RIFTEK
Sensors & Instruments

GYPSUM PLASTERBOARD GEOMETRY CONTROL SYSTEM

3DGypsumB Series

User's manual

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Contents

1. Safety precautions

- Only persons who have studied this Manual are allowed to service the Gypsum Plasterboard Geometry Control System 3DGypsumB (hereinafter referred to as the system).
- Use supply voltage and interfaces indicated in the system specifications.
- When connecting/disconnecting cables, the system must be powered off.
- Do not use the system in locations close to powerful light sources.

2. CE compliance

The system has been developed for use in industry and meets the requirements of the following Directives:

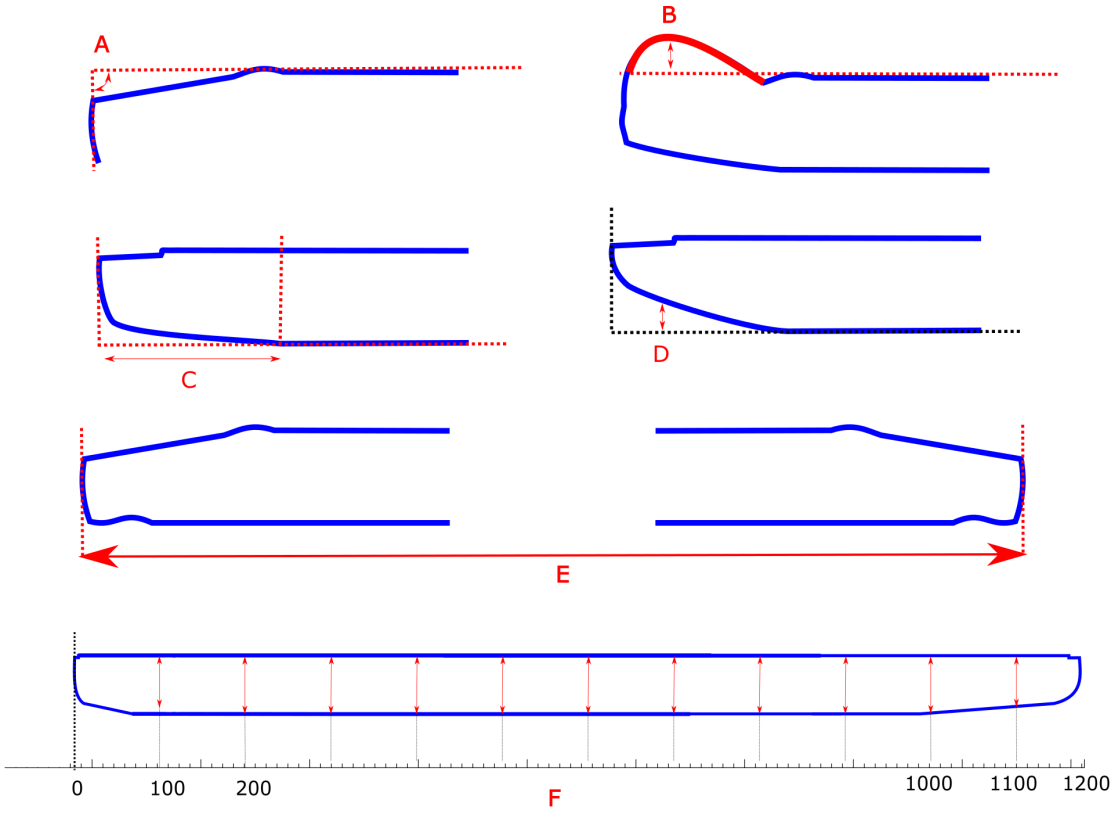
- EU directive 2014/30/EU. Electromagnetic compatibility (EMC).
- EU directive 2011/65/EU, “RoHS“ category 9.

3. General information

The system is designed to measure and control the geometric parameters of gypsum plasterboards during production.

4. Controlled parameters

The system performs measurement, display (both in digital and graphical form), and tolerance control of the following parameters:



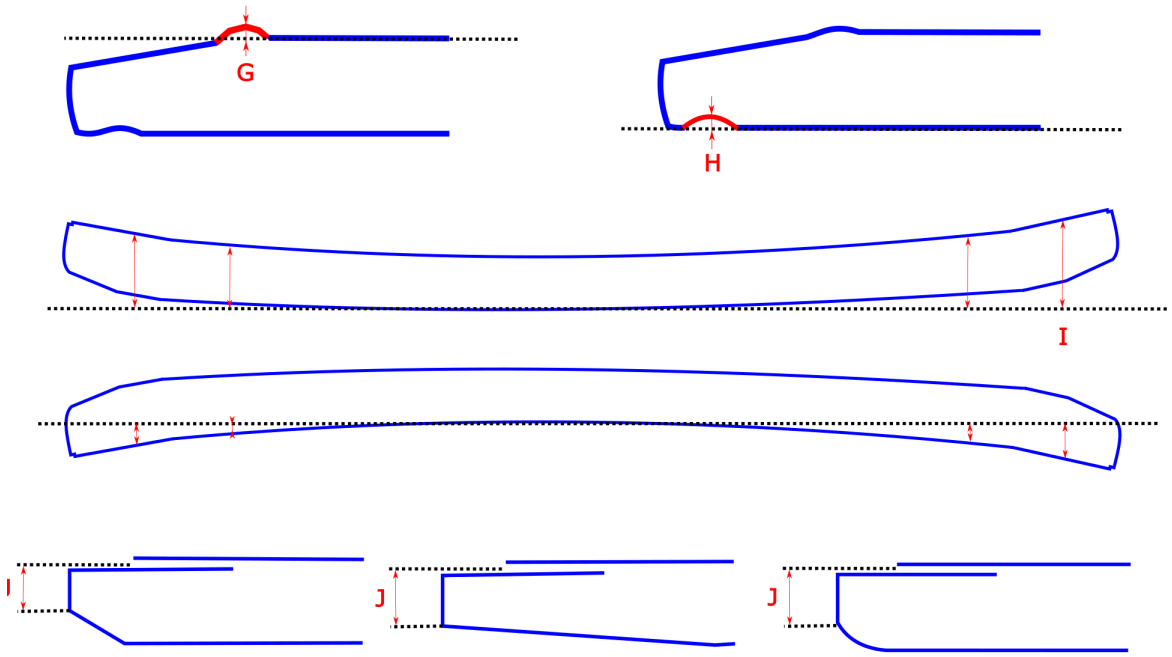


Figure 1 - Controlled parameters

Designations:

A - Edge angle (the angle between the top surface of the board and the side edge).

B - Shoulder (the maximum deviation of the upper edge of the board from its main surface).

C - Taper length (the distance from the start of the edge to the end of the thinning of the edge).

D - Taper depth (the distance from the bottom baseline to the bottom edge at a given horizontal position).

E - Board width (the distance between the board edges).

F - Board thickness.

G - Rim.

H - Groove.

I - Raising/lowering (lifting) the board edges.

J - Edge width.

5. Structure and operating principle

5.1. Structure

The 3DGypsumB system contains three measuring stations located along the production line.

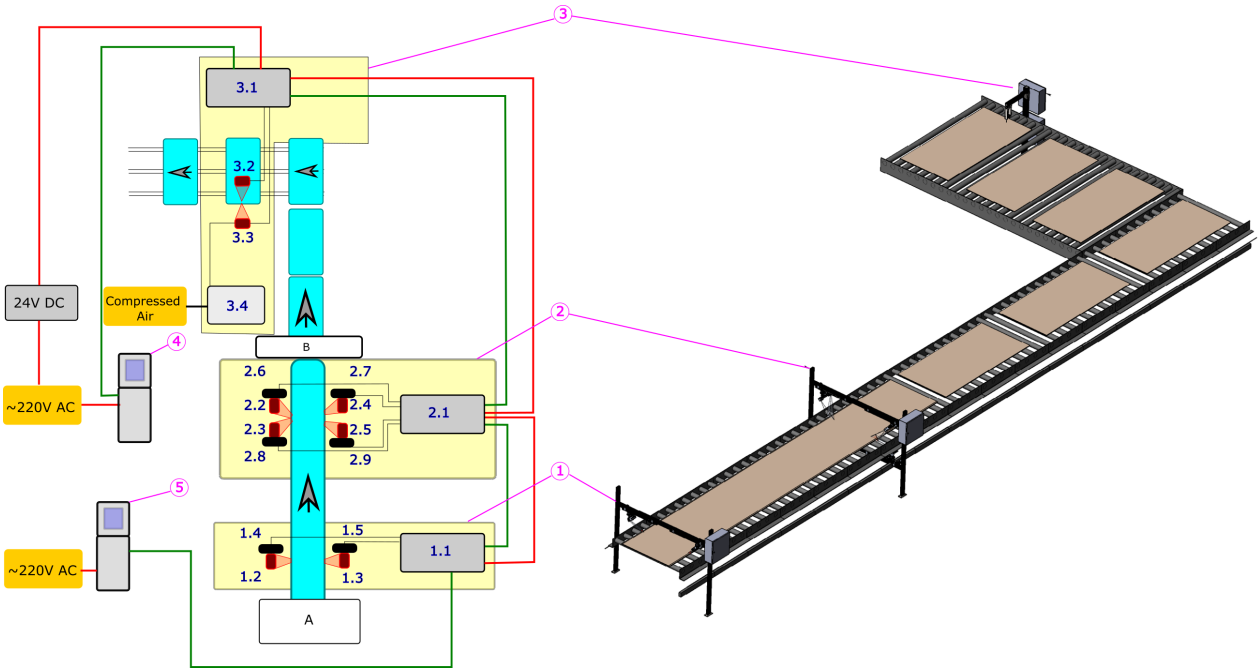


Figure 2 - Functional block diagram of the 3DGypsumB system

Designations:
1 – Measuring station 1.
2 – Measuring station 2.
3 – Measuring station 3.
4 – Additional operator terminal.
5 – Central computer.
A – Mixer / molding.
B – Slicing.
Red lines – 24V power supply (generated by the system).
Green lines – Ethernet network of the system.

5.1.1. Station 1

Measuring station 1 is designed to control:

- board width,
- edge angle,
- edge width (optional).

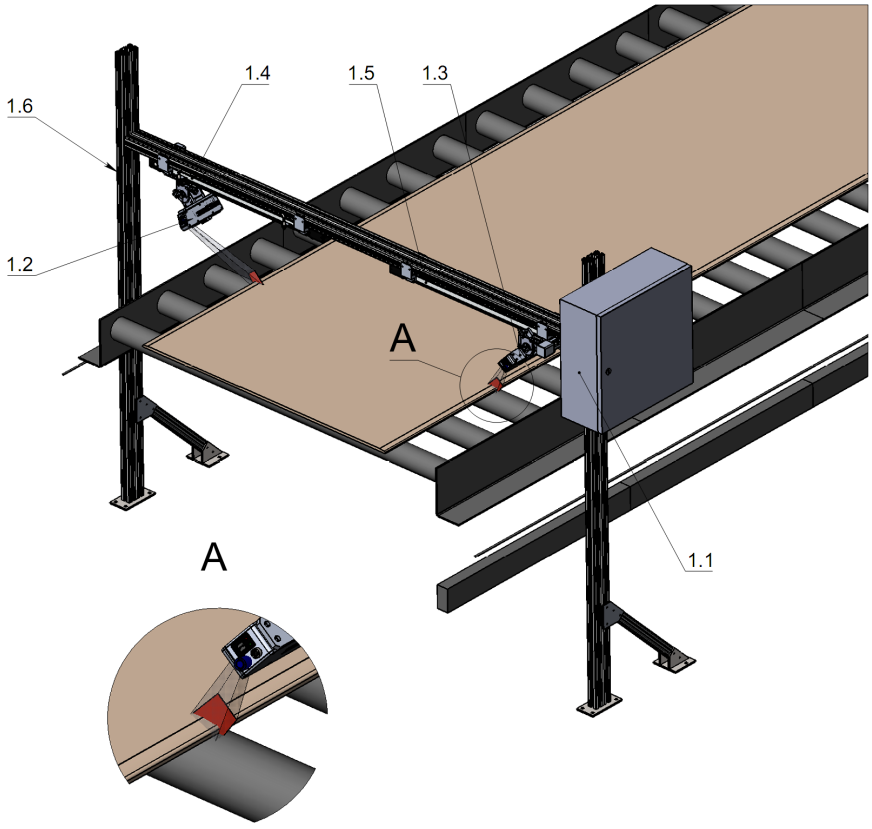


Figure 3 - Measuring station 1

Station 1 contains a frame (1.6) carrying 2D laser scanners (1.2 and 1.3) mounted at an angle to the board surface. To measure boards of different widths, scanners are installed with the possibility of transverse movement in a direction perpendicular to the direction of the conveyor.

There are two options for mounting scanners:

1) with automatic movement (1.4 and 1.5),

2) with manual movement.

The scanners are positioned so that the edges of the board are in their field of view. The distance between the scanners is calibrated using a master template (see Calibration procedure). Changing the board width requires shifting the scanners and recalibrating. For systems with automatic movement, recalibration is not required as the scanners are positioned automatically.

Switchboard (1.1) contains control drivers for displacement modules (optional) and means for connecting the scanners to the Ethernet network of the system.

As the board passes along the conveyor, laser scanners continuously monitor the profile of the edge and its position, the measurement results are transmitted to the central computer.

5.1.1.1. Overall and mounting dimensions

Dimensions of Station 1 with automatic movement of laser scanners are shown in the figure and can be changed upon request:

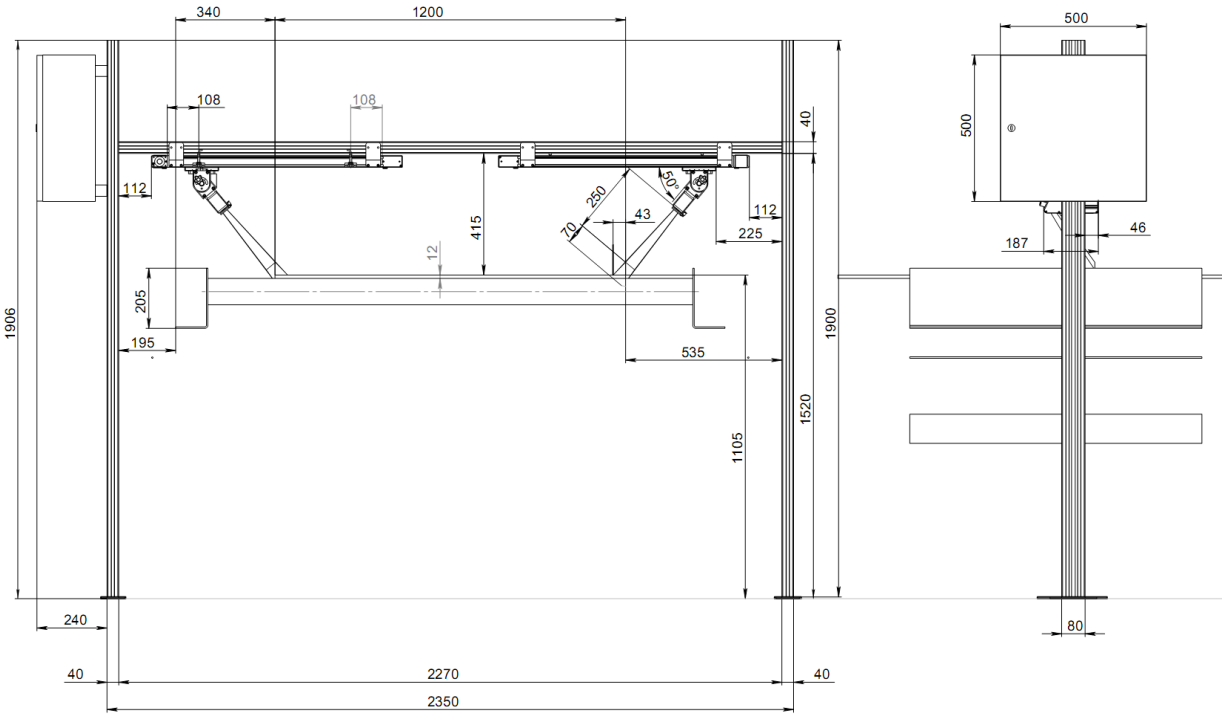


Figure 4 - Overall and mounting dimensions of Station 1

5.1.2. Station 2

Measuring station 2 is designed to control:

- board width,
- profile of board edges with adjacent surfaces, including control of edge shoulder, length and width of taper, rim and groove (optional),
- rising/lowering edges (optional).

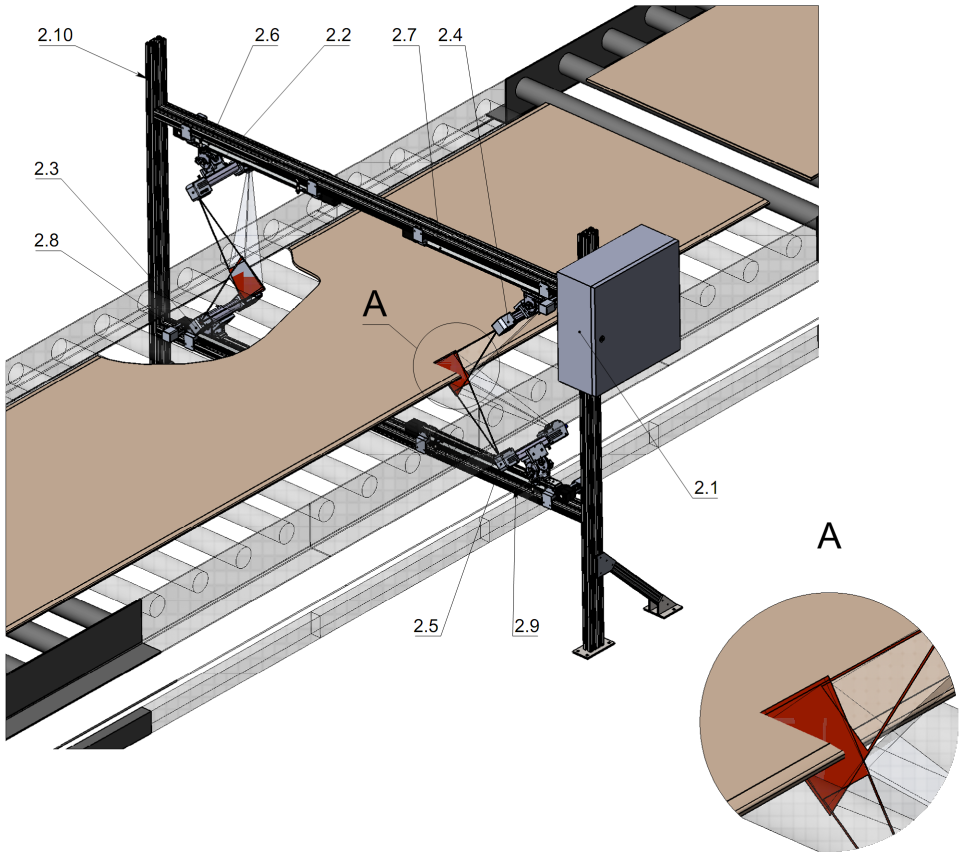


Figure 5 - Measuring station 2

Station 2 contains a frame (2.10) that covers the conveyor and carries four 2D laser scanners 2.2, 2.3, 2.4, 2.5 mounted at an angle to the board surface. To measure boards of different widths, scanners are installed with the possibility of transverse movement in a direction perpendicular to the direction of the conveyor.

There are two options for mounting scanners:

1) with automatic movement (2.6, 2.7, 2.8, 2.9),

2) with manual movement.

The scanners are positioned so that the edges of the board are in their field of view. The distance between the scanners is calibrated using a master template (see Calibration procedure). Changing the board width requires shifting the scanners and recalibrating. For systems with automatic movement, recalibration is not required as the scanners are positioned automatically.

Switchboard (2.1) contains control drivers for displacement modules (optional) and means for connecting the scanners to the Ethernet network of the system.

When passing along the board, laser scanners continuously control the profile of the board edge, as well as the areas of the upper and lower board surfaces adjacent to the edge. The scanning range is about 100 mm, starting from the edge of the board. Profile parameters as well as the distance between scanners are transmitted to a central computer.

5.1.2.1. Overall and mounting dimensions

Dimensions of Station 2 with automatic movement of laser scanners are shown in the figure and can be changed upon request:

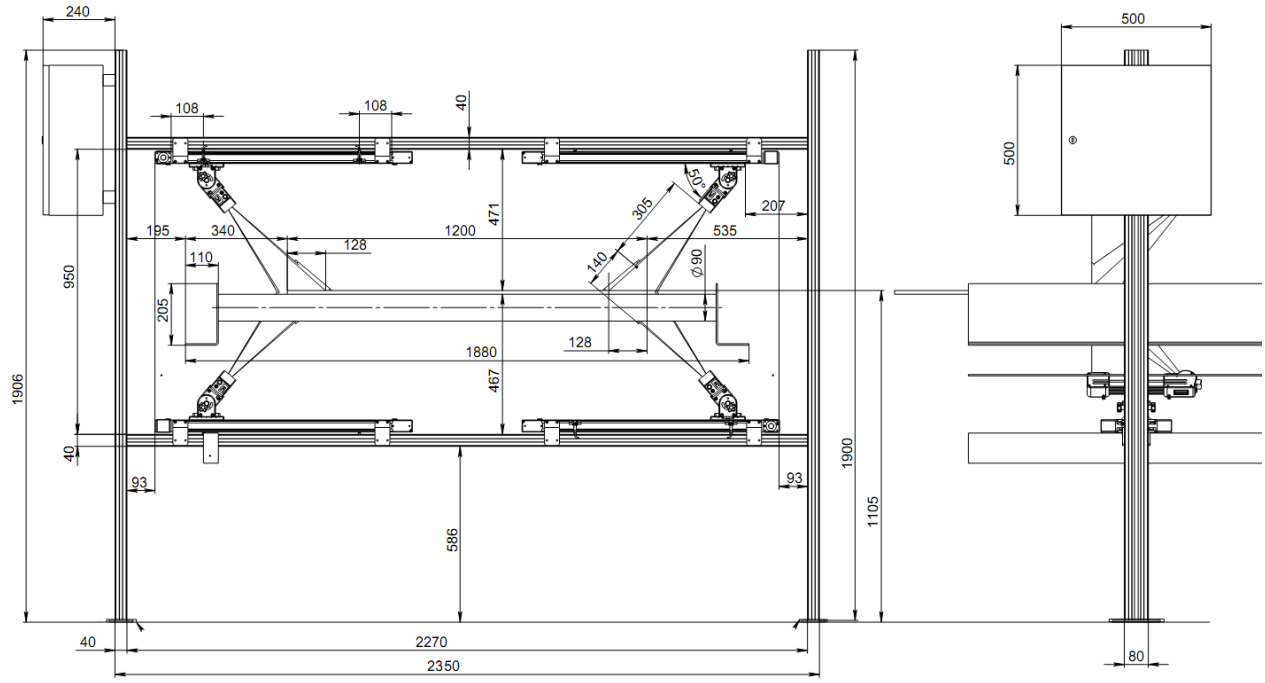


Figure 6 - Overall and mounting dimensions of Station 2

5.1.3. Station 3

Measuring station 3 is designed to control:

- board thickness.

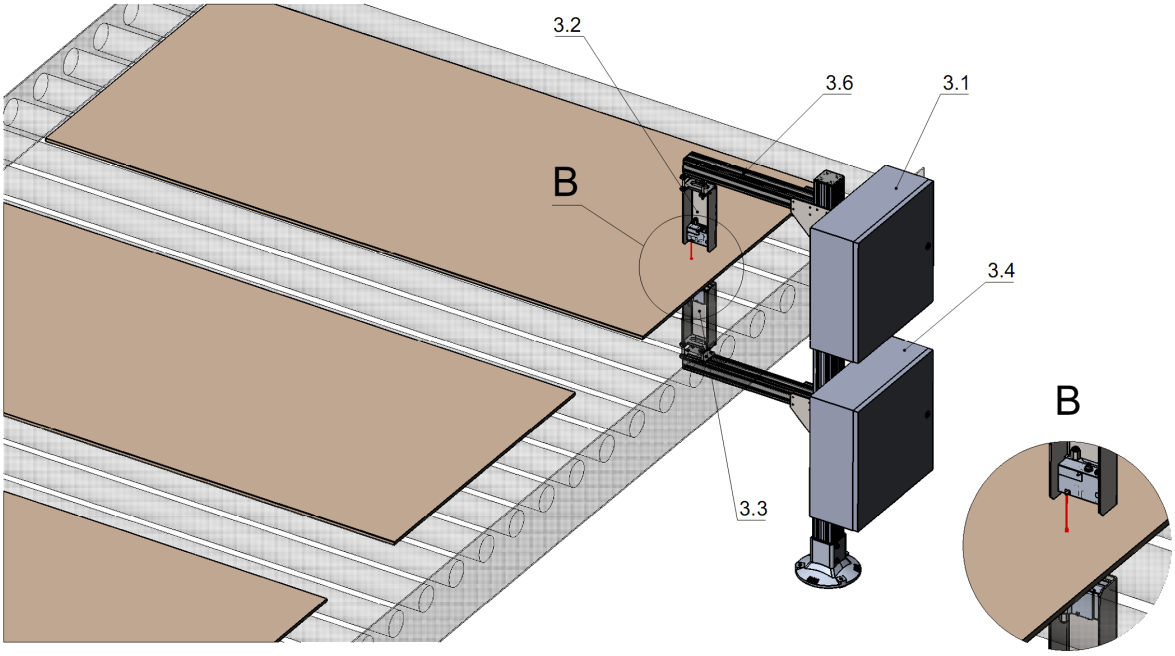


Figure 7 - Measuring station 3

Station 3 contains C-frame (3.6), on which two point laser triangulation sensors (3.2 and 3.3) are installed on opposite sides of the board. To prevent contamination, the lower sensor is equipped with a blowing system (3.4). Switchboard (3.1) contains means for connecting the sensors to the Ethernet network of the system.

The distance between the laser sensors is pre-calibrated using the tools supplied (see Calibration procedure). When passing along the board, laser sensors continuously control the distance to the top and bottom surfaces of the board. The readings from the sensors are transmitted to a central computer, which calculates the thickness of the board.

5.1.3.1. Overall and mounting dimensions

Dimensions of Station 3 are shown in the figure and can be changed upon request:

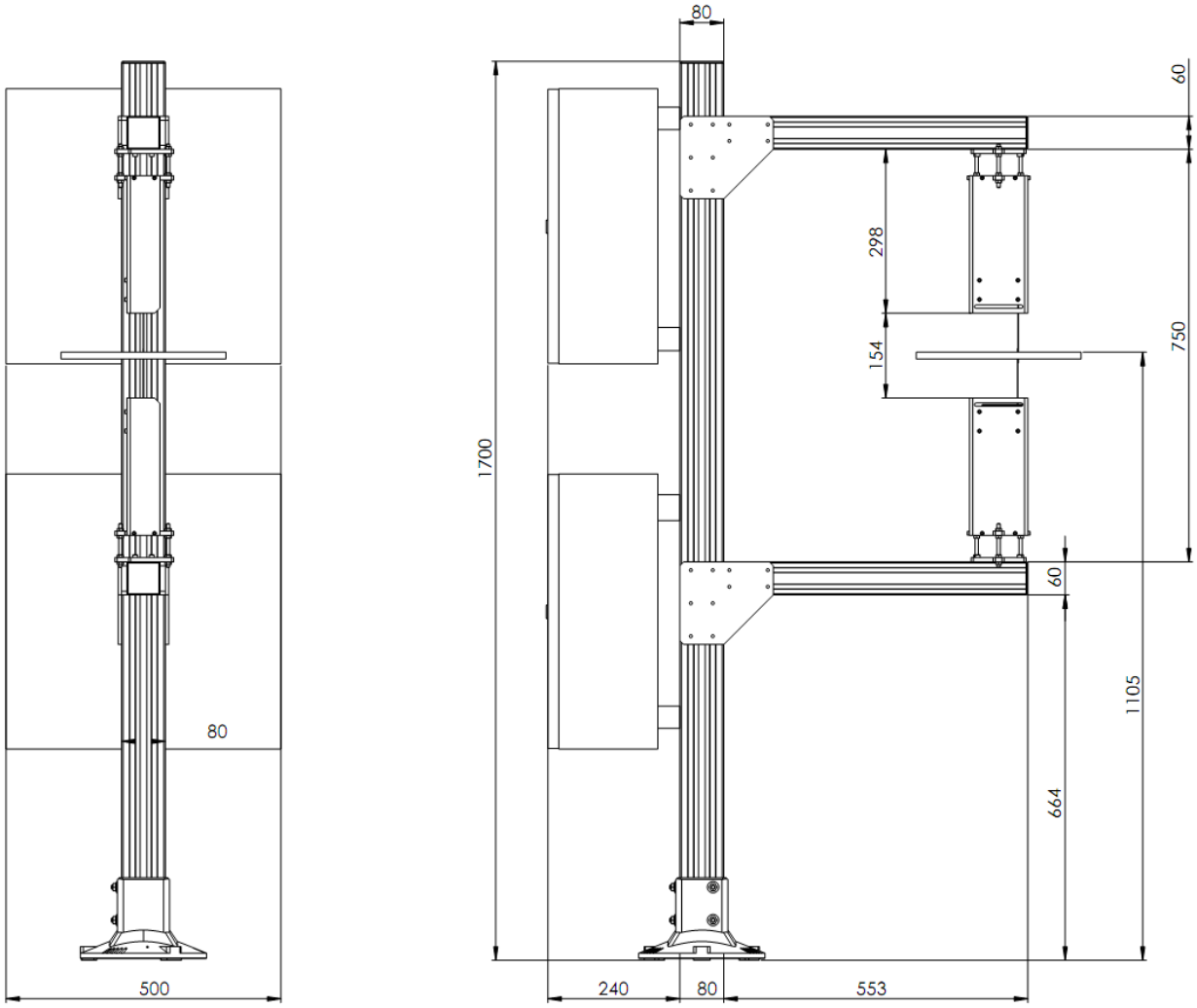


Figure 8 - Overall and mounting dimensions of Station 3

5.2. Operating principle

As the gypsum boards move along the conveyor, they are continuously measured by the system's sensors.

Information from sensors is processed on a central computer using the supplied software (hereinafter referred to as the software). If the values of the parameters are outside of tolerances, a corresponding warning is displayed on the screen of the central computer and the additional operator terminal.

6. Basic technical data

6.1. System

Parameter	Value
Measurement object	Gypsum plasterboards (sheets) with straight, rounded and beveled edges
Width range, mm	400…1400
Thickness range, mm	2…45
Thickness measurement error, mm	±0.1
Width measurement error, mm	±1
Profile measurement error, mm	±0.1
Range of linear displacement modules, mm	800
Linear positioning error of laser scanners, mm	±0.02
Power supply	220 V, 400 W
Computer	Industrial computer, 19” touch screen (central computer) 17” touch screen (additional terminal)
Dimensions of computer consoles, mm	1509x800x550 (central), 1509x600x550 (additional)

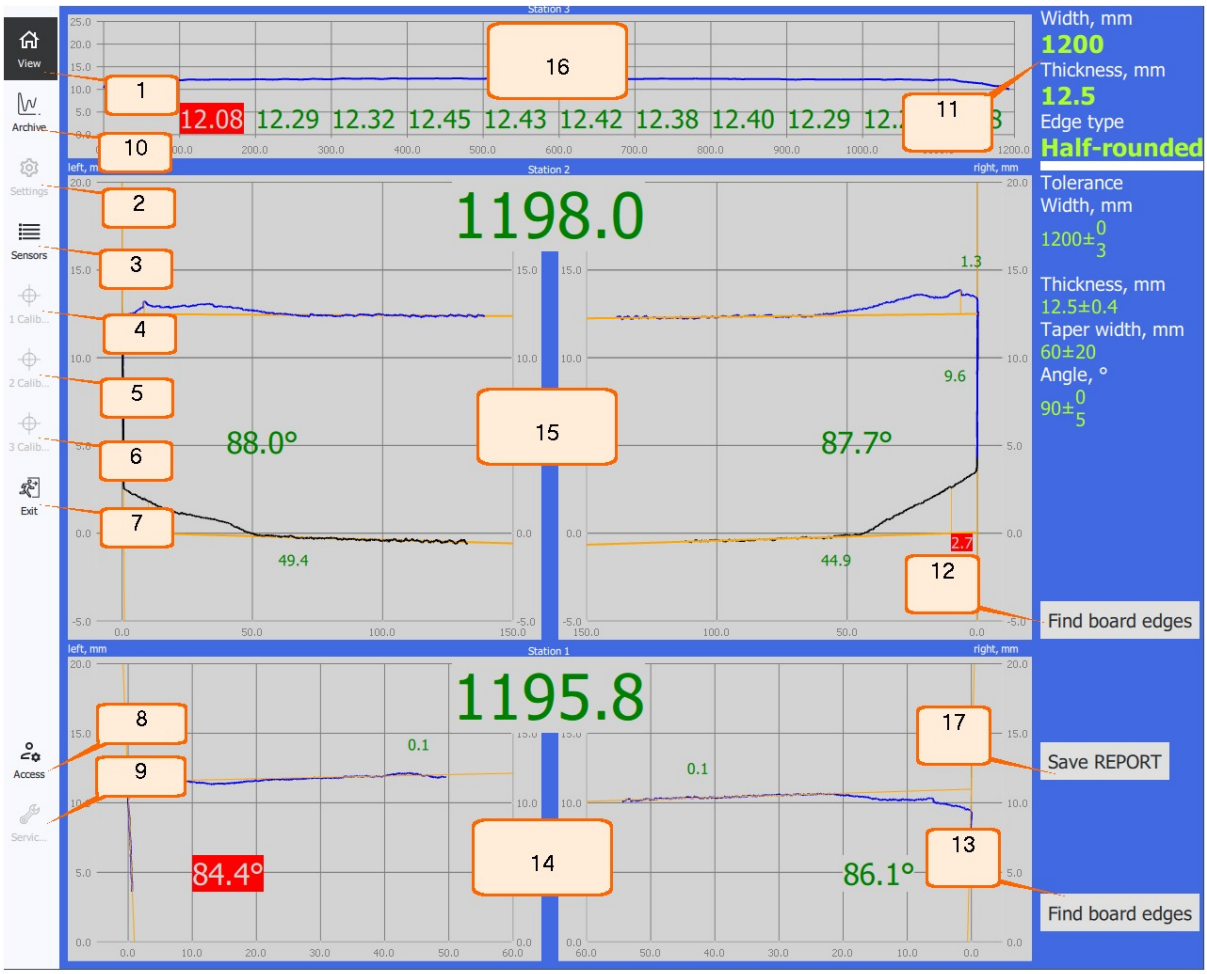
6.2. Sensors

Parameter	Value
General parameters of 2D laser scanners	
Sampling rate, profiles/s	1500
Resolution, points along the laser line	1296
Laser, wavelength	660 nm (red)
Laser safety class according to IEC/EN 60825-1:2014	2M
Enclosure rating	IP67
Operating ambient temperature, °C	-20…+45
Station 1: RF627- 245/70-40/50	
Base distance, mm	245
Range Z (depth), mm	70
Range X, mm	40…50
Measurement error, mm	±0.03
Station 2: RF627- 245/140-110/140	
Base distance, mm	245
Range Z (depth), mm	140
Range X, mm	110…140
Measurement error, mm	±0.07
Station 3: RF603-80/25-ET	
Base distance, mm	80
Range Z (depth), mm	25
Measurement error, mm	±0.01
Rate, measurements/s	9400
Laser, wavelength	660 nm (red)
Laser safety class according to IEC/EN 60825-1:2014	2
Enclosure rating	IP67
Operating ambient temperature, °C	-20…+50

7. Software

7.1. Main window

After turning on the system and starting the software on the central computer, the window shown below appears.

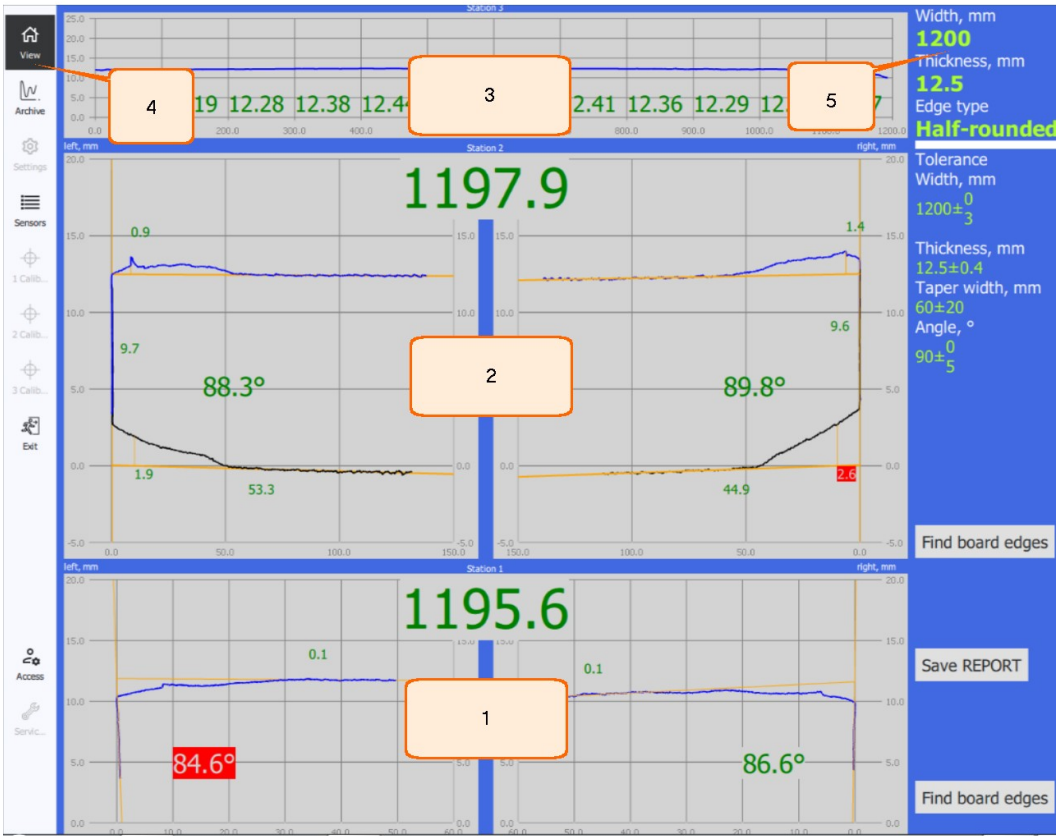


On the left side of the window there are menu buttons that can be grouped into two sections according to their main functions:

1. *View* – The main section of the program (1). This section displays all the necessary information about the measurement results (14, 15, 16), the history of measurements (10), current settings (11), the buttons for automatic search for board edges on measuring stations #1 (13) and #2 (12), and the button for saving the current readings of the sensors to analyze the anomalous behavior of the system (17). Button for viewing the status of sensors (3). Button for closing the program (7).
2. *Settings* – Menu sections intended for setting software parameters (2) and calibrating three measuring stations (4, 5, 6). Sections are activated by button (8) after entering the password. Button (9) is intended for maintenance of the system by the manufacturer and is always inactive.

7.2. "View" section

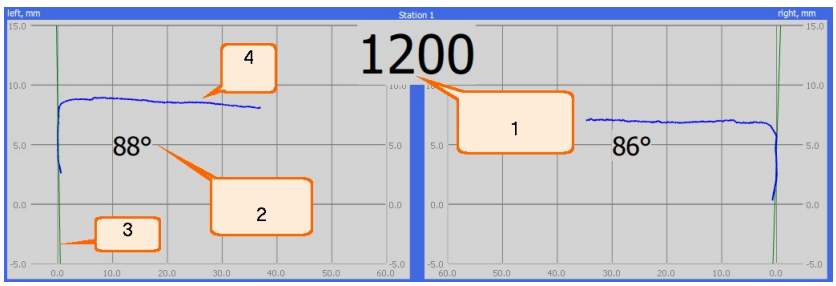
The **View** section is designed to display the measurement results.



#	Name	Description
1	"Station 1" panel	Displaying the profile of the upper edge of the board obtained at station #1 (left and right edges).
2	"Station 2" panel	Displaying the profile of the upper edge of the board obtained at station #2 (left and right edges).
3	"Station 3" panel	Displaying the profile of the board obtained when measuring its thickness at station #3.
4	"View section" button	The main section of the program.
5	"Current settings" panel	Current system settings (width, thickness, edge type) and tolerances.

7.2.1. "Station 1" panel

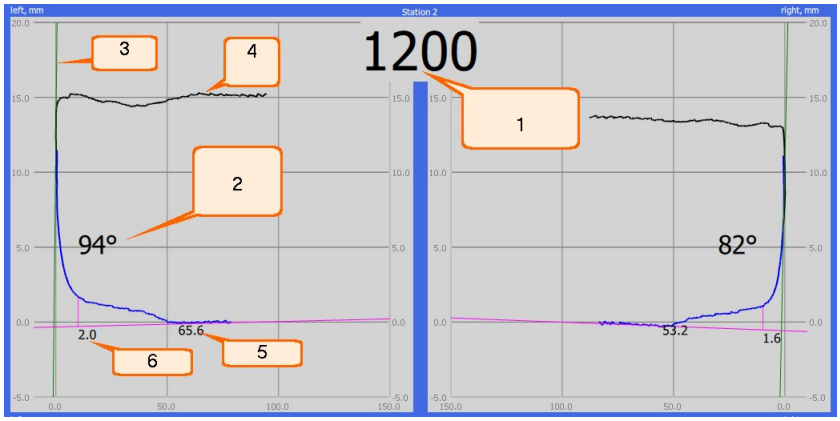
This panel is designed to display and control the profile of the upper part of the left and right edges of the board obtained using two laser scanners at Station 1 (see Main window, 14).



#	Name	Description
1	Board width indicator	Displaying the board width at the location where the board edges are measured at Station #1.
2	Edge angle indicator	Displaying the angle between the side edge and the surface of the board (see Controlled parameters, A).
3	Edge indicator	Displaying the edge line.
4	Edge profile	Displaying the profile of the board edge obtained by a laser scanner.

7.2.2. "Station 2" panel

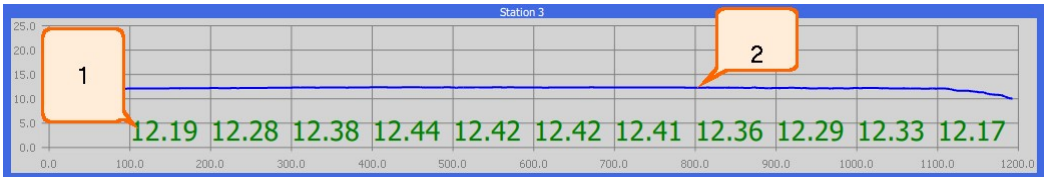
This panel is designed to control the profile of the upper part of the left and right edges of the board, obtained using four laser scanners at Station 2 (see Main window, 15).



#	Name	Description
1	Board width indicator	Displaying the board width at the location where the board edges are measured at Station #2.
2	Edge angle indicator	Displaying the angle between the side edge and the surface of the board (see Controlled parameters, A).
3	Edge indicator	Displaying the edge line.
4	Edge profile	Displaying the profile of the board edge that combines the readings of the upper and lower laser scanners.
5	Taper length indicator	Displaying the length of the bottom edge thinning (see Controlled parameters, C).
6	Taper depth indicator	Displaying the depth of the bottom edge thinning (see Controlled parameters, D).

7.2.3. "Station 3" panel

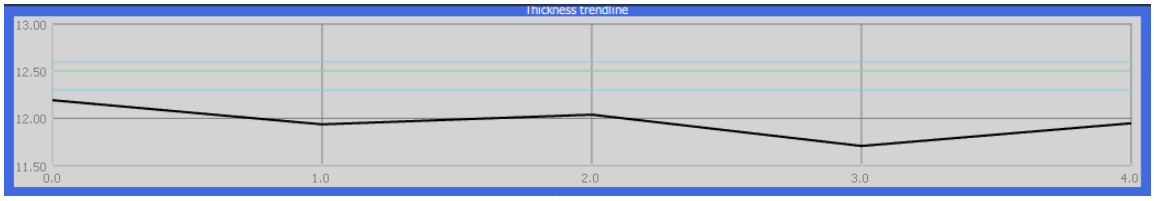
This panel is designed to control the board thickness obtained using two point laser triangulation sensors at Station 3 (see Main window, 16).



#	Name	Description
1	Board thickness indicator	Displaying the value of the board thickness at the specified position (see Controlled parameters, F).
2	Board thickness profile	Displaying the profile obtained when the board passes through Station #3.

7.2.4. "Trends" panel

This panel displays the trend line (history of changes) of the specified parameter (see Main window, 17).



The graph displays the most recently measured values along with the target value and tolerance lines.

7.2.5. "Information" panel

This panel displays the current width, thickness and type of edge, as well as the current parameters and their tolerances.

The settings can be changed in the **Settings** menu (see Main window, 2).

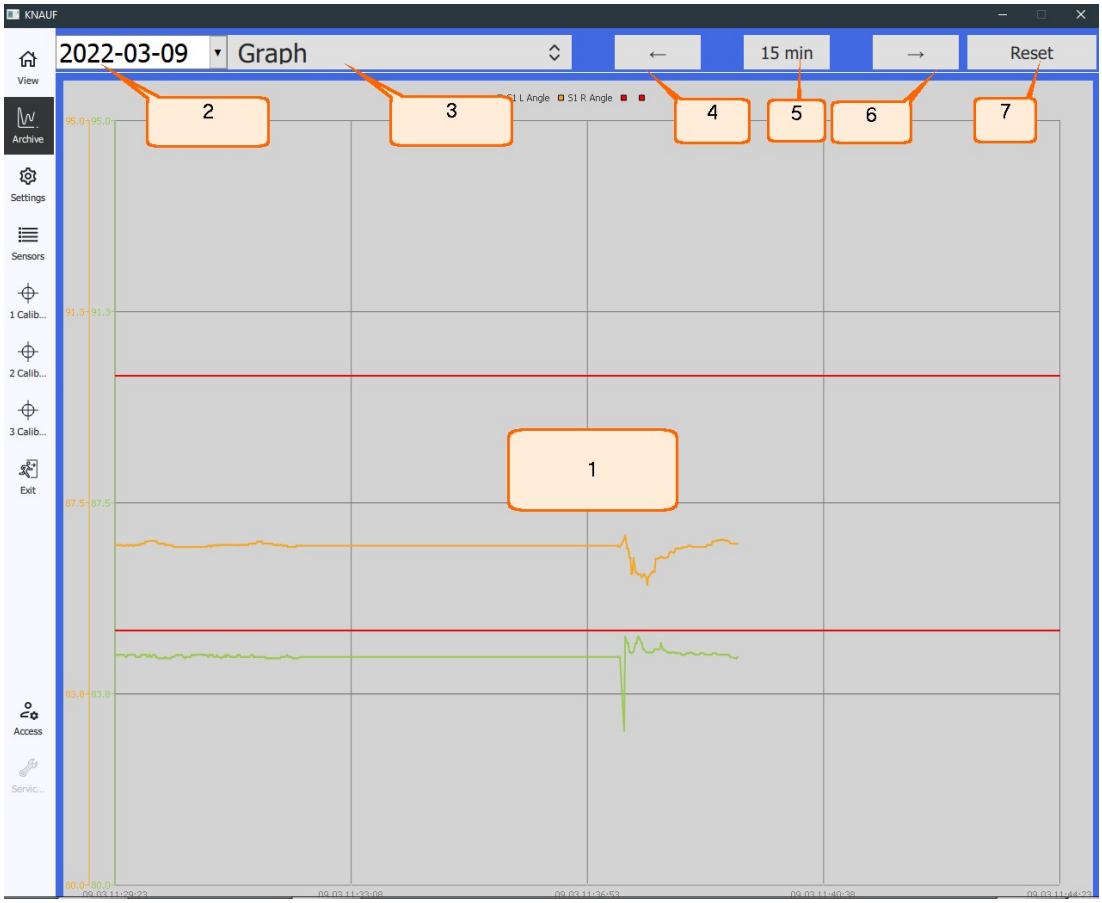
7.2.6. "Find board edges" button

Clicking this button starts automatic search for board edges (see Main window, 13 and 12) and is used for the "automatic movement of scanners" option.

You must click this button if there are no board edges in the scanners' field of view at measuring station #1 and/or #2.

7.3. "Archive" section

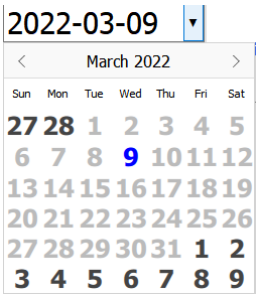
The **Archive** section is designed to display the measurement results for a specific date.



#	Name	Description
1	«Graph» panel	Displaying a graph of parameter changes over time. Tolerance lines are shown as horizontal red lines.
2	«Date» panel	Selecting the measurement date.
3	«Parameter» panel	List of parameters to display as graphs (1).
4	«Move left» button	Moving the time interval (5) to the left.
5	«Time interval» button	Specifying the time interval for graphs (1).
6	«Move right» button	Moving the time interval to the right.
7	«Reset» button	Setting the default time interval.

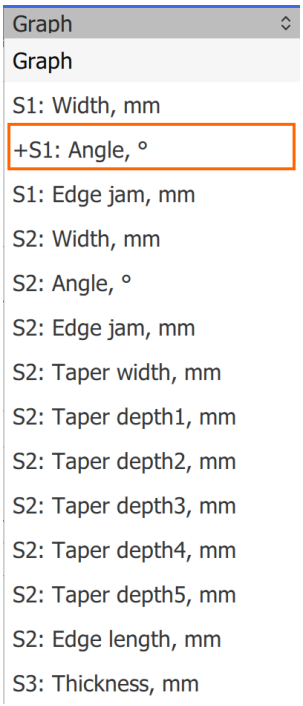
7.3.1. "Date" panel

This panel is designed to select the measurement date (see "Archive" section, 2).



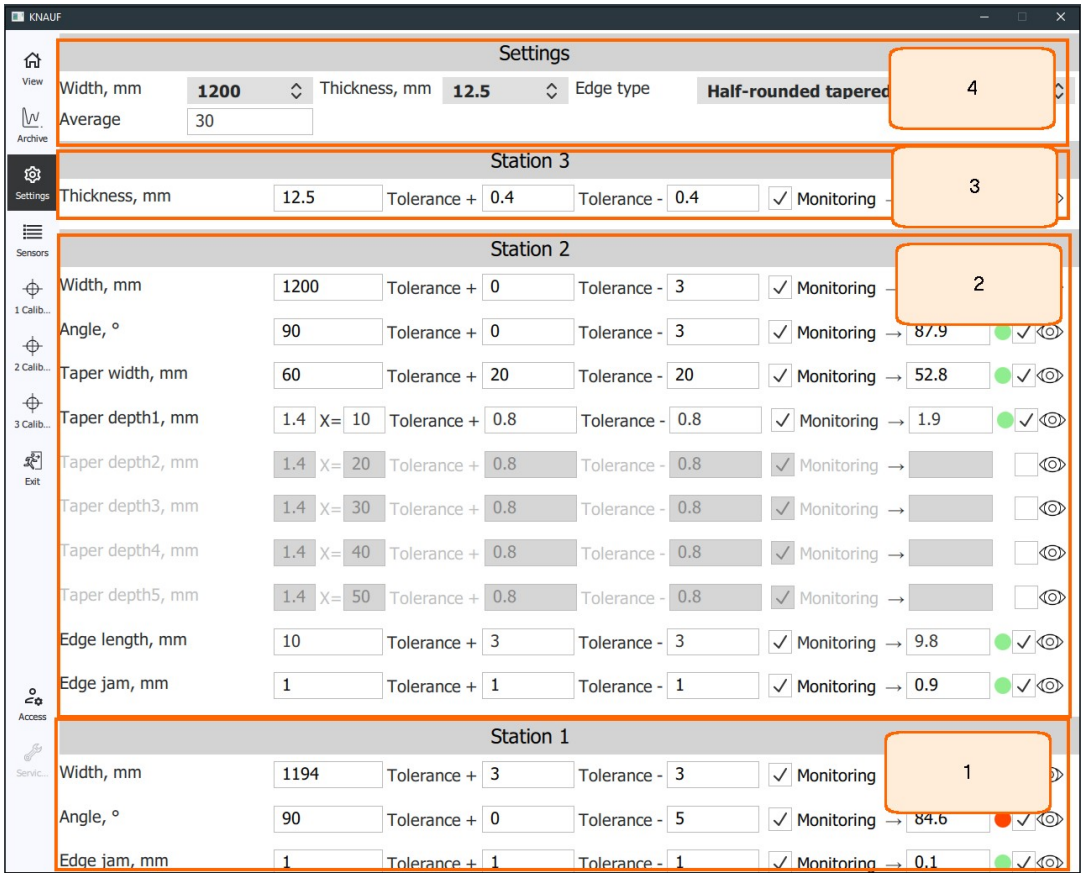
7.3.2. "Parameter" panel

This panel is designed to select the parameters that will be displayed on the graph (see "Archive" section, 1). The selected parameters are marked with "+".



7.4. "Settings" section

The **Settings** section is designed to change the software settings (see Main window, 2). This section is activated after entering the password (see Main window, 8). General view of the **Settings** section:



This section can be divided into four groups: settings for station #1 (1), station #2 (2), station #3 (3) and general software settings (4). General settings allow the user to set the width, thickness or type of edge. Station settings allow the user to set specific values for each station.

The **Settings** section contains the following panels:

1. Selection.
2. Parameter.

7.4.1. "Selection" panel

This panel is used to select thickness, width or type of edge (see "Settings" section, 4).

The selection is made from predefined variants. After selection, the corresponding group of settings in the "Settings" section (1, 2, 3) is highlighted in blue.

7.4.2. "Parameter" panel

This panel is used to set the parameter value, as well as the range of acceptable values (see "Settings" section (1, 2, 3).

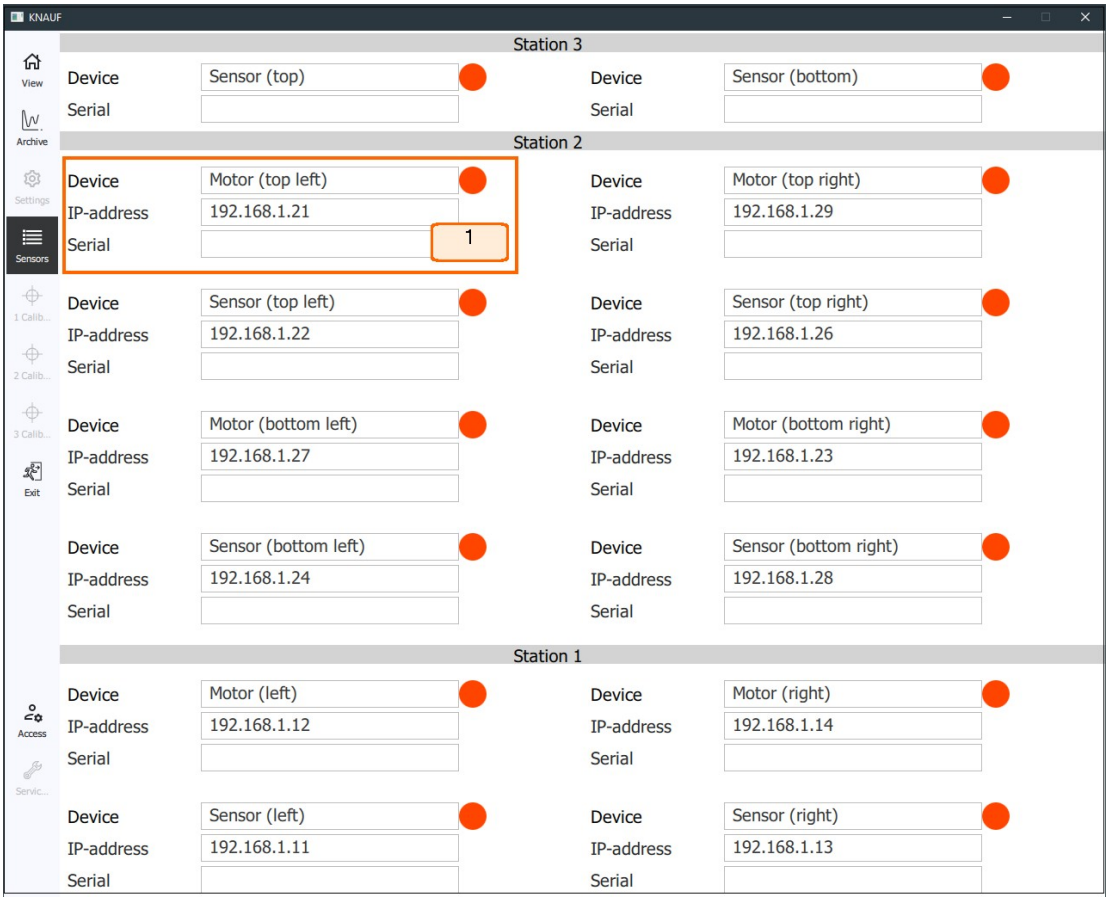
#	Name	Description
1	Parameter name	See Controlled parameters.
2	Target value	The target value of the controlled parameter.
3	Tolerance "+"	Permissible deviation from the target value (increasing).
4	Tolerance "-"	Permissible deviation from the target value (decreasing).
5	Monitoring	Monitoring (control) of the parameter value going beyond the permissible values. The result is displayed on the main window: • Green – parameter value is within tolerances. • Red – parameter value is out of tolerances. • Black – parameter value is not controlled (checkbox 5 is not marked).
6	Current value	Current parameter value.
7	Monitoring status	The result of monitoring the parameter value for going beyond the permissible values.
8	Trend	Displaying the "Trends" panel in the main window. Trends can only be displayed for one parameter.
9	Display	Displaying the parameter in the main window.

To change the value, select the corresponding field.
A virtual keyboard will appear below the input field.

After editing, click **OK** on the virtual keyboard. The value will be changed and the virtual keyboard will be hidden.

7.5. "Sensors" section

The **Sensors** section is designed to view the list and status of sensors and motor controllers (see Main window, 3). General view of this section:

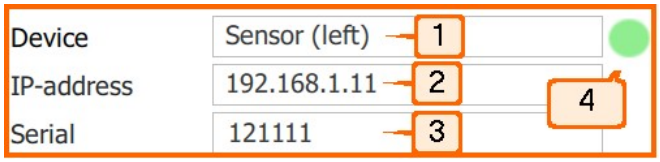


The **Sensors** section contains the following panels:

1. Status.

7.5.1. "Status" panel

This panel displays the connection status of the device.



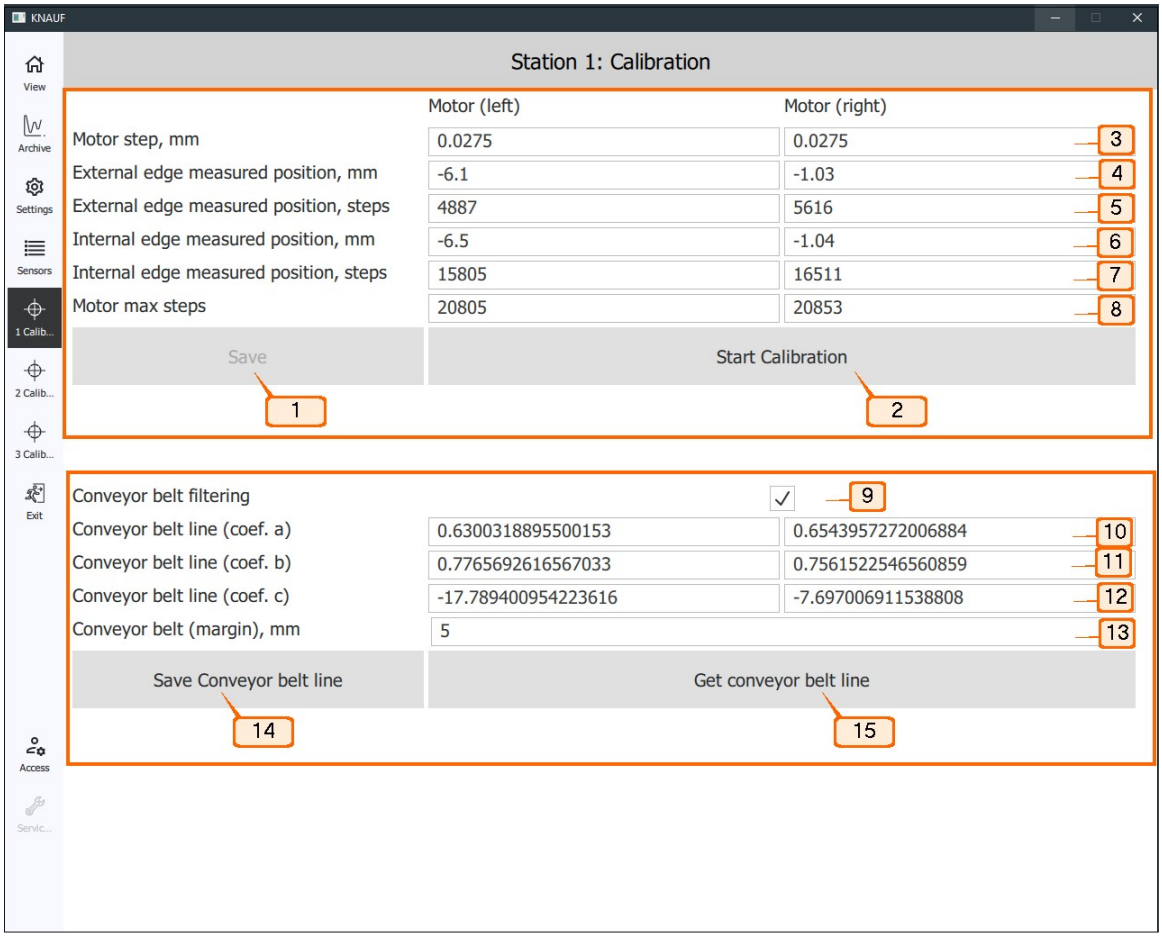
#	Name	Description
1	Device type	Displays the position and type of device: sensor or motor controller.
2	Network address	The IP address of the device.
3	Serial number	Serial number of the sensor or MAC address of the motor controller. If there is no connection to the device, the field is empty.
4	Status	Connection status: • green – connected; • red – not connected. If there is no connection, it is recommended to check the cables and restart the program.

7.6. "Calibration" section

The **Calibration** sections are designed to calibrate three measuring stations (see Main window (4, 5, 6)). These sections are inactive by default and are activated after entering the password (see Main window, 8).

7.6.1. "Station 1: Calibration" panel

This panel is used to calibrate two linear motion modules of measuring station 1 (see Main window, 4). The calibration procedure is described in par. Calibration of Station 1.



Calibration of two linear motion modules of measuring station 1:

#	Name	Description
1	Save	Saving calibration results. This button becomes active after a successful calibration.

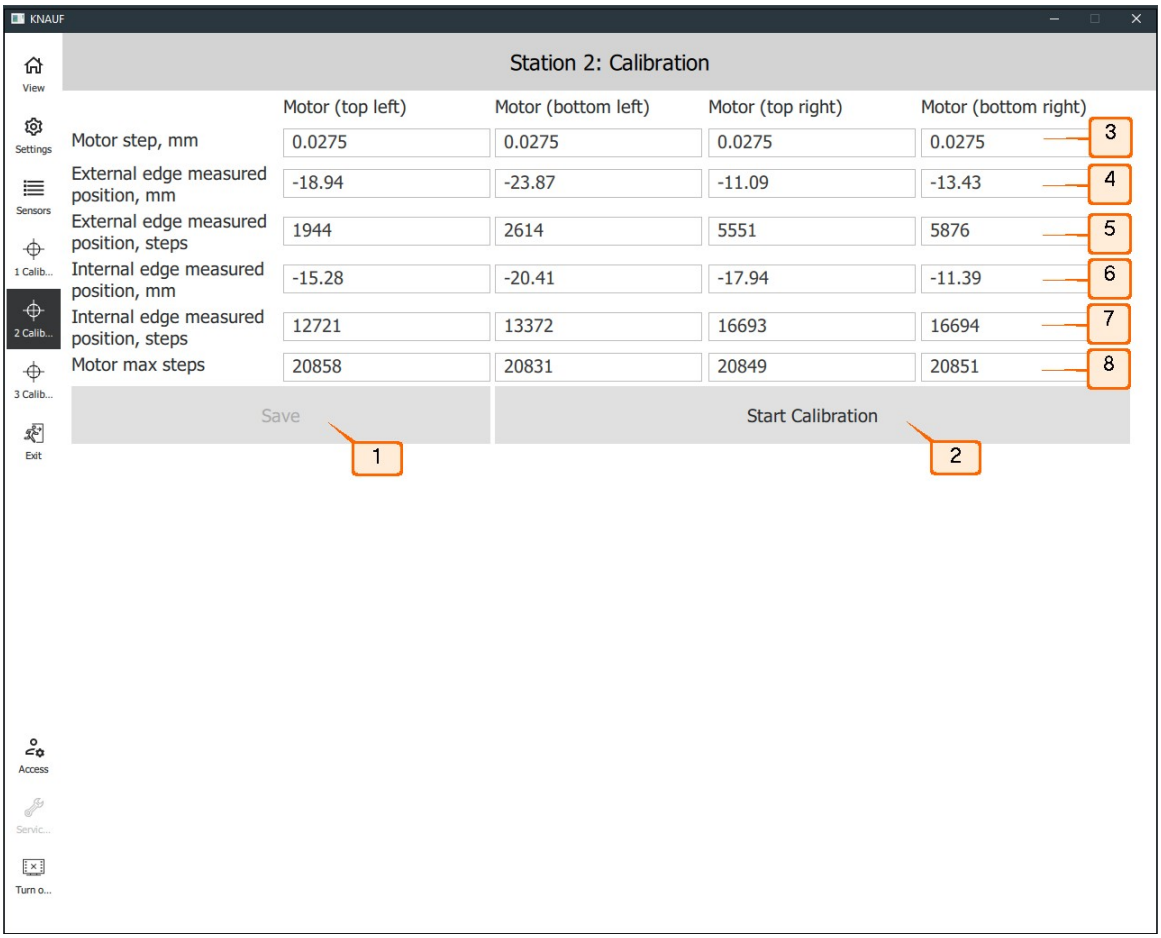
#	Name	Description
2	Start Calibration	Calibration start button. After clicking, the calibration block is automatically scanned and the calibration parameters are calculated (3) - (8). In case of successful scanning, button (1) becomes active.
3	Motor step, mm	The motor step is calculated automatically if the calibration block is scanned successfully.
4	External edge measured position, mm	The measured position of the edge of the calibration block in the local coordinate system of the laser scanner.
5	External edge measured position, steps	The number of steps the motor has traveled to the position where the edge of the calibration block is within the working range of the laser scanner.
6	Internal edge measured position, mm	The measured position of the edge of the calibration block in the local coordinate system of the laser scanner.
7	Internal edge measured position, steps	The number of steps the motor has traveled to the position where the edge of the calibration block is within the working range of the laser scanner.
8	Motor max steps	The maximum possible number of motor steps from the zero mark to the limit switch.

Calibration of the conveyor belt line of measuring station 1:

#	Name	Description
14	Save Conveyor belt line	Saving calibration results. This button becomes active after a successful calibration.
15	Get Conveyor belt line	After clicking, the empty conveyor belt is automatically scanned and the parameters of the conveyor belt line are calculated (10) – (12).
9	Motor step	The motor step is calculated automatically if the reference is scanned successfully.
10	Conveyor belt line (coef. a)	The coefficient of the equation of the line passing along the conveyor belt.
11	Conveyor belt line (coef. b)	The coefficient of the equation of the line passing along the conveyor belt.
12	Conveyor belt line (coef. c)	The coefficient of the equation of the line passing along the conveyor belt.
13	Conveyor belt (margin), mm	Distance from the conveyor line in mm, below which the points of the profile part are ignored by the sensors.

7.6.2. "Station 2: Calibration" panel

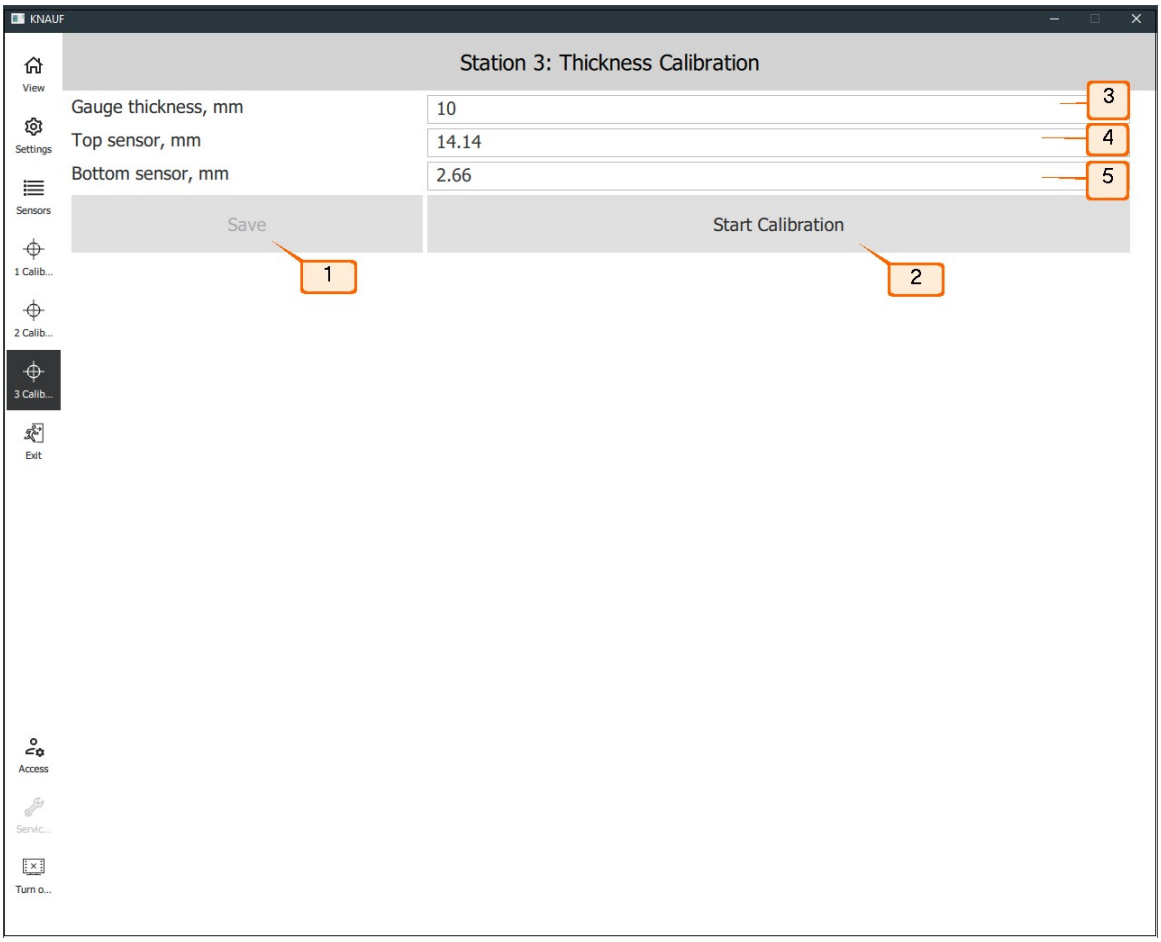
This panel is used to calibrate four linear motion modules of measuring station 2 (see Main window, 5). The calibration procedure is described in par. Calibration of Station 2.



#	Name	Description
1	Save	Saving calibration results. This button becomes active after a successful calibration.
2	Start Calibration	Calibration start button. After clicking, the calibration block is automatically scanned and the calibration parameters are calculated (3) - (8). In case of successful scanning, button (1) becomes active.
3	Motor step, mm	The motor step is calculated automatically if the calibration block is scanned successfully.
4	External edge measured position, mm	The measured position of the edge of the calibration block in the local coordinate system of the laser scanner.
5	External edge measured position, steps	The number of steps the motor has traveled to the position where the edge of the calibration block is within the working range of the laser scanner.
6	Internal edge measured position, mm	The measured position of the edge of the calibration block in the local coordinate system of the laser scanner.
7	Internal edge measured position, steps	The number of steps the motor has traveled to the position where the edge of the calibration block is within the working range of the laser scanner.
8	Motor max steps	The maximum possible number of motor steps from the zero mark to the limit switch.

7.6.3. "Station 3: Thickness Calibration" panel

This panel is used to calibrate two laser triangulation sensors of measuring station 3 (see Main window, 6). The calibration procedure is described in par. Calibration of Station 3.



#	Name	Description
1	Save	Saving calibration results. This button becomes active after a successful calibration.
2	Start Calibration	Calibration start button. After clicking, the calibration block is automatically scanned and the calibration parameters are calculated (3) - (8). In case of successful scanning, button (1) becomes active.
3	Gauge thickness, mm	Calibration block thickness, mm.
4	Top sensor, mm	The measured distance from the upper sensor to the top face of the calibration block.
5	Bottom sensor, mm	The measured distance from the lower sensor to the top face of the calibration block.

8. Intended use

8.1. Preparation for use

Preparation of the 3DGypsumB system includes:

- Visual inspection.
- Turning on the system.

8.1.1. Visual inspection

Before operating, make sure that there is no external damage to the system, check the condition of cables and ground wires. Check the condition of the output windows of the laser scanners and, if necessary, clean them with a soft cloth. Laser scanners are virtually maintenance free. As these are optical systems, they are sensitive to dust and sputter on the front windows. Cleaning is best done with a soft cloth. Do not use scratching cleaners or other aggressive media. Make sure that there are no fingerprints on the glass - they significantly degrade the quality of the resulting profile. To remove fingerprints or grease, clean the windows with 20% alcohol and then wipe them with soft paper.

8.1.2. Turning on the system

1. Supply power to the central computer and the additional operator terminal.
2. Start the software and wait for the main window to appear (see Main window).

8.2. Working in the "View" mode

To make measurements, it is necessary to study the following paragraphs: Main window, "View" section, "Sensors" section.

Follow these steps:

1. Turn on the system as described in par. Turning on the system.
2. If there are no profiles in the field of view of station #1 and/or station #2, start automatic search (see "Find board edges" button) or move scanners manually.

8.3. Working in the "Setting" mode

To make measurements, it is necessary to study the following paragraphs: Main window, "Settings" section, "Calibration" section. This operating mode is auxiliary and is intended primarily to control the operation and settings of the system.

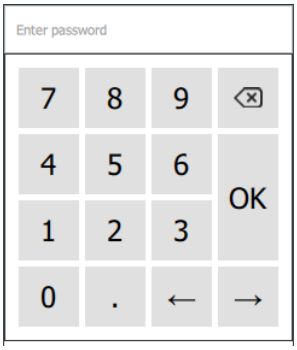
Follow these steps:

1. Turn on the system as described in par. Turning on the system.
2. Activate the menu items by entering the password (see Main window, 8).
3. Specify the width, thickness, edge type, as well as controlled parameters in accordance with par. "Settings" section.
4. The graphical interface of the **Calibration** section is described in par. "Calibration" section, and the calibration procedure is described in par. Calibration procedure.

8.4. Activating menu items

By default, the menu items related to system settings are not active. To activate them you need:

1. Click Access (see Main window, 8).
2. Enter the password: 1.



3. Click **OK**. If the correct password is entered, the menu items become active.
4. To lock the menu buttons related to system settings, it is necessary to restart the program, or perform step 1, enter any incorrect password and click **OK**.

8.5. Power supply circuit

The switches are located at the bottom of the central computer and the additional operator terminal.

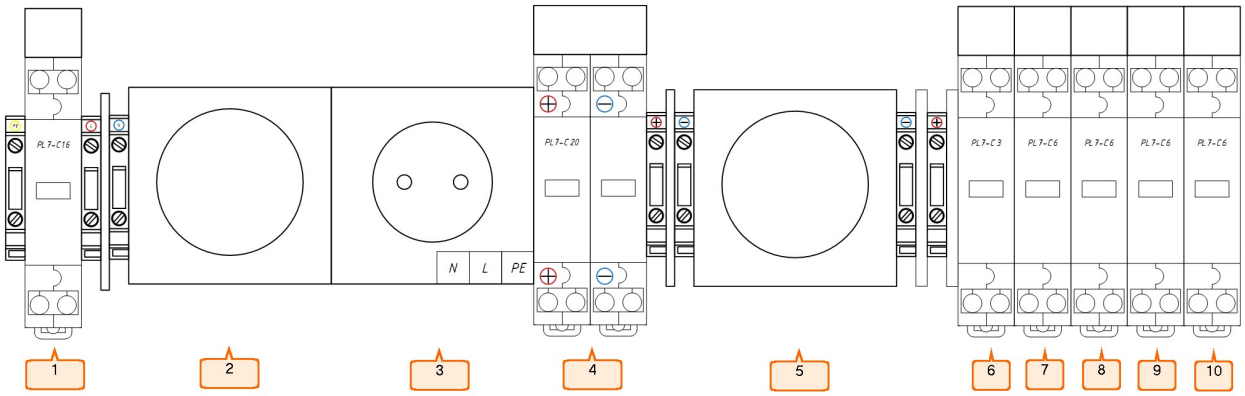


Figure 9 - Central computer power supply circuit

#	Name	Central computer	Additional operator terminal
1	Input 220V	Input circuit breaker 220V.	
2	Indicator 220V	Input voltage indicator 220V (red).	
3	Output connector 220V	Additional power connector 220V for connecting an external device.	
4	Output 24V	Dual circuit breaker for total output power 24V.	
5	Indicator 24V	Output voltage indicator 24V (green).	
6	Output 24V	Computer circuit breaker.	
7	Output 24V	Ethernet switch circuit breaker.	
8	Output 24V	Circuit breaker for the Ethernet switch and sensors of Station 1, as well as the Ethernet switch between Station 1 and Station 2 (if any).	Circuit breaker for the Ethernet switch and sensors of Station 2.
9	Output 24V	Circuit breaker for the motors of the linear movement module of Station 1.	Circuit breaker for the motors of the linear movement module of Station 2.
10	Output 24V	–	Circuit breaker for the Ethernet switch and the motors of the linear movement module of Station 3.

8.6. Turning off the system

1. Exit the program (see Main window, 7) and shut down the operating system, or click the button (see Main window, 10).
2. Turn off the power to the central computer and the additional operator terminal.

9. Maintenance

9.1. General information

Maintenance of the system is carried out to ensure its constant readiness for operation and to prevent premature failure. Maintenance includes preventive measures aimed at identifying and eliminating defects, and at ensuring the normal operation of the system. It is necessary to carry out daily and monthly maintenance work.

9.2. Safety precautions

Observe the safety precautions outlined in Section 1 of this User's Manual.

9.3. Maintenance procedure

9.3.1. Daily maintenance work

- Visual inspection.
- Checking for completeness.
- Checking for damage to structural elements, power and measuring cables and connectors.
- Checking the linear displacement modules and the windows of the laser sensors for dirt and, If necessary, cleaning them with a soft, lint-free cloth.

9.3.2. Monthly maintenance work

- System calibration.

9.4. Calibration procedure

Calibration of measuring stations is carried out in accordance with the maintenance procedure or as required. Each measuring station is calibrated using the calibration block supplied with the system.

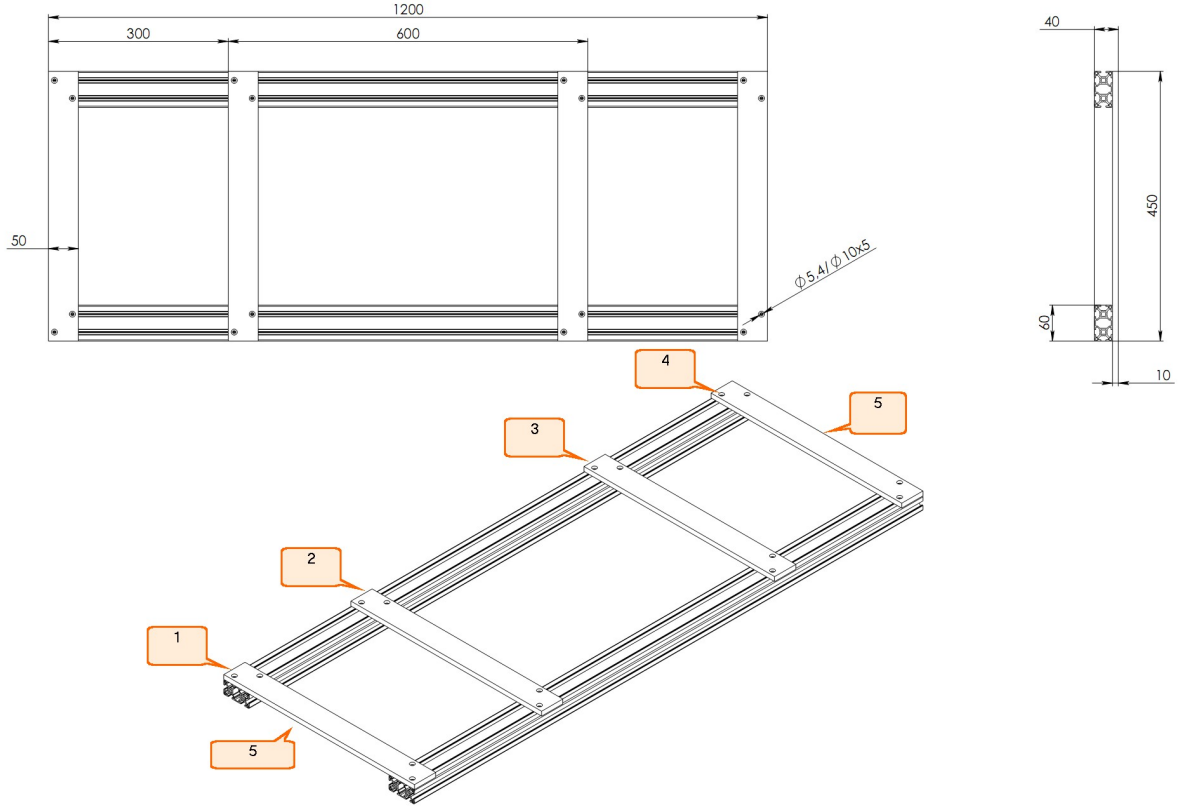


Figure 10 - Calibration block

The calibration block consists of four cross bars (1), (2), (3), (4). On the lateral ends of the cross bars, their numbers from 1 to 4 and the midpoint marks (5) are applied.

9.4.1. Calibration of Station 1

Calibration of Station 1 consists of two procedures: calibration of two linear motion modules and calibration of the conveyor belt line (see "Station 1: Calibration" panel).

1. Calibration of the conveyor belt line of Station 1

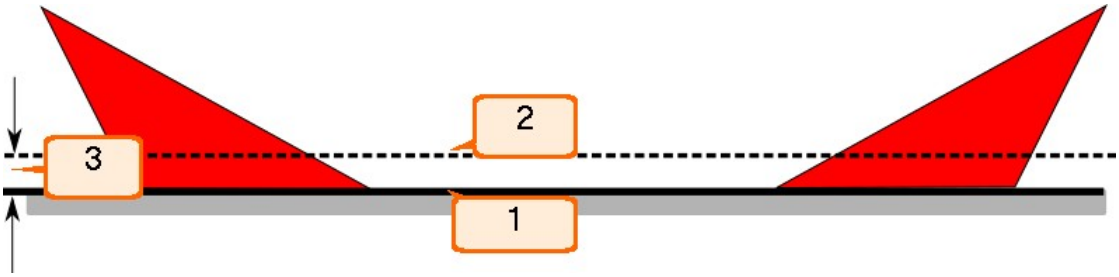
The field of view of the sensors may include the conveyor belt, which must be excluded.

Apply power to Station 1. The scan line will be displayed.

Empty the conveyor belt within the field of view of the sensors. Manually move the scanners so that both scan lines are on the conveyor belt only.

Start the software. Unlock the **Calibration** section (see Main window, 8). Go to the **Station 1: Calibration** panel (see "Station 1: Calibration" panel) and click the button to receive the conveyor belt line (see "Station 1: Calibration" panel, 15). After clicking the button, the empty conveyor belt is automatically scanned and the parameters of the conveyor belt line are calculated (see "Station 1: Calibration" panel, 10 – 12).

It is recommended to set the **Conveyor belt (margin)** parameter to 3-5 mm to take into account the unevenness of the conveyor belt (see "Station 1: Calibration" panel, 13). The figure below schematically shows the line of the conveyor belt (1) and the same line (2) shifted up by the value of the **Conveyor belt (margin)** parameter (3).



Click the button to save the calibration results (see "Station 1: Calibration" panel, 14). After clicking this button, the calibration results will be saved in the settings file. Regular calibration of the conveyor belt is not required.

2. Calibration of two linear motion modules of Station 1

Apply power to Station 1. The scan line will be displayed.

Shake the supplied aerosol can and apply it to the middle of the upper part of the cross bars of the calibration block. The chalk-based mixture makes the edges highly visible to scanners.

The calibration block is installed in the middle and across the conveyor belt so that the lines of the left and right scanners are at a distance of 5 mm from the midpoint marks on the cross bars. Cross bar #1 should be located near the right side of the station in the direction of the conveyor movement. The scanners can be moved manually when aligning the laser beams.

Start the software. Unlock the **Calibration** section (see Main window, 8). Go to the **Station 1: Calibration** panel (see "Station 1: Calibration" panel) and click the **Start Calibration** button (see "Station 1: Calibration" panel, 2).

After successful calibration, the **Save** button will become available (see "Station 1: Calibration" panel, 1). Click this button to save the calibration results to the settings file. If the calibration fails, it is necessary to repeat the calibration procedure.

ATTENTION!
An additional sign of a successful calibration is that the step is the same for all motors (see "Station 1: Calibration" panel, 3). If the steps of the motors are not the same, it is recommended to repeat the calibration.

9.4.2. Calibration of Station 2

Apply power to Station 2. The scan line will be displayed.

Shake the supplied aerosol can and apply it to the middle of the top and bottom of the cross bars of the calibration block. The chalk-based mixture makes the edges highly visible to scanners.

The calibration block is installed in the middle and across the conveyor rollers so that the lines of the left (upper and lower) and right (upper and lower) scanners are at a distance of 5 mm from the midpoint marks on the cross bars. The conveyor rollers serve as guides for the longitudinal profiles of the calibration block (see Figure 11). Cross bar #1 should be located near the right side of the station in the direction of the conveyor movement. The scanners can be moved manually when aligning the laser beams.

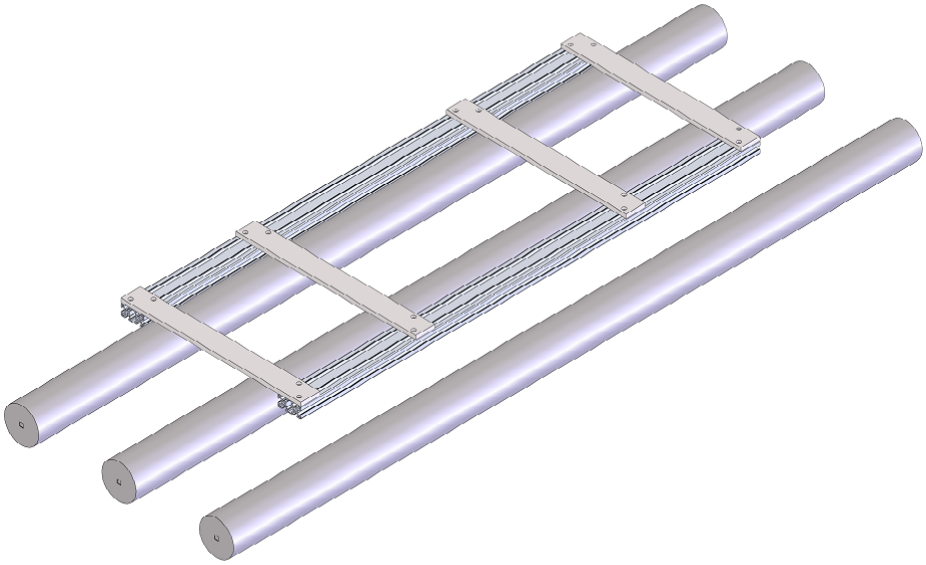


Figure 11 - Calibration of Station 2

Start the software. Unlock the **Calibration** section (see Main window, 8). Go to the **Station 2: Calibration** panel (see "Station 2: Calibration" panel) and click the **Start Calibration** button (see "Station 2: Calibration" panel, 2).

After successful calibration, the **Save** button will become available (see "Station 2: Calibration" panel, 1). Click this button to save the calibration results to the settings file. If the calibration fails, it is necessary to repeat the calibration procedure.

ATTENTION!
An additional sign of a successful calibration is that the step is the same for all motors (see "Station 2: Calibration" panel, 3). If the steps of the motors are not the same, it is recommended to repeat the calibration.

9.4.3. Calibration of Station 3

Apply power to Station 3. The thickness measurement points will be displayed.

Shake the supplied aerosol can and apply it to the middle of the top and bottom of cross bar #1 of the calibration block. The chalk-based mixture makes the edges highly visible to sensors.

The calibration block is installed so that the upper and lower sensors are perpendicular to the top and bottom of cross bar #1.

Start the software. Unlock the **Calibration** menu (see Main window, 8). Go to the **Station 3: Calibration** panel (see "Station 3: Calibration" panel) and click the **Start Calibration** button (see "Station 3: Calibration" panel, 2).

After successful calibration, the **Save** button will become available (see "Station 3: Calibration" panel, 1). Click this button to save the calibration results to the settings file. If the calibration fails, it is necessary to repeat the calibration procedure.

10. Warranty policy

Warranty assurance for the Gypsum Plasterboard Geometry Control System 3DGypsumB – 24 months from the date of putting in operation; warranty shelf-life – 12 months.

11. Revisions

Date	Revision	Description
22.11.2021	1.0.0	Starting document.

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