SONO-WZ

Short Instruction Sheet

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Moisture Sensor Experts

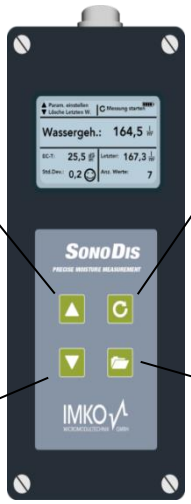
IMKO

Due to the heterogeneity of the material, the precise determination of the W/C ratio of fresh concrete is demanding, regardless of the measuring method. The procedures described below must be carefully considered to determine reliable measurement values.

Short overview of the key functions of SONO-DIS:

„High“
Select menu item or setting

„Measure“
- Switch on / off (>1 Second)
- Start a measurement
- Select a menu item
- Save and activate a single position

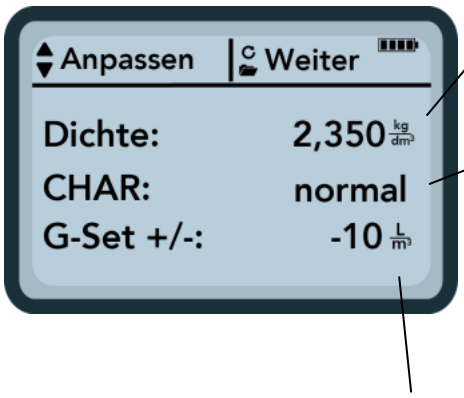


„Down“
- Select menu item or setting
- Delete measured value

„Settings“
- Activate settings by pressing (>1 Second)
- Exit settings
- Back

NOTE: The preset standard calibration curve for concrete, is generally “Cal. No.: 4“. When the SONO-DIS is switched on, the display shows that the device is set on Cal. No.: 4. This setting should not be changed or only changed if a different material is measured instead of fresh concrete.

Enter the three configuration parameters shown below:



Density: Bulk density, the value from a shatter test, or the density from the mixture calculation can be entered here.

CHAR: Characteristics of the recipe. There are 4 setting options available:

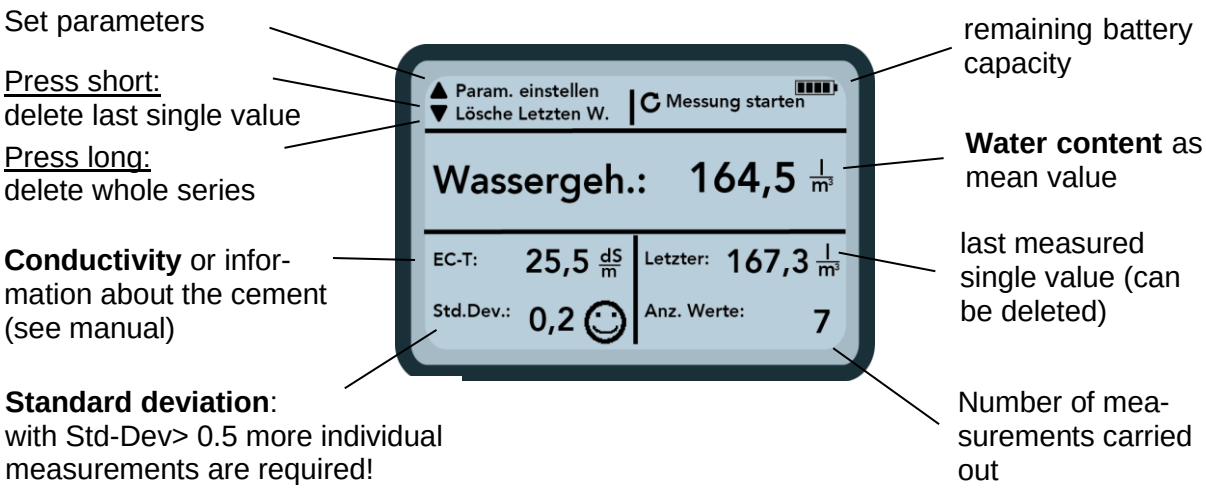
coarse (minus correction), normal (no correction), fine (plus correction), or special (minus correction in case of failure grain). **Note: the mortar content in the concrete essentially influences this parameter, coarse means a low, fine means a high mortar content.**

G Set +/-: General set, fine adjustment of the SONO tool, the measurement result is corrected with this value. The setting of these parameters is described on page 4.

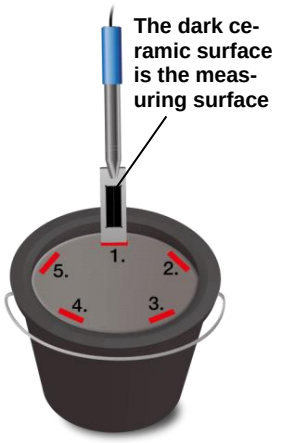
NOTE: The above settings help with an initial adjustment and may be sufficient under normal conditions, but the measured values should generally be validated against a reference and if necessary, adjusted using the G-Set. A reliable reference measurement is necessary for this. Please take into account that the standard kiln drying measurements also comprise measurement errors.

Concretes that do not meet the specifications according to DIN EN 206-1 and DIN 1045-2 (concretes that tend to bleed, for example), may leed to significant deviations of the measured values.

The measuring menu with display



Measurement procedure for concrete with slump F2, F3 and F4



NOTE:
When taking a sample of the concrete for filling the bucket, make sure that the concrete is not segregated already during this procedure.
Use a 12 liter plastic bucket commonly used in the construction industry. Do not use a metal bucket (this will affect the electrical measuring field) or a larger bucket (this will result in non-desirable compression).

- Plunge the probe at a slight angle in position 1 on the edge of the bucket.
- Compact the concrete by kicking at the side of the bucket. This ensures that the concrete is optimally compacted on the probe surface.
- Perform a single measurement after compacting.
- Insert the probe about 45° to 90° at position 2 again at the edge of the bucket, kick and carry out another measurement.
- Repeat this process 4 to 5 times, whereby the probe is inserted about 45° to 90° at the edge of the bucket.
- The probe must not be moved during an active measuring process!

NOTE: When conducting the measurement procedure, be aware the following rules and empirical values:

1. Never plunge the device at the same spot in the bucket
2. Delete individual measured values if they deviate significantly from the mean value
3. An increase in the number of individual measurements leads to an increase in accuracy
4. At the start of the measurement procedure, it is recommended to carry out a test measurement and then delete this first individual value.

Measurement procedure for concretes with slump F5 and F6

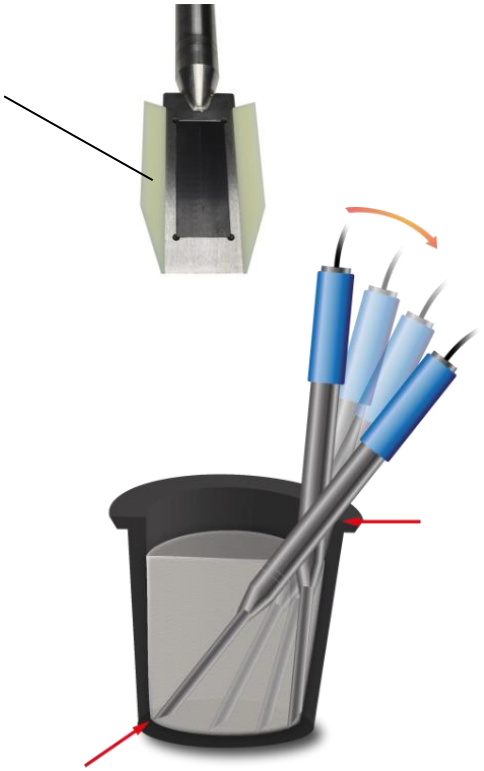
NOTE: When taking a sample of the concrete for filling the bucket, make sure that the concrete is not segregated already during this procedure.
Use a 12 liter plastic bucket common in the construction industry. Do not use a metal bucket (this will affect the electrical measuring field) and no larger bucket (this will result in non-desirable compression.

1. Only fill the bucket ¾ with concrete.

2. Plunge the probe head with the drawn-out tool shovel (made of plastic) vertically at the edge of the bucket completely into the concrete.
The shovel ensures that larger pebbles do not move to the side of the probe head during the measurement, which could lead to deviations or increased measurement values.

3. Slowly push the probe head with the black ceramic surface in front to the opposite edge on the bottom of the bucket, with the handle resting on the edge of the bucket (see red arrows). This ensures that the concrete does not separate and that a representative concrete mix is in good contact with the probe surface. Take a measurement.

4. Repeat this process 4 to 5 times, whereby the probe is inserted about 45° to 90° at the edge of the bucket.



NOTE: When conducting the measurement procedure, note the following rules and empirical values:

1. Never plunge the device at the same spot in the bucket
2. Delete individual measured values if they deviate significantly from the mean value
3. An increase in the number of individual measurements leads to an increase in accuracy.
4. At the start of the measurement procedure, it is recommended to carry out a test measurement and then delete this first individual value.

Helpful references and findings from user practice

Mixing in the laboratory:

For mixing with dry aggregates, depending on the rock, a certain waiting time must be taken into account before the measurement takes place, as the saturation time depends on the type of rock. If the measurement is started too early on dry rock, the measured water content will be too high because the core water has not yet been absorbed by the rock!

Subsequent adding of water in the laboratory:

Subsequent mixing of water into a fresh concrete in the bucket (e.g. +50 grams of water to turn a concrete with 175 liters/m^3 into a concrete with 185 liters/m^3) leads to considerable deviations. During the mixing in drops of water can escape from an open bucket, in addition the water evaporates very quickly on the bucket wall. Depending on the mixing time, errors of up to 5 liters/m^3 may occur.

Sampling in the concrete plant:

Please refer to the corresponding chapter in the manual.

Air pores and glass fibers:

Air pores and glass fibers reduce the concrete density and thus the displayed moisture. This can be compensated with the parameter G-Set.

Concretes with steel fibers:

Measurement deviations can occur due to the steel content. This can be compensated with the parameter G-Set.

The water / liquid proportions measured by SONO-WZ

In principle, SONO-WZ measures the same proportions of water as the kiln drying method.

1. **The effective water** in the concrete mix is the water which is considered for the w/c ratio. This water is the target value to be determined with SONO-WZ.

2. **Part of the core water**, water that is sucked up by the aggregates, whereby 1/3 of the core water is captured by SONO-WZ. Depending on the type of rock, the core water can be 2 up to > 50 liters per m^3.

3. **Additives** that behave like water are also measure captured by SONO-WZ, which must be taken into account.

The water content determined by kiln drying is composed of effective water, core water and additives:

Kiln drying water = effective water + Core water + Additives which behave like water.

The SONO WZ captures the entire effective water and a part of the core water. This must be taken into account when comparing the measured value against the kiln drying result. Since typical concrete recipes contain around 1/3 sand as an aggregate which is completely measured as a component of the cement paste, one can work with the distribution 1/3 to 2/3 as an initial orientation.

Measurement of the effective water with SONO-WZ:

SONO WZ captures the active water and 1/3 (see above = cement paste) of the core water. This 1/3 of the core water must be compensated in order to correctly record the effective water. This means that the parameter G-Set needs to be set with 1/3 of the core water as a negative value in order to measure the content of effective water. For example, if a rock takes 15 liters/m^3 of core water (typical), the correct setting of the G-Set parameter is -5 liters/m^3.

Measurement of the kiln drying water with SONO-WZ:

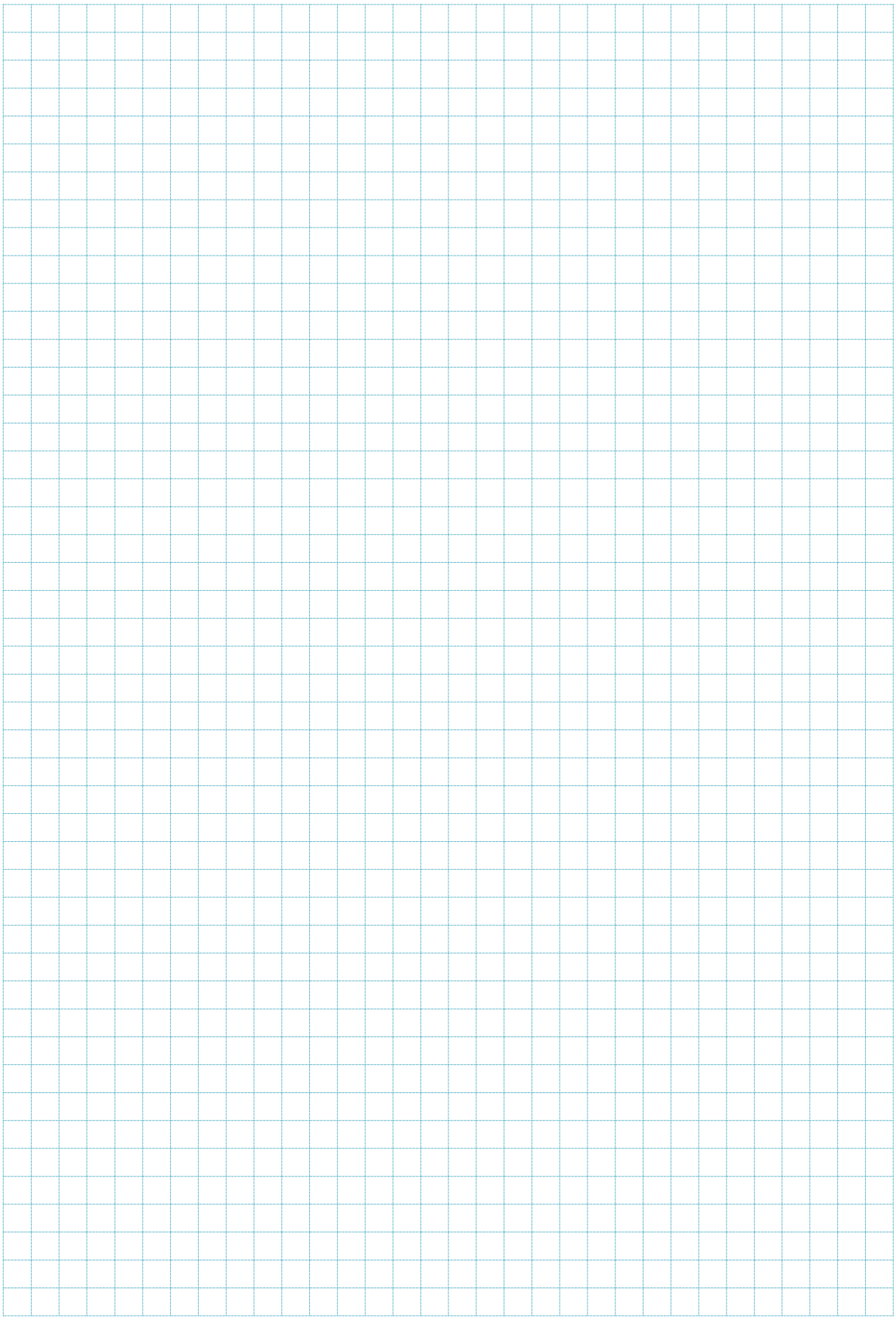
SONO WZ captures the effective water and 1/3 (see above = cement paste) of the core water. The remaining 2/3 of the core water must be added to measure the kiln drying water. This means that the parameter G-Set needs to be set with 2/3 of the core water as a positive value in order to measure the content of kiln drying water. For example, if a rock takes 15 liters/m^3 of core water (typical), the correct setting of the G-Set parameter is +10 liters/m^3.

If SONO-WZ shows too high a water contents in special concretes, the **G-Set** can be reduced by the corresponding number of liters. The exact positive or negative value to be set as **G-Set** can be determined in two ways:

- By comparative measurements with several correct target water contents of the concrete. E.g. with concrete mixtures that were mixed with dry aggregates.
- By comparative measurements with several correct determinations of the water content by kiln drying.

Reference is made to the SONO WZ manual and the respective chapters concerning the comparison with kiln drying measurements.

Notes:



Short Instruction SONO-WZ | 2021-02

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