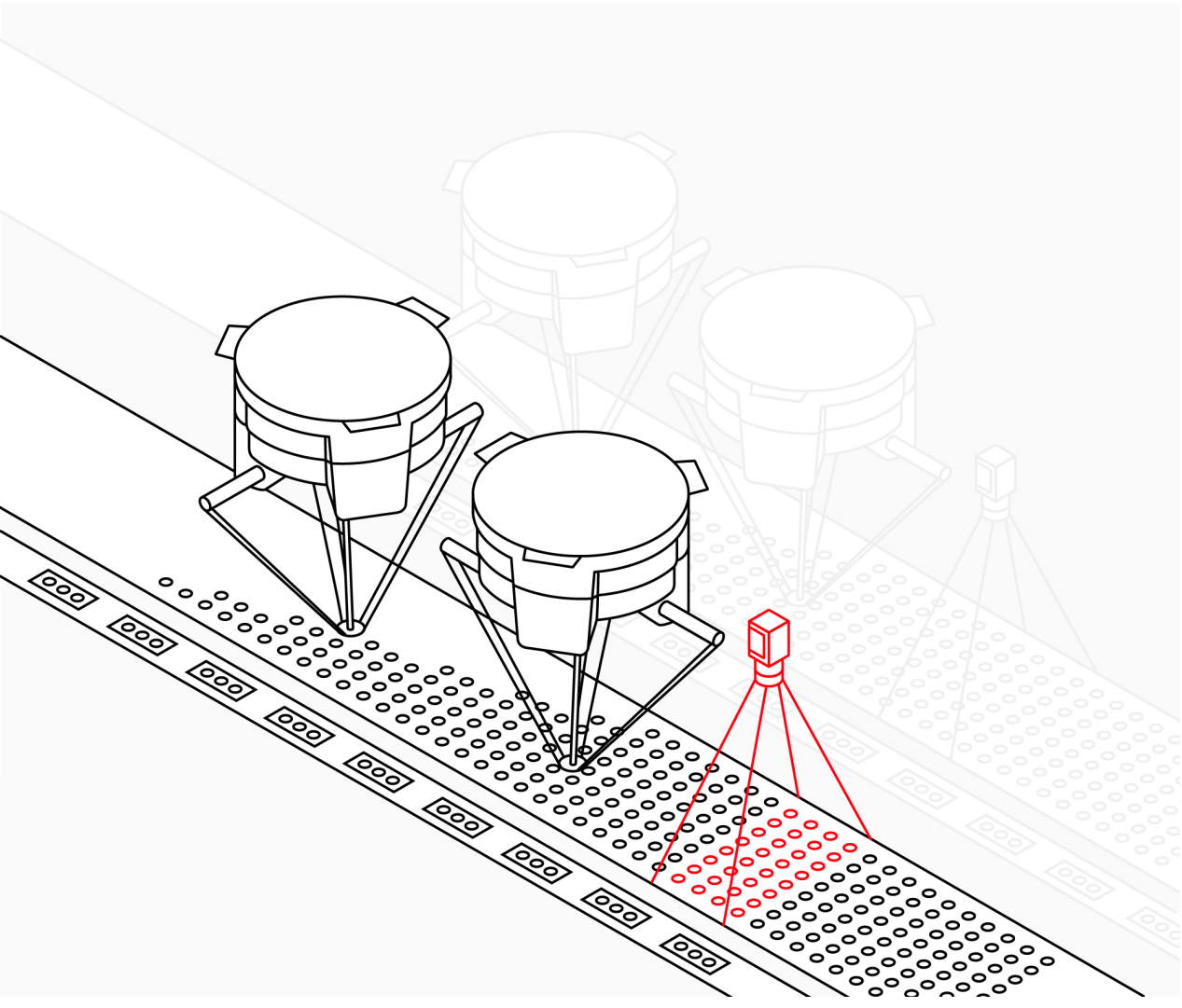
ROBOTICS

Application manual

PickMaster® Twin - Operator



Trace back information:
Workspace Main version a676
Checked in 2025-06-08
Skribenta version 5.6.019

Application manual

PickMaster® Twin Operator Release 3.0.1

OmniCore and IRC5

Document ID: 3HAC092762-001

Revision: B

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Original instructions.

Table of contents

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Overview of this manual

About this manual

This manual contains instructions for installation, configuration, and daily operation of PickMaster Operator.

Usage

This manual should be used during installation, configuration, and operation of a PickMaster system.

Who should read this manual?

This manual is intended for:

- Installation personnel
- Programmers
- Integrators
- Operators

Prerequisites

Any maintenance/repair/installation personnel working with an ABB robot must be trained by ABB and have the required knowledge of mechanical and electrical installation/repair/maintenance work.

Disclaimer

PickMaster Operator is a robot application software that requires the user to ensure the safety of the robot or equipment during operation. If losses are caused by user negligence or improper operation, the corresponding responsibility shall be borne by the user.

Cybersecurity

This product is designed to be connected to and to communicate information and data via a network interface. It is your sole responsibility to provide, and continuously ensure, a secure connection between the product and to your network or any other network (as the case may be).

You shall establish and maintain any appropriate measures (such as, but not limited to, the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information. ABB Ltd and its entities are not liable for damage and/or loss related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

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Note

Only qualified personnel should write or modify the script files.

It is the responsibility of the writer to make sure that the cell is safe when running with the script files.

Application ports and protocol types

The following table lists the used port numbers between the PickMaster Operator and other components, their communication protocol types and usage.

Port	Protocol Type	Usage
50000	TCP	RIS2 commands of PickMaster Runtime
6001	TCP	Emulation of PickMaster Runtime
3	TCP	Vision client
5	TCP	Vision server
9000	TCP	Zenon event port
319-320	UDP	Time sync service
502	TCP	Modbus
34964	UDP	Profinet
44818	TCP	EtherNet/IP
2222	UDP	EtherNet/IP

References

OmniCore

Reference	Document ID
Application manual - PickMaster Twin PowerPac	*3HAC092761-001*
Operating manual - PickMaster Twin Recipe Manager	*3HAC092763-001*
Product specification - PickMaster® Twin	*3HAC092765-001*
Circuit diagram - PickMaster Twin	*3HAC024480-020*
Safety manual for robot - Manipulator and IRC5 or OmniCore controller [i]	*3HAC031045-001*
Application manual - Conveyor tracking	*3HAC066561-001*
Product manual - OmniCore C30	*3HAC060860-001*
Product manual - OmniCore C90XT	*3HAC073706-001*
Operating manual - OmniCore	*3HAC065036-001*
Operating manual - Integrator's guide OmniCore	*3HAC065037-001*
Application manual - Controller software OmniCore	*3HAC066554-001*
Technical reference manual - Event logs for RobotWare 7	*3HAC042927-001*
Technical reference manual - Lubrication in gearboxes	*3HAC042927-001*
Technical reference manual - System parameters	*3HAC065041-001*

[i] This manual contains all safety instructions from the product manuals for the manipulators and the controllers.

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IRC5

Reference	Document ID
Application manual - PickMaster Twin PowerPac	*3HAC092761-001*
Operating manual - PickMaster Twin Recipe Manager	*3HAC092763-001*
Product specification - PickMaster® Twin	*3HAC073650-001*
Circuit diagram - PickMaster Twin	*3HAC024480-020*
Operating manual - RobotStudio	*3HAC032104-001*
Application manual - Conveyor tracking	*3HAC050991-001*
Product manual - IRC5	*3HAC047136-001*
Product manual - IRC5 Panel Mounted Controller	*3HAC027707-001*
Operating manual - IRC5 with FlexPendant	*3HAC050941-001*
Operating manual - IRC5 Integrator's guide	*3HAC050940-001*
Operating manual - Troubleshooting IRC5	*3HAC020738-001*
Technical reference manual - RAPID Instructions, Functions and Data types	*3HAC050917-001*
Technical reference manual - RAPID Overview	*3HAC050947-001*
Technical reference manual - System parameters	*3HAC050948-001*

Revisions

Revision	Description
A	First edition.
B	Released with PickMaster® Twin 3.0.1. • Minor corrections. • Supported multi-language documentation.

Safety

Safety of personnel

A robot is heavy and extremely powerful regardless of its speed. A pause or long stop in movement can be followed by a fast hazardous movement. Even if a pattern of movement is predicted, a change in operation can be triggered by an external signal resulting in an unexpected movement.

Therefore, it is important that all safety regulations are followed when entering safeguarded space.

Safety regulations

Before beginning work with the robot, make sure you are familiar with the safety regulations described in the manual *Safety manual for robot - Manipulator and IRC5 or OmniCore controller*.

When using PickMaster® Twin products

- When using with PickMaster® Twin products, it is the user's responsibility to adhere to the relevant standards and safety directives. In addition, the application manuals for proper use must be observed.
- Only personnel with appropriate training and required knowledge are allowed to use PickMaster® Twin products.
- The integrator installing the PickMaster® Twin is responsible for the safety.
- Wherever possible, the auto mode of operation shall be performed with all persons outside the safeguarded space.
- An emergency stop must also be available to make sure the emergency stop function is enabled.
- PickMaster® Twin only provides Operational Stop (Program Stop). The integrator shall make sure that proper Normal Stop (machinery stop) is configured correctly in the system.
- Make sure the hazardous situation that resulted in the emergency stop condition no longer exists. Release the emergency stop button manually to remove the emergency stop condition.
- Stops for the machine is the responsibility of the integrator and must be addressed according to local legislation.
- The integrator is responsible to conduct a risk assessment of the final application.
- Sensitive body parts, such as the eyes and the larynx, must be protected by personal protective equipment (PPE).
- Protective measures should be the precondition when using PickMaster® Twin products. PickMaster® Twin does not guarantee the robot targets are always in safe zone. It is integrator's responsibility to take protection measures, like using safe-move or setting proper robot work range etc.

Continues on next page

- Safety related status and operations shall be handled on the controller and by safety rated systems. PickMaster® Twin status information shall not be used as input for safety related information and operations.
- Protective measures should be the precondition when install/adjust/replace hardware parts, for example, the camera.
- The stop functions in PickMaster® Twin can never be used to replace A-stop/E-stop or any other safety related stops.

Note

If PickMaster Twin obtains the status of active AS/ES from the robot controller, the items in the queue will not be cleared. Once the AS/ES is deactivated, the users can resume the production by clicking the **Start**/**Unhold**/**Unsuspend** button on PickMaster Twin.

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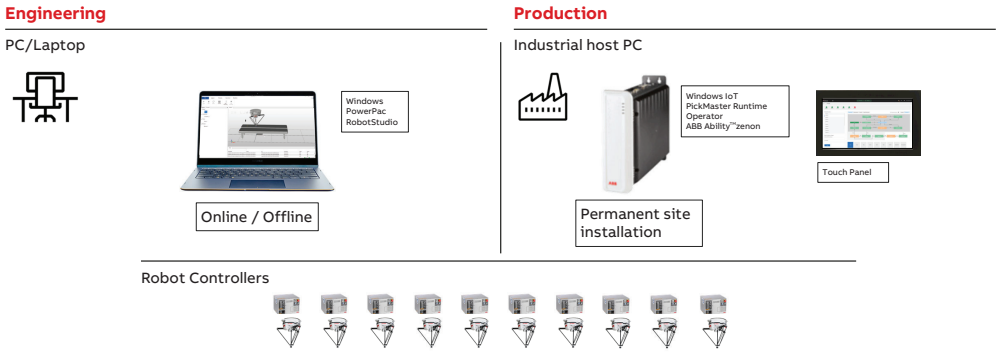
1 Introduction and installation

1.1 Introduction to PickMaster Operator

About PickMaster® Twin

PickMaster® Twin is an application product designed for vision based high speed picking of random flow products on the fly. PickMaster® Twin supports ease-of use configuration, simulation and operation of a big variation of smaller or larger line layouts composed of a multitude of robots, cameras, conveyors and fixed work areas. It is a production system that comprises all steps in the life cycle of a picking installation from proposal, engineering, commissioning, operation to maintenance and support.

PickMaster® Twin is a modular product for controlling ABB robots in picking applications through the robot controller. It is configurable to perform pick and place operations of items. A vision system is used to find randomly placed items on conveyor belts or indexing static work areas. PickMaster PowerPac is the engineering software aimed at configuring and validating the application in offline simulation with a virtual system and in online mode directly connected to the real installation. It uses comprehensive graphical interfaces to configure powerful applications, where it can control multiple robots picking and placing sensor-detected items on different conveyor belts. PickMaster Operator is the software for integrating and operating PickMaster Twin in the production environment.



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PickMaster Operator can be customized for some of the following special needs:

- With the integrated vision system it can be used for full random operation on a continuously moving conveyors and for absolute accurate positioning on indexed feeders or trays.
- Without vision recognition it can be used as a tool for the efficient production with guided product flows on multiple conveyors.
- For efficient quality inspection and product categorization alone or together with the position recognition.

PickMaster® Twin comprises the following modules:

Continues on next page

PickMaster® PowerPac

Ease of Use software for offline and online configuration and commissioning in a visual 3D environment, powered by RobotStudio™.

PickMaster® Operator

State-of-the art user interface for operating and integrating PickMaster on the shop floor, built on ABB Ability™ zenon data management software. PickMaster Operator also allows users to manage all recipes directly on the host.

PickMaster® Runtime

Efficient runtime operation software for orchestrating the coordination of the packaging process for a multitude of robots and conveyors including integrated vision software for precise robot guidance and quality inspection.

- Virtual Runtime: running the PickMaster process in a simulated virtual environment on a client system connected to virtual robot controllers.
- Real Runtime: running the PickMaster process in the real production installation on the Host computer connected to real robot controllers.

Note

PickMaster® Twin is delivered with different hardware configurations. For more information, see *Product specification - PickMaster® Twin*.

About PickMaster Operator

PickMaster Operator is the production interface providing intuitive control and data visualization to PickMaster Runtime. It provides modern comprehensive touch control interfaces for safe operation of a PickMaster installation with up to ten robots. PickMaster Operator is designed to run on an industrial PC with a multi-touch color panel.

The operator built on the ABB Ability™ zenon platform acts as a modern local control panel to run the line. Moreover, compliant with the OMAC PackML industry standard, it is easily connected to a cell PLC through modern fieldbus communication, understanding the same commands and status as related upstream and downstream packaging machinery. It also integrates with factory control systems for reporting and optimizing production pace and overall equipment efficiency (OEE).

PickMaster Operator features

- Operational top information bar
- Graphical tile page selection
- Full user authentication management and login control
- Compliance with OMAC PackML standard and additional transparency control and status of individual robots in a PickMaster line
- Integrated soft PLC with PackML operation logics
- Two hand operation safety
- Recipe management system
- Production dashboard

Continues on next page

- Online parameter tuning
- Customized graphical line layout
- Production control page
- Vision result display and recording
- Remote control connectivity over field bus

About this chapter

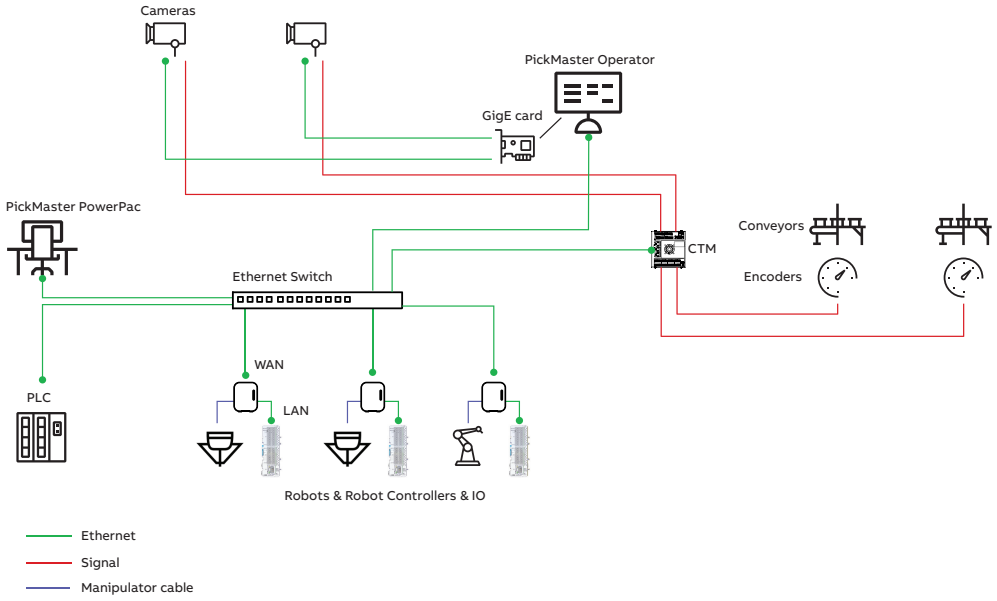
This chapter will guide you through the installation process, which consists of these steps:

- *Installing and uninstalling ABB Ability™ zenon on page 19*
- *Installing and uninstalling PickMaster Twin Host on page 36*
- *Network setting on page 38*

1.2 PickMaster® Twin Hardware connection illustration

Example

The following illustration is showing an installation example with 3 robots, 2 cameras and 2 conveyors.



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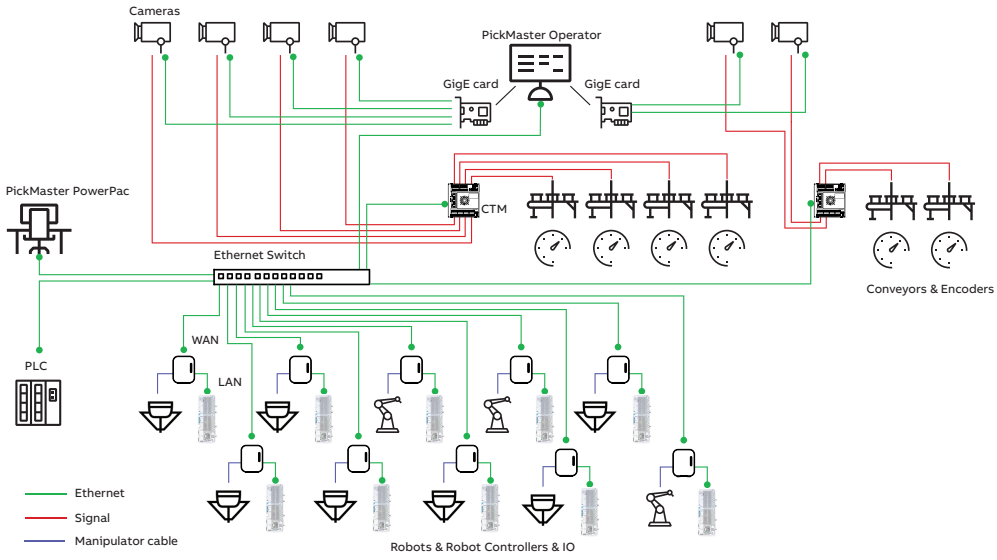
The following illustration is showing an installation example with 10 robots, 6 cameras and 6 conveyors.



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1.3 System requirements

1.3.1 System requirements

Hardware and software requirements

Hardware requirements

Part	PickMaster Twin Client	PickMaster Twin Host
CPU	2.0GHz or faster processor, multiple cores is recommended.	
Memory	8 GB RAM is the minimum requirement. 16 GB or more is recommended if working with vision or heavy CAD models.	
Disk	500 GB, solid state drive (SSD) is recommended.	
Graphics card	High-performance, DirectX 11 compatible, gaming graphics card from any of the leading vendors. For the Advanced lightning mode Direct3D feature level 10_1 or higher is required.	
Display settings	23 inches, 1920 x 1080 pixels or higher resolution is recommended. Multi-touch screen is recommended for PickMaster Twin Host.	
Mouse	Three-button mouse	
3D Mouse [optional]	Any 3D mouse from 3DConnexion. See http://www.3dconnexion.com.	
USB slots	Minimum two USB slots.	
Ethernet port	At least one Ethernet port.	
PCI Express slot	NA	At least one free PCI Express x4 slot for a 145 mm x 110 mm size PCIE card for PickMaster Twin Host.

Note

When running the software, close other software that consumes a lot of memory, otherwise it will affect the software normal use.

Software requirements

Part	PickMaster Twin Client	PickMaster Twin Host
System	Windows 10/11 (64 bit)	
RobotStudio	RobotStudio 2024.3.1	
RobotWare	• Omnicore with RobotWare 7.16 • IRC5 with RobotWare 6.15	
Installation package	PickMaster Twin Client, which includes PickMaster PowerPac, PickMaster Runtime.	PickMaster Twin Host, which includes PickMaster Operator, PickMaster Runtimeand PickMaster Recipe Manager.

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1.3.1 System requirements
Continued

Part	PickMaster Twin Client	PickMaster Twin Host
License	• An activated RobotStudio license • An activated PickMaster PowerPac license.	• On host PC: PickMaster Runtime license. • On robot controller: PickMaster Cell ready or PickMaster Robot Ready with/without PickMaster Vision Ready

For more information, refer to *Product specification - RobotStudio*.

1.4 Installing and uninstalling ABB Ability™ zenon

Overview

This section describes the installation process for the ABB Ability™ zenon.

Tip

Download the ABB Ability™ zenon 12 installation package from PickMaster Twin product page: *https://new.abb.com/products/robotics/software-and-digital/application-software/pickmaster*.

Note

Each ABB Ability™ zenon installation file contains at least one demo license.

This has a pre-defined duration or number of permitted starts. If these are consumed up, the product can continue to be used in demo mode, but production is ended after running for 30 minutes. You can find the usage period that is available in the License Manager in the License usage tab in the details of the license.

Prerequisites

To start the installation process, the following must be available:

- A computer that meets or exceeds the *System requirements on page 17*.
- A log on account with administrator rights on the computer.

Installing ABB Ability™ zenon

Preparation

Before installing ABB Ability™ zenon:

1. All current operating system updates must be installed.

   Note

   If you always use the latest version (Service Pack) of your operating system, you cannot only avoid compatibility issues but also security problems.

2. There must not be a restart pending.
3. The system requirements are checked before installation. If the requirements are not met, these will be shown on a separate page with notices on how to rectify this.
4. **Automatic Windows updates** influence the installation. If an update of the Windows operating system is carried out while the ABB Ability™ zenon setup is running, it can cause problems.

   To prevent this: Deactivate the automatic Windows update during the ABB Ability™ zenon installation and carry out the Windows update before starting the ABB Ability™ zenon installation.

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5 During the installation of ABB Ability™ zenon, the ABB Multiple Network Protocol Driver (cdprotdrv.sys) is installed. To start the driver, the operating system must be restarted after installation.

> **Tip**
>
> The installation will take a long time.
>
> Do not power off your computer during the installation.

Installing ABB Ability™ zenon

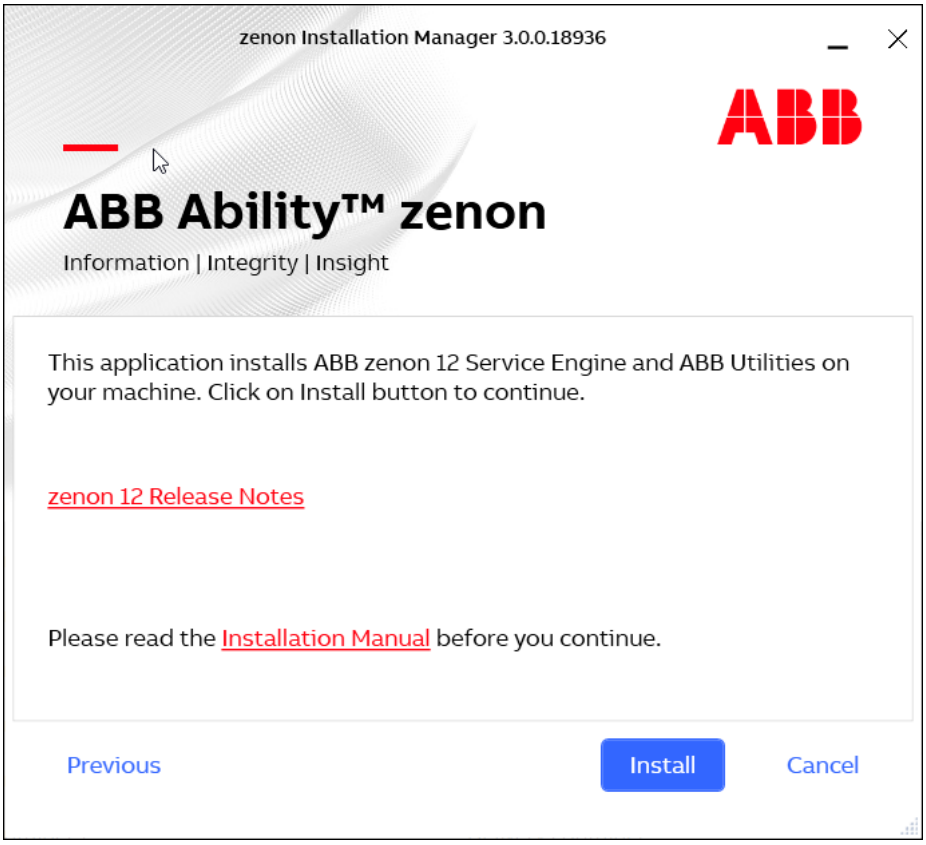
Use this procedure to install ABB Ability™ zenon:

1 Copy the ABB Ability™ zenon installation package to a local folder which the path of the folder contains no space.

2 Open the ABB Ability™ zenon installation package and run the installation file `START.exe` as administrator to open the installation window.

3 Select the language for the installation and click on **OK** to continue.

4 Click on **Install** to start the installation.



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5 Click **Next** to continue.

6 When the installation is completed, click **Finish**.

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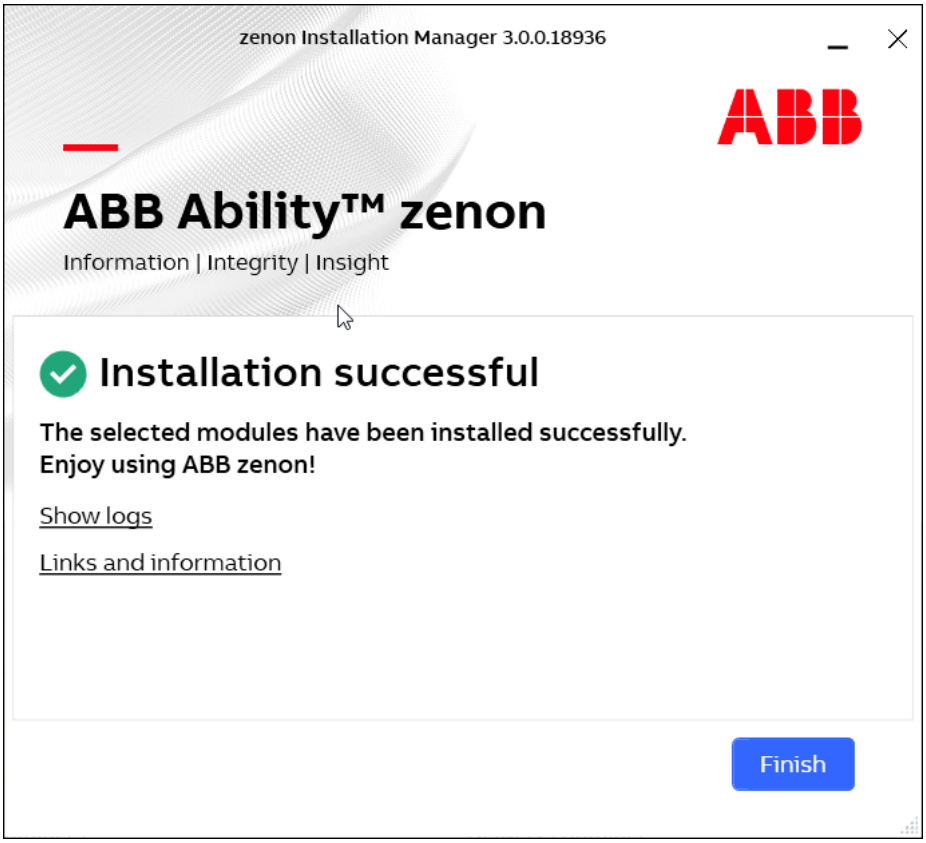

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Uninstalling ABB Ability™ zenon

Note

Follow the procedure to uninstall the ABB Ability™ zenon. Otherwise the ABB Ability™ zenon cannot be installed on the same computer normally.

Note

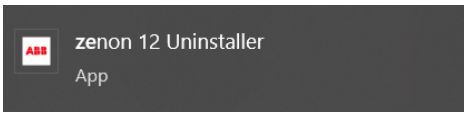
Return the license to release it before any uninstalling ABB Ability™ zenon work.

Otherwise the license will be occupied by the uninstalled ABB Ability™ zenon and may not be reused anymore.

If this already happened, please contact ABB.

Use this procedure to uninstall ABB Ability™ zenon:

1 Start the zenon 12 Uninstaller.



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2 Select the language for the uninstallation and click on **OK** to continue.

3 Select the **zenon 12** checkbox and click **Uninstall all**.

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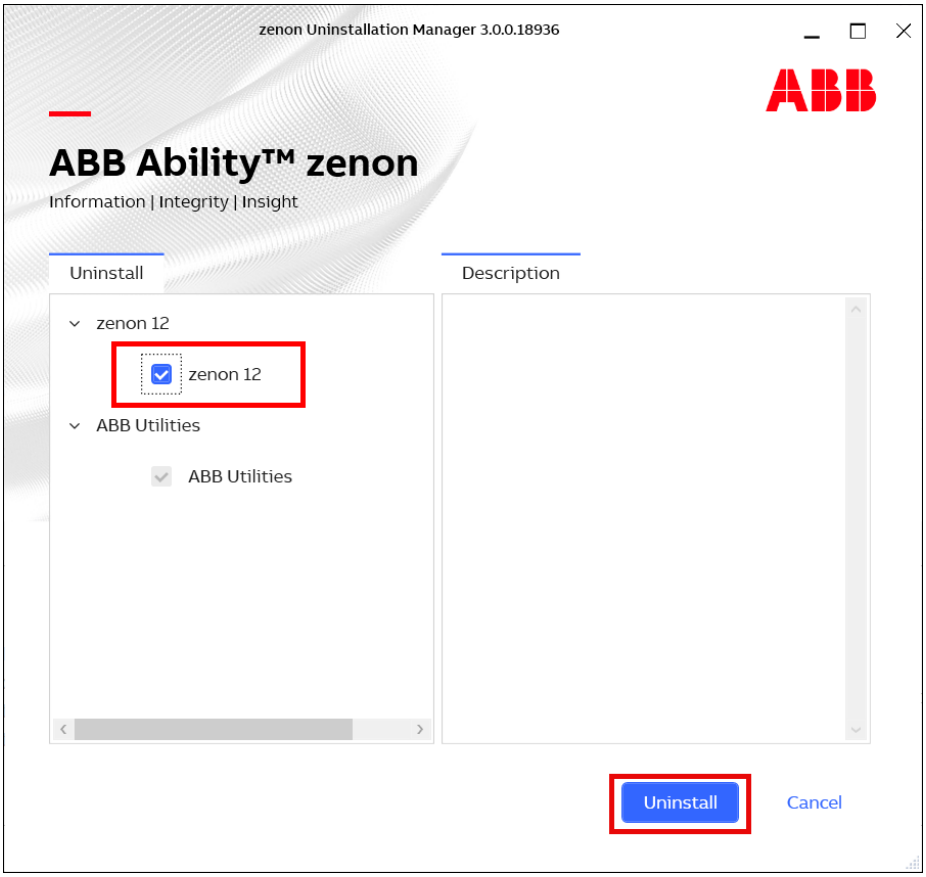

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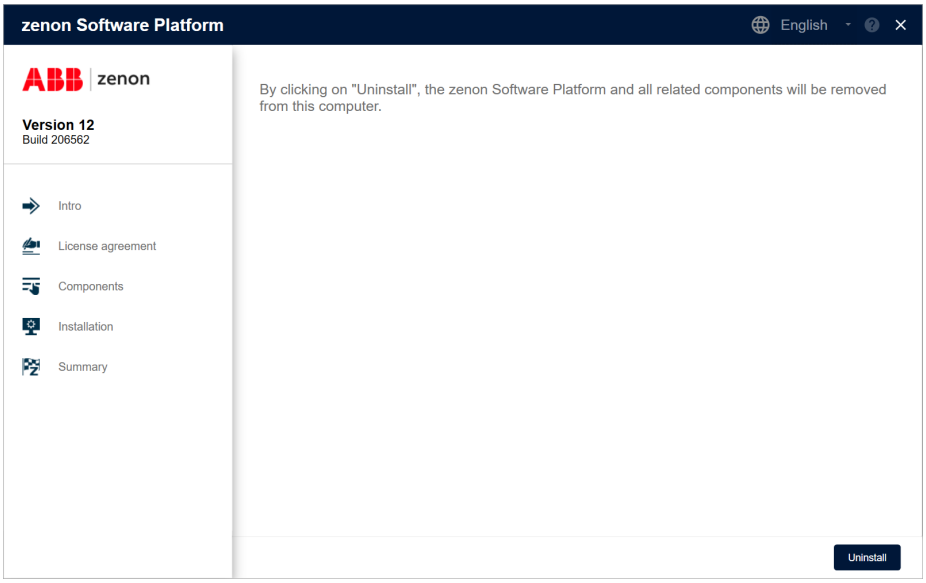
4 Click **Uninstall** on the pop-up **zenon Software Platform** window.



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5 When the uninstallation is completed, click **Exit** to exit from **zenon Software Platform**.

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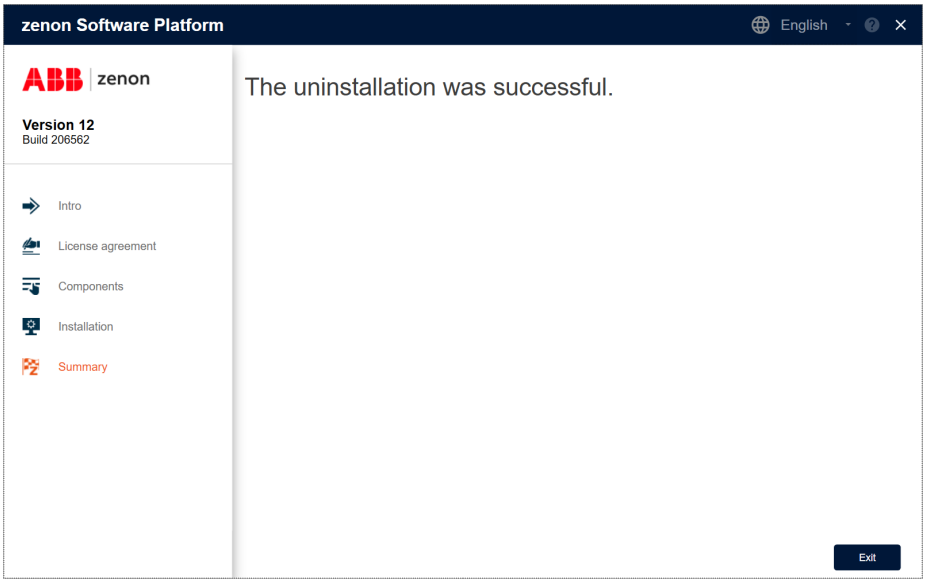

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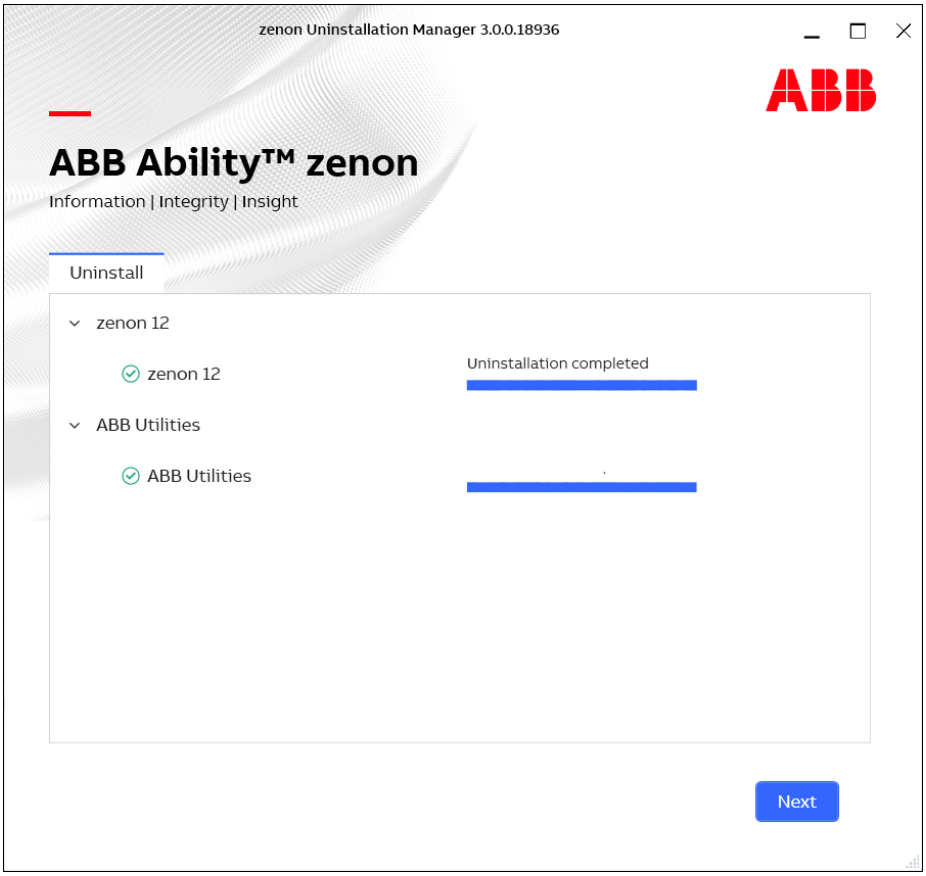
6 Go back to zenon Installation Manager window, click **Next** when the uninstallation of **ABB Utilities** is finished.



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7 On the zenon Installation Manager window, click **Finish**.

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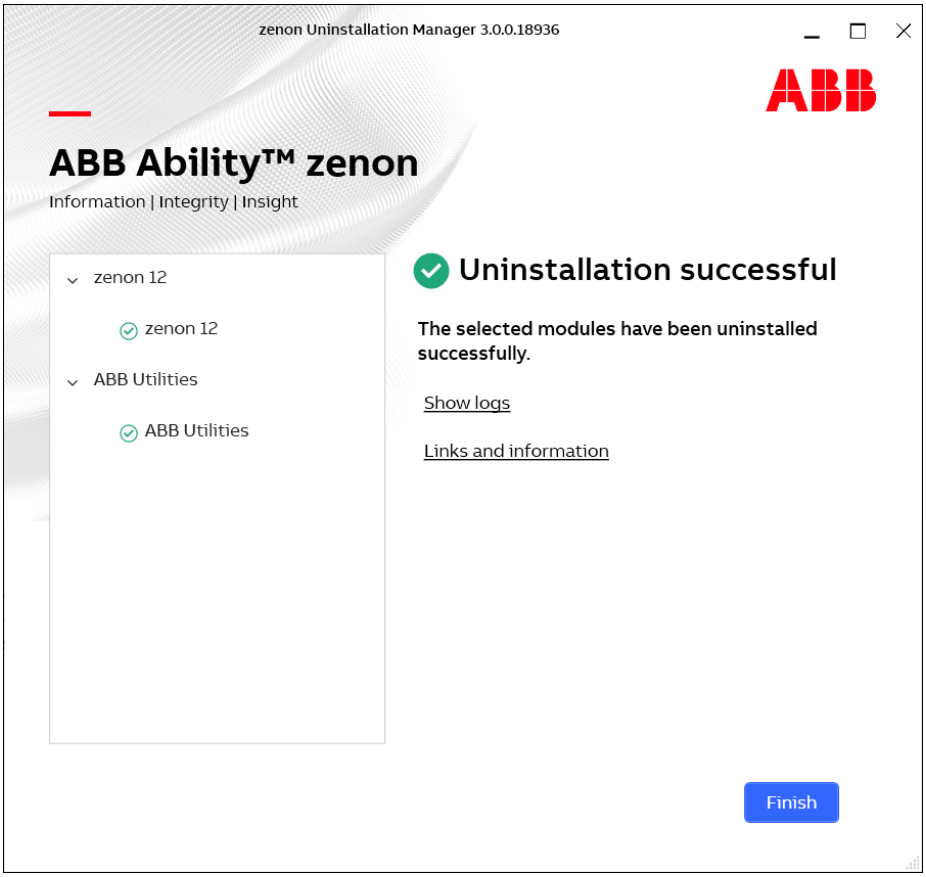
1.4 Installing and uninstalling ABB Ability™ zenon
Continued



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Frequent sources of error during installation

1 The virus scanner is active and blocks the installation because the scanner may take it as a virus.

Solution: Separate the system from the network and disable the virus scanner, then execute the installation again.

1.5 ABB Ability™ zenon license

Introduction

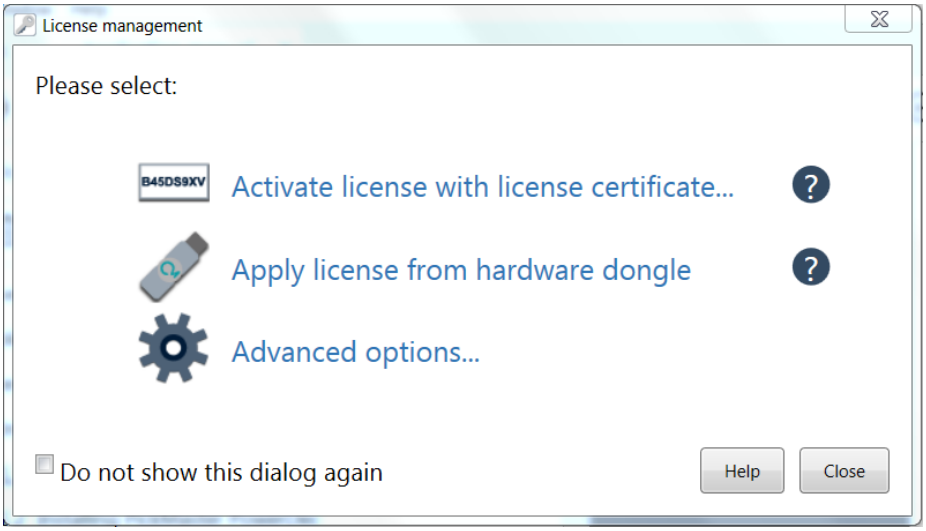
The license is enclosed in an envelope with the hardware product when it is purchased.

Access to the **License Manager** from the **License Manager** button on the user interface or the start menu of the computer.

Overview of activated license on the computer

Get an overview of the activated license with following steps:

1 Open the **License Manager**.



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2 Click on **License overview**.

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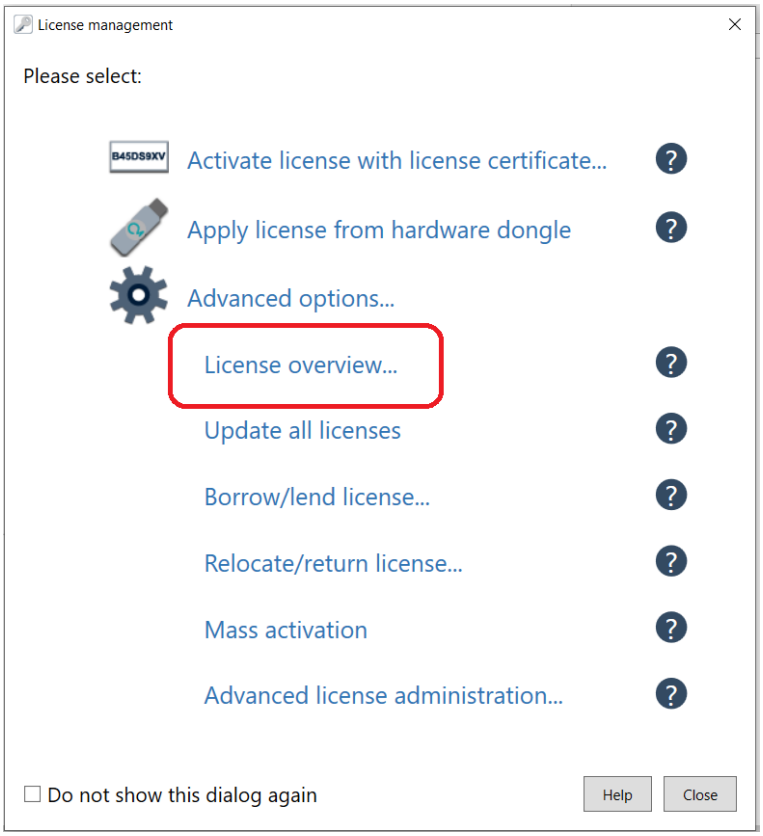
1.5 ABB Ability™ zenon license

Continued



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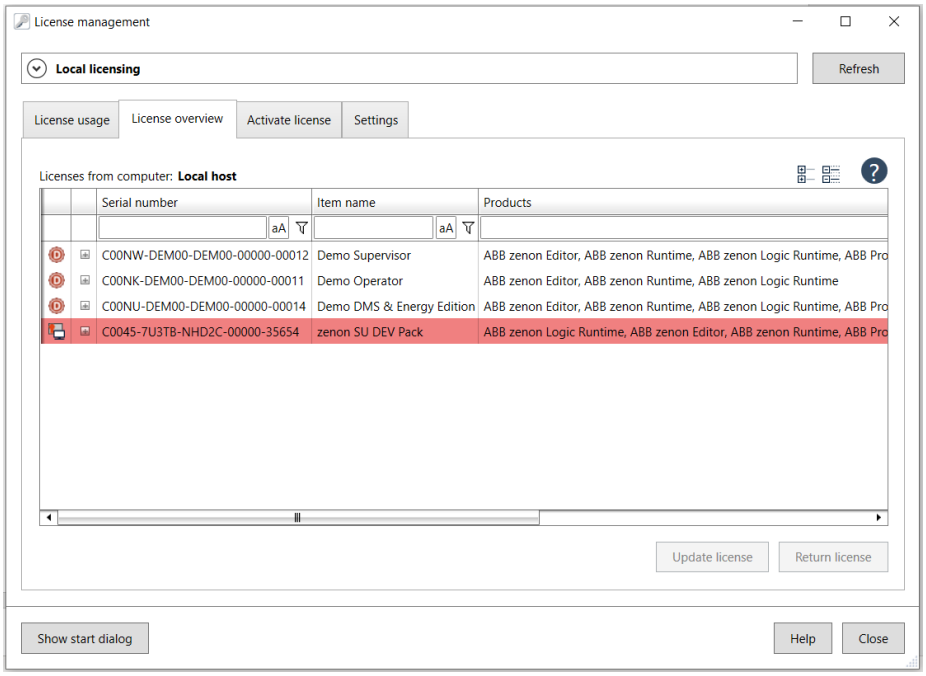
3 The all activated license show up in the pop-up window.



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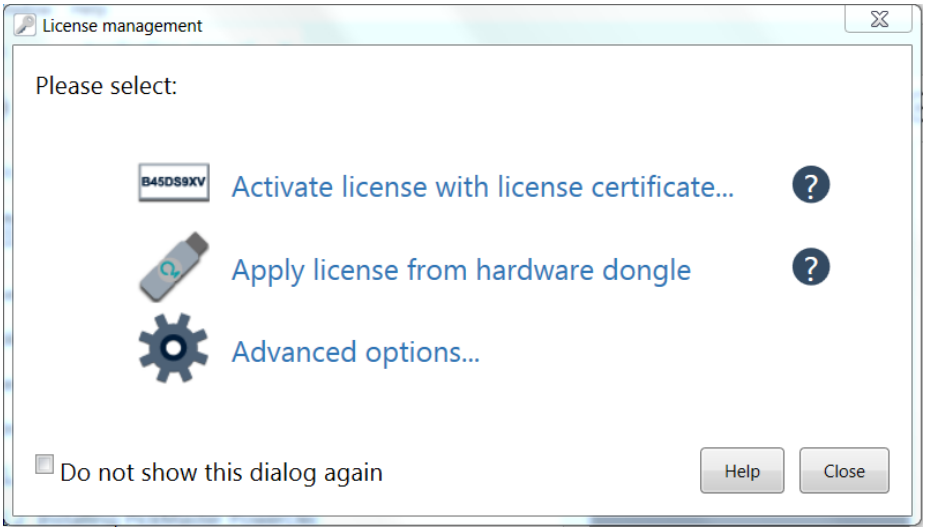
Activating a license

Activating a license online

If this computer is with internet access, active the license with following steps:

1 Open the **License Manager**.



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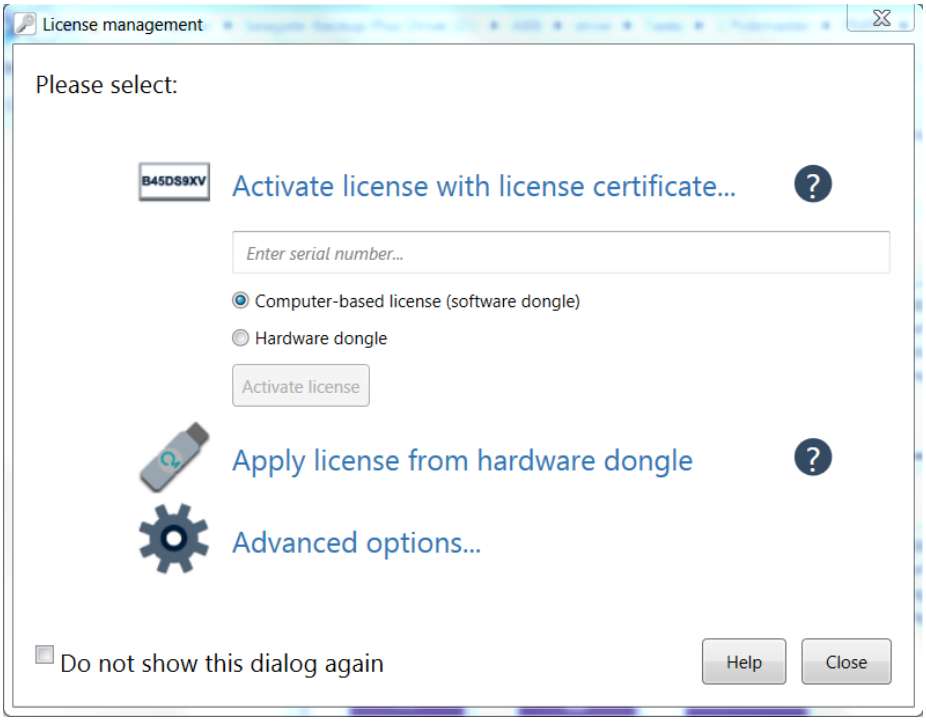
2 Click on **Activate license with license certificate...** to open the *Enter serial number* text box.



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3 Enter a valid license for the PickMaster Operator in the text box.

4 Click **Activate license** button.

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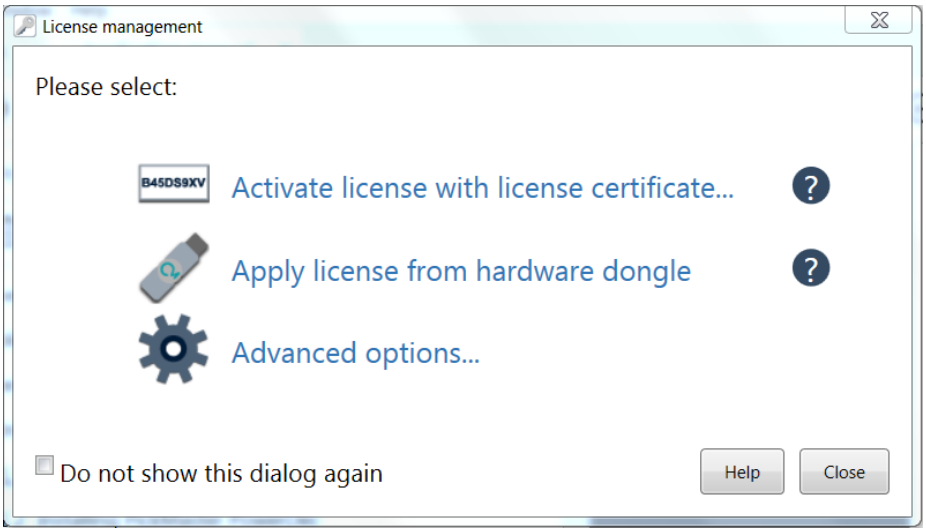
1.5 ABB Ability™ zenon license
Continued

Activating a license offline

If this computer is without internet access, active the license with following steps:

1 Open the **License Manager**.



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2 Click on **Advanced options...** and then **Advanced license administration....**

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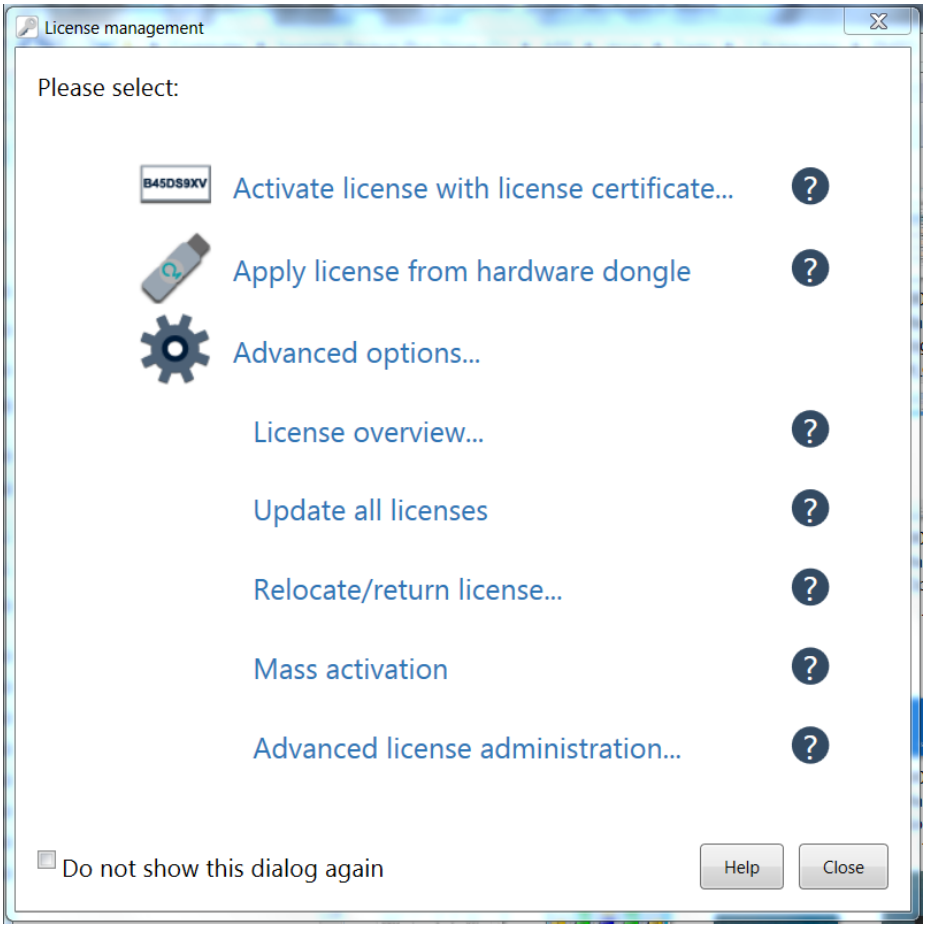

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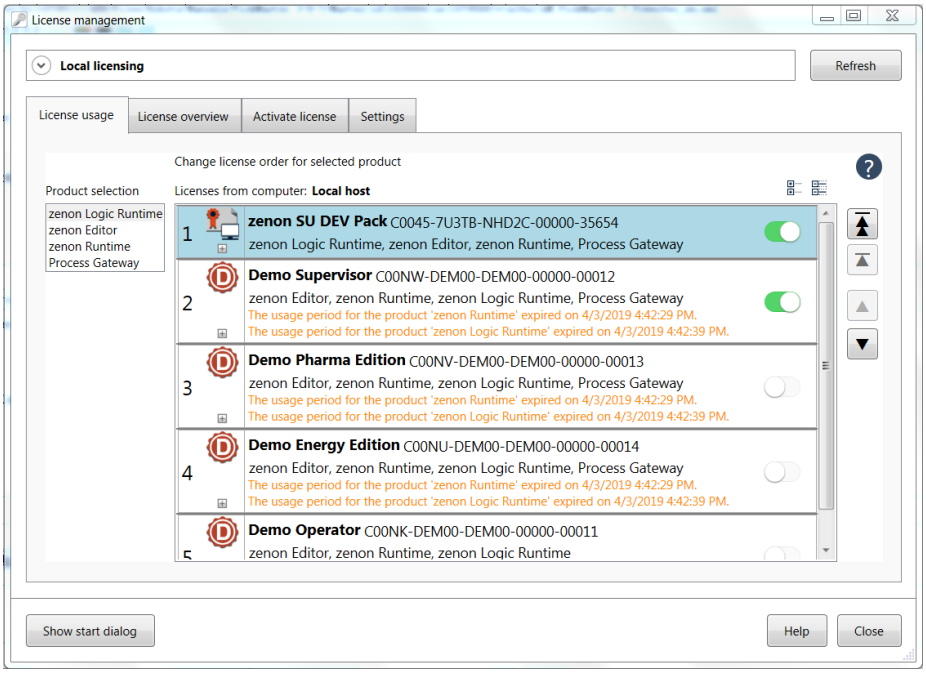

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3 Click on the **Activate license** tab.

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1.5 ABB Ability™ zenon license

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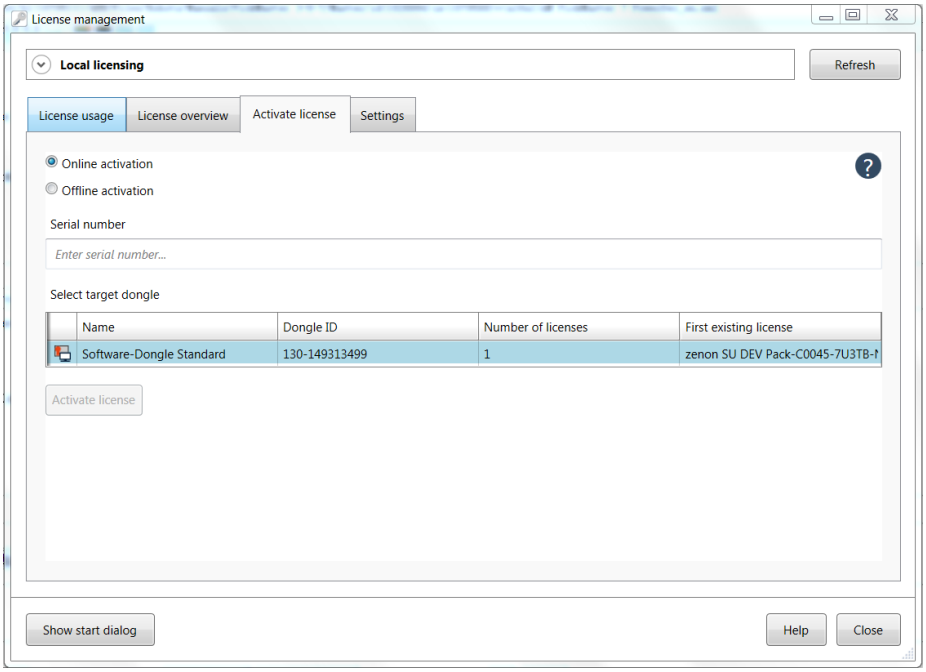

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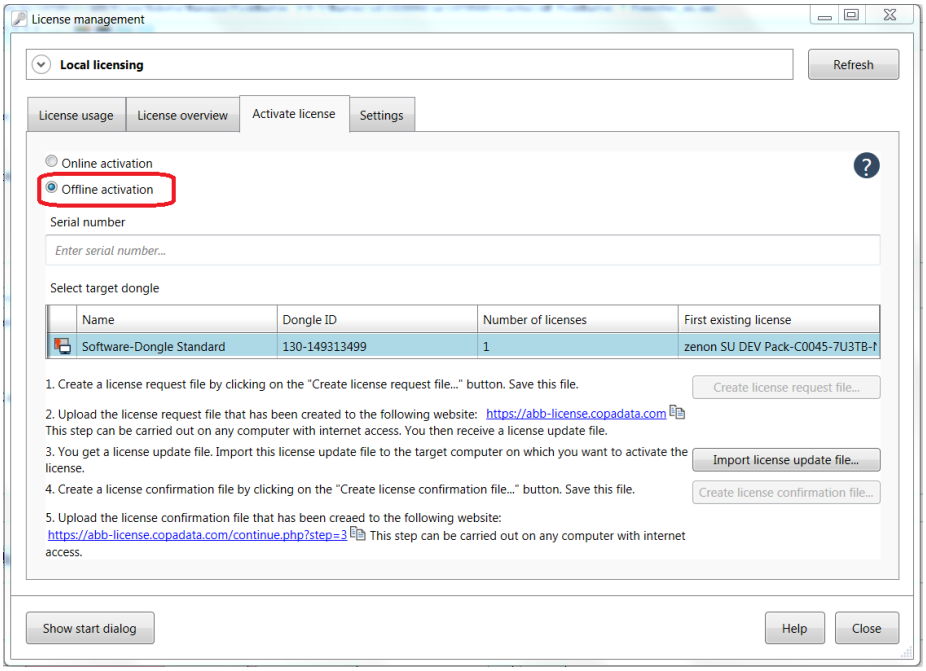
4 Click on the **Offline activation** option.



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5 Follow the steps to access an available license and activate it on your PickMaster Operator computer.

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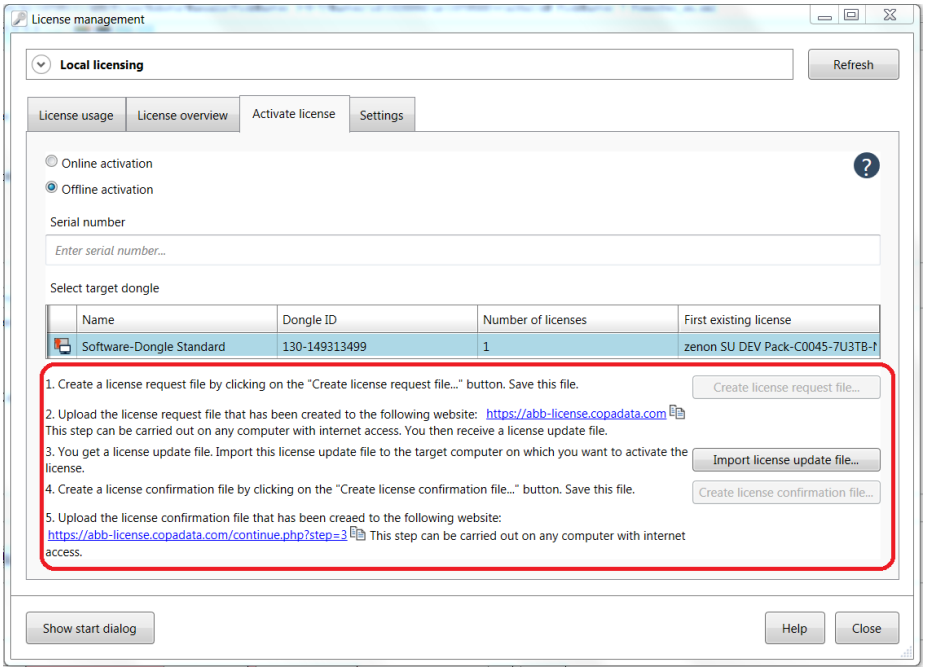


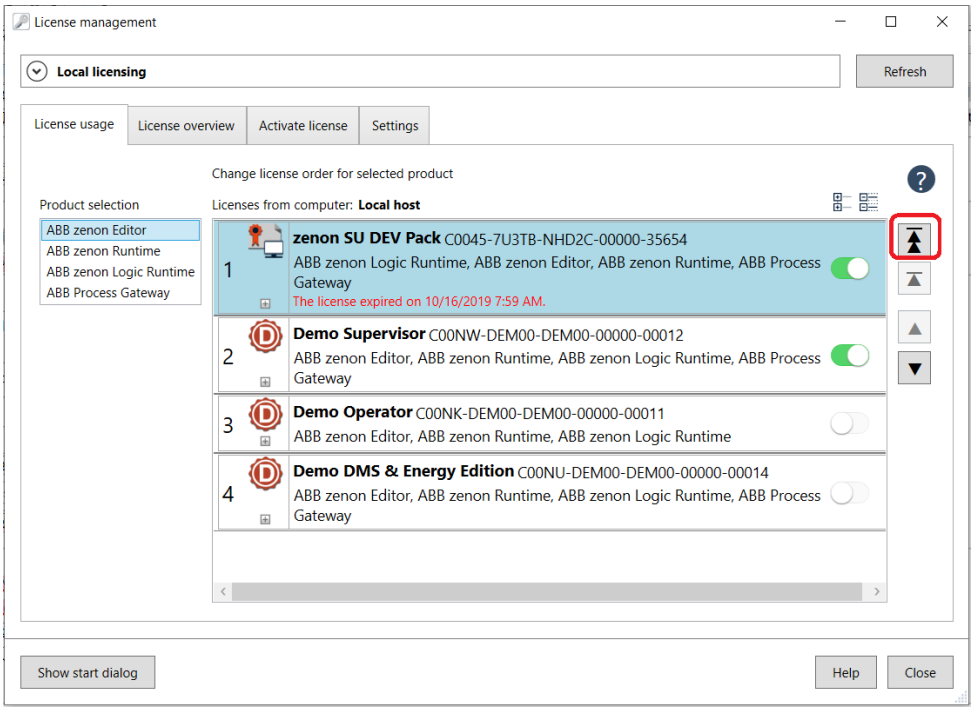
xx1900002351

Continues on next page

Note

If a valid license is already activated but the user still use the Demo license when launching PickMaster Operator, this is caused by that the license is not mentioned in the first choice.

Select the activated license and click the up button to bring the activated license to the first choice of the license.



xx2000000239

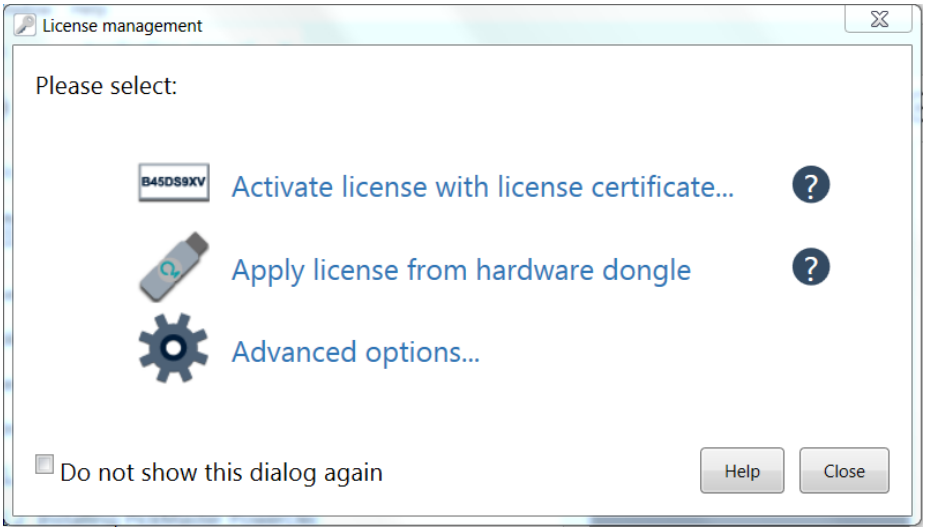
Retuning a license

When a license need to be released from one computer, return it first. During the validity period, it's allowed to activate the returned license on another proper computer.

Return a license with the following steps:

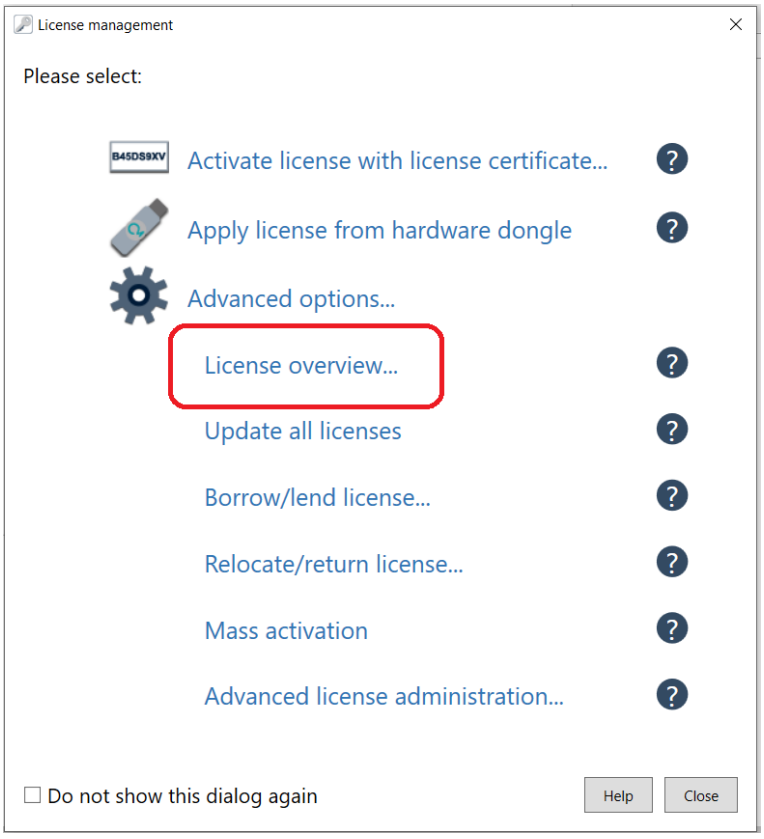
1 Open the **License Manager**.

Continues on next page



xx1900000799

2 Click on **License overview**.



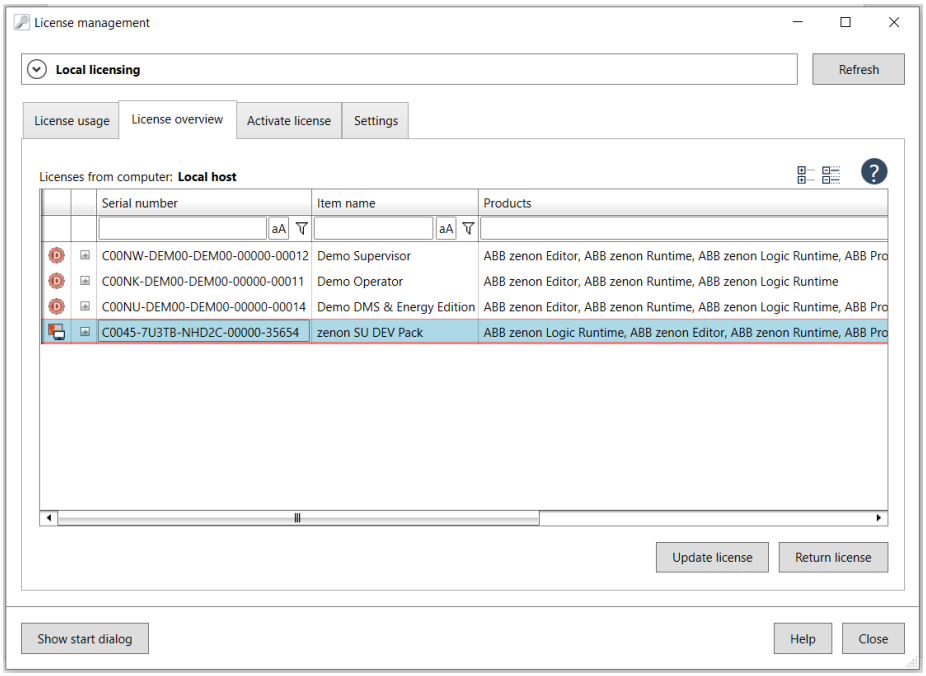
xx2000000224

3 Click on the license to be returned.

Continues on next page

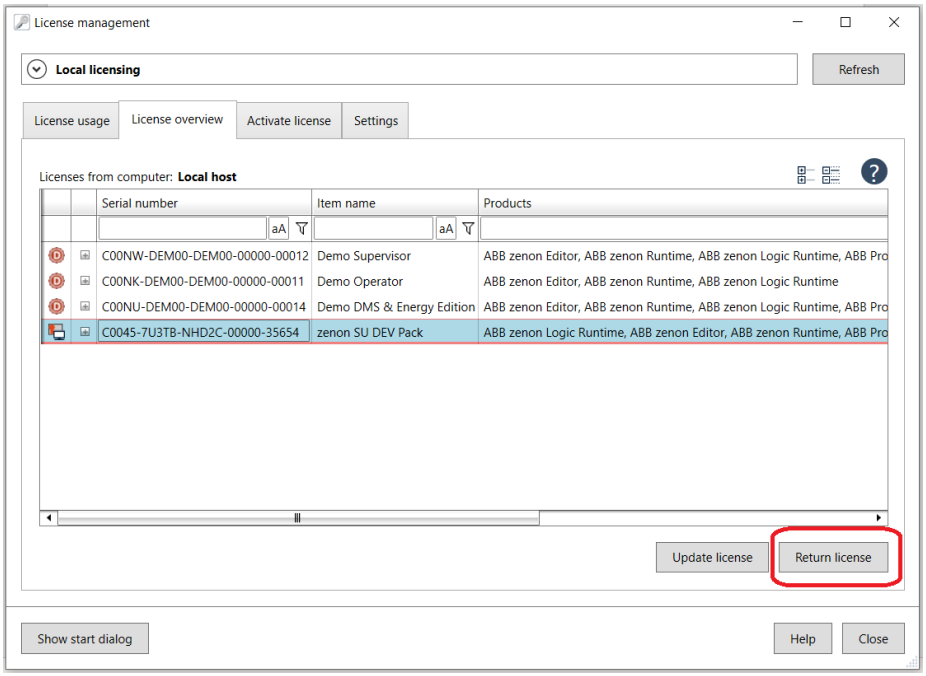
1.5 ABB Ability™ zenon license

Continued



xx2000000227

4 Click on **Return License.**



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5 Click **OK** when the license is successfully returned.

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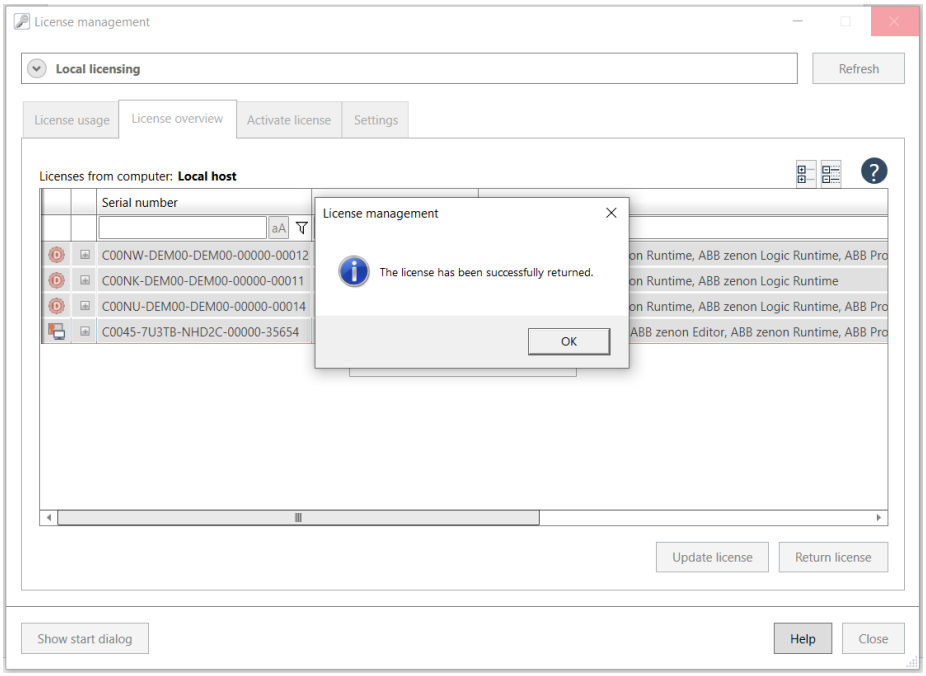

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Note

Return the license to release it before any uninstalling ABB Ability™ zenon work.

Otherwise the license will be occupied by the uninstalled ABB Ability™ zenon and may not be reused anymore.

If this already happened, please contact ABB.

1.6 Installing and uninstalling PickMaster Twin Host

Overview

This section describes the installation process for the PickMaster Twin Host.

The PickMaster Twin Host contains the PickMaster Operator and real Runtime for production.

Prerequisites

To start the installation process, the following must be available:

- A computer with ABB Ability™ zenon installed.
- A computer that meets or exceeds the *System requirements on page 17*.
- A log on account with administrator rights on the computer.
- PickMaster Twin Host installation package
- A license certificate

> **Note**
>
> The PickMaster Twin Client and PickMaster Twin Host are not recommended to be installed on a same PC.

Installing PickMaster Twin Host

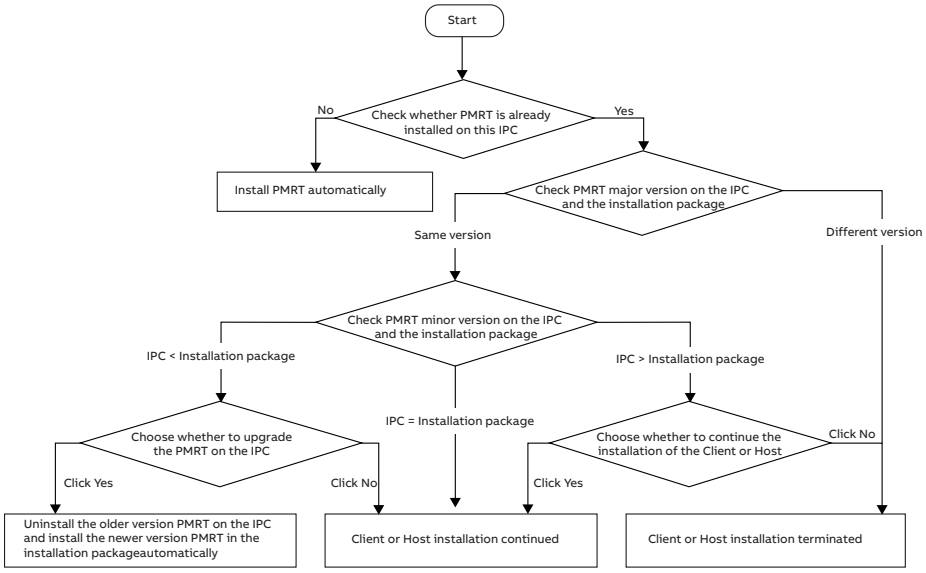
Use the following procedure to install the PickMaster Twin Host:

1. Browse to the PickMaster Twin Host installation package and double-click `Setup.exe`.

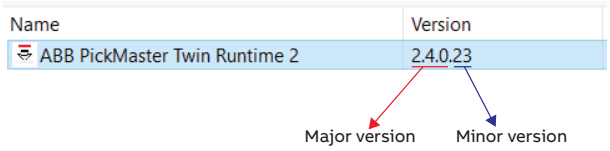
   The installation starts.
2. Click **Next**.
3. Read the **license agreement** and accept the terms.
4. Click **Next**.
5. PickMaster Twin Client will check whether the **Congnex vision driver** is already installed on this computer automatically.

   If not, it will install the **Congnex vision driver** automatically.
6. PickMaster Twin Client will check to install the PickMaster Runtime according to the following flowchart.

Continues on next page



xx2400000341



xx2400000342

7 If installation is continued, click **Next**.
8 Click **Next** to start the installation.
9 When the installation is complete, choose to restart the computer now or later and click **Finish**.

Uninstalling PickMaster Twin Host

Use this procedure to uninstall PickMaster Twin Host:

1 Right click and select **Uninstall** on PickMaster Twin Host in the control panel.
2 If needed, select the **Uninstall Cognex drivers** checkbox to uninstall the cognex drivers on the computer.
3 Click **Next**.
4 Click **Yes** to start the uninstallation.

> **Note**
>
> If only PickMaster Twin Host is existing on the IPC, PickMaster Runtime will be uninstalled automatically at the same time.
>
> If PickMaster Twin Client and PickMaster Twin Host are both existing on the IPC, PickMaster Runtime will not be uninstalled.

5 When the uninstallation is completed, click **Finish**.

1.7 Network setting

1.7.1 Configuring networks

Introduction to the controller network

The PickMaster Operator and the robot controller communicate through Ethernet. If you have problems in connecting to the network, contact the local network administrator.

> **Note**
>
> The PickMaster Operator must be connected to the WAN port on the controller. Do not use the service port.

Configuring the controller network

If a new local area network (LAN) is created specifically for PickMaster Operator the following settings can be used.

- Use static IP numbering with different addresses for both the computer and the robot controller.
- IP addresses: 192.168.1.X (where X is between 1 and 253).
- Subnet mask: 255.255.255.0
- Gateway: 192.168.1.254
- DNS: N/A.
- Wins: N/A.

> **Note**
>
> The robot controller has a service Ethernet card configured with an IP address (192.168.125.1). Therefore, the same subnet (192.168.125.X) must not be used for the standard LAN Ethernet card.
>
> For more information, see *the Windows documentation and the product manual for the robot controller* to set up the IP configuration.

> **Note**
>
> It's not allowed to use any of the following IP addresses which are allocated for other functions:
>
> - 192.168.127.0 - 255
>
> The IP address cannot be on a subnet which overlaps with any of the above reserved IP addresses. If a subnet mask in the class B range has to be used, then a private address of class B must be used to avoid any overlapping. Contact your local network administrator regarding network overlapping.
>
> See the section *Communication* in *Technical reference manual - System parameters*.

Continues on next page

Prerequisites for vision networks

The vision network settings must be configured similar to the robot controller network settings.

Use a separate network for the vision system, that is controllers and cameras cannot be connected to the same network port on the PC.

To use more cameras than the number of available Ethernet ports on the PC, use one or two additional GigE cards.

The maximum number of cameras that can be used with one PC is 10. Distribute them evenly on the dedicated vision network ports on the PC. Use the supplied cables with fastening screws between GigE card and camera. For the example of network architecture, see *Example of suitable network architecture on page 45*.

Overview

This chapter describes the procedures on setting up the Internet. Otherwise the PackML function cannot work normally.

CAUTION

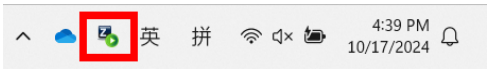
If the Network Adaptor is not renamed correctly, the PickMaster Operator cannot work normally.

Use this procedure to set the Network for PickMaster Operator:

Note

If the status indicator of zenon is red, check whether the network name is changed to 'ProfinetIOAdapter' or not.

If not, change the name to fix the problem.



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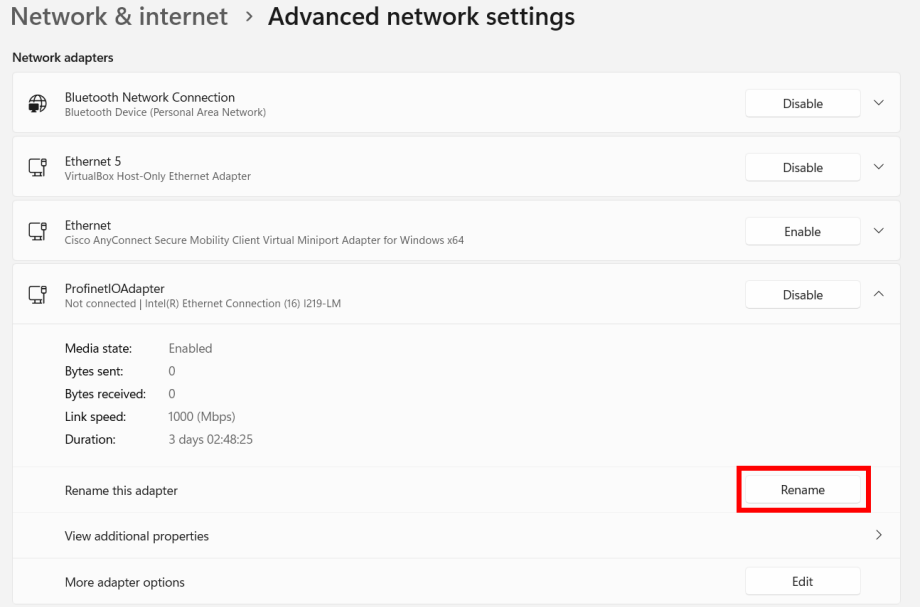
Configuring the IPC network for PickMaster Operator

The following procedure is recommended to modify the computer network configuration which camera is connected to:

1. Open the **Network &internet** -> **Advanced network settings** page on the IPC.
2. Open the network which is used for connecting PickMaster Operator and rename the network name to *ProfinetIOAdapter*.

Continues on next page

1.7.1 Configuring networks
Continued



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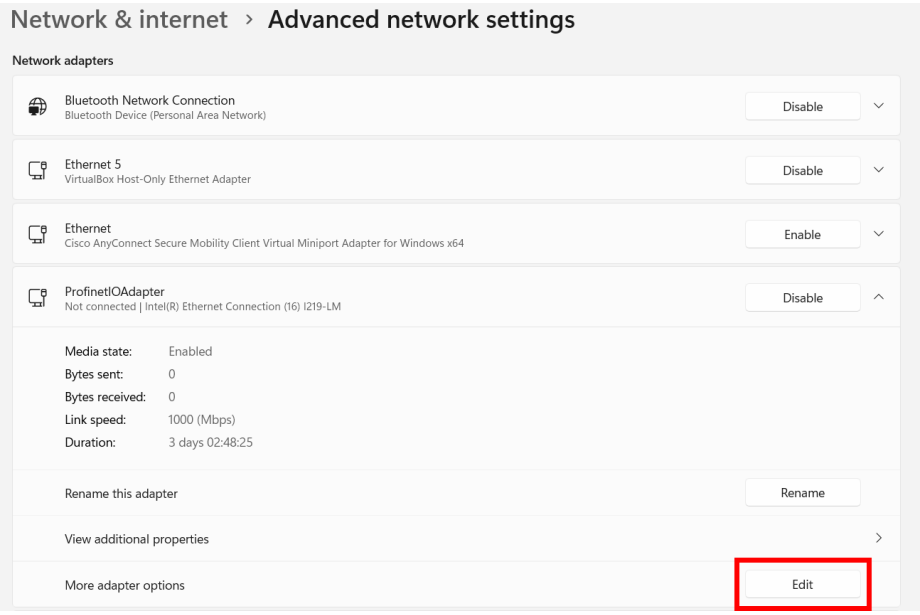
3 Click **Edit** to open the property window of the *ProfinetIOAdapter*.



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4 Make sure that the following protocols or drivers are selected:
- **eBUS Universal Pro Driver**
- **COPA-DATA Multiple Network Protocol Driver (64 bit)**
- **Internet Protocol Version 4(TCP/IPv4)**

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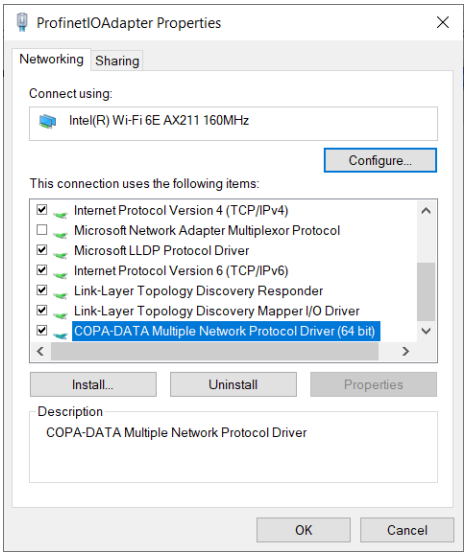

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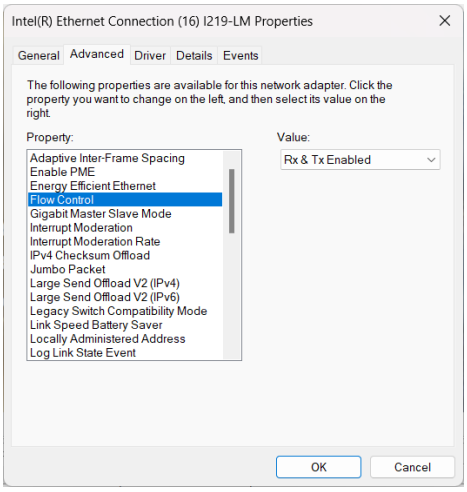
5 Click **Configure** and then choose the **Advanced** tab.



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6 Modify the following properties as necessary:
   - Select the **Jumbo Packet** property and choose the highest possible value in the dialog box.

7 In addition, Cognex recommends you modify the following properties for this network connection, which may or may not be grouped together with the previous properties:
   - Change the **Receive Buffers** property and choose the highest possible value in its **Value** list.
   - Change the **Interrupt Moderation Rate** property to **Extreme** in its **Value** list.
   - Change the **Transmit Buffers** property and choose the highest possible value in its **Value** list.
   - Change the **Flow control** property to **Rx&Tx Enabled** in its **Value** list.

8 Click **OK**.

Continues on next page

1.7.1 Configuring networks
Continued

Refer to the embedded Questions and Answers of the Gig Vision Configuration Tool for more details on what system properties you should modify as necessary.

Configuring the vision network

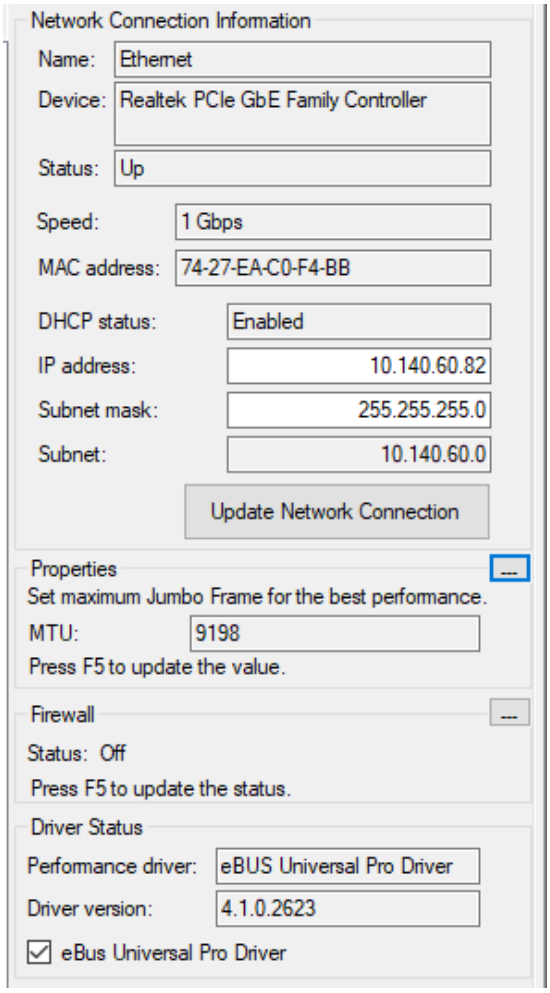
Use this procedure to configure the vision network.

1. Assign each camera with its own IP-address. The same rules apply as for other Ethernet networks, that is each camera and vision network card must have a unique IP address, and be located on the same subnet. The communication with cameras and controllers should be separated on different subnets. See *Example of suitable network architecture on page 45*.
2. Configure the IP addresses for the cameras using **Cognex GigE Vision Configurator**. It can be used to set IP addresses of both cameras and network interface cards.
3. When all cameras are configured, install the *Performance Driver* for Gigabit Ethernet vision for each port, see steps 4-6.
4. In the **Ethernet Camera Tool**, for each vision network port in the tree view, do the following settings:
   a. In the **Properties** section set the value of MTU at around 9000. If the MTU value is around 1500, it means that the Jumbo frames is not set.

      To set the Jumbo frames:

      I Click ...

Continues on next page



xx2200001607

The **Ethernet Properties** window is displayed.

II Click the **Networking** tab.

III Click **Configure**.

The properties window is displayed.

IV Click the **Advanced** tab.

V Select **Jumbo Frame** from the **Property** list.

VI Select a value as high as possible from the **Value** drop-down list.

VII Click **OK**/**Apply** until you are back in the **Ethernet Camera Configuration** tool.

VIII Press F5 to refresh the values in the window.

IX Verify that the MTU value is about 9000.

b Select the **eBus Universal Pro Driver** check box. A warning about installing unsigned software appears.

c Click **OK**.

5 Reboot the PC when the installation is complete for all the vision ports.

Continues on next page

6 Start the **Ethernet Camera Tool** and verify that the performance driver has been successfully installed for each vision network port. Also verify that the Jumbo frames MTU value is set to about 9000.

Note

In case you face any issue during image capture, modify the following network configuration on the ethernet where the camera is connected:

- In the **Ethernet Camera Tool** for vision network port in the tree view Click ...

  The Ethernet Properties window is displayed.
  - In the **Networking** tab, clear all the check boxes listed under **This connection uses the following items** except **eBUS Universal Pro Driver** and **Internet Protocol Version 4 (TCP/Ipv4)**.
  - Click **Configure** and then choose the **Advanced** tab.
    # Select the **Receive Buffers** property and choose the highest possible value in the **Value** list.
    # Select the **Interrupt Moderation Rate** property and choose the value as **Extreme**.

Note

Running the Ethernet Camera Tool and Runtime at the same time may result in unpredictable behavior. To avoid this, use only one of the programs at a time.

CAUTION

Running camera traffic and controller traffic on the same network can cause serious communication failure.

Note

If any third-party vision software is installed, please check the vision network configuration according to *Configuring the vision network on page 42*.

The use of third-party software may cause an unintended change of the settings, thus causing the cameras to malfunction.

Configuring the Runtime network

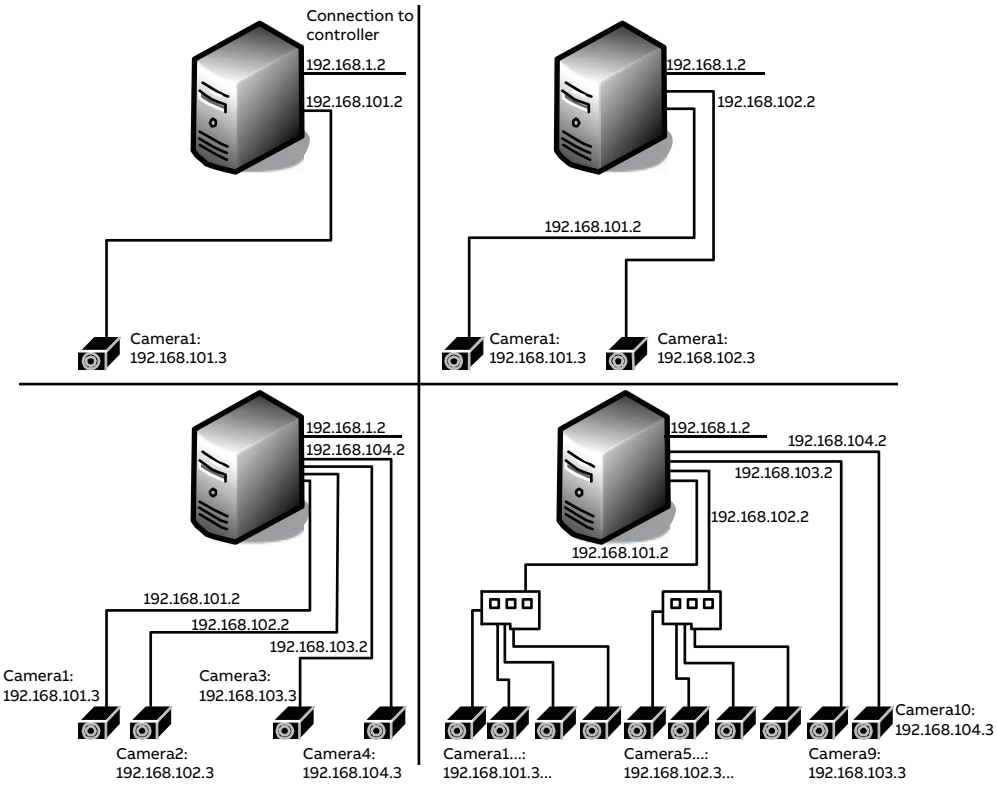
If a new local area network (LAN) is created specifically for Runtime the following settings can be used.

- Use static IP numbering with different addresses for the PickMaster Operator and the robot controller.
- IP addresses: 192.168.1.X (where X is between 1 and 253).

Continues on next page

Example of suitable network architecture

- Use static IP numbering with different addresses for both the computer and the camera(s).
- IP addresses of Port #1 and the cameras connected to it: 192.168.101.X (where X is between 1 and 253).
- IP addresses of Port #2 and the cameras connected to it: 192.168.102.X (where X is between 1 and 253).
- Subnet mask: 255.255.255.0
- Gateway: Not Needed.
- DNS: N/A.
- Wins: N/A.



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Note

Changes made to the camera settings outside Runtime will not be applied until Runtime is restarted. This means that if a camera is restarted (power on/off) or a camera's IP address is changed,then Runtime must be restarted to function properly. Therefore, Runtime and the *Ethernet camera tool* program should not be run simultaneously, to avoid unpredictable behavior. Instead, shut down Runtime before making changes, then start Runtime after changes are saved.

Continues on next page

Configuring the host computer IP address (COD file) for remote control over EtherNet/IP

> **Note**
>
> If the IP address in the COD file is not matched with host computer IP address, the remote control over EtherNet/IP can not be used.

The following procedure is recommended to modify the host computer IP address for remote control over EtherNet/IP:

1. Contact ABB for support with the request to update the IP address for EtherNet/IP. Please state the correct IP address of the network adapter named ProfinetIOAdapter on the host computer in the case.
2. A new file named `STRATONRT.COD` with the correct IP address will be returned.
3. Replace the old `STRATONRT.COD` in the path `C:\Program Files (x86)\ABB\PickMaster Twin 3\Pickmaster Twin Host 3\PickMaster Operator\PMPDRT\RT\FILES\straton\PackMLLogic` by the new `STRATONRT.COD` file that returned.
4. Start the PMOP again, select EtherNet/IP fieldbus, enable remote control and verify that the communication is functioning.
5. If the communication is OK, close the case, else ask for more support.

> **Note**
>
> The COD file needs to be updated for each new version of PickMaster Twin Operator.

1.8 Accessing the user interface

Overview

This chapter describes the procedures before login.

> **Note**
>
> After installed PickMaster Twin Client and PickMaster Twin Host on different PC as recommended, there will be two real Runtime available but only the one connected to controller or camera should be used. This is the one that user should connect PickMaster Operator with and login.
>
> The real Runtime on Host PC and Client PC are identical but the one on Host is for production. Robot controllers and cameras should also be connected to this one.

Prerequisites

To start the PickMaster Operator, the following must be available:

- ABB Ability™ zenon must have been installed to the computer.
- PickMaster Operator must have been installed to the computer.
- A log on account with administrator rights on the computer.

Opening PickMaster Operator

Use this procedure to start PickMaster Operator:

1. Double click the `PickMaster Operator` file to open the **Welcome to ABB PickMaster** window.
2. Enter the IP address of the PickMaster Runtime which need to be connected.

> **Tip**
>
> Check the IPv4 address of the computer which the PickMaster Runtime is installed on.

> **Note**
>
> Loopback address 127.0.0.1 is use as the default value for PickMaster Runtime IP address.
>
> As the PickMaster Runtime on Host PC is suggested to be used for production.

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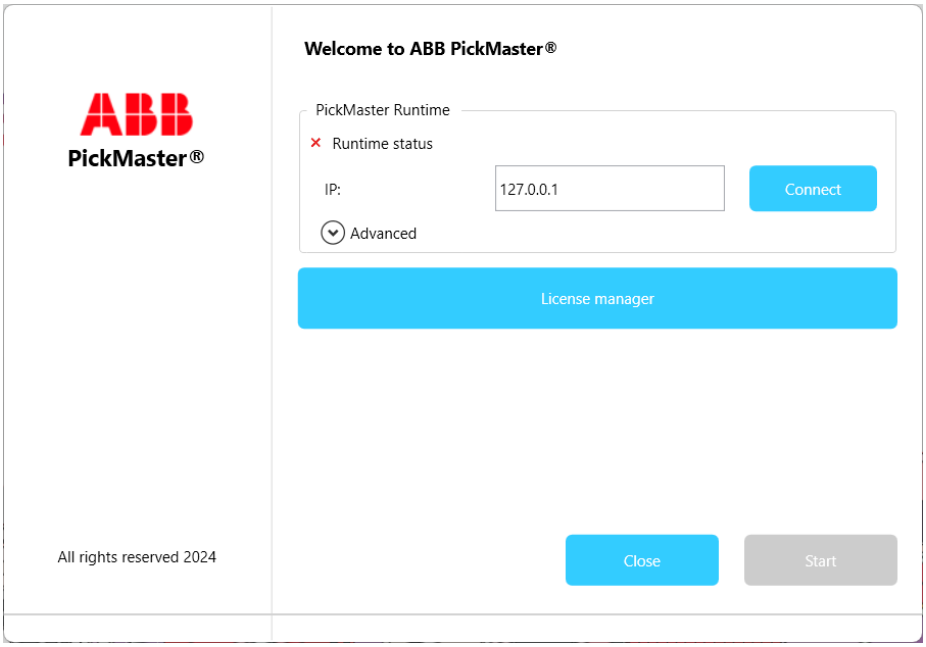

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3 If needed, click **Advance** to open the setting view for Runtime user and language.

Tip

The default Runtime user name and password is the credential for connecting the PickMaster Runtime by `https` protocol.

Default Username: `admin` with Password: `password`

Note

The user should change the password of the default user account for higher Cyber Security.

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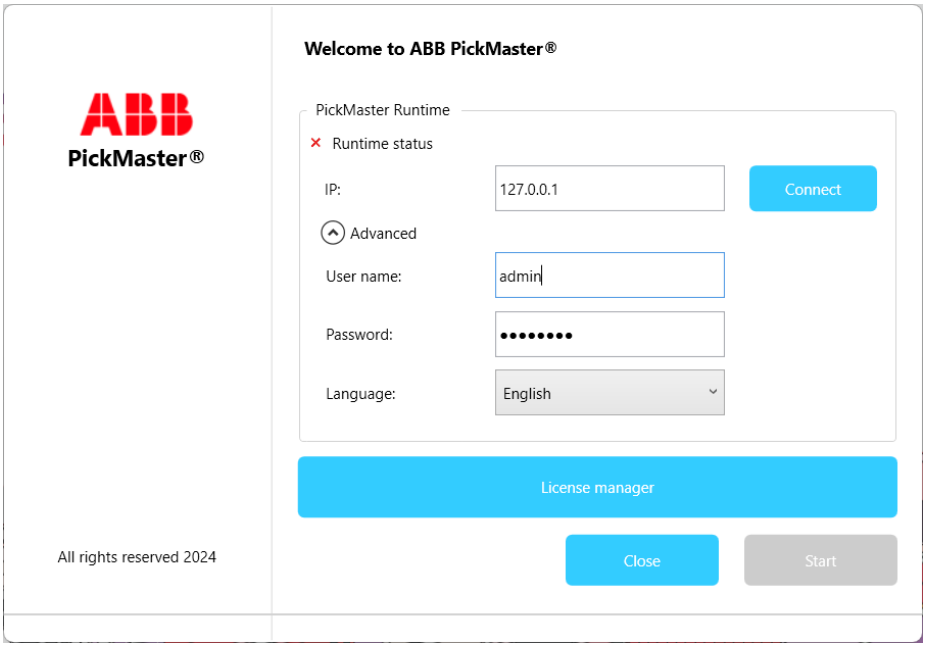

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4 Click **Connect** button.

> **Note**
>
> When the **SSL** dialog box pops up during the first operation of the PickMaster Operator, click **Yes**.
>
> Otherwise the PickMaster Operator cannot work normally.
>
> For more information, see chapter *Self-signing certificate* in *Application manual - PickMaster® Twin - PowerPac*.

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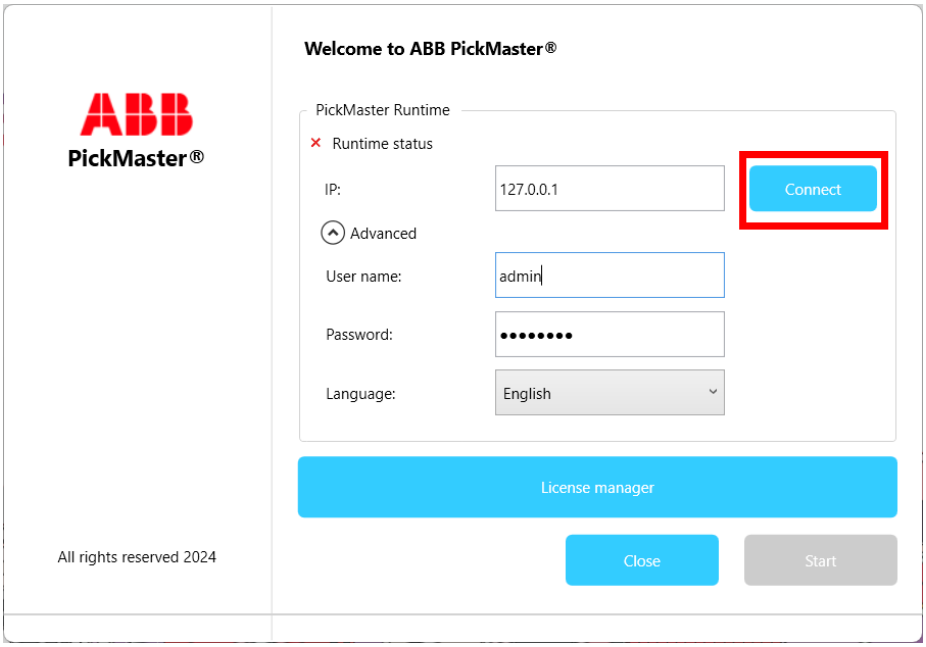
1.8 Accessing the user interface
Continued



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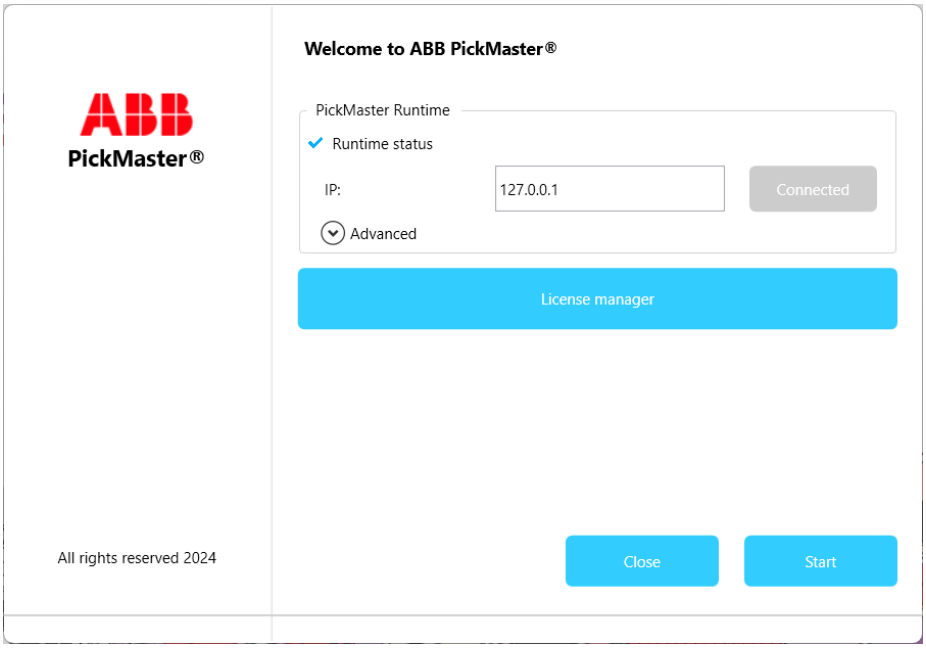
5 Click the **License Manager** button to open the **License Management** window. For more detail on activating the license, see *ABB Ability™ zenon license on page 25*.

6 Click **Start** button to open the login interface.



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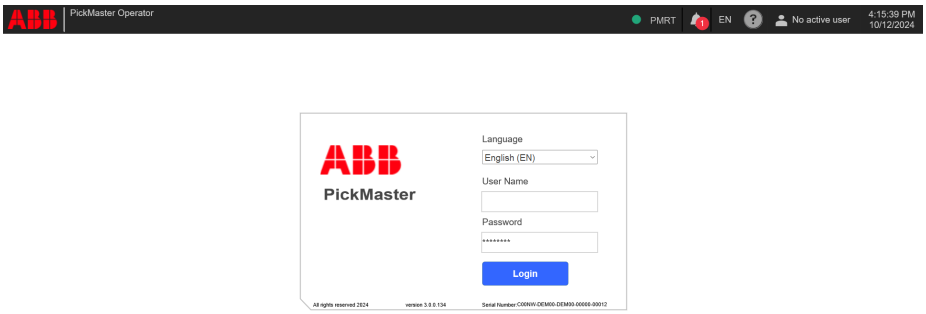
Note

If the user meets any problem when building connection between PickMaster Operator and real Runtime, please check from below possible reasons:

a Using a Host account that is not administrator;
b Firewall blocking;
c VPN interference;
d Host IP address incorrect;
e The network name not renamed to "ProfinetIOAdapter".

7 Login with an effective user account.



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Tip

A default user and password have been created for each role.

Administrator Username: `admin` with Password: `password`

Note

The Username and Password are case sensitive.

Note

To enhance the security of the user account, user lockout logic is used in PickMaster Operator.

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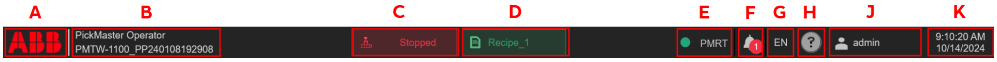
2 PickMaster Operator main navigation bar

Structure of the main navigation bar

The PickMaster Operator main navigation bar provides a series of basic functions.



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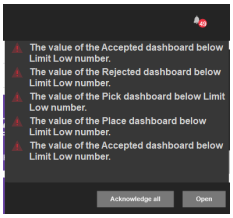
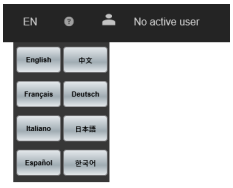
ID	Object	Description
A	**Home Page** icon	Go back to the main page when you open any page.
B	Solution indicator	Shows the loaded solution name.
C	Status indicator	Shows the status of the production.
D	Recipe indicator	Shows the recipe in use. **No recipe**: No recipe is loaded or the selected recipe has errors. **Recipe Loaded**: Recipe is loaded and no errors. For more information, see *Recipe Settings on page 74*.
E	**PMRT** indicator	Shows the connection status of **PMRT** and PickMaster Operator. • Green: PickMaster Operator is connected with **PMRT**. • Red: PickMaster Operator is not connected with **PMRT**.
F	Bell icon	Shows the alarm messages.  xx1900000324
G	Language	Change the language. Available languages: • English • Simplified Chinese • German • Italian • Spanish • Japanese • French • Korean  xx1900000322

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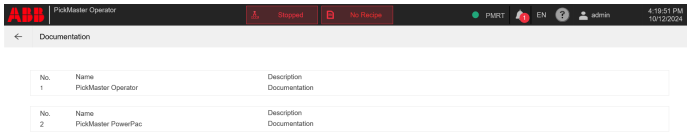
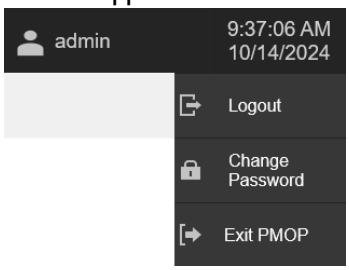
Continued

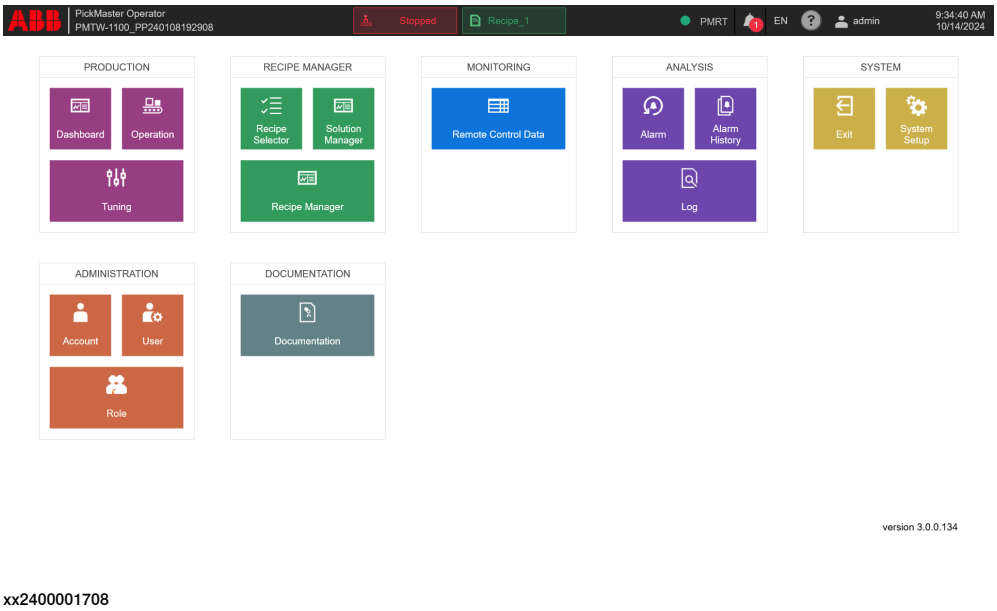
ID	Object	Description
H	Help	Link to the related manual of the PickMaster Operator and PickMaster® PowerPac.  xx2400001707
J	Login	Log in, log out, manage PickMaster Operator user password and exit application.  xx2400001710
K	System time	Shows the system time of the PickMaster Operator IPC.

3 PickMaster Operator page groups

3.1 Overview

Overview

The following figure shows the PickMaster Operator main page.



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Elements on the page groups

Group	Menu	Description
PRODUCTION	Dashboard	Shows the status of the robots. For detailed description, see *Dashboard on page 57*.
	Operation	Send commands from PickMaster Operator and reflect the states of PackML in PickMaster Operator. For detailed description, see *Operation on page 58*.
	Tuning	Adjust recipe parameters during operation. For detailed description, see *Tuning on page 65*.
RECIPES	Recipe Selector	Choose a recipe. For detailed description, see *Recipe Selector on page 74*.
	Recipe Manager	Open the add-in PickMaster Recipe Manager. For detailed description, see *Recipe Manager on page 77*.
MONITORING	SoftPLC Live Data	Monitor the live data of the softPLC. For detailed description, see *Remote Control Data on page 78*.

Continues on next page

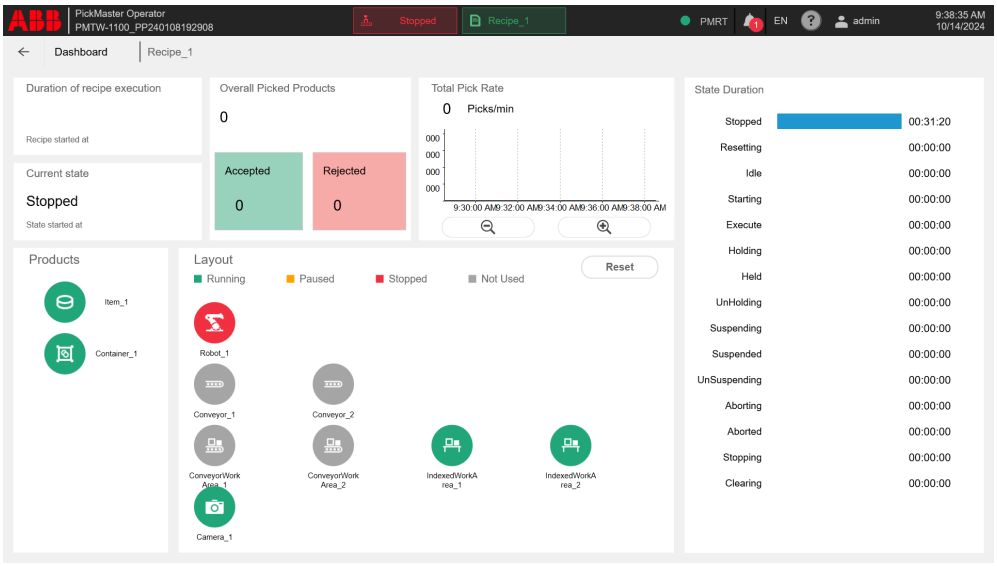
Group	Menu	Description
ANALYSIS	Alarm	Monitor the alarms that are not acknowledged. For detailed description, see *Alarm on page 91*.
	Alarm History	Monitor all the alarms.  **Tip** The acknowledged alarms are in black color and the un-acknowledged alarms are in red color. For detailed description, see *Alarm History on page 91*.
	Log	Monitor all the operations that happened. For detailed description, see *Log on page 92*.
SYSTEM	Exit Runtime	Exit the PickMaster Operator. For detailed description, see *Exit on page 93*.
	System Setup	Import solutions. For detailed description, see *System Setup on page 93*.
ADMINISTRATOR	Account	Manage the account in use. For detailed description, see *Account on page 99*.
	User Management	Manage the users. For detailed description, see *User Management on page 99*.
	Role Management	Manage the roles. For detailed description, see *Role Management on page 101*.
DOCUMENTATION	PickMaster	Open the related documents. For detailed description, see *Documentation on page 104*.

3.2 PRODUCTION group

Dashboard

Overview

Dashboard shows the layout of the solution, the quantity and status of the components in the solution, the status of the robots and the live data of pick/place rate and allows the user to adjust the layout of the components in current solution.



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Parameter	Description
Duration of recipe execution	The duration of the recipe executing from Resetting to Stopped. **Recipe started at** displays the time when Resetting is started.
Current state	The current state of the PackML, which is consistent with the state displayed on the navigation bar. **State started at** displays the start time of current state.
Overall Picked Products	The total number of the picked products in current solution.
Total Pick Rate	Shows the overall pick rate for all robots in the form of numerical values and trend chart. The trend chart is set as default to display values for 10 minutes. The displaying range of the trend chart can be adjusted with the zoom in and zoom out buttons.
Products	Shows the used items and containers in current recipe.

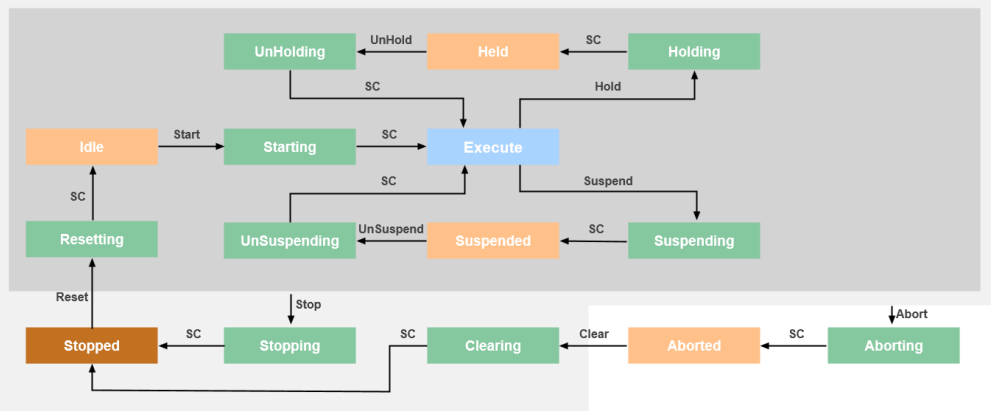
Continues on next page

Parameter	Description
Layout	Shows all components in current solution. All the component icons can be adjusted and arranged by user. The component is in different status which can be identified by the color of the icon: • Green, the robot is in running status or the component is in used. • Yellow, the robot is paused. • Red, the robot is stopped or the RAPID program is abnormal. • Grey, the component is not in used in current recipe but existing in current solution. **Reset**: click to restore all icons back to the initial positions.
State Duration	Shows the duration of all states automatically.

Operation

What is PackML?

PickMaster® Twin includes an internal SoftPLC, which controls a state machine following the PackML standard according to OMAC (Organization for Machine Automation and Control: omac.org). PackML stands for Packaging machine language and it defines a unified way of operating packaging machinery as well as the inter-machinery communication.



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- A transition State (Green in picture) is a state that holds a process until certain conditions are met.
- A Wait State (Orange in picture) - A stable state used to identify that a unit/machine has achieved a defined set of conditions.
- Dual state (Blue) - The unit/machine is in a stable acting state - unit/machine is producing; but in case of batch production, it can be a transition state.

The states in orange and blue are stable states, i.e. they can be valid for a longer period of time. The states in green are states that are only valid for a certain period of time and transfer to the next state without intervention from an operator. The transition is automatically done if the state is complete (SC = State Complete).

Shown above is the full state diagram with the state Execute (in blue) the producing state. The loop under-neath, via Suspended, is a waiting loop for material to be

Continues on next page

worked upon. The loop above, via Held, is the loop where the operator holds the system out of the producing state.

After all products are made, the producing state Execute is left via Complete, and ready for a new production order.

At power on, the state Stopped is valid. After a Reset it moves to the state Idle via Resetting.

Issuing ‘Start’ gets the unit to ‘Execute’ via ‘Starting’.

The PackML state diagram leaves its normal loop via either Abort or Stop. The Abort is coupled to the error handling from every state. The Stop is for the operator interface.

PackML state diagram

	State Commands									State Complete
Current State	Start	Reset	Hold	Unhold	Suspend	UnSuspend	Clear	Stop	Abort	
IDLE	STARTING							STOPPING	ABORTING	
STARTING								STOPPING	ABORTING	EXECUTE
EXECUTE			HOLDING		SUSPENDING			STOPPING	ABORTING	COMPLETING
COMPLETING								STOPPING	ABORTING	
COMPLETE		RESETTING						STOPPING	ABORTING	
RESETTING								STOPPING	ABORTING	
HOLDING								STOPPING	ABORTING	
HELD				UNHOLDING				STOPPING	ABORTING	
UNHOLDING								STOPPING	ABORTING	
SUSPENDING								STOPPING	ABORTING	
SUSPENDED						UNSUSPENDING		STOPPING	ABORTING	
UNSUSPENDING								STOPPING	ABORTING	
STOPPING									ABORTING	
STOPPED		RESETTING							ABORTING	
ABORTING										

Continues on next page

3.2 PRODUCTION group
Continued

	State Commands									State Complete
Current State	**Start**	**Reset**	**Hold**	**Unhold**	**Suspend**	**UnSuspend**	**Clear**	**Stop**	**Abort**	
ABORTED							CLEARING			
CLEANING									ABORTING	

Actions for each command

Command	Step 1: Active state	Step 2: PickMaster actions	Step 3: Robot and controller actions	Step 4: Expected command result	Step 5: Expected active state
Reset	Resetting	Create line and project files; Initiate vision; Start vision; Initiate robots (position sources, pipes, RAPID program, etc).	Controller Motors ON; Robots move to Safe position.	Controller Motors on; Init vision finished; Init robots finished.	Idle
Start	Starting	Start robots.	Running pickplace routine	Robots is in running state.	Execute
Stop	Stopping	Stop vision; Stop robots; Stop project; Close project.	Moving to safe positions	Robots stopped; Project stopped and closed.	Stopped
Hold	Holding	Hold robots.	Executing holding operation Robots; stopped in HOLD position.	Robots reached hold position.	Held
Unhold	UnHolding	Start robot to pick/place.	Restarting pick or place	Robots is running.	Execute
Suspend	Suspending	Suspend robots.	Executing Suspending operation; Robots stopped in SUSPEND position.	Robots reached suspend position.	Suspended
UnSuspend	UnSuspending	Start robot ready to pick/place.	Restarting pick or place	Robots is running.	Execute
Abort	Aborting	Stop vision; Stop robots; Stop project.	Moving to safe positions	Robots stopped in safe position.	Aborted
Clear	Clearing	Close project.	Stopped in safe position	Close project completed.	Stopped

Self-diagnosis processing PackML state

Mandatory robot command result when PML is Execute				
Robot command (UI buttons or remote commands)	**Production State**	**Optional Robot**	**Other Mandatory Robot**	**Remark**
Pause	Holding	Pause in Safe position	Pause in Safe position	/
Stop	Holding	Pause in Safe position	Pause in Safe position	/
Start (not allowed)	/	/	/	/
AutoStop (A-stop)	Holding	Pause in Safe position	Pause in Safe position	/
E-stop	Stopping	Stop	Stop	/

Continues on next page

Optional robot command result when PML is Execute, with mandatory robot				
Robot command (UI buttons or remote commands)	**Production State**	**Other Optional Robot**	**Mandatory Robot**	**Remark**
Pause	no effect	no effect	no effect	Only the commanded robot is influenced
Stop	no effect	no effect	no effect	
Start(after robot stopped or paused)	no effect	no effect	no effect	
AutoStop (A-stop)	no effect	no effect	no effect	
E-stop	no effect	no effect	no effect	

Optional robot command result for the robot except the last robot when PML is Execute, All robots are optional			
Robot command (UI buttons or remote commands)	**Production State**	**Other Optional Robot**	**Remark**
Pause	no effect	no effect	Only the commanded robot is influenced
Stop	no effect	no effect	
Start(after robot stopped or paused)	no effect	no effect	
AutoStop (A-stop)	no effect	no effect	
E-stop	Stopping	Stop	

Optional robot command result for the the last robot when PML is Execute, All robots are optional			
Robot command (UI buttons or remote commands)	**Production State**	**Other Optional Robot**	**Remark**
Pause	Holding	no effect	Only the commanded robot is influenced
Stop	Holding	no effect	
Start(after robot stopped or paused)	no effect	no effect	
AutoStop (A-stop)	Holding	no effect	
E-stop	Stopping	Stop	

When Mandatory robot enters stop state (not E-stop)		
PML states when robot stop happens	**PML state reactions**	**Remark**
Restting/Idle	PackML automatically go to stopping	
Starting/Un-Holding/Un-suspending	Stay in current state	Other robots will be started and PML state goes to Execute, at this moment it fulfills the condition to go to Held, then PML goes to Held.
Holding/Suspending/Held/Suspended/Aborting/Aborted/Clearing/Stopping/stopped	Do nothing	/
Execute	PackML automatically go to Holding	/

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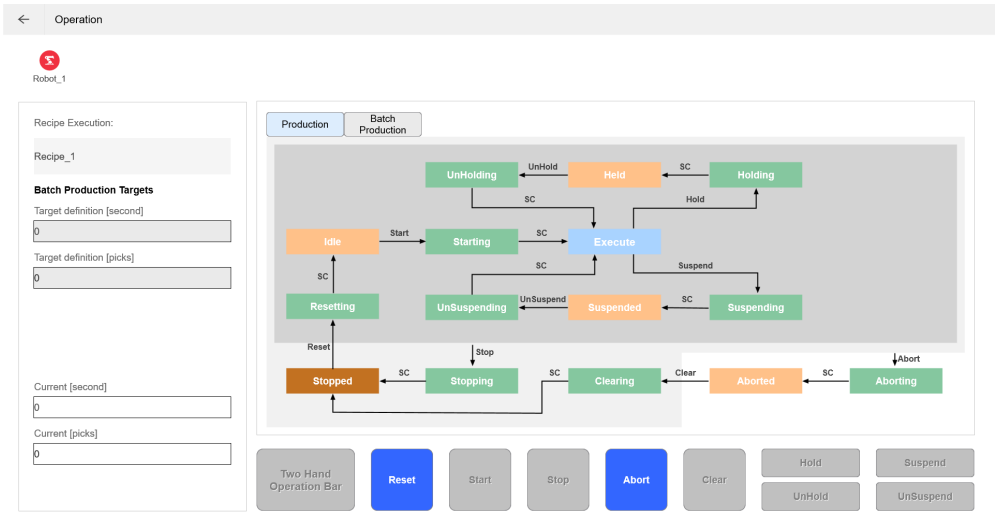
3.2 PRODUCTION group

Continued

PackML for PickMaster Operator

This function is used to send commands from PickMaster Operator and reflect the states of PackML in PickMaster Operator.



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Parameter	Description
Recipe execution	Shows the name of the executing recipe.
Batch Production Targets	Set the judgment condition for batch production. **Target definition [second]**: set a pick time as the judgment condition to complete the production. **Target definition [picks]**: set a pick number as the judgment condition to complete the production.
Current [second]	Shows the current completed duration of the production or batch production.
Current [picks]	Shows the current completed picking amount of the production or batch production.

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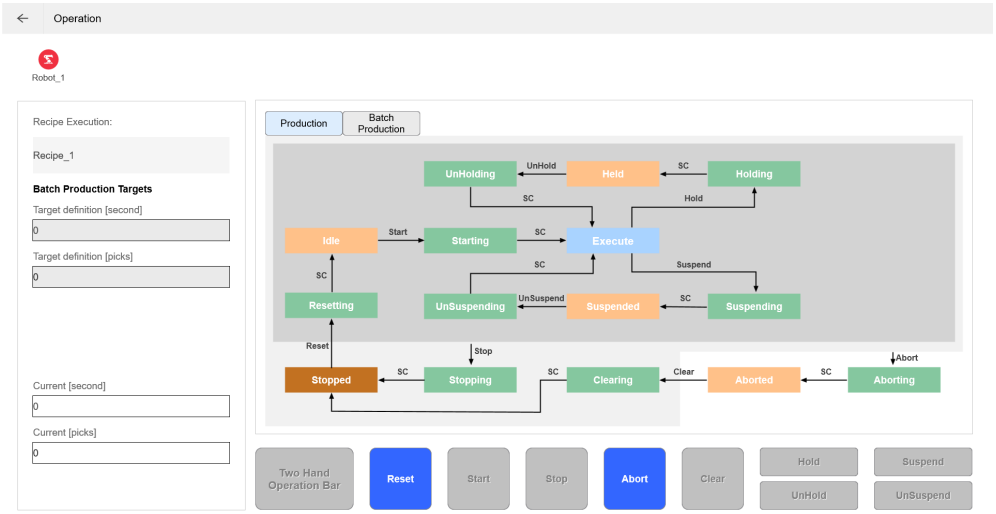
Production

Production is the basic operation of the state machine.



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Batch production

Batch production is the basic operation with the complete operation of the state machine.

Target definition [second] (Pick time) or **Target definition [picks]** (Pick number) can be set as the judgment condition. If the set condition is reached, the system will enter the **Complete** process automatically.

> **Note**
>
> If need to use the batch production function in remote control mode, the **Target definition [second]** or **Target definition [picks]** need to be set before changing to remote control mode.
>
> Or the batch production function cannot be used.

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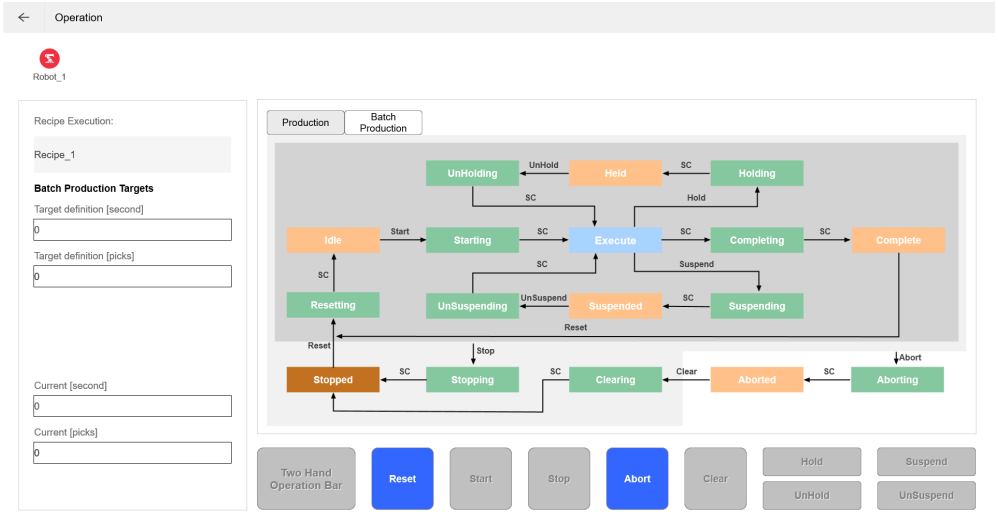

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Recipe checking when resetting

When start the production and click on **Reset** button, PickMaster Operator will check whether the recipe is valid or not.

If the following errors pop up, the recipe cannot be reset:

- `{0} lack(s) valid distribution. Please check in PMPP!`

> **Tip**
>
> Make sure that at least there is one group valid distribution setting under **Item distribution Accept** or **Reject** for all available items.

- `{0} lack(s) real controller setting. Please check in PMPP!`

> **Tip**
>
> Make sure that at least one real controller has been selected for the controller which need to run the production.

If the following warning pops up, the recipe may NOT work correctly:

- `{0} use(s) default signal type and lack(s) customized signal type setting. Please check in PMPP!`

> **Tip**
>
> Make sure that it is NOT set as **Default** signal type for the work areas which need to run the production.

Continues on next page

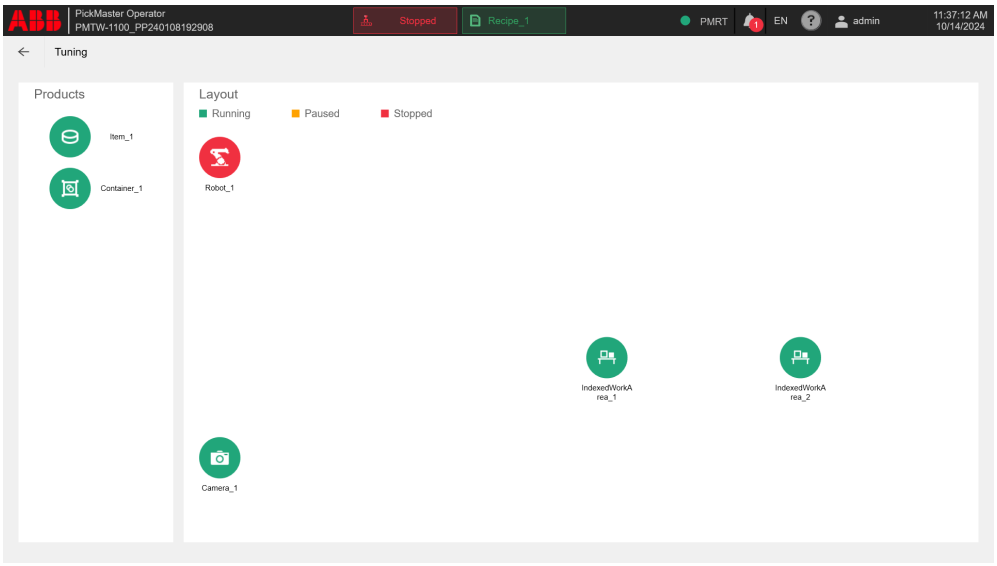
Tip

When running production with a specific recipe in PickMaster Powerpac, it will check whether the recipe is valid or not.

Tuning

Overview

This function is used to change the parameters of the conveyors, robot and items during operation, such as positions, speed, offset and timing.



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Click on the icon to open the tuning window for each component.

Clicking the camera icon opens the detail vision window, which displays the camera images with the object hits. The images and results can be recorded and saved to a file for later analysis with the PickMaster Vision Viewer.

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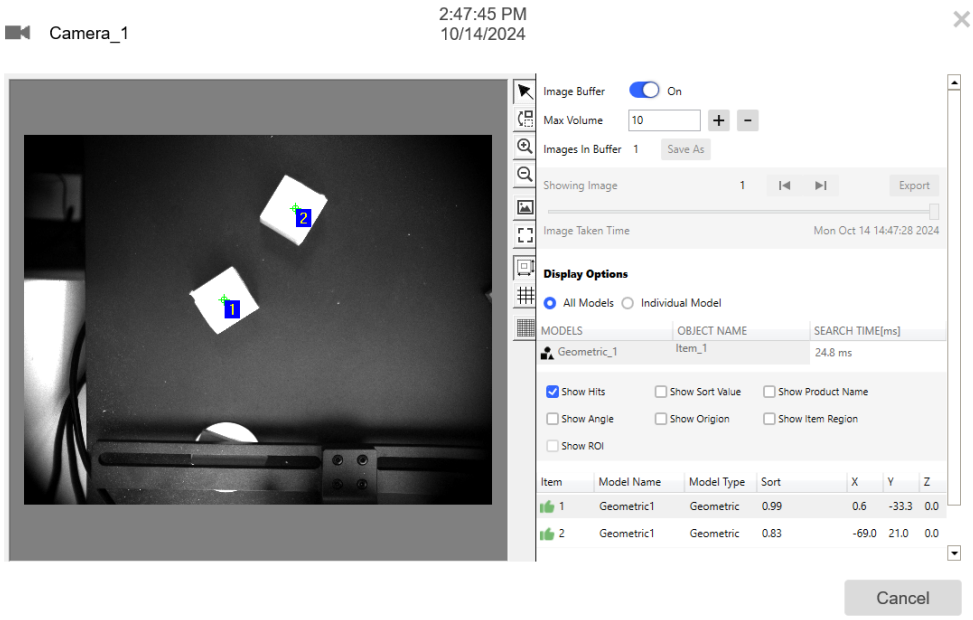
3.2 PRODUCTION group

Continued



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Parameter	Description
Products	Shows the used items and containers in current recipe. Only items can be tuned.
Layout	Shows the used components in current recipe. All the component icons can be adjusted and arranged by user. The component is in different status which can be identified by the color of the icon: • Green, the robot is in running status or the component is in used. • Yellow, the robot is paused. • Red, the robot is stopped or the RAPID program is abnormal.

Tip

For item tuning, the tuning value only affects the new generated item targets. The tuning value will not be effective on the recognized item targets in the queue.

For the work area and robot tuning, the tuning value will be effective immediately.

Tip

The position of the **Layout** components can be adjusted in **Dashboard** -> **Layout**.

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Tuning the robot

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Item	Description
Start	Start the selected robot.
Stop	Stop the selected robot. A robot stop empties all targets in the position queue. At a re-start after a stop, the robot waits until new targets are generated from the position source.
Pause	Pause the selected robot. A robot pause keeps all targets in the position queue. At a re-start after a pause, the robot resumes operation immediately with the next target in the queue.
Speed	Change the speed of the selected robot in `mm/s`. **Note** When the data in the tuning is updated, it will be saved to the recipe.

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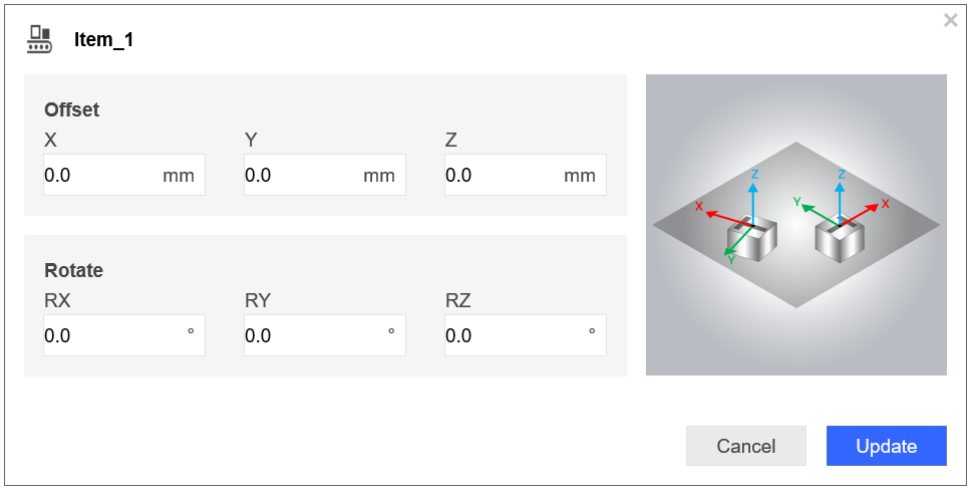
Tuning the item



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	Description
OffsetX	Set the location of the gripper when doing the picking and placing operation in X direction.
OffsetY	Set the location of the gripper when doing the picking and placing operation in Y direction.
OffsetZ	Set the location of the gripper when doing the picking and placing operation in Z direction.
RotateRX	Set the angle of the gripper when doing the picking and placing operation in X direction. **Note** The angle cannot be out of the physical limits. Otherwise the robot will not work normally. For example, trying to rotate the gripper of an IRB 360 robot in X or Y direction will cause an error. Redo the simulation after the error occurred.
RotateRY	Set the angle of the gripper when doing the picking and placing operation in Y direction. **Note** The angle cannot be out of the physical limits. Otherwise the robot will not work normally. For example, trying to rotate the gripper of an IRB 360 robot in X or Y direction will cause an error. Redo the simulation after the error occurred.
RotateRZ	Set the angle of the gripper when doing the picking and placing operation in Z direction. **Note** The angle cannot be out of the physical limits. Otherwise the robot will not work normally.

Continues on next page

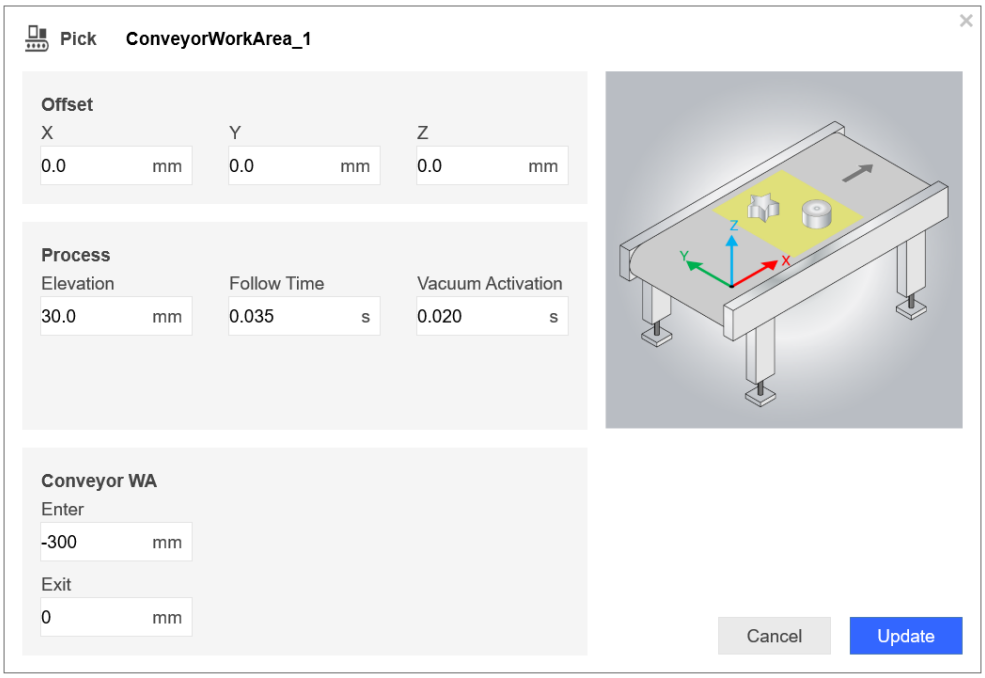
Note

When adjusting the angles, IRB 360 does not support adjusting the angles in the X and Y direction.

Note

When the data in the tuning is updated, it will be saved to the recipe.

Tuning the work area



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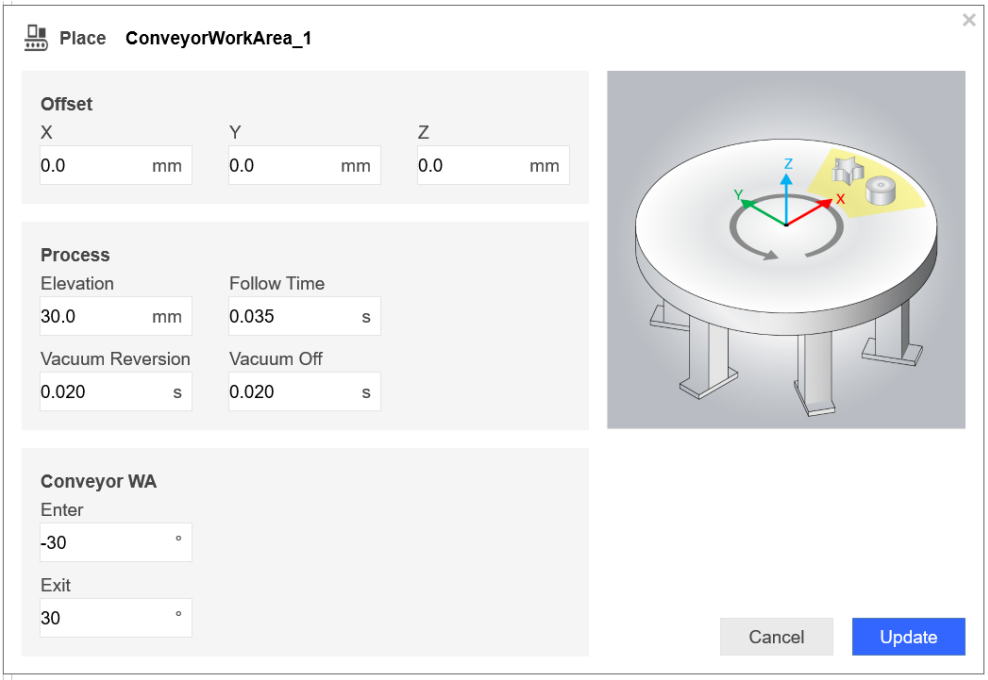
3.2 PRODUCTION group

Continued



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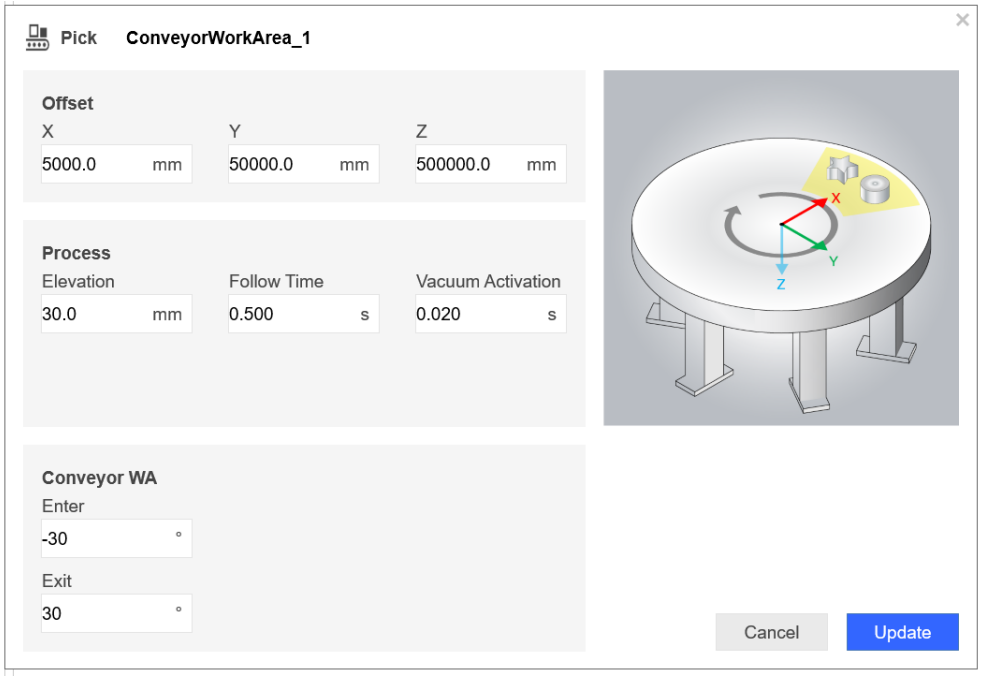

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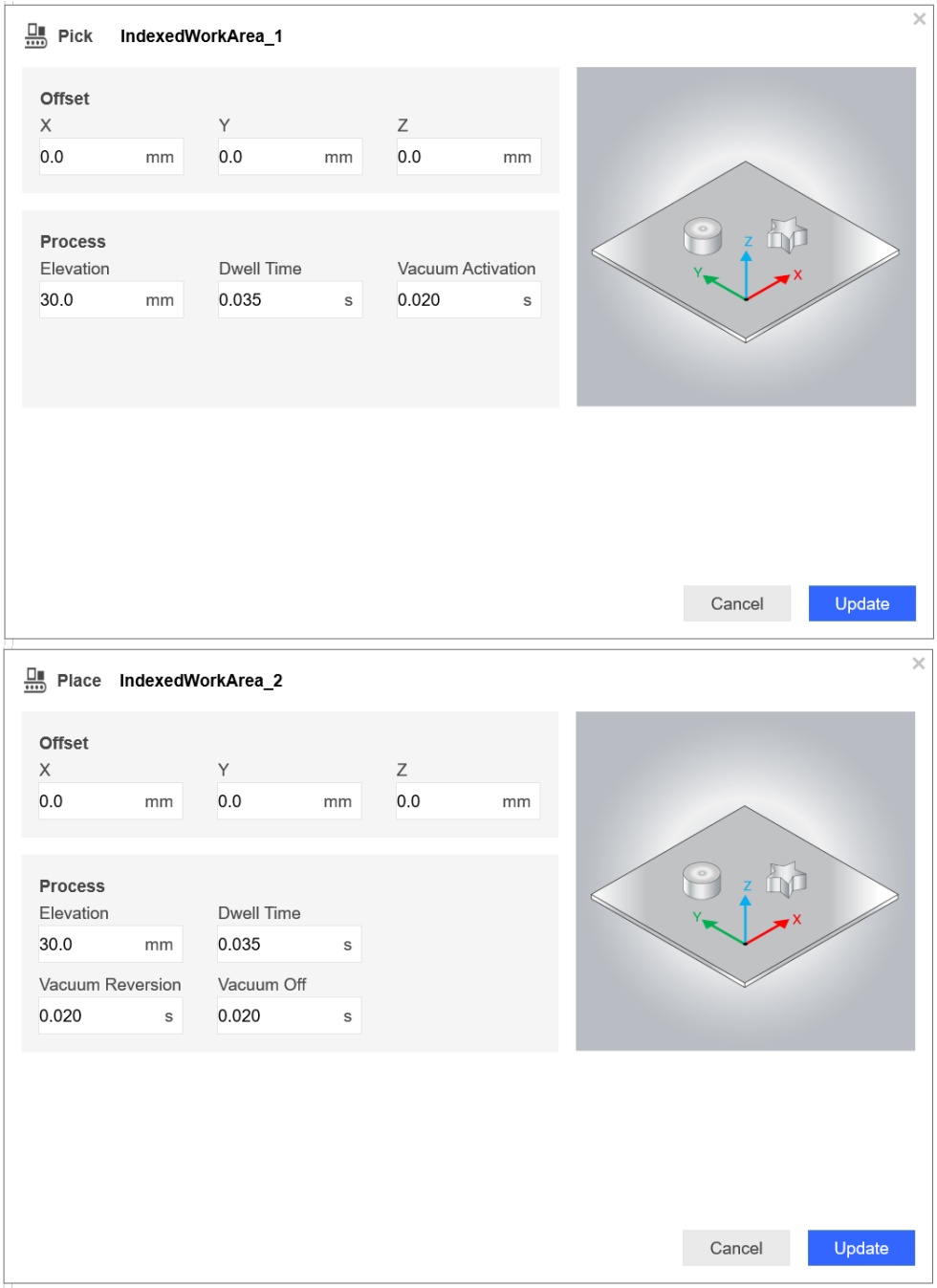

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	Description
OffsetX[mm]	Tune the position of the work area along the X direction when running simulation or production. Tuning the position of the work area along the X direction is equivalent to offsetting the conveyor base frame along the X direction.
OffsetY[mm]	Tune the position of the work area along the Y direction when running simulation or production. Tuning the position of the work area along the Y direction is equivalent to offsetting the conveyor base frame along the Y direction.

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3.2 PRODUCTION group

Continued

	Description
OffsetZ[mm]	Tune the position of the work area along the Z direction when running simulation or production. Tuning the position of the work area along the Z direction is equivalent to offsetting the conveyor base frame along the Z direction.
Enter[mm][i]**/[degree]**[ii]	**Enter** is the limit from where the robot starts to execute item targets on the work area. The distance is calculated in millimeters from the center of the robot. The range is positive if the limit is beyond the center of the robot, relative to the moving direction of the conveyor. Make sure that the enter limit can be reached by the robot. For more details, see *Available Work Areas*.
Exit[mm][i]**/[degree]**[ii]	**Exit** is the limit from where the robot considers an item target as lost on the work area. The distance is calculated in millimeters from the center of the robot. The range is positive if the limit is beyond the center of the robot, relative to the moving direction of the conveyor. When the tracked item passes beyond this limit it will be dropped. This limit must be chosen well within the maximum reach of the robot. The robot must be able to reach this position from an arbitrary position in the robot's working area before the position is out of reach. For more details, see *Available Work Areas*.
Elevation[mm]	**Elevation** is the distance, in negative z-direction relative to the tool, from where the robot approaches the item target.
Follow Time[s]/Dwell Time[s]	**Follow Time**/**Dwell Time** is the time the robot is in the pick/place position. If the conveyor is moving during the pick/place time, the robot will track along the conveyor to keep the relative position on the moving conveyor.
Vacuum Activation[s]	**Vacuum Activation** is the time in seconds before the middle of the corner path of the approaching position, when the vacuum I/O should be set. If a negative value is entered, the vacuum I/O will be set the time after the middle of the corner path. This value is only valid for work areas of type **Pick**. **Note** Vacuum activation does not affect the picking of items in simulation. Items are attached to the picking tool using `SimAttach` events, for example, in the Pick Routine.
Vacuum Reversion[s]	**Vacuum Reversion** is the time in seconds before the half place time in the place position, when the blow I/O should be set. If a negative value is entered, the blow I/O will be set the time after the half place time in the place position. This value is only valid for work areas of type **Place**. **Note** Vacuum reversion does not affect the placing of items in simulation. Items are detached from the picking tool using `SimDetach` events, for example, in the Place Routine.
Vacuum Off[s]	**Vacuum Off** is the time in seconds after the half place time in the place position, when the blow I/O should be reset. If a negative value is entered, the blow I/O will be reset the time before the half place time in the place position. This value is only valid for work areas of type **Place**. **Note** Vacuum Off does not affect the placing of items in simulation. Items are detached from the picking tool using **SimDetach** events, for example, in the Place Routine.

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	Description
Y Max[i]**/Radius Max**[ii]	**Note** To enable this function, you need to select the **Use Start/Stop** checkbox for this function in the recipe configuration page. **Note** The **Y Max/Radius Max** function in the **Tuning** window has a slight delay. If there is any update for this value, you need to wait a while to see the results. **Y Max/Radius Max** is the limit from where robot considers an item target as lost on the work area in End Y.The distance is calculated in millimeter from the center of the robot. The range is positive if the limit is beyond the center of the robot, relative to the moving vertical direction of the conveyor. Make sure that the **Y Max/Radius Max** can be reached by the robot. If the y coordinate value of the item's position is greater than the**Y Max/Radius Max**, the robot will not grab the item. So when the tracked item passes beyond this limit it will be dropped. This limit must be chosen well within the maximum reach of the robot. For more details, see *Available Work Areas*.
Y Min[i]**/Radius Min**[ii]	**Note** To enable this function, you need to select the **Use Start/Stop** checkbox for this function in the recipe configuration page. **Note** The **Y Min/Radius Min** function in the **Tuning** window has a slight delay. If there is any update for this value, you need to wait a while to see the results. **Y Min/Radius Min** is the limit from where robot starts to execute item targets on the work area in Start Y. The distance is calculated in millimeter from the center of the robot. The range is positive if the limit is beyond the center of the robot, relative to the moving vertical direction of the conveyor. For more details, see *Available Work Areas*.

i Only available when the conveyor is linear conveyor.
ii Only available when the conveyor is circular conveyor.

Note

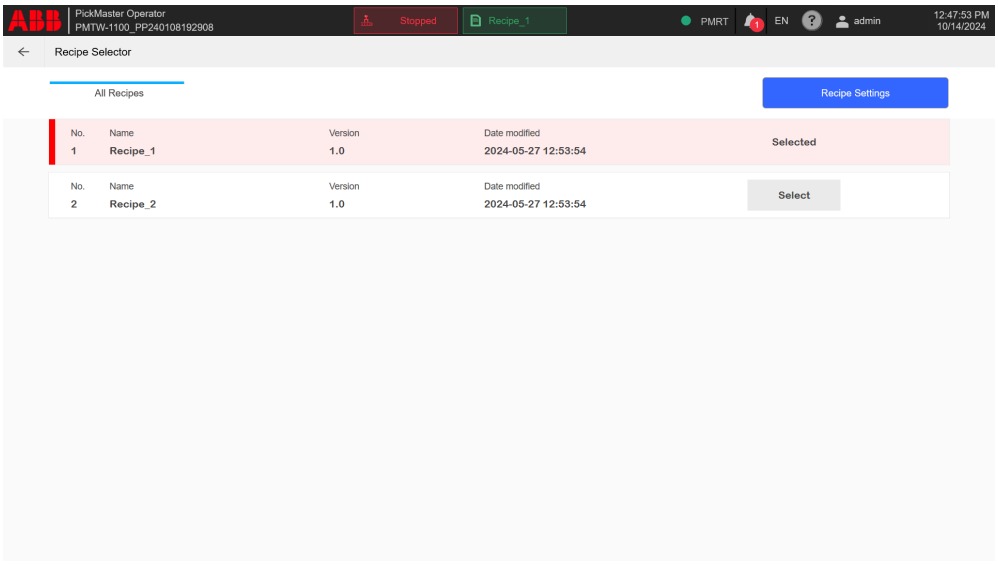
When the data in the tuning is updated, it will be saved to the recipe.

3.3 RECIPES group

Recipe Selector

Overview

This function is used to select the working recipe.



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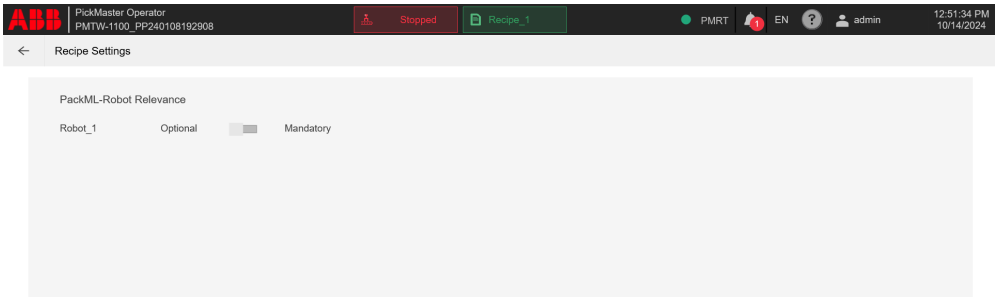
Click on the **Select** to activate the recipe you need.

When the recipe is selected, the selected recipe will be highlighted as pink and the status will be set as **Selected**.

Recipe Settings

Click on the **Recipe Settings** to open the recipe settings window.



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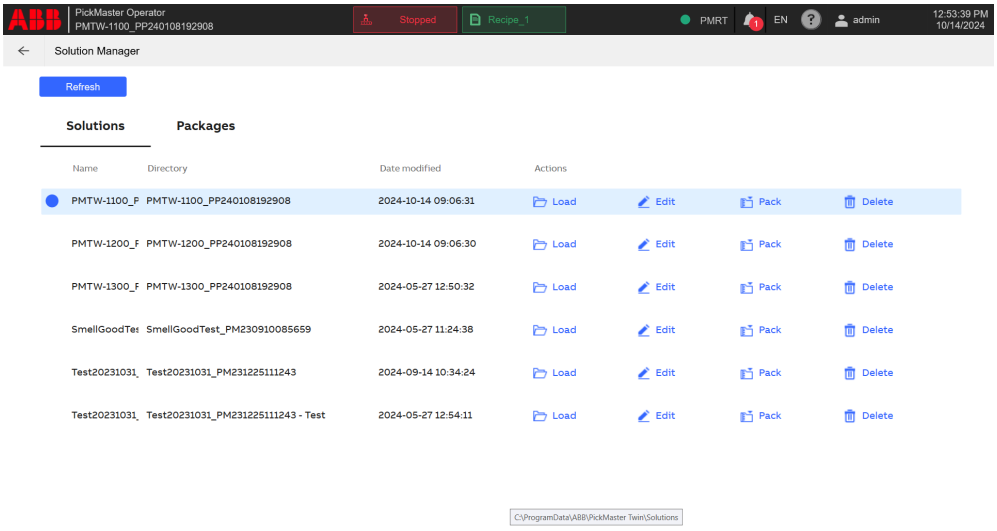
Parameter		Description
PackML-Robot Relevance	Optional	The robot is optional for this production. If this robot stops, it will not influent the other robots and the production.
	Mandatory	The robot is mandatory for this production. If this robot stops, it will stop the whole production.

Solution Manager

Overview

This function is used to load solution and enable the PackML function for selected solution.



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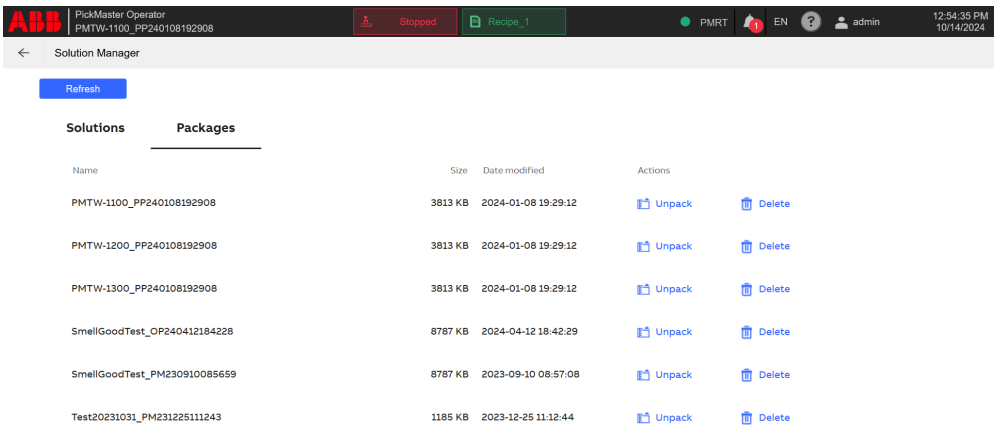

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Function	Description
Refresh	Refresh to get the latest solution and package list from the default folder.  **Tip** The files uploaded from PickMaster Twin Client **Runtime file transfer** will only show up after the refreshing.  **Tip** Default folder: • **Pack&Go** file: `C:\ProgramData\ABB\PickMaster Twin\PackedSolutions`
Solutions page	Shows the available solution list. The following actions are available for the solutions in the list. • **Load**: Load the selected solution. • **Edit**: Open the selected solution with PickMaster Recipe Manager. • **Pack**: Pack the selected solution to a `.rspag` file. A suffix is added to the name containing "OP", date and time. • **Delete**: Delete the selected solution. .
Package page	Shows the **Pack&Go** files list in the default folder. The following actions are available for the **Pack&Go** files in the list. • **Unpack**: Unpack the selected **Pack&Go** file. • **Delete**: Delete the **Pack&Go** file from `C:\ProgramData\ABB\PickMaster Twin\PackedSolutions`.

Procedure

Use the following procedures to load a solution that has been upload from PickMaster PowerPac:

1 Go to the **Solution Manager** page.
2 Click on the **Refresh** button.
3 If used **Pack&Go** file, go to **Package** page and click **Unpack** button for the desired **Pack&Go** file.
4 On **Solutions** page, click **Load** button for the desired solution.
5 Wait until the solution is totally loaded.

 **Tip**

When the solution is totally loaded, the solution name will show up as the selected solution on the navigation bar.

Continues on next page

Tip

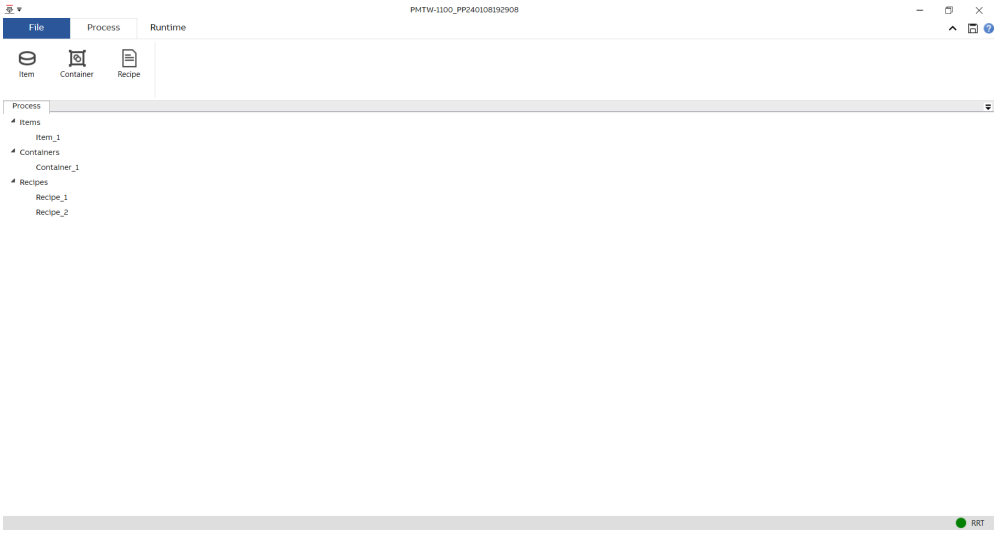
Default folder:

- **Pack&Go** file: `C:\ProgramData\ABB\PickMaster Twin\PackedSolutions`

Recipe Manager

Overview

This function is used to open the solution with PickMaster Recipe Manager.



xx2400001720

For more details on PickMaster Recipe Manager, see *Operation Manual PMTW Recipe Manager, 3HAC092763-001*.

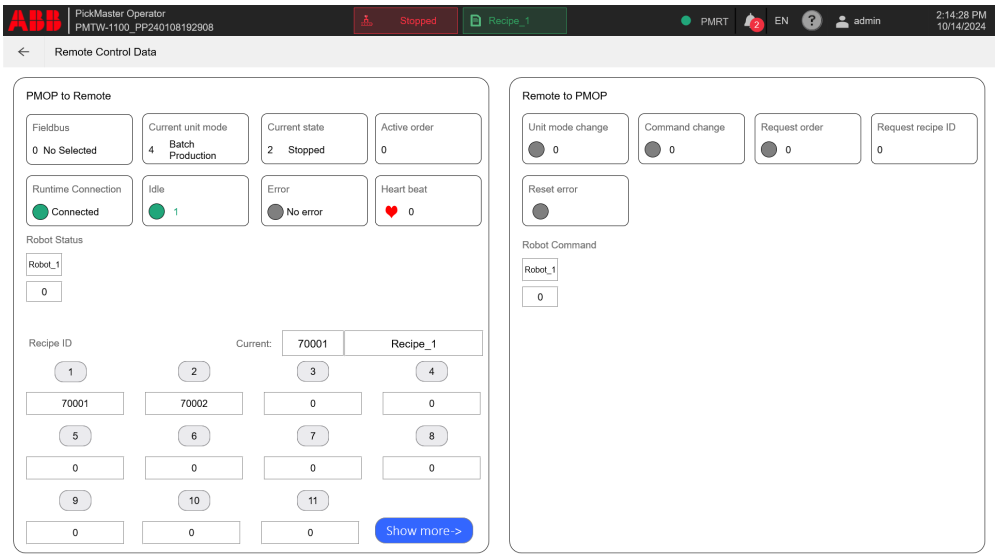
Note

When a loaded solution is opened with PickMaster Recipe Manager from PickMaster Operator, this solution will be unloaded from the PickMaster Operator automatically.

3.4 MONITORING group

Remote Control Data

This function is used to monitor the real-time remote control data.



xx2400001721

Parameter		Description
PMOP to Remote	**Fieldbus**	Shows the used fieldbus during the remote control. The remote control fieldbus can be set in **System Setup** page. For more information, see *FieldbusSelection on page 80*.
	Current unit mode	For more information, see *UnitModeCurrent on page 85* or *UnitMode on page 85*.
	Current state	For more information, see *StateCurrent on page 83*.
	Active order	For more information, see *ActiveOrder on page 81*.
	Runtime Connection	For more information, see *PMRTConnected on page 80*.
	Idle	For more information, see *Idle on page 82*
	Error	For more information, see *Error on page 81*, *ErrorCode on page 81*, .
	Heart beat	For more information, see *HeartBeat on page 80*.
	Robot Status	For more information, see *RobotStatus[0-9] on page 88*.
	Recipe ID	For more information, see *CurrentRecipeID on page 82*.
	Show more -> button	Click on this button to show up the remaining pre-defined 150 signals.

Continues on next page

Parameter		Description
Remote to PMOP	**Unit mode change**	For more information, see *UnitModeChangeRequest on page 85*.
	Command change	For more information, see *Request on page 81*.
	Request order	For more information, see *RequestOrder on page 81*.
	Request recipe ID	For more information, see *RequestRecipeID on page 83*.
	Reset error	For more information, see *ResetError on page 82*.
	Robot Command	For more information, see *RobotCmd[0-9] on page 88*.

Continues on next page

3.4.1 Signals and definition

Overview

All the signals are defined according to the definition of the smallest order Packtag from the standard **ANSI** / **ISA-TR88.00.02-2015** chapter 7.5 Tag details, Table 7 PackTags Minimum required for information / machine monitoring and Table8 PackTags Minimum required for supervisory control.

> **Tip**
>
> To get the specific address for a signal in the data package, see the *Appendix on page 127* (*EtherNet/IP signal definition on page 127*, *Modbus signal definition on page 130* and *PROFINET signal definition on page 133*) according to the predefined signal name.

Common signals

The common signals are used for data exchange between PickMaster Operator, Runtime and the remote device.

FieldbusSelection

The selected remote control mode is EtherNet IP, Modbus or Profinet. Modbus is 1, Profinet is 2 and EtherNet/IP is 4.

Predefined signal name: Modbus, PROFINET, EtherNet/IP

HeartBeat

Data Type: Bool

Value: **0 - False**; **1 - True**

The circle time of the signal HeartBeat's pulse is one second. The value turns per 500 ms.

If the signal HeartBeat turns correctly, means that the PickMaster Operator is running correctly.

Predefined signal name: HeartBeat

PMRTConnected

Data Type: Bool

Value: **0 - False**; **1 - True**

When the PickMaster Operator is correctly connected to **PMRT**, the signal PMRTConnected will turn to **1**; if the connection between the PickMaster Operator and **PMRT** is disconnected, the signal PMRTConnected will turn to **0**.

Predefined signal name: PMRTConnected

Recipe setting signals

The recipe setting signals are used for recipe controlling or related data exchanging, for example switching the recipe.

Continues on next page

ActiveOrder

Data Type: INT (32bit)

Value: **101 - Recipe switching**

Command name	Description
Recipe switching	Switches to other recipes in current solution.

The ActiveOrder indicates the current executing activity order in PickMaster Operator.

Predefined signal name: ActiveOrder

RequestOrder

Data Type: INT (32bit)

Value: **101 - Recipe switching**

The RequestOrder is the activity order which need to be executed.

Predefined signal name: RequestOrder

Request

Data Type: Bool

Value: **0 - False**; **1 - True**

Set the signal Request as **1 - True** to trigger the PickMaster Operator to execute the command from the remote controller.

Predefined signal name: Request

Error

Data Type: Bool

Value: **0 - False**; **1 - True**

When PickMaster Operator's processing runs incorrectly, this signal Error will turn to **1**. For example, PickMaster Operator received invalid command from the remote controller.

When signal Error is turned to **1**, PickMaster Operator will be occupied and cannot execute any new commands from the remote controller.

Predefined signal name: Error

ErrorCode

Data Type: INT (32bit)

The ErrorCode indicates the specific error when signal Error turns to **1**. The numerical values are in the table below are reserved.

Predefined signal name: ErrorCode

ErrorCode	Name	Description
10001	InvalidRequestOrder	Request Command Order Code is not existed.
10002	NotAllowedCommand	Command is not allowed. For example, the recipe can't be switched when PickMaster Operator is not in stopped status.
10003	InternalError	
10004	LoadTuningDataError	

Continues on next page

3.4.1 Signals and definition
Continued

ErrorCode	Name	Description
10005	SaveTuningDataError	
20001	InvalidRecipeID	RecipeID is not existed.
20002	InvalidWAID	WAID is not existed.
20003	InvalidItemID	ItemID is not existed.
20004	InvalidRobotID	RobotID is not existed.
20005	InvalidCameraID	CameraID is not existed.
20012	InvalidWAData	Work area data is not set correctly. For more details, see the PickMaster Operator log.
20013	InvalidItemData	Item data is not set correctly. For more details, see the PickMaster Operator log.
20014	InvalidRobotData	Robot data is not set correctly. For more details, see the PickMaster Operator log.
20015	InvalidCameraData	Camera data is not set correctly. For more details, see the PickMaster Operator log.

ResetError

Data Type: Bool

Value: **0 - False**; **1 - True**

When signal ResetError is set as **1**, the signal Error will be reset to **0**.

Set ResetError as **1** to clean up the errors and restore the remote control function with the remote controller.

Predefined signal name: ResetError

Idle

Data Type: Bool

Value: **0 - False**; **1 - True**

PickMaster Operator can execute the command from the remote controller only when the Idle signal is **0**.

When PickMaster Operator is executing the commands, the Idle signal will turn to **1**.

When PickMaster Operator completes the received commands, the Idle signal will turn back to **0**.

Predefined signal name: Idle

RecipeIDList

Data Type: INT (32bit)

The RecipeIDList indicates the all recipe index ID list in current solution.

For the specific index ID information, see the `.csv` file in the solution folder which is the same name with the solution.

Predefined signal name: RecipeIDList[0]...

CurrentRecipeID

Data Type: INT (32bit)

The CurrentRecipeID indicates the current recipe index ID.

Continues on next page

For the specific index ID information, see the `.csv` file in the solution folder which is the same name with the solution.

Predefined signal name: CurrentRecipeID

RequestRecipeID

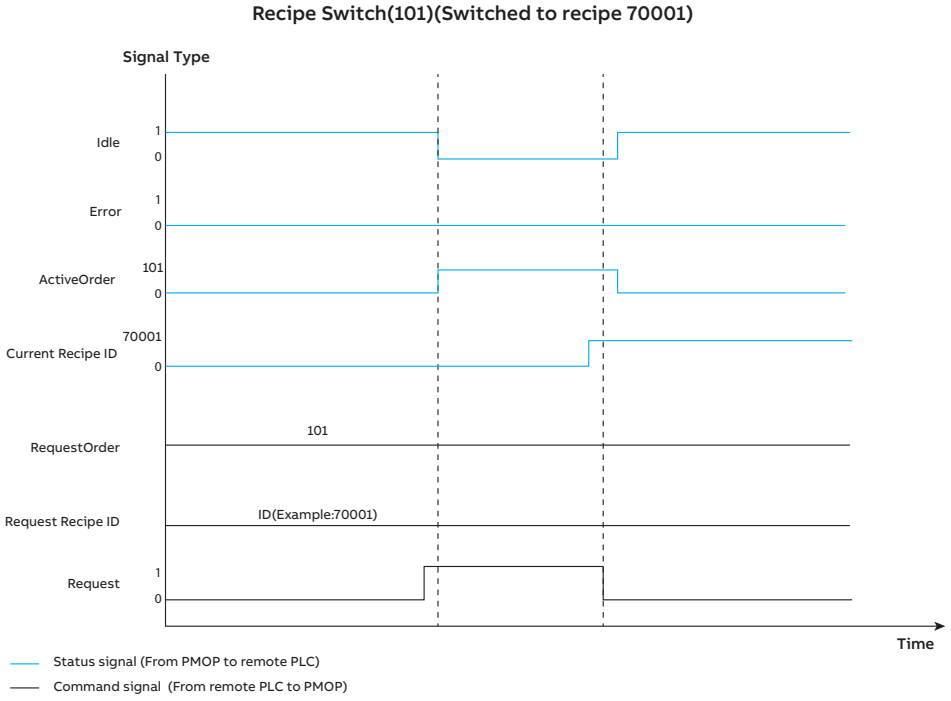
Data Type: INT (32bit)

The RequestRecipeID indicates the recipe index ID that is desired to be changed to.

For the specific index ID information, see the `.csv` file in the solution folder which is the same name with the solution.

Predefined signal name: RequestRecipeID

Remote recipe setting example signal sequence diagram



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PackML setting signals

The PackML setting signals are used for solution PackML controlling or related data exchanging, for example starting the solution, stopping the solution and so on.

StateCurrent

Data Type: INT (32bit)

Tag Descriptor: Current State Number

The StateCurrent status tag specifies the current state in the current unit mode of the unit machine. The numerical values are in the table below are reserved.

Continues on next page

3.4.1 Signals and definition
Continued

Predefined signal name: StateCurrent

0	Undefined
1	Clearing
2	Stopped
3	Starting
4	Idle
5	Suspended
6	Execute
7	Stopping
8	Aborting
9	Aborted
10	Holding
11	Held
12	UnHolding
13	Suspending
14	Unsuspending
15	Resetting
16	Completing
17	Complete

CntrlCmd

Data Type: INT (32bit)

Tag Descriptor: Control Command

The tag holds the value of the command that provides the state command to drive a state change in the Base State Model, this tag is typically manipulated locally. Local processing of this tag can be combined with remote or local machine conditions to drive the state model from Wait state to a Transient state. This tag can be set by a local or remote source. All values in the table below are reserved.

Predefined signal name: CntrlCmd

0	Undefined
1	Reset
2	Start
3	Stop
4	Hold
5	Unhold
6	Suspend
7	Unsuspend
8	Abort
9	Clear

Continues on next page

CmdChangeRequest

Data Type: Bool

Tag Descriptor: State Change Request

Value: **0 - False**; **1 - True**

This CmdChangeRequest bit will command the machine to proceed to change the state to the target state. The tag can be used to condition when a change of state can occur. The target state will be one of the states in the base state model.

The request for changing state machine command in the remote command. The command can only take effect when the command is set as **True**.

Predefined signal name: CmdChangeRequest

UnitModeCurrent

Data Type: INT (32bit)

Tag Descriptor: Unit Mode in current use.

Value: **1 - Production**; **4 - Batch production**

Predefined signal name: UnitModeCurrent

UnitMode

Data Type: INT (32bit)

Value: **1 - Production**; **4 - Batch production**

Tag Descriptor: Unit Mode is desired to be changed to.

Predefined signal name: UnitMode

UnitModeChangeRequest

Data Type: Bool

Tag Descriptor: Request Unit Mode Change

Value: **0 - False**; **1 - True**

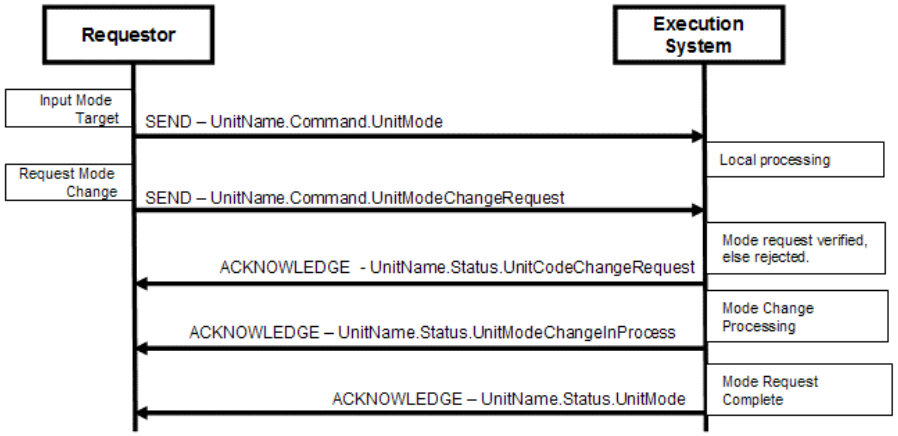
When a unit mode request takes place a numerical value must be present in the Command.UnitMode tag to change the unit mode. Local processing and conditioning of the requested mode change is necessary in order to accept, reject, or condition the timing of the change request.

The request for changing the unit mode in the remote command. The changed working mode can only take effect when the change request is set as **True**.

Predefined signal name: UnitModeChangeRequest

Continues on next page

3.4.1 Signals and definition
Continued



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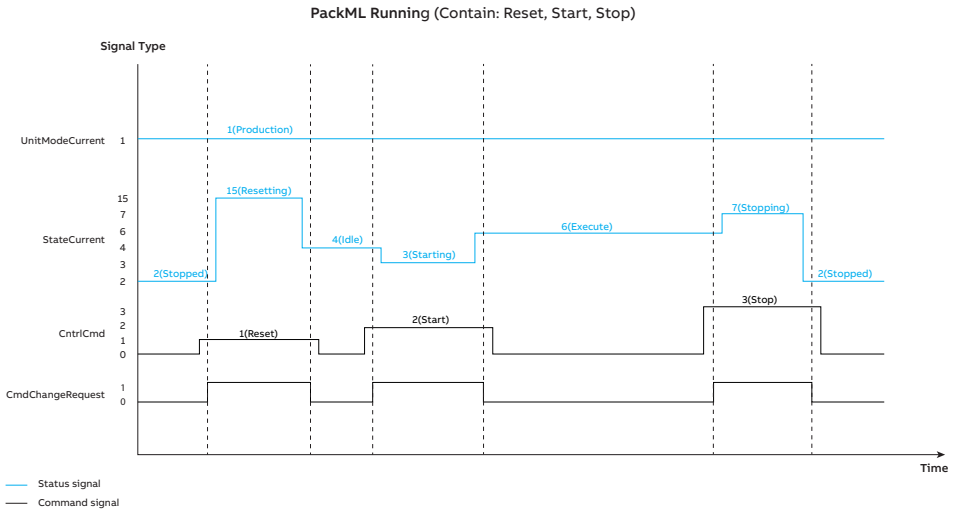
Remote PackML setting example signal sequence diagram



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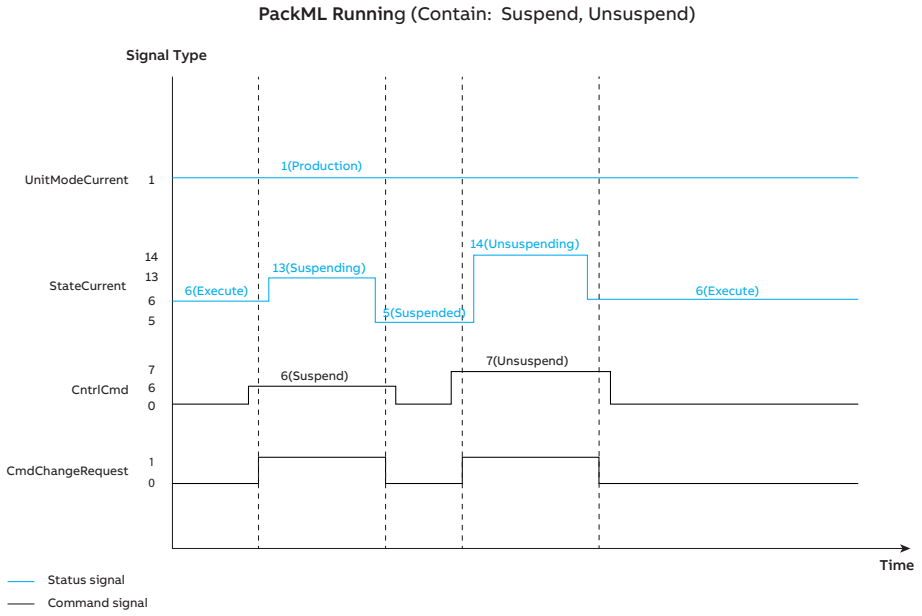

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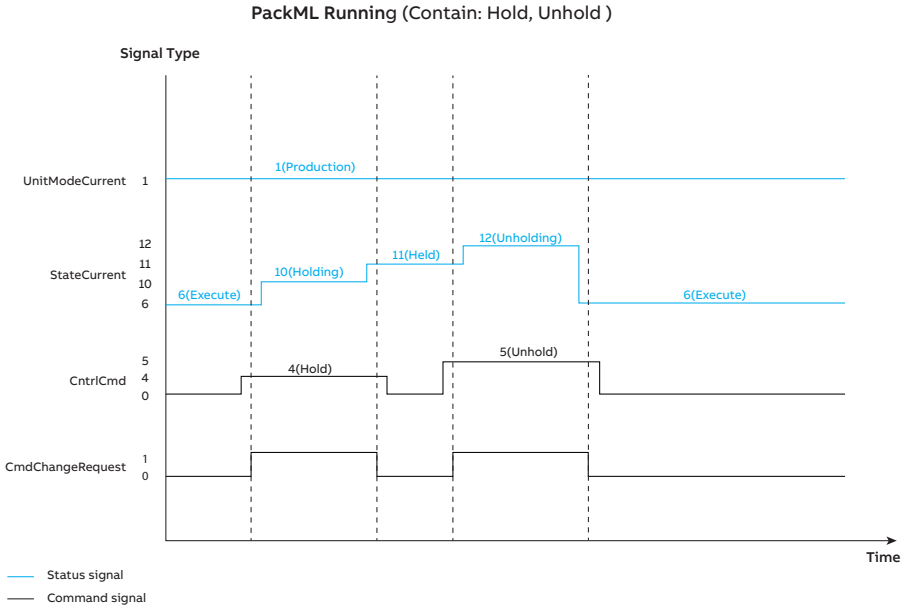


xx2300000985

Single robot setting signals

The single robot setting signals are used for single robot controlling or related data exchanging, for example starting a specific robot, stopping a specific robot and so on.

Continues on next page

3.4.1 Signals and definition
Continued

RobotStatus[0-9]

The status of the 10 robots.

Predefined signal name: RobotStatus[0-9]

Value	Robot status
0	NO_ROBOTID
2	PROJ_STOPPED
7	PROJ_CLOSED
17	IDLE
18	INIT RAPID
19	CLEARALL START
20	INIT QUEUES
21	RUNNING
22	PAUSED
23	RAPID STOPPED
24	CLEARALL STOP
25	RAPID STOPPED PAUSING
26	HELD
27	SUSPENDED

RobotCmd[0-9]

The command for the 10 robots. The predefined signal name is RobotCmd[0-9].

Value: **1 - Start**; **2 - Stop**; **3 - Pause**

Predefined signal name: RobotCmd[0-9]

Single robot command availability with PackML in different states

The commands for single robot control is only valid when PackML in specific states. See the following command availability table.

Note

When doing the remote control to change signal robot status, the command from the remote device should be sent according to the command availability table.

Otherwise the remote control function cannot work normally.

PackML states (StateCurrent)\ Signal Robot Command (RobotCmd[0-9])	Start (1)	Pause (2)	Reset (3)	Stop (4)
Resetting (15)	Disable	Disable	Enable (only for RW6)	Disable
Idle (4)	Disable	Disable	Disable	Disable
Starting (3)	Enable (when the robot is not running)	Disable	Disable	Disable

Continues on next page

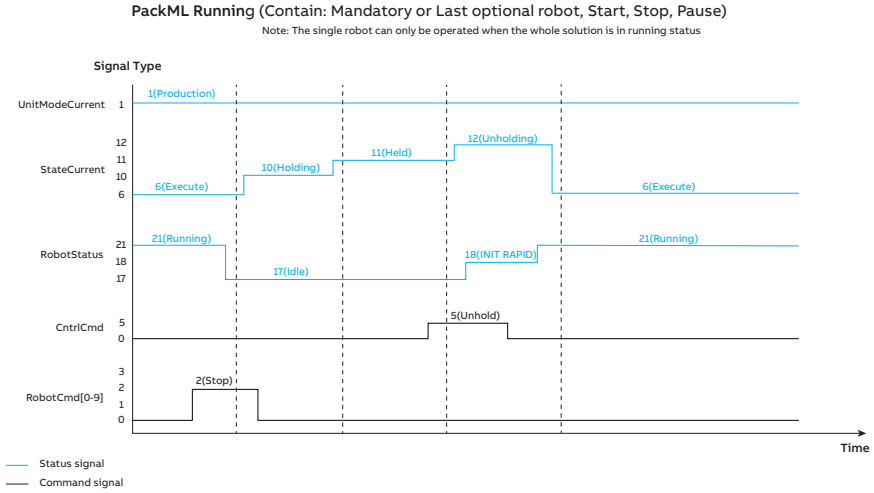
PackML states (StateCurrent)\ Signal Robot Command (RobotCmd[0-9])	Start (1)	Pause (2)	Reset (3)	Stop (4)
Execute (6)	Disable (for mandatory robot); Enable (for optional robot when it is stopped or paused)	Enable (when the robot is not paused and not stopped)	Disable	Enable (when the robot is not stopped)
Holding (10)	Disable	Enable (when the robot is not paused)	Disable	Enable (when the robot is not stopped)
Held (11)	Enable (if all robots are optional)	Disable	Enable (only for RW6)	Disable
UnHolding (12)	Enable (when the robot is not running)	Disable	Enable (only for RW6)	Disable
Suspending (13)	Disable	Enable (when the robot is not paused)	Disable	Enable (when the robot is not stopped)
UnSuspending (14)	Enable (when the robot is not running)	Disable	Enable (only for RW6)	Disable
Aborting (8)	Disable	Disable	Disable	Enable (when the robot is not stopped)
Aborted (9)	Disable	Disable	Enable (only for RW6)	Disable
Clearing (1)	Disable	Disable	Disable	Disable
Stopping (7)	Disable	Disable	Enable (only for RW6)	Enable (when the robot is not stopped)
Stopped (2)	Disable	Disable	Disable	Disable
Completing (16)	Disable	Disable	Enable (only for RW6)	Enable(when the robot is not stopped)
Complete (17)	Disable	Disable	Disable	Disable

Continues on next page

3.4.1 Signals and definition

Continued

Single robot setting example signal sequence diagram



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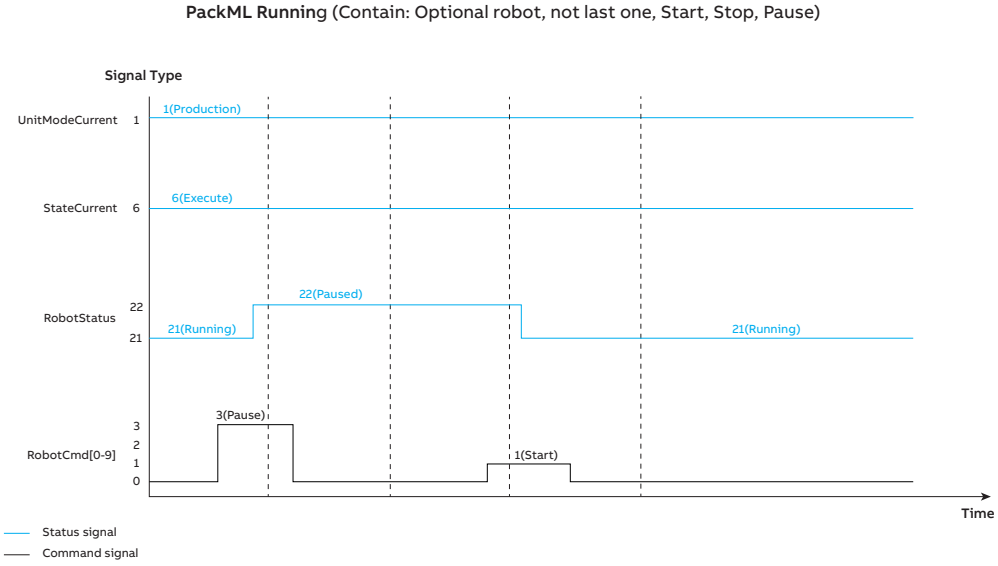

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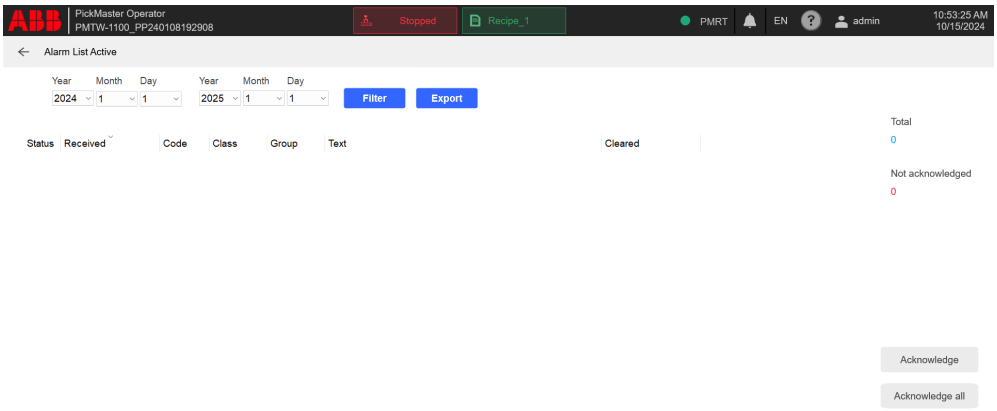
3.5 ANALYSIS group

Alarm

This function is used to show the alarms which are not acknowledged for the user.

The alarms in **Alarm** are not acknowledged. If you double-click an alarm information, the alarm information will disappear in the **Alarm** page;



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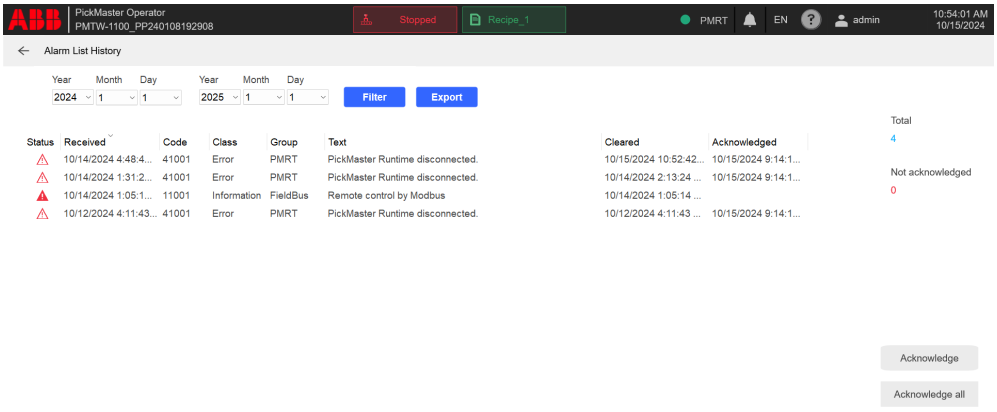
Alarm History

This function is used to show all alarms for the user.

The alarm history page contains all the alarm information. If it is acknowledged, it is in black; if it is not acknowledged, it is in red.



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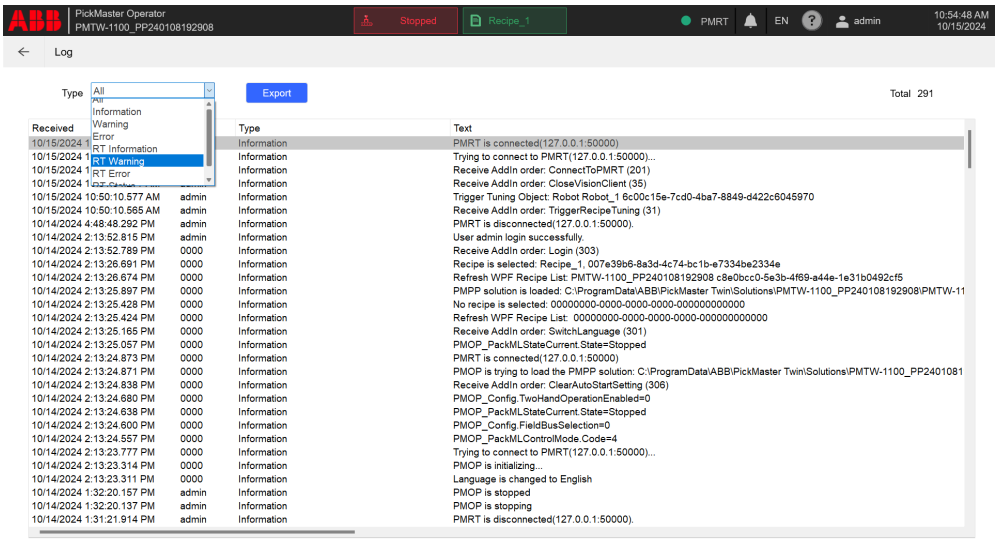
Log

This function is used to show the logs for the user. Logs can be exported with **Export** button.



xx2400001724

Tip

The 0000 in the user column means that no user is logged on.

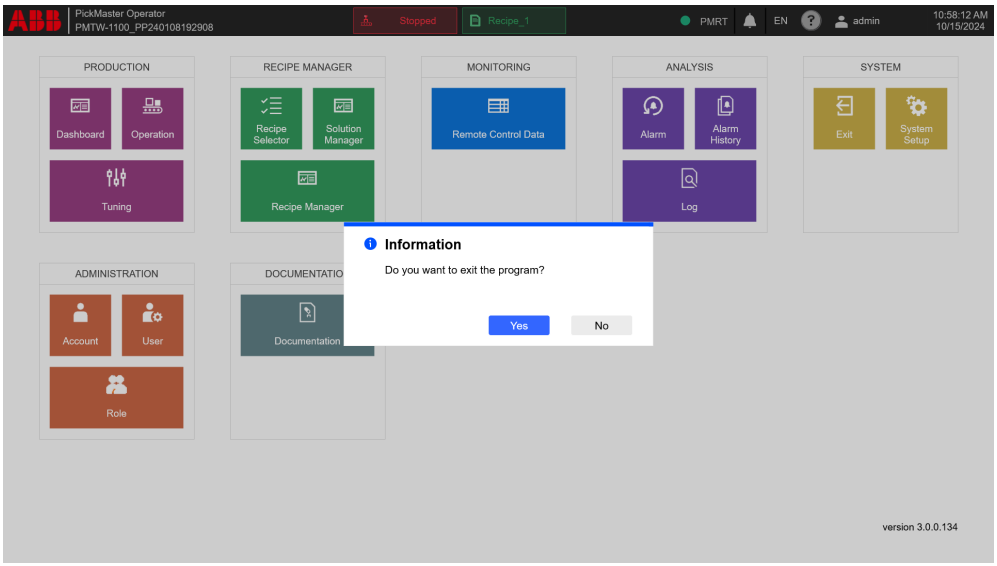
Type	Description
Information	The logs for the PickMaster Operator.
Warning	The warnings for the PickMaster Operator.
Error	The errors for the PickMaster Operator.
RT Information	The logs for the PickMaster Runtime.
RT Warning	The warnings for the PickMaster Runtime.
RT Error	The errors for the PickMaster Runtime.
RT Status	The status of the PickMaster Runtime.

3.6 SYSTEM group

Exit

Overview

This function is used to exit the PickMaster Operator.

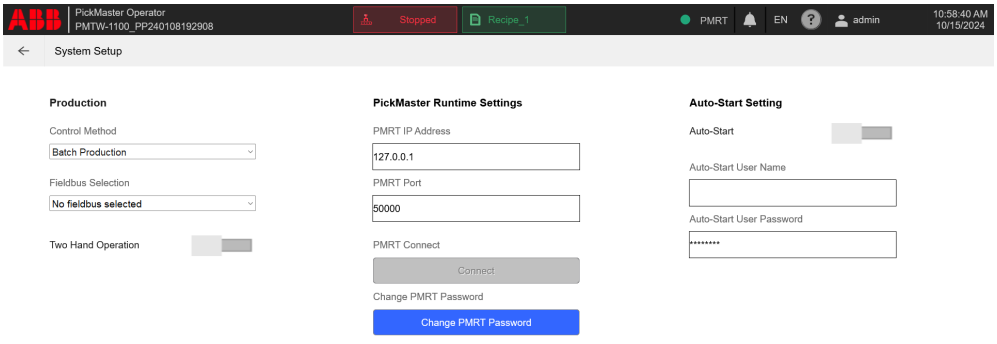


xx2400001725

System Setup

Overview

This function is used to set up the the PackML function, remote control function, auto-start function and so on for selected solution.



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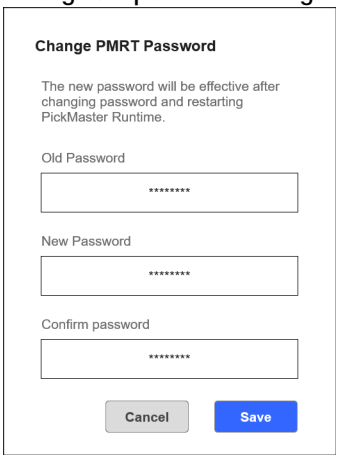
3.6 SYSTEM group
Continued

Function		Description
Production	**Control Method**	Select the production control method: • **Production**, run production in PackML mode. The PackML flow in the **Operation** window is available. • **Batch Production**, run production in PackML mode with judgment conditions. The PackML flow in the **Operation** window is available. • **Basic Mode**, run production in basic mode. The PackML function will be disabled.  **Tip** In **Operation** page, **Production** and **Batch Production** can be switched between each other. But cannot switch between PackML mode and **Basic Mode** in **Operation** page.
	Fieldbus Selection	Select the fieldbus mode to enable the remote control function: • EtherNet/IP • Modbus • Profinet
	Two hand operation	Enable/disable the **Two hand operation** function. When the **Two hand operation** function is enabled, you need to hold the **Two hand operation** button during the operation.  **Note** Multi-touch screen is a prerequisite for the **Two hand operation** function.

Continues on next page

Function		Description
PickMaster Runtime Settings	**PMRT IP Address**	Show/Edit the IP address of the PickMaster Runtime which need to be connected. **Tip** When the PMRT is already connected, the IP address cannot be edited.
	PMRT Port	Show/Edit the port of the PickMaster Runtime which need to be connected. **Tip** When the PMRT is already connected, the port cannot be edited.
	PMRT Connect button	Click to connect with PickMaster Runtime. **Tip** When the PMRT is already connected, the button cannot be clicked.
	Change PMRT Password	Change the password for login the **PMRT**(User name: admin).  xx2400001727 • **Old Password**: input the old password. • **New Password**: input the new password. • **Confirm Password**: input the new password again. **Note** Restart the **PMRT** after changed the password to effect the new password.

Continues on next page

Function		Description
Auto-Start Setting	**Auto-Start Setting**	Allows you to enable/disable the auto-start function and pre-define the user account used for auto-start. When the auto-start function is enabled, the PickMaster Operator will start and login with the predefined user account automatically. **Note** Any account can be used for **Auto-Start**. The user should be aware of that when set the auto-start with a higher level account, any auto-logged user on this device will have higher level authority.
	Auto-Start User Name	Input the the user name that need to be set as auto-start account. Default auto-start Username: `default user` with Password: `password`
	Auto-Start Password	Input the the password for the user that need to be set as auto-start account.

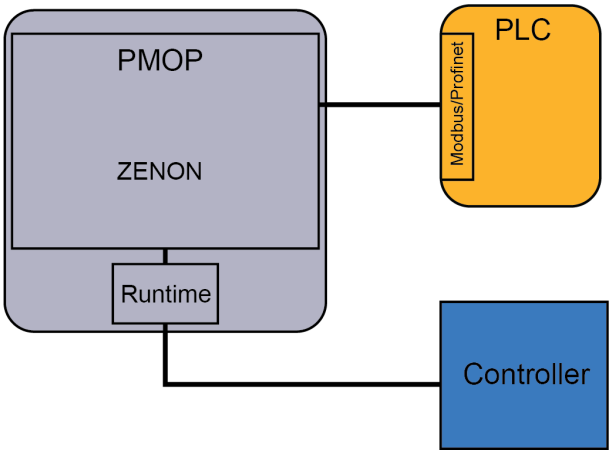
Remote control

Overview

Remote control is that the remote control terminal, such as PLC, can send or read the corresponding PackTag through the industrial bus to control the PickMaster Operator.

PickMaster Operator supports the following buses:

- EtherNet/IP
- Modbus
- Profinet



xx2000000230

Note

The firewall setting on the Host computer may cause the failure that connects to PickMaster Operator through the fieldbus.

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Prerequisites

To work with the remote control, the following requirements must be fulfilled:

- Format of the PackTags (Communication Directive) must meet the **ANSI/ISA-TR88.00.02-2015** standard.
- The remote control terminal and the PickMaster Operator are in the same LAN.

Format of the PackTags

Machine Implementation Guide chapter 11.PACKTAGS, Table 19 Minimum PackTags.

PackTag type	PackTag	Example of end user term	Datatype	TR 88.00.02 Minimum tags	End user Minimum tags	Available
Status	StateCurrent	State	INT(32)	x	x	x
Status	UnitModeCurrent	Mode	INT(32)	x	x	x
Status	MachSpeed	Nominal Speed	REAL	x	x	
Status	CurMachSpeed	Current Speed	REAL	x	x	
Status	EquipmentInterlock.Blocked	Blockage	BIT	x	x	
Status	EquipmentInterlock.Starved	Starvation	BIT	x	x	
Status	Parameter [#]	Machine data/parameter	Array Structure		x	Robot state
Status	Parameter[#].ID	Parameter ID	INT(32)		x	
Status	Parameter[#].Name	Name of parameter	STRING		x	
Status	Parameter[#].Unit	Unit of measure	STRING[5]		x	
Status	Parameter[#].Value	Value of parameter	User Defined		x	
Status	RemoteInterface.Parameter[#]	Additional production data	Structure		x	
Status	RemoteInterface.Parameter[#].ID	Parameter ID	INT(32)		x	
Status	RemoteInterface.Parameter[#].Name	Name of parameter	STRING		x	
Status	RemoteInterface.Parameter[#].Unit	Unit of measure	STRING[5]		x	
Status	RemoteInterface.Parameter[#].Value	Value of parameter	REAL		x	
Admin	Warning[#]	Warning	Array Structure		x	
Admin	Warning[#].Trigger	Trigger			x	
Admin	Warning[#].ID	ID	Int (32bit)		x	
Admin	Warning[#].Value	Value	Int (32bit)		x	
Admin	ProdDefectiveCount	OEE.Bad count	INT(32)	x	x	
Admin	ProdProcessedCount	OEE.Total count	INT(32)	x	x	Total Pick number

Continues on next page

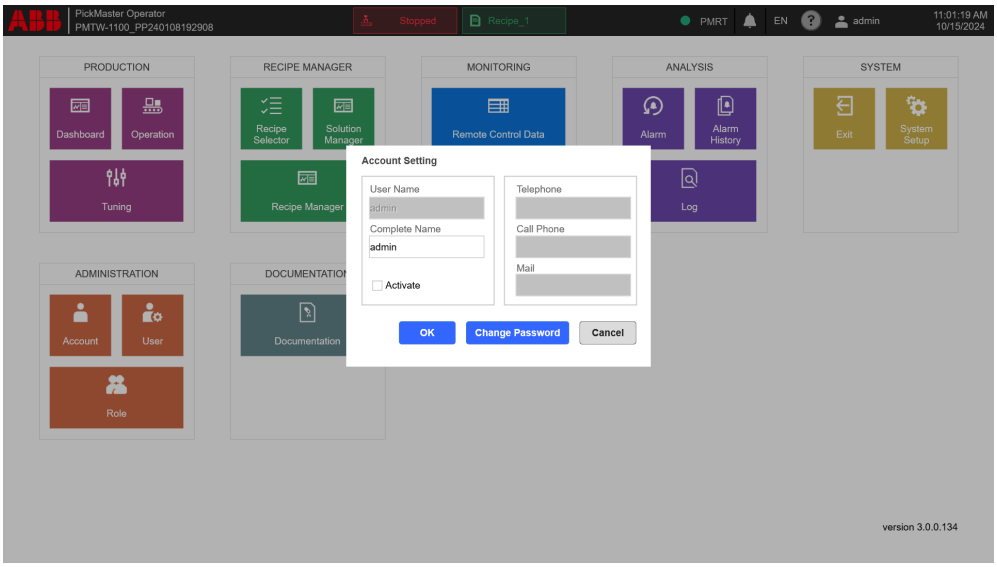
3.6 SYSTEM group
Continued

PackTag type	PackTag	Example of end user term	Datatype	TR 88.00.02 Minimum tags	End user Minimum tags	Available
Admin	StopReason.ID	Event and stop reason	INT(32)	x	x	
Admin	StopReason.Value	Detailed Error Information	INT(32)		x	
Command	CntrlCmd	Command	INT(32)	x	x	x
Command	Parameter [#]	Machine data/parameter	Array Structure		x	Robot command
Command	Parameter[#].ID	Parameter ID	INT(32)		x	
Command	Parameter[#].Name	Name of parameter	STRING		x	
Command	Parameter[#].Unit	Unit of measure	STRING[5]		x	
Command	Parameter[#].Value	Value of parameter	User Defined		x	
Command	RemoteInterface.Parameter [#]	Additional Production data	Array Structure		x	
Command	RemoteInterface.Parameter[#].ID	Parameter ID	INT(32)		x	
Command	RemoteInterface.Parameter[#].Name	Name of parameter	STRING		x	
Command	RemoteInterface.Parameter[#].Unit	Unit of measure	STRING[5]		x	
Command	RemoteInterface.Parameter[#].Value	Value of parameter	REAL		x	
Command	UnitMode	Mode	INT(32)	x	x	x
Command	UnitModeChangeRequest	Change mode	BOOL	x	x	x
Command	MachSpeed	Mach Speed	REAL	x	x	
Command	CmdChangeRequest	Change command	BOOL	x	x	x

3.7 ADMINISTRATOR group

Account

This function is used to modify the information for the active account.



xx2400001728

User Management

Overview

This function is used to manage the users and roles.

PickMaster Operator provides two types of users:

- **Administrator**

  The users whose User Type is **Administrator** can add, delete or edit other users, and can add, delete or edit roles.

  The default user of User Type administrator contains:

  - admin

- **Power User**

  The users whose User Type is **Power User** can add, delete or edit other users, and can add, delete or edit roles, except the **Administrator** role or user.

- **Users**

  The users whose User Type is **User** are not authorized to add or delete other users, and they are not authorized to add or delete roles.

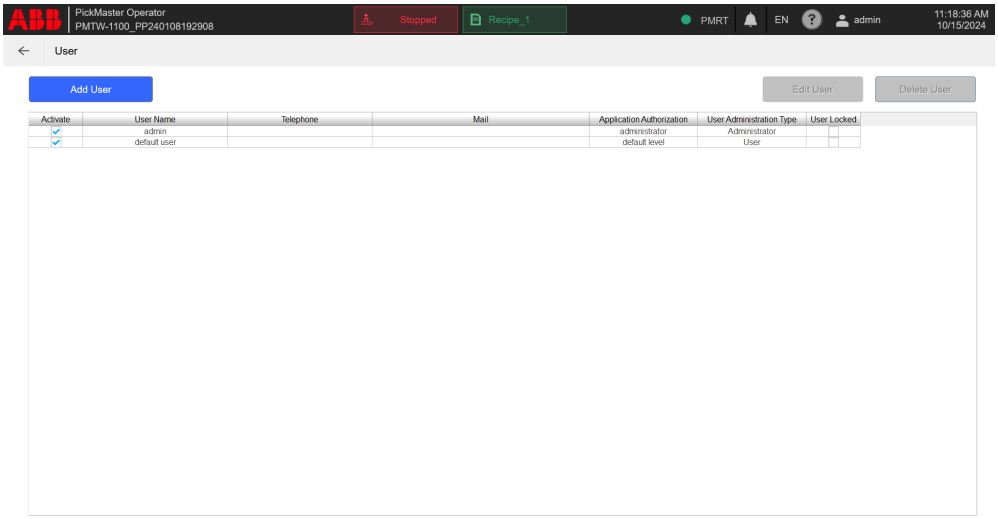
  The default user of User Type user contains:

  - default user

Continues on next page

3.7 ADMINISTRATOR group

Continued



xx2400001735

Function	Description
Add User	Add a new user.
Edit User	Edit an existed user.
Delete User	Delete an existed user.

Group	Description
Active	Active the selected user.
User name	Shows the name of the user.
Complete name	Shows the complete name of the user.
Telephone	Shows the telephone of the user.
Mail	Shows the mail of the user.
Application Authorization	Shows the roles of the user. **Note** Available role: • administrator
User Administration type	Shows the type of the user.
User Locked	Active/unactive the selected user.

New user

Note

When a new user is added, change the password to active the new user account.

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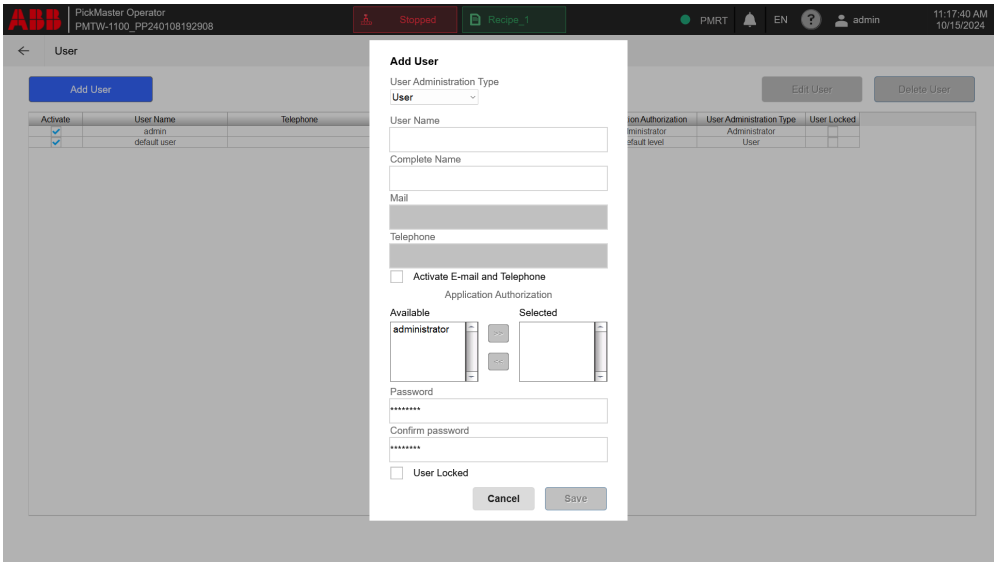


xx2400001736

Group	Description
User Administration type	Select the type of the user. • **Administrator**:The highest level in the three user type. Can carry out all administration tasks. • **Power Users**: The medium level in the three user type. Can create and edit users. • **Users**: The Lowest level in the three user type. Can carry out actions according to the authorization levels they have been assigned.
User name	Enter the name of the new user.
Complete name	Enter the complete name of the new user.
Mail	Enter the mail of the new user.
Telephone	Enter the telephone of the new user.
Active E-mail and Telephone	Active the E-mail and telephone of the new user.
Authorization	Choose the authority from the available list to the selected list.
Password	Enter a password for the new user.
Confirm Password	Confirm the password for the new user.
User Locked	Disable the new user.

Role Management

Overview

This function is used to manage the roles for PickMaster Operator. Add new roles or delete existing roles are available.

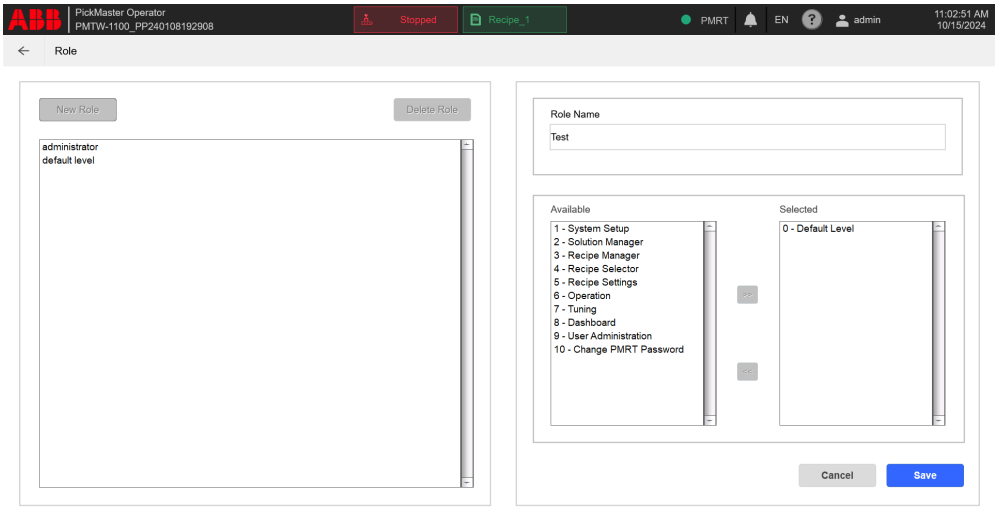
PickMaster Twin provides one default role:

- administrator, contains all authorities.
- default role, contains **0-Default level** authority.

Continues on next page

3.7 ADMINISTRATOR group

Continued

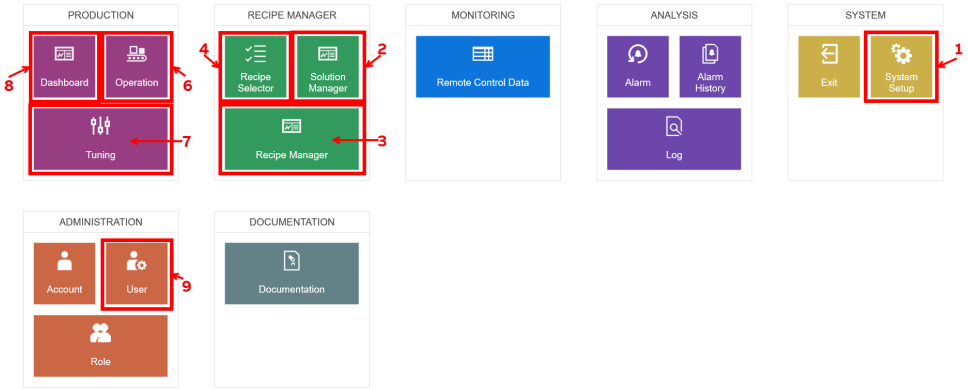


xx2400001730

Function	Description
New role	Create a new role.
Delete role	Delete a role.

New role

Group	Description
Role name	Enter the name for a new role.
Available	Choose the authority for the new role.
Selected	Shows the chosen authority for the new role.
Save	Save the changes.
Cancel	Discard the changes.



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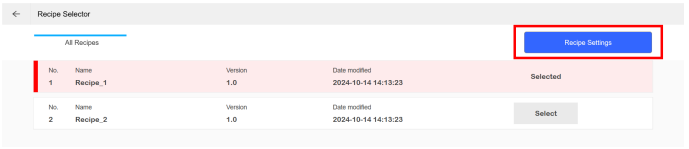
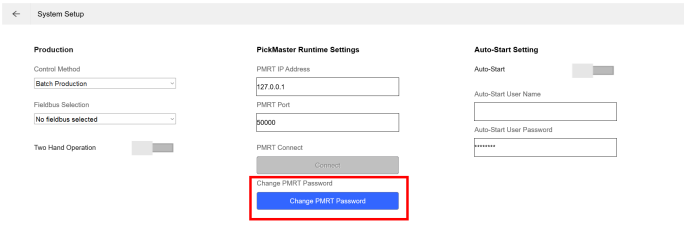
Continues on next page

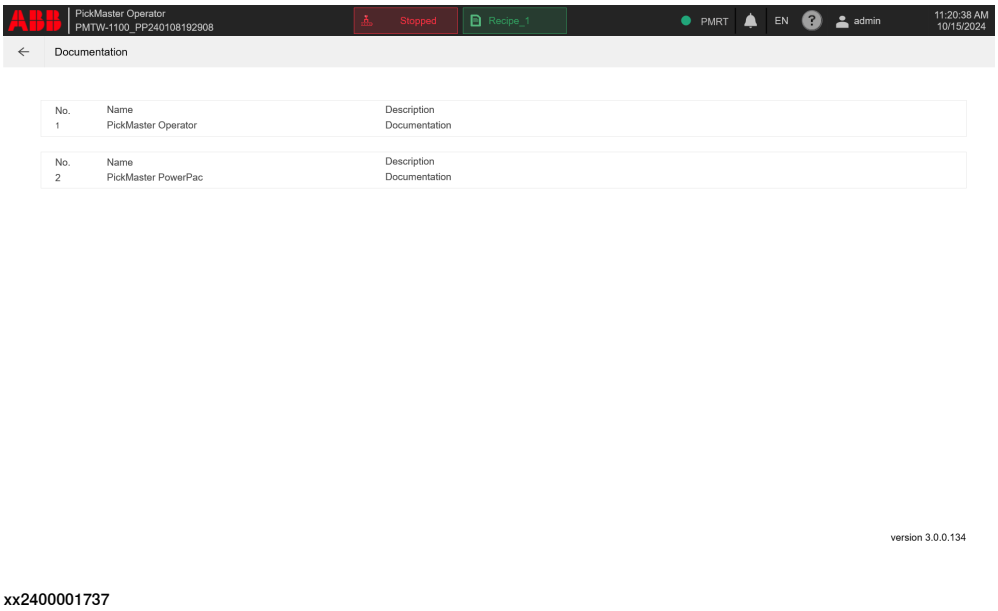
Available permission	Description
0 - Default user	The user with default role can only edit the in the following page: • Dashboard • Alarm • Alarm history • Log • Account In the remaining pages, it's only allowed to view the parameters.
1 - System Setup	*System Setup on page 93*
2 - Solution Manager	*Solution Manager on page 75*
3 - Recipe Manager	*Recipe Manager on page 77*
4 - Recipe Selector	*Recipe Selector on page 74*
5 - Recipe Settings	*Recipe Selector on page 74*  xx2400001733
6 - Operation	*Operation on page 58*
7 - Tuning	*Tuning on page 65*
8 - Dashboard	*Dashboard on page 57*
9 - User Administration	*User Management on page 99*
10 - Change PMRT Password	*System Setup on page 93*  xx2400001734

3.8 DOCUMENTATION group

Documentation

Overview

This function is used to open the related documentation.



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4 PickMaster Operator workflow

4.1 About the workflow

Overview

This chapter describes examples step-by-step to guide you how to work with the PickMaster Operator.

Note

For most scenarios, you are recommended to follow the workflow from start to finish, even though other sequences maybe possible.

4.2 Production

Opening PickMaster Operator

Use this procedure to start PickMaster Operator:

1. Double click the `PickMaster Operator` file to open the **Welcome to ABB PickMaster** window.
2. Enter the IP address of the PickMaster Runtime which need to be connected.

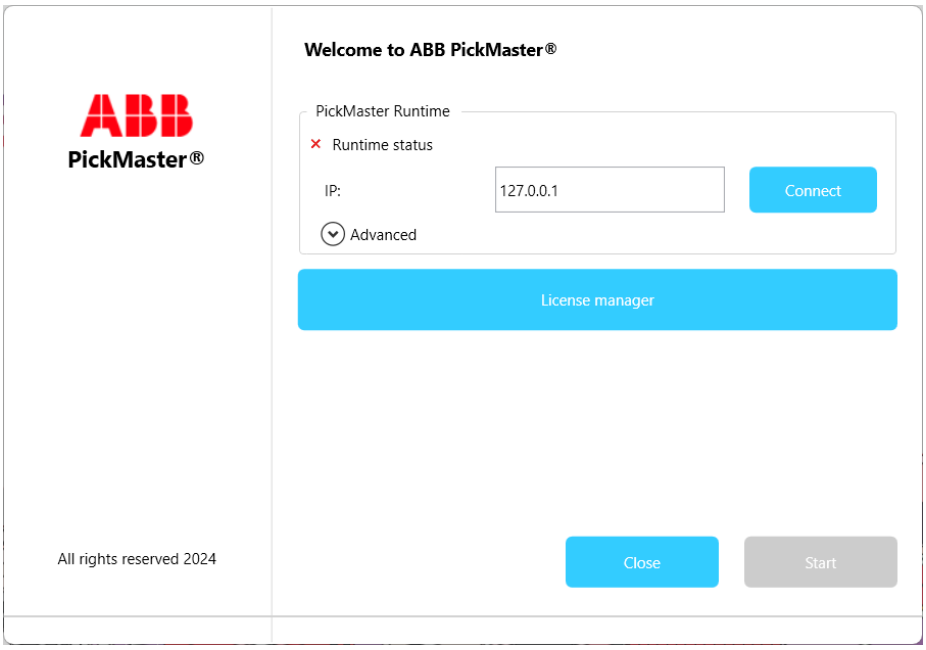
Tip

Check the IPv4 address of the computer which the PickMaster Runtime is installed on.

Note

Loopback address 127.0.0.1 is use as the default value for PickMaster Runtime IP address.

As the PickMaster Runtime on Host PC is suggested to be used for production.



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3. If needed, click **Advance** to open the setting view for Runtime user and language.

Continues on next page

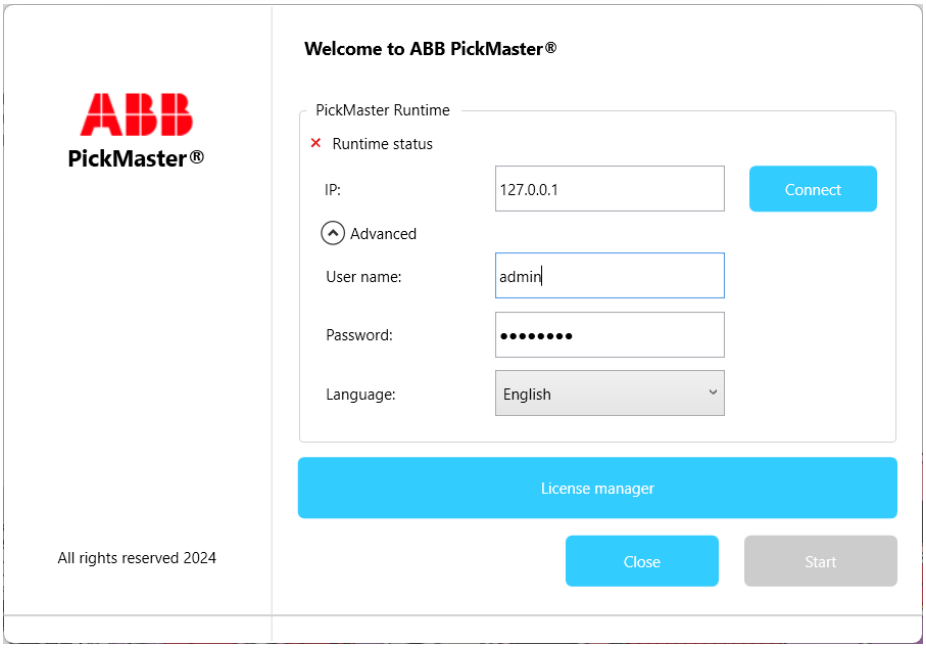
Tip

The default Runtime user name and password is the credential for connecting the PickMaster Runtime by `https` protocol.

Default Username: `admin` with Password: `password`

Note

The user should change the password of the default user account for higher Cyber Security.



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4 Click **Connect** button.

Note

When the **SSL** dialog box pops up during the first operation of the PickMaster Operator, click **Yes**.

Otherwise the PickMaster Operator cannot work normally.

For more information, see chapter *Self-signing certificate* in *Application manual - PickMaster® Twin - PowerPac*.

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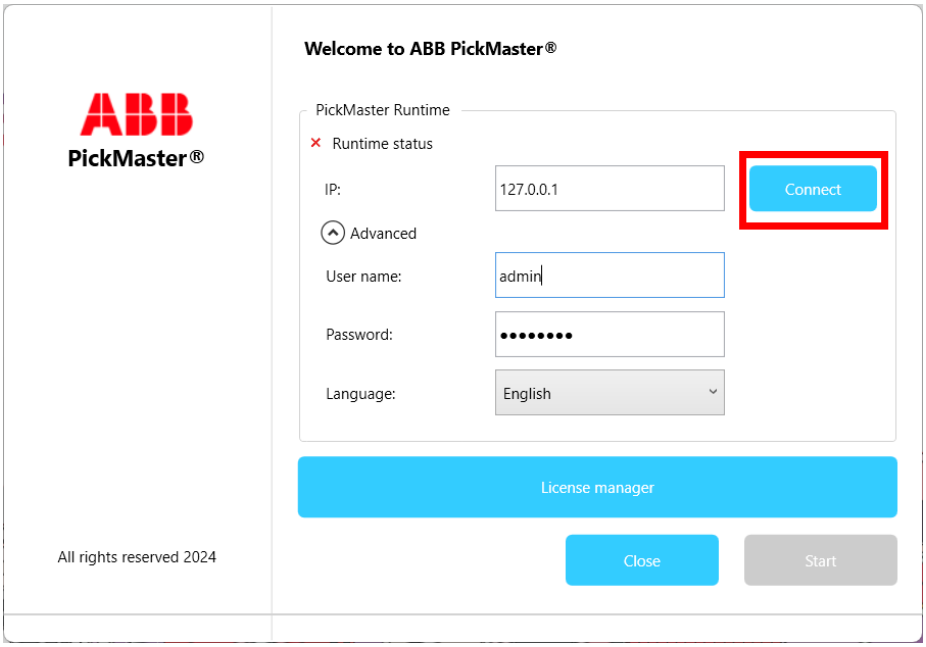
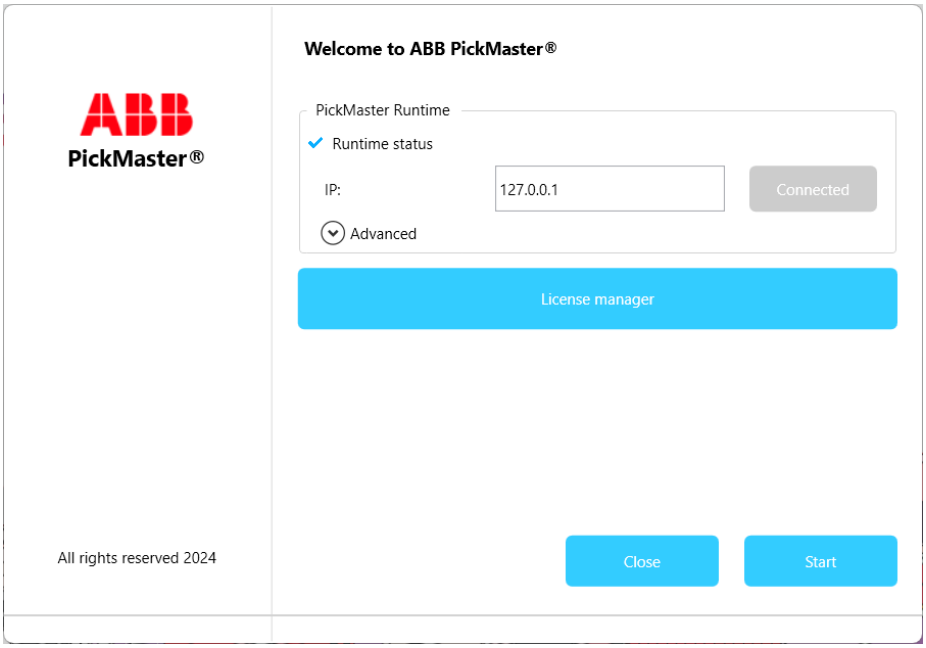


xx2400001740

5 Click the **License Manager** button to open the **License Management** window. For more detail on activating the license, see *ABB Ability™ zenon license on page 25*.

6 Click **Start** button to open the login interface.



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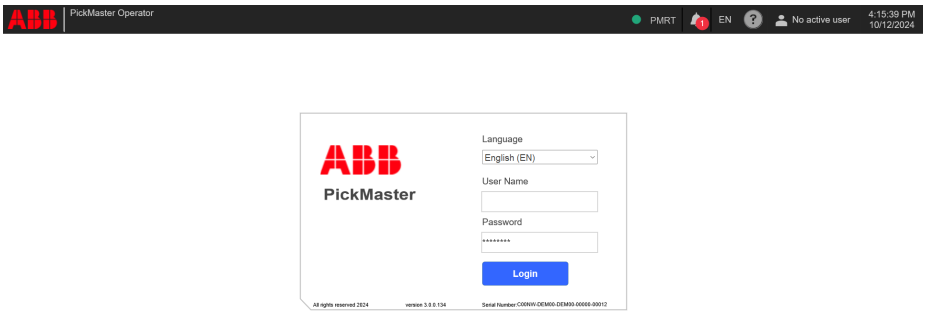
Note

If the user meets any problem when building connection between PickMaster Operator and real Runtime, please check from below possible reasons:

a Using a Host account that is not administrator;
b Firewall blocking;
c VPN interference;
d Host IP address incorrect;
e The network name not renamed to "ProfinetIOAdapter".

7 Login with an effective user account.



xx2400001705

Tip

A default user and password have been created for each role.

Administrator Username: `admin` with Password: `password`

Note

The Username and Password are case sensitive.

Note

To enhance the security of the user account, user lockout logic is used in PickMaster Operator.

Continues on next page

Loading solution

Use this procedure to load a solution that has been transferred from PickMaster PowerPac:

1. Go to the **Solution Manager** page.
2. Click on the **Refresh** button.
3. If used **Pack&Go** file, go to **Package** page and click **Unpack** button for the desired **Pack&Go** file.
4. On **Solutions** page, click **Load** button for the desired solution.
5. Wait until the solution is totally loaded.

> **Tip**
>
> When the solution is totally loaded, the solution name will show up as the selected solution on the navigation bar.

> **Tip**
>
> Default folder:
>
> - **Pack&Go** file: `C:\ProgramData\ABB\PickMaster Twin\PackedSolutions`

Selecting recipe

Use this procedure to select the recipe:

1. In PickMaster Operator main page, click **Recipe Selector**.
2. Click on the **Select** button to activate the target recipe.

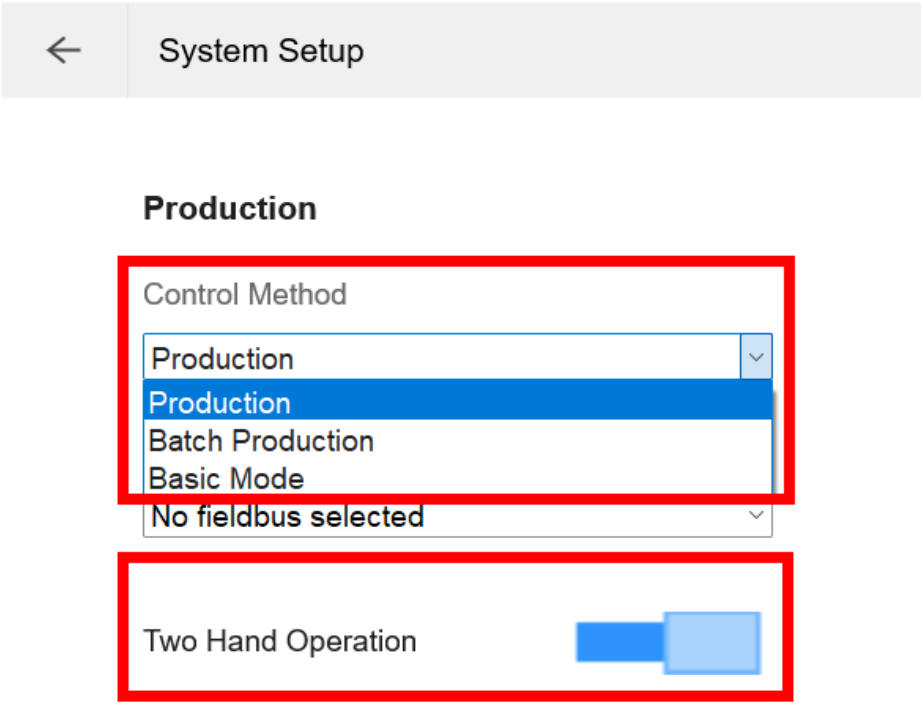
   When the recipe is selected, the selected recipe will be highlighted as pink.

Starting production

Use this procedure to start the production:

1. In PickMaster Operator main page, go to **Solution Manager** page.
2. Set the **Control Method** as **Production**.
3. Click to enable **Two hand operation**.

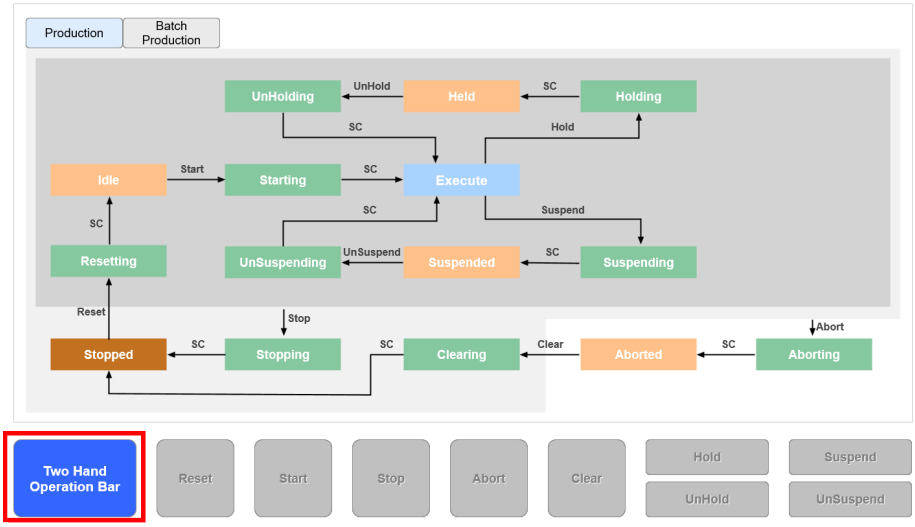
Continues on next page



xx2400001743

4 In PickMaster Operator main page, go to **Operation** page.

5 Hold the **Two Hand Operation bar** button to enable the operation.



xx2400001744

6 Click on the **Reset** button and then **Start** button to start the production.

> **Note**
>
> If any errors or warnings pop up, see *Recipe checking when resetting on page 64*.

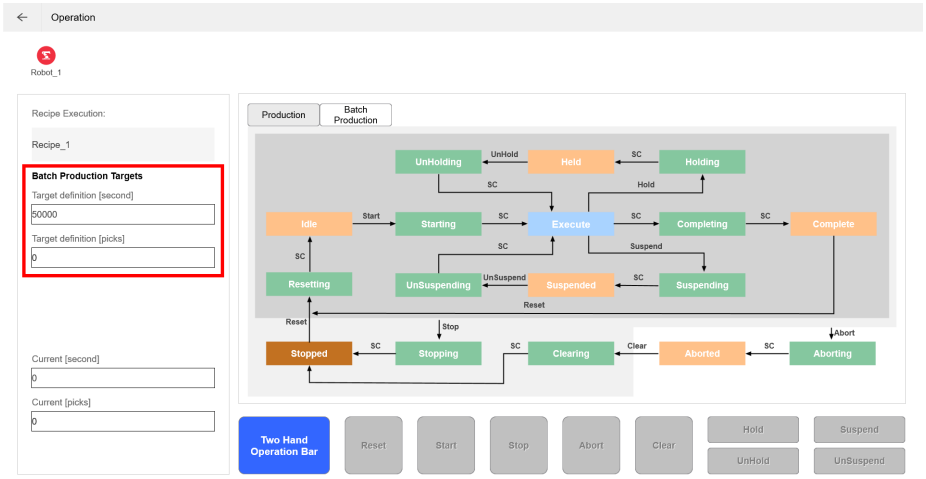
4.3 Batch production

Starting batch production

Use this procedure to start the production:

1. In PickMaster Operator main page, go to **Solution Manager**.
2. Set the **Control Method** as **Batch Production**.
3. If needed, click to enable **Two hand operation**.
4. In PickMaster Operator main page, go to **Operation** page.
5. If needed, hold the **Two Hand Operation bar** to enable the operation.
6. Enter the target time or counts for the Batch Production in the **Batch Production targets** text box.

> **Note**
>
> Pick time and Pick number are alternative. When one is fulfilled, the other input box will be grayed out.



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7. Click the **Apply** button.
8. Click the **Reset** button and then **Start** button to start the production.

> **Note**
>
> When the conditions are met, the state machine will jump to the **Completing** state, and it will stop the operation. And finally jump to the **Stopped** state.

4.4 Remote control

Tip

The reader for this chapter should have the basic knowledge of automatic control.

Continues on next page

4.4.1 Enabling Remote control

How to enable Remote control

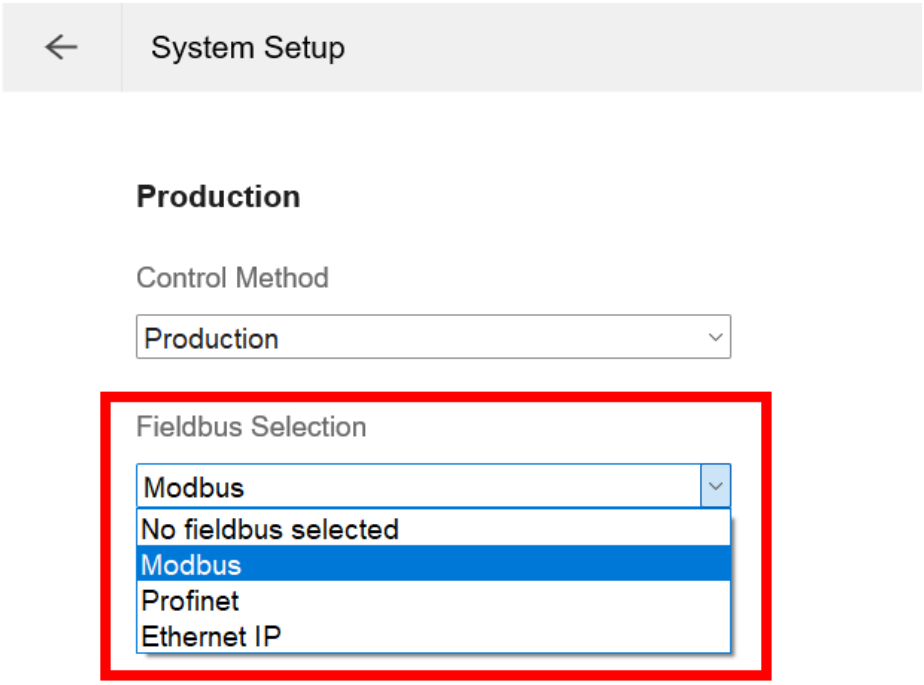
This section describes how to enable the **Remote control** in PickMaster Operator.

Users can choose the appropriate fieldbus connection according to their requirements.

1 In PickMaster Operator main page, go to **System Setup** page.
2 Select the **Control Method** as **Production** or **Batch Production** to enable the PackML function.
3 Select **EtherNet IP**/ **Modbus**/ **Profinet** in **Fieldbus Selection** drop-down list to enable **Remote Control** function.

> **Note**
>
> For more information about **EtherNet IP**/ **Modbus**/ **Profinet** signals, see *Appendix on page 127*.

> **Note**
>
> If **Profinet** is used, the user needs to obtain the GSDML files under `C:\ProgramData\ABB\zenon1200\straton\GSDML` **folder.**



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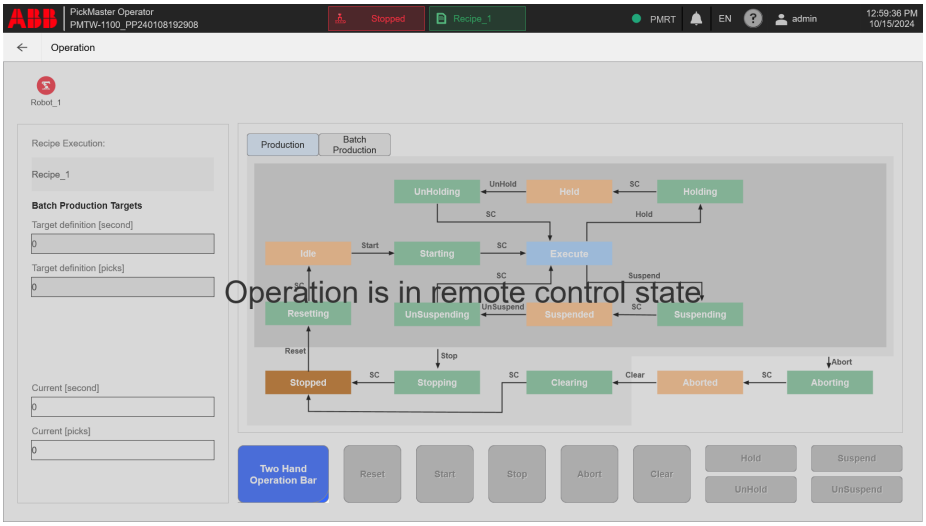
4 Back to PickMaster Operator main page, click **Operation**.
The user cannot control the production from the **Operation** page.
All commands are from the remote controller.

Continues on next page



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This **Remote Control Data** page shows the parameters which reflect the real data of the selected fieldbus signal.

The data structure of the following Packtag is based on the data structure defined by the previous Packtag (see *Format of the PackTags on page 97*). Users can refer to the following Packtag data structure when using Modbus for remote control.

Configuring Remote control signal

For more information on configuring **Remote control** signal, see *Signals and definition on page 80* and *Appendix on page 127*.

4.4.2 Examples

Remote control - Basic function - PackML

This section describes an example for some basic function of **Remote control**.

1 Open PickMaster Operator and load solution.
2 In PickMaster Operator main page, go to **System Setup** page.
3 Select **EtherNet IP**/ **Modbus**/ **Profinet** in **Fieldbus Selection** drop-down list to enable **Remote Control** function.
4 Send the command from the remote control equipment to PickMaster Operator.
5 Set the **UnitMode** to **1** (1=Production/4=Batch Production) and **UnitModeChangeRequest** from **0** to **1**.

> **Tip**
>
> For more details about the signal information, see *UnitModeChangeRequest on page 85*.

6 Check **UnitModeCurrent**:
   - If **UnitModeCurrent**=1, it means that PickMaster Operator now is in Production mode.
   - If **UnitModeCurrent**=4, it means that PickMaster Operator now is in Batch Production mode.
7 Set the **CntrlCmd** to **1** (1=Reset) and **CmdChangeRequest** from **0** to **1** to trigger the PickMaster Operator preparing for production.

> **Tip**
>
> For more details about the signal information, see *CmdChangeRequest on page 85*.

8 Check PickMaster Operator current state by **StateCurrent**=15 and change to **StateCurrent**=4.

> **Tip**
>
> For more details about the signal information, see *StateCurrent on page 83*.

9 Set the **CntrlCmd** to **2** (2=Start) and **CmdChangeRequest** from **0** to **1** to trigger the PickMaster Operator running production.

> **Tip**
>
> For more details about the signal information, see *CntrlCmd on page 84*.

Continues on next page

10 Check PickMaster Operator current state by **StateCurrent**=3 (Starting) then **StateCurrent**=6 (Execute) which means that production is running.

> **Tip**
>
> For more details about the signal information, see *StateCurrent on page 83*.

11 Set the **CntrlCmd** to **3** (3=Stop) and **CmdChangeRequest** from **0** to **1** to trigger the PickMaster Operator to stop the production.

> **Tip**
>
> For more details about the signal information, see *CmdChangeRequest on page 85*.

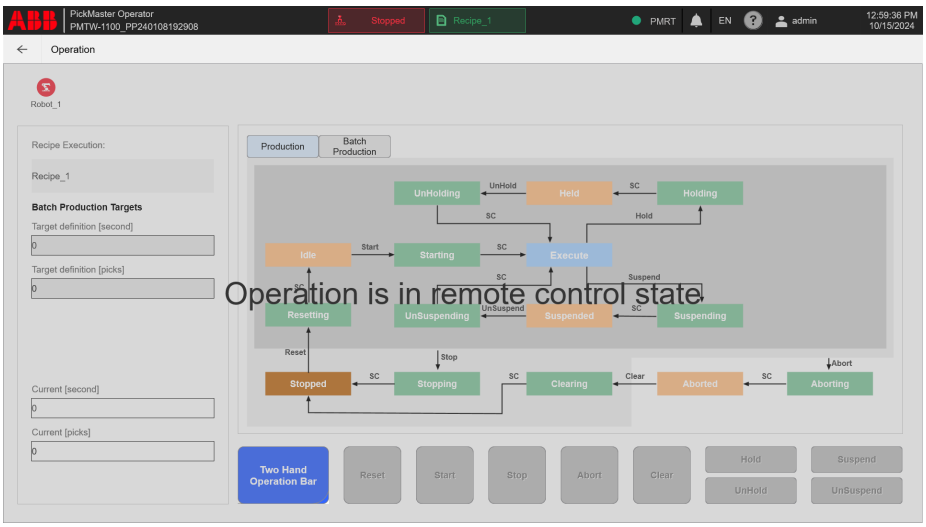
12 Check PickMaster Operator current state by **StateCurrent**=7 and change to **StateCurrent**=2 which means that production is stopped.

> **Tip**
>
> For more details about the signal information, see *StateCurrent on page 83*.

13 Back to PickMaster Operator main page, click **Operation**.

The user cannot control the production from the **Operation** page.

All commands are from the remote control equipment.



xx2400001747

The data structure of the following Packtag is based on the data structure defined by the previous Packtag (see *Format of the PackTags on page 97*). Users can refer to the following Packtag data structure when using Modbus for remote control.

Continues on next page

4.4.2 Examples
Continued

> **Note**
>
> Besides the Fieldbus logic interface listed in the Appendix, any other Fieldbus protocol will be invalid in PickMaster Operator. For example, ModbusRTU, Modbus_Energy or the Modbus process gateway are all invalid.

Remote control - Recipe switch

This section describes an example for the recipe switch function of **Remote control**.

1 Open PickMaster Operator and load solution.
2 In PickMaster Operator main page, click **System Setup**.
3 Select **EtherNet IP**/ **Modbus**/ **Profinet** in **Fieldbus Selection** drop-down list to enable **Remote Control** function.
4 Check the **Idle** signal in **ScadaToRemote** window is **1**.

   If the idle signal is 1, it means that the PickMaster Operator can receive remote command. The **ScadaToRemote** window will show current recipe ID and recipe ID list.

> **Note**
>
> The maximum number of the items in the recipe ID list for **EtherNet IP**/ **Modbus** is 150.
>
> The maximum number of the items in the recipe ID list for **Profinet** is 50.

5 Set **RequestRecipeID** as request (For example 70001) and the **RequestOrder** to 101 in **RemoteToScada** window.

> **Tip**
>
> 101 is the job number for remote recipe switch.

6 Set the command **Request** signal from **0** to **1** in **RemoteToScada** window. This can trigger the PickMaster Operator to switch the recipe by **RecipeRequestID**. The PickMaster Operator only monitors the rising edge of the command **Request** signal.

> **Note**
>
> After the PickMaster Operator received the command **Request** signal, the recipe in PickMaster Operator will switch accordingly and the **Idle** signal in **ScadaToRemote** window will change back to **0**.

7 If need to switch the recipe again, set the command **Request** signal from **1** to **0** and repeat step 5 to 8.

Continues on next page

Note

If any error raised, PickMaster Operator will send an error signal and error code to the remote control equipment.

The error signal must be reset before sending any other command to PickMaster Operator. Reset the PickMaster Operator error by sending a pulse signal of **ResetError** from the remote control equipment.

4.5 Auto-start

4.5.1 Enabling Auto-Start

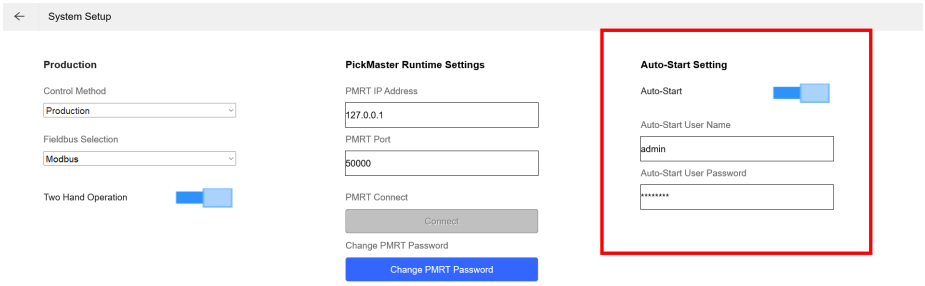
How to enable Auto-Start

This section describes how to enable the **Auto-Start** in PickMaster Operator.

1. In PickMaster Operator main page, click **System Setup**.
2. Enter the user name and password of the user account that will be used as the auto-start account.

> **Tip**
>
> The predefined default user account only contains **0-Default level** authority. Any operation is not allowed to do by the predefined default user.

3. Click on the activation button to enable **Auto-Start** function.



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4. Open *Run* program on the computer and input `shell:startup` to open the default folder for auto-start.
5. Copy PickMaster Operator shortcut to the default folder for auto-start.
6. Change the level of **User Account Control Settings** to **Never notify** of the computer.

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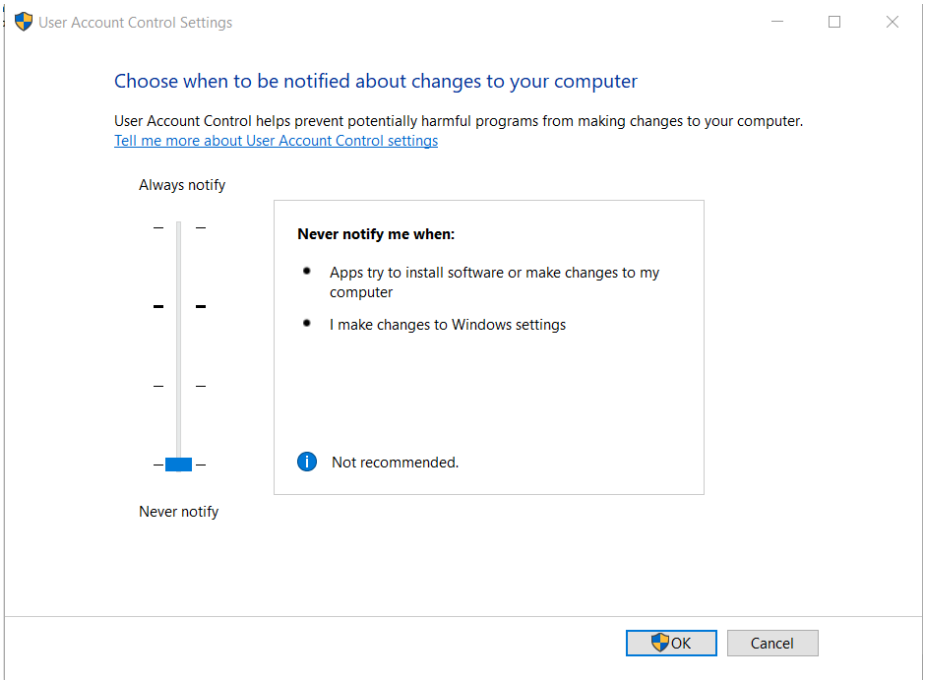

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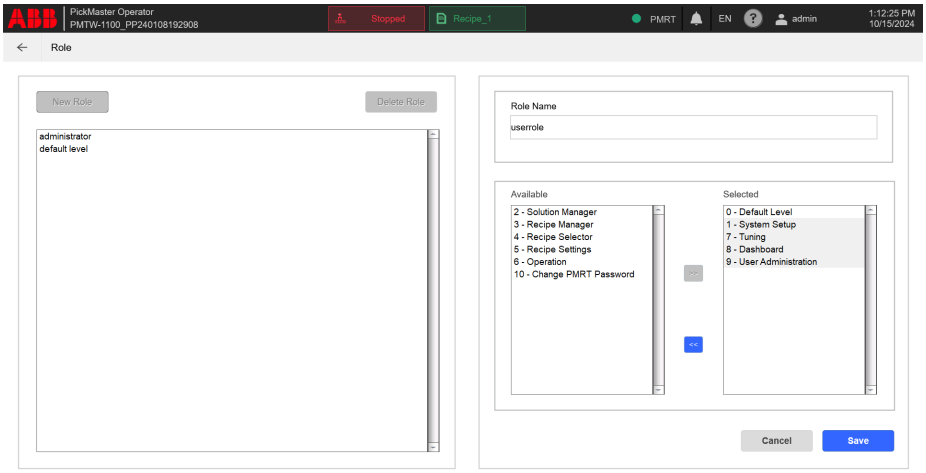
After the setting, the PickMaster Operator will start and login with the entered user account automatically when the computer is restarted next time.

4.6 Adding a new user with new role

Adding a new role

Use this procedure to add a new role:

1. In PickMaster Operator main page, click **Role Management**.
2. Click **New Role**.
3. Enter the role name as **userrole**.
4. Add the following functions for the new role from the available list to selected list.
   - Default Level
   - System Setup
   - Tuning
   - Dashboard
   - User Administration



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5. Click **Save**.

Adding a new user

Use this procedure to add a new role:

1. In PickMaster Operator main page, click **User**.
2. Click **Add User**.

   The **Add User** page will pop up.
3. Select the **User Administration Type** as **Users**.
4. Enter the user name and the complete name as **ABBUser**.

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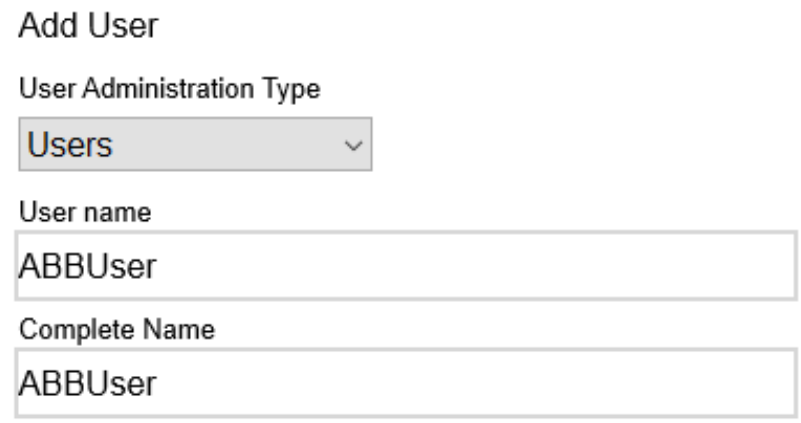

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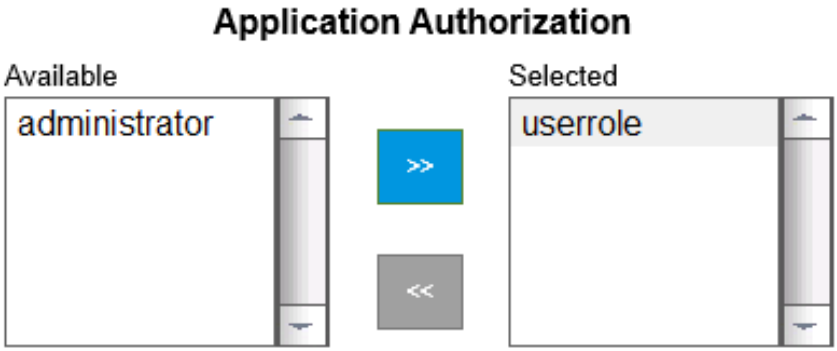
5 Select the authorization for the new user from the available list to selected list.



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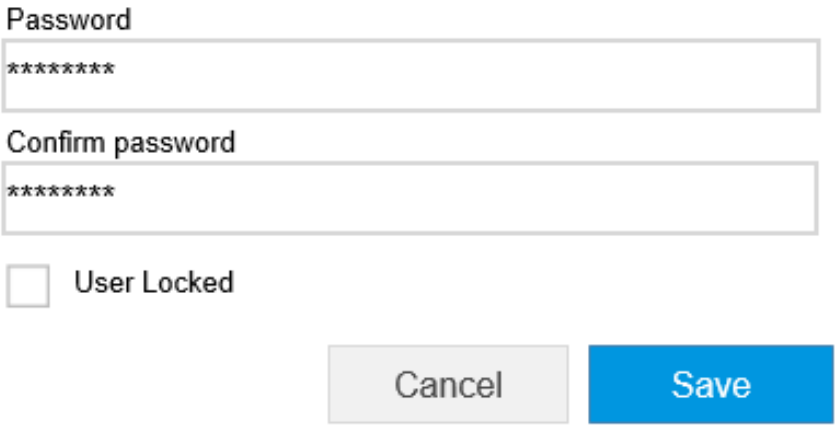
6 Enter the password for new user and confirm it.



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> **Note**
>
> If **User Locked** is selected, the new created user will not be able to login.

7 Click **Save**.

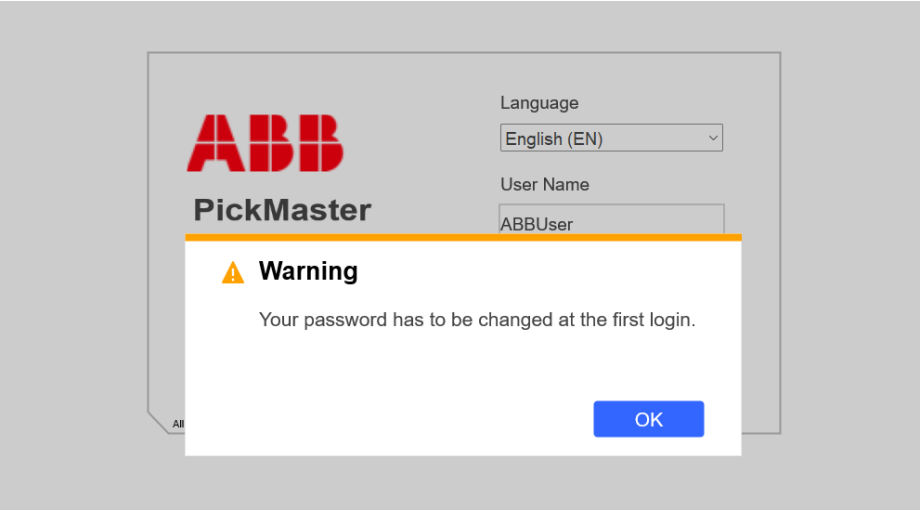
The new user will show up in the user list.

8 Logout current user.

9 Login with the new user.

> **Note**
>
> The first time when you log in with the new created user, you will be prompted to the password expired page. You need to change the password to active the new user.

When you click **Login**, this page will show up.



xx2000000195

10 Change the password and click **Save**.

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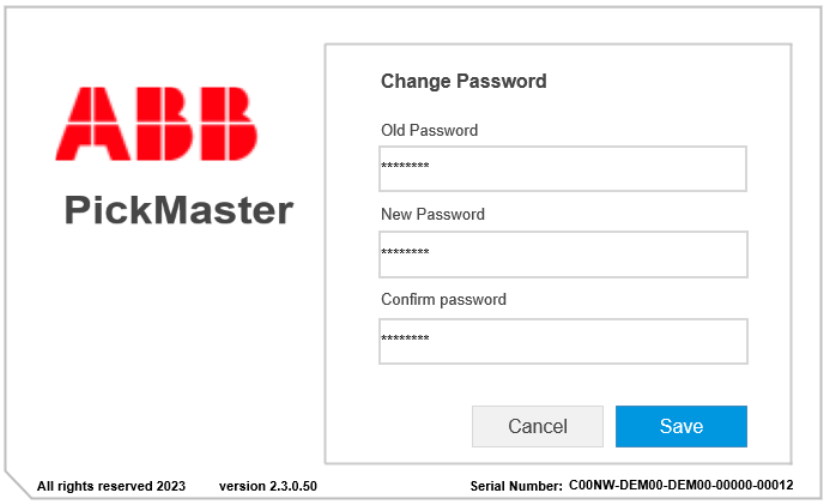

xx2000000196

11 Login with the new user and the new password.

When you login successfully, the selected functions will be available.

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5 Appendix

5.1 EtherNet/IP signal definition

Tip

For more detail information on the signal definition, see *Signals and definition on page 80*.

EtherNet/IP Instance

Data	Name	Mes-saging	Type	In-stance	Class	Size	Description
ScadaToRe-mote	PMOPToRemote	implicit	Inputs	101		496	Current, Command, RecipeID
ScadaToRe-mote	PMOPToRemoteR-ecipeIDList1	explicit	Inputs	113	3	400	RecipeIDList[0]-[99]
ScadaToRe-mote	PMOPToRemoteR-ecipeIDList2	explicit	Inputs	114	3	200	RecipeIDList[100]-[149]
RemoteTo-Scada	RemoteToPMOP	implicit	Out-puts	201		496	Current, Command, RecipeID

Essential information for EtherNet/IP device configuration

Name	Value
Connected to Industrial Network	EtherNet/IP
Address	The IP address of the Host computer. **Note** The default IP address that is preset internally in the PickMaster Operator in the COD file is 192.168.10.48, which needs to be matched with the host computer IP address. If they are not matched, the COD file needs to be changed according to the host computer IP address. For more detailed information, see *Configuring the host computer IP address (COD file) for remote control over EtherNet/IP on page 46*.
Vendor ID	0
Device Type	0
Product Code	0
Output Assembly	201
Input Assembly	101
Output Size (bytes)	496
Input Size (bytes)	496

Continues on next page

5.1 EtherNet/IP signal definition

Continued

PMOP to Remote

Instance	Byte	Bit	Signal	Type
101	0		UnitModeCurrent	int32
101	4		StateCurrent	int32
101	28		RobotStatus[0]	int16
101	30		RobotStatus[1]	int16
101	32		RobotStatus[2]	int16
101	34		RobotStatus[3]	int16
101	36		RobotStatus[4]	int16
101	38		RobotStatus[5]	int16
101	40		RobotStatus[6]	int16
101	42		RobotStatus[7]	int16
101	44		RobotStatus[8]	int16
101	46		RobotStatus[9]	int16
101	64	0	Idle	bool
101	64	1	Error	bool
101	64	2	PMRTConnected	bool
101	64	3	HeartBeat	bool
101	64	4		
101	64	5		
101	64	6		
101	64	7		
101	66	0	Modbus	bool
101	66	1	PROFINET	bool
101	66	2	EtherNet/IP	bool
101	66	3		
101	66	4		
101	66	5		
101	66	6		
101	66	7		
101	68		ActiveOrder	uint32
101	72		ErrorCode	uint32
101	128		CurrentRecipeID	uint32
113	0		RecipeIDList[0]	uint32
113	…		RecipeIDList[…]	uint32
113	396		RecipeIDList[99]	uint32
114	0		RecipeIDList[100]	uint32
114	…		RecipeIDList[…]	uint32

Continues on next page

Instance	Byte	Bit	Signal	Type
114	196		RecipeIDList[149]	uint32

Remote to PMOP

Instance	Byte	Bit	Signal	Type
201	0		UnitMode	int32
201	4		CntrlCmd	int32
201	12		RobotCmd[0]	int16
201	14		RobotCmd[1]	int16
201	16		RobotCmd[2]	int16
201	18		RobotCmd[3]	int16
201	20		RobotCmd[4]	int16
201	22		RobotCmd[5]	int16
201	24		RobotCmd[6]	int16
201	26		RobotCmd[7]	int16
201	28		RobotCmd[8]	int16
201	30		RobotCmd[9]	int16
201	32	0	UnitModeChangeRequest	bool
201	32	1	CmdChangeRequest	bool
201	32	2		
201	32	3		
201	32	4		
201	32	5		
201	32	6		
201	32	7		
201	64	0	Request	bool
201	64	1	ResetError	bool
201	64	2		
201	64	3		
201	64	4		
201	64	5		
201	64	6		
201	64	7		
201	68		RequestOrder	uint32
201	128		RequestRecipeID	uint32

5.2 Modbus signal definition

Tip

For more detail information on the signal definition, see *Signals and definition on page 80*.

Essential information for Modbus device configuration

Name	Value
Connected to Industrial Network	Modbus
Address	The IP address will be acquired automatically from the Host computer network which is name as "ProfinetIOAdapter".
Port	502

PMOP to Remote (Input Registers)

Register	Bit	Signal	Type
0		UnitModeCurrent	int32
2		StateCurrent	int32
14		RobotStatus[1]	int16
15		RobotStatus[2]	int16
16		RobotStatus[3]	int16
17		RobotStatus[4]	int16
18		RobotStatus[5]	int16
19		RobotStatus[6]	int16
21		RobotStatus[7]	int16
22		RobotStatus[8]	int16
23		RobotStatus[9]	int16
26	0	Idle	bool
26	1	Error	bool
26	2	PMRTConnected	bool
26	3	HeartBeat	bool
26	4		
26	5		
26	6		
26	7		
26	8		
26	9		
26	10		
26	11		

Continues on next page

Register	Bit	Signal	Type
26	12		
26	13		
26	14		
26	15		
27	0	Modbus	bool
27	1	PROFINET	bool
27	2	EtherNet/IP	bool
27	3		
27	4		
27	5		
27	6		
27	7		
27	8		
27	9		
27	10		
27	11		
27	12		
27	13		
27	14		
27	15		
28		ActiveOrder	uint32
30		ErrorCode	uint32
32		CurrentRecipeID	uint32
34		RecipeIDList[0]	uint32
…		RecipeIDList[…]	uint32
332		RecipeIDList[149]	uint32

Remote to PMOP (Holding Registers)

Register	Bit	Signal	Type
0		UnitMode	int32
2		CntrlCmd	int32
6		RobotCmd[0]	int16
7		RobotCmd[1]	int16
8		RobotCmd[2]	int16
9		RobotCmd[3]	int16
10		RobotCmd[4]	int16
11		RobotCmd[5]	int16
12		RobotCmd[6]	int16

Continues on next page

5.2 Modbus signal definition

Continued

Register	Bit	Signal	Type
13		RobotCmd[7]	int16
14		RobotCmd[8]	int16
15		RobotCmd[9]	int16
16	0	UnitModeChangeRequest	bool
16	1	CmdChangeRequest	bool
16	2		
16	3		
16	4		
16	5		
16	6		
16	7		
16	8		
16	9		
16	10		
16	11		
16	12		
16	13		
16	14		
16	15		
17	0	Request	bool
17	1	ResetError	bool
17	2		
17	3		
17	4		
17	5		
17	6		
17	7		
17	8		
17	9		
17	10		
17	11		
17	12		
17	13		
17	14		
17	15		
18		RequestOrder	uint32
20		RequestRecipeID	uint32

5.3 PROFINET signal definition

Tip

For more detail information on the signal definition, see *Signals and definition on page 80*.

Note

There may be stability problems in PMTW when the PLC poll rate is too high. In Siemens PLC's, the default poll rate is 2 ms, which means that the PackML interface is polled for status at that frequency, and we have observed stability issues in these cases.

It is recommended to increase the polling loop time to 150–200 ms. That is still about 5 times per second and there is not much happening between those polls.

Essential information for PROFINET device configuration

Name	Value
Connected to Industrial Network	PROFINET
Address	The IP address will be acquired automatically from the Host computer network which is name as "ProfinetIOAdapter".
Name	straton-profinetio-device

PROFINET Slot

Slot	Name	Type
1	Input 32 bit - DINT	ScadaToRemote
2	Input 32 bit - DINT	ScadaToRemote
3	Input 32 bit - DINT	ScadaToRemote
4	Input 32 bit - DINT	ScadaToRemote
5	Input 32 bit - DINT	ScadaToRemote
6	Input 32 bit - DINT	ScadaToRemote
7	Input 32 bit - DINT	ScadaToRemote
8	Input 16 bit - INT	ScadaToRemote
9	Input 16 bit - INT	ScadaToRemote
10	Input 16 bit - INT	ScadaToRemote
11	Input 16 bit - INT	ScadaToRemote
12	Input 16 bit - INT	ScadaToRemote
13	Input 16 bit - INT	ScadaToRemote
14	Input 16 bit - INT	ScadaToRemote
15	Input 16 bit - INT	ScadaToRemote
16	Input 16 bit - INT	ScadaToRemote

Continues on next page

Slot	Name	Type
17	Input 16 bit - INT	ScadaToRemote
18	Input 8 bit - USINT	ScadaToRemote
19	Output 32 bit - DINT	RemoteToScada
20	Output 32 bit - DINT	RemoteToScada
21	Output 32 bit - DINT	RemoteToScada
22	Output 16 bit - INT	RemoteToScada
23	Output 16 bit - INT	RemoteToScada
24	Output 16 bit - INT	RemoteToScada
25	Output 16 bit - INT	RemoteToScada
26	Output 16 bit - INT	RemoteToScada
27	Output 16 bit - INT	RemoteToScada
28	Output 16 bit - INT	RemoteToScada
29	Output 16 bit - INT	RemoteToScada
30	Output 16 bit - INT	RemoteToScada
31	Output 16 bit - INT	RemoteToScada
32	Output 8 bit - USINT	RemoteToScada
33	Input 16 bit - UINT	ScadaToRemote
34	Input 16 bit - UINT	ScadaToRemote
35	Input 32 bit - UDINT	ScadaToRemote
36	Input 32 bit - UDINT	ScadaToRemote
37	Input 32 bit - UDINT	ScadaToRemote
38	Output 16 bit - UINT	RemoteToScada
39	Output 32 bit - UDINT	RemoteToScada
40	Output 32 bit - UDINT	RemoteToScada
41	Input STRING - 255 byte	ScadaToRemote

PMOP to Remote

Slot	Subslot	Module	Bit	Signal	Type
1	1	DINT		UnitModeCurrent	int32
2	1	DINT		StateCurrent	int32
8	1	INT		RobotStatus[0]	int16
9	1	INT		RobotStatus[1]	int16
10	1	INT		RobotStatus[2]	int16
11	1	INT		RobotStatus[3]	int16
12	1	INT		RobotStatus[4]	int16
13	1	INT		RobotStatus[5]	int16
14	1	INT		RobotStatus[6]	int16
15	1	INT		RobotStatus[7]	int16

Continues on next page

Slot	Subslot	Module	Bit	Signal	Type
16	1	INT		RobotStatus[8]	int16
17	1	INT		RobotStatus[9]	int16
33	1	UINT	0	Idle	bool
33	1	UINT	1	Error	bool
33	1	UINT	2	PMRTConnected	bool
33	1	UINT	3	HeartBeat	bool
33	1	UINT	4		
33	1	UINT	5		
33	1	UINT	6		
33	1	UINT	7		
33	1	UINT	8		
33	1	UINT	9		
33	1	UINT	10		
33	1	UINT	11		
33	1	UINT	12		
33	1	UINT	13		
33	1	UINT	14		
33	1	UINT	15		
34	1	UINT	0	Modbus	bool
34	1	UINT	1	PROFINET	bool
34	1	UINT	2	EtherNet/IP	bool
34	1	UINT	3		
34	1	UINT	4		
34	1	UINT	5		
34	1	UINT	6		
34	1	UINT	7		
34	1	UINT	8		
34	1	UINT	9		
34	1	UINT	10		
34	1	UINT	11		
34	1	UINT	12		
34	1	UINT	13		
34	1	UINT	14		
34	1	UINT	15		
35	1	UDINT		ActiveOrder	uint32
36	1	UDINT		ErrorCode	uint32
37	1	UDINT		CurrentRecipeID	uint32

Continues on next page

Slot	Subslot	Module	Bit	Signal	Type
41	1	STRING 255byte	0	RecipeIDList[0]	uint32
…	1	STRING 255byte	…	RecipeIDList[…]	uint32
41	1	STRING 255byte	196	RecipeIDList[49]	uint32

Remote to PMOP

Slot	Subslot	Module	Bit	Signal	Type
19	1	DINT		UnitMode	int32
20	1	DINT		CntrlCmd	int32
22	1	INT		Robot Cmd [0]	int16
23	1	INT		Robot Cmd [1]	int16
24	1	INT		Robot Cmd [2]	int16
25	1	INT		Robot Cmd [3]	int16
26	1	INT		Robot Cmd [4]	int16
27	1	INT		Robot Cmd [5]	int16
28	1	INT		Robot Cmd [6]	int16
29	1	INT		Robot Cmd [7]	int16
30	1	INT		Robot Cmd [8]	int16
31	1	INT		Robot Cmd [9]	int16
32	1	USINT	0	UnitModeChangeRequest	bool
32	1	USINT	1	CmdChangeRequest	bool
32	1	USINT	2		
32	1	USINT	3		
32	1	USINT	4		
32	1	USINT	5		
32	1	USINT	6		
32	1	USINT	7		
38	1	UINT	0	Request	bool
38	1	UINT	1	ResetError	bool
38	1	UINT	2		
38	1	UINT	3		
38	1	UINT	4		
38	1	UINT	5		
38	1	UINT	6		
38	1	UINT	7		
38	1	UINT	8		
38	1	UINT	9		

Continues on next page

Slot	Subslot	Module	Bit	Signal	Type
38	1	UINT	10		
38	1	UINT	11		
38	1	UINT	12		
38	1	UINT	13		
38	1	UINT	14		
38	1	UINT	15		
39	1	UDINT		RequestOrder	uint32
40	1	UDINT		RequestRecipeID	uint32

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