ADDI-DATA

USER MANUAL

MSX-AI-5000

Edge AI vision system

Version 9.0.0

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PRODUCT INFORMATION

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- Corporation.
- CompactPCI is a registered trademark of PCI Industrial Computer Manufacturers Group.
- VxWorks is a registered trademark of Wind River Systems, Inc.
- RTX is a registered trademark of IntervalZero.
- Google Chrome is a trademark of Google LLC.
- Mozilla Firefox is a registered trademark of Mozilla Foundation.

BRIEF DESCRIPTION

MSX-AI-5000 edge vision systems are intended to capture video streams from several industrial cameras, to run embedded vision algorithms in real-time, and to visualize the ongoing processing as a live stream.
The system comes with two user interfaces: an Android application and a web browser interface. They allow you to setup, monitor and live visualize the machine vision applications. The web browser interface also allows you to centrally manage the deployed devices.

Features

- NVIDIA® Jetson Xavier™ NX
- 8GB LPDDR4x
- Multi-storage option: 16GB eMMC / MicroSD slot / mSATA slot / 2.5 drive bay
- GbE PoE/PSE LAN x 2
- HDMI Input x 1 & HDMI Output x 1
- Digital I/O 13-channel
- Expansion support for WiFi/LTE

Included components

- 1x hardware module
- 1x power supply cable
- 1x LAN Ethernet cable
- 2x Wi-Fi antennas

Optional components

- Cameras (optional)
- Camera cables
- Mounting system
- Light system

CONNECTING THE PERIPHERALS

Power supply

Connect the power supply cable to the DC IN 12~24V port of the module and to your power grid.

Ethernet

If you need to establish a wired connection, plug the Ethernet cable to the module's LAN port and to your internal Ethernet network.

> Please note that the PoE ports aren't suitable for this purpose.

Cameras

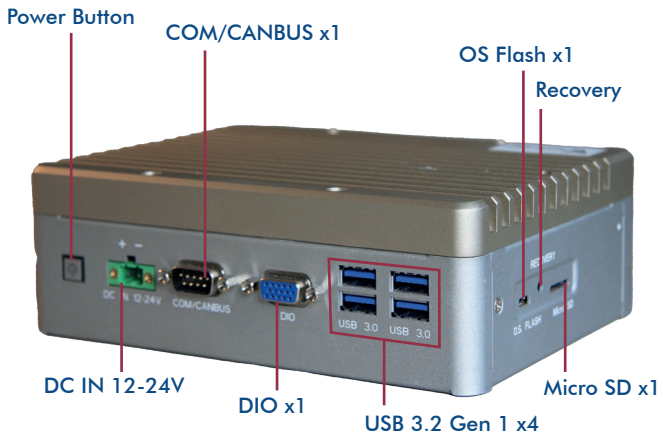
If you use Ethernet cameras, connect them to the module's **Power Over Ethernet (PoE)** ports.

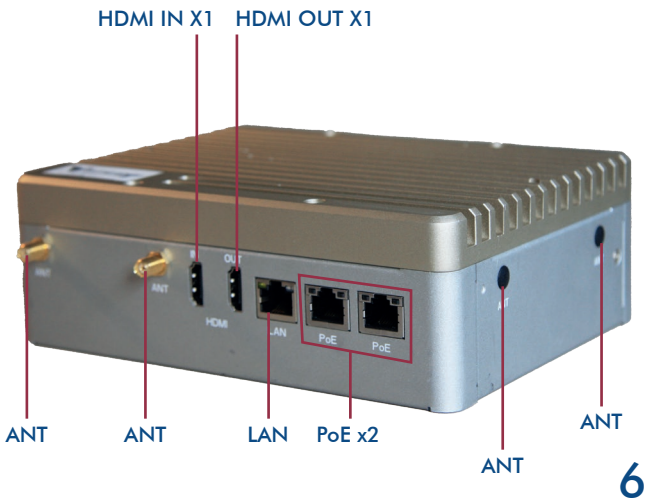
> Please note that the LAN port isn't suitable for this purpose.

If you use USB cameras, connect them to the module's **USB** ports.

Antennas (optional)

If needed, connect the Wi-Fi antennas to the ANT ports.





WEB APPLICATION USER GUIDE

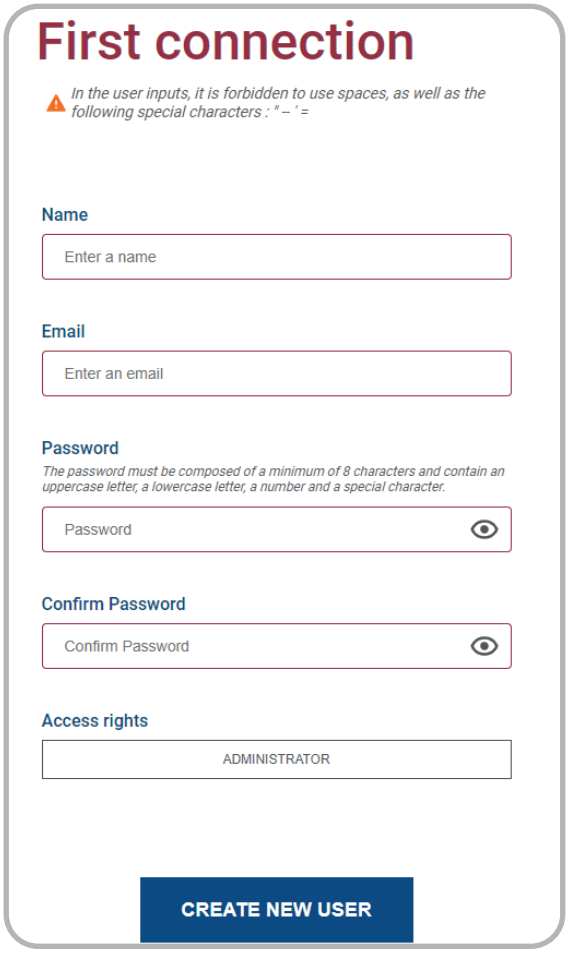
Connection to the system

Turn on the MSX-AI-5000 and wait a few minutes for the system to boot up.

Create a new account

If you start the application for the first time, you have to create an account.

If you already have an account, please go to the next section.



To create an account, all fields are mandatory.
The name field must contain between 3 and 30 characters.
The field for the email address must contain "@".
The password must meet the following criteria:

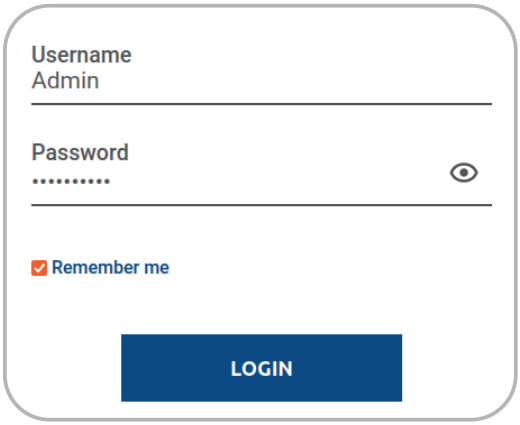
- be at least 8 characters long
- contain a lowercase, an uppercase, a number and a special character

The first user of the application to create an account must be an **administrator**.

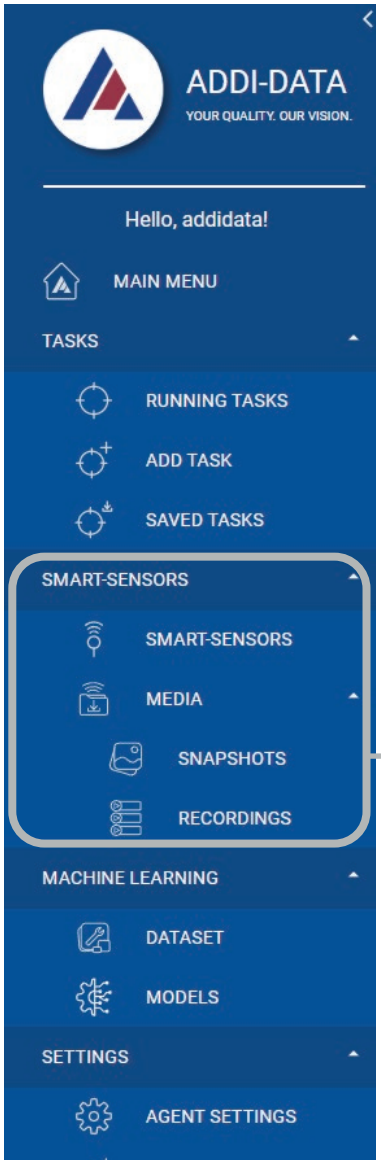
User login

Log in to the user account provided by your organization.

> If you don't have an account, please go to the previous section.



Menu

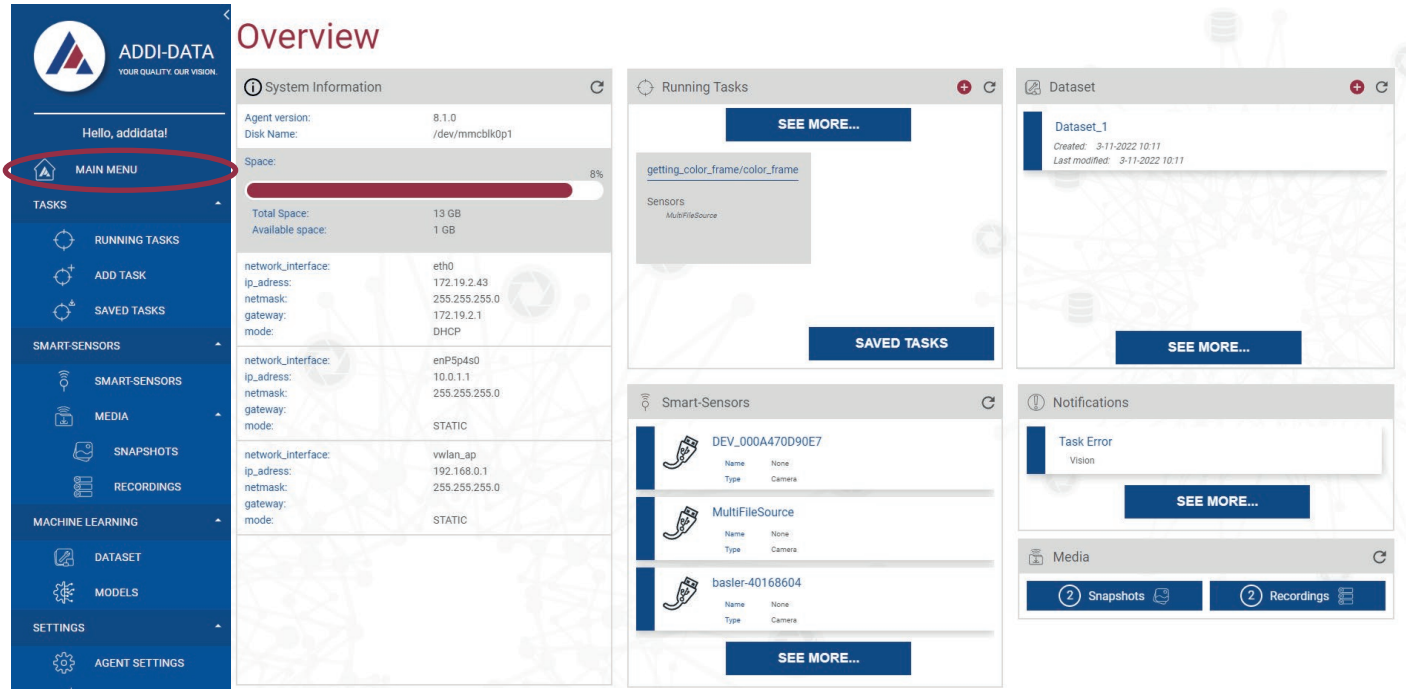


The main menu is on the left of the screen. It allows to access the different items.

Each item is represented by an icon, making it easier to understand and find your way around.

You can open or close the sections of the menu by clicking on the heading.

Overview



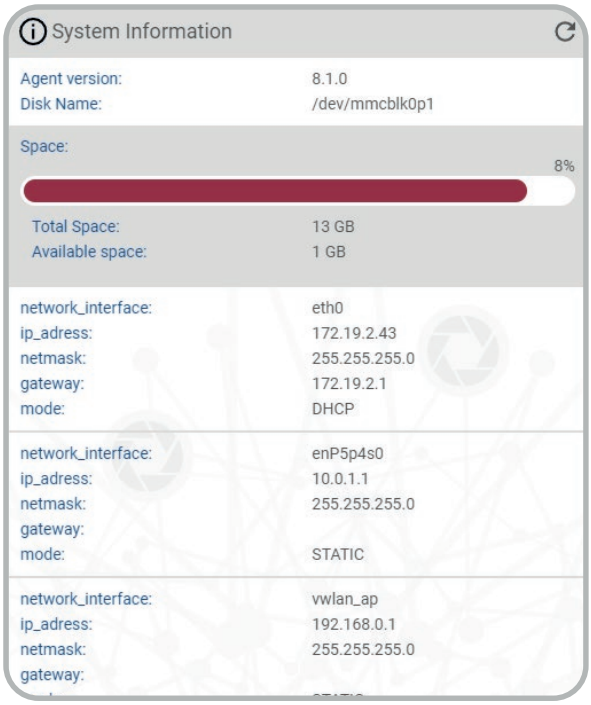
The main page of the application is accessed by clicking on the **"MAIN MENU"** button.
This page encapsulates the general status of the application: ranging from system status to the list of devices connected to the Agent, including the various data held in memory.

▶ *System information*

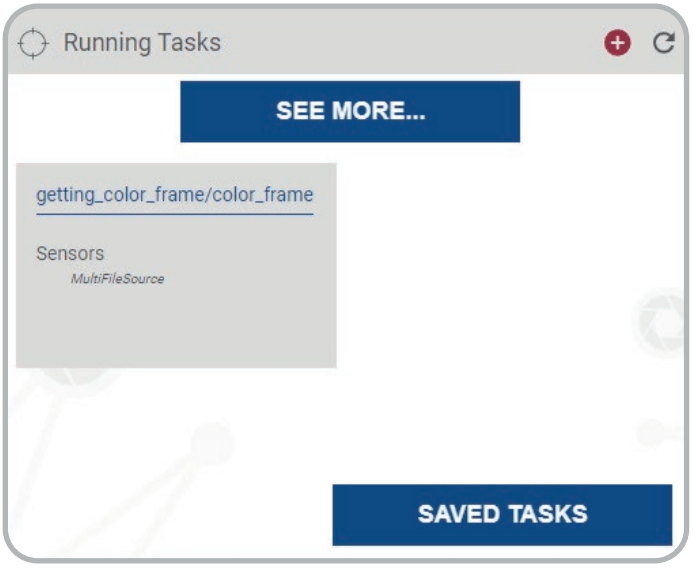
This insert contains system-related information, such as :

- Agent version
- Disk name
- Total available space
- Space interface specifications

This insert can be independently refreshed using the refresh button ↻



Running tasks



This insert provides an overview of the Running tasks. The user will find an overview of all items and actions relating to the Running tasks.

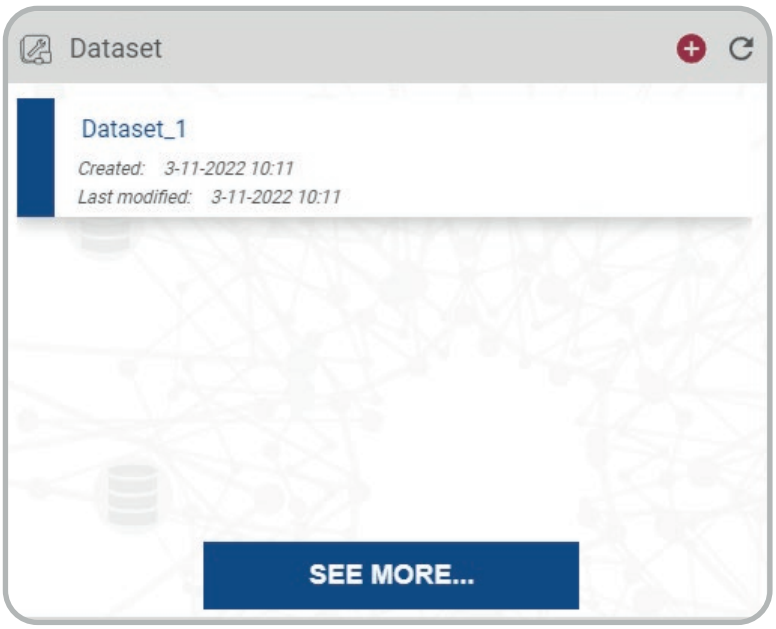
The **"SEE MORE..."** button takes the user to the dedicated Running tasks page.

The **"Saved Tasks"** button takes the user to a page containing a list of previously Saved tasks, together with all related parameters.

Clicking on the ⊕ button in the header takes the user to the page allowing the creation of a new Task.

This insert can be refreshed independently using the refresh button ↻

Dataset

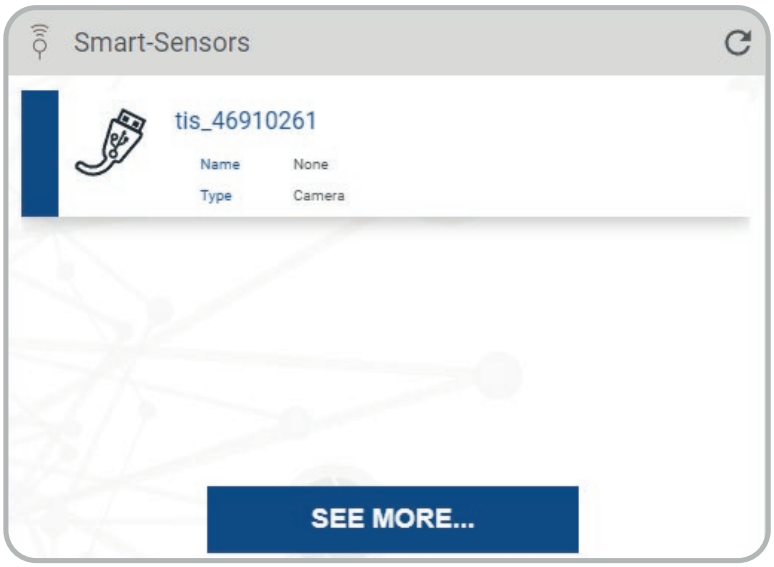


This insert provides a simplified version of the list of Datasets available on the Agent.

The **"SEE MORE..."** button takes the user to the page containing the complete Dataset information.
Clicking on the ⊕ button in the header takes the user to the page allowing the creation of a new Dataset.

This insert can be independently refreshed using the refresh button ↻

Smart sensors



This insert provides an overview of the various devices connected to the Agent.

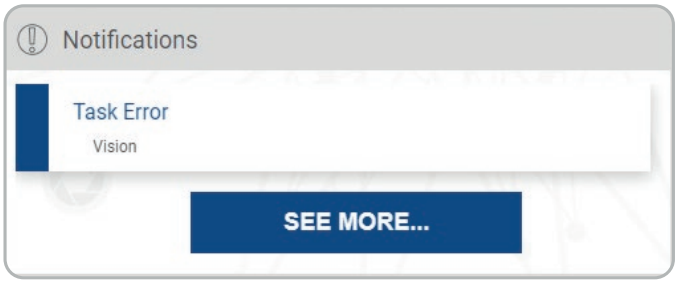
The **"SEE MORE..."** button takes the user to the page containing the full information about the devices connected to the Agent.

This insert can be independently refreshed using the refresh button

Notifications

This insert displays the last notification received by the system.

All notifications received by the system can be accessed by clicking on the **"SEE MORE..."** button and on the **"NOTIFICATIONS"** tab in the main menu (more informations p.32).



Media

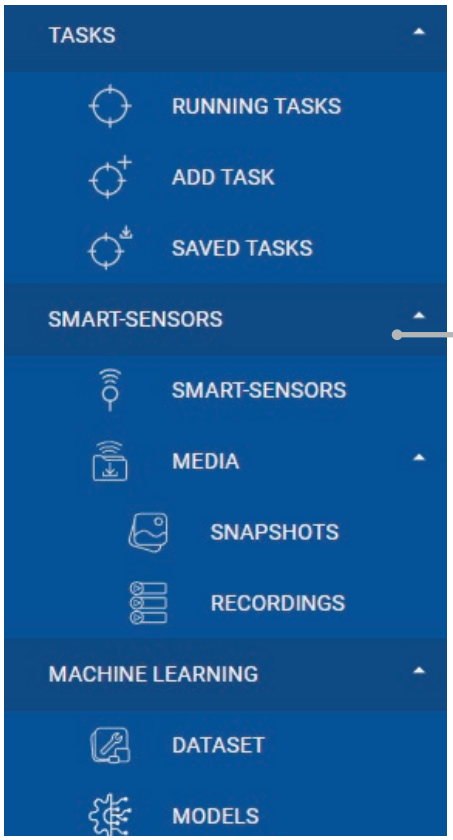
This insert gives the total number of media available on the Agent (both snapshots recordings).

The complete gallery of snapshots and/or recordings can be accessed by clicking on the corresponding button in this insert, or via the corresponding tab in the "**MEDIA**" category of the main menu (more informations p.16).

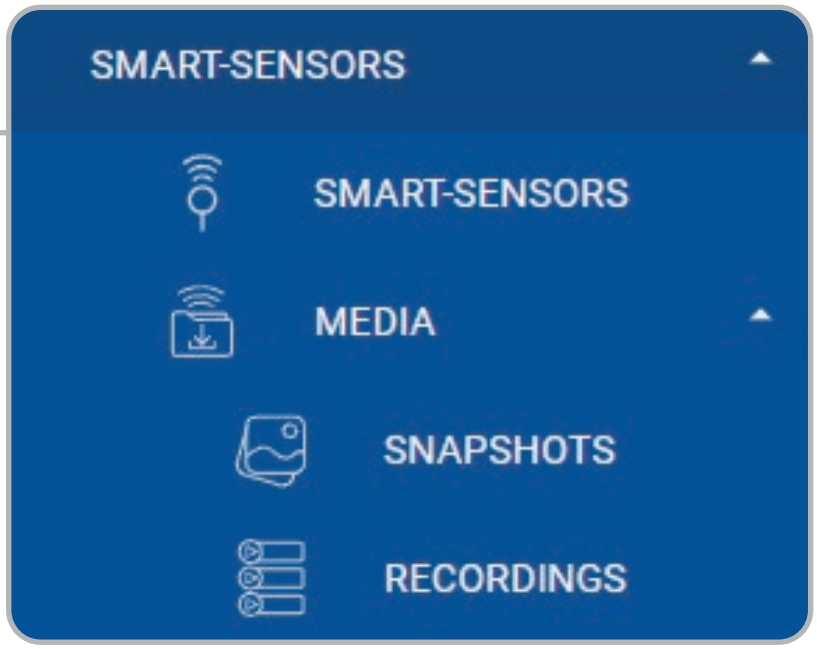
This insert can be independently refreshed using the refresh button

Camera settings

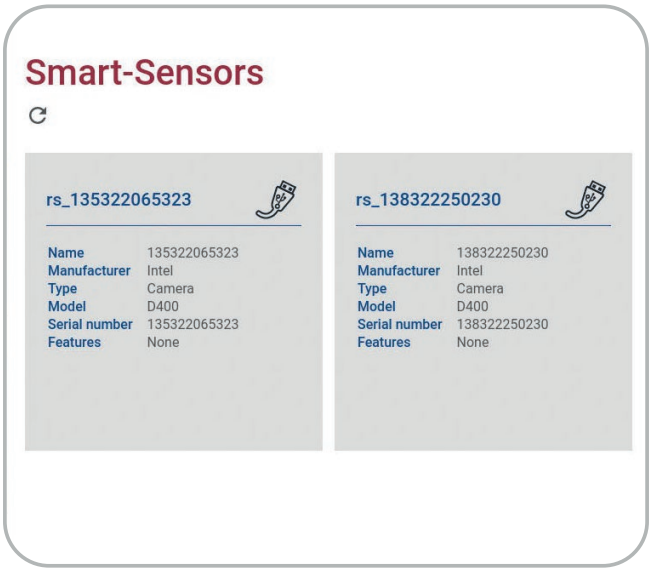
▶ *Access to camera settings*



Within the menu, click on the **"SMART SENSORS"** tab to access the sensor settings.



▶ *Configure camera(s)*

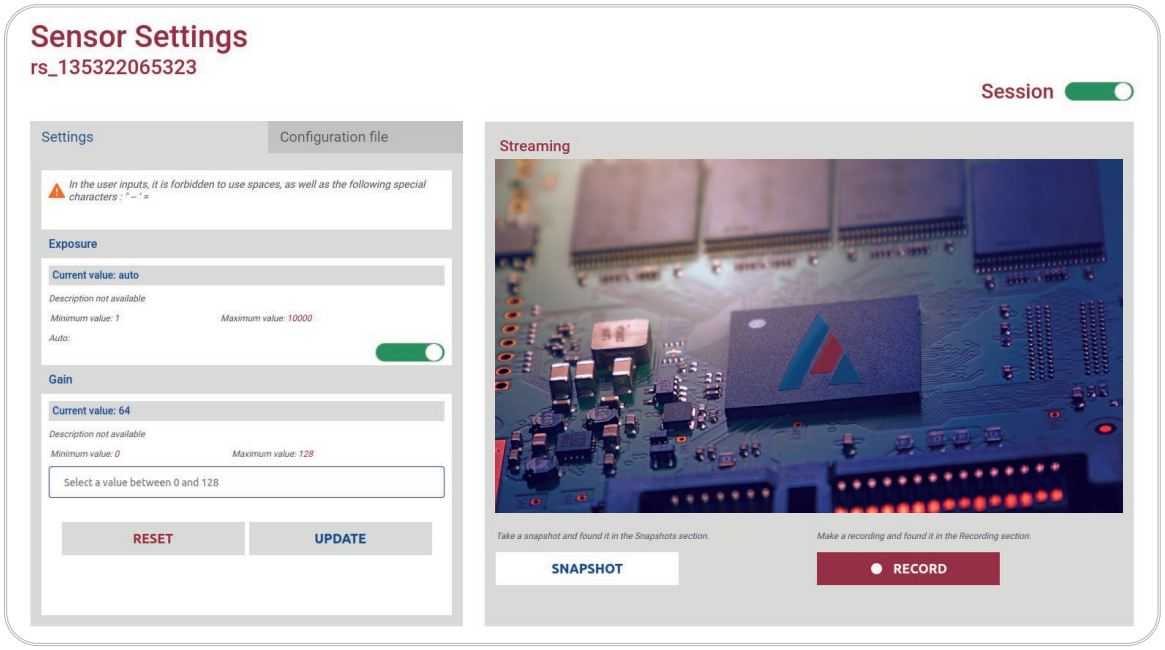


Select the camera you want to configure.

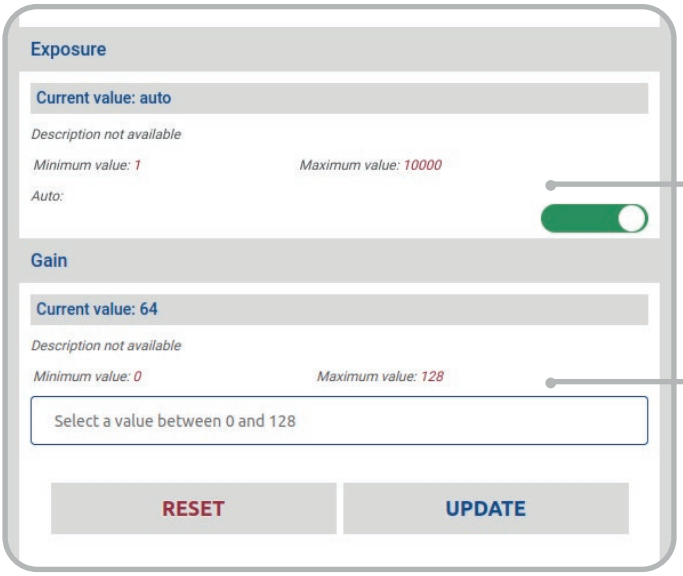
A symbol for each camera appears in the right top corner, representing the type of connection of the camera.

The ↻ button allows to refresh the page.

You can set different parameters depending on the cameras. The updates are displayed in real-time. The settings you've made are stored in the system.



In the user inputs, it is forbidden to use spaces, as well as the followings special characters: « _ - =

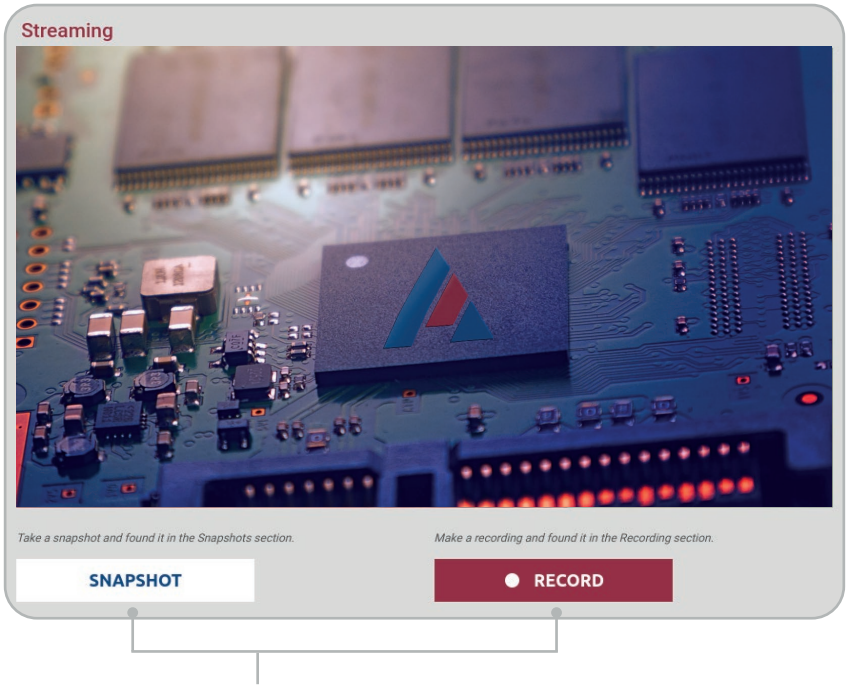


At this step, you can modify different parameters in real time.

You can adjust the exposure manually or just put an automatic exposure.

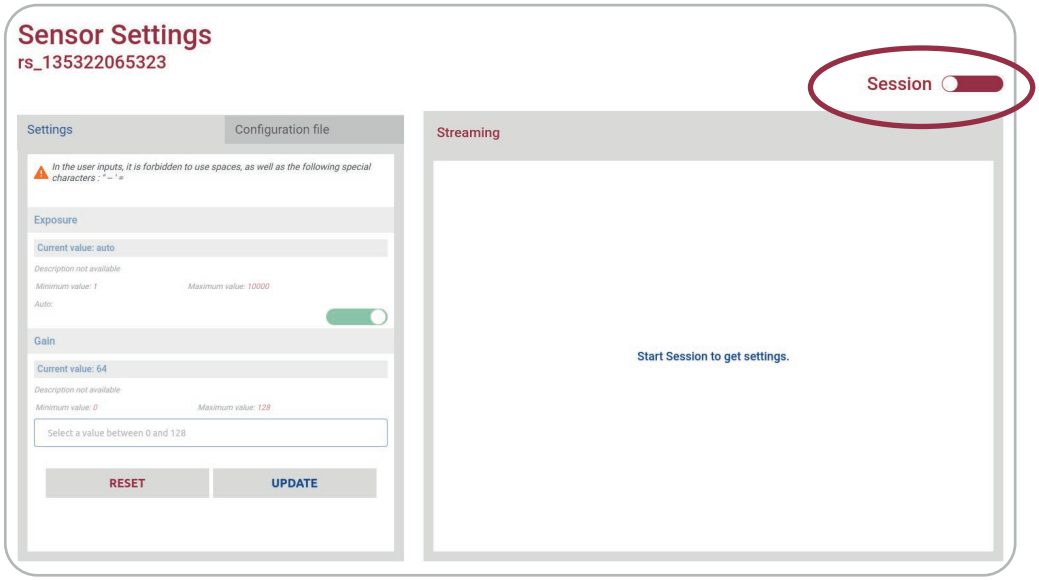
You can adjust the gain of the video stream to manage the visual noise.

Save a media



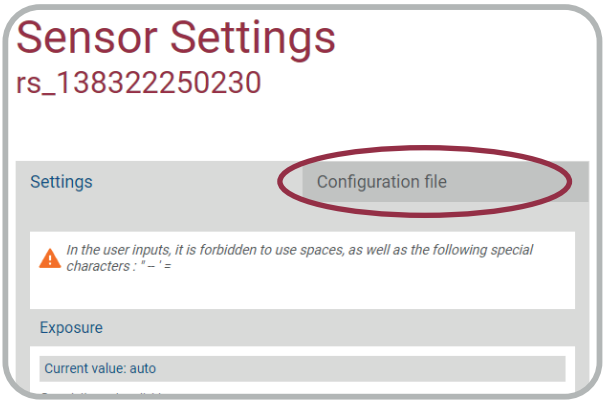
You can take a snapshots or recordings with the cameras.
You may find your recordings and snapshots in the Media section of the application.

Close the session

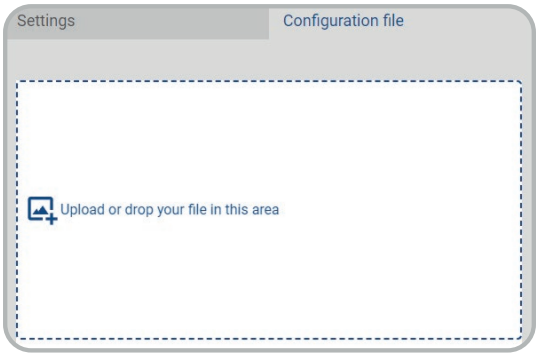


You can close the session with the top right button.

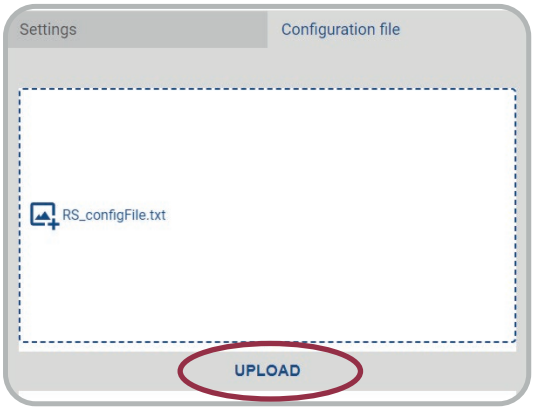
▶ *Configuration file*



Click here to open the **"Configuration file"** tab.



This feature allows to manually upload an existing file (.txt or .xml) for default camera configuration. This configuration file must comply with the specifications provided by the manufacturer.



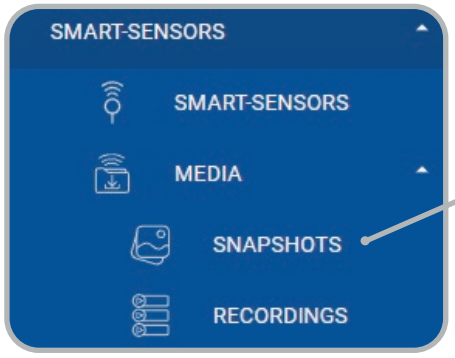
If the configuration file is compliant, click on the **"UPLOAD"** button for validation.

An uploaded file can be downloaded or deleted.
If you delete a file, the default settings will be restored.

The file must be a text file complying with the manufacturer's specifications.

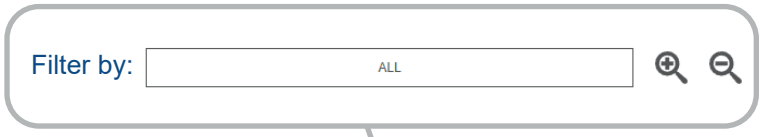
Media

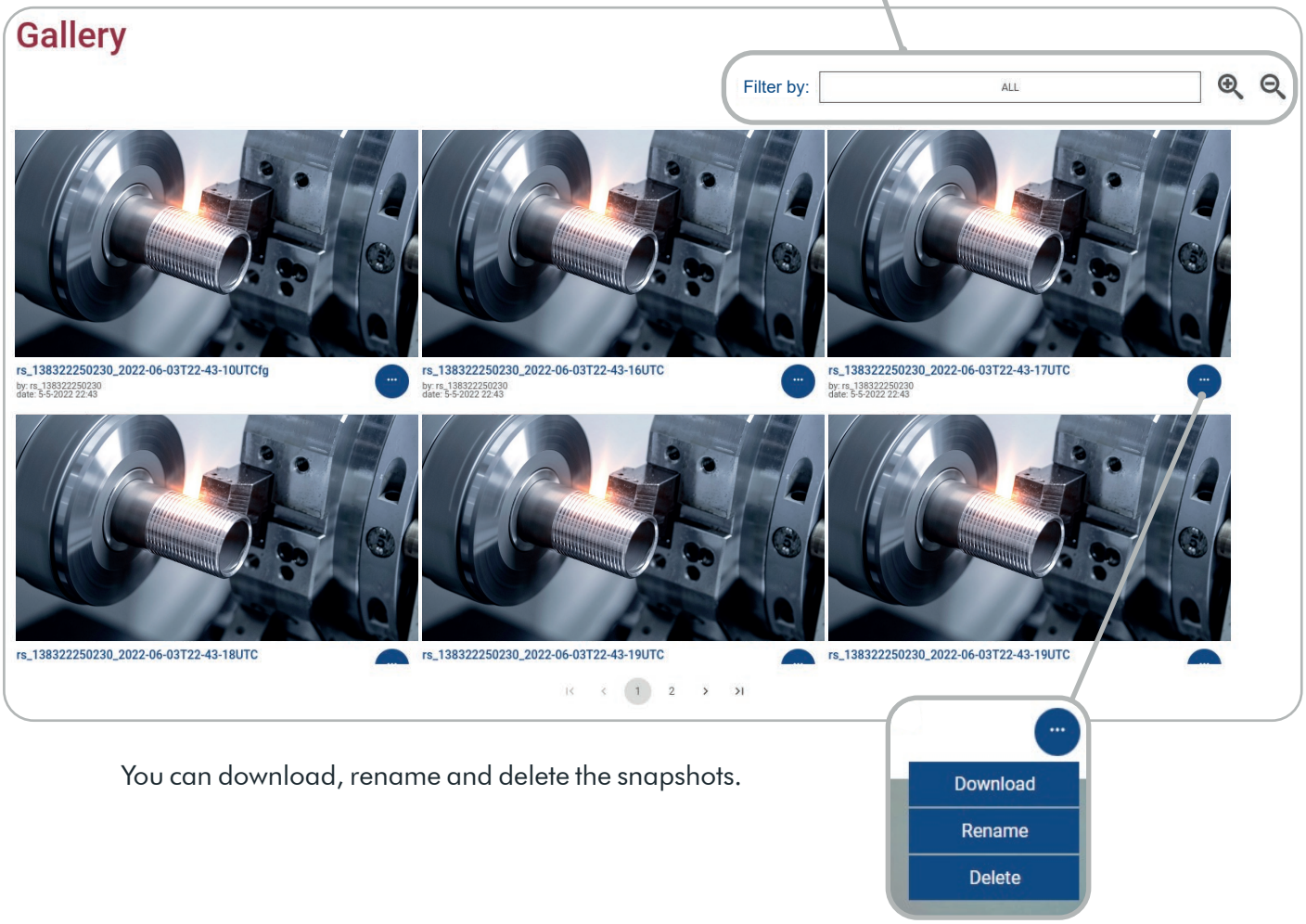
▶ *Snapshots*



Click here to see the gallery of snapshots.

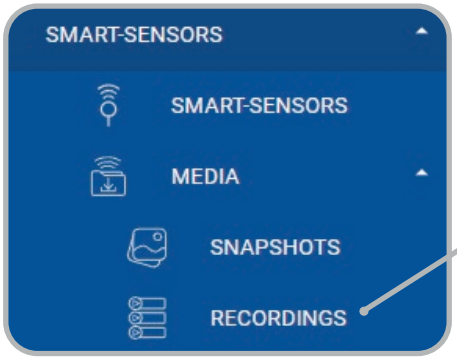
Click on the section **"Filter by"** to sort or filter the snapshots.



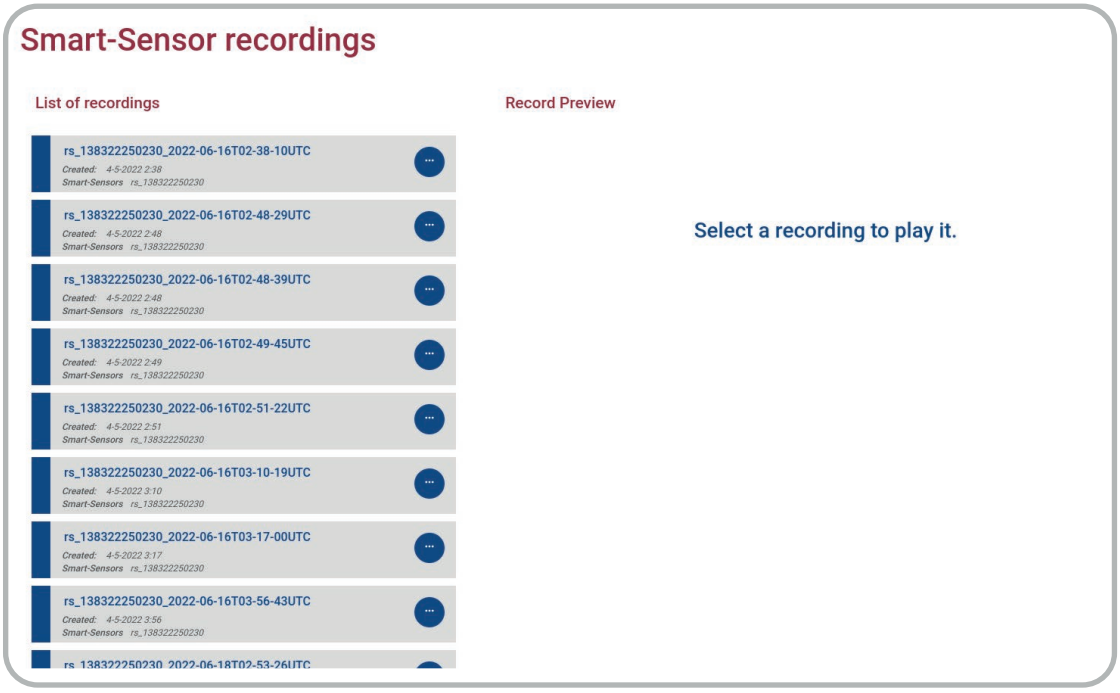


You can download, rename and delete the snapshots.

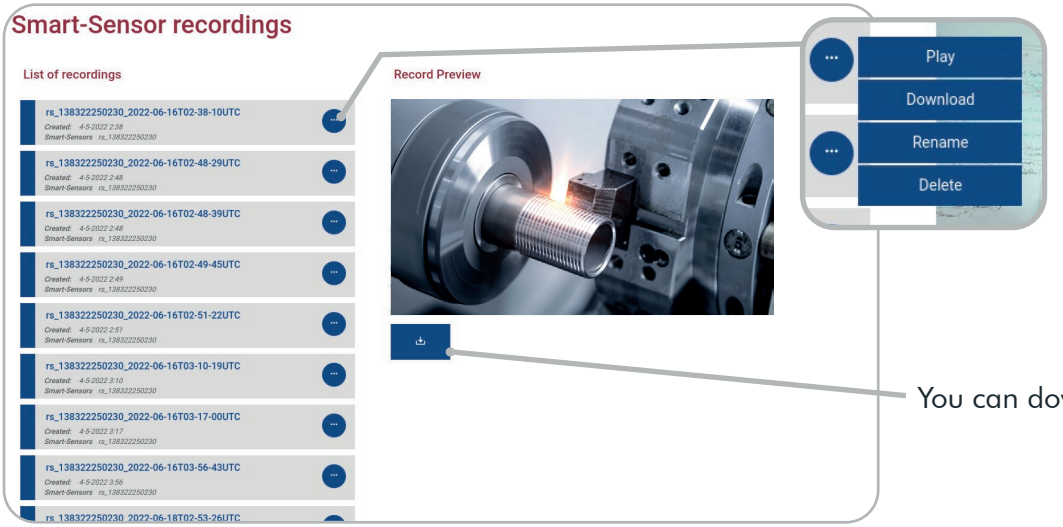
▶ *Recordings*



Click here to see the list of recordings.



Click on one of the recordings in the list to view it.



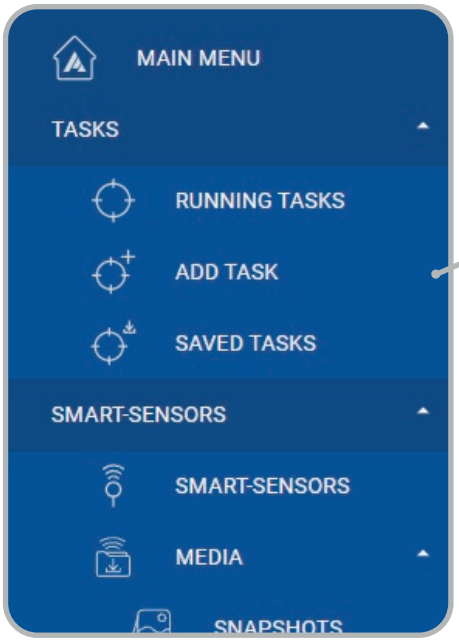
You can play, download, rename and delete recordings.

You can download the recordings.

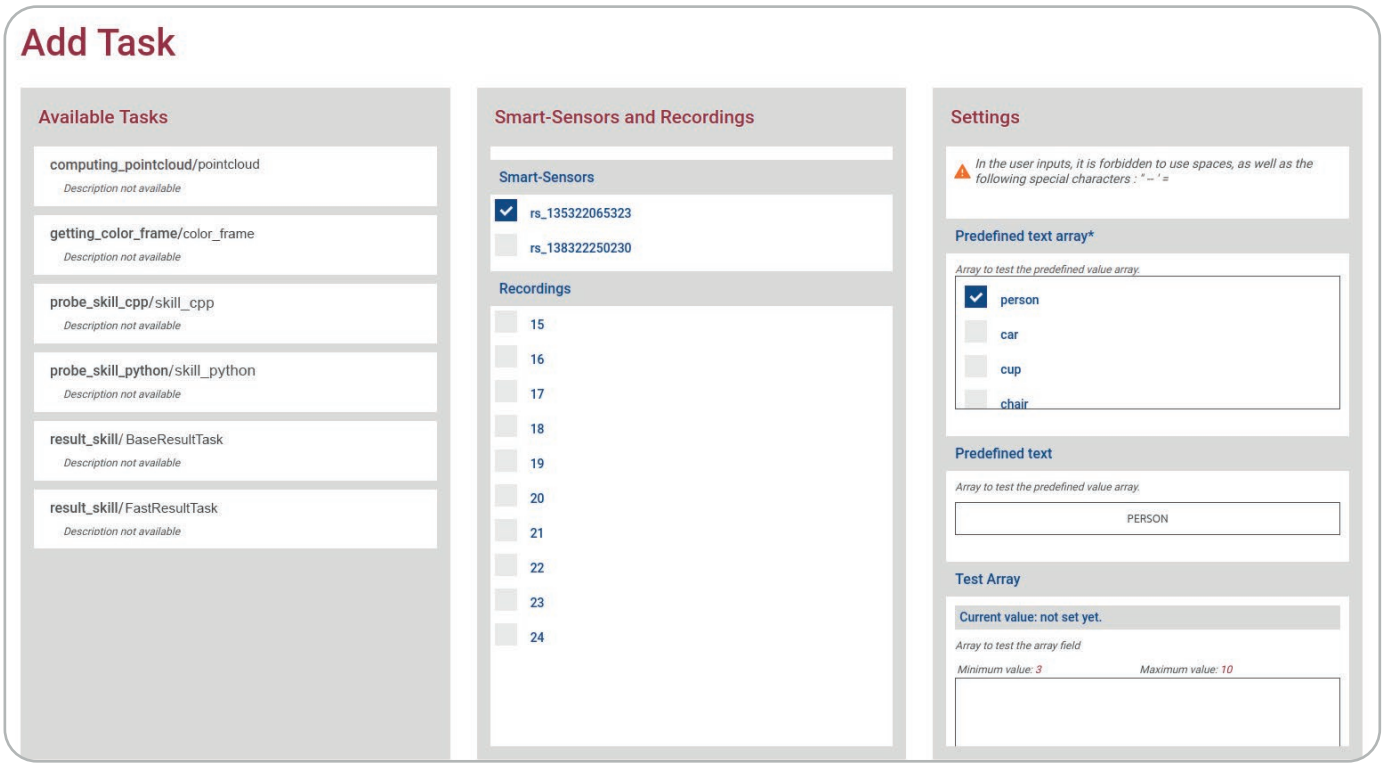
Task launch

▶ *Add task(s)*

If there are no running tasks, the following message is displayed: **"No Tasks are currently running"**.



Within the menu, go on the **"TASKS"** rubric to open the task menu, and click on the button **"ADD TASK"** to add a new task.

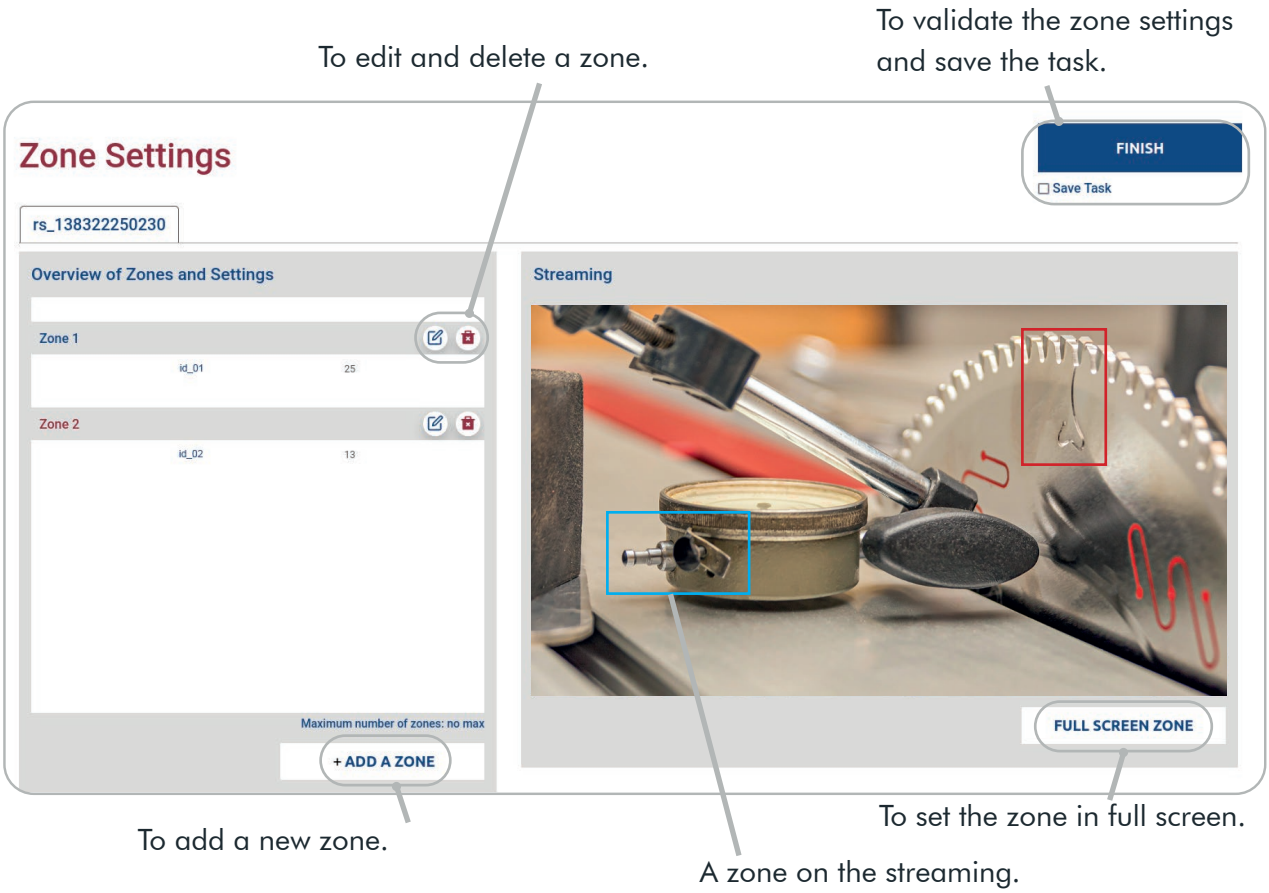


- Select an available task among the list
- You can choose to execute the task on the live stream of a camera, or on a previous recording:
  - select the relevant camera within the "Smart sensors" list
  - or select the relevant recording within the "Recordings" list
- Adjust the settings according to your needs

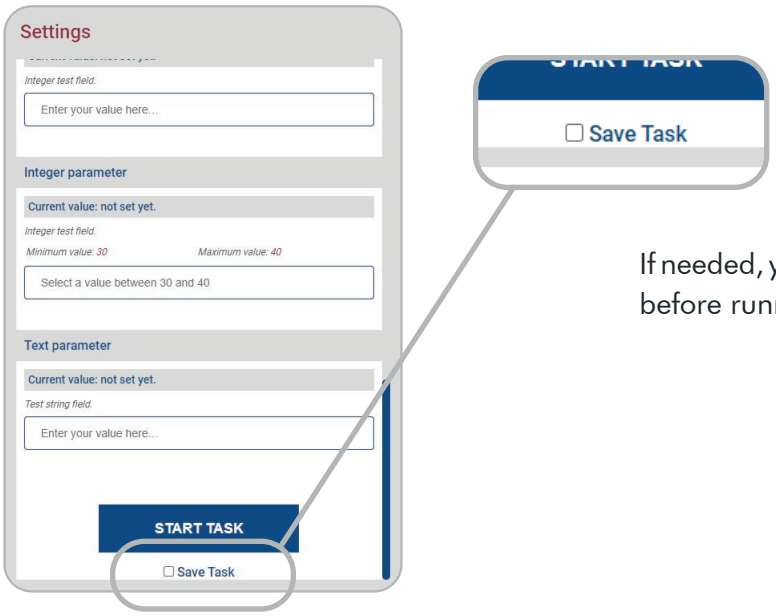
The Zone Settings

You can set zones on the streaming depending on the task chosen if you have the button **"SET ZONES"**.

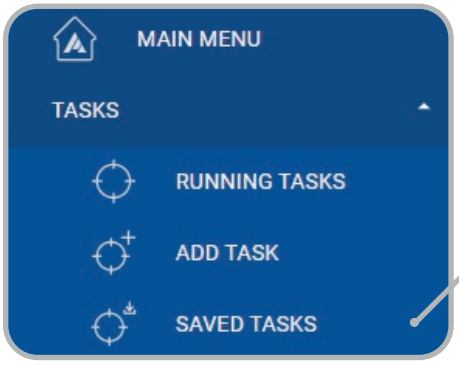
You can add a zone and define the zone on the streaming with your cursor.



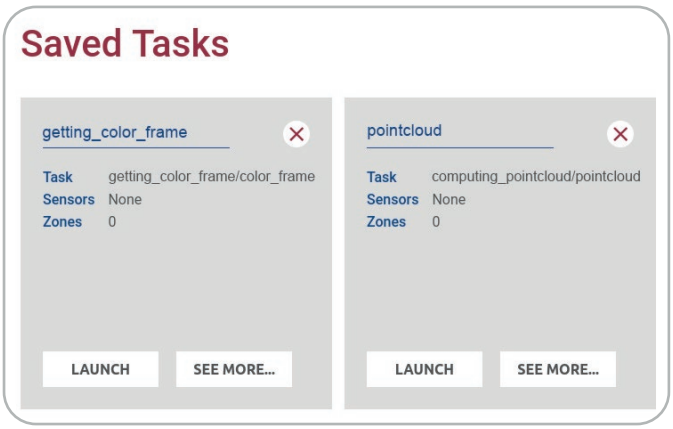
▶ *Save task(s)*



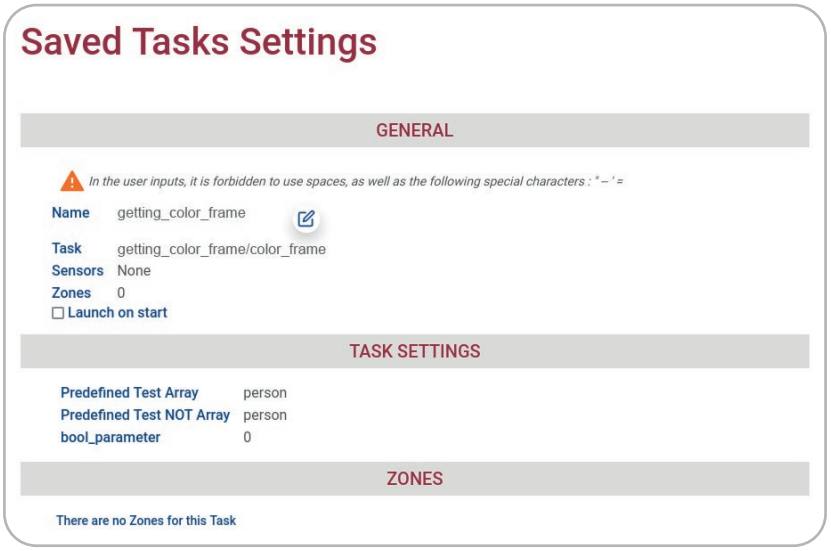
If needed, you can save the task and its parameters before running it.



Within the menu, go on the **"TASKS"** rubric to open the task menu, and click on the button **"SAVED TASKS"** to access the previously saved tasks.

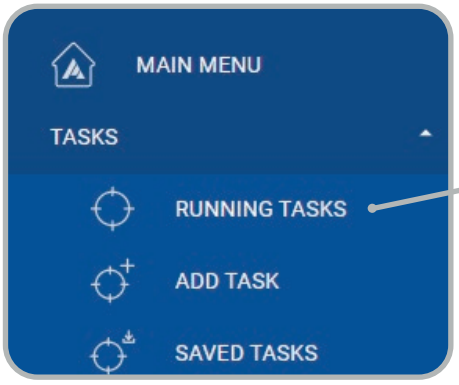


You can launch or delete saved tasks, and access to their parameters with the button: **"SEE MORE..."**

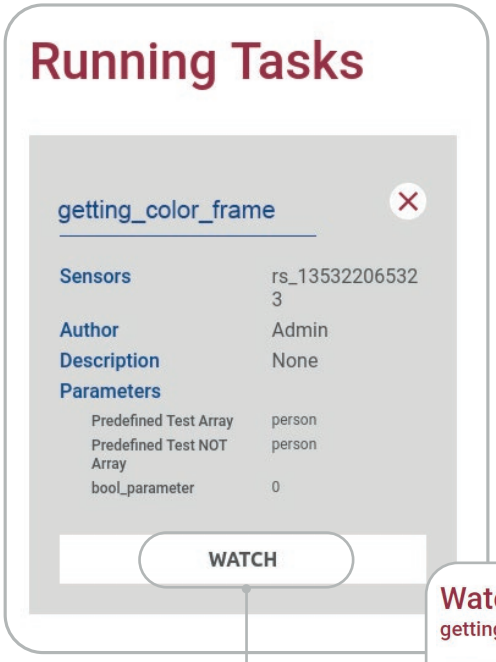


In the settings, you can choose to activate the automatic launch of the task at system startup and change the name of the task with this icon:

▶ *Watch the task*



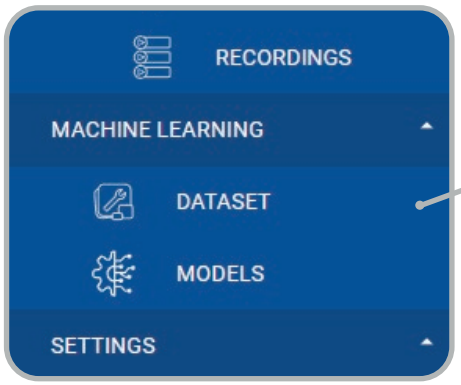
Within the menu, go on the **"TASKS"** rubric to open the task menu, and click on the button **"RUNNING TASKS"**.



You can watch a task, or stop it with the cross at the top right.

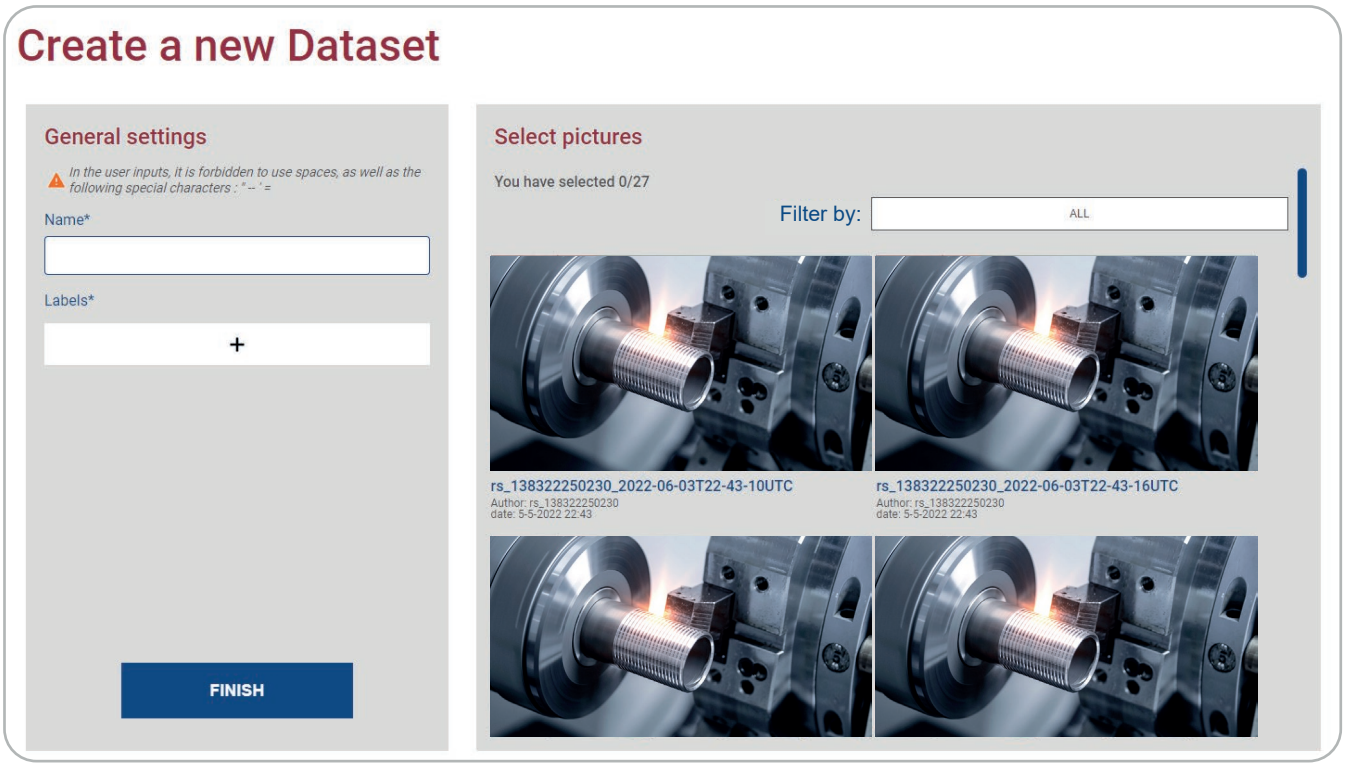
Dataset

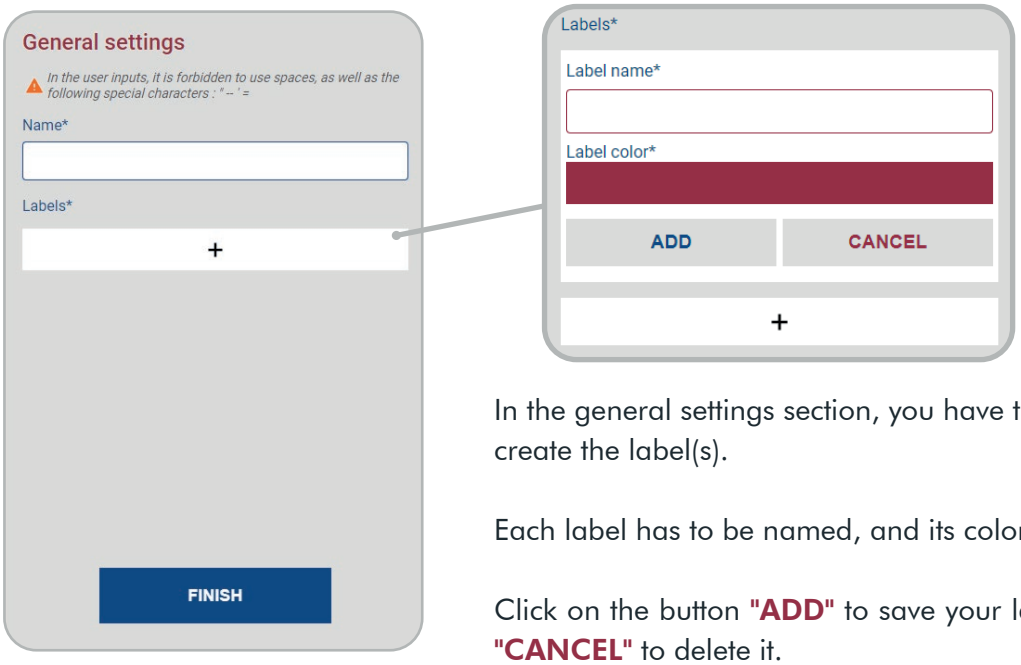
▶ *Add a new dataset*



Within the menu, go on the **"MACHINE LEARNING"** rubric to open the training menu, and click on the button **"DATASET"**.

Click on the icon ⊕ to add a new dataset.

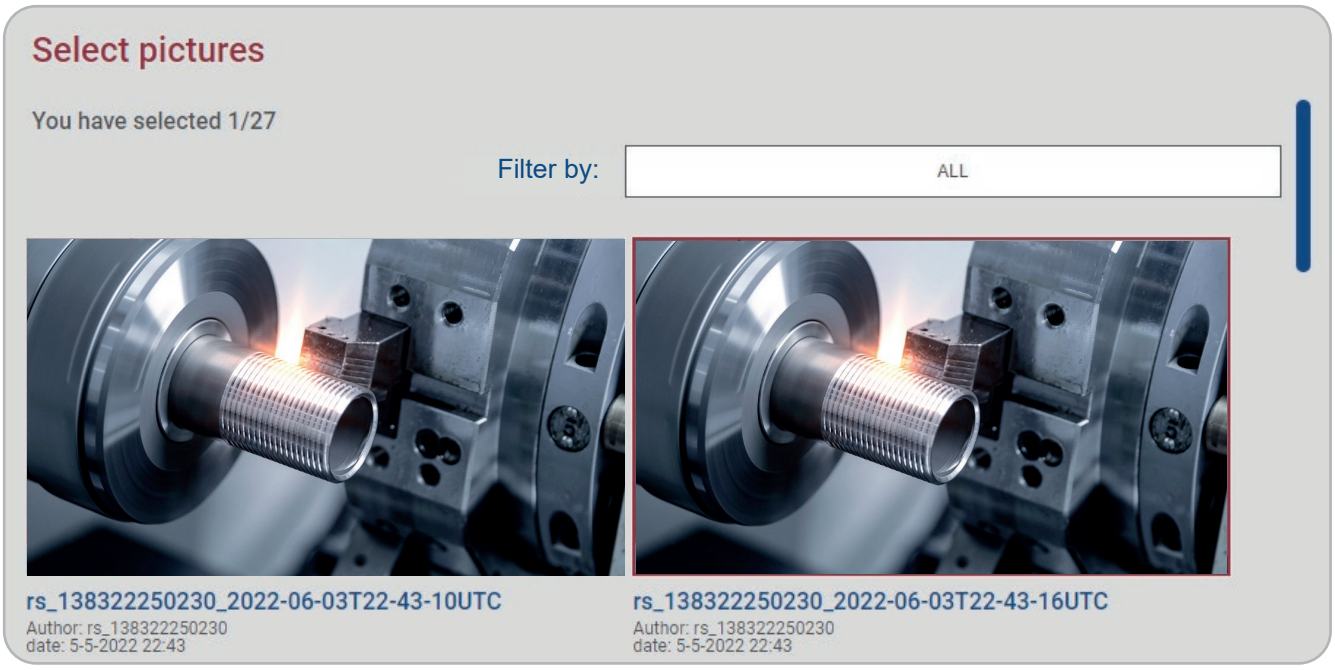




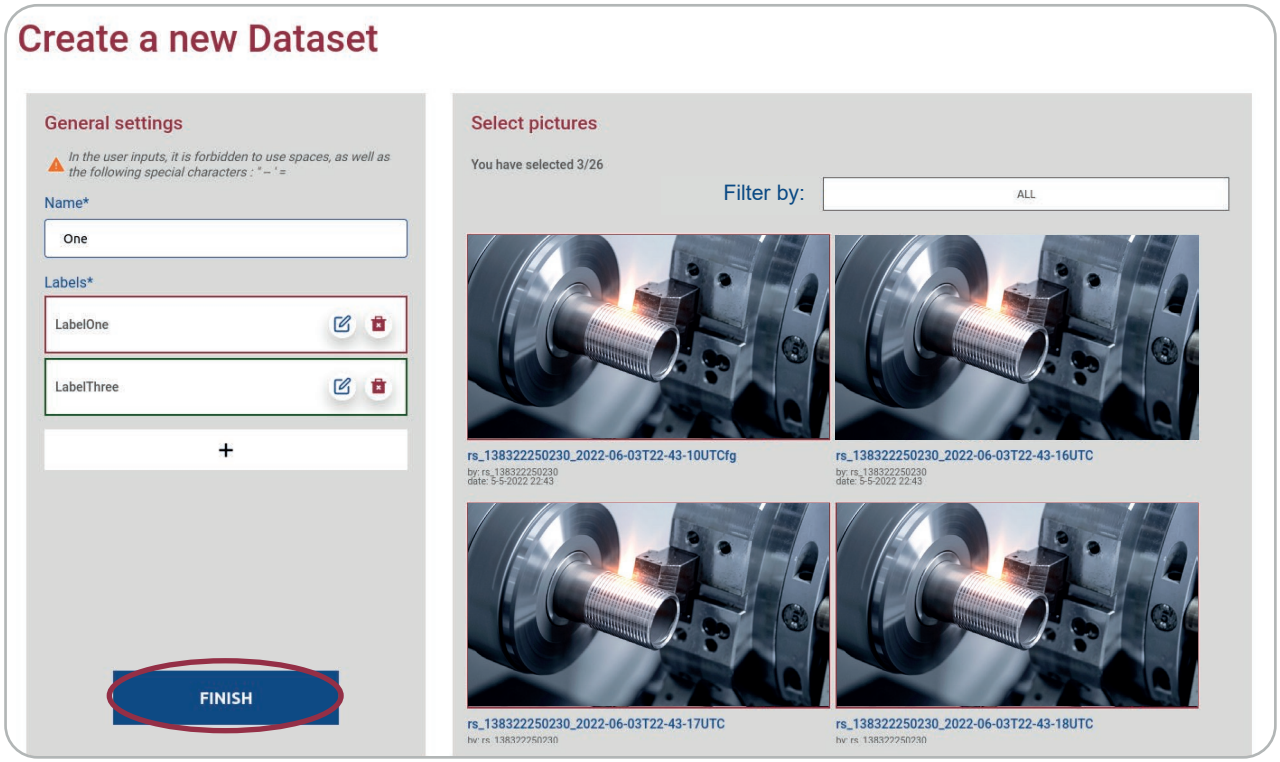
In the general settings section, you have to name the dataset and to create the label(s).

Each label has to be named, and its color can be changed.

Click on the button **"ADD"** to save your label or click on the button **"CANCEL"** to delete it.

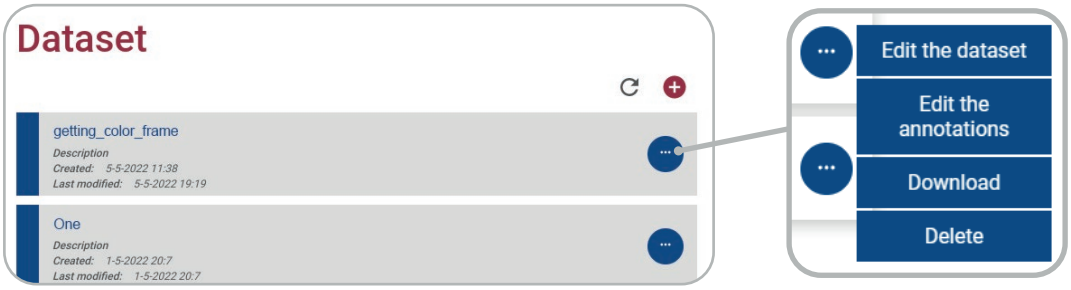


Then, select the pictures you want to add in the dataset. The selected pictures are outlined in red. You can sort or filter the snapshots with the **"Filter by"** section.



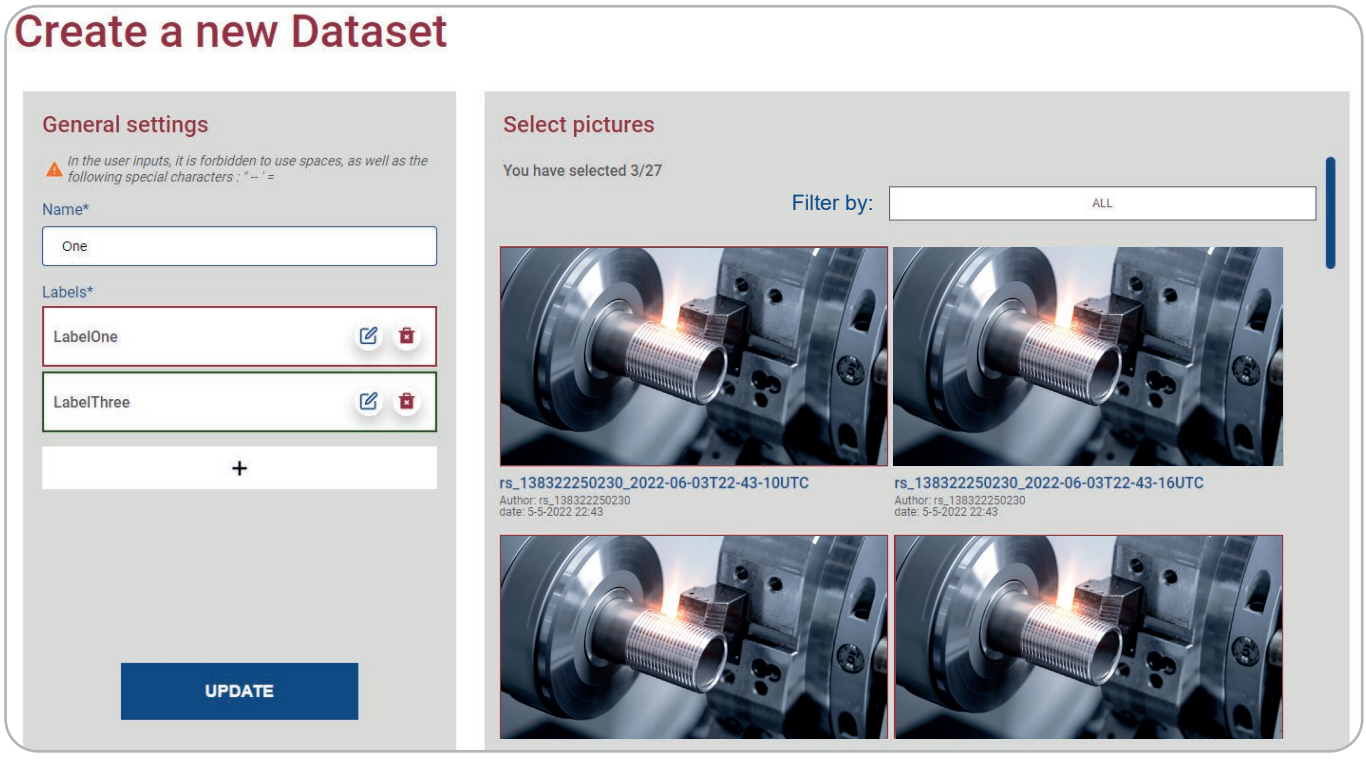
Once all the images of the different labels have been selected, click on the button **"FINISH"** to save the dataset.

▶ *Edit a dataset*



You can edit the datasets or their annotations, and download or delete the datasets.

The ↻ button allows to refresh the page.



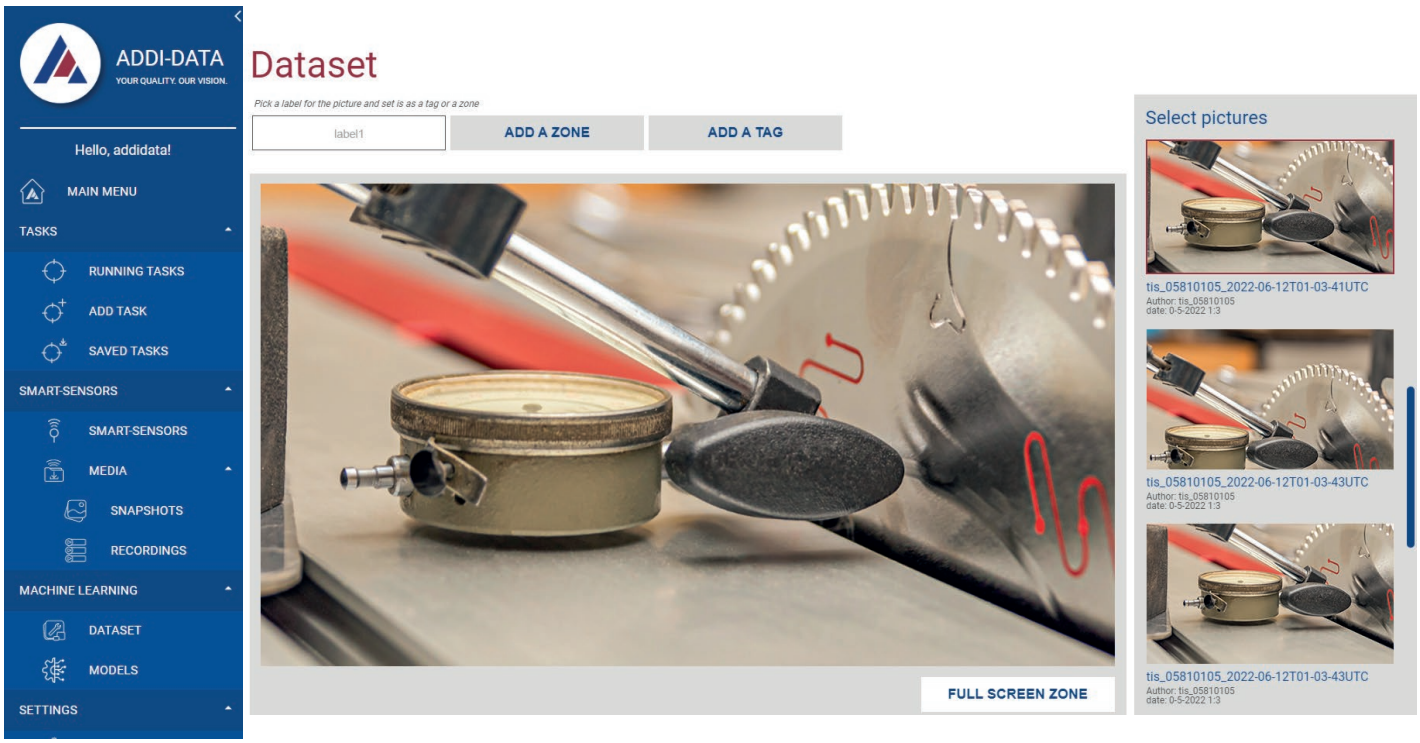
After clicking on the button **"Edit the dataset"**, you can edit:

- the name
- the labels: edit with the icon ✎ and delete with the icon 🗑
- the selected snapshots
- you can also add news labels.

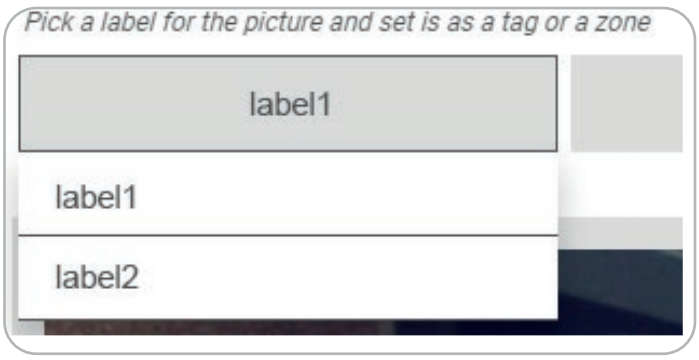
To save the edit, click on the button **"UPDATE"**.

After clicking on the button **"Edit the annotations"**, you can create or edit annotations:

- select in the column on the right the picture you want to annotate

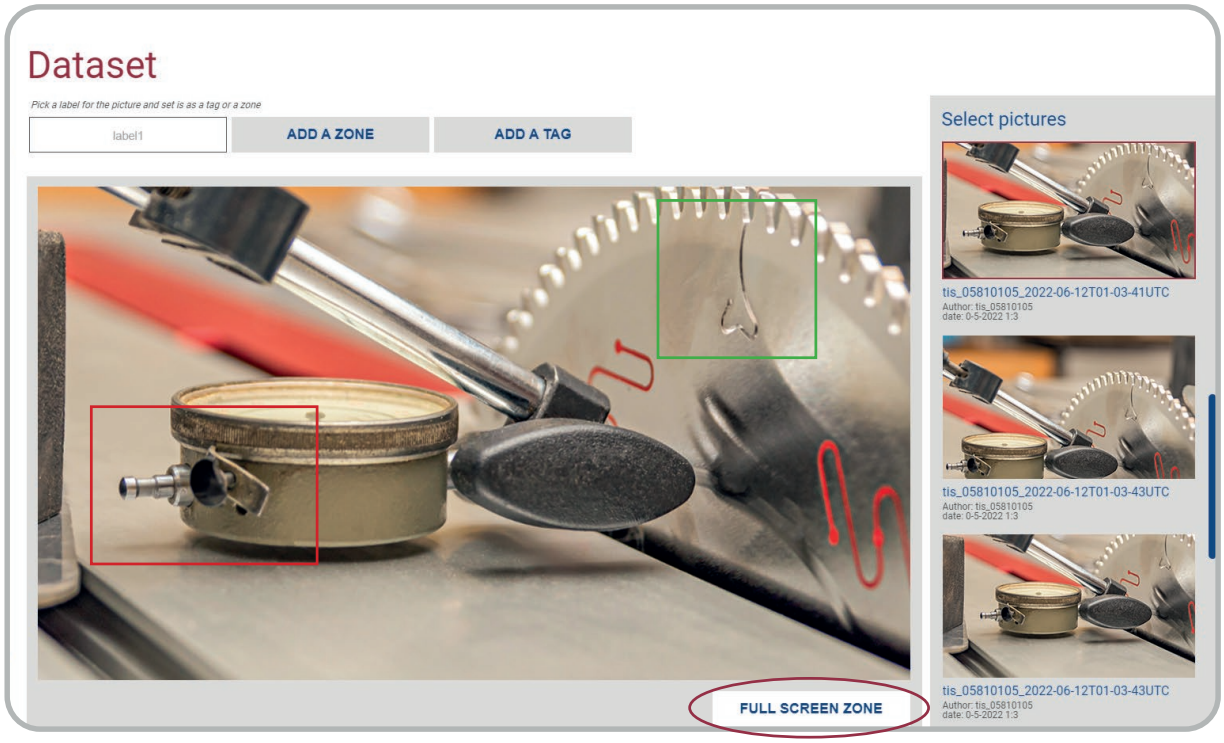


- select the label you want to set on the picture

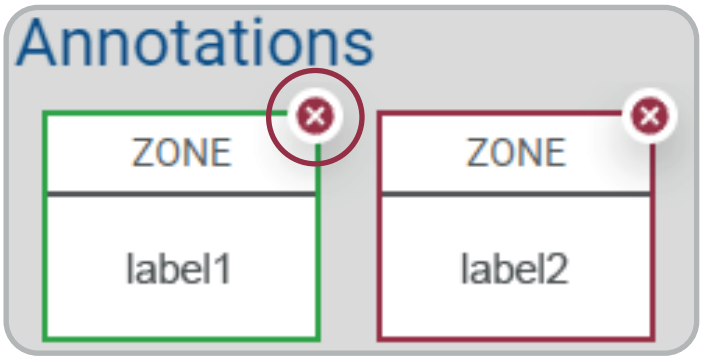


- add the annotation as a picture tag or as a picture zone

- if you want to set the annotation as a picture zone, you can use the **"FULL SCREEN ZONE"** button, or define a zone with your cursor



- you can delete an annotation



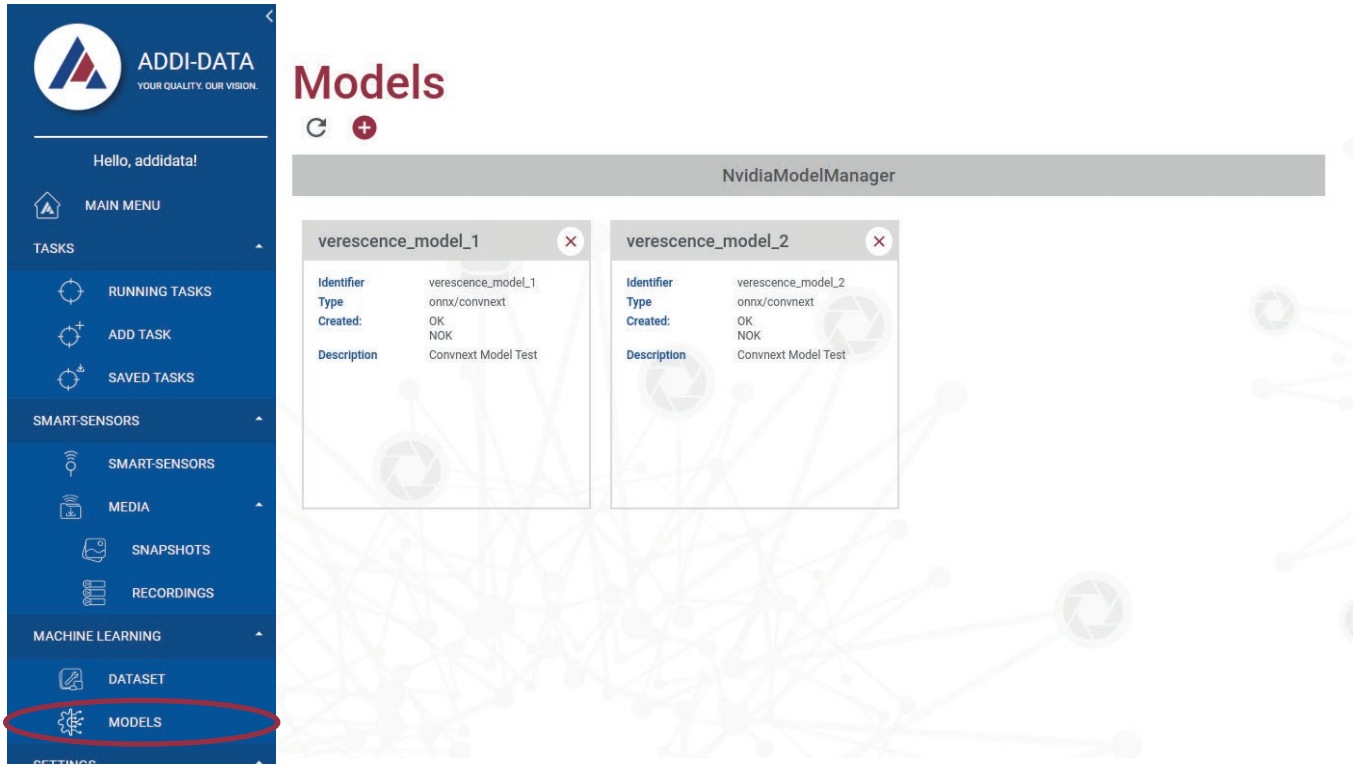
Annotations are automatically saved in real time.

Models

This page provides information on the Machine Learning models available on the Agent, categorized according to the Managers to which they belong.

In the world of artificial intelligence, a model is a system which, thanks to a mathematical or statistical algorithm, learns from targeted data until it achieves the lowest possible average statistical error. The model resulting from the learning phase is then applied to analyze new, unknown data.

In addition, the Model Manager is specific to the hardware on which the Machine Learning models are intended to evolve.

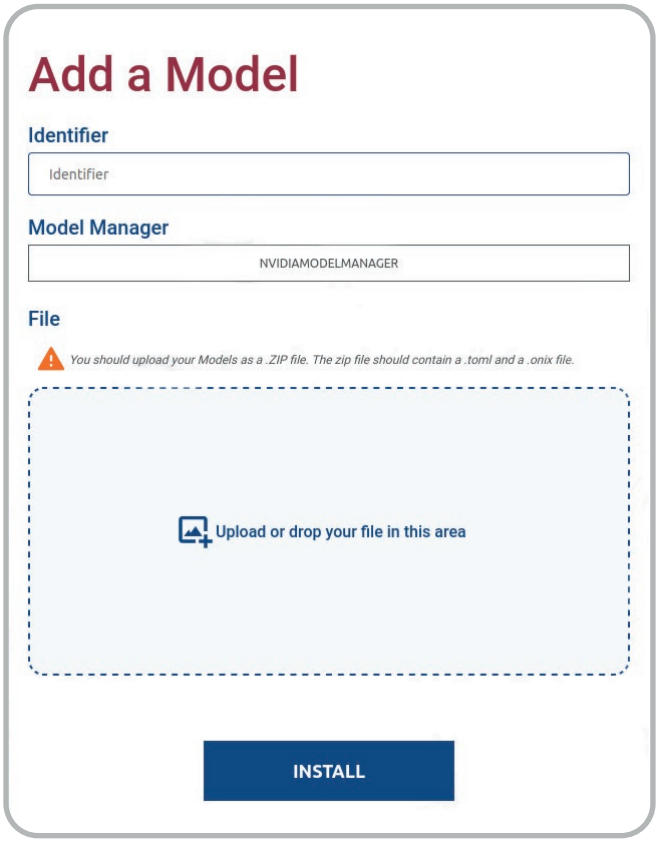


The Agent can contain several types of Models, characterized by:

- identifier
- type
- creation date
- model description

To delete a Model, click on the cross ✕ at the top right of the Model tile.
Clicking on the button ⊕ in the header takes the user to the page allowing to add a new Model to the system.
This insert can be independently refreshed using the refresh button ↻

▶ *Add a model*



To add a model to the Agent, user needs to fill in the following fields:

- **Identifier** : specify a custom ID for your model
- **Model manager**: choose the model manager to be used from the list. The choice must match the hardware architecture
- **File** : import the model itself, in a compressed ZIP-type format. This file must contain at least:
  - an .onnx file
  - a .toml file
  - and the Model

To complete the installation, press the **"INSTALL"** button. A pop-up informing the user of the success or failure of the installation will be automatically displayed after completion.

Status panel

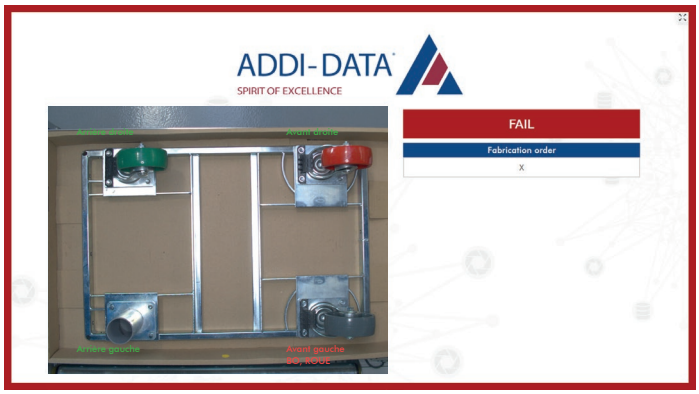
On each page of the application, a panel provides the user with:

- date and time
- the latest notification received by the system

This status panel is not present on the Overview page.

Dashboard

The dashboard shows the status of the manufacturing process. As soon as the page is opened, the application connects via MQTT and waits for information to be published by the Agent. This information is published according to the status of the manufacturing process.



The dashboard encapsulates three types of information.

Status :
The inspection result of the part in the camera's field-of-view is represented by:

- the top panel (above the production order)
- the colored outline of the dashboard window

If a manufacturing error is detected, the outline of the dashboard will turn red and the panel will display the status FAIL. If the part successfully passes the inspection, the outline of the dashboard will turn green and the panel will display the status PASS. If no results have been received, or if there is an error in the content received, the outline of the dashboard will turn red and the panel will display the status FAIL, until a new message is received.

FAIL **PASS**

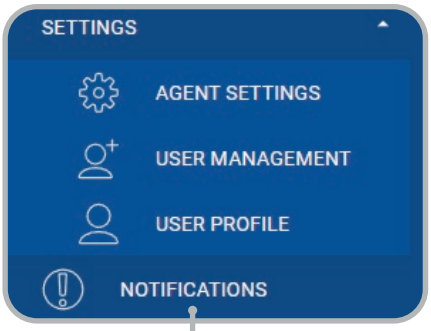
Image :
The last image captured by the camera(s) connected to the Agent is displayed. It represents the status of the process at a specific moment and provides the user with a visual referent to correlate with other information received. If no visualization has been received, or if there is an error in the content received, a textual content will notify the user and there will be no image displayed.

Production order
This insert provides the user with the reference of the part being inspected, which matches the image displayed on the dashboard. If no result has been received, or if there is an error in the content received, an "X" will specify the absence of a reference.

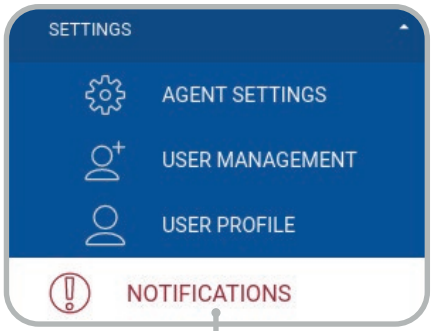
Fabrication order
52-1000_RR4M_PROTEC

Fabrication order
X

Notifications



Click on **"NOTIFICATIONS"** to see the different notifications.



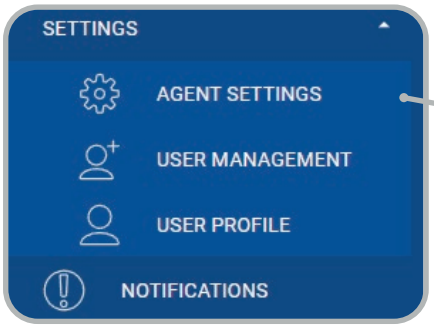
If the button is white and red, you have a new notification.

The notification explain the alert or the error and provides the name of the task.

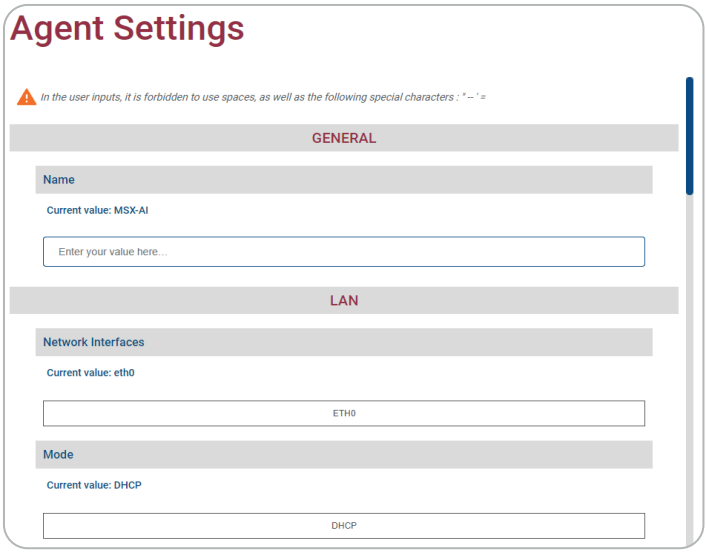
You can delete notification with the right red cross.

Settings

▶ *Agent settings*



Within the menu, go on the **"SETTINGS"** rubric to open the settings menu, and click on the button **"AGENT SETTINGS"**.



On this page you can configure different settings of the agent.

LAN parameters

If you want to modify the LAN parameters (e.g. IP Address) of the MSX-AI-5000, you have to:

- Choose the network interface (ETH0 or VWLAN)
- Choose the mode (DHCP or STATIC)
- In Static mode: enter the IP, netmask and gateway addresses

All fields must be completed.

The availability of addresses and the validity of fields are checked.

MQTT (Message Queuing Telemetry Transport) Publisher

You can send the results from a Skill to a MQTT broker to store it in a distant location and reuse it after processing.

Minimal required information : Mode (enables or disables MQTT interface), Broker address and Topic.

Quality of Service: You have a choose 0, 1 or 2 for the quality of Service in MQTT.

- 0: At most once. It is the minimal quality of service level. This service level guarantees a best-effort delivery. There is no guarantee of delivery.
- 1: At least once. It guarantees that a message is delivered at least one time to the receiver. It is possible for a message to be sent or delivered multiple times.
- 2: Exactly once. It is the safest and slowest level of service on MQTT. This level guarantees that each message is received only once by the intended recipients (a four-part handshake).

If the Broker is password protected:

- Complete username and password

OPC UA

You can enable an OPC UA **server** to collect the results of a skill via an OPC UA client.

Connect the client to:

- url: opc.tcp://ip_of_the agent:4840
- node: airis.tasks.results
- format: string

WLAN

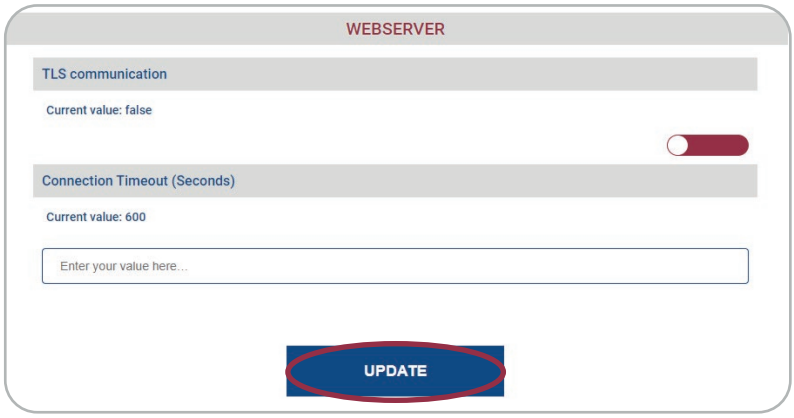
- Choose the WLAN to connect
- Complete password

> Even if current SSID is the right one, you must explicitely choose the one to connect.

Webserver

The HTTPS encrypts the connection: new self-signed certificates are regenerated each time the webserver is reactivated.

Connection timeout: you can use the timeout to stop the connection to the WebApp when there is no activity.



To save the modifications you've made, click on the button **"UPDATE"**.

▶ *Types of settings*

There are several types of settings for the Tasks, Cameras, Agent, etc.

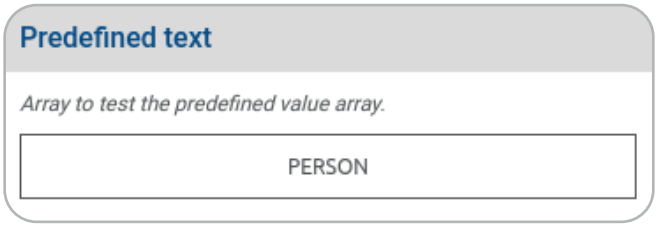
Simple inputs

You can write a text (a number, sometimes with a limitation) and a min/max.
In the camera settings, there may be automatic Boolean parameters. If the Boolean is true, the settings are automatic, and your input is hidden. If you set the Boolean on false, the input field appears and you can write your values.

Boolean inputs

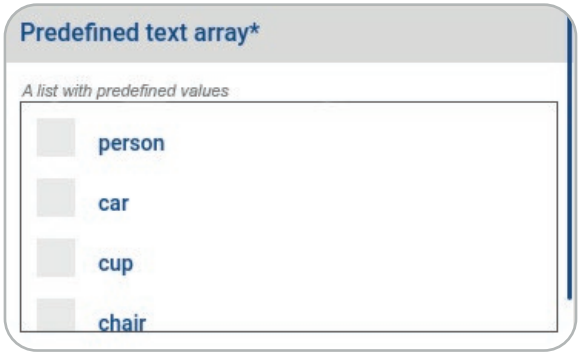
A true/false parameter.

Spinner inputs



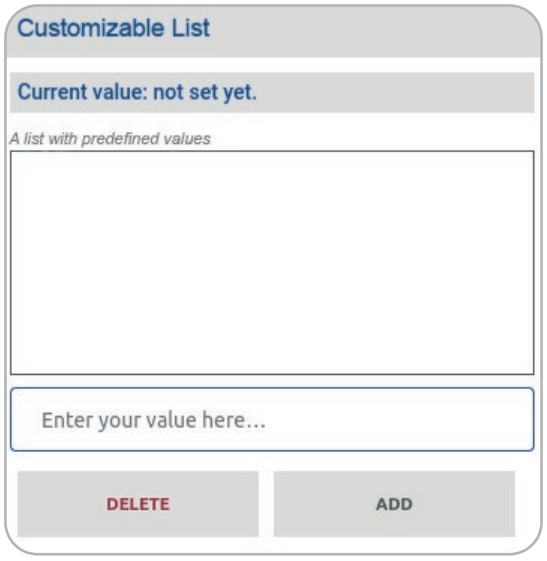
Choose from a predefined list. The list appears on mouse-over.

Predefined multiple-choices input



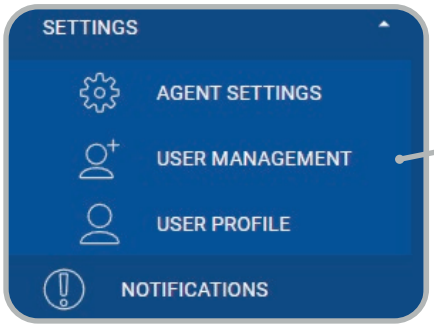
In the predefined list, you can tick as many boxes as you need.

Free multiple-choices input

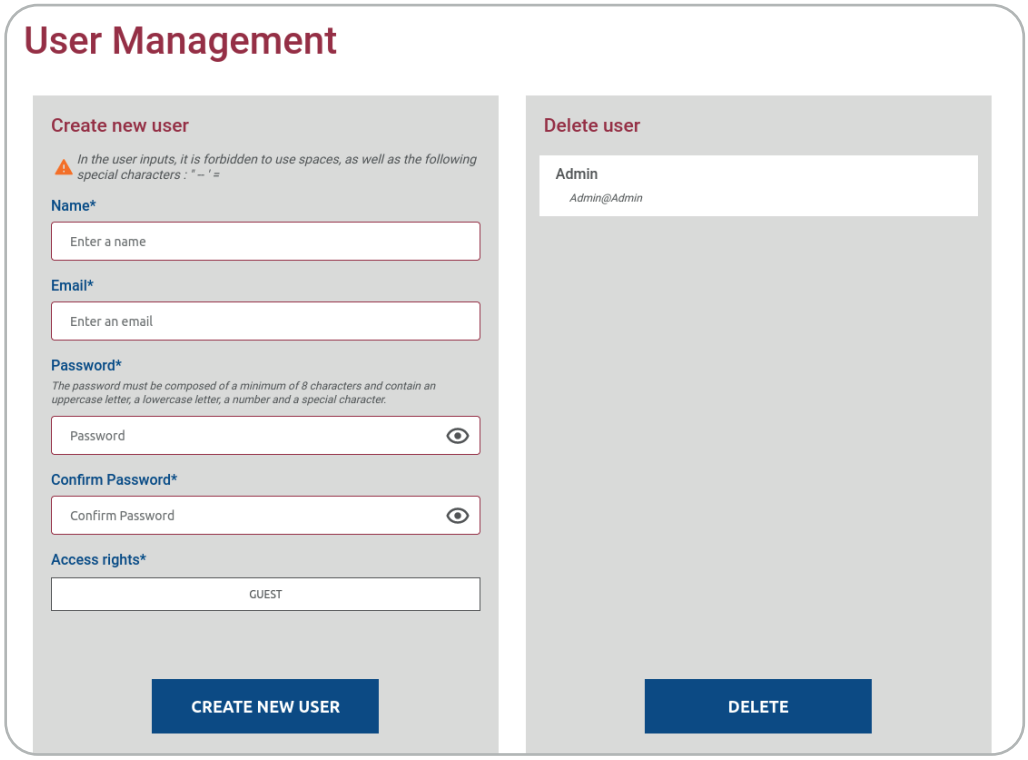


You can define as many values as you need.

▶ *User management*



Within the menu, go on the **"SETTINGS"** rubric to open the settings menu, and click on the button **"USER MANAGEMENT"**.



On this page, you can configure users.

Create new user

On the left, you can create a new user. All fields are mandatory.
The name must contain between 3 and 30 characters.
The email address must contain "@".
The password must meet the following criteria:

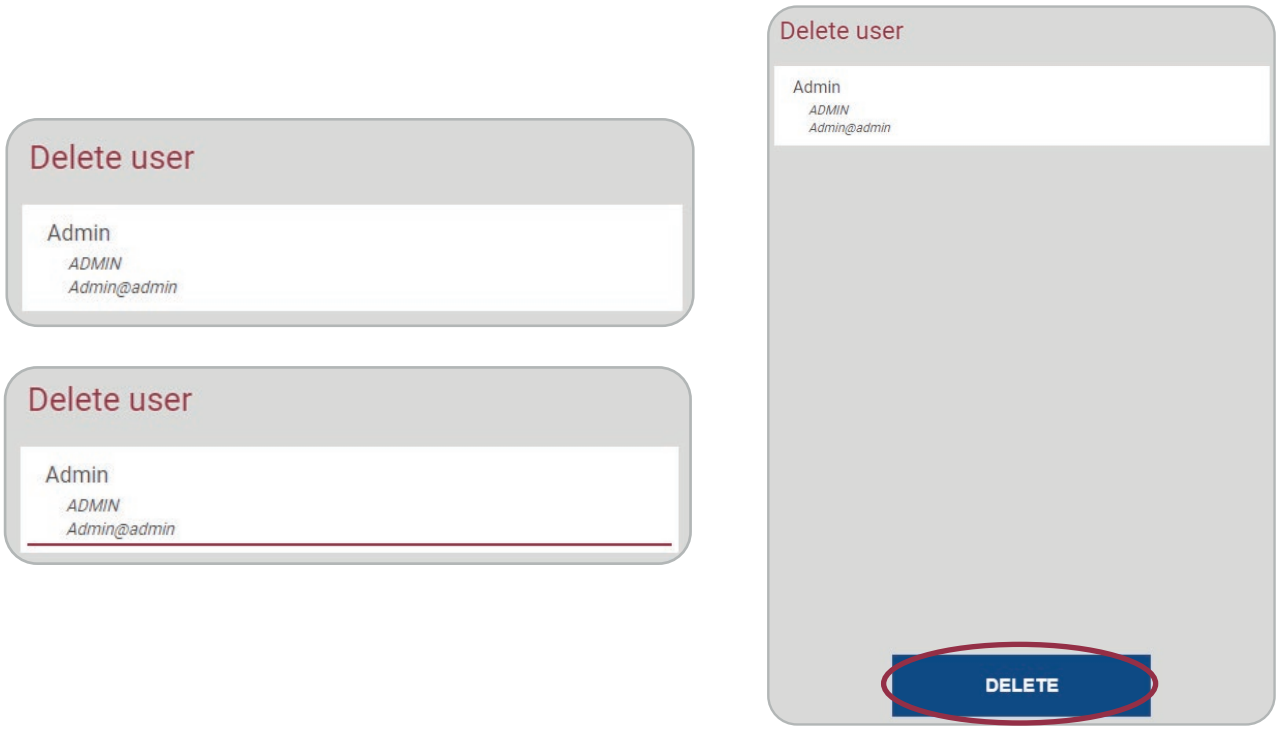
- be at least 8 characters long
- contain a lowercase, an uppercase, a number and a special character

Finally, you have to define the access rights, according to different levels:

- **GUEST**: read-only access, 24-hour account
- **OPERATOR**: read-only access
- **MAINTENER**: read and write access
- **ADMIN**: read and write access, with admin rights (i.e. user management)

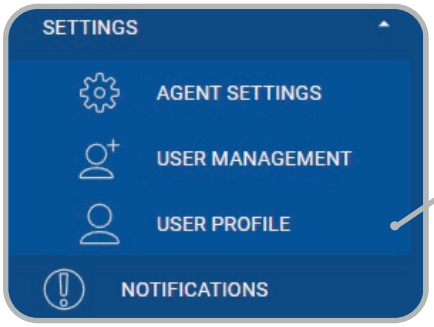
Delete user

On the right, there is a list of the existing users. You can select a user and click on the bottom button to delete it. The selected user is underlined in red.

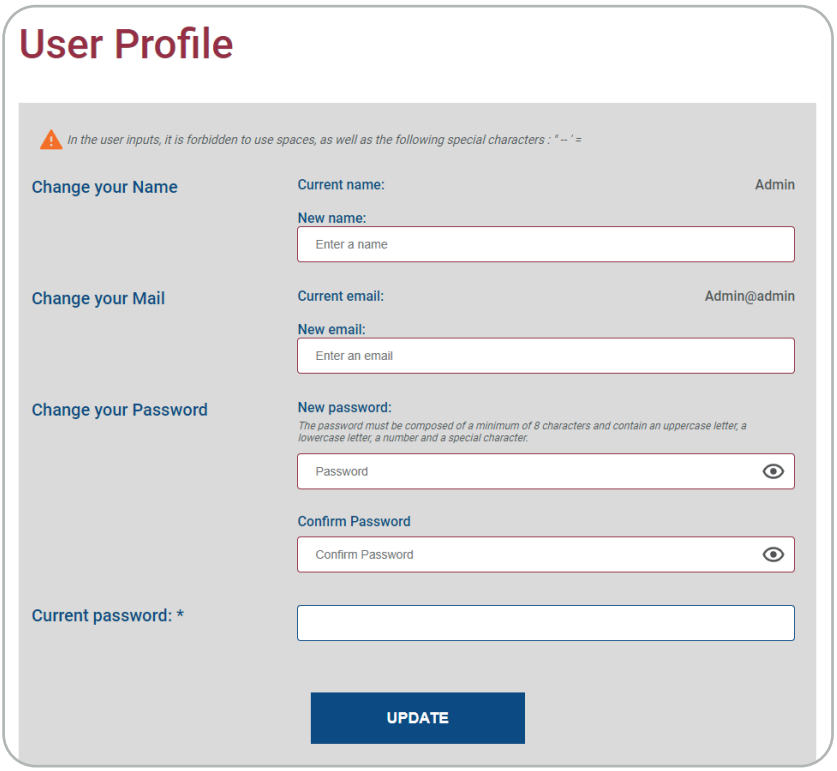


An administrator can delete his own account, which will automatically log him out. However, be careful that in this case you won't be able to manage the user administration.

▶ *User Profile*



Within the menu, go on the **"SETTINGS"** rubric to open the settings menu, and click on the button **"USER PROFILE"**.



You can manage your user profile: name, password and email address.
Your password must be at least 8 characters long and contain a lowercase, an uppercase, a number and a special character.

Your current password is required.

Click on the button **"UPDATE"** to save the modifications.

Languages

Within the menu, go on the **"LANGUAGES"** rubric to open the languages menu. The supported languages are:

- French
- English
- German

Logout

Within the menu, click on the **"LOGOUT"** button to log out of the session.

RETURN OF THE MATERIAL

Before returning your Edge AI Vision System, you should read the following checklist:

- Specify the reason for returning your Edge AI Vision System (e.g. exchange, hardware update, end of subscription), the contact person in your company including his/her phone number and e-mail address, as well as the mailing address for a potential new delivery.

- Place the different parts of the system in an ESD protective cover. Please pack the system securely for shipping. Send the system together with your detail.

CONTACT AND SUPPORT

Please feel free to contact us if you have any questions.

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