Moisture meter

Operating Manual
humimeter FS1 & FS1.1
Grain moisture meter

78,0 °F | 6,16% | 456 kg/m³ | −27,3 td | 0,64 aw | 51,9% r.H. | 14,8% abs | 100,4 g/m² | 09 m/s | 4,90 Ugl | 1

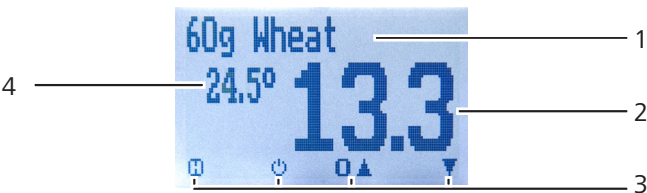# Your humimeter FS1 & FS1.1 at a glance

The main unit

No.	Name
1	Auxiliary plate for filling
2	Display
3	Keypad
4	Measuring chamber

Rear of the main unit

No.	Name
1	Battery compartment

The display

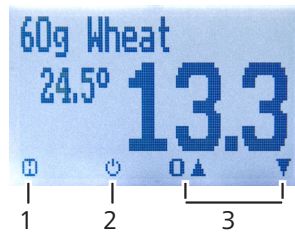| No.	Name
1	Product type
2	Moisture content in % ("6.2 How moisture content is defined")
3	Display symbols
4	Temperature display

The display symbols

Symbol	Name	Symbol	Name
↵	Enter	✗	No
▲	Up	⇧	Change input Level
▼	Down	OK	OK
←	Back	↻	Change menu
0..9	Enter numbers	⏻	On/off button, display light
A..Z	Enter letters	▥	Hold measured value
▶	Continue / go right		
◀	Left		
✓	Yes		

The menus

The device has two different menus: product selection menu and main menu

Product selection menu

No.	Name
1	Hold the measured value (see "5.3 Hold function - Freezing the displayed values")
2	Display illumination / device on/off
3	For changing the product type

Main menu

The main menu comprises the following menu items:

- **Options:**
  Language, Unlock, °C/°F, BL On Time, Auto Off Time, Materialcalibration, Password, Reset
- **Status**

Table of contents

1.   Introduction

1.1   Information about this operating manual

This operating manual is designed to enable you to use the humimeter FS1 & FS1.1 safely and effectively. It is part of the device, has to be stored nearby and must be easily accessible to users at all times.

All users are required to carefully read and make sure that they have understood this operating manual before using the humimeter FS1 & FS1.1. All of the safety and operating instructions detailed in this manual have to be observed to ensure the safety of the device.

1.2   Limitation of liability

All of the information and instructions provided in this operating manual have been compiled on the basis of the current standards and regulations, the state of the art, and the extensive expertise and experience of Schaller GmbH.

Schaller GmbH does not accept any liability for damage associated with the following, which also voids the warranty:

- Non-observance of this operating manual
- Improper use
- Inadequately qualified users
- Unauthorised modifications
- Technical changes
- Use of unapproved spare parts

This fast measuring procedure can be affected by a range of different factors. For this reason, we recommend periodically checking the device's measurements with a standardised oven-drying method.

We, as the manufacturer, do not accept any liability for any incorrect measurements and associated consequential damage.

1.3   Symbols used in this manual

All of the safety information provided in this manual is shown with a corresponding symbol.

> **! ATTENTION**
>
> It is essential to observe this warning. Non-compliance can lead to damage to property or equipment.

> **i   Information**
>
> This symbol indicates important information that enables users to use the device more efficiently and cost-effectively.

1.4   Customer service

For technical advice, please contact our customer service department at

Schaller GmbH
Max-Schaller-Straße 99
A - 8181 St.Ruprecht an der Raab

Telephone: +43 (0)3178 28899
Fax: +43 (0)3178 28899 - 901

E-mail: info@humimeter.com
Internet: www.humimeter.com

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C E

2.   For your safety

The device complies with the following European directives:

- Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS)
- Electromagnetic compatibility (EMC)

The device corresponds to state-of-the-art technology. However, it is still associated with a number of residual hazards.

These hazards can be avoided through strict observance of our safety information.

2.1   Proper use

- Easy to use device for quickly measuring the moisture content of grain.
- The device must only be used for taking measurements on the products defined in the following sections of this manual (see "6. Product types").

2.2   Improper use

- The device is not suitable for measuring mouldy material.
- The device is not waterproof and must be protected from water and fine dust.

2.3   User qualifications

The device must only be operated by people who can be expected to reliably take the measurements. The device must not be operated by people whose reaction times may be slowed due to, e.g. the use of drugs, alcohol or medication.

All persons using this device must have read, understood and follow the instructions provided in the operating manual.

2.4   General safety information

The following safety information has to be observed at all times to avoid damage to objects and injury to people:

- Remove the batteries if the device isn't used for a prolonged period of time (4 weeks).
- In case of damages or loose parts on the device, remove the batteries and contact Schaller GmbH or your dealer.

All of the device's technical features have been inspected and tested before delivery. Every device has a serial number. Do not remove the tag with the serial number.

2.5   Warranty

The warranty does not apply to:

- Damage resulting from non-observance of the operating manual
- Damage resulting from third-party interventions
- Products that have been used improperly or modified without authorisation
- Products with missing or damaged warranty seals
- Damage resulting from force majeure, natural disasters, etc.
- Damage from improper cleaning
- Batteries older than six months

3.   On receipt of your device

3.1   Taking the device out of its packaging

- Take the device out of its packaging.
- Next, make sure that it is not damaged and that no parts are missing.

3.2   Making sure that all of the components have been included

Make sure that all of the components have been included by checking the package contents against the following list:

3.2.1   FS1's scope of supply

- humimeter FS1
- 4 pieces of AA Alkaline batteries
- Digital scale 150 grams
- Measuring cup 0.25 liter
- Plastic case
- Operating manual

### 3.2.2   FS1.1's scope of supply

- humimeter FS1.1
- 4 pieces of AA Alkaline batteries
- Digital scale 150 grams
- Measuring cup 0.25 liter
- Operating manual

3.3   Inserting batteries

1. Take hold of the device with one hand, press your thumb onto the engraved area of the battery compartment (1) and drag downwards (2) (figure 1).

2. Insert the batteries with negative and positive terminals matching those indicated on the battery compartment. Press down the batteries so that they lay flat on the bottom of the housing (figure 2).

    »   As soon as all batteries have been inserted, the device switches on automatically.

3. Push the battery cover onto the housing until it clicks into place (figure 3).
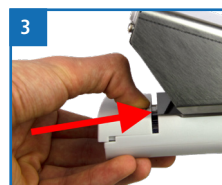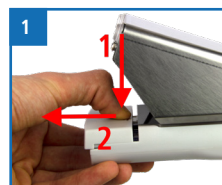
4.   Using the device - Basics

4.1   Switching the device on

- Press the ⏻ button for 3 seconds.

- » The display will then show the status indicator (figure 4).
- » After inserting the batteries, the device switches on automatically.
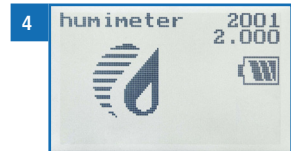
4.2   Automatic calibration

- » The display will show the message **Adjust?** (figure 5).

1. Make sure that the measuring chamber of the device is empty and place the device on a level table.

2. Confirm by pressing ✅.

- » The display will now appear as shown in figure 6.

- » The bar will run upwards. During this period, the device must remain on the table without external influence,

- » which only takes a couple of seconds to complete.

- » Once completed, the device will show the measuring window (see "Product selection menu" page 5).
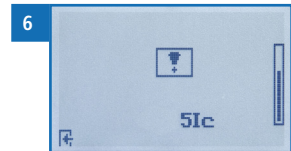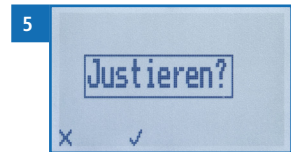
4.3   Accessing the main menu

To do so: The devices is switched off.

- Switch on the device (see "4.1 Switching the device on").
- While switching on, keep both the ▽ and △ buttons pressed.
- The display will then show the main menu.

4.4 Selecting the product type

To do so: The device has to be in the product selection menu (figure 7).

For an overview of the different product types and the criteria for selecting them, please refer to "6. Product types".

1. Press the ▽ or △ button to move from one product type to the next Or

1. Press the ▽ or △ button for 3 seconds to open the product type overview (figure 8).

7

> 60g Wheat
> 25.0°
> 0.0

8

> 50g Corn
> 60g Rye
> 60g Triticale
> 60g Wheat
> 50g Barley
> 30g Oats

2. Use the arrow keys to move from one product type to the next

3. and keep any of them pressed to scroll through the types.

4. Confirm your selection by pressing ↵.
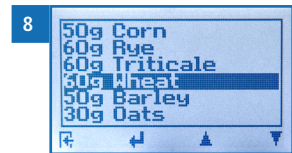
   » The product type you selected will now be shown at the top of the display.

4.5 Taking a measurement

• For information on how to take a measurement, see section "5. The measuring process".

4.6 Switching the device off

To do so: The device has to be in the product selection menu. It is not possible to switch off the device when it is in the main menu.

• Press the ⏻ button for 3 seconds.

5.   The measuring process

5.1   Preparing a measurement

To do so: The device has to have nearly the same temperature than the product being measured. It is recommended to let your humimeter device adjust to the surrounding temperature of the material being measured for at least 30 minutes.

1.   Place the empty and clean measuring cup (0.25 liter) on the switched-off scale (figure 9). Then switch on the scale.

   »   The scale must display 0.0 g with the empty measuring cup on it. The measuring cup must not be weighed.

2.   Check whether the measuring chamber of the device is empty. When the device is switched on, there must not be any material in it.

   »   Empty the instrument and clean the measur-ing chamber if necessary (see "9.3 Cleaning the device").

3.   Switch on the device (see "4.1 Switching the device on").

4.   Perform the automatic calibration (see "4.2 Auto-matic calibration").

5.   Select the required product type (see "6. Product types") by pressing the ▼ or ▲ button (see "4.4 Selecting the product type").
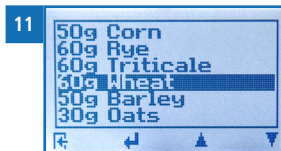
5.2   Taking a measurement

To do so: The device has to have nearly the same temperature than the product being measured.

1. Fill the measuring cup with the filling quantity displayed in the product type name (+/- 1.0 g) (figure 12) (see "6. Product types").

2. Now slowly and evenly fill the measuring chamber of the device with the material being measured (figure 13).

    »   For the filling, no funnel or similar device may be used.

3. The device will now display the moisture content (figure 14).

    »   The displayed value flashes when the moisture content exceeds the measuring range of the se-lected product type (figure 15). A flashing value signals a decreasing accuracy of the measure-ment. The measuring range is dependent on the product type (see "6. Product types").

    »   Once the reading has been taken, the measuring values can be frozen on the display (see "5.3 Hold function - Freezing the displayed values").

4. Empty the device and make sure that there are no residues in the measuring chamber.

    »   Clean the measuring chamber if necessary (see "9.3 Cleaning the device").

> **i   Information - Measuring accuracy**
>
> Benefit from this rapid and non-destructive measuring procedure and take several moisture readings of the same sample material.

> **i   Information - Incorrect readings**
>
> Always make sure to select the correct product type and the correct filling quantity for the material you are measuring. This prevents taking incorrect read-ings (see "10. Faults").

5.3   Hold function - Freezing the displayed values

The device is configured in such a way that the information being shown on the display will freeze at the touch of a button until a new button is pressed. This function can be used if the measured value should remain on the display.

5.3.1   Using the Hold function

To do so: The device has to be switched on and be in the product selection menu.

- Press [H].
- » The current reading will be frozen. All of the four symbols will now be displayed as [H] (figure 16).

- To reactivate the frozen display, simply press any button.

16 | 60g Wheat
25.0° **13.3**

6.   Product types

50g Corn 8 % - 30 %	60g Rye 8 % - 23 %	60g Triticale 8 % - 23 %	60g Wheat 8 % - 23 %
50g Barley 8 % - 23 %	30g Oats 8 % - 23 %	55g Rape 4 % - 15 %	60g Soybeans 6 % - 18 %

60g Horse Beans 8 % - 18 %	35g Sunflower 5 % - 18 %	65g Rice peeled 8 % - 18 %	40g Rice unpeeled 5 % - 22 %
50g Buckwheat 8 % - 18 %	60g Mustard Seeds 5 % - 18 %	60g Sorghum Millet 8 % - 18 %	30g Coffee roasted 1 % - 10 %
50g Raw Coffee peeled 5 % - 18 %	Reference ! Only for testing the moisture meter !		

6.1   Adaptation to other devices

The measured value can be adjusted to other devices by changing the filling quantity. By increasing the filling quantity, the device shows a higher measuring value, by decreasing the filling quantity, the device shows a lower measuring value.

.

product type	filling quantity	change in weight	filling quantity display + 1 %
50g Corn	50 g	+ 2.4 g	52.4 g
60g Rye	60 g	+ 3.2 g	63.2 g
60g Triticale	60 g	+ 2.8 g	62.8 g
60g Wheat	60 g	+ 3.3 g	63.3 g
50g Barley	50 g	+ 3.3 g	53.3 g
30g Oats	30 g	+ 5.0 g	40.0 g
55g Rape	55 g	+ 3.9 g	58.9 g
60g Soybeans	60 g	+ 4.0 g	64.0 g
60g Horse Beans	60 g	+ 3.8 g	63.8 g
35g Sunflower	35 g	+ 4.7 g	39.7 g
65g Rice peeled	65 g	+ 4.5 g	69.5 g
40g Rice unpeeled	40 g	+ 2.8 g	42.8 g
50g Buckwheat	50 g	+ 3.3 g	53.3 g
60g Mustard Seeds	60 g	+ 3.7 g	63.7 g
60g Sorghum Millet	60 g	+ 3.2 g	63.2 g

Example: Increasing the filling quantity of wheat by 3 grams (filling weight of 63 g wheat), the measuring value is 1% higher. That way the filling quantity can be modified to the extent that the displayed value corresponds to an other measuring device.

6.2   How moisture content is defined

The device measures and shows a material's moisture content. The moisture content readings it displays are calculated in relation to the material's overall mass:

$$\%WG = \frac{M_n - M_t}{M_n} \times 100$$

M_n: Mass of the sample with average moisture content

M_t: Mass of the sample with zero moisture content

%WG: Moisture content (in accordance with the corresponding product norms)

7.   Checking the device's status

1.   Access the main menu (see "4.3 Accessing the main menu").

2.   Select **Status**. To do so, press ![icon] or ![icon] and confirm by pressing ![icon].

  »   The display will then show the status indicator **humimeter**.

  »   The display will show the following information:

| No.	Name
1	Serial number
2	Software version
3	Battery status

3.   Confirm by presssing ![icon].

4.   Press ![icon] to leave the main menu.

8.   Configuring the device

8.1   Selecting a language

1.   Access the main menu (see "4.3 Accessing the main menu").

2.   Select **Options**. To do so, press ▼ or ▲ and confirm by pressing ↵.

3.   Select **Language**. To do so, press ▼ or ▲ and confirm by pressing ↵.

4.   Navigate to the required language. To do so, press ▼ or ▲ and confirm by pressing ↵.

    »   The settings have been saved.

5.   Press ⊞ to leave the **Options** menu.

6.   Press ⬚ to leave the main menu.

8.2   Activating options

To do so: Some of the options must be deactivated.

1.   Access the main menu (see "4.3 Accessing the main menu").

2.   Select **Options**. To do so, press ▼ or ▲ and confirm by pressing ↵.

3.   Select **Unlock**. To do so, press ▼ or ▲ and confirm by pressing ↵.

    »   The display will now appear as shown in figure 17.
    »   On delivery, the four-digit password is the device's serial number.

17

4.   Inputting numbers:
      Press and hold **0..9** to quickly scroll to the required number and either press it for 3 seconds or press ↵ to confirm the selected number (figure 18).

18

5.   Moving back:
      Press ⬆ to switch to another input level.
      To move back, press ◀.
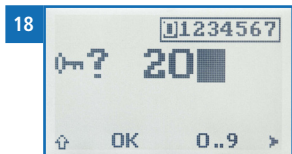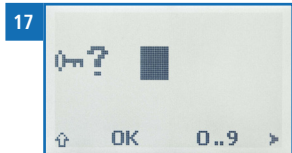
6. Confirm the four-digit password by pressing ⬛⬛.

» The settings have been saved.

» The **°C/°F, BL On Time, Auto Off Time, Materialcalibration, Password, Reset** options are now activated.

7. Press ⬛ to leave the **Options** menu.

8. Press ⬛ to leave the main menu.

8.3 Deactivating options

Once the device has been switched restarted, the **°C/°F, BL On Time, Auto Off Time, Materialcalibration, Password, Reset** options will be deactivated again.

8.4 Selecting °C/°F

To do so: All of the options must be activated (see "8.2 Activating options").

1. Access the main menu (see "4.3 Accessing the main menu").

2. Select **Options**. To do so, press ⬛ or ⬛ and confirm by pressing ⬛.

3. Select **°C/°F**. To do so, press ⬛ or ⬛ and confirm by pressing ⬛.

4. Navigate to the required temperature scale, i.e. Celsius (**°C**) or Fahrenheit (**°F**). To do so, press ⬛ or ⬛ and confirm by pressing ⬛.

» The setting has been saved.

5. Press ⬛ to leave the **Options** menu.

6. Press ⬛ to leave the main menu.

8.5 Reducing the device's power consumption

8.5.1 Configuring the display illumination time

To do so: All of the options must be activated (see "8.2 Activating options").

1. Access the main menu (see "4.3 Accessing the main menu").

2. Select **Options**. To do so, press ![icon] or ![icon] and confirm by pressing ![icon].

3. Select **BL On Time**. To do so, press ![icon] or ![icon] and confirm by pressing ![icon].

4. Select the required display illumination period (30 seconds, 2 minutes, 5 minutes, 10 minutes). To do so, press ![icon] or ![icon] and confirm by pressing ![icon].

   » The setting has been saved.

5. Press ![icon] to leave the **Options** menu.

6. Press ![icon] to leave the main menu.

8.5.2 Configuring automatic switch-off

To do so: All of the options must be activated (see "8.2 Activating options").

1. Access the main menu (see "4.3 Accessing the main menu").

2. Select **Options**. To do so, press ![icon] or ![icon] and confirm by pressing ![icon].

3. Select **Auto Off Time**. To do so, press ![icon] or ![icon] and confirm by pressing ![icon].

4. Select the period of time you want the device to stay switched on (3 minutes, 5minutes, 10 minutes). To do so, press ![icon] or ![icon] and confirm by pressing ![icon].

   » The setting has been saved.

5. Press ![icon] to leave the **Options** menu.

6. Press ![icon] to leave the main menu.

8.6 Configuring the material calibration function

The type calibration function is described in a separate operating manual.

8.7   Changing the password

To do so: All of the options must be activated (see "8.2 Activating options").

1.   Access the main menu (see "4.3 Accessing the main menu").

2.   Select **Options**. To do so, press ![icon] or ![icon] and confirm by pressing ![icon].

3.   Select **Password**. To do so, press ![icon] or ![icon] and confirm by pressing ![icon].

»   The display will show the current password.

4.   Overwrite the current password. To do so, press and hold ![0..9] to quickly scroll to the required number and either press it for 3 seconds or press ![icon] to confirm the selected number.

Moving back:
Press ![icon] to switch to another input level.
To move back, press ![icon].

5.   Confirm the new four-digit password by pressing ![OK].

»   The setting has been saved.

6.   Press ![icon] to leave the **Options** menu.

7.   Press ![icon] to leave the main menu.

8.8   Resetting the device to its factory settings

To do so: All of the options must be activated (see "8.2 Activating options").

1.   Access the main menu (see "4.3 Accessing the main menu").

2.   Select **Options**. To do so, press or and confirm by pressing .

3.   Select **Reset**. To do so, press or and confirm by pressing .

   »   The display will then show the message **Reset?**
        (figure 19).

4.   Confirm by pressing .

   »   The device will now be reset to its factory settings.
        All of your personal settings will be lost.

   »   The display will show the status indicator **humimeter**
        (figure 20).
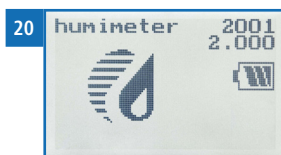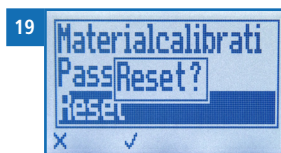
9.   Cleaning and maintenance

Regularly cleaning and maintaining the device will ensure that it will have a long service life and stay in good condition.

9.1   Changing batteries

The device constantly monitors the charge level of the batteries. The current battery status is shown on the status screen.

If the battery´s charge is very low, the battery symbol will be shown with an exclamation mark. In that case, the batteries must be changed immediately (figure 22).

For changing the batteries, see section "3.3 Inserting batteries".

As the device's user, you are responsible by law for properly disposing of all used batteries, which must not be disposed of as domestic waste (Battery Directive).

9.2   Care instructions

- Do not leave the device out in the rain. The device is not waterproof.
- Do not expose the device to extreme temperatures.
- Protect the device from strong mechanical shocks and loads.
- Remove the batteries after the harvesting season.

9.3   Cleaning the device

> ❗ **ATTENTION**
>
> **Do not clean with fluids**
> Water or cleaning fluid getting inside the device can destroy the device.
> ►   Only clean with dry materials.

Plastic housing

- Clean the plastic housing with a dry cloth.

Measuring chamber

- Clean the measuring chamber with a soft brush.

10. Faults

If the measures listed below fail to remedy any faults or if the device has faults not listed here, please contact Schaller GmbH.

Fault	Cause	Remedy
Measuring error	The temperature of the material being measured is too low or high. I.e. the material's temperature is lower than 0 °C or higher than +40 °C.	The temperature of the material being measured has to be between 0 °C and +40 °C.
	Temperature discrepancy between device and material being measured	Let the temperature adjust to the material being measured (permitted difference of max. 3 °C).
	Wrong product type	Check whether you have selected the right product type (product) before taking a reading (see "6. Product types").
	Wrong filling quantity	Exactly fill in the filling quantity displayed in the product type name (+/- 0.5 gram).
	Mouldy or rain wet material	The accuracy decreases significantly.
	Stored and fermented corn from whole grain silage	May lead to a too high displayed measuring value.
	Frozen material or material mixed with snow	The accuracy decreases significantly.
	Contaminated material	Highly contaminated material such as long ears of barley or foreign material can strongly influence the measuring result.

11. Storage and disposal

11.1 Storing the device

The device must be stored as follows:

- Do not store outdoors.
- Store in a dry and dust-free place.
- Protect the device from sunlight.
- Avoid mechanical shocks/loads.
- Remove the batteries if the device isn't used for a period of 4 weeks or longer
- Storage temperature: -20 °C to +60 °C

11.2 Disposing of the device
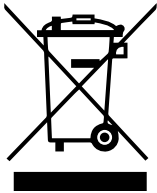
Devices marked with this symbol are subject to Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE).
If the device is being operated outside the European Union, the national regulations on the disposal of such devices that apply in the country of use must be observed.

Electronic devices must not be disposed of as domestic waste.

The device must be disposed of appropriately using appropriate collection systems.

12. Device information

12.1 EC declaration of conformity

CE DECLARATION OF CONFORMITY

We **Schaller GmbH**

Max-Schaller-Straße 99

A – 8181 St. Ruprecht

in accordance with the following Directives:

EMV - Richtlinie 2014/30/EU,

RoHS - Directives 2011/65/EG,

hereby declare that the following product types:

Product: **humimeter**

Types: **FS1, FS1.1, FS2, FS3, FS4, BM1, BM2, BP1**

are in conformity with the applicable requirements of the following documents

- **EN 61326–1:2013** Electrical equipment for measurement, control and laboratory use – EMC requirements
- **EN 50581:2012** Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances:

I hereby declare that the equipment named above has been designed to comply with the relevant Sections of the above referenced specifications. The unit complies with all applicable Essential Requirements of the Directives.

St. Ruprecht a.d. Raab, 21.03.2016

Schaller GmbH
Maximilian Schaller
General Manager

12.2 Technical data

Display resolution	0.1 % moisture content, 0.5 °C/°F temperature
Measuring range (depending on product type)	(FS1) 5 % to 30 % moisture content (FS1.1) 5 % to 25 % moisture content
Calibration accuracy to reference material	(FS1) +/- 0.7 % (FS1.1) +/- 0.9 %
Operating temperature	0 °C to +40 °C
Storage temperature	-20 °C to +60 °C
Temperature compensation	Automatic
Power supply	4 x 1.5 Volt AA Alkaline batteries
Current consumption	60 mA (incl. display illumination)
Menu languages	English, German, French, Italian, Spanish, Portuguese, Czech, Polish, Hungarian, Russian, International
Display	128 x 64 illuminated matrix display
Device dimensions	155 x 75 x 90 mm
Device weight	360 g
Case dimensions (FS1's scope of supply)	270 x 220 x 80 mm
Weight of device + case	850 g
Device IP rating	IP 40

Climate Environment

Materials

Food

Buildings

Bioenergy

Paper / Board

Schaller Messtechnik develops, produces and sells professional moisture meters and turnkey solutions.