USER MANUAL MEAX

Brand of ACOEM

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WELCOME TO OUR WORLD

Since the very beginning in 1984, ACOEM AB has helped industries throughout the world to achieve more profitable and sustainable production. We have reached where we are today by having the courage to think beyond the norm and follow slightly unconventional paths. We have had the courage to make mistakes and find new directions. Through our resolve, ambition and knowledge we have become a global player and a leader in innovative, user-friendly measurement tools.

MEAX

As ever-increasing demands are being placed on machine tools, we have arrived at the conclusion that an optimally functional machine forms the basis for better business. Modern machine tools must maintain a high level of flexibility, a high degree of utilization and a minimum downtime which calls for the correct geometry in all the machine's movements.

So we created MEAX and started to sketch solutions for machine tool measurements that, in our opinion, are so self-evident that they should have been developed a long time ago.

By performing fast measurements, possessing a logical user interface, smart applications and fewer complicated functions, we can now build a future for machine tool measurement.

END USER LICENSE AGREEMENT

The rights to use the software in this product are offered only on the conditions that you agree to all the terms stated below, i.e. the end user agreement. By using this product you agree to be bound by this agreement. If you do not accept this agreement your sole remedy is to return the entire unused product, hardware and software, promptly to your place of purchase for a refund.

The user is granted a single license to use the software contained in this product. Use is only permitted on the hardware it has been installed on at the time of purchase. The software may not be removed from the hardware.

The software contained in the system is the property of ACOEM AB, any copying or redistribution is strictly prohibited.

Modifying, disassembling, reverse engineering or decompiling the system or any part thereof is strictly prohibited.

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ACOEM AB (formerly known as Elos Fixturlaser AB) is since mid-2014 a fully owned subsidiary of ACOEM Group, headquartered in Lyon, France. Other brands within ACOEM Group are 01dB, ONEPROD, METRAVIB and FIXTURLASER. For more information please visit www.acoemgroup.com

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DECLARATION OF CONFORMITY

In accordance with the EMC Directive 2004/108/EC, the Low Voltage Directive 2006/95/EC, including amendments by the CE-marking Directive 93/68/EEC & EC directives RoHS 2011/65/EU.

Type of equipment

Machine Tool Measurement System

Brand name or trade mark

MEAX

Type designation(s)/Model no(s)

1-1013 MEAX DU 01
1-0984 MEAX LM 201
1-0985 MEAX LR 201
1-0986 MEAX SM 201
1-0987 MEAX SR 201

Manufacturer's name, address & phone no

ACOEM AB
Box 7
SE-431 21 Mölndal
Sweden

Phone: +46 31 7062800

The following standards and/or technical specifications, which comply with good engineering practice in safety matters in force within the EEA, have been applied:

Standard/Test report/Technical construction file/Normative document

EN 61000-6-3:2007.

EN 61000-6-2:2005, EN 61000-4-2, -3, -4, -5, -6, -11.

EN 61010-1:2010

ISO9001:2008 Ref. No/ Issued by: DNV Certification AB Certification No. 2009-SKM-AQ-2704/2009-SKM-AE-1419.

The wireless device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions;
(1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

Additional information

The product was CE-marked in 2015.

As manufacturer, we declare under our sole responsibility that the equipment follows the provisions of the Directives stated above.

Date and place of issue

Mölndal 2015-12-01

Signature of authorized person

Hans Svensson, Managing Director

SAFETY

Retain and follow all product safety and operating instructions. Observe all warnings on the product and in the operating instructions.

Failure to observe the safety pre-cautions and operating instructions can cause bodily injury, fire, and damage to the equipment.

Do not disassemble, modify or use the equipment in other ways than explained in the operating instructions. ACOEM AB will not accept any liability for such use.

WARNING!

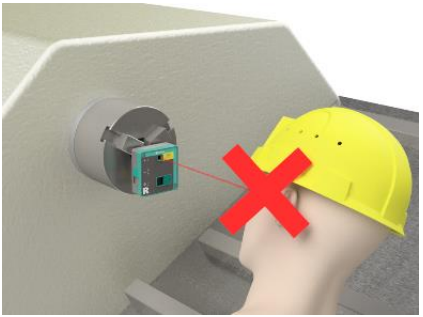
Make sure to fully comply with all appropriate safety measures and regulations at worksite and local regulations regarding safety in a machine environment. Do not operate a machine such as a lathe, if you have not received safety instructions and understand how to use the machine. Take all appropriate measures to prevent unintentional start-up of machines.

LASER PRECAUTIONS

MEAX Instruments uses laser diodes with a power output of < 1.0 mW. The laser classification is Class 2.

Class 2 is considered safe for its intended use with only minor precautions required.
These are:

- Never stare directly into the laser transmitter.
- Never shine the laser directly into anyone else's eyes.



CAUTION!

USE OF CONTROLS OR ADJUSTMENTS OR PERFORMANCE OF PROCEDURES OTHER THAN THOSE SPECIFIED HEREIN MAY RESULT IN HAZARDOUS RADIATION EXPOSURE.

Your system complies with the requirements in:

- IEC-60825-1:2007
- British Standard BS EN 60825-1
- DIN EN 60825-1

USA FDA Standard 21 CFR, Ch 1, Part 1040.10 and 1040.11

POWER SUPPLY

The MEAX equipment is powered by high-capacity rechargeable Li-Ion packs mounted in the display unit and the sensors.

When used in typical conditions the battery will sustain good capacity for approximately 2-3 years before needing replacement. Contact your sales representative for battery replacement.

The batteries contain safety circuitry to operate safely with the display unit and the sensors. The display unit and the sensors can therefore only be used with the Li-Ion batteries supplied by MEAX.

Improper replacement of batteries can cause damage and risk for personal injury.

WARNING!

BATTERY REPLACEMENT SHALL ONLY BE PERFORMED BY AUTHORIZED MEAX REPRESENTATIVES.

USE OF ANY OTHER BATTERIES THAN THOSE SUPPLIED BY MEAX WILL CAUSE SEVERE DAMAGE TO THE SENSOR AND CAN CAUSE RISK FOR PERSONAL INJURY!

Handle any batteries with care. Batteries pose a burn hazard if handled improperly. Do not disassemble and keep away from heat sources. Handle damaged or leaking batteries with extreme care. Please keep in mind that batteries can harm the environment. Dispose of batteries in accordance with local regulatory guidelines, if in doubt contact your local sales representative.

Only use the external power adapter supplied by MEAX for use with the display unit.

Only use the external power adapter supplied by MEAX or a 5V USB charger or battery life extender to charge the battery in the sensors.

Using other power adapters can cause damage to the unit and personal injury.

WIRELESS TRANSCEIVER

The MEAX system is fitted with Bluetooth wireless transceivers.

Make sure that there are no restrictions on the use of radio transceivers at the site of operation before using the wireless transceivers.

WARNING!

Before using the wireless transceivers make sure that there are no restrictions on the use of radio transceivers at the site. Do not use on aircraft.

CARE

PACKING THE CASE

Make sure to use the supplied case when transporting the system.

Calibration certificates are placed behind the lid foam.

CLEANING

The system should be cleaned with a cotton cloth or a cotton bud moistened with a mild soap solution, with the exception of the detector and laser window surfaces, which should be cleaned with alcohol.

For the best possible function, the laser diode apertures, detector surfaces and connector terminals should be kept free from grease or dirt. The display unit should be kept clean and the screen surface protected from scratches.

Do not use paper tissue, which can scratch the detector surface.

Do not use acetone.

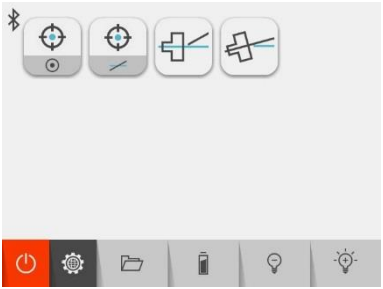
4.4

MAIN MENU

The MEAX systems are available with different apps for specific purposes.

The apps included depend upon which app packages you have selected.

Press the ON button to start the system.



In the Main Menu you can select the app that you want to use.

In the Main Menu you will also find the Memory Manager and Global Settings.

APPS

Sensor Display Level

Sensor Display Machine Tool

Spindle Measurement

Coaxiality

MEMORY MANAGER

Memory Manager

SYSTEM FUNCTIONS

Global Settings

Battery Status

Decrease Backlight

Increase Backlight

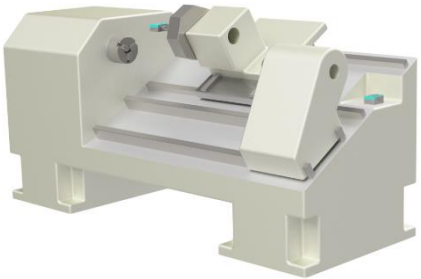
Off

Bluetooth Indicator
On/Off

5.4

SENSOR DISPLAY LEVEL

INTRODUCTION



The Sensor Display for the MEAX Level sensors can be used for different applications where you want to use the readings from the sensors in different ways. The app could be used with one sensor (LM) or two sensors (LM and LR) connected to the display unit.

With the one sensor connected it is possible to measure an objects angle towards gravity (levelling) or be able to measure an objects relative angular deviation (roll and pitch).

When two sensors are connected it is also possible to measure an objects angle towards a reference.

The Sensor Display app can show the values from the 2-axis sensors in both directions (α and β) as live values or it can record readings and present a fixed value for a measurement point. It is also possible to download recorded measuring values or stream values to a data file.

When two sensors are connected (M and R) it is possible to display the values in different ways.

R and M

R and M-R

MEASUREMENT METHOD

When measuring an objects angle towards gravity (levelling), the M sensor is placed on the object and the displayed values are set to zero. Then, the sensor is rotated 180° and the displayed values are set to half. The shown values on the Sensor Display are the objects deviation towards gravity.

To measure the relative angle of an object, the M sensor is placed on the object and the displayed values are set to zero. The object can then be moved or the sensor can be placed on another object. The displayed values are the angular deviation relative to the first measuring point/object (zero).

When two sensors are connected (M and R) it is possible to measure an objects relative angle in relation to a reference. The M-sensor is mounted on the measuring object and R-sensor is placed on the reference. The values on the display unit shows the difference in angles between the object and the reference (M-R).

STARTING THE APP

Start the Sensor Display Level app by touching its icon in the Main Menu.

FUNCTIONS

When entering Sensor Display Level, raw data from the connected Level sensors are displayed.

If any value is missing, ----- is shown.

Available functions at start

Zero values.

Sample and display a single value.

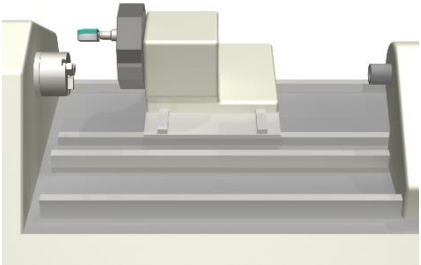
Record values to file.

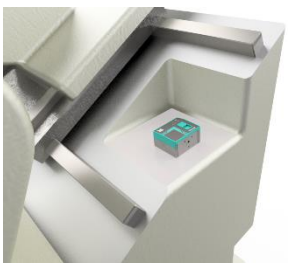
Global settings.

Home.

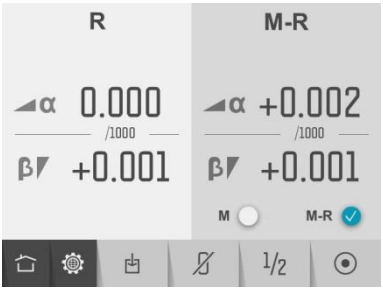
M / M-R

The values from the M sensor can either be displayed as M values (not relative to the R sensor) or as M-R values (relative to the R sensor).



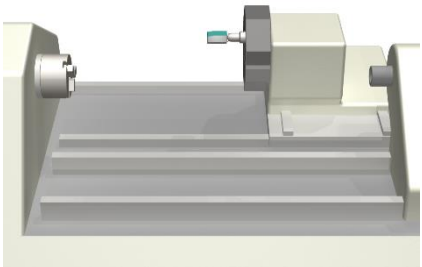


Zero values



Halve values.

Reset values to raw data.



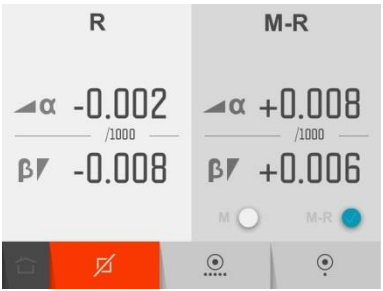
Sample and display a single value

Return to live values.

Record values to file

Records values that are sampled from the sensors and stores them in a file.

Enter file name and confirm.



Record single values.

Start continuous recording.
(All values are recorded until the function is stopped.)

Stop and confirm continuous recording.
(Only available when continuous recording is active.)

Finish recording values to file.

Recording can be started and stopped several times and all the recorded values will be stored in the same file.

The recorded values are stored in a text file with a time stamp for each sampling.

SENSOR DISPLAY MACHINE TOOL

INTRODUCTION

The Sensor Display for the MEAX Position Sensors can be used for different applications where you want to use the readings from the sensors in various ways. The app is used with two sensors connected, SM and SR, to the display unit.

The Sensor Display app can show the values from both sensors. Each sensor is measuring in two directions (b and a) together with the rotational angle (r). The displayed values can be shown live or it can record readings and present a fixed value for a dedicated measurement point. It is also possible to download recorded measuring values or stream values to a data file.

MEASUREMENT METHOD

The Sensor Display app is used for general purposes. The displayed live values can be zeroed to measure the relative movement on a measuring object. This function can be used to check in a field test to check that the values from the senor are corresponding to a known movement.

After the values have been zeroed it can also be halved. This function can be used to find out the center position of a rotating object.

STARTING THE APP

Start the Sensor Display Machine Tool app by touching its icon in the Main Menu.

FUNCTIONS

When entering Sensor Display Machine Tool, raw data from the connected position sensors are displayed.

Available functions at start

Zero values.

Sample and display a single value.

Record values to file.

Global settings.

Home.

Zero values

Sample and display a single value

Halve values.

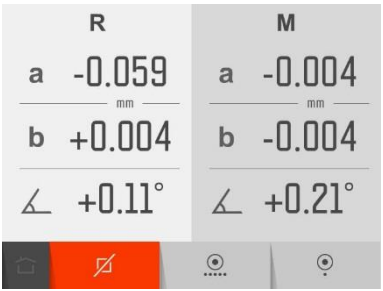
Reset values to raw data.

Return to live values.

Record values to file

Records values that are sampled from the sensors and stores them in a file.

Enter file name and confirm.



Record single values.

Start continuous recording.
(All values are recorded until the function is stopped.)

Stop and confirm continuous recording.
(Only available when continuous recording is active.)

Finish recording values to file.

Recording can be started and stopped several times and all the recorded values will be stored in the same file.

The recorded values are stored in a text file with a time stamp for each sampling.

MACHINE TOOL STRAIGHTNESS

Under construction

8.2

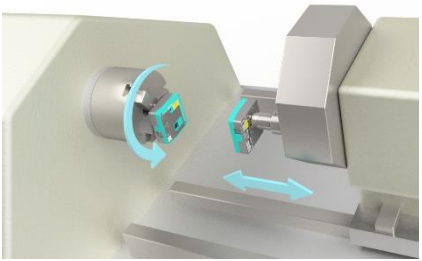
SPINDLE MEASUREMENT

INTRODUCTION

The Spindle Measurement app is used to determine the direction of the rotational axis of a spindle or any other rotating object, in relation to a guideway motion in a machine tool. The guideway is used as a reference and its direction is defined as a straight line between to measuring points.

The direction of the spindle is presented as an angle towards the reference guideway in 2 axes.

MEASUREMENT METHOD



The direction of the spindle rotational axis is obtained by measuring the position of the spindle rotational center at two points along the guideway. The MEAX SR sensor is mounted on the spindle and its laser is representing the axis of rotation when the spindle is rotated. The MEAX SM sensor is mounted on the carriage (or any other part) that moves along the guideway. The MEAX SM sensor adjusted in a position that the

laser hits the detector area of the MEAX SM sensor. The carriage is positioned in two position, close to the spindle and at far distance. The distance between the points are entered into the system. In each position, the spindle is rotated 180°, to determine the spindle rotational center on the detector. Any deviation in the position of the rotational centers is recorded and is presented as an angular error between the spindle and the guideway.

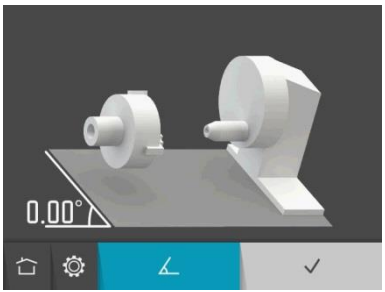
STARTING THE APP

Start the Spindle Measurement app by touching its icon in the Main Menu.

CONFIGURATION

Machine bed slant

When entering Spindle measurement, the machine bed slant screen is displayed.



The machine bed slant is measured with the SM sensor.

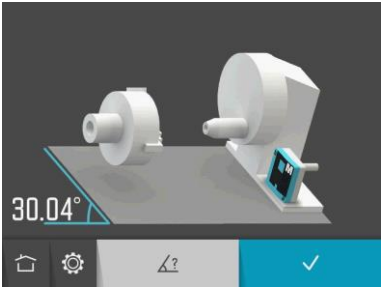
If you have an existent machine bed slant you just need to confirm it.

Measure machine bed slant.

Confirm existent machine bed slant.

Settings.

Home.



When measuring machine bed slant with the SM sensor, the angle value is displayed live.

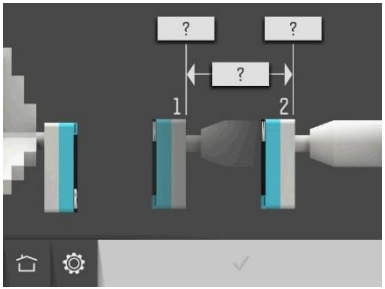
Place the SM sensor at the machine bed slant.

Confirm measured machine bed slant.

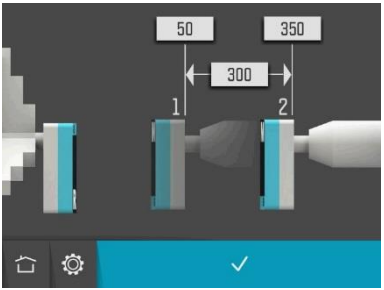
The machine bed slant can also be entered manually.

Enter machine bed slant manually.

Positions and distance



Enter positions at the measurement points and/or distance between the measurement points.



Confirm positions and distance.

MEASUREMENT

The screen displays the main spindle with the SR sensor to the left and the tool holder with the SM sensor to the right.

The rotational angles for each sensor are displayed at the top. These angles are relative to the machine bed slant.

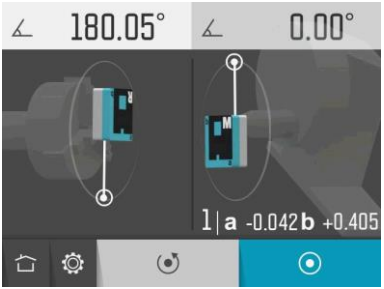
The measurement is carried out by register values in two positions at each measurement point. The small circles show where to rotate the sensors.

Place the tool holder with the SM sensor at the first measurement point and set the SM sensor at 0°.

Set the SR sensor at the first measurement position at 0°.

Touch the measurement icon.

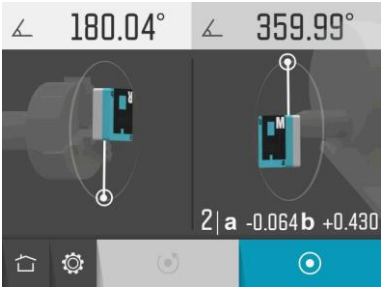
This registers the first measurement position at the first measurement point.



Rotate the SR sensor to the second measurement position at 180°.

Touch the measurement icon.

This registers the second measurement position at the first measurement point.

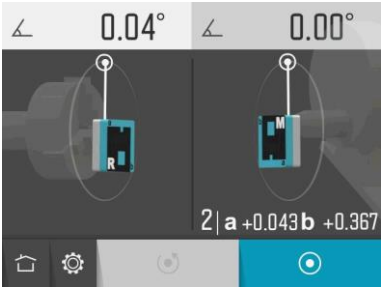


Move the tool holder with the SM sensor to the second measurement point.

Let the SM sensor stay at 0° and let the SR sensor stay at the position 180°.

Touch the measurement icon.

This registers the first measurement position at the second measurement point.



Rotate the SR sensor back to the measurement position at 0°.

Touch the measurement icon.

This registers the second measurement position at the second measurement point.

RESULT

The measurement result screen displays angle values in two directions, perpendicular to the machine bed slant and parallel to the machine bed slant.

The symbols, the diagram curve and the colour of the values show if the values are inside the selected tolerance or not.

Perpendicular direction in tolerance.

Perpendicular direction out of tolerance.

Parallel direction in tolerance.

Parallel direction out of tolerance.

Save the measurement result.

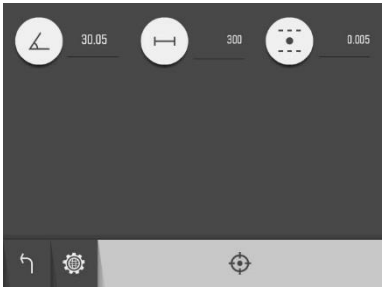
Re-measure.

The axes can be custom named (up to 3 characters) by touching them.

Name perpendicular axis.

Name parallel axis.

SETTINGS



The settings menu includes settings for Spindle measurement.

For most of the settings, the current selection is shown beside the icon.

Machine Bed Slant

Open window for machine bed slant settings.

Positions & Distances

Open window for position and distance settings.

Tolerance

Open window for tolerance settings.

Sensor Display

Open Sensor Display Machine Tool.

Global Settings

Open Global Settings.

Return

Return to the app.

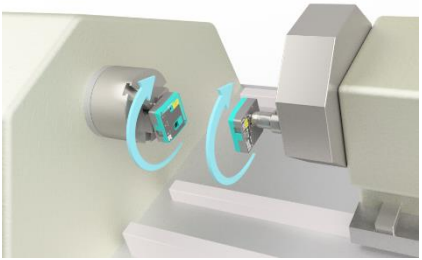
COAXIALITY

INTRODUCTION

The Coaxiality app is used to determine the direction of the rotational axis of a secondary spindle or a tool holder, in relation to a main spindle in a machine tool. The axis of rotation in the main spindle is used as a reference and the axis of rotation of the other object is measured in relation to that. The result is presented as an angular and offset deviation in two directions, perpendicular and parallel to the bed slant.

The Coaxiality app is also used to monitor the actual position of the secondary spindle or a tool holder during adjustment. During adjustment the app shows the offset and angular misalignment live in both directions.

MEASUREMENT METOD



The angular and offset misalignment of the secondary spindle (or tool holder) is determined by measuring the distance between the rotational center of the main and secondary spindle in two planes. The MEAX SR sensor is mounted on the main spindle (reference) and the MEAX SM sensor is mounted on the secondary spindle (or tool holder). The distance between the sensors are entered into the system. By rotating both

spindles and recording the radial displacements in 4 rotational angles, the distances between the rotational centers can be calculated and the angular and offset misalignment can be calculated.

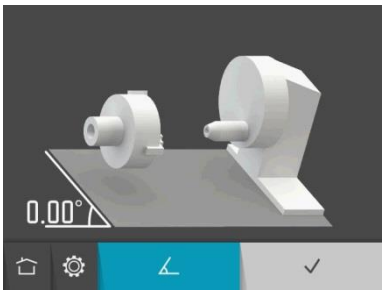
STARTING THE APP

Start the Coaxiality app by touching its icon in the Main Menu.

CONFIGURATION

Machine bed slant

When entering Coaxiality, the machine bed slant screen is displayed.



The machine bed slant is measured with the SM sensor.

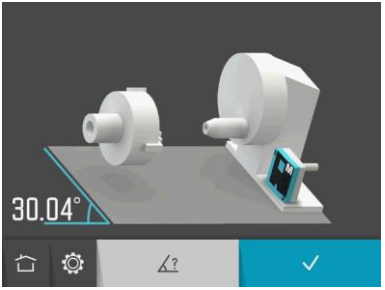
If you have an existent machine bed slant you just need to confirm it.

Measure machine bed slant.

Confirm existent machine bed slant.

Settings.

Home.



When measuring machine bed slant with the SM sensor, the angle value is displayed live.

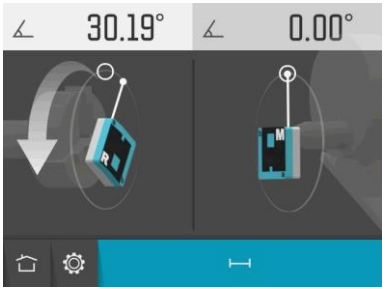
Place the SM sensor at the machine bed slant.

Confirm measured machine bed slant.

The machine bed slant can also be entered manually.

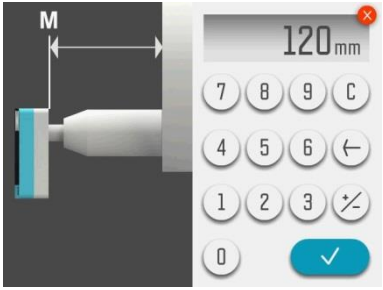
Enter machine bed slant manually.

Distances



Measure and enter distance between the sensors SR and SM.

Go to distances.



Measure and enter distance from the sensor SM to the turret front.

This gives the offset position.

MEASUREMENT

The screen displays the main spindle with the SR sensor to the left and the tool holder with the SM sensor to the right.

The rotational angles for each sensor are displayed at the top. These angles are relative to the machine bed slant.

The measurement is carried out by register values in four positions, 0°, 90°, 180° and 270°. The small circles show where to rotate the sensors.

NOTE: Both the sensors must be inside 0.1° at each position in order to get a good result.

Set the sensors at the first measurement position, at the rotational angle 0°.

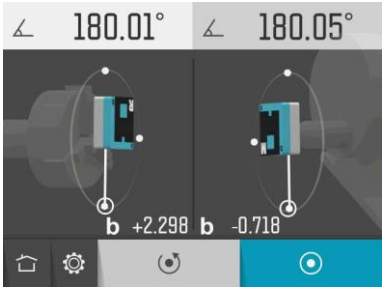
Touch the measurement icon.

This registers the first measurement position.

Rotate the sensors to the second measurement position, at the rotational angle 90°.

Touch the measurement icon.

This registers the second measurement position.



Rotate the sensors to the third measurement position, at the rotational angle 180°.

Touch the measurement icon.

This registers the third measurement position.

Rotate the sensors to the fourth measurement position, at the rotational angle 270°.

Touch the measurement icon.

This registers the fourth measurement position.

RESULT

The measurement result screen displays angle and offset values in two directions, perpendicular to the machine bed slant and parallel to the machine bed slant.

The symbols and the colour of the values show if the values are inside the selected tolerance or not.

Perpendicular direction in tolerance.

Perpendicular direction out of tolerance.

Parallel direction in tolerance.

Parallel direction out of tolerance.

Angle in tolerance.

Angle out of tolerance.

Offset in tolerance.

Offset out of tolerance.

Save the measurement result.

Re-measure.

The axes can be custom named (up to 3 characters) by touching them.

Name perpendicular axis.

Name parallel axis.

ADJUSTMENT

The adjustment screen displays the angle and offset values live.

Flashing axis symbols indicates that values are live.

Adjust the machine until all values are within tolerance.

To confirm the result, re-do the measurement.

Re-measure.

SETTINGS

The settings menu includes settings for Coaxiality.

For most of the settings, the current selection is shown beside the icon.

Machine Bed Slant

Open window for machine bed slant settings.

Distances

Open window for position and distance settings.

Tolerance

Open window for tolerance settings.

Sensor Display

Open Sensor Display Machine Tool.

Global Settings

Open Global Settings.

Return

Return to the app.

SQUARENESS

Under construction

11.2

MEMORY MANAGER

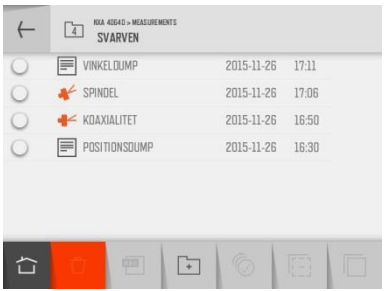
EXPRESS MANAGER

Under construction.

STANDARD MANAGER

In the Standard Manager all editing functions are available.

Open the Standard Manager from the Main Menu.



Measurements are sorted by date in folders.

Open file or folder

Touch a file or folder to open it.

Select files

Touch the check box to the left to select a file.

Select all files.
(Under construction)

Deselect all files.

Cut, Copy and Paste

Cut selected items.

Copy selected items.

Paste items that have been cut or copied.

New folder

Create a new folder.

Change name of file or folder

Change name of selected file or folder.

Delete

Delete selected items.

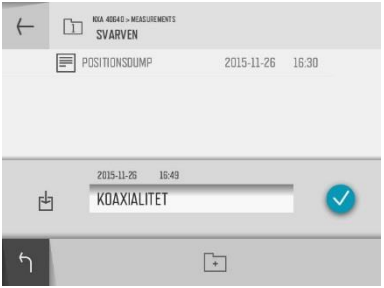
Folder up

Go up one level in the file structure.

Home

Home.

SAVE MEASUREMENT



Enter file name

Touch the white field to enter a file name.

Confirm

Confirm.

When saving a measurement, both a text file and a picture file (jpeg) are created.

In some apps there will also be a list file (lst) in the PC.

Recorded values from Sensor Displays will only generate a text file.

TRANSFER FILES TO A PC

Files can be transferred to a PC using a USB flash drive.

Express Manager

Express Manager is the easiest way to transfer files to a PC. See “Express Manager”.

Standard Manager

Standard Manager can also be used to transfer files to a PC.

Insert the USB flash drive in the USB port of the display unit, and the USB flash drive will be available in the Standard Manager.

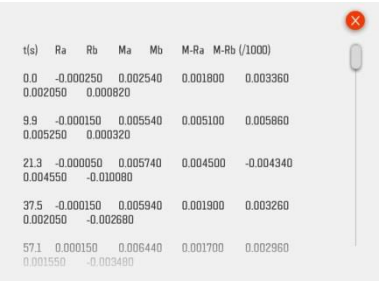
Files can be transferred to the USB flash drive with the cut/copy/paste functions in the Standard Manager.

The USB flash drive has to be open when pasting files.

Files in the PC

In the PC there will be two files for each measurement, a picture file (jpeg) and a text file. The picture file shows the same picture as in the memory. The text file shows just the measurement data.

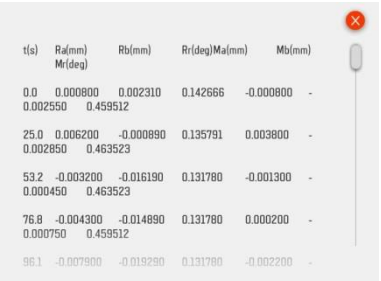
SENSOR DISPLAY LEVEL



The screen displays recorded values with a time stamp for each sampling.

Close.

SENSOR DISPLAY MACHINE TOOL



The screen displays recorded values with a time stamp for each sampling.

Close.

SPINDLE MEASUREMENT

The screen displays measurement results, positions, distance, machine bed slant, tolerance, axes names, file name, date and time, serial number of the display unit, program and program version.

Close.

COAXIALITY

The screen displays measurement results, positions, distances, machine bed slant, tolerances, axes names, file name, date and time, serial number of the display unit, program and program version.

Close.

GLOBAL SETTINGS

The global settings menu includes settings that are universal for all applications.

For most of the settings, the current selection is shown beside the icon.

The program version and serial number of the display unit is also shown on this screen.

Date and time

Open window for date and time settings.

Measurement unit

Open window for selection of measurement unit, mm or inch.

Bluetooth settings

Open window for Bluetooth settings.

Battery status

Open window for battery status information.

Backlight

Decrease Backlight.

Increase Backlight.

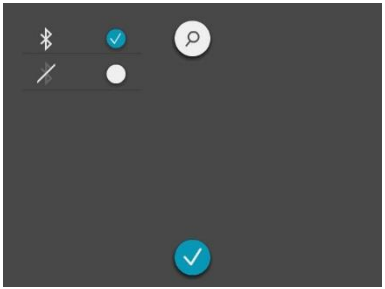
Service settings

Open service settings.
Requires access code.

Home

Home.

BLUETOOTH SETTINGS



Bluetooth communication

Bluetooth activated.

Bluetooth deactivated.

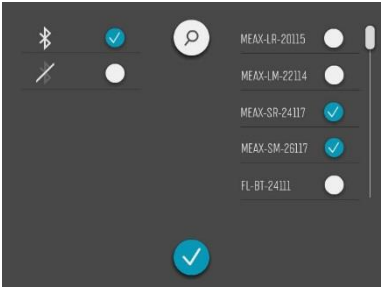
Pairing Bluetooth units

Touch the search icon to search for units that are pair able.

Search for Bluetooth units.

Pair able units appear in the list to the right.

Touch the white icon beside the units to pair.



Paired units are marked with a check mark.

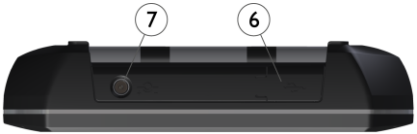
To unpair, touch the check mark icon beside the unit.

Confirm.

DISPLAY UNIT MEAX DU 01

1. 6.5” Touch screen
2. On button with status LED
   a. Continuously green – ON
3. Battery Status button – press to instantly show the battery status when the unit is switched off.
4. Display Unit battery status
   a. Continuously green – battery capacity
   b. Rolling green – charging
   c. First LED flashing red - <10% capacity
5. Measurement Unit battery status*

*) Will only work when the Display Unit is turned on and communicating with measurement units. If more than one measurement unit is used the LEDs will show the battery status of the measurement unit with the least charge.



6. USB master (IP 67)
7. External power (IP 67)

OPERATING MODES

The display unit has two operating modes: On and Off.

To turn on the unit, press the ON button.

To turn off the unit, touch the Off icon in the main menu.

In case the system fails to respond, it is possible to turn it off by pressing down the ON button for more than 15 seconds.

CONNECTIONS

The main connection for the Display Unit is the built in Bluetooth connection. See chapter “Global settings” for instructions on how to pair measurement units.

The USB master can be used with USB flash drives to transfer files to a PC for storage.

POWER SUPPLY

MEAX DU 01 is powered by a high-capacity rechargeable Li-Ion pack in the display unit, or by the external power unit.

The operating time of the batteries is approximately 8-10 hours when the system is used for a typical alignment work (continually on with 50% backlight).

To prolong the operating time the backlighting of the screen should be used moderately.

If the system turns off due to low power, the resume function will save the data. When the system is turned on again after battery recharge or connection of external power, you will be prompted to choose whether to return to the state when the unit was turned off (i.e. resuming operation without loss of data) or start the main menu.

The external power unit is connected to the external power connector on the display unit and to a wall socket with 110 - 240 Volts.

When the external power supply is connected, the unit will automatically start charging the batteries. This will be indicated by the battery status LED. The charging time is approximately 5-6 hours for fully drained batteries. The charging time will be longer if the unit is turned on while being charged.

When used in typical conditions the batteries will sustain good capacity for approximately 2-3 years before needing replacement. Contact your sales representative for battery re-placement.

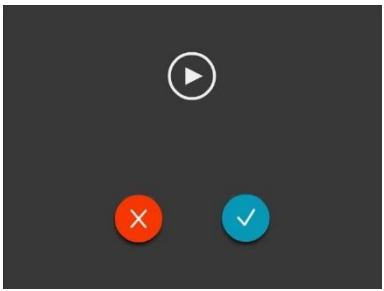
The batteries contain safety circuitry to operate safely with the display unit. The unit can therefore only be used with the Li-Ion batteries supplied by MEAX. Improper replacement of batteries can cause damage and risk for personal injury. Please refer to the chapter on safety for further instructions.

AUTO-OFF

In the Main Menu the system will turn itself off automatically after 60 minutes inactivity.

RESUME FUNCTION

If the system is turned off due to low power, the resume function will save the data.



When the system is turned on again after charging the batteries, you will be prompted to choose whether to return to the stage when the system was turned off (i.e. resuming operation without loss of data) or start the Main Menu.

Resume.

Close and start the Main Menu.

UPGRADING THE SOFTWARE

Upgrades to the software will be sent out or made available for download on our website. The upgrade will be in a compressed zip-file, there is no need decompress it.

Put the zip-file on a USB stick. Insert the USB stick in the display unit. The upgrade file will be automatically detected by the software and the following screen will appear.

You can choose between exiting (and not upgrading) or installing the new software version. The version numbers of the existing and the new software are displayed above the icons.

To proceed with the installation perform the following:

- Touch the confirmation icon to upload the new software.
- The box will turn itself off and reboot.
- The new software will be uploaded from the USB stick during the start up. This will take several minutes.

  DO NOT REMOVE the USB stick during the installation.
- When the upgrade is finished the system starts the MEAX application automatically.

DO NOT REMOVE the USB stick until the application has started up.

NOTE: If, after several minutes, the unit has not booted up and started the MEAX application, please check if the light from the status LED on the USB stick is flashing or constant.

- If it is flashing files are being transferred - this is OK, wait until the display unit starts.
- If there is no flashing the display unit will need to be manually rebooted. Turn the unit off by pressing the on/off button for more than 15 seconds. Turn the unit on with a short press on the on/off button. Wait for several minutes until the display unit starts.

Settings and stored measurements will not be affected by an upgrade.

If you have a USB stick with another software version than the current inserted in the display unit, the upgrade window will appear every ten seconds. Remove the zip-file from the USB stick to prevent this.

FLASH

MEAX software contains
Macromedia® Flash™ technology by Adobe Systems, Inc.

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CALIBRATING THE TOUCH SCREEN

In order to make the touch screen to respond to the icons on the display, it may be necessary to recalibrate it from time to time.

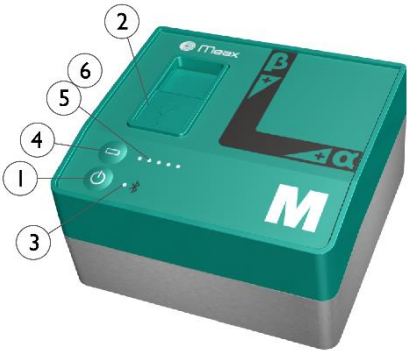
Screen calibration procedure:

- Start the system.
- Wait until the main menu appears.
- Press down on the screen somewhere outside of the icons for 10 seconds.
- The screen calibration function should start.
- Touch and hold down on the target displayed until it moves.
- Repeat the step above on the 4 new positions of the target.
- When the target disappears, touch somewhere on the screen to finish and store the settings. (If, after the calibration procedure, you don't touch the screen to confirm within 30 seconds the calibration procedure will start again.)

NOTE!

For best results please use a stylus for calibration.

SENSORS MEAX LM 201 AND LR 201



High precision 2-axes level sensors.

1. ON/OFF button with status indication LED
   a. Continuously green – On
2. Mini USB for charging
3. Bluetooth indication LED
   a. Continuously blue – paired and ready.
   b. Flashing blue – searching/ready to pair
   c. No light – Bluetooth disabled.
4. Battery status button – press to instantly show the battery status (also works when the unit is switched off).

5. Battery status LED

    a. One LED flashing red – less than 10% charge left.

    b. One LED double flashing red – less than 5% charge left.

    c. One LED continuously orange – charging

    d. One LED continuously green – fully charged.

6. Battery status LED when battery button is pressed

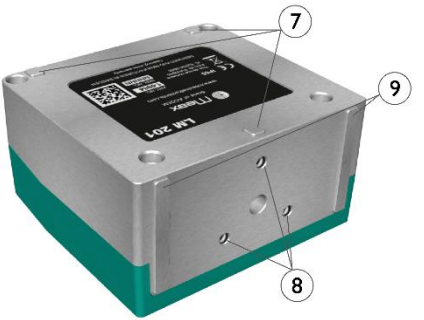
    a. Continuously green – battery status

    b. Rolling green – battery charging

7. Reference plane

8. Hole pattern for spindle holder

9. α reference



OPERATING MODES

MEAX LM 201 and LR 201 units has two operating modes: On and Off.

Turn the units on and off by pressing the ON/OFF button firmly.

In case the units fail to respond, it is possible to turn it off by pressing down the ON button for more than 10 seconds.

CONNECTIONS

Bluetooth connection

The main connection for LM 201 and LR 201 units is the built in Bluetooth connection.

See Bluetooth settings in the chapter “Global Settings” for instructions on how to pair measurement units with the app.

POWER SUPPLY

The LM 201 and LR 201 units are powered by a high-capacity rechargeable Li-Ion cell, or by the external power unit.

The operating time of the batteries is approximately 12 hours when the system is used for a typical measurement work (continuously on).

The LM 201 and LR 201 units can be charged with the supplied combined charger or any 5V USB charger or battery life extender.

When the external power supply is connected, the unit will automatically start charging the batteries. This will be indicated by the first battery status LED turning orange, when the unit is fully charged the LED will turn green. By pressing the battery status button the exact charging status can be monitored.

The charging time is approximately 8 hours for fully drained batteries. (Charging to 50% takes approximately 2 hours.) The charging

time will be longer if the unit is turned on while being charged.

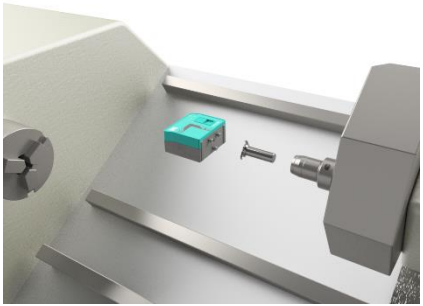
When used in typical conditions the batteries will sustain good capacity for approximately 2-3 years before needing replacement. Contact your sales representative for battery replacement.

The batteries contain safety circuitry to operate safely with the unit. The unit can therefore only be used with the Li-Ion batteries supplied by MEAX. Improper replacement of batteries can cause damage and risk for personal injury. Please refer to the chapter on safety for further instructions.

AXES

MEAX LM 201 and LR 201 measures the axes α and β.

MOUNTING



Mounting of the sensors are made by shafts ø16, fitting made for hydraulic chucks. In the spindle you must use a protective collet if the jaws are hardened.

You can either use the supplied protective collets with outer diameter of 20 mm, or you can use your own collets.

The LM and LR sensors can also be placed on their reference planes.

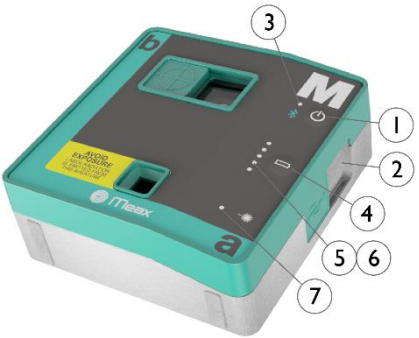
HANDLING

Warm up the sensors for 30 minutes before starting the measurement.

Do not measure with external power connected.

15.6

SENSORS MEAX SM 201 AND SR 201



Sensors with 2-axes detector, inclinometer and laser transmitter.

1. ON/OFF button with status indication LED
   a. Continuously green – On
2. Mini USB for charging
3. Bluetooth indication LED
   a. Continuously blue – paired and ready.
   b. Flashing blue – searching/ready to pair
   c. No light – Bluetooth disabled.
4. Battery status button – press to instantly show the battery status (also works when the unit is switched off).

5. Battery status LED

    a. One LED flashing red – less than 10% charge left.

    b. One LED double flashing red – less than 5% charge left.

    c. One LED continuously orange – charging

    d. One LED continuously green – fully charged.

6. Battery status LED when battery button is pressed

    a. Continuously green – battery status

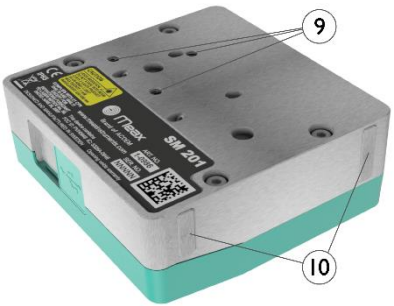
    b. Rolling green – battery charging

7. Laser status LED

8. Laser button (SR 201 only)

9. Hole pattern for spindle holder

10. Horizontal reference surfaces



OPERATING MODES

MEAX SM 201 and SR 201 units has two operating modes: On and Off.

Turn the units on and off by pressing the ON/OFF button firmly.

In case the units fail to respond, it is possible to turn it off by pressing down the ON button for more than 10 seconds.

CONNECTIONS

Bluetooth connection

The main connection for SM 201 and SR 201 units is the built in Bluetooth connection.

See Bluetooth settings in the chapter “Global Settings” for instructions on how to pair measurement units with the app.

POWER SUPPLY

The SM 201 and SR 201 units are powered by a high-capacity rechargeable Li-Ion cell, or by the external power unit.

The operating time of the batteries is approximately 10 hours when the system is used for a typical measurement work (continuously on).

The SM 201 and SR 201 units can be charged with the supplied combined charger or any 5V USB charger or battery life extender.

When the external power supply is connected, the unit will automatically start charging the batteries. This will be indicated by the first battery status LED turning orange, when the unit is fully charged the LED will turn green. By pressing the battery status button the exact charging status can be monitored.

The charging time is approximately 8 hours for fully drained batteries. (Charging to 50%

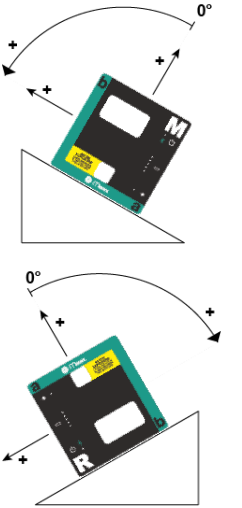
takes approximately 2 hours.) The charging time will be longer if the unit is turned on while being charged.

When used in typical conditions the batteries will sustain good capacity for approximately 2-3 years before needing replacement. Contact your sales representative for battery re-placement.

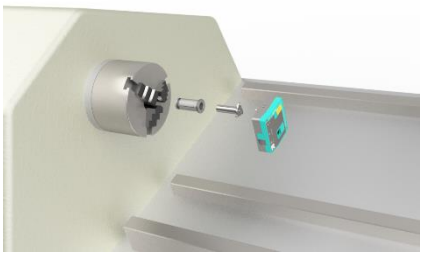
The batteries contain safety circuitry to operate safely with the unit. The unit can therefore only be used with the Li-Ion batteries supplied by MEAX. Improper replacement of batteries can cause damage and risk for personal injury. Please refer to the chapter on safety for further instructions.

AXES

MEAX SM 201 and SR 201 measures the axes b and a, and rotational angle.



MOUNTING



Mounting of the sensors are made by shafts ø16, fitting made for hydraulic chucks. In the spindle you must use a protective collet if the jaws are hardened.

You can either use the supplied protective collets with outer diameter of 20 mm, or you can use your own collets.

Mount the sensor SR in the main workhead spindle. (SR will represent the reference.)

Mount the sensor SM in the tool holder or in the opposite workhead spindle. (SM will represent the measured value.)

If the spindles have numerical control functions you can use that to achieve the positions the app are asking for. If not, you have to turn them manually. You can set the hydraulic pressure in the chuck on a level which gives the SM sensor stability but you can still rotate it between the measurement positions.

HANDLING

Warm up the sensors for 30 minutes before starting the measurement.

Do not measure with external power connected.

16.6

TECHNICAL SPECIFICATION – MEAX DU 01

Part No: 1-1013

Housing material	Brushed Anodized Aluminum frame and high impact ABS plastic over molded with TPE rubber
Operating temp	-10 to 50°C (14 to 122°F)
Storage temp	-20 to 70°C (-4 to 158°F)
Battery Charging Temp, system off	0 to 50°C (32 to 122°F)
Battery Charging Temp, system on	0 to 40°C (32 to 104°F)
Relative humidity	10 – 90%
Weight	1,2 kg (2,6 lbs) with battery
Dimensions	224mm x 158mm x 49mm (8,8 in x 6,2 in x 1,9 in)
Environmental protection	IP 65 (Dust tight and protected against water jets)
Processor	1 GHz Dual core main processor with ultra-low power core for instant power management
RAM memory	256 Mb
Flash storage memory	8 Gb >100 000 measurements

Display	Colour Reality Display, TFT-LCD backlit, sunlight readable, with wide angle viewing technology
Display size	6,5” (165mm) diagonal (133 x 100 mm)
Display resolution	Full VGA 640x480 pixels
Colour depth	262 000 colours
Interface	6,5” High Impact Polyester laminated touch screen with enhanced transmission and reduced glare
Gyroscope	6-Axis MEMS Inertial Motion Sensor with drift compensation and automatic field calibration.
Connectors	1 USB 2.0 Master port (IP67) 1 Power/Charger connector 10-14V DC (IP67)
Wireless communication	Class I Bluetooth transmitter with multi-drop capability
Power supply	High performance, High Temperature rechargeable Li-Ion battery or external power supply
Peripherals – User accessible	1 USB Mini port; Charging: 5V, 0,5A
Power supply	High performance Li Ion battery or external power.

Operating time	10 hours continuous use (with 50% LCD backlight)
Battery charging time (system off, room temperature)	5 h
Battery capacity	48.8 Wh
LED indicators	Unit state and 2x5 battery state indicators with instant battery check

Specifications are subject to change without notice.

17.4

TECHNICAL SPECIFICATION – MEAX LM 201 AND LR 201

Part No LM 201: 1-0984, LR 201: 1-0985

Housing material	Anodized Aluminum and ABS plastic
Operating temp	15 to 30°C (59 to 86°F)
Storage temp	-20 to 70°C (-4 to 158°F)
Battery charging temp	0 to 40°C (32 to 104°F)
Relative humidity	10 – 90%
Weight	386 g (13.6 oz)
Dimensions	77 mm x 84 mm x 45 mm (3.0 in x 3.3 in x 1.8 in)
Environmental protection	IP 65 (Dust tight and protected against water jets)
Inclinometer	High performance MEMS inclinometers
Calibrated measuring range	±50 mm/m
Internal resolution	0.001 mm/m
Displayed resolution	0.001 mm/m
Inclinometer accuracy	1% ± 0.005 mm/m
Temperature error	0.015 mm/m/°C
Stabilization time	18 s

Warming up time	30 min
Wireless communication	Class I Bluetooth transceiver with multi-drop capability. BLE Bluetooth Low Energy (BT 4.0) and Classic Bluetooth.
Communication range	10 m (33 ft)
Peripherals – User accessible	1 USB Mini port; Charging: 5V, 0,5A
Power supply	High performance Li Ion battery or external power.
Operating time	12 hours continuously
Battery charging time (system off, room temp)	8 h
Battery capacity	10.4 Wh
LED indicators	Unit state, battery status and Bluetooth status.

Specifications are subject to change without notice.

TECHNICAL SPECIFICATION – MEAX SM 201 AND SR 201

Part No SM 201: 1-0984, SR 201: 1-0985

Housing material	Anodized Aluminum and ABS plastic
Operating temp	15 to 30°C (59 to 86°F)
Storage temp	-20 to 70°C (-4 to 158°F)
Battery charging temp	0 to 40°C (32 to 104°F)
Relative humidity	10 – 90%
Weight	306 g (10.9 oz)
Dimensions	82 mm x 86 mm x 33 mm (3.2 in x 3.4 in x 1.3 in)
Environmental protection	IP 65 (Dust tight and protected against water jets)
Laser	650 nm class II diode laser
Laser power	< 1 mW
Measurement distance	Up to 3 m
Detector	2-axis PSD
Detector size	16 mm x 16 mm (0.6 in x 0.6 in)
Detector resolution	1 µm
Measurement accuracy	1% ± 3 µm

Ambient light protection	Optical filtering and ambient light signal rejection
Inclinometer resolution	0.01°
Inclinometer accuracy	±0.1°
Warming up time	30 min
Wireless communication	Class I Bluetooth transceiver with multi-drop capability. BLE Bluetooth Low Energy (BT 4.0) and Classic Bluetooth.
Communication range	10 m (33 ft)
Peripherals – User accessible	1 USB Mini port; Charging: 5V, 0,5A
Power supply	High performance Li Ion battery or external power.
Operating time	10 hours continuously
Battery charging time (system off, room temp)	8 h
Battery capacity	10.4 Wh
LED indicators	Unit state, laser transmission, battery status and Bluetooth status

Specifications are subject to change without notice.

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