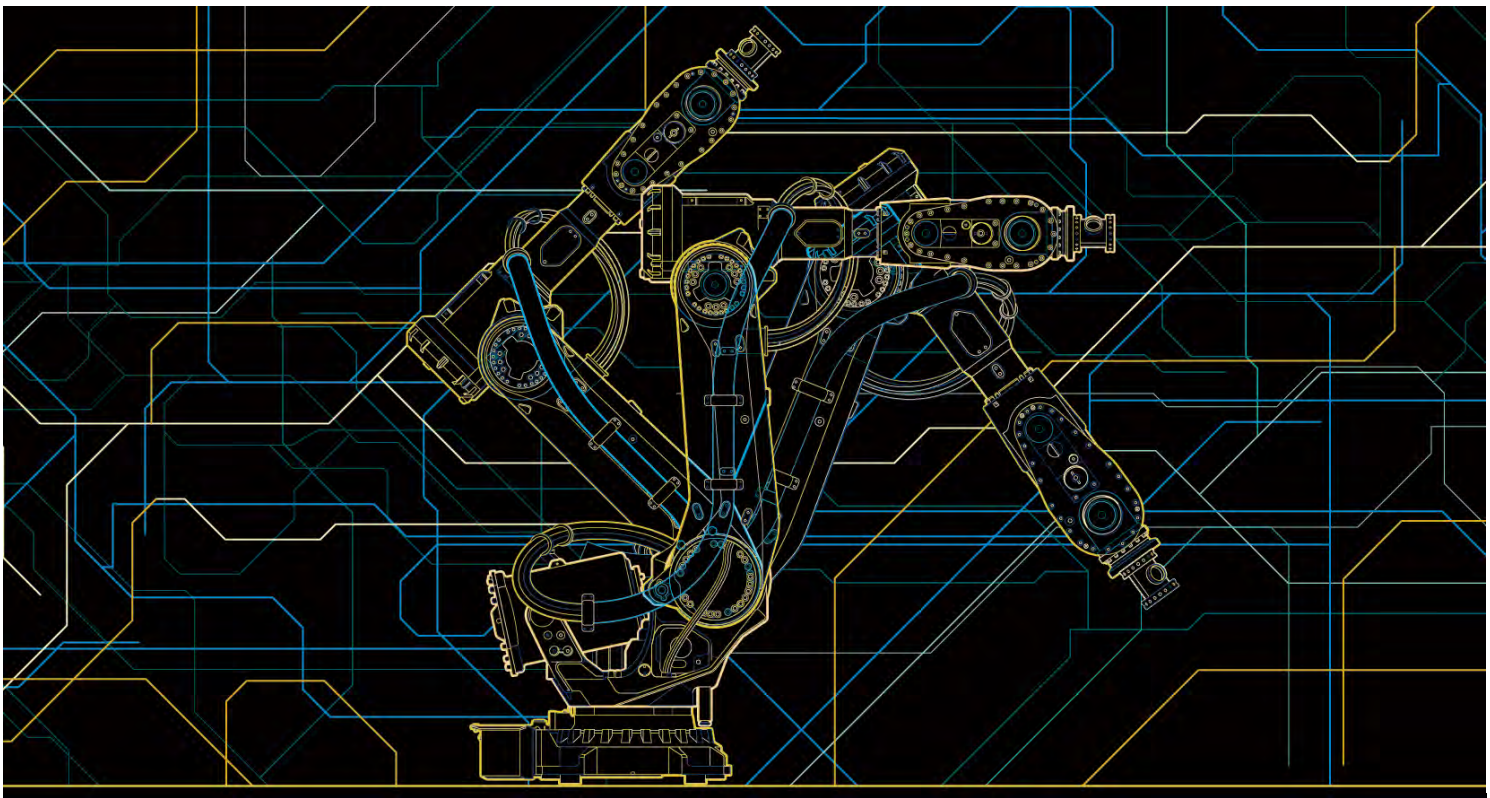

Product specification
FlexMT

Power and productivity
for a better world™

Trace back information:
Workspace R15-1 version a9
Checked in 2015-04-05
Skribenta version 4.1.349

Product specification
FlexMT

Document ID: 3HAC049820-001
Revision: B

ABB AB
Robotics Products
Se-721 68 Västerås
Sweden

Table of contents

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Overview of this specification

About this product specification

This product specification describes the performance of the FlexMT in terms of:

- The structure and dimensional prints
- The fulfilment of standards, safety and operating requirements
- The motion and reach
- The specification of variants and options available

Usage

Product specifications are used to find data and performance about the product, for example to decide which product to buy. How to handle the product is described in the product manual.

Users

This specification is intended for:

- Product managers and product personnel
- Sales and marketing personnel
- Order and customer service personnel

Trademarks

FlexMT is a trademark of ABB.

PickMT is a trademark of SVIA, Svensk Industriautomation AB.

References

Reference	Document ID
Product specification - Robot user documentation, IRC5 with RobotWare 5	*3HAC024534-001*
Product specification - IRB 2600	*3HAC035959-001*
Product specification - IRB 4600	*3HAC032885-001*
Product manual - FlexMT	
Product manual - PickMT	
Product manual - Safety Center	

Revisions

Revision	Description
-	New product specification
A	Minor corrections. The width of the infeed and outfeed conveyor is corrected.
B	Minor update/corrections

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1 Description

1.1 Structure

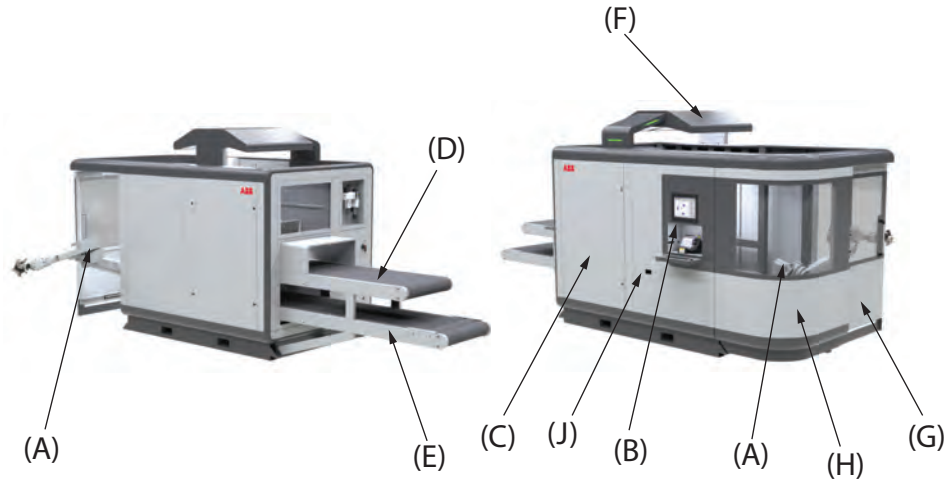
1.1.1 Introduction to the FlexMT

Introduction

The FlexMT is a standardized vision based solution for machine tending. It is a pre-engineered, pre-assembled, well tested and reliable automation solution to load and unload machine tools using vision guided robotics. The solution is prepared for the most common functionality needed for machine tending, for example, robot, conveyor belts, vision system, gripper, deburring tools, software, re-grip station, etc.

Typical usage can be machine tending of horizontal and vertical lathes, horizontal and vertical machining center, 5 axis machining centers, and grinding machines.

The FlexMT cell



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Pos	Description	Pos	Description
A	6-axis robot	F	Vision system and illumination
B	Operators panel	G	Retractable sliding door
C	IRC5 Panel mounted controller	H	Swing door
D	Infeeding conveyor	J	Statistical outlet
E	Outfeeding conveyor		

Available robot variants

The FlexMT solution can be delivered with the IRB 2600 or the IRB 4600.

Standard variants:

- FlexMT 20 is delivered with a IRB 2600-20/1.65
- FlexMT 60 is delivered with a IRB 4600-60/2.05

Continues on next page

1.1.1 Introduction to the FlexMT
Continued

Other robot variants may be possible, contact ABB Robotics.

See *Product specification - IRB 2600* and *Product specification - IRB 4600*.

IRC5 and RobotWare

The FlexMT solution includes the panel mounted IRC5 controller and robot control software, RobotWare, which supports every aspect of the robot system, such as motion control, development and execution of application programs, communication, etc. See *Product specification - Controller IRC5 with FlexPendant* and *Product specification - Controller software IRC5*.

Safety

The FlexMT safety standards are valid for the complete solution.

Additional functionality

For additional functionality, the FlexMT can be equipped with additional hardware options, see *FlexMT options on page 38*.

1.1.2 The FlexMT solution

Introduction

FlexMT is a designed and pre-built automation solution for loading and unloading of machine tools using vision guided robotics. It is prepared with the most common functionality and a well developed interface to machine tools.

Main features

The following main features are always included in the FlexMT solution:

- Industrial robot
- Integrated control cabinet with robot controller and electrical equipment
- PickMT camera system and associated illumination
- Operating panel
- Infeeding and outfeeding conveyors
- Drawer for statistical sampling

Options

FlexMT has a number of prepared options that are commonly used in machine tending applications.

- Two different deburring tools
- Marking unit
- Re-grip table
- Turn station
- Air cleaning box
- Extension panels

The FlexMT can be delivered with a flexible gripper solution consisting of either a two-finger gripper or a three-finger gripper, or a combination of both.

Available variants

Variant	Description
FlexMT 20	Standardized solution using IRB 2600-20/1.65. Payload 20 kg and reach 1.65 m.
FlexMT 60	Standardized solution using IRB 4600-60/2.05. Payload 60 kg and reach 2.05 m.

Technical data

	FlexMT 20	FlexMT 60
Length	5810 mm	5810 mm
Width (without corridor)	2000 mm	2000 mm
Height	2717 mm	2717 mm
Height (without camera and lightning)	2207 mm	2207 mm
FlexMT weight	2260 kg	2300 kg
Robot variant	IRB 2600	IRB 4600

Continues on next page

1.1.2 The FlexMT solution
Continued

	FlexMT 20	FlexMT 60
Robot payload	20 kg	60 kg
Robot reach	1.65 m	2.05 m
Certificates	UL/CSA Prep. for CE labelling 2B	
Mains voltage	220V - 600V	
Operating temperature	Max. 45° C (std) Max. 52° C (option)	
Infeeder conveyor width	795 mm	
Infeeder conveyor length	3000 mm	
Outfeeder conveyor width	795 mm	
Outfeeder conveyor length	4000 mm	
Maximum object/part height	270 mm	
Robot airborne noise level [i]	< 74 dB (A) [ii] Leq / 1m (according to Machinery directive 2006/42/EG).	

i The sound pressure level outside the working space
ii Increased airborne noise level possible due to customer specific deburring

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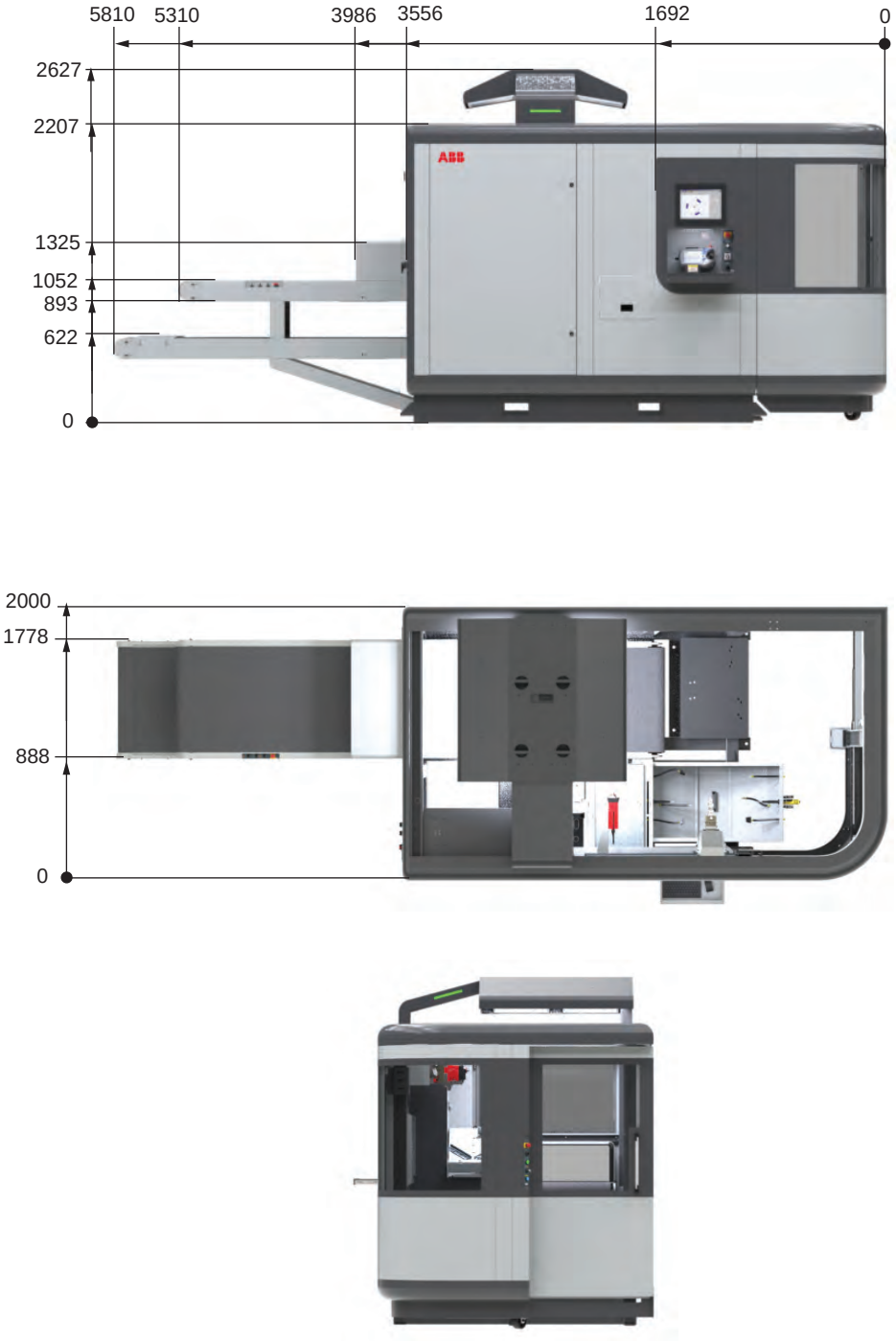
Dimensions FlexMT 20 and FlexMT 60



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1.2 Standards and safety

Standards and safety valid for the robot

The standards and safety that are valid for the robots are listed in their respective product specification.

Product specification - IRB 2600

Product specification - IRB 4600

Standards and safety valid for the FlexMT cell

The FlexMT system is designed in accordance with:

- SS-EN60204-1: Safety of machinery – Electrical equipment of machines - Part 1: General requirements
- SS-EN ISO 12100:2010: Safety of machinery - General principles for design - Risk assessment and risk reduction
- EN ISO 13849-1: Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design
- EN ISO 10218-2: Robots and robotic devices – Safety requirements for industrial robots – Part 2: Robot systems and integration

1.3 Installation

1.3.1 Introduction

The delivery

The FlexMT is delivered pre-assembled, including the robot and control cabinet, and ready to be directly installed and assembled on site. All hardware features and options are assembled and prepared in the FlexMT solution, including the electrical wiring.

Additional work for machine interfacing, programming and commissioning, etc is needed.

Related information

Detailed information regarding mechanical installation and commissioning of the robot and controller is found in the respective product manual.

1.3.2 Operating requirements

Protection standards

Protection type	Description	Class
Standard	FlexMT cell (no manipulator)	Cabinet: IP21 Illumination: IP21 SmartCamera: IP67 Sensors: IP66 ConnectorBoxes (splitter box): IP54 Motors: IP66 Screen: IP23 (front)
Standard	IRB 2600 and IRB 4600	IP67
Foundry Plus 2	IRB 2600 and IRB 4600	IP67

Explosive environments

The FlexMT must not be located or operated in an explosive environment.

Ambient temperature

Description	Standard/Option	Temperature
During operation	Standard	+ 5°C [i] (41°F) to + 45°C (113°F)
	Option	+ 5°C [i] (41°F) to + 52°C (127°F)
For short periods (not exceeding 24 hours)	Standard	up to + 70°C (158°F)

[i] At low environmental temperature < 10 °C is, as with any other machine, a warm-up phase recommended to be run with the robot. Otherwise there is a risk that the robot stops or run with lower performance due to temperature dependent oil- and grease viscosity.

Relative humidity

Description	Relative humidity
Complete unit during transportation and storage	Max. 95% at constant temperature
Complete unit during operation	Max. 95% at constant temperature

1.3.3 Installation requirements

Lifting and moving

The FlexMT is delivered bolted onto the wooden pallet. If FlexMT was shipped in a container, the vision tower is dismantled from the chassis.

The FlexMT weight is approximately 2500 kg and shall be lifted off the transporter with a forklift, marked on the wooden pallet.

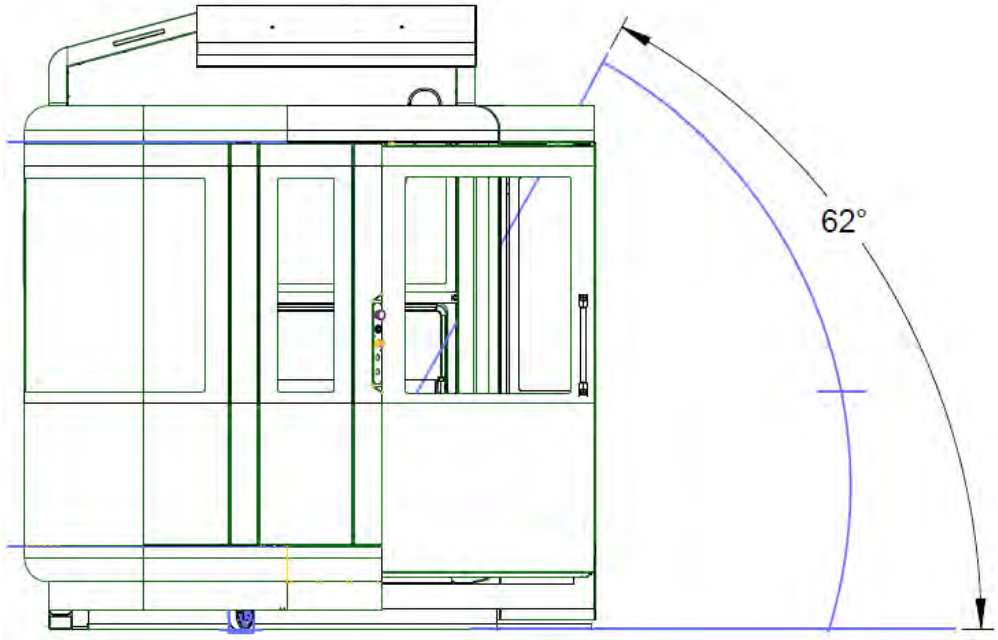
The FlexMT can be moved in the workshop either with a forklift, or with 3 handheld lifts, or on appropriate skates. Lifting equipment is not included in the delivery.

Attachment bolts, specification

The FlexMT shall be bolted with four bolts (around the robot). The minimum dimension of the bolts is M20 (3/4").

The fastening elements are not part of the delivery as they must be selected with reference to the floor material.

1.4 Motion



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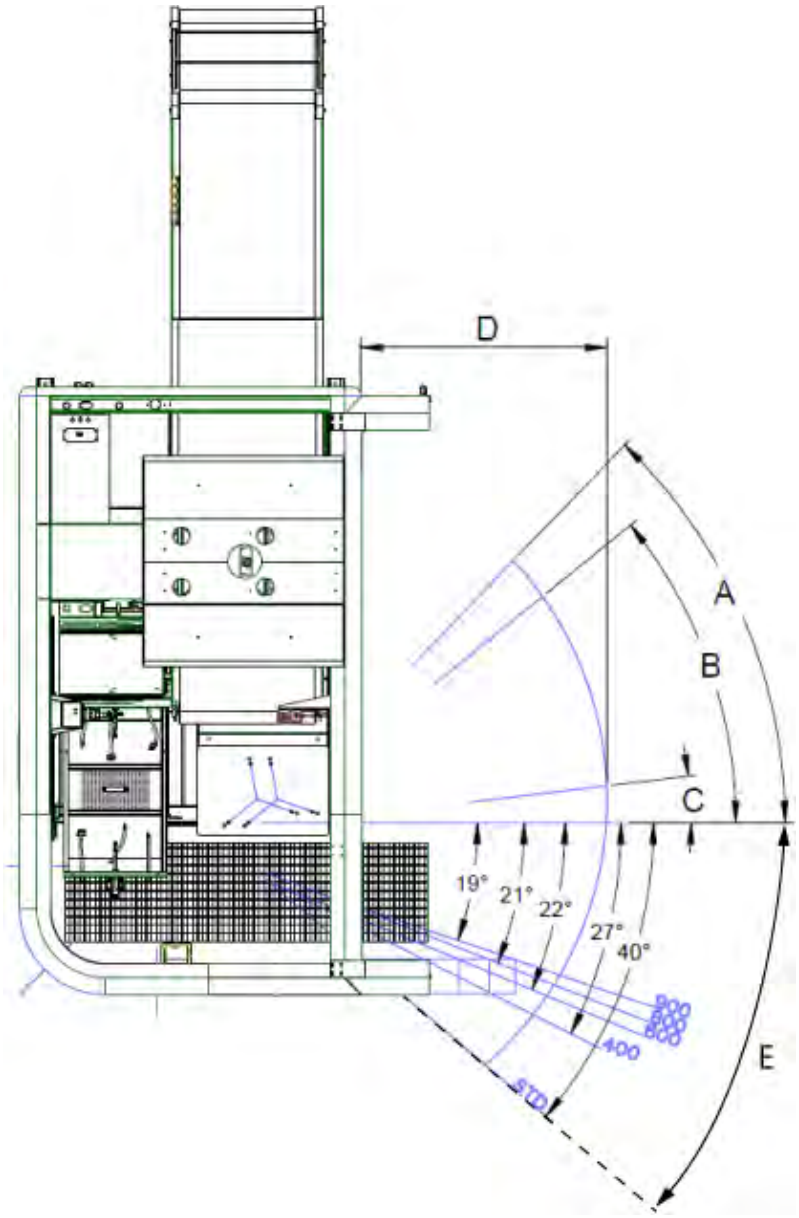
Flexible panel opening



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	FlexMT 20	FlexMT 60	Flexible panel opening
A-C	Opening angles depending on the size of the flexible panel, see *Flexible panels on page 31*		
A	46°	43°	1500 mm
B	40°	38°	1300 mm
C	7°	5°	850 mm
D	1240 mm	1440 mm	-
E	Opening angles depending on the size of the extension panel door, see *Extension panel - Door on page 41*		

1.5 FlexMT components

1.5.1 PickMT

Introduction

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

See Product manual - PickMT.

What is included

PickMT contains:

- SmartCamera and associated lens and cables
- Powerful illumination
- Vision software
- User interface on separate operator screen. For simple and intuitive user interactions, designed to minimize set-up times
- Calibration methods and tools

Features

- Specifically designed for robot guidance
- Pre-programmed for all FlexMT options and features
- Tightly integrated control and communication with the robot
- Collision detection
- Support user defined grippers
- Avoid parts that are out of reach
- Error handling
- Simplified teach-in for lathes
- High performance PickMT vision algorithms from Matrox Imaging
- Identification (and discrimination) of different objects is possible by using tools for image preparation, enhancement and various verification methods
- Proven and ready to use RAPID application code examples

Background and illumination

The FlexMT is equipped with a very powerful vision system, called PickMT, and associated illumination, to guide the robot. The associated illumination is used for creating a clear and visible contrast of the part against the background, or a contrast in the part by itself. Based on the contrast, PickMT identifies the location, position and orientation of a part and this information is sent to the robot. The robot can then pick up the part without need for any mechanical fixtures.

Continues on next page

The key in achieving a reliable vision guided robotic solution is to create a clear visible contrast either by the part itself or by the part against the background surface.

Different type of belt background colors are used for different type of parts. Most commonly used is a grey background belt as it can be used for many different parts. However, for some parts another background color can be used to optimize the vision function.

- Green colored background is recommended for parts with a shiny and glossy surface.
- White colored background is recommended for brass.

In the standard FlexMT offer, three different belt colors are available (gray, green and white) that give a possibility to achieve a good contrast between most of the parts and the background belt. If uncertain what belt color to use, tests are recommended to make an appropriate selection. Belts can be changed relative easy to fit the parts to be processed. However, it is not recommended to change the belt regularly between batches of different parts.

Specific vision considerations

The vision system capabilities to identify a part can be affected by surface variations of the parts within a production batch, for example, a cast iron part with rust is identified in a different way than the same part without rust. Therefore, it is important to have a stable quality of the raw material to secure reliable use of the vision system.

For parts where the orientation is identified by part cavities or holes, it may be needed to add side angle lightning to create a visible part feature that the vision system can recognize.

When searching for a specific feature or aspect on a part it might be required to add a second picture closer to the camera for better resolution and feature identification. Meaning one position and picture on the belt to find the part and guide the robot, and a second position and picture closer to the camera for detailed feature orientation.

A tall part will limit the use of the full width of the belt.

Due to perspective effects, the camera image in the vision system differs from center to side of the belt. To secure gripping of some specific tall parts more than one part position can be used in the PickMT system, for example, one position in the center of the belt and one on each side of belt. If the pattern which the vision system is searching for is on the same height above the belt, one position shall be enough.

PickMT is a dedicated system developed for robot guidance for part picking. It has no dedicated tools for quality check or measurement tasks. For this application other vision systems are available, for example, *Integrated Vision*.

1.5.2 Interface connections

Machine tool interface

FlexMT connects to the machine tool by means of a safety interface and a functional interface.

The safety interface handles the following aspects:

- bi-directional exchange of emergency stop between FlexMT and machine tool
- one-directional exchange of autostop from FlexMT to machine tool
- machine tool is expected to behave as emergency stop master in standard configuration (slave configuration is available on request)
- overall safety functions in FlexMT fulfill requirements for PLd according to EN ISO 13849-1
- overall safety function in machine tool must fulfill requirements for PLd according to EN ISO 13849-1
- two-channel potential-free connections
- optional external autostop interface
- the physical interface is constituted by terminal blocks in the control cabinet.

The functional interface can communicate by means of any available physical interface on the robot, or using interface converters (AnyBus). The FlexMT standard configuration includes:

- digital 24V I/O interface with 16 IN and 16 OUT signals to be connected to the machine tool
- digital I/O is working with the machine tools 24V
- other physical interfaces are available by using optional IRC5 fieldbus or interface options (to be ordered with robot)

Network connections

The FlexMT product has no generally available connection to a factory network.

Network connections to the robot controller can be established by means of the built-in service port.

The WAN port of the robot controller is exclusively used for communication with the vision system. For security reasons, it is not advisable to connect this network to any external network.

1.5.3 Controller cabinet

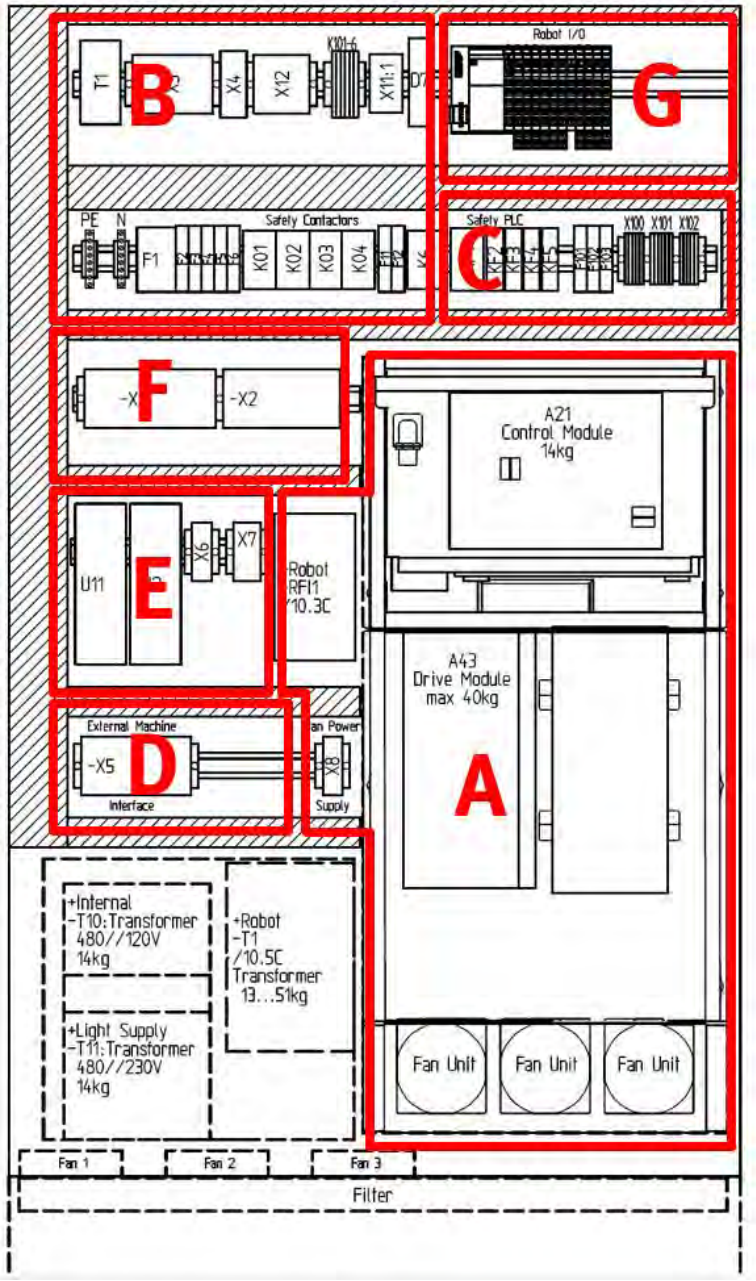
Content in the controller cabinet

The FlexMT controller cabinet contains all necessary equipment for power supply and control of the FlexMT and its options. FlexMT options that need to be moved in and out are connected by service-friendly connector boxes.

The main parts of the controller cabinet are shown below.

Ventilation is handled by fans situated in the base of the control cabinet.

Illustration



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1.5.3 Controller cabinet
Continued

Pos	Description	Pos	Description
A	Panel mounted controller with control module, drive module, power supply, fans	E	Drive units for in/out conveyors
B	Power supply and distribution	F	Internal terminal blocks
C	Safety related control elements	G	I/O units (internal and external)
D	Machine tool interface connections		

1.5.4 Lightning

Capabilities and limitations

The illumination has been designed to minimize the effect of surrounding lightning conditions.

Avoid strong direct lightning or sun into the cameras imaging area.

Lightning conditions should be the same during teach-in of the position of the parts as during normal operation. The identification of parts may be influenced if the FlexMT operates during night in a dimmed/dark workshop and the teach-in of the position of the part was done in normal daylight conditions. Operating the machine cell during these conditions might require a second teach-in for the same part, due to other background light conditions.

Fluorescent lamps

Reliable illumination of the vision systems field of view is given by a number of powerful high-frequency fluorescent lamps.

1.5.5 Parts and objects considerations

Introduction

FlexMT is a versatile tool for machine tending of a large variety of parts. Most parts can be handled, provided that they can be reliably transported on the conveyors, gripped by the gripper, and mechanically fit into the FlexMT and the machine tool.

Prerequisites

The following considerations should be kept in mind.

Part dimensions:

- The maximum height of parts on the infeeder conveyor should be below 285 mm.
- The maximum height of parts on the outfeeder conveyor should be below 270 mm.
- The total weight of the parts on the infeeder and outfeeder should be kept below 500 kg, respectively.
- Part diameter: see *Grippers on page 27*.

Part detection and localization:

- Part localization is simplified by clear contour lines and/or structures on the part surface.
- To use the full potential of gripper collision avoidance, a good contrast is needed between part and belt. Consult your ABB sales contact for suitable choice of belt color.

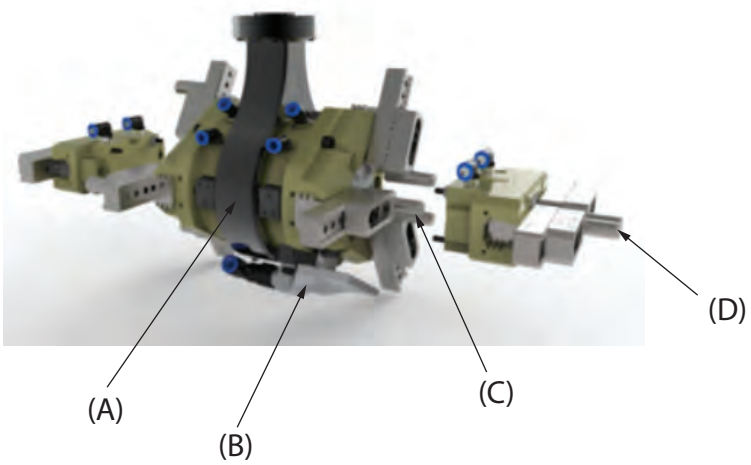
Other considerations:

- For nearly flat parts, practically the whole conveyor width of 795 mm can be used. For parts with increasing height, the width of the inspection view of the conveyor must be reduced, due to the parallax effects in the vision system. At the maximum height of parts (285 mm), then the usable infeeder width is approximately 640 mm.
- The full width of the outfeeder conveyor can be used independent on the height of the parts.
- The FlexMT is designed for manual loading/unloading of parts to/from conveyor system.

1.5.6 Grippers

Standard gripper solution

There are different sizes of grippers for different FlexMT variants. It is possible to combine two or three adjustable gripper fingers as needed.



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Pos	Description
A	Gripper holder
B	Air cleaning nozzles
C	3-finger gripper
D	2-finger gripper

Note

Gripper status sensors are not included. Electrically prepared for sensors (splitter box on upper arm).

Grippers for FlexMT 20

FlexMT 20 can be equipped with 2-finger gripper (PGN+ 100/1) or 3-finger gripper (PZN+ 100/1).

The following values are standard gripping ranges with standard fingers (data is given for gripper finger stroke with safety marginal of 3 mm).

PGN-100/1	
Minimum diameter (gripping on outer surface):	5 mm
Maximum diameter (gripping on outer surface):	174 mm
Minimum diameter (gripping on inner surface):	30 mm
Maximum diameter (gripping on inner surface):	197 mm

PZN-100/1	
Minimum diameter (gripping on outer surface):	4 mm

Continues on next page

1.5.6 Grippers
Continued

PZN-100/1	
Maximum diameter (gripping on outer surface):	182 mm
Minimum diameter (gripping on inner surface):	26 mm
Maximum diameter (gripping on inner surface):	206 mm

Grippers for FlexMT 60

FlexMT 60 can be equipped with 2-finger gripper (PGN+ 160/1) or 3-finger gripper (PZN+ 160/1).

The following values are standard gripping ranges with standard fingers (data is given for gripper finger stroke with safety marginal of 3 mm).

PGN-160/1	
Minimum diameter (gripping on outer surface):	9 mm
Maximum diameter (gripping on outer surface):	232 mm
Minimum diameter (gripping on inner surface):	47 mm
Maximum diameter (gripping on inner surface):	271 mm

PZN-160/1	
Minimum diameter (gripping on outer surface):	7 mm
Maximum diameter (gripping on outer surface):	245 mm
Minimum diameter (gripping on inner surface):	47 mm
Maximum diameter (gripping on inner surface):	281 mm

Maximum allowed load

For robot load diagrams, see the product specification for the respective robot. For approximate data you can use the following tables. For detailed calculations, use the exact Schunk data.

FlexMT 20	PZN+ 100/1	PGN+ 100/1
Gripper	2 x 3-finger	2 x 2-finger
Center of gravity (CoG) (approx.)	[0,0,115]	[0,0,115]
Weight	5.3 kg	4.0 kg
TCP (approx.)	[0;+/- 122; 125]	[0;+/- 128; 125]
Gripping force	1500 N	600 N
Max torque	Mz=70 N	Mz=70 N

FlexMT 60	PZN+ 160/1	PGN+ 160/1
Gripper	2 x 3-finger	2 x 2-finger
Center of gravity (CoG) (approx.)	[0,0,190]	[0,0,190]
Weight	20 kg	13.7 kg
TCP (approx.)	[0;+/- 172; 200]	[0;+/- 180; 200]
Gripping force	5000 N	1500 N

Continues on next page

FlexMT 60	PZN+ 160/1	PGN+ 160/1
Max torque	Mz=130 N	Mz=130 N

1.5.7 Statistical outlet

Introduction

Statistical outlet for process control of parts. Parts up to 320 mm x 700 mm x 300 mm (WxLxH) can automatically fed into the outlet for statistical process control.

Possibility to use for sampling and manual quality checks of parts during production. User can set sampling interval on the control panel. The signal tower gives the operator a signal that sample part is in the drawer. Sample parts can also be manually requested.

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Position	Description
A	Statistical outlet (drawer)

1.5.8 Flexible panels

Introduction

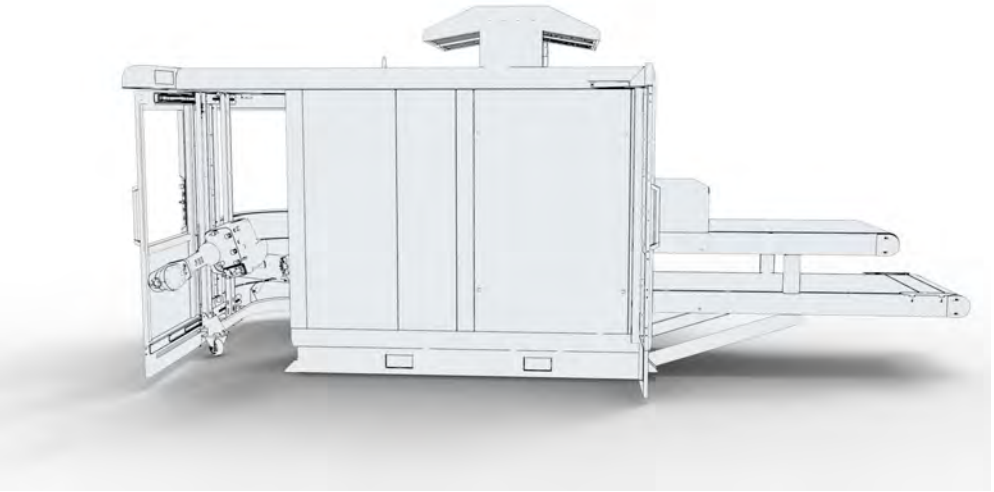
If a larger opening to the machine tool is required, then it is possible to remove the panels on the back of the FlexMT. Note that the removal of the panels must be analyzed from a safety perspective, and appropriate measures must be taken.

The FlexMT is delivered with complete set of panels. Two panels on the back are possible to remove.

Panel sizes

By removing one of the two panels, the opening can be increased.

Standard opening: 850 mm



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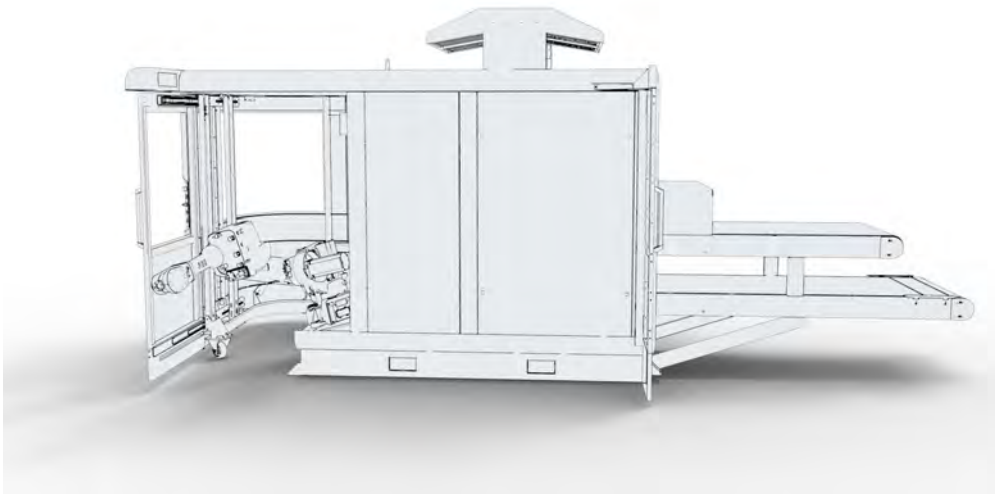
1.5.8 Flexible panels
Continued

Opening with the narrow panel removed: 1300 mm



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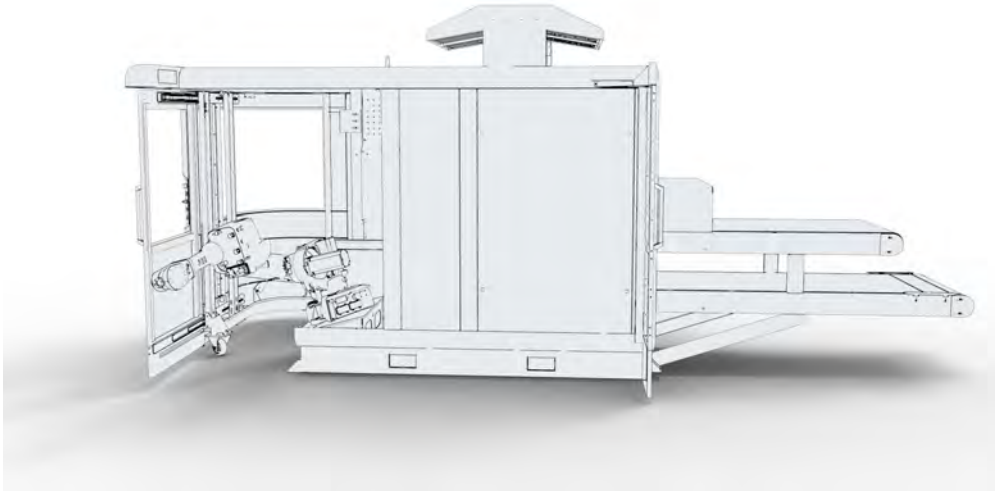
Opening with the wide panel removed: 1500 mm



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1.6 Maintenance and troubleshooting

General

The FlexMT requires only minimum maintenance during operation. The robot has been designed to make it as easy to service as possible:

- Maintenance-free AC motor is used.
- Oil is used for the gear boxes.
- The cabling is routed for longevity, and in the unlikely event of a failure, its modular design makes it easy to change.

Maintenance

The maintenance intervals depend on the use of the FlexMT. For detailed information on maintenance procedures, see the maintenance instructions in the product manuals.

FlexMT - Manual

Product manual - IRB 2600

Product manual - IRB 4600

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2 Specification of variants and options

2.1 Introduction

Information

The different variants and options for the FlexMT are described below. The same numbers are used here as in the specification form.

Related information

For the controller see *Product specification - Controller IRC5 with FlexPendant*.

For the software options see *Product specification - Controller software IRC5*.

For robot IRB 2600 options see *Product specification - IRB 2600*.

For robot IRB 4600 options see *Product specification - IRB 4600*.

2.2 Robot - FlexMT

Standard robot specification - FlexMT 20 / 60

The following options are available, for more information regarding robot options see *Product specification - IRB 2600* and *Product specification - IRB 4600*.

Manipulator

Option	Description	Note
435-95	IRB 2600-20/1.65	Valid variant for FlexMT 20
435-84	IRB 4600-60/2.05	Valid variant for FlexMT 60
209-202	ABB Graphite White	Only this color is available
287-4	Standard	Protection class IP67
334-1	ABB	Signs on manipulator
803-1	Parallel & Air	Media & Communication for customer connections
431-1	Upper arm	Connector kit
239-1	On foot	Connector kit

Basic

Option	Description	Note
700-5	Panel mounted modules	Controller variant
769-X [i] [ii]	Mains voltage	For selectable options see *Product specification - IRB 2600* and *Product specification - IRB 4600*
438-2	Standard + 12 Months	Valid warranty

i Select the same for the FlexMT structure.

ii If Mains voltage 3x400V - 3x480V is available for FlexMT 60, then option 881-2 (PMC without transformer) can be added.

Floor cable

Option	Description	Note
210-2	Manipulator cable	Length: 7 m

Control module

Option	Description	Note
701-1	FlexPendant	FlexPendant with 10 m cable
709-1	Single ch	DeviceNet™ m/s
731-1	Safety internal conn.	Safety interface
733-3	External panel	Operators panel
734-5	Operators panel cable	Panel cable with 7m cable
735-4	Add. contacts, 2 modes	Operating mode selector
970-1	RS232 Serial channel	If option FlexMT 117-1 (Marking unit) is selected

Continues on next page

Drive module

Option	Description	Note
810-1	SafeMove	Position supervision computer

RobotWare

Option	Description	Note
608-1	World Zones	
616-1	PC Interface	
623-1	Multitasking	

Documentation

Option	Description	Note
808-1	Documentation	Documentation on DVD

2.3 FlexMT options

General

Option	Description	Note
FlexMT_100-1	FlexMT 20	With IRB 2600-20/1.65
FlexMT_100-2	FlexMT 60	With IRB 4600-60/2.05

Standard gripping

Gripper status sensors not included. Electrically prepared for sensors (splitter box on upper arm).

For gripper information *Grippers on page 27*.

xx1400000504

Option	Description	Note
FlexMT_110-1	Holder FlexMT 20	Requires: FlexMT 20 [FlexMT_100-2] For up to two grippers including air cleaning nozzle. Five pneumatic valves (Festo) included on upper arm. Four reserved for gripper, one reserved for air cleaning nozzle, one spare position on valve manifold (eletrically connected)
FlexMT_110-2	Holder FlexMT 60	Requires: FlexMT 60 [FlexMT_100-1] For up to two grippers including air cleaning nozzle. Five pneumatic valves (Festo) included on upper arm. Four reserved for gripper, one reserved for air cleaning nozzle, one spare position on valve manifold (eletrically connected).
FlexMT_111-1	Gripper F2 FlexMT 20	2-finger gripper with adjustable parallel fingers. Schunk PGN+ 100/1 Requires: FlexMT 20 [FlexMT_100-2] and Holder FlexMT 20 [FlexMT_110-2]
FlexMT_111-2	Gripper F2 FlexMT 60	2-finger gripper with adjustable parallell fingers. Schunk PGN+ 160/1 Requires: FlexMT 60 [FlexMT_110-1] and Holder FlexMT 60 [FlexMT_110-1]

Continues on next page

Option	Description	Note
FlexMT_112-1	Gripper F3 FlexMT 20	3-finger gripper with adjustable fingers. Schunk PZN+ 100/1 Requires: FlexMT 20 [FlexMT_100-2] and Holder FlexMT 20 [FlexMT_110-2]
FlexMT_112-2	Gripper F3 FlexMT 60	3-finger gripper with adjustable fingers. Schunk PZN+ 160/1 Requires: FlexMT 60 [FlexMT_100-1] and Holder FlexMT 60 [FlexMT_110-1]

Air cleaning box

Prepared to assemble deburring tools, see *Deburring tools on page 39*.

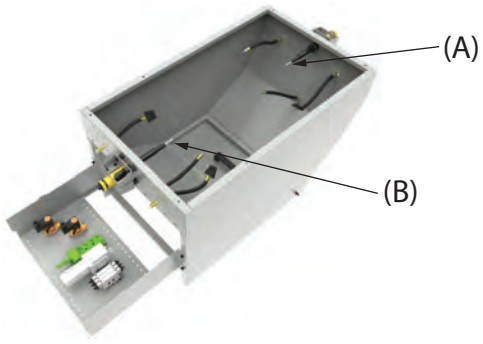
Option	Description	Note
FlexMT_113-1	Cleaning box	With 6 air nozzles

Deburring tools

There are two pneumatic deburring tools available, rotating and reciprocating. Maximum two deburring tools can be used. The tools can be of the same type or different.

All deburring tool options require the option *1502-1 Cleaning box*.

Option	Description	Note
FlexMT_114-1	(1-2) Choose quantity	Rotating deburring Pneumatic rotating 3000 rpm tool (starter kit tools 2 pcs included)
FlexMT_114-2	(1-2) Choose quantity	Reciprocating deburring Pneumatic reciprocating file 105 Hz tool (starter kit tools 2 pcs included)



xx1400000503

Pos	Description
A	Reciprocating file
B	Rotating file

Deburring tools are assembled into the air cleaning box.

Continues on next page

2.3 FlexMT options
Continued

Re-grip station

Re-grip station when calibration of grip position needed.

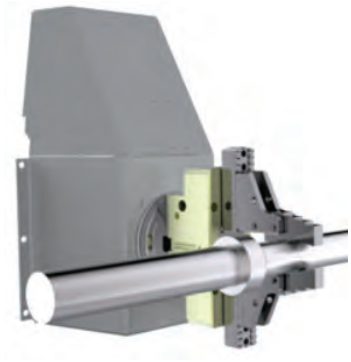
Option	Description	Note
FlexMT_115-1	Re-grip station	Re-grip station (starter kit fixtures for billets and axles are included). If necessary, the re-grip station can be modified to be a flat horizontal surface for part gripping.

xx1400000505

Pos	Description
A	Length calibration of axles
B	Calibration of billets

Turn station

Turning of axles and billets, allow 180 degree rotation.



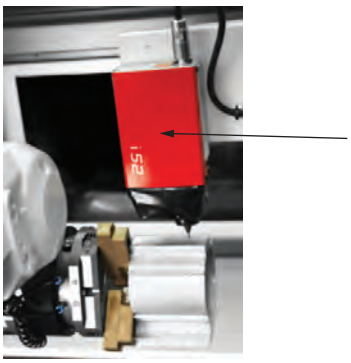
xx1400000506

Option	Description	Note
FlexMT_116-1	Turn station	Turn station with *Schunk PGN+ 160/1* parallel gripper with adjustable fingers. Max payload 5 kg. Depending on the actual mass moment of inertia there may be speed restrictions.

Continues on next page

Marking unit

The marking unit contains a dot pen, used for marking of text, digits, logo, data matrix code, etc. The unit is pre-configured for standard text marking. More advanced features can be programmed using control software on a PC. Requires the option *970-1 RS232 Serial channel*.

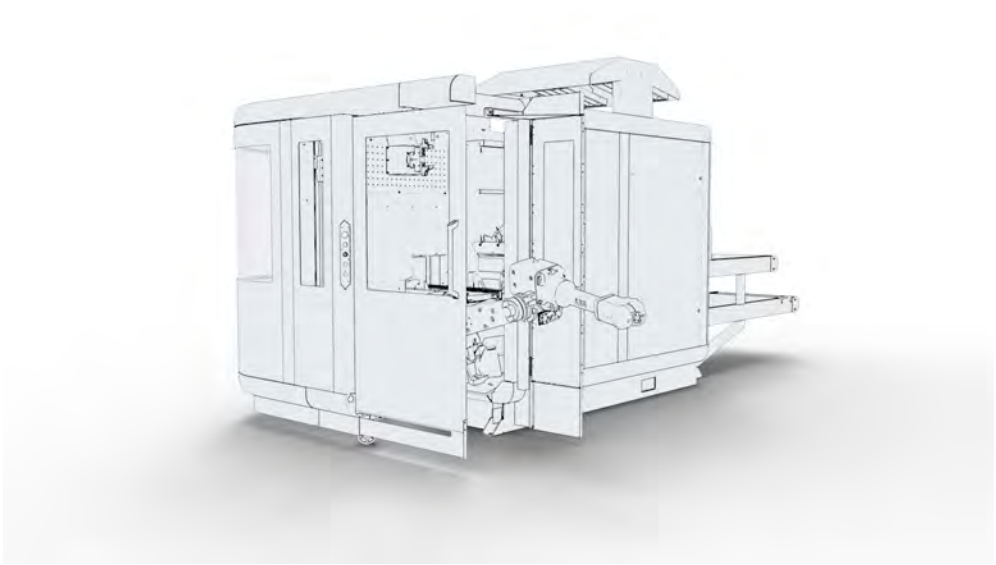


xx1400000502

Option	Description	Note
FlexMT_117-1	Dot pen	Sic e10 i53 dot pen marking head 50 x 20 mm write area

Extension panel - Door

Allow for space and access between FlexMT and machine tool.



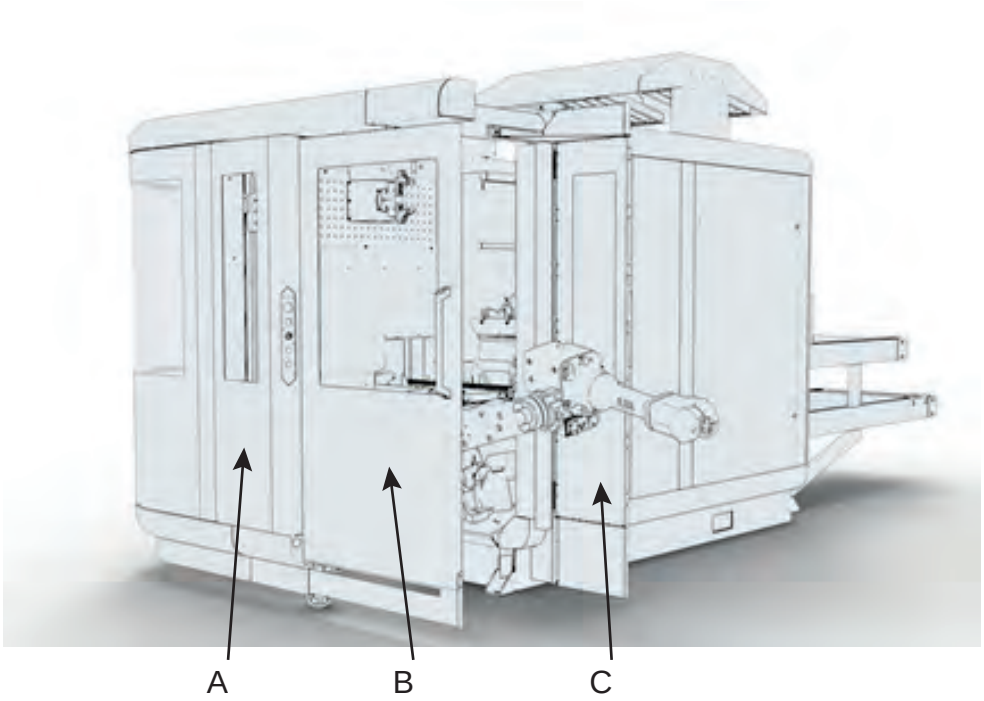
xx1400001246

Option	Description	Note
FlexMT_118-1	400 mm	Curved/irregular machine fronts need custom built panels
FlexMT_118-2	600 mm	Curved/irregular machine fronts need custom built panels
FlexMT_118-3	800 mm	Curved/irregular machine fronts need custom built panels

Continues on next page

Option	Description	Note
FlexMT_118-4	900 mm	Curved/irregular machine fronts need custom built panels

The extension panel door is available in different sizes, from 400 mm to 900 mm. The extension panel can either be placed to the left or to the right of the sliding door.



xx1400001079

A	Extension panel door
B	Sliding door
C	Extension panel back

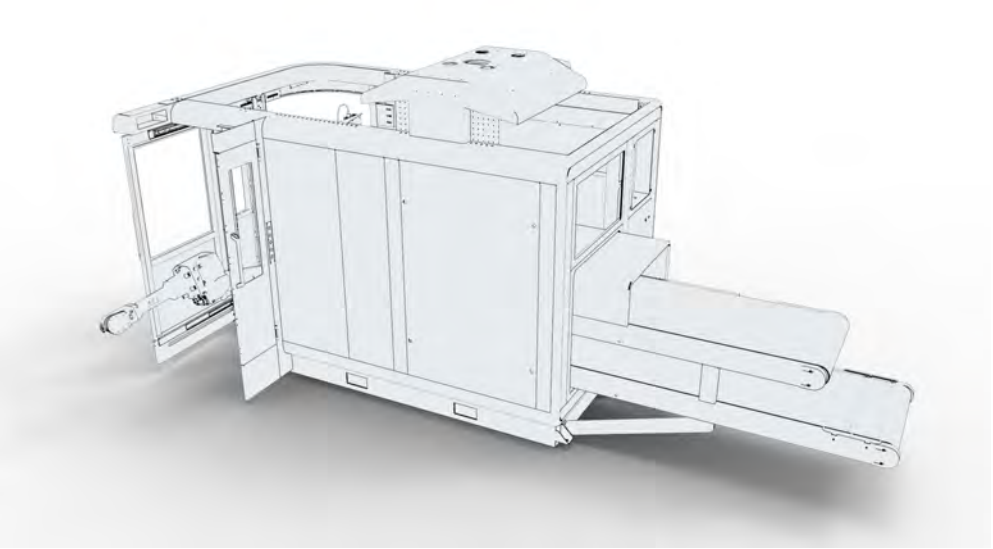
Note

The robot's reach into the machine is affected.

Continues on next page

Extension panel - Back

Allow for space and access between FlexMT and machine tool.



xx1400001245

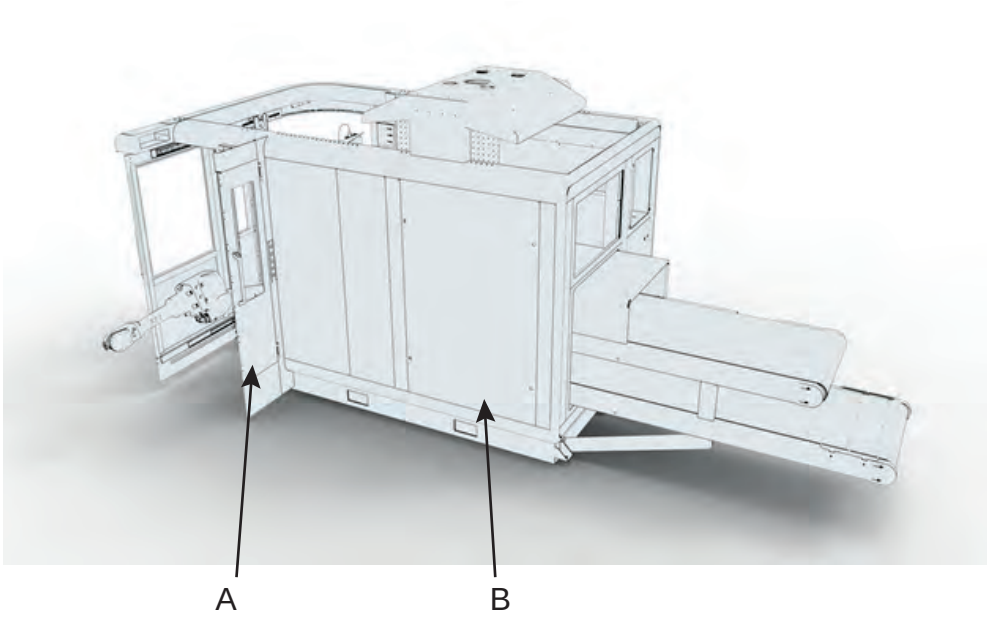
Option	Description	Note
FlexMT_119-1	400 mm	Curved/irregular machine fronts need custom built panels
FlexMT_119-2	600 mm	Curved/irregular machine fronts need custom built panels
FlexMT_119-3	800 mm	Curved/irregular machine fronts need custom built panels
FlexMT_119-4	900 mm	Curved/irregular machine fronts need custom built panels

The extension panel back is available in different sizes, from 400 mm to 900 mm. The extension panel can be positioned anywhere from the front position (shown in picture below) to the back position (marked by an arrow). The extension panel is not assembled on delivery; it is the responsibility of the customer to assemble the extension panel at the desired position.

The extension panel back is a swing door that can be opened to enter the cell. The extension panel back is intended as service door, and completely integrated in the

Continues on next page

safety system. Being a service door, no entry control nor robot restart is provided for this door.



xx1400001080

A	Extension panel back. Front position.
B	Extension panel back. Back position.

Note

The robot's reach into the machine is affected.

Camera belt color

Grey belt is the most commonly used color. Choose different to get contrast between parts and belt color for better camera recognition.

Option	Description	Note
FlexMT_120-1	Grey	
FlexMT_120-2	White	
FlexMT_120-3	Green	

Underwriters Laboratory

Option	Description	Note
FlexMT_429-1	UL/CSA	Electrical cabinet

EC Machinery Directive

Option	Description	Note
FlexMT_129-1	Prep. for CE labelling	

Continues on next page

Mains voltage

Option	Description	Note
FlexMT_769-1	3x220 V	
FlexMT_769-2	3x400 V	
FlexMT_769-3	3x440 V	
FlexMT_769-X	3x460 V	
FlexMT_769-4	3x480 V	
FlexMT_769-7	3x200 V	

Electrical cabinet cooling conditions

Room temperature.

Option	Description	Note
FlexMT_708-1	Max. 45 C	Standard design
FlexMT_708-2	Max. 52 C	Enforced cooling

User interface and keyboard language

The language of the user interface and the keyboard is English (not localized). The PickMT user interface is translated into major European languages. It is also possible to translate into other languages than those that are supported by ABB. The user manuals are available in English.

Option	Description
FlexMT_125-1	English
FlexMT_125-2	German
FlexMT_125-3	Spanish
FlexMT_125-4	Italian
FlexMT_125-5	Chinese
FlexMT_125-6	Portuguese
FlexMT_125-7	Dutch
FlexMT_125-8	Swedish
FlexMT_125-9	Danish
FlexMT_125-10	Czech
FlexMT_125-11	Finnish
FlexMT_125-12	Korean
FlexMT_125-13	Japanese
FlexMT_125-14	Russian
FlexMT_125-15	Polish
FlexMT_125-16	Turkish
FlexMT_125-17	Hungarian
FlexMT_125-18	Romanian
FlexMT_125-19	French

Continues on next page

2.3 FlexMT options
Continued

Option	Description
FlexMT_125-20	Other

2.4 Warranty FlexMT, excluding robot

Warranty

Option	Type	Description
438-1	Standard warranty	Standard warranty is 12 months from *Customer Delivery Date* or latest 18 months after *Factory Shipment Date*, whichever occurs first. Warranty terms and conditions apply.
438-2	Standard warranty + 12 months	Standard warranty extended with 12 months from end date of the standard warranty. Warranty terms and conditions apply. Contact Customer Service in case of other requirements.
438-4	Standard warranty + 18 months	Standard warranty extended with 18 months from end date of the standard warranty. Warranty terms and conditions apply. Contact Customer Service in case of other requirements.
438-5	Standard warranty + 24 months	Standard warranty extended with 24 months from end date of the standard warranty. Warranty terms and conditions apply. Contact Customer Service in case of other requirements.
438-6	Standard warranty + 6 months	Standard warranty extended with 6 months from end date of the standard warranty. Warranty terms and conditions apply.
438-7	Standard warranty + 30 months	Standard warranty extended with 30 months from end date of the standard warranty. Warranty terms and conditions apply.
438-8	Stock warranty	Maximum 6 months postponed start of standard warranty, starting from factory shipment date. Note that no claims will be accepted for warranties that occurred before the end of stock warranty. Standard warranty commences automatically after 6 months from *Factory Shipment Date* or from activation date of standard warranty in WebConfig.  **Note** Special conditions are applicable, see *Robotics Warranty Directives*.

 **Note**

For robot warranty, see Product Specification for each robot.

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Contact us

ABB AB
Discrete Automation and Motion
Robotics
S-721 68 VÄSTERÅS, Sweden
Telephone +46 (0) 21 344 400

ABB AS, Robotics
Discrete Automation and Motion
Nordlysvegen 7, N-4340 BRYNE, Norway
Box 265, N-4349 BRYNE, Norway
Telephone: +47 51489000

ABB Engineering (Shanghai) Ltd.
5 Lane 369, ChuangYe Road
KangQiao Town, PuDong District
SHANGHAI 201319, China
Telephone: +86 21 6105 6666

www.abb.com/robotics

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