Attaching a DocuClip to a pH Sensor
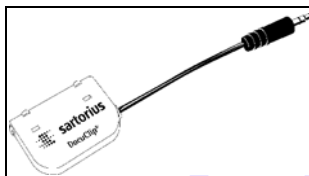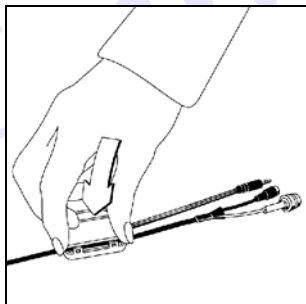

Fig. 9: The DocuClip

You can attach a DocuClip to a sensor that does not already have one. If you do so, first be sure to read the instructions that came with the DocuClip. See also "The Sartorius DocuClip®" on page 15.

The first time you attach a pH sensor to the meter after attaching the DocuClip to the sensor, the meter prompts you to calibrate the sensor.

The pH sensor cable must be between 2.5 mm and 5 mm in diameter.

1. Place the sensor cable in the DocuClip. Make sure all connectors are at an approximately equal distance from the DocuClip housing.

2. Press down on the cover plate until it clicks into place.

⚠ The DocuClip is now irreversibly fastened to the cable.

3. Before you can use the pH sensor and DocuClip, you must calibrate the DocuClip. See "Preparing and Connecting the pH Sensor" on page 33 and "Calibration" on page 37.
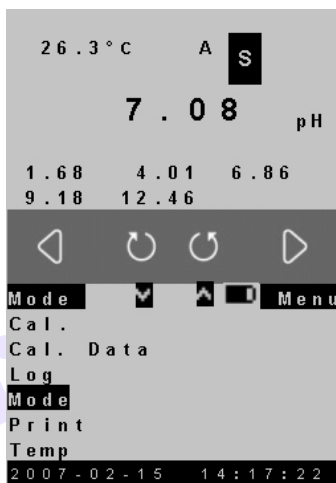
Turning On the Meter

– Press the On/Off button (❶) on the side of the meter. (See "Display" on page 10.)

The Sartorius logo is displayed, and then the meter information is displayed for a moment. The meter information includes:

– Meter Model
– Meter Serial Number
– pH sensor Model (if DocuClip attached)
– pH sensor Serial Number (if DocuClip attached)
– Meter Software Version

After the meter information, the main measurement screen is displayed:

Logging In

If meter security is turned on, each user is required to enter their User ID and Password to use the meter. See "Turning On Meter Security" on page 28 for more information.

If you are required to log in, the following is displayed on the lower screen when you turn on the meter:

```
User ID
---
Password
XXXXXX
```

1. Use the rotary dial to enter your User ID. Press ▶ to enter each character; press ▶ when you are finished.

2. Use the rotary dial to enter your password.

   The meter will not accept your password unless it is the correct one.

Setting Up the Meter

You can configure the meter to meet your own preferences and requirements.

Note: Meter settings and pH sensor calibration data are kept in separate non-volatile memory. Unplugging the meter or replacing the batteries has no effect on these stored items.
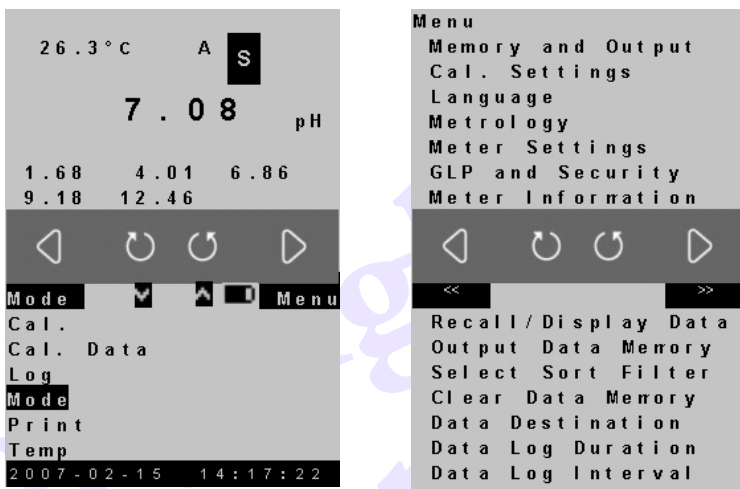
Navigating the Menus

Fig. 10: Example of main measurement screen (left) and main menu (right).

1. From the main measurement screen, press ▷ to open the main menu.

   The current, active menu is displayed on the upper screen. The menu options available for the item highlighted on the upper screen appear on the lower screen.

2. Rotate the dial clockwise to scroll down the menu displayed on the upper screen; rotate it counterclockwise to scroll up the menu.

3. Press ▷ to select a menu item and go to the next menu.

4. To select from a list of options, use the rotary dial to highlight the desired option, and

   then press ▷ to select it.

   In the case of an option you can toggle, such as On/Off, the option may appear next to

   the menu option. Press ▷ to toggle between the options.

5. Press ◁ to return to the previous menu. You may have to press this key more than once to return to the main menu, and once more to return to the main measurement screen.

Entering Numerical Data

Where you can change or enter numbers for certain menu options, the numeral or "_" is

highlighted. Use the rotary dial to change the numeral, and then press ▷ to proceed to the

next numeral or "_". When you are finished, press ▷ to accept your changes or entry.

General Settings

See also:

Changing the Display Language

You can choose from English, Deutsch, Francais, Espanol, and Italiano.

1. From the main menu, select Language.
2. Select the desired language. The default is English.

Setting the Time and Date

1. From the main menu, select Meter Settings.
2. Select Time / Date.
3. Select Set Time or Set Date, and then enter the desired time or date.

Changing the Time and Date Format

You can choose from two time formats (HH:MM:SS or HH:MM:AM/PM) and three date formats (MM/DD/YYYY, DD-MM-YYYY or YYYY.MM.DD).

1. From the main menu, select Meter Settings.
2. Select Time / Date.
3. Select either Time Format or Date Format, and then select the desired format.

Changing the Temperature Units

You can choose to display temperatures in Celsius, Fahrenheit, or Kelvin.

1. From the main menu, select Meter Settings.
2. Select Temperature Units, and then select the desired units. The default is °C.

Enabling or Disabling the Measurement Lock

The measurement lock freezes the measurement when it is stable.

See also "Read/Lock" on page 14.

1. From the main menu, select Meter Settings.
2. Select Measure Lock.

3. Press ⊳ to toggle between On or Off. The default is Off.

Enabling or Disabling Strict Calibration

If strict calibration is enabled, no measurements can be taken if the calibration reminder (see "Changing the Calibration Reminder Interval" on page 38) has expired. A pH calibration must be performed before you can take any measurements.

Note: When strict calibration is enabled, the calibration reminder is also enabled and cannot be disabled.

1. From the main menu, select Meter Settings.

2. Select Strict Cal..

3. Press ▶ to toggle between On or Off.

Display Settings

See "Display" on page 10 for more information.

Changing the Display Contrast

You can change the display contrast, making the displayed characters lighter or darker. Select setting 5 for typical conditions.

1. From the main menu, select Meter Settings.

2. Select Video / Power.

3. Select Contrast.

4. Use the rotary dial to change the % value displayed.

Changing the Backlight Intensity

1. From the main menu, select Meter Settings.

2. Select Video / Power.

3. Select Disp-light Intensity.

4. Use the rotary dial to change the % value displayed.

Changing the Sensitivity of the Rotary Dial

1. From the main menu, select Meter Settings.

2. Select Video / Power.

3. Select Rotary Switch.

4. Use the rotary dial to select one of the levels. Press ▶ to temporarily enable that level so you can test it. Repeat until you have the desired speed.

5. Press ▶ again to select the desired level (the one marked with "?").

Rotating the Orientation of the Display

The display can be rotated 180° so the meter can be operated and read with sensor connections at the bottom instead of the top of the meter. The SoftKeys functions are reversed as well. The meter is then used upside down from its normal position.

1. From the main menu, select Meter Settings.

2. Select `Video / Power`.

3. Select `Rotate Display`.

4. Select either `0°` or `180°`. The default is 0°; in this position, the meter is used with the sensor connections at the top of the meter.

Changing the Backlight Timer

You can change the length of time the backlight stays on after you turn it on.

1. From the main menu, select `Meter Settings`.

2. Select `Video / Power`.

3. Select `Disp-light Timer`.

4. Use the rotary dial to change the number of minutes displayed. It can be set for up to 99 minutes. The default is 1 minute.

   To leave the light on until you manually turn it off, enter `00`.

Changing the Power Off Timer

You can change the length of time the meter stays on when not in use.

1. From the main menu, select `Meter Settings`.

2. Select `Video / Power`.

3. Select `Power Off Timer`.

4. Use the rotary dial to change the number of minutes displayed. It can be set for up to 59 minutes. The default is 10 minutes.

   To leave the meter on until you manually turn it off, enter `00`.

Meter Information

Viewing Meter Information

When you turn on the meter, after the Sartorius logo is displayed, the meter information is displayed for a moment. None of this information can be changed. The meter information includes:

– Meter Model

– Meter Serial Number

– pH sensor Model (if DocuClip attached)

– pH sensor Serial Number (if DocuClip attached)

– Meter Software Version

To view the meter information again:

– From the main menu, select `Meter Information`.

Restoring All Defaults

You can reset all settings to the factory defaults (see the list beginning on page 76).

WARNING: A General Reset also clears all pH sensor calibrations.

1. From the main menu, select `Meter Settings`.

2. Select `General Reset`.

3. Use the rotary dial to highlight `Yes`, and then press ⏵.

Temperature Sensor Setup

Accurate temperature readings of the buffer or sample are necessary for accurate calibration and readings. If your pH sensor has a temperature sensor or if you use a separate temperature sensor that plugs into the meter, the meter uses the measured temperature to adjust pH readings accordingly. For a more detailed explanation of the effects of temperature on pH readings, see "Temperature Compensation" on page 82.

The meter will usually automatically detect the type of temperature sensor you are using when you connect it to the meter. If you need to manually enter the temperature sensor type, see "Entering the Temperature Sensor Type" below.

If you are not using a temperature sensor, you will need to measure and enter the temperature manually. See "Manually Entering a Temperature" on page 37 for instructions.

Entering the Temperature Sensor Type

By default, the meter assumes that an NTC-10K temperature sensor is being used. You can set the meter to automatically detect what type of sensor is being used or manually enter the type of sensor.

1. From the main menu, select `Metrology`.

2. Select `Temperature Sensor`.

3. Select one of the following:

   `Auto-Detect` – the meter determines the sensor type when it is connected to the temperature sensor connector on the meter.

   Important Note: For the meter to automatically detect the type of temperature sensor, you must first turn on the meter and then connect the sensor to the meter. The sensor *must* be between 15°C and 40°C (59°F–104°F); if the sensor is outside this range, the meter can not correctly identify the sensor type and temperature readings will be incorrect. In this case, you must manually enter the sensor type.

   `10 kOhm` – NTC-10K; Resistance greater than 1405 ohms and less than 16,000 ohms, which represents temperatures from 14.6°C to 76.4°C. This is the default.

   `30 kOhm` – NTC-30K; Resistance greater than 16,000 ohms, which represents temperatures lower than 40.4°C.

   `PT 1000` – Resistance less than 1405 ohms, which represents any temperature measurable by the sensor that is within the range of the meter (–5.0°C to 105.0°C).

Selecting the pH or mV Mode

The default measurement mode is pH.

1. From the main measurement screen, use the rotary dial to highlight `Mode` on the lower screen, and then press ◀.

2. Use the rotary dial to highlight either `pH` or `mV` on the upper screen, and then press ⏵.

3. Press ◀ to return to the main measurement screen.

pH Mode Setup

Changing the pH Resolution

1. Make sure the meter is in pH mode.
2. From the main menu, select Metrology.
3. Select Resolution.
4. Select the resolution you want to use: 0.1, 0.01, or 0.001 pH units. The default is 0.01 pH units.

Changing the Stability Criteria

This controls the amount of signal variation allowed for a stable measurement.

1. From the main menu, select Metrology.
2. Select Stability Criteria.
3. Select Fast, Medium, or Slow. The default is Medium.

Changing the Number of Samples for Signal Averaging

You can choose the number of signals to be included in a moving average of all measurement signals received from the pH sensor. The options are very slow (10 readings), slow (8), medium (6), fast (4) or very fast (2). Slower settings produce more stable readings, although they can take longer to reach stability.

1. From the main menu, select Metrology.
2. Select Signal Averaging.
3. Select the desired number of samples. The default is 6.

Setting the Data Alarm

You can enable an alarm to be displayed on the main measurement screen when a measured value is outside certain limits. You can also change the default alarm limits. When the data alarm is enabled and the measured value is outside of the defined limits, the meter displays

⚠ on the main measurement screen and includes a "*" character in the data log printout.

By default, the alarm is off. The default alarm limits are the range of the meter for each mode.

1. Make sure the meter is in the correct mode (pH or mV).
2. From the main menu, select Metrology.
3. Select Data Alarm.
4. Select one of the following:

   On (or Off) – On enables the alarm for that mode; Off disables the alarm. The default is Off.

   Upper Limit

   Lower Limit

5. If you selected the Upper Limit or Lower Limit, enter the limit you want to use.

mV Mode Setup

Millivolt measurements are used to measure ORP (oxidation-reduction potential, or redox potential) to check the performance of pH sensors. Relative mV can be measured by entering a mV offset or using the current mV value as the mV offset.

See also:

– "Changing the Stability Criteria" on page 27
– "Changing the Number of Samples for Signal Averaging" on page 27
– "Entering the Temperature Sensor Type" on page 26.

Changing the mV Resolution

1. Make sure the meter is in mV mode.
2. From the main menu, select Metrology.
3. Select Resolution.
4. Select the resolution you want to use: 1 mV or 0.1 mV. The default is 0.1 mV.

Turning On Meter Security

Security allows the meter to have up to 256 users. If meter security is turned on, all users must have:

– A User Number (three digits, from 001 to 256)
– A User ID (three alphanumeric characters; "NEW" is reserved for unused User ID's)
– A Password (six alphanumeric characters)
– Privileges giving or denying access to:
    – Calibrating the meter
    – Changing the meter settings
    – Security administration

Any user can be given administrator privileges by an administrator. When security is enabled, an authorized user must enter his or her user ID and password to use the meter.

The menu displayed is dependent on the security status of the meter and whether or not the current user is an administrator.

Initial Security Setup

Until security is configured the first time, the only option on the Security menu is Configure Security.

The first user who configures security becomes the first administrator and is assigned user number 001.

To set up meter security the first time:

1. From the main menu, select GLP and Security.
2. Select Security.

3. Select `Configure Security`.

```
User ID
---
Password
XXXXXX
Confirm Password
XXXXXX
```

4. Use the rotary dial to enter a three-character alphanumeric User ID. Press ▶ to enter each character; press ▶ when you are finished.

5. Use the rotary dial to enter a six-character alphanumeric Password. Press ▶ to enter each character; press ▶ when you are finished.

6. Under `Confirm Password`, re-enter the same password, and then press ▶. (If the second password does not match the first password, the meter will not accept it.)

Managing Meter Security: Administrators

Logging In

1. From the main menu, select `GLP and Security`.
2. Select `Security`.

```
User ID
---
Password
XXXXXX
```

3. Use the rotary dial to enter your User ID. Press ▶ to enter each character; press ▶ when you are finished.
4. Use the rotary dial to enter your password.
   The meter will not accept your password unless it is the correct one.

Setting Security Status

1. On the Security menu, highlight `Security Status`.

2. Press ▶ to toggle between `On` or `Off`. The default is `On`.
   On – The meter requires a valid User ID and Password for use.
   Off – The meter can be used by anyone.

3. Press ◀ to accept the change in security status.

Adding a New User

1. On the Security menu, select `Users`.

```
User No.
  001 --- *
```

*The second set of characters is the User ID of the first user.

2. Enter a new User Number.

```
User No.
  002 NEW *
```

*"NEW" is displayed next to an unassigned User Number.

3. Press ▶.

4. Select `User ID`.

```
NEW
Not Unique *
```

*`Not Unique` is displayed until you begin to enter a unique User ID.

5. Change `NEW` to a unique User ID.

6. Select `User Password`.

```
Password
XXXXXX
Confirm Password
XXXXXX
```

7. Enter a six-character password, and then press ▶.

8. Re-enter the same password, and then press ▶. (If the second password does not match the first password, the meter will not accept it.)

9. Select `Permissions`.

```
Calibrate
Settings
Administrator
```

In this example, all the permissions are turned off.

10. To turn a permission on or off, use the rotary dial to highlight it, and then press ▶.

If the permission is off and you press ▶, **>** appears next to the permission, indicating that it is now enabled for that user. If **>** is shown next to the permission and you press

▶, **>** disappears and that permission is now disabled for that user.

11. When you are finished, press ▶.

Changing a User's Settings

You can change a user's ID, password, or permissions.

1. On the Security menu, select `Users`.

```
User No.
 001 --- *
```

*The second set of characters is the User ID of the first user.

2. Enter an existing User No., and then press ![icon].

```
User No.
 002 --- *
```

*The second set of character is the User ID of the user number entered.

3. To change the user ID:

   a. Select `User ID`.

   b. Change the User ID to a new, unique User ID.

4. To change the user password:

   a. Select `User Password`.

```
Password
XXXXXX
Confirm Password
XXXXXX
```

   b. Enter a six-character password, and then press ![icon].

   c. Re-enter the same password, and then press ![icon]. (If the second password does not match the first password, the meter will not accept it.)

5. To change the user's permissions:

   a. Select `Permissions`.

```
Calibrate
Settings
Administrator
```

   In this example, all the permissions are turned off.

   b. To turn a permission on or off, use the rotary dial to highlight it, and then press ![icon].

   If the permission is off and you press ![icon], **>** appears next to the permission, indicating that it is now enabled for that user. If **>** is shown next to the permission

   and you press ![icon], **>** disappears and that permission is now disabled for that user.

   c. When you are finished, press ![icon].

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Deleting a User

1. On the Security menu, select `Users`.

```
User No.
 001 --- *
```

*The second set of characters is the User ID of the first user.

2. Enter an existing User No., and then press .

```
User No.
 002 --- *
```

*The second set of character is the User ID of the user number entered.

3. Select `Delete User`.

4. Use the rotary dial to highlight `Yes`, and then press .

Resetting Security

Resetting security erases all user ID's and passwords. The next time you select the Security menu, the only option you will see is `Configure Security` (see "Initial Security Setup" on page 28).

1. On the Security menu, select `Security Reset`.

2. Use the rotary dial to highlight `Yes`, and then press .

Managing Meter Security: Non–Administrators

Logging In

1. From the main menu, select `GLP and Security`.
2. Select `Security`.

```
User ID
---
Password
XXXXXX
```

3. Use the rotary dial to enter your User ID. Press to enter each character; press when you are finished.

4. Use the rotary dial to enter your password. Press to enter each character; press when you are finished.

   The meter will not accept your password unless it is the correct one.

Changing Your Password

1. On the Security menu, select `Users`.

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```
User No.
 001 --- *
```

*The second set of characters is the User ID of the first user.

2. Select `Change Password`.

```
Password
XXXXXX
Confirm Password
XXXXXX
```

3. Enter a six-character password, and then press ▷.

4. Re-enter the same password, and then press ▷. (If the second password does not match the first password, the meter will not accept it.)

Viewing Your Permissions

1. On the Security menu, select `Users`.

2. Select `Permissions`.

```
>Calibrate
 Settings
 Administrator
```
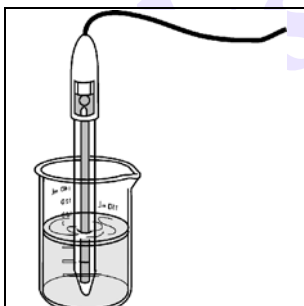
In this example, the Calibrate permission is turned on; Settings and Administrator are turned off.

If you are not an Administrator, you cannot change your own permissions.

Preparing and Connecting the pH Sensor

Be sure to first read the instructions that came with the pH sensor. See also "pH Sensors" on page 15.

Hints to achieve better accuracy

- Make sure the tip of the sensor remains immersed in the buffer or sample while measuring.
- Gently stir all buffers and samples about 1 minute to allow the sensor to reach equilibrium.
- Calibrate using at least two buffers, bracketing the expected pH of your samples.
- Always calibrate the meter and sensor within the temperature range in which measurements are to be performed.
- Leave the fill/vent hole open during use.
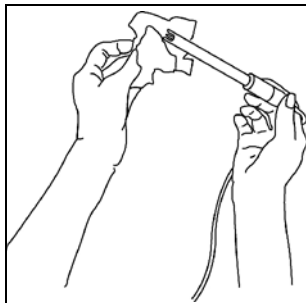
● Rinse the sensor between each measurement with DI or RO water, and then blot the sensor dry with a soft, absorbent paper. *Do not* touch the glass membrane or rub the electrode. Then rinse the sensor with a portion of the next buffer or sample to be measured.
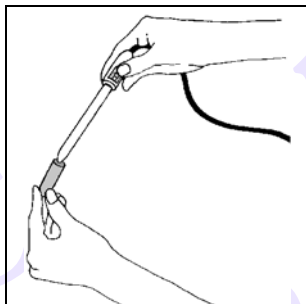
● When not in use, close the fill/vent hole and keep the sensor wet by placing some sensor filling or storage solution (3 mol/L KCl) in the wetting cap and storing the sensor with the wetting cap on.

To prepare and install the pH sensor:
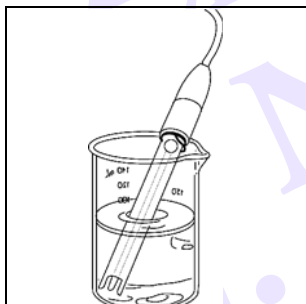
1. Remove the wetting cap from the sensor.
2. If necessary, clean the sensor (see "Cleaning the pH Sensor" on page 69).
3. Before first using the sensor, or whenever the sensor is dry, soak it overnight in a sensor filling or storage solution (3 mol/L KCl).
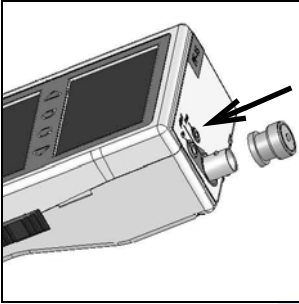
4. Turn on the meter and check it for correct function:

a. Put the BNC shorting cap (supplied with the meter) on the meter's BNC connector.

b. Measure the mV offset (see "mV Calibration" on page 44).

If the mV value is 0.0 ±0.1, the meter is functioning correctly. Note that the long-term drift specified for this portable meter is ±0.1 mV/month since the most recent calibration.

5. Plug the pH sensor cable into the BNC input connector (❻) on the meter. Push the connector on the cable onto the connector on the meter and rotate it clockwise until it locks in place.

Important Note: For the meter to automatically detect the type of temperature sensor, you must first turn on the meter and then connect the sensor to the meter. The sensor *must* be between 15°C and 40°C (59°F–104°F); if the sensor is outside this range, the meter can not correctly identify the sensor type and temperature readings will be incorrect. In this case, you must manually enter the sensor type (see "Entering the Temperature Sensor Type" on page 26).

6. Plug the temperature sensor cable into the temperature sensor connector (❽) on the meter. If using a DocuClip, plug its cable into the DocuClip connector (❼) on the meter.

If you are using a DocuClip that was installed on the pH sensor and pre-calibrated at the factory, the meter automatically reads the sensor's most recent calibration data.

If you are using a DocuClip that you installed on the pH sensor, the meter prompts you to enter the sensor's serial number and calibrate the sensor before use. See "Calibration" on page 37.

To disconnect the pH sensor:

1. Unplug the temperature sensor and DocuClip cables.

2. Push in on the pH sensor's BNC connector to unlock it, and then rotate it counterclockwise and pull.

To store the pH sensor:

● *Always* store pH sensors in 3 mol/L KCl storage solution. This is the best way to ensure the performance and life of the sensor.

● Always leave the fill/vent hole open when the sensor is in use and closed when it is in storage.

– Refill with filling solution (3 mol/L KCl) when the internal solution drops to 1 inch (approximately 25 mm) below the fill/vent hole.

See also "Storing pH Sensors" on page 71.

Turning Off the Meter

Press and hold the on/off button (❶) on the side of the meter until the meter turns off.

Automatic Shut–Off

The meter is equipped with a timer that turns off the meter after a certain period of non-use. See "Changing the Power Off Timer" on page 25 for more information.