

The Formwork Experts.

Concremote software

User Manual

Please retain for future reference



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General

Remarks on this document

- This manual describes the Concremote software, its function and intended use.
- This manual is aimed at all persons who will be working with the Doka product or system that it describes. It contains information on the standard design for setting up this system, and on correct, compliant utilisation of the system.
- All persons working with the product described herein must be familiar with the contents of this manual and with all the safety instructions it contains.
- Persons who are incapable of reading and understanding this booklet, or who can do so only with difficulty, must be instructed and trained by the customer.
- The customer is to ensure that the information materials provided by Doka (e.g. User Information booklets, Instructions for Assembly and Use, Operating Instruction manuals, plans etc.) are available to all users, and that they have been made aware of them and have easy access to them at the usage location.

Manufacturer

- B | A | S Remote Sensing B.V.
- We reserve the right to make alterations in the interests of technical progress.

Support

Landline: +31 77 850 7220
 E-mail: support@concremote.com
 Fax: +31 77 850 7223

Symbols used

The following symbols are used in this booklet:



Important note

Failure to observe this may lead to malfunction or damage.



CAUTION / WARNING / DANGER

Failure to observe this may lead to material damage, and to injury to health which may range up to the severe or even life-threatening.



Instruction

This symbol indicates that actions need to be taken by the user.



Sight-check

Indicates that you need to do a sight-check to make sure that necessary actions have been carried out.



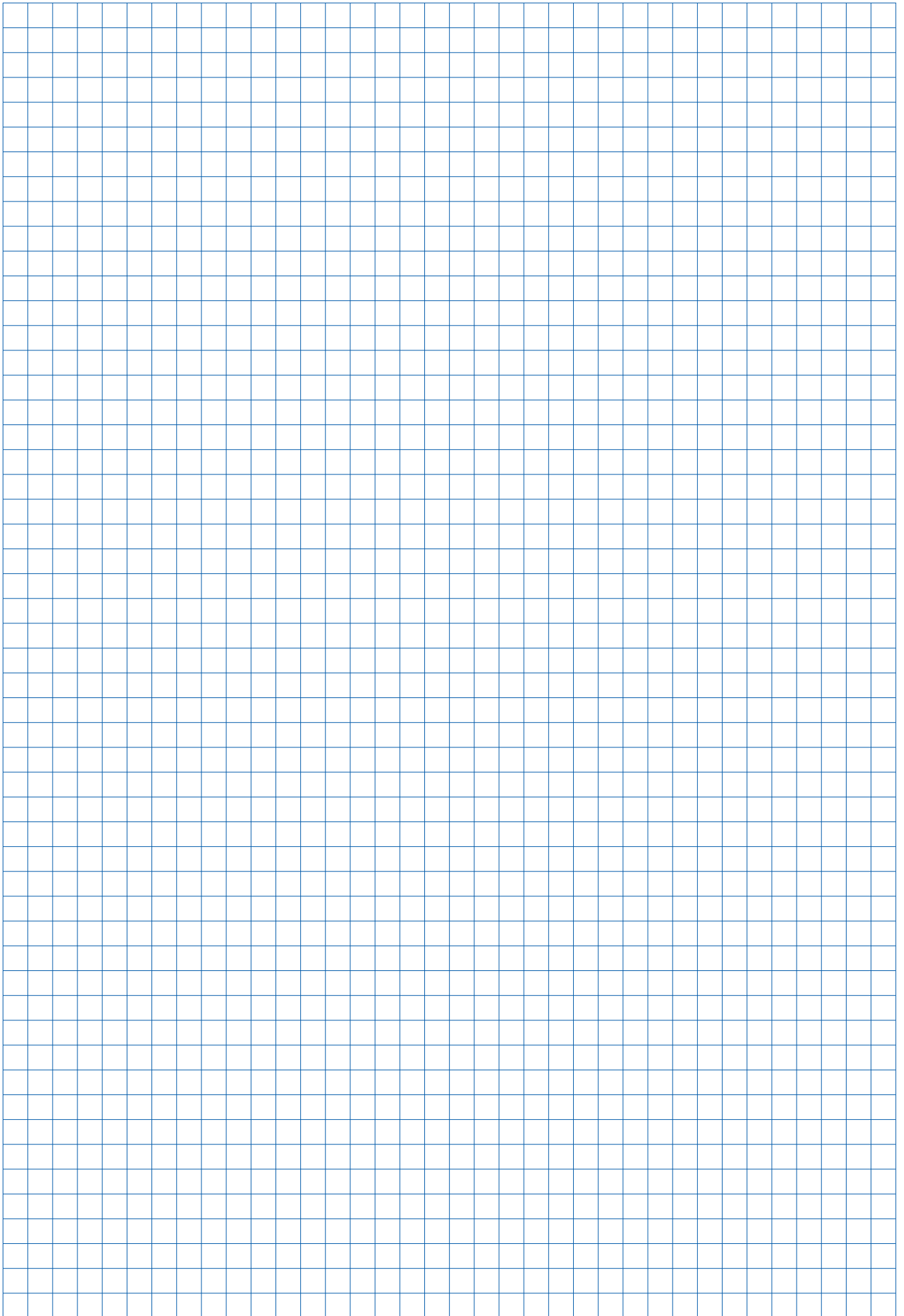
Tip

Points out useful practical tips.



Reference

Refers to other documents and materials.



The Doka Concremote service

System description

Concrete monitoring: how it works, how it is used

Measuring concrete strength in real time.

Concremote is a service for performing non-destructive real-time measurement of concrete strengths in structure members (floor-slabs, walls, beams, ...) on the site.

This service comprises two parts:

- measuring-sensors
- data management and processing

The **sensors** placed on the structure member continuously measure the heat development of the concrete, which is mainly influenced by the hydration heat of the cement and by ambient temperatures. The more intense the heat development, the faster the strength development of the concrete.

The **measured data** (temperature measurements) from the structure member are transmitted to the computing centre via the mobile communications network as data packets. At the computing centre, they are automatically evaluated by the maturity monitoring method, using calibration measurement.

A separate calibration measurement is needed for each different grade of concrete to be measured at the site. This calibration measurement must be performed either by the clients themselves, by the concrete supplier or by an appointed test laboratory – ideally, using the calibration box. For this purpose, six cubes are stored under defined partially adiabatic conditions. The cubes are tested at different times, depending on the target value (in N/mm² / MPa, for stripping, curing, etc.). Each of these tests yields a compressive strength value, and the temperature value associated with it. From this calibration measurement, the relationship can be computed between the strength and the maturity of the grade of concrete concerned.

The Concremote software continuously provides these data and strengths to its users, enabling them to live monitor the strength development in a specific structure member.

As soon as the target value (in N/mm² / MPa) is reached, the next steps (stripping, pre-stressing, etc.) can be taken.

Precise measurement facilitates accurate control

Efficient construction processes

The strength values computed by Concremote, according to the maturity method by de Vree, permit targeted control of forming and concreting operations in real time.

Concremote provides very accurate results on the basis of reference values, which in turn are based on the cube strengths obtained from the calibration measurement.

It records profiles of both the concrete temperature and the ambient temperature around the sensors.

Highly versatile

2 types of sensor

The Concremote **slab sensor** and the Concremote **cable sensor** can be used in a targeted manner in all areas of cast-in-place building construction.

- Cast-in-place concrete floor-slabs
- Wall and column formwork
- Crane-climbed and automatic climbing projects
- Bridge and tunnel building sites
- Mass concrete structures

Easy to use

Wireless data transmission and easy access from anywhere

The user-friendly software can be used effortlessly and can be accessed from any internet-enabled device at any time.

Certainty for the construction project

Helps you take decisions and records your data

- Compliant decision-making based on the measured data.
- Strength development can be estimated early on from graphs.
- Printing and storage of data for long-term verification.

Exact results enabled by calibration

The calibration box is used to calibrate the different grades of concrete used. These calibration measurements provide reference data for computing the compressive strength development in relation to the maturity.

Before the sensors are used, Concremote generates a calibration curve for each grade of concrete, by means of the calibration box.

The smallest measurable strength is 5 N/mm².

Online data access

Via the user-optimised, web-based programme, users can access the data at any time. Furthermore, they can grant read and write permissions.

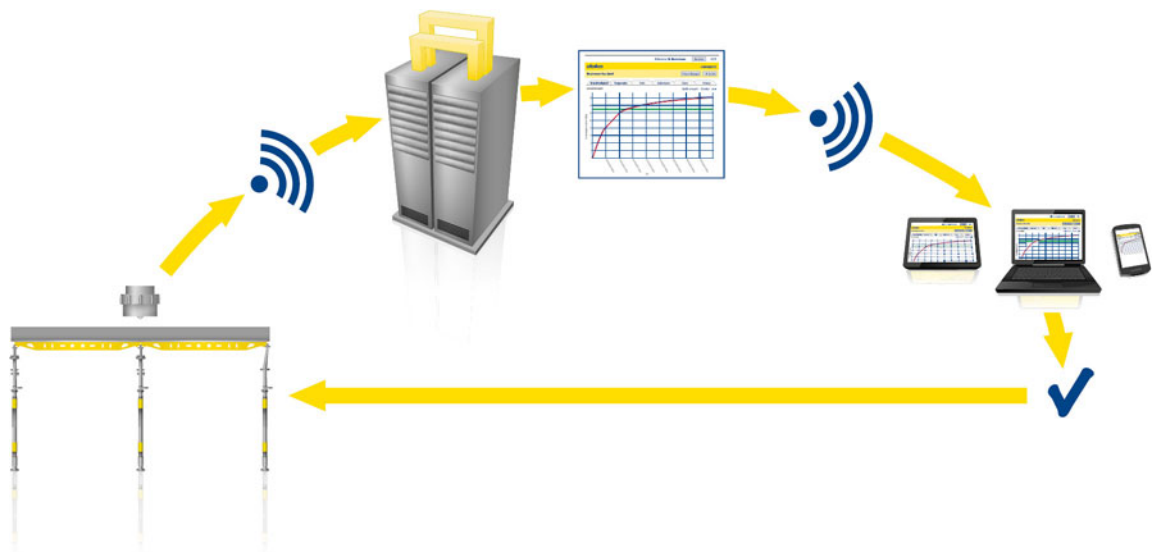
Users can store data and unlock them for use by authorised persons.

Accurate documentation ensures both certainty for the building process and transparency.



The temperature, maturity and strength data will help you take decisions in many areas:

- Stripping time
 - Crack width limitation (stresses)
 - Loads
 - Curing measures
 - Pre-stressing
 - Cycle times
 - Temporary reshores
 - Construction conditions
 - Concrete orders
 - Team coordination
- etc.



Process scheme

Overview and introduction

Login

You will receive your software login details by e-mail as soon as you have placed your order for Concremote. To log in enter the following web address into your browser:

concremote.doka.com.



Important note:

- If you have not received your login details or have forgotten your password, please contact the support team.
- After starting the application, you can change the default password by clicking on **'My data'** and **'Profile'**.
- You are not allowed to pass your login details on to unauthorised persons.

Home page

After logging in you will be redirected to the home page. The home pages gives you an overview of the existing projects.

A Starting the software (link to the graph page)

B Overview of structures/measurements and the sensor status

C Calendar

D Tab menu (personal data and contact)



Important note:

- **'Logout'** button: You can exit the software securely at any time.
- The overview provides information on the sensor status, among other things. If one of the sensors is marked with a red dot, please contact the support team or inform your Doka contact person (unless this is automatically done).

Tab menu:

- **'My projects'**: takes you back to the home page
- **'My data'**: for changing your personal details and password
- **'Contact'**: contact details of the support

Graph page

You can open the graph page by clicking on **'Start CONCREMOTE'**. Here you can access all the measurements.



- A Measurement drop-down menu
- B Graph tabs
- C Graph
- D Project Manager

Buttons:

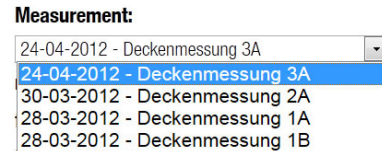
- **'Print'**: For printing the current graph along with a list of the relevant project information.
- **'Project Manager'**: For adding further measurements or editing existing ones.
- **'Refresh graph'**: For updating the graph after changing the drop-down options.

Selecting a measurement

- Select the respective project, structure, location and structure member from the drop-down menu on the left-hand side (from the top down).



- Then, select a measurement from the drop-down list at the bottom of the menu.



In the middle section of the menu under **'View sensors'**, you can find the legend of the graph currently displayed as well as the parameters on which the measurement is based.

Graph tabs

By means of the graph tabs you can select the different parameters of the measurement:

- **'Compressive strength'** and **'Temperature'**: for illustrating results
- **'Maturity'**, **'Calibration curve'** and **'Data'**: for illustrating data
- **'Annex'**: for attaching files (e.g. project-specific data and documents)

What the graphs illustrate

Compressive strength

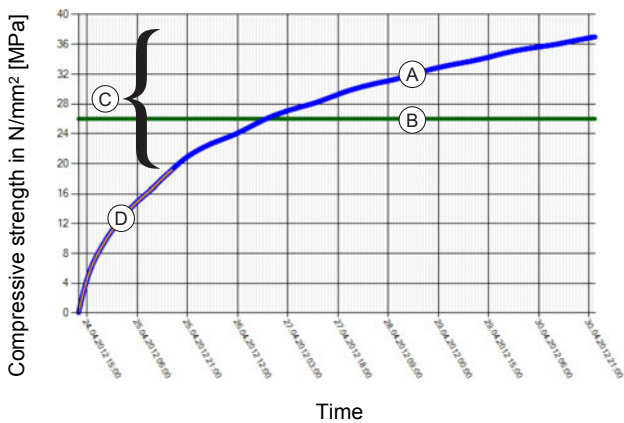
In this graph you can monitor the compressive strength development.

The thin, orange line inside the compressive strength development curve represents the non-calibrated range. The measurement result is considered calibrated only from where the orange line ends.



WARNING

Decisions that are based on non-calibrated data (orange line inside the compressive strength curve) can cause personal injury.



A Compressive strength development

B Target value line

C Calibrated range

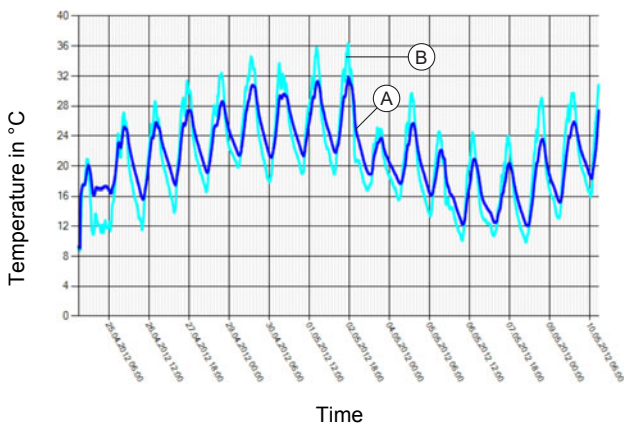
D Non-calibrated range (orange)

Temperature

This graph illustrates the temperature profile of the measurement as a function of time.

The concrete temperature and the ambient temperature recorded by the sensor are both displayed in one graph in different colours.

In the menu on the left-hand side you can find a legend of the colours used in the graph.

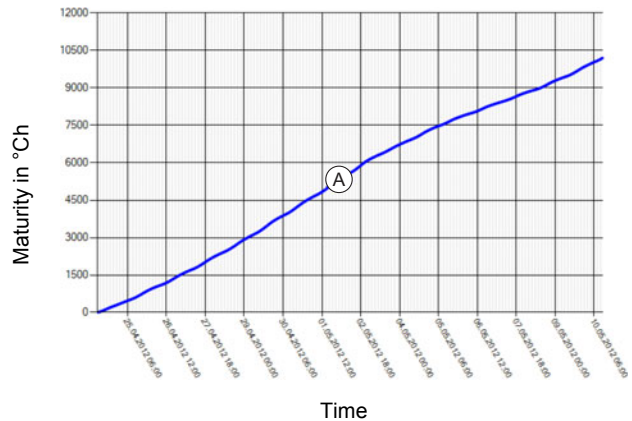


A Concrete temperature measured by the sensor

B Ambient temperature measured by the sensor

Maturity

The maturity curve is generated on the basis of the measured temperature, the time, as well as the concrete data on which the measurement is based.



A Development of weighted maturity

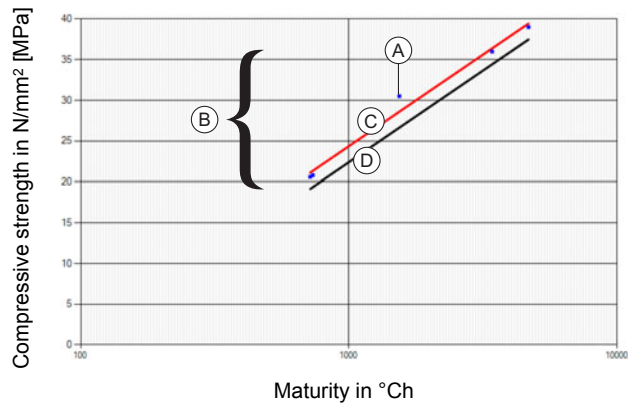
Calibration curve

The calibration curve illustrates the result of the calibration, expressed as a relationship between the compressive strength and the maturity.

The results of the compressive cube tests are indicated as blue dots.

The red regression curve is automatically computed by the software, based on the compressive cube tests.

The black calibration/reference line running parallel below the red line (mean value), forms the basis for calculating further strength values. The spread of the measured values ensures certainty and reliability in the process.



A Result of the compressive cube test

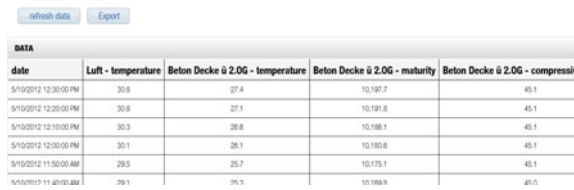
B Calibrated range

C Regression curve based on the compressive cube tests

D Calibration curve for further measurement

Data

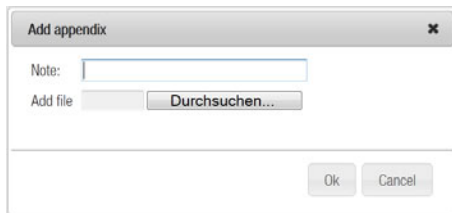
The individual data that are measured and computed are compiled into a list and can be exported for documentation purposes by clicking on the **'Export'** button.



| date | Luft - temperature | Beton Decke ü 2.0G - temperature | Beton Decke ü 2.0G - maturity | Beton Decke ü 2.0G - compressi |
|-----------------------|--------------------|----------------------------------|-------------------------------|--------------------------------|
| 5/15/2012 12:30:00 PM | 30.8 | 27.4 | 10,191.7 | 45.1 |
| 5/15/2012 12:30:00 PM | 30.8 | 27.1 | 10,191.8 | 45.1 |
| 5/15/2012 12:10:00 PM | 30.3 | 26.6 | 10,186.1 | 45.1 |
| 5/15/2012 12:00:00 PM | 30.1 | 26.1 | 10,180.6 | 45.1 |
| 5/15/2012 11:50:00 AM | 29.5 | 25.7 | 10,175.1 | 45.1 |
| 5/15/2012 11:40:00 AM | 29.1 | 25.3 | 10,169.6 | 45.0 |

Annex

Here you can upload project-specific data and files.



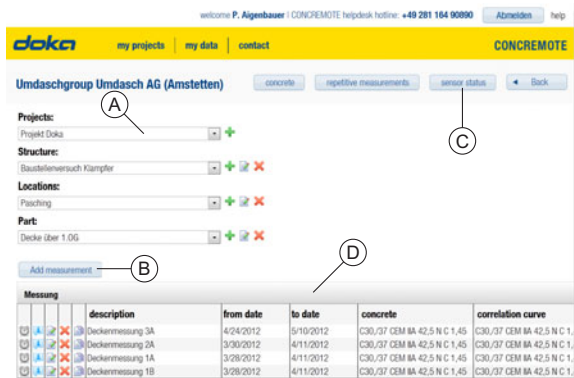
Add appendix ✕

Note:

Add file

Project Manager

The Project Manager is designed primarily for adding new measurements and for editing existing ones.



Umdaschgroup Umdasch AG (Amstetten)

Projects: A

Structure: C

Locations: B

Part: D

Add measurement

| | description | from date | to date | concrete | correlation curve |
|--|------------------|-----------|-----------|------------------------------|----------------------------|
| | Deckenmessung 3A | 4/24/2012 | 5/10/2012 | C30./37 CEM BA 42.5 N C 1,45 | C30./37 CEM BA 42.5 N C 1, |
| | Deckenmessung 2A | 3/30/2012 | 4/11/2012 | C30./37 CEM BA 42.5 N C 1,45 | C30./37 CEM BA 42.5 N C 1, |
| | Deckenmessung 1A | 3/28/2012 | 4/11/2012 | C30./37 CEM BA 42.5 N C 1,45 | C30./37 CEM BA 42.5 N C 1, |
| | Deckenmessung 1B | 3/28/2012 | 4/11/2012 | C30./37 CEM BA 42.5 N C 1,45 | C30./37 CEM BA 42.5 N C 1, |

- A** Project drop-down menu
- B** Adding a measurement
- C** Checking the sensor status
- D** Status of current measurements

Buttons:

- **'Sensor status'**: For viewing the signal strength of all sensors currently assigned, as well as the time when they last transmitted data.
- **'Concrete'**: For viewing and, to some extent, editing the data of the concrete mixture.
- **'Repetitive measurements'**: For creating a measurement with fixed intervals.

Application and usage

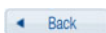
General












This section describes the most important ways in which the software can be used. If you have any further questions or problems, please contact the support team or your Doka contact person.

General notes regarding the measured data:





- All of the data measured and transmitted by the sensors are stored in the computing centre for years.
- These data remain stored in the computing centre even if a measurement is deleted from the Concremote software.
- Therefore, to be displayed again in the software, a deleted measurement simply needs to be added once again, based on the data stored in the computing centre.

Active icons

 Back Function as indicated on the button

-  Edit
-  User selection
-  Add
-  Delete
(action cannot be undone)
-  Add notification
-  Notification is active
-  Copy measurement
-  Information
-  Information
-  Save
-  Cancel

Inactive icons


-  Sensor status: OK
-  Sensor status: error
-  High signal strength
-  Medium signal strength

How to add a structure member

- Click '**Start CONCREMOTE**' and then '**Project Manager**'.
- The project name is preset and given in the drop-down list. A structure and location can be added or existing ones be modified.
- Next, add a structure member by clicking on the '+' icon.

Structure:
   

Locations:
   

Part:
    



Enter a meaningful description, such as 'Structure member A', 'House1' etc.

The description can be changed again later by means of the **Edit** icon.

A structure member can only be deleted ('X') after each measurement assigned to it has been removed.

How to add a sensor

- Click '**Start CONCREMOTE**' and then '**Project Manager**'.
- Enter the sensor number (see on the outside of the sensor or inside the battery compartment), installation time and a description of the measurement (e.g. 'Floor-slab GF').

At least two sensors are placed in one structure member at a time.

When a measurement is added, then all the sensors positioned in the structure member concerned must be assigned to this measurement. This will make the different data measured by the different sensors visible on the graph page.

How to add a measurement

Adding a measurement involves 4 steps. To begin with, click on the 'Add measurement' button:

A window will open asking you to accept the Terms and Conditions. Confirm to continue.

- **Step 1:** Select the respective existing structure member or add a new one by clicking on '+'. Click 'Next' to continue with the next step.
- **Step 2:** Enter a description of the measurement, plus the date and starting time. The latter will vary depending on the kind of structure member. In walls it corresponds to the end of concreting operations, in floor-slabs it is equal to the installation time of the last sensor.

Step 2 of 4. Measurement

1 instructions

1. Please add required information to start new measurement. Start by using a meas
2. Startdate will be automatically saved by CONCREMOTE. Please add the startingdate and the starting time of the measurement. If you want If you want to include starting date which lies in the past for more than 30 days ple

Measurement details

Description:

Startdate:

- **Step 3:** Select the concrete mixture and the calibration curve from the drop-down lists (the calibration curve is generated prior to the measurement in collaboration with the test laboratory – see the 'Concremote calibration box' User Information booklet). If no calibration measurement is available yet, this step can be skipped for the moment and be taken at a later time.

Step 3 of 4. Concrete mix-design and Calibration curve

1 instructions

1. Select a concrete mix-design
Select an existing mix-design or add a new mix-design by using the + icon

Concrete mix-design

Description:

Concrete mix-design property:

2 instructions

2. Select calibration curve.
Select existing calibration curve or add new via + icon.

Calibration curve

Calibration curve:

-- Select callibration curve. --



Important note:

Before you can continue with Step 4 by clicking the 'Next' button, the selected concrete mixture must be confirmed. Always make sure that the concrete that has been selected is equal to the concrete mixture used in the structure member in question.

- **Step 4:** Assigning the sensors.

Select the respective sensor by its serial number and add it by clicking '+ Add device'.

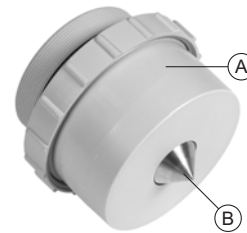
Step 4 of 4. CONCREMOTE device

Measurement details: **Description:**
Startdate:

Concremote device

The 2 to 4 measuring positions are preset but can be further edited. Measuring positions:

- **0** Air temperature (measurement of the air temperature using the sensor)
- **1-3** Measurement of the concrete temperature using the sensor, either by means of a measuring position inside the sensor or with a cable (in cables with 3 measuring points, position 1 is the measuring point closest to the sensor)



A Position 0: air temperature

B Position 1: concrete temperature

| Measurement unit | Sensor position | Sensor name | Color | methods |
|------------------|-----------------|------------------------------|-----------|----------------------|
| 6861785004397299 | 0 | 397299 - Ambient temperature | Aqua | Temperature |
| | 1 | 397299 - Concrete | Blue | Strength development |
| | 2 | 397299 - Concrete | Red | Strength development |
| | 3 | 397299 - Concrete | BurlyWood | Strength development |

For adding a second sensor to the measurement, click '+ Add device'.

When finished, confirm by clicking 'Next'.

Optionally, the system can send you a text message or e-mail notification for targeted information (see the section 'How to set text message/e-mail notifications').

After clicking on 'Finish', the measurement settings are complete. You can change your settings at any time by clicking on the 'Project Manager' button.

How to repeat and copy a measurement

- ▶ To copy a measurement, start the **'Project Manager'** and select the desired project.
- ▶ Click on the **'Copy'** icon next to the measurement.
- ▶ For repeating a measurement, only specify the description of the measurement and the date and starting time.
- ▶ When copying a measurement, additionally check the selected concrete mixture and calibration curve and make changes if necessary.
- ▶ Save your settings by clicking on **'Save'**. Then return to the **'Project Manager'** by means of the 'Back' button.

How to set text message/e-mail notifications

Text message or e-mail notifications can be set when the sensor is added, or subsequently by clicking on the notification icon in the 'Project Manager'.

| Messung | | | |
|---------|-------------|-----------|-----------|
| | description | from date | to date |
| | Decke ü. EG | 7/19/2013 | 7/19/2013 |

- ▶ After clicking on the **'Add notification'** button and on the **'+'** icon on the following page, enter a description (e.g. 'Target value reached'). Then click **'Next'**.
- ▶ Choose between two notification types – one that is sent once the target value is reached, and one that can be freely set.
- ▶ When setting the target value, select the concrete mixture and the target strength as specified by the construction firm.

Measurement Description: Decke ü. EG
 Date of measurement: Start date: 7/19/2013 10:00 AM
 Alert description: Zielwert erreicht

control values
 397299 - Lufttemperatur Temperature less than or equal to 0.00 °C
 Add sensor name select
 action driven by individual sensor

- ▶ Then select the persons to be notified.

| Text message | E-mail |
|--------------------------|--------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> |

- ▶ Click **'Finish'** to confirm your settings.
- ▶ Click **'Finish'** again. The measurement including notification is added and can be accessed via the graph page.



Important note:

If a person to be notified is missing in the list, please inform the support team or your Doka contact person.

Reading the data

After having entered all the data, the measurement can be monitored on the graph page. The recorded data are displayed with a one-hour delay.

If only the compressive strength is recorded but no temperature values, then no calibration has been defined for the measurement concerned.

The compressive strength is displayed only once a certain maturity level has been reached. In low temperatures, for example, the measured data can only be displayed when a minimum maturity value has been reached.

Function test

It is recommended to perform a function test each time before using Concremote in a structure.

- ▶ Add a measurement with all existing sensors.
- ▶ Switch on the sensors and/or connect them to the battery.
- ▶ Check the sensors in the overview given on the home page or on the graph page.



A function test is particularly important for projects where connectivity may be limited.



Important note:

If a failure occurs, immediately inform your Doka contact person or the support team.

How to set time lags

If two sensors, for example, are installed in a floor-slab at different times, the time difference must be entered in the 'Delay' field of the first sensor.

This will make the sensors start to measure simultaneously.

delay: 00:00

Note:

For setting a time lag, open a previously added measurement in the Project Manager and edit it.

Near to you, worldwide

Doka is one of the world leaders in developing, manufacturing and distributing formwork technology for use in all fields of the construction sector.

With more than 160 sales and logistics facilities in over 70 countries, the Doka Group has a highly efficient distribution network which ensures that equipment and

technical support are provided swiftly and professionally.

An enterprise forming part of the Umdasch Group, the Doka Group employs a worldwide workforce of more than 5600.

