RADTKE
MESSTECHNIK

SINCE
1995

Quick determination of the moisture content of any material using the

Carbide-Method

Instruction manual

Determination of mositure levels
Fast. Simple. Reliable.
www.radtke-measuring.com

Below you will find a number of **QR codes that give you mobile access to our explanatory videos.** The list shown here is a current selection and is subject to occasional adjustments. Therefore, we cannot claim that it is exhaustive.

CALIBRATION WITH THE MECH. MANOMETER

(further details on page 36 of this manual)
Click here if you are working with the manual as a PDF file.

CALIBRATION WITH DIG. MANOMETER

(further details on page 36 of this manual)
Click here if you are working with the manual as a PDF file.

SAMPLING MATERIAL AND SAMPLE PREPARATION

(further details on page 42 of this manual)
Click here if you are working with the manual as a PDF file.

SAFETY DATA SHEETS ACCORDING TO CLP-REG 1272/ 2008

Calcium Carbide
CAS 75-20-7 EC 200-848-3 Index-Nr: 006-004-00-9
Danger

Foreword

Our CM devices are ideal moisture measuring instruments for **quickly determining the moisture content of any material** that does not react with calcium carbide or its reaction products.

As with all measuring methods based on a chemical reaction, particular care is also required here. Please study this manual before commissioning and pay particular attention to the safety instructions.

Persons who are not familiar with the carbide method are not allowed to use the measuring instrument!

Warranty

Dr. Radtke CPM Chemisch-Physikalische Messtechnik AG guarantees the equipment to be free from defective parts and poorly manufactured products, excluding consumables, for a period of 2 year from the date of purchase. Excluded from this are the manometer and batteries. Own repair attempts invalidate warranty claims.

Please keep the manual in a safe place.

Spare parts can be ordered from your dealer or directly on our website. The latest version of the manual as well as additional information can also be found on our website.

Using the manual

This document provides information on the components and their properties in connection with the carbide method. It contains basic information on the measuring method for the on-site calibration of the measuring instruments. It also describes essential applications.

If the instructions are followed closely, there is no risk of an accident when handling our CM devices. Before carrying out measurements with the CCM device, we kindly request that you read the instructions precisely. The CM device may only be used in accordance with the instructions for use.

An explosive air-acetylene mixture forms in the CM bottle during the measurement. If this gas mixture is ignited as a result of sparks, this will results in the complete destruction of the manometer as well as the loss of the measurement result.

If sample material contains components that could generate sparks (e.g. flint), we strongly recommend that you carry out the measurement with the support of the optional crushing rod. The crushing of the sample with the crushing rod takes place separately from the moisture measurement.

The escaping gas is combustible:

- Do not open the CM bottle indoors.
- Do not smoke and do not work near to open flames or electrical installations.
- If a fire develops, smother it with sand or with a blanket; do not extinguish with water!
- After a measurement, open the CM bottle while pointing it away from your face and allow the gas to escape slowly.

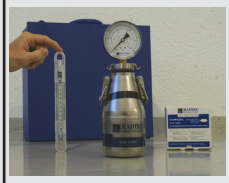
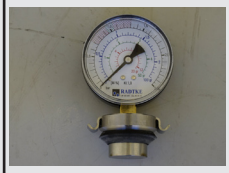
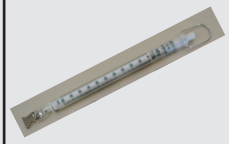
<u>First aid measures in relation to Calcium Carbide</u>

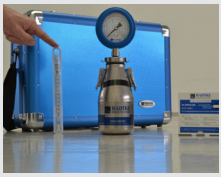
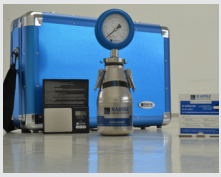
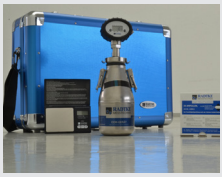
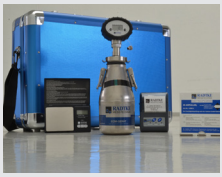
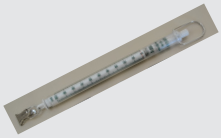
- In case of skin contact: Brush off well before rinsing with copious amounts of water.
- In case of eye contact: Rinse the eyes out with copious amounts of water.
- In case of caustic burns: These usually only occur when adhering calcium carbide is not removed. In any case, notify a doctor and show him/her the safety label of your calcium carbide box.

Additional safety instructions can be found using the link on page 2 in the safety data sheet for calcium carbide or on our website under «Support».

TABLE OF CONTENTS

RADTKE MESSTECHNIK SINCE 1995
FEUCHTIGKEITSBESTIMMUNG
SCHNELL EINFACH ZUVERLÄSSIG

	CM device versions	
	ECO	**ECO dig**
CM device in aluminum case with basic equipment		
CM device in metal case with basic equipment	 **Art. no. 110060**	 **Art. no. 110061**
Manometer and log printer		
Max. moisture level with 50 g	**4.8 % by weight**	**4.8 % by weight**
Max. pressure; class of accuracy	**2.5 bar; class 1.0**	**2.5 bar; class 1.0**
Lid damping according to EN 837-2 and rubber protective cap		
Scale		
Maximum weight	**100 g**	**200.00 g (0.05 g)**
can be tared	**YES**	**YES**
can be calibrated		**YES**

CM device versions			
CLASSIC	**CLASSIC dig**	**BUSINESS**	**BUSINESS PRO**
			
Art. no. 110004	**Art. no. 110005**	**Art. no. 110007**	**Art. no. 110006**
			
Art. no. 110000	**Art. no. 113100**	**Art. no. 110021**	
			
Art. no. 110115	**Art. no. 110115**	**Art. no. 110023**	**Art. no. 110022**
4.8 % by weight	**4.8 % by weight**	**6 % by weight**	**6 % by weight**
2.5 bar; class 1.0	**2.5 bar; class 1.0**	**3 bar; class 0.1**	**3 bar; class 0.1**
YES	**YES**	**YES**	**YES**
			
100 g	**200.00 g (0.05 g)**	**200.00 g (0.05 g)**	**200.00 g (0.05 g)**
YES	**YES**	**YES**	**YES**
	YES	**YES**	**YES**

CM devices Alu BUSINESS and BUSINESS PRO**

Art.no. 110007 and **BUSINESS PRO art. no. 110006****

1	Lump hammer	9	Sundries set Business and hearing protection
2	Flat chisel		
3	Sampling spoon	J	Vials with Calcium Carbide, 25 pcs
4	Cleaning brush	K	Tested pressure bottle, standard with surface thermometer
5	Scale, digital up to 200 g with batteries*	L	-
6	Set of balls	M	Manometer BUSINESS to 3.0 bar with damped lid (according to EN 837-2), instructions, sample bag and locksmith›s hammer
7	Crushing bowl		
8	Sample cup incl. lid, 2 sets	N	Aluminium case with insert & carrying strap

Weight: 8.2 kg

** The CM device BUSINESS PRO also contains the log printer, art. no. 110024 (see page 10)

CM device BUSINESS

Art. no. 110021

1	Lump hammer	9	Sundries set Business and hearing protection
2	Flat chisel		
3	Sampling spoon	J	Vials with Calcium Carbide, 25 pcs
4	Cleaning brush	K	Tested pressure bottle, standard with surface thermometer
5	Scale, digital up to 200 g with batteries*	L	-
6	Set of balls	M	Manometer BUSINESS to 3.0 bar with damped lid (according to EN 837-2), instructions, sample bag and locksmith›s hammer
7	Crushing bowl		
8	Sample cup incl. lid, 2 sets	N	Metal case with insert

Weight: 10.0 kg

* Model may differ from the illustration.

RADTKE MESSTECHNIK SINCE 1995
FEUCHTIGKEITSBESTIMMUNG
SCHNELL EINFACH ZUVERLÄSSIG

CM device Alu BUSINESS and BUSINESS PRO**

Art. no. 110007 and **BUSINESS PRO art. no. 110006****

CM device BUSINESS

Art. no. 110021

BUSINESS retrofit kit

Art. no. 110023

1	Manometer, digital, up to 3.0 bar with damped lid incl. spare battery (battery not shown)

Weight: 0.6 kg

Log printer retrofit kit

Art. no. 110024

2	Connection cable printer -> manometer
3	Log printer with paper roll for Business retrofit set (with battery)
4	Spare roll of thermal paper
5	Charger for printer

Weight: 0.5 kg

BUSINESS PRO retrofit kit

Art. no. 110022

1	Manometer, digital, up to 3.0 bar with damped lid incl. spare battery (battery not shown)
2	Connection cable printer -> manometer
3	Log printer with paper roll for Business retrofit set (with battery)
4	Spare roll of thermal paper
5	Charger for printer

Weight: 1.1 kg

Crushing rod retrofit kit

Art. no. 110031

Crushing rod for crushing samples before the chemical reaction.

- greater security against sparks
- higher accuracy of the measurement results

Weight: 0.3 kg

RADTKE MESSTECHNIK SINCE 1995
FEUCHTIGKEITSBESTIMMUNG
SCHNELL EINFACH ZUVERLÄSSIG

BUSINESS PRO retrofit kit

Art. no. 110022 (110023 & 110024)

Crushing rod retrofit kit

Art. no. 110031

RADTKE MESSTECHNIK SINCE 1995
FEUCHTIGKEITSBESTIMMUNG
SCHNELL EINFACH ZUVERLÄSSIG

CM device Alu CLASSIC

Art. no. 110004

1	Lump hammer	9	Sundries set and hearing protection
2	Flat chisel		
3	Sampling spoon	J	Vials with Calcium Carbide, 25 pcs
4	Cleaning brush	K	Tested pressure bottle, standard with surface thermometer
5	Scale, mechanical up to 100 g	L	Weighing rod and timer*
6	Set of balls	M	CLASSIC manometer up to 2.5 bar with damped lid (according to EN 837-2), instructions, sample bag and locksmith›s hammer
7	Crushing bowl		
8	Sample cup incl. lid, 2 sets	N	Aluminium case with insert & carrying strap

Weight: 8.2 kg

CM device Alu CLASSIC dig

Art. no. 110005

1	Lump hammer	9	Sundries set dig and hearing protection
2	Flat chisel		
3	Sampling spoon	J	Vials with Calcium Carbide, 25 pcs
4	Cleaning brush	K	Tested pressure bottle, standard with surface thermometer
5	Scale, digital up to 200 g with batteries*	L	Timer*
6	Set of balls	M	CLASSIC manometer up to 2.5 bar with damped lid (according to EN 837-2), instructions, sample bag and locksmith›s hammer
7	Crushing bowl		
8	Sample cup incl. lid, 2 sets	N	Aluminium case with insert & carrying strap

Weight: 8.3 kg

***** Model may differ from the illustration.


CM device Alu CLASSIC
Art. no. 110004
N
6
J
2
4
5
L
7
K
3
9
1
8
M


CM device Alu CLASSIC dig
Art. no. 110005
N
6
J
2
4
5
L
7
K
3
9
1
8
M

CM device CLASSIC

Art. no. 110000

1	Lump hammer	9	Sundries set and hearing protection
2	Flat chisel		
3	Sampling spoon	J	Vials with Calcium Carbide, 25 pcs
4	Cleaning brush	K	Tested pressure bottle, standard with surface thermometer
5	Scale, mechanical up to 100 g	L	Weighing rod and timer*
6	Set of balls	M	CLASSIC manometer up to 2.5 bar with damped lid (according to EN 837-2), instructions, sample bag and locksmith›s hammer
7	Crushing bowl		
8	Sample cup incl. lid, 2 sets	N	Metal case with insert

Weight: 10.1 kg

CM device CLASSIC dig

Art. no. 113100

1	Lump hammer	9	Sundries set dig and hearing protection
2	Flat chisel		
3	Sampling spoon	J	Vials with Calcium Carbide, 25 pcs
4	Cleaning brush	K	Tested pressure bottle, standard with surface thermometer
5	Scale, digital up to 200 g with batteries*	L	Timer*
6	Set of balls	M	CLASSIC manometer up to 2.5 bar with damped lid (according to EN 837-2), instructions, sample bag and locksmith›s hammer
7	Crushing bowl		
8	Sample cup incl. lid, 2 sets	N	Metal case with insert

Weight: 10.2 kg

***** Model may differ from the illustration.


CM device CLASSIC
Art. no. 110000
N
6
J
L
2
4
7
3
5
9
1
8
K
M


CM device CLASSIC dig
Art. no. 113100
N
6
J
5
L
2
4
7
3
9
1
8
K
M

RADTKE MESSTECHNIK SINCE 1995
FEUCHTIGKEITSBESTIMMUNG
SCHNELL EINFACH ZUVERLÄSSIG

CM device ECO

Art. no. 110060

1	Lump hammer	9	Sundries set and hearing protection
2	Flat chisel		
3	Sampling spoon	J	Vials with Calcium Carbide, 25 pcs
4	Cleaning brush	K	Tested pressure bottle, standard with surface thermometer
5	Scale, mechanical up to 100 g	L	Weighing rod
6	Set of balls	M	CLASSIC manometer up to 2.5 bar with lid, instructions, sample bag
7	Crushing bowl		
8	Sample cup incl. lid, 2 sets	N	Metal case with insert

Weight: 9.5 kg

CM device ECO dig

Art. no. 110061

1	Lump hammer	9	Sundries set dig and hearing protection
2	Flat chisel		
3	Sampling spoon	J	Vials with Calcium Carbide, 25 pcs
4	Cleaning brush	K	Tested pressure bottle, standard with surface thermometer
5	Scale, digital up to 200 g with batteries*	L	-
6	Set of balls	M	CLASSIC manometer up to 2.5 bar with lid, instructions, sample bag
7	Crushing bowl		
8	Sample cup incl. lid, 2 sets	N	Metal case with insert

Weight: 9.6 kg

***** Model may differ from the illustration.

RADTKE MESSTECHNIK SINCE 1995
FEUCHTIGKEITSBESTIMMUNG
SCHNELL EINFACH ZUVERLÄSSIG

Calcium Carbide

CAS 75-20-7 EC 200-848-3 Index-Nr: 006-004-00-9

Danger

Danger information: In contact with water releases flammable gases which may ignite spontaneously. Causes skin irritation. Causes serious eye damage. May cause respiratory irritation.
Safety information/ Prevention: Avoid breathing dust. Wear protective gloves/protective clothing/ eye protection/face protection.
Reaction: IF ON SKIN: Wash with plenty of water. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor. IN CASE OF FIRE: Use powders to extinguish.
Storage & Disposal: Store in a dry place. Dispose of contents/container in accordance with local/ regional/national/international regulations.

Glass vials with Calcium Carbide

Glass vials with Calcium Carbide:

Qunatity:	7.0 g ± 210 mg (± 3 wt-%)
Granulation:	0.3 / 1 mm
Shelf life:	unlimited if sealed tight

Download safety data sheet
https://www.radtke-messtechnik.com/en/material-safety-data-sheets/

Standard pressure bottle, tested

Regulations:	Pressure Equipment Directive 97/23/EC
Accuracy:	± 1% by vol. of the target volume
Material:	stainless steel
Special features:	Calibration identification number
	Surface thermometer 7 – 33 °C

Surface thermometer

The surface thermometer indicates temperatures between 7 °C and 33 °C in seven fields. Field colours: Black-brown-green-blue-black.
This number corresponds to the temperature when the field is green. if the temperature is 1°C lower than the number shown, the field is brown. If it is 1°C higher, the field is blue.

Set of balls

The ball set used contains 4 steel balls with a defined diameter. The free volume of the pressure bottle is calibrated with these balls.

CLASSIC manometer

Pressure range:	0 to 2.5 bar
Accuracy class:	1.0
Display (division):	0.05 bar (50 mbar)
Overload-proof to	3.0 bar (short-term)
Operating temperature:	-10 to 80 °C (IP32)
Conversion scales	coloured 20 g, 50 g, 100 g
Assembly	**from version CM device CLASSIC damped according to EN 837-2**

Lid damping from CLASSIC upwards

For the CM device versions CLASSIC and BUSINESS, the lid of the CM bottle is equipped with a damping system and meets the requirements for the manometer assembly according to EN 837-2.

The damping reduces the impact energy of the balls on the manometer and thus extends its service life. During the measurement, the bottle can thus be shaken up and down vigorously without endangering the manometer.

BUSINESS manometer

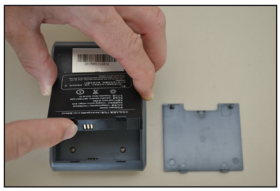
Pressure range:	-1.0 to 3.0 bar
Accuracy class:	0.1
Display (division):	0.01 bar (optional 1 mbar)
Overload-proof to	4.3 bar (short-term)
Operating temperature:	0 to 50 °C (IP64)
Data output	Log printer / PC
Power supply	Button cell type 2032, 3 V
Conversion scales	10 g, 20 g, 50 g, 100 g
Assembly	**damped according to EN 837-2**

Operation of the BUSINESS manometer

The manometer is operated by the two 2 buttons: «Menu» and «Enter». After switching on using any key, the manometer displays the last measured value. Pressing the «Enter» button temporarily displays the duration of the last measurement.

To scroll through the manometer menu commands, press the «Menu» button. The respectively selected command is displayed.
To execute the selected command, it must be confirmed with the «ENTER» key. If the command has not been confirmed after 7 seconds, the display returns to the default display: last measured value.

«StArt» command: The manometer switches to measuring mode and sets the zero point at the currently prevailing ambient pressure. It now waits 5 minutes for the start of the reaction. If a pressure increase is detected during this time, the definitive measuring cycle begins. If no pressure increase is detected, the manometer returns to the standard display.
«OFF» command: After confirmation of the OFF command, the manometer is turned off.
«PrInt» command: After confirmation of the print command, the stored measurement data is sent to the log printer via a cable.
«UnIt» command: After confirmation of the unit command, the manometer outputs the measured value as pressure [bar] or as humidity [% by weight]. The unit [% by weight] refers to a sample weight of 100 g, 50 g, 20 g or 10 g (corresponding to the tick on the top edge of the display).



Log printer

Dimensions:	108 x 78 x 45 mm
Weight:	150 g (without battery & paper roll)
Printing principle:	Thermal direct printing
Paper width:	58 mm
Effective print:	48 mm
Paper length	25 m
Diameter:	max. 40 mm roll
Printing speed:	max. 80 mm/s
Operating temperature:	0 to 50 °C.
Operating humidity:	10% to 80% RH
Storage temperature:	-40 to 70 °C
Storage humidity:	10% to 95% RH
Connection:	Cable (RS232 / TTL)
Charging current:	DC 12 V, 2 A (24 VAmax)
Pole assignment:	Plus pole inside
Battery:	7.4 V / 2000 mAh (Li-ion polymer)
Charging time:	about 3 hours
Specifications:	RoHS (Restriction of Hazardous Substances Directive)

Inserting the battery

Insert the battery into the compartment according to the adjacent image sequence. The battery has a certain charge state.

Basic function: Switching on

To turn on the printer, press the ON/OFF button for one second. A beep sounds and the mode LED as well as the battery status LED light up.

Basic function: Switching off
To turn off the printer, press the ON/OFF button for more than a second. Two beeps sound. The printer is turned off.

Paper feed
When the printer is turned on, the loaded paper can be transported at any time by pressing the FEED button.

Inserting paper
Open the loading flap with two fingers and empty the paper compartment. Place the prepared paper roll as shown with the winding from below to the tear-off zone and carefully press the paper compartment lid down on both sides.

Charging the printer
To charge the printer, connect the original charger.

Printing the log
If the printer is turned on, the connection cable must be connected as shown in the left image series at the bottom. Make sure that the cable is connected to the printer on the correct side (left side of the printer).

Also connect the cable to the manometer and trigger the **PrInt command** on the manometer. You can print as many logs as you wish from the last measurement.

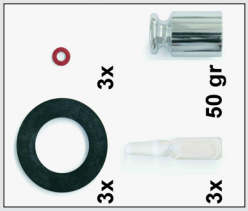
The manometer can be prematurely reset to the starting position by selecting the STOP command with the 'Menu' button and confirming with the 'Enter' key.
When a measurement is running, 3 ticks flash at the bottom-left edge of the screen. In this phase the unit of the displayed measured value cannot be changed.
The duration of the measurement is usually 10 minutes. A running measurement can be terminated prematurely by the STOP command.
The last measured value remains in memory even after a battery change. If no button is pressed for a period of 60 minutes, the manometer switches itself off automatically.

Battery replacement – BUSINESS manometer
If the battery power is low, this is indicated on the left-hand side of the display by a crossed-out battery symbol. In such a case, we recommend replacing the battery at the next opportunity.

To do this, the cover of the interface must be unscrewed and the rubber protective cap pulled down.

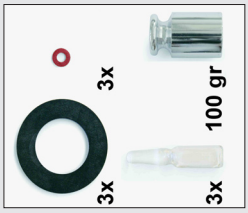
The front side of the display can be removed from the top side (ideally with the help of a coin).

Carefully remove the old battery. The new battery must first be placed against the two contacts (red circle) and then carefully pressed into the locks.
Reassemble the device in the reverse order, taking care that the rubber sealing ring (red oval) rests on the upper edge of the front part so that the front side lies close to the manometer housing in the closed state.
In principle the battery can be used for several hundred measurements. Power consumption during the measurement is very small. Most power is consumed when sending the data packets to the log printer.



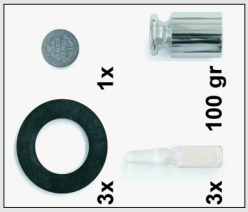
Sundries set

- Replacement seals for manometer
- Replacement seals for pressure bottle,
- Calibration ampoules (1.00 g ± 1% by weight)
- Checking weight 50 g M2 for spring scales



Sundries set dig

- Replacement seals for manometer
- Replacement seals for pressure bottle,
- Calibration ampoules (1.00 g ± 1% by weight)
- Calibration weight 100 g M2 for digital scale



Sundries set Business

- Replacement battery for digital manometer
- Replacement seals for pressure bottle,
- Calibration ampoules (1.00 g ± 1% by weight)
- Calibration weight 100 g M2 for digital scale

RADTKE MESSTECHNIK

Dr. Radtke CPM Chemisch-
Physikalische Messtechnik AG
Lättichstr. 4A
CH-6340 Baar

Testprotokoll: N° 00034
Seriennummer: 06027

Ort der Messung:

Probenmaterial:

Boden:
Estrichdicke [mm]:

Temperatur [°C]:

Raum:
Temperatur [°C]:

Luftfeuchte [%rF]:

CCM Hygro Combi:

Temperatur [°C]:

Luftfeuchte [%rF]:

Druckentwicklung:

[min:s]	[bar]
00:03	00.62
00:05	00.72
00:15	00.90
00:30	01.03
00:45	01.12
05:00	01.62

Temperatur am Drucksensor:
bei Start: 17.68 °C
bei Ende: 19.23 °C

Messdauer: 10:00 [min:s]
End-Druck: 01.74 [bar]

MP nach DIN/Radtke:___

Umrechnung zu Feuchte

EW		[CM-%]	
10g	=	17.28	____
20g	=	08.67	____
50g	=	03.40	____
100g	=	01.65	

Adjusting the log

Subsequent log adjustments can only be made by the manufacturer. For this purpose, send the printer and manometer with cables and charger to the manufacturer.

LED and acoustic signals

The printer is equipped with 3 LEDs and a buzzer. A 3-colour battery status LED, 1 green MODE LED and 1 ERROR LED.

Battery status LED

Green:	Battery is fully charged
Blue:	Battery charge level half
Red:	Battery charge level low
Red flashing:	Battery must be charged
No light:	Printer is turned off or battery has no contact
Long green, short red and blue:	Battery is charging

MODE LED

Green:	Printer is turned on

ERROR LED

Red:	Paper compartment is empty
Red flashing:	Print head overtemperature Turn off printer and allow to cool

Other error messages such as flashing 1 to 8 times followed by a pause indicate major problems.

Red 1x:	Memory read or write errors
Red 2x:	Overvoltage
Red 3x:	Undervoltage
Red 4x:	CPU execution error
Red 5x:	UIB error
Red 6x:	Flash write error
Red 7x:	Parameter write error
Red 8x:	Temperature monitoring error

Sounds

The printer has a buzzer.

1 beep:	Printer is turned on
2 beep:	Printer is turned off
3 beep:	Printer is charged (only when turned on)
Xx beeps:	Continuous beeping: Paper compartment lid is open

Digital scale

Capacity	200 g
Division	0.05 g
Colour	black
Accuracy	± 15 mg according to calibration weight
Scale bowl	stainless steel
Switch-off	automatically after 120 seconds
Calibration	possible by user with 100 g
Power supply	2 alkaline batteries, type AAA
Special feature	sensitive to electromagnetic radiation

For more information, see separate instructions (e.g. for calibration)

Mechanical scale

Capacity	100 g
Division	1.0 g
Colour	green transparent
Accuracy	± 0.3 %
Tare range	15 - 20% of the scale length
Scale length	100 mm
Length of scale	225 mm
Max length	330 mm
Diameter	12.2 mm
Weight	20 g

Calibration not possible by user!
Corrosion-free components (except for the clamp)

Handling mechanical scales

The scale allows the weighing of samples up to 100 g. The weight of the sample cup can be neutralised by taring. The scale can be aligned by turning the metal bracket.

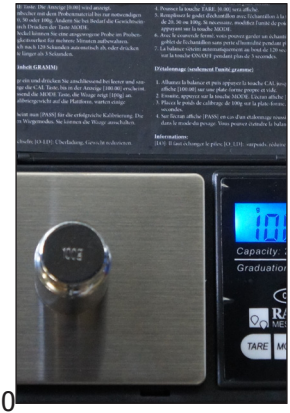
Preparation: Press the scale rod into the foam and hang the scale on it.

Taring / reading: Attach a clean, empty sample cup. Adjust the zero point by turning the white taring screw (black circle). Your eyes must be at the same height as the scale when doing this in order to minimise reading errors.

On-site checking: To check the scale, place the 50 g checking weight in the sample cup, which is tared to «0».

Sample cup

The sample cups are supplied with a sealable lid. Sample material can be simply poured in using a sampling spoon or another suitable aid. A clean closed sample cup prevents unwanted moisture loss.
The capacity of the sample cup is 70 ml.



Handling digital scales

Before first use, make sure that the batteries (2 pieces, type: AAA) are inserted correctly. Check that the scale indicates the weight in GRAMS.

Taring / reading:

1. Place the scales on a horizontal surface and press the ON/OFF button.
2. Place the clean empty sample cup on the platform.
3. Press the TARE button. The reading [0.00] is displayed.
4. Fill the required amount of sample material into the sample cup.

The scales automatically switch off after 120 seconds; alternatively, press the ON/OFF button for longer than 3 seconds.

Calibration (in GRAMS only):

Turn on the scale and then press the CAL button with the platform empty and clean until a multi-digit sequence of numbers appears on the display. Now press the CAL button again. The display [CAL] flashes and then switches to [100.00].
Place the 100 g calibration weight on the platform and wait a few seconds.
[PASS] now appears on the display, indicating a successful calibration. The scale switches to weighing mode. You can now switch off the scales.

Reaction

Calcium carbide reacts selectively with water, forming gaseous acetylene and solid calcium hydroxide. Water can be present for the reaction as a pure substance (calibration ampoule) or as part of another material (bulk, paste, concrete).

$$CaC_2 + 2\,H_2O \rightarrow Ca(OH)_2 + C_2H_2$$

Calcium Carbide + Water	Calcium Hydroxide + Acetylene

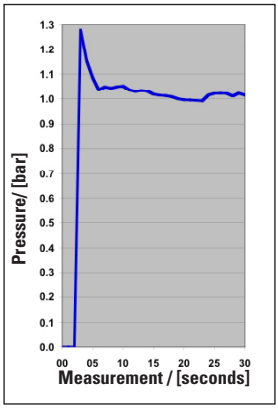
Calcium Carbide also reacts with Methanol. Therefore, a sample must not contain Water and Methanol at the same time.

Water is consumed – a sample is dried!

See an apple slice when it is fresh or 47 hours later, or the leaky vial with Calcium Carbide whose contents have reacted with the moisture. The white powder is Calcium Hydroxide

Facts about the Carbide method

- The measured variable is the pressure.
- The pressure remains constant when the sample is completely dry or when there is no carbide left.
- The pressure increases slowly when carbide



and water can only touch indirectly, e.g. via airway (left to stand or porous samples).

- The pressure increases very quickly when carbide and water can touch each other intensively and directly (shaking or calibration ampoule).
- **Heat is released during the reaction**.

In the reaction of very fine calcium carbide with a calibration ampoule, a great deal of heat is released quickly and the pressure temporarily exceeds the setpoint.

Measured Variable: Pressure

The ideal gas law establishes the relationship between the increase in pressure **Δp** and the amount of material formed **Δn**. The acetylene formed corresponds to the amount of material **Δn**. There is a linear relationship between the amount of material formed and the water consumed. Thanks to this relationship, the reaction can be used to determine the water content of a sample.

Ideal gas law: $\Delta p \times V = \Delta n \times R \times T \Rightarrow \Delta p = \Delta n * K$

where:

Δp	Pressure increase in the bottle
V	Bottle volume
Δn	Amount of substance formed in the bottle
R	Gas constant
T	Temperature in the bottle
K	summarised constant at constant temperature and volume

Factors influencing the measured variable

The sealed CM bottle is a closed system. Since the gas constant R and the volume V are constant, **only the temperature as an environmental variable can influence the measurement.** A change in pressure **Δp** only occurs when the temperature **T** or the amount of material **n** changes.
Our conversion tables are based on a **reference temperature of 20 °C**. If the temperature deviates from this, it may be useful to correct the pressure reading to improve the accuracy of the measurement result.
We distinguish between 3 cases.
To determine the correction factor for the pressure, the temperature must be known when closing the bottle (**start temperature**) and when reading the pressure (**end temperature**). These variables can be approximated with the help of the surface thermometer on our pressure bottles!

CASE	Start-T.	End-T.	Correction rule
I	20 °C	20 °C	Factor = 1
II	26 °C	26 °C	Reduce the pressure by 1% for every 3 °C difference from 20 °C. **Example:** (26-20=6) => 2 % less factor = 0.98 (read pressure * 0.98)
III	5 °C	20 °C	Subtract 3 mbar from the pressure for each 1 °C difference. **Example:** Difference 15 °C => 45 mbar less.

A cold bottle can be brought to «operating temperature» with the help of an on-site calibration.

Purpose and advantage of the set of balls

The ball set performs different tasks before and during the measurement:

1. Crushing: The sample material containing water is crushed by shaking. (Use of the crushing rod before the reaction)
2. Start: The glass ampoule with calcium carbide is smashed.
3. Mixing: The solids are intensively mixed together and the reaction product adhering to the calcium carbide is shaken off. The reaction is correspondingly faster.

Normal accuracy of the Carbide method

The normal accuracy of the carbide method depends on the accuracy of the manometer. Its accuracy class is listed in the technical specifications for our device versions and is maximally ± 2.5% (CLASSIC manometer) and ± 0.4% (BUSINESS manometer) at a pressure of 1 bar. In the case of manometers, the permissible deviation applies absolutely over the entire pressure range. The variance of the bottle volume is ± 1% by vol.

If the sample quantity is also weighed with an error of ± 1% by weight, **the total error of a read measured value of 1 bar at 20 °C lies between 2.4 % (BUSINESS manometer) and 4.5 % (CLASSIC manometer).**

At a lower pressure of 0.5 bar, the total error is higher and lies between just under 3% and 7%. At a higher pressure of 2 bar, it is reduced to between 2% and just over 3%.

In order to achieve **higher accuracy**, it is useful to develop your own calibration curves and to record the start and end temperatures before and after the measurement. Even more accurate results can be determined when the pressure is measured as an absolute pressure instead of a differential pressure. For this purpose, the BUSINESS manometer is required together with optional PC software.

Measuring ranges

The following measuring ranges can be covered by standardised calibration curves for different sample quantities depending on the manometer and the size of the bottle **(standard bottle with CLASSIC manometer):**

MAXIMUM MOISTURE CONTENT Pressure: 2.5 bar, (quantity of Water reacted: 2.5 g) [% by weight]	SAMPLE QUANTITY [g]
83	3
50	5
25	10
12.5	20
4.8	50
2.4	100

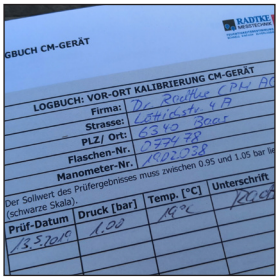
BUSINESS manometer: Absolute quantity of water of 3 g, with higher accuracy: Depending on the measurement task, specific sample quantities arise!

About the ecology of the Carbide method

The residues from the reaction may be excess Calcium Carbide as well as Calcium Hydroxide and Acetylene. Residual Calcium Carbide reacts further with the Water from the air to form the two reaction products:

Acetylene as a gas occurs in the atmosphere in concentrations between 0.5 (rural) and 300 ppbV (urban regions). Acetylene is removed from the atmosphere by reaction with OH radicals and has an average lifespan of about 30 days. (Source: VDI-Lexikon Umwelttechnik p.78: F.J. Dreyhaupt, Springer-Verlag Berlin Heidelberg GmbH, edition 1994).
Acetylene in the atmosphere is considered a precursor to the formation of soot. (Quelle: http://www4.lubw.baden-wuerttemberg.de/servlet/is/18791, Stand 2017_02_24).

Calcium Hydroxide is a white powder and is also known as slaked lime.
In humid environments, a reaction with atmospheric Carbon Dioxide will produce harmless non-hydraulic lime in a few days. (Source: Zement und Kalk, Der Baustoff als Werkstoff S.334: J. Stark, B. Wicht, Springer Basel AG, 2000).



On-site calibration

Test your CM device at regular intervals. We recommend at least twice a year. Record the test result in the logbook on the last page of the jacket with date and signature. For testing, follow the procedure in our explanatory video: www. youtube.com/c/Radtke-messtechnik or according to the QR code on the inside of the jacket.

Preparation:
You need the cleaned and dry pressure bottle with lid and manometer, the complete ball set, a calibration ampoule and a glass vial with Calcium Carbide.

Execution:
The balls, the standard ampoule and the calibration ampoule are placed in the pressure bottle in this order and the bottle is subsequently closed with the manometer cover.

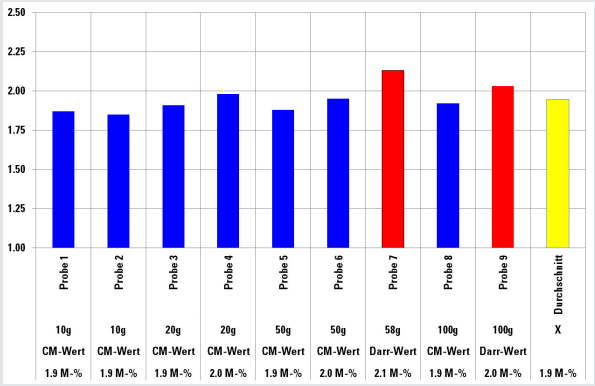
Through the shaking of the CM device, the ampoules are smashed and the released reagents come into contact with each other. **The reaction is usually completed in 1 minute when you rotate the bottle horizontally back and forth.**

The final pressure must be 1.00 bar ± 0.05 bar, measured at 20 °C.

General information

The CM method is suitable for the determination of the moisture content of all sample materials which themselves do not react with calcium carbide or the reaction products and which contain no methanol. These include fuels, building materials, salts and minerals as well as ore concentrates and ores.

Probe	=	Sample
Durchschnitt	=	Average
CM-Wert	=	CM value
Darr-Wert	=	Kiln dried value
M-%	=	% by weight



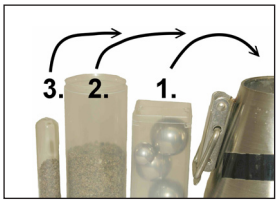
Measuring moisture with complete drying

The careful determination of the moisture content of a sample requires that a **representative selection** be made from the existing sample material. We recommend adapting the sample quantities to the maximum possible pressure of the manometer (see page 35).

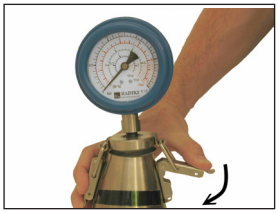
The following measurement procedure is designed for bulk or granular samples as well as for liquids and pasty materials. **The reaction is completed after the measurement and the sample is completely dried.**

The CM method provides the same results as the kiln-drying method. In the illustration, the blue bars show the CM values and the red bars show the kiln-dried values (dried at 105 °C) of a sand sample. Yellow represents the average. It can be seen that the measurement results are identical for both measuring methods in the range of ± 5% of the average value, despite different weights.

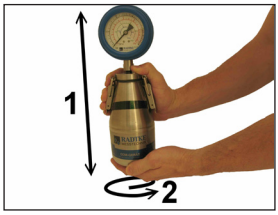
Execution with complete drying



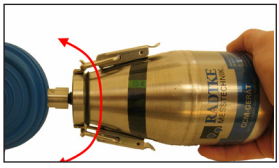
Place the complete ball set (1) and, depending upon the expected moisture content, the accurately weighed, representative sample quantity (2) in the pressure bottle. Then hold the bottle at an angle and gently let an ampoule with calcium carbide slide in (3).



Seal the pressure bottle with the lid. Set the timer (included with CLASSIC equipment) to 10:05 minutes:seconds, start it and shake the pressure bottle vigorously when the time reaches 10:00. The chemical reaction begins with the shattering of the ampoule.



The reaction mixture is mixed together by rotational and vertical shaking movements. With liquid or pasty samples, it is recommended to hold the pressure bottle flat and additionally to rotate it several times around its longitudinal axis (see picture below). This way, sample material adhering to the inner wall can also be made to react. This procedure is repeated after approximately 3 minutes.



The measurement is finished when the pressure is constant. This essentially depends on the intensity of the shaking and is typically achieved after 10 minutes (timer), depending on the sample material. The pressure bottle is shaken again to check. If the pressure remains unchanged, the measurement can be regarded as final.

Too little shaking or no shaking at all will lead to an incomplete reaction in case of a limited reaction time and thus to too low a result.

The water content can be directly read off from the manometer for the usual sample weights of 20 g (red scale), 50 g (blue scale) or 100 g (green scale). For lower weights (higher moisture contents), this conversion table can be used.
Create a handwritten log or use the template on page 50 to record the measurement results.

Since the calibration curves have been calculated for a reference temperature of 20 °C. Observe the display of the surface thermometer on the pressure bottle. In the event of deviations, you can estimate the possible error according to the temperature influence and, if necessary, limit it.

CONVERSION TABLE: PRESSURE MATERIAL MOISTURE

Pressure	Sample weight					
Bar (black)	3g	5g	10g	20g (red)	50 g (green)	100g (blue)
Water content in % by weight in relation to the dry weight						
0	0	0	0	0	0	0
0.2	**6.3**	**3.8**	**1.9**	**0.9**	**0.38**	**0.19**
0.3	9.7	5.8	2.9	1.5	0.58	0.28
0.4	**13.0**	**7.8**	**3.9**	**2**	**0.78**	**0.38**
0.5	16.3	9.8	4.9	2.5	0.98	0.47
0.6	**19.7**	**11.8**	**5.9**	**3**	**1.18**	**0.57**
0.7	23.0	13.8	6.9	3.5	1.37	0.66
0.8	**26.3**	**15.8**	**7.9**	**4**	**1.57**	**0.76**
0.9	29.7	17.8	8.9	4.5	1.76	0.85
1	**33.3**	**20**	**10**	**5**	**1.96**	**0.95**
1.1	36.7	22	11	5.5	2.16	1.05
1.2	**40.0**	**24**	**12**	**6**	**2.35**	**1.14**
1.3	43.3	26	13	6.5	2.55	1.23
1.4	**46.7**	**28**	**14**	**7**	**2.74**	**1.33**
1.5	50.0	30	15	7.5	2.94	1.42

You can extrapolate the values linearly at higher pressures.

For arbitrary materials with a sample quantity of more than 10 g or samples with a particularly low density (less than 1 kg/m^3) it is advisable to carry out a separate calibration.

European and international standards

Special **measurement procedures**, which increasingly correspond internationally, apply to questions relating to the testing of the readiness for covering of screeds.
Germany, Italy and Switzerland, for example, prescribe the same measurement procedures. Other countries in the EEA as well as outside it are adapting their standards to the two measurement procedures described below.

These are already defined in DIN 18560, UNI 10329, SIA 252 and SIA 253, in each case in the latest version. In France and Austria, the Carbide method is also used to test the readiness for covering, however a different measurement procedure is used.

COUNTRY*	**STANDARD***
GERMANY	DIN 18560, DIN 18157
ITALY	UNI 10329
SWITZERLAND	SIA 248, SIA 252, SIA 253
FRANCE	DTU 51.2 / 51.11 / 54.1 CPT 3527_V3 u.a.
AUSTRIA	ASSOCIATION-GUIDELINE WKO / VÖEH
UNITED STATES OF AMERICA	ASTM D4944, FDOT FM 5-507, AASHTO T217, SD 108
*unvollständige Liste	

In the following chapter we pay great attention to sampling and test material preparation, which is essential in order to obtain a usable result with this moisture measurement method.

Testing the readiness for covering of screeds

Among other things, the term **readiness for covering** describes the moisture status of a screed, which, if it has been covered with an upper covering, no longer causes moisture damage to the latter. Such damp damage can occur if the moisture profile in the screed under the top covering can balance itself faster than the moisture can pass through the top covering and be given off to the ambient air. Such an accumulation of moisture under the top covering can lead up to the condensation of the water. Apart from the influence of the temperature on the accumulation of moisture under the top covering, no further potential parameters have been investigated so far. Mobile water, i.e. the free water content, is responsible for any damage.

In the case of mineral building materials such as concrete, mortar and screeds, therefore, the user wishes to determine the **free water content**. The free water content is not identical to the water content determined by kiln drying a sample in the drying cabinet (at 105 °C). It is always lower than the kiln-dried value (105 °C). By kiln drying at 105 °C, the **evaporable water content** is determined. In addition to the free water, this also includes crystalline-bound water contents.

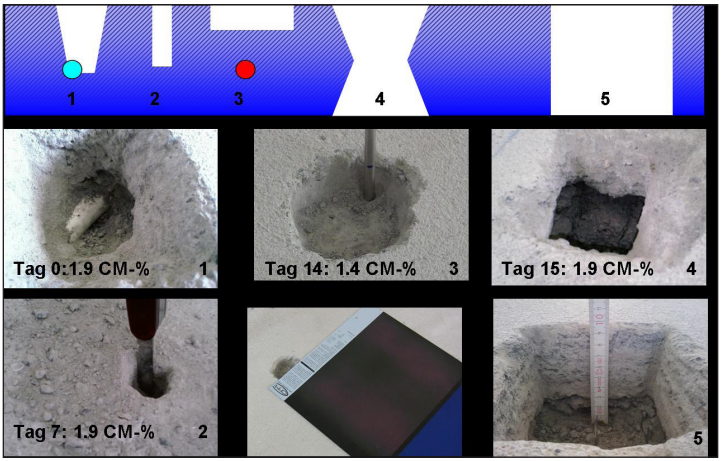
In the case of mineral building materials, the reaction time of 10 minutes is not sufficient to finish the chemical reaction during CM measurement.

The values for the readiness for covering are empirical limit values (experience values) which are set out in national standards and have been adapted continuously over time. Current limit values are listed on page 46.

Representative sampling

The following picture illustrates the problem of moisture distribution when sampling for the determination of the readiness for covering. Avoidable discussions result from test material sampling that has been incorrectly executed. As a result of the dehydration behavior of layers drying from one side, it is very important that the sampling takes place over the entire cross-section. Only in this way is it representative.

Tag = Day

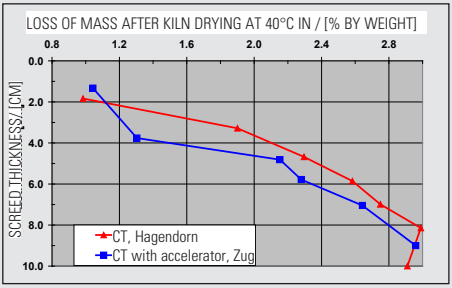


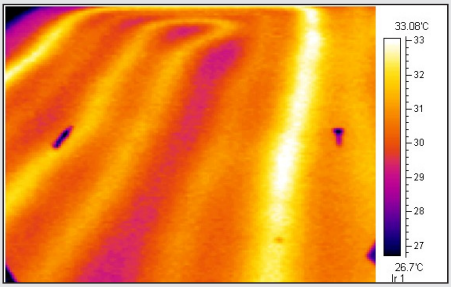
The pictures show the test material withdrawal points found in the same apartment for the assessment of the readiness for covering.

Sampling 1: Heating turned off, test material only sampled up to the height of the underfloor heating. Action: Turn on heating.
Sampling 2: A week later, test material sampled only up to the height of the underfloor heating, uncertainty due to same value.
Sampling 3: CM measurement commissioned by construction management, test material sampled directly above a heating pipe from a depth of 3cm.
Sampling 4: Test material was sampled for the first time over the entire cross-section, installation height of the screed of 10 cm instead of the planned 8 cm was measured.
Sampling 5: The optimal sampling over the entire cross-section is carried out with an electric chisel.

Drying conditions and moisture distribution

A screed can be regarded as a large flat slab that can give off its water only via the surface during the drying phase, i.e. to the room air. The water is transported out of the building as a gas in the room air. The speed of water desorption to the room air depends to a large extent on the climatic conditions in the room and on the intensity of the air movement. **The stronger the ventilation**, the better the transition of water from the building material to the room air. In addition to ventilation, low room air humidity increases the air transport capacity. The low room air humidity is usually achieved on the building site by **increasing the room air temperature**. A higher room air and building material temperature results in higher mobility of the water molecules. The suitability of the building material for the selected temperature or, respectively, its behaviour towards the temperature increase (possible curling in a cement screed) must be taken into account.





The screed has a moisture profile due to drying from one side: Dry relatively quickly at the top and increasingly moist in a downward direction. **(Picture top left)**

Depending on the room geometry, exposure to the sun, ventilation, underfloor heating and also the installation height, a different moisture distribution can likewise form across the surface. **(Picture top right)**

RADTKE MESSTECHNIK SINCE 1995
FEUCHTIGKEITSBESTIMMUNG
SCHNELL EINFACH ZUVERLÄSSIG

Test material sampling and sample homogenisation

Using the hammer and chisel on an area of about 100 x 100 mm, remove material evenly from the substrate to be examined over the entire cross-section. (It›s easier with an electric chisel). Continuously fill all removed fragments into a PE bag. After complete sampling, crush the pieces in the bag with the help of the lump hammer. The bag will break when you do this. Transfer the crushed sample material into a fresh PE bag and homogenise it by shaking. Repeat this process until the fragments are smaller than 10 mm. Remove a representative amount from the crushed and homogenised material and weigh it.

Note: The amount depends on the sample material and the accuracy of the manometer. The following amounts are to be used for the materials below:

- Calcium sulphate screed 100 g (50 g are sufficient with a digital manometer)
- Concrete/cement screed 50 g

A **learning video on the sampling of test material and sample homogenisation** can be found on our YouTube channel at: www.youtube.com/c/Radtke-messtechnik or directly via the adjacent QR code.



Measurement procedure without crushing rod

First place the steel balls, then the sample, without residue, in the dry pressure bottle. Holding the pressure bottle at a slight angle, carefully allow a glass ampoule of calcium carbide to slide into the bottle. Fit the lid with the manometer and seal it gastight. These procedures must be carried out quickly in order to avoid changes in moisture. The pressure bottle should be at ambient temperature.
Note: If the pressure bottle is too cold, it can be heated to ambient temperature with an on-site calibration.

Measuring and crushing: Smash the glass ampoule by vigorously shaking the pressure bottle. Crush the test material in the pressure bottle with the help of the steel balls by vigorous up, down and rotary **movements for 2 minutes**. Then leave the pressure bottle to rest in a shaded spot.
5 minutes after sealing the pressure bottle, shake the test material vigorously for **another 1 minute** and then again leave the pressure bottle to rest in a shaded place.
10 minutes after sealing the pressure bottle, shake the test material again briefly (about 10 seconds) and then read the pressure on the manometer and enter it in the log.
Determine the moisture content directly on the manometer with the special scales and enter it in the log to the precise decimal place.
Note: Carefully open the pressure bottle after taking the reading (flammable gas). Shake the contents out. Visually inspect the test material (the cement stone must be powdery).
Clean the bottle with a dry bottle brush and the balls with a dry cloth and prepare it for the next test. Clean the lid seal on the manometer.

A **learning video for checking the readiness for covering using the Carbide method** can be found on our YouTube channel at: www.youtube.com/c/Radtke-messtechnik or directly via the adjacent QR code.



Measurement procedure with crushing rod

Note: The variant with the crushing rod has two advantages:

1. The sample material is crushed in an controlled, safe and even manner before the chemical reaction, thereby significantly increasing the reproducibility of the measurement results.
2. By crushing the sample separately at a different time to the chemical reaction, any presence of flint in the addition does not adversely affect the determination of residual moisture.

Pre-crushing: First place the steel balls, then the sample, without residue, in the dry pressure bottle. Apply the crushing rod and pre-crush the sample material together with the steel balls for 2 minutes. Remove the crushing rod.

50 g sample before and after pre-crushing with the crushing rod

Measurement: With the pressure bottle at a slight angle, carefully allow a glass ampoule of calcium carbide to slide into the bottle. Fit the lid with the manometer and seal it gastight. These procedures must be carried out quickly in order to avoid changes in moisture. The pressure bottle should be at ambient temperature. Smash the glass ampoule by vigorously shaking the pressure bottle. Mix the test material in the pressure bottle with the help of the steel balls by means of vigorous up, down and rotary movements for 1 minute. Then leave the pressure bottle to rest in a shaded spot.
10 minutes after sealing the pressure bottle, shake the test material again briefly (about 10 seconds) and then read the pressure on the manometer and enter it in the log. Determine the moisture content directly on the manometer with the special scales and enter it in the log to the precise decimal place.

Note: Carefully open the pressure bottle after taking the reading (flammable gas). Shake the contents out. Visually inspect the test material (the cement stone must be powdery).
Clean the bottle with a dry bottle brush and the balls with a dry cloth and prepare it for the next test. Clean the lid seal on the manometer.

A **learning video for checking the readiness for covering using the carbide method and the crushing rod** can be found on our YouTube channel at: www.youtube. com/c/Radtke-messtechnik or direct via the adjacent QR-code.

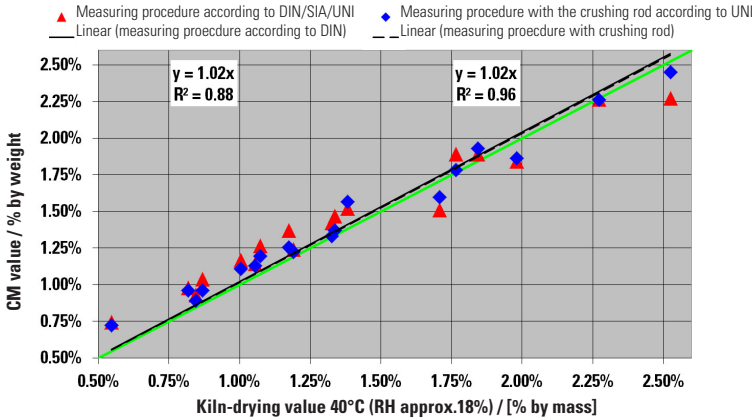
Note: The following applies to both measurement procedures: A further increase in pressure is possible with calcium sulphate-bound and cementitious screeds. This can be ignored, since chemically (i.e. firmly) bound water is present.

The measurement procedure with the crushing rod releases less water of crystallization because the bottle is shaken for less time.

Comparison of the two measurement procedures

A comparison of the results of different cementitious screeds shows a very good correlation of the results. The samples were also dried for reference at 40 °C (18% RH). This also illustrates that not only Calcium Sulphate-bound systems can be dried at 40 °C (ideally at 25% RH), but also cementitious systems when it is a question of the free water content of a mineral sample.

The green line represents the reference line for the kiln-dried values at 40 °C. The red triangles are the CM values according to DIN / SIA / UNI and the blue diamonds are the CM values after the measurement procedure with the crushing rod (UNI). Both data series coincide very well with the green reference line, wherein the R^2 value of the results for the measurement procedure with the crushing rod is closer to 1 and thus more accurate.



Normal readiness for covering limit values

Readiness for covering values according to DIN 18560

Binding agent	heated	unheated
Cement screed	1.8 CM-%[1]	2.0 CM-%
Calcium Sulphate screed	0.5 CM-%	0.5 CM-%

[1] Under stone and ceramic coverings: 2.0 to 2.5 CM % according to DIN 18157

CONCLUSION

The data in the operating instructions correspond to our present level of knowledge and are intended to inform about our products as well as their application possibilities. They do not represent an assurance of certain characteristics of the products or their suitability for a specific use. Any existing industrial property rights are to be taken into account.
We constantly strive to improve our products. Therefore we reserve the right to make changes and improvements to the products described in these operating instructions without prior notice.

DECLARATION OF CONFORMITY

European Union directives applied:
We confirm that our products were manufactured in accordance with the following directives.

- 2002/95/EC of the European Parliament and of the Council of 27.01.2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.
- 2002/96/EC of the European Parliament and of the Council of 27.01.2003 on waste electrical and electronic equipment.
- Directive (EC) No. 1907/2006 (REACh regulation) of the European Parliament and of the Council of 18.12.2006.
- Manufacturing of the pressure bottle according to the Pressure Equipment Directive 97/23/EC of 29 May 1997 on the approximation of the laws of the member states concerning pressure equipment.
- Installation of the manometers from the CLASSIC and BUSINESS versions in accordance with EN 837-2 Pressure gauges. Selection and installation recommendations for pressure gauges.
- The glass vials containing Calcium Carbide are labelled and marked according to CLPVO No. 1272 / 2008 and the packaging for glass vials of Calcium Carbide complies with the regulations according to ADR / IATA.

CM MEASUREMENT LOG
COMPANY: _____
NAME OF TESTER: _____

RADTKE MESSTECHNIK SINCE 1995
FEUCHTIGKEITSBESTIMMUNG
SCHNELL EINFACH ZUVERLÄSSIG

Building/ Property						
Building section/ part						
Floor/ apartment						
Type of screed	**CT**		**CA**		**CAF**	
	OTHER:					
Additive						
Underfloor heating	**YES**		NO			

DOCUMENTATION OF ROOM AIR

Temperature	**[°C]**	**[°C]**	**[°C]**
Humidity	**[%RH]**	**[%RH]**	**[%RH]**

DOCUMENTATION OF FLOOR

Measurement No:	**1**	**2**	**3**
Screed thickness	**[mm]**	**[mm]**	**[mm]**
Temperature	**[°C]**	**[°C]**	**[°C]**

PRELIMINARY TEST

Test device used			
Measured value digits			

RESULT OF MATERIAL CLIMATE «CCM HYGRO COMBI»

Equilibrium moisture	**[%RH]**	**[%RH]**	**[%RH]**
Equilibrium temperature	**[°C]**	**[°C]**	**[°C]**

RESULT OF CM MEASUREMENT

Sample weight		**[g]**		**[g]**		**[g]**
Pressure		**[bar]**		**[bar]**		**[bar]**
Water content		**[% by w.]**		**[% by w.]**		**[% by w.]**
Temperature		**[°C]**		**[°C]**		**[°C]**
Readiness for covering reached?						
	YES	**NO**	**YES**	**NO**	**YES**	**NO**
Date/signature Client						

LOGBOOK: ON-SITE CALIBRATION OF CM DEVICE			
Company:			
Street:			
Post code/ Place:			
Bottle no.			
Manometer no.			
The setpoint of the test result must lie between 0.95 and 1.05 bar (black scale) at 20°C.			
Test date	**Pressure [bar]**	**Temperture [°C]**	**Signature**

RADTKE MESSTECHNIK SINCE 1995

FEUCHTIGKEITSBESTIMMUNG
SCHNELL EINFACH ZUVERLÄSSIG

Sales CH / World:
Dr. Radtke CPM AG, Lättichstrasse 4A, CH-6340 Baar/ Switzerland
Phone +41 41 710 00 32, Email: info@cpm-radtke.com, www.radtke-measuring.com

Sales EU / EEA:
Radtke Messtechnik Vertriebs GmbH, Schaanerstrasse 27, LI-9490 Vaduz/ Liechtenstein
Phone +423 230 11 66, Email: info@vertrieb-radtke-messtechnik.com