

Software instructions | matriq AG

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1. Preconditions

These instructions assume that the operating instructions have been successfully completed in accordance with matriq_DM-qode_BA1_Rev03. The device must be switched on and the matriq tablet must be connected to it. The dashboard is loaded automatically.

2. Software layout

The user interface can be used across all platforms, both on touch-based tablets and on desktop PCs with mouse and keyboard input. The dashboard can be accessed from non-matriq devices by entering the IP in the browser.

The application is divided into three central areas: Navigation area, status bar and the content area.

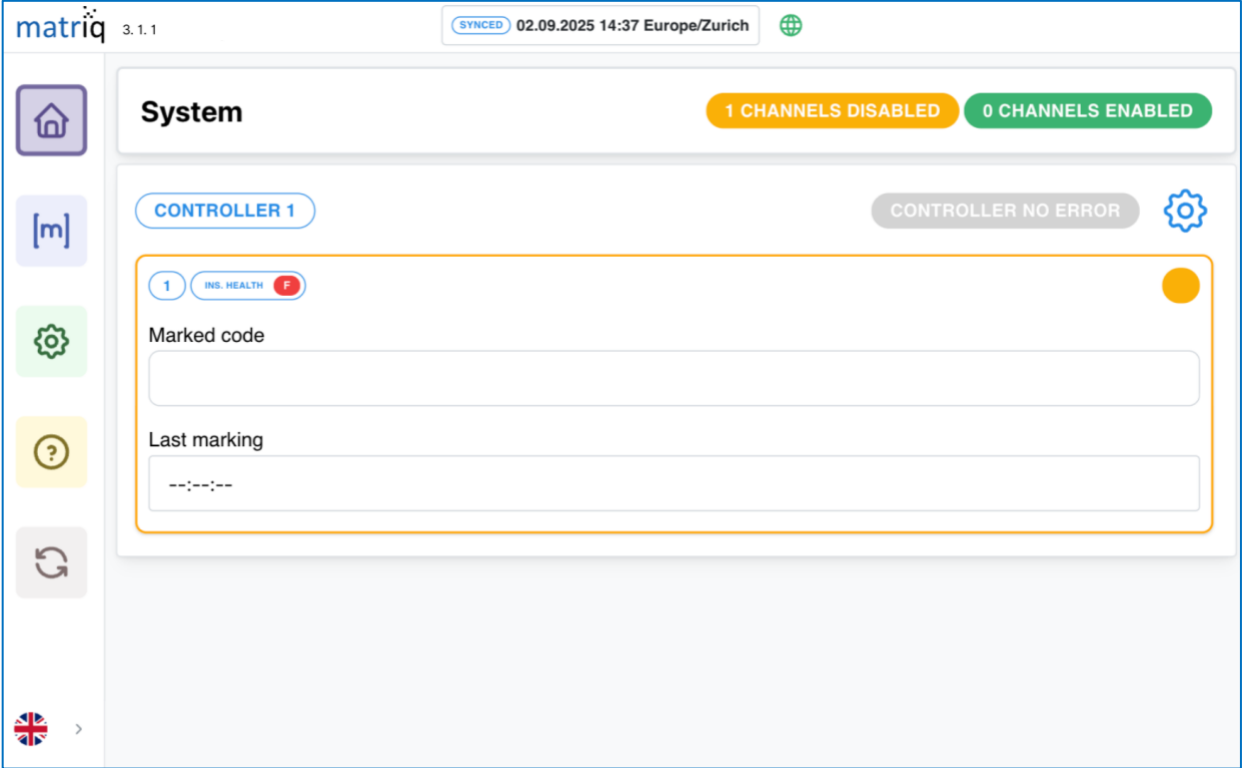


Figure 1 : Dashboard display with navigation area (left), status bar (top), content area (center)

2.1. Navigation area (left sidebar)

On the left is a vertical sidebar with icons for navigation:



Home

Overview with all central information at a glance: current production status, system messages, access to marking control



Markings

Shows a history of the most recently created DataMatrix codes including their metadata and status information.



System settings

Access to system configurations: Network and device settings, as well as customization of interfaces (e.g. OPC UA, Time Server etc.).



About

System information such as software version, current hardware configuration and connected modules.



Refresh

Reloads the web application.

2.1.1. Language Settings

The language selection is located at the bottom of the navigation area. The language can be changed via the country icon. Currently, German and English are supported.

2.2. Status bar (top bar)

There is a horizontal status bar at the top of the application:

- Centered: The current system time combined with the display of whether the time has been actively synchronized with configured time servers.
- Right-aligned: Context-dependent system status messages, such as "Restart required", "Update ready", etc.

The status bar provides continuous feedback on the state of the system.

2.3. Content area (central content area)

The main area of the user interface displays the currently selected view, depending on the selection made in the navigation menu. Typical contents are









- Overview of the connected modules
- Detailed views of individual markings
- Form masks for configuring devices or interfaces
- System logs or diagnostic information

3. Operating status

The DynamicMold® software signals different operating states of the application, both in the dashboard and on the housing of the LinQ using the status LEDs. There is also an error contact for forwarding the status to the machine. These statuses reflect both software and hardware-related system information.

3.1. System states in the software

There are several states that the system can assume:

Condition	Description	UI - Status Color	LED on the LinQ	Error Contact
Idle	The system is ready for operation but does not carry out any markings.	 Orange	 Blue	Active
Active	The marking process is running without errors. All systems are in normal operation.	 Green	 Green	Inactive
Error	A critical error has occurred. The marking process is not guaranteed.	 Red	 Red	Active
Boot mode	The system is in boot mode. This mode is primarily relevant for technicians.	 Blue	 Blue	Active

3.2. Error messages and warnings

The controller reports both error messages and warning messages which are displayed in the UI dashboard:

- Warnings: Have no direct influence on the system status.
- Errors: Lead directly to the error state being triggered. In this case, the error contact is activated.

3.2.1. UI interaction with errors and warnings

The tablet dashboard always shows which channel or module has reported a warning or error. When the affected module is selected, an information window opens containing detailed information on the respective message, including classification (warning/error), description and possible recommendations for action (such as resetting the module).

4. Markings

The system can be equipped with up to four channels with one insert each.

The individual channels are configured using:

- Selection of the marking content (e.g. alphanumeric or coded content).
- Adaptation of the marking behavior depending on the material used, and the definition of the marking mode per module.

The marking function must be active:

- The controller is correctly connected to the LinQ.
- At least one insert is connected to a channel of the controller.
- The relevant channel is "ENABLED" and is in an error-free state.

As soon as all requirements are met, the marking process runs completely autonomously:

- The system recognizes the incoming plastic at the insert (via sensor).
- The marking is triggered automatically, without manual intervention.

All active marking processes can be viewed in the UI dashboard of the matriq platform. The following information is displayed for each active module:

- The current status.
- Visual feedback on the last successful marking.
- Status of the connected insert.
- Possible warnings or error messages.

The markings are created continuously as long as the machine is producing components and the relevant channels are activated (ENABLED).

4.1. Setting the marking patterns

The matriq platform enables the definition and configuration of individual marking patterns that are used during the injection molding marking process. Depending on the application, different pattern types (code sources) are available to design the marking content dynamically or in a fixed way.

To make these settings, the corresponding channel must be selected in the UI dashboard. This opens a pop-up with the "Marking" pattern configuration section preselected. To change the settings, the marking function must be disabled. If a warning or error is present, the detailed display for the warning or error is shown as the first window.

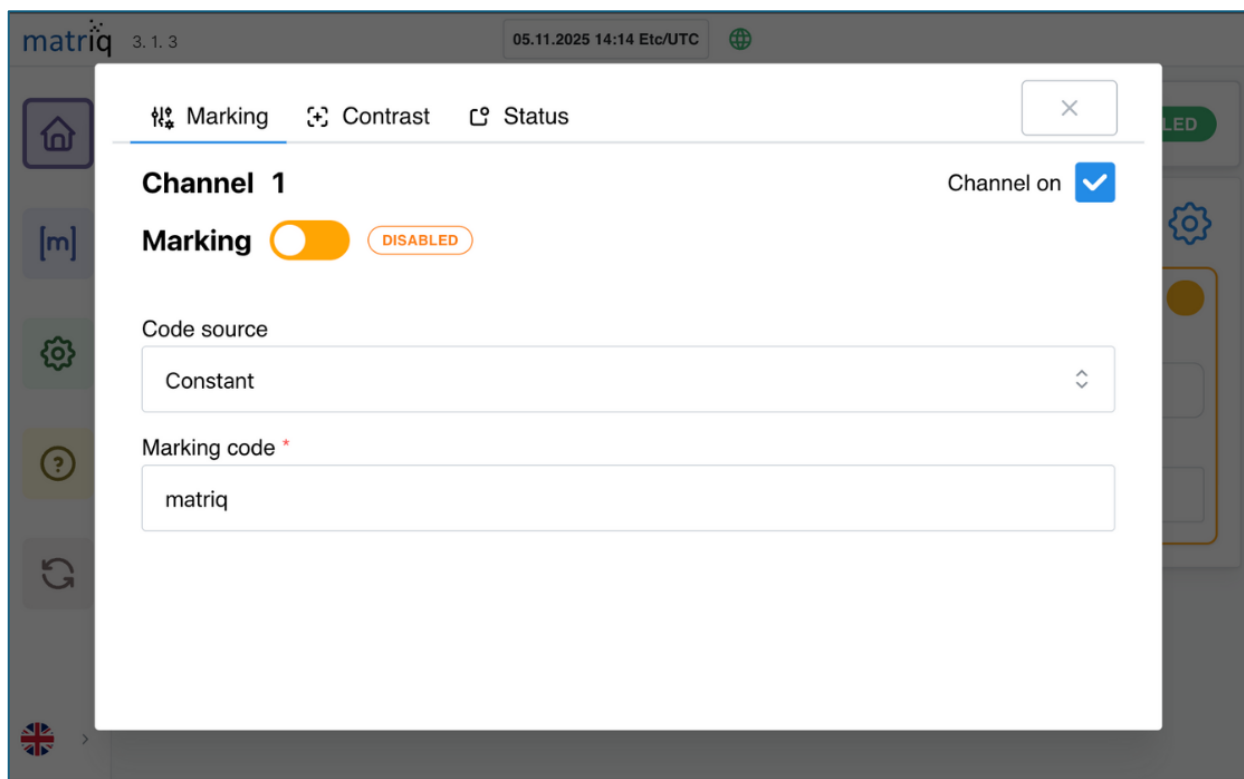


Figure 2 : Marking Configuration Pop-up

Available marking patterns:

- **Constant:** a constant, alphanumeric code (characters A-Z, a-z, 0-9)
- **Count Up:** A ten-digit number which is counted up automatically; starting value and increment can be set
- **Constant + Count Up:** A combination of a fixed prefix (consisting of two alphanumeric characters) and a counter with six digits. Example: AB000001, AB000002, AB000003 etc.

- **Unix timestamp:** The current timestamp of the marker in UTC time . The display is in the format of a 10-digit Unix timestamp (seconds since 01.01.1970, 00:00 UTC). Example: 1747778400 corresponds to May 21, 2025, 00:00:00 UTC.
Note: The accuracy of the timestamp depends directly on the synchronization with a reliable time server (see Time server configuration).
- **Random:** A quasi-random ten-digit number is marked for each component. This mode is primarily suitable for test purposes and is not recommended for productive series production.

All changes are saved automatically, provided that no errors are present.

The marking process is started after:

- Activate module: set the module to ENABLED via the status switch to mark the marking logic as active.
- Save configuration: Press the Save button to save the configuration.

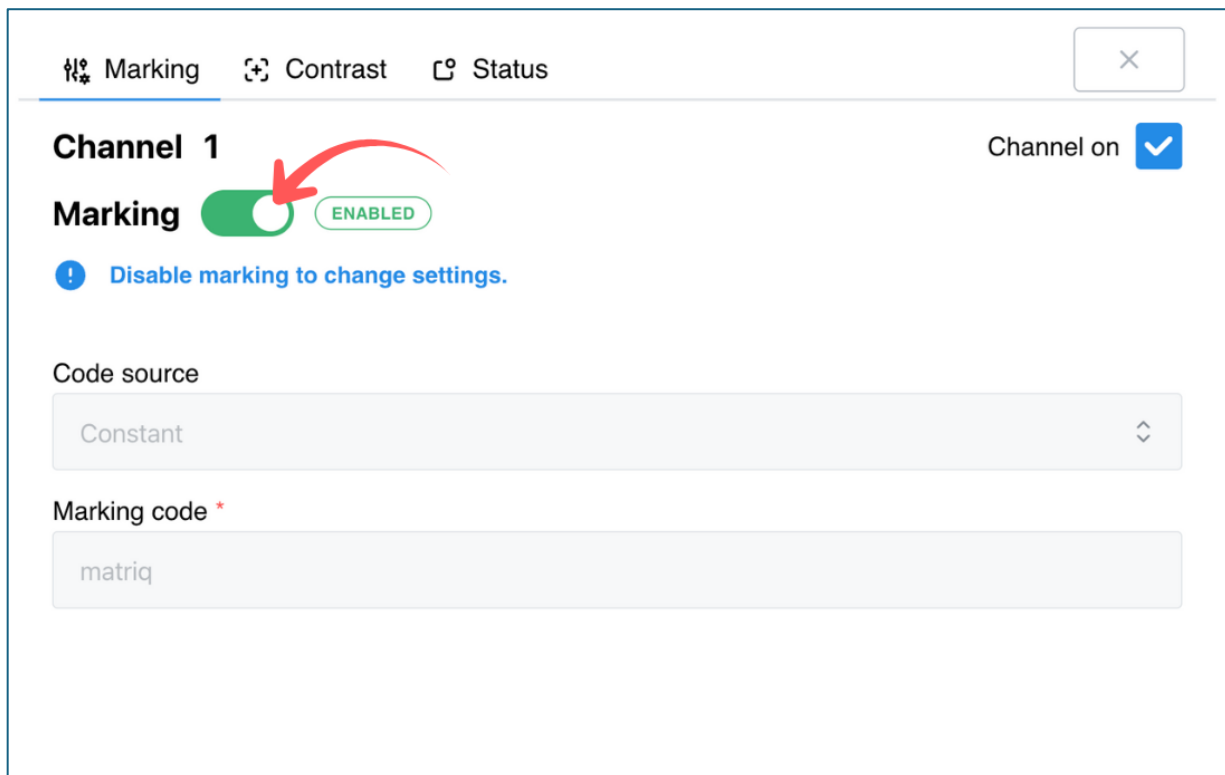


Figure 3: Channel status ENABLE view

4.2. Fine-tuning the marking contrast

Depending on the material and component shape, different heating parameters must be set to achieve the best marking contrast. These parameters can be adjusted both when marking is enabled and when it is disabled. This is done in the channel configuration view under “Contrast”:

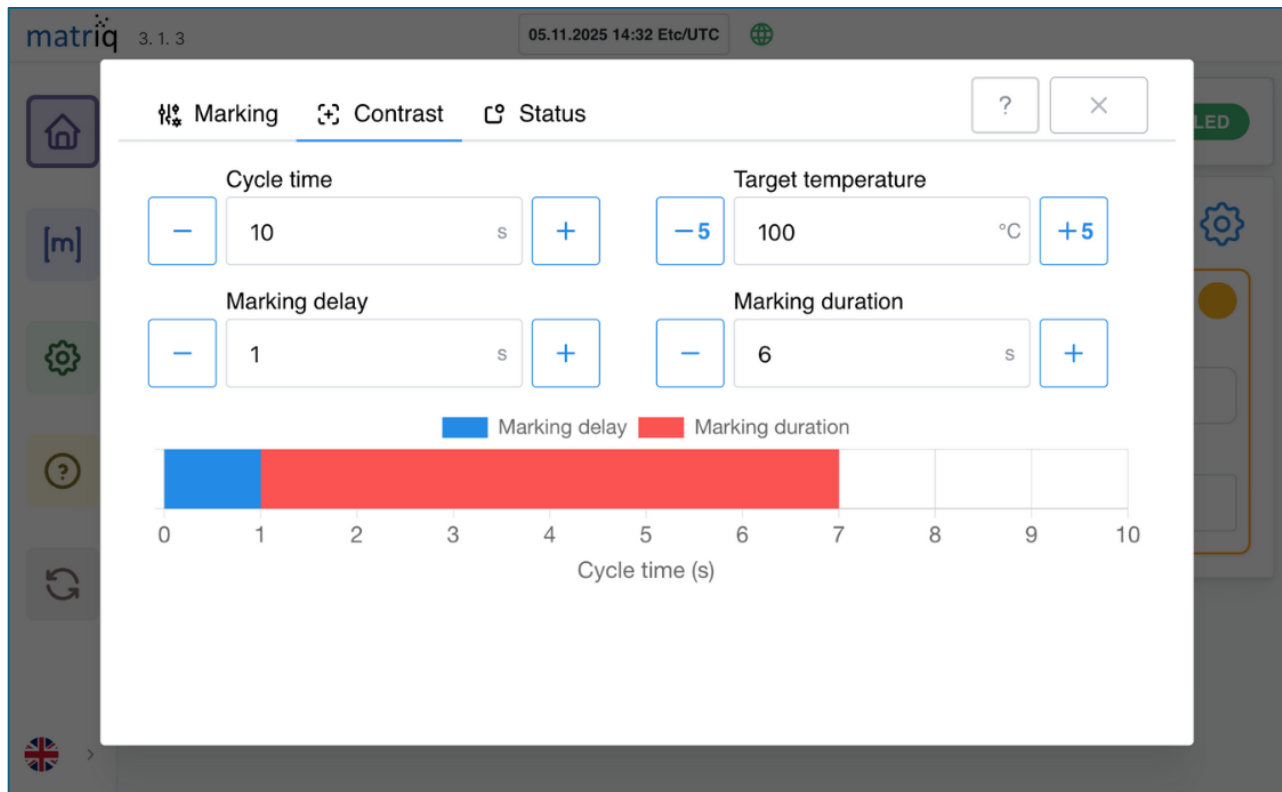


Figure 4 : Insert Setup Pop-Up

- Cycle time: Total duration of an injection molding cycle, so that the marking process stops before the next component is produced (typically 5-20s).
- Marking delay: Delay between material detection (trigger) and start of marking (typically 0-10s).
- Marking duration: Time window of the marking process.
- Target temperature: Target temperature insert (typically 90-150°C).

Changes are saved automatically and applied from the next marking onward.

4.3. Display of the markings

The matriq platform saves all created markings continuously in a local database on the LinQ system. This memory is continuously filled with new marking data as long as

sufficient memory space is available. When the memory is full, the oldest marking data is overwritten.

Channel	Marking date [UTC]	Marking start time	Marking code	Marking grade
1	02.09.2025 14:07:53	02.09.2025 14:07:45	1756822071	A
1	02.09.2025 14:07:51	02.09.2025 14:07:43	1756822069	A
1	02.09.2025 14:07:48	02.09.2025 14:07:40	1756822066	A
1	02.09.2025 14:07:46	02.09.2025 14:07:38	1756822064	A
1	02.09.2025 14:07:43	02.09.2025 14:07:35	1756822061	A
1	02.09.2025 14:07:41	02.09.2025 14:07:33	1756822059	A
1	02.09.2025 14:07:38	02.09.2025 14:07:30	1756822056	A
1	02.09.2025 14:07:36	02.09.2025 14:07:28	1756822054	A
1	02.09.2025 14:07:33	02.09.2025 14:07:25	1756822052	A
1	02.09.2025 14:07:31	02.09.2025 14:07:23	1756822049	A
1	02.09.2025 14:07:28	02.09.2025 14:07:20	1756822047	A
1	02.09.2025 14:07:26	02.09.2025 14:07:18	1756822044	A
1	02.09.2025 14:07:18	02.09.2025 14:07:10	1756822036	A

Figure 5 : View of the last 15 markers

The overview table contains the following columns:

- Channel: Indicates which module or insert generated the respective marking.
- Marking Date [UTC]: Timestamp of the marking in UTC time, for cross-system synchronization.
- Marking Start Time: Timestamp of the starting point of the marking in the injection mold marking process.
- Marking code: The marked DataMatrix code or serial value.
- Marking grade: Evaluation of the error correction used on a scale from A (optimal) to F (unsatisfactory). Is calculated from the distribution of any defective heater pixels for the respective code. However, there is no information about the marking quality in terms of legibility (contrast, etc.).

4.4. Exporting the markings

The export button (left button) is located at the top right of the marking view. Markings can be exported as CSV or TXT. Three different time ranges are available: the last 100 markings, markings from the last 24 hours or a user-defined time period. In addition, the level of detail of the exported data can be selected: Basic or Expert.

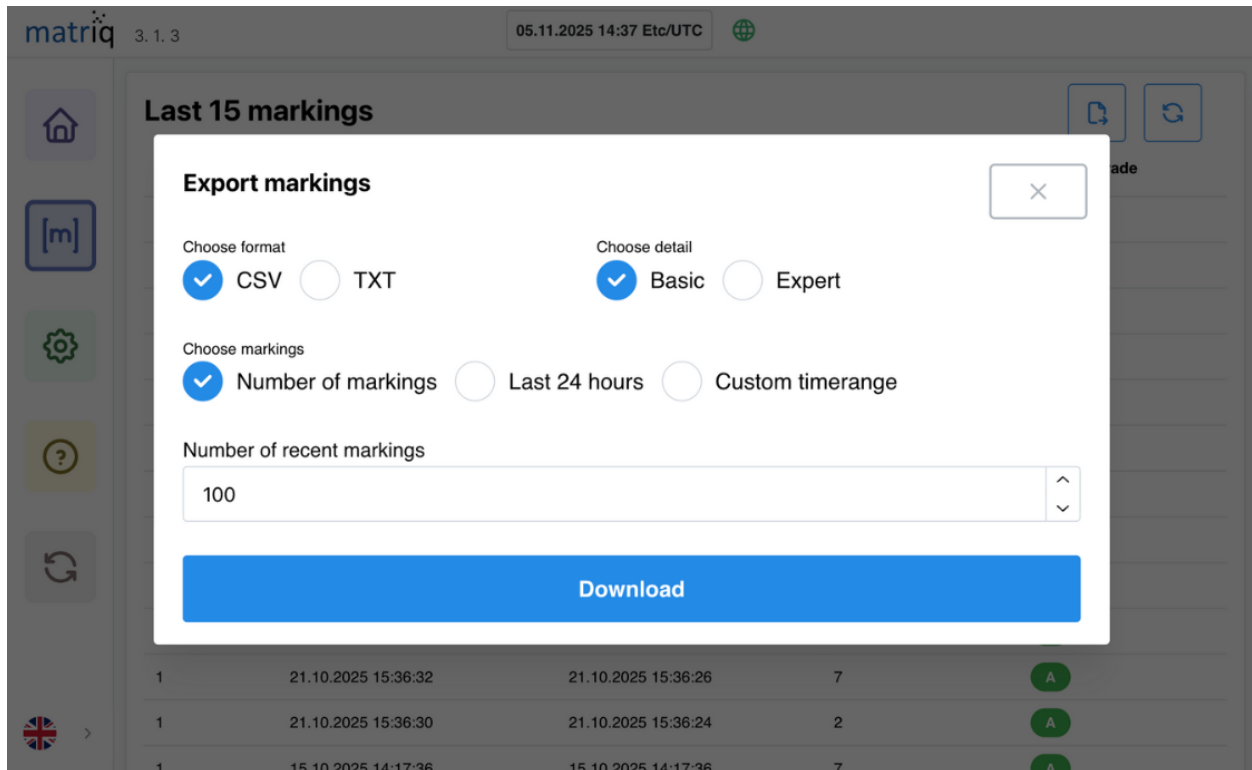


Abbildung 6 Export options for markings

In Expert mode, all available attributes of the markings are exported. These are listed and briefly described below:

- `master_id`: ID of the marking job
- `requested_code`: Originally requested code
- `code_grade`: Evaluation of the error correction used (A - optimal ... F - unsatisfactory)
- `code_format`: Format of the created code
- `marked_code_matrix`: Matrix of the created code
- `requested_code_matrix`: Matrix of the requested code
- `marking_time`: Timestamp of the marking created
- `modul_id`: ID of the associated module
- `marking_parameter`: Marking parameters used (e.g. `code_rotation` or `timeslot_duration`)
- `timing_info`: Heating start and heating end, each as Unix timestamp

- marking_object_id_time: Time of the database entry of the marking

In Basic mode, only parameters that can be configured via the user interface are included. These are listed and briefly described below:

- requested_code: Originally requested code
- code_grade: Evaluation of the error correction used (A - optimal ... F - unsatisfactory)
- marking_time: Timestamp of the marking created
- channel_id: ID of the associated module
- trigger_to_marking_delay: Marking delay in ms
- marking_duration: Marking duration in ms
- target_temperature_phase_2: Target temperature in °C

5. Interfaces

5.1. Network

The matriq platform enables flexible network configuration to allow access to external systems and integration into existing infrastructures. All settings are made directly via the UI and can be adapted to specific network requirements.

To do this, navigate to the "Settings" page in the menu on the left and select "Interfaces". The network settings only relate to the LAN output. The network settings of the "Tablet" output are static and cannot be configured.

- DHCP: If the checkbox is activated, the IP address is automatically obtained from the network. This requires a correctly configured DHCP server in the same network segment.
- Gateway, subnet mask and DNS: These parameters can be set manually if required, for example to connect to specific subnets or DNS servers.

5.2. OPC UA

The client-server URL can be entered individually for access to external OPC UA servers. In addition, the username and password for establishing the connection can be configured.

The OPC UA interface of the matriq platform has been successfully tested with Arburg brand machines. However, for smooth integration with other machine manufacturers, it may be necessary to make device-specific adaptations. Such manufacturer-specific extensions are maintained as customized OPC UA configurations within the matriq software and can be distributed and imported via the software update system if required (see Software updates).

The matriq platform supports two operating modes for OPC UA, which can be used depending on the application, client or server mode.

5.2.1. OPC UA client mode

In client mode, the platform actively connects to external OPC UA servers (e.g. injection molding machines, MES systems or PLC controllers) and reads the data they provide. In addition, the matriq client can also write back marking data, e.g:

- Current DataMatrix code in the machine's production log.
- Status information on the marking process.
- Marking parameters.

5.2.1.1. Functional principle (example Arburg machine)

The LinQ controller connects as an OPC UA client to the OPC UA server of the injection molding machine (IMM) to write the individual DataMatrix code to the machine protocol before each injection cycle. The prerequisite is that LinQ and IMM are in the same network segment and the IP address of the machine is known. The IMM must allow external fields to be written. On Arburg machines, this is done via the External Part ID field (f96358).

Important: As each machine (even identical models) has its own OPC UA tree, the implementation can vary from machine to machine.

Workflow at Arburg-IMM

Step	Action at the IMM	Action on the LinQ
1	Set the External Part ID field on the control panel to external	-
2	Select start trigger (see below)	Adapt corresponding ENV variables or load specific implementation from matriq via USB memory.
3	Call the SetExternalPartID method	Automatically triggered by the client as soon as the trigger signal is received
4	Include field f96358 in the production log	-

The SetExternalPartID method expects two arguments:

- station_number (UInt32) - for standard machines 1
- external_part_id (string, under 256 characters) with the desired marker

Trigger variants

Variant	OPC-UA field	Time	Remark
1 (Standard)	Start Cycle ns= 2;i=64572	Approx. 1s before the start of the cycle	Works on most Arburg machines
2 (fallback)	F14001-Load ns= 2;i=245533	End of cycle / immediately before new start	Recommended if Start Cycle is not active

Both variants must not be active at the same time.

Configuration in the LinQ UI

1. Settings > Network | Open OPC UA
2. Activate OPC UA Client (checkbox selection)
3. Enter server URL, user name "host_computer" and password "dummy_password"
4. Save

Note: The Arburg OPC UA server accepts a maximum of **3** parallel clients. If the slots of other OPC UA clients are already occupied, the connection with the matriq LinQ client will not be established.

5.2.2. OPC UA server mode (beta version)

In server mode, the matriq platform itself **provides** an OPC UA interface on port **4840** and offers other systems (e.g. host computers or QA tools) access to marking-relevant data. This includes

- Recently generated marking codes
- Status of individual modules
- Time stamp, error or warning messages
- Diagnostic and configuration information

The server can be reached via the configured IP address of the device and the standardized OPC UA port **4840**.

To establish a connection using an OPC UA client software, the following steps are required:

- In the Security Mode section, select “Sign&Encrypt”
- In the Security Policy section, select “Basic256Sha256”
- Confirm with OK

In the next step (the exact interface may vary depending on the software):

- Set User Authentication to “Anonymous”
- Confirm with OK

A certificate request will usually appear:

- Permanently accept the offered certificate

After a short waiting period, the connection will be established, and access to the device’s OPC UA interface will be possible.

5.2.2.1. Node structure

The server follows a fixed NodeId division in namespace 2.

Type	ID area	Example enum
Objects	10000-19999	matriqLinq (= root)
Variables	30000-39999	systemStatus, lastMarking
Methods	50000-59999	requestAllPattern
Events	derived	markingEvent, allPatternEvent

The complete mapping is embedded in the OPC-UA component of the matriq software platform.

Central nodes

Node	Type	Purpose	Data type
matriqLinq	Object	Root node	-
operation/system Status	Variable	Operating status (RUNNING, ERROR, IDLE, NOT_CONNECTED)	Enum
marking/markings Event	Event	Contains last marker as JSON CodeInfoType	-
pattern/requestAllPattern	Method	Provides all currently valid marking patterns	-
pattern/allPattern Event	Event	Result of requestAllPattern (AllPatternType)	-
version/softwareVersion	Variable	OPC UA server version	String

6. Settings

Central system settings such as time, network or communication interfaces can be configured directly via the matriq platform's UI using the "Settings" menu item.

6.1. NTP server and time zones

Precise system time is essential for time-based markings (Unix timestamp marking patterns), logging of events and synchronization with other systems - especially in automated production environments.

The matriq platform supports the synchronization of the system time via so-called Network Time Protocol (NTP) servers. Synchronization takes place automatically, provided there is Internet access and the predefined public time servers are accessible.

In isolated networks without internet access, for example in internal production intranets, the system time can be provided via user-defined NTP sources. Up to four time servers can be configured manually for this purpose, either as IP addresses or as resolvable host names (DNS).

The system uses a hierarchical fallback strategy:

1. An attempt is first made to synchronize with the primary (top-level) time server.
2. If this attempt fails, the next configured server in the sequence is contacted automatically.
3. This process is repeated until an accessible server successfully transmits a valid time message.

6.1.1. Procedure for setting up the time server

The configuration is carried out via the Settings > Time Server area within the user interface.

1. Navigate to the Settings page.
2. Select the Time Server area.
3. Enter up to four time servers - either as IP addresses (e.g. 192.168.0.100) or as host names (e.g. ntp.localdomain).
4. Save the settings.

Note: It should be ensured that the servers used are permanently accessible and correctly registered in the internal DNS if host names are used.

The status of the time synchronization is displayed visually on the right-hand side of the user interface. Among other things, the following information is available here:

- Server reached (host name/IP)
- Synchronization status (successful/failed)
- Time deviation in milliseconds compared to the server

This information helps with the diagnosis of time deviations and network problems.

7. Updates to the matriq platform

The matriq platform updates contain updates for all operational application components, including the user interface (UI) on the tablet as well as the browser-based applications and the operating system. These updates provide new functions, stability improvements and consistently up-to-date application logic.

7.1. Procedure for matriq updates

1. Connect USB stick
2. Navigate to the matriq UI settings section.
3. Open the "LinQ Update" area (this area is already open by default).
4. Enter the provided update file (*.tar.gz or *.rauc) in the corresponding file field or navigate to the file manually.
5. Start the update.

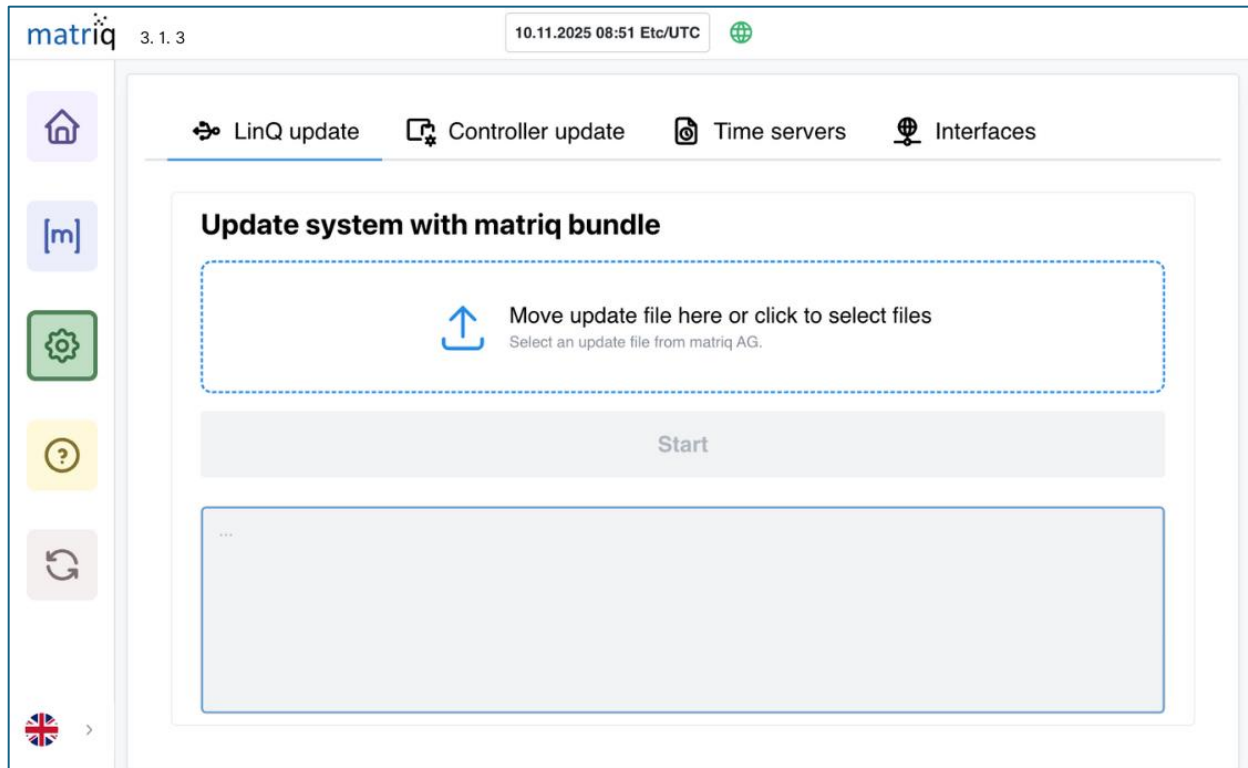


Figure 7: Settings page with active “LinQ Update” tab

After starting, the platform automatically recognizes from the file whether it is an operating system update or a software update. The update logic is then activated and the update process begins.

During the process:

- The progress is displayed in real time in the log area at the bottom of the user interface.
- Error messages and status information are clearly documented.
- The overall status section in the upper right corner of the UI will display the status of the update as long as the update process is in progress or a restart is pending.

Once the update has been successfully completed, a message will appear indicating that a restart is required. The updated system will only be fully activated after this restart. If an error occurs when updating the system, the system automatically reverts to the last functioning version and starts with this version. The currently installed software version can be always seen in the user interface.

Important notes

- The update process must not be interrupted. The USB stick may only be removed after the update has been completed.
- Ideally, matriq updates should be carried out outside of productive operating hours.
- After the restart, the dm-LinQ system is fully operational and up to date.

8. Information and diagnostics

The information page is the last menu item in the left-hand navigation bar of the user interface. It provides a central overview of the current system status, connected hardware components and relevant support contact data. This view is used both for transparency during operation and for quick orientation in the event of support.

8.1. Contact information

The support contact details of matriq AG are displayed at the top of the page. These include the following:

- Address of matriq AG
- E-mail address for support requests
- Technical support telephone hotline (also accessible via QR code)
- Link to online support (also accessible via QR code)

This information is deliberately placed in a prominent position to enable quick access to assistance in the event of a fault.

8.2. Diagnostic report

The information page provides an integrated diagnostic function to assist with support cases. This makes it possible to automatically collect system-relevant log files and provide them as a compact report. A diagnostic report can be generated using the "Create" button. This process includes

- the compilation of all relevant system and error logs,
- the protocols of active modules and the controller,
- as well as other status data that is helpful for error analysis.

The collected information is automatically summarized in a JSON file. Once the file has been successfully created, it can be downloaded directly and copied to a USB stick, for example, or forwarded to the matriq AG support team by email.

The diagnostic report serves as a central error analysis basis and enables technical support to respond more quickly and in a more targeted manner. The structured collection of all log data eliminates the need for queries or manual exports of individual files.

8.3. Overview of the connected hardware

Below this is a dynamic system overview that lists all currently recognized hardware components in the system, including

- Device name (e.g. LinQ Controller, insert module)
- Serial number (if available)
- Current firmware version
- Current software version

This display is constantly updated and always reflects the current hardware inventory. If a new module or an additional controller is connected, it automatically appears in the overview.