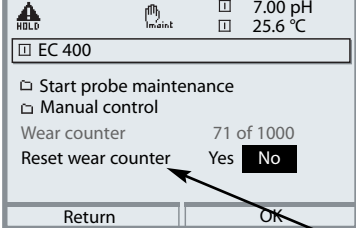


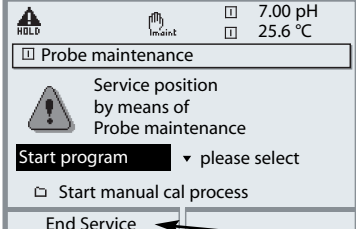



Sensor monitor, temperature probe adjustment

**Note:** Function check active

Menu	Display	Maintenance
	  	<p><b>Call up Maintenance</b>            From the measuring mode:            Press <b>menu</b> key to select menu.            Select maintenance using            arrow keys, confirm with <b>enter</b>.            Passcode 2958            (For passcodes, see Pg 25)            Then select            “Module EC 700(X)”.</p> <p><b>Sensor monitor</b>            for validation of sensor and complete measured-value processing.</p> <p><b>Temp probe adjustment</b>            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!</p>

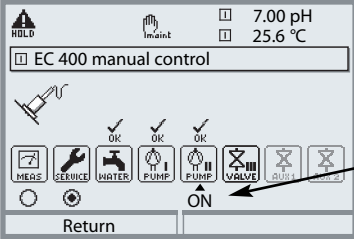
# Probe maintenance via M 700(X)

“Maintenance / EC 400” menu

Menu	Display	Maintenance
	 <p>   <span>7.00 pH</span>  <span>25.6 °C</span> </p> <p>Maintenance</p> <ul style="list-style-type: none"> <li>Module BASE M 700-021</li> <li>Module EC 700           <ul style="list-style-type: none"> <li>EC 400</li> </ul> </li> </ul> <p>Return      OK</p>	<p><b>Select “EC 400”</b></p> <p>The maintenance menu shows the EC 400(X) as a component of the EC 700(X) module. Select using arrow keys, confirm with <b>enter</b>.</p> <p><b>Start probe maintenance</b></p> <p>Here you can select a preset program (Cleaning, Cal 2point, Cal1point) or one of the three user-specific programs. Select using arrow keys, confirm with <b>enter</b>.</p> <p><b>Reset wear counter</b></p> <p>The wear counter indicates the number of probe movements.</p> <p><b>Probe maintenance</b></p> <p>With the EC 400 “SERVICE” program, the probe is moved into SERVICE position. The individual program steps are indicated in the display. After having terminated the servicing work, press the “End Service” soft-key to move the probe back to “Measuring” position (PROCESS).</p>
	 <p>   <span>7.00 pH</span>  <span>25.6 °C</span> </p> <p>EC 400</p> <ul style="list-style-type: none"> <li>Start probe maintenance</li> <li>Manual control</li> <li>Wear counter      71 of 1000</li> <li>Reset wear counter    Yes <b>No</b></li> </ul> <p>Return      OK</p>	
	 <p>   <span>7.00 pH</span>  <span>25.6 °C</span> </p> <p>Probe maintenance</p> <p> Service position by means of Probe maintenance</p> <p><b>Start program</b>    ▾ please select</p> <ul style="list-style-type: none"> <li>Start manual cal process</li> </ul> <p>End Service</p>	

# Manual control via M 700(X)

“Maintenance / EC 400” menu

Menu	Display	Maintenance
		<p><b>Manual control</b>          (requires access code*)          Select function using arrow keys.          Symbol flashes, activate with <b>enter</b>.          “ON” appears below the icon.          Terminate function with <b>enter</b>.          (“ON” disappears again.)</p> <p>* The access code is specified in the          “Parameter setting / EC 400 /          Installation” menu.</p>



## Warning!


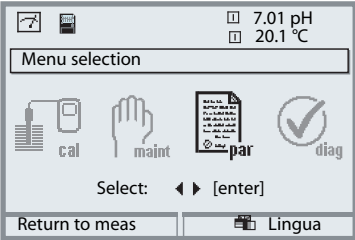
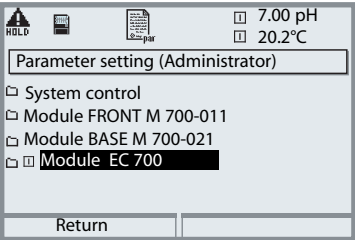
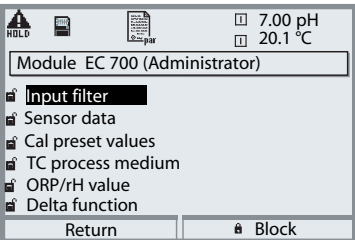
**When using manual control, make sure that the probe is separated from the process!**

With manual control via M 700(X) the EC 400(X) probe controller can be actuated for servicing.

Rinsing water, media supply, and valve functions can be tested individually.

# Parameter setting of EC 700(X)

Call up parameter setting

Menu	Display	Parameter setting
		<p><b>Call up parameter setting</b>            From the measuring mode:            Press <b>menu</b> key to select menu.            Select parameter setting using arrow keys, confirm with <b>enter</b>.            Passcode 1989            (For passcodes, see Pg 25)</p>
		<p>Select "Module EC 700(X)",            confirm with <b>enter</b>.</p>
		<p>Select parameter using arrow keys,            confirm with <b>enter</b>.</p>


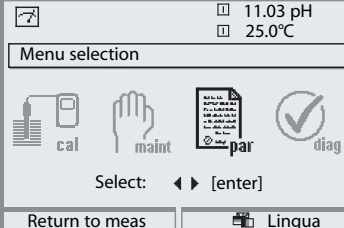
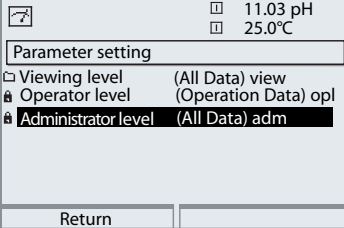
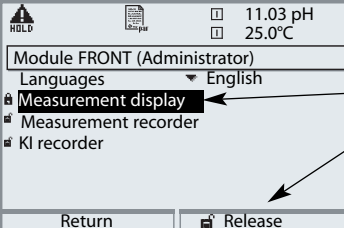
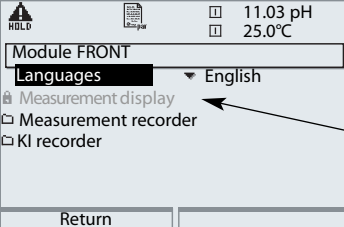
**During parameter setting the M 700 is in function check mode.**

Current outputs and relay contacts behave as configured (Base, Out, PID modules).

# Parameter setting: Operating levels

Viewing level, Operator level, Administrator level

**Note:** Function check active (Parameter setting: Base, Out, PID modules)


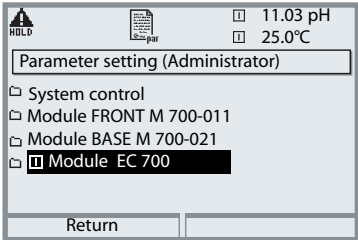
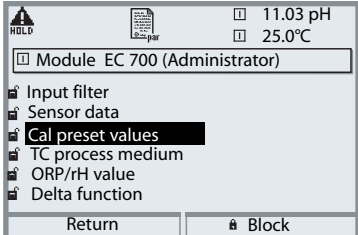
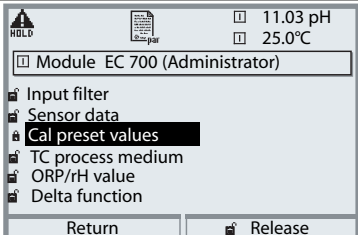

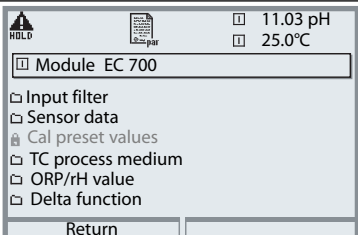
Menu	Display	Viewing level, Operator level, Administrator level
		<p><b>Call up parameter setting</b>            From the measuring mode:            Press <b>menu</b> key to select menu.            Select parameter setting using arrow keys, confirm with <b>enter</b>.</p>
	 	<p><b>Administrator level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



# 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
		<p><b>Example:</b> Blocking access to the calibration adjustments from the Operator level</p> <p><b>Call up parameter setting</b> Select Administrator level. Enter passcode (1989). Select "Module EC 700(X)" using arrow keys, confirm with <b>enter</b>.</p>
		<p>Select "Cal preset values" using arrow keys. "Block" with softkey.</p>
		<p>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".</p>
		<p><b>Call up parameter setting</b> Select <u>Operator level</u>, passcode (1246), select EC 700(X) module. Now, the locked function is displayed in gray and marked with the "lock" icon.</p>

# Settings of sensor data

With “Auto”, the tolerance limits for the monitoring criteria are determined by the analyzer. They are then displayed in gray.


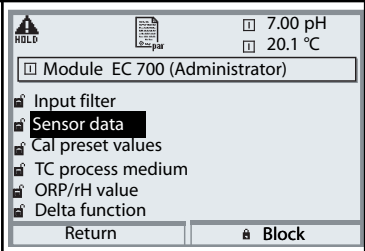

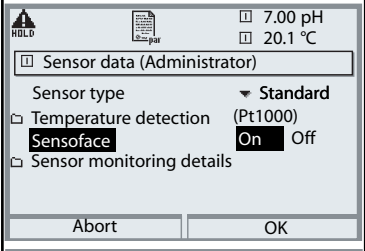

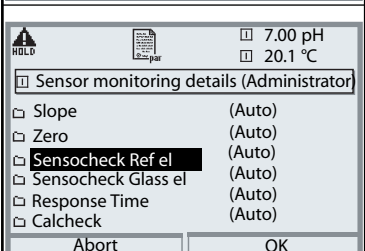
With “Individual”, these tolerances can be adjusted.

**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 • Temperature detection - Temperature probe - Measuring temp - Cal temp • Sensoface • Sensor monitoring details - Slope Nominal Min Max Message - Zero point Nominal Min Max Message - Sensocheck Ref el Nominal Min Max Message - Sensocheck Glass el Nominal Min Max Message - Response time Response time Max Message - Calcheck Meas distance Max Message	Standard  Pt 1000 Manual Manual Default On Auto 59.2 mV/pH 53.3 mV/pH 61.0 mV/pH Maint. request Auto 07.00 pH 06.00 pH 08.00 pH Maint. request Auto 5.0 kΩ 3.1 kΩ 100.0 kΩ Off Auto 120.0 MΩ 28.6 MΩ 350.0 MΩ Off Auto 0000 s Off Auto 3.20 pH Off	Standard, (ISFET - requires module pH 2700)  Pt100, Pt1000, NTC 8.55 kΩ, NTC30kΩ (sensor) Auto, Manual: Default +25.0 °C (entry) Auto, Manual: Default +25.0 °C (entry) Default, Individual Off, On Auto, Individual Can only be set with “Individual” selected  Off, failure, maintenance request Auto, Individual Can only be set with “Individual” selected  Off, failure, maintenance request Auto, Individual Can only be set with “Individual” selected  Off, failure, maintenance request Auto, Individual (not for sensor type ISFET) Can only be set with “Individual” selected  Off, failure, maintenance request Auto, Individual Off, failure, maintenance request Auto, Individual Off, failure, maintenance request

# Parameter setting of EC 700(X)

**Note:** Function check active

Menu	Display	Parameter selection
		<p><b>Sensor data</b></p> <p>Sensor data are preset depending on the sensor type.</p> <p>Gray display lines cannot be edited.</p> <p><b>Sensoface</b> provides information on the sensor condition (evaluating the sensor data). Great deviations are signaled. Sensoscheck can be switched off.</p> <p>The following parameters are monitored: Slope, zero, reference impedance, glass impedance (pH electrodes), response time, Calcheck. The tolerance limits are displayed in gray.</p> <p><b>Message</b></p> <p>Limit violations can be signaled by a NAMUR message either as failure or maintenance request.</p>
		<p><b>Sensor monitoring details</b></p> <p>The following parameters are monitored: Slope, zero, reference impedance, glass impedance (pH electrodes), response time, Calcheck. For "Auto", the tolerance limits are displayed in gray. For "Individual", the settings can be specified by the user.</p>
		<p><b>Sensor monitoring details</b></p> <p>The following parameters are monitored: Slope, zero, reference impedance, glass impedance (pH electrodes), response time, Calcheck. For "Auto", the tolerance limits are displayed in gray. For "Individual", the settings can be specified by the user.</p>

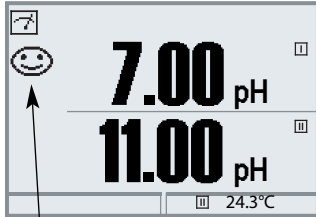
## Calcheck

Constantly checks distance between calibration buffers and measured values.

# Sensoface

Graphical indication of sensor condition


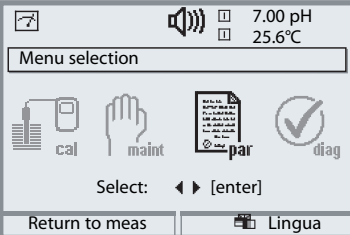
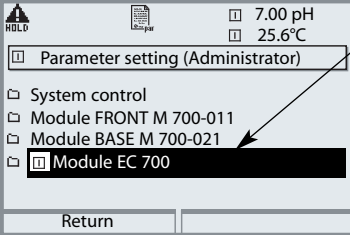
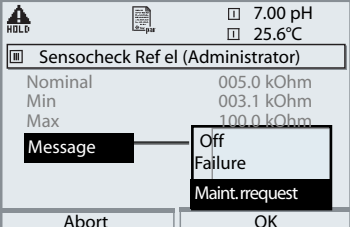
Sensocheck must have been activated during parameter setting



## Sensocheck:

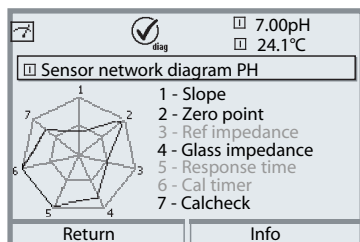
Automatic monitoring of glass and reference electrode

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

Menu	Display	Activate Sensocheck
		<p><b>Open menu selection</b>            Select parameter setting            Enter passcode (Administrator)</p>
		<p>Select module ("EC 700")            Confirm with <b>enter</b>.</p>
		<p>Select "Sensor data".            Confirm with <b>enter</b>.            Then select "Sensocheck Ref el"            (Fig.)            Assign function and confirm with <b>enter</b>.</p>

## Sensoface is "sad" ...

The "Diagnostics / Module EC 700(X) / Sensor network diagram" shows all current sensor parameters in a graphic diagram.



### Sensor network diagram

"Diagnostics / Module EC 700(X) / Sensor network diagram".

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.

## Sensoface criteria

Parameter	Standard*	Critical range (Monitoring: Auto)
Slope	59.2	< 53.3 or > 61.0
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 K $\Omega$ + 0.5 Rcal
Response time		
Fine		120 s
Standard		80 s
Coarse		60 s
Calibration timer		80 % elapsed
Calcheck		Difference meas. value / buffer > 3.2 pH

\* Applies to standard electrodes with pH = 7.00

\*\* Rcal is determined during calibration, adjustment is taken over.

# Parameter setting of EC 700(X)

Cal preset values

**Note:** Function check active

Parameter	Default	Selection / Range
Cal preset values <ul style="list-style-type: none"> <li>Calimatic buffer</li> </ul>	Mettler-Toledo	Knick: 2.00 4.01 7.00 9.21 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 Hamilton: 2.00 4.01 7.00 10.01 12.00
<ul style="list-style-type: none"> <li>Drift check</li> </ul>	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)
<ul style="list-style-type: none"> <li>Calibration timer               <ul style="list-style-type: none"> <li>Monitoring</li> <li>Cal timer</li> <li>Adaptive cal timer</li> </ul> </li> </ul>	Auto 0168h Off	Auto, Off, Individual Entry with "Individual", Off = 0000 Off, On
<ul style="list-style-type: none"> <li>Tolerance band check</li> </ul>	Off	Tolerance adjustment: Off, On Tolerance Zero +00.20 pH (entry) Tolerance Slope +002.0 mV/pH (entry)

## Tolerance adjustment

(Additional function SW 700-005)

During calibration the tolerance band checks the the zero and slope and automatically performs an adjustment when the tolerance range is exceeded. The parameters are stored in the tolerance band recorder (Diagnostics menu).

### Control via EasyClean 400(X):

(Parameter setting / EC 400 / Cal preset values / Adjustment)

With "Cal tolerance band check" switched on, data are only taken over when they exceed the limits defined by the cal tolerance band.

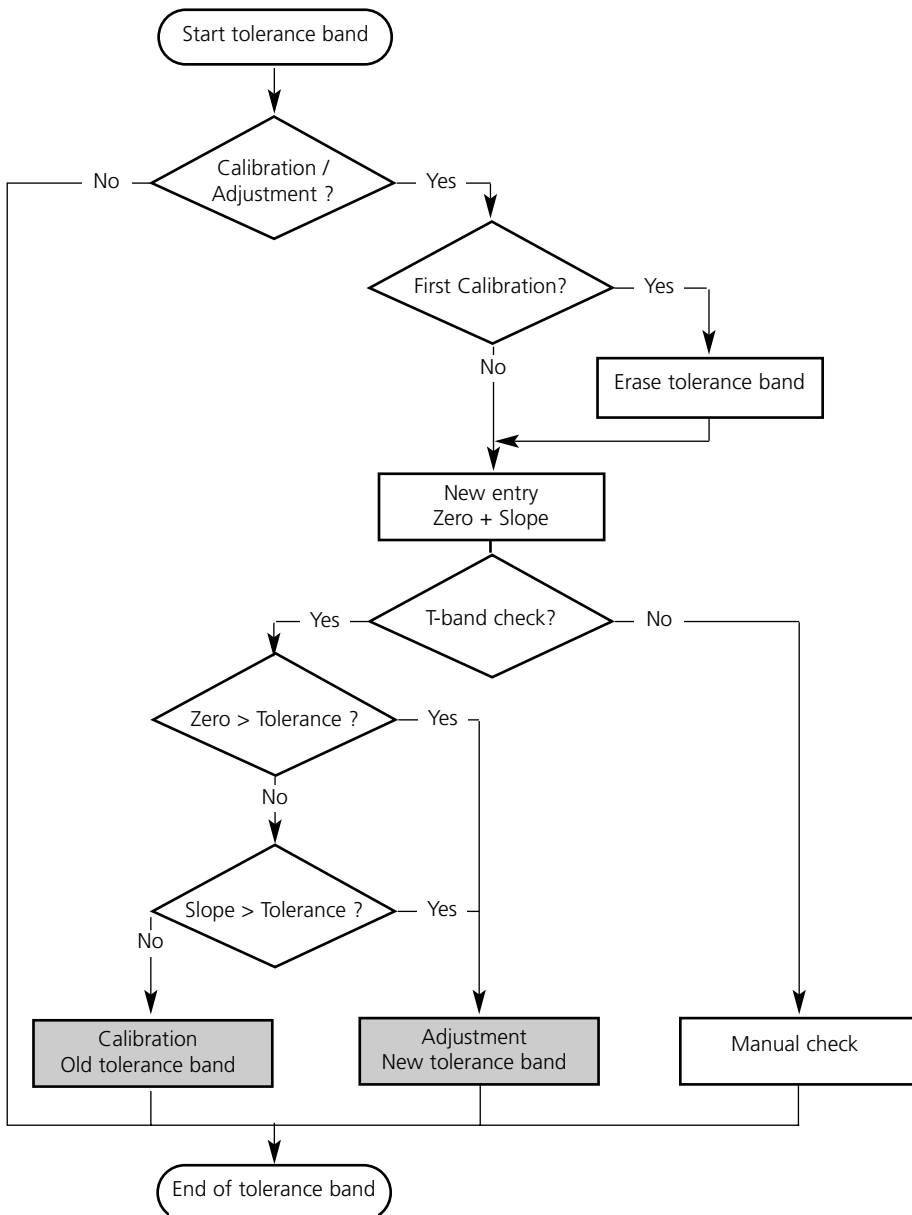
### EC 400 in check mode:

(Parameter setting / EC 400 / Cal preset values / Check)

An adjustment (taking over the values determined during calibration) is not performed.

# SW 700-005:


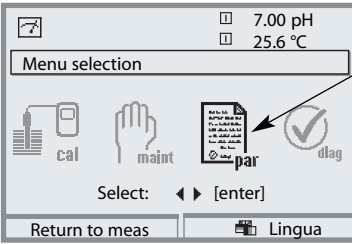
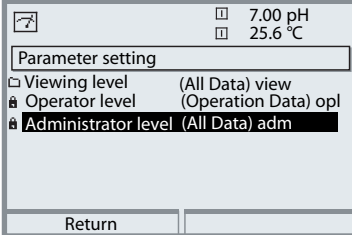
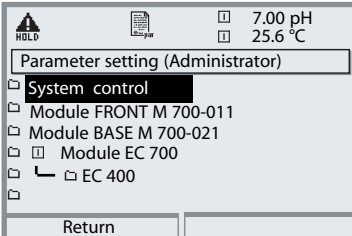
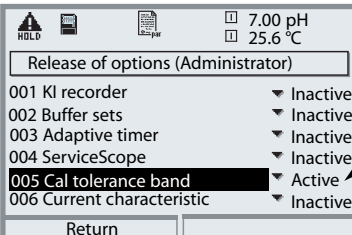
## Tolerance adjustment: Program flow



# Activating the cal tolerance band

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!


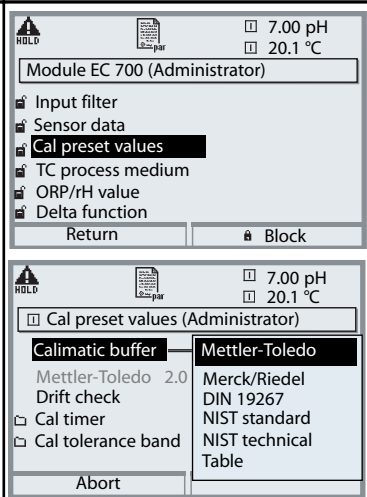

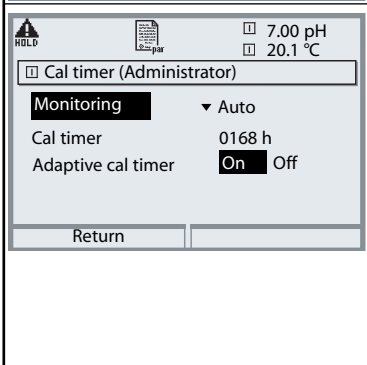

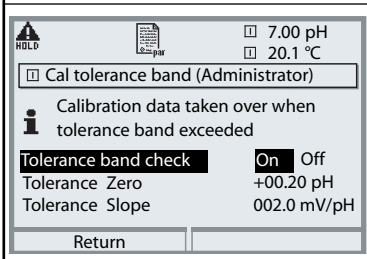
Menu	Display	Activate additional function
	   	<p><b>Menu selection</b></p> <p>Call up parameter setting. From the measuring mode: Press <b>menu</b> key to select menu. Select parameter setting using arrow keys, confirm with <b>enter</b>.</p> <p><b>Parameter setting</b></p> <p>Select Administrator level using arrow keys, confirm with <b>enter</b>. Enter passcode and confirm (Passcode as delivered: 1989).</p> <p>Select System control using arrow keys, confirm with <b>enter</b>. Then select Release of options using arrow keys, confirm with <b>enter</b>.</p> <p><b>Release of options</b></p> <p>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.</p>



# Parameter setting of EC 700(X)

Cal preset values: Calimatic buffer, cal timer, cal tolerance band

**Note:** Function check active

Menu	Display	Cal preset values
		<p><b>Calimatic buffer</b></p> <p>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.</p> <p>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 <b>enter</b>.</p>
		<p><b>Calibration timer</b></p> <p>Entry of the time interval until the next due calibration.</p> <p><b>Adaptive calibration timer</b></p> <p>When the electrode is exposed to high stress (temperature, extreme pH values), the time until the next due calibration is reduced.</p>
		<p><b>Tolerance adjustment</b></p> <p>If the measured value leaves the tolerance band specified here for zero and slope, an adjustment is automatically performed during calibration.</p>

# Parameter setting of EC 700(X)

Default settings and selection range


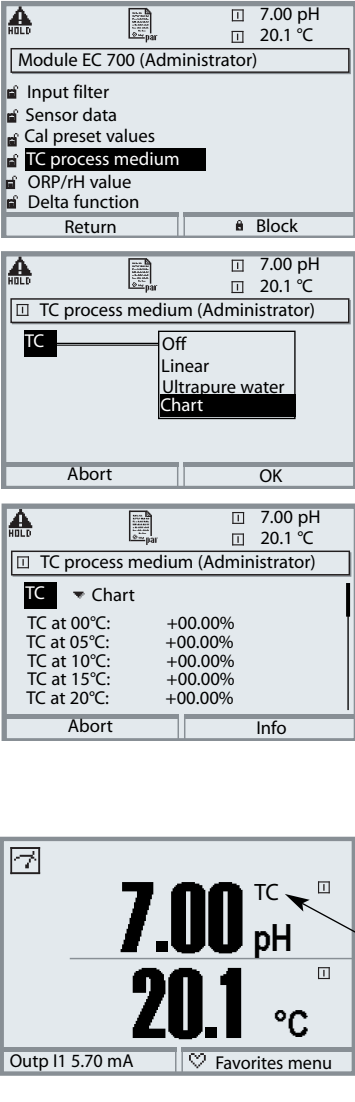
**Note:** Function check active

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 1 mol/l  No No	Ag/AgCl,KCl 1 mol/l Ag/AgCl,KCl 3 mol/l Hg, Tl/TlCl, KCl 3.5 mol/l Hg/Hg <sub>2</sub> SO <sub>4</sub> , K <sub>2</sub> SO <sub>4</sub> sat No, Yes No, Yes, entry of factor
Delta function • Delta function	Off	Off, pH, mV <sub>ORP</sub> or rH: entry of delta value

# Parameter setting of EC 700(X)

TC process medium

**Note:** Function check active

Menu	Display	TC process medium (Parameter selection Pg 64)										
	 <p>Module EC 700 (Administrator)</p> <ul style="list-style-type: none"> <li>Input filter</li> <li>Sensor data</li> <li>Cal preset values</li> <li><b>TC process medium</b></li> <li>ORP/rH value</li> <li>Delta function</li> </ul> <p>Return      Block</p> <hr/> <p>TC process medium (Administrator)</p> <ul style="list-style-type: none"> <li>TC             <ul style="list-style-type: none"> <li>Off</li> <li>Linear</li> <li>Ultrapure water</li> <li><b>Chart</b></li> </ul> </li> </ul> <p>Abort      OK</p> <hr/> <p>TC process medium (Administrator)</p> <ul style="list-style-type: none"> <li>TC             <ul style="list-style-type: none"> <li>▼ Chart</li> </ul> </li> </ul> <table border="0"> <tr> <td>TC at 00°C:</td> <td>+00.00%</td> </tr> <tr> <td>TC at 05°C:</td> <td>+00.00%</td> </tr> <tr> <td>TC at 10°C:</td> <td>+00.00%</td> </tr> <tr> <td>TC at 15°C:</td> <td>+00.00%</td> </tr> <tr> <td>TC at 20°C:</td> <td>+00.00%</td> </tr> </table> <p>Abort      Info</p> <hr/> <p>7.00 pH TC</p> <p>20.1 °C</p> <p>Outp I1 5.70 mA      Favorites menu</p>	TC at 00°C:	+00.00%	TC at 05°C:	+00.00%	TC at 10°C:	+00.00%	TC at 15°C:	+00.00%	TC at 20°C:	+00.00%	<p><b>TC process medium</b></p> <p>You can choose from:</p> <ul style="list-style-type: none"> <li>• Linear (input of TC coefficient)</li> <li>• Ultrapure water</li> <li>• Chart</li> </ul> <p>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 interpolated. In the case of lower or higher temperatures (&lt; 0 °C or &gt; +95 °C), the last chart value is used for calculation. If the delta function has been activated (see Pg 64) simultaneously with temperature compensation, the temperature is compensated first and then the delta value is subtracted.</p> <p>When the TC correction for process medium is switched on, "TC" appears in the display in measuring mode.</p>
TC at 00°C:	+00.00%											
TC at 05°C:	+00.00%											
TC at 10°C:	+00.00%											
TC at 15°C:	+00.00%											
TC at 20°C:	+00.00%											

# Parameter setting of EC 700(X)

---

TC process medium – Linear temperature compensation of process medium

## Temperature compensation of process medium

Linear temperature compensation, reference temp fixed at 25 °C

$$\text{pH}_{(25\text{ }^\circ\text{C})} = \text{pH}_M + \text{TC}/100 \% (25\text{ }^\circ\text{C} - T_M)$$

$\text{pH}_{(25\text{ }^\circ\text{C})}$  = pH value compensated to 25 °C

$\text{pH}_M$  = Measured pH value (temperature-corrected)

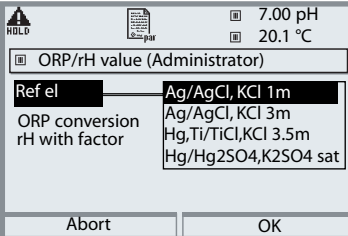
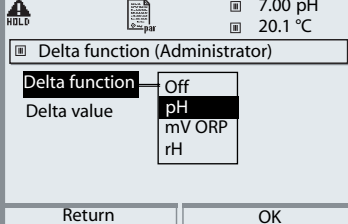
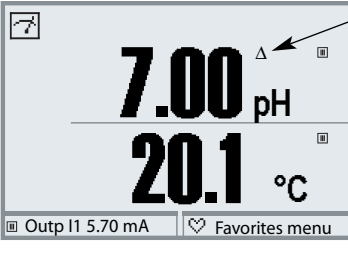
TC = Temperature factor [%/K]

$T_M$  = Measured temperature [° C]

# Parameter setting of EC 700(X)

ORP/rH value, delta function, messages

**Note:** Function check active

Menu	Display	ORP/rH value, delta function, messages (Selection Pg 60)
	<p><b>ORP/rH value</b></p> <ul style="list-style-type: none"> <li>• Select type of reference electrode:           <ul style="list-style-type: none"> <li>Ag/AgCl, KCl 1 mol/l (Silver/silver chloride)</li> <li>Ag/AgCl, KCl 3 mol/l (Silver/silver chloride)</li> <li>Hg, Tl/TlCl, KCl 3.3 mol/l (Thalamic)</li> <li>Hg/Hg<sub>2</sub>SO<sub>4</sub>, K<sub>2</sub>SO<sub>4</sub> saturated (mercury sulfate)</li> </ul> </li> <li>• ORP conversion to SHE</li> <li>• Calculate rH with factor</li> <li>• Factor entry</li> </ul>	
	<p><b>Delta function</b></p> <p>When a delta value is entered, the M 700 calculates the difference</p> <p>Output value = measured value – delta value</p> <p>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.</p> <p>When delta function is switched on, “Δ” appears in the display in measuring mode.</p>	
		

# Parameter setting of EC 700(X)

Messages: Default settings and selection range

**Note:** Function check active

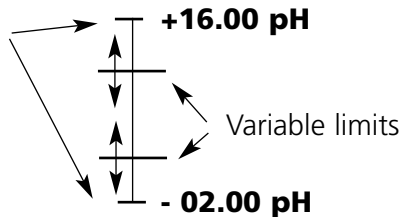
Parameter	Default	Selection / Range
Messages <ul style="list-style-type: none"> <li>• pH value</li> <li>• ORP value</li> <li>• rH value</li> <li>• Temperature</li> <li>• mV value</li> </ul>	Limits max Off Off Limits max Off	Off, device limits max., variable limits* Off, device limits max., variable limits* 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: <ul style="list-style-type: none"> <li>• Failure Limit Lo</li> <li>• Warning Limit Lo</li> <li>• Warning Limit Hi</li> <li>• Failure Limit Hi</li> </ul>

## Device limits

- Device limits max.
- Variable limits:

Maximum measurement range of device  
Range limits specified

## Device limits max.


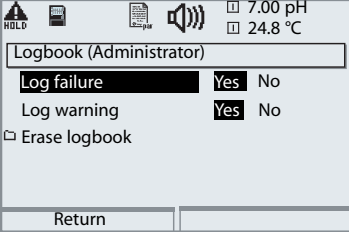
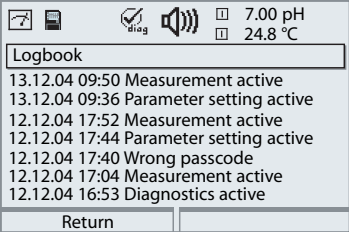
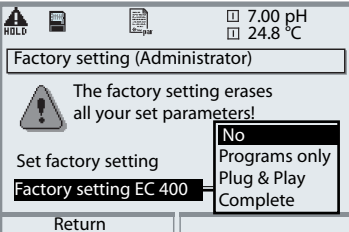




# Logbook, factory setting

Parameter setting/System control/Logbook (not with SW 700-107 AuditTrail)

**Note:** Function check active


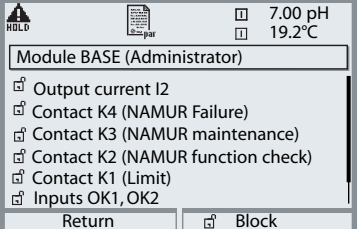
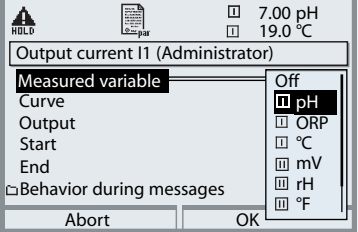
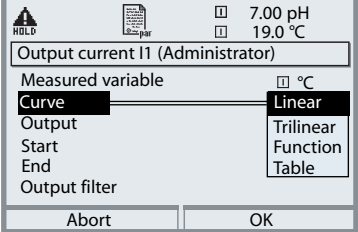
Menu	Display	Logbook, factory setting
	  	<p><b>Logbook</b>            (Parameter setting / System control / Logbook)            Select which messages are to be logged in the logbook. The last 50 events are recorded with date and time.            This permits quality management documentation to ISO 9000.</p> <p>The logbook can be called up from the diagnostics menu (Fig.).</p> <p>Additional function SW 700-104:            Extended logbook for recording data on SmartMedia card (TAN).</p> <p><b>Factory setting</b>            (Parameter setting / System control / Factory settings)            Allows resetting the parameters to their factory setting.</p> <ul style="list-style-type: none"> <li>• Plug &amp; Play:</li> </ul> <p>The automatic hardware identification is reset.</p> <ul style="list-style-type: none"> <li>• Complete:</li> </ul> <p>Hardware identification and programs are reset.</p>



# Current outputs, contacts, OK inputs

Select menu: Parameter setting/Module BASE

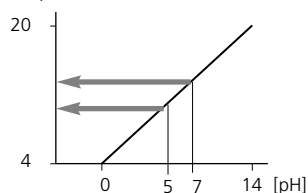
**Note:** Function check active

Menu	Display	Parameter setting BASE module
		<p><b>Configure current output</b></p> <ul style="list-style-type: none"> <li>• Call up parameter setting</li> <li>• Enter passcode</li> <li>• Select "Module BASE"</li> <li>• Select "Output current ..."</li> </ul>
		<ul style="list-style-type: none"> <li>• Select measured variable</li> </ul>
		<ul style="list-style-type: none"> <li>• 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".</li> </ul>

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

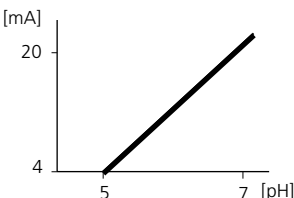
Example 1: Range pH 0 - 14

Output current [mA]



Example 2: Range pH 5 - 7

Advantage: Higher resolution in range of interest

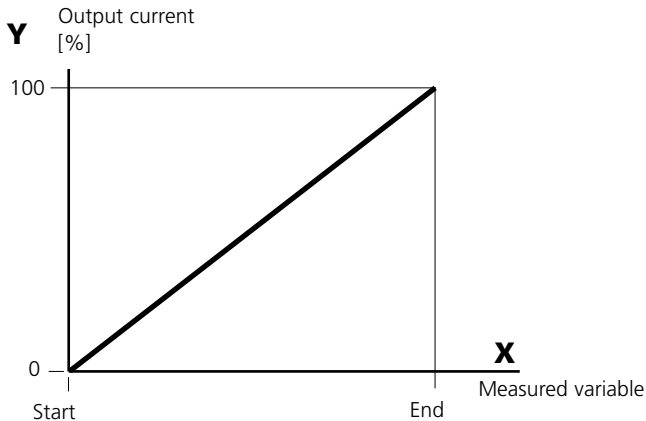


# Current outputs: Current output curves

Select menu: Parameter setting/Module BASE

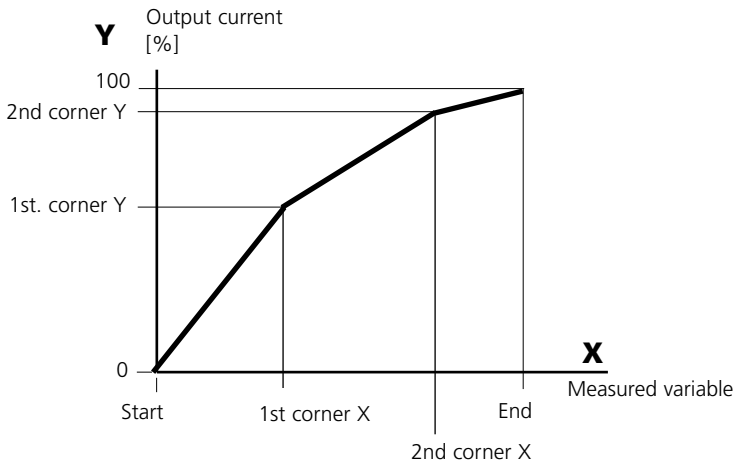
- **Linear characteristic**

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



- **Trilinear characteristic**

Two additional corner points must be entered:



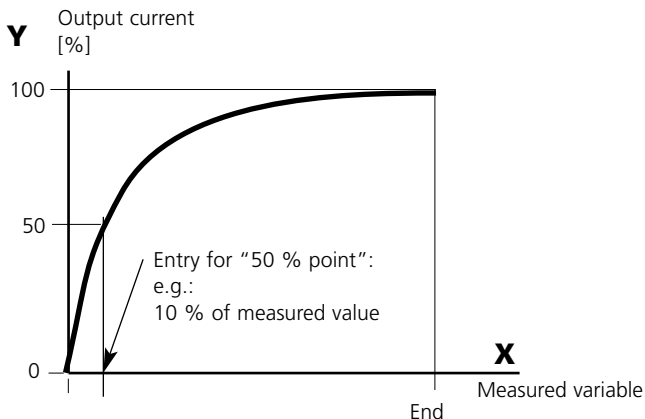
- **Note: Bilinear characteristic**

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

• **Function characteristic**

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

Required: Entering a value for 50 % output current.



**Equation**

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

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

*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

---

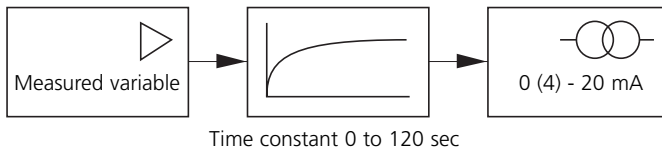
Time constant

## 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:

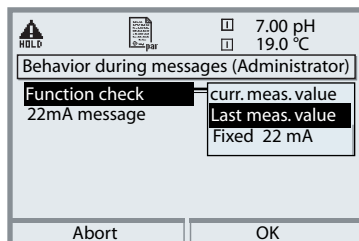
The filter only acts on the current output and the current value of the secondary display, not on the measurement display, the limit values, or the controller!



# NAMUR signals: Current outputs

Behavior during messages: Function check, 22 mA signal

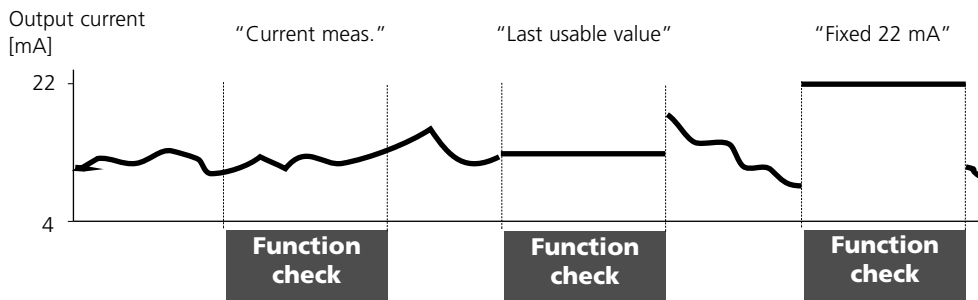
## Behavior during messages



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).



## Message when the current range is exceeded

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

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.

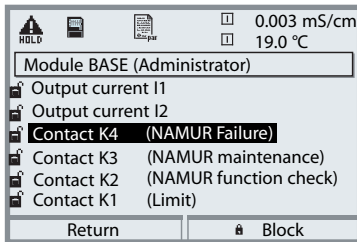
# NAMUR signals: Relay contacts

---

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:

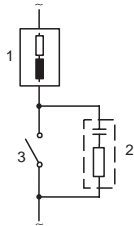
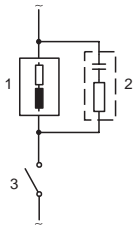
- during calibration
- during maintenance (current source, meas. point maintenance)
- during parameter setting at the Operator level and the Administrator level
- during an automatic rinsing cycle.

# 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  $\mu$ F,  
Resistor 100 ohms / 1 W
- 3 Contact

## **Warning!**


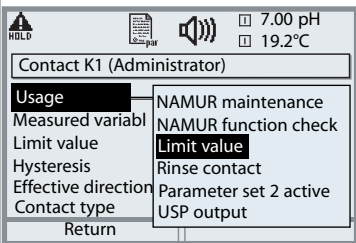
**Make sure that the maximum ratings of the relay contacts are not exceeded even during switching!**

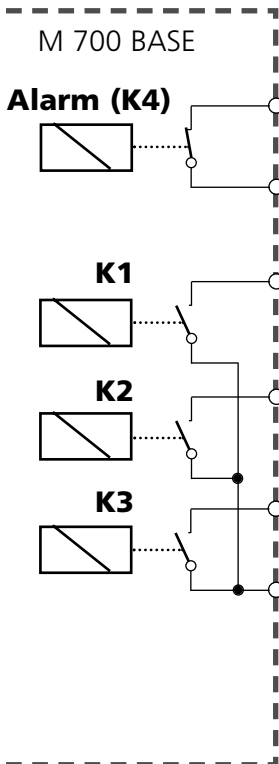
## **Information concerning relay contacts**

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
	 <p>7.00 pH 19.2°C</p> <p>Contact K1 (Administrator)</p> <p>Usage: NAMUR maintenance, NAMUR function check, Limit value</p> <p>Measured variable: Rinse contact</p> <p>Hysteresis: Parameter set 2 active</p> <p>Effective direction: USP output</p> <p>Contact type: Return</p>	<h3>Relay contacts, usage</h3> <ul style="list-style-type: none"> <li>• Call up parameter setting</li> <li>• Enter passcode</li> <li>• Select "Module BASE"</li> <li>• Select "Contact ..."</li> <li>• "Usage" (Fig.)</li> </ul>



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"):


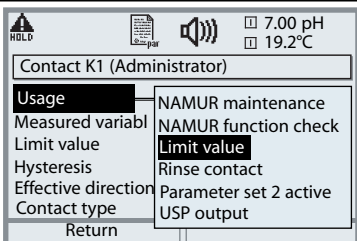
- NAMUR maintenance request
- NAMUR function check
- Limit value
- Rinse contact
- Parameter set 2 active
- USP output (Cond module only)
- KI recorder active

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

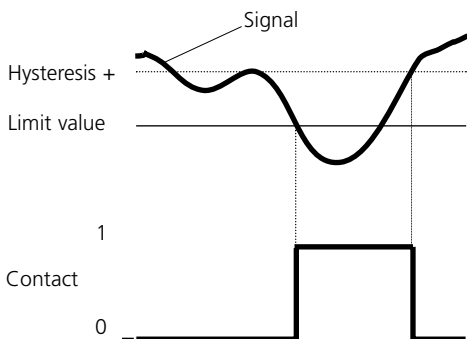


# Limit value, hysteresis, contact type

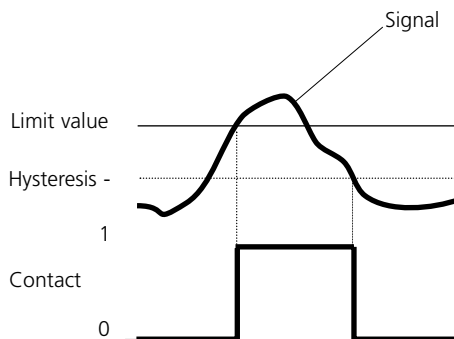
Parameter setting/Module BASE/Relay contacts/Usage

Menu	Display	Usage as limit value
		<b>Relay output: Limit value</b> <ul style="list-style-type: none"> <li>• Call up parameter setting</li> <li>• Enter passcode</li> <li>• Select "Module BASE"</li> <li>• Select "Contact ..."</li> <li>• "Usage: Limit" (Fig.)</li> </ul>

**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.)


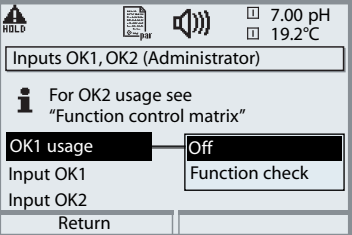
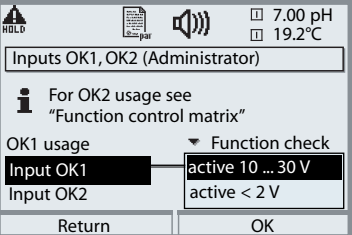
## Contact type

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

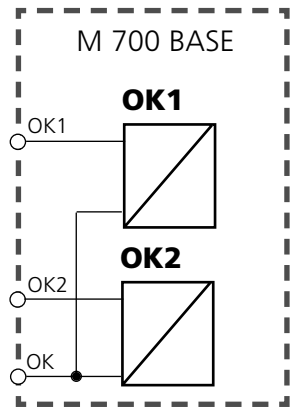
**Note:** Function check active

Menu	Display	Setting the OK inputs
		<p><b>OK1 input: Usage</b></p> <ul style="list-style-type: none"> <li>• Call up parameter setting</li> <li>• Enter passcode</li> <li>• Select "Module BASE"</li> <li>• Select "Inputs OK1/OK2"</li> <li>• Select "OK1 usage"</li> </ul>
		<p><b>OK1/OK2 inputs: Switching level</b></p> <ul style="list-style-type: none"> <li>• Call up parameter setting</li> <li>• Enter passcode</li> <li>• Select "Module BASE"</li> <li>• Select "Inputs OK1/OK2"</li> <li>• Specify active switching level</li> </ul>

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", "EC 400")

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

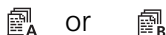
## Parameter sets


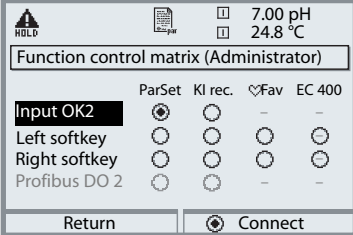
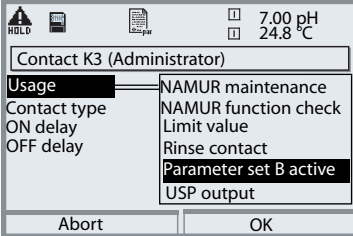
2 complete parameter sets (A, B) stored in the analyzer.

You can switch between the parameter sets using the OK2 input.

The currently activated set can be signaled by a relay contact.

An icon in the measurement display shows which parameter set is active:



Menu	Display	Parameter sets
		<p><b>Select parameter set (A, B) via input OK2</b></p> <ul style="list-style-type: none"> <li>• Call up parameter setting</li> <li>• System control</li> <li>• Function control matrix</li> <li>• Select "OK2"</li> <li>• Connect "Parameter set A/B"</li> </ul>
		<p><b>Signaling active parameter set via relay contact</b></p> <ul style="list-style-type: none"> <li>• Call up parameter setting</li> <li>• Select "Module BASE"</li> <li>• Select contact</li> <li>• Usage: "Parameter set ...".</li> </ul>

## Note

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

# **Measurement procedures EC 400(X)**

- **Continuous measurement:**

With continuous measurement the pH electrode is located in the process medium and is retracted for calibration or cleaning.

- **Short-time measurement:**

(interval measurement, sampling, sample mode ...)

The pH electrode is only momentarily moved into the process medium.

This method is applied when measuring aggressive or thermally demanding process media which require short measurement times with long rest periods.

Example:

After cleaning / calibration the probe remains in the calibration chamber and only moves into the process for measurement upon request (or time-controlled).

## **Start-up program**

### **Parameter setting: Start-up program**

At the end of the parameter-setting procedure, a "Start-up" line appears in the "Installation" menu. When you are sure to have set all parameters, select "Yes" to confirm.

Now the pumps perform the number of stroke movements required for filling the media tubes completely. The necessary rinsing cycles are automatically started.

As delivered, the USER 2 program with Start-up program is set as default.

### **Sensor detection**

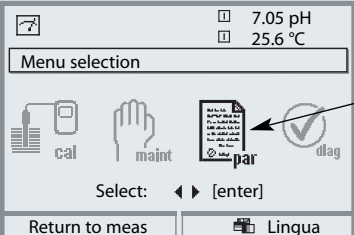

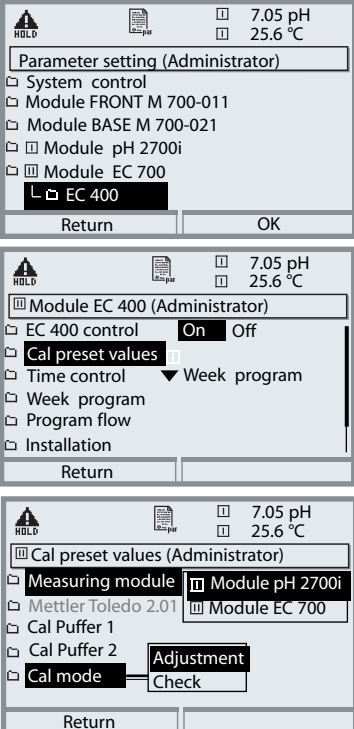
To prevent a program start via DCS when the sensor is removed, you should set "Sensor detection On".


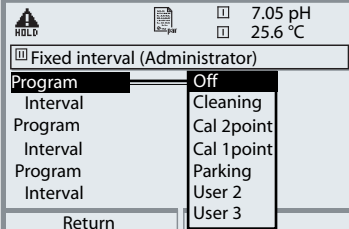
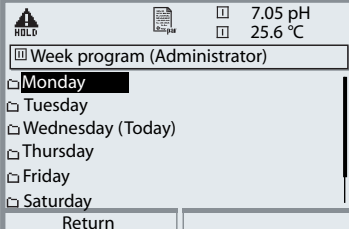
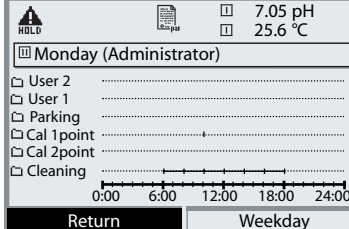
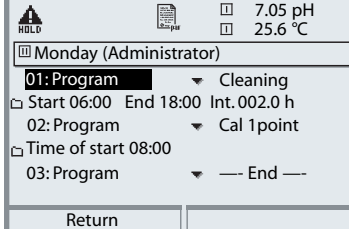
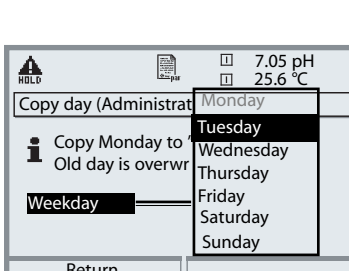
# Parameter setting of EasyClean 400(X)

Functional capabilities

Function	Adjustable parameters	Description Pg:
<b>Control</b>	- On / Off	84
<b>Cal preset values</b>	- Buffer specs	
<b>Calibration mode*</b>	- Check / Adjustment	
<b>Time control</b>	- Fixed interval / Week program	85
<b>Program flow</b>	- Cleaning - 2-point calibration - 1-point calibration - SERVICE program - Parking and user programs (2)	86    97
<b>Installation</b>		
- Meas. procedure	- Continuous / Short-time	
- External control (PCS)	- Polarity / Output settings	
- Sensor detection	- On / Off	
- Access manual control	- Access code	
- InTrac probe	- Move time max. - Sealing water On / Off - Wear counter max.	
- Rinse water (monitoring)	- Off / Process value / Temperature	
- Media adapter (I ... III) (up to 3x metering pump, or 2x metering pump, 1x cleaning valve)	- Equipment (Off / Pump / Cleaning valve) - Medium (Text to be entered) - Displaced volume - Residual volume - Media monitoring (Off/Process value/Temperature)	
- Additional media (1 ... 2)	- Equipment (On / Off) - Medium (Text to be entered) - Media monitoring (Off/Process value/Temperature)	
<b>- Start-up</b>	- Yes / No	62

\* "Select module" is displayed when further pH modules are installed in addition to the EC 700(X) module and the sensor installed in the probe is operated with one of these modules.

Menu	Display	Parameter setting EC 400
		<p><b>Call up parameter setting</b></p> <p>From the measuring mode: Press <b>menu</b> key to select menu. Select parameter setting using arrow keys, confirm with <b>enter</b>.</p>
		<p>Parameter setting: Select "EC 400".</p> <p><b>Icons to assign the measured values displayed:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> specifies module slot I.</li> <li><input checked="" type="checkbox"/> specifies module slot II.</li> </ul> <p><b>EC 400: Cal preset values</b></p> <ul style="list-style-type: none"> <li>• <b>Select pH module</b> Select the pH module for evaluation with the EasyClean 400 controller (when more than one pH module is installed).</li> <li>• <b>Select cal mode</b></li> <li>• Adjustment: The values determined by a calibration are taken over.</li> <li>• Check: The values determined by a calibration are logged, but not taken over.</li> </ul> <p><b>Time control</b></p> <ul style="list-style-type: none"> <li>• Fixed interval (3): Specify times (000.0 h ... xxx.x h) (Please note: 000.1 h = 6 min)</li> <li>• Week program: Specify weekday</li> </ul>

Menu	Display	Time control configuration
		<p><b>Time control: Fixed interval</b></p> <p>The “Fixed interval” menu allows selection of up to three programs. An individual time interval can be assigned to each program.</p>
		<p><b>Time control: Week program</b></p> <p>In this menu you can View, Edit and Copy.</p>
		<p><b>View</b></p> <p>shows the configured program sequences over the day</p>
		<p><b>Edit</b></p> <p>allows selection of up to 10 programs per day and you can choose between “Individual start” or “Interval” (the program is executed within a start and an end time at a specified interval).</p>
		<p><b>Copy</b></p> <p>allows taking over a configured program for another weekday. (Further editing is possible.)</p>

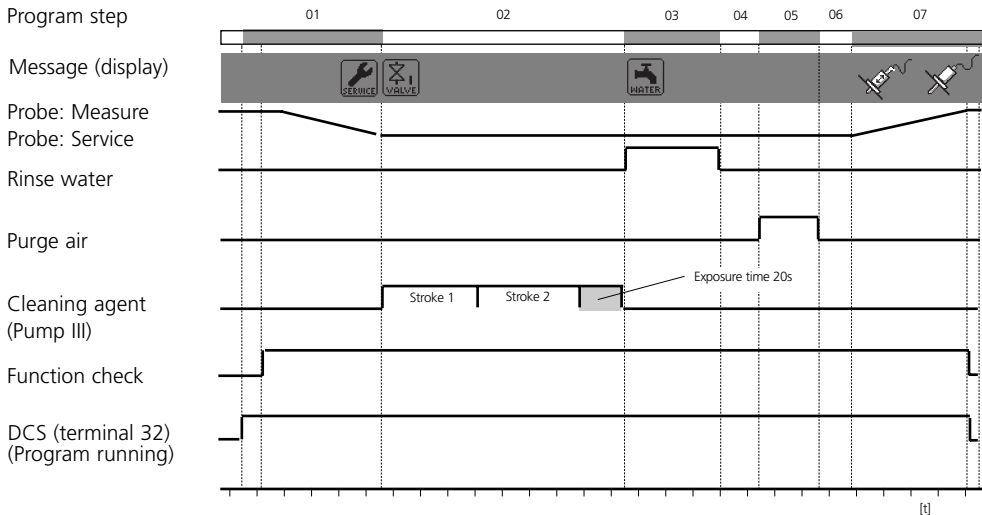
# Parameter setting: Program flows

## Cleaning, continuous, media monitoring off

Display text	Time [s]
01: Probe in SERVICE	
02: Cleaning agent*	0020 s
03: Rinse water On	0060 s
04: Rinse water Off	0002 s
05: Purge air On*	0010 s
06: Purge air Off*	0002 s
07: Probe in MEASURE	0005 s
08: Prog. end	

\* Text user-defined

**Cleaning (continuous) can also be started via a DCS input signal at input BIN1 of the EC 400.**





# Parameter setting: Program flows

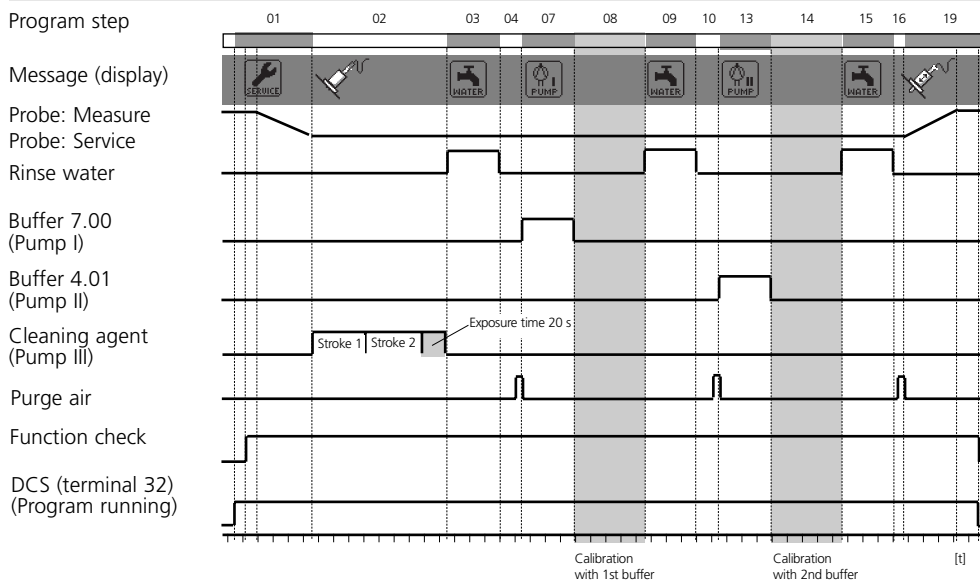
## Cal 2point, continuous, media monitoring off

(This is also the pre-setting for "User 2")

Display text	Time [s]	Comment
01: Probe in SERVICE		
02: Cleaning agent*	0020 s	
03: Rinse water On	0060 s	
04: Rinse water Off	0002 s	
05: Purge air On*	0010 s	
06: Purge air Off*	0002 s	
07: Buffer 7.00*	0000 s	This step allows programming a calibration delay
08: Cal buffer 1		
09: Rinse water On	0010 s	
10: Rinse water Off	0002 s	
11: Purge air On*	0010 s	
12: Purge air Off*	0002 s	
13: Buffer 4.01*	0000 s	This step allows programming a calibration delay
14: Cal buffer 2		
15: Rinse water On	0010 s	
16: Rinse water Off	0002 s	
17: Purge air On*	0010 s	
18: Purge air Off*	0002 s	
19: Probe in MEASURE	0005 s	This step allows programming an extended HOLD period
20: Prog. end		* Text user-defined

**Cal2point (continuous) can also be started via a DCS input signal at input BIN2.**

Program step



# Parameter setting: Program flows

## Cal 1point, continuous, media monitoring off

Display text	Time [s]	Comment
01: Probe in SERVICE		
02: Cleaning agent*	0020 s	
03: Rinse water On	0060 s	
04: Rinse water Off	0002 s	
05: Purge air On*	0010 s	
06: Purge air Off*	0002 s	
07: Buffer 7.00*	0000 s	This step allows programming a calibration delay
08: Cal buffer 1		
09: Rinse water On	0010 s	
10: Rinse water Off	0002 s	
11: Purge air On*	0010 s	
12: Purge air Off*	0002 s	
13: Probe in MEASURE	0005 s	This step allows programming an extended HOLD period
14: Prog. end		

\* Text user-defined

Program step

Message (display)

Probe: Measure

Probe: Service

Rinse water

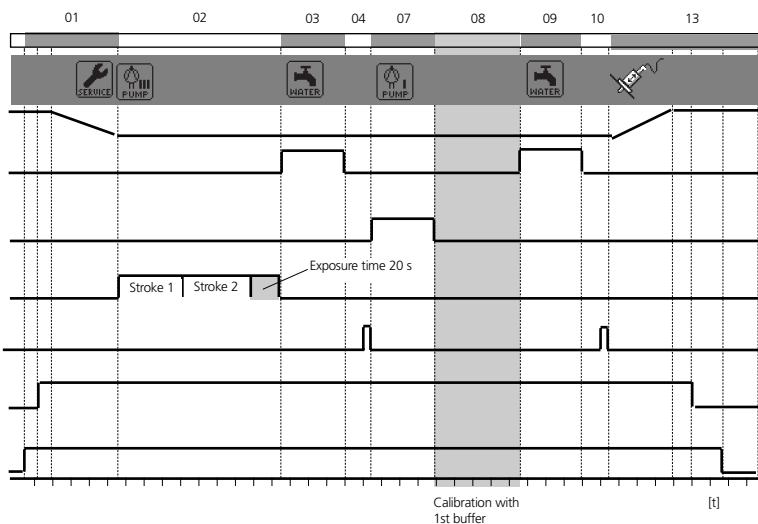
Buffer I  
(Pump I)

Cleaning agent  
(Pump III)

Purge air

Function check

DCS (terminal 32)  
(Program running)



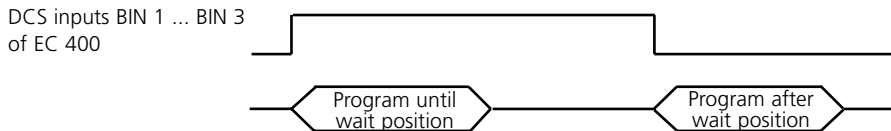
# Parking program: wait position

---

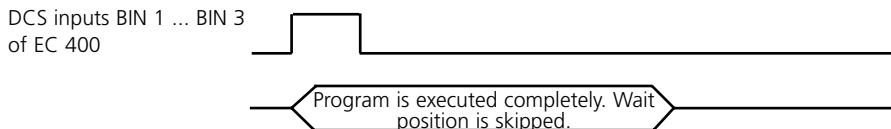
The park program includes the programming step “Wait position”.

When the program is started via the DCS inputs BIN 1 ... BIN 3 on the EC 400, the program will be executed until the “Wait position” is reached. There it stops until the signal status at the DCS inputs changes.

- 1. The program is started via the DCS inputs and remains in “Wait position” until the assignment of the DCS inputs changes:**



- 2. The program is started by a short signal at the DCS inputs: Wait position is skipped.**



**Note:**

If the programs are started by the premium line transmitter M 700(X) from the Calibration or Maintenance menu, the wait position will also be skipped.

# Parameter setting: Program flows

## Parking

Display text	Time [s]	
01: Probe in SERVICE		
02: Cleaning agent*	0020 s	
03: Rinse water On	0060 s	
04: Rinse water Off	0002 s	
05: Purge air On	0010 s	
06: Purge air Off	0002 s	
07: Buffer 7.00		
08: Wait position	> Position will be held until initial status is changed	
09: Rinse water On	0010 s	
10: Rinse water Off	0002 s	
11: Purge air On	0010 s	
12: Purge air Off	0002 s	
13: Probe in MEASURE	0005 s	This step allows programming an extended HOLD period
14: Prog. end		

The “Parking” program can be started via Bin 3. The program stops at the “Wait position” step until the initial status at Bin 1 ... 3 is changed.

\*Text user-defined

“Parking” can also be started via a DCS input signal at input BIN3 of the EC 400.

Program step

Message (display)

Probe: Measure

Probe: Service

Rinse water

Buffer 7.00  
(Pump I)

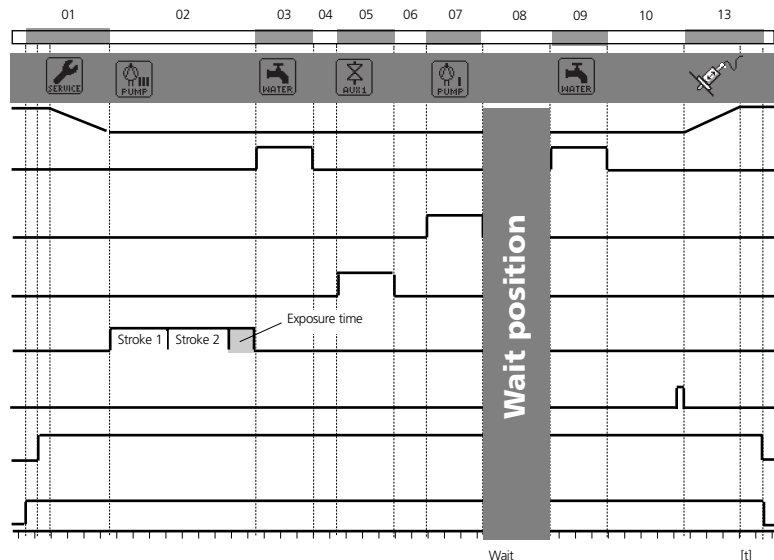
Purge air  
(AUX1 valve)

Cleaning agent  
(Pump III)

Purge air

Function check

DCS (terminal 32)  
(Program running)



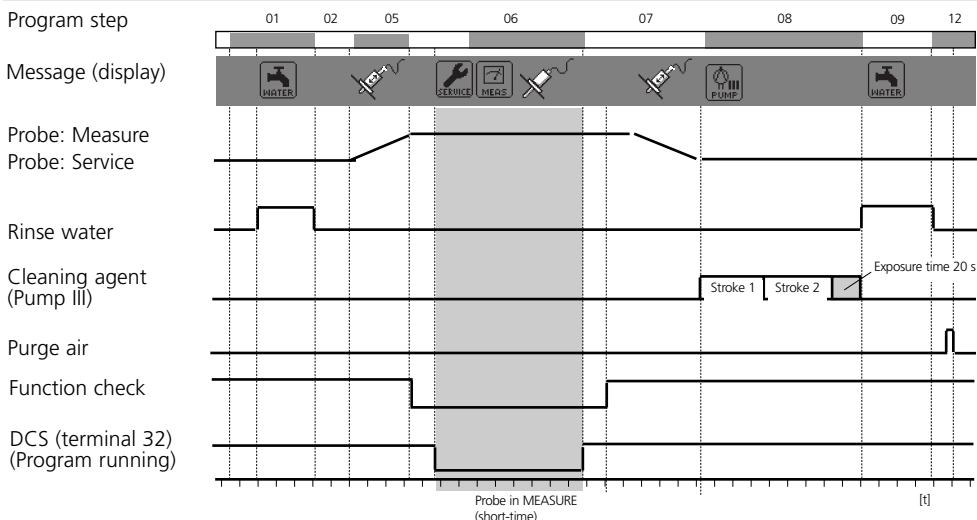
# Parameter setting: Program flows

## Measurement, short-time, media monitoring off

Display text	Time [s]
01: Rinse water On	0010 s
02: Rinse water Off	0002 s
03: Purge air On*	0010 s
04: Purge air Off*	0002 s
05: Probe in MEASURE	0005 s
06: Meas duration	0030 s
07: Probe in SERVICE	
08: Cleaning agent*	0020 s
09: Rinse water On	0060 s
10: Rinse water Off	0002 s
11: Purge air On*	0010 s
12: Purge air Off*	0002 s
13: Prog. end	

\*Text user-defined

**Measurement (short-time) can also be started via a DCS input signal at input BIN1 of the EC 400.**



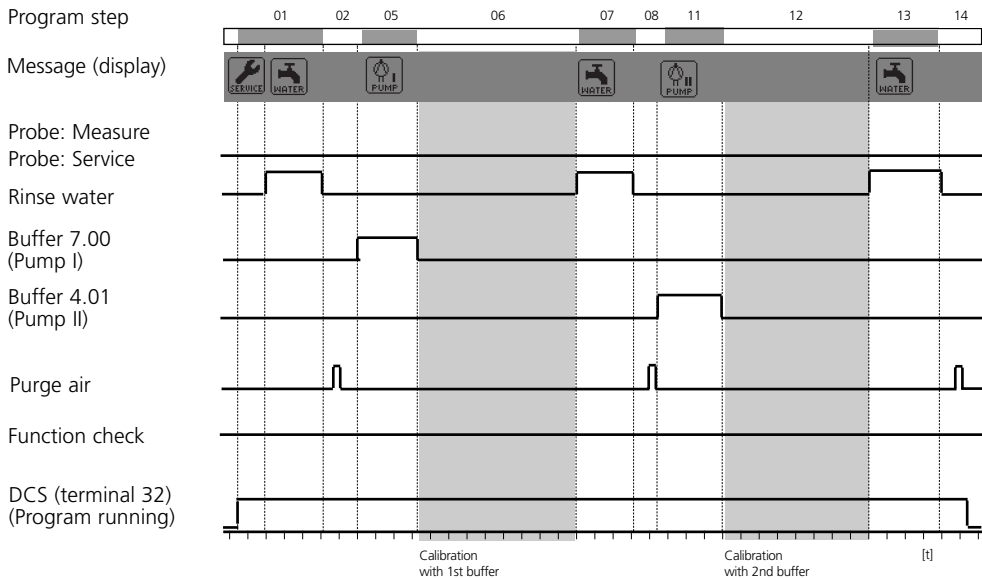
# Parameter setting: Program flows

## Cal 2point, short-time, media monitoring off

Display text	Time [s]	Comment
01: Rinse water On	0010 s	
02: Rinse water Off	0002 s	
03: Purge air On*	0010 s	
04: Purge air Off*	0002 s	
05: Buffer 7.00*	0000 s	This step allows programming a calibration delay
06: Cal buffer 1		
07: Rinse water On	0010 s	
08: Rinse water Off	0002 s	
09: Purge air On*	0010 s	
10: Purge air Off*	0002 s	
11: Buffer 4.01*	0000 s	This step allows programming a calibration delay
12: Cal buffer 2		
13: Rinse water On	0010 s	
14: Rinse water Off	0002 s	
09: Purge air On*	0010 s	
10: Purge air Off*	0002 s	
15: Prog. end		

\*Text user-defined

**Cal2point (short-time) can also be started via a DCS input signal at input BIN2 of the EC 400.**



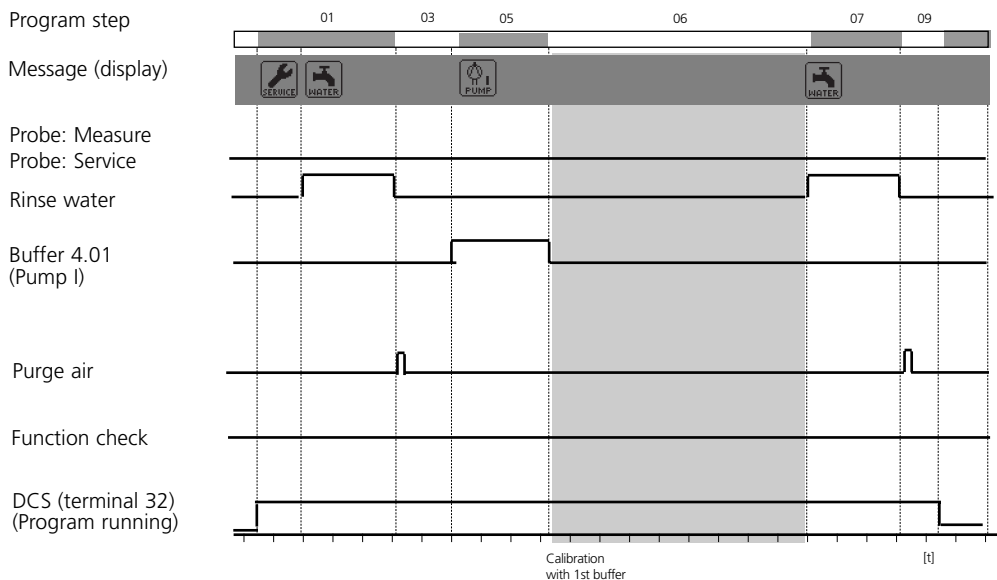
# Parameter setting: Program flows

## Cal 1point, short-time, media monitoring off

Display text	Time [s]	Comment
01: Rinse water On	0010 s	
02: Rinse water Off	0002 s	
03: Purge air On*	0010 s	
04: Purge air Off*	0002 s	
05: Buffer 7.00*	0000 s	This step allows programming a calibration delay
06: Cal buffer 1		
07: Rinse water On	0010 s	
08: Rinse water Off	0002 s	
09: Purge air On*	0010 s	
10: Purge air Off*	0002 s	
11: Prog. end		

\*Text user-defined

### Cal1point (short-time)



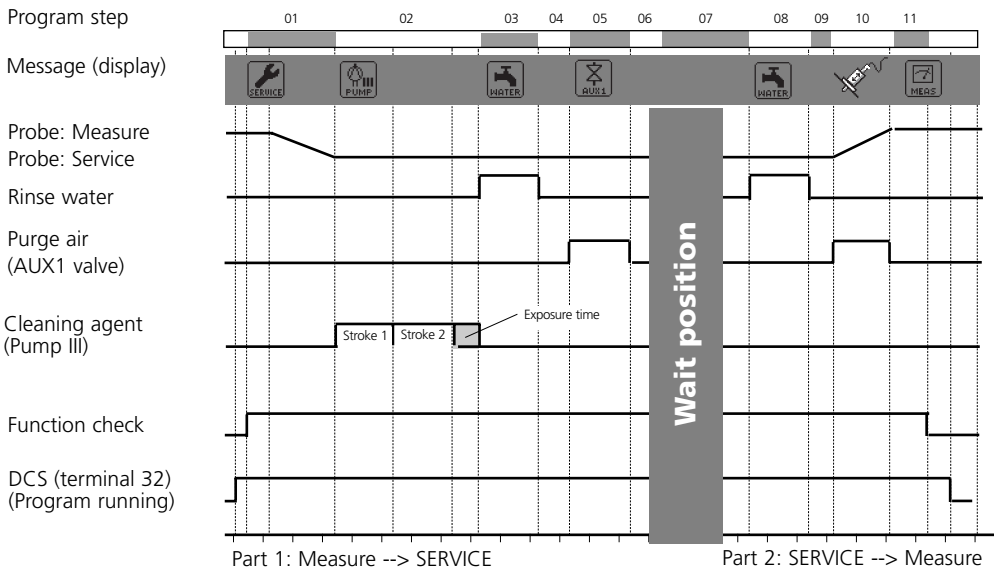
# Parameter setting: Program flows

## Service


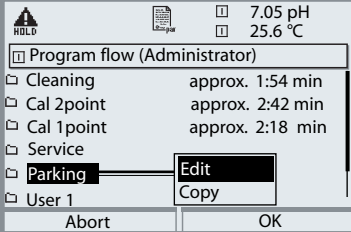
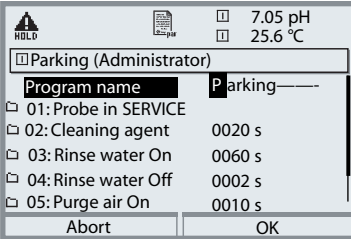
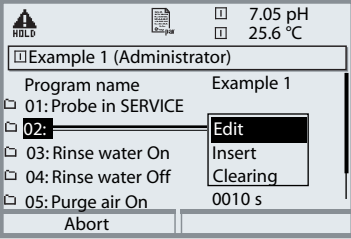
Display text	Time [s]	
01: Probe in SERVICE		
02: Cleaning agent*	0020 s	Measure -> Service
03: Rinse water On	0060 s	
04: Rinse water Off	0002 s	
05: Purge air On*	0010 s	
06: Purge air Off*	0002 s	
07: Wait position		Service position
08: Rinse water On	0010 s	
09: Rinse water Off	0002 s	
10: Purge air On*	0010 s	
11: Purge air Off*	0002 s	
12: Probe in MEASURE	0005 s	Service -> Measure (This step allows programming an extended HOLD period)
13: Prog. end		

\*Text user-defined

Service can also be started via DCS input M/S.





Menu	Display	Parameter setting Program flow
		<p><b>Configure program flow</b>  Parameter setting / EC 400 /  Program flow / Parking:  Select "Edit" using arrow keys,  confirm with <b>enter</b>.</p>
		<p><b>Enter program name</b>  A new program name can be entered  using the arrow keys.  Confirm the name with <b>enter</b>.</p>
		<p><b>Edit program step</b>  Select the program step you want  to edit using the arrow keys.  Press <b>enter</b>:  Now you can choose between  "Edit, Insert, Delete".</p> <ul style="list-style-type: none"> <li>• Edit:  Allows selecting a function</li> <li>• Insert:  Inserts an empty step above the  selected program steps and then  allows selecting a function  – by "editing" empty step –</li> <li>• Delete:  The program step is deleted.</li> </ul>

**Menu Display**

- **Configure function**
- **Activate monitoring**

par

HOLD 7.05 pH 25.6 °C

Program flow (Administrator)

Function

Exposure time

- Cal Buffer 1
- Cal Buffer 2
- Purge air On
- Purge air Off
- Aux medium On
- Aux medium Off
- Blank step**

Abort OK

For valve functions the run time must be specified, for pumps the exposure time.

**Configure function**

Select a function using arrow keys, confirm with **enter**:

- Program end
- Probe in SERVICE
- Probe in MEASURE
- Rinse water On
- Rinse water Off
- Wait position
- Goto line
- Buffer 7.00 --- Text can be edited during installation
- Buffer 4.01 --- Text can be edited during installation
- Cleaning agent -- Text can be edited during install.
- Cal buffer 1
- Cal buffer 2
- Purge air On -- Text can be edited during installation
- Purge air Off -- Text can be edited during installation
- Aux medium On - Text can be edited during install.
- Aux medium Off - Text can be edited during install.
- Blank step

HOLD 7.05 pH 25.6 °C

Program flow (Administrator)

Function

Exposure time

Monitoring

Cleaning agent

0020 s

On Off

Return

---

HOLD 7.05 pH 25.6 °C

Program flow (Administrator)

Program name

Example 1

- 01: Probe in SERVICE
- 02: Cleaning agent 0020 s Chk
- 03: Rinse water On 0010 s
- 04: Rinse water Off 0002 s
- 05: Buffer 7.00 0000 s

Return

---

HOLD 7.05 pH 25.6 °C

Media adapter (Administrator)

Port III

Medium

Monitoring

Setpoint

Adm. deviation

- Cleaning valve
- Cleaning agent
- Process value
- 09.20 pH
- 01.00 pH

Return

**Activate monitoring**

(See Pg 102 "Media monitoring")

With several functions you can monitor the media used (e.g. cleaning agent, buffers, rinsing water, ...) in the calibration chamber. ("Monitoring: On" must have been enabled in the Installation menu.). A minimum response time > 2 s is required.

The respective program step is then marked with "Chk".

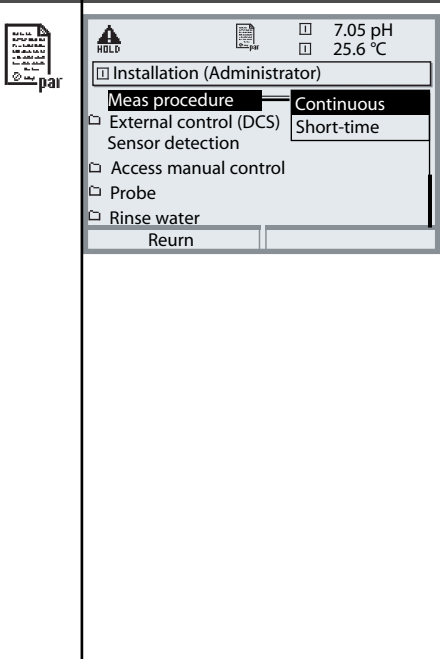






In any case it is necessary that you select the monitoring function for the respective medium in the "Installation" menu and specify valid tolerance limits for temperature or process value, otherwise the respective line is not displayed.

# Parameter setting: Installation

Configuration of EasyClean 400 functions

Installation	Default setting	Adjustable parameters
• Meas. procedure	Continuous	(Short-time)
• External control (DCS)		(Polarity, Output settings)
- Signal level of inputs (Bin1..3, M/S, A/M)	Active: 10 ... 30 V	(Active: 10 ... 30 V / active < 2V)
- Signal level of outputs:	N/O	(N/O / N/C)
• Sensor detection	Off	Off, On
• Manual control	Access code for manual control (maint menu) Default: 2598	
• InTrac probe		
- Max. move time	0015 s	
- Sealing water	Off	(On)
- Wear counter	0000	(max.1000)
• Rinse water Monitoring	Off	(Process value / Temperature)
- Setpoint	+07.00 pH	
- Adm. deviation	01.00 pH	
• Media adapter		
- Port I ... III	Off*	"Off", "Metering pump," or "Cleaning valve" (port III only)
- Medium	(e.g. "Buffer 7.00")	(Text can be entered)
- Displaced volume	50 ml	(25 / 50 / 75 / 100 ml)
- Recommended volume:		InTrac 77Xe 50 ml InTrac 797e 75 ml InTrac 798e 100 ml
- Residual volume	500 ml	(0 / 250 / 500 ml)
- Monitoring	Off	(Process value / Temperature)
- Setpoint	07.00 pH	(Process medium or Temperature)
- Adm. deviation	0.50 pH	
• Additional media	Purge air	
- Additional medium 1	Off*	(Monitoring: On, Off)
- Additional medium 2	Off*	(Monitoring: On, Off)
• Start-up	No	Yes / No

\*Automatic adjustment by "Plug & Play" in: System control / Factory setting EC 400

Menu	Display	<ul style="list-style-type: none"> <li>• Measurement procedures</li> <li>• External control via DCS</li> </ul>
	<p>   7.05 pH   25.6 °C </p> <p> <input type="checkbox"/> Installation (Administrator) </p> <p> <input checked="" type="checkbox"/> Meas procedure <ul style="list-style-type: none"> <li>Continuous</li> <li>Short-time</li> </ul> </p> <p> <input type="checkbox"/> External control (DCS) </p> <p> <input type="checkbox"/> Sensor detection </p> <p> <input type="checkbox"/> Access manual control </p> <p> <input type="checkbox"/> Probe </p> <p> <input type="checkbox"/> Rinse water </p> <p>Return</p>	<p><b>Select measurement procedure</b></p> <ul style="list-style-type: none"> <li>• <b>Continuous measurement:</b> With continuous measurement the pH electrode is located in the process medium and is retracted for calibration or cleaning.</li> <li>• <b>Short-time measurement:</b> (interval measurement, sampling, sample mode ...) The pH electrode is only momentarily moved into the process medium. This method is applied when measuring aggressive or thermally demanding process media which require short measurement times with long rest periods.</li> </ul>
	<p>   7.05 pH   25.6 °C </p> <p> <input type="checkbox"/> External control (DCS) (Administrator) </p> <p> Control <input type="checkbox"/> On <input type="checkbox"/> Off </p> <p> <input checked="" type="checkbox"/> Inputs DCS (36..39) active 10...30V </p> <p> Input M/S (42/43) active &lt; 2 V </p> <p> Input A/M (40/41) active 10...30 V </p> <p> Output DCS (34) Measure Alarm </p> <p> Output DCS (31..34) N/O </p> <p>Return</p>	<p><b>External control via DCS</b></p> <ul style="list-style-type: none"> <li>• <b>DCS inputs:</b> Inputs for selecting the control programs. Here, the active signal level is specified (&lt; 2 V or 10 ... 30 V).</li> <li>• <b>M/S input:</b> Control of probe movement</li> <li>• <b>A/M input:</b> Intervals automatic / blocked</li> <li>• <b>DCS output (34):</b> Specify the output signal for terminal 34: - Measuring or - Alarm</li> <li>• <b>DCS outputs (31 ... 34):</b> Specify the contact type (N/O, N/C)</li> </ul>

# Control via process control system (DCS)

## Inputs/outputs of EasyClean 400(X)

No.	Designation	I / O	Level	Function
42	Measuring / Service	I	0	Probe moves to meas. position *
43			1	Probe moves to service position
40	Auto / Manual	I	0	Automatic interval control from M 700 *
41			1	Automatic intervals blocked
37	Bin 3	I		Program selection and start, manual / DCS * **
38	Bin 2			(Program 1 ... 6 - see following page)
39	Bin 1			
34	Measuring*** (user-defined: "Alarm")	O	0	
			1	Probe in "MEASURE" position *
33	Service	O	0	
			1	Probe in "SERVICE" position *
32	Program runs	O	0	
			1	Program running *

\*) Passive contacts,  
24 V must be supplied externally or via DCS

\*\*\*) Signal duration at least 2 sec (passing contacts)

\*\*\*) As delivered, the signal output DCS 34 serves for probe position feedback – as shown. However, you can also program this output as "Alarm". Then it sends a signal to the DCS in the event of calibration errors or faulty probe movement.

# Control programs and measurement procedures

Factory settings

## Control programs of EasyClean 700(X)

6 programs and one service program can be called up. 5 program flows are preset. 2 further programs can be entered by the user (User 1, User 2).

The programs are called up ...

- for manual operation via M 700(X)
- remote via DCS or switch with passive inputs Bin 1 ... 3  
(24 V must be externally supplied, see specifications)


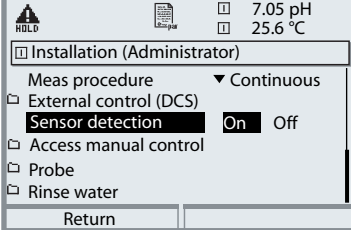
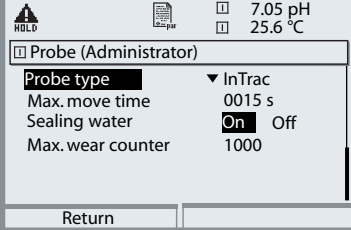
Program	Description	Bin 3	Bin 2	Bin 1
1	Cleaning	0	0	1
2	Two-point calibration (Cal 2point)	0	1	0
3	One-point calibration (Cal 1point)	0	1	1
4	Park position	1	0	0
5	User-programmable (User 1)	1	0	1
6	User-programmable (User 2)	1	1	0
7	Service program	Request via M/S		

The service program (7) stops all other running programs (1 - 6) immediately and erases stored requests. For programs 1-6 the following applies:

When you start a new program, the remaining steps of a currently running program are executed first. Further requests are stored and executed subsequently. When you control the EC 400(X) via M 700(X), you can block the Bin 1, Bin 2, Bin 3 signal lines as well as M/S and A/M to prevent conflicts (Parameter setting / EC 700(X) / Installation / Ext. control (DCS): Off)

## Measurement procedures

- Continuous measurement:  
After cleaning / calibration the probe moves into the process for measurement
- Short-time measurement (interval measurement, sampling, sample mode)  
After cleaning / calibration the probe remains in the calibration chamber and only moves into the process for measurement upon request.

Menu	Display	<ul style="list-style-type: none"> <li>• Sensor detection</li> <li>• Probe</li> </ul>
		<p><b>Sensor detection</b></p> <p>Sensor detection “On” prevents accidental probe movement when the electrode has been removed. This is done by checking whether the temperature probe integrated in the sensor is connected.</p>
		<p><b>Probe</b></p> <p>Select the retractable fitting. Here, the max. move time is automatically adjusted (depending on model).</p> <ul style="list-style-type: none"> <li>• <b>Sealing water:</b> Sealing water is switched on shortly before the probe movement is started to keep the rinsing chamber free from medium. This is important for processes containing fibrous or adhering media. The sealing water pressure must be higher than the medium pressure. Intrusion of medium is prevented by the counter-pressure in the rinsing chamber which is caused by the sealing water.</li> <li>• <b>Wear counter:</b> Permits specifying the max. admissible number of move cycles until a message is generated.</li> </ul>

# Configuring media monitoring


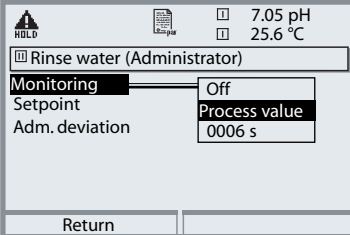
Parameter setting / EC 400 / Installation

## Media monitoring

For perfect system control, the pH value (or temperature) of the media used (buffer solutions, cleaning solution, rinsing water ...) can be checked against a specified value in the calibration chamber. This ensures that only correct media are used in the calibration chamber of the probe. Exchanged or contaminated media or media with a wrong temperature are recognized. In that case a message will be released. If faulty media are recognized before a calibration step, that step will not be performed.

### Caution!

When monitoring the pH value of a medium, the zero and slope deviations of the electrode must be taken into account. Therefore the value specified for "Adm. deviation" must not be too low!

Menu	Display	Configuring media monitoring
		<p>Media monitoring can be configured in the "Parameter setting / EC 400 / Installation" menu for:</p> <ul style="list-style-type: none"> <li>• Rinse water</li> <li>• Media at media adapter (... in the "Media adapter" menu)</li> <li>• Additional media</li> </ul> <p>The process value or temperature of the media can be monitored. Please note that the value specified for "Adm. deviation" should not be too low.</p> <p>The minimum response time is automatically taken into account when configuring the user programs.</p>



Menu	Display	<ul style="list-style-type: none"> <li>• <b>Media adapter, Add. media</b></li> <li>• <b>Start-up</b></li> </ul>
	<p><b>Media adapter</b></p> <ul style="list-style-type: none"> <li>- Specify the equipment (Metering pump, Off, or Cleaning agent)</li> <li>- Designate medium,</li> <li>- Specify the displaced volume depending on model, e.g.:  InTrac 77Xe 50 ml  InTrac797e 75 ml  InTrac797e 100 ml)</li> <li>- Residual volume</li> <li>- Monitoring (Process value/Temp)</li> <li>- Setpoint</li> </ul>	
		<p><b>Additional media (2)</b></p> <ul style="list-style-type: none"> <li>- Specify the equipment (On, Off)</li> <li>- Designate medium</li> <li>- Monitoring (Process value/Temp)</li> <li>- Setpoint</li> </ul>
		<p><b>Start-up</b></p> <p>At the end of the parameter-setting procedure, a “Start-up” line appears in the “Installation” menu. When you are sure to have set all parameters, select “Yes” to confirm. Now the pumps perform the number of stroke movements required for filling the media tubes completely. The necessary rinsing cycles are automatically started.</p>

# **EC 700(X) parameter set for copy**

---

Parameter set: Individual settings

**Point of measurement:** .....

Parameter set: .....

Configured by / date: .....

<b>EC 700 parameter</b>	<b>Set A</b>	<b>Set B</b>
Input filter Pulse suppression		
Sensor type		
Temperature probe		
Sensoface		
Nominal slope		
Nominal zero		
Sensocheck ref el		
Sensocheck glass el		
Response time		
Calcheck		

<b>EC 700 parameter</b>	<b>Set A</b>	<b>Set B</b>
Calimatic buffer		
Drift check		
Cal timer		
Adaptive cal timer		
Cal tolerance band check		
TC correction		
ORP/rH value: Reference electrode		
ORP conversion to SHE		
Calculate rH with factor		
Delta function		
Messages pH value		
Messages ORP value		
Messages rH value		
Messages Temperature		
Messages mV value		

# EC 700(X) parameter set for copy Part 2

EasyClean 400(X) parameters

---

**Point of measurement:** .....

Configured by / date: .....

Parameter	Setting
Measuring module	
Calibration mode	
Time control	
Fixed interval / Week program	
Program 1	
Interval 1	
Program 2	
Interval 2	
Program 3	
Interval 3	

# EC 700(X) parameter set for copy Part 3

EasyClean 400(X) weekday parameters

(This form can be used as original for copy for each weekday.

Max. 10 programs can be set for each day.)

Week program parameter	Setting
<b>Weekday</b>	
<b>Program No. ....</b>	<input type="checkbox"/> Individual start <input type="checkbox"/> Interval
Start	
End	
Interval	
<b>Program No. ....</b>	<input type="checkbox"/> Individual start <input type="checkbox"/> Interval
Start	
End	
Interval	
<b>Program No. ....</b>	<input type="checkbox"/> Individual start <input type="checkbox"/> Interval
Start	
End	
Interval	

# EC 700(X) parameter set for copy Part 4

EasyClean 400(X) parameters: Individual program flow (for Parking, ... )

---

One copy per program. Each program can include up to 30 steps.

**Program** .....

Configured by / date: .....

Step	Function	Time	Media test

# EC 700(X) parameter set for copy Part 5

EasyClean 400(X) parameters: Installation

---

Configured by / date: .....

Parameter	Setting
Meas. procedure	
External control (DCS)	
Access code Manual control	
<b>InTrac probe</b>	
Move time max.	
Sealing water	
Wear counter max.	
Rinse water Monitoring	
- Setpoint	
- Adm. deviation	

# EC 700(X) parameter set for copy Part 6

EasyClean 400(X) parameters: Installation / Media adapter

---

Configured by / date: .....

Parameter	Setting
<b>Media adapter port I</b>	
Medium	
Displaced volume	
Residual volume	
Media monitoring	
Setpoint / Adm. deviation	
<b>Media adapter port II</b>	
Medium	
Displaced volume	
Residual volume	
Media monitoring	
Setpoint / Adm. deviation	





















# EC 700(X) parameter set for copy Part 7













EasyClean 400(X) parameters: Installation / Media adapter

---

Configured by / date: .....

<b>Parameter</b>	<b>Setting</b>
<b>Media adapter port III</b>	
Medium	
Media monitoring	
Setpoint / Adm. deviation	
<b>Additional medium 1</b>	
Medium	
Media monitoring	
Setpoint / Adm. deviation	
<b>Additional medium 2</b>	
Medium	
Media monitoring	
Setpoint / Adm. deviation	

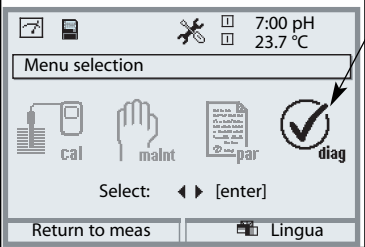

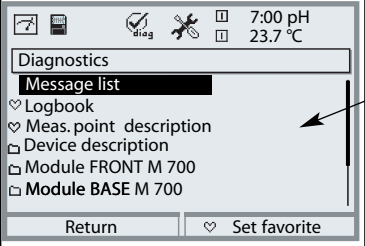
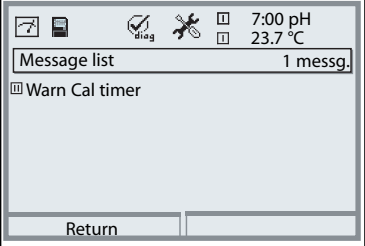
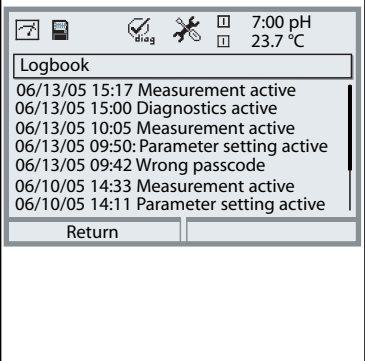
Icon	Explanation of icons important for the EC 700(X) module
	The M 700 is in measuring mode.
 	The M 700 is in calibration mode. Function check is active.
 	The M 700 is in maintenance mode. Function check is active.
 	The M 700 is in parameter setting mode. Function check is active.
	The M 700 is in diagnostics mode.
<b>NAMUR signals</b>	<p> <b>Function check.</b> The NAMUR “function check” contact is active (factory setting: M 700 BASE, contact K2, N/O contact). Current outputs as configured:</p> <ul style="list-style-type: none"> <li>• Currently measured value: The currently measured value appears at the current output</li> <li>• Last measured value: The last measured value is held at the current output</li> <li>• Fix 22 mA: The output current is at 22 mA</li> </ul> <p> <b>Failure:</b> The NAMUR “failure” contact is active (factory setting: M 700 BASE, contact K4, N/C contact). To view error message, call up: Diagnostics menu/Message list</p> <p> <b>Maintenance:</b> The NAMUR “maintenance request” contact is active (factory setting: M 700 BASE, contact K2, N/O contact). To view error message, call up: Diagnostics menu/Message list</p>
 man	Temperature by manual input
	Calibration is performed (progress display)
	Calibration - Step 1 of product calibration has been executed. The M 700 is waiting for the sample value
TC	Temperature compensation for process medium is active (Linear/Ultrapur 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 <b>enter</b>
	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 e.g. in the case of identical module types.
 B	Indicates the active parameter set (The M 700 provides two parameter sets A and B. Up to 5 sets can be added using additional functions and SmartMedia card.)


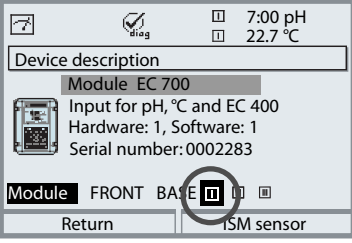
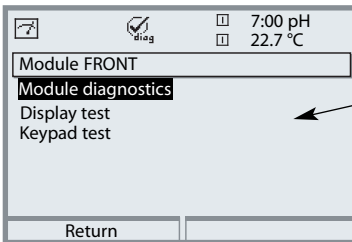
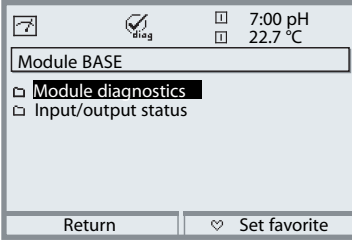
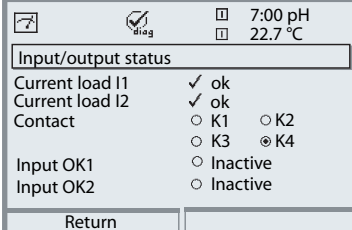
Icon	Explanation of icons important for the EasyClean 400(X) probe controller
	Feedback: The probe is in MEASURE position (“PROCESS”)
	Feedback: The probe is in SERVICE position
	Rinse water active
	Metering pump at media adapter port I active.
	Metering pump at media adapter port II active.
	Metering pump at media adapter port III active.
	Additional medium 1 activated
	Additional medium 2 activated
	Valve at port III active
	Probe in SERVICE position
	Probe changes position
	Probe in MEASURE position (“PROCESS”)

# Diagnostics functions

General status information of the measuring system

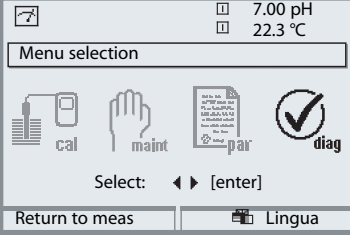

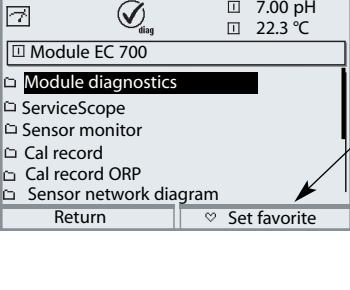
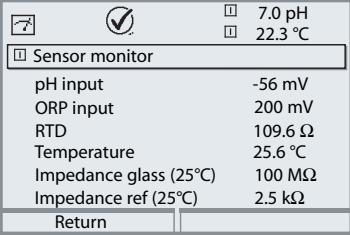
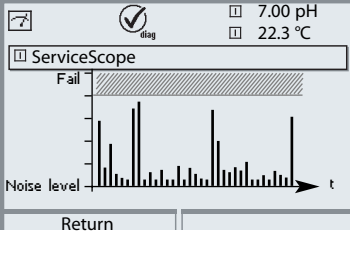
Select menu: Diagnostics

Menu	Display	Diagnostics functions
		<p><b>Call up diagnostics</b></p> <p>From the measuring mode: Press <b>menu</b> key to select menu. Select diagnostics using arrow keys, confirm with <b>enter</b>.</p>
		<p>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 28).</p>
		<p><b>Message list</b></p> <p>Shows the currently activated warning or failure messages in plain text.</p>
		<p><b>Logbook</b></p> <p>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.</p> <p>Extended logbook: SmartMedia card (SW 700-104)</p>

Menu	Display	Diagnostics functions
		<p><b>Device description</b></p> <p>Select module using arrow keys: Provides information about all modules installed: Function, serial number, hardware and software version and device options.</p>
		<p><b>M 700 FRONT</b></p> <p>The module contains the display and keypad control. Test possibilities:</p> <ul style="list-style-type: none"> <li>• Module diagnostics</li> <li>• Display test</li> <li>• Keypad test</li> </ul>
		<p><b>M 700 BASE</b></p> <p>The module generates the standard output signals. Test possibilities:</p> <ul style="list-style-type: none"> <li>• Module diagnostics</li> <li>• Input/output status</li> </ul>
		<p>Example: Module BASE, input/output status.</p>


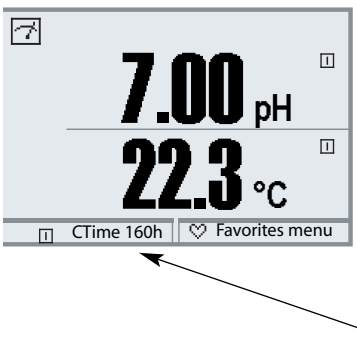

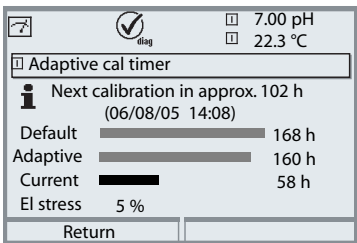
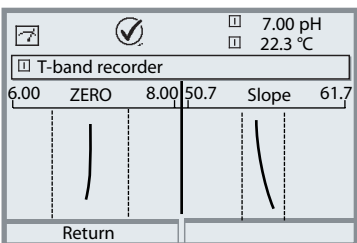
# Diagnostics of EC 700(X)

Module diagnostics, sensor monitor, ServiceScope


Menu	Display	Module diagnostics, sensor monitor, ServiceScope
		<p><b>Call up diagnostics</b></p> <p>From the measuring mode: Press <b>menu</b> key to select menu. Select diagnostics using arrow keys, confirm with <b>enter</b>. Then select "Module EC 700".</p>
		<p>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, select: Parameter setting / System control / Function control matrix.</p>
		<p><b>Module diagnostics</b> Internal function test.</p> <p><b>Sensor monitor (Fig.)</b> Shows the values currently measured by the sensor. Important function for diagnostics and validation! (cf Maintenance)</p>
		<p><b>ServiceScope (SW 700-004)</b> 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.</p>

# Diagnostics of EC 700(X)

Calibration timer, Tolerance band recorder, Cal record, Sensor network diagram, Statistics


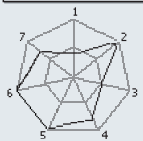
Menu	Display	Calibration timer, tolerance band recorder
		<p><b>Calibration timer</b></p> <p>After expiration of a presettable interval (Parameter setting, Module EC 700(X), Cal preset values), the calibration timer generates a warning message as a reminder that calibration is required. The remaining time can be indicated in the measuring mode by pressing a softkey (secondary display: "CTime").</p>
		<p><b>Adaptive calibration timer</b></p> <p>The time until the next due calibration is automatically reduced depending on the electrode stress (temperature, pH value).</p>
		<p><b>Tolerance adjustment</b></p> <p>Records the tolerance ranges for zero and slope over the time. If the values determined by a calibration exceed the tolerance limits, the "Tolerance band exceeded, an adjustment can be executed automatically. Display can be graphical or as a listing. The tolerance band for zero and slope is configured during parameter setting (Module EC 700(X), Cal preset values).</p>

Menu	Display	Cal record, sensor network diagram, statistics
------	---------	--

 diag	<input type="checkbox"/> 7.00pH <input type="checkbox"/> 24.2°C
<input type="checkbox"/> Cal record	
Active adjustment	05/01/05 09:34
Sensor type	InPro3200SG
Serial number	08151234
Cal mode	Data entry
Zero point	+07.00 pH
Slope	057.7 mV/pH
Return	Calibration data

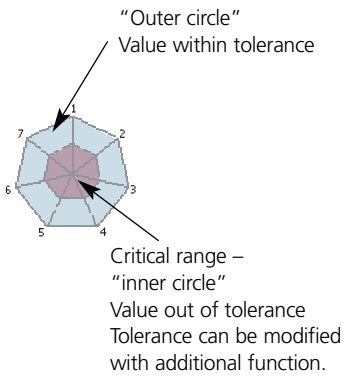
### Cal record

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)

 diag	<input type="checkbox"/> 7.00pH <input type="checkbox"/> 24.1°C
<input type="checkbox"/> Sensor network diagram PH	
	1 - Slope 2 - Zero point 3 - Ref impedance 4 - Glass impedance 5 - Response time 6 - Cal timer 7 - Calcheck
Return	Info

### Sensor network diagram


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.



With individual settings in the “Sensor monitoring details” menu, the tolerance limits (radius of “inner circle”) can be modified as desired.

See Parameter setting Pg 56.

For more detailed information, press “Info” softkey.

 diag	<input type="checkbox"/> 7.00pH <input type="checkbox"/> 20.2°C
<input type="checkbox"/> Statistics	
Zero point	
1st Cal	+07.03 pH 01/07/05 10:03
Diff	+07.03 pH 01/07/05 10:24
Diff	+07.03 pH 01/07/05 09:14
Diff	+07.03 pH 01/07/05 11:47
Slope	
Return	

### Statistics

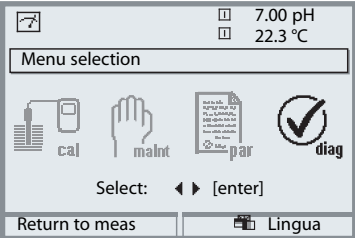

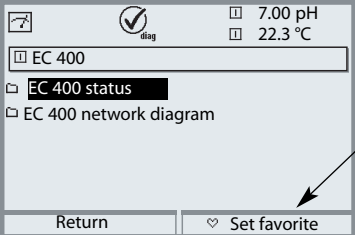
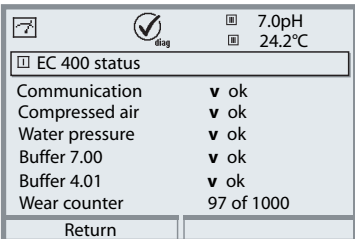
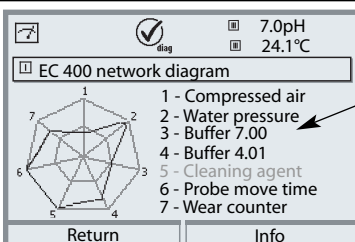
Indication of sensor data for the First Calibration (adjustment) and the last 3 calibrations compared to the First Calibration.

(Date and time of First Calibration, zero and slope, impedance of glass and reference electrode, response time)



# Diagnostics of EC 400(X)

EC 400 status, EC 400 network diagram

Menu	Display	EC 400 status, EC 400 network diagram
		<p><b>Call up diagnostics</b></p> <p>From the measuring mode: Press <b>menu</b> key to select menu. Select diagnostics using arrow keys, confirm with <b>enter</b>. Then select EC 400.</p>
		<p>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, select: Parameter setting / System control / Function control matrix.</p>
		<p><b>EC 400 status</b></p> <p>The media / ports at the media adapter. The texts for the media are entered by the user during the installation (here, for example "Buffer 7.00")</p>
		<p><b>EC 400 network diagram</b></p> <p>Graphical representation of the parameters. Status messages can be seen at a glance. For principle of function, see "Sensor network diagram", Pg 118.</p>

# Error messages of EasyClean 400(X)

<b>Class</b>	<b>Message</b>	<b>Cause</b>
Maint. request	Probe Move time MEASURE Probe Move time SERVICE	<ul style="list-style-type: none"> <li>- Probe dirty</li> <li>- Low air pressure</li> <li>- Filter choked</li> <li>- Specified move time too short</li> </ul>
Failure	Probe Limit position MEASURE Probe Limit position SERVICE	<ul style="list-style-type: none"> <li>- Probe jammed</li> <li>- Check-back error</li> <li>- Move time too short</li> <li>- Probe valve defective</li> <li>- Pilot valve defective</li> </ul>
Failure	EC 400 Switch Compressed air	<ul style="list-style-type: none"> <li>- Failure in compressed-air supply</li> <li>- Pressure too low</li> <li>- Compressed-air sensor defective</li> </ul>
Failure	EC 400 Probe valve defective	<ul style="list-style-type: none"> <li>- Probe valve defective</li> <li>- Pilot valve at probe defective</li> </ul>
Failure	EC 400 flooded	<ul style="list-style-type: none"> <li>- Tubings untight</li> <li>- Hose/tube torn off</li> <li>- Water valve leaking</li> <li>- Water stop - sensor defective</li> </ul>
Failure	Sensor dismounted	<ul style="list-style-type: none"> <li>- Sensor dismounted</li> <li>- Sensor cylinder untight</li> <li>- Probe lines untight</li> <li>- Dismount guard defective</li> <li>- Line breakage at temperature probe of sensor (only with Sensor detection = On)</li> </ul>

<b>System reaction</b>	<b>Reset</b>	<b>Remark</b>
Message only	By next smooth probe movement	Limit position reached at the second trial MEASURE or SERVICE specifies the destination of the movement
Stop of all programs DCS inputs blocked All pilot valves closed	SERVICE request	Limit position was not reached even after several trials MEASURE or SERVICE specifies the destination of the movement
Stop of all programs DCS inputs blocked All pilot valves closed	Automatic as soon as pressure is provided	
Stop of all programs DCS inputs blocked All pilot valves closed	SERVICE request	
Stop of all programs DCS inputs blocked All pilot valves closed	SERVICE request Remove water from EC 400 housing	Water has been stopped
Probe does not move into MEASURE position ("PROCESS")	When sensor has been remounted	
Message only	After valve replacement	Redundancy of pilot valves not given any more. Can only be noticed when SERVICE function has been activated via service switch

# Error messages of EasyClean 400(X)

- continued -

<b>Class</b>	<b>Message</b>	<b>Cause</b>	
Maint. request	Buffer I almost empty Buffer II almost empty	<ul style="list-style-type: none"> <li>- Filling level below minimum</li> <li>- Floater switch stuck</li> <li>- Check-back error</li> <li>- Bottle untight</li> </ul>	
Failure	Buffer I empty Buffer II empty	<ul style="list-style-type: none"> <li>- Residual bottle contents used up</li> <li>- Floater switch stuck</li> <li>- Check-back error (line interrupted or short-circuited)</li> </ul>	
Maint. request	Cleaner almost empty	<ul style="list-style-type: none"> <li>- Filling level below minimum</li> <li>- Floater switch stuck</li> <li>- Check-back error</li> <li>- Bottle untight</li> </ul>	
Failure	Cleaner empty	<ul style="list-style-type: none"> <li>- Residual bottle contents used up</li> <li>- Floater switch stuck</li> <li>- Check-back error (line interrupted or short-circuited)</li> </ul>	
Maint. request	EC 400 Switch Water pressure	<ul style="list-style-type: none"> <li>- No water</li> <li>- Water pressure too low</li> </ul>	
Maint. request	Wear counter	<ul style="list-style-type: none"> <li>- Wear counter expired</li> </ul>	
Maint. request	Check water Check buffer I Check buffer II Check cleaner Check aux. valve I Check aux. valve II	<ul style="list-style-type: none"> <li>- Wrong medium</li> <li>- Wrong medium temperature</li> <li>- Media mixed</li> <li>- System untight</li> <li>- Probe untight</li> <li>- Adm. limits too tight</li> <li>- Specified exposure time too long</li> </ul>	
WARN	EC 400 Cal error	<ul style="list-style-type: none"> <li>- Wear counter expired</li> </ul>	
WARN	EC 400 Communication error	<ul style="list-style-type: none"> <li>- Cable problem</li> <li>- EC 400 failure</li> </ul>	

<b>System reaction</b>	<b>Reset</b>	<b>Remark</b>
Message only	Automatic when buffer solution is topped up above min. level	
All programs requiring buffer solution are blocked	Automatic when buffer solution is topped up above min. level	
Message only	Automatic when cleaning solution is topped up above min. level	
All programs requiring cleaning solution are blocked	Automatic when cleaning solution is topped up above min. level	
All programs requiring water are blocked	Automatic as soon as water pressure OK	
Message only	Manual reset in maintenance menu	Maintenance interval expired
Message, calibration not performed	Automatic as soon as medium OK	
Additional message for cal cause	Next correct calibration	
EC 400 running individually	Connection re-built	

# Specifications

---

## Specifications of EC 700(X) module

### pH/ORP input

(EEx ia IIC)

Simultaneous measurement of pH and ORP  
with glass electrode (or ISFET - requires module pH 2700)  
Input for glass electrode (or ISFET - requires module pH 2700)  
Input for reference electrode  
Input for redox (ORP) electrode or auxiliary electrode

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

Glass electrode input \*\*

Input resistance           > 1 x 10<sup>12</sup> Ω  
Input current              < 1 x 10<sup>-12</sup> A \*\*\*\*  
Impedance range          0.5 ... 1000 MΩ

Reference electrode input \*\*

Input resistance           > 1 x 10<sup>10</sup> Ω  
Input current              < 1 x 10<sup>-10</sup> A \*\*\*\*  
Impedance range          0.5 ... 200 kΩ

Measurement error \*\*\*

(Display)

pH value                   < 0.02    TC < 0.001 pH/K  
ORP value                  < 1 mV    TC < 0.05 mV/K

### Temp input

(EEx ia IIC)

Measurement range (MR)

Pt 100/Pt 1000/NTC 30 kΩ/NTC 8.55 kΩ  
2-wire connection, adjustable  
-50 ... +150 °C (Pt 100/Pt 1000/NTC 30 kΩ)  
-20 ... +150 °C (NTC 30 kΩ)  
-10 ... +130 °C (NTC 8.55 kΩ, Mitsubishi)

Resolution

0.1 °C

Measurement error\*\*\*

0.2 % meas.val. + 0.5 K (< 1 K with NTC > 100 °C)

### Temp compensation

media-dependent

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

### Power output

(EEx ia IIC)

for the operation of EasyClean 400  
Vo = +7.2 V                    Io = 200 mA                    Ri = 20 Ω  
Operating data: 6.8 V (±10%) / 15 mA

---

**ORP \***

ORP calibration \*

---

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

---

---

**pH calibration \***

Drift check\*:

Calimatic buffer sets: \*

1-/2-/3-point calibration (best fit line)

Operating modes:

- Calimatic automatic buffer recognition
- Input of individual buffer values
- Product calibration
- Data entry of pre-measured electrodes

Fine / standard / coarse

- 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 SW700-002)

pH 0 ... 14; calibration range  $\Delta\text{pH} = \pm 1$

25 ... 61 mV/pH; calibration range 80 ... 103 %

-1000 ... +1000 mV

---

Nom. zero \*

Nom. slope (25 °C) \*

$V_{\text{iso}}$  \*

---

---

**Calibration record**

Recording of: zero, slope,  $V_{\text{iso}}$ , response time, calibration method with date and time

---

---

**Statistics**

Recording of:

zero, slope, response time, glass and reference impedance with date and time of the last three calibrations and the First Calibration

---

---

**Sensocheck**

Automatic monitoring of glass and reference electrode, message can be switched off

---

---

**Sensoface**

Provides information on the sensor condition: zero/slope, response time, calibration interval, Sensocheck, Calcheck, can be switched off

---

---

**Calcheck**

(Pat DE 195 36 315 C2)

---

Monitoring of electrode calibration range during measurement

---

---

**Sensor network diagram**

Graphical representation of sensor parameters in a network diagram on the display: slope, zero, reference impedance, glass impedance, response time, calibration timer, deviation from calibration range (Calcheck)

---

# Specifications

---

## Sensor monitor

Display of directly measured sensor values for validation  
pH input, ORP input, glass el. impedance /  
ref. el. impedance, RTD, temperature

## KI recorder

(Additional function SW700-001)

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 SW700-004)

Monitoring the inputs for overdrive  
graphical representation

## Tolerance adjustment

(Additional function SW700-005)

Tolerant calibration/adjustment, tolerance limits adjustable  
graphical representation of zero and slope  
for the last 40 calibrations/adjustments

## RS 485

(EEx ia IIC)

Transfer rate

$V_o/V_i = 5\text{ V}$      $I_o/I_i = 250\text{ mA}$      $R_i = 20\ \Omega$

1200 Bd for EasyClean 400(X)

Protocol

8 data bits / 1 stop bit / no parity

HART Rev. 5

## EasyClean 400(X) controller

Programs

Manual, interval and time-controlled activation of  
calibration and rinsing programs

7 programs can be called up

- 3 programs with fixed sequences, modifiable
- 3 freely configurable programs, 1 service program

Diagnostics

EasyClean 400(X) network diagram, graphical representation  
of EasyClean status

Maintenance

Control of the individual valves and pumps  
with status indicators

\* User-defined

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

\*\*\*  $\pm 1$  count, plus sensor error

\*\*\*\* at 20 °C, doubles every 10 K



# Specifications

---

## General data

### Explosion protection (Module EC 700X only)

See rating plate: KEMA 03 ATEX 2056  
II 2 (1) GD EEx ib [ia] IIC T4

### EMC

Emitted interference  
Immunity to interference

NAMUR NE 21 and  
EN 61326 VDE 0843 Part 20 / 01.98  
EN 61326/A1 VDE 0843 Part 20/A1 / 05.99  
Class B  
Industry

### Lightning protection

EN 61000-4-5, Installation Class 2

### Nominal operating conditions

Ambient temperature -20 to +55 °C (Ex: max. +50 °C)  
Relative humidity 10 to 95 % not condensing

### Transport/ Storage temperature

-20 ... +70 °C

### Terminals

Single wires and flexible leads up to 2.5 mm<sup>2</sup> (AWG 14)

## Minimum measuring spans for current outputs

---

The EC 700(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 module). The corresponding parameters must be set there.

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

### EC 700(X) module

pH	1.00
ORP	100.0
°C	10.0
mV	100.0
rH	1.00
°F	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
<b>25</b>	<b>2,00</b>	<b>4,01</b>	<b>7,00</b>	<b>9,21</b>
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
<b>20</b>	<b>2,00</b>	<b>4,00</b>	<b>7,00</b>	<b>9,00</b>	<b>12,00</b>
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

# **Puffertabellen / Buffer tables / Tables des tampons**

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	9,27	12,96
<b>25</b>	<b>1,09</b>	<b>4,65</b>	<b>6,79</b>	<b>9,23</b>	<b>12,75</b>
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

# **Puffertabellen / Buffer tables / Tables des tampons**

---

NIST Standard (DIN 19266 : 2000-01)

<b>°C</b>	<b>pH</b>			
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
<b>25</b>	<b>1.680</b>	<b>4.008</b>	<b>6.865</b>	<b>9.184</b>
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

<b>°C</b>	<b>pH</b>		
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

# Buffer sets to be entered: SW 700-002

Select menu: Parameter setting/System control/Buffer table


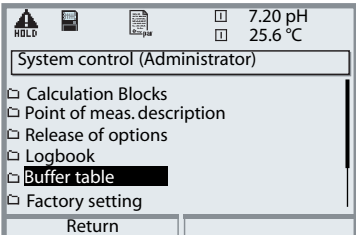
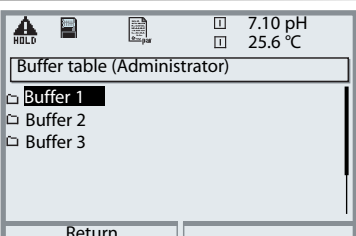
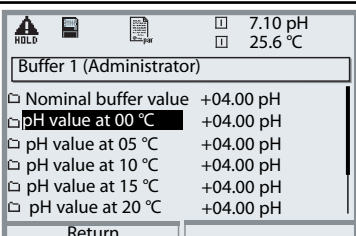
Individual buffer set (with 3 buffer solutions) for pH measurement

## 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).

Distance between buffers in the whole temperature range: min. 1 pH unit.

Then this buffer set is available as "Table" in addition to the permanently set standard buffer solutions.

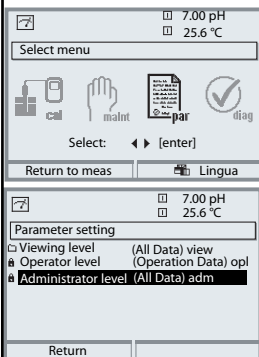
Menu	Display	Buffer table: Entering values
	 <p>System control (Administrator)</p> <ul style="list-style-type: none"> <li>Calculation Blocks</li> <li>Point of meas. description</li> <li>Release of options</li> <li>Logbook</li> <li><b>Buffer table</b></li> <li>Factory setting</li> </ul> <p>Return</p>	<p><b>Enter buffer set</b></p> <ul style="list-style-type: none"> <li>• Call up parameter setting</li> <li>• System control</li> <li>• Select "Buffer table"</li> </ul>
	 <p>Buffer table (Administrator)</p> <ul style="list-style-type: none"> <li><b>Buffer 1</b></li> <li>Buffer 2</li> <li>Buffer 3</li> </ul> <p>Return</p>	<ul style="list-style-type: none"> <li>• Select buffer to be entered</li> </ul> <p>3 complete buffer solutions must be entered in ascending order (e.g. pH 4, 7, 10). Minimum distance: 1 pH unit</p>
	 <p>Buffer 1 (Administrator)</p> <ul style="list-style-type: none"> <li>Nominal buffer value +04.00 pH</li> <li><b>pH value at 00 °C</b> +04.00 pH</li> <li>pH value at 05 °C +04.00 pH</li> <li>pH value at 10 °C +04.00 pH</li> <li>pH value at 15 °C +04.00 pH</li> <li>pH value at 20 °C +04.00 pH</li> </ul> <p>Return</p>	<ul style="list-style-type: none"> <li>• 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 <b>enter</b>.)</li> </ul>

**The special buffer set** is selected as follows:

Parameter setting/Module pH/Cal preset values/Calimatic buffer/Table.



# Overview of parameter setting



## Parameter setting

Activated from measuring mode:

Press **menu** key to select menu.

Select parameter setting using arrow keys, confirm with **enter**.

### Administrator level

Access to all functions, also passcode setting. Releasing or blocking 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 memory card, not an M700 update 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

### Point of meas 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

# Parameter setting menu



## Display settings: FRONT module

### Language

#### Measurement display

- Main display
- Display format
- Viewing angle

Representation of measured values on the display:

- Selecting the number of primary values displayed (one or two)
- Decimal places

#### Measurement recorder

- Time base
- Zoom function
- Min/Max display

Option. 2-channel, selection of process variable, start and end

#### KI recorder

Option. See more detailed "Options" manual

## Signal outputs and inputs, contacts: BASE module

### Output current I1, I2

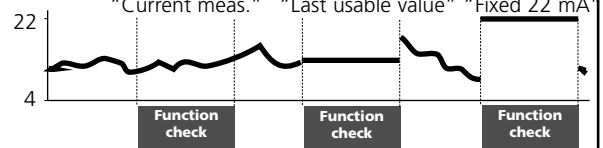
2 current outputs, separately adjustable

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

### Inputs OK1, OK2

- OK1 usage
  - Signal level

Optocoupler - signal inputs

Off, function check

active level switchable from 10 to 30 V or < 2 V, resp.  
For OK2 see System control/Function control matrix

# Parameter setting menu



## EC 700(X) module

### Input filter

#### Sensor data

Representation of measured values on the display:

- Sensor type - Select
- Temperature detection - Selection for Measurement / Calibration
- Sensoface
- Sensor monitoring
  - Details
  - Slope
  - Zero
  - Sensocheck ref. el.
  - Sensocheck glass el.
  - Response time
  - Calcheck

#### Cal preset values

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

#### TC process medium

Select: 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

# Parameter setting menu



## EC 400(X)

<b>Control</b>	On / Off (automatic calibration)
<b>Cal preset values</b> <ul style="list-style-type: none"> <li>• Measuring module</li> <li>• Cal buffer 1</li> <li>• Cal buffer 2</li> <li>• Cal mode</li> </ul>	Selecting the calibration method for automatic control <ul style="list-style-type: none"> <li>- Selecting the measuring module</li> <li>- Menu entry depending on selected sensor type</li> </ul> Check / Adjustment
<b>Time control</b> <ul style="list-style-type: none"> <li>• Fixed interval</li> <li>• Week program</li> </ul>	Selecting the program (Cleaning, Cal 2point, ..., Off) and interval Selecting up to 10 programs per weekday, adjustable for each program are: mode (individual start / interval), start and end time. Programmed weekdays can be copied.
<b>Program flow</b>	Configuring the detailed program sequences (Cleaning, Cal 1point: 1-point calibration, Cal 2point: 2-point calibration, Parking, User1 ... 2 - for free programming)
<b>Installation</b> <ul style="list-style-type: none"> <li>• Meas. procedure</li> <li>• External control (DCS)               <ul style="list-style-type: none"> <li>- DCS inputs (36/39)</li> <li>- M/S input (42/43)</li> <li>- A/M input (40/41)</li> <li>- Outputs 1-3 (31-34)</li> <li>- DCS output (34)</li> </ul> </li> <li>• Sensor detection</li> <li>• Access manual control</li> <li>• InTrac probe               <ul style="list-style-type: none"> <li>- Max. move time</li> <li>- Sealing water</li> <li>- Max. wear counter</li> </ul> </li> <li>• Rinse water               <ul style="list-style-type: none"> <li>— Monitoring</li> <li>— Setpoint</li> <li>— Adm. deviation</li> </ul> </li> <li>• Media adapter               <ul style="list-style-type: none"> <li>- Port I</li> <li>- Medium 1</li> <li>- Displaced volume</li> <li>- Residual volume</li> <li>- Monitoring</li> <li>- Setpoint</li> <li>- Adm. deviation</li> </ul> </li> </ul>	For first start-up or change of configuration Continuous (probe always in the process) / Short-time When external controllers such as SiMatic® are used Setting the active signal level (10 ... 30 V or < 2 V) Control inputs Control input Measuring / Service Selecting the switch function (N/O or N/C) Measuring / Alarm Monitoring as a dismount guard 4-digit access code; access from maintenance menu Usage: Metering pump / Off Buffer 7.00 25 / 50 / 75 / 100 ml 0 / 250 / 500 ml Process value / Temperature / Off 7.00 pH (default) 00.50 pH (default)

# Parameter setting menu



## EC 400(X)

- Media adapter
  - Port II Usage: Metering pump / Off
  - Medium 2 Buffer 4.01
  - Displaced volume 25 / 50 / 75 / 100 ml
  - Residual volume 0 / 250 / 500 ml
  - Monitoring Process value / Temperature / Off
  - Setpoint 7.00 pH (default)
  - Adm. deviation 00.50 pH (default)

---

- Port III Usage: Cleaning valve / Metering pump / Off
- Medium Cleaning agent
- Displaced volume 25 / 50 / 75 / 100 ml
- Residual volume 0 / 250 / 500 ml
- Monitoring Process value / Temperature / Off
- Setpoint 9.21 pH (default)
- Adm. deviation 00.50 pH (default)

---

- Additional media
  - Additional medium 1 On/Off
  - Medium Purge air \_ \_ \_ \_ \_
  - Monitoring Process value / Temperature / Off
  - Setpoint 7.00 pH (default)
  - Adm. deviation 00.50 pH (default)
  
- Additional medium 2 On/Off
- Medium Aux Medium \_ \_ \_ \_ \_
- Monitoring Process value / Temperature / Off
- Setpoint 7.00 pH (default)
- Adm. deviation 00.50 pH (default)

---

- Start-up Yes/No
- Makes sure that the tubings between media adapter and probe are filled with calibration medium

# Calibration menu (manual)



## EC 700(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

## EC 700(X) module

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

## EC 400(X)

**Start probe maintenance** Service program is executed, Cal starts are possible  
**Manual control** Direct access to all control elements  
 (only after input of passcode (Administrator level /  
 Parameter setting / EC 400 / Installation)  
**Reset wear counter** Resetting the wear counter after electrode replacement

# Diagnostics menu



**Message list** List of all warning and failure messages  
**Point of meas description**  
**Logbook**  
**Device description** Hardware version, Serial no., (Module) Firmware, Options

## FRONT module

**Module diagnostics**  
**Display test**  
**Keypad test**

## BASE module

**Module diagnostics**  
**Input/output status**

## EC 700(X) module

**Module diagnostics** Internal function test  
**Servicescop** 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  
**Statistics** Displays first calibration and deviations of last 3 calibrations

## EC 400(X)

**EC 400 status**  
**EC 400 network diagram**

# Index

---

## A

Access control 54  
Activate monitoring 96  
Activating the tolerance band 62  
Adaptive cal timer 63, 117  
Additional media 103  
Adjustment 31  
Administrator level 54  
Assigning process available to current output 71  
Automatic buffer recognition 38  
Automatic calibration 34

## B

BASE 17  
Behavior during messages 75  
Bilinear characteristic 72  
Buffer sets to be entered: SW 700-002 134  
Buffer table 134  
Buffer tables 129

## C

Cable glands 14  
Cal 1point 88  
Cal 1point, short-time 93  
Cal 2point 87  
Cal 2point, short-time 92  
Cal preset values 60, 63  
Cal record 118  
Cal tolerance band 62  
Calibration 30  
Calibration by entering data from premeasured electrodes 44  
Calibration methods 32  
Calibration timer 63, 117  
Calibration with sampling 42  
Calibration, automatic, with EC 400(X) 34

# Index

---

Calimatic 38  
Calimatic buffer 63  
Characteristic, linear (current output) 72  
Cleaning (program flow) 86  
Components 18  
Configuring a function 96  
Configuring media monitoring 102  
Connection of EasyClean 400(X) 23  
Contact "Parameter set 2 active" 78  
Contact K4 136  
Contacts K3, K2, K1 136  
Contacts of EasyClean 400 99  
Control panel 14  
Control programs of EC 700(X) 100  
Control signal, switching level 80  
Current outputs 71  
Current outputs: Assignment of measured values 71  
Current outputs: Characteristics 72

## **D**

Data entry of premeasured electrodes 44  
Delta function 67  
Device description 10, 115  
Device limits 68  
Diagnostics 116  
Diagnostics functions 114  
Digital inputs 80  
Displaced volume 97  
Display icons 112  
Display settings: FRONT module 136  
Disposal 2

## **E**

EasyClean 400X 23  
EC 400 network diagram 119



# Index

---

- EC 400 status 119
- EC 700(X) individual parameter settings (original for copy) 104
- Electrode (pH/temp) 22
- EMC 127
- Error messages of EasyClean 400(X) 120
- Explosion protection 127
- External control via DCS 98
- F**
- Factory settings 70
- Failure 76
- Failure message 75
- Favorites 28
- FDA 21 CFR Part 11 8
- Fixed interval 85
- FRONT 14
- Fully automated process analysis system 18
- Function check 75, 76
- Function control matrix 28, 135
- G**
- Graphic display 14
- H**
- Hazardous locations 9
- I**
- Icons 112
- Individual buffer set 134
- Individual parameter settings (original for copy) 104
- Individual start 85
- Inputs/outputs of EasyClean 400(X) 99
- Inserting the module 20
- Installation (Parameter setting menu) 97
- Intended use 8
- Interval 85
- ISFET zero adjustment 48

## L

LED 14  
Lightning protection 127  
Linear characteristic 72  
Logarithmic output curve 73  
Logbook 70, 114

## M

M 700 BASE 115  
M 700 FRONT 115  
Maintenance of EC 700(X)50  
Maintenance request 76  
Manual calibration 36  
Manual control via M 700(X) 52  
Manual entry of buffer values (Calibration) 40  
Measured variable 27  
Measurement display 136  
Measurement display settings 26  
Measurement procedures 82  
Measurement recorder 136  
Measuring, short-time 91  
Media adapter 103, 139  
Media monitoring 96, 102  
Memory card 135  
Menu selection 24  
Menu structure 15  
Message icons 69  
Message list 114  
Message when the current range is exceeded 75  
Messages 69, 120  
Messages: Default settings and selection range 68  
Minimum measuring spans for current outputs 128  
Modular concept 11  
Module diagnostics 116

# Index

---

Module equipment 17  
Multisense electrode 21

## **N**

NAMUR function check 78  
NAMUR maintenance 78  
NAMUR signals: Current outputs 75  
NAMUR signals: Relay contacts 76  
Nominal operating conditions 127

## **O**

OK1 usage 80  
OK1,OK2 inputs 80  
OK1/OK2 switching level 80  
Operating structure, overview 135  
Operator level 54  
Optocoupler signal inputs 136  
ORP adjustment 46  
ORP conversion to SHE 64  
ORP related to the standard hydrogen electrode (SHE) 46  
ORP/rH value 67  
Output characteristic 73  
Output current 136  
Output filter 74

## **P**

Parameter set: Individual settings 104  
Parameter sets 81, 135  
Parameter setting of EasyClean 400(X) 83  
Parameter setting of EC 700(X)53  
Parameter setting: Installation 97  
Parameter setting: Locking a function 55  
Parameter setting: Operating levels 54  
Park program 90  
Parking 90  
Passcode entry 25

# Index

---

Plug & Play 97  
Point of meas. description 135  
Primary values 27  
Probe maintenance via M 700(X) 51  
Product calibration 42  
Program flow, configuring 95  
Program name 95  
Program step, editing 95

## **R**

Range 68  
Relay contacts 78  
Relay contacts: Protective wiring 77  
Relay output: Limit value 79  
Release of options 135  
Reset wear counter 51  
Return of products 2  
Rinse contact 78

## **S**

Safety information 9  
Sealing water 101  
Secondary displays 26, 28  
Sensoface 58  
Sensoface criteria 59  
Sensor detection 101  
Sensor monitor 50, 116  
Sensor monitoring 56  
Sensor monitoring details 57  
Sensor network diagram 59, 118  
Service 94  
ServiceScope 116  
Setting diagnostics messages as favorite 28  
Short description 14  
Signal duration 99

# Index

---

Signal level of inputs 97  
Signal level of outputs 97  
SmartMedia card 17  
Smoothing the current output 74  
Softkeys 26  
Software update 135  
Software version 10  
Specifications 124  
Specifying the measurement procedure 98  
Start-up 19, 103  
Start-up program 82  
Statistics 118  
System components 18  
System overview 12

## **T**

TC correction 64  
TC process medium 64  
Temp probe adjustment 50  
Temperature compensation 33  
Temperature compensation of process medium 66  
Temperature dependence of commonly used reference systems measured against SHE 47  
Time constant of output filter 74  
Time control 84  
Tolerance adjustment 60, 117  
Tolerance adjustment: Program flow 61  
Trademarks 2

## **V**

Variable limits 68  
Viewing level 54

## **W**

Wait position 90  
Warranty 2

# Index

---

Wear counter 101

Week program 85

Wiring examples 21

## **Z**

Zero point 30



# Index

---







# Menu selection:

---

EC 700(X) module

---


	<b>Calibration and adjustment</b> .....	30
	Calimatic: automatic calibration.....	38
	Manual entry of buffer values.....	40
	Product calibration.....	42
	Data entry: premeasured electrodes.....	38
	ORP calibration.....	46
	ISFET zero adjustment.....	46
<hr/>		
	<b>Maintenance</b> .....	50
	Sensor monitor .....	50
	Temp probe adjustment.....	50
<hr/>		
	<b>Parameter setting</b> .....	53
	Input filter .....	56
	Sensor data .....	56
	Cal preset values .....	60
	TC process medium .....	65
	ORP/rH value .....	67
	Delta function.....	67
	Messages.....	68
<hr/>		
	<b>Diagnostics</b> .....	116
	Module diagnostics.....	116
	ServiceScope.....	116
	Sensor monitor .....	116
	Adaptive calibration timer.....	117
	Cal record.....	118
	Sensor network diagram.....	118
	Statistics .....	118
	T-band recorder .....	117

# Quick access


---

Functions for EasyClean 400(X) control


---

	<b>Parameter setting of EasyClean 400(X)</b> .....	83
	Functional capabilities.....	83
	Time control (fixed interval / week program).....	84
	Week program .....	85
	Parameter setting: Program flows .....	86
	Parameter setting: Service program .....	94
	Parameter setting: Installation.....	97
	Configuring media monitoring .....	102
	Parameter sets for copy .....	106
	Overview of icons.....	112

---

	<b>Maintenance of EasyClean 400(X)</b> .....	50
	Probe maintenance.....	51
	Manual control .....	52

---

	<b>Diagnostics of EasyClean 400(X)</b> .....	119
	EC 400 status .....	119
	EC 400 network diagram.....	119
	Error messages of EasyClean 400(X) .....	120