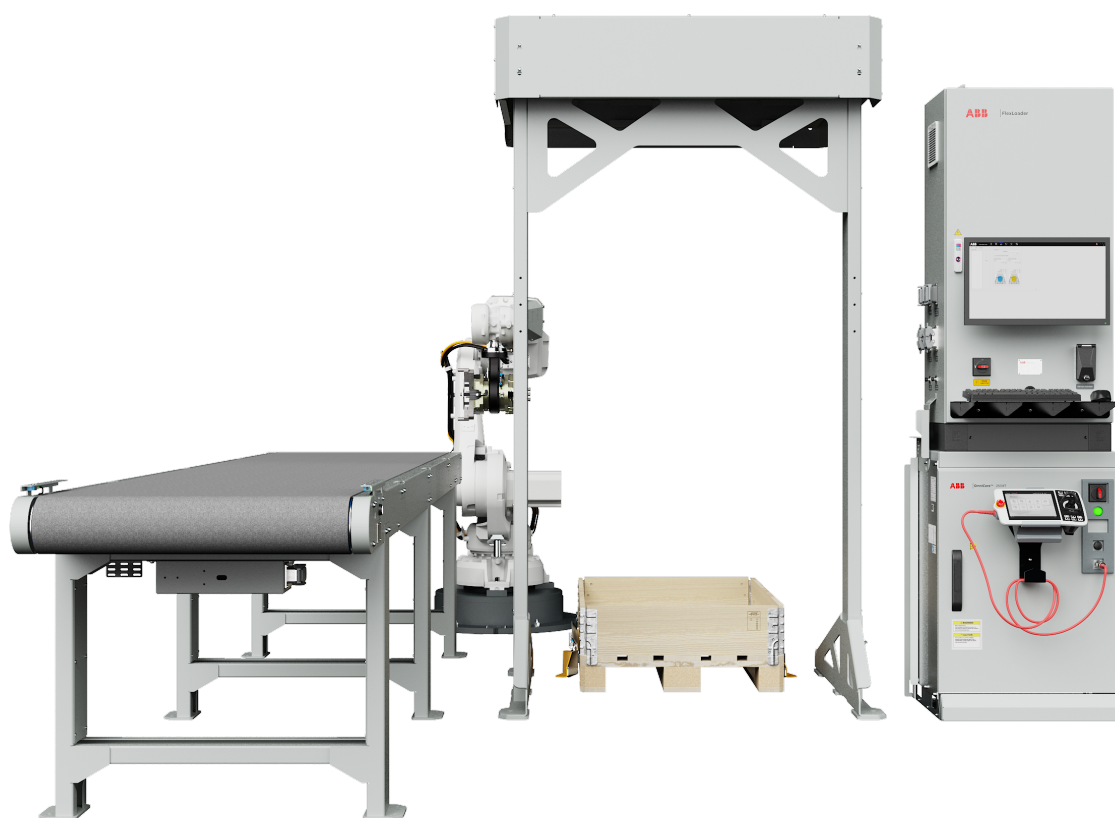


ROBOTICS

Product manual

FlexLoader Feeding Functional Module



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FlexLoader Feeding Functional Module

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Original instructions.

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Overview of this manual

About this manual

FlexLoader Feeding Functional Module is a versatile feeding solution for pick-and-place applications. This manual describes how to install, maintain, service and troubleshoot the FlexLoader Feeding Functional Module.

Usage

This manual should be used during:

- Installation and preparation work
- Maintenance work
- Repair work
- Service work

Who should read this manual?

This manual is intended for:

- Installation personnel
- Maintenance personnel
- Repair personnel

Prerequisites

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

Trademarks

FlexLoader is a trademark of ABB.

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Scope of supply

The FlexLoader Feeding Functional Module scope of supply is:

- Feeding system with conveyor or pallet locators.
- ABB industrial robot with OmniCore controller.
- Safety solution with CE2B certificate.
- Calibration equipment.
- Vision tower with 2D camera or 3D sensor.
- Electrical control cabinet with IPC and FlexLoader Vision.

Optional

- Standard grippers
- Dresspack
- Robot riser

References

Reference	Document ID
<i>Product manual - OmniCore V250XT Type B Controller</i>	3HAC087112-001
<i>Product manual - FlexLoader Vision Module</i>	4GAA136019901-001
<i>Operating manual - FlexLoader Feeding Functional Module</i>	4GAA139009903-001
<i>Installation and Commissioning manual - FlexLoader Feeding Functional Module</i>	4GAA139009915-001
<i>Product manual - Robot Riser</i>	4GAA00212990100
<i>Operating manual - RobotStudio</i>	3HAC032104
<i>Operating manual – OmniCore Controller</i>	3HAC065036-001

Revisions

Revision	Description
A	First edition.

License agreement for FlexLoader Feeding Functional Module

- 1 ABB is the only owner of the copyright and usage rights of the FlexLoader Feeding Functional Module software option that is delivered.
- 2 ABB assigns the license a simple, non-transferable, exclusive, but unlimited right to use the FlexLoader Feeding Functional Module software option.
- 3 The license allows the user to use the FlexLoader Feeding Functional Module software option on the robot controller. The license is not allowed to replicate the FlexLoader Feeding Functional Module software option or any of its components for third-party access or use on other robot controllers.
- 4 Modifying, translating, reverse engineering, decompiling or disassembling the FlexLoader Feeding Functional Module software option is not allowed.

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1 Getting Started

Basic steps for integrators

Follow the steps below for getting started with a FlexLoader Feeding Functional Module.

	Action
1	Become familiar with this manual.
2	Transport the FlexLoader Feeding Functional Module to its intended location and integrate it with external equipment.
3	Pay special attention to safety and functional interface.
4	Prepare the vision system.
5	Calibrate all camera work objects.
6	Perform a vision teachin.
7	Adjust the robot program to fit the needs of the robot cell.
8	Perform a first pick with the robot at low speed.

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2 Safety

2.1 Introduction

Overview

This section contains safety information for procedures where there is a risk of personal injury or damage to property.

Equipment that is part of a fully or semiautomatic system must always be treated with care regarding safety.

The users of the ABB industrial robots are responsible for ensuring that the applicable safety laws and regulations in the country concerned are observed, and that the safety devices necessary to protect people working with the robot system are designed and installed correctly. Personnel working with the robot must be familiar with the operation and handling of the robot, as described in the applicable documents:

- Only personnel with required training are authorized to use the system.
- All received training must be documented in writing.

Activity	Trained operator	Trained service and maintenance technician	Qualified electrician	System integrator
Commissioning				X
Operation	X	X		
Troubleshooting		X	X	
Correction of mechanical fault		X		
Correction of electrical fault			X	
Service		X		
Maintenance		X		

X = Authorized to perform the activity.

2 Safety

2.2 Safety during installation, commissioning and decommissioning

2.2 Safety during installation, commissioning and decommissioning

Overview

Carefully read the safety information before unpacking and installing the equipment. Personnel who are involved in the installation and commissioning must have relevant training for the respective robot and corresponding safety issues.



WARNING

Maintain established good work practices with regard to robot safety.
Ensure that nobody is within the safeguarded area during automatic operation.

2.3 Safety during setup, maintenance, service and repair

Overview

Always ensure that the FlexLoader Feeding Functional Module cannot be started when working on the cell. Keep all installed protective devices in place during automatic operation.

Work on mechanical systems must only be carried out by a qualified person or by a trained person under the guidance and supervision of a qualified person according to the applicable technical regulations.

Work on electrical systems or operating material must only be carried out by a qualified electrician or by a trained person under the guidance and supervision of a qualified electrician according to the applicable electrical technical regulations.

Prior to commencing work on the FlexLoader Feeding Functional Module, it is essential to conduct the following checks:

- Activate the emergency stop when the FlexLoader Feeding Functional Module is not in operation.
- Disconnect the voltage supply to the robot cell.
- Use the available lockout device to prevent the voltage supply from being connected while work is being carried out on the conveyor belt.



Note

Note that mechanical, pneumatic, or electrical energy may be stored in the FlexLoader Feeding Functional Module. Take the necessary precautions when carrying out work in the robot cell.

All safety and warning signs must be kept clean and legible. If necessary, replace them.

Always check the function of all safety devices after performing work that may have had an impact on the safety systems.



CAUTION

Ear and eye protection shall be used when working with an air nozzle on the gripper system.

Continues on next page

2 Safety

2.3 Safety during setup, maintenance, service and repair

Continued



CAUTION

Safety shoes shall be used when working with the FlexLoader Feeding Functional Module. The need will depend on the application and shall be risk assessed.



CAUTION

Pneumatic energy can be stored in the gripper system. Be aware of crushing risk.



CAUTION

Workpiece held in the gripper can fall down after an extended period of depressurized state, if the grippers are equipped with pressure retaining valves. Be aware of crushing risk.

2.4 Cyber Security

Disclaimer

This document provides examples for legal language to be used in documentation shared with the customer or made publicly available. The examples provided below have been reviewed by GF-LI. The legal conditions may vary depending on countries and subject matters. It is advisable to consult local legal support for any specific use/changes of the legal statements suggested in the document. The texts and examples provided in this document shall not be considered comprehensive (e.g., they do not address copyright or confidentiality), nor shall these texts or examples be used without prior review and approval by the responsible legal entity.

General

This product is designed to connect to and communicate information and data via a network interface. It is the customer's sole responsibility to provide and continuously ensure a secure connection between the product and the customer network or any other network (as the case may be). The customer shall establish and maintain any appropriate measures (such as, but not limited to the installation of firewalls, application of authentication measures, encryption of data, and 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 affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage, and/or theft of data or information.

Network Manager

Network Manager products are designed to be connected and to communicate information and data via a network interface, which should be connected to a secure network. It is the customer's sole responsibility to provide and continuously ensure a secure connection between the product and your network or any other network (as the case may be) and establish and maintain 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 Network Manager product, the network, its system, and interfaces against any kind of security breaches, unauthorized access, interference, intrusion, leakage, and/or theft of data or information. ABB Ltd and its affiliates are not liable for damages and/or losses related to such security breaches, unauthorized access, interference, intrusion, leakage, and/or theft of data or information.

Although ABB provides functionality testing on the products and updates that we release, the customer should institute their own testing program for any product updates or other major system updates (to include but not limited to code changes, configuration file changes, third party software updates, or patches, hardware change out, etc.) to ensure that the security measures that you have implemented have not been compromised and system functionality in the customer's environment is as expected.

2.5 Limitation of liability

Overview

Any information given in this manual regarding safety must not be constructed as a warranty by ABB that the FlexLoader Feeding Functional Module will not cause injury or damage, even if all safety instructions are complied with.

The information does not cover how to design, install, and operate a complete system, nor does it cover all peripheral equipment that can influence the safety of the entire system.

In particular, liability cannot be accepted if injury or damage has been caused for any of the following reasons:

- Use of the FlexLoader Feeding Functional Module in other ways than intended.
- Incorrect operation or maintenance.
- Operation of the FlexLoader Feeding Functional Module when the safety devices are defective, not in their intended location or in any other way not working.
- When instructions for operation and maintenance are not followed.
- Non-authorized design modifications made in or around the FlexLoader Feeding Functional Module.
- Repairs carried out by in-experienced or non-qualified personnel.
- Foreign objects.
- Force majeure.

2.6 Nation and region specific regulations

Overview

To protect personnel, the complete system must be designed and installed in accordance with the safety requirements set forth in the standards and regulations of the country where the FlexLoader Feeding Functional Module is installed.

Within the EU, refer to the Machinery Directive 2006/42/EC with addendum.

In the US, refer e.g. to ANSI/RIA R15.06 (Industrial Robots and Robot Systems - Safety Requirements) and UL 1740 (Standard for Robots and Robotic Equipment).

In Canada, refer e.g. to CAN/CSA-Z434-03 (Industrial Robots and Robot Systems - General Safety Requirements).



Note

The supplied equipment must not be operated until the processing machine or system in which the equipment is included, has been approved according to national and regional laws and regulations.

2 Safety

2.7 To be observed by the supplier of the complete system

2.7 To be observed by the supplier of the complete system

Overview

The integrator is responsible for ensure that the safety devices necessary to protect people working with the FlexLoader Feeding Functional Module are designed and installed correctly.

When integrating the FlexLoader Feeding Functional Module with external devices and machines:

- The supplier of the complete system must ensure that all circuits used in the protective stop function are interlocked in a safe manner, in accordance with the applicable standards for the protective stop function.
- The supplier of the complete system must ensure that all circuits used in the emergency stop function are interlocked in a safe manner, in accordance with the applicable standards for the emergency stop function.
- The supplier of the complete system must ensure that all circuits used in all other safety function are interlocked in accordance with the applicable standards for that function.

The integrator of the final application is required to perform an assessment of the hazards and risks (HRA).



Note

The integrator is responsible for the safety of the final application.

Safe access

The robot system shall be designed to allow safe access to all areas where intervention is necessary during operation, adjustment, and maintenance.

Where it is necessary to perform tasks within the safeguarded space there shall be safe and adequate access to the task locations.

Safety zones, which must be crossed before admittance, must be set up in front of the robot's working space.

Also consider the maximum possible impact caused by a breaking or malfunctioning rotating tool or other device fitted to the robot or positioned stationary in the cell.

Safe handling

Ensure that the users cannot be exposed to hazards, including slipping, tripping, and falling hazards.

Safe design

The emergency stop buttons must be positioned in easily accessible places so that the system can be stopped quickly. If any of the buttons do not stop all the robot workcell motion, each emergency stop button must be marked (if more than one is provided) to indicate its designated safety function.

2.8 Safety signals in the manual

Introduction to safety signals

This section specifies all safety signals used in the manuals. Each signal consists of:

- A caption specifying the hazard level (DANGER, WARNING, or CAUTION) and the type of hazard.
- Instruction about how to reduce the hazard to an acceptable level.
- A brief description of remaining hazards, if not adequately reduced.

Hazard levels

The table below defines the captions specifying the hazard levels used throughout this manual.

Symbol	Designation	Significance
	DANGER	Signal word used to indicate an imminently hazardous situation which, if not avoided, will result in serious injury.
	WARNING	Signal word used to indicate a potentially hazardous situation which, if not avoided, could result in serious injury.
	ELECTRICAL SHOCK	Signal word used to indicate a potentially hazardous situation related to electrical hazards which, if not avoided, could result in serious injury.
	CAUTION	Signal word used to indicate a potentially hazardous situation which, if not avoided, could result in slight injury.
	ELECTROSTATIC DISCHARGE (ESD)	Signal word used to indicate a potentially hazardous situation which, if not avoided, could result in severe damage to the product.
	NOTE	Signal word used to indicate important facts and conditions.
	TIP	Signal word used to indicate where to find additional information or how to do an operation in an easier way.

2 Safety

2.9 Installation and Operating safety

2.9 Installation and Operating safety

Installation safety

Safety has to be studied carefully before starting any mechanical and/or electrical installation and ensure that you are familiar with the safety regulations - general safety information.

Strictly follow the given instructions to avoid hazards and injury.

Personal protective equipment

Always use suitable personal protective equipment based on the risk assessment for the installation, maintenance and repair operation.

Symbol	Equipment	Significance
	Eye protective glass	Wear eye protective glass
	Safety shoes	Wear safety shoes
	Hand gloves	Wear protective hand gloves
	Safety helmet	Wear a safety helmet

Operational safety

General

- All work must be carried out professionally and in accordance with the applicable safety regulations.
- Care must be taken at all times.

Qualified personnel

Corrective maintenance must only be carried out by qualified personnel who are familiar with the entire installation as well as the special risks associated with its different parts.

2.10 Residual risks

General

If the working process is interrupted, extra care must be taken due to risks other than those associated with regular operation. Such an interruption may have to be rectified manually:

- Risk of electric shock or electrocution with parts due to poor insulation.
- Risk of electrical shock or electrocution with electrically live parts of the robot.
- Risks are associated with control failure due to poor programming or a calibration error.
- Risk of entrapment/crushing of fingers between gripper finger and workpiece.

Conveyor - Related risks

- Risk of injury from the conveyors starting automatically while personnel are inside the cell.
- Risk of injury from parts falling from the conveyor.
- Risk of injury due to personnel entering the cell through the conveyor area.
- Risk of unintended motion resulting from incorrect programming or configuration.
- Risk of ergonomic strain during equipment installation.
- Risk of electric shock from exposed live wires.
- Risk of injury due to the re-establishment of energy sources after maintenance.
- Risk of injury if personnel access the cell during maintenance activities.

Pallet Locator - Related risks

- Risk of injury from parts falling from the pallet.
- Risk resulting from incorrect programming or configuration.
- Risk of ergonomic strain during equipment installation.
- Risk of electric shock from exposed live conductors.
- Risk caused by the unintentional re-energization of equipment after maintenance.
- Risk to personnel who enter the cell during maintenance activities.

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3 Product description

Introduction



WARNING

Applicable training is required to use the product. Incorrect use of the product can lead to personal injury and material damage. Before commissioning the product, it is your responsibility to carefully read the [Safety on page 13](#) and to be familiar with the safety devices.

The FlexLoader Feeding Functional Module is a versatile feeding solution for pick-and-place applications. It combines pallet/bin and conveyor feeding in one system, making it ideal for machine tending and various material handling tasks. Equipped with advanced FlexLoader Vision, it accurately identifies and picks parts including stacked layers, semi-oriented items, and complex geometries from pallets, bins, or conveyors.

This capability supports extended unmanned production, reducing operator intervention and boosting productivity. Pre-tested robot programming modules and an adaptable layout ensure easy integration into complex or space-limited environments. Its flexibility allows one robot to serve multiple machines with different feeding and placing needs, delivering high uptime and reliable performance.

Area of use

FlexLoader Feeding Functional Module is a function package with standard equipment for automatic feeding of unsorted details with a robot. The solution can separate and feed many different types of parts. The function package must only be used as intended and according to the product, operating, safety, and installation requirements.

For more information, see [Operating manual - FlexLoader Feeding Functional Module](#) and [Installation and Commissioning manual - FlexLoader Feeding Functional Module](#).

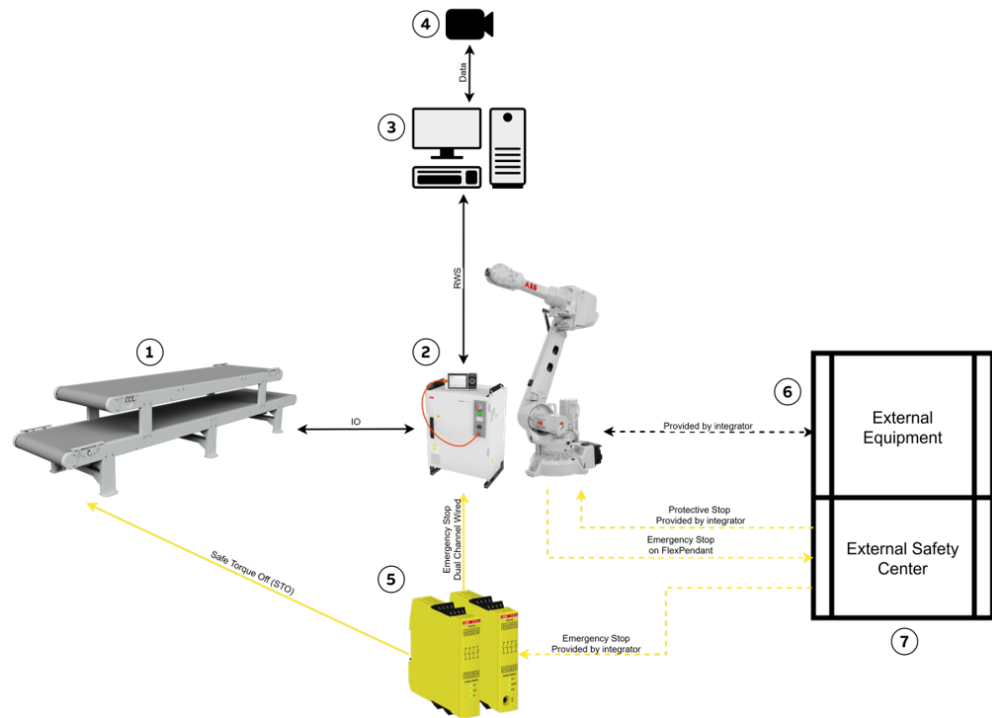
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3 Product description

Continued

Typical integration example

The figure below illustrates a typical integration example of FlexLoader Feeding Functional Module with a robot, external safety center, external equipment, and FlexLoader Vision.



Pos.	Description
1	Feeding system
2	Manipulator with robot controller
3	FlexLoader Vision
4	2D camera or 3D sensor
5	Safety relays (located in electrical control cabinet)
6	External equipment
7	External safety center

Continues on next page

3.1 Standard offering

The following main features are included in the FlexLoader Feeding Functional Module:

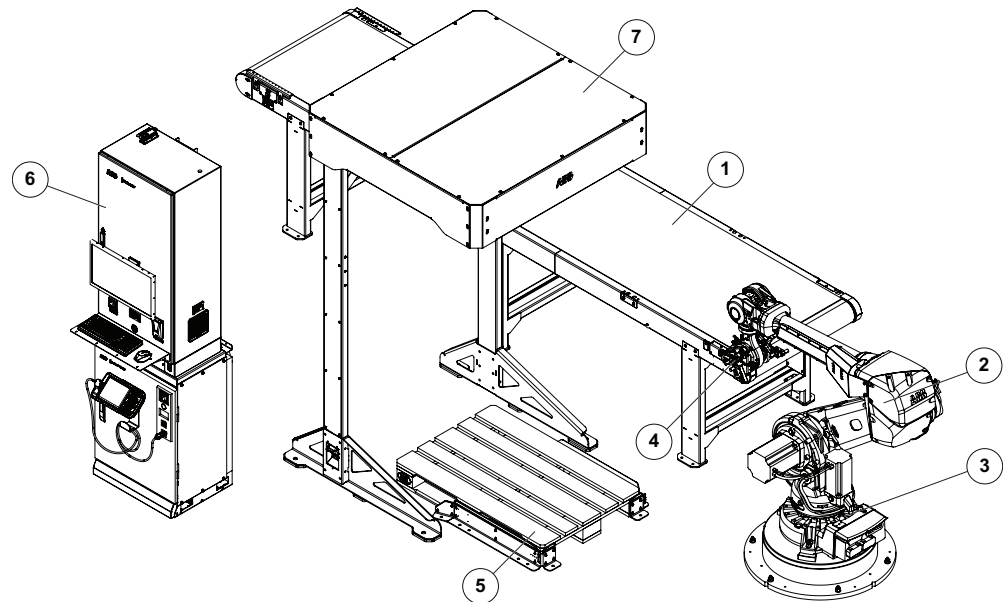
- ABB industrial robot with OmniCore V250XT controller.
- Electrical control cabinet.
- IPC with FlexLoader Vision.
- Vision stand (with 2D camera and illumination or 3D scanner).
- Feeding system (conveyors or pallet locators or a combination of both).
- Calibration equipment.
- RAPID code for FlexLoader Feeding Functional Module and FlexLoader Vision.
- Declaration of incorporation of partly completed machinery.
- Documentation.

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4 Overview of system specifications

FlexLoader Feeding Functional Module Layout

The main system components of FlexLoader Feeding Functional Module are shown in the figure below.



Pos.	Component	Description/Link
1	Out-feeding system (configurable)	For more information, see Out-feeding system on page 36 .
2	Robot dress kit (optional)	For more information, see robot Robot dress kit on page 48 .
3	Robot	For more information, see Robot on page 31 .
4	Robot gripper (optional)	For more information, see Standard grippers on page 45 .
5	In-feeding system (configurable)	For more information, see In-feeding system on page 34 .
6	Electrical control cabinet	For more information, see Electrical system on page 38 .
7	Vision stand	For more information, see FlexLoader Vision on page 42 .

Continues on next page

4 Overview of system specifications

4.1 FlexLoader Feeding Functional Module Configurations

4.1 FlexLoader Feeding Functional Module Configurations

Overview

FlexLoader Feeding Functional Module is available in various configurations. The system supports various robot sizes. An in-feeding system, either an inbound conveyor or a pallet locator to pick parts from a load carrier. The out-feeding system can be an outbound conveyor or a pallet locator.

Electrical control cabinet is available in **CE** compliant version and **UL/CSA** compliant version. For the vision system, a 2D camera can be used when the system is configured with an inbound conveyor as an in-feeding option. A 3D scanner can be selected for both in-feeding options. To the desired configuration of FlexLoader Feeding Functional Module, standard options such as grippers, robot dress kit, and robot riser can be added.

4.2 Robot system

Robot

The FlexLoader Feeding Functional Module offers IRB family robots, which include models from the 1600 to the 6700 series. The IRB is a 6-axis industrial robot, designed specifically for manufacturing industries that use flexible robot-based automation. The robot has an open structure that is specially adapted for flexible use and can communicate extensively with external systems.



Note

ABB industrial robots will not be included in the initial release.

For more information, see respective *Robot manuals*.

Robot Controller

The robot controller is the processing core of the robot. It runs the robot program, controls the movements of the robot arm, reads and writes digital signals to other devices, communicates with the PC, handles the safety related to the robot motion, etc.

Omnicore V250XT

- Ruggedized IP54 enclosure for harsh environments.
- Small and powerful for maximum flexibility.
- Including space for built-in process integration.
- Optional extension box for process equipment.



Figure 4.1: Omnicore V250XT

For more information about the controller, see [Product manual - OmniCore V250XT Type B Controller](#).

Continues on next page

4 Overview of system specifications

4.2 Robot system

Continued

Required robot options

The options listed in the table below are required for FlexLoader Feeding Functional Module.

Hardware options	
Option	Description
3000-310	OmniCore V250XT
3007-3	3x380=480 V AC±10%
3008-2	Connector
3054-1	Safety internal conn.
3050-1	Cable grommet 1
3032-2	Base Dig. 16In/16Out 1
3033-2	Add-on Dig. 16In/16Out 1
3325-11	MH Parallel
3330-2	CP/CS bus, Proc 1 base*
3333-2	CP/CS bus, Proc 1 axis 3



Note

*Not available for IRB 1600, but included in scope of supply for FlexLoader Feeding Functional Module with IRB 1600.

Software options	
Option	Description
3114-1	Multitasking
3119-1	RobotStudio Connect
3134-1	Prep. For FL Vision

FlexPendant unit

The FlexPendant is a handheld operator unit that is used for many of the tasks when operating a robot: running programs, jogging the manipulator, modifying programs, and so on.

The FlexPendant is designed for continuous operation in harsh industrial environments. Its touchscreen is easy to clean and resistant to water, oil, and accidental welding splashes.

The FlexPendant consists of both hardware and software and is a complete computer in itself. It is connected to the robot controller by an integrated cable and connector.



Note

If protective gloves are used, these must be compatible with touchscreens when using the FlexPendant.

Continues on next page

The main parts of the FlexPendant are shown in the image below:

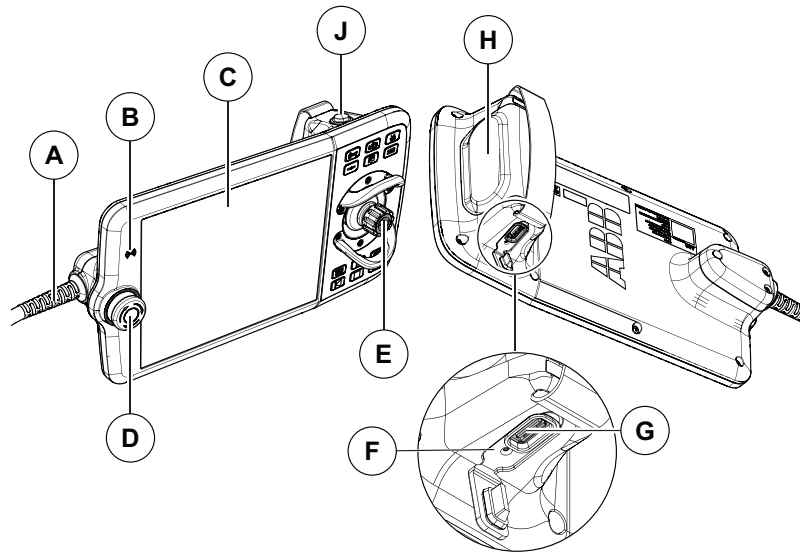


Figure 4.2: FlexPendant - Main parts

Pos.	Description
A	Connector
B	RFID reader (functionality not yet implemented)
C	Touchscreen
D	Emergency stop device
E	Joystick
F	Reset button
G	USB port
H	Three-position enabling device
J	Thumb button

For more information about the FlexPendant, see [Operating manual – OmniCore Controller](#).

4 Overview of system specifications

4.3 Feeding system

4.3 Feeding system

The feeding system includes both an in-feeding and an out-feeding system:

- In-feeding operations can be configured using a single standalone conveyor, a stacked conveyor, or a pallet locator.
- Out-feeding operations can be configured using either a single standalone conveyor or a pallet locator.

In-feeding system



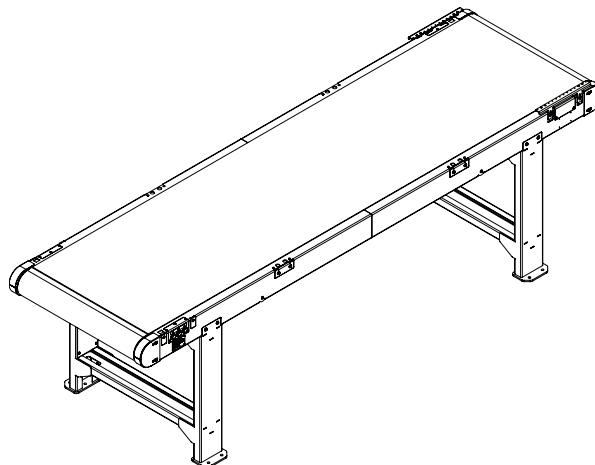
Note

The buffer capacity is specified for when the belt is pulled. When the belt runs in reverse, the maximum capacity may be lower. This reduction depends on the load distribution on the belt and the belt tension.

Inbound conveyor

Single standalone conveyor

Single standalone conveyor system for in-feeding of parts as shown in the figure below:



Technical details

The conveyor belt is made of grey felt material.

Technical details	Values
Length	3000, 4000 and 5000 mm
Width	800 mm
Buffer capacity	800 kg

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Stacked conveyors

A stacked conveyor system consists of two conveyors arranged vertically. The top conveyor serves as the in-feeder, while the lower conveyor acts as the out-feeder.

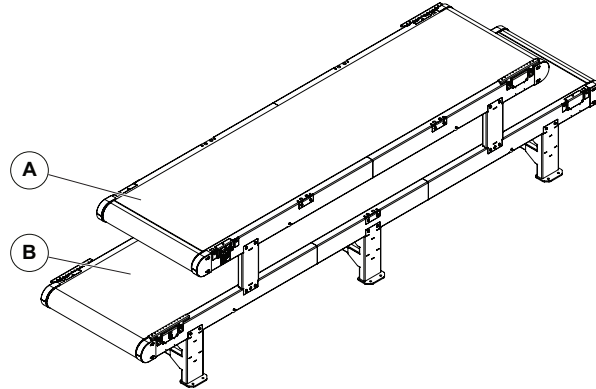


Figure 4.3: Stacked conveyor

Pos.	Description
A	Inbound conveyor
B	Outbound conveyor

Technical details

Stacked conveyor systems are available in two size options: 3000 + 4000 mm and 4000 + 5000 mm.

The conveyor belt is made of grey felt material.

Technical details	Values
Length (Inbound conveyor + Outbound conveyor)	3000 + 4000 mm and 4000 + 5000 mm
Width	800 mm
Buffer capacity	800 kg per conveyor

Continues on next page

4 Overview of system specifications

4.3 Feeding system

Continued

Functions of the inbound conveyor

Operation mode selection enables the operator to change the mode using the button box mounted on the side of the conveyor.

- Forward and backward operation using the unit.
- A sensor to stop the belt when the raw part reaches the camera's field of view.
- A sensor to stop the belt if the part is not recognized by the camera system.
- Adjustable belt speed, changed at the frequency inverter.
- Time monitored belt stop with manual reset.
- After turning ON the FlexLoader Feeding Functional Module and after activating the emergency stop, the inbound remains stationary.

Inbound pallet locator

A single pallet locator includes a sensor that detects the presence of the load carrier. The pallet locator is designed to be universal and supports various sizes and types of load carriers. For more information, see [Outbound pallet locator on page 37](#).

Out-feeding system

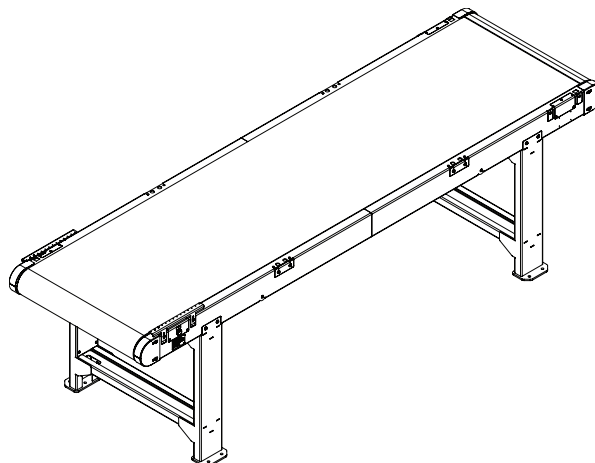


Note

The buffer capacity is specified for when the belt is pulled. When the belt runs in reverse, the maximum capacity may be lower. This reduction depends on the load distribution on the belt and the belt tension.

Outbound conveyor

Single standalone conveyor system for out-feeding of parts as shown in the figure below:



Continues on next page

Technical details

The conveyor belt is made of grey felt material.

Technical details	Values
Length	3000, 4000 and 5000 mm
Width	800 mm
Buffer capacity	800 kg

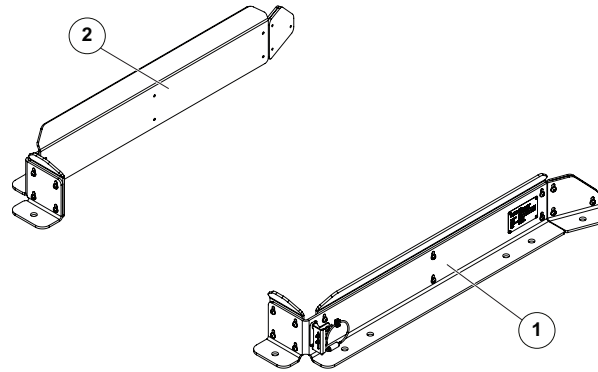
Functions of the outbound conveyor

Operating mode selection allows the operator to change the operating mode via the button box is mounted on the conveyor's side.

- A sensor to stop the belt when the finished part reaches the end of the belt.
- Time monitored belt stop with manual reset.

Outbound pallet locator

The outbound pallet locator parts as shown in the figure below:



Pos.	Description
1	Pallet Locator Side (Right, with sensor)
2	Pallet Locator Side (Left)

Technical details

Since the pallet locator sides are secured to the floor individually it supports various sizes of load carriers. The type of sensor, the placement, and the ability to adjust the sensor position enables it to support various types of load carries.

4 Overview of system specifications

4.4 Electrical system

4.4 Electrical system

Major electrical components

No.	Component	Description	Additional Information
1	Miniature Circuit Breaker S303P-K32 	Miniature Circuit Breaker - S300P - 3P - 32 A - K - (400 V) 20 kA.	For more information, see S303P-K32 .
2	Miniature Circuit Breaker S303P-B6 	Miniature Circuit Breaker - S300P - 3P - 6 A - B - (415 V AC) 100 kA.	For more information, see S303P-B6 .
3	Miniature Circuit Breaker S303P-C6 	Miniature Circuit Breaker - S300P - 3P - 6 A - C - (415 V AC) 100 kA.	For more information, see S303P-C6 .
4	Residual Current Circuit Breaker DS201 B10 A30 UL 	Residual Current Circuit Breaker with Overcurrent Protection DS201 UL - 1P+N - 30 mA - 10 A - B - Type A.	For more information, see DS201 B10 A30 UL .

Continues on next page

No.	Component	Description	Additional Information
5	Power Supply CP-T 24/20.0 	• CP-T 24/20.0 Power supply. • In: 3x400-500VAC. • Out: 24VDC/20.0A.	For more information, see CP-T 24/20.0 .
6	Industrial Ethernet Switch-FL SWITCH 1108N 	• Narrow Ethernet switch. • Eight RJ45 ports with 10/100/1000 Mbps on all ports. • Automatic data transmission speed detection. • Autocrossing function. • QoS.	For more information, see FL SWITCH 1108N .
7	Safety Relay Sentry SSR10 	• Sentry SSR10 Safety relay with relay outputs 3NO+1NC. • +24 VDC supply voltage. • Screw terminals.	For more information, see Sentry SSR10 .
8	Safety Relay Sentry BSR11 	• Sentry BSR23 safety expansion relay with relay outputs 4NO+1NC. • +24 VDC supply voltage. • Screw terminals.	For more information, see Sentry BSR11 .

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4 Overview of system specifications

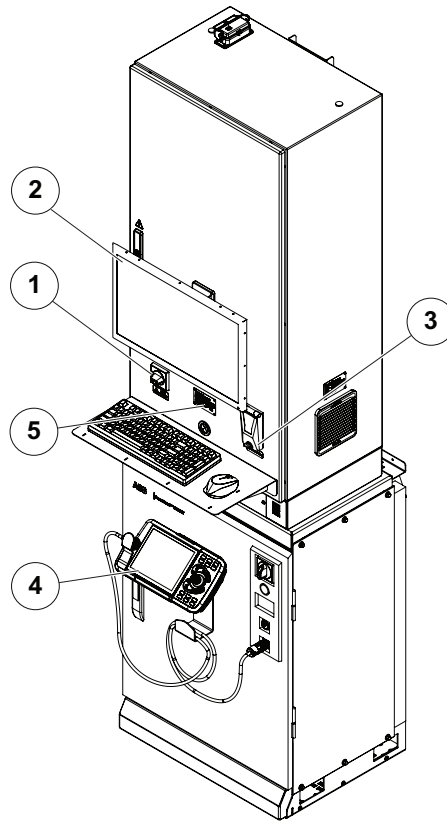
4.4 Electrical system

Continued

No.	Component	Description	Additional Information
9	Local I/O Digital base DSQC1030 	• Digital base device, DSQC1030. • EtherNet/IP Adapter. • 16 digital inputs. • 16 digital outputs. • Combinable with up to four add-on devices.	For more information, see DSQC1030 .
10	Digital Add-On DSQC1031 	• Digital add-on device, DSQC1031. • 16 digital inputs. • 16 digital outputs. • Must be used together with a digital base device.	For more information, see DSQC1031 .
11	LV AC Machinery Drive Module ACS180-04S-01A8-4 	• LV AC machinery drive module. • IEC: Pn 0.55 kW, 1.8 A, 400 V. • UL: Pld 0.75 Hp, 1.6 A, 460 V.	For more information, see ACS180-04S-01A8-4 .

4.5 Operator interface

Devices for controlling the robot and the safety system are found on the electrical control cabinet of the FlexLoader Feeding Functional Module.



Pos.	Description
1	Main switch
2	FlexLoader vision interface
3	Service Interface
4	FlexPendant
5	Machine ID Plate

4 Overview of system specifications

4.6 FlexLoader Vision

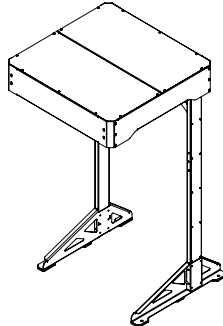
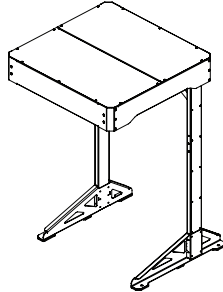
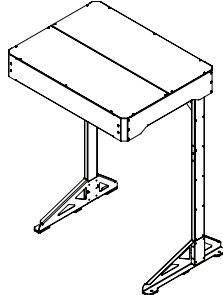
4.6 FlexLoader Vision

Introduction

FlexLoader Vision is a user-friendly vision system designed to guide ABB robots during material handling. A 2D camera or a 3D sensor is used to identify the location and orientation of a part and this information is sent to the robot. The robot can then pick up or manipulate the part without the need for any mechanical fixtures. FlexLoader Vision has a simple and intuitive user interface that is designed to minimize setup times.

Vision stand

The different types of vision stands are listed below:

Types	Illustrations
Vision Stand 2D	
Vision Stand 3D W1200 x H2562	
Vision Stand 3D W1600 x H2562	

Continues on next page

What is included

FlexLoader Vision contains the following:

- Industrial PC with Windows 11 Enterprise (English).
- FlexLoader Vision software.
- User interface for simple and intuitive user interactions, designed to minimize setup times.
- 2D camera (B/W, 1.3 Megapixel), lens and cabling or 3D sensor with cabling.
- Powerful illumination (only for 2D).
- RAPID code for communication between robot and FlexLoader Vision.
- Documentation.

Features

FlexLoader Vision features the following:

- Specifically designed for guidance of ABB robots.
- Tightly integrated control and communication with the robot.
- Scalable up to 4 cameras.
- Pre-picking avoidance of gripping tool collisions.
- Easy definition of standard grippers and supports user defined grippers.
- Avoid moving parts.
- Supports user defined parameters (PLC or robot).
- High-performance FlexLoader Vision algorithms from Zebra Imaging.
- Identification (and discrimination) of different objects is possible by using tools for image preparation, enhancement and various verification methods.
- Proven and ready to use RAPID application code templates.
- Multi-language support.
- Graphical interface with PLC integration.
- Configurable graphical presentation of safety information (data from robot controller) and cell overview.

For more information, see [Product manual - FlexLoader Vision Module](#).

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5 Standard options

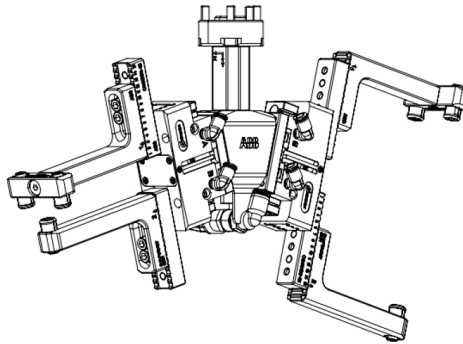
5.1 Standard grippers

Overview

The standard grippers are compatible with multiple robot models. The standard gripping solution consists of dual 3-finger grippers and 2-finger grippers. The fingers are adjustable to suit multiple sizes of parts.

2-Finger gripper

Double 2-finger gripper with flexible fingers, interchangeable contact points, and an air blow nozzle. The gripper is suitable for both internal and external gripping.



Sizes		
Gripper ID	Recommended workpiece*	Suitable robots
83220-0001	Maximum width for outside grip: 150 mm Minimum width for outside grip: 10 mm Maximum recommended weight: 2,75 kg	Fits robot with flange diameter of 50 mm: <i>IRB 1300-11/0.9</i> <i>IRB 1300-10/1.15</i> <i>IRB 1300-7/1.4</i> <i>IRB 1300-12/1.4</i> <i>IRB 1600-6/1.2</i> <i>IRB 1600-6/1.45</i> <i>IRB 1600-10/1.2</i> <i>IRB 1600-10/1.45</i>
83220-0002	Maximum width for outside grip: 150 mm Minimum width for outside grip: 10 mm Maximum recommended weight: 2,75 kg	Fits robot with flange diameter of 63 mm: <i>IRB 2600-20/1.65</i> <i>IRB 2600-12/1.65</i> <i>IRB 2600-12/1.85</i> <i>IRB 4400/L10</i> <i>IRB 4600-20/2.50</i> <i>CRB 15000 GoFa 5</i> <i>CRB 15000 GoFa 10</i> <i>CRB 15000 GoFa 12</i>

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5 Standard options

5.1 Standard grippers

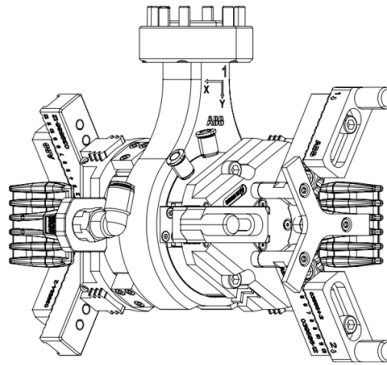
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Sizes		
Gripper ID	Recommended workpiece*	Suitable robots
85050	Maximum width for outside grip: 270 mm Minimum width for outside grip: 28 mm Maximum recommended weight: 12,5 kg	Fits robot with flange diameter of 125 mm: <i>IRB 4600-60/2.05</i> <i>IRB 4600-45/2.05</i> <i>IRB 4600-40/2.55</i> <i>IRB 5710-90/2.7</i> <i>IRB 5710-70/2.7 LID</i>

*The recommended maximum workpiece weight is specified per gripper. The maximum weight must always be within the maximum allowed weight for the robot's size.

3-Finger gripper

Double 3-finger gripper with adjustable fingers and two air cleaning nozzles. A spring loaded pressure piece on one side is used when loading a part to a stop. The gripper is suitable for both internal and external gripping.



Sizes		
Gripper ID	Recommended workpiece*	Suitable robots
83290-0001	Maximum width for outside grip: 113,45 mm Minimum width for outside grip: 13,55 mm Maximum recommended weight: 2,9 kg	Fits robot with flange diameter of 50 mm: <i>IRB 1300-11/0.9</i> <i>IRB 1300-10/1.15</i> <i>IRB 1300-7/1.4</i> <i>IRB 1300-12/1.4</i> <i>IRB 1600-6/1.2</i> <i>IRB 1600-6/1.45</i> <i>IRB 1600-10/1.2</i> <i>IRB 1600-10/1.45</i>

Continues on next page

Sizes		
Gripper ID	Recommended workpiece*	Suitable robots
83290-0002	Maximum width for outside grip: 150 mm Minimum width for outside grip: 18 mm Maximum recommended weight: 5 kg	Fits robot with flange diameter of 63 mm: <i>IRB 2600-20/1.65</i> <i>IRB 2600-12/1.65</i> <i>IRB 2600-12/1.85</i> <i>IRB 4400/L10</i> <i>IRB 4600-20/2.50</i> <i>CRB 15000 GoFa 5</i> <i>CRB 15000 GoFa 10</i> <i>CRB 15000 GoFa 12</i>
85045	Maximum width for outside grip: 251 mm Minimum width for outside grip: 37 mm Maximum recommended weight: 30 kg	Fits robot with flange diameter of 125 mm: <i>IRB 4600-60/2.05</i> <i>IRB 4600-45/2.05</i> <i>IRB 4600-40/2.55</i> <i>IRB 5710-90/2.7</i> <i>IRB 5710-70/2.7 LID</i>

*The recommended maximum workpiece weight is specified per gripper. The maximum weight must always be within the maximum allowed weight for the robot's size.

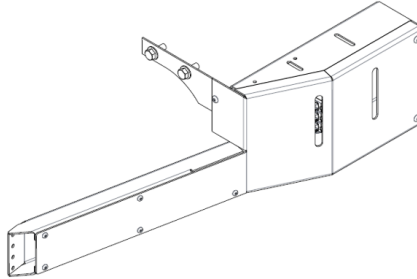
5 Standard options

5.2 Robot dress kit

5.2 Robot dress kit

Overview

The option robot dress kit is attached to the robot and includes pre-configured signals and pneumatic valves to control the gripper.



Valve outputs

Two double-solenoid valves will be assigned to the two grippers, and a 2-way monostable valve will be allocated for air cleaning nozzles. Additionally, six signals will be configured and wired to effectively manage the outputs of the grippers.

Sizes		
Gripper ID	Pneumatic connection	Suitable robots
83364-0001	Input: 1 x 10 mm hose Output: 6 x 6 mm hose on pneumatic manifold rails	<i>IRB 1600-6/1.2</i> <i>IRB 1600-6/1.45</i> <i>IRB 1600-10/1.2</i> <i>IRB 1600-10/1.45</i>
83364-0002	Input: 1 x 10 mm hose Output: 6 x 6 mm hose on pneumatic manifold rails	<i>IRB 2600-20/1.65</i> <i>IRB 2600-12/1.65</i> <i>IRB 2600-12/1.85</i>
85035-0001	Input: 1 x 10 mm hose Output: 4 x 6 mm hose on outside of dress kit 2 x 8 mm hose on outside of dress kit	<i>IRB 4600-60/2.05</i> <i>IRB 4600-45/2.05</i>
85035-0002	Input: 1 x 10 mm hose Output: 4 x 6 mm hose on outside of dress kit 2 x 8 mm hose on outside of dress kit	<i>IRB 4600-40/2.55</i>

6 Installation

6.1 General

**Note**

Read the safety precautions and other instructions carefully before unpacking and installing the equipment.

This section provides a brief overview of how to install the FlexLoader Feeding Functional Module. For more information, see [Installation & Commissioning manual – FlexLoader Feeding Functional Module](#).

6 Installation

6.2.1 Transportation

6.2 Mechanical installation

6.2.1 Transportation



DANGER

All lifting devices must be properly dimensioned. The weight of the packages included in the delivery will depend on the chosen configuration, manipulator size and additional options:

- 1 Electrical control cabinet:
 - a With package weight = From 200 kg.
 - b Without package weight = From 175 kg.
- 2 Robot:
 - a With package weight = From 290 kg (IRB 1600).
 - b Without package weight = From 250 kg (IRB 1600).
- 3 Vision Stand 2D:
 - a With package weight = From 285 kg.
 - b Without package weight = 210 kg.
- 4 Vision Stand 3D:
 - a With package weight = From 255 kg.
 - b Without package weight = From 180 to 200 kg, depending on width.
- 5 Single Conveyor:
 - a With package weight = From 310 kg to 460 kg, depending on length.
 - b Without package weight = From 310 kg to 460 kg, depending on length.
- 6 Stacked Conveyors
 - a With packaging = From 635 kg to 765 kg, depending on length.
 - b Without packaging = From 635 kg to 765 kg, depending on length.
- 7 Pallet Locator:
 - a With package weight = Packed together with vision stand.
 - b Without package weight = 21 kg.



WARNING

The lifting instructions below apply to standard equipment. The center of gravity varies depending on how the FlexLoader Feeding Functional Module is configured. Lift with care and adjust which openings are selected in relation to the center of gravity.

When standard equipment is supplemented with additional items, the center of gravity shifts, making the lifting operation unsafe and hazardous.

Continues on next page



CAUTION

The FlexLoader Feeding Functional Module must be lowered carefully. Knocks, shaking and drops can cause deformation.

Be careful with moving parts when transporting the FlexLoader Feeding Functional Module using a forklift truck.



WARNING

Never walk or stand beneath a suspended load.

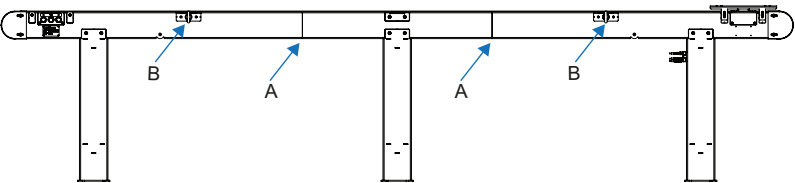
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6 Installation

6.2.1 Transportation

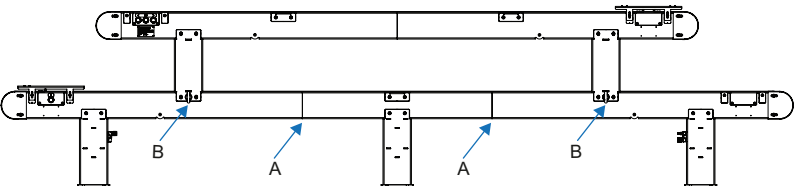
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Single Conveyor



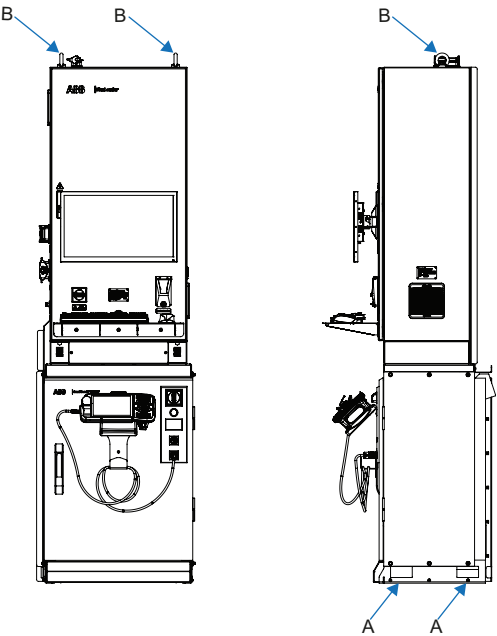
Pos.	Description
A	Use lifting straps on lifting lugs
B	Forks underneath conveyor chassis

Stacked Conveyor



Pos.	Description
A	Use lifting straps on lifting lugs
B	Forks underneath conveyor chassis

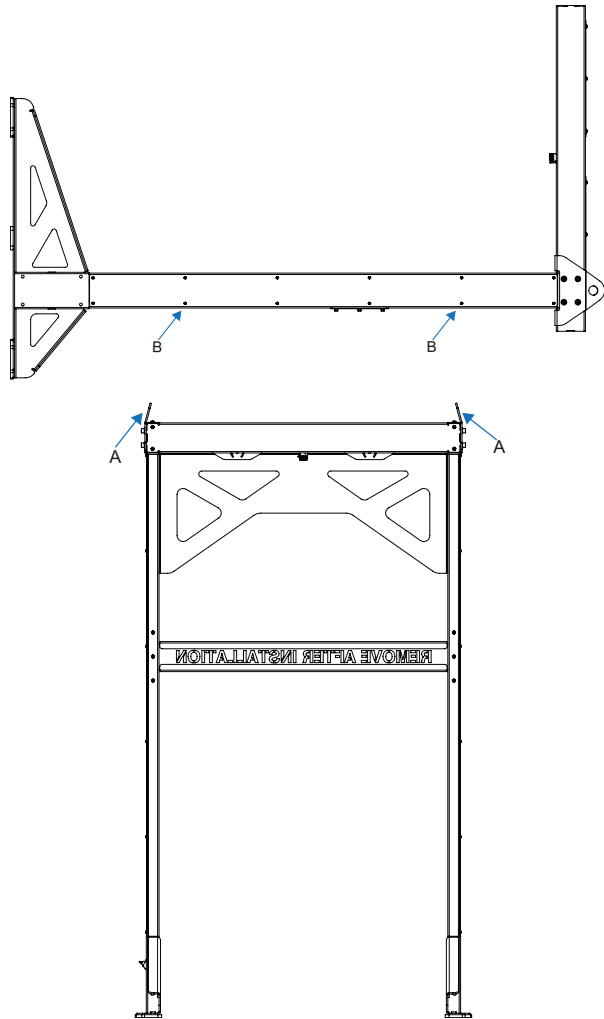
Electrical control cabinet



Pos.	Description
A	Forks in forklift slots
B	Use lifting straps on lifting lugs

Continues on next page

Vision stand



Pos.	Description
A	Laying: Forks underneath chassis
B	Standing: Lifting straps

Continues on next page

6 Installation

6.2.1 Transportation

Continued

Floor requirements

The floor where the FlexLoader Feeding Functional Module is installed has to fulfill certain requirements:

- The floor and fastening elements must support the forces generated by the robot. For more information, see respective *Robot manual*.
- The robot must be secured to the floor. For more information, see respective *Robot manuals* and [Product manual - Robot Riser](#).
- Other equipment must be secured with suitable fasteners chosen based on the floor type and quality. Fastener dimensions vary from M12 to M20.

6.3 Electrical installation

Introduction

Connect the necessary wiring to the electrical cabinet and connect other media to the respective connection points, according to the wiring diagram.

Connect the wiring between the processing machine and the external equipment according to the wiring diagram.

Ensure that local rules and legislation is followed, e.g, by setting a lockable main switch if needed.

Power supply

Power supply conductors shall be connected to the Harting connector for mains connection. The connector is included in the delivery of the FlexLoader Feeding Functional Module. The customer end of the connector should be connected to the mains connector located on the top surface of the electrical control cabinet.

3x 380...400V 50Hz

The maximum short-circuit current is 10 kA. Required a circuit breaker with a minimum characteristic of at least type C or better. The maximum fuse size is 63 A.

3x 440...480V 60Hz

The maximum short-circuit current is 10 kA. Required a circuit breaker with a minimum characteristic of at least type C or better. The maximum fuse size is 63 A.



Note

For other voltage standards, a transformer must be used between the power supply and the mains connection of the FlexLoader Feeding Functional Module.

Earthing system

Within countries applying EU regulation, the protective earthing system shall be performed according to EN-60204-1, the PE conductor shall be dimensioned according to section 5.2, table 1.

Within countries applying US regulations, grounding and bonding equipment shall be performed according to the national electrical code, NFPA 70.



CAUTION

The FlexLoader Feeding Functional Module is designed for use with the TNS earthing scheme.

6 Installation

6.4 Pneumatic installation

6.4 Pneumatic installation

General

The standard delivery does not require any pneumatic connections.

If the option for a robot dress kit or gripper is selected, a pneumatic connection must be provided for the robot. For more information, see respective *Robot manuals*.

6.5 Network security

Overview

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 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.

6 Installation

6.6 Licensing

6.6 Licensing

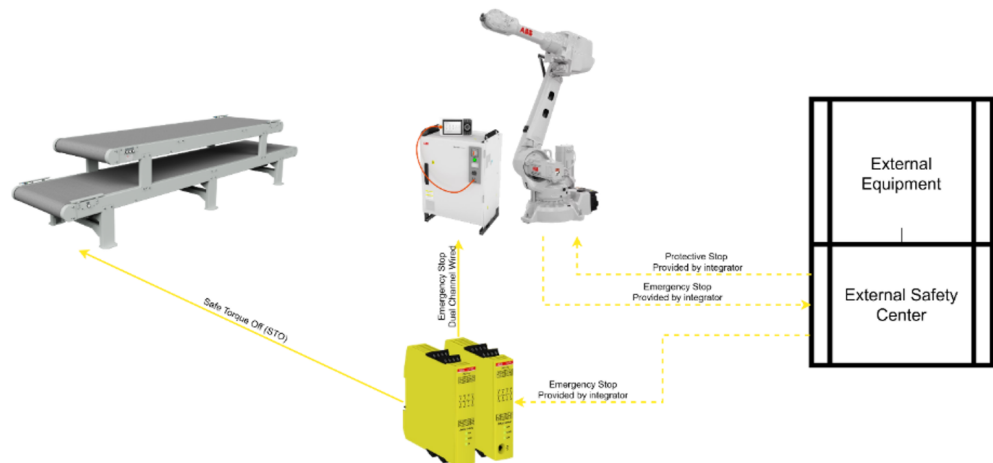
By installing and using FlexLoader Feeding Functional Module and its FlexLoader Vision you agree to Microsoft and Zebra's license agreements.

7 Interface

7.1 Safety interface

Overview

The FlexLoader Feeding Functional Module functions as a slave component towards external equipment. The external equipment must act as the master of the safety. The FlexLoader Feeding Functional Module's safety relays manage the safety of its internal components, such as feeders and robots.



The emergency stop and protective stop on the FlexLoader Feeding Functional Module meets the requirements of category 3 and PLd.



Note

The integrator is responsible for the safety of the final application.

The integrator of the FlexLoader Feeding Functional Module is responsible for handling the signals for emergency stop and protective stop:

- Receiving the emergency stop signals from the robot.
- Sending emergency stop signals to FlexLoader Feeding Functional Module.
- Sending auto stop signals for protective stop functionality to the robot.

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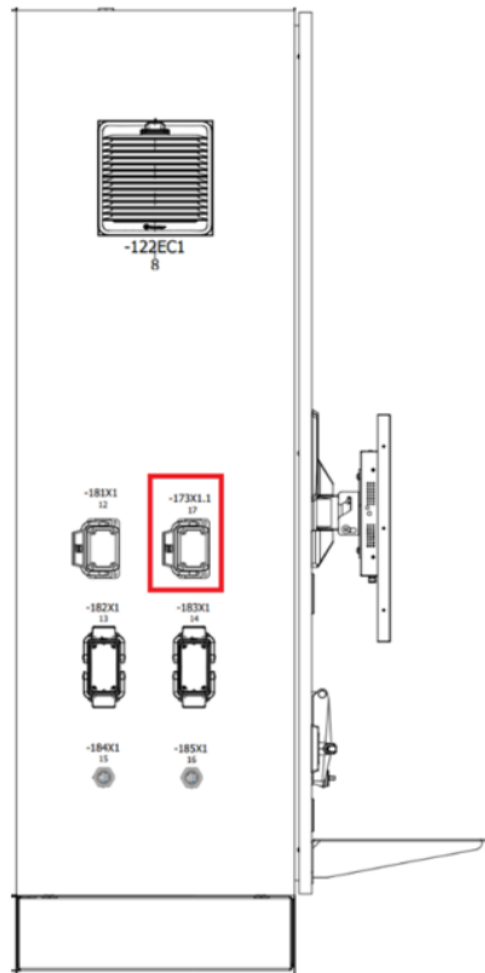
7 Interface

7.1 Safety interface

Continued

External safety connection

The necessary parts for the integrator/customer side of the external safety connection are supplied with the FlexLoader Feeding Functional Module. The connector is located on the side of the electrical control cabinet, as shown in the figure below:



The external safety interface includes the following connections:

- Two-channel potential-free emergency stop to the external safety center.
- Two-channel potential-free emergency stop from the external safety center.
- Two-channel potential-free protective stop from the external safety center.
- 24 VDC and 0 VDC.

7.2 Functional interface

Overview

FlexLoader Feeding Functional Module features a function interface that enables communication with the robot and the rest of the robot cell. Some signals may not be present depending on how the FlexLoader Feeding Functional Module is configured.

The signals are connected to the **DSQC1030**, and there are spare signals available for use.



Note

The number of available spare signals: 19 inputs and 20 outputs (two of these are connected to the CP/CS connection of the robot).

The internal interface between the robot and FlexLoader Feeding Functional Module is described below.

Signal list for robot

Name	Type of Signal	Signal Identification Label	Available for option
doCam_IlluminationOn	Digital Output	Signal for light for 2D camera.	2D Camera
diConv1In_InPos	Digital Input	Sensor on inbound conveyor. Indicating a part is present under the camera.	Inbound conveyor
diConv1In_TooFar	Digital Input	Sensor on inbound conveyor. Indicating a part has reached the end of the conveyor.	Inbound conveyor
diConv1In_ManForward	Digital Input	Button on inbound conveyor to start manual run forward.	Inbound conveyor
diConv1In_ManModeSelect	Digital Input	Button on inbound conveyor to switch operating mode.	Inbound conveyor
diConv1In_ManBackward	Digital Input	Button on inbound conveyor to start manual run backward.	Inbound conveyor
diConv1In_DrivesOK	Digital Input	Drives for inbound conveyor OK.	Inbound conveyor
doConv1In_RunForward	Digital Output	Signal to frequency inverter to run inbound conveyor forward.	Inbound conveyor
doConv1In_RunBackward	Digital Output	Signal to frequency inverter to run inbound conveyor backward.	Inbound conveyor
doConv1In_ManModeIndicator	Digital Output	Lamp on inbound conveyor to indicate operation mode of conveyor.	Inbound conveyor
diConv10Out_TooFar	Digital Input	Sensor on outbound conveyor. Indicating a part has reached end of conveyor.	Outbound conveyor
diConv10Out_ManForward	Digital Input	Button on outbound conveyor to start manual run forward.	Outbound conveyor
diConv10Out_DrivesOK	Digital Input	Drives for outbound conveyor OK.	Outbound conveyor

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7 Interface

7.2 Functional interface

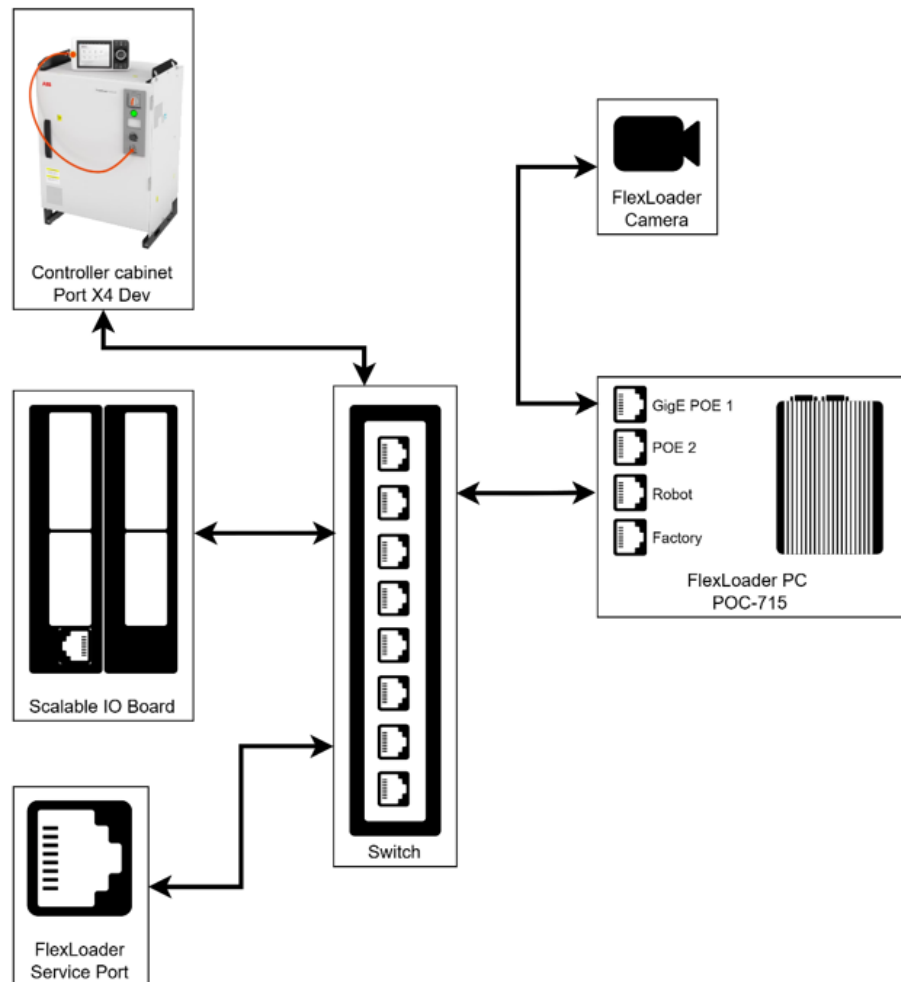
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Name	Type of Signal	Signal Identification Label	Available for option
doConv10ut_RunForward	Digital Output	Signal to frequency inverter to run outbound conveyor forward.	Outbound conveyor
doConv10ut_EmptyingMode Indicator	Digital Output	Lamp on outbound conveyor to indicate outbound conveyor is in emptying mode.	Outbound conveyor
diPallet1In_InPos	Digital Input	Pallet in position under cameras.	Pallet In
diPallet10ut_InPos	Digital Input	Pallet out in position.	Pallet Out
doRob_Gripper1Open	Digital Output	Signal to open gripper 1	Robot dress kit
doRob_Gripper1Close	Digital Output	Signal to close gripper 1	Robot dress kit
doRob_Gripper2Open	Digital Output	Signal to open gripper 2	Robot dress kit
doRob_Gripper2Close	Digital Output	Signal to close gripper 2	Robot dress kit
doRob_AirNozzle1On	Digital Output	Signal for airclean nozzle 1	Robot dress kit
doRob_AirNozzle2On	Digital Output	Signal for airclean nozzle 2	Robot dress kit
diEM_StopOK	Digital Input	Emergency stop is OK. Feedback from safety relay.	
diControlVoltage_OK	Digital Input	A control voltage of 24 volts is OK.	

7.3 Network architecture

Overview

The standard network setup is configured as shown below:



- The camera network is reserved for the FlexLoader Vision camera.
- The internal cell network connects all internal components, mainly through **Ethernet** communication.
- The factory network can be connected to the FlexLoader Vision PC. This network is optional and needs to be configured if used.

Continues on next page

7 Interface

7.3 Network architecture

Continued

Internal cell network

The internal cell network connects the FlexLoader Vision PC, the robot, and other components within the cell. The PC's network connection is labeled **Robot**. This network serves as the robot's private network and is connected through the physical port labeled **X4 Device**.

Camera network

The **FlexLoader Vision PC** is connected to the 2D camera or 3D sensor on a separate internal network.

The PC network connection is named **GigE** on physical port **PoE1**.

A single 2D camera or 3D sensor is connected to a **PoE** port of the **FlexLoader Vision PC**. Several cameras are typically connected by using a **PoE** switch.

Standard network IP settings

Internal machine network

Equipment	IP address	Subnet mask	Gateway	Device name
Camera network				
FLV PC GigE PoE 1	192.168.2.1	255.255.255.0	192.168.2.1	N/A
Camera 1	192.168.2.2	255.255.255.0	192.168.2.1	N/A
Cell network				
Robot (DEV)	192.168.125.1	255.255.255.0	192.168.125.1	N/A
FLV PC Robot	192.168.125.150	255.255.255.0	192.168.125.1	N/A
Scalable IO Ethernet IP	192.168.125.100	255.255.255.0	192.168.125.1	KEC1

8 RAPID Overview

Overview

This section provides an overview of the robot program's basic structure. The provided code will handle the internal functionality and options for the FlexLoader Feeding Functional Module. Further modifications and adjustments are necessary for functionality that depends on the process scenario and robot cell modifications. For more information on robot programming, see the RAPID-related manual.

The FlexLoader Feeding Functional Module RAPID code is composed of multiple modules, each one supporting a specific system as follows:

- 1 Communication with FlexLoader Vision
- 2 Conveyor Control
- 3 Master/slave for FlexLoader Vision control
- 4 Error logging and handling, among others.
- 5 Optional – Gripper control and example of handling. Load handling for gripper with multiple grippers.

Continues on next page

8.1 Functionality

Conveyor Control

Conveyor control is a solution for managing parts handling conveyors. It supports both **Manual** and **Automatic** operator control. The module features a dual conveyor system, both input and output, with sensor-based positioning, drive monitoring, and mode switching. Parameters for the conveyors can be adjusted as needed.

The general program flow is as follows:

- Initialize variables for both conveyors.
- Monitor frequency inverter health.
- Switch between **Automatic** and **Manual** mode.
- Get the current signals from the sensors and the robot.
- Execute robot operations depending on the state.

Master/slave for FlexLoader Vision control

The Master/slave for FlexLoader Vision is a template in which the robot controller acts as the master and actively commands the FlexLoader Vision. The integrator has the flexibility to adjust this template as necessary.

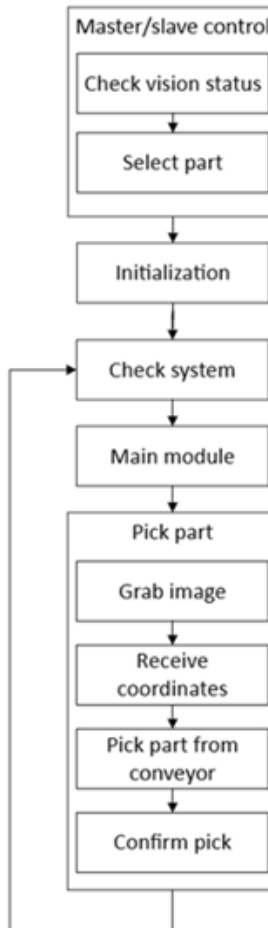
The general program flow is as follows:

- 1 Initialize the variables, set up FlexLoader Vision, and establish machine communication, etc.
- 2 Grab images and get vision analysis results.
- 3 Retrieve the part coordinates.
- 4 Move to the camera area.
- 5 Pick parts.

Continues on next page

RAPID flow

The figure below shows the general flow of the RAPID code.



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9 Maintenance

9.1 Maintenance schedule



WARNING

Always follow the general safety instructions, see [Safety on page 13](#).

This section covers maintenance of both the FlexLoader Feeding Functional Module and options that are not included in all installations. If the installation contains further parts, maintenance instructions may also be found in other documentation.

The FlexLoader Feeding Functional Module is made of components that have a minimal maintenance requirement. However, there are some components that require scheduled maintenance.

Always ensure that the FlexLoader Feeding Functional Module is turned off during maintenance.

Below is an overview of the maintenance intervals and the corresponding corrective actions.

Maintenance intervals	Corrective action
Daily	Clean the conveyor belt.
Every week	Check the conveyor belt. The FlexLoader Feeding Functional Module overall cleaning.
Every month	Check the electrical functions. Check the gripper (option).
Every 3 months	Check the cables and the cable rack. Check the connections.
Every 6 months	Replace the compressed air filter cartridge.
When necessary	Adjust the conveyor belt. Replace the illumination tower lamps. Check, clean and replace the sensors and sensor reflectors. Clean the camera optics. Clean the PC screen. Drain the air preparation condensate.
If the system has been changed	Backup the robot program. Backup the vision system. Create recovery image of vision PC.
Automatic	Windows updates (performed as long as PC has internet connectivity).
After 10 million cycles	Lubricate the gripper system.

9 Maintenance

9.2 Mechanical maintenance

9.2 Mechanical maintenance

FlexLoader Feeding Functional Module overall cleaning

What: Overall cleaning of the FlexLoader Feeding Functional Module.

When: Once / week. More often if needed.

How: Let the robot move to its home position (-> entry request).

Clean all surfaces from chips, oil, and other material that might disturb correct function.

Vacuum clean with an industrial grade vacuum cleaner. Be careful when cleaning inside.

Robot, mechanical maintenance

What: Refer to the product manual of the robot for more information.

Clean the conveyor belt

What: Clean the conveyor belt.

When: Vacuum the felt belts at least once a week. Clean all other belts every day.

How: Felt belts should be vacuumed. All other belts are cleaned with a soap solution and a cloth. Run the belt to be able to clean the entire belt.

Check the conveyor belt

What: Check the conveyor belt.

When: Every week.

How: Run the conveyor belt and check that the belt does not slip at the motor drum nor moves sideways.

Adjust the conveyor belt

What: Adjust the conveyor belt.

When: When it starts to move sideways or slacken.

How: Refer to the installation sections for belt adjustment and belt tension.

Check the gripper system (option)

What: Check the gripper system.

When: Every month.

How: Visually check the gripper system, including gripper holder, gripper finger holders and gripper fingers, for signs of mechanical wear. Replace damaged or worn parts.

Continues on next page

Lubricate the gripper system

What: Lubricate the gripper system.

When: After 10 million cycles. At ambient temperature above 60°C the lubricants can harden faster. Decrease the interval accordingly.

How: During maintenance, apply lubricant to all greased areas using a lint-free cloth.

Surface	Recommended lubricant
Metallic sliding surfaces	Schunk LINOMAX or Schunk microGLEIT GP 360 or equivalent.
All seals	Schunk Renolit HLT 2 or equivalent.
Bores on the piston	Schunk Renolit HLT 2 or equivalent.

In addition to the described maintenance, the guides of the gripper can be re-lubricated as needed by means of lubricating nipples. The lubricating nipples can be used instead of the air purge connection. Remove the two adjustment screws for the air purge connection and replace them with two conical grease nipples.

For more information on gripper system lubrication, see *Schunk manuals*.

9 Maintenance

9.3 Electrical maintenance

9.3 Electrical maintenance

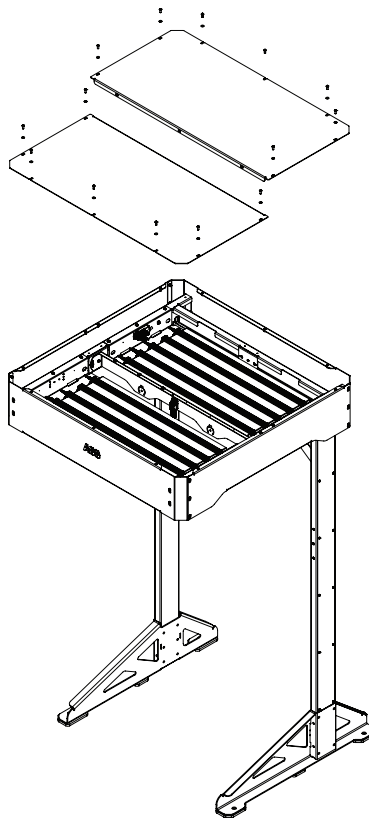
Robot, control cabinet

For more information about control cabinet and robot maintenance, see [Product manual - OmniCore V250XT Type B Controller](#) and respective *Robot manuals*.

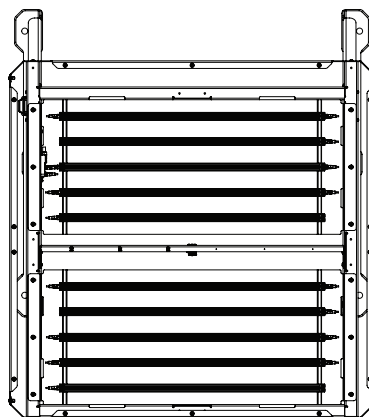
Illumination

Follow the steps below to replace the faulty LED module:

- 1 Switch off the power.
- 2 Disconnect the Harting connector from the vision stand.
- 3 Remove the top cover plates from the roof of the vision stand.



- 4 Disconnect the cable(s) from the defective LED module.



Continues on next page

- 5 The LED modules are secured in their respective brackets. To remove a module, pull it downwards to disengage it from the bracket.
- 6 Install the new LED module in reverse order.

Sensors and reflectors

What: Check that all sensors and sensor reflectors (if any) are intact, clean and secured properly.

When: Check and clean when necessary, depending on the amount of dirt that comes from the workpieces and the surroundings. Replace if necessary.

Check the safety functions

What: Check all emergency stops and emergency and safety switches.

When: Check every month and fix when necessary.

Electrical function check

What: Check all electrical functions, breakers, and limit position functions.

When: Once / month.

Check the cables and cable racks

What: Check the cables and cable racks.

When: Every 3 months.

How: Inspect the entire cable rack (fixing points, dirt deposits, wear) and remedy any breaks. Check all cables. Replace any damaged cables. Extend cables that rub against sharp edges.

Check the connections

What: Check the connections.

When: Every 3 months.

How: Inspect all connections and ensure that they are secured properly and that there is no risk of play.

9.4 Backup

Backup the vision system

What: Do a backup of workpieces stored in the vision system.

When: When you have made a change to the system.

How: Create a backup on the **Service** tab on the **Settings** menu and save it to a secure media.

Backup the robot program

What: Do a backup of the robot program.

When: When you have made a program change.

How: Follow the robot manual and save the copy to secure media.

Recovery image of the vision system

What: Do a complete recovery image of the vision system.

When: After major system changes, upgrades or updates.

How: Follow instructions in the FlexLoader Vision product manual.

9.5 Other maintenance

Clean the camera optics

What: Clean the camera optics.

When: When the image quality is reduced by dirt.

How: Wipe the front of the object using a clean cloth. If this is not sufficient, use pure alcohol or similar. Ensure not to leave any streaks on the lens.



Note

If you happen to change the camera position, perform a new calibration.

Clean the computer screen

What: Carefully wipe the screen off using a damp cloth.

When: As necessary.

Windows updates

What: Download and install Windows updates.

When: Windows updates are downloaded and installed by standard Windows functionality as long as the PC has internet connectivity.

How: Normally, no user interaction is necessary. If the system needs to restart this is performed by standard windows functionality.



Note

Feature updates shall not be installed on the PC. This is defined by deselecting the "Defer feature updates" switch.

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10 Repair

10.1 Introduction

This section describes how to repair FlexLoader Feeding Functional Module and options that are not included in all installations. If the installation contains further parts, repair instructions may also be found in other documentation.

Most repairs of FlexLoader Feeding Functional Module are relatively straight forward to carry out. The most important procedures can be found in this section. Minor repairs that can be performed with common industry methods are not described in this manual.



WARNING

Always follow the general safety instructions, see [Safety on page 13](#).



Note

How to repair the robot is described in the *Robot Product Manual*.

10 Repair

10.2 Conveyors

10.2 Conveyors

Safety



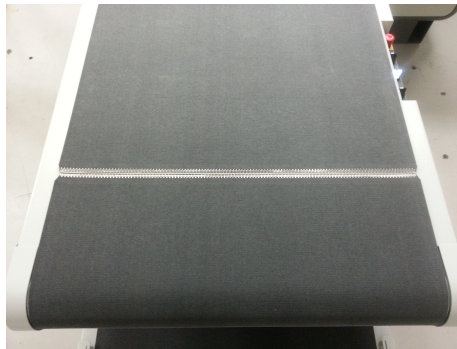
WARNING

Before carrying out any work on the conveyors: Place the belt in a suitable position, switch off the power to FlexLoader Feeding Functional Module and lock the switch to prevent unintentional switching on.

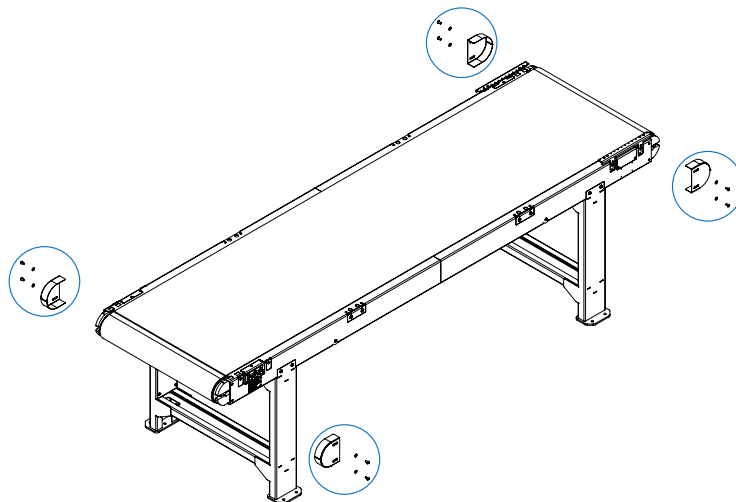
Conveyors

Follow the steps below to replace the belt on the conveyor:

- 1 Run the belt to a suitable position. Position the belt joint close to the end of the conveyor.

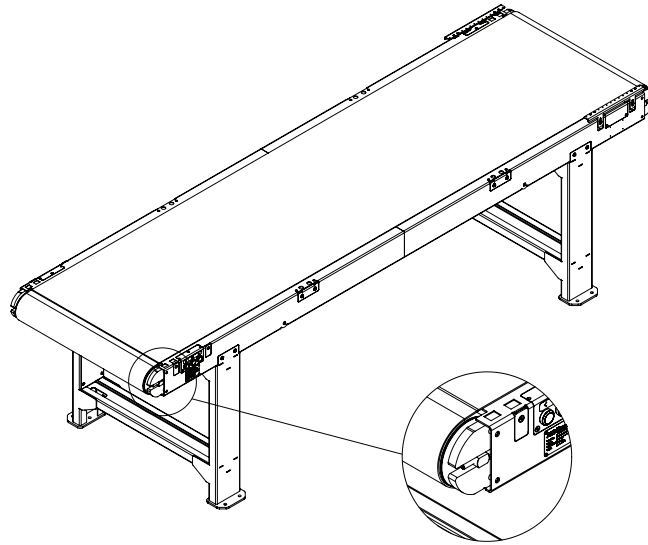


- 2 Switch off the power and disconnect the Harting connector from the conveyor.
- 3 Remove the protective covers from the conveyor.

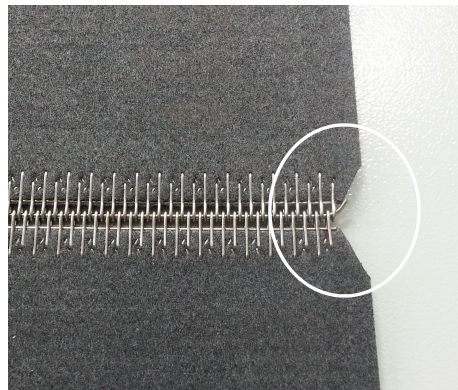


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- 4 Loosen the belt tension using the tension screws located under the covers.



- 5 Open the belt joint by straightening and pulling out the locking wire.



WARNING

The belt is the only component holding the motor and idler in place, so be cautious when removing the old belt and ask someone to support the idler/motor on the other end.

- 6 Attach the new belt to the belt joint.
- 7 Pull the new belt around the belt chassis using the old belt.

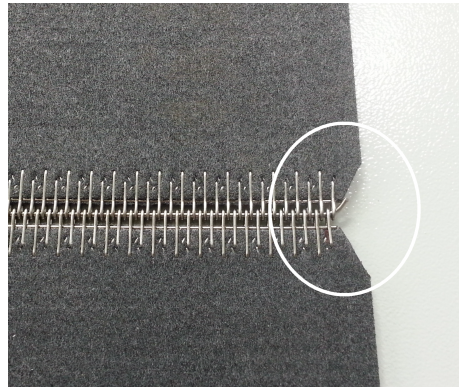
Continues on next page

10 Repair

10.2 Conveyors

Continued

- 8 Remove the old belt. Then join the belt joints of the new belt and secure them with the locking wire.



- 9 Adjust the belt tension as needed. For more information, see [Installation & Commissioning manual – FlexLoader Feeding Functional Module](#).
- 10 Reinstall the protective covers.



WARNING

To adjust the belt tension on the FlexLoader Feeding Functional Module, power must be restored before reinstalling the protective covers.



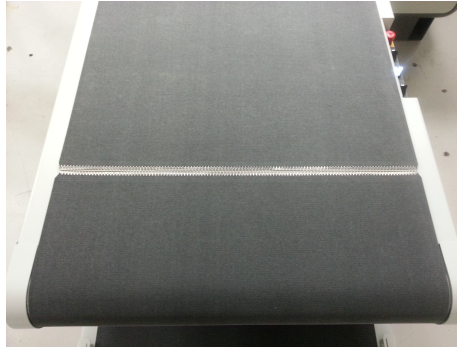
Be cautious when changing the belt to avoid crushing.

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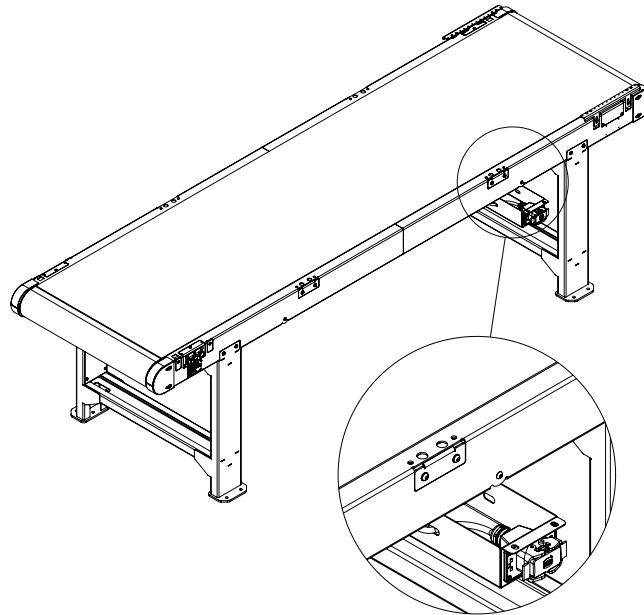
Belt motor replacement

Follow the steps below to replace the belt motor:

- 1 Run the belt to a suitable position. Position the belt joint close to the end of the conveyor.



- 2 Turn off the power and disconnect the Harting connector from the conveyor.
- 3 Loosen the electrical box located underneath the conveyor.



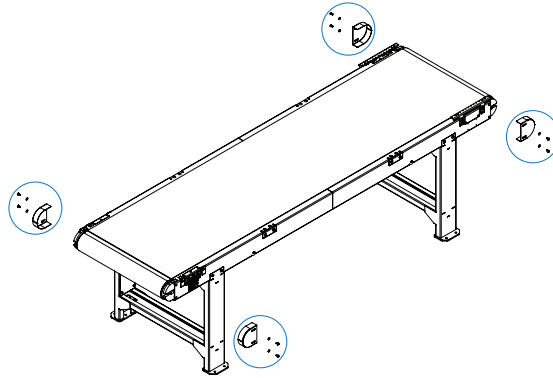
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10 Repair

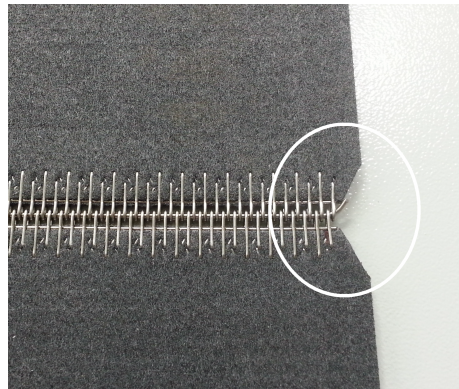
10.2 Conveyors

Continued

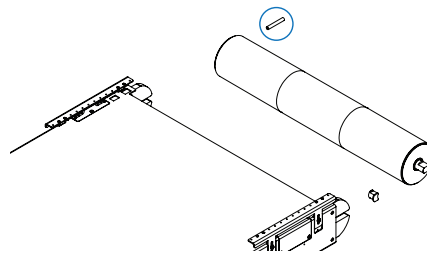
- 4 Loosen the cable gland on the Harting connector and remove it from the housing. Then, disconnect the wiring from the connector and back out the cable from the housing and the cable gland to free the cable end.
- 5 Remove the protective covers from the conveyor.
- 6 Loosen the belt tension using the tension screws located under the covers.



- 7 Open the belt joint by straightening and pulling out the locking wire.



- 8 Remove the old drum motor from the conveyor chassis and pull out the cabling.



WARNING

When removing the motor, the distance from the bracket might drop since the motor is the only thing holding it in place.

- 9 Remove the set screw from the old motor.
- 10 Route the new motor's cabling through the conveyor chassis to the electrical box the same way the cabling for the old motor was routed.

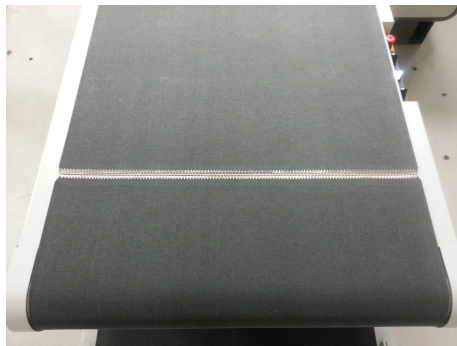
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- 11 Ensure the motor distance is correctly placed in the motor bracket with the larger flange facing outwards.
- 12 Insert the set screw into the new motor and attach the motor to the conveyor chassis.
- 13 Join the belt joints and secure them with the locking wire.
- 14 Route the new motor cable through the cable gland and the housing for the Harting connector.
- 15 Wire the cabling to the Harting connector according to the electrical schematics of FlexLoader Feeding Functional Module.
- 16 Reinstall the cable gland to the Harting connector housing and tighten it securely.
- 17 Re-attach the electrical box to the conveyor.
- 18 Reconnect the Harting connector, switch on the power, and test the new motor.
- 19 Adjust the belt tension as needed. For more information, see [Installation & Commissioning manual – FlexLoader Feeding Functional Module](#).
- 20 Reinstall the protective covers for the belt.

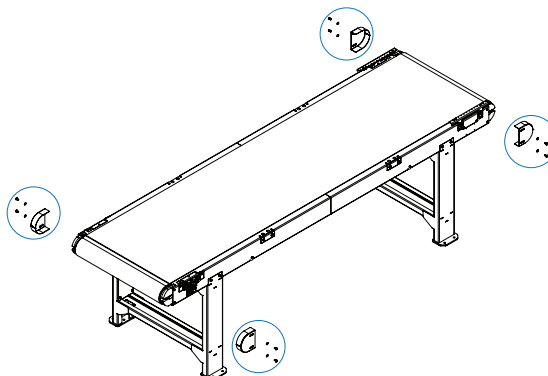
Belt idler replacement

Follow the steps below to replace the belt idler:

- 1 Run the belt to a suitable position. Position the belt joint close to the end of the conveyor.



- 2 Turn off the power and disconnect the Harting connector from the conveyor.
- 3 Remove the protective covers from the conveyor.



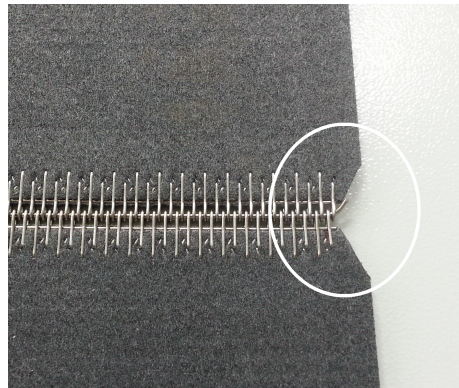
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10 Repair

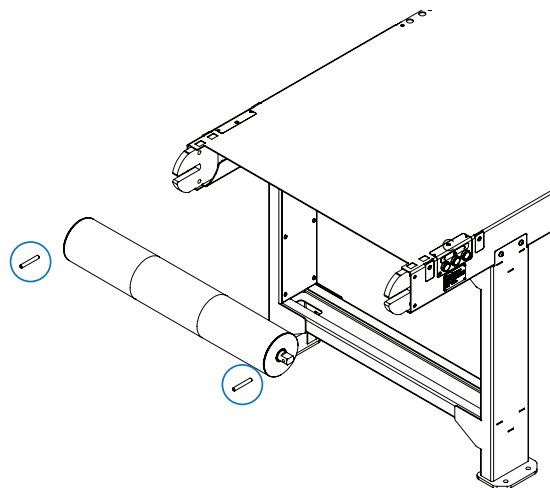
10.2 Conveyors

Continued

- 4 Loosen the belt tension using the tension screws located under the covers.
- 5 Open the belt joint by straightening and pulling out the locking wire.



- 6 Remove the old idler from the conveyor chassis.



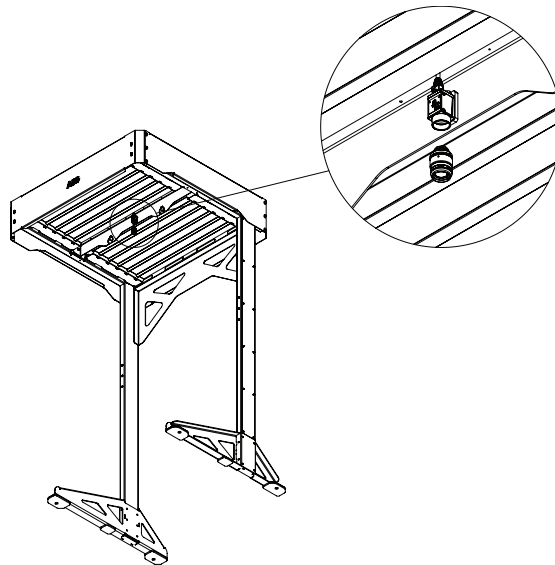
- 7 Remove the set screws from the old idler and install them in the new idler.
- 8 Attach the new idler to the conveyor frame.
- 9 Join the belt joints and secure them with the locking wire.
- 10 Reconnect the Harting connector and switch on the power.
- 11 Adjust the belt tension as needed. For more information, see [Installation & Commissioning manual – FlexLoader Feeding Functional Module](#).
- 12 Reinstall the protective covers.

10.3 FlexLoader Vision

Replacing the camera lens

Follow the steps below to change the camera lens with the least possible impact on existing workpiece teach-in:

- 1 Unscrew the old lens.



- 2 Fit the new lens on the camera.
- 3 Adjust the focus of the new lens.
- 4 Use an existing image, e.g. one of the existing teachin images, and compare the image brightness. Adjust the aperture to match the appearance with the old lens.
- 5 Calibrate the vision system with the robot according to the [Installation & Commissioning manual – FlexLoader Feeding Functional Module](#).
- 6 Run the system at a slow speed for the first few picks.

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10 Repair

10.3 FlexLoader Vision

Continued

Replacing the camera

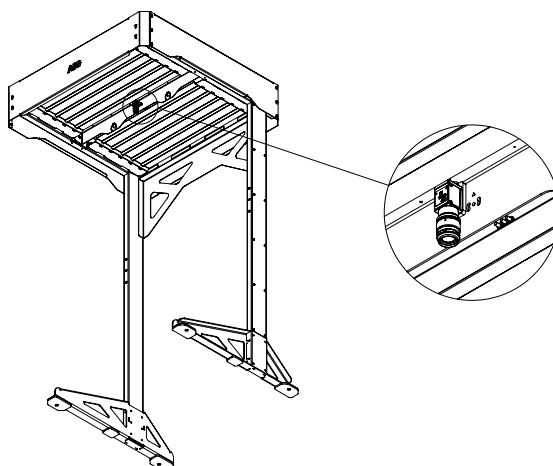


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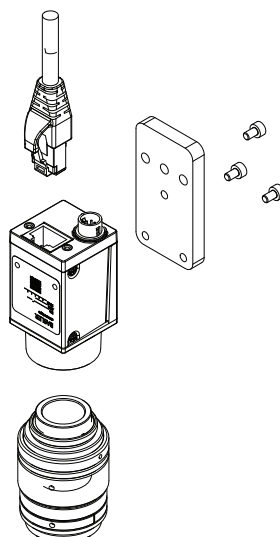
Before replacing the camera, switch off the power to FlexLoader Feeding Functional Module and lock the switch to prevent unintentional power switching on.

Follow the steps below to replace the camera with minimal impact on the existing workpiece:

- 1 Detach the camera assembly from the camera beam by unscrewing the three screws.



- 2 Detach the camera from the camera mounting plate by unscrewing the screws. Then remove the lens from the old camera and disconnect the Ethernet cable.



- 3 Attach the lens and the Ethernet cable to the new camera, and then attach them in reverse order.

Continues on next page

- 4 Adjust the camera's leveling. If necessary, use an existing teach-in as a reference. The camera's field of view must align with the existing teach-in. The camera's level can be adjusted with the screws that hold the camera assembly to the camera beam.
- 5 Calibrate FlexLoader Vision with the robot. For more information, see [*Installation & Commissioning manual – FlexLoader Feeding Functional Module*](#).
- 6 Run the system at a low speed for the first few picks.

10 Repair

10.4 Software

10.4 Software

General

Robot backup is saved on the robot at the standard backup path (**hd0a - backup**). FlexLoader Vision backup is located at *D:\Program Files\Abb Industrial IT\Robotics IT\FlexLoader Vision\Backup*.

Robot backup and recovery

A robot backup that restores the robot system to its factory settings is saved on the FlexLoader Vision PC hard disk.

Copy this backup to a USB memory stick and restore it with standard robot backup restore procedures. For more information, see *Robot product manual*.

FlexLoader Vision backup and recover

A FlexLoader Vision backup that restores the system to its factory settings are saved on a separate USB drive.

For more information about backup and recovery, see [Product manual - FlexLoader Vision Module](#).

10.5 Standard options

10.5.1 Standard gripper

Safety**DANGER**

Before carrying out work on the gripper: Safely shut down the pneumatic supply to the FlexLoader Feeding Functional Module and lock the switch to prevent unintentional switching on.

Replacing the gripping module on the gripper

Follow the steps below to replace one or more gripping modules:

- 1 Move the robot to a suitable service position.
- 2 Unscrew the screws that holding the gripper fingers and then remove the gripper fingers.
- 3 Unscrew the screws that holding the gripper jaws and then remove the gripper jaws from the gripper module.
- 4 Mark the pneumatic hoses if necessary.
- 5 Disconnect the pneumatic tubes from the pneumatic fittings.
- 6 Remove the pneumatic fittings from the gripper module.
- 7 Unscrew the screws that holding the gripper module and then remove the gripper module.
- 8 Install the new gripper module and re-attach the pneumatic fittings and hoses.
- 9 Fit the gripper jaws onto the new gripper module.
- 10 Fit the gripper fingers.
- 11 Activate the pneumatic supply to the FlexLoader Feeding Functional Module and test the new gripper.

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10 Repair

10.5.1 Standard gripper

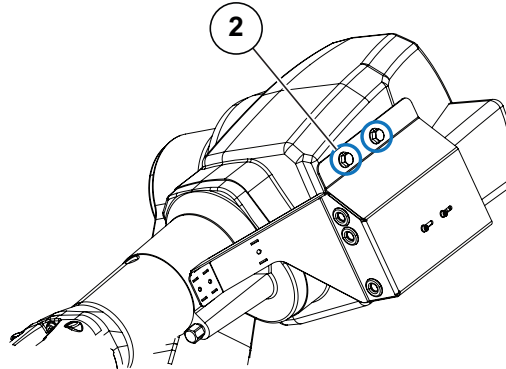
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Replacing the gripper valves

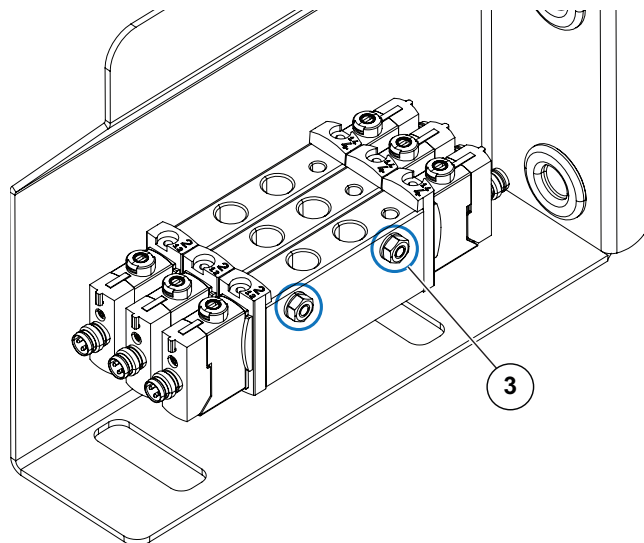
IRB 1600

Follow the steps below to replace one or more gripper valve modules in the IRB 1600:

- 1 Switch off the power to the FlexLoader Feeding Functional Module and lock the switch to prevent unintentional switch-on.
- 2 Remove the dress plate from the manipulator by unscrewing the two screws that holding it in place.



- 3 Loosen the screws that holding the valves to the dress plate.



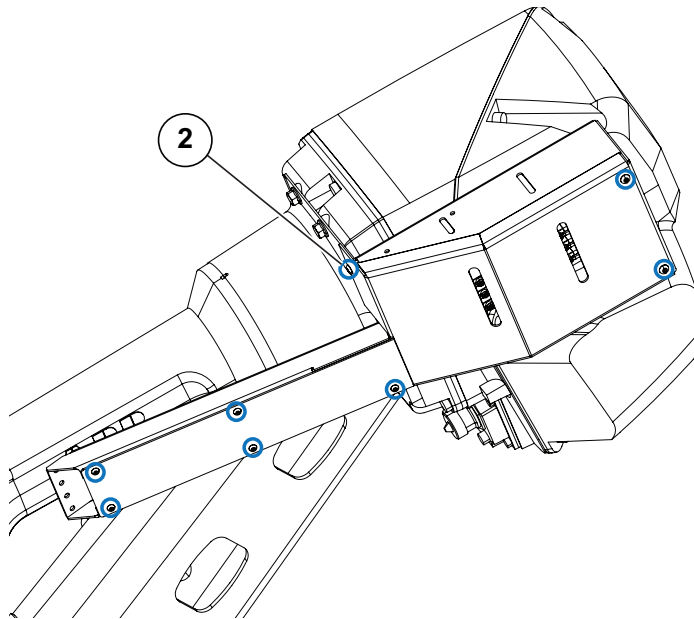
- 4 Mark the pneumatic hoses and signal cables if necessary.
- 5 Disconnect the pneumatic tubes from the pneumatic fittings and the signal cables from the valves.
- 6 Remove the pneumatic fittings from the valve.
- 7 Attach the pneumatic fittings and the pneumatic hoses to the new valve.
- 8 Re-attach the signal cables to the valve.
- 9 Re-attach the valves to the dress plate and tighten the screws.
- 10 Re-attach the dress plate to the manipulator.
- 11 Activate the power and the pneumatic supply to the FlexLoader Feeding Functional Module and test the new valve.

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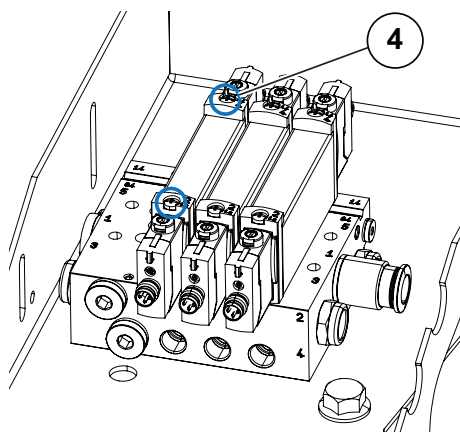
IRB 2600

Follow the steps below to replace one or more gripper valve modules in the IRB 2600:

- 1 Switch off the power to the FlexLoader Feeding Functional Module and lock the switch to prevent unintentional switch-on.
- 2 Remove the cover plate from the dress kit by unscrewing the eight screws that holding it in place.



- 3 Mark the signal cables if necessary.
- 4 Disconnect the signal cables from the valves.



- 5 Loosen the two screws that holding the valve to the base.
- 6 Pull the valve straight upward from the base.
- 7 Attach the new valve to the base and tighten the two screws.
- 8 Connect the signal cables to the valve.
- 9 Re-attach the cover plate to the dress kit and tighten the screws.
- 10 Activate the power and the pneumatic supply to the FlexLoader Feeding Functional Module and test the new valve.

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10 Repair

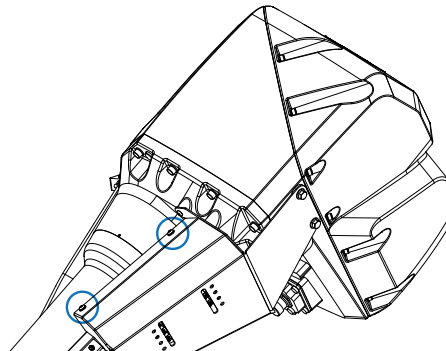
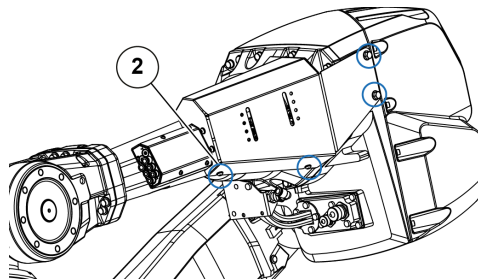
10.5.1 Standard gripper

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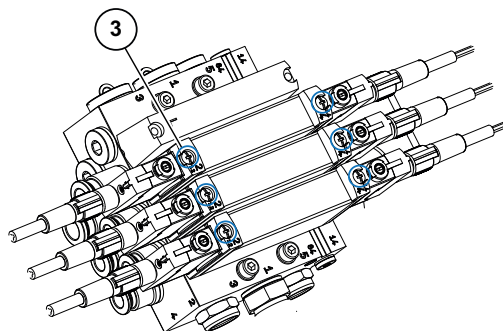
IRB 4600

Follow the steps below to replace one or more gripper valve modules in the IRB 4600:

- 1 Switch off the power to the FlexLoader Feeding Functional Module and lock the switch to prevent unintentional switch-on.
- 2 Remove the cover plate from the dress kit by unscrewing the screws that holding it in place.



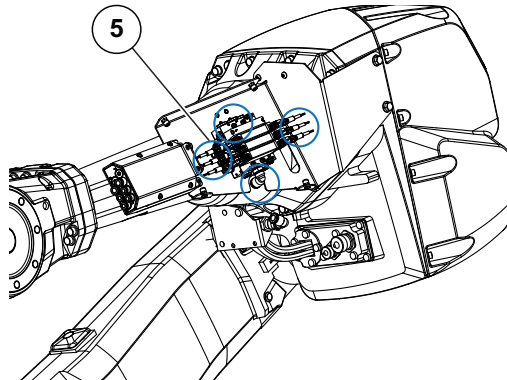
- 3 Loosen the screws that holding the valve to the valve manifold.



- 4 Mark the pneumatic hoses and signal cables if necessary.

Continues on next page

- 5 Disconnect the signal cables from the valve.



- 6 Re-attach the signal cables to the valve.
- 7 Re-attach the cover plate to the manipulator.
- 8 Activate the power and the pneumatic supply to the FlexLoader Feeding Functional Module and test the new valve.

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11 Troubleshooting

11.1 Alarms, warnings, information and troubleshooting

Introduction

A number of alarms, warnings, and informations are generated from the system. All messages are accompanied by corresponding light tower signalling.

For more information about troubleshooting, see [Product manual - FlexLoader Vision Module](#).

Category	Header	Description
Information	No load present	Reason: No load present during the call of the procedure UpdateGripLoad. The program pointer will be reset. Action: Update procedure call for UpdateGripLoad.
Error	24 V supply low	Reason: Control voltage from a 24 V supply gives an alarm from the supply terminal. Action: Check connections for the supply terminal. Check sub devices. For more information about connections, see <i>Electrical schematic</i>.
Warning	FlexLoader Vision aborted	Reason: Image grab for FlexLoader Vision was aborted during image grab. See the message for the reason.
Warning	No parts found for FlexLoader Vision	Reason: No parts were found for FlexLoader Vision during the grab of the image. No parts were found, even after retries. Action: Verify that parts are placed correctly. Verify the correct part is running. Review TeachIn if necessary.
Warning	Change bin for FlexLoader	Reason: The bin is empty under the camera. Action: Replace the bin with new parts.
Warning	Pick inter layer for FlexLoader	Reason: The inter layer for the bin is empty and needs to be removed. Action: Remove the inter layer from the bin. The warning can be removed from the code, and the interlayer can be programmed to be picked up by the robot.
Warning	Pick inter layer and change bin for FlexLoader	Reason: The last inter layer in the bin is empty and needs to be removed. The pallet needs to be replaced. Action: Replace the bin with new parts. The interlayer can be programmed to be picked up by the robot.

Continues on next page

11 Troubleshooting

11.1 Alarms, warnings, information and troubleshooting

Continued

Category	Header	Description
Error	Drive for inbound conveyor is NOK	<i>Reason:</i> The drives for the conveyor have an alarm. <i>Action:</i> Check the frequency inverter for more information. For more information about connection, see <i>Electrical schematic</i>.

Robot

For more information about robot troubleshooting, see respective *Robot manuals*.

12 Decommissioning

12.1 General

Introduction

This section contains information to consider when taking a product, robot or controller, out of operation.

It deals with how to handle potentially dangerous components and potentially hazardous materials.

When decommissioning the FlexLoader Feeding Functional Module, start with decommissioning of the robot according to the robot product manual.

Disposal of storage media

Before disposal of any storage equipment (anything from an SD card to a complete controller), ensure that all sensitive information has been deleted.



Tip

To remove all data from the SD card, use the **Clean Disk** function (part of **Recovery Disk** function) in RobotStudio. See [Operating manual - RobotStudio](#).

12 Decommissioning

12.2 Environmental information

12.2 Environmental information

General

All used grease/oils and dead batteries must be disposed of in accordance with the current legislation of the country in which the robot and the control unit are installed.

If the robot or the control unit is partially or completely disposed of, the various parts must be grouped together according to their nature (which is all iron together and all plastic together), and disposed of accordingly. These parts must also be disposed of in accordance with the current legislation of the country in which the robot and control unit are installed.

Symbol

The following symbol indicates that the product must not be disposed of as common garbage. Handle each product according to local regulations for the respective content.



For professional users in the European Union

The crossed –out wheeled bin symbol on the product(s) and/or accompanying documents means that used electrical and electronic equipment (WEEE) should not be mixed with general household waste.

If you wish to discard electrical and electronic equipment (EEE), please contact your dealer or supplier for further information.

Disposing of this product correctly will help save valuable resources and prevent any potential negative effects on human health and the environment, which could otherwise arise from inappropriate waste handling.

For disposal in countries outside the European Union

The crossed –out wheeled bin symbol is only valid in the European Union (EU) and means that used electrical and electronic equipment (WEEE) should not be mixed with general household waste.

If you wish to discard this product please contact your local authorities or dealer and ask for the correct method of disposal.

Disposing of this product correctly will help save valuable resources and prevent any potential negative effects on human health and the environment, which could otherwise arise from inappropriate waste handling.

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Oil and grease

Where possible, arrange for oil and grease to be recycled. Dispose of via an authorized person/contractor in accordance with local regulations. Do not dispose of oil and grease near lakes, ponds, ditches, down drains, or onto soil. Incineration must be carried out under controlled conditions in accordance with local regulations.

Also note that:

- Spills can form a film on water surfaces causing damage to organisms. Oxygen transfer could also be impaired.
- Spillage can penetrate the soil, causing ground water contamination.

Hazardous material

The table specifies some of the materials in the FlexLoader function package and their respective use throughout the product.

Dispose of the components properly to prevent health or environmental hazards.

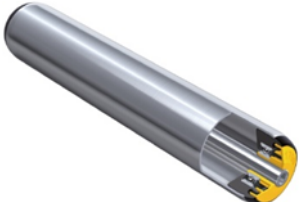
Material	Example application
Batteries, Lithium	Main computer Serial measurement board
Copper	Cables Motors
Steel	Cabinet structure, plates, screws, etc.
Plastic/rubber (PVC)	Cables, connectors, etc.
Aluminium	Heat sinks on power supplies and drive units
Lead	Electronics
Brominated flame retardants	Electronics
Oil, grease	Gearboxes
Neodymium brakes	Motors

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13 Spare parts

13.1 FlexLoader Feeding Functional Module

Conveyors

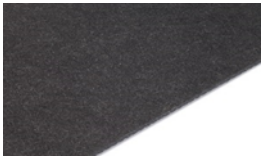
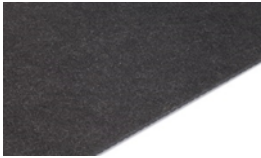
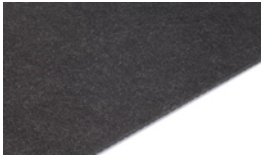
No.	Component	Description	Additional Information
1	Idler Pulley IM 0138 	Idler pulley for conveyors.	3HAG320738-0031 For more information, see IM 0138 .
2	Universal Conveyor Roller Series 1700 	Support roller for conveyors.	3HAG309978-0003 For more information, see Series 1700 .
3	Drum Motor DM 0138 Asynchronous 3-Phase 	Drum motor for conveyors.	3HAG320739-0032 For more information, see DM 0138 .
4	Photoelectric Sensors GSE6-P3211 	Photoelectric sensors for the conveyors.	3HAG320508-0001 For more information, see GSE6-P3211 .
5	Pushbutton RAMO 22T 	Pushbutton for the conveyors.	3HAG320403-0008 For more information, see RAMO 22T .

Continues on next page

13 Spare parts

13.1 FlexLoader Feeding Functional Module

Continued

No.	Component	Description	Additional Information
6	Conveyor Belt W:800 L:3000 	Conveyor belt for inbound and outbound conveyors with a width of 800 mm and length of 3000 mm.	3HAF110751-0011
7	Conveyor Belt W:800 L:4000 	Conveyor belt for inbound and outbound conveyors with a width of 800 mm and length of 4000 mm.	3HAF110751-0012
8	Conveyor Belt W:800 L:5000 	Conveyor belt for inbound and outbound conveyors with a width of 800 mm and length of 5000 mm.	3HAF110751-0013

Pallet Locator

No.	Component	Description	Additional Information
1	Photoelectric Proximity Sensor GTB2S-F5451 	Photoelectric proximity sensor for the pallet locator.	3HAG320755-0001 For more information, see GTB2S-F5451 .

Vision Stands

No.	Component	Description	Additional Information
1	LEANLED II 1020 mm, Cascadable 	Light module for illumination for FlexLoader Vision. Used in Vision Stand (2D).	3HAG320282-0070 For more information, see LEANLED II .

Continues on next page

No.	Component	Description	Additional Information
2	LEANLED II 1020 mm 	Light module for illumination for vision stand. Used in Vision Stand (2D).	3HAG320282-0064 For more information, see LEANLED II .
3	Camera acA1300-60gm 	Camera for FlexLoader Vision. Used in Vision Stand (2D).	3HAG307703-0001 For more information, see acA1300-60gm .
4	Camera Lens AZURE-0814MM 	Camera lens for FlexLoader Vision. Used in Vision Stand (2D).	3HAG320757-0001 For more information, see AZURE-0814MM .
5	PhoXi 3D Scanner L Gen3 (Red) 	3D scanner for FlexLoader Vision. Used in Vision Stand (3D).	3HAG320758-0002 For more information, see PhoXi 3D Scanner Gen3 .

Electrical Control Cabinet

No.	Component	Description	Additional Information
1	Filter Fan 	Filter fan for electrical cabinet.	3HAG320688-0001 For more information, see Type 7F.20 – Filter Fan .

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13 Spare parts

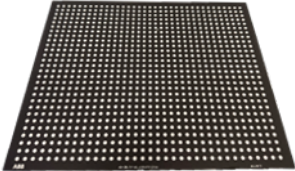
13.1 FlexLoader Feeding Functional Module

Continued

No.	Component	Description	Additional Information
2	Exhaust Filter 	Exhaust filter for electrical control cabinet.	3HAG320689-0001 For more information, see Type 7F.02 – Exhaust Filter .
3	Neousys POC-715 	Machine computer for FlexLoader Vision.	3HAG320792-0001 For more information, see POC-715 .
4	USB Mouse 	USB Mouse.	For more information, see MC 1000 .
5	USB Keyboard (EU) 	USB Keyboard (EU).	3HAG320797-0001 For more information, see G84-4100 .
4	USB Keyboard (US) 	USB Keyboard (US)	3HAG320797-0002 For more information, see G84-4100 .

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Calibration Equipment

No.	Component	Description	Additional Information
1	Camera Calibration Plate 860x800 mm 	Calibration plate for FlexLoader Vision.	3HAF110815-0001
2	Calibration Tip 	Tip for calibration tool.	3HAF110843-0001
3	Calibration Pin 	Pin for calibration tool.	3HAF110842-0001
4	3D Calibration Cone 	Calibration cone for 3D calibration tool.	3HAF110844-0001
5	Calibration Mirror 	Mirror for calibration of the camera for FlexLoader Vision.	3HAG301541 100x150x6 mm

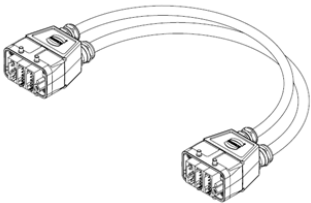
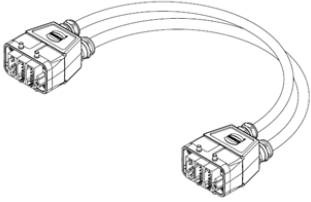
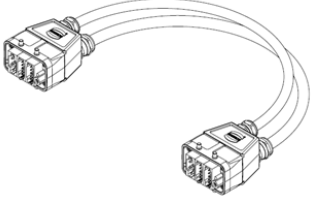
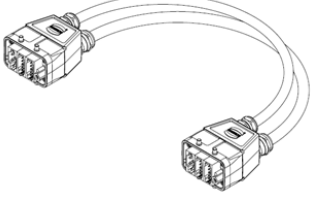
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13 Spare parts

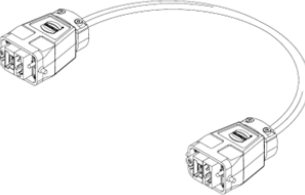
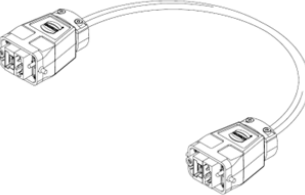
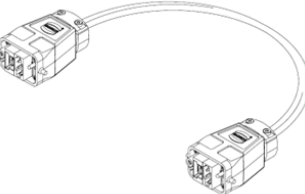
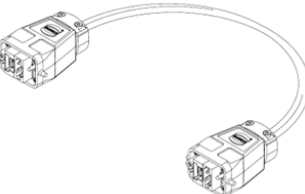
13.1 FlexLoader Feeding Functional Module

Continued

Connection Cables

No.	Component	Description	Additional Information
1	Connection Cable Conveyors (CE) 7.5 m 	Connection cable for conveyors, CE version, cable length 7,5 m.	3HAF110814-0011
2	Connection Cable Conveyors (CE) 15 m 	Connection cable for conveyors, CE version, cable length 15 m.	3HAF110814-0012
3	Connection Cable Conveyors (UL) 7.5 m 	Connection cable for conveyors, UL version, cable length 7,5 m.	3HAF110814-0021
4	Connection Cable Conveyors (UL) 15 m 	Connection cable for conveyors, UL version, cable length 15 m.	3HAF110814-0022
5	Connection Cable Pallet Locator 7.5 m 	Connection cable for pallet locator, CE/UL version, cable length 7,5 m.	3HAF110817-0001

Continues on next page

No.	Component	Description	Additional Information
6	Connection Cable Pallet Locator 15 m 	Connection cable for pallet locator, CE/UL version, cable length 15 m.	3HAF110817-0002
7	Connection Cable Vision Stand (CE) 7.5 m 	Connection cable for vision stands, CE version, cable length 7,5 m.	3HAF110816-0011
8	Connection Cable Vision Stand (CE) 15 m 	Connection cable for vision stands, CE version, cable length 15 m.	3HAF110816-0012
9	Connection Cable Vision Stand (UL) 7.5 m 	Connection cable for vision stands, UL version, cable length 7,5 m.	3HAF110816-0021
10	Connection Cable Vision Stand (UL) 15 m 	Connection cable for vision stands, UL version, cable length 15 m.	3HAF110816-0022

13 Spare parts

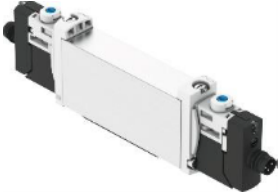
13.2 Add-Ons

13.2 Add-Ons

Robot Dress Kit IRB 1600

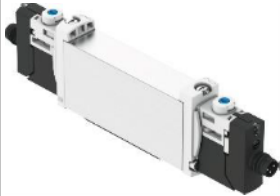
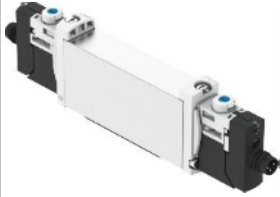
No.	Component	Description	Additional Information
1	Solenoid Valve VUVG-L14-B52-ZT-G18-1R8L 	5/2-way bistable valve for controlling the grippers (used in dress kit for IRB 1600).	For more information, see VUVG-L14-B52-ZT-G18-1R8L .
2	Solenoid Valve VUVG-L14-T32C-MZT-G18-1R8L 	2x3/2-way normally closed valve for controlling the air cleaning nozzle(s) (used in dress kit for IRB 1600).	For more information, see VUVG-L14-T32C-MZT-G18-1R8L .

Robot Dress Kit IRB 2600

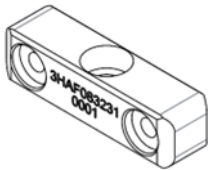
No.	Component	Description	Additional Information
1	Solenoid Valve VUVG-B14-B52-ZT-F-1R8L 	5/2-way bistable valve for controlling the grippers (used in dress kit for IRB 2600).	For more information, see VUVG-B14-B52-ZT-F-1R8L .
2	Solenoid Valve VUVG-B14-T32C-MZT-F-1R8L 	2x3/2-way normally closed valve for controlling the air cleaning nozzle(s) (used in dress kit for IRB 2600).	For more information, see VUVG-B14-T32C-MZT-F-1R8L .

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Robot Dress Kit IRB 4600

No.	Component	Description	Additional Information
1	Solenoid Valve VUVG-B14-B52-ZT-F-1R8L 	5/2-way bistable valve for controlling the grippers (used in dress kit for IRB 4600).	For more information, see VUVG-B14-B52-ZT-F-1R8L .
2	Solenoid Valve VUVG-B14-T32C-MZT-F-1R8L 	2x3/2-way normally closed valve for controlling the air cleaning nozzle(s) (used in dress kit for IRB 4600).	For more information, see VUVG-B14-T32C-MZT-F-1R8L .

Standard 2-Finger Gripper (83220-0001)

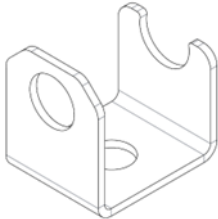
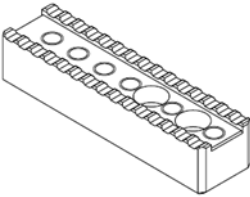
No.	Component	Description	Additional Information
1	Gripper Finger Base Small 	Gripper finger base for 2-finger gripper (PGN-plus-P 80)	3HAF083229-0001
2	Gripper Finger Tip Small 	Gripper finger tip for 2-finger gripper (PGN-plus-P 80)	3HAF083231-0001
3	Gripper Finger Small 	Gripper finger for 2-finger gripper (PGN-plus-P 80).	3HAF083227-0001

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13 Spare parts

13.2 Add-Ons

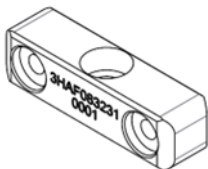
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No.	Component	Description	Additional Information
4	Nozzle Bracket Small 	Nozzle bracket for double 2-finger gripper.	3HAF083233-0001
5	Universal Jaw 	Universal gripper jaw for 2-finger gripper (PGN-plus-P 80)	3HAF039566-15
6	Universal Gripper PGN-plus-P 80-1 	Universal gripper, PGN-plus-P, size: 80, pneumatic. For 2-finger gripper.	For more information, see PGN-plus-P 80-1 .
7	Air Nozzle 9002W 	Air cleaning nozzle for 2-finger gripper.	For more information, see 9002W .
8	Gripper Insert Form C, Size Ø12 	Gripper insert, form C, hardened steel, Ø12x12 mm.	For more information, see K0385 .
9	Gripper Insert Form K, Size Ø12 	Gripper insert, form K, POM, Ø12x12 mm.	For more information, see K0385 .

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No.	Component	Description	Additional Information
10	Gripper Insert Form M, Size Ø12 	Gripper insert, form M, carbide, toothed, Ø12x12 mm.	For more information, see K0385 .
11	Gripper Insert, Form O, Size Ø12 	Gripper insert, form O, stainless steel, diamond impregn., Ø12x12 mm.	For more information, see K0385 .
12	Gripper Insert, Form P, Size Ø12 	Gripper insert, form P, polyurethane, Ø12x12 mm.	For more information, see K0385 .

Standard 2-Finger Gripper (83220-0002)

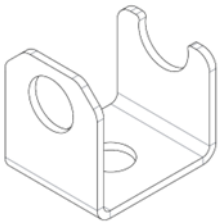
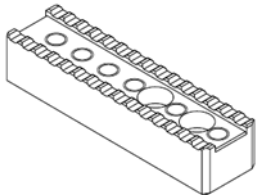
No.	Component	Description	Additional Information
1	Gripper Finger Base Small 	Gripper finger base for 2-finger gripper (PGN-plus-P 80)	3HAF083229-0001
2	Gripper Finger Tip Small 	Gripper finger tip for 2-finger gripper (PGN-plus-P 80)	3HAF083231-0001

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13 Spare parts

13.2 Add-Ons

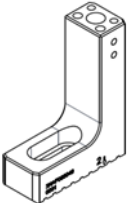
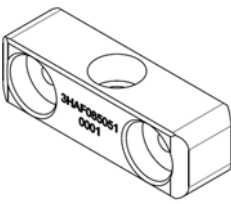
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No.	Component	Description	Additional Information
3	Gripper Finger Small 	Gripper finger for 2-finger gripper (PGN-plus-P 80).	3HAF083227-0001
4	Nozzle Bracket Small 	Nozzle bracket for double 2-finger gripper.	3HAF083233-0001
5	Universal Jaw 	Universal gripper jaw for 2-finger gripper (PGN-plus-P 80)	3HAF039566-15
6	Universal Gripper PGN-plus-P 80-1 	Universal gripper, PGN-plus-P, size: 80, pneumatic. For 2-finger gripper.	For more information, see PGN-plus-P 80-1 .
7	Air Nozzle 9002W 	Air cleaning nozzle for 2-finger gripper.	For more information, see 9002W .
8	Gripper Insert Form C, Size Ø12 	Gripper insert, form C, hardened steel, Ø12x12 mm.	For more information, see K0385 .

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No.	Component	Description	Additional Information
9	Gripper Insert Form K, Size Ø12 	Gripper insert, form K, POM, Ø12x12 mm.	For more information, see K0385 .
10	Gripper Insert Form M, Size Ø12 	Gripper insert, form M, carbide, toothed, Ø12x12 mm.	For more information, see K0385 .
11	Gripper Insert, Form O, Size Ø12 	Gripper insert, form O, stainless steel, diamond impregn., Ø12x12 mm.	For more information, see K0385 .
12	Gripper Insert, Form P, Size Ø12 	Gripper insert, form P, polyurethane, Ø12x12 mm.	For more information, see K0385 .

Standard 2-Finger Gripper (85050)

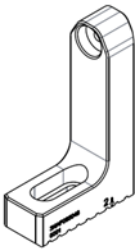
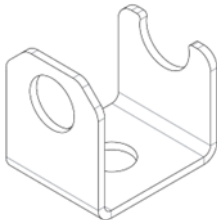
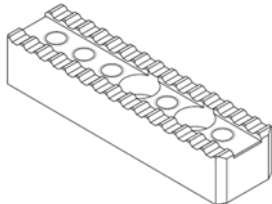
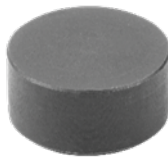
No.	Component	Description	Additional Information
1	Gripper Finger Base Large 	Gripper finger base for 2-finger gripper (PGN-plus-P 160)	3HAF085049-0001
2	Gripper Finger Tip 	Gripper finger tip for 2-finger gripper (PGN-plus-P 160)	3HAF085051-0001

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13 Spare parts

13.2 Add-Ons

Continued

No.	Component	Description	Additional Information
3	Gripper Finger Large 	Gripper finger base for 2-finger gripper (PGN-plus-P 160).	3HAF085048-0001
4	Nozzle Bracket Small 	Nozzle bracket for double 2-finger gripper.	3HAF083233-0001
5	Universal Jaw 	Universal gripper jaw for 2-finger gripper (PGN-plus-P 160)	3HAF038751-15
6	Universal Gripper PGN-plus-P 160-1 	Universal gripper, PGN-plus-P, size: 80, pneumatic. For 2-finger gripper.	For more information, see PGN-plus-P 160-1 .
7	Air Nozzle 9002W 	Air cleaning nozzle for 2-finger gripper.	For more information, see 9002W .
8	Gripper Insert Form C, Size Ø20 	Gripper insert, form C, hardened steel, Ø20x12 mm.	For more information, see K0385 .

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No.	Component	Description	Additional Information
9	Gripper Insert Form K, Size Ø20 	Gripper insert, form K, POM, Ø20x12 mm.	For more information, see K0385 .
10	Gripper Insert Form M, Size Ø20 	Gripper insert, form M, carbide, toothed, Ø20x12 mm.	For more information, see K0385 .
11	Gripper Insert, Form O, Size Ø20 	Gripper insert, form O, stainless steel, diamond impregn., Ø20x12 mm.	For more information, see K0385 .
12	Gripper Insert, Form P, Size Ø20 	Gripper insert, form P, polyurethane, Ø20x12 mm.	For more information, see K0385 .

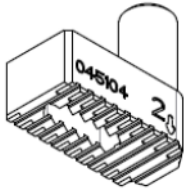
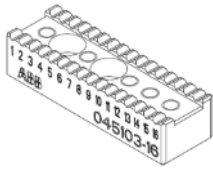
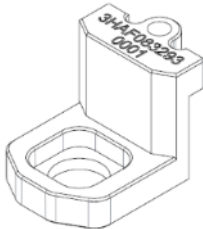
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13 Spare parts

13.2 Add-Ons

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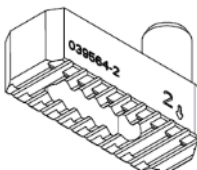
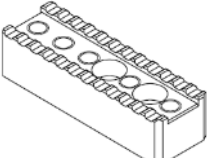
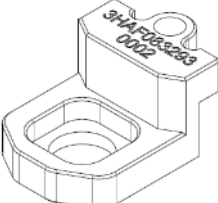
Standard 3-Finger Gripper (83290-0001)

No.	Component	Description	Additional Information
1	Universal Finger 	Universal gripper finger for 3-finger gripper (PZN-plus 64).	3HAF045104
2	Universal Jaw 	Universal gripper jaw for 3-finger gripper (PZN-plus 64).	3HAF045103-16
3	Nozzle Bracket PZN-plus 64 	Air cleaning nozzle mounting bracket for PZN-plus 64	3HAF083293-0001
4	Springload Distance 64 	Distance for spring-loaded pressure piece for PZN-plus 64.	3HAF083294-0001
5	Universal Gripper PZN-plus 64-1 	Universal gripper, PZN-plus, size: 64, pneumatic. For 3-finger gripper.	For more information, see PZN-plus 64-1 .

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No.	Component	Description	Additional Information
6	Spring-loaded Pressure Piece A-PZN-plus 64 	Spring-loaded pressure piece for PZN-plus 64. For 3-finger gripper.	For more information, see A-PZN-plus 64 .
7	Air Nozzle 9002W 	Air cleaning nozzle for 2-finger gripper.	For more information, see 9002W .

Standard 3-Finger Gripper (83290-0002)

No.	Component	Description	Additional Information
1	Universal Finger 	Universal gripper finger for 3-finger gripper (PZN-plus 80).	3HAF039564-2
2	Universal Jaw 	Universal gripper jaw for 3-finger gripper (PZN-plus 80).	3HAF039566-12
3	Nozzle Bracket PZN-plus 80 	Air cleaning nozzle mounting bracket for PZN-plus 80.	3HAF083293-0002

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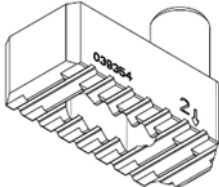
13 Spare parts

13.2 Add-Ons

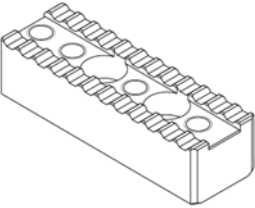
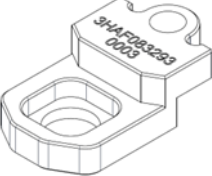
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No.	Component	Description	Additional Information
4	Springload Distance 80 	Distance for spring-loaded pressure piece for PZN-plus 80.	3HAF083294-0002
5	Universal Gripper PZN-plus 80-1 	Universal gripper, PZN-plus, size: 80, pneumatic. For 3-finger gripper.	For more information, see PZN-plus 80-1 .
6	Spring-loaded Pressure Piece A-PZN-plus 80 	Spring-loaded pressure piece for PZN-plus 80. For 3-finger gripper.	For more information, see A-PZN-plus 80 .
7	Air Nozzle 9002W 	Air cleaning nozzle for 2-finger gripper.	For more information, see 9002W .

Standard 3-Finger Gripper (85045)

No.	Component	Description	Additional Information
1	Universal Finger 	Universal gripper finger for 3-finger gripper (PZN-plus 160).	3HAF039354

Continues on next page

No.	Component	Description	Additional Information
2	Universal Jaw 	Universal gripper jaw for 3-finger gripper (PZN-plus 160).	3HAF038751-12
3	Nozzle Bracket PZN-plus 80 	Air cleaning nozzle mounting bracket for PZN-plus 160.	3HAF083293-0003
4	Springload Distance 80 	Distance for spring-loaded pressure piece for PZN-plus 160.	3HAF083294-0003
5	Universal Gripper PZN-plus 160-1 	Universal gripper, PZN-plus, size: 160, pneumatic. For 3-finger gripper.	For more information, see PZN-plus 160-1 .
6	Spring-loaded Pressure Piece A-PZN-plus 160 	Spring-loaded pressure piece for PZN-plus 160. For 3-finger gripper.	For more information, see A-PZN-plus 160 .
7	Air Nozzle 9002W 	Air cleaning nozzle for 2-finger gripper.	For more information, see 9002W .

Continues on next page

13 Spare parts

13.2 Add-Ons

Continued

Calibration Pin For Grippers (84805)

No.	Component	Description	Additional Information
1	Calibration Pin 	Base for calibration tool.	3HAF083226-0001
2	Calibration Tip 	Tip for calibration tool.	3HAF084808-0001

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