

User instruction

5th Edition

Industrial Palletizer
RI20 version 1.1

Original instruction
English

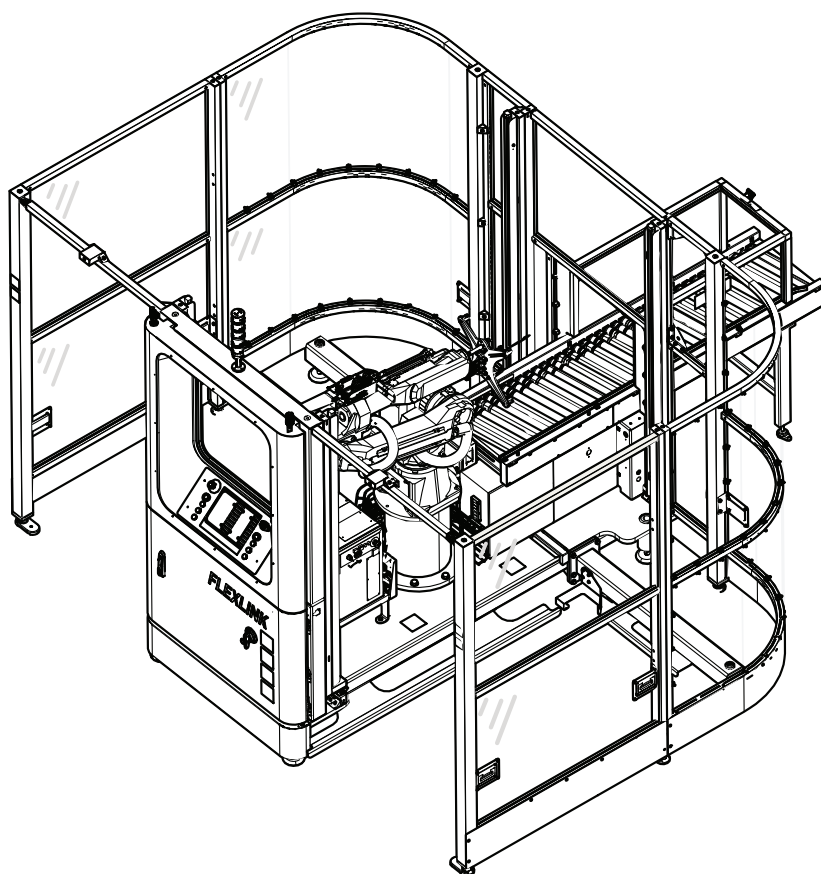


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User instruction

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FlexLink is not responsible for damage if service on the equipment is not performed in accordance with this manual.

Residual risks must be eliminated or sufficiently reduced so that essential health and safety requirements are fulfilled before the machine is put into service or placed on the market. Local regulations must be followed.

Print this instruction in color and save for future usage.

Preface

The purpose of this manual is to describe a number of operations that are intended for the user concerned. The instruction describes how the user can work safely with the machine.

FlexLink takes no responsibility for safety issues related to pallet handling.
FlexLink takes no responsibility for safety issues related to cartons falling from pallet.

FlexLink accepts no responsibility if the product is not used in accordance with this User instruction. This instruction contains safety notices which you must observe to ensure your personal safety, the safety of others involved in the operations as well as to prevent damage to machine. For risk levels “DANGER” and “Warning” all residual risks need to be eliminated or reduced to a sufficient level.

The following safety symbols are used:



DANGER: Description of imminent hazard and failure if not avoided will result in serious injury or death.



Warning: Description of imminent hazard and failure if not avoided could result in serious injury or death.



Caution: Description of minor personal injury, malfunction or damage on machine or environmental risks.

Note: This is not a safety precaution but will give valuable detailed information.

Explanation of safety symbols used in this document:



Warning for entanglement



Warning for burn hazard



Warning for falling items



Warning for crushing

Explanation of safety symbols on the machine:



Forklift pick point



Access restricted to authorized personnel



No jewellery, loose hanging hair or clothes.

Compliance with standards:

FlexLink hereby declare that the RI20 Industrial Palletizer fulfills all relevant provisions of the Machinery Directive 2006/45/EC and EMC directive 2014/30/EU

Other standards:

ANSI B11.0-2015 Safety of Machinery
ANSI/RIA R15.06-2012 Industrial Robots and Robot Systems- safety requirements.
NFPA 70 National Electrical code (NEC)
NFPA 79 Electrical Standard for Industrial Machinery
UL 508 Standard for Industrial Control Equipment

1 Scope of delivery

1.1 Machine identification

Machine name: RI20 Industrial palletizer

Item numbers:

RI20 KUKA: FLX1002729

RI20 Fanuc: FLX1002029

See Appendix C for the RI20 EC Declaration template

1.2 Machine plate position

Always specify product- and/or serial number when communicating with FlexLink.

The machine plate is attached on a plate close to the back of the robot controller.

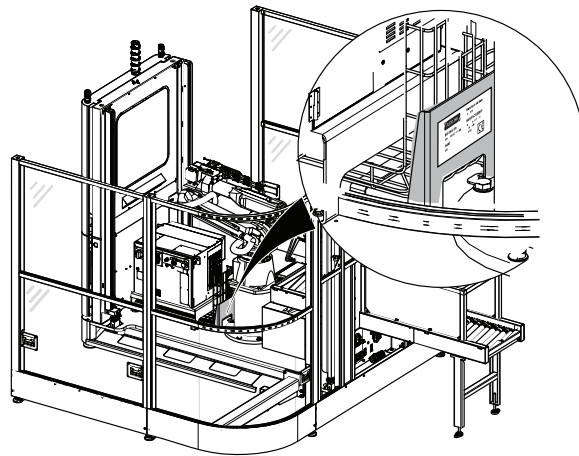
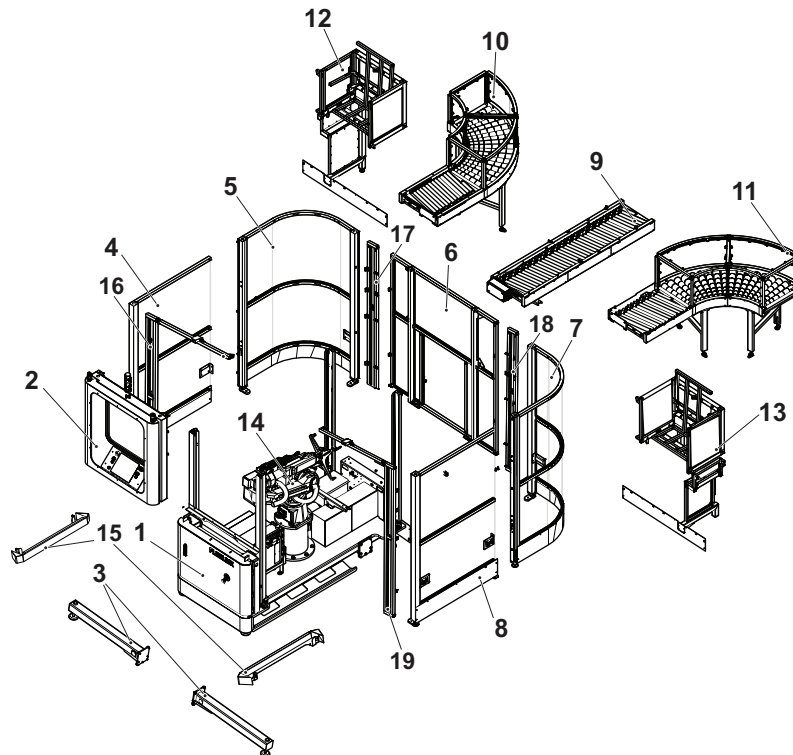


Figure 1 The machine plate position on the central unit



Figure 2 Machine plate layout

1.3 Content of delivery



No.	Item	QTY	No.	Item	QTY
1	Central unit	1	11	RH conveyor ¹⁾	1
2	HMI module	1	12	LH interlayer module ²⁾	1
3	Side support	2	13	RH interlayer module ²⁾	1
4	Fencing panel A	1	14	Robot arm	1
5	Fencing panel B	1	15	Pallet guide ¹⁾	2
6	Fencing panel C	1	16	Fencing panel F ¹⁾	1
7	Fencing panel D	1	17	Fencing panel G ¹⁾	1
8	Fencing panel E	1	18	Fencing panel H ¹⁾	1
9	Central conveyor ¹⁾	1	19	Fencing panel I ¹⁾	1
10	LH conveyor ¹⁾	1			

Figure 3 Content of delivery

The machine is delivered in wooden pallets:

Pallet A contains position number 1, 2 and 3 (incl. 14 if standard pedestal)

Pallet B contains position number 4-13 and 15-19

Pallet C contains position number 14 (if extended pedestal)

1) Depending on machine configuration

2) Additional module

2 Machine description

The RI20 Industrial Palletizer picks cartons up from manufacturing line terminals and stacks them on pallets.

The machine is a mobile unit with no anchoring to the ground. It has two palletizing nests, positioned symmetrically in relation to the central axis of the robot. An integrated roller conveyor feeds the machine with carton boxes. The conveyor receives one box at a time, from a connected conveyor. The box is transported, without collision, to the end picking point where the robot picks it up.

The robot arm picks one or two boxes at a time from the conveyor, puts it on the pallet in a pattern selected by the user. The gripper waits above the picking point if no pallet is in position to stack the box.

Sensors at the two pallet nests, on the central unit, automatically detects pallets.

The machine has to be served with empty pallets and have fully loaded pallets removed manually.

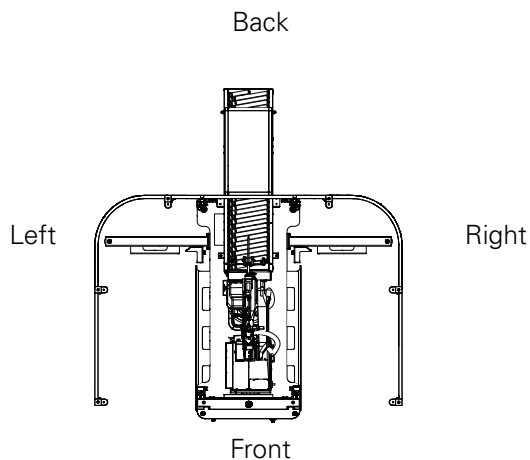


Figure 4 Machine orientation

2.1 Central unit

The central unit is fully independent and is the center of all logic functions. It contains a base frame and a pedestal with a robot arm. All electrical equipment is fitted and connected in the central unit where components responsible for safe work and operation of the system are included.

The central unit is equipped with a controls system. To protect the workspace from human accessibility, embedded safety rated controller and sensors, as vertical scanners and light curtains, are included in the system.

The robot arm is located on the pedestal. The arm position can be changed, by use of an extended pedestal, to be able to palletize higher (only possible for EUR pallets).

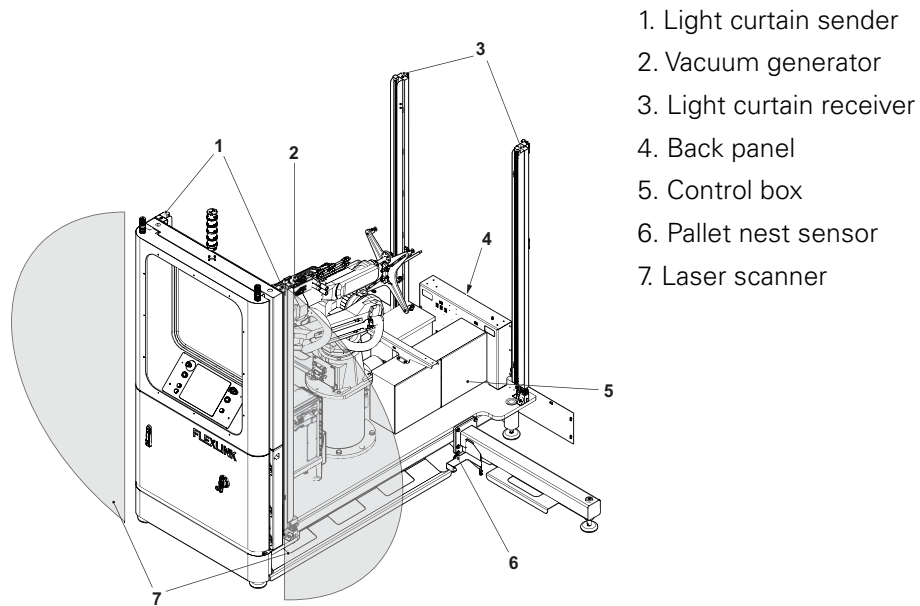


Figure 5 Central unit

2.1.1 Back panel

The compressed air preparation unit is responsible for proper quality air preparation and to monitor the pressure level. This is an integral part of the safety system.

The machine is connected to power through the electrical power terminal box. To provide the roller conveyor with power and get signal exchange the conveyor is connected to the industrial conveyor socket.

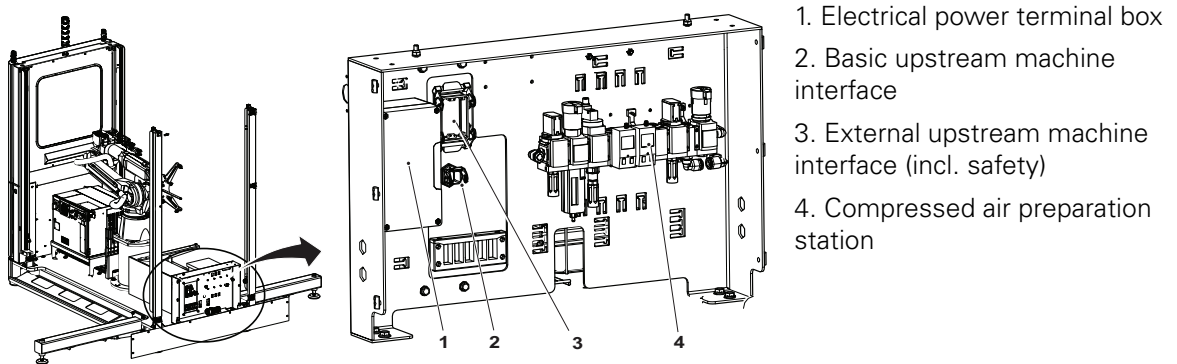


Figure 6 Position of the back panel on machine and close-up

2.1.2 Vacuum generator

The vacuum generator is positioned on the robot arm. It consists of two ejectors and four 2/2 solenoid valves to control the flow. The vacuum sensors supervise the vacuum level that is generated by the ejectors.

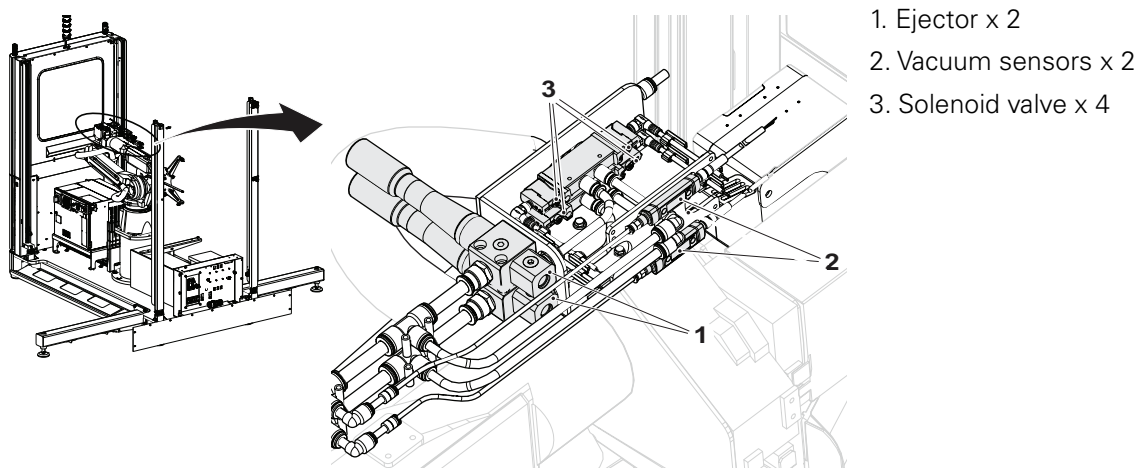


Figure 7 Position of vacuum generator on robot arm

2.1.3 Front wall

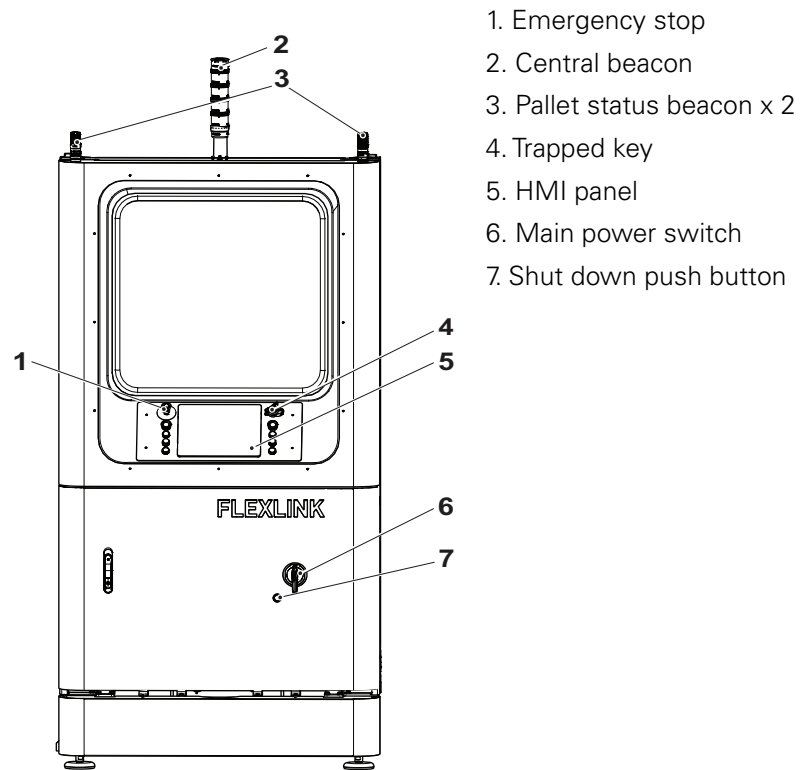


Figure 8 Functions positioned on the front wall

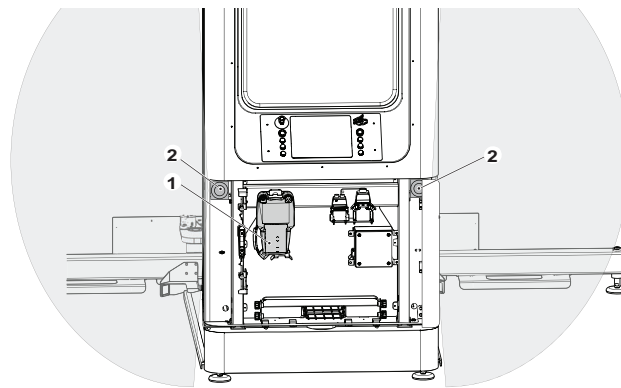
All control functions and the main panel are positioned on the front wall. By using the human machine interface (HMI) panel (5) pushbuttons the operator can control the current status of the machine.

The “Emergency stop” (1) and a trapped key (4), used to enter the machine in a safe way, are located on the panel.

The “Main power switch” (6) is located next to the “Shutdown” pushbutton (7) (for the HMI window,) on the door section,

At each top corner of the front wall a signal tower (3) shows the status of the left and right pallet. The central signal tower (2) shows the machine status.

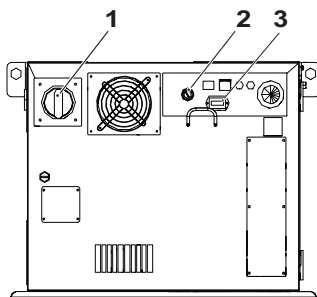
The robot arm control panel is located behind the door. It is used for maintenance or more advanced operations on the robot arm. The pallet entrances is supervised by safety scanners, one at each side.



- 1. Robot control panel
- 2. Safety scanner x 2

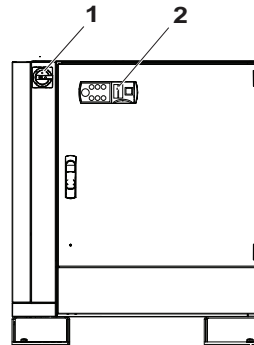
2.1.4 Robot control box

The control box for each robot arm are located behind the front wall.



Fanuc robot controller

- 1. Robot main switch
- 2. T1/Auto mode selection switch
- 3. USB port



KUKA robot controller

- 1. Robot main switch
- 2. USB port

2.1.5 Gripper

The robot arm is equipped with a non-mechanical vacuum effect gripper as end effector. The arm is holding the work piece with eight vacuum suction cups. The suction cups are designed for cardboard boxes.

The suction cups are mounted into slots for easy adjustment.

There are two types of grippers:

- Type A is used for single pick- single place operation.
- Type B for single/double pick- single/double place operation.

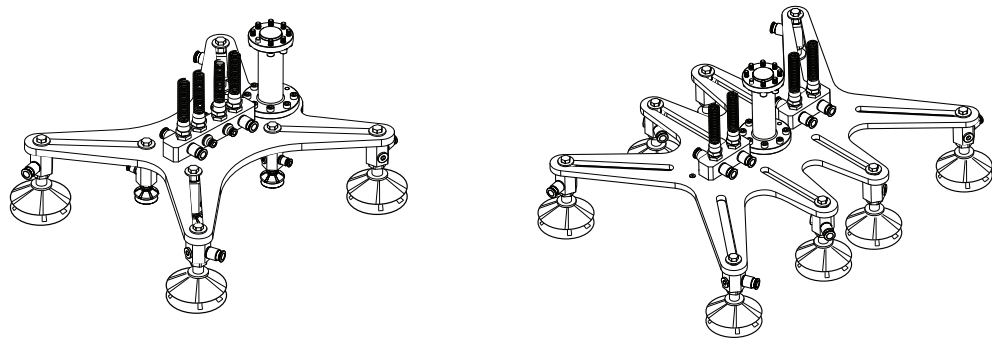


Figure 9 Left - gripper type A, right - gripper type B.

	Type A	QTY	Type B	QTY
Suction cup outer diameter [mm]				
Small	35	4 pcs		
Medium ¹⁾	50	4 pcs		
Large	80	4 pcs	80	8 pcs

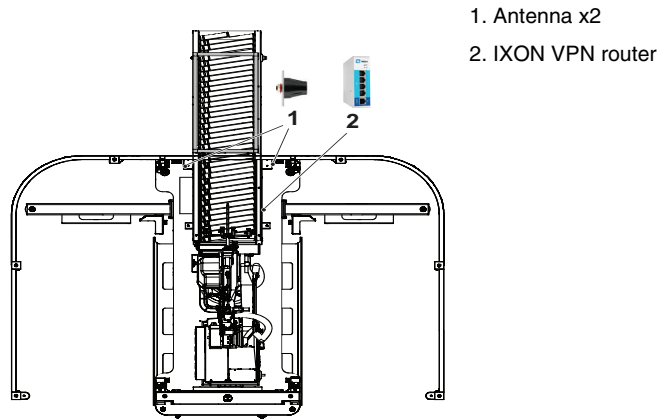
1) Optional replacement kit for the small size suction cup to increase the vacuum force.

It is possible to replace standard sets of suction cups by any available set in the RI20 Spare part list.

2.1.6 IXON VPN router

All standard RI20 are equipped with an IXON VPN router. The router is an industrial router allowing IoT edge gateway for end to end remote access to RI20.

The router is positioned and built into the control cabinet. Two antennas are positioned on the rear light curtains guards, one at each side.



The router becomes visible in the VPN cloud service when it has access to the internet and it can be connected to FlexLink service. This allows, for the local team of technicians, to make diagnostics and support in case of machine failure. With this connection to a tablet it is also possible to create and change into new pallet patterns.

IXON router

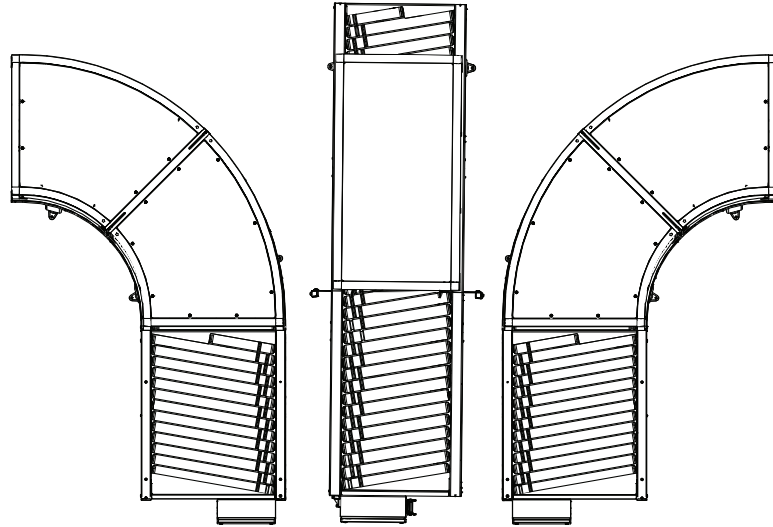
Type:	IX2415 IXrouter3
WAN interface:	1x RJ45 cable connection WiFi 4G global modem
LAN interface:	4 x RJ45 LAN ports WiFi

The configuration is made by a FlexLink technician at installation. See the status for the LED lamps on the router display in Section 8.3.1.

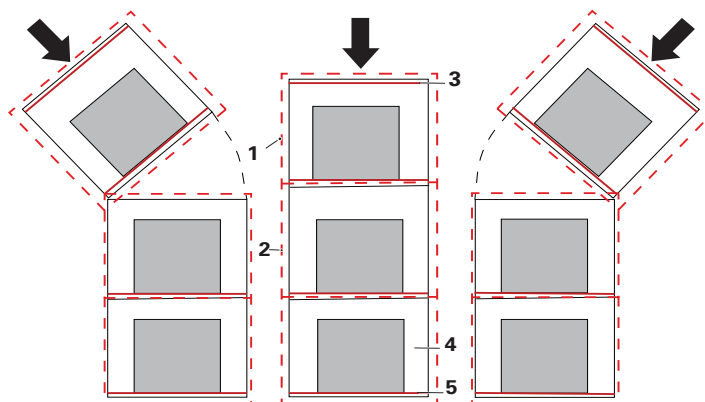
2.2 Conveyor

The roller conveyor receives products from the manufacturing line, delivers and positions the products in the pick-up area. The conveyor is divided into three no-contact accumulation zones.

Maximum width of transported products: 480 mm.
Type: Roller conveyor



Sensor positions



No. Sensor description

1. Zone 1 end/ stop position
2. Zone 2 end/ stop position
3. Detect incoming box
4. Double pick, second product end / stop position or single pick product position confirmation
5. End position signal to robot that box is ready for pick up.

2.3 Fencing module

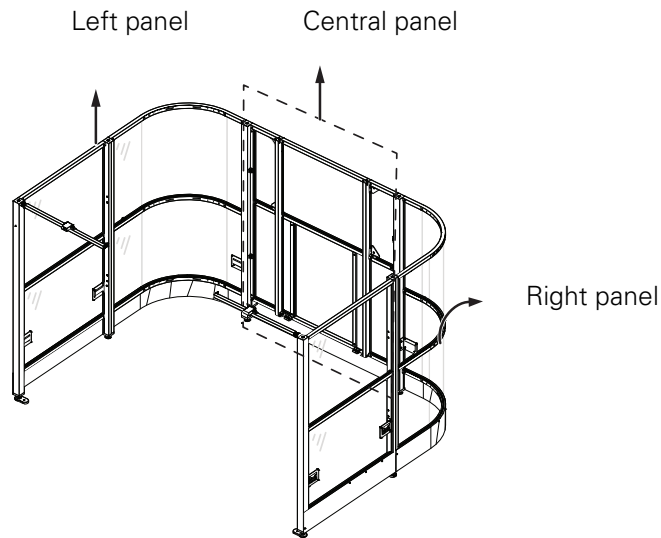


Figure 10 Fencing standard [FS]

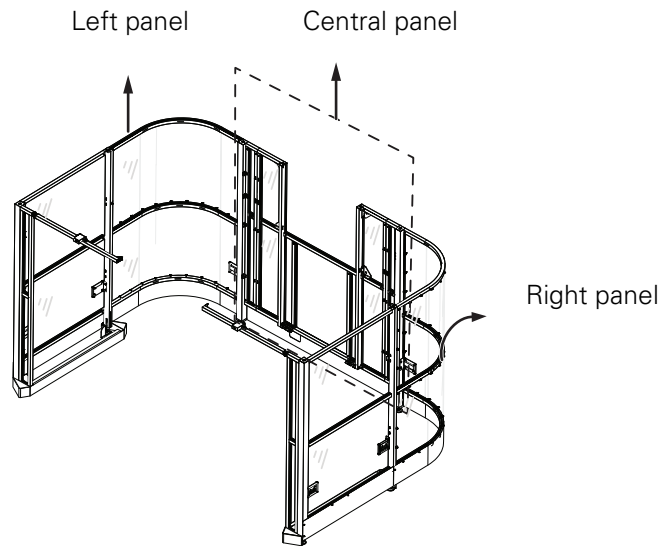


Figure 11 Fencing extended [FE]

The fencing is made of painted aluminum profiles, filled with polycarbonate panels. The fencing meets the standard: ISO 14120:2015 regulation.

The fencing is part of the RI20 order configuration where two types of fencing are available:

- Fencing standard [FS] for pallet size 800x600, 1200x1000, 40"x48" (1019x1219)

- Fencing extended [FE] additional pallet sizes 1100x1100, 46"x46" (1168x1168)

Note: Limitations for FE:

Max sheet size for interlayer module is 1200x1000.
FE is only available with standard pedestal.

It is recommended to anchor the left and right front pillar to the ground while the center panel is connected to the base frame.



Warning: The guiding system must be anchored for the FE version.

Note: All RI20 produced after April 2021 are prepared for an upgrade of FS to FE after production. Please contact your local FlexLink office for more details.

2.4 Interlayer module

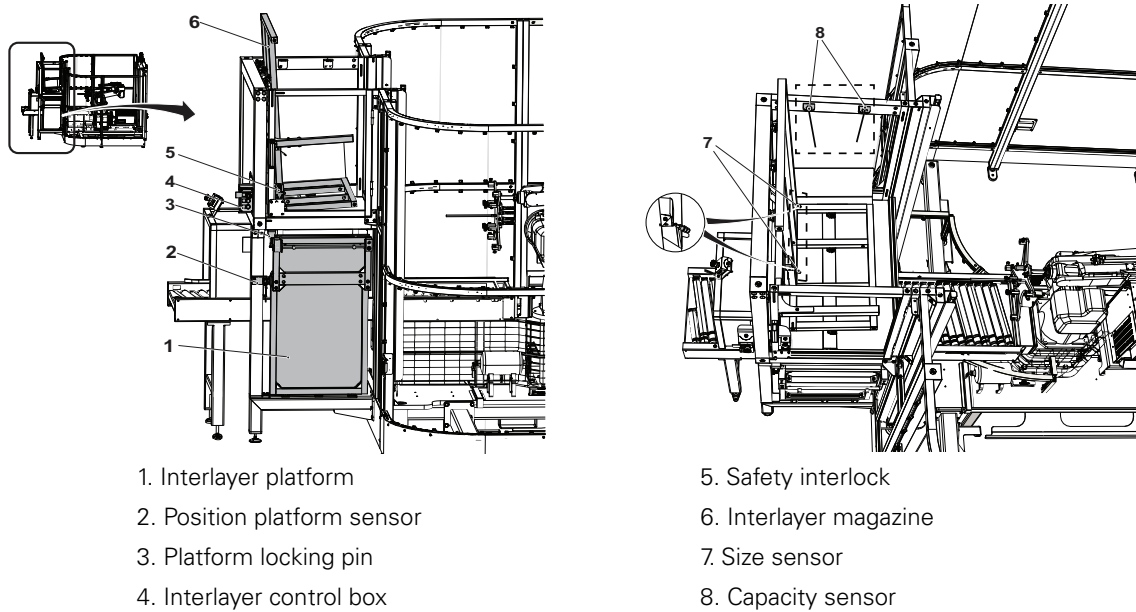


Figure 12 Interlayer part description

The interlayer module is an add on that allows the machine to use cardboard to improve the friction between the palletized layers. The module can be installed from the start or added later on.

The module fits 150 pcs of 3 mm thick cardboard sheets, 1200x800 or max1200x1000 mm. To load the machine a safety procedure has to be followed.

The module has sensors to detect loaded cardboard size and when the magazine is running low.

2.5 Configurable parameters

Robot arm:	[FANUC], [KUKA],
Pedestal	[STANDARD], [EXTENDED]
Controls:	[ALLEN BRADLEY], [SIEMENS]
Electrical standard:	[UE], [US]
Pick point conveyor:	[CENTER], [LEFT], [RIGHT]
Gripper	[SINGLE PICK], [DOUBLE PICK]
Interlayer module	[FILL RIGHT], [FILL LEFT]
Fencing	[FS], [FE]

		Designation											
		RI20	1.1	F	P	AB	UE	C	SP	V	NO	FE	EN/SE ¹⁾
Name													
Version													
	Symbol												
Robot arm													
Kuka	K												
Fanuc	F												
Pedestal													
Standard	ST												
Extended	EXT ²⁾												
Control system													
Siemens	S												
Allen Bradley	AB												
Market													
UE	EU												
US	US												
Conveyor													
Left	L												
Right	R												
Center	C												
Gripper													
Single pick	SP												
Double pick	DP												
Vacuum generator													
Standard	V												
Interlayer module													
Left	IL												
Right	IR												
Without	NOI												
Fencing													
Standard	FS												
Extended	FE												
Language													
1st language	EN ¹⁾												
2nd language	SE ¹⁾												

1) Language code depends on chosen language

2) Extended pedestal only available for Euro pallet and Fencing Standard.

Figure 13 Machine code

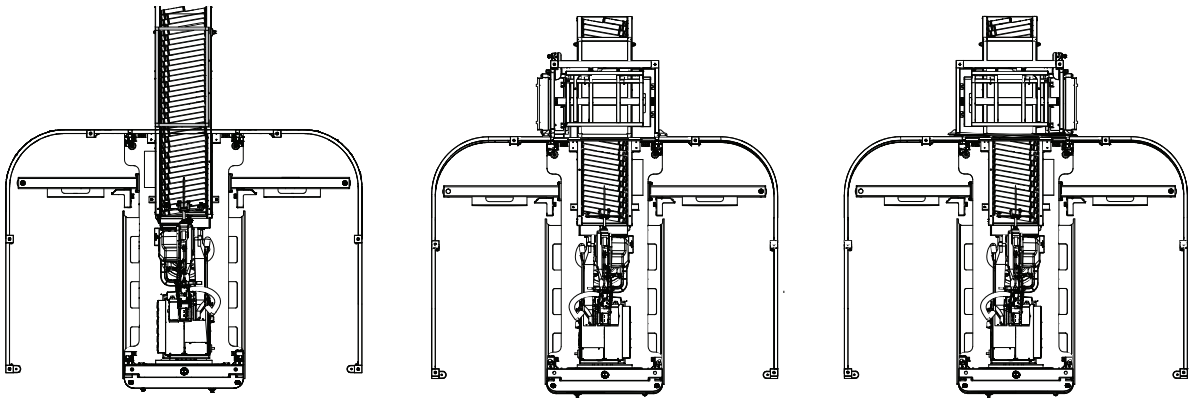


Figure 14 Centre conveyor position alternatives with or without interlayer module.

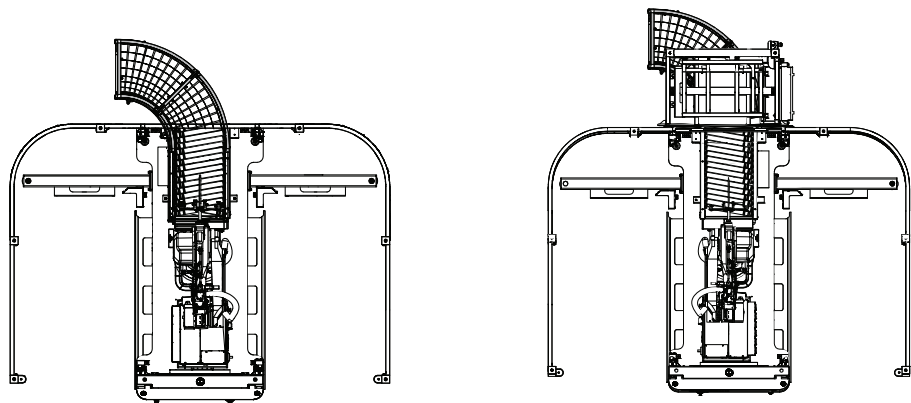


Figure 15 Left conveyor position alternatives with or without interlayer module.

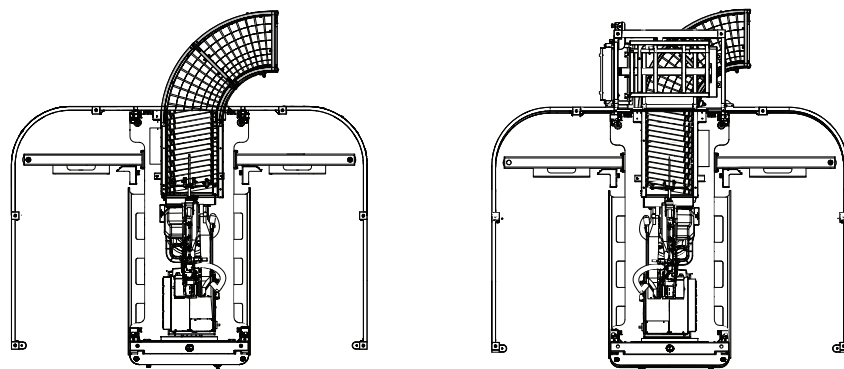


Figure 16 Right conveyor position alternatives with or without interlayer module.

All above configurations are available with extended fencing.

2.6 Technical specification

Mass [kg]	3000 kg /3100 kg ²⁾
Overall dimensions [mm]	3950 ±20 x 4100 ± 20 (W x L) 4290 ±20 x 4100 ± 20 (W x L) ²⁾
Capacity [cycles/ min] ¹⁾	≤12
Piking accuracy [mm]	10

1) Depending on e.g. cardboard density, COG, humidity etc.

2) With extended fencing.

3 Requirements

3.1 Usage requirements

3.1.1 Intended use

The machine is specifically made for automatic palletizing of carton boxes from a fixed picking position. The boxes should be undamaged, clean and square-shaped.

3.1.2 User requirements

General requirements:

- User must be an adult.
- Do not wear loose hanging clothes, accessories or long hair as it can get entangled in the machine (moving parts).
- Unskilled or Skilled (for definition- reference to ISO 12100:2010).

Machine operator:

- Can be unskilled.
- Limited to actions only in automatic mode (AUTO).
- Successfully trained in machine including the User Instruction.

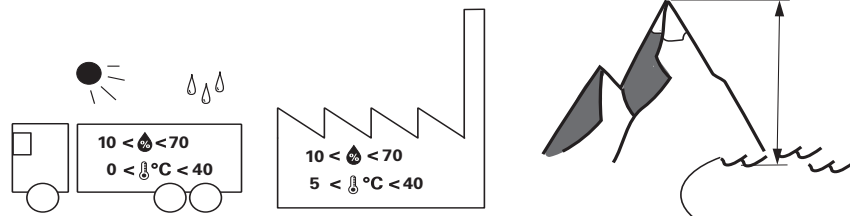
Advanced operator:

- Skilled.
- Typically electrician, maintenance personnel or specialists.
- Good technical knowledge.
- Ability to understand technical drawings.
- Ability to read English.
- High safety awareness, competence and experience for risks associated to the machine.
- Authorized to enter No entry zone when safety precautions are met.
- Ability to operate the robot in T1 mode.

3.2 Environment requirements

General climate requirement
Temperature [°C]/Humidity [%]

Indoor without direct sunlight



Light: > 500 lx acc. to ISO 8995-1

*Check with the local FlexLink office for parameters outside recommended.

3.3 Work piece requirements

General

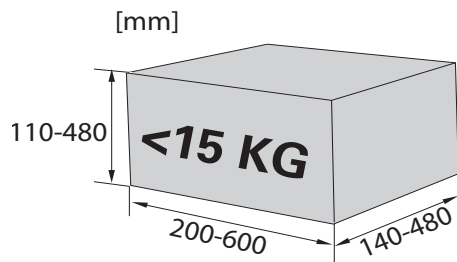
Undamaged, clean and rectangular cardboard box.

Lift surface

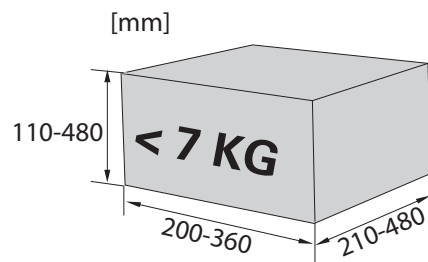
Flat top-surface, corrugated material

Recommended Cardboard
box quality:

EUPS 110, BC-Flute (Double well, 7.0 mm) Brown/Brown.



Single gripper parameters



Double gripper parameters

Note: Minimum cardboard size are related to specific requirements; pallet size and palletizing pattern, label position, box weight and quality and other box dimensions. Some combinations of large pallets and small products may not be practical for the standard gripper. Contact FlexLink for an assessment of your application.

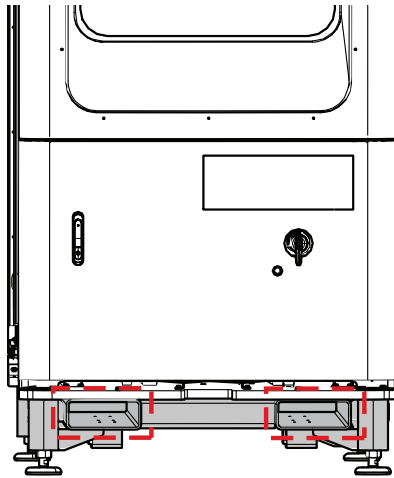
3.4 Forklift requirements

The following requirements are defined by the Central unit that is the heaviest element of the machine.

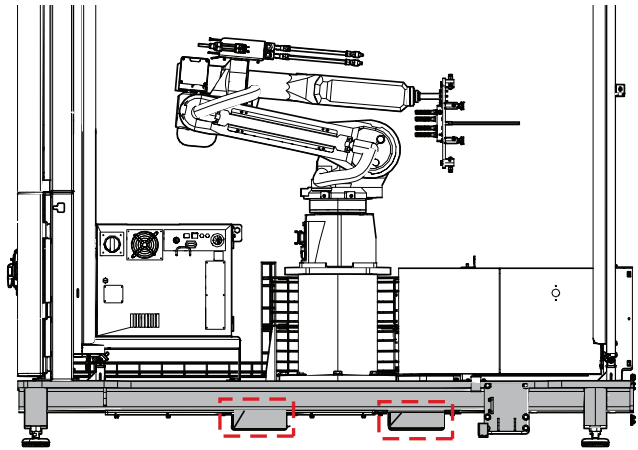
Blade length [mm]	2000
Blade width	< 215
Blade C-C distance [mm]	700

Lifting at front: Able to lift 2500 kg at 1500 mm distance. (Front slots)

Lifting at side: Able to lift 2500 kg at 750 mm distance. (Side slots)



Front slots



Side slots

3.5 Pallet requirements

Pallet dimension [mm]:

Pallet size:

EUR	1200x800
IND	1200x1000
US	1219x1016 [48"x40"]
JPN	1100x1100 ¹⁾
AUS	1165x1165 [46"x46"] ¹⁾

Max palletized height from floor level [mm]:

EUR	2200 ^{2)/3)}
IND/US	≤ 2000 ³⁾
JPN	≤ 1700 ³⁾
AUS	≤ 1550 ³⁾

1) Only possible with extended fencing.

2) Only possible with the extended pedestal.

3) Maximum palletized height is related to: pallet size, empty pallet height, palletizing pattern, expected label position on pallet, box dimensions and quality, but also to RI20 configuration; single or double pick gripper and robot arm alternative. Some combinations of high pallets and small products may not be practical for the standard gripper. Contact FlexLink for an assessment of your application.

3.6 Floor requirements

Strength [MPa]	4 C20/25 concrete
Floor quality	Thickness: 200 mm Flatness: 3 mm/1 m

3.7 Compressed air supply

Pressure [bar]	6
Tube [mm]	Outer Ø12, Inner Ø 8
Air quality	According to ISO 8573-2010 [7:4:4]
Air flow [NI/ min]	> 300

3.8 Electrical power supply requirement

3.8.1 General

Phases	3 + PE
Short-circuit current capacity/SCCR [kA]	
EU-KUKA/Fanuc:	25/2.5
US-KUKA/Fanuc:	25/1.5 (largest FLA: 2A)
Connection type	Terminals 6 mm ² incoming power
Power supply cable	4G6 mm ² / 10 AWG protected by 3x32A slow blow circuit breaker

3.8.2 Control box

Voltage [V_{AC}]	UE = 3 x 400VAC + PE US = 480Y/277V WYE
Frequency [Hz]	UE = 50/ US = 60
Nominal current [A_{AC}]	UE/US = 25A
Protection degree	EU= IP54 US=NEMA 12

3.9 Space requirements

3.9.1 Minimum space required to operate the machine

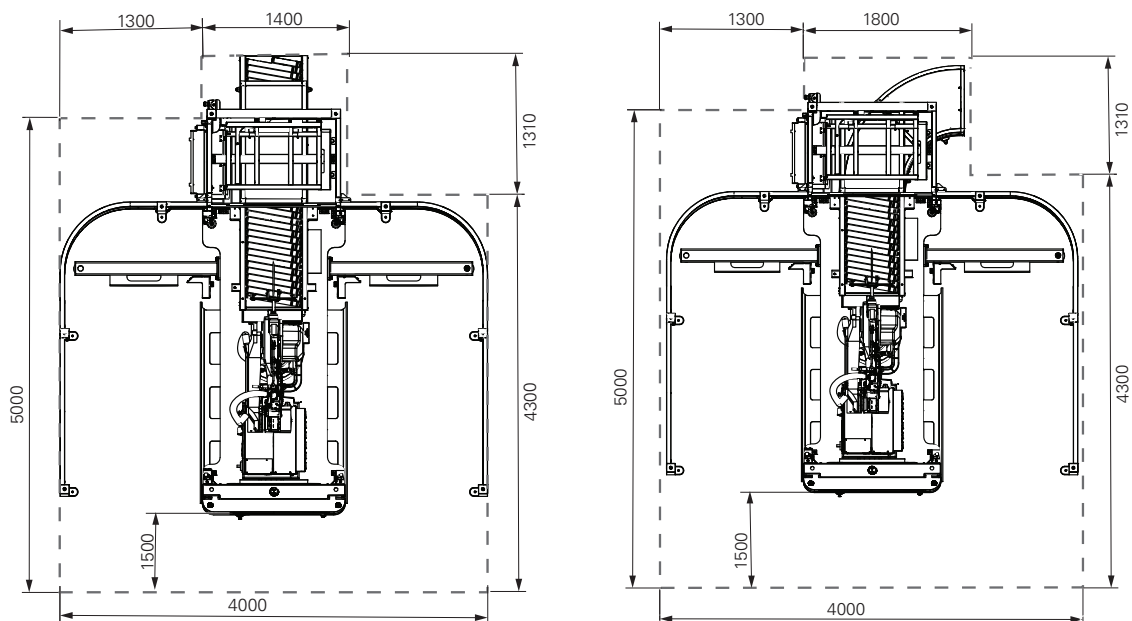


Figure 17 Machine dimensions for Standard fencing [FS].

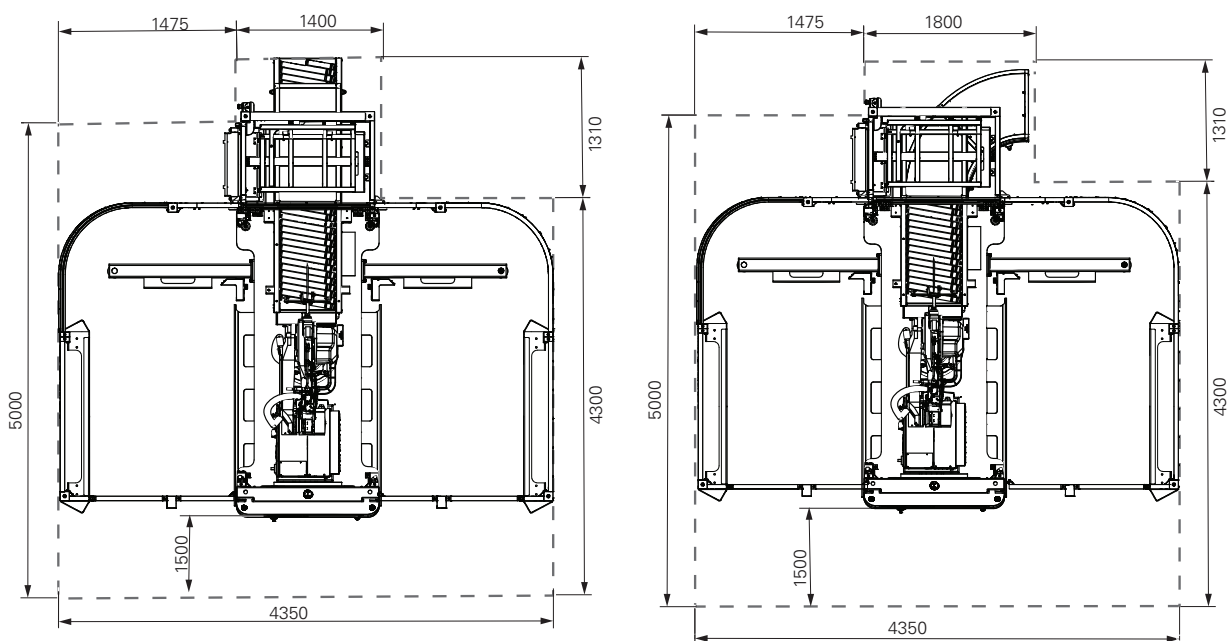


Figure 18 Machine dimensions for Extended fencing [FE].

3.9.2 Minimal height

Minimal height required for installation and working space.

Vertical clearance [mm] 3500

3.9.3 Torque table

The following torque should be used if nothing else is stated.

Connecting threads	Tightening torque [Nm]			
	Aluminum	Steel		
Screw/ nut class	Any class	8,8	10,9	12,9
M5	-	5,6	7,5	9
M6	-	8	11,5	15
M8	-	20	28	36
M10	8-10	40	53	70
M12	12-15	70	85	125
M16	28-30	168	210	305
M20	-	328	410	600
1/8	7-9	-	-	-
1/4	12-14	-	-	-
3/8	22-24	-	-	-
1/2	28-30	-	-	-

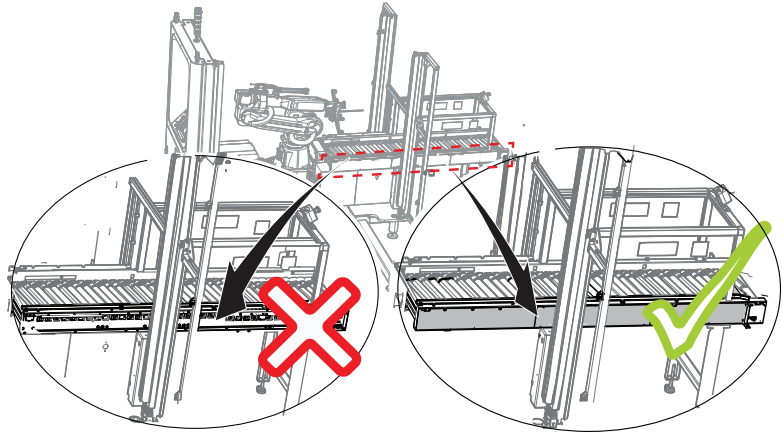
4 Safety

Safety performance level: PL_d (ISO 13849-1)

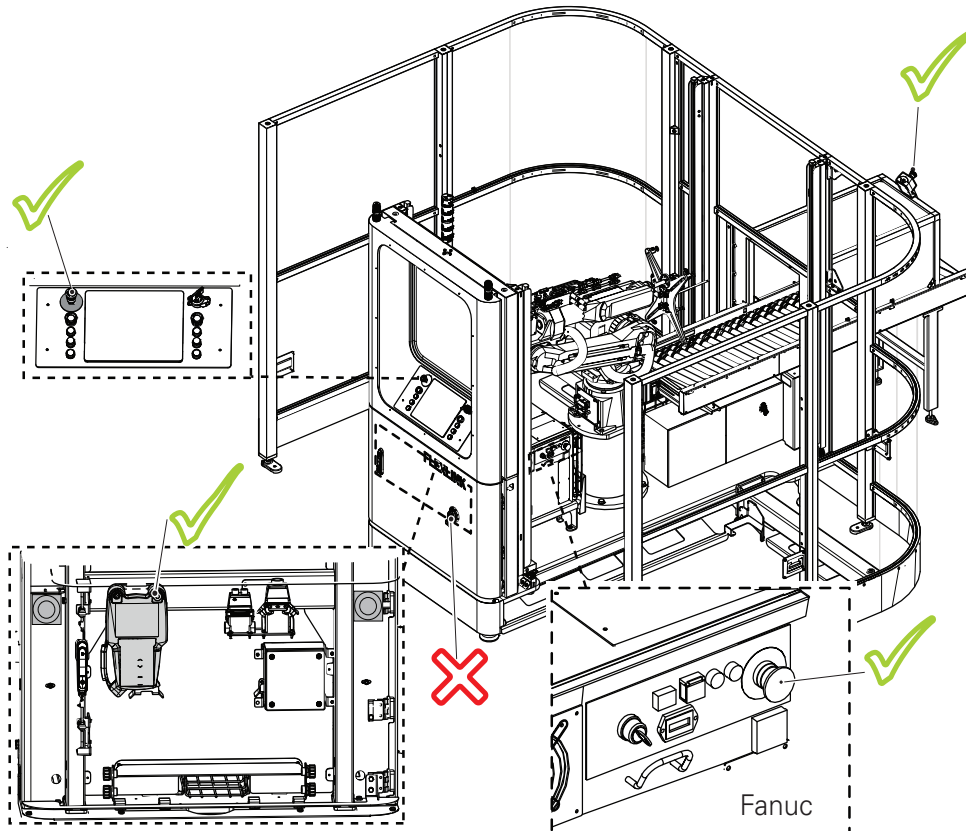
4.1 General

- The safety checksum for the following items are available in each of its post-production checklist:
 - FANUC robot
 - KUKA robot
 - Allen Bradley PLC
 - Siemens PLC
 - SICK safety scanners
- Noise level < 69 dB (EN ISO 4871).
- Pallet jacks must be used for lifting/transporting pallets in/out of the No entry zone.
- Pallets must be handled in front-to-back direction, never side-ways.
- The robot generates heat during operation. Do not handle or touch while in operation or immediately after. To cool down, turn off power and wait one hour or use gloves.
- Robot workplace must be kept empty, clean and tidy.
- Electrical and/or pneumatic power interruption or turned off main switch will cause lost vacuum which makes the robot drop the work piece.
- Parts of the electrical installations contain electrical power when main switch is turned off.
- The robot arm must be in transportation position to avoid tilting during lifting and handling.
- Always use proper PPE stated at each section.

- Conveyor covers needs to be in place

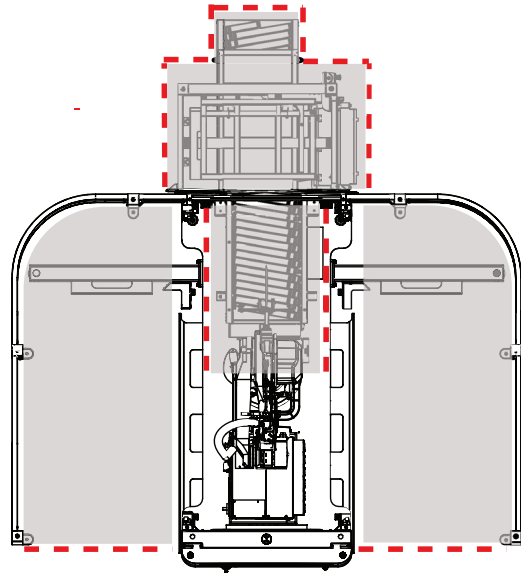


- In case of emergency:

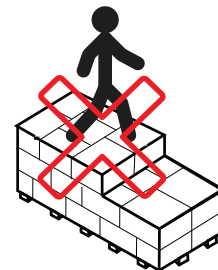
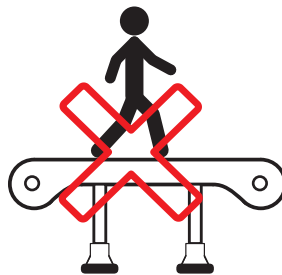


Main switch should not be used.

- The delineation of the No entry zone must be kept visible and clear at all time.



4.2 Prohibitions to avoid misuse

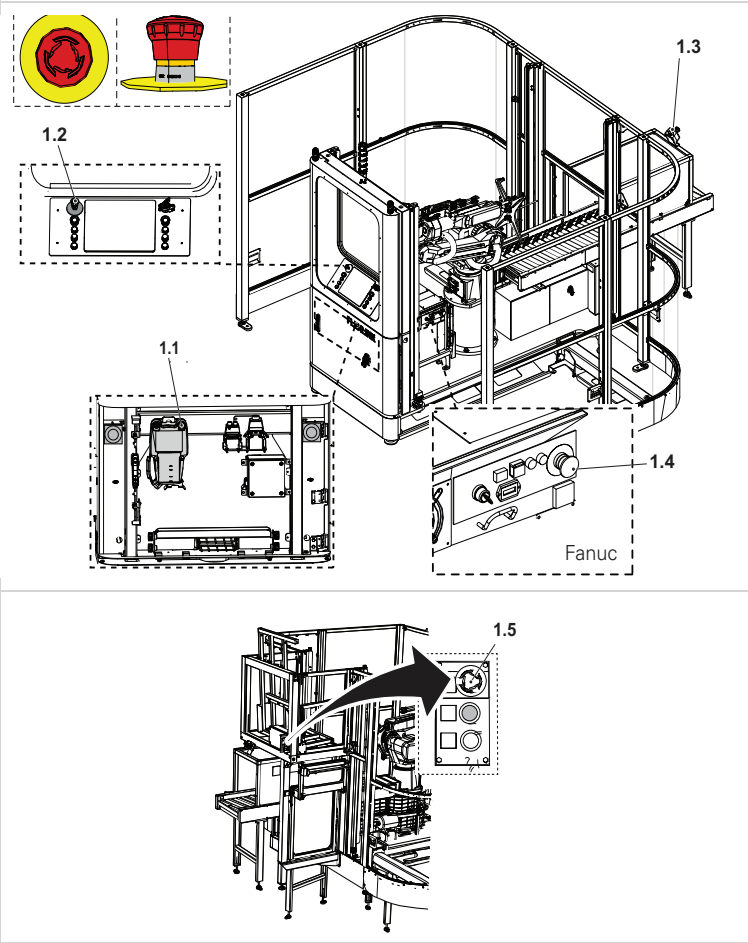
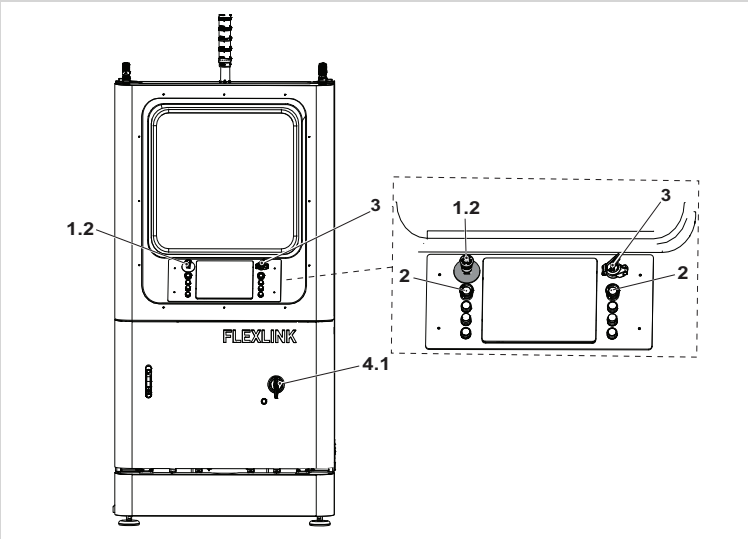


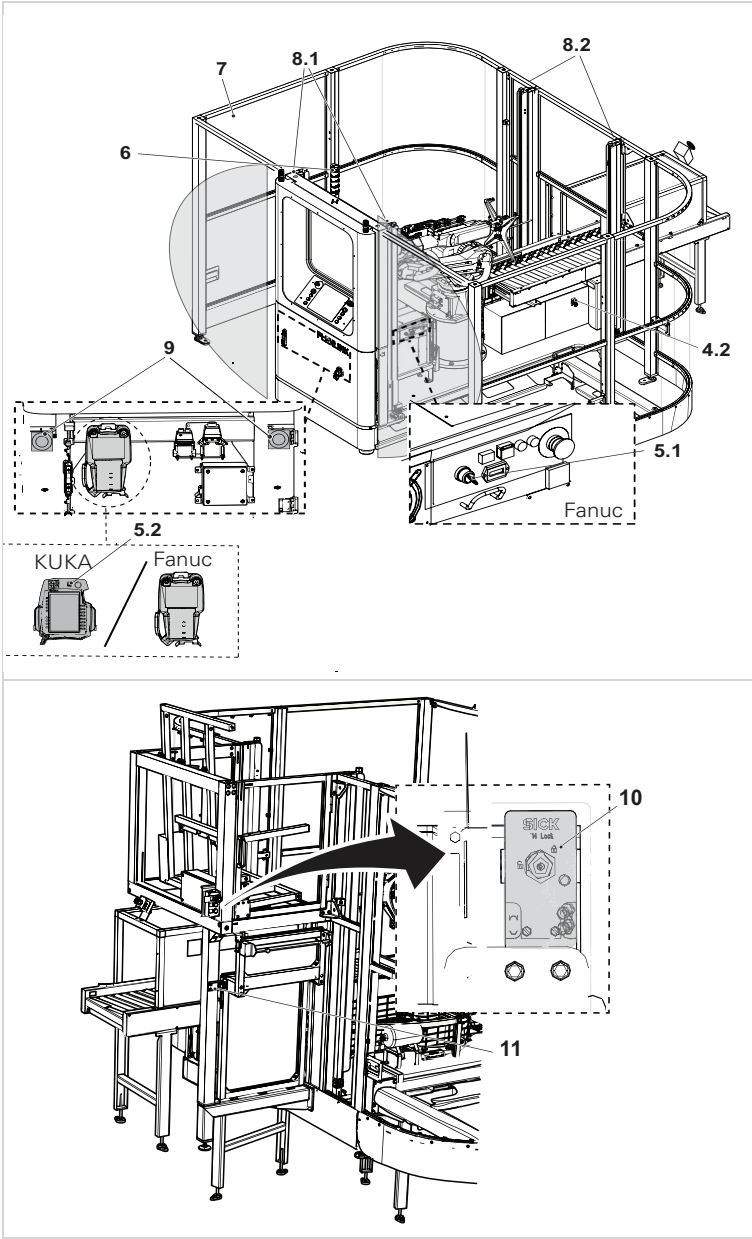
- Do not make any changes to the robot safety system.
- Do not use the machine without safety enclosures.
- Do not use the machine with any other gripper than the standard/delivered.
- Do not make modifications to the machine without the manufacturers authorization.
- Persons under the age of 18 are not allowed closer to the machine footprint than 2.5 m.
- Only spare parts specified in the spare part list are allowed.
- Do not bypass the machine fencing/enclosure, photo electric or functional safety systems at any time.

-
- Access to No entry zone is prohibited except for advanced operators while machine is in safe state and required safety precautions are made to eliminate all risks.
 - Do not use emergency switches for normal stop.
 - Do not use the main switch for emergency stopping. In order to avoid long recovery time.
 - Do not disconnect connectors while electrically loaded.
 - Do not palletize workpieces classified as explosives.
 - Do not use any kind of open fire in less than 2.5 m from the machine.
 - Do not bypass the interlocked guards to reset the safety and start the machine with opened guard.
 - Do not start the machine with someone inside the No entry zone.

4.3 Safety devices, guards and hazards

The safety devices are pointed out in the table below with a description

	No.	Safety devices	Qty
	1	Emergency switches (E-stop)	4
	(1.1)	E-stop robot tech pendant	(1)
	(1.2)	E-stop HMI panel	(1)
	(1.3)	E-stop conveyor tunnel	(1)
	(1.4)	E-stop robot controller	(1)
	(1.5)	E-stop Interlayer option	(1)
	2	Reset buttons	2
	3	Trapped key	1
	4.1	Main switch- front door	1



No.	Safety devices	Qty
4.2	Main switch- control box	1
5.1	Fanuc only: T1/Auto switch	1
5.2	KUKA only: T1/Auto switch	1
6	Signal tower/ buzzer	1
7	Fencing	
8	Vertical light curtains	2 sets
(8.1)	Sender	(1)
(8.2)	Receiver	(1)
9	Vertical laser scanner	2
10	Interlocked guard	1
11	Interlayer platform sensor	1

Description of Safety devices, guards:

see list above

- 1 E-stop: Stops all movements of the machine immediately.

When pressed down it will stay in that position. When any E-stop is activated a final reset, of all safety devices, is needed to start the machine. A final reset is done by pressing one of the reset buttons on the front panel.

1.1 The tech pendant (Fanuc)/ smartPAD (KUKA) has a dead man switch that are used when the robot arm is set into T1 mode. The arm only moves if one of the switches is pressed in middle position.

- 2 Reset buttons: For reset of the machine.
- 3 Trapped key: The key is needed in place to start the machine. By removing the key, the machine will stop.
- 4 4.1 and 4.2 are connected in series.
 - 4.1 Main switch front door: Cuts electrical power.
 - 4.2 Main switch control cabinet: Cuts electrical power.



Warning: The electrical power upstream from the cabinet is still on (from the cabinet to the front).

- 5 T1/Auto rotary switch; control of the robot arm.
Note: Location for Fanuc 5.1/ KUKA 5.2
- 6 Signal tower/ buzzer: Signals machine start up and machine status.
- 7 Fencing: Cutting off the No entry zone.
- 8 Vertical light curtains: Protects from access to the robot arm. The entire machine stops if a light curtain is interrupted.
- 9 Vertical laser scanner: Safety for the No entry zone entrance. Mode depends of currently used pallet nest.

If the palletizing side is interrupted the machine stops. For the side not currently palletized the scanner blocks the nest for robot entrance. In addition for the KUKA robot; the arm movement speed slows down.

- 10 Interlocked guard: Controls the opening of the fixed guards. Its necessary to open to load interlayers. To open during operation a procedure to stop all risk of robot arm movement is performed. See Section 10.

- 11 Interlayer platform sensor: If/when the platform opens the machine stops.

4.4 Functional test of safety related equipment

It is mandatory to test and verify the safety system periodically- once a year or each 4000 h. Perform the functional test according to "Appendix A" in this manual.



DANGER: If a step in the checklist is not passed, the machine is not in function for normal production until the step is passed and normal condition is restored.

4.5 Robot safety

Operator safety with regards to unintentional contact is based upon active methods.

4.5.1 Robot safety system

The robot system incorporates the following inherently safety-rated limiting functions:

- Limitation of velocities (kinetic energy).
- Use of safety-rated space limitation function for certain sectors.
- Password-protected settings.
- Robot dead man switch located on the back of the teach pendant/ smartPAD.
- Robot safety settings generates checksum.

4.5.2 Robot system safety - Safety-rated software space limitations

The robot system is equipped with safety-rated space limiting functions such as safety barriers and software limits.

The safety barriers are permanent and creates a cage for the robot to move inside. A breach by the robot will cause the robot to stop (stop category 0, IEC 60204-1). The space enclosed must be kept as small as possible.

The software limits are dynamic and causes the robot to stop if any limit is passed while active (stop category 0, IEC 60204-1).

The empty area in Fig. 19 is the robot arm operating space (for the right side). Mirrored is applicable for the left side.

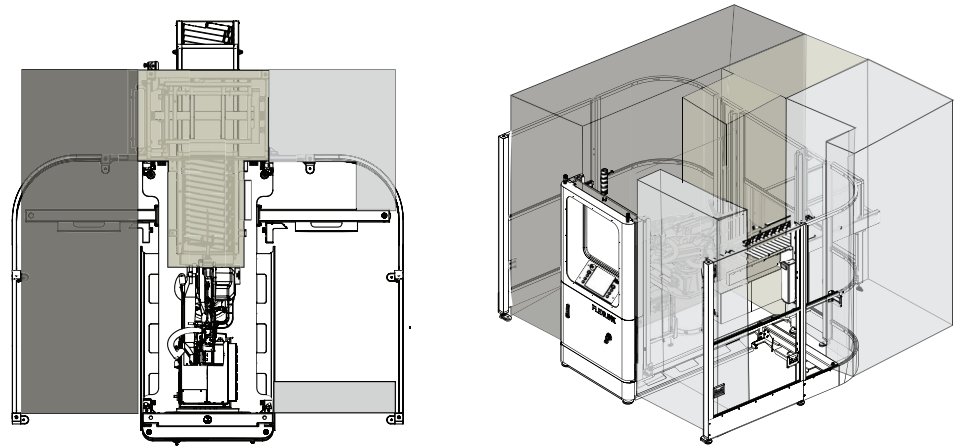
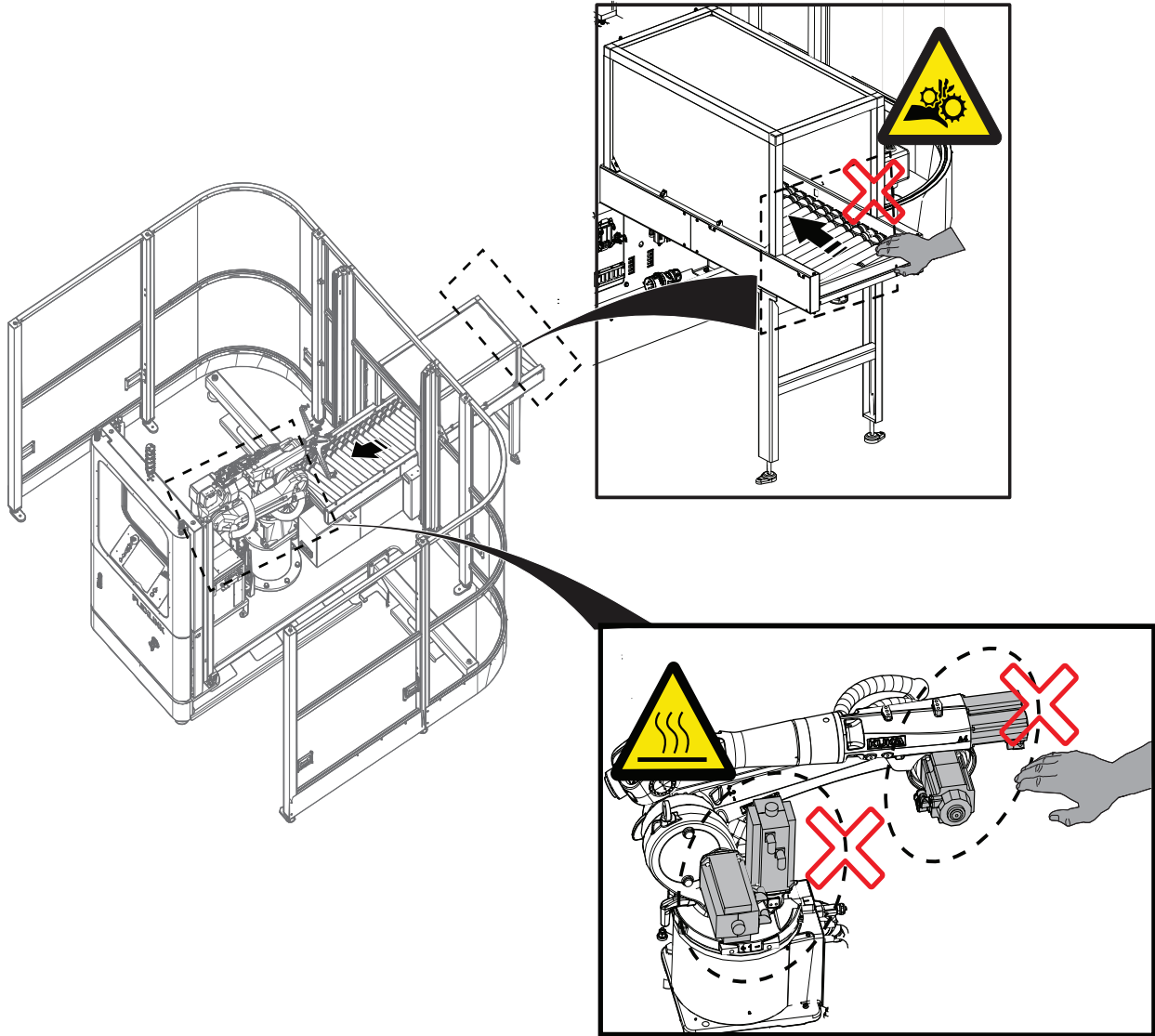
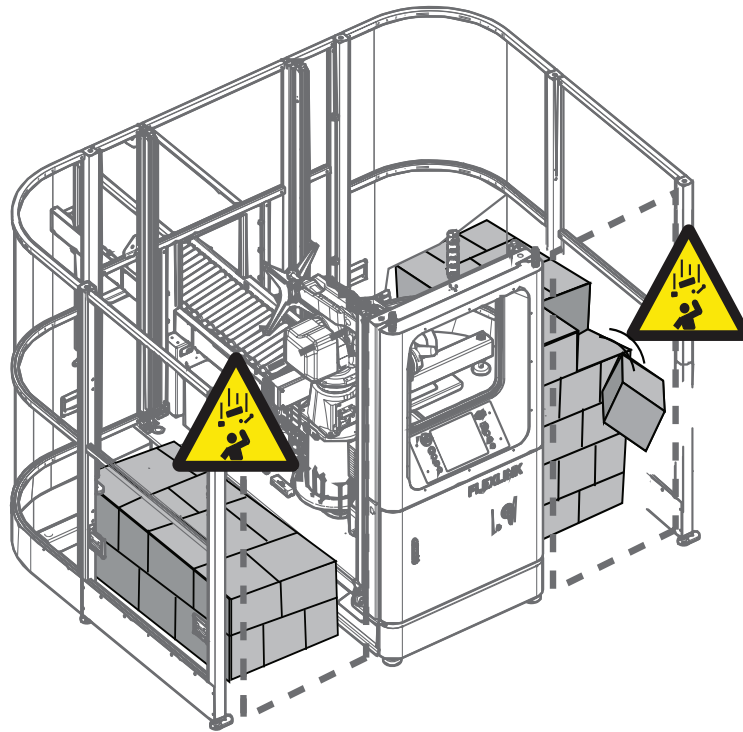


Figure 19 Layout of software safety limitations.

4.6 Residual risks





5 Unpacking, lifting and transporting



DANGER: Heavy weight parts are handled at several steps in this section. Be aware and handle with care.



Warning: Handle with care to avoid shock or impact causing the arm to de-calibrate. If the robot arm needs a recalibration, please contact FlexLink service.



5.1 Transporting

The pallets are transported to the installation site from the manufacturer in pallets.

Pallet A	3200x1500x2040 mm	2500 kg
Pallet B	3200x1500x2169 mm	1200 kg
Pallet C	Fanuc: 1155x1360x1600 mm	300-500 kg
	KUKA: 790x1510x1560 mm	

5.2 Lifting

Tools:



Required personnel:



PPE:



To lift pallets containing the machine out of the transportation vehicle use a forklift able to lift pallets with Center of gravity (CoG) in the middle of it's overall dimensions.

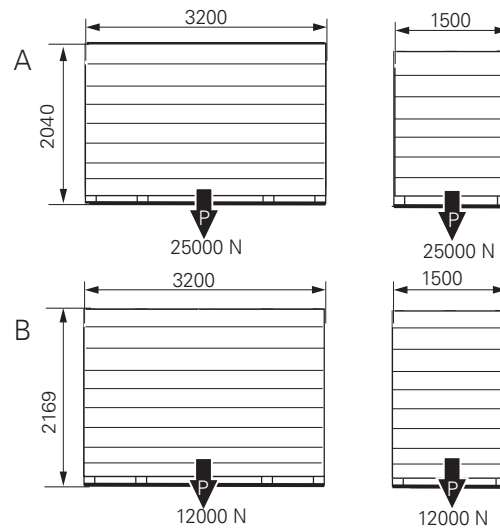
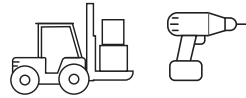


Figure 20 CoG on pallet A and B

5.3 Unpacking

Tools:



Required
personnel:



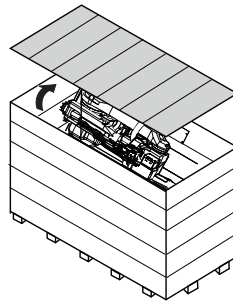
PPE:



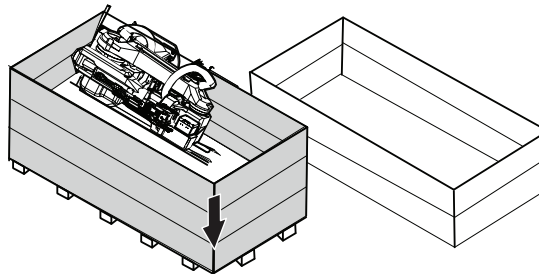
For information of the content in each pallet, see section Section 1.3 'Content of delivery'.

5.3.1 Unpacking procedure

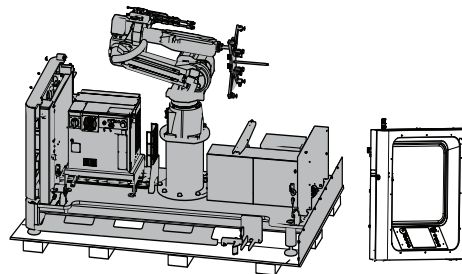
- 1 Remove the lid.



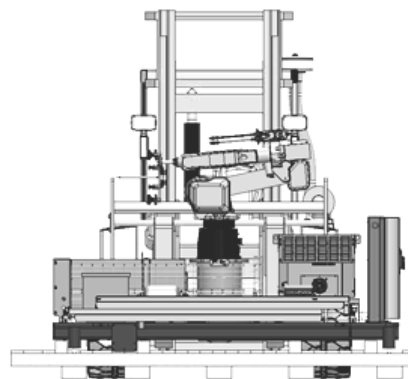
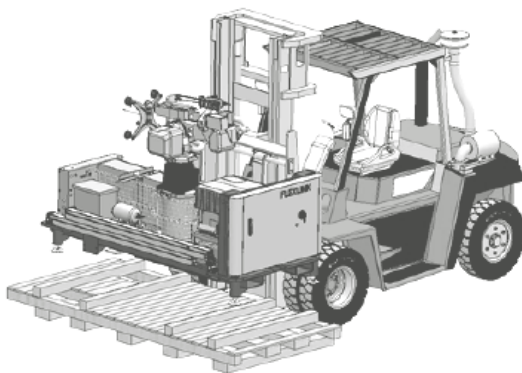
- 2 Remove the collars from top to bottom.



- 3 Unfix all parts (except the main base) and put them outside the pallet.



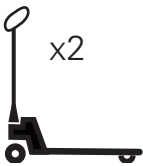

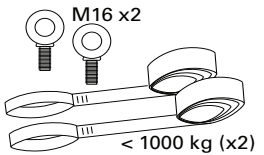
- 4 Lift the central unit from pallet with a fork lift.



6 Assembly, installation and relocation


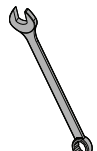
6.1 Assembly

Tools:

Capacity: [T@mm]
-2,5 @1500
-2,5 @750 (side lift)

Lifting belt capacity:
< 500 kg (x2)

2, 3, 8, 10, 12 mm 10, 13, 15, 18, 24, 26, 46 mm

Required personnel:



PPE:



DANGER: Heavy weight parts are handled at several steps in this section. These steps are marked with a crushing risk. Be aware and handle with care.



Warning: Handle with care to avoid shock or impact causing the arm to de-calibrate. If the robot arm needs a recalibration, please contact FlexLink service.

6.1.1 Positioning of the base unit

- 1 Position the base unit on the floor with a height distance of 280 mm, see figure below. For feet/height adjustment; see Section 6.1.7.

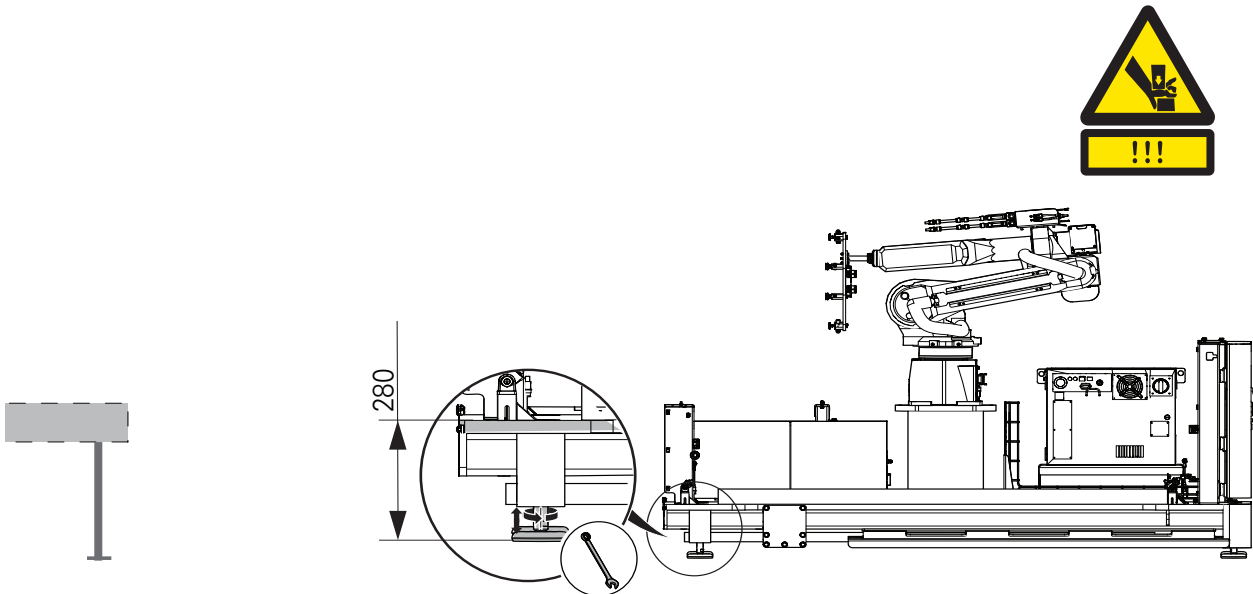


Figure 21 Base unit distance from floor

- 2 Position the base unit 2810 mm from the existing conveyor to allow the pick point conveyor assembly.

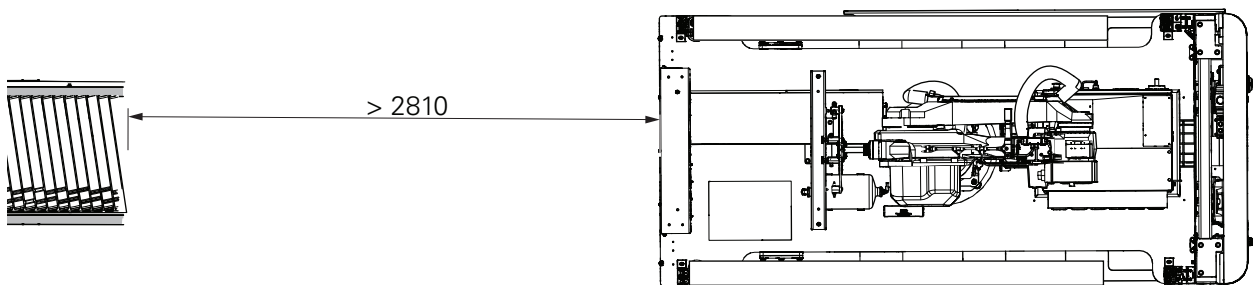
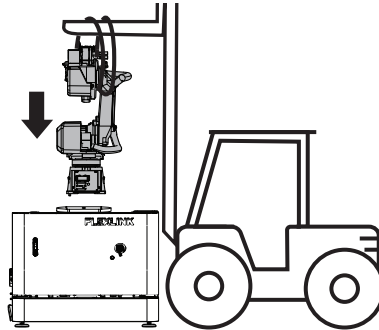


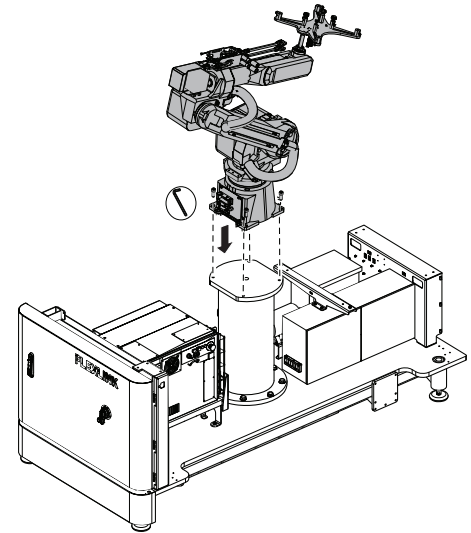
Figure 22 Distance between base unit and existing conveyor.

6.1.2 Assembly for extended pedestal (configuration option)

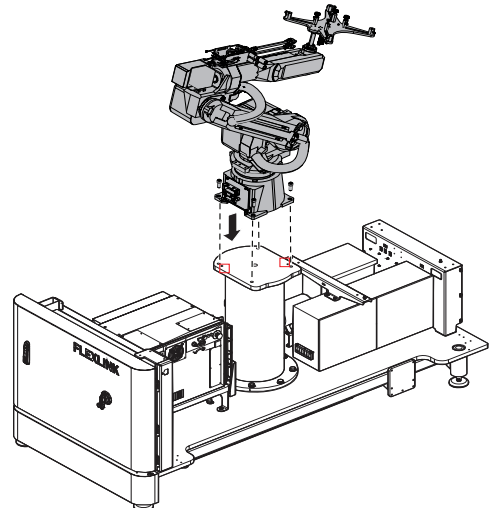
- 1 Lift the robot arm from the pallet with a forklift.



- 2 A. FANUC- Position the robot arm on the extended pedestal with a fork lift.



- B. KUKA- Position the robot arm in the matching position pins on the extended pedestal with a forklift.

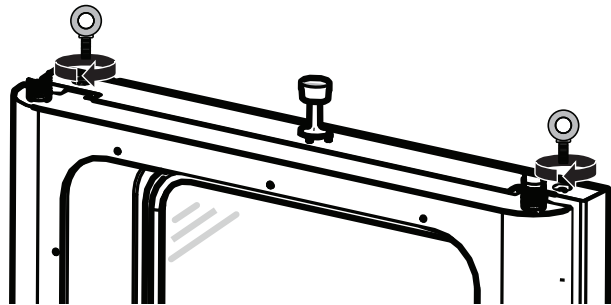


- 3 Tighten the robot arm to the pedestal.
FANUC- 4 x M16, 318 Nm
KUKUA- 4 x M20, 320 Nm
Note: Use the specific washer included for each bolt.

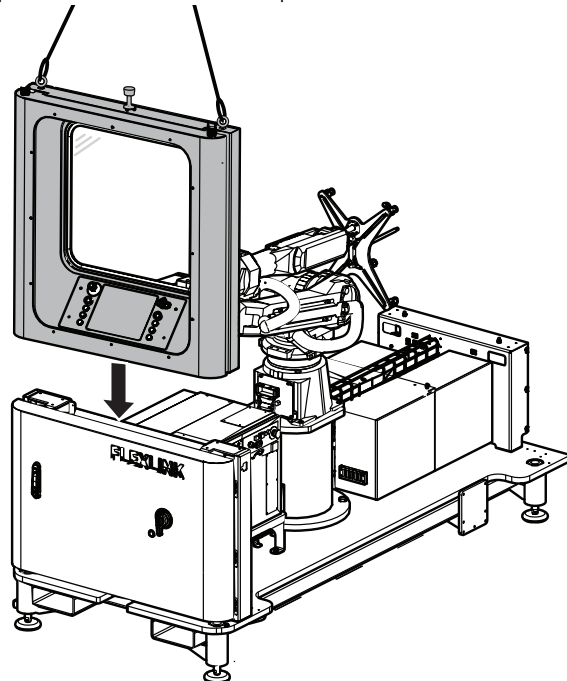
6.1.3 Assembly of front panel



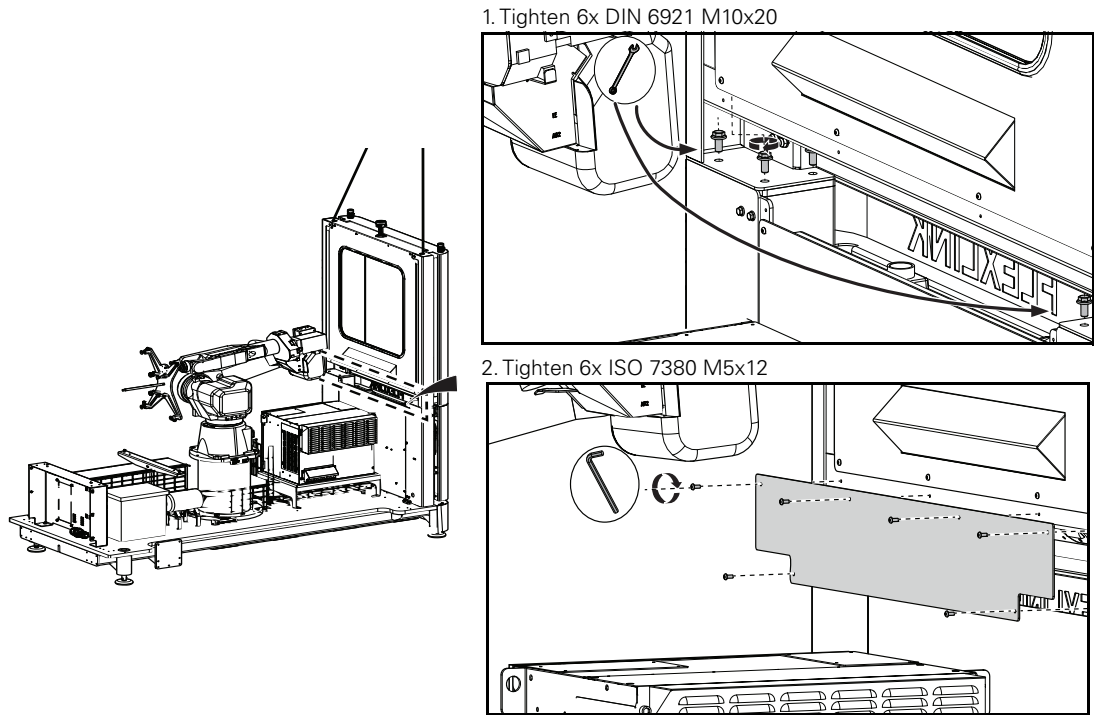
- 1 Tighten the lifting eye bolts, one M16 ISO 3266 on each side, at the top of the front wall.



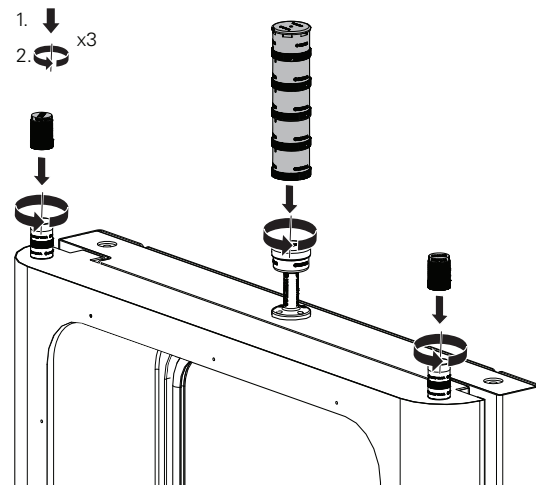
- 2 Attach the slings valid for lifting.
- 3 Position the top of the front wall at its position on the base unit.



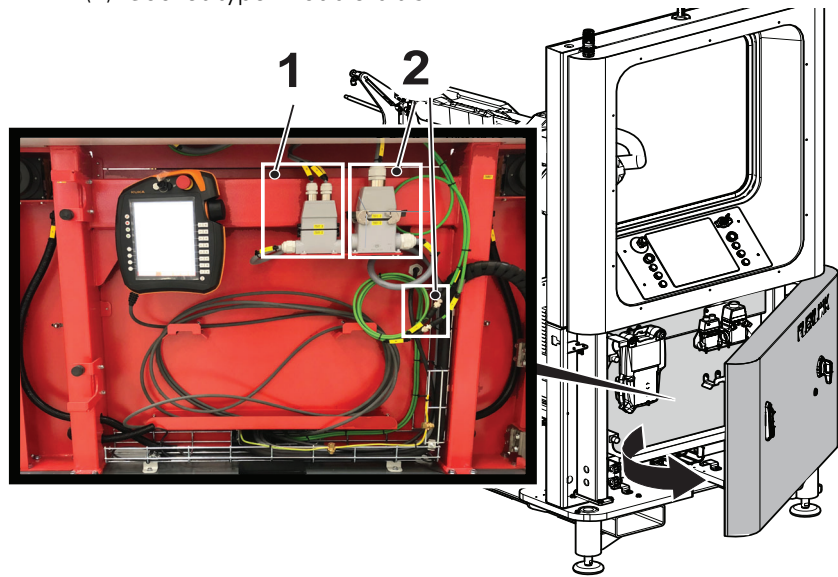
- 4 Tighten the screws on the back of the front panel to attach the panel to the base unit.



- 5 Remove the slings and eye bolts.
- 6 Attach the three signal towers.



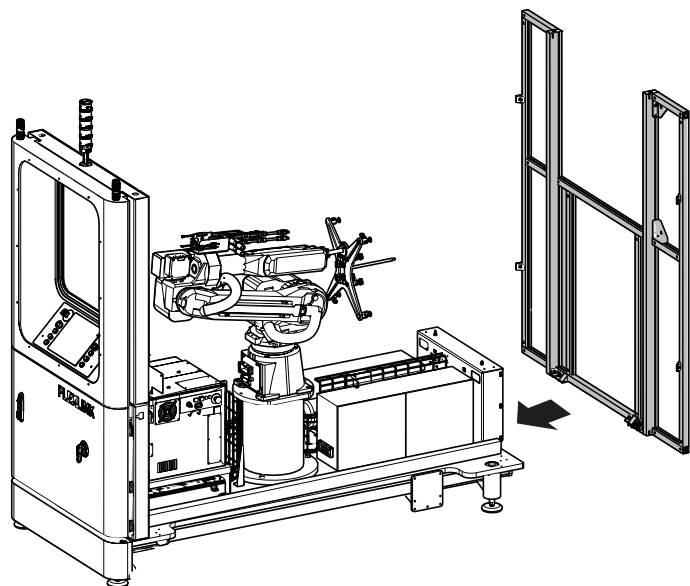
- 7 Open the door and connect the signal towers (1) and HMI plugs (2). Socket type: Double bit 5.



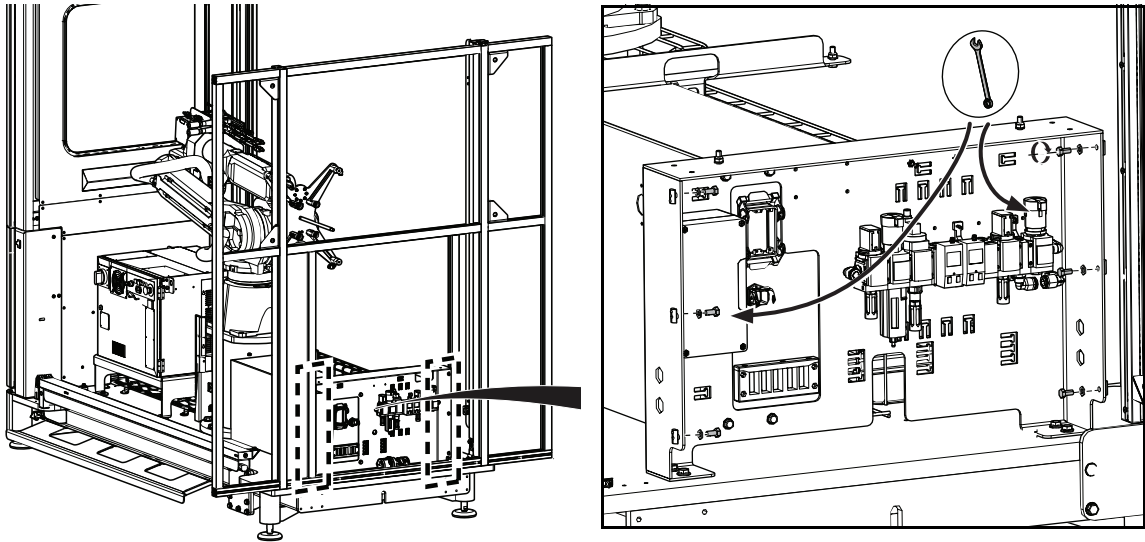
6.1.4 Assembly of the fencing panel



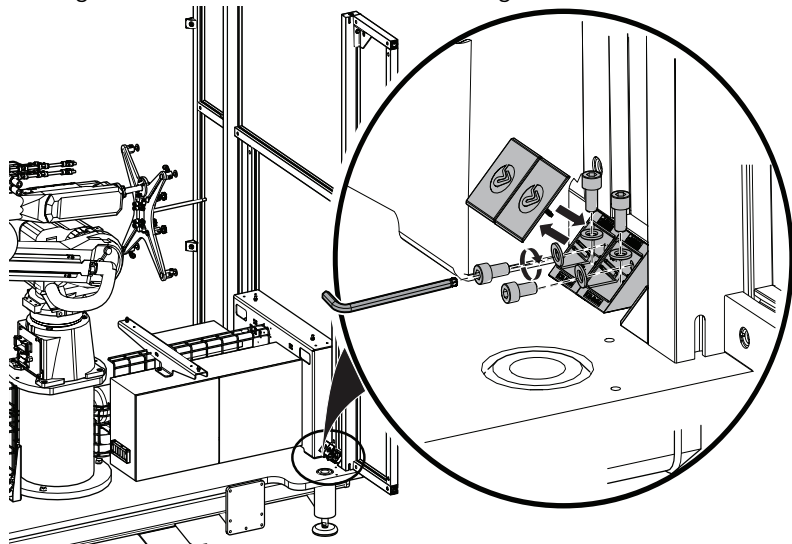
- 1 Attach the fencing panel C (pos. 6 Fig. 3).



- 2 Tighten the screws 6x ISO 4017 M8x16 from the inside of the back panel.

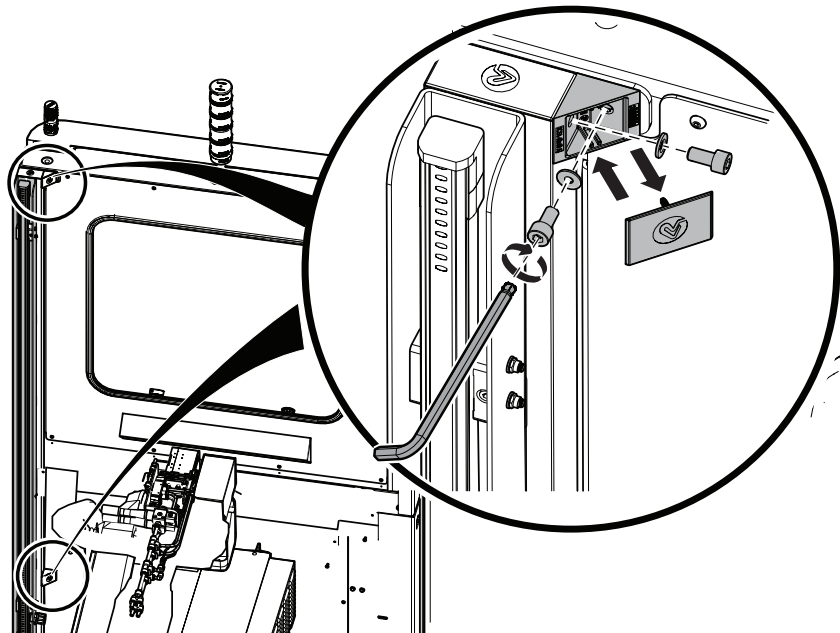


- 3 Tighten the screws on both left and right side of the base unit.



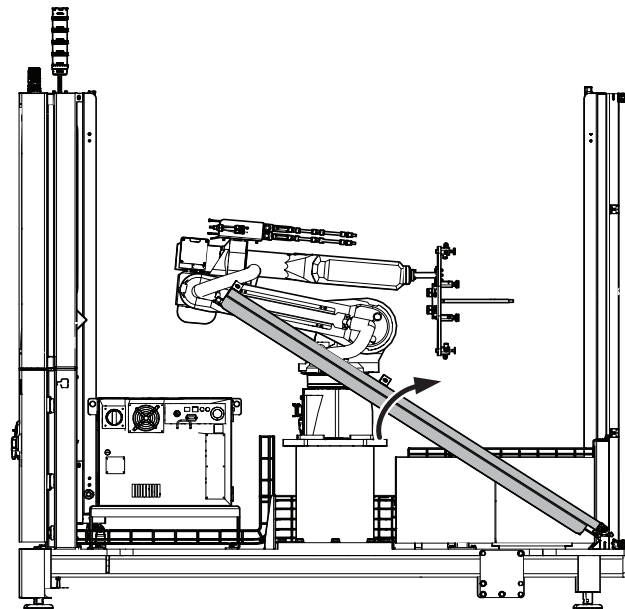
6.1.5 Assembly of light curtains

- 1 Unfold one of the front light curtains.
- 2 Fix in position with 2 x TCFA 40X40 AAB.

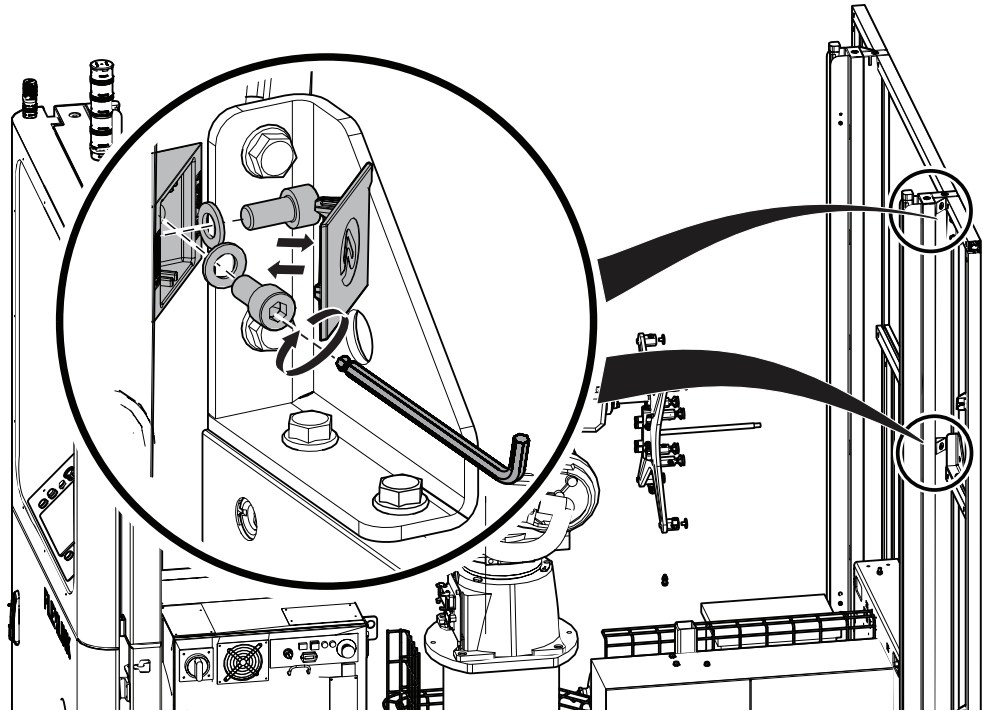


3 Repeat step 1 and 2 for the other side.

4 Unfold one of the back light curtains.



5 Fix in position with 2 x TCFA 40X40 AAB.



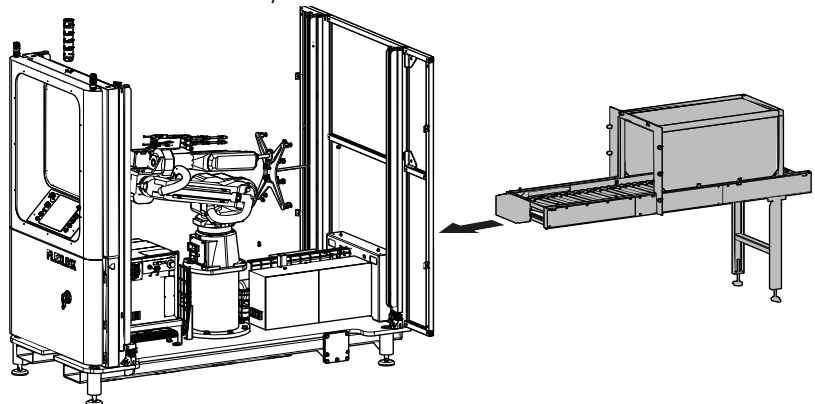
6 Repeat step 4 and 5 for the other side.

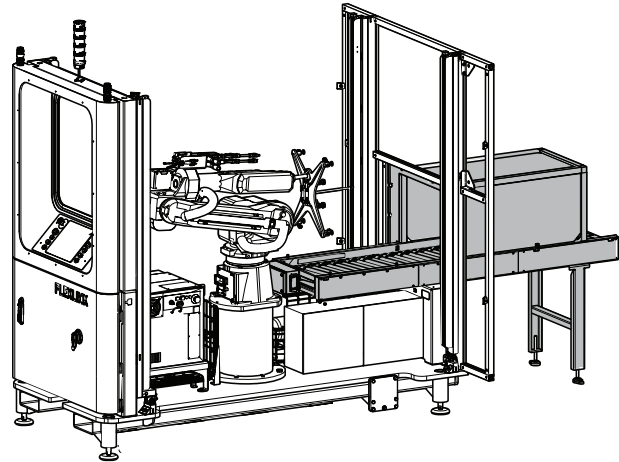
6.1.6 Assembly of pick point conveyor

a Straight conveyor:

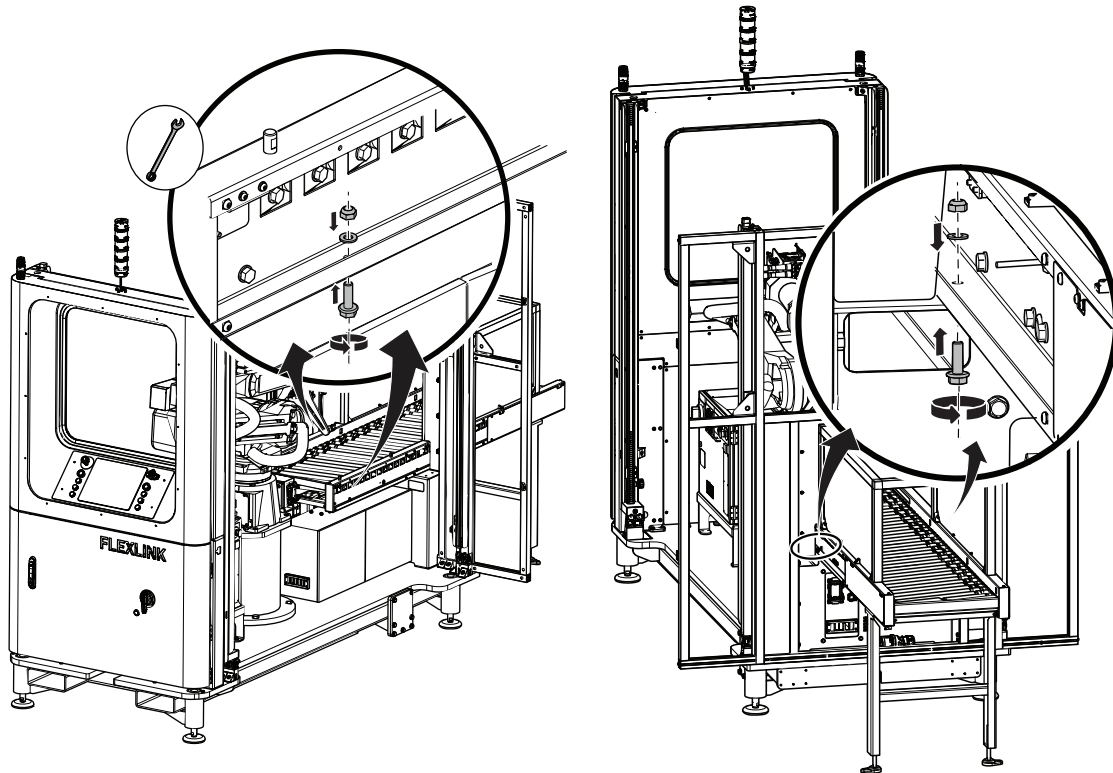


1 Position the conveyor in its final destination.

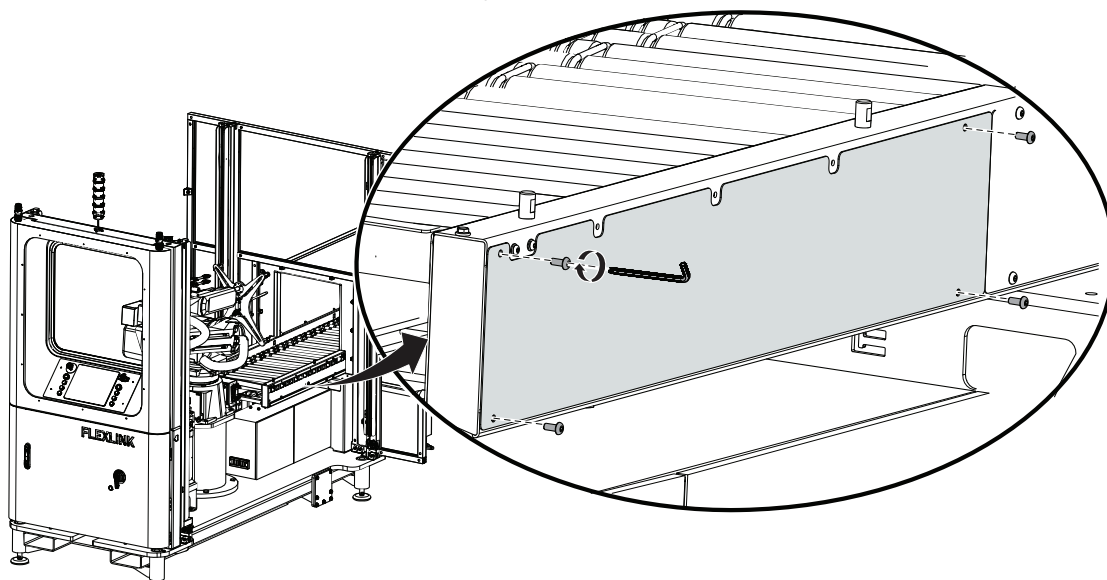




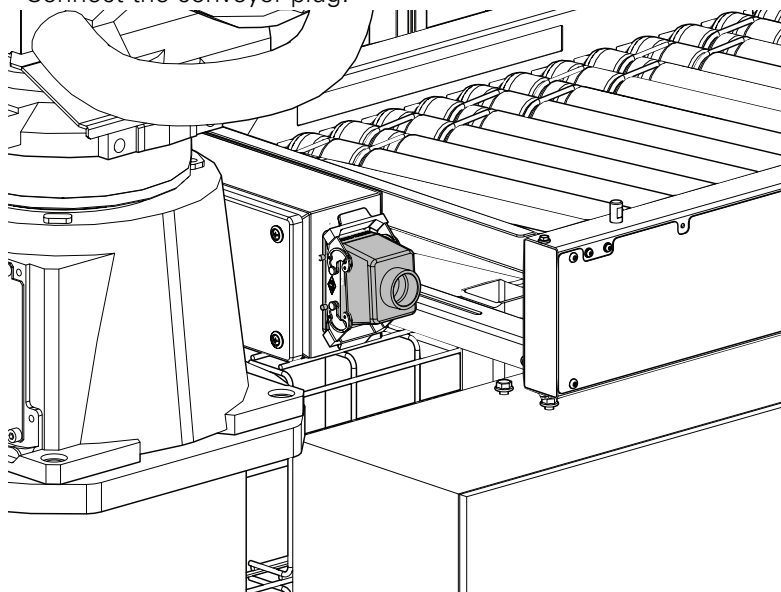
- 2 Fix the conveyor with 4x DIN 6921 M8x25, DIN 985 M8, ISO 7089 8,4x16x1,6 (2 on each side).



- 3 Fix the cover with 4x ISO 7380 M5x12 on each side of the conveyor.



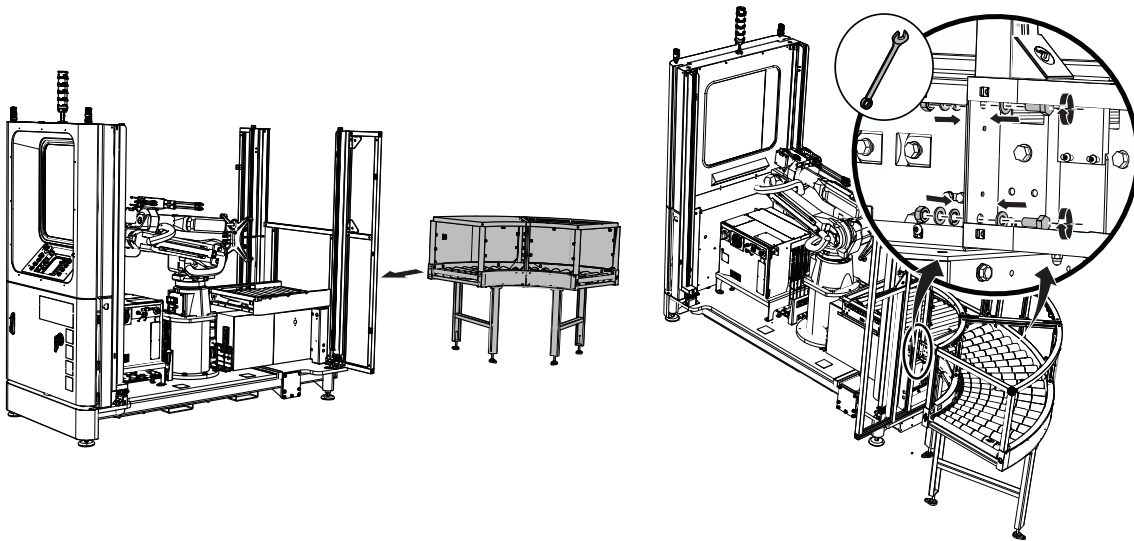
- 4 Connect the conveyor plug.



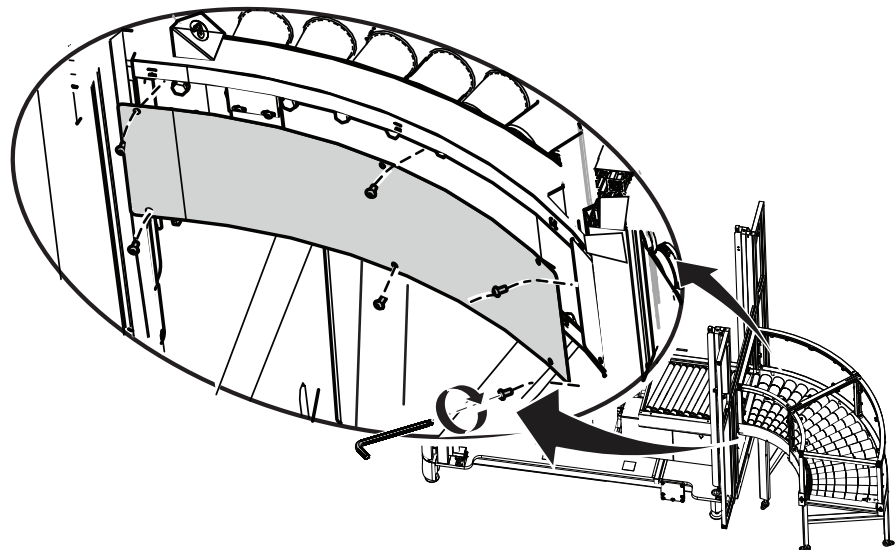
b Bended section of RH/LH conveyor



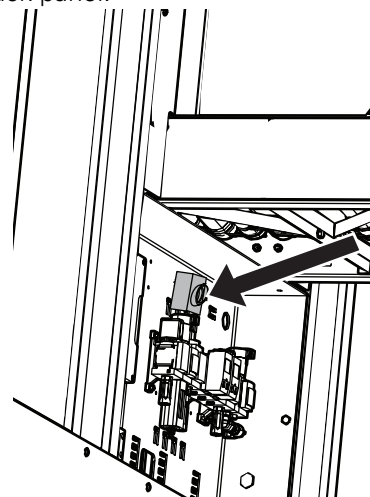
- 1 Fix the conveyor bend with 4x ISO 4017 M8x8, ISO 7089 8,4x16x1,6 and DIN 980 M8.



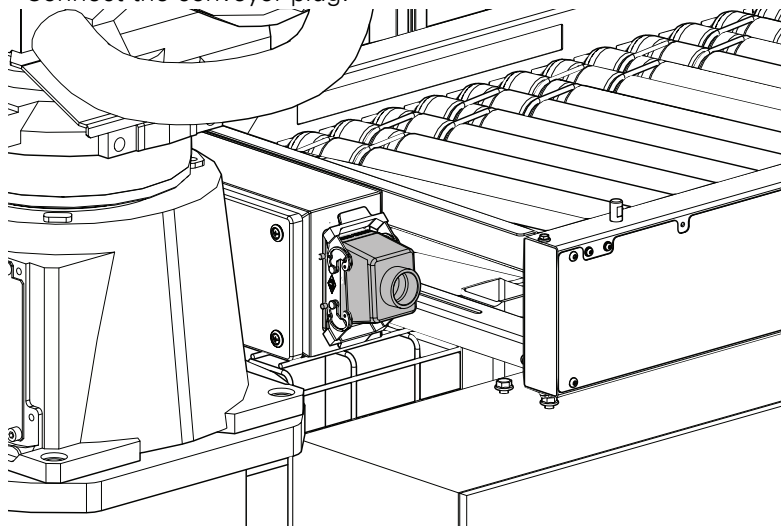
- 2 Attach the cover plate to the conveyor side with 6x ISO 7380 M5x12 (or 10x depending on inner or outer bend).



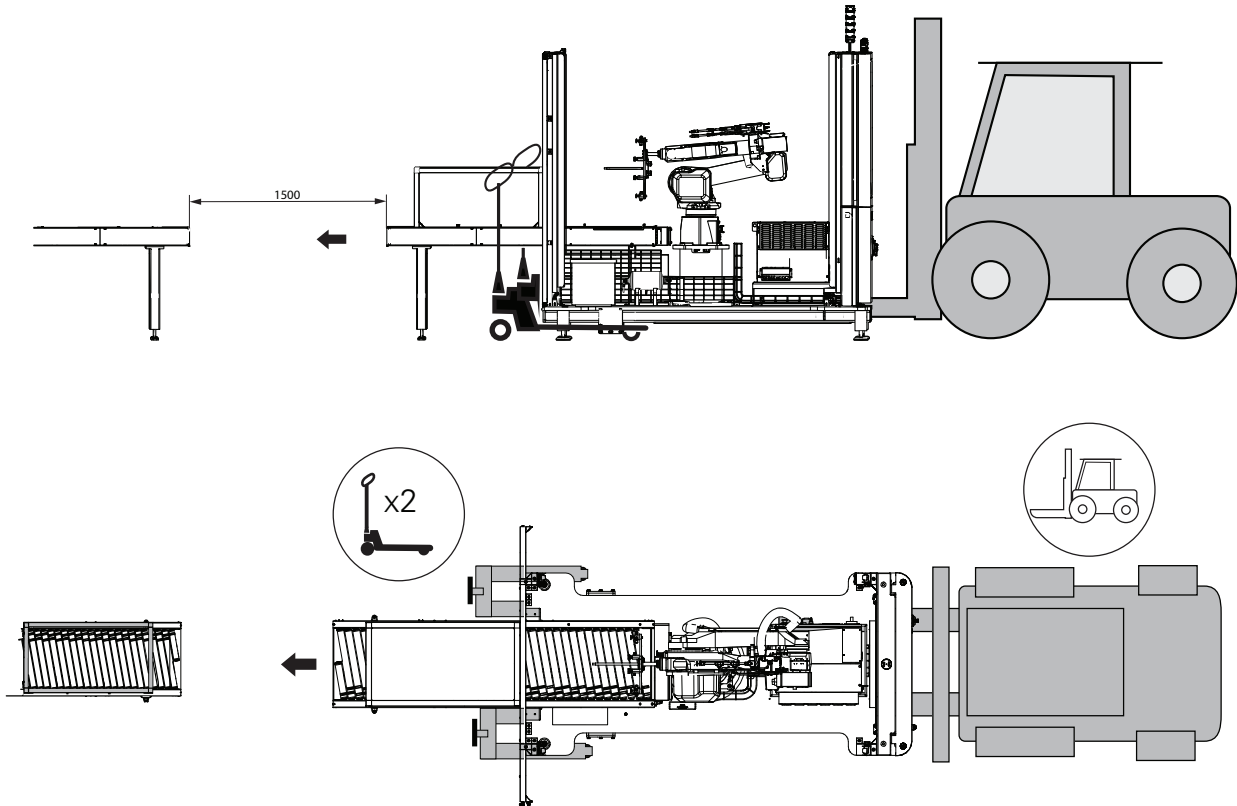
- 3 Connect the J conveyor to the back panel.



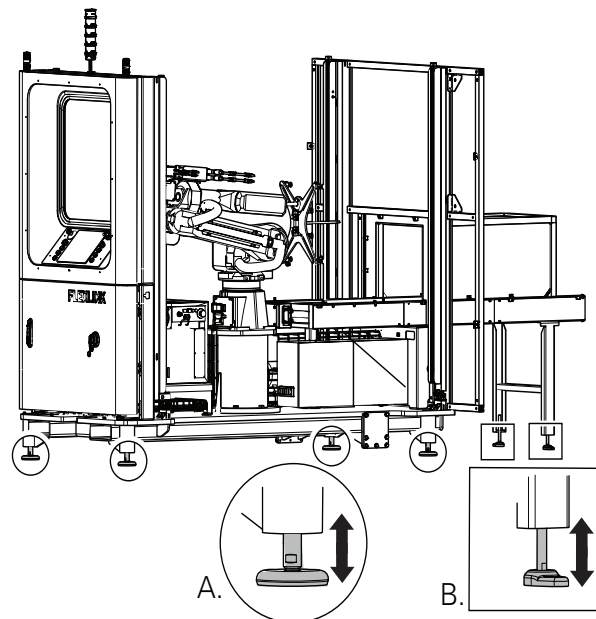
- 4 Connect the conveyor plug.



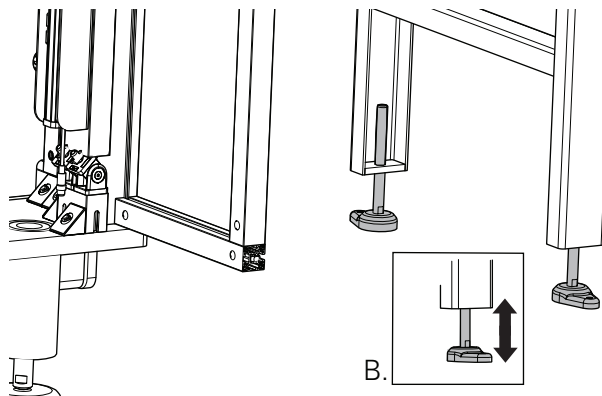
6.1.7 Move the station to the final position.



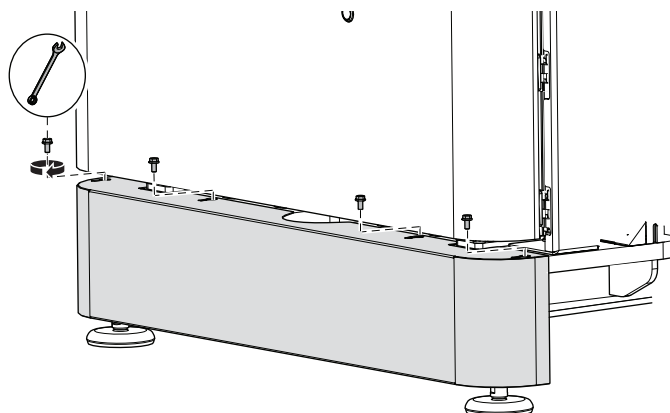
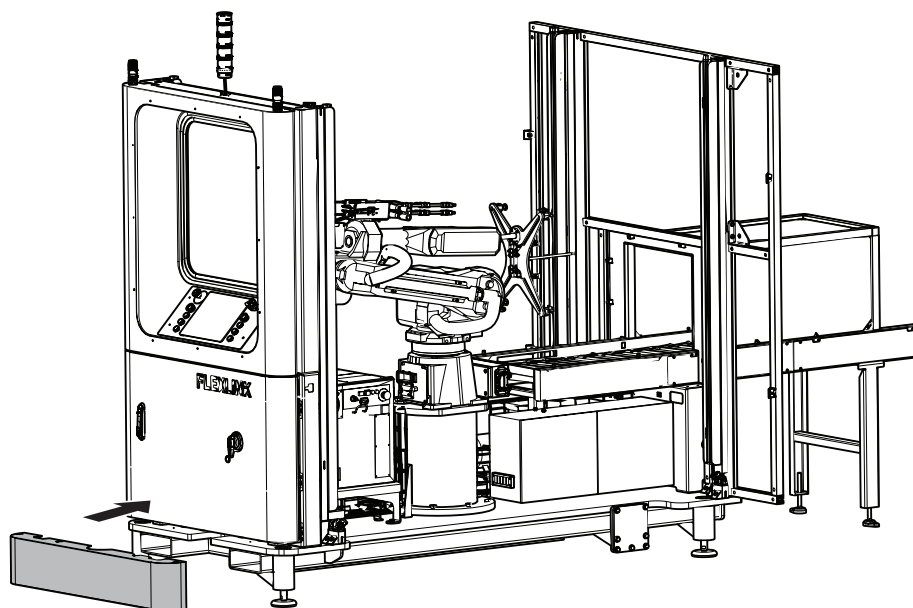
- 1 Adjust the feet to get the machine in an even horizontal position and make sure all feet are in contact with the floor. Lock with A. M30 nuts, B. lock with M12 nuts..



B.



2 Assemble the front cover and fix with 4 x DIN 6921 M8x16.

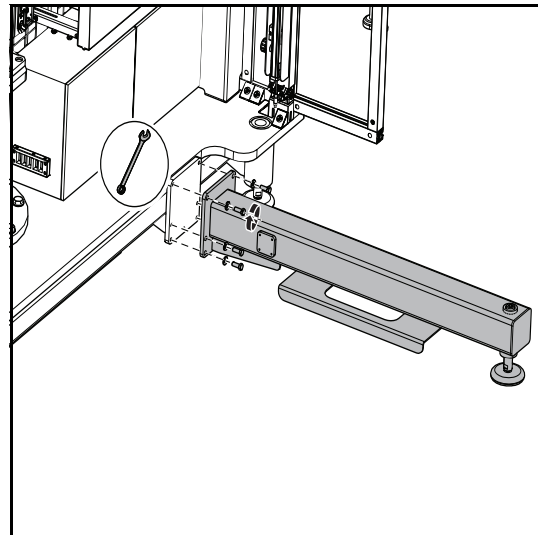
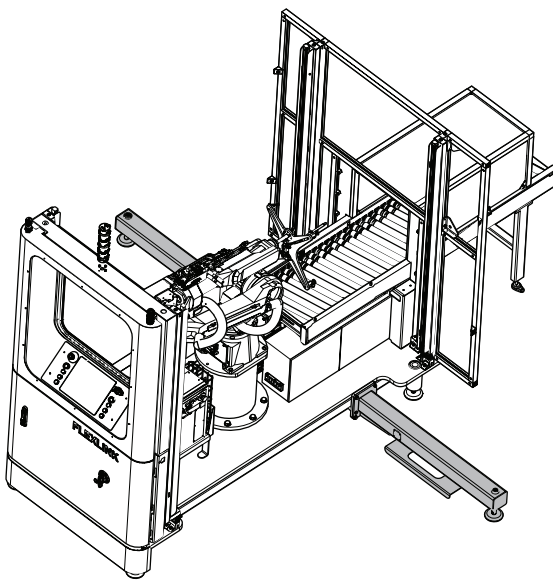


6.1.8 Assemble the side supports

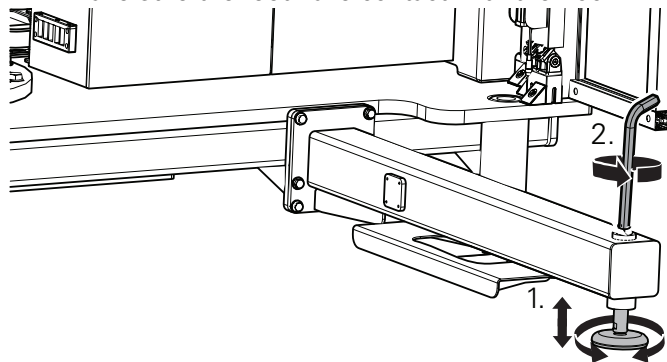
- 1 Assemble the side support on each side and fix with 7x ISO 4017 M12x30 with NORD LOCK NL12sp.



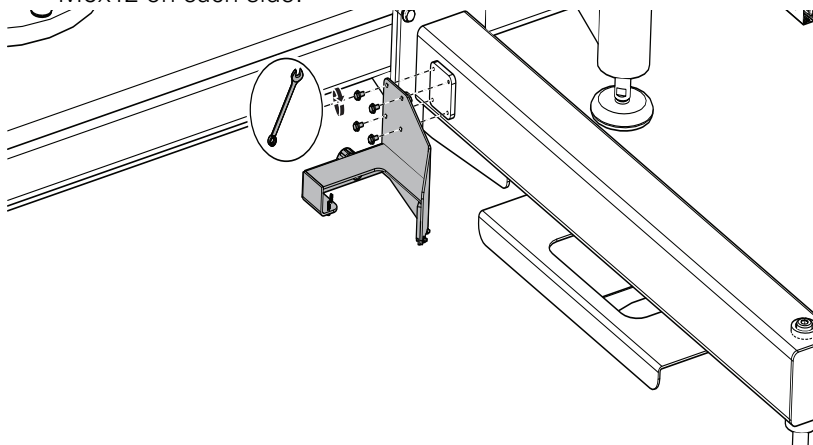
Warning: Make sure to use 79 Nm Torque to tighten the bolts.



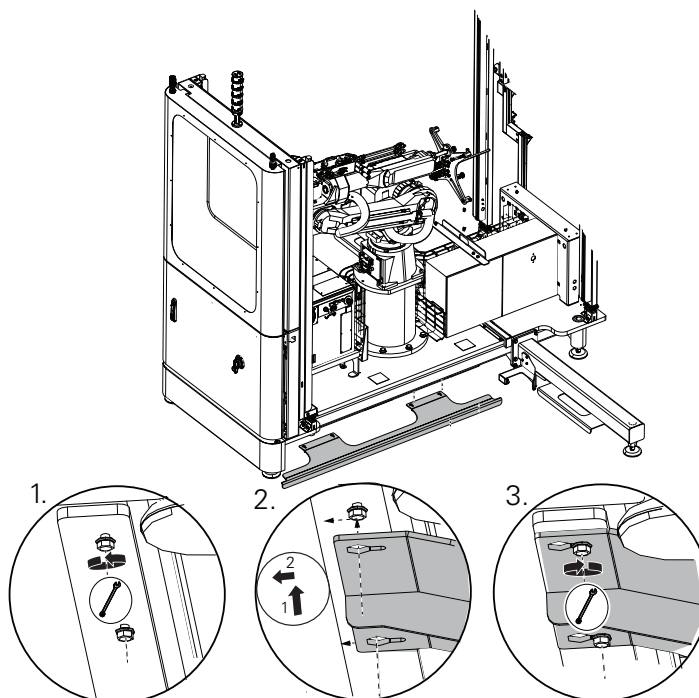
- 2 Adjust the feet and lock with M30 nut on both sides. Make sure the feet have contact with the floor.



- 3 Assemble and fix the pallet sensor brackets with 4x DIN 6921 M6x12 on each side.



- 4 Assemble and fix the side plates guides with 4 x DIN 6921 M8x16 on each side.



6.1.9 Assemble the fencing panels - Standard fencing (FS)



Lift the fencing panels by the handles.

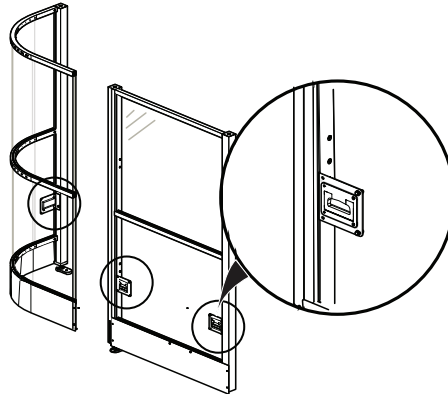
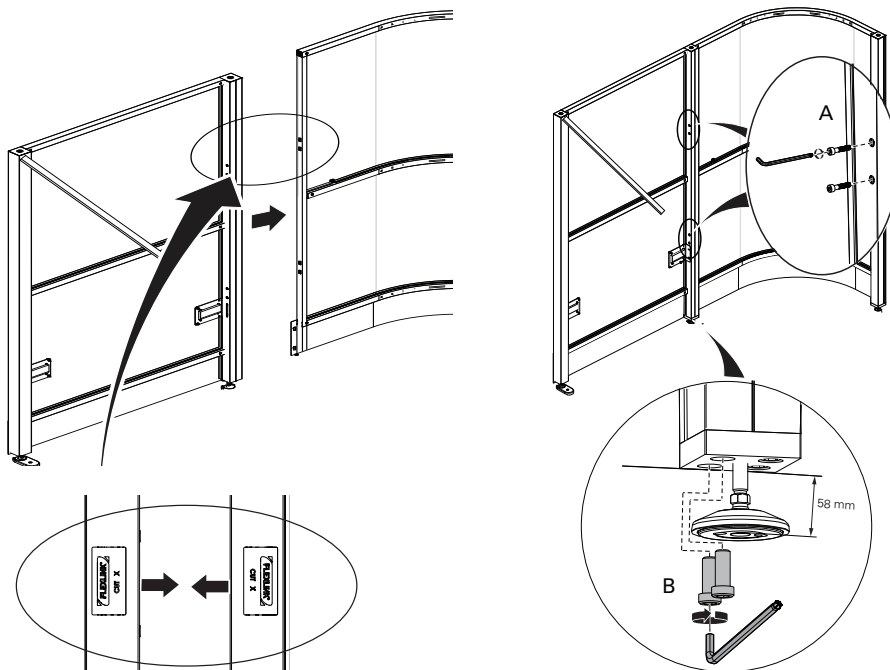


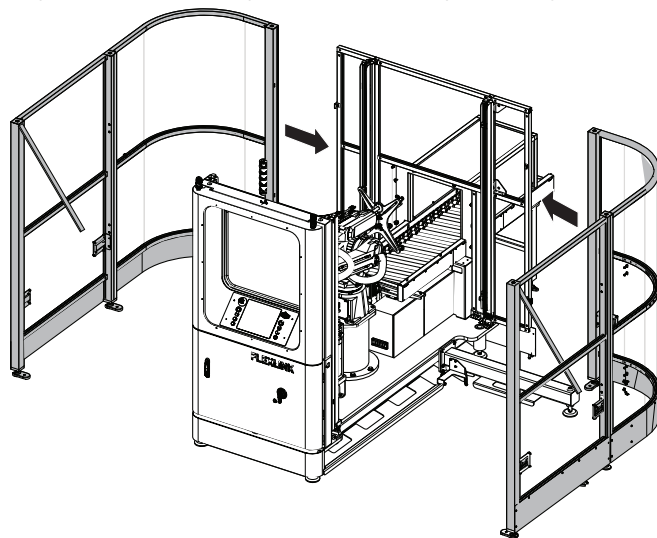
Figure 23 Position of fencing panel lifting handles

- 1 Connect the straight part with the bend, for each side, with 4x ISO 4762 M8x40 (A) and 2x DIN 6912 M12x30 (B) (Distance from bottom plate of fencing to floor is preliminary 58 mm)

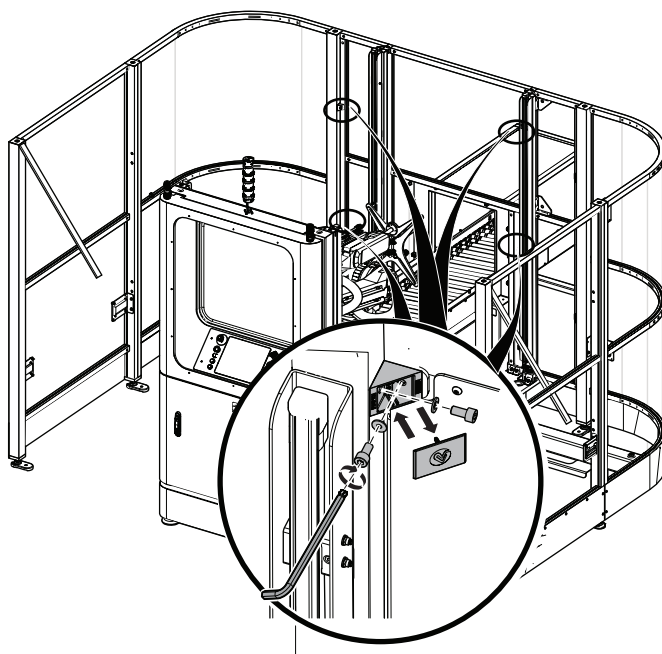
Note: Each panel have a sticker that will match with the panel to connect.



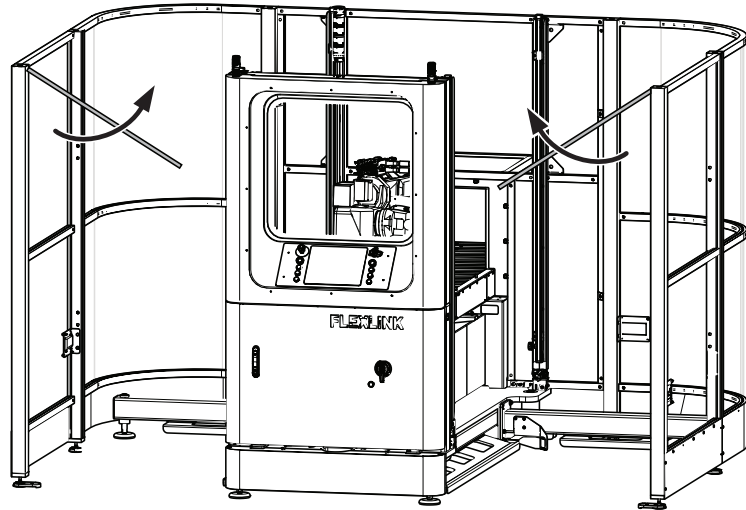
- 2 Attach the panel sections to panel section C (pos. 6 Fig. 3)



- 3 Fix the left/right section with 3x TCFA 40X40 AAB

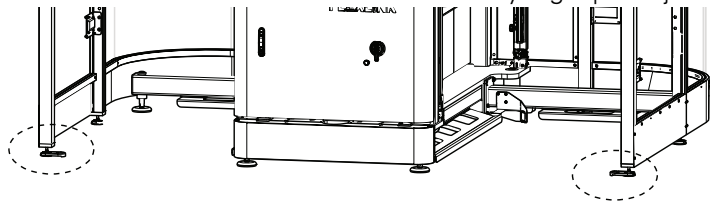


- 4 Connect the fencing panels to the top of the front wall with TCFA 40X40 AAB

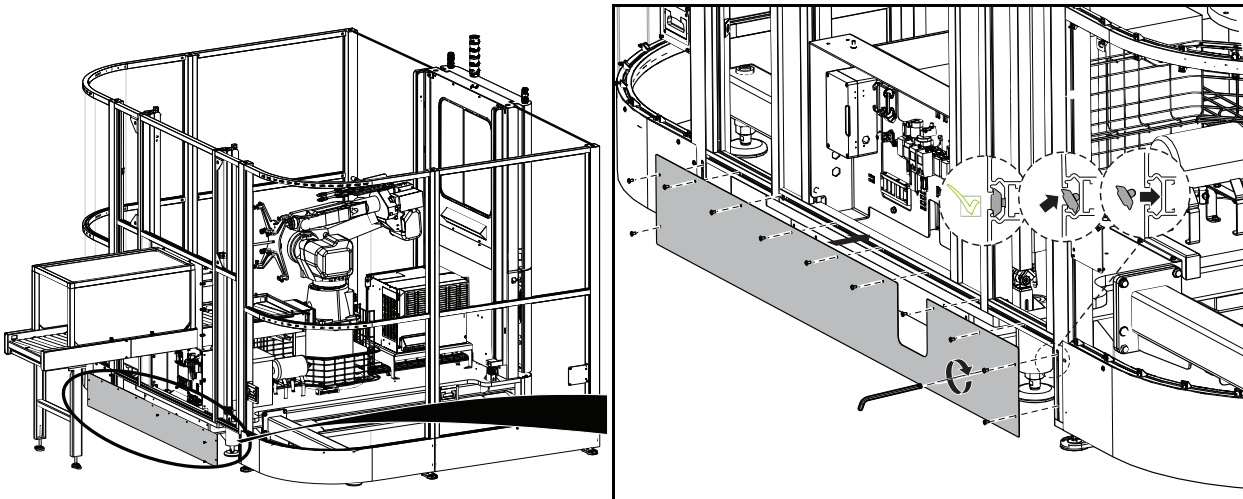


- 5 Add TCFF 80x150 B at the front fencing feet at each side and anchor to the floor.

Note: If not anchored the feet can be moved by e.g.a pallet jack.

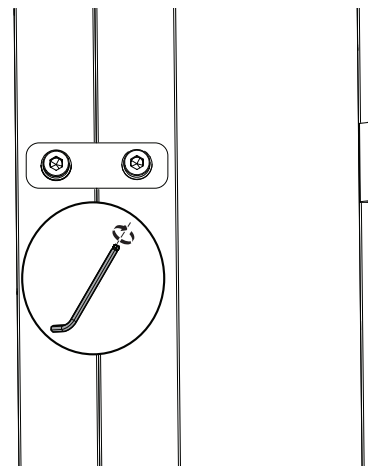
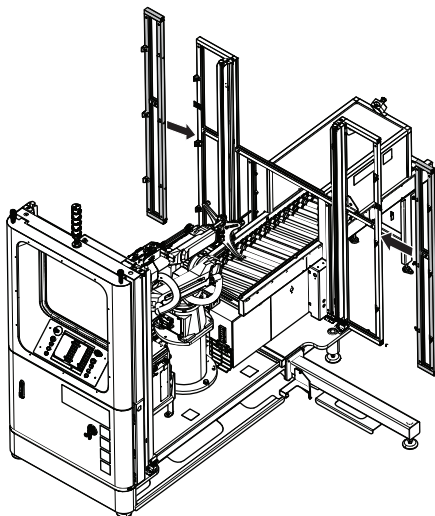


- 6 Attach the lower back cover with 11x ISO 7380-2 M6x12 and TCAN 6.



6.1.10 Assemble the fencing panels - Extended fencing (FE)

- 1 Attach the side panels (G/H) to Panel C and fix with 6 x TCCS 74.



Lift the fencing panels by the handles.

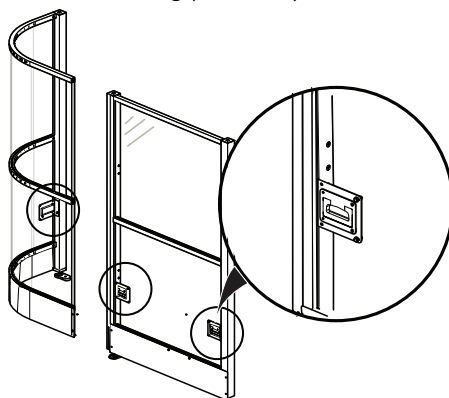
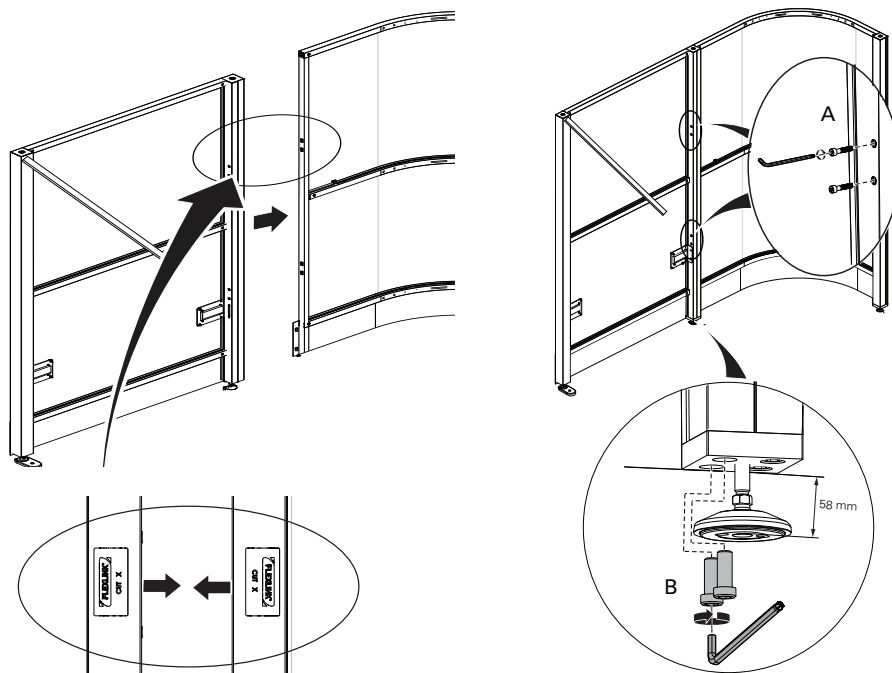


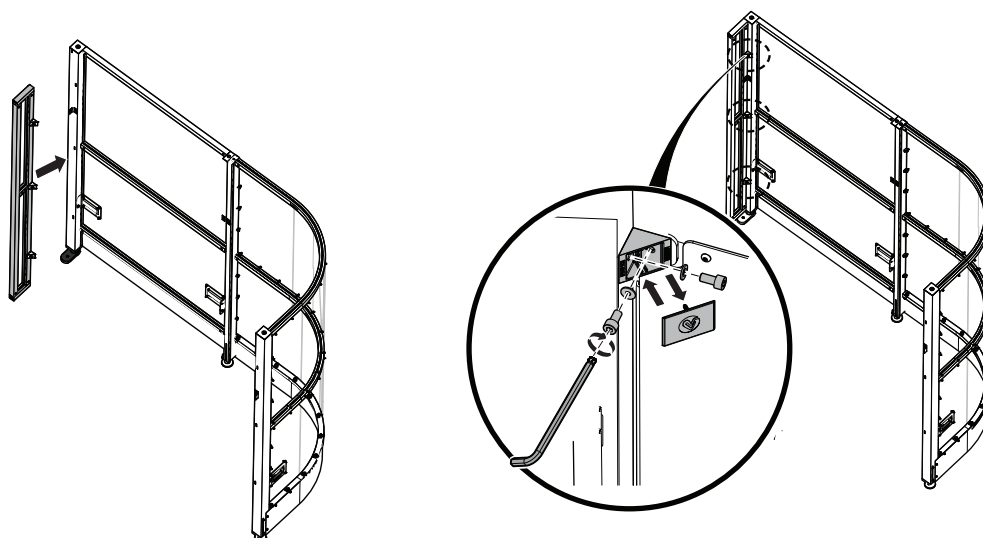
Figure 24 Position of fencing panel lifting handles

- 2 Connect the straight part with the bend, for each side, with 4x ISO 4762 M8x40 (A) and 2x DIN 6912 M12x30 (B) (Distance from bottom plate of fencing to floor is preliminary 58 mm)

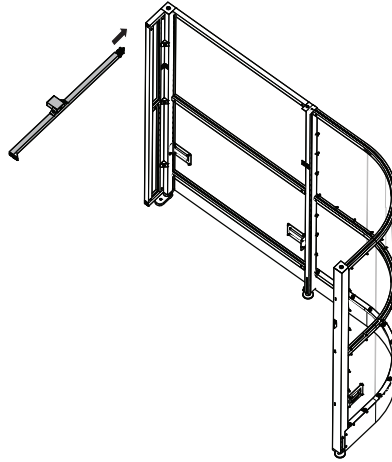
Note: Each panel have a sticker that will match with the panel to connect.



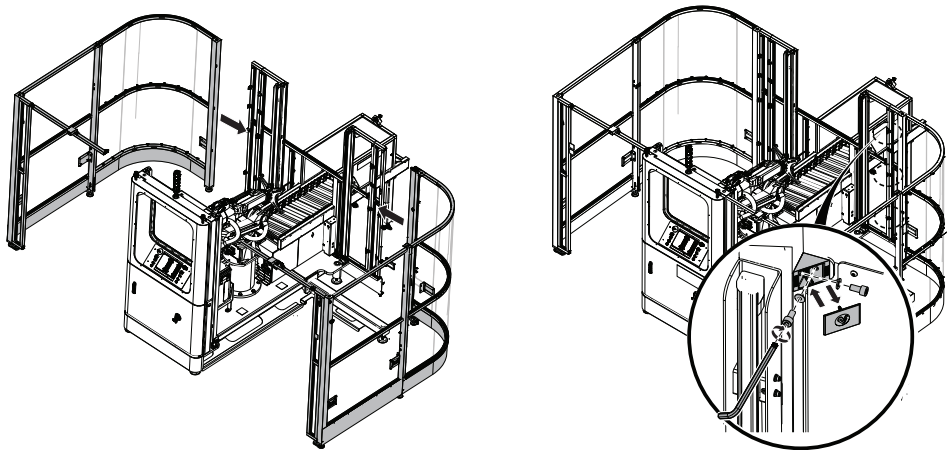
- 3 Connect the front panel F/I with the panel wall in previous step for each side and fix with 3x TCFA 40x40 AAB.



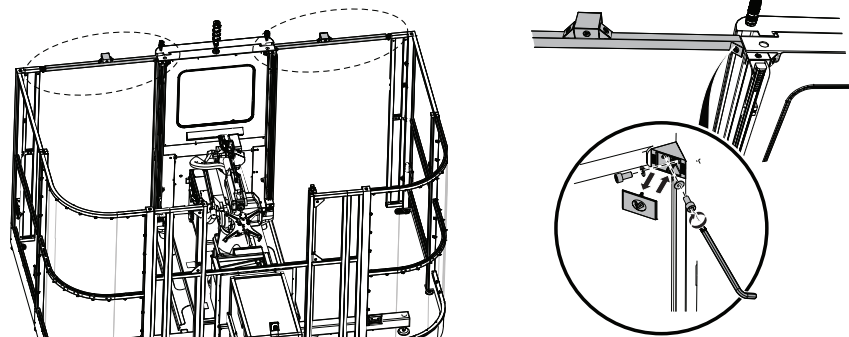
- 4 Connect the front fencing beam with the assembled panel wall for each side.



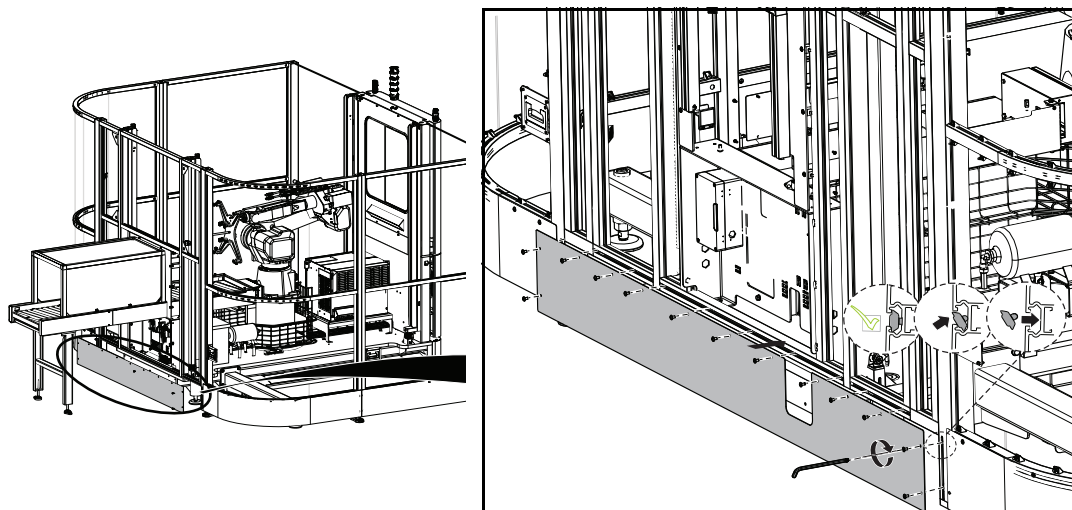
- 5 Assemble the two panel wall sides to Panel section C. Fix with 3 x TCFA 40x40 AAB for each side.



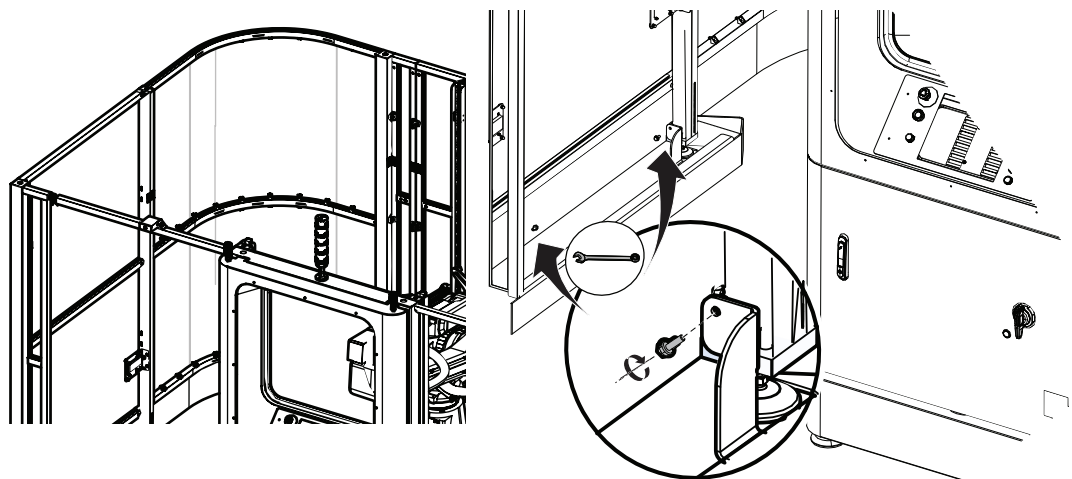
- 6 Connect the fencing beams to the top of the front wall and fix with TCFA 40x40 AAB.



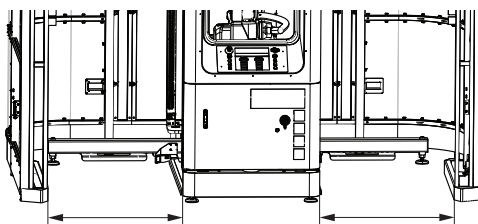
- 7 Assemble the lower back cover and fix with 13x ISO 7380-2 M6x12 and TCAN 6.



- 8 Assemble the pallet guides and fix them with 4x DIN 6921 M8x16 8,8 A2K and TCAN 8.



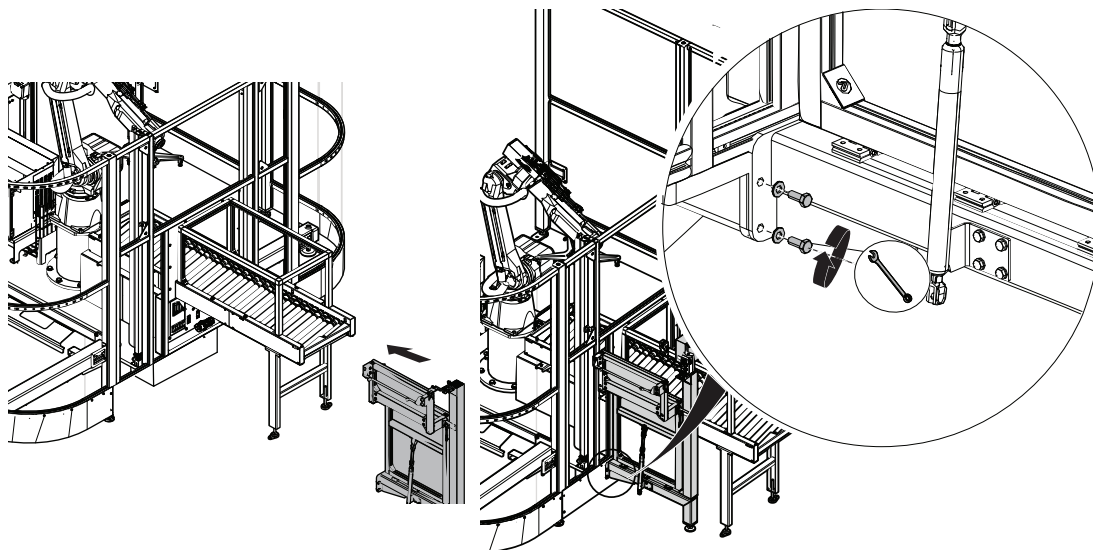
- 9 Measure the distance between the guides to 1230 mm.



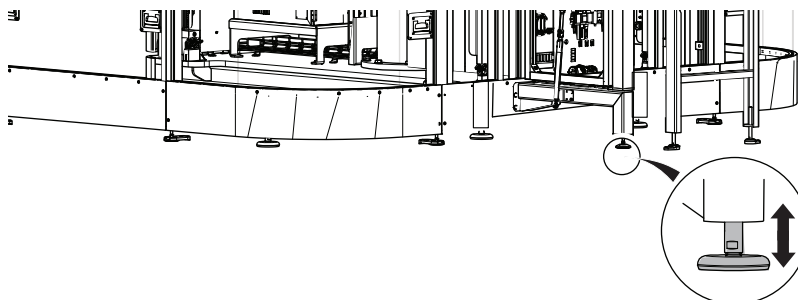
- 10 Fix the guides to the floor with anchors Ø12 mm. Each guide should be fixed with at least two anchors.

6.1.11 Assemble the interlayer module

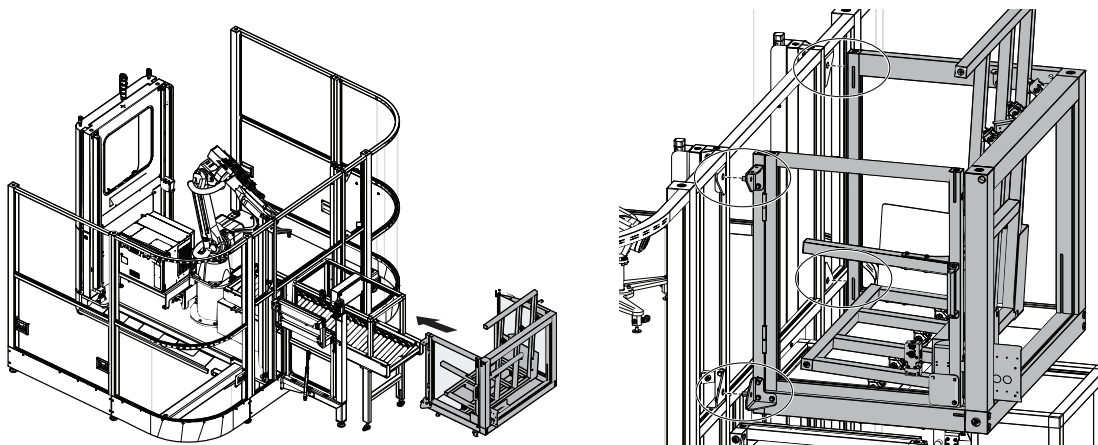
- 1 Attach the interlayer support and fix with 4x ISO 4017 M10x25 (two on each side).



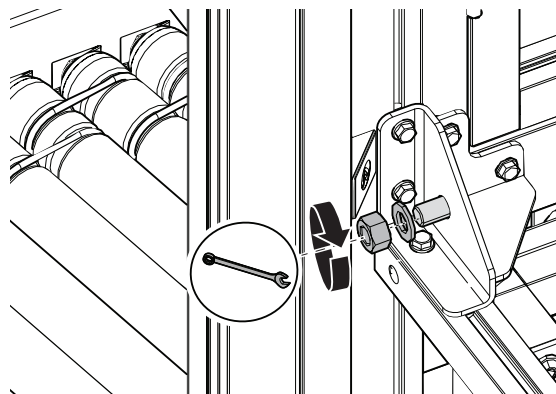
- 2 Adjust the foot and lock with M12 nut.



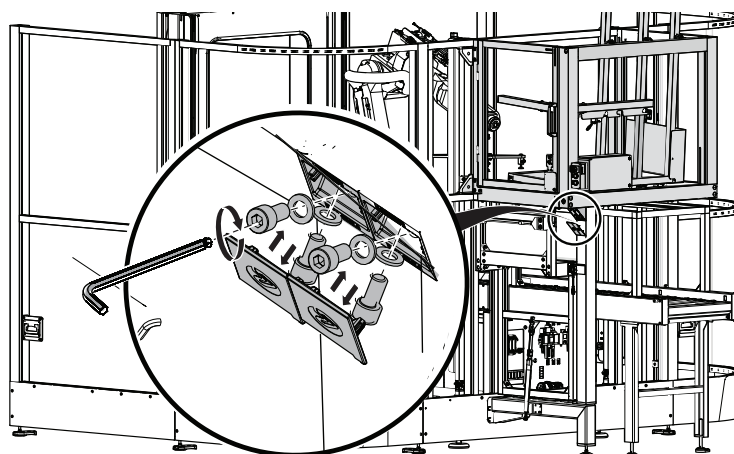
- 3 Assemble the interlayer module on the support with the threaded pins in position.



- 4 Fix the interlayer module with 4x M16 nuts on the threaded pins.



- 5 Connect the module to the support with TC40 brackets.



6.2 Installation

Tools:



Required
personnel:



PPE:



6.2.1 Initial start-up procedure

It is mandatory to perform and pass all steps of the checklist; "Appendix B" Part 1 and 2 "Initial start up procedure checklist to launch the machine.

The testing and a complete passed test should be confirmed and signed by the person performing the test.

6.2.2 Electrical power connection

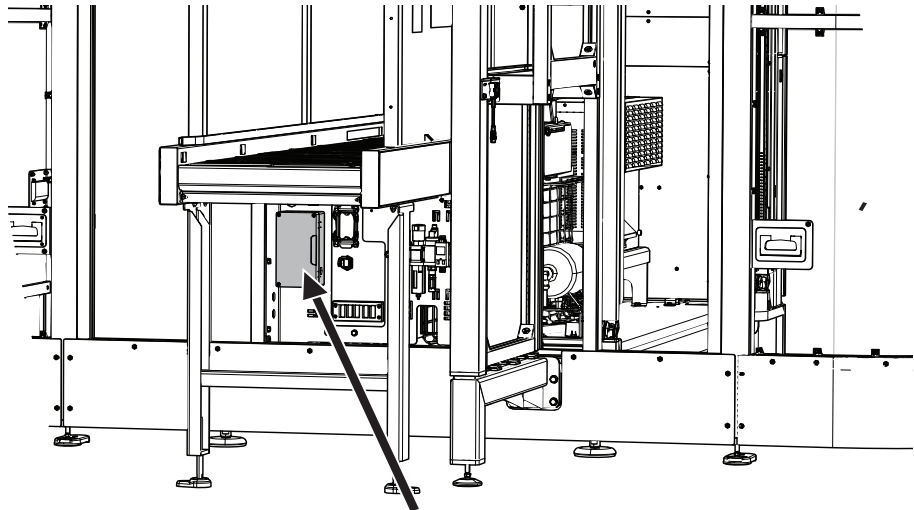


DANGER: It is mandatory to have performed and passed all steps of "Appendix B" part 2 before connecting the electrical power.



DANGER: It is forbidden to be inside the machine during power cable connection.

Connect the power cable to the cabinet (see position in the illustration below) on the back panel, according to electrical documentation.



6.2.3 Pneumatic power connection

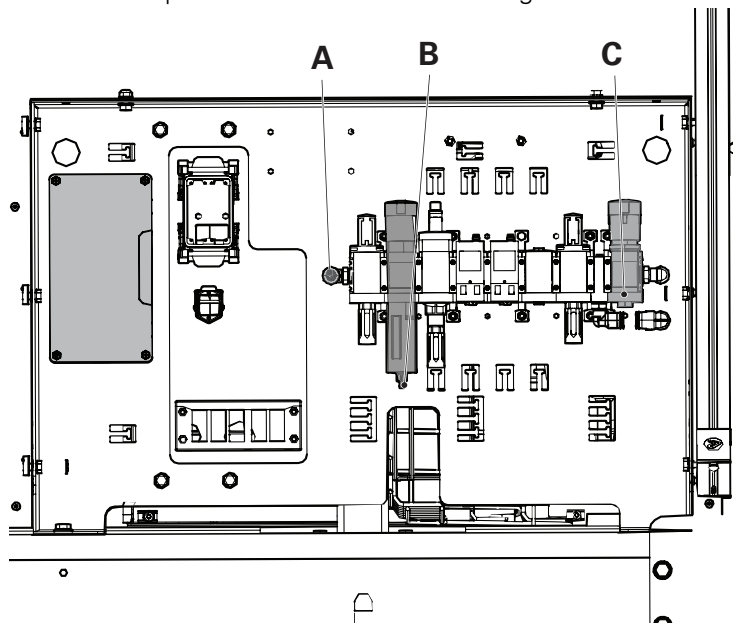


DANGER: It is mandatory to have performed and passed all steps of "Appendix B" part 1 before connecting any media.



DANGER: It is forbidden to be inside the machine during connection of any media.

- 1 Connect the pneumatic power to port A.
- 2 Set and secure pressure value to 6 bar at regulator B.
- 3 Set and secure pressure value to 4.5 bar at regulator C.



6.3 Relocation



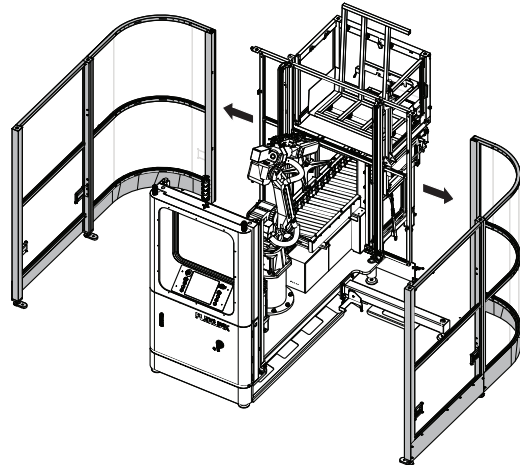
DANGER: Heavy weight parts are handled at several steps in this procedure.



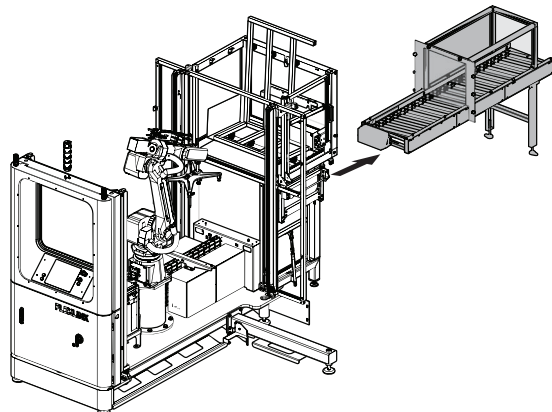
Caution: The robot arm has to be set to transportation position during relocation to avoid tipping risks. See Section 8.4.0.15.

Perform the removal reverse from referenced section.

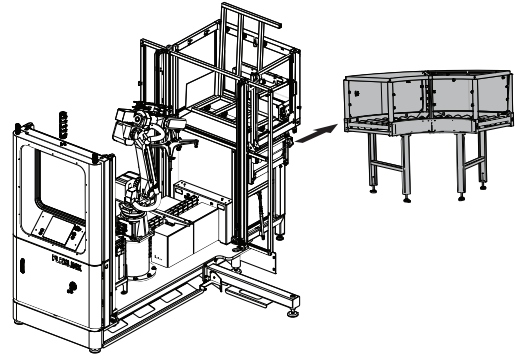
- 1 Remove the fencing according to Section 6.1.9 step 4 and 2 for SF or according to Section 6.1.10 step 6 and 5 for SE.



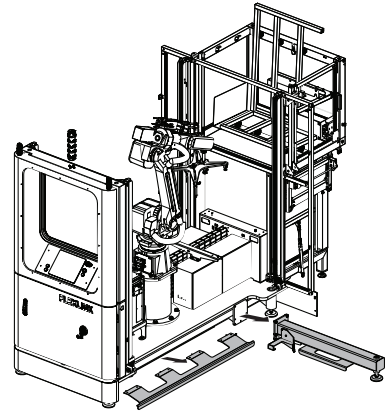
- 2 If a straight conveyor: remove according to Section 6.1.6 a.



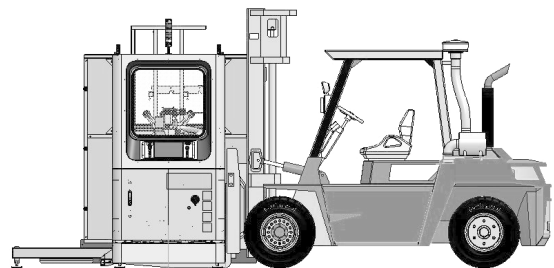
- 3 If a conveyor bend; remove according to Section 6.1.6 b.



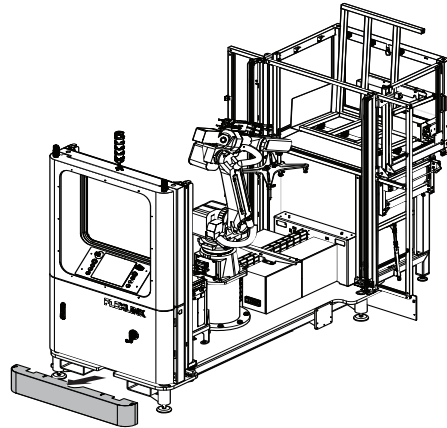
- 4 Remove the side supports and pallet guides on one side (to be able to get close with the forklift) according to Section 6.1.8 step 1.



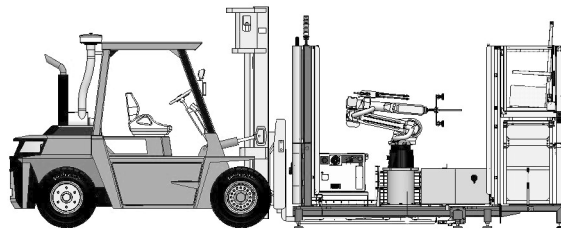
- 5 Lift the machine with the forklift and relocate.



- 6 Remove the front cover according to Section 6.1.7 step 2.



- 7 Lift the machine with the forklift and relocate.



- 8 Assemble all removed parts back on the machine.



DANGER: It is mandatory to have performed and passed all steps of "Appendix B" part 1 before connecting any media.



DANGER: It is mandatory to have performed and passed all steps of "Appendix B" part 2 before connecting the electrical power.



DANGER: It is forbidden to be inside the machine during power cable connection or connection of any media.

7 Calibration

The calibration section has a general section first and is then split up into sections for the Fanuc and KUKA robot for different calibration input.

7.1 General information for Fanuc and KUKA

7.1.1 Station coordinate system



Warning: Calibration of the coordinate system should only be performed by trained technician or engineer. Training is available at local FlexLink office.

The coordinate systems calibration defines the position of the:

- Left pallet
- Right pallet
- Product picking point
- Interlayer magazine

Temporary systems are calibrated as it is impossible, due to mechanical limitations, to reach desired points. The temporary systems are then translated to desired systems.

Temporary systems = "ref points".

"Ref points" are the only coordinate systems to calibrate. The other coordinate systems are calculated during robot installation performed after a MASTER RESET procedure.

- Coordinate systems in Fanuc are called USER FRAMES.
- Coordinate systems in KUKA are called BASE.

7.1.2 Safety during calibration

Set the robot in T1 mode when performing calibration, see Section 9 for information of how to switch to T1 mode.

When performing calibration the robot has to be set to T1 mode, which is manual jogging with speed limited to 250 mm/sec.

To enable robot movements the Dead man switch has to be pressed to its middle position.



Warning: The person holding the Dead man switch is responsible to supervise the movement of the robot and to assure the robot does not collide with any equipment or personnel.

7.1.3 Calibration tool

Perform calibration with the reference pin attached to the gripper. The pin is located in a pocket inside the machine front wall door.

- 1 Position the pin in the hole at the center of the gripper.
- 2 Rotate CW to tighten the pin.

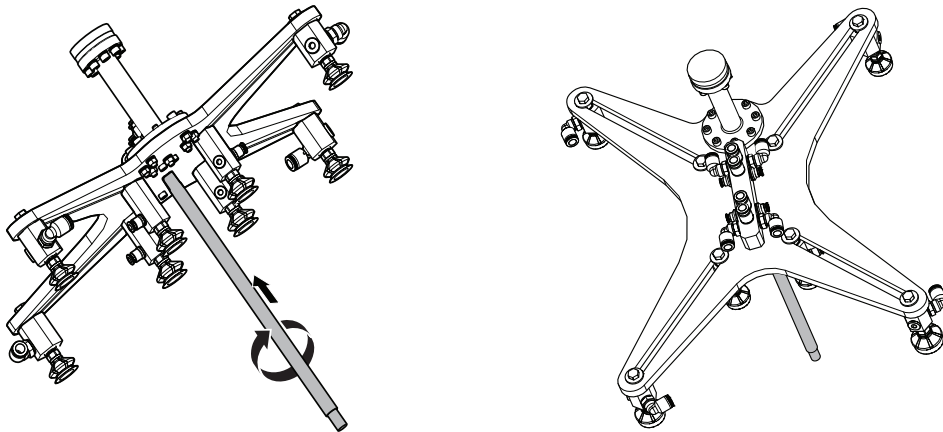


Figure 25 Calibration pin position on the one section gripper.

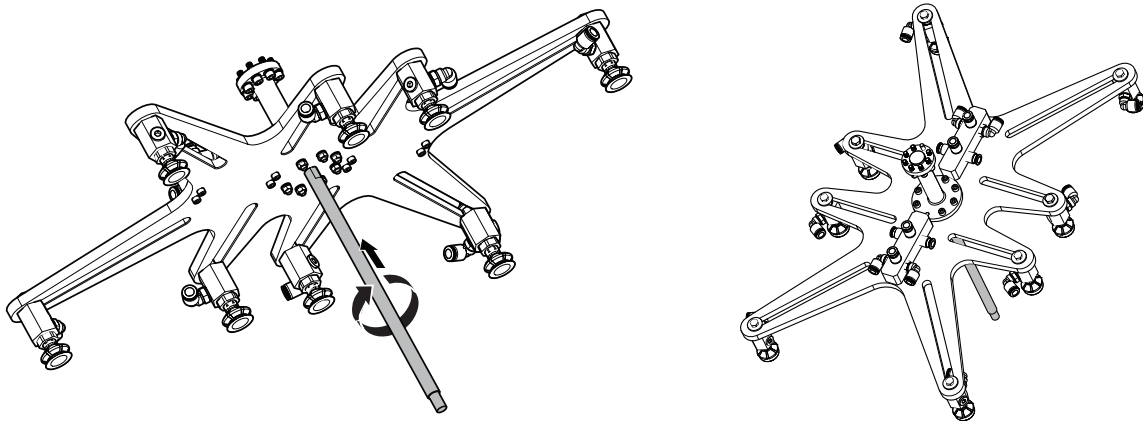


Figure 26 Calibration pin position on the two section gripper.

7.2 Calibration Fanuc

Coordinate systems in Fanuc are called USER FRAMES.

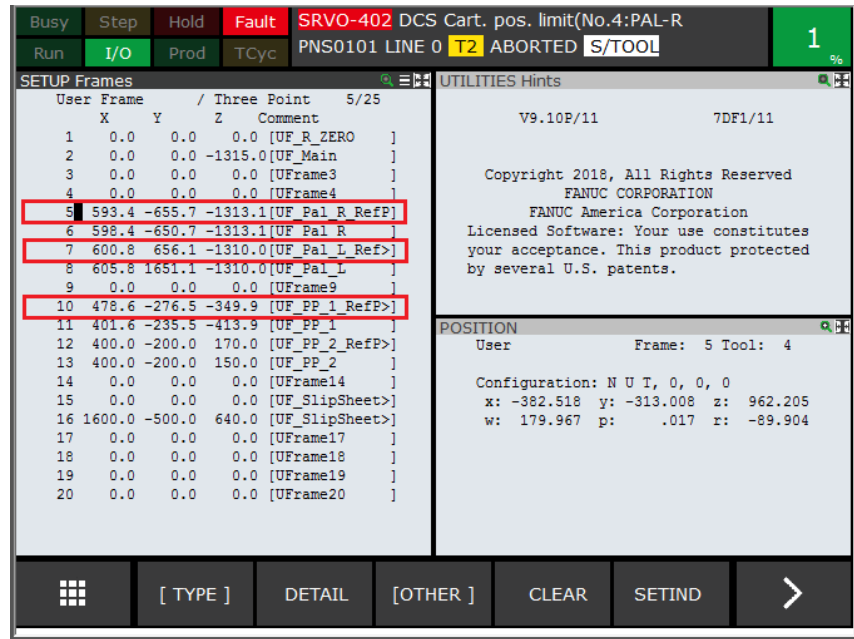


Figure 27 User frames in Fanuc

7.2.1 Tool setting

Inform the robot system where the TCP (tool center point) is located. The TCP depends on the gripper type:

- One section gripper: Select 4.
- Two sections gripper: Select 9.

Confirm the tool selection in the robot position window:

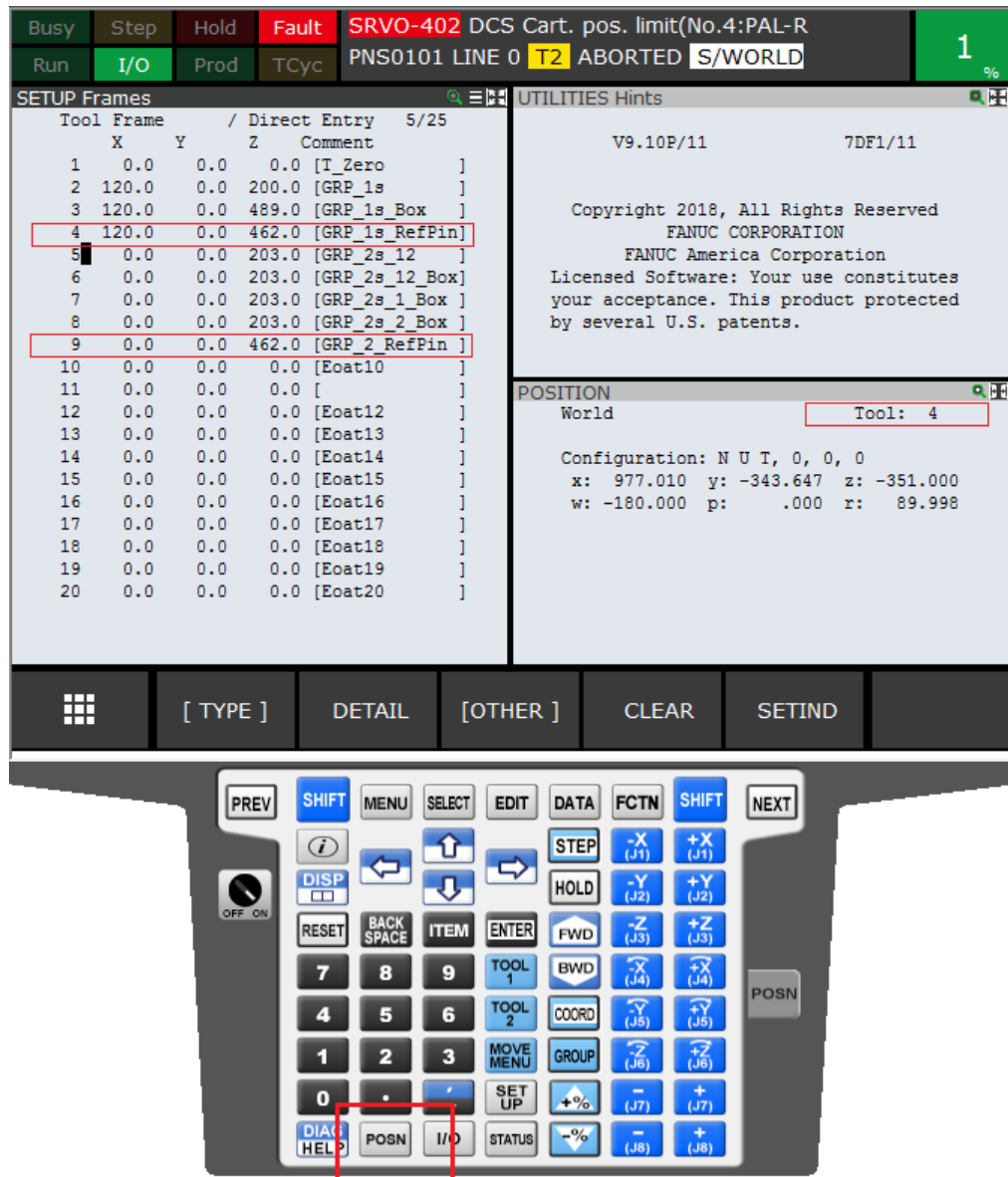


Figure 28 Display of TCP

7.2.2 Tool setting verification

Verify that the settings are correct:

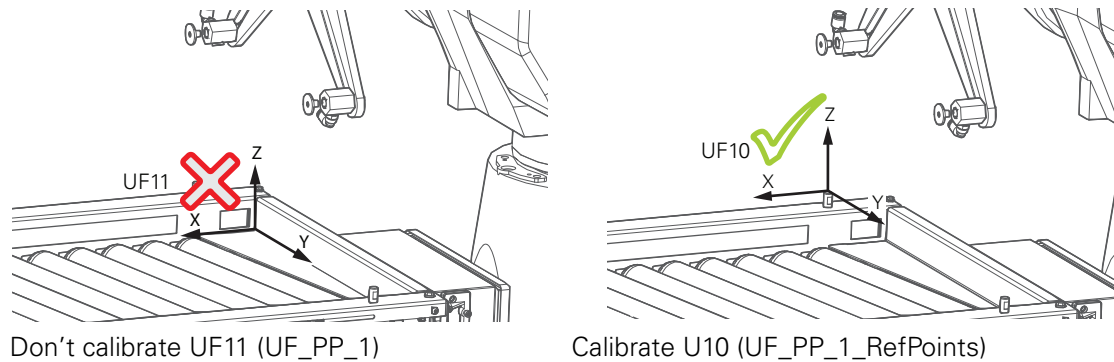
Change gripper orientation by moving robot in T1 mode.

- 1 Press any of the buttons marked red in figure to hustle/jogging the robot in any of the coordinate systems **except** the JOINT coordinate system.
- 2 The robot moves maintaining end of the reference pin position (X, Y, Z), only its orientation should change Xrot, Yrot, Zrot).



7.2.3 Pick point calibration

Calibrate USER FRAME: UF10, UF_PP_1_RefPoints, by using the three-point method (see Fig. 29).



The pick point coordinate system is always located in the same way independent of in-feed conveyor type.

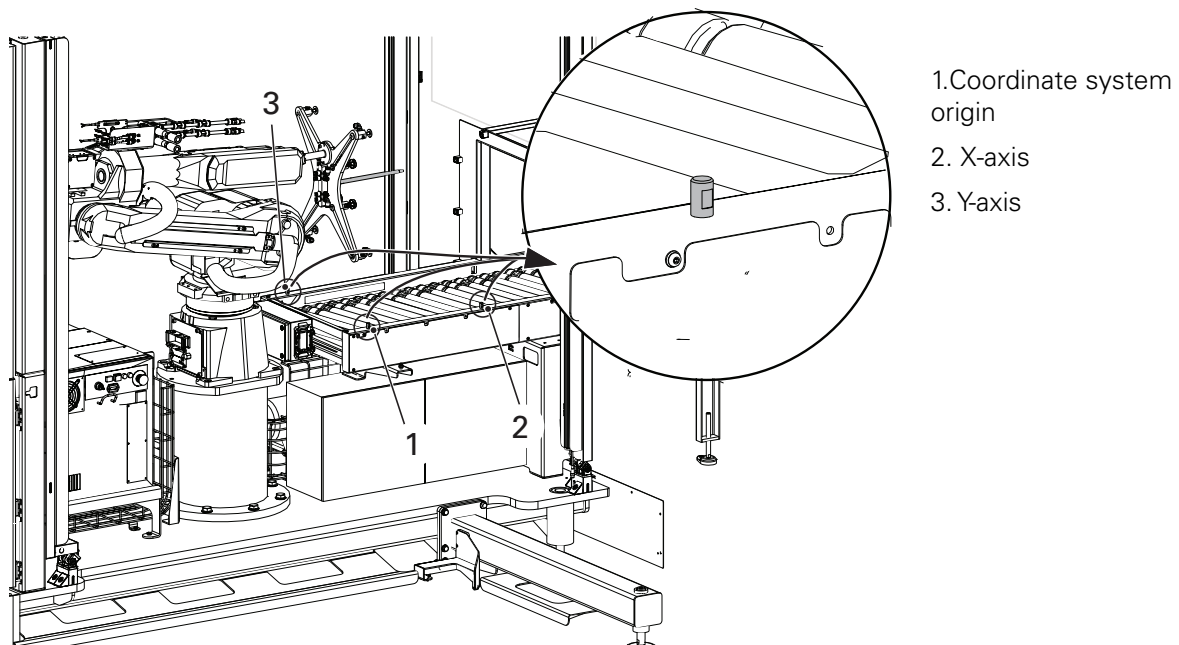
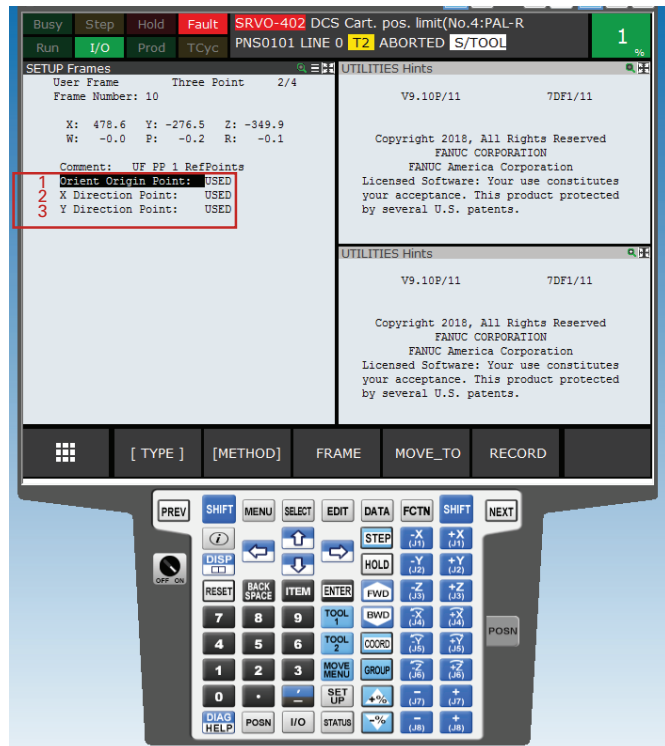
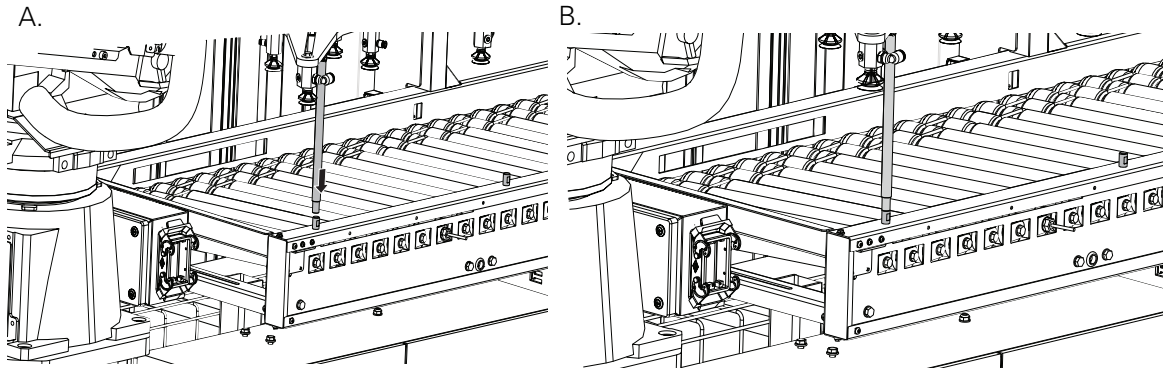


Figure 29 The three reference points

Let the end of the pin (reference tool) (A) come in contact with each of the three fixed reference points (B), on the conveyor side beams (see the figure below), in order (1-3).

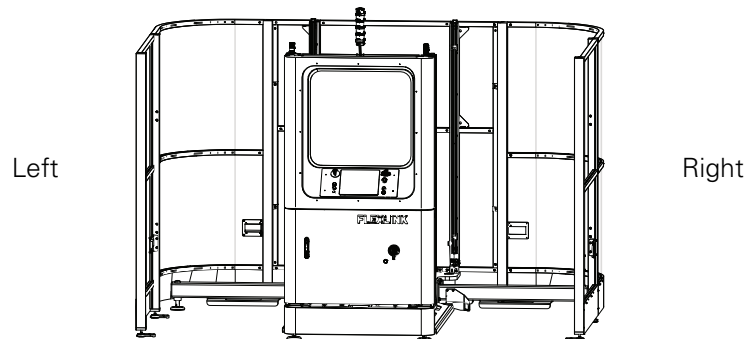


Do **not** calibrate:

- UF 11- "UP_PP_1

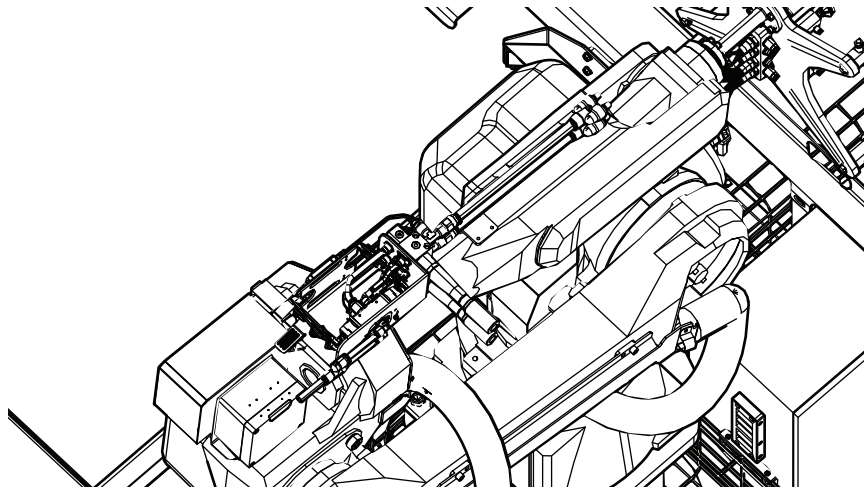
as it is calculated automatically by the robot after MASTER RESET procedure, based on measured UF 10.

7.2.4 Pallet calibration



Right pallet calibration

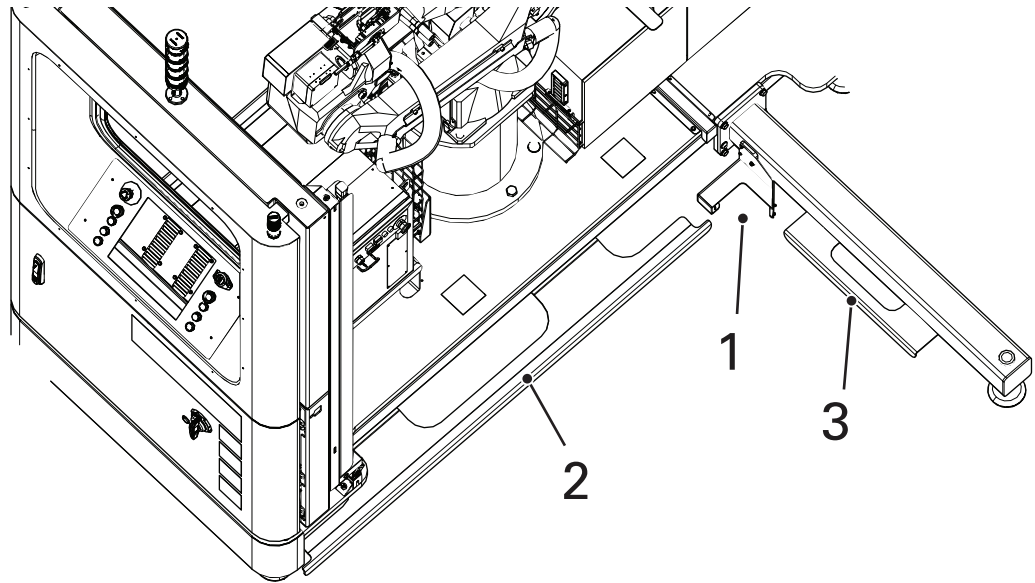
Calibrate USER FRAME: UF5, "UF_Pal_R_RefP", by using the three-point method.



Note: Do **not** calibrate:

- UF6- "UF_Pal_R" (the user frame for the right pallet) The only difference between UF5 and UF6 is the thickness of the reference pin.

UF6 is calculated automatically by robot after MASTER RESET procedure, based on measured UF 5.



2. Side guide

3 Front guide

Figure 30 The three reference points for the right-side calibration

The gripper pin has to reach the floor level as the pallet coordination systems have no reference points marked.

Point 1:

USER FRAME origin, has no side guides to be touched.

- 1 Switch to WORLD frame.

X-axis:

- 2 Set the pin in vertical direction.
- 3 Touch the pallet front guide and the floor at the same time.
Note: Exact position alongside guide is not important.
- 4 Note the value of the X position.

Y-axis:

- 5 Set the pin in vertical direction.

- 6 Touch the pallet side guide and the floor at the same time.
Note: Exact position alongside guide is not important.
- 7 Note the value of the Y position.

Origin:

- 8 Move the reference pin to points given for X and Y and to the floor.
- 9 RECORD the origin orient point.

Point 2:

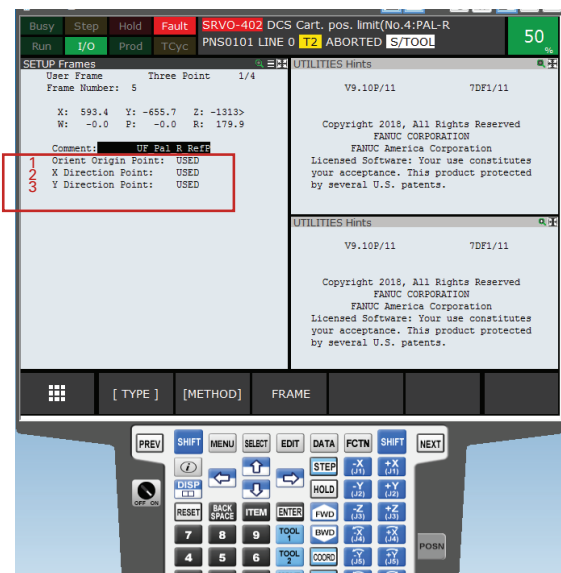
X-axis:

- 1 Set the pin in vertical direction.
- 2 Touch both the pallet side guide and the floor at the same time.
Note: Exact position alongside guide is not important.
- 3 RECORD the X-direction point.

Point 3:

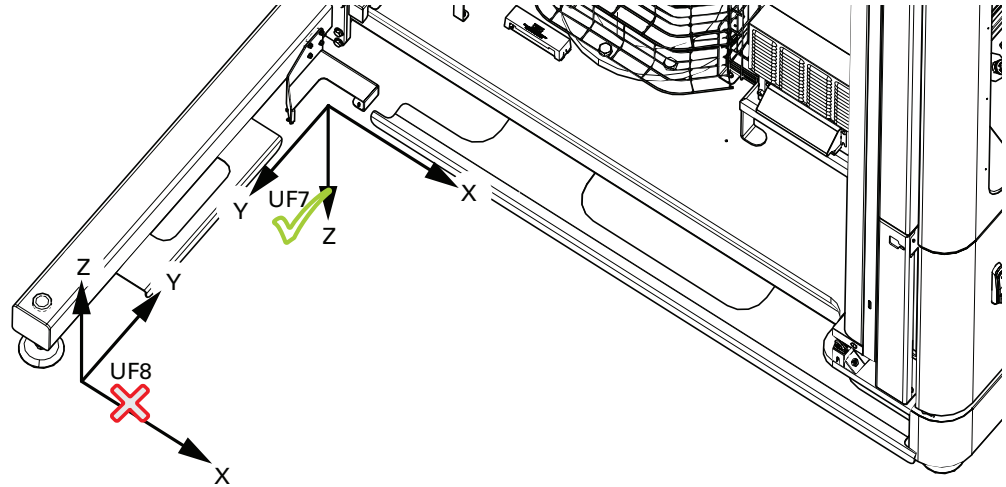
Y axis:

- 1 Set the pin in vertical direction.
- 2 Touch both the pallet front guide and the floor at the same time.
Note: Exact position alongside guide is not important.
- 3 RECORD the Y-direction point.



Left pallet calibration

Calibrate USER FRAME: UF7, "UF_Pal_L_RefP", by using the three point method.



Note: Do **not** calibrate:

- UF8- "UF_Pal_L" (the user frame for the left pallet) The only difference between UF7 and UF8 is the thickness of the reference pin, pallet size and orientation

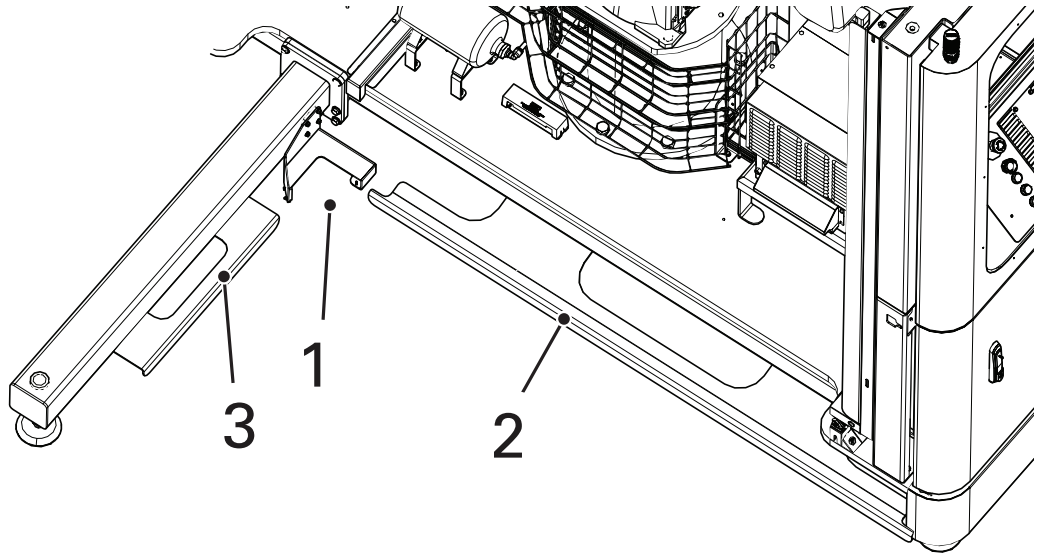
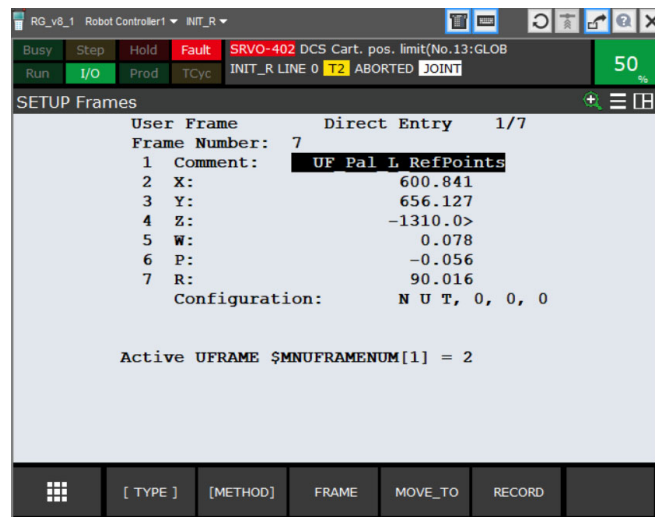


Figure 31 The three reference points for the left side calibration

Use the same procedure as for right pallet calibration Section 7.2.4.

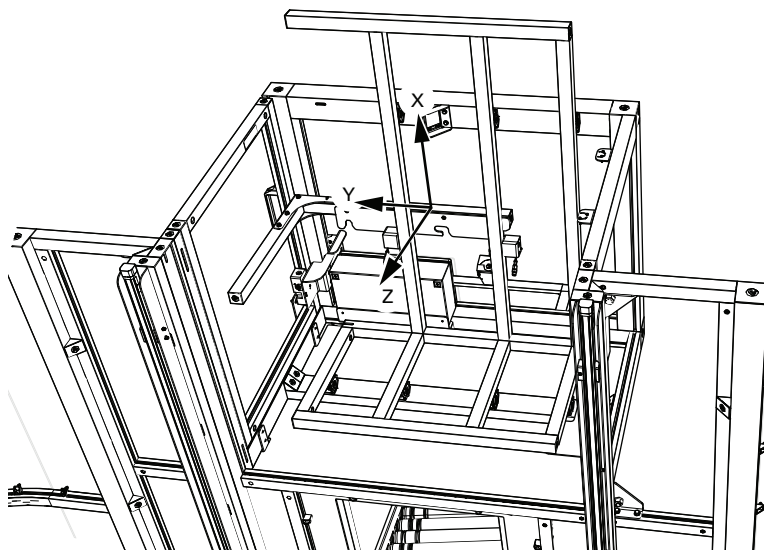
Use the reference points for the left side (see Fig. 31).



Interlayer module calibration

The interlayer module is optional.

A local coordinate system for the interlayer is linked to the module; UF16, UF_SlipSheets_1. The X- and Y- axis is in the interlayer plane. The Z-axis is perpendicular to the interlayer surface. The coordinate system origin is positioned at the middle of the last EUR interlayer. The one picked last.



7.2.5 User Frame recalculation

A recalculation will be performed automatically when the program is started after a MASTER RESET procedure. After USER FRAME calibration MASTER RESET procedure must be performed. This is mandatory to trigger USER FRAME recalculation. In case it needs to be performed earlier, for user frame verification; Trigger it by running the INIT_UF subprogram.

7.2.6 User frame verification

When each USER FRAME is calibrated, verify that the calibration was performed correct.

- 1 Switch to jogging and position measurement to USER FRAME.
- 2 Use the same gripper reference pin.

For example, if UF10, UF_PP_1_RefPoint is checked, Teach Pendant should be set as in figure below.

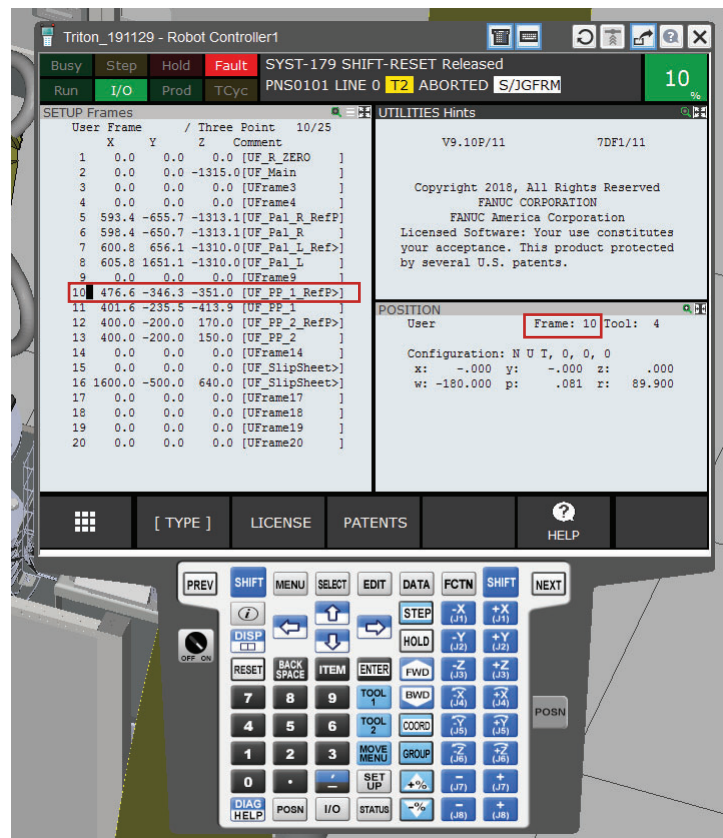


Figure 32 Check of UF10.

- 3 Position the end of the tool reference pin close to the origin of the USER FRAME. Check the POSITION window where the values for X, Y and Z should be close to 0 + /- 2 mm for good enough accuracy.
- 4 Move the robot along X-axis. The end of the tool reference pin should follow the in-feed conveyor side beam, or in case of pallets coordinate system, pallet side guide.

7.3 Calibration KUKA

Coordinate systems in KUKA are called BASE.

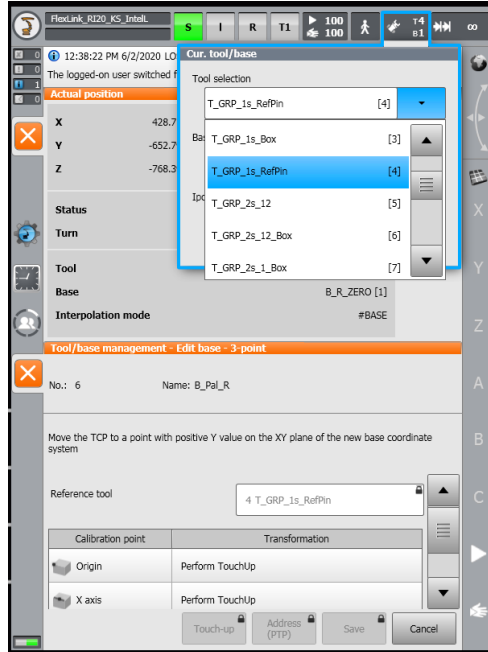


Figure 33 Base frame for KUKA

Note: Disabling palletizing mode might be required to get some of the reference points. Set variable \$PAL_MODE to FALSE.

7.3.1 Tool setting

Inform the robot system where the TCP (tool center point) is located. The TCP depends on the gripper type:

- One section gripper: Select 4.
- Two sections gripper: Select 9.

Confirm the tool selection in the top right corner:

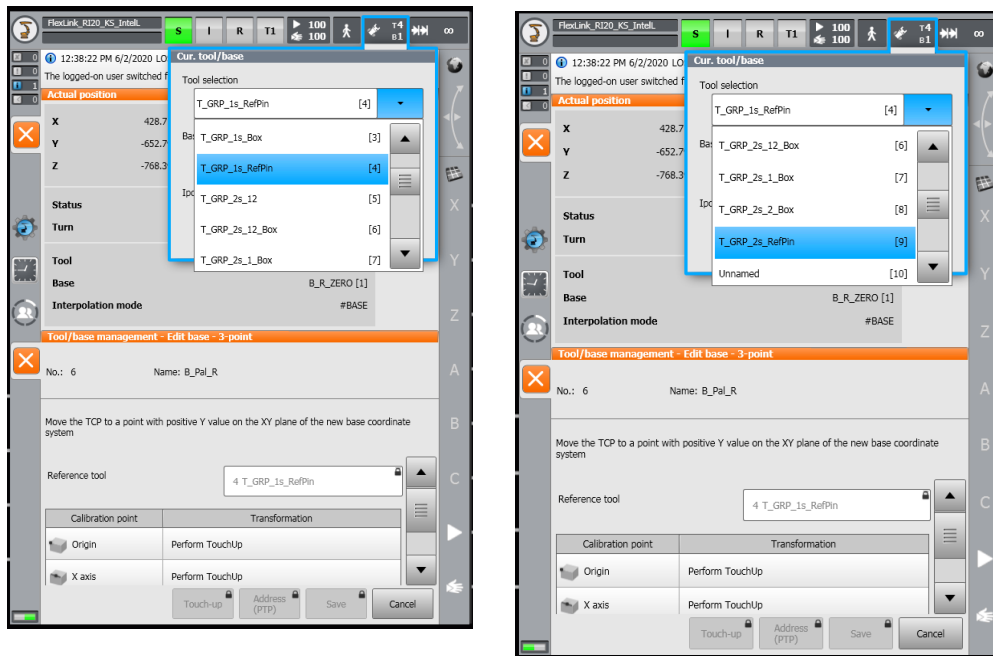


Figure 34 Display TCP

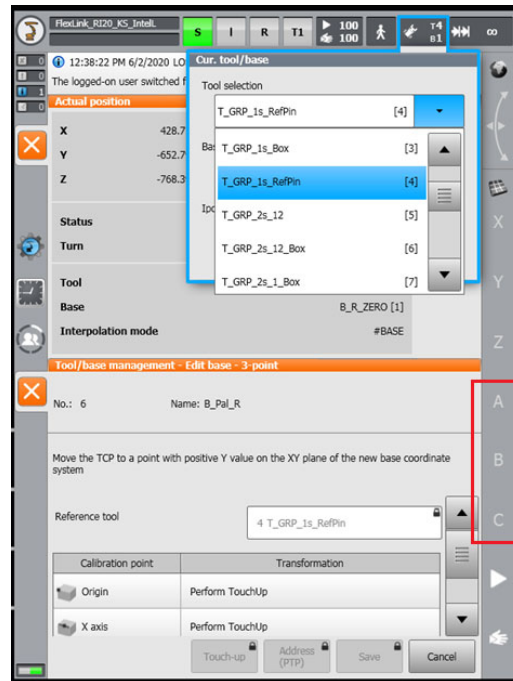
7.3.2 Tool setting verification

Verify that the settings are correct:

Change gripper orientation only, not position, by moving the robot in T1 mode.

- 1 Press any of the buttons marked red in the figure to hustle/jogging the robot in any of the coordinate systems **except** the JOINT coordinate system.

- 2 The robot moves with the end of the pin in the same location just changing the angle.



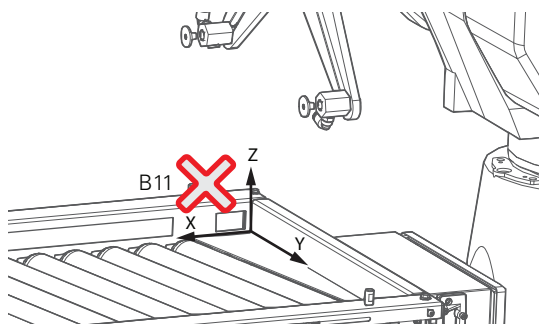
7.3.3 Pick point calibration

Calibrate BASE: B10, B_PP_1_RefP, by using the three-point method (see Fig. 29).

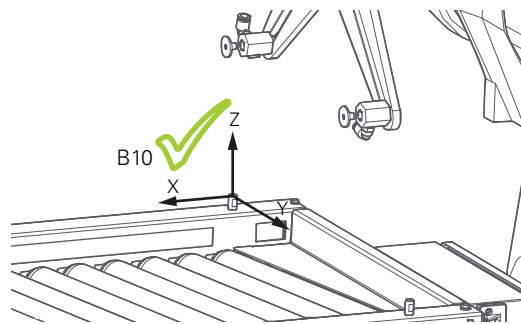
Note: Do **not** calibrate:

- B 11- "UP_PP_1

as this pick point (1) is installed as a standard..



Don't calibrate B11 (B_PP_1)



Calibrate B10 (B_PP_1_RefPoints)

The pick point coordinate system is always located in the same way independent of in-feed conveyor type.

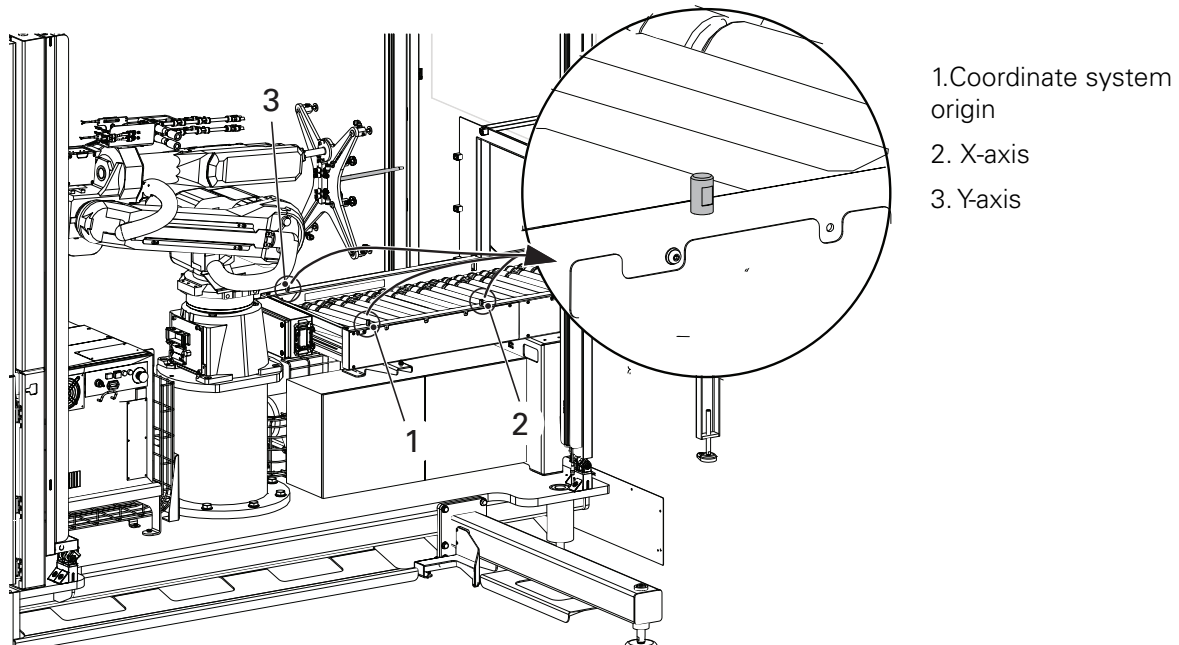
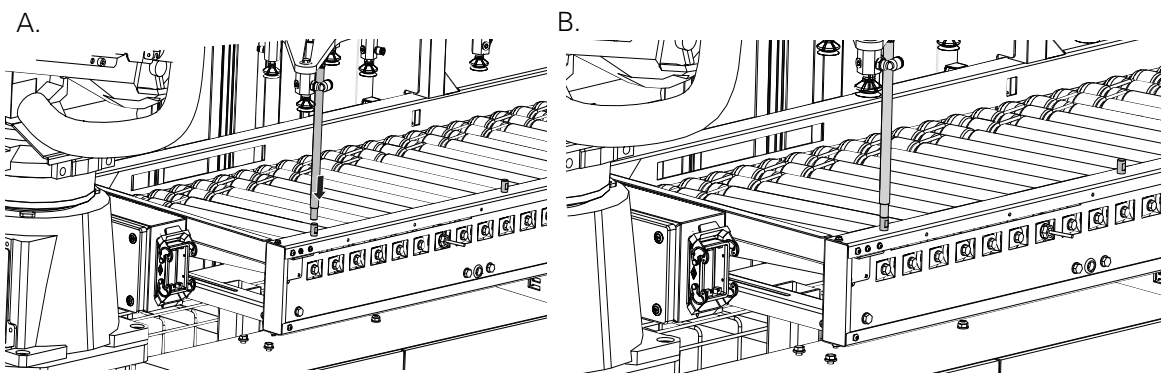
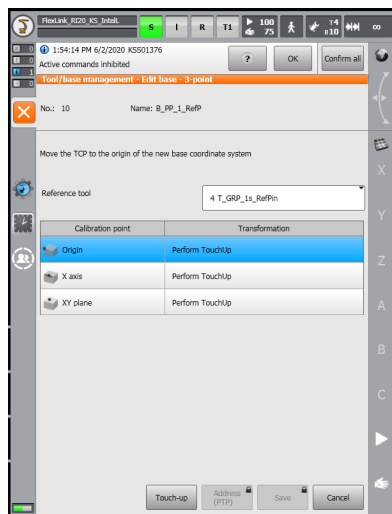
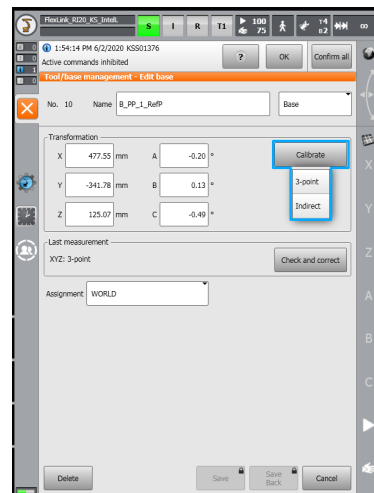


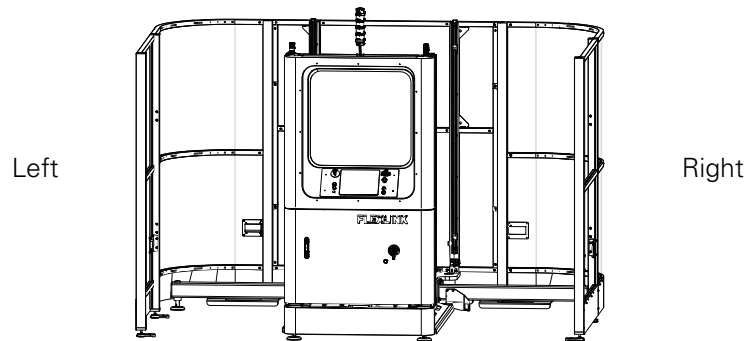
Figure 35 The three reference points

Let the end of the pin (reference tool) (A) come in contact with each of the three fixed reference points (B), on the conveyor side beams (see the figure below), in order (1-3).



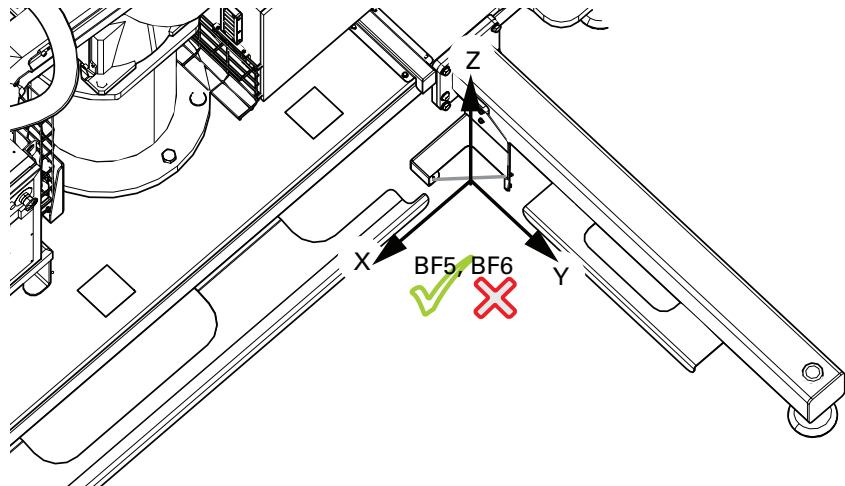


7.3.4 Pallet calibration



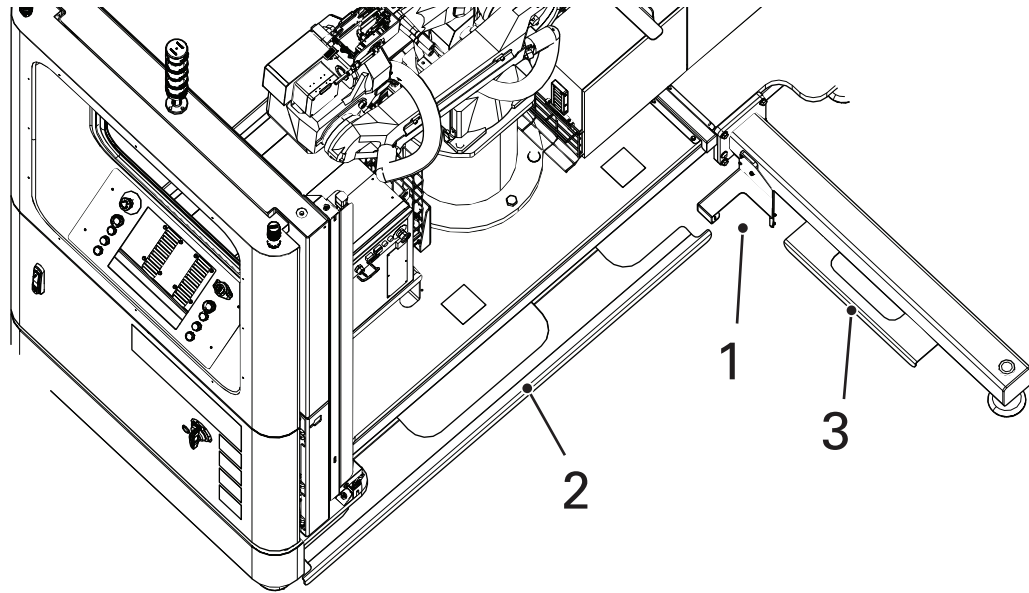
Right pallet calibration - KUKA

Calibrate BASE: B5, "B_Pal_R_RefP", by using the three-point method.



Note: Do **not** calibrate:

- B6- "UF_Pal_R" (the base for the right pallet) The only difference between B5 and B6 is the thickness of the reference pin.



2. Side guide

3 Front guide

Figure 36 The three reference points for the right-side calibration

The gripper pin has to reach the floor level as the pallet coordination systems have no reference points marked.

Point 1:

BASE origin, has no side guides to be touched.

- 1 Switch to WORLD frame.

X-axis:

- 2 Set the pin in vertical direction.
- 3 Touch the pallet front guide and the floor at the same time.
Note: Exact position alongside guide is not important.
- 4 Note value of X position.

Y-axis:

- 5 Set the pin in vertical direction.

- 6 Touch the pallet side guide and the floor at the same time.
Note: Exact position alongside guide is not important.

- 7 Note value of Y position.

Origin:

- 8 Move the reference pin to points given for X and Y and to the floor.
- 9 Touch up Origin calibration point.

Point 2:

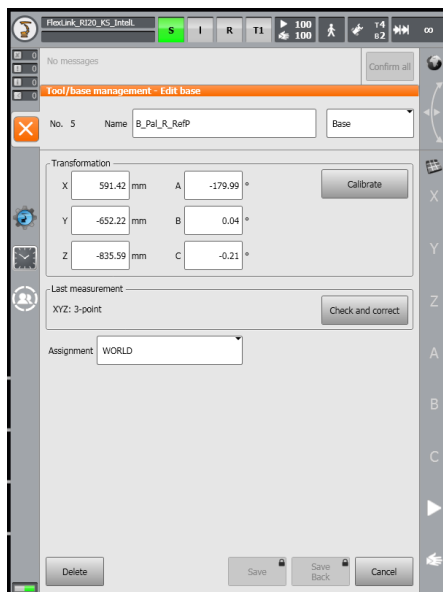
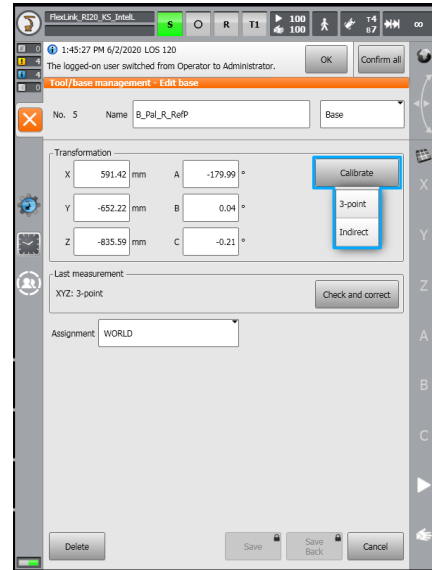
X-axis:

- 1 Set the pin in vertical direction.
- 2 Touch both the pallet side guide and the floor at the same time.
Note: Exact position alongside guide is not important.
- 3 Touch up X-axis calibration point.

Point 3:

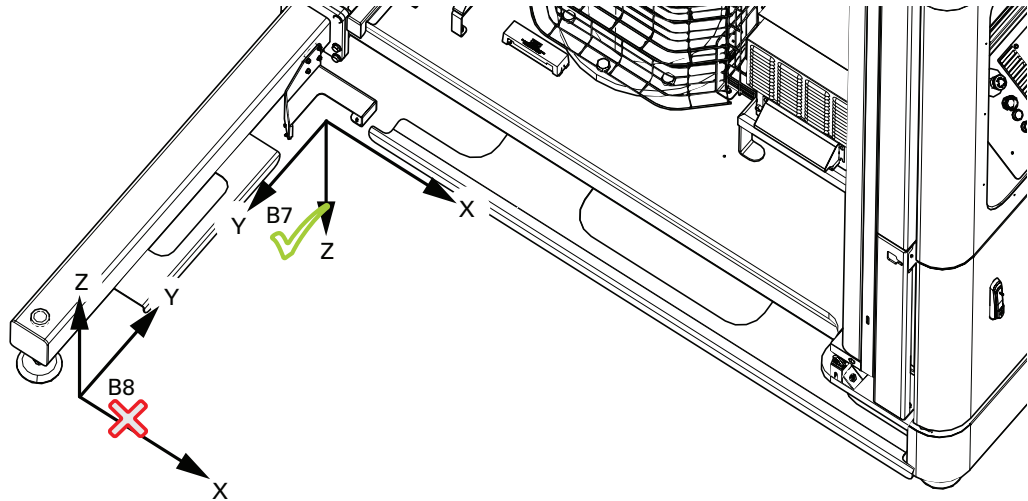
Y axis:

- 1 Set the pin in vertical direction.
- 2 Touch both the pallet front guide and the floor at the same time.
Note: Exact position alongside guide is not important.
- 3 Touch up Y-axis calibration point.



Left pallet calibration - KUKA

Calibrate BASE: B7, "B_Pal_L_RefP", by using the three point method.



Note: Do **not** calibrate:

- B8- "B_Pal_L" (the base for the left pallet) The only difference between B7 and B8 is the thickness of the reference pin, pallet size and orientation.

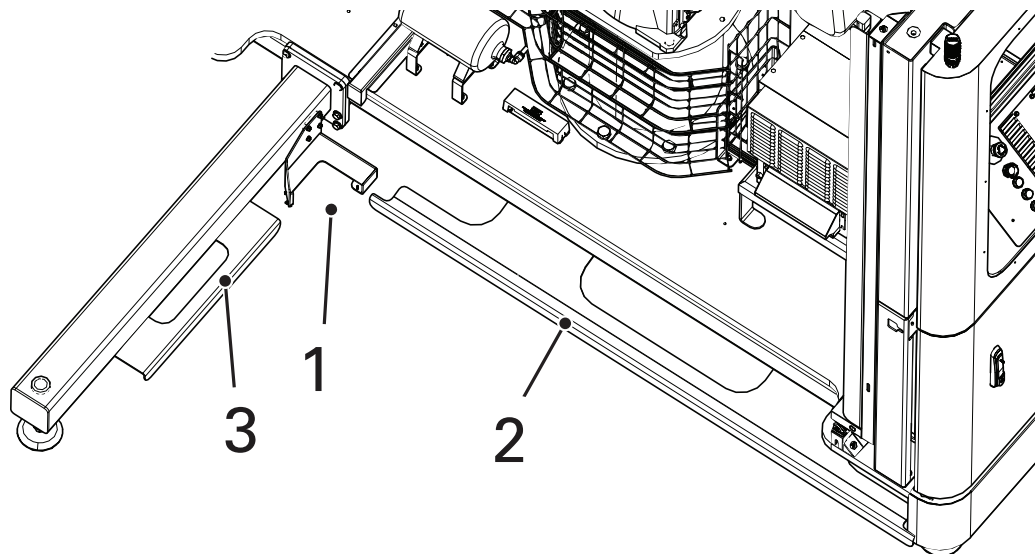
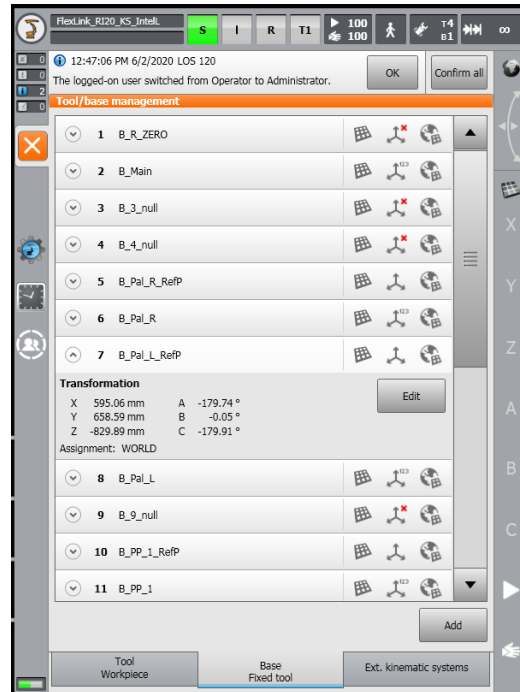


Figure 37 The three reference points for the left side calibration

Use the same procedure as for right pallet calibration.

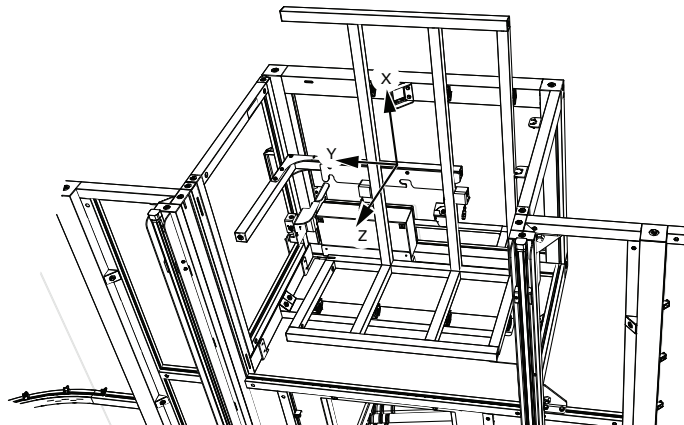
Use the reference points for the left side (see Fig. 31).



Interlayer module calibration

The interlayer module is optional.

A local coordinate system for the interlayer is linked to the module; B16, B_InterL_1. The X- and Y- axis is in the interlayer plane. The Z-axis is perpendicular to the interlayer surface. The coordinate system origin is positioned at the middle of the last EUR interlayer. The one picked last.



7.3.5 User Frame recalculation

A recalculation will be performed automatically when the program is started after a MASTER RESET procedure. After USER FRAME calibration MASTER RESET procedure must be performed. This is mandatory to trigger USER FRAME recalculation. In case it needs to be performed earlier, for user frame verification; Trigger it by running the FLT_PalBase_Recalc subprogram.

Available in FL_Maintenance_&_Test folder in the robot.

7.3.6 User frame verification

When each BASE is calibrated, verify that the calibration was performed correct.

- 1 Switch to jogging and position measurement to BASE.
- 2 Select tool T4, T_GRP_1s_RefPin.

For example, if B10, B_PP_1_RefP is checked, The smart pad should be set as in figure below.

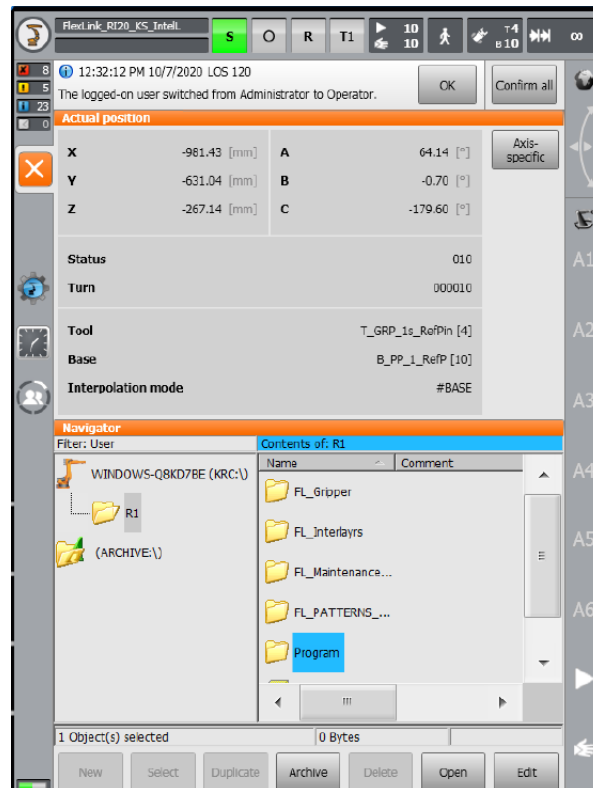


Figure 38 Check of B10.

- 3 Position the end of the tool reference pin close to the origin of the BASE. Check the POSITION window where the values for X, Y and Z should be close to 0 + /- 2 mm for good enough accuracy.
- 4 Move the robot along X-axis. The end of the tool reference pin should follow the in-feed conveyor side beam, or in case of pallets coordinate system, pallet side guide.

8 Operation

Tools: N/A

Required
personnel:



PPE:



Caution: At abnormal operation of the machine contact the maintenance team for intervention.

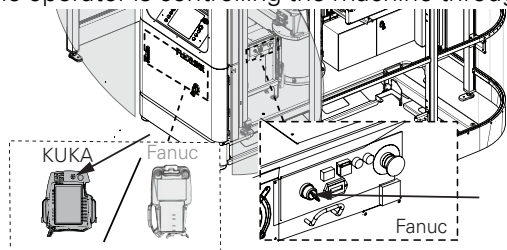
Machine operator tasks during operation

To run and use the machine the following task/requirements should be met:

- During the normal operation work cycle the operator should control proper operation of the machine and intervene if necessary.
- Stay in front of the HMI panel with the light towers in sight to be able to react to different machine status.
- When exchanging pallets, with pallet jack, just enter the cell to the front of the pallets.
- If other issues e.g. dropped boxes, check gripper suction cups etc. needs to be handled the maintenance procedure should be followed and the tasks needs to be performed in a safe manner.

8.1 Operating modes

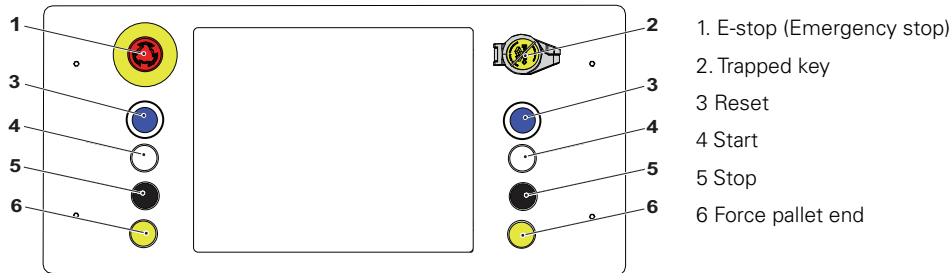
During operation the machine and robot arm are set in AUTO mode/Ext. Aut. and the operator is controlling the machine through the HMI panel.



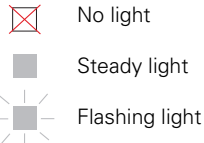
8.2 Control panel

Light signals address the state of the machine.

No. 3-6 controls one side each. The push buttons positioned on the left side only controls the robot on the left side of the machine. Buttons on the right side controls the right side only.

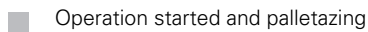
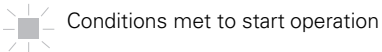


Definition of light symbols:

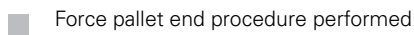
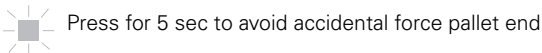


LEFT SIDE

- 1 Emergency stop
- 3 **Reset** Secure palletizing area
- 4 **Start** Starts operation

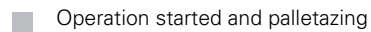


- 5 **Stop** Stops operation, possible to resume
- 6 **Force pallet end** End palletization

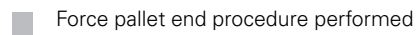
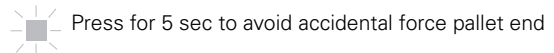


RIGHT SIDE

- 2 Trapped key
- 3 **Reset** Secure palletizing area
- 4 **Start** Starts operation

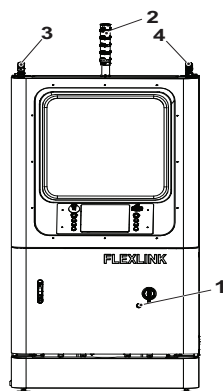


- 5 **Stop** Stops operation, possible to resume
- 6 **Force pallet end** End palletization



8.3 Light and sound signals

Light and sound signals addresses the state of the machine



- 1. Light HMI/PLC
- 2. Central signal tower
- 3 Left signal tower
- 4 Right signal tower

Definition of light symbols:

- No light
- Steady light
- Flashing light

- 1 Connection between HMI and PLC

- No connection between HMI and PLC

2 Central signal tower

- [red] Alarm is pending

- [red] Emergency stop or robot in T1 mode

- [yellow] Stopped cell- robot program paused or aborted- no product in in-feed conveyor or low interlayer magazine

- [yellow] Robot started palletizing

- [green] Robot program is running

- [green] Robot is ready to start palletizing

- [blue] Robot in restarting process or both pallets are full and needs replacing

- [sound] 3 sec, ready to start palletizing > press start / or restart after stop due to no product in in-feed conveyor

- [sound] 10 sec, alarm is pending

LEFT SIDE

3 Signal tower

- [green] Ready for palletizing

- [yellow] Pallet full and ready to remove

- Pallet full, exchange. Opposite pallet almost full.

RIGHT SIDE

4 Signal tower

- [green] Ready for palletizing

- [yellow] Pallet full and ready to remove

- Pallet full, exchange. Opposite pallet almost full.

8.3.1 Light signals; IXON router

Light/LED status. The router has two LEDs to indicate the router status.

The light signal will be either steady, flashing or pulsing.

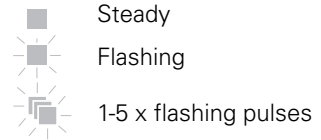


Signal LED

1.Signal LED

2.Activity LED

Light status:



[blue] Initializing cellular mode



[red] x1 No reception or unable to connect to network
(APN or SSID may be incorrect)



[red] x2 Invalid PIN or PUK required
(a phone to unlock SIM card with PUK is required)



[red] x4 Invalid or missing SIM card



[red] Connected-poor reception



[purple] Connected- medium reception



[blue] Connected- good reception

Activity LED



[red] Booting (may take 1-2 min) or not yet registered



[red] x1 Waiting for internet access



[red] x3 LAN/WAN conflict (conflicting subnets)



[red] x4 Removed from platform (re-insert USB flash drive to register again)



[red] x5 Previously registered to IXON cloud
(remove from IXON cloud and register again)



[blue] x1 Connecting to IXON cloud



[blue] x2 Setting up VPN connection

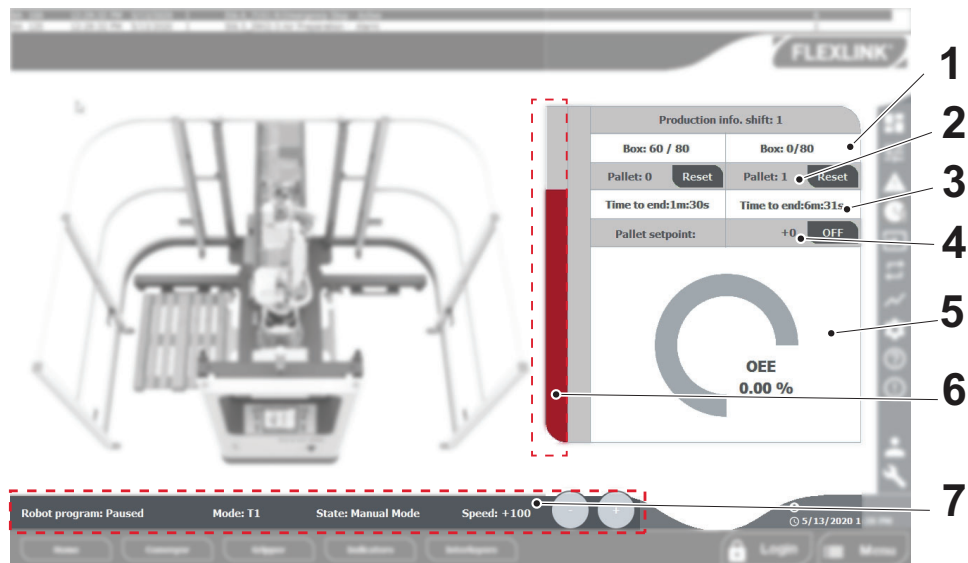
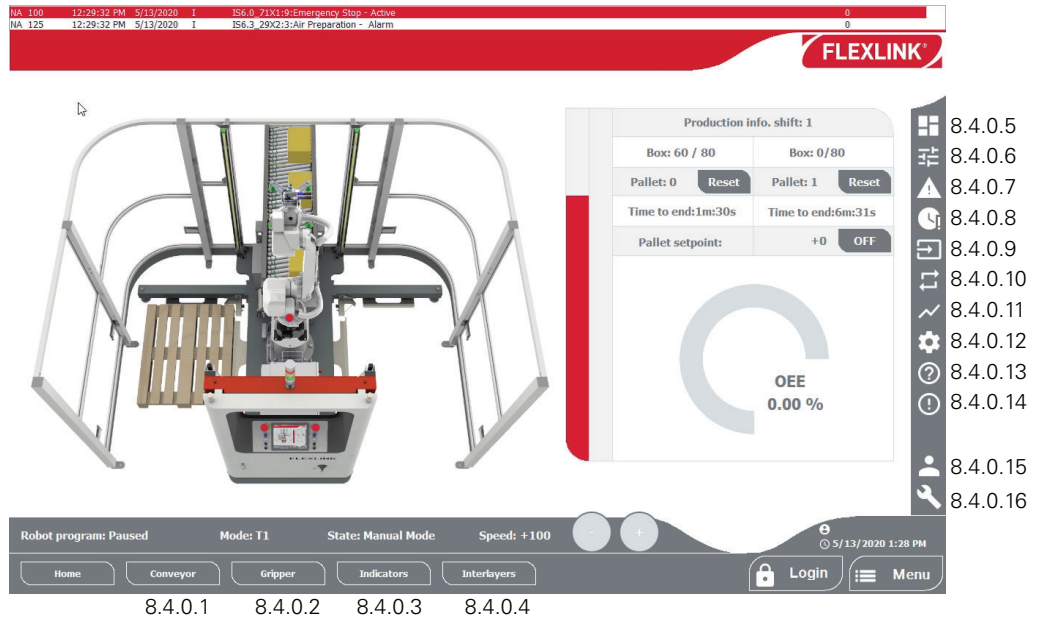


[blue] Active VPN connection to IXON cloud

8.4 HMI Dashboard

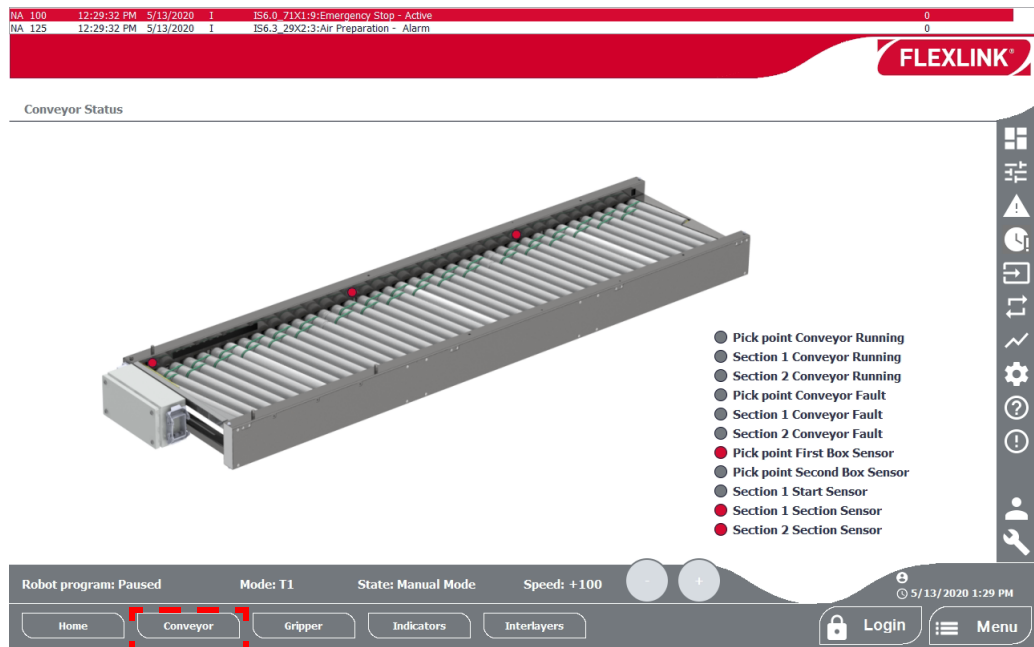
The following section describes the HMI dashboard and its functions. The operator will operate the machine by the HMI panel, with interfaces for function and existing control logic.

Main dashboard- The following figure shows the functions reached from the main screen. See the functions in each section.

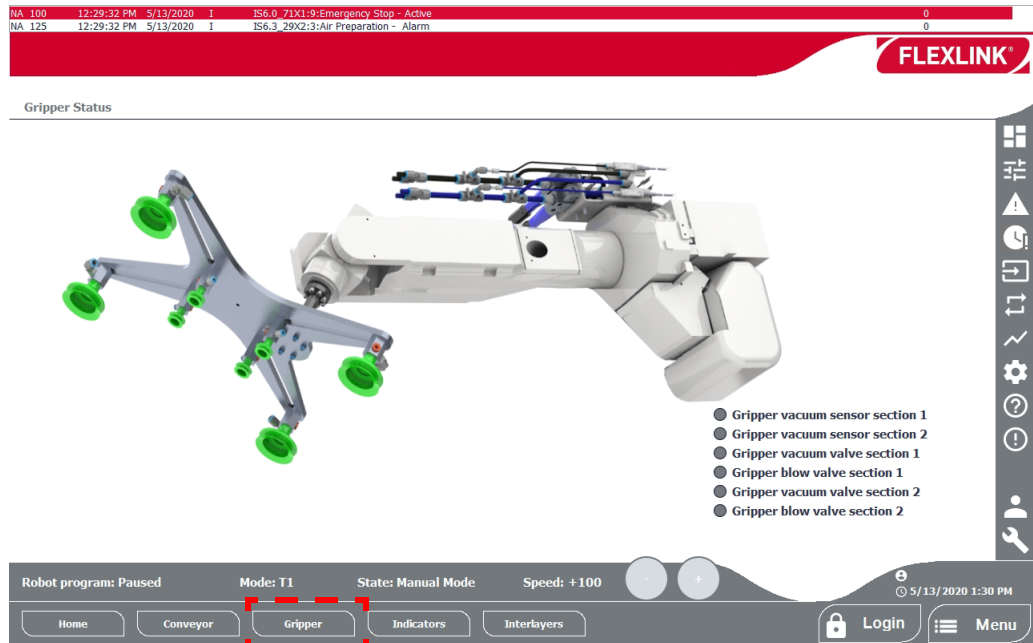


- 1 Box counter for each side.
- 2 Pallet counter for each side.
- 3 Estimated time for a full pallet at each side.
- 4 Turn on to see the remaining pallets until set target is reached. Machine will stop when target is reached.
- 5 OEE (option that will appear here if included).
- 6 Palletizing progress for left and right.
- 7 Showing status of robot program.

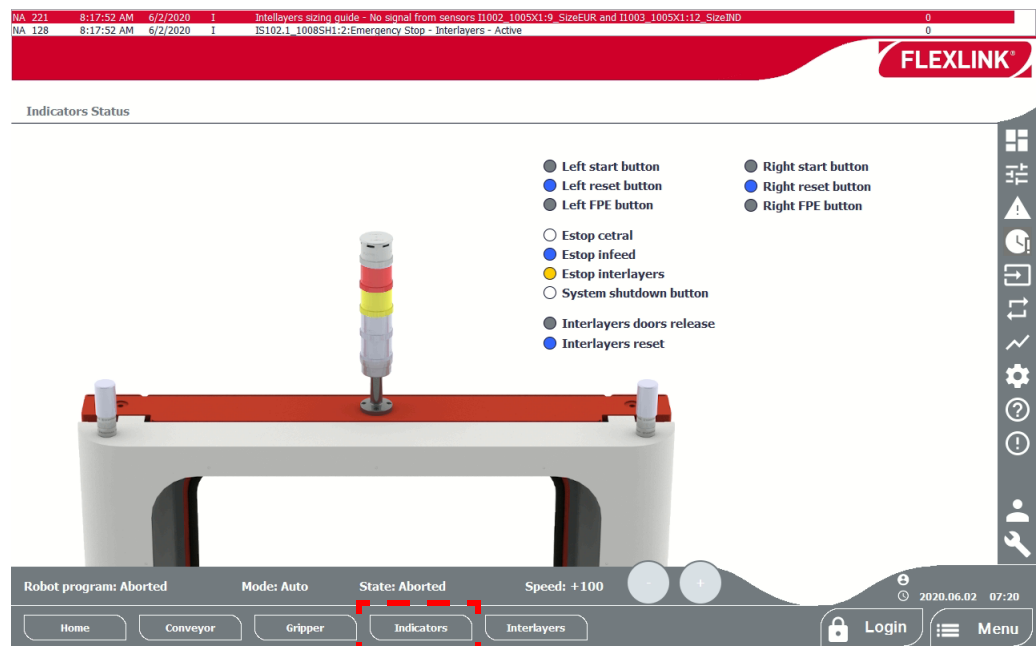
8.4.0.1 Conveyor



8.4.0.2 Gripper



8.4.0.3 Indicators




8.4.0.4 Interlayer

NA 100	1:38:29 PM	5/13/2020	I	IS6.0 71X119:Emergency Stop - Active	0
NA 125	1:38:29 PM	5/13/2020	I	IS6.3 29X2.3:Air Preparation - Alarm	0

FLEXLINK®

Interlayers Status



- Door Open
- Door Closed
- Door Locked
- Door Unlocked
- Platform Up
- Platform Down
- Size EUR
- Size IND

Robot program: Paused Mode: T1 State: Manual Mode Speed: +100

Home Conveyor Gripper Indicators **Interlayers** Login Menu

8.4.0.5 Robot config.

Create, manage and upload machine palletizing patterns.
See instructions in Section 8.9.

< 

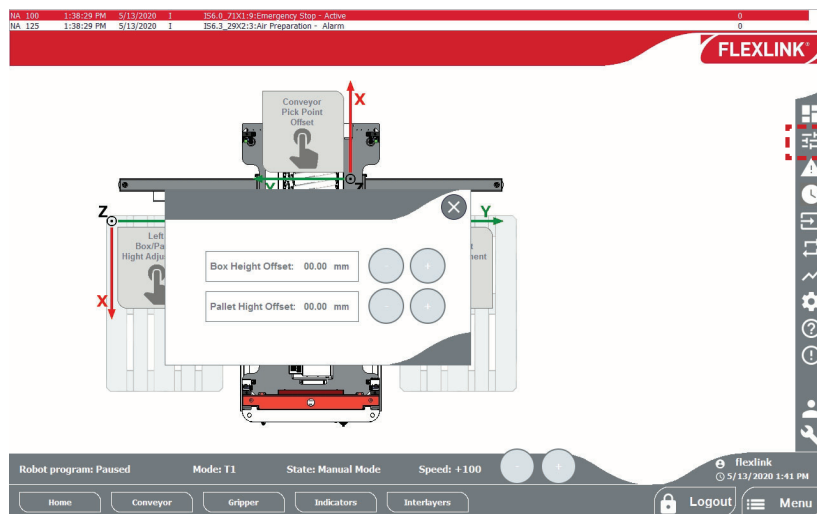
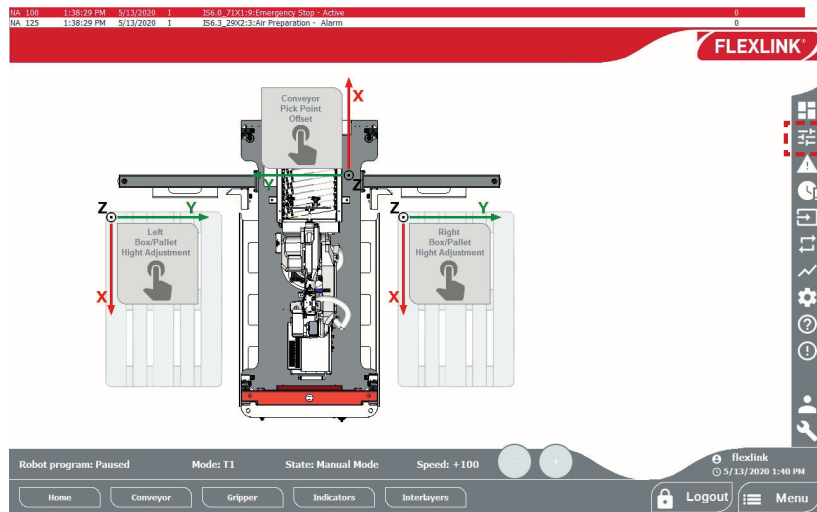
CREATE A NEW PALLET PATTERN

VIEW SAVED PALLET PATTERNS

8.4.0.6 Adjustments

Allows for adjustments in X,Y and Z direction for:

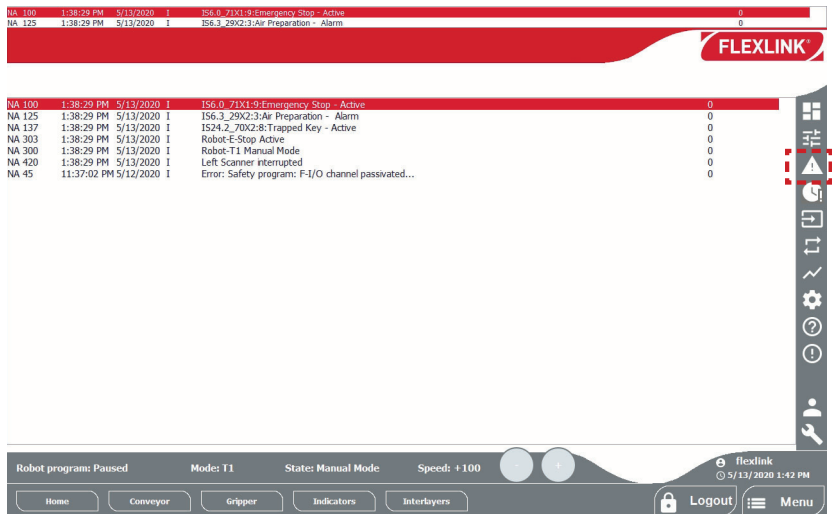
- Picking position at in-feed conveyor.
- Delivery position at left and right pallet





8.4.0.7 Alarms

Information if an alarm goes off.



8.4.0.8 Alarm history

List with information of former alarms with time, date, type etc.

NA 100	1:38:29 PM	5/13/2020	1	IS6.0_71X1-9:Emergency Stop - Active	0
NA 125	1:38:29 PM	5/13/2020	1	IS6.3_29X2-3:Air Preparation - Alarm	0

NA 45	11:37:02 PM	5/12/2020	1		0
NA 100	1:38:29 PM	5/13/2020	1	IS6.0_71X1-9:Emergency Stop - Active	0
NA 125	1:38:29 PM	5/13/2020	1	IS6.3_29X2-3:Air Preparation - Alarm	0
NA 137	1:38:29 PM	5/13/2020	1	IS24.2_70X2-8:Trapped Key - Active	0
NA 303	1:38:29 PM	5/13/2020	1	Robot-E-Stop Active	0
NA 300	1:38:29 PM	5/13/2020	1	Robot-T1 Manual Mode	0
NA 420	1:38:29 PM	5/13/2020	1	Left Scanner interrupted	0
NA 407	1:27:07 PM	5/13/2020	IO	Warning robot arm battery to be replaced	0
NA 406	1:27:07 PM	5/13/2020	IO	Replace robot arm battery	0
NA 405	1:27:07 PM	5/13/2020	IO	Warning perform Air Discharge	0
NA 404	1:27:07 PM	5/13/2020	IO	Perform Air Discharge I	0
NA 403	1:27:07 PM	5/13/2020	IO	Warning J6 Oil to be changed	0
NA 402	1:27:07 PM	5/13/2020	IO	Robot J6 Oil change I	0
NA 401	1:27:07 PM	5/13/2020	IO	Warning J1-35 Oil to be changed	0
NA 400	1:27:07 PM	5/13/2020	IO	Robot J1-35 Oil change I	0
NA 409	1:27:07 PM	5/13/2020	IO	Warning robot controller battery to be replaced	0
NA 408	1:27:07 PM	5/13/2020	IO	Replace robot controller battery	0
NA 417	1:27:07 PM	5/13/2020	IO	Warning air preparation filter to be replaced	0
NA 416	1:27:07 PM	5/13/2020	IO	Change air preparation filter I	0
NA 415	1:27:07 PM	5/13/2020	IO	Check blow valve section 2	0
NA 414	1:27:07 PM	5/13/2020	IO	Check blow valve section 1	0
NA 413	1:27:07 PM	5/13/2020	IO	Check suction valve section 2	0
NA 412	1:27:07 PM	5/13/2020	IO	Check suction valve section 1	0
NA 411	1:27:07 PM	5/13/2020	IO	Check suction cups section 2	0
NA 410	1:27:07 PM	5/13/2020	IO	Check suction cups section 1	0
NA 45	11:37:02 PM	5/12/2020	1		0
NA 100	12:29:32 PM	5/13/2020	1	IS6.0_71X1-9:Emergency Stop - Active	0
NA 125	12:29:32 PM	5/13/2020	1	IS6.3_29X2-3:Air Preparation - Alarm	0
NA 137	12:29:32 PM	5/13/2020	1	IS24.2_70X2-8:Trapped Key - Active	0
NA 303	12:29:32 PM	5/13/2020	1	Robot-E-Stop Active	0

Robot program: Paused	Mode: T1	State: Manual Mode	Speed: +100	flexlink
Home	Conveyor	Gripper	Indicators	Interlayers
				Logout Menu

8.4.0.9 I/O status

Switch to manual to turn on and off segments/functions of machine parts.

- 1 Auto/ Manual
- Conveyor segments, Fig. 39
 - Suction cup functions, Fig. 40
 - Indicators, Fig. 41
 - Interlayer; Fig. 42



Figure 39 Conveyor segments in display 1; Auto/ manual

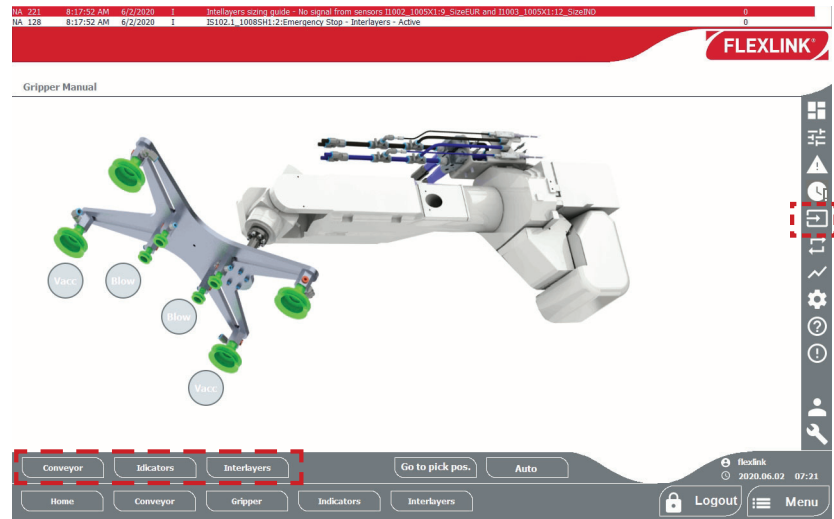


Figure 40 Suction cup functions

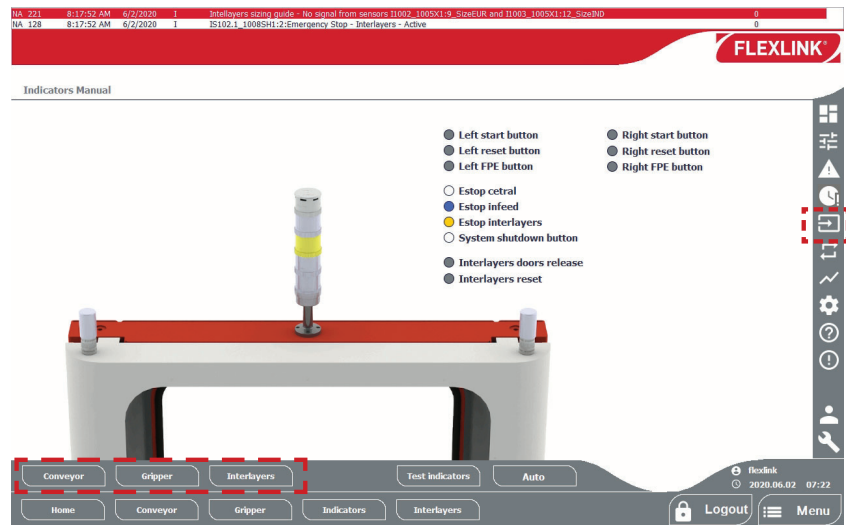


Figure 41 Indicators

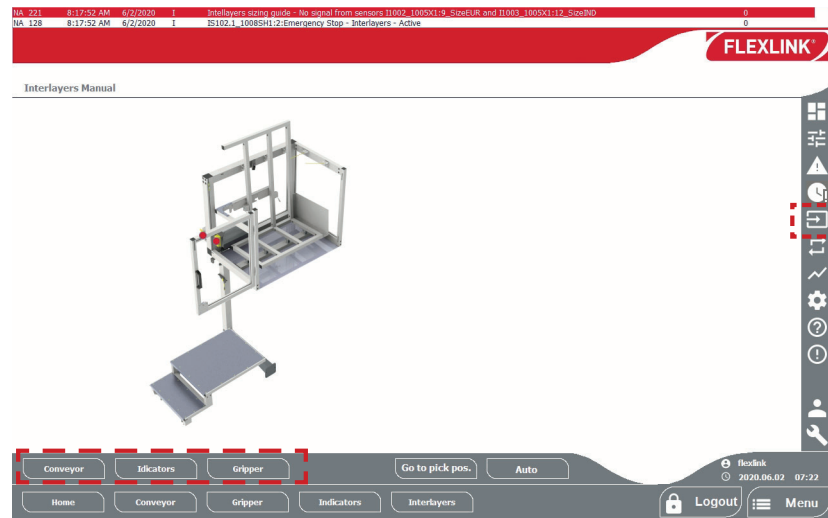
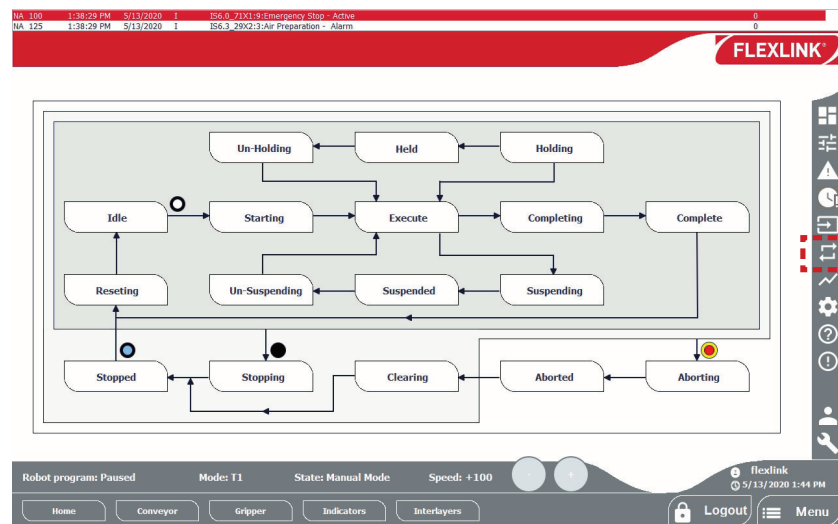


Figure 42 Interlayer

8.4.0.10 Pack ML

The PackML shows the machine status.

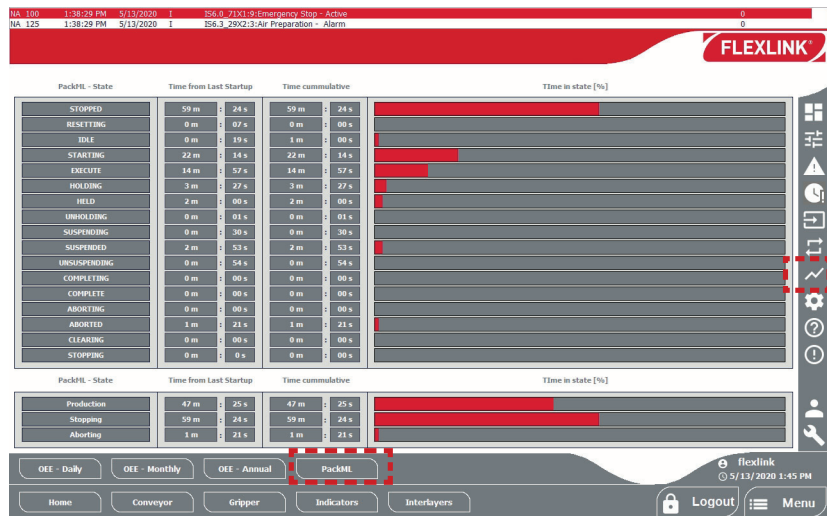
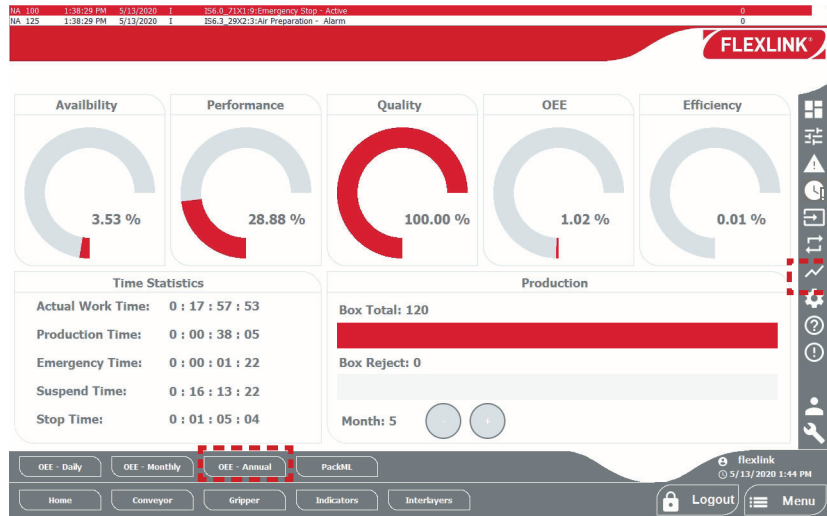
Note: Is only available in Auto mode.



8.4.0.11 Statistics

Shows annual-, monthly-, daily- and PackLM status.



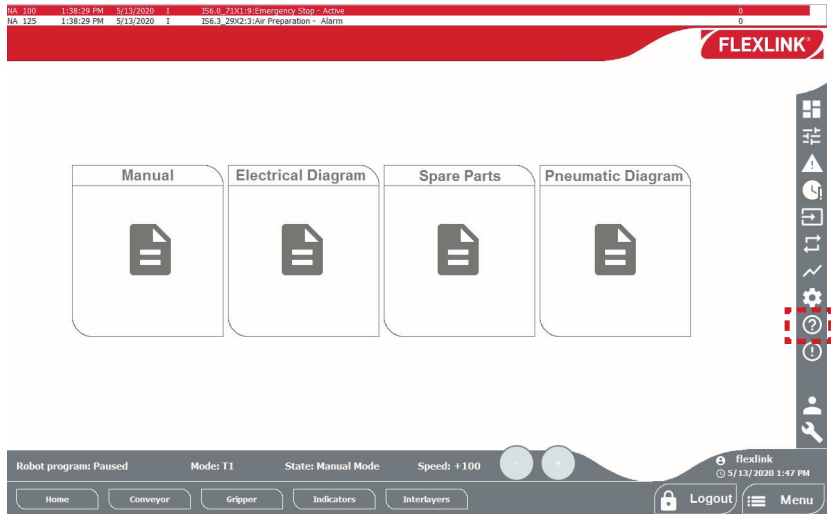


8.4.0.12 Maintenance

See Section 11

8.4.0.13 Help

Manual, electrical- and pneumatic diagrams and spare parts are available here.

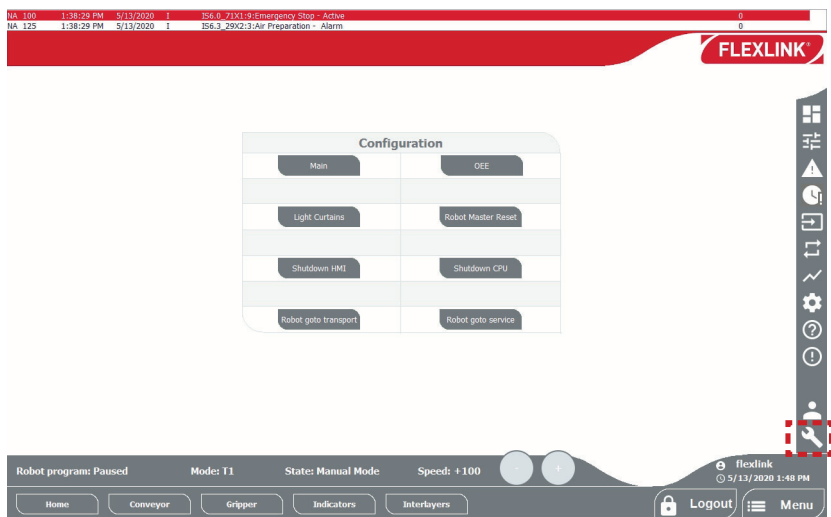


8.4.0.14 Information

Shows the machine plate.
See Section 1.2 for machine plate position.

8.4.0.15 Configuration

Configuration page



Main

NA	ID	Time	Date	Status	Message
NA_100	1:38:29 PM	5/13/2020	I	556.0_71X1-9-Emergency Stop - Active	0
NA_125	1:38:29 PM	5/13/2020	I	556.3_25X2-3-Air Preparation - Alarm	0

FLEXLINK

Date / Time












Units: Metric (mm)

Current Date / Time: 2020 : 05 : 13 12 : 50 : 40



Set Date / Time: 2020 : 05 : 12 18 : 26 : 43 Set time

Robot cell production date: 2019 : 01 : 01 00 : 00 : 00

Set Date / Time: 0000 : 00 : 00 00 : 00 : 00 Set prod. date

Robot program: Paused
Mode: T1
State: Manual Mode
Speed: +100

flexlink
5/13/2020 1:50 PM

Home
Conveyor
Gripper
Indicators
Interlayers
Logout
Menu












Light curtains- switch on/off alignment mode

NA	ID	Time	Date	Status	Message
NA_100	1:38:29 PM	5/13/2020	I	556.0_71X1-9-Emergency Stop - Active	0
NA_125	1:38:29 PM	5/13/2020	I	556.3_25X2-3-Air Preparation - Alarm	0



FLEXLINK

Safety Curtains - Alignment lasers

Left alignment switch
Right alignment switch

Robot program: Paused
Mode: T1
State: Manual Mode
Speed: +100

flexlink
5/13/2020 1:51 PM

Home
Conveyor
Gripper
Indicators
Interlayers
Logout
Menu

OEE- set information required for OEE statistics

NA 100 1:30:29 PM 5/13/2020 I SC.9 - T1M1 Emergency Stop - Alarm

NA 125 1:30:29 PM 5/13/2020 I SC.3 - 2002.3 Air Preparation - Alarm

0

FLEXLINK

Date / Time

Number of shifts: 3

Format: HH:MM (24h clock)

Shift 1 - Start:	06:00	End:	14:00	0480	●
Shift 2 - Start:	14:00	End:	05:40	0940	●
Shift 3 - Start:	06:00	End:	06:00	1440	●
Ideal Cycle Time: [s]				005.50	

Robot program: Paused

Mode: T1

State: Manual Mode

Speed: +100

flexlink

5/13/2020 1:50 PM

Home

Conveyor

Gripper

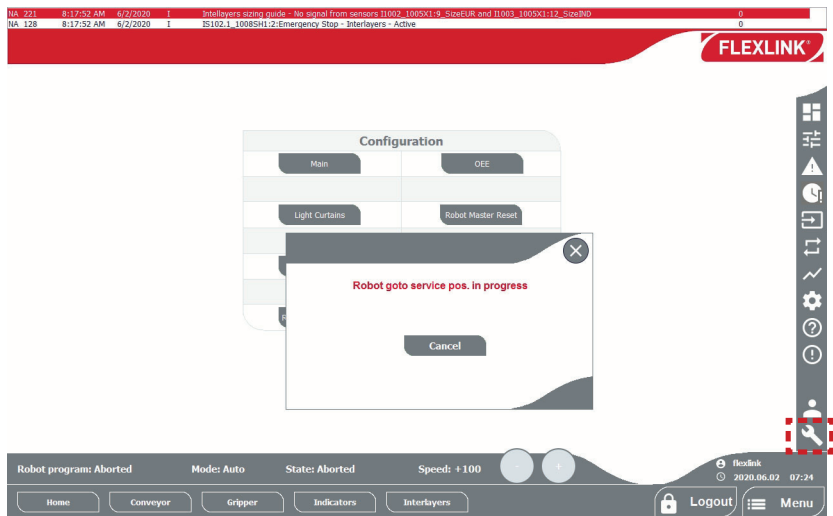
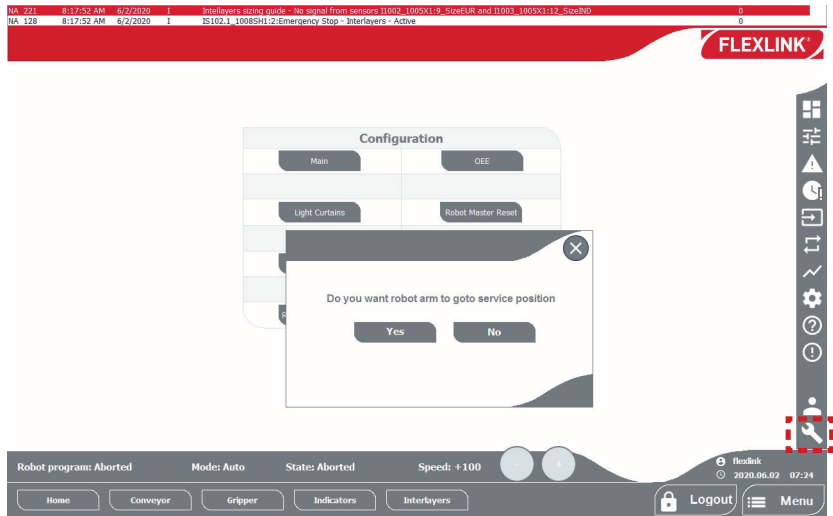
Indicators

Interfayers

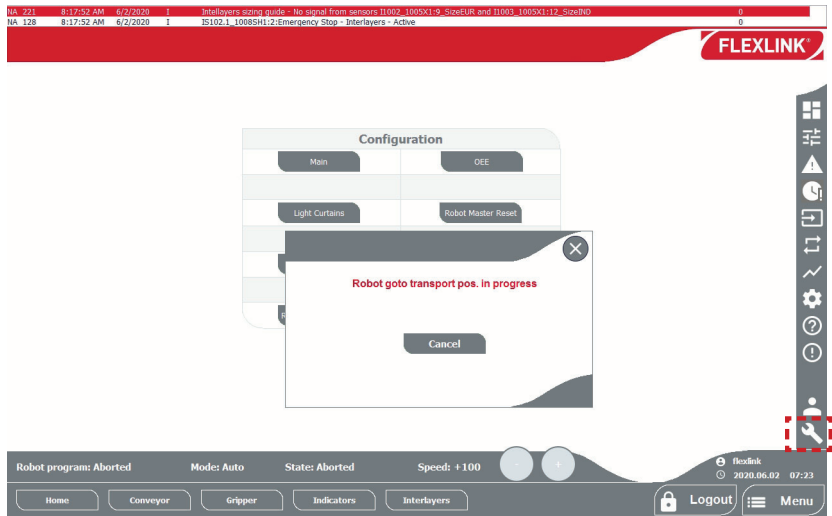
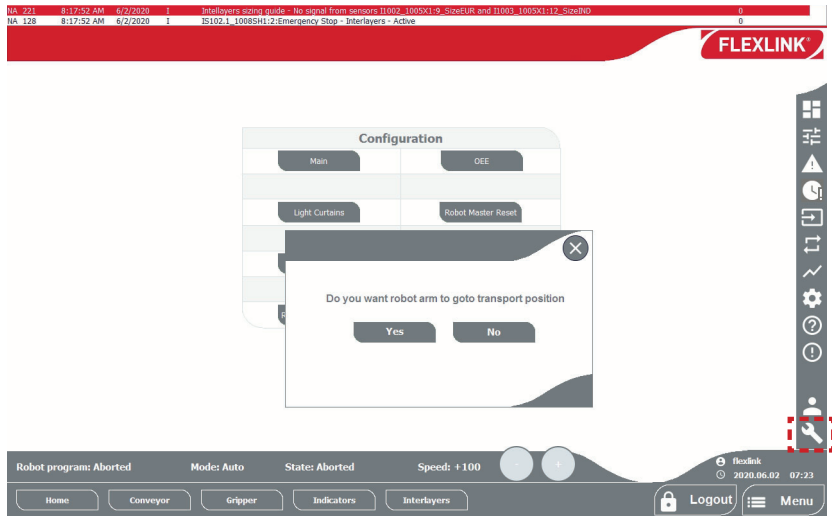
Logout

Menu

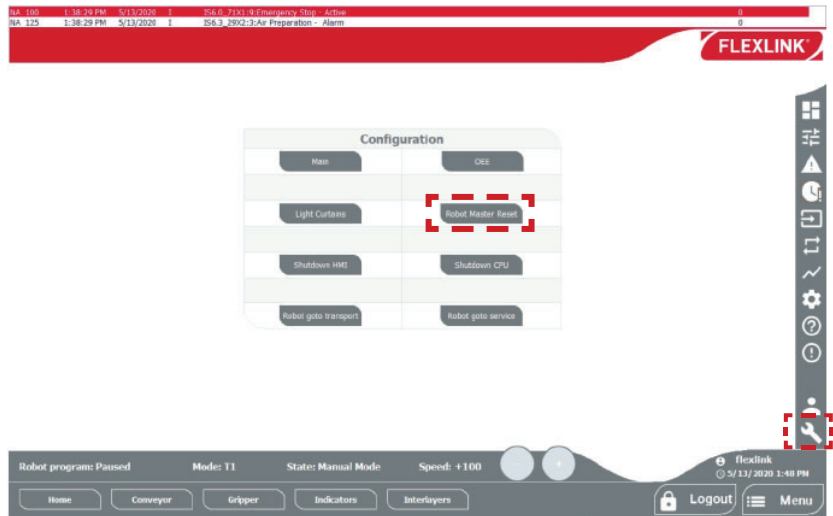
Robot go to service position



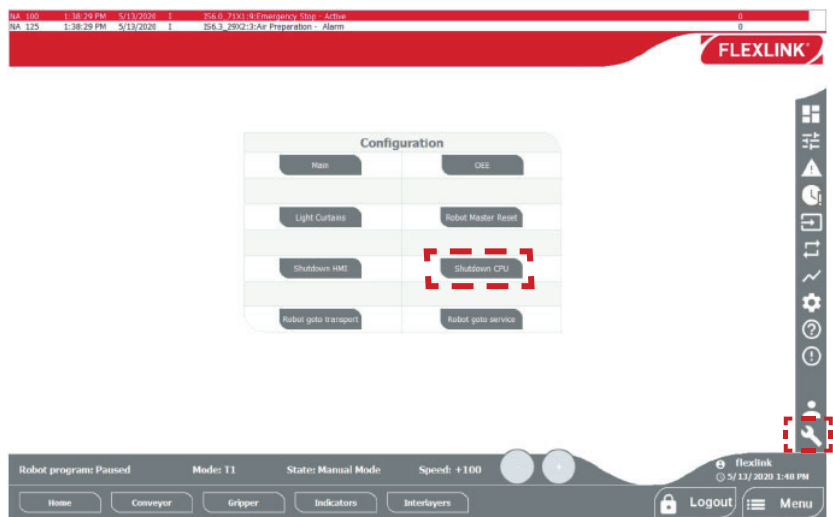
Robot go to transport position



Robot master reset, see Section 9

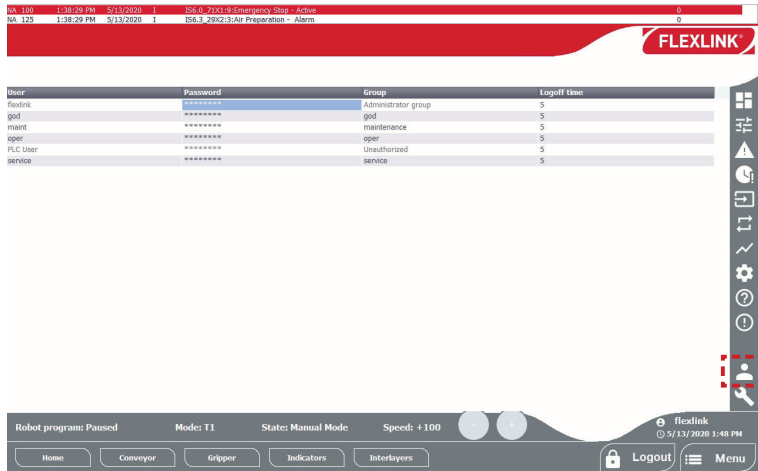


Shutdown CPU - Window shutdown (same function as pos. no.7 in Fig. 8)



8.4.0.16 Users

Manage account for users to perform maintenance etc.



8.5 Visual inspection

Perform a visual inspection according to Section 11.1 in Maintenance section.

8.6 System launch

- 1 Open the Robot Config and choose or create the product pallet pattern.
- 2 Load the pattern and product from the Robot Config software to the robot controller.
- 3 Check that the robot arm is in "Auto/Ext.Aut." mode.
If not: Fanuc- set the robot controller to "Auto" mode.
KUKA- change to "Ext. Aut." on robot arm smartPAD.
- 4 Set the speed to 50% on the HMI panel.
Note: Start with 50% to confirm box quality. If the speed is set to 100% the boxes might be dropped due to poor quality of the box.
- 5 Make sure no one is in the No entry zone.
- 6 Reset by pressing the "Reset" buttons on each side of the panel (Section 8.2).
- 7 Press the "Start" buttons on each side of the panel to start palletize (Section 8.2).
- 8 Increase the speed when the first layer is palletized without errors.

8.7 Stop

The machine can be stopped both intentional (by operator) or accidental (caused by outer factors).

Possible situations are defined in the following list:

8.7.1 Intentional stop

The operator can stop the machine at "End of work".
The machine stops when the intended quantity of pallets are reached.

8.7.2 Normal stop

Press "Stop" on one side and machine will stop the work on that specific side.

When "Stop" is pressed the robot arm will stop, the vacuum will still be on, but the conveyor stops.

To restart after stop: Press "Reset" followed by "Start"

8.7.3 Emergency stop (E-stop) -Only used for emergencies



Caution: Only use the E-stop for emergencies to avoid unnecessary maintenance problems.

Press one of the "Emergency stops" and all activities will stop. The robot is stopping with a cat 0.

Vacuum remains and the products will be held by the gripper. The button remains pushed in (activated) until a reset is performed.

To restart after stop:

- 1 Eliminate the cause of the E-stop.
- 2 Pull back the button pressed if necessary.
- 3 Press "Reset".
- 4 Press "Start" when the machine is ready.

8.7.4 Accidental stop

The following reasons will cause an accidental stop.

- **Electrical outage**

The machine stops immediately at loss of electrical power.

The compressed air valve will switch off and slowly reduce the accumulated pressure in the backup tank. The products will drop down from the gripper after a few seconds.

To restart after stop:

- 1 Turn the machine on.
- 2 Perform a master reset. See Section 9.
- 3 Make a visual inspection. See Section 11.1.
- 4 Load the "Pattern and Pallet".
- 5 Press "Reset".
- 6 Press "Start".

- **Pneumatic outage**

The machine stops immediately at loss of pneumatic power.

The compressed air valve will switch off and slowly reduce the accumulated pressure in the backup tank. The products will drop down from the gripper after a few seconds.

To restart after stop:

- 1 Return the pneumatic power.
- 2 Press "Reset".
- 3 Press "Force pallet end".
- 4 Load the "Pattern and Pallet".
- 5 Replace the pallet.

Press "Start" for the opposite pallet.

- **Circuit protection device**

Components designed to protect the circuits of the machine, usually switches. The circuits positioning is due to electrical and technical requirements.

To restart after stop:

- 1 A skilled electrician needs to check the system to know why and what switch was interrupted.
- 2 Perform a master reset. See Section 9.
- 3 Make a visual inspection. See Section 11.1.
- 4 Load the "Pattern and Pallet".
- 5 Press "Reset".
- 6 Press "Start".

- **Entrance crossed**- safety scanner activated.

- 1 Remove the cause of interruption.
- 2 Press "Reset".
- 3 Press " Start".

- **Entrance crossed** - safety light curtain between pallet and robot zone.

- 1 Remove the cause of interruption.
- 2 Press "Reset".
- 3 Press " Start".

8.8 Exchange pallets

A steady yellow light from the side signal tower indicates ready for exchange.

A flashing light; opposite pallet will be ready for exchange.

Pallet exchange procedure:

- 1 Remove the indicated pallet with a pallet jack.
- 2 Place a new pallet in the empty nest.
- 3 Leave the zone as soon as the pallet is in place.
- 4 Make sure no one is in the No entry zone.
- 5 Press the "Reset" button (for the pallet exchange side).
- 6 Press "Start" (for the pallet exchange side).
The robot will automatically palletize on the new pallet.

8.9 Robot configuration and pattern setting

8.9.1 Pattern creation

Create a pattern:

- 1 Select the top right icon in the menu on the HMI, in RoboConfig software.
- 2 Connect any web browsing capable device like tablet, laptop, smart phone to RI20 internal WiFi network.
- 3 **Note:** This way it is possible to open the same application web interface, without interrupting HMI normal operations.
- 4 Use WiFi SSID: FlexLink_RI20_XXXX. (xxx = the machine serial number).
- 5 Use password: flexlink
- 6 Type the following address in the web browser:
192.168.1.11:5567/

Note: This address can be scanned as a QR code in RobotConfig "About Robot Config" menu.

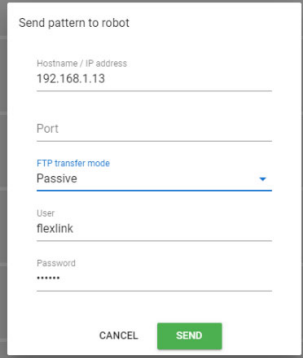


8.9.2 Pattern transfer from Robot config. application to robot



Fanuc transfer settings:

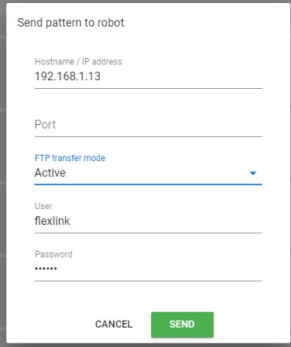
Hostname / IP address: 192.168.1.13
Port: leave empty
FTP transfer mode: Passive
User: flexlink
Pass: ckm25f



The screenshot shows a dialog box titled "Send pattern to robot". It contains the following fields: "Hostname / IP address" with the value "192.168.1.13", "Port" which is empty, "FTP transfer mode" set to "Passive" (indicated by a blue underline and a dropdown arrow), "User" with the value "flexlink", and "Password" with masked characters "*****". At the bottom, there are two buttons: "CANCEL" and "SEND".

KUKA transfer settings:

Hostname / IP address: 192.168.1.13
Port: leave empty
FTP transfer mode: Active
User: flexlink
Pass: ckm25f



The screenshot shows a dialog box titled "Send pattern to robot". It contains the following fields: "Hostname / IP address" with the value "192.168.1.13", "Port" which is empty, "FTP transfer mode" set to "Active" (indicated by a blue underline and a dropdown arrow), "User" with the value "flexlink", and "Password" with masked characters "*****". At the bottom, there are two buttons: "CANCEL" and "SEND".

A message will be displayed at the bottom screen to confirm the pattern has been successfully transferred.

8.9.3 Pattern activation in robot

The transferred pattern is stored in robot memory, but not necessarily used yet.

At first, previous pallets have to be finished according to previously selected pattern. Newly transferred pattern can be used by robot, instead of previous one, only if certain conditions are met.

Pattern activation condition for Fanuc robot:

Robot running in AUTO mode.

Both pallets have to be in one of below states: (any mix possible)

- Pallet not present.
- Pallet present but empty.
- Pallet present, ready to be exchange, indicated by yellow light on the side signal tower.

Pattern activation condition for KUKA robot:

- Robot running in AUT. Ext. mode.
- Both pallets removed. New, empty pallets, not present.
- Robot is not at transport position.

8.9.4 New pattern testing

When starting palletization of a new pallet pattern, not tested before, there is a risk of collision, as box dimensions or pattern layout could be set wrongly.

1. Run with speed below 40% to observe the robot performance. The speed can be adjusted on HMI visualization.
2. Adjust the suction cups if needed (if the new boxes differ).
3. Select "Go to pick pos." and run the robot as usual.

Note: The gripper will stop a few centimeters above the box and switch to PAUSED state.



Warning: Remove the trapped key before entering the robot working area when AUTO mode is selected and keep the key with you while inside the robot cell.

4. Enter the cell and adjust the cups. The box in pick point position can be used as a reference.

5. Start the machine; reset safety circuits, press start buttons and the robot will continue.

8.10 Machine shutdown

- 1 Wait for the final pelletizing operation or press "Force end".
- 2 Press "Windows," next to the Main power switch and wait for the window to close.
- 3 Switch off the machine with the "Main power switch".

9 Master reset procedure



Caution: The master reset procedure should be performed only by trained personnel with knowledge of how to set the robot to T1 manual mode.

The procedure sets the system back to initial start settings. All products in the gripper will be released and the pallet product count will be erased.

The reset procedure below explains an example of a master reset procedure where a box, with higher dimensions than defined in the packing pattern, is handled by the robot.

This results in a collision problem when the robot is trying to stack the box lower than what is possible.

The robot collision detection will stop the robot and display: **collision error**.

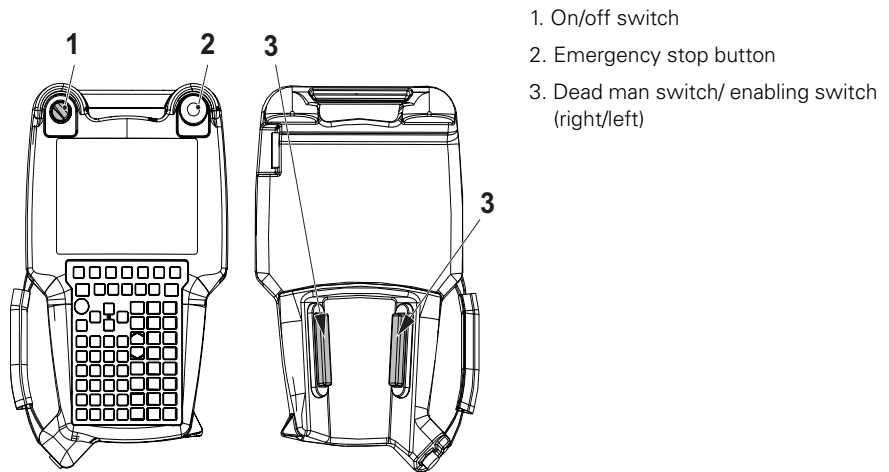


Figure 43 Description of tech pendant functions for Fanuc

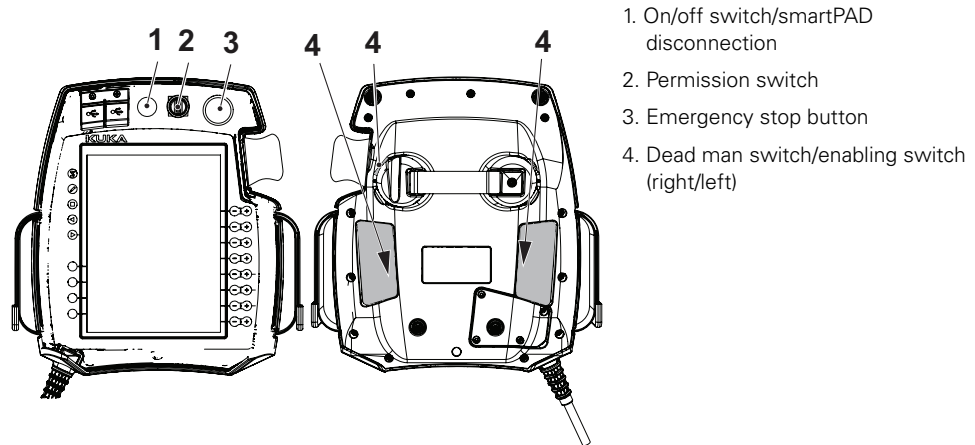


Figure 44 Description of SmartPAD functions for KUKA

The dead man switches (3 Fanuc/ 4 KUKA) are part of the safety system. When the system is set into T1 mode the robot will only move when one of the switches is pressed down to its middle position. The robot will stop if the switch is released or pressed all the way in. There are two switches one for left- and one for right handed.

Follow the procedure to recover from the situation:

- 1 Remove The Trapped key from the panel. The key is found at the top right corner next to the front HMI panel. (see Fig. 45)
Note: Now the safety system disables any robot movement in AUTO mode.



Warning: Keep the key with you. The robot will not be able to start as long as the key is removed.

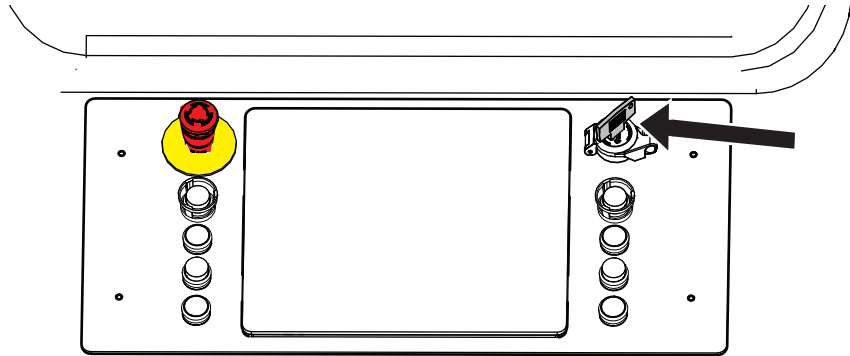


Figure 45 Trapped key position at the sides of the HMI screen

T1 mode

- 2 Switch the robot to T1 mode, with a speed limited to max. 250 mm/sec.
 - a) Fanuc Robot; Rotate the switch on the front door of the robot controller. See Fig. 46a.
 - b) KUKA robot; Rotate the permission switch on the SmartPAD. See Fig. 46b.

Note: The robot is now set to manual mode.

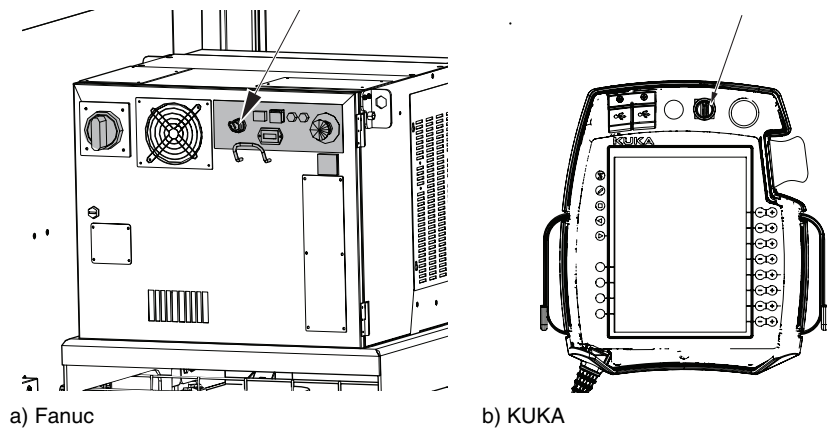
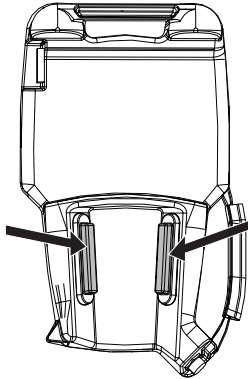


Figure 46 Rotary switch for T1 and manual mode a) Fanuc b) KUKA

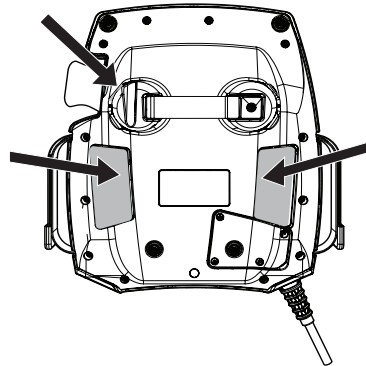
- 3 Fanuc: Open the front wall door and take out the tech pendant.
- 4 Fanuc: Turn the Teach pendant to ON.

- 5 Press one of the Dead man switches, on the back, to its middle position.

Note: If the switch is in any other position the robot will stop.



Fanuc



KUKA

- 6 Move the robot (or gripper), manually by jogging, out of collision position.

Note: If the collision alarm went off it can go off again while moving in T1 mode.

- 7 Move the robot to one starting position:

- Center of left pallet, above products.
- Center of right pallet, above products.
- Picking area, above product.

Note: Required accuracy is approximately ± 150 mm horizontally and vertically between 0,5- 1,8 m above floor level. Later when setting the robot into AUTO/Ext. Aut. mode it will move to the start position.

Reset the program on the HMI main screen:

- 8 Press the Reset button at the HMI main screen (see Fig. 47).

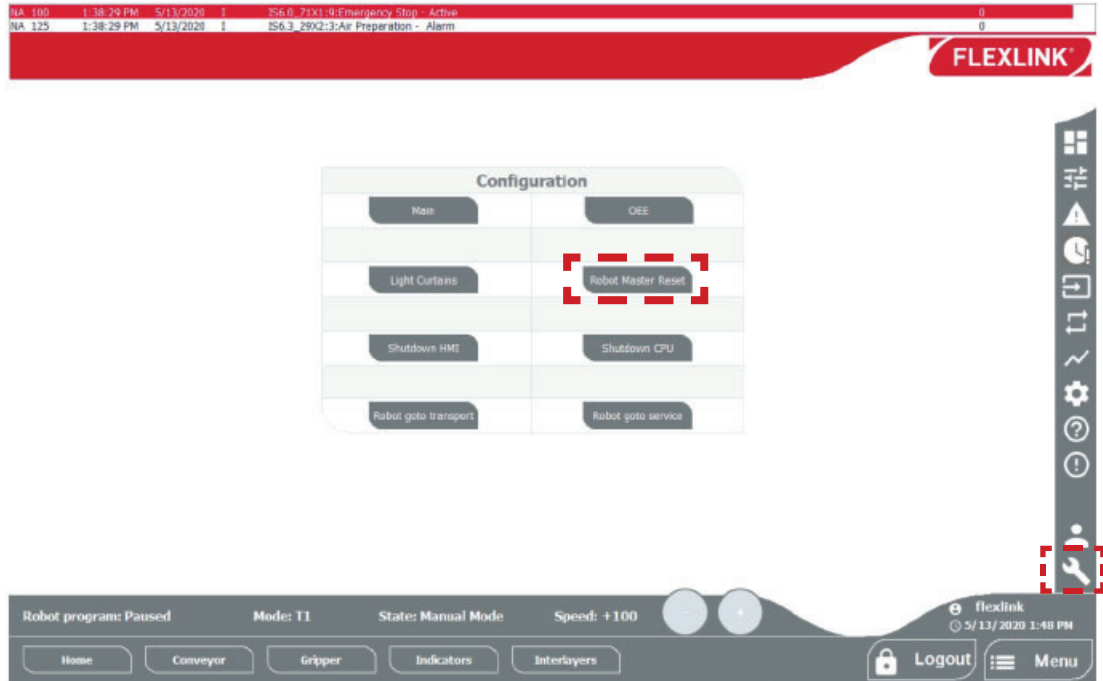


Figure 47 Location for reset.

Note: The reset will force the program to restart.

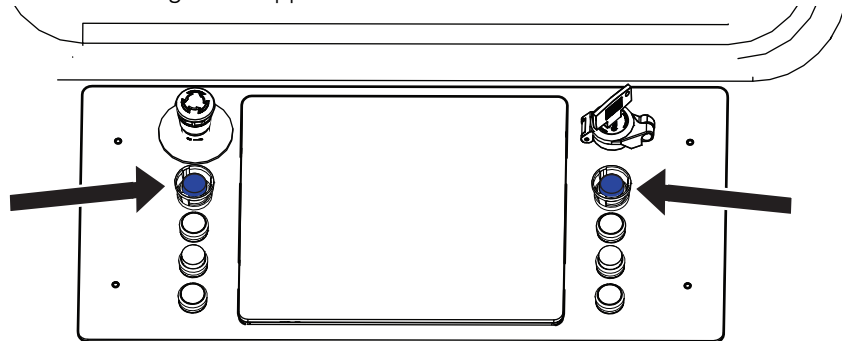
AUTO mode:

- 9 Turn the Teach pendant to OFF.
- 10 Return the tech pendant to its position behind the front door.
- 11 Switch the robot back to AUTO mode on the robot control panel.
- 12 Make sure no personnel or objects such as, tools, packaging material etc. is in the robot working area.

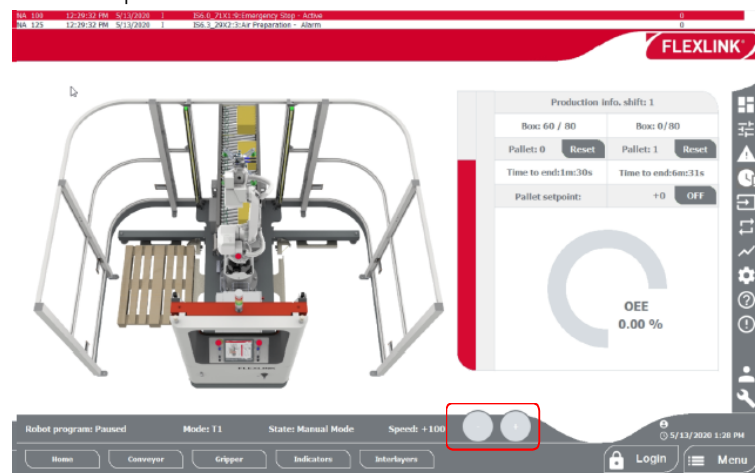


Warning: The operator is responsible to make sure no one is within the robot movement range when resetting the safety circuits.

- 13 Press the "Reset" buttons located on each side of the HMI screen. Press both blue buttons to restart both sides of the robot cell. A blue light will appear.



- 14 Reduce robot speed to less than 30% by pressing the speed adjustment at the bottom menu.
Note: All conditions are not defined after a reset and because of that the speed needs to be reduced.



- 15 Start the robot, by pressing the "Start" buttons (see below).
Note: The robot will start its program from the first line.

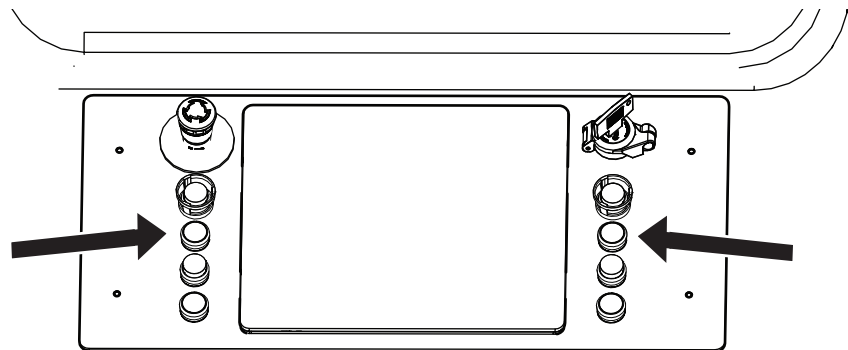


Figure 48 Start buttons on the HMI panel

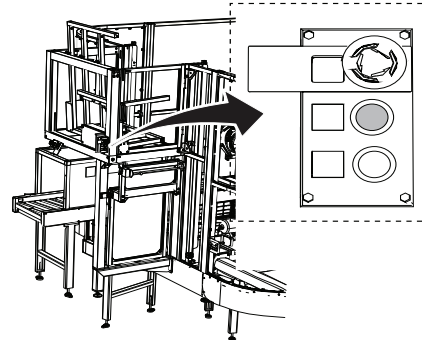
- 16 Change both pallets, with or without products. Pallet exchange is indicated by the yellow light on the small signal towers.

When the palletizer have new, empty pallets the palletization can continue.

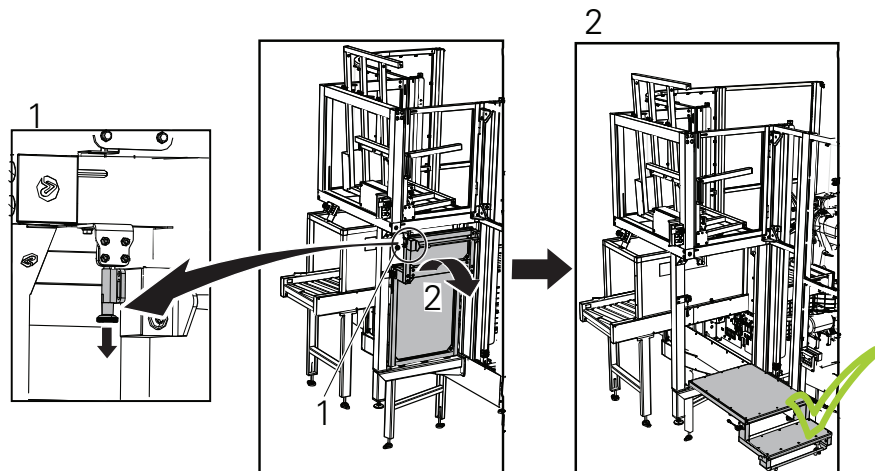
10 Interlayer refill procedure

The following procedure needs to be followed to refill the interlayer module with cardboard. See Section 2.4 'Interlayer module', Fig. 12 for interlayer description.

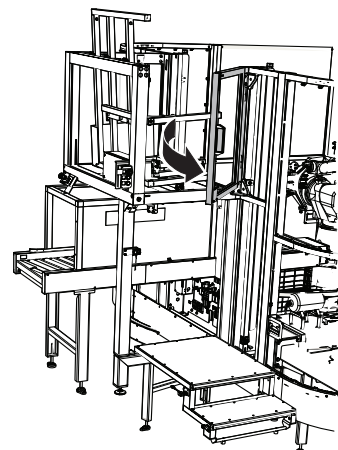
- 1 Press the "Request interlayer refill" button on the control panel (no.4 in Fig. 12).



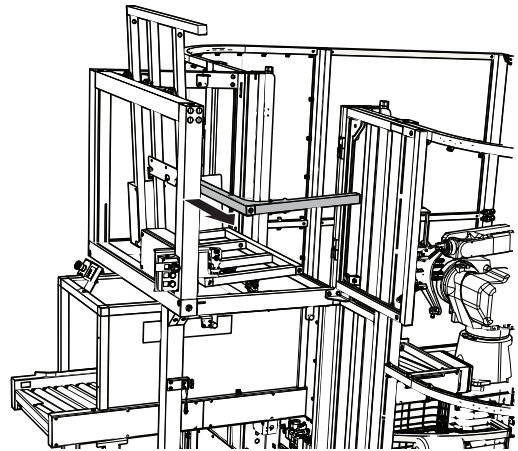
- 2 Release the locking pin (1) and lower the platform (2).



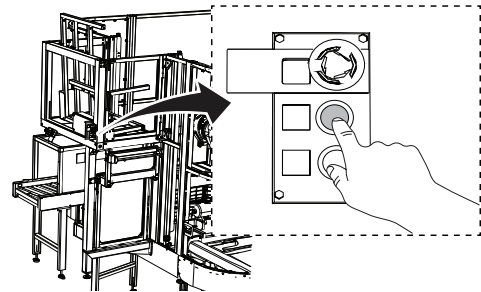
- 3 Open the side door.



- 4 Pull out the interlayer guide with brush.



- 5 Position 150 pcs of interlayers (3 mm thickness) on the platform.
- 6 Push the interlayer guide back.
- 7 Close the refill door.
- 8 Lift and lock the securing pin (no.1 step 2).
- 9 Press the "Reset" button on the interlayer control panel to activate the local safety system.



- 10 Press "Reset" on the front panel.
- 11 Press both "Start" buttons on the front panel.

11 Inspection, Maintenance and Cleaning

Inspection, maintenance and cleaning needs to be performed regularly to keep the machine in good condition. Follow the described procedures with given intervals. Some complex procedures are left out from this document as this needs special competence, contact your local FlexLink office for service.



DANGER: If it is necessary to remove any safety device during maintenance, the risk should be assessed, and suitable measures should be taken.



DANGER: Unauthorised personnel are not allowed in the area of maintenance during activities described in this section.



Caution: Mark machine with a sign that maintenance is ongoing during maintenance.



Caution: Clean any grease or oil leakage on floor immediately to avoid slip accidents.

11.1 Visual inspection:

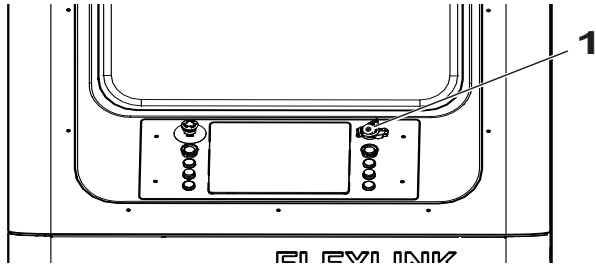
This procedure can be performed by unskilled personnel/ operator.

Schedule:

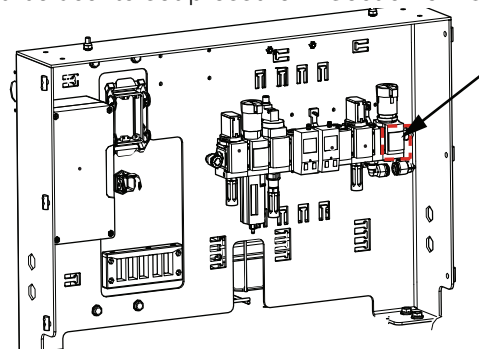
The following tasks/ procedures should be performed every 8 hours or before production start.

Procedure: Visual inspection

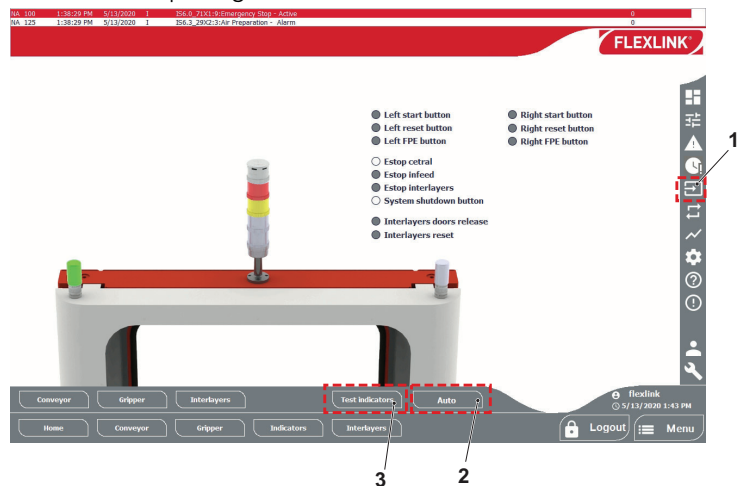
- 1 Remove the trapped key (1) and keep it on you until the inspection is finished.



- 2 Make sure to have visual access to the robot arm.
- 3 Remove empty pallets.
- 4 Check the pressure of the pressure regulator on the back panel. The pressure should be acc. to set pressure in Section 6.2.3)

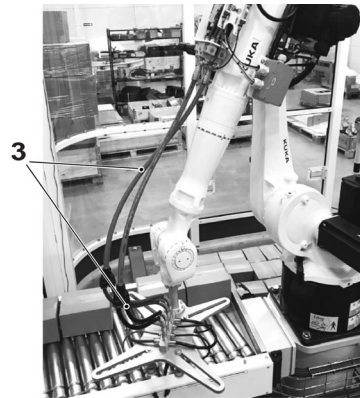
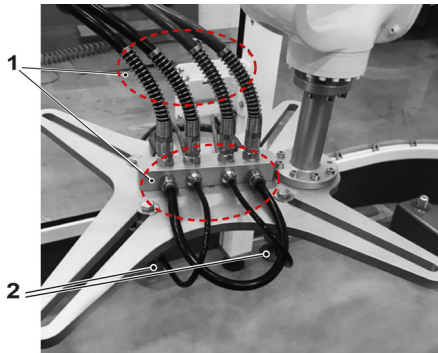


- 5 Check the lamps/ signal tower



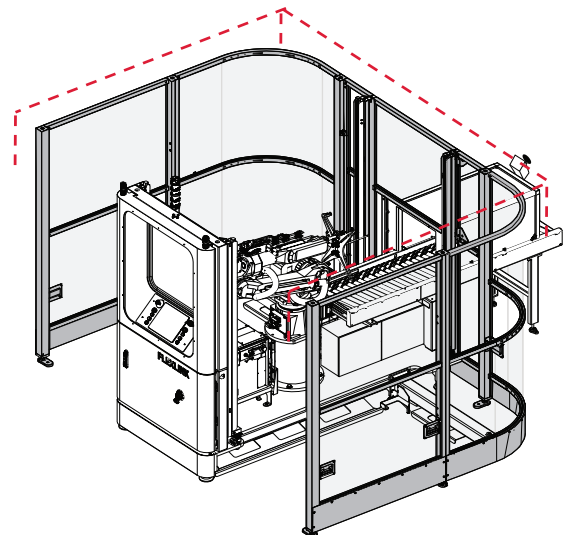
Check all indicators according to the following procedure:

- a Press I/O status (1).
 - b Press "Auto/ Manual" to switch to manual mode (2).
 - c Press "Test indicator" and it will remain on for 20 sec. (3).
 - d Press "Auto/ Manual" to switch back to automatic mode (2).
- 6 **Visual inspection;** check the condition of the following:
Note: Contact the technical maintenance team if any damages or wear are found.
- a Suction cups
 - b Pneumatic tubes

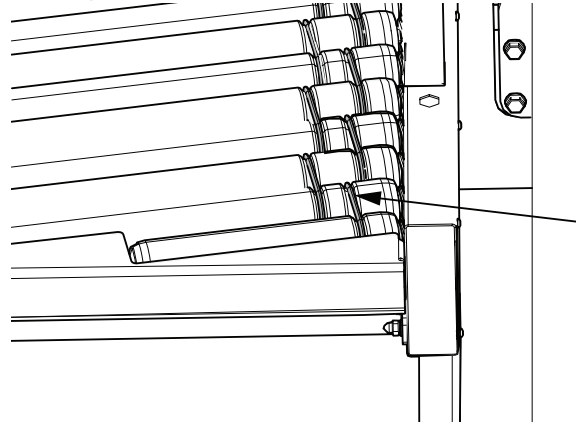


1. Plastic tubes
2. Suction cups
3. Pneumatic tubes

- c Safety guards

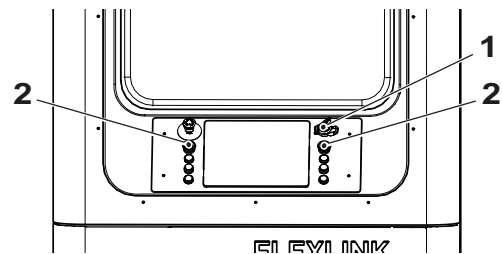


d Polycords on conveyor



e Visible components of the machine

- 7 Check the machine for foreign objects. Remove if found.
- 8 Make sure there are no persons in the No entry zone.
- 9 Put the trapped key back in its position (1) in the machine and turn the key.



- 10 Press the two "Reset" buttons (2) to reset the robot operating zone (No entry zone).

The machine is now ready to palletize.

11.2 Input /output panel

"IO" is embedded in the HMI and allows to trigger the machine elements manually. The panel is secured by password and is only accessible by Advanced operators.

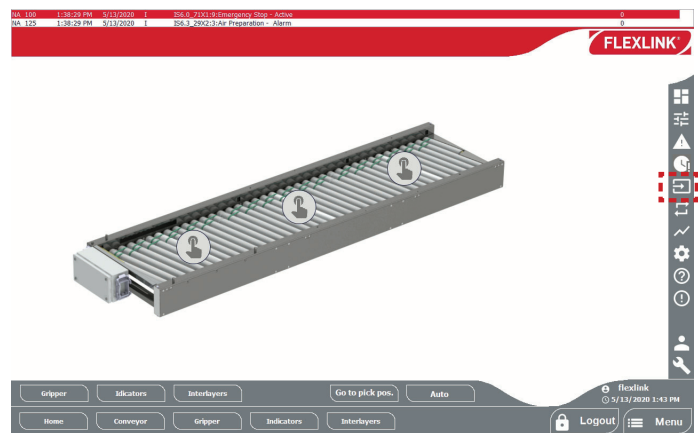
Sections able to trigger:

- Conveyor rollers
- Gripper suction cups
- Indicators
- Interlayer module

- 1 Press I/O status on the HMI screen.
- 2 Login to "minimum required maintenance"
- 3 Press Auto/ (Manual) to switch to manual mode.
- 4 Press the element to be triggered.
- 5 Press Manual/ (Auto) to switch back to auto.

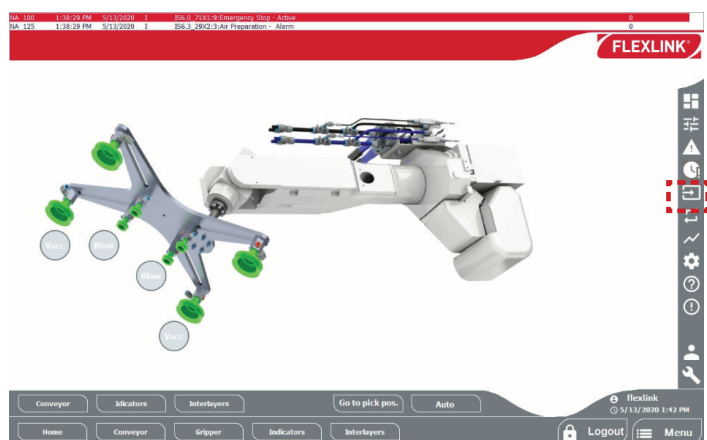
Conveyor rollers

Section 1, 2 or 3 can be triggered. Press on section number to trigger.



Gripper suction cups

Blow or suction can be triggered. Press 1 or 2.



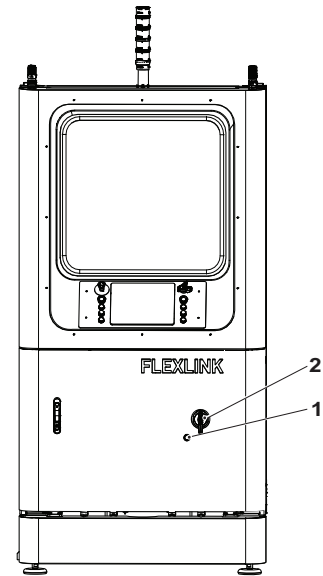
Indicators

Press test indicators and the indicators will be on for 20 sec.



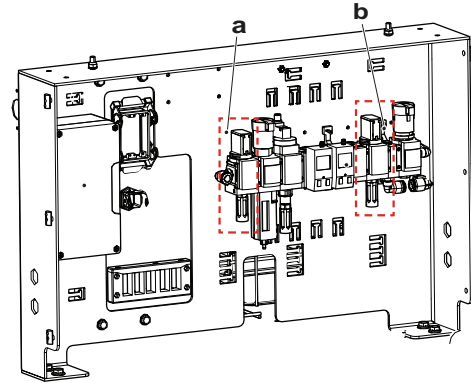
11.3 Lock out, Tag Out Procedure

To start maintenance the following procedure needs to be performed:



- 1 Press the shut down button (1) to switch off the HMI.
Note: Wait until the screen turns black and the "Shut down" button stops blinking until proceeding to the next step.
- 2 Switch off and lock the electrical switch with padlock (2).

- 3 Release all remaining pneumatic energy at the back panel.



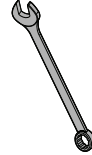
- a Cut off the pneumatic energy from external sources ("a" in above figure) and lock by padlock
 - b Release the remaining pressure ("b" in above figure).
- 4 Mark the machine with visible signs that the machine is closed for maintenance to make sure no one starts the machine.
 - 5 The machine is ready, and it is safe to perform maintenance.

11.4 Maintenance

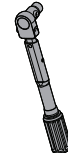
Tools:



3, 4, 6, 10, 12
mm



10, 13, 15, 18,
24, 26, 46 mm



0-320 Nn

Required
personnel:



Advanced
operators

PPE:



Caution: The tasks in this section should be performed by Advanced operators.



Caution: Only use spare parts from spare part list.



Caution: Replace parts where necessary if nothing else is stated.



Caution: Maintenance should be performed in adequate lightening.

































































































































































































































Caution: Make sure tools are in perfect condition and equipped with isolation handles. Make sure measurement instrumentation cabling and wiring have no signs of damage.



Caution: Make sure the Tag out procedure is completed before any activities are started. See Section 11.3

11.5 Maintenance schedule RI20- KUKA robot arm version

		Duration in Minutes	Quantity	Where	By Who	Daily Check	Weekly check	Monthly check	1 Year	2 Years	3 Years	4 Years	5 Years	6 Years	7 Years	8 Years	9 Years	10 years	
External check	Check for external damage	2																	
	Completeness of guards	2																	
	Check suction cups condition ⁽¹⁾	2																	
	Check gripper tubing condition	2																	
	Lamps / signal tower test	2																	
	Check system pressure ⁽¹⁾	2																	
	Check polycord belt ⁽¹⁾	2																	
	Checking gear leakage	2																	
Cleaning	Clean optical surfaces Scanner / Light curtains	5																	
	Clean optical surfaces of all optical sensors	5																	
	Clean optical surfaces HMI	1																	
	Remove dust & chips	5																	
	General cleaning for chips, debris, dust	5																	
	Clean ejektor nozzle	15																	
	Clean interlayer module	10																	
	Remove condensate from pressure regulator	5																	
	Remove tank condensate	5																	
	Cleaning control cabinet cooling fans	5																	
Cleaning robot controller' cooling fans	15																		
Preventive Inspection	Deep check for external damage	5																	
	Check gas spring leaks	5																	
	Check robot connection cables	5																	
	Check and if nessesity tighten the gripper bolts	15																	
	Check Robot arm Cables	10																	
	Water, humidity check	5																	
	Check and retighten robot / pedestal bolts	15																	
	Check filter in pressure regulator	5																	
Maintenance	Replace filter in pressure regulator ⁽²⁾																		
	Replace of selenoid valves																		
	Replace suction cups ⁽²⁾																		
	Replace conveyor polycords ⁽²⁾																		
	Replace Robot pneumatic tubes																		
	Software updates																		
Robot Maintenance	Technical Inspection			ALL															
	Minor Electrical maintenance			ALL															
	Major Electrical maintenance			ALL															
	Check and, if necessary, regrease motor A1 involute toothing	2g	8																
	Check and, if necessary, regrease motor A2 involute toothing	2g	4																
	Check and, if necessary, regrease motor A3 involute toothing	2g	5																
	Check and, if necessary, regrease motor A4 involute toothing	2g	6																
	Check and, if necessary, regrease motor A5 involute toothing	2g	7																
	Check and, if necessary, regrease motor A6 involute toothing	2g	2																
	Oil change, gear unit A1 ⁽³⁾	1,2 L	8																
	Oil change, gear unit A2 ⁽³⁾	0,8 L	4																
	Oil change, gear unit A3 ⁽³⁾	0,32 L	5																
	Oil change, gear unit A4 ⁽³⁾	0,32 L	6																
	Oil change, gear unit A5 ⁽³⁾	0,14 L	7																
	Oil change, gear unit A6 ⁽³⁾	0,23 L	2																
Please contact your FlexLink office for service support																			
 Visual check and replace if necessary (Emergency kit)						 Spare Parts needed						 Tools needed							
 Customer advanced operator						 Customer machine operator						 Flexlink Engineer							

(1) Spares Parts included in emergency kit

(2) Spares Parts included in maintenance kit

(3) Please check RI20 Spare part document for grease and oil type

































































































































































































11.6 Maintenance schedule RI20- Fanuc robot arm version

		Duration in Minutes	Yearly Inspection / Maintenance	4th year Inspection / Maintenance	By Who	Quantity	Daily Check	Weekly check	Monthly check	960 3 months	1920 6 months	2880	3840 1 Year	4800	5760 1,5 Years	6720	7680 2 Years
External check	Check for external damage	2	X	X													
	Completeness of guards	2	X	X													
	Check suction cups condition ⁽¹⁾	2	X	X													
	Check gripper tubing condition	2	X	X													
	Lamps / signal tower test	2	X	X													
	Check system pressure ⁽¹⁾	2	X	X													
	Check polycord belt ⁽¹⁾	2	X	X													
	Checking gear leakage	2	X	X													
Cleaning	Clean optical surfaces Scanner / Light curtains	5	X	X													
	Clean optical surfaces of all optical sensors	5	X	X													
	Clean optical surfaces HMI	1	X	X													
	Remove chips	5	X	X													
	General cleaning for chips, debris, dust	5	X	X													
	Clean ejector nozzle	15	X	X													
	Clean interlayer module	10	X	X													
	Remove condensate from pressure regulator	5	X	X													
	Remove tank condensate	5	X	X													
	Cleaning control cabinet cooling fans	5	X	X													
Preventive inspection	Cleaning robot controller cooling fans	15	X	X													
	Deep check for external damage	5	X	X													
	Check gas spring leaks	5	X	X													
	Check robot connection cables	5	X	X													
	Check and if necessary tighten the gripper bolts	15	X	X													
	Check Robot arm Cables	10	X	X													
	Water, humidity check	5	X	X													
	Check and retighten robot / pedestal bolts	15	X	X													
Maintenance	Check filter in pressure regulator	5	X	X													
	Replace filter in pressure regulator ⁽²⁾			X													
	Replace of solenoid valves			X													
	Replace suction cups ⁽²⁾		X	X													
	Replace conveyor polycords ⁽²⁾			X													
	Replace Robot pneumatic tubes			X													
	Software updates?																
	Cable check (damaged or kinked)		X	X													
Robot maintenance	On-board actuator cable check		X	X													
	Tool tightening		X	X													
	Tightening of covers and main screws		X	X													
	Standard and adjustable mechanical stop verification		X	X													
	Cleaning of dust, splashes, etc.		X	X													
	Replacement of batteries (robot)		X	X													
	Lubricator or grease replacement of J1 reducer ⁽³⁾		X	X		1111 mL											
	Lubricator or grease replacement of J2 reducer ⁽³⁾		X	X		944 ml											
	Lubricator or grease replacement of J3 reducer ⁽³⁾		X	X		211 mL											
	Lubricator or replacement of gearbox oil J4 ⁽³⁾		X	X		1200 mL											
Controller	Lubricator or replacement of gearbox oil J5 ⁽³⁾		X	X		1110 mL											
	Lubricator or grease replacement of J6 reducer ⁽³⁾		X	X		40 mL											
	Check mechanical unit cable			X													
	Verification of Teach cable.		X	X													
	Battery replacement (controller)		X	X													
	Checking the supply voltages		X	X													
	Please contact your FlexLink office for service support																
Visual check and replace if necessary (Emergency kit)			Spare Parts needed			Tools needed											
Customer advanced engineer			Customer machine operator			FlexLink Engineer											

(1) Spares Parts included in emergency kit

(2) Spares Parts included in maintenance kit

(3) Please check Spare parts document for grease and oil type











































































































































































		Duration in Minutes	Yearly Inspection / Maintenance	4th year Inspection / Maintenance	By Who	Quantity	Daily Check	Weekly check	Monthly check	8640	9600	10560	11520 3 Years	12480	13440	14400	15360 4 years
External check	Check for external damage	2	X	X													
	Completeness of guards	2	X	X													
	Check suction cups condition ⁽¹⁾	2	X	X													
	Check gripper tubing condition	2	X	X													
	Lamps / signal tower test	2	X	X													
	Check system pressure ⁽¹⁾	2	X	X													
	Check polycord belt ⁽¹⁾	2	X	X													
Cleaning	Checking gear leakage	2	X	X													
	Clean optical surfaces Scanner / Light curtains	5	X	X													
	Clean optical surfaces of all optical sensors	5	X	X													
	Clean optical surfaces HMI	1	X	X													
	Remove chips	5	X	X													
	General cleaning for chips, debris, dust	5	X	X													
	Clean ejector nozzle	15	X	X													
	Clean interlayer module	10	X	X													
	Remove condensate from pressure regulator	5	X	X													
	Remove tank condensate	5	X	X													
Preventive inspection	Cleaning control cabinet cooling fans	5	X	X													
	Cleaning robot controller' cooling fans	15	X	X													
	Deep check for external damage	5	X	X													
	Check gas spring leaks	5	X	X													
	Check robot connection cables	5	X	X													
	Check and if necessary tighten the gripper bolts	15	X	X													
	Check Robot arm Cables	10	X	X													
Maintenance	Water, humidity check	5	X	X													
	Check and retighten robot / pedestal bolts	15	X	X													
	Check filter in pressure regulator	5	X	X													
	Replace filter in pressure regulator ⁽²⁾			X													
	Replace of selenoid valves			X													
	Replace suction cups ⁽²⁾		X	X													
	Replace conveyor polycords ⁽²⁾			X													
Robot maintenance	Replace Robot pneumatic tubes			X													
	Software updates?																
	Cable check (damaged or kinked)		X	X													
	On-board actuator cable check		X	X													
	Tool tightening		X	X													
	Tightening of covers and main screws		X	X													
	Standard and adjustable mechanical stop verification		X	X													
	Cleaning of dust, splashes, etc.		X	X													
	Replacement of batteries (robot)		X	X													
	Lubrication or grease replacement of J1 reducer ⁽³⁾		X	X		1111 mL											
	Lubrication or grease replacement of J2 reducer ⁽³⁾		X	X		944 mL											
	Lubrication or grease replacement of J3 reducer ⁽³⁾		X	X		211 mL											
	Lubrication or replacement of gearbox oil J4 ⁽³⁾		X	X		1200 mL											
	Lubrication or replacement of gearbox oil J5 ⁽³⁾		X	X		1110 mL											
	Lubrication or grease replacement of J6 reducer ⁽³⁾		X	X		40 mL											
Controller	Check mechanical unit cable			X													
	Verification of Teach cable.		X	X													
	Battery replacement (controller)		x	X													
	Checking the supply voltages		X	X													
 Visual check and replace if necessary (Emergency kit)				 Spare Parts needed								 Tools needed					
 Customer advanced engineer				 Customer machine operator								 Flexlink Engineer					

(1) Spares Parts included in emergency kit

(2) Spares Parts included in maintenance kit

(3) Please check Spare parts document for grease and oil type

(1) Spares Parts included in emergency kit	(2) Spares Parts included in maintenance kit	(3) Please check Spare parts document for grease and oil type
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		Duration in Minutes	Yearly Inspection / Maintenance	4th year Inspection / Maintenance	By Who	Quantity	Daily Check	Weekly check	Monthly check	24000	24960	25920	26880 7 Years	27840	28800	29760	30720 8 Years
External check	Check for external damage	2	X	X													
	Completeness of guards	2	X	X													
	Check suction cups condition ⁽¹⁾	2	X	X													
	Check gripper tubing condition	2	X	X													
	Lamps / signal tower test	2	X	X													
	Check system pressure ⁽¹⁾	2	X	X													
	Check polycord belt ⁽¹⁾	2	X	X													
	Checking gear leakage	2	X	X													
Cleaning	Clean optical surfaces Scanner / Light curtains	5	X	X													
	Clean optical surfaces of all optical sensors	5	X	X													
	Clean optical surfaces HMI	1	X	X													
	Remove chips	5	X	X													
	General cleaning for chips, debris, dust	5	X	X													
	Clean ejektor nozzle	15	X	X													
	Clean interlayer module	10	X	X													
	Remove condensate from pressure regulator	5	X	X													
	Remove tank condensate	5	X	X													
	Cleaning control cabinet cooling fans	5	X	X													
Preventive Inspection	Cleaning robot controller' cooling fans	15	X	X													
	Deep check for external damage	5	X	X													
	Check gas spring leaks	5	X	X													
	Check robot connection cables	5	X	X													
	Check and if necessary tighten the gripper bolts	15	X	X													
	Check Robot arm Cables	10	X	X													
	Water, humidity check	5	X	X													
	Check and retighten robot / pedestal bolts	15	X	X													
Maintenance	Check filter in pressure regulator	5	X	X													
	Replace filter in pressure regulator ⁽²⁾			X													
	Replace of solenoid valves			X													
	Replace suction cups ⁽²⁾		X	X													
	Replace conveyor polycords ⁽²⁾			X													
	Replace Robot pneumatic tubes			X													
	Software updates?																
Robot maintenance	Cable check (damaged or kinked)		X	X													
	On-board actuator cable check		X	X													
	Tool tightening		X	X													
	Tightening of covers and main screws		X	X													
	Standard and adjustable mechanical stop verification		X	X													
	Cleaning of dust, splashes, etc.		X	X													
	Replacement of batteries (robot)		X	X													
	Lubrication or grease replacement of J1 reducer ⁽³⁾		X	X		1111 mL											
	Lubrication or grease replacement of J2 reducer ⁽³⁾		X	X		944 mL											
	Lubrication or grease replacement of J3 reducer ⁽³⁾		X	X		211 mL											
	Lubrication or replacement of gearbox oil J4 ⁽³⁾		X	X		1200 mL											
	Lubrication or replacement of gearbox oil J5 ⁽³⁾		X	X		1110 mL											
	Lubrication or grease replacement of J6 reducer ⁽³⁾		X	X		40 mL											
	Check mechanical unit cable			X													
Controller	Verification of Teach cable.		X	X													
	Battery replacement (controller)		X	X													
	Checking the supply voltages		X	X													
			Please contact your FlexLink office for service support														
 Visual check and replace if necessary (Emergency kit)			 Spare Parts needed			 Tools needed											
 Customer advanced engineer			 Customer machine operator			 Flexlink Engineer											

(1) Spares Parts included in emergency kit

(2) Spares Parts included in maintenance kit

(3) Please check Spare parts document for grease and oil type

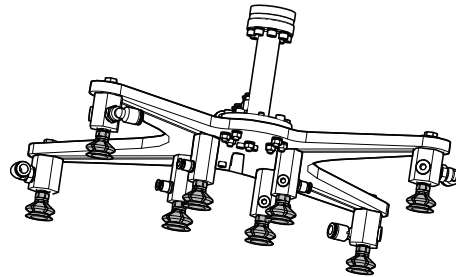
MAJOR OVERHAUL

See Section 11.8 for tasks to complete when maintenance is completed.

See Section 11.9 to restore the machine back to normal after a Lock out, Tag out.

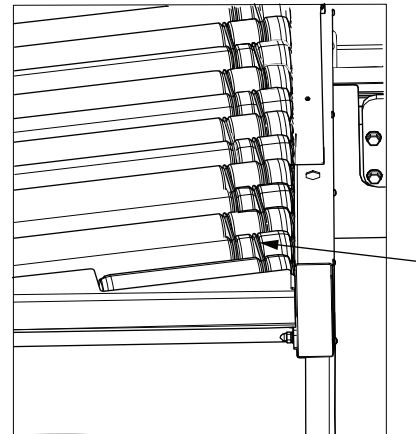
11.6.1 Suction cup

Visually inspect the suction cups, replace if damaged..



11.6.2 Conveyor belt polycords

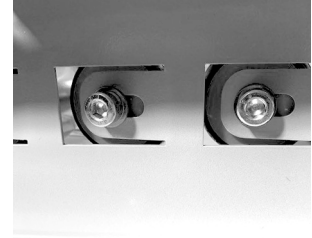
Check the conveyor belt polycords.



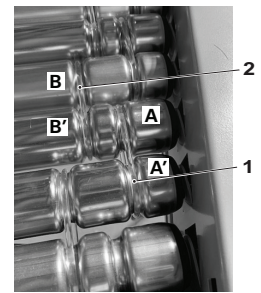
Replacement of polycords:

- 1 Remove the conveyor cover according to Section 6.1.6.

- 2 Remove the material flange to access the CHC screw.



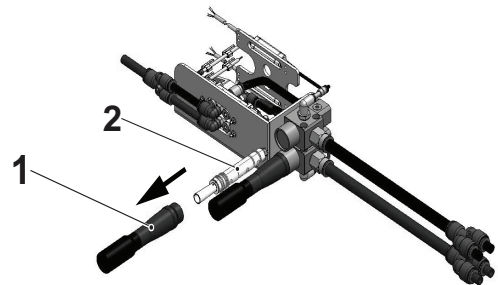
- 3 Remove roller marked A-A' to change the outer polycord



- 4 Remove roller marked B-B' to change the inner polycord. See figure in step 3.
- 5 Assemble the conveyor cover.

11.6.3 Ejector

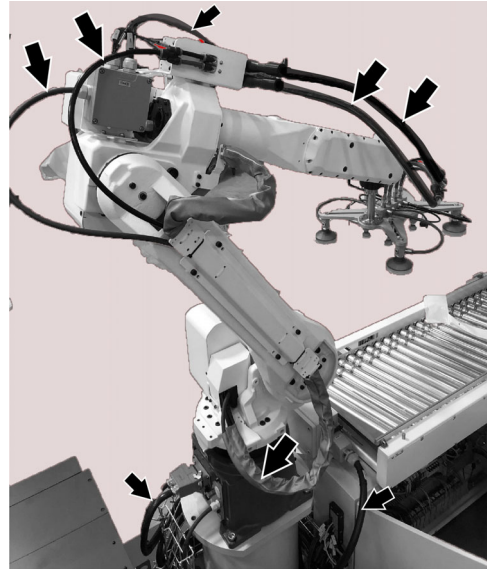
Remove 1 and check the nozzle 2.



11.6.4 Robot arm cables

Check the movable cables on the arm. Correct the cable if it's twisted or bent.

Note: Contact FlexLink Service if any damages.



11.6.5 Gear leakage

Check for leakage from the robot arm gear seal. Check for oil drops or spots on arm and operation area. Wipe away any accumulated oil.

Contact FlexLink Service if any leakage.

11.6.6 Robot/ pedestal bolt

Check the screws in the areas pointed out in the figure. Tighten bolts with correct torque according to torque Table 1.



DANGER: Incorrect torque can cause loose screw and breakage of the thread connection.

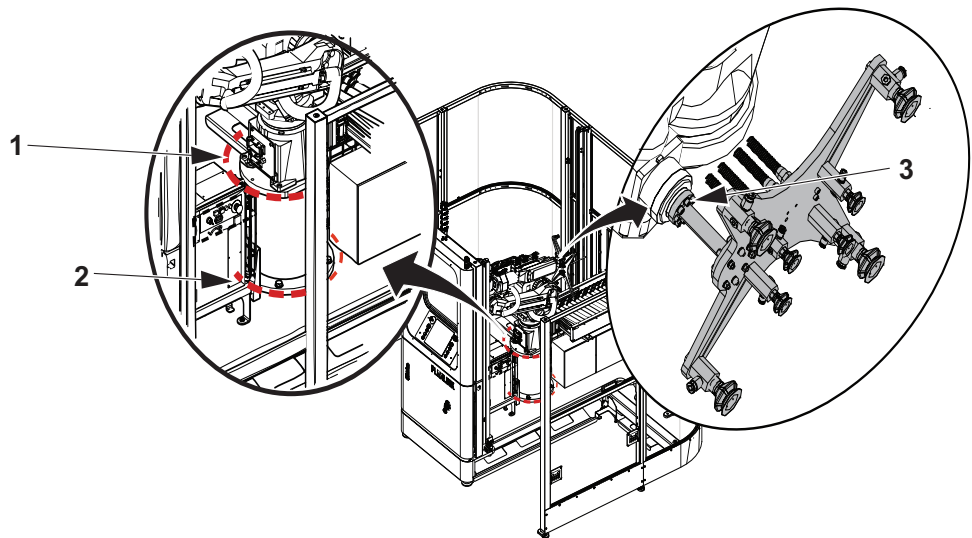


Table 1 Tightening torque for bolts on robot arm and gripper

No.	Position	Washer Nor-lock	Bolt	QTY	Tightening torque [Nm]
1	Robot arm Fanuc Fanuc M-20iA/ 35M	NL 16 sp	M16	4	318
1	Robot arm KUKA KR20 1810	NL 20 sp	M20	4	320
2	Pedestal	NL 20 sp	M20	8	320
3	Gripper	NL 6	M6	8	8

11.6.7 Filter in compressed air preparation station

Check the Festo documentation for MS4 units.

https://www.festo.com/net/en-gb_gb/SupportPortal/default.aspx?q=MS4

11.6.8 Periodical maintenance Fanuc robot

The FANUC M20iA robot does not require any maintenance, except an annual lubrication (calculated on a basis of 1.5 shift per day) and change of batteries every 5760 hours or every 1.5 years.

The described preventive maintenance operations must be performed by qualified personnel, please contact your FlexLink service team to schedule these interventions.

11.6.9 Periodical maintenance KUKA robot

The KUKA KR 20 R1810 robot does not require any maintenance, except an annual lubrication (calculated on a basis of 1.5 shift per day) and change of batteries every 6000 hours or every 1.5 years.

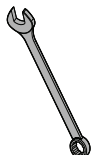
The described preventive maintenance operations must be performed by qualified personnel, please contact your FlexLink service team to schedule these interventions.

11.7 Cleaning

Tools:



3, 4, 6, 10, 12
mm



10, 13, 15, 18,
24, 26, 46 mm



Vacuum
cleaner



Clean cloth
FLX1005434



Compressed air



Soft brush

Required
personnel:

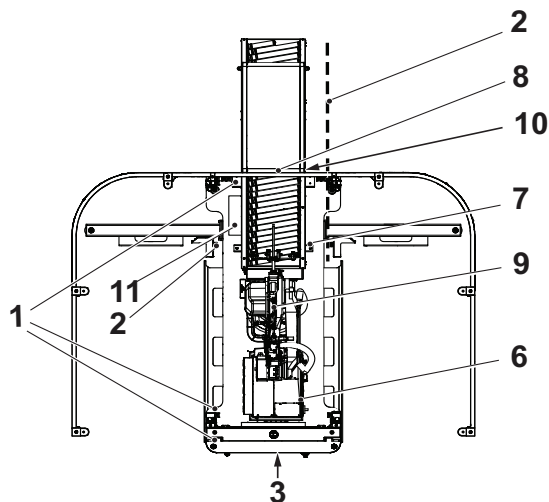


Advanced operators

PPE:



Cleaning:



1	Optical surfaces scanner/ light curtains	7	Control cabinet
2	Surface of all optical sensors	8	Interlayer module (if present)
3	Optical surface of HMI	9	Ejector nozzle
4	Chips and debris on the machine	10	Pressure regulator condensation
5	Dust on the machine	11	Tank condensation
6	Robot controller cooling fans ventilation		

General instructions:

- Use a cloth where nothing else is stated.



Caution: Always use a clean cloth to avoid scratches.

- If stains are difficult to remove with dry cloth or brush, use a suitable cleaning liquid, harmless to seals, rubber and painted parts. Non-flammable and non-toxic.
- Do not spray cleaning liquid with pressure bottles, because its volatility prevents the required cleaning effect and may cause vapor generation at workplace. Use soft cloths, well soaked with the cleaning solution for a better effect.
- Avoid prolonged contact with cleaning liquids nor inhaling their vapors.

- Avoid using near open flame or heat sources.
- Ensure good ventilation at the place of use.
- Perform cleaning of the machine thoroughly, in particular the area of guides and non-painted sliding parts. After; cover these parts with a thin layer of lubricant to protect from corrosive agents.
- See Section 11.8 for tasks to complete when maintenance is completed.
- See Section 11.9 to restore the machine back to normal after a Lock out, Tag out.



Caution: The tasks in this section should be performed by Advanced operators.



Caution: Make sure the Tag out procedure is completed before any activities are started. See Section 11.3.



Caution: Do not use water to clean the machine.

11.7.1 Optical surfaces scanner/ light curtains (1)

Clean the optical surfaces, with cloth, for proper function.

11.7.2 Surface of all optical sensors (2)

All optical sensors have reflectors. Clean both sensor and reflector, with cloth, for proper function.

11.7.3 Optical surface of HMI (3)

Clean the HMI panel with a cloth.

11.7.4 Chips and debris on the machine (4)

Use vacuum cleaner and cloth to clean chips and debris from the machine.

11.7.5 Dust on the machine (5)

Use vacuum cleaner and cloth to clean dust from the machine.

11.7.6 Robot controller cooling fan ventilation (6)

Clean according to the robot controller manual.



DANGER: High risk of electrical shock. Check local rules and regulations for electrical work.

11.7.7 Controller cabinet (7)

Clean only the cabinet outside.

11.7.8 Interlayer module (if present) (8)

Remove all dust collected on the cardboard interlayer sheets with vacuum cleaner and/or cloth.

Please perform cleaning process for all optical sensors according to Section 11.7.2.

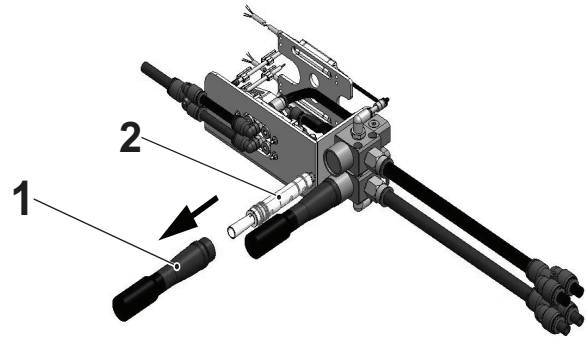
11.7.9 Ejector nozzle (9)

Clean the ejectors (2 pcs) located on the robot arm. Inspect the nozzle and clean if dust or dirt is visible. Use compressed air and/or cloth. Follow separate instruction to clean.

https://pimmedia.schmalz.com/Dokumente/Bedienungsanleitung/10/1002/100201/10020101397/BAL_10.02.01.01397_en-EN_00.pdf

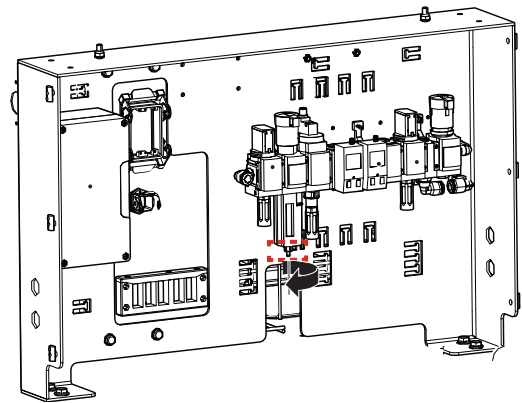


Caution: Wear safety glasses when using compressed air.



11.7.10 Pressure regulator condensation (10)

The pressure regulator is located on the back panel.
Loosen the pressure regulator nipple and remove any liquid.



11.7.11 Tank condensation (11)

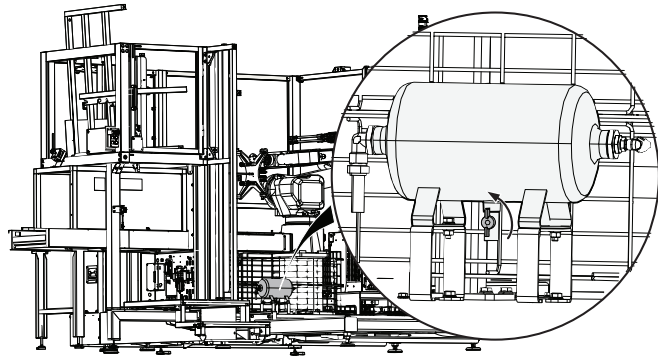
Open the valve at the bottom of the tank to release the condensate.



Caution: Make sure remaining pressure is released or contaminated water might spray out.



Caution: Recycle contaminated liquids in accordance with regulations in the country of use.



11.8 Actions after maintenance/cleaning

The following actions should be carried out after maintenance/cleaning is performed and before the machine is turned on.

- 1 Make sure to remove all spilled material e.g. oil, water, metal clips, tools etc. from the floor and the machine.
- 2 Make sure no parts are missing. All parts should be returned to its original position and in good condition.
- 3 Make sure to restore the deactivated safeguards e.g. panels, guards, screens, E-stop, interlock etc.
- 4 Start the machine according to procedure in Section 8, Operation.

11.9 Restore after Lock out, Tag out

- 1 Remove the padlock from the electrical switch.
- 2 Turn the electrical power on and wait until its activated.
- 3 Remove the padlock from the pneumatic switch.
- 4 Turn the pneumatic power on.
- 5 Perform a visual inspection according to Section 11.1.

11.10 Long time storage

Preparations for the machine if it will be shut down for a longer period of time (> one month).

Storage humidity: +85 %, Temperature: 10-60 °C.

Battery recharging interval during storage (KUKA)

< 20°C	9	months
20-30°C	6	
20-40°C	3	

The following procedure will be performed by an Advanced operator.

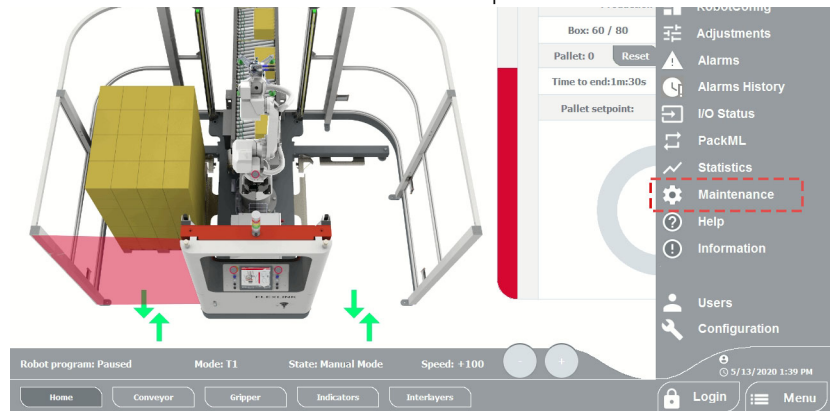
- 1 Remove dirt and machining material from the machine.
- 2 Clean the machine with a cloth.
- 3 Remove any mark of humidity on painted surfaces on the machine.
- 4 Store the machine indoors and cover moving parts to protect from dust.

Note: Store the machine in an environment free from aggressive chemical substances or similar.

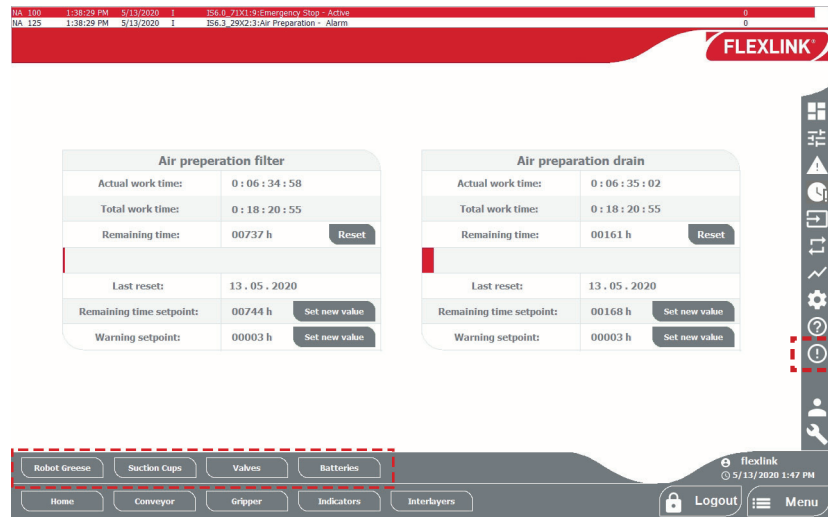
11.11 Preventative maintenance (Optional)

This option, embedded in the HMI panel, will keep you updated on when to perform the most critical maintenance tasks (inspection, cleaning and service).

- 1 Press on Maintenance on the HMI panel left side menu.



- 2 In the bottom menu the following maintenance schedules will appear.
Press to change schedule.



The following schedules are available:

- Air preparation filter
- Air preparation drain
- Mechanical unit batteries
- Controller batteries
- Robot greasing- joints
- Suction cups- section 1
- Suction cups- section 2

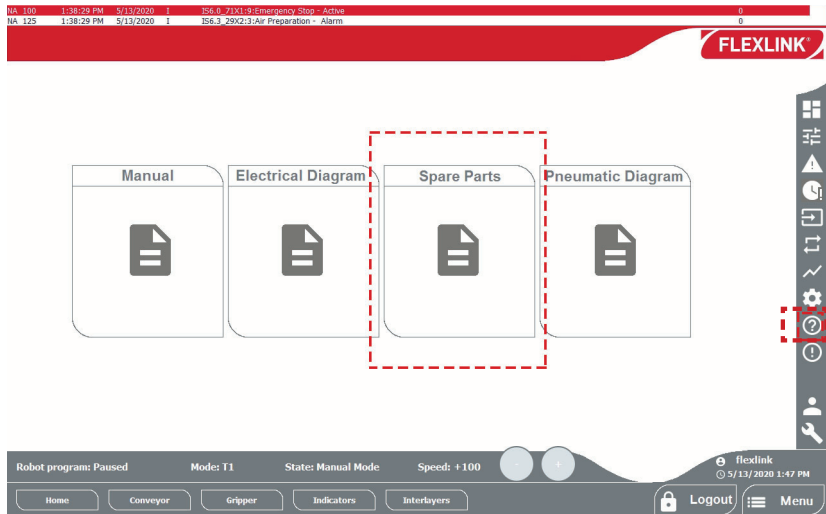
Each choice presents the following basic data:

- Actual work time/ cycles
- Total work time/ cycles
- Remaining time/ cycles
- Date of last reset
- Remaining time/ cycle set point
- Warning set point. A pop up message as a reminder prior to the maintenance operation.

Note: By pressing on "Set new value" the "Remaining time/cycle set point" and "Warning set point" can be changed.

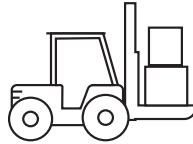
11.12 Spare part list

The spare part list amongst other documents are available by pressing the "Help" symbol.



12 Decommissioning

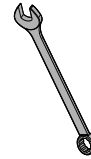
Tools:



Capacity: [T@mm]
-2,5 @1500
-2,5 @750 (side lift)



2, 3, 4, 6, 8, 10,
12 mm



7, 8, 10, 13, 16, 18, 24,
26, 46 mm

Required
personnel:



PPE:



Warning: Only authorized personnel aware of safety work are allowed to decommission, disassemble and scrap the machine.

Decommissioning, storing and disposal must be carried out according to applicable national laws, regulations and standards.

The machine is essentially build with the following materials:

- Ferritic steel, painted or zinc plated
- Stainless steel
- PE, ABS plastics
- Elastomer, graphite
- Gear oil
- Electric motor
- Electrical cables with relevant sheaths
- Electrical devices for test and activation
- Polycarbonate
- Aluminum anodized, painted
- Etc.

Decommissioning procedure:

Preparation: Make sure to wear proper PPE equipment.

- 1 Make sure to have sufficient space around the machine to allow safe operation.
- 2 Disconnect the machine power supply.
- 3 Disconnect the switches and lock in open position.
- 4 Disconnect the power supply cable from the disconnection device by:
 - a Remove the power cables.
 - b Remove the ground cables.
- 5 Make sure the pneumatic supply have been shut off.
- 6 Release remaining pressure in tank.
- 7 Disconnect the pneumatic supply tube from the air preparation unit.
- 8 Start to disassemble the machine starting from the top to bottom.



Caution: Be aware of parts/units that might fall due to gravity.

Disassembly of commercial parts (equipment and/or units) that are part of the machine should be performed according to the manual from the supplier.



Caution: The machine is from non-biodegradable materials. Take the machine to an authorized disposal centre.

13 Alarm list handling

Should be performed by Advanced operators.

Error code	Cause	Action
100	E-stop- Active	Pull e-stop button and reset the machine.
101	E-stop input inconsistent	Check the cabling connection according to the electrical drawing. Push and pull e-stop, inputs should be on or off in the same moment. Reset the machine.
102	E-stop- Fault present	Check the cabling connection according to the electrical drawing. Turn off machine. Check if the IO module is correctly inserted. Turn on machine. Reset the machine.
103	External E-stop active	Pull e-stop button and reset the machine.
104	External E-stop- input inconsistent	Check the cabling connection according to the electrical drawing. Push and pull e-stop, inputs should be on or off in the same moment. Reset the machine.
105	External E-stop- input inconsistent	Check the cabling connection according to the electrical drawing. Turn off machine. Check if the IO module is correctly inserted. Turn on machine. Reset the machine.
106	Emergency stop is pressed- in-feed tunnel	Pull e-stop button and reset the machine.
107	E-stop input inconsistent- in-feed tunnel.	Check the cabling connection according to the electrical drawing. Push and pull e-stop, inputs should be on or off in the same moment. Reset the machine.
108	Fault on input module- in-feed tunnel.	Check the cabling connection according to the electrical drawing. Turn off machine. Check if the IO module is correctly inserted. Turn on machine. Reset the machine.
109	Emergency stop	Robot- active emergency stop is pressed. Pull E-stop and reset the machine.
113	Safety scanner is active- left side	Remove the object from a laser beam and reset the machine.
114	Fault on input module safety scanner left side	Check the cabling connection according to the electrical drawing. Turn off machine. Check if the IO module is correctly inserted. Turn on machine. Reset the machine.
115	Safety scanner is active- right side	Remove the object from a laser beam and reset the machine.
116	Fault on input module safety scanner right side	Check the cabling connection according to the electrical drawing. Turn off machine. Check if the IO module is correctly inserted. Turn on machine. Reset the machine.
117	Safety scanner is active- center (optional)	Remove the object from a laser beam and reset the machine

Error code	Cause	Action
118	Fault on input module safety scanner- center (optional)	Check the cabling connection according to the electrical drawing. Turn off machine. Check if the IO module is correctly inserted. Turn on machine. Reset the machine.
119	Safety light curtain is active- left side.	Remove the object from a laser beam and reset the machine
120	Safety light curtain input inconsistent- left side.	Check the cabling connection according to the electrical drawing. Push and pull e-stop, inputs should be on or off in the same moment. Reset the machine.
121	Fault on input module safety light curtain- left side	Check the cabling connection according to the electrical drawing. Turn off machine. Check if the IO module is correctly inserted. Turn on machine. Reset the machine.
122	Safety light curtain is active- right side.	Remove the object from a laser beam and reset the machine
123	Safety light curtain input inconsistent- right side.	Check the cabling connection according to the electrical drawing. Push and pull e-stop, inputs should be on or off in the same moment. Reset the machine.
124	Fault on input module safety light curtain- right side.	Check the cabling connection according to the electrical drawing. Turn off machine. Check if the IO module is correctly inserted. Turn on machine. Reset the machine.
125	Installation pressure below 4 bar.	Check the air supply.
126	Fault on input module safety air pressure.	Check the cabling connection according to the electrical drawing. Turn off machine. Check if the IO module is correctly inserted. Turn on machine. Reset the machine.
127	External device monitoring.	Check status of relays 28K1 and 28K2 according to the electrical drawing.
128	Emergency stop is pressed- Interlayer module.	Pull e-stop button and press reset on interlayers module then reset the machine.
129	Fault on input module- Interlayer module.	Check the cabling connection according to the electrical drawing. Turn off machine. Check if the IO module is correctly inserted. Turn on machine. Reset the machine.
130	E-stop input inconsistent-Interlayer module.	Check the cabling connection according to the electrical drawing. Push and pull e-stop, inputs should be on or off in the same moment. Reset the machine.
131	Service door is open- Interlayer module.	Close the doors and press reset on interlayer module then reset the machine.
132	Service door input inconsistent-Interlayer module.	Check the cabling connection according to the electrical drawing. Push and pull e-stop, inputs should be on or off in the same moment. Reset the machine.

Error code	Cause	Action
133	Fault on input module- Interlayer module.	Check the cabling connection according to the electrical drawing. Turn off machine. Check if the IO module is correctly inserted. Turn on machine. Reset the machine.
134	Loading platform is open- Interlayer module.	Close the loading platform and press reset on interlayer module then reset the machine.
135	Loading platform input inconsistent-Interlayers module.	Check the cabling connection according to the electrical drawing. Push and pull estop, inputs should be on or off in the same moment. Reset the machine.
136	Fault on input module- Interlayers module.	Check the cabling connection according to the electrical drawing. Turn off machine. Check if the IO module is correctly inserted. Turn on machine. Reset the machine.
137	Trapped key is unlocked - central panel.	Lock the trapped key and reset the machine.
138	Trapped key input inconsistent- central panel.	Check the cabling connection according to the electrical drawing. Lock the trapped key, inputs should be on or off in the same moment. Reset the machine.
139	Fault on trapped key input module- central panel.	Check the cabling connection according to the electrical drawing. Turn off machine. Check if the IO module is correctly inserted. Turn on machine. Reset the machine.
200	Overcurrent protection 6GF1 is on.	Check status of over-current protection 6GF1 according to the electrical drawing.
201	Safety light curtain left side weak signal.	Adjust light curtain position according to light curtain manufacturer manual.
202	Safety light curtain right side weak signal.	Adjust light curtain position according to light curtain manufacturer manual.
203	Safety scanner device error- left side.	Read error code on display and perform according to scanner manufacturer manual.
204	Safety scanner contamination error- left side.	Turn off machine and clean the scanner optics according to scanner manufacturer manual.
205	Safety scanner device error- right side.	Read error code on display and perform according to scanner manufacturer manual.
206	Safety scanner contamination error- right side.	Turn off machine and clean the scanner optics according to scanner manufacturer manual.
207	Safety scanner device error- center (optional).	Read error code on display and perform according to scanner manufacturer manual.
208	Safety scanner contamination error- center (optional).	Turn off machine and clean the scanner optics according to scanner manufacturer manual.
209	Interroll DriveControl 54 fault- section 1.	Fault on Interroll DriveControl 54 module, perform according to manufacturer manual
210	Interroll DriveControl 54 fault- pick point.	Fault on Interroll DriveControl 54 module, perform according to manufacturer manual
211	Left pallet not present in palletize area.	Replace pallet on left side.
212	Right pallet not present in palletize area.	Replace pallet on right side.

Error code	Cause	Action
213	Fuse6F2_OK- Alarm.	Over-current protection 6GF2 is on
214	IO.2_Spare-Alarms	Fault on UPS perform according to manufacturer manual.
215	No interlayers in interlayer module	Fill interlayer according to machine manual.
216	Interroll DriveControl 54 fault- section 2.	Fault on Interroll DriveControl 54 module, perform according to manufacturer manual
217	No vacuum on gripper section 1.	Check suction cups position on gripper section 1. Check box quality. Check vacuum sensor.
218	No vacuum on gripper section 2.	Check suction cups position on gripper section 2. Check box quality. Check vacuum sensor.
219	Left pallet was removed during the palletization.	Check pallet position sensor. Put pallet in place. If new pallet is placed during the palletization- perform Force Pallet End procedure.
220	Right pallet was removed during the palletization.	Check pallet position sensor. Put pallet in place. If new pallet is placed during the palletization- perform Force Pallet End procedure.
221	Interlayer sizing guide- No signal from sensor I1002_1005X1:9_SizeEUR and I1003_1005X1:12_SizeIND according to machine electrical drawing.	Check the I1002_1005X1:9_SizeEUR and I1003_1005X1:12_SizeIND according to machine electrical drawing.
222	Broken box on pick point	Check the box on pick point. Remove any object from pick point.
300	Robot in T1 mode.	Robot is operating in manual mode with reduced speed. Safety scanners and curtains are disabled.
301	Robot in T2 mode.	Robot is operating in manual mode with full speed. Safety scanners and curtains are disabled.
302	Robot general error.	Read error code on display of robot teach pendant. Perform action according to robot manual.
303	Emergency stop is pressed- Robot.	Pull e-stop button and reset the machine.
304	Batch production ended.	Machine palletize amount of pallets set on the HMI home screen. Turn off batch production or reset amount of produced pallet by pressing reset for 3 seconds on HMI main screen.
305		
306		
307		
308	Robot speed monitoring robot speed exceeded	Reduce speed.
400	Change robot J1- J5 oil.	Replace robot oil according to robot maintenance manual.
401	Warning- Robot J1- J5 oil to be replaced.	The robot oil should be replaced in near future. Prepare maintenance action.
402	Change robot J6 oil.	Replace robot oil according to robot maintenance manual.
403	Warning- Robot J6 oil to be replaced.	The robot oil should be replaced in near future. Prepare maintenance action.
404	Perform tank air discharge.	Perform air discharge according to machine manual.

Error code	Cause	Action
405	Warning- Air Discharge to be performed	Tank air discharge should be performed in near future. Prepare maintenance action.
406	Change robot battery.	Replace robot battery according to robot maintenance manual.
407	Warning robot arm battery to be replaced	The robot battery should be replaced in near future. Prepare maintenance action.
408	Replace robot controller battery.	Replace robot controller battery according to robot maintenance manual.
409	Warning- Robot controller battery to be replaced.	The robot controller battery should be replaced in near future. Prepare maintenance action.
410	Check suction cups section 1.	Perform visual inspection of suction cups, replace if needed.
411	Check suction cups section2.	Perform visual inspection of suction cups, replace if needed.
412	Check suction valve section 1.	Perform visual inspection of suction cups, replace if needed.
413	Check suction valve section 2.	Perform visual inspection of suction cups, replace if needed.
414	Check blow valve section 1.	Perform visual inspection of blow valves, replace if needed.
415	Check blow valve section 2.	Perform visual inspection of blow valves, replace if needed.
416	Change air preparation filter.	Replace air preparation filter according to machine maintenance manual.
417	Warning- air preparation filter to be replaced.	The air preparation filter should be replaced in near future. Prepare maintenance action.
418	No product from upstream machine.	Place the box on machine conveyor. Check the connection of the section 1 start sensor according to the electrical drawing.
419	Low level of interlayers	Fill interlayers according to machine manual.
420	Left scanner has been interrupted. Right side is working with reduced speed.	Remove the object from a laser beam and reset the machine
421	Right scanner has been interrupted. Left side is working with reduced speed.	Remove the object from a laser beam and reset the machine
430	Robot program structure corrupted	Check the information on the robot teach pendant and perform according to robot manufacturer manual.

14 Abbreviations & definitions

Acc.	according to
config.	configuration
E-stop	Emergency stop
FLA	Full load amperes
HMI	Human machine interface
IoT	Internet of things
Machine operator	The person operating the machine
N/A	Not applicable
NOK	Not ok, (test step not approved), not passed
OK	Okey, test step passed and approved)
Palletize	Stack boxes/cartons onto pallets
PLC	Programmable logic controller
PPE	People protective equipment
Robot Config	Software tool for defining pallet pattern
Safety checksum	Individual code for every possible safety settings combination
VPN	Virtual private network

15 Change history

Edition	Date	Change	Note
1	200623	Document created	
2	201105	Info added, updated and changed	
3	201203	Maintenance charts updated	
4	210318	Version revision 1.0->1.1, maintenance charts updated, typos corrected	

16 References

Reference to technical library on www.flexlink.com which contains documentation to download:



<http://www.flexlink.com/en/home/support/technical-library>

No	Name	Doc item no.	Note
1	Siemens Electrical documentation	FLX1005231	
2	Allen Bradley Electrical documentation	FLX1005232	
3	Pneumatic schematics	FLX1002286	
4	Declaration	FLX1003795	
5	Spare parts	FLX1005233	
	User instruction	FLX1003780	English- original
	User instruction	FLX1003781	Swedish
	User instruction	FLX1003782	Norwegian
	User instruction	FLX1003783	Finnish
	User instruction	FLX1003784	Danish
	User instruction	FLX1003785	German
	User instruction	FLX1003786	French
	User instruction	FLX1003787	Czech
	User instruction	FLX1003788	Polish
	User instruction	FLX1003789	Dutch
	User instruction	FLX100790	Italian
	User instruction	FLX1003791	Spanish
	User instruction	FLX1003792	Hungarian
	User instruction	FLX1003793	Portuguese
	User instruction	FLX1003794	Russian

17 Contact information


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Appendix A

Appendix A/ Functional test of safety related equipment				
Step		Test	Section	NOK,OK,N/A
Visual inspection before starting the machine				
1		Main power switch is in "OFF" position	4.3	
2		Cut off valve is in "OFF" position	4.3	
3		All guard are present and undamaged	-	
4		All E-stop push-buttons are in place and without damages.	4.3	
5		Light curtains- no sign of damages	4.3	
6		Vertical scanners - no sign of damages	4.3	
7		All E-stop push-buttons latch mechanism are in "ON" position (the push-button are still in "pushed in position").	4.3	
8		The trapped key rotary mechanism works	4.3	
9		Interlock mechanism blocks access to the Interlayer maga- zine ¹⁾	4.3	
Practical test during operation in "AUTO" mode				
		It is forbidden to be in the No entry zone during "Power on" the machine		
10		Turn the main power switch to "ON" position.	4.3	
11		Turn the Cut-off valve to "ON" position.	4.3	
12		Open the Robot config and choose/create product pallet pat- tern.	8.9	
13		Load pattern and product from the Robot config software to the robot controller.	-	
14		Make sure the robot arm is in "Auto"/"Ext.Aut." mode.	-	
15		Set the speed to 10% on the HMI panel.	-	
16		Make sure no one is in the No entry zone.	-	
17		Insert the trapped key and turn to "ON"		
18		Reset by pressing the "Reset" button- on each side of the panel.	8.2	
		It is forbidden to be inside the No entry zone d.uring reset procedure.		

Date and signature

Appendix A/ Functional test of safety related equipment

Step	Test	Section	NOK,OK,N/A
	If there are no reaction of any E-stop push-button- stop the machine by the main switch. Block the machine by locking the main power switch. Inform the maintenance department.		
19	Press the "Start" button on each side of the panel to start palletize.	8.2	
20	Push each E-stop button in following step during palletizing to make sure it stops the robot and the roller conveyor.		
20.1	Front panel E-stop	4.3	
20.2	Conveyor E-stop	4.3	
20.3	SmartPAD (KUKA)/TeachPendant (Fanuc) E-stop ²⁾	4.3	
20.4	Interlayer module E-stop ¹⁾	4.3	
20.5	External E-stop for upstream machine ³⁾	6.2.2	
21	By hand, cross the scanner, on the side not palletized (robot arm is on the opposite side) to disarm that side. Blue "Reset" lamp starts flashing. Check both sides.	-	
22	By hand, cross the scanner, on the palletized side (robot arm is on this side) to disarm that side. The machine stops. Check both sides.	-	
23	With a stick, cross the light curtain on the disarmed (not palletized) side. The robot stops. Check both sides. ⁴⁾	-	
24	Open the interlayer platform to stop the robot ¹⁾	10	
25	Remove the trapped key and make sure the machine cannot be started.	4.3	
26	Open the loading door of the Interlayer magazine to make sure it is not possible to start the machine. ¹⁾	10	

1) Not Applicable ("N/A") for machines without the interlayer module.

2) Depends on robot arm type

3) If an external stop is connected

4) Recommended stick; SICK test rod 14 mm, part no. 2022599



If a step in the checklist is not passed, the machine is not in function for normal production until the step is passed and normal condition is restored.

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Appendix B Part 1

Appendix B Part 1 Initial start up procedure checklist - before media connection

Step	Test	Section	NOK,OK,N/A
1	All feet are on the floor (without clearance)	6.1.1	
2	Base is levelled.	6.1.7	
3	Robot arm has a firm and correct assembly to the pedestal. (extended) ¹⁾	6.1.2	
4	Side supports are assembled and tightened with the correct torque.	6.1.8	
5	Pallet sensors are correctly assembled to the side supports.	6.1.8	
6	All nuts on the feet are counter tightened.	6.1.1, 6.1.8	
Make sure the following items have a firm and correct assembly to each other			
7	The back fencing panel to the central unit.	6.1.4	
8	The side fencing panels to the back fencing panel.	6.1.9, 6.1.10	
9	The top beams to central unit and fencing.	6.1.9, 6.1.10	
10	Pallet guides to central unit	6.1.8	
11	Fencing pallet guides (JPN, AUS) to fencing. Also make sure the fencing guides are anchored.	6.1.10	
12	Front panel to central unit.	6.1.3	
13	Back cover of front panel to central unit.	6.1.3	
14	Signal towers to top of front panel.	6.1.3	
15	HMI and signal towers to central unit (Harting connectors).	6.1.6	
16	Conveyor to central unit.	6.1.6	
17	Conveyor to main cabinet (Harting connector).	6.1.6	
18	Light curtains to fencing and front panel. Make sure the curtains are unfolded.	6.1.5	
19	Front bottom cover.	6.1.7	
20	Interlayer module to central unit.	6.1.11	

Test continues on next page

Date and signature

21		Make sure/set power switch is in/to "OFF" position.	4.3	
22		Make sure the gripper sections are connected according to the pneumatic schematics.	see dwg. FLX10022861	
23		Make sure the lighting is > 500 lx acc. to ISO 8995-1	3.2	
24		Make sure/set the compressed air preparation station valve is in/to "OFF" position.	6.2.2	
	1)	Only applicable for robot with the extended pedestal		





It is mandatory to pass all steps in "Appendix B Part 1" checklist before connecting any media

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Appendix B Part 2




Appendix B Part 2 / Initial start up procedure checklist

Step	Test	Section	NOK,OK,N/A
1	Make sure the electrical power supply parameters are aligned with defined parameters on the junction box plate "1EB1".	6.1.1	
2	Make sure/ set the Main power switch is in/to "OFF" position	4.3	
3	Electrical power is connected to the junction box according Electrical schematics.	-	
	It is forbidden to be inside the No entry zone during machine "Power ON".		
4	Set the Main power switch in "ON" position	4.3	
5	Set Cut-off valve in "ON" position.	-	
6	Make sure there is a steady light from the shut down push-button.	8.3	
7	Light towers works. (test screen on HMI).	8.4.0.9	
8	Remove the trapped key from the socket on the front panel.	4.3	
	It is only allowed to go inside the machine when the trapped key is removed.		
9	Make sure/set the first pressure regulator is/to 6 bar	6.2.3	
10	Make sure/set the second pressure regulator is/to 4.5 bar	6.2.3	
11	Make sure there is no leakage in any pneumatic tubing.	-	
12	Make sure the compressed tank has no leakage.	-	
13	Make sure all suction cups are assembled to the gripper.	-	

Test continues on next page

Date and signature

Appendix B Part 2 / Initial start up procedure checklist

Step	Test	Section	NOK,OK,N/A
Practical testing during operation in "Auto" mode			
	It is forbidden to be in the No entry zone during "Power on" the machine		
14	Turn the main power switch to "ON" position.	4.3	
15	Turn the Cut-off valve to "ON" position.	4.3	
16	Open the Robot config and choose/create product pallet pattern.	8.9	
17	Load pattern and product from the Robot config software to the robot controller.	-	
18	Make sure the robot arm is in "Auto"/"Ext.Aut." mode.	-	1
19	Set the speed to 10% on the HMI panel.	-	
20	Make sure no one is in the No entry zone.	-	
21	Insert the trapped key and turn to "ON"		
22	Reset by pressing the "Reset" buttons- one on each side of the panel.	8.2	
	It is forbidden to be inside the No entry zone during "Reset" procedure.		
	If there are no reaction of any E-stop push-button-> stop the machine by the main switch. Block the machine by locking the main power switch. Inform the maintenance department.		
23	Press the "Start" buttons, one on each side of the panel to start palletize.	8.2	
24	Push each E-stop button in following step during palletizing to make sure it stops the robot and the roller conveyor.		
	24.1 Front panel E-stop	4.3	
	24.2 Conveyor E-stop	4.3	
	24.3 SmartPAD (KUKA)/TeachPendant (Fanuc) E-stop ²⁾	4.3	
	24.4 Interlayer module E-stop ¹⁾	4.3	
	24.5 External E-stop for upstream machine ³⁾	6.2.3	

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Appendix B Part 2 / Initial start up procedure checklist

Step	Test	Section	NOK,OK,N/A
25	By hand, cross the scanner, on the side not palletized (robot arm is on the opposite side) to disarm that side. Blue "Reset" lamp starts flashing. Check both sides.	-	
26	By hand, cross the scanner, on the palletized side (robot arm is on this side) to disarm that side. The machine stops. Check both sides.	-	
27	With a stick, cross the light curtain on the disarmed (not palletized) side. The robot stops. Check both sides. ⁴⁾	-	
28	Open the interlayer platform to stop the robot ¹⁾	10	
29	Remove the trapped key and make sure the machine cannot be started.	4.3	
30	Open the loading door on the Interlayer magazine to make sure it is not possible to start the machine. ¹⁾	10	

- 1) Not Applicable ("N/A") for machines without the interlayer module.
- 2) Depends on robot arm type
- 3) If an external stop is connected
- 4) Recommended stick; SICK test rod 14 mm, part no. 2022599



If a step in the checklist is not passed, the machine is not in function for normal production until the step is passed and normal condition is restored.

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Appendix C

see next page



EC DECLARATION OF CONFORMITY OF THE MACHINERY

We hereby declare the following machinery fulfills all the relevant provisions of the Machinery Directive **2006/42/EC** and EMC directive **2014/30/EU**:

RI20 Industrial Palletizer
FLX1002029 (FANUC robot arm)
FLX1002729 (KUKA robot arm)

The machine complies with **Annex I; Chapter 1**.

The **Manager Product Development** is responsible for the technical documentation. It will be provided on request by national authorities.

Applied harmonized standards: **ISO 12100:2010, ISO 13857:2008, ISO 14121-2:2012, ISO 13849-1:2008, IEC 60204-1:2006, EN 619:2010, ISO 10218-2:2011.**

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Alexander Schmitz (*signed by FlexLink CEO*)

Date

Göteborg

