

Quick Setup Guide

Transmitter M400 PA



Content

1	Introduction	2
2	Operation	3
3	Menu Structure	4
4	Terminal Block (TB) Definitions	5
5	Wiring example for pH Transmitter	10
6	General Setup	11
6	Calibration (applies for all sensors)	13
7	pH Calibration	14
8	O ₂ Calibration	16
9	O ₃ Calibration	17
10	CO ₂ Calibration	18
11	Conductivity Quick Setup	21
12	Conductivity Calibration for 2-e and 4-e Sensors	21

1 Introduction



Note: The Quick Setup Guide is a brief operating instruction.

The M400 PA transmitter must only be installed, connected, commissioned, and maintained by qualified specialists e.g. electrical technicians in full compliance with the instructions in this Quick Setup Guide, the applicable norms and legal regulations.

The specialist must have read and understood this Quick Setup Guide and must follow the instructions it contains. If you are unclear on anything in this Quick Setup Guide, you must read the Operation Manual (supplied on CD-ROM). The Operation Manual provides detailed information on the device.

The M400 PA transmitter should be operated only by personnel familiar with the transmitter and who are qualified for such work.

Intended Use

The M400 PA multi-parameter transmitter is a single channel online process instrument with PROFIBUS® communication capabilities for measuring various properties of fluids and gases. The transmitter is able to measure following parameters: pH/ORP, Oxygen, Dissolved Carbon Dioxide, Conductivity and Ozone. The M400 PA is a mixed mode transmitter able to handle analog or ISM (digital) sensors.

2 Operation

Entry of data values, selection of data entry options

Use the ▲ key to increase or the ▼ key to decrease a digit. Use the same keys to navigate within a selection of values or options of a data entry field.



Note: Some screens require configuring multiple values via the same data field (ex: configuring multiple setpoints). Be sure to use the ► or ◀ key to return to the primary field and the ▲ or ▼ key to toggle between all configuration options before entering to the next display screen.

Navigation with ↑ in Display



If a ↑ is displayed on the bottom right hand corner of the display, you can use the ► or ◀ key to navigate to it. If you click [ENTER] you will navigate backwards through the menu (go back one screen). This can be a very useful option to move back up the menu tree without having to exit into the measuring mode and re-enter the menu.

Exit menu



Note: Exit the menu at any time by pressing the ◀ and ► key simultaneously (ESCAPE). The transmitter returns to the Measurement mode.

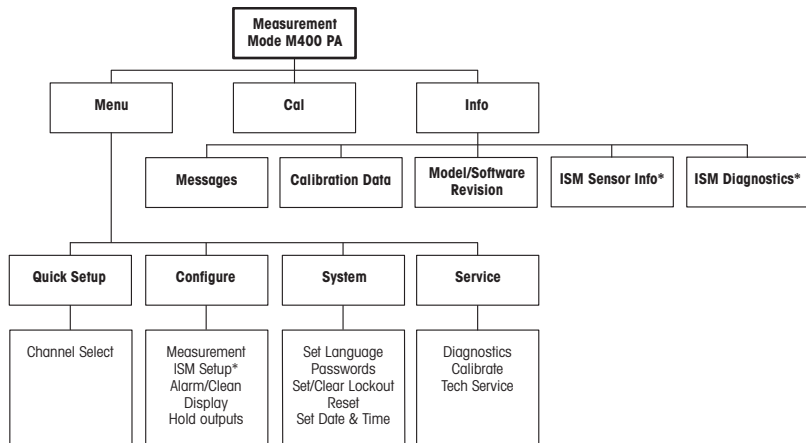
“Save changes” dialog

Three options are possible for the “Save changes” dialog:

- “Yes & Exit”: Save changes and exit to measuring mode.
- “Yes & ↑”: Save changes and go back one screen.
- “No & Exit”: Don’t save changes and exit to measuring mode.

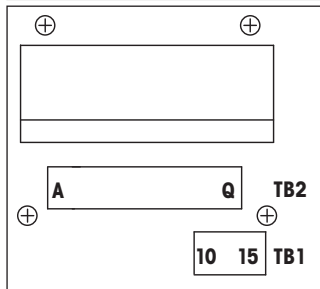
The “Yes & ↑” option is very useful if you want to continue configuring without having to re-enter the menu.

3 Menu Structure



* Only available in combination with ISM sensors.

4 Terminal Block (TB) Definitions



Power connections are labeled **+ PA** and **– PA**

FISCO bus: 9 to 17.5 V DC

Linear barrier: 9 to 24 V DC

Non hazardous area (Non-IS): 9 to 32 V DC

TB1

1	Not available
2	Not available
3	Not available
4	Not available
5	Not available
6	Not available
7	Not available
8	Not available
9	Not available
10	+ PA
11	– PA
12	+ PA
13	– PA
14	Not used
15	⏏

TB2 – ISM (digital) Sensors

	pH, Amp. Oxygen, Ozone, Cond 4-e, Dissolved CO₂	
Terminal	Function	Color
A	Not used	–
B	Not used	–
C	Not used	–
D	Not used	–
E	Not used	–
F	Not used	–
G	Not used	–
H	Not used	–
I	Not used	–
J	Not used	–
K	Not used	–
L	1-wire	transparent (cable core)
M	GND	red (shield)
N	RS485-B	–
O	RS485-A	–
P	+ input 4/20 mA signal	–
Q	– input 4/20 mA signal	–

TB2 – ISM (Digital) Sensors

	Optical Oxygen with VP8 Cable*		Optical Oxygen with other Cables**	
Terminal	Function	Color	Function	Color
A	Not used	–	Not used	–
B	Not used	–	Not used	–
C	No used	–	No used	–
D	Not used	–	Not used	–
E	Not used	–	Not used	–
F	Not used	–	Not used	–
G	Not used	–	Not used	–
H	Not used	–	Not used	–
I	Not used	–	Not used	yellow
J	Not used	–	Not used	–
K	Not used	–	Not used	–
L	Not used	–	Not used	–
M	D_GND (Shield)	green/ yellow	D_GND (Shield)	grey
N	RS485-B	brown	RS485-B	blue
O	RS485-A	pink	RS485-A	white
P	+ input 4/20 mA signal	–	+ input 4/20 mA signal	–
Q	– input 4/20 mA signal	–	– input 4/20 mA signal	–

* Connect the grey +24 DC wire and the blue GND_24 V wire of the sensor separately.

** Connect the brown +24 DC wire and the black GND_24 V wire of the sensor separately.

TB2 – Analog Sensors

	pH		Redox (ORP)	
Terminal	Function	Color*	Function	Color
A	Glass	transparent	Platinum	transparent
B	Not used	—	—	—
C	No used	—	—	—
D	Not used	—	—	—
E	Reference	red	Reference	red
F	Reference**	—	Reference**	—
G	Solution GND**	blue***	Solution GND**	—
H	Not used	—	—	—
I	RTD ref / GND	white	—	—
J	RTD sense	—	—	—
K	RTD	green	—	—
L	Not used	—	—	—
M	Shield (GND)	green / yellow	Shield (GND)	green/yellow
N	Not used	—	—	—
O	Not used	—	—	—
P	Not used	—	—	—
Q	Not used	—	—	—

* Grey wire not used.

** Install jumper between F and G for ORP sensors and pH electrodes without SG.

*** Blue wire for electrode with SG.

TB2 – Analog Sensors

Cond 4-e or 2-e		
Terminal	Function	Color
A	Cnd inner1 *	white
B	Cnd outer1 *	white/blue
C	Cnd outer1	—
D	Not used	—
E	Cnd outer2	—
F	Cnd inner2**	blue
G	Cnd outer2 (GND)**	black
H	Not used	—
I	RTD ref / GND	bare shield
J	RTD sense	red
K	RTD	green
L	Not used	—
M	Not used	—
N	Not used	—
O	Not used	—
P	Not used	—
Q	Not used	—

* For third party
Cond 2-e sensors
may be jumper
between A and B
has to be installed.

** For third party
Cond 2-e sensors
may be jumper
between F and G
has to be installed.

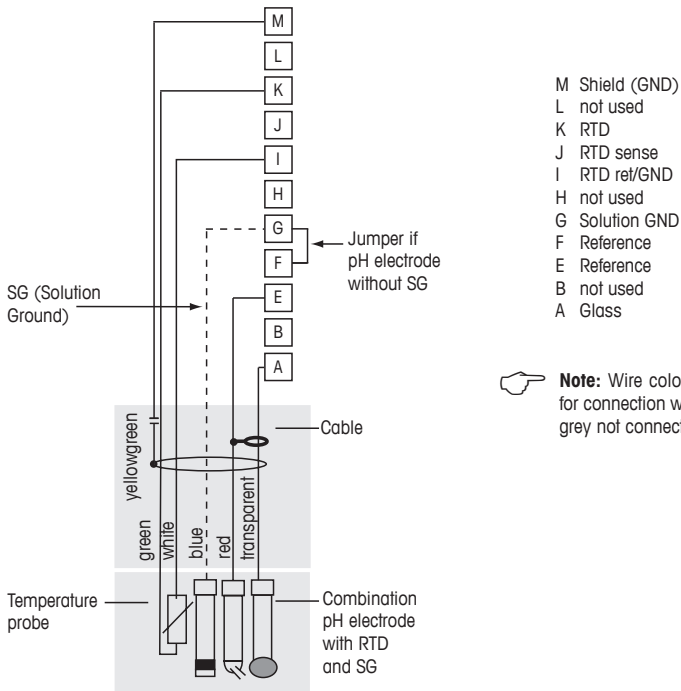
TB2 – Analog Sensors


		Oxygen		
		InPro 6800(G)	InPro 6900	InPro 6950
Terminal	Function	Color	Color	Color
A	Not used	—	—	—
B	Anode	red	red	red
C	Anode	—*	—*	—
D	Reference	—*	—*	blue
E	Not used	—	—	—
F	Not used	—	—	—
G	Guard	—	grey	grey
H	Cathode	transparent	transparent	transparent
I	NTC ref (GND)	white	white	white
J	Not used	—	—	—
K	NTC	green	green	green
L	Not used	—	—	—
M	Shield (GND)	green/yellow	green/yellow	green/yellow
N	Not used	—	—	—
O	Not used	—	—	—
P	+ input 4/20 mA signal	—	—	—
Q	— input 4/20 mA signal	—	—	—

* Install jumper between C and D for InPro 6800(G) and InPro 6900.

5 Wiring example for pH Transmitter (using TB2)

pH measurement with monitoring of glass electrode.



 **Note:** Wire colors only valid for connection with VP cable, grey not connected.

6 General Setup

You can configure the M400 PA transmitter via configuration program or via display on-site.

For step 1 to 4 see documentation of the configuration program.

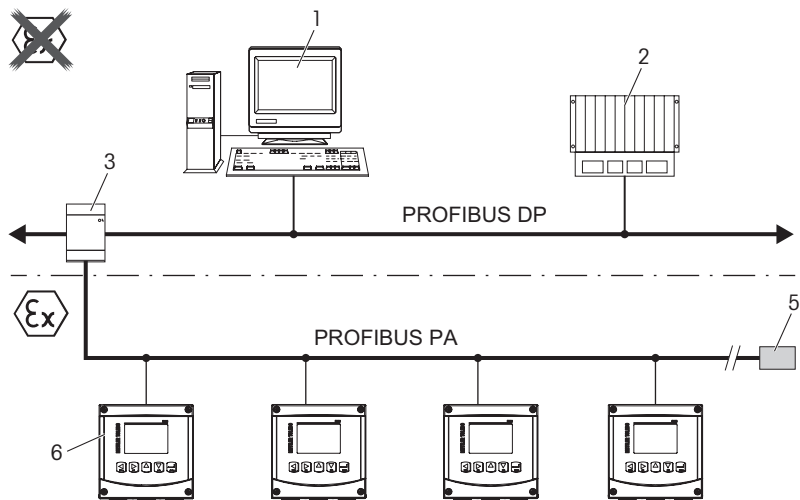
Prerequisite: The M400 PA transmitter and the sensor are mounted and electrically connected.



Note: The GSD file is on the supplied CD-ROM.

1. Copy the GSD file into the GSD-directory of the configuration program.
GSD file: METTOE8A.gsd
2. Update hardware catalogue.
3. Integrate M400 PA transmitter into the DP master system.
4. Set PROFIBUS address for M400.
Factory setting: 126, Input range: 0 ... 125
5. Perform parameterization. For further information see documentation of the M400 PA on the supplied CD-ROM and of the configuration program.

PROFIBUS® system architecture



1. PC with PROFIBUS interface card and PROFIBUS configuration program (Class 2 master)
2. PLC (Class 1 master)
3. Segment coupler DP/PA
4. M400 PA transmitter with connected sensor (sensor not illustrated)
5. PROFIBUS PA terminating resistor

6 Calibration (applies for all sensors) (PATH: Cal)

After every successful calibration the following options are available.

After selection one of these option the message "RE-INSTALL SENSOR and Press [ENTER]" appears on the display.

After pressing [ENTER] the M400 returns to the measuring mode.

ISM (digital) sensors

Adjust

Calibration values are stored in the sensor and used for the measurement. Additionally, the calibration values are stored in the calibration history.

Calibrate

Calibration values are stored in the calibration history for documentation, but not be used for the measurement. The calibration values from the last valid adjustment are further used for the measurement.

Abort

Calibration values are discarded.

Analog sensors

Adjust

Calibration values are stored in the transmitter and used for the measurement. Additionally, the calibration values are stored in the calibration data.

Calibrate

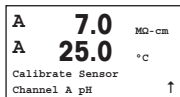
The function "Calibrate" is not applicable for analog sensors.

Abort

Calibration values are discarded.

7 pH Calibration (PATH: Cal)

Two Point Calibration

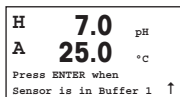
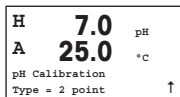


While in Measurement mode press the ► key. If the display prompts you to enter the calibration security code, press the ▲ or ▼ key to set the calibration security code, then press the [ENTER] key to confirm the calibration security code.

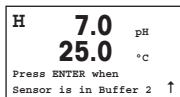
Press the ▲ or ▼ key to select the pH calibration sub function.

A flashing “H” shows the ongoing calibration process.

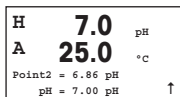
Select 2 POINT CALIBRATION by pressing the [ENTER] key.



Place the electrode in the first buffer solution and then press the [ENTER] key.



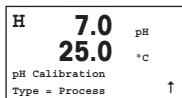
As soon as the stabilization criteria have been fulfilled (or [ENTER] was pressed in manual mode) the display changes and prompts you to place the electrode in the second buffer solution.



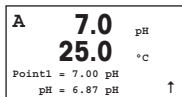
As soon as the stabilization criteria have been fulfilled (or [ENTER] was pressed in manual mode) the display changes to show the slope calibration factor S and the offset calibration factor Z.

For ISM (digital) sensors select ADJUST, CALIBRATE or ABORT to finish calibration. For Analog sensors select ADJUST or ABORT to finish calibration. See Chapter 6 “General Setup” on Page 11.

Process calibration



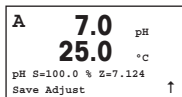
Select PROCESS CALIBRATION by pressing the ▲ key once followed by the [ENTER] key. To show the ongoing Calibration Process an “H” is displayed in the top left hand corner.



A flashing “H” shows the ongoing calibration process.

Take a sample and press the [ENTER] key again to store the current measuring Value.

After determining the pH Value of the Sample press the ► key again to proceed with the calibration. If the display prompts you to enter the calibration security code, press the ▲ or ▼ key to set the calibration security code, then press the [ENTER] key to confirm the calibration security code.



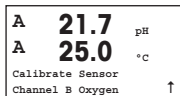
Enter the pH value of the sample then press the [ENTER] key to start calibration.

After the calibration the slope calibration factor S and the offset calibration factor Z are displayed.

For ISM (digital) sensors select ADJUST, CALIBRATE or ABORT to finish calibration. For Analog sensors select ADJUST or ABORT to finish calibration. See Chapter 6 “General Setup” on Page 11.

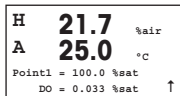
8 O₂ Calibration (PATH: Cal)

One Point Calibration



While in Measurement mode press the ► key. If the display prompts you to enter the calibration security code, press the ▲ or ▼ key to set the calibration security code, then press the [ENTER] key to confirm the calibration security code.

A flashing "H" shows the ongoing calibration process.



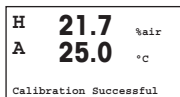
A oxygen sensor calibration is always a one point calibration either in Air (Slope) or a zero (Offset) calibration.

It is possible to select a SLOPE or ZERO CALIBRATION. A one point slope calibration is done in air and a one point offset calibration is done at 0 ppb oxygen. Press the [ENTER] key after selecting SLOPE or OFFSET.



Enter the value for Point 1 including a decimal point. Oxygen is the value being measured by the transmitter and sensor in the units set by the user. Press [ENTER] when this value is stable to perform the calibration.

After the calibration the slope calibration factor S and the offset calibration factor Z are displayed.



For ISM (digital) sensors select ADJUST, CALIBRATE or ABORT to finish calibration. For Analog sensors select ADJUST or ABORT to finish calibration. See Chapter 6 "General Setup" on Page 11.

9 O₃ Calibration (PATH: Cal)

One Point (Zero Pt) Calibration

B	15.0	ppmO ₃
B	25.0	°C
Calibrate Sensor		
Channel B Ozone		
↑		

While in Measurement mode press the ► key. If the display prompts you to enter the calibration security code, press the ▲ or ▼ key to set the calibration security code, then press the [ENTER] key to confirm the calibration security code.

A flashing “H” shows the ongoing calibration process.

B	15.0	ppmO ₃
H	25.0	°C
O ₃ Calibration		
Type = 1 point ZeroPt		
↑		

It is possible to select 1 POINT ZERO PT or PROCESS CALIBRATION. Press the [ENTER] key after selecting 1 POINT ZERO PT.

B	15.0	ppmO ₃
H	25.0	°C
B Point1 = 0.000 ppm O ₃		
B O ₃ = 15.0 ppm		
↑		

Enter the value for Point 1 including a decimal point. Ozone is the value being measured by the transmitter and sensor in the units set by the user. Press [ENTER] when this value is stable to perform the calibration.

B	15.0	ppmO ₃
H	25.0	°C
O ₃ S=0.100nA Z=0.0000nA		
Save Adjust		
↑		

After the calibration the slope calibration factor S and the offset calibration factor Z are displayed.

B	0.0	ppmO ₃
H	25.0	°C
Calibration Successful		

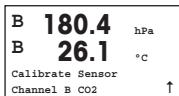
For ISM (digital) sensors select ADJUST, CALIBRATE or ABORT to finish calibration. For Analog sensors select ADJUST or ABORT to finish calibration. See Chapter 6 “General Setup” on Page 11.



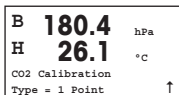
Note: An ozone sensor PROCESS calibration is either a SLOPE or ZERO PT calibration. The PROCESS SLOPE calibration is always obtained from a comparison instrument or colorimetric test kit. The PROCESS ZERO PT calibration is done in air or in ozone-free water.

10 CO₂ Calibration (PATH: Cal)

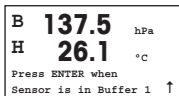
CO₂ One point Calibration



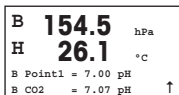
While in measurement mode press the key [CAL]. Press the ▲ or ▼ key to select the CONDUCTIVITY CALIBRATION and press the [ENTER] key to call the sub function.



Select 1 POINT and press [ENTER].



Place the sensor in the buffer solution and press the [ENTER] key to start the calibration.



The display shows the buffer the transmitter has recognized (Point 1) and the measured value.



As soon as the drift conditions have stabilized the display changes to show the slope calibration factor S and the offset calibration factor Z.

For ISM (digital) sensors select ADJUST, CALIBRATE or ABORT to finish calibration. For Analog sensors select ADJUST or ABORT to finish calibration. See Chapter 6 "General Setup" on Page 11.

CO₂ Two point Calibration

Start as in chapter CO₂ ONE POINT CALIBRATION described.

B **154.5** hPa
B **26.1** °C
CO2 Calibration
Type = 2 Point ↑

Select 2 POINT CALIBRATION.

B **137.5** hPa
H **26.1** °C
Press ENTER when
Sensor is in Buffer 1 ↑

Place the sensor in the first buffer solution and press the [ENTER] key to start the calibration.

B **154.5** hPa
H **26.1** °C
B Point1 = 7.00 pH
B CO2 = 7.07 pH ↑

The display shows the buffer the transmitter has recognized (Point 1) and the measured value.

B **122.4** hPa
H **26.1** °C
Press ENTER when
Sensor is in Buffer 2 ↑

As soon as the drift conditions have stabilized, the display changes and prompts you to place the electrode in the second buffer.

Place the sensor in the second buffer solution and press the [ENTER] key to go on with the calibration.

B **2.8** hPa
H **26.1** °C
B Point2 = 9.21 pH ...
B CO2 = 8.80 pH ↑

The display shows the second buffer the transmitter has recognized (Point 2) and the measured value.

B **2.8** hPa
H **26.1** °C
pH S=74.21% Z=6.948pH
Save Adjust ↑

As soon as the drift conditions have stabilized the display changes to show the slope calibration factor S and the offset calibration factor Z.

For ISM (digital) sensors select ADJUST, CALIBRATE or ABORT to finish calibration. For Analog sensors select ADJUST or ABORT to finish calibration. See Chapter 6 "General Setup" on Page 11.

CO₂ Process Calibration

Start as in chapter CO₂ ONE POINT CALIBRATION described.

B	17.3	hPa
H	27.3	°C
CO2 Calibration		
Type = Process		

Select PROCESS CALIBRATION.

B	17.3	hPa
H	27.3	°C
B Point1 = 00000 hPa		
B CO2 = 17.3 hPa		

Take a sample and press the [ENTER] key again to store the current measuring value. A flashing "H" shows the ongoing calibration process. After determining the CO₂ value of the sample, press the ► key again to proceed with the calibration.

B	17.3	hPa
H	27.3	°C
B Point1 = 16.90 hPa		
B CO2 = 17.3 hPa		

Enter the CO₂ value of the sample then press the [ENTER] key to start calibration.

B	17.3	hPa
H	27.3	°C
pH S=100.0% Z=7.009pH		
Save Adjust		

The display shows the slope calibration factor S and the offset calibration factor Z.

For ISM (digital) sensors select ADJUST, CALIBRATE or ABORT to finish calibration.
For Analog sensors select ADJUST or ABORT to finish calibration. See Chapter 6 "General Setup" on Page 11.

11 Conductivity Quick Setup (PATH: Menu/Quick Setup)

Sensor Type Selection

1.25	$\mu\text{S}/\text{cm}$
25.0	$^{\circ}\text{C}$
Sensor Type = Cond(2) ↑	

Select the type of sensor to be used with the M400 transmitter. Choices are "Cond(2)", used for all 2-electrode sensors and "Cond(4)" for all 4-electrode sensors. Press the [ENTER] key.

Cell Constant

1.25	$\mu\text{S}/\text{cm}$
25.0	$^{\circ}\text{C}$
p M=0.1003 A=0.0000	
s M=1.0000 A=0.0000	

Enter the appropriate cell constant(s): from the sensor label or certificate (M) for 2-electrode sensors, leaving (A) at 0.000; or (M) and (A) values for 4-electrode sensors. Press the [ENTER] key.

Measurement units

1.25	$\mu\text{S}/\text{cm}$
25.0	$^{\circ}\text{C}$
a S/cm	
Analog Output? Yes ↑	

Select the measurement (conductivity or temperature) and units for measurement.

12 Conductivity Calibration for 2-e and 4-e Sensors (PATH: Cal)

Cond One point Calibration

A	1.25	$\mu\text{S}/\text{cm}$
A	25.0	$^{\circ}\text{C}$
Calibrate Sensor		
Channel A Conductivity ↑		

While in Measurement mode press the [CAL] key. If the display prompts you to enter the calibration security code, press the ▲ or ▼ key to set the calibration security code, then press the [ENTER] key to confirm the calibration security code.

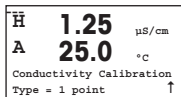
Press [ENTER] to select the CONDUCTIVITY CALIBRATION SUB FUNCTION.

A flashing "H" shows the ongoing calibration process.

Choose the compensation mode by using the ▲ or ▼ key.

Press [ENTER] to confirm the compensation mode.

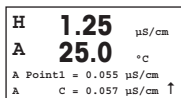
H	1.25	$\mu\text{S}/\text{cm}$
A	25.0	$^{\circ}\text{C}$
Cal Compensation		
Standard ↑		



Select 1 POINT instead of 2 POINT CALIBRATION by pressing the ▼ key once followed by the [ENTER] key.

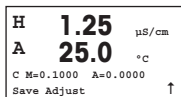


CAUTION: Rinse sensors with a high-purity water solution before every calibration to prevent contamination of the reference solutions.



Place the electrode in the reference solution.

Enter the value of Point 1 and press the [ENTER] key.



After the calibration of the cell multiplier or slope calibration factor "M" i.e. cell constant and the Adder or offset calibration factor "A" are displayed.

For ISM (digital) sensors select ADJUST, CALIBRATE or ABORT to finish calibration. For Analog sensors select ADJUST or ABORT to finish calibration. See Chapter 6 "General Setup" on Page 11.

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