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Schaller
Messtechnik / humimeter.com

Analytic balance

Operating Manual

Moisture analyser G110

Analytic balance for determination of moisture

78,0 °F | 6,16% | 456kg/m³ | −27,3td | 0,64aw | 51,9%r.H. | 14,8%abs | 100,4g/m² | 09m/s | 4,90Ugl | 163ym | 23,2 °C | 78,8°F | 6,21% |424 kg/m


Climate


Food


Bionenergy


Material


Buildings


Paper / Board

Schaller GmbH
Max-Schaller-Straße 99, A - 8181 St. Ruprecht an der Raab
Tel +43 (0)3178 - 28899 , Fax +43 (0)3178 - 28899 - 901
info@humimeter.com, www.humimeter.com

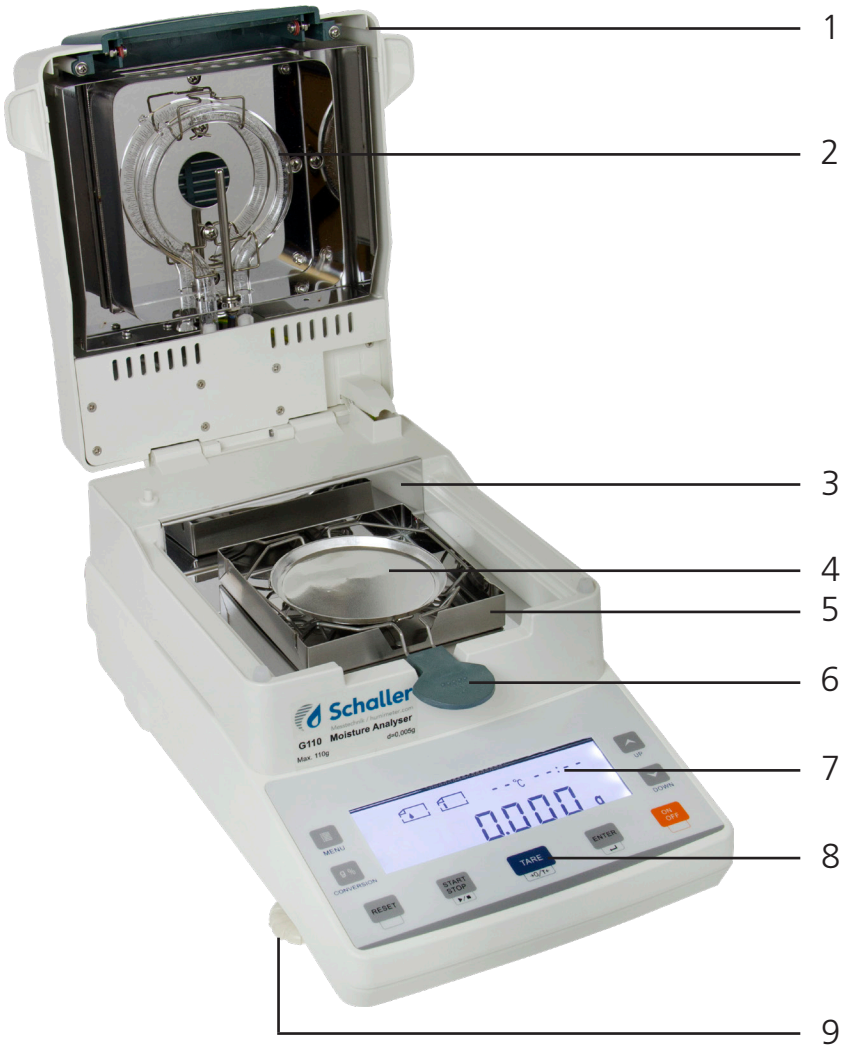
Table of contents

1 Technical data

Heating element	Halogen lamp (1 x 400 W)
Drying temperature range	40 °C - 199 °C
Maximum weight	110 g
Minimum weight	0.02 g
Readability	0.005 g / 0.05 %
Measuring range moisture	0 - 100 %
Drying time	1 to 99 min. adjustable
Displayed values	[%] moisture; [%] dry weight; [g] remaining weight
Maximum sample size	Ø 92 mm, height 20 mm
Calibration weight	100 g (F2)
Interface	RS232
Display	LCD
Dimensions	240 x 365 x 180 mm
Net weight	4.8 kg
Power supply	230V AC 50Hz
Scope of delivery	Analytic balance G110, sample pan, mains cable, 100 g calibration weight, operating manual

2 Description of the device

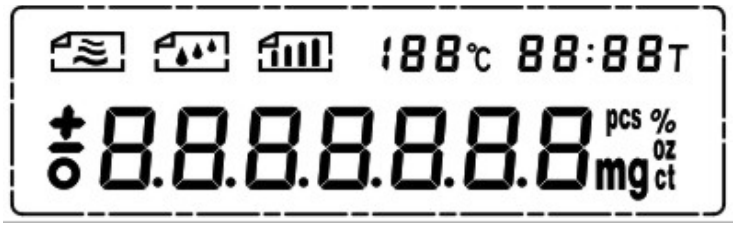
2.1 Basic device



No.	Description
1	Heating hood
2	Heating lamp
3	Heat protection plate
4	Sample pan
5	Wind shield
6	Insertion aid
7	LCD display
8	Keypad
9	Height-adjustable foot

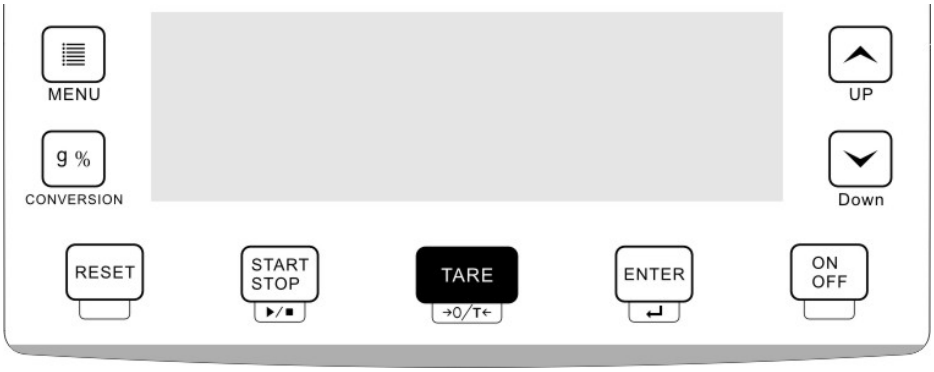
No.	Description
10	RS-232 interface
11	Bubble level
12	Fan
13	Power supply socket

2.2 Display



Symbol	Description
	Heat-up mode Standard
	Heat-up mode Quick
	Heat-up mode Slow
	Measuring / Stop mode
188℃	Drying temperature
88:88T	Drying time
%	Percentage dry weight / dry matter %
m %	Percentage moisture
g	Grammes

2.3 Keypad



Key	Function
ON/OFF	Power on / off
START / STOP	Start / stop measurement
TARE	Tare / Leave settings
MENU	Settings
CONVERSION	Switch between absolute and relative measuring result
ENTER	Confirm / go to next setting
RESET	Return to weighing mode
DOWN	Change settings
UP	Change settings

3 General information

3.1 Publication declaration

This version of the manual replaces all previous versions. This manual may not be reproduced, edited, duplicated or distributed without the written permission of Schaller GmbH.
Subject to technical and documentary changes. All rights reserved. The operating manual has been compiled with due care. Schaller GmbH accepts no liability for omissions or errors. The determination of valid measurement results, conclusions and measures derived therefrom are the sole responsibility of the user. Schaller GmbH accepts no liability for the accuracy of the measured values or measurement results displayed. Schaller GmbH accepts no liability for any damage resulting from the use of the measured values.

3.2 Proper use

The G110 analytical balance is designed for determining the moisture content of liquid, porous and solid materials using the thermogravimetric method. The balance can also be used to weigh all solids and liquids.

3.3 Improper use

Impacts and overloading exceeding the stated maximum load (max) of the device, minus a possibly existing tare load, must be strictly avoided. This could cause damage to the integrated balance.
Do not use the instrument in explosive atmospheres.
The balance is not explosion-protected. The instrument must not be opened, dismantled or modified in any way. This can lead to incorrect weighing results, safety defects and destruction of the balance.
The instrument may only be operated in accordance with the specifications described in this manual.

The warranty does not apply to:

- Overload of the balance (maximum weight)
- Damage resulting from non-observance of the operating manual

- Damage resulting from improper use
- Products that have been opened and/or modified
- Mechanical damage and damage caused by measuring material, liquids etc.
- Damage resulting from improper installation or electrical installation

3.4 Monitoring of measuring devices

In order to guarantee the metrological characteristics of the integrated balance in the framework of quality assurance, we recommend checking the calibration of the balance at regular intervals.
The interval and the method of this check must be defined by the responsible user of the balance. Test weights are available from Schaller GmbH. A test weight of 100 g is included in the scope of delivery.

4 Safety information

4.1 Symbols used in this manual

The symbols used have the following meanings:

General safety symbol:
Non-observance can cause personal injury and/or damage to the device.

Warning of hot surface:
Non-observance can cause burns.

Fire or explosion:
Spontaneously flammable substances, highly flammable gaseous substances, moisture-sensitive substances or flammable liquids.

Poisoning:
Substances which contain toxic or corrosive components, produce toxic gases during drying, cause irritation (eyes, skin, respiratory system), nausea or death.

4.2 User qualifications

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

4.3 Hazard warnings

Warning!

- Carefully read this operating manual before setup and commissioning.
- The operation of the moisture analyser is restricted to trained competent specialist staff.
- The moisture analyser may not be used in a hazardous area.
- Never use the moisture analyser in an explosive environment.
- The moisture analyser is used to analyse the moisture content of materials. This instrument must be used exclusively for this purpose. Any other usage may cause a risk to personnel, da-

mage to the instrument or other material damage.

- The moisture analyser should be used only for the drying of aqueous substances.
- Never make any modifications or design changes to the equipment. Always use original spare parts and accessories.
- Make sure that liquids cannot penetrate the interior of the device.
- If you spill liquid on the device, disconnect it immediately.
- Ensure correct installation of all components.

Hot surfaces

- Maintain sufficient space in the environment of the instrument to prevent heat build-up.
- Careful when removing the sample. The sample itself, the sample dish and the heating unit may be very hot.
- Use the sample retainer at all times as it allows safe working and prevents burns.
- The case (e. g. the ventilation grids) may heat up considerably during operation.

Fire or explosion

- Never place combustible materials on, under or next to the instrument, as the environment of the instrument heats up to a high temperature.
- Explosive, easily flammable samples and samples that go into a chemical reaction when subjected to heat, may not be analysed with the moisture analyser.
- If in doubt, conduct a risk analysis.
- Do not use the moisture analyser in an explosive environment.
- Never leave the analytical scale unattended during the analysis process.

Poisoning

- Sample materials that contain toxic or corrosive ingredients, produce toxic gases when drying or cause irritation must only be dried with a special extraction system in place.

Danger!

- Do not leave the packaging material careless. It could become a dangerous toy for children.
- The device is not a toy and should not be handled by children.
- This device can be dangerous if it is used by untrained persons or used improperly. Observe the personnel qualifications.

5 On receipt of your device

5.1 Taking the device out of its packaging

Immediately after unpacking, check the integrity and completeness of the device and the scope of delivery.

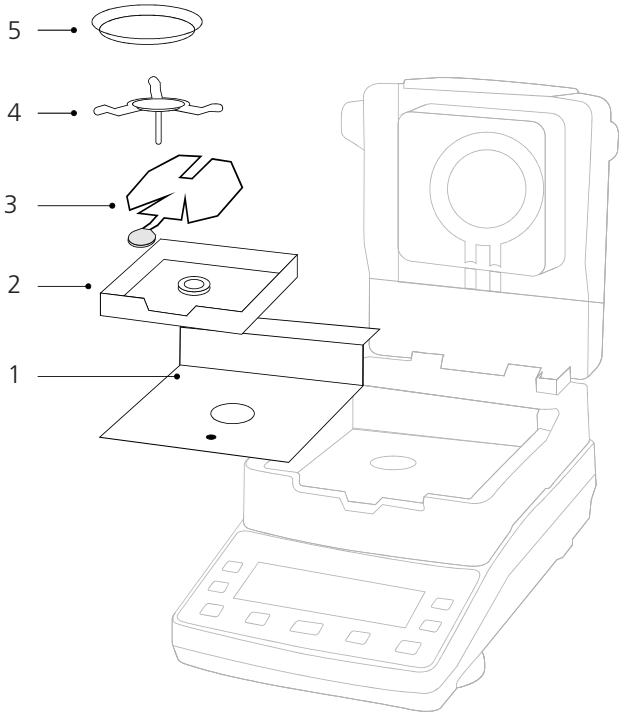
Do not discard the packaging! In case of shipping the device, only use the original packaging.

5.2 Place of installation

Choose an appropriate place of installation, considering the following points:

- Wind and air draft protected
- Approximately constant ambient air temperature
- Ambient air humidity between 40 % and 75 %
- Not in the vicinity of flammable or explosive materials
- Distance to heat-sensitive materials
- Dust-protected
- Stable surface
- Not in the vicinity of radiating electrical devices (electrical radiation)

5.3 Assembling the analytic balance



Unpack the delivered parts aud assemble them as illustrated.

1.) Start with the heat protection plate (1).

2.) Insert the wind shield (2) in the way the notch in the side wall faces the user.

3.) Place the handle of the insertion aid (3) in the notch of the wind shield (2).

4.) Place the sample pan retainer (4) in the middle of the measuring chamber. Make sure that the cone of the sample pan retainer rests in the guide properly.

5.) Then put the sample pan (5) onto the sample pan retainer.

5.4 Levelling the analytic balance

In order to obtain accurate and repeatable measuring results, it is important to align the balance accurately using the level indicator and the two setting wheels. Turn the foot screws until the air bubble of the water balance is in the prescribed circle.

5.5 Power supply

Before connecting the device to the mains, make sure that the mains voltage is 230V AC and 50Hz and an earth connection is provided.

Operating the balance at a lower or higher voltage may destroy the device.

6 Preparation

6.1 Preparation of sample

Always prepare only one sample for the measurement. This prevents the sample from exchanging moisture with the ambient air. In case several samples have to be taken at the same time, put them into airtight containers.

Before the sample is spread on the aluminium pan, the empty aluminium pan should be placed on the balance and the balance should be tared (display of 0.000 g).
Now spread the sample on the sample pan evenly and in a thin layer to get reproducible results. Recommended layer thickness: 2 to 5 mm.

An uneven application of the sample causes inhomogeneous heat distribution in the sample to be dried. This means that the sample is dried incompletely or that the drying time is increased. Due to piling material, the upper layers will heat up more strongly, which will cause combustion or incrustation. An excessively high thickness of the layer or possible incrustations prevents the moisture from leaving the sample. The residual moisture makes the measurement results non-verifiable and non-reproducible.

6.2 Tools and accessories for sample preparation

The tools and instruments used for sample preparation have a huge effect on the accuracy and reliability of the measurement. You should avoid tools with heat-conducting properties, i. e. which are able to transfer heat to the sample. Improper handling and preparation of the sample will falsify the end result of the measurement.

Re-using a sample pan can falsify the end result of the measurement because of the adhering residues. Therefore, always take care to use only well-cleaned aluminium pans.

6.3 Preparation of analytic balance

Switch on the balance at least 30 minutes before starting a measurement. This ensures that the balance is at operating temperature.
Before each measurement, check that the sample pan is empty and remove any kind of pollution if present.

7 Operation / Measuring procedure

7.1 Switching the device on

Press the „ON/OFF“ button for switching the device on. After switching on, the last used settings are called up. These settings are shown on the display.

7.2 Drying modes

Press the „Menu“ key to get to the drying mode selection screen. Here you can select different drying modes and set up new ones.

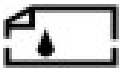
On the left-hand side of the display flashes a number which indicates the memory location. Here you can retrieve up to 16 different memory locations, using the arrow keys „UP“ and „DOWN“. The saved drying parameters are displayed along with the selected memory location.

If you wish to use the drying parameters of a certain memory location, press the „TARE“ key. The analytic balance will then take over the drying parameters and you can start the measurement.

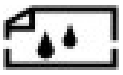
If you want to save some new drying parameters to a memory location, select the memory location and confirm by pressing the „ENTER“ key.

7.2.1 Specifying the heat-up mode

After the selection of the memory location, the drop icon will flash in the upper side of the display.
Here you can select one out of three heat-up speeds.



Standard heat-up mode
This is the default mode which is suitable for most sample types.
In this heat-up mode, 120 °C are reached after approx. 4 minutes.



Quick heat-up mode
This mode is suitable for samples with a high moisture content.
In this heat-up mode, 120 °C are reached after approx. 1 minute.

ATTENTION: When using this heat-up mode, there might be increased temperatures in the drying chamber for a short period as the sensor and the control need some time to regulate the temperature.

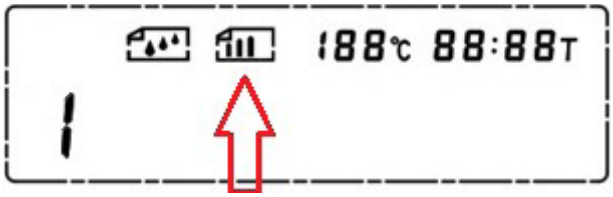
Slow heat-up mode
This mode is suitable for samples with a low moisture content.
In this heat-up mode, 120 °C are reached after approx. 8 minutes.

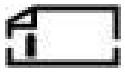
ATTENTION: When using this heat-up mode, it is particularly important that the drying time of the sample is adapted to the drying mode as otherwise the drying process could be terminated (time expired) although there is still some residual moisture in the sample.

Select the desired heat-up mode using the arrow keys „UP“ and „DOWN“. To confirm the selected heat-up mode, press the „ENTER“ key.

7.2.2 Specifying measurement / stop mode

After the selection of the heat-up mode, the bar icon will flash in the upper side of the display. Here you can select between three measurement /stop modes.





Constant measuring value
In this measurement / stop mode, the measurement is stopped automatically when the measuring value is constant over a certain period of time.

Manual / user stop mode
In this measurement / stop mode, the measurement can be ended by the user. To do so, press the „START / STOP“ key.

ATTENTION: Depending on the temperature, combustion of the sample can easily occur in this measurement / stop mode. This mode should only be used if constant monitoring can be guaranteed. The advantage of this mode is that the sample can be dried for a long time to allow moisture to escape which is located very deep in the sample.

Time stop mode
In this measurement / stop mode, the measurement is stopped automatically when the set measuring / drying time has passed.

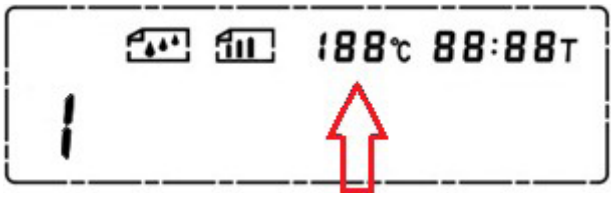
88:88T

ATTENTION: The maximum measuring / drying time you can set is 99 minutes.

The desired measurement / stop mode can be selected by means of the arrow keys „UP“ and „DOWN“. To confirm the selected measurement / stop mode, press the „ENTER“ key.

7.2.3 Setting the drying temperature

After selecting the measurement / stop mode, the temperature indication will flash in the upper side of the display.



Here you can set the drying temperature using the arrow keys „UP“ and „DOWN“. The first setting can be made in steps of 10 %. After confirming with the „ENTER“ key, the setting can be carried on in increments of 1 °C.

ATTENTION: During temperature regulation, temperature fluctuations of approx. 4 °C can occur. Mind this when selecting the temperature to make sure the sample does not scorch. Otherwise, the moisture reading will be falsified.

7.2.4 Setting the drying / measuring time (only in the time stop mode)

Depending on the previously set measurement / stop mode, the time indication flashes in the upper side of the display.

The drying / measuring time can be set using the arrow keys „UP“ and „DOWN“. To confirm the set drying / measuring time, press the „ENTER“ key.

ATTENTION: The maximum measuring / drying time you can set is 99 minutes.

7.3 Measurement

Prepare the sample and place it in the drying chamber. Select the correct drying program for your sample as described. Start the measurement by pressing the „START“ key.

After the measurement, the measured values will be available until they are deleted. Pressing the „CONVERSION“ key, you can switch between the weight indication /dry matter indication in % and the indication of the moisture content in % during and after the measurement. After the measurement, the measuring values last determined must be deleted from the memory. To do so, press the „RESET“ key.

ATTENTION: Before placing the next sample on the sample pan, make sure that the display shows 0.0 g respectively 0.00 g. If this is not the case, press the „TARE“ key.

Hot surface!

- Do not touch the halogen lamps or the cover during or after the measurement as this can cause severe burns.
- After the measurement, let the sample cool down before touching it.

7.4 Adjustment / calibration

The moisture analyser consists of a weighing unit and a drying chamber. The moisture measurement is carried out on the basis of the weight loss of the sample.

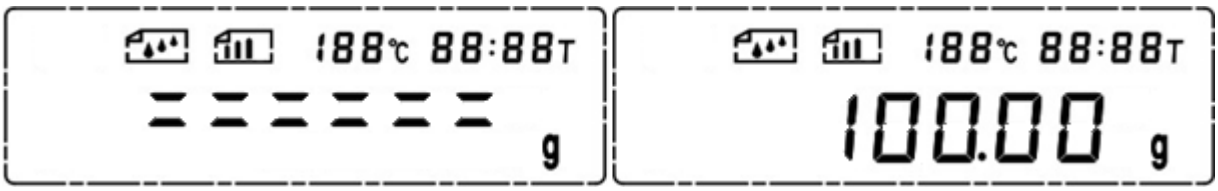
ATTENTION: The moisture analyser internally has a higher weighing resolution than the one indicated. The moisture analyser uses the higher resolution which is invisible to the user for calculation. This can result in deviations after the decimal point when trying to reproduce the result.

The weighing unit can be adjusted by means of a 100 g external test weight (min. M1). Special care must be taken when positioning the scales (as little vibration as possible and balanced by means of the level). The adjustment of the weighing unit should only be carried out after a heat-up time of at least 30 minutes.

To do so, press and hold the „RESET“ key for approx. 6 seconds. The display shows „-CAL-“.

After the “-CAL-” indication, “100.00 g” will flash.

Now place the 100 g calibration weight in the middle of the weighing platform. The indication will change from “100.00 g” to “=====”.



When the indication changes from “=====” back to “100.00 g”, remove the weight from the weighing platform. After this, the display will show “=====” again and change to “0.00 g” automatically.

The adjustment of the balance is now finished.

7.5 Troubleshooting

Error code	Error cause	Possible solution
Err 1	Sample weight below 1 g	Put more than 1 g of the sample on the balance and start the measurement.
Err 2	Temperature setting below +40 °C	Restart the balance.
Err 3	Measuring time setting below 30 seconds	Restart the balance.
Err 4	Halogen lamp problem	Please contact our technical support.
Err 5	Time setting for slow heat-up mode below 3 minutes	Restart the balance.
Err6	Temperature sensor broken	Please contact our technical support.

8 Warranty

The warranty period is 6 months for business to business transactions and 2 years for consumer transactions, subject to compliance with the above-mentioned handling of the analytical balance, beginning on the day of delivery. This service refers to all essential defects of the device which are demonstrably due to material or manufacturing defects.
It is carried out by a replacement delivery of a faultless device or by free repair of the device, depending on our choice. A claim to an extended warranty period does not arise from this. During the warranty period, all defects must be notified in writing immediately after their occurrence. In addition to a description of the defect, also state the serial number of the device. Any additional costs such as interruptions of operation, working hours, freight, customs charges are excluded from this service.

The warranty does not apply to:

Transport damage, improper handling, wilful destruction, any modification of the device, unauthorized opening of the device.

9 Limitation of liability

We do not accept any liability for any incorrect measurements and associated consequential damage. For this reason, we recommend periodically checking the device's measurements with a standardised oven-drying method.

All of the device's technical features have been inspected and tested before delivery. Each device has a serial number and a test sticker on it. If these stickers are removed, no warranty claims can be made.

Any technical modifications reserved.

Dealers and employees of Schaller GmbH are not authorised to grant changes or additional warranty periods beyond the warranty, neither verbally nor in writing.

10 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.

Dispose of the packaging sorted by type. Add paperboard and cardboard to waste paper, plastic films to the recyclables collection.

11 Notes

Schaller GmbH
Max-Schaller-Straße 99, A - 8181 St. Ruprecht an der Raab
Tel +43 (0)3178 - 28899 , Fax +43 (0)3178 - 28899 - 901
info@humimeter.com, www.humimeter.com