



Phil Crowther, Product Management, April 2015

YuMi[®] – IRB 14000

Overview

YuMi: IRB 14000

Agenda

- Differentiated value proposition
- Overview and vision
- Main features
- Payload
- Working range
- Performance and accuracy
- Main dimensions
- Easy integration
- Outline manipulator
- Table mounting
- IP protection
- ESD protection
- Controller
- Customer benefits
- Key applications and segments
- Summary

Overview

Differentiated value proposition



No barriers, no cages, no zones, YuMi is the first truly collaborative robot solution.

Overview and vision

- The target is to make automation technically and economically feasible for small part assembly.
- The solution shall also be suitable for pre-processing, assembly and packaging of all 3C product and other small devices, e.g. digital cameras, toys, watches, ABB low voltage products.
- The automated cells will co-exist with manual assembly cells and interaction between manual and automated cells must be smooth and safe.
- The robot automation should in principle perform the same work as a skilled assembly worker.
- The robot automation shall be easy to adapt for new conditions and tasks.

Overview and vision

Demand from all industries

Target Industry (Consumer)	Market Demand	Market Demand (continued)
<ul style="list-style-type: none">▪ Small parts assembly▪ 3C▪ Consumer products▪ Toy Industry▪ Watch industry	<ul style="list-style-type: none">▪ Cycle time performance▪ Safe by design▪ ESD compliance▪ Work close with humans▪ Easy to depoly/program	<ul style="list-style-type: none">▪ IP 30▪ Accuracy and cost efficiency▪ Size of human torso▪ Portable

Most common feedback

- Fencing and safety are a big part of the cell cost
- Must be able to assemble same parts in fast and accurate manner whilst been safe
- Need to be able to deploy and program

Overview and vision

Target growth markets



Small Parts Assembly

- Collaborative Assembly
- Camera-based inspection and assembly
- Accurate and fast assembly
- Testing and packaging

Consumer Products

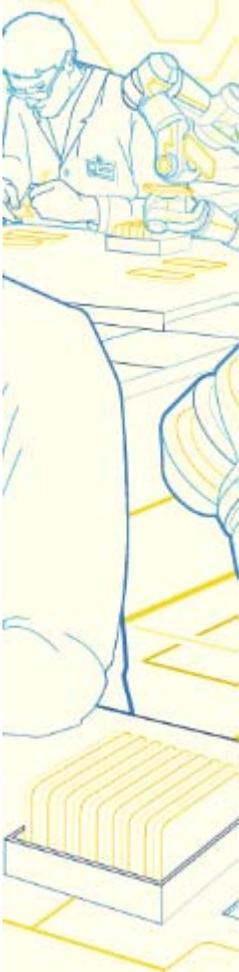
- Collaborative Assembly (Plastic parts etc.)
- Packaging of small goods
- Multifunction hand for add components

Toy Industry

- Collaborative Assembly (toys)
- Use of feeding and vision options

Overview and vision

Filling a gap



Small IRBs

- Our market in the Small Parts Assembly, has reached great potentials
 - Good market reputation
 - Good performance in terms of accuracy and robustness
 - One major drawback – working close to humans and collaboration
- Aim of IRB 14000 is to fill this gap

IRB 14000

- Goal is to provide a solution to small parts assembly while providing a cost competitive offering like
 - Inherent safety
 - Flexible feeding parts management
 - Vision-Guided Assembly
 - Best in class accuracy
 - Speed effective assembly

Overview and vision

Leading the competition



- More compact than the competitors
- More precise
- Equipped with an enclosed controller
- Universal parts feeding system
- High-end camera part location
- State of the art motion control
- First safe robot by design

Overview

Current portfolio

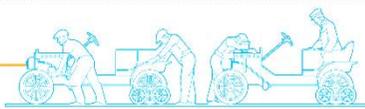


**Strong robot offering from starting
at the IRB 120 to the IRB 7600**

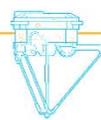
Overview and vision

New era in our portfolio

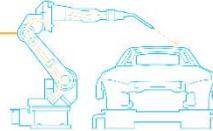
Before robots



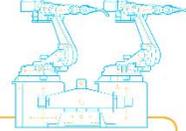
After robots



Improved safety
Increased flexibility
Reduced waste

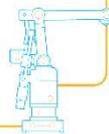


Improved product quality
Increases productivity
Reduced operating costs



Improved efficiency
Increased product consistency

In 1974, the IRB 6 was the start of it all:
The world's first microprocessor controlled,
electrically-driven industrial robot became
commercially available.



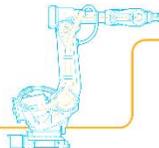
Becoming more useful

Over time, we have developed robots for more and more industries and purposes,
bringing the benefits of robots to anyone who needs them.



Small robots
For the delicate, fast and flexible tasks

Palletizing robots
For when you have to load a pallet as
quickly and accurately as possible



Large heavy duty robots
For those applications that require
the ultimate in strength and reach

Welding robots
For reaching II too hard to reach spaces
and delivering a quality weld every time.



IRB 360 Flexpicker®
For high speed picking and
packing

Now - becoming collaborative

YuMi® is the world's first truly collaborative robot, and represents
the ultimate in what collaborative robots stand for.

• Inherent safety makes it possible to operate without safety fencing
• Human proportional, for natural co-working with people and the
ability to fit into existing human sized spaces.
• Meant for small parts assembly



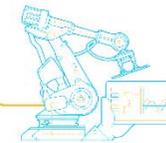
Becoming smarter

With advances in hardware, we have delivered technology
that can sense its surroundings and work more efficiently.

Integrated Vision
The gift of sight is just as good for a robot

Integrated Force Control
Know where the workspace is and how hard to push for the
perfect finish

Superior motion control
Getting from point A to point B efficiently and quickly makes all
the difference



RobotWare
The underlying brains of the robot for easy
optimization and high flexibility

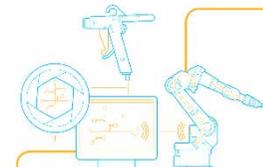
Becoming easier

Making smart robots for many uses is only half the story,
the rest comes down to making implementation as easy as
possible.

Function packages
Standardized components and design make for quick startup
and reduced costs.

RobotStudio®
Powerful PC based programming makes it easier than ever to
program complex robotic operations.

PowerPacs
Plug-ins for RobotStudio that make programming for specific
industries a matter of plug and play.

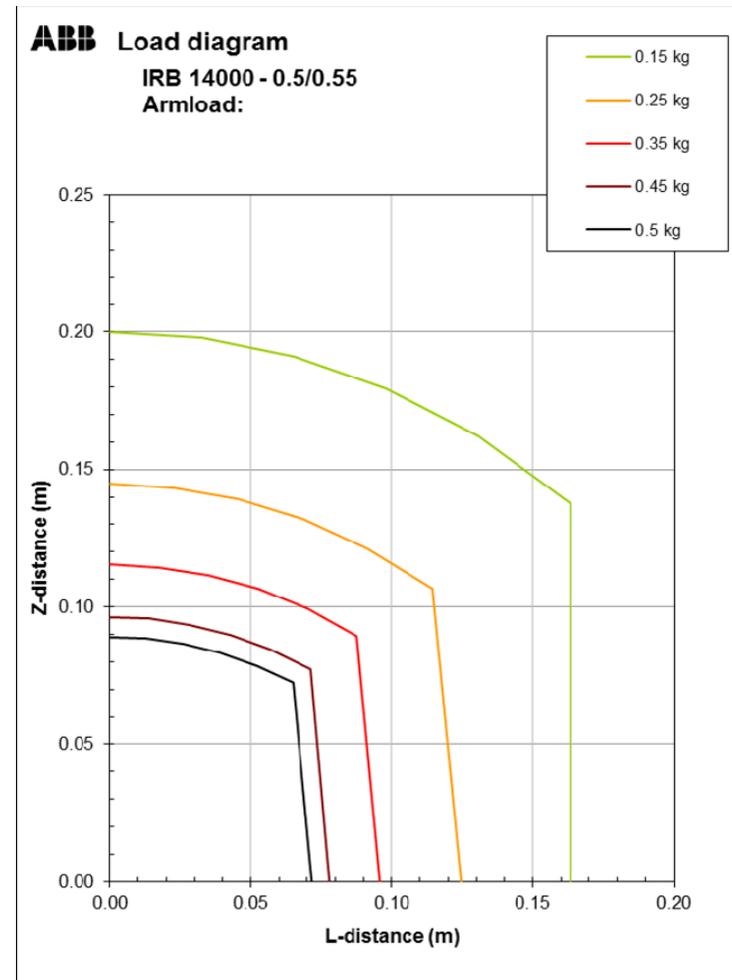


Simplified Robot Programming
A revolution in turning manual motions into
robotic path programs.

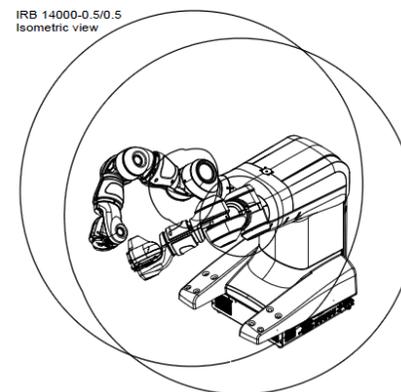
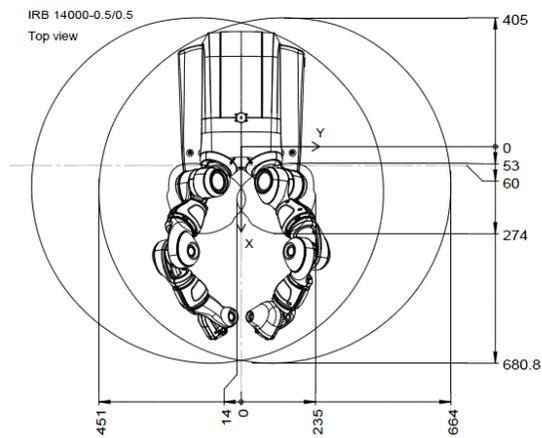
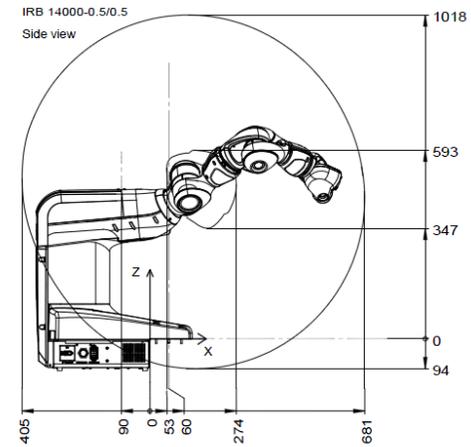
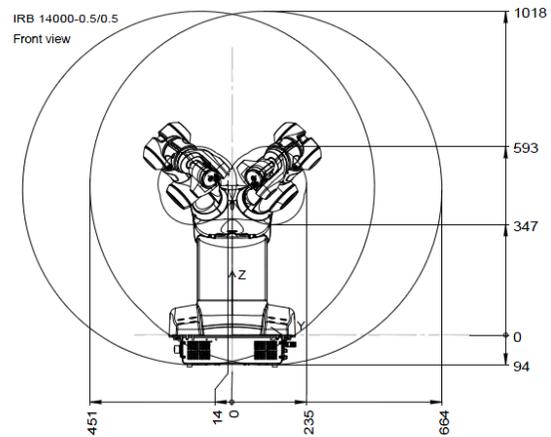
Main features

	IRB 14000 – 0.5/0.5
Payload	0.5 kg per arm
Reach	559 mm
Accuracy	0.02 mm
Footprint	399 mm * 497 mm
Customer interface	Foot interface
Weight	38 kg
Mounting position	Table
Temperature	5 C – 40 C deg
IP Protection	IP 30
Clean room / food grade	No

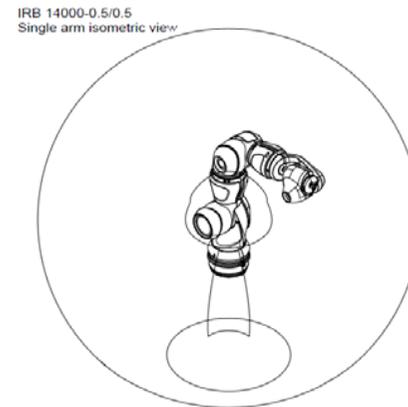
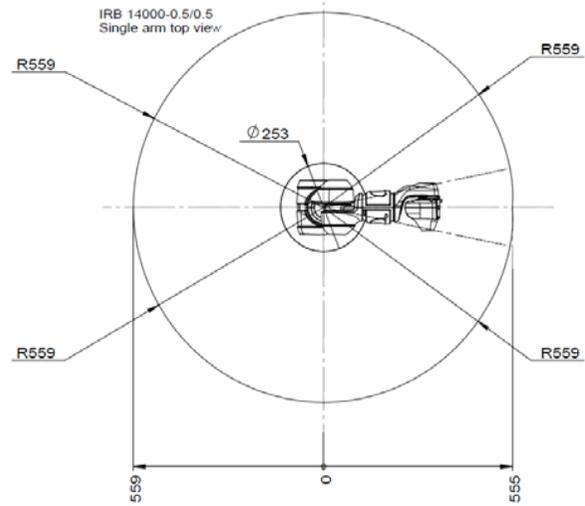
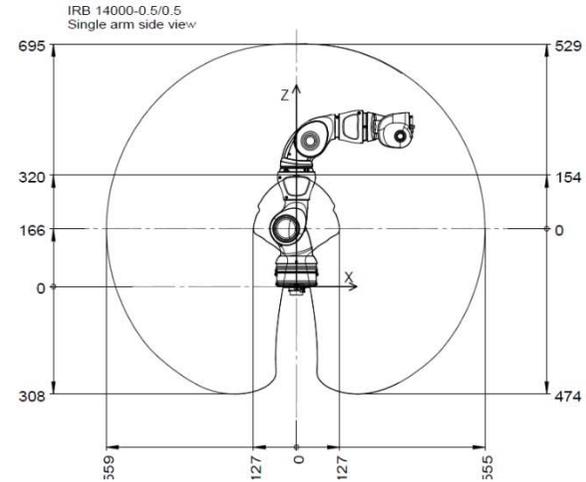
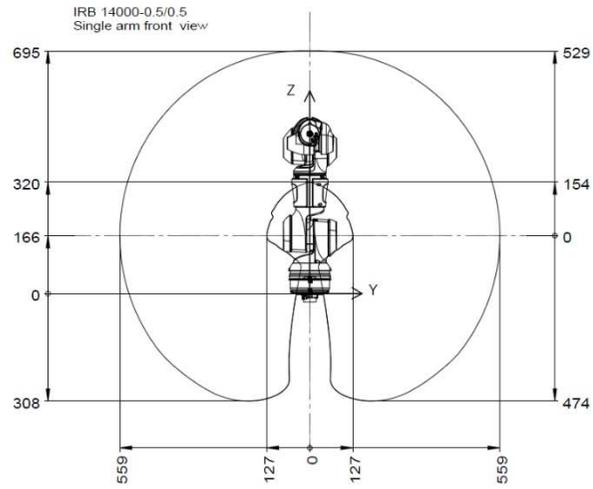
Payload IRB 14000 0.5/0.55



Working range IRB 14000 0.5/0.55



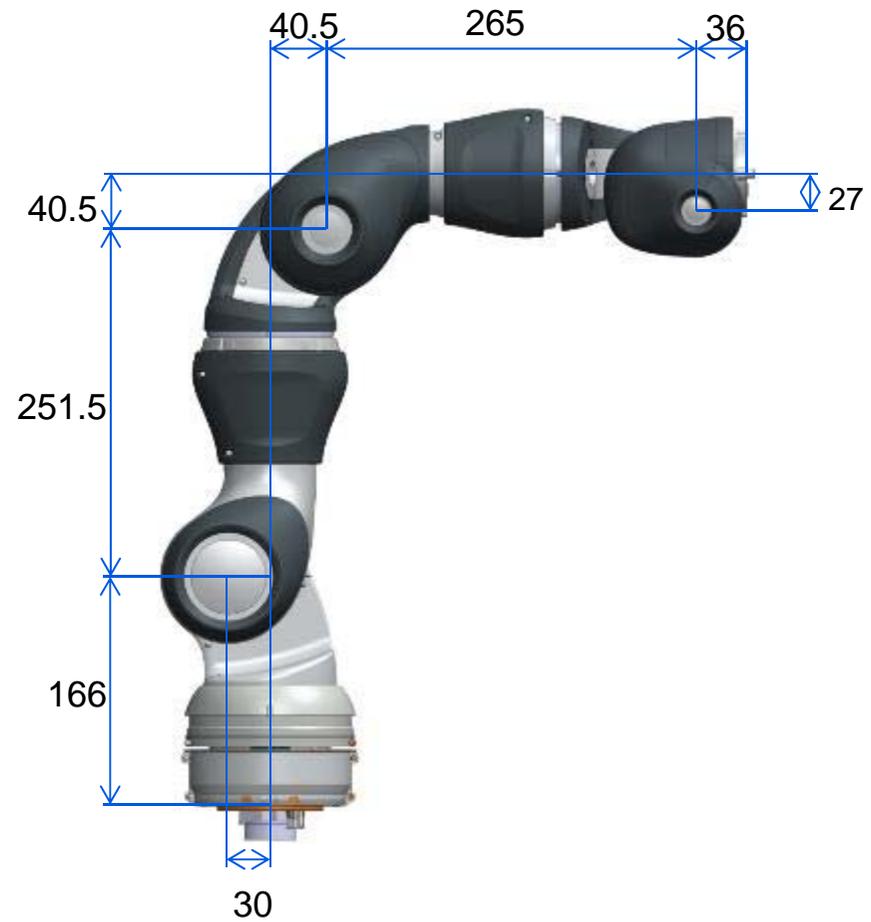
Working range: Single arm IRB 14000 0.5/0.5



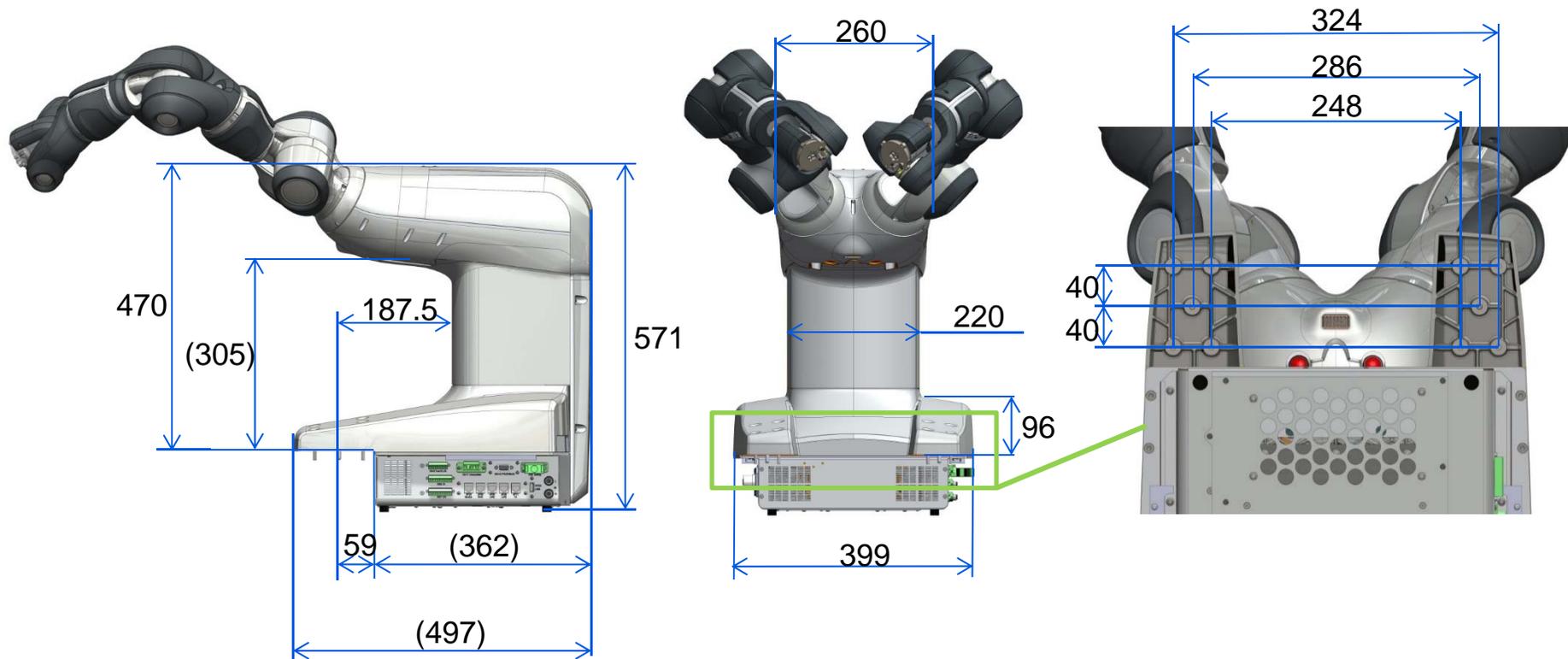
Working range Maximum velocity

	Motion Range	Max. Velocity
Axis 1 Rotation	+168.5° to -168.5 °	180 °/s
Axis 2 Arm	+43.5° to -143.5 °	180 °/s
Axis 7 Rotation	+168.5° to -168.5 °	180 °/s
Axis 3 Arm	+80° to -123.5 °	180 °/s
Axis 4 Wrist	+290° to -290 °	400 °/s
Axis 5 Bend	+138° to -88°	400 °/s
Axis 6 Turn	+229° to -229 °	400 °/s

Main dimensions IRB 14000 0.5/0.5

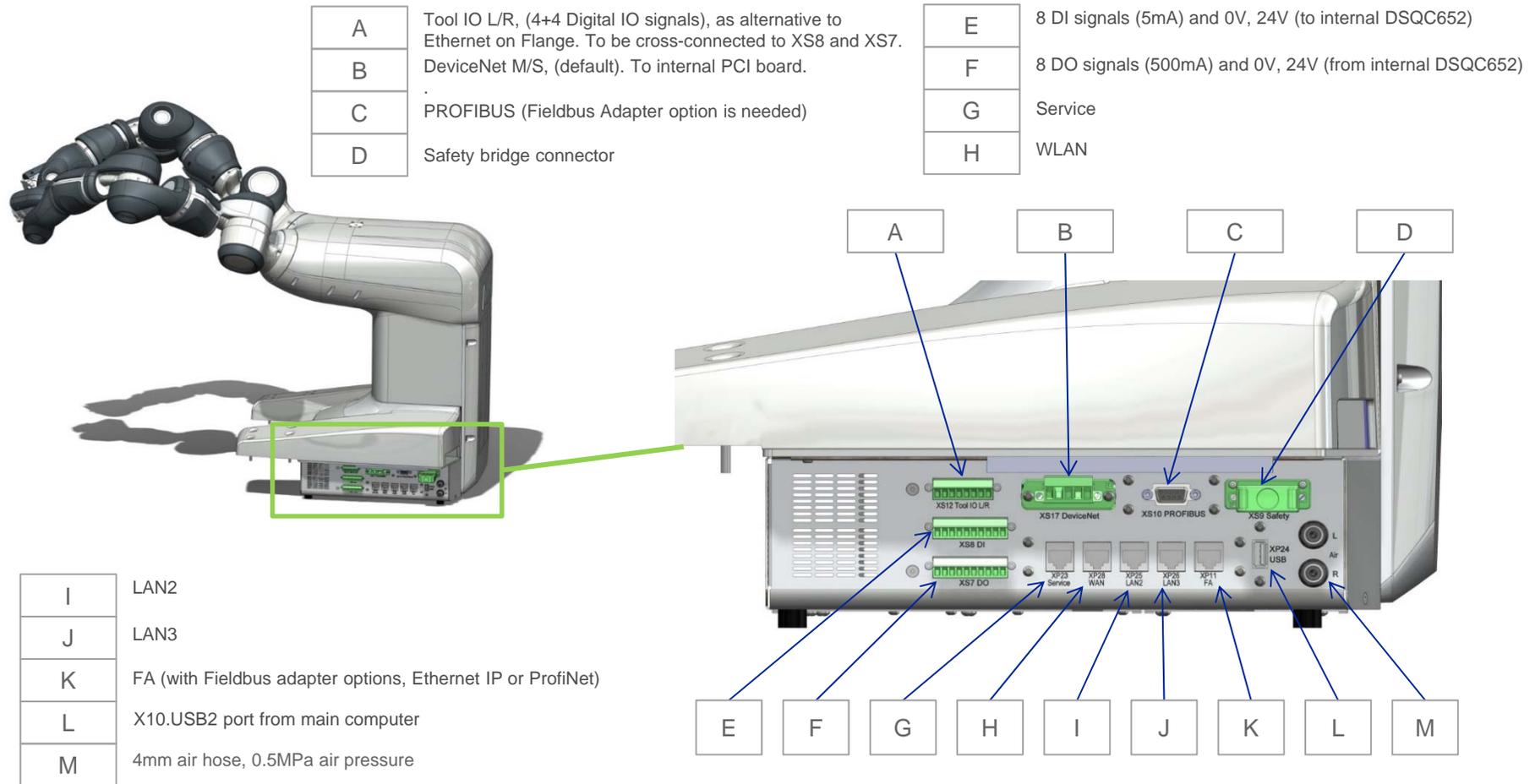


Main dimensions IRB 14000 0.5/0.5



Easy integration

I/O: Customer interfaces



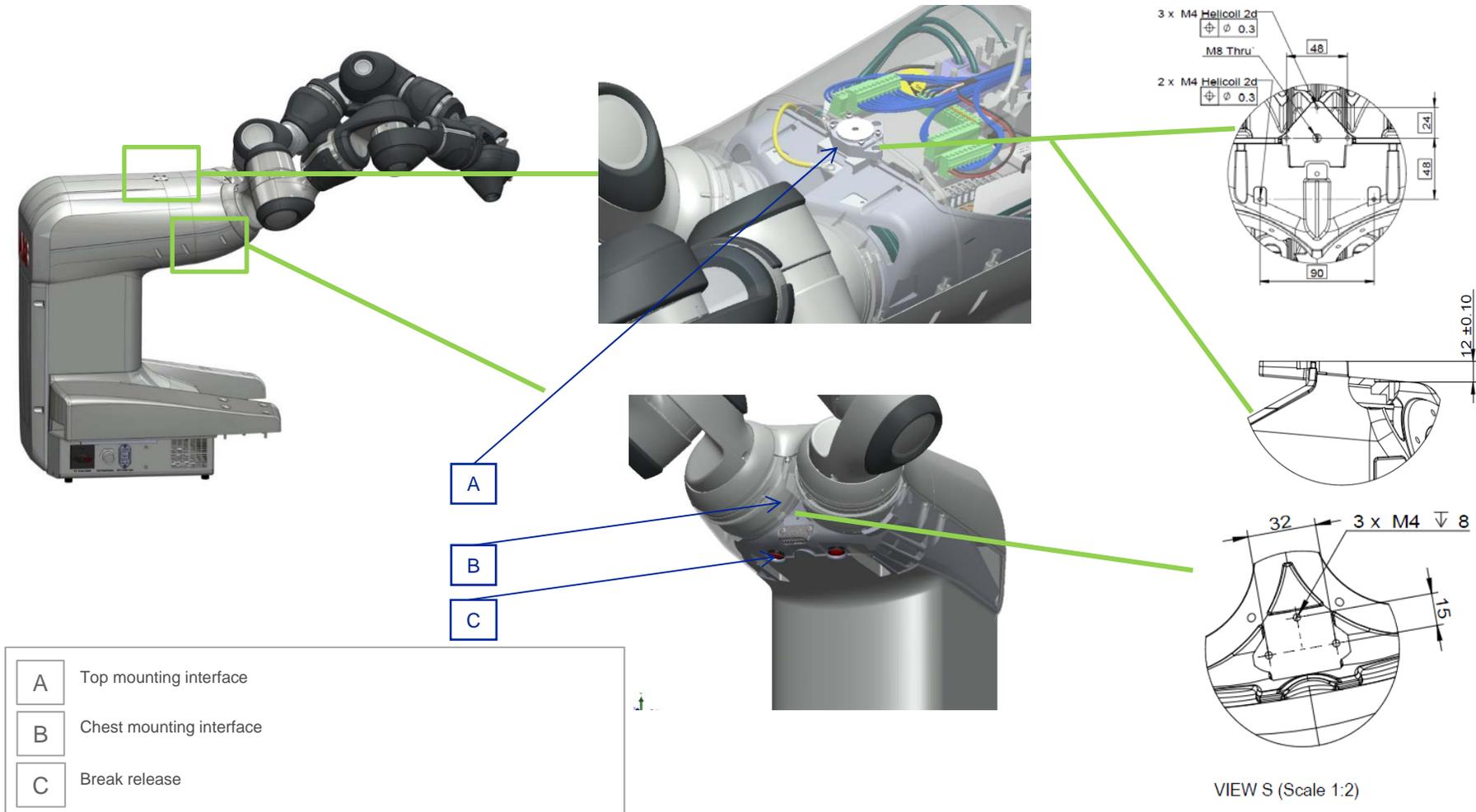
Easy integration Customer interfaces



- A Power Switch
- B FlexPendant
- C Power Inlet type (IEC 60320-1 C14) 100-240VAC, 50-60Hz

Easy integration

I/O: Customer interfaces

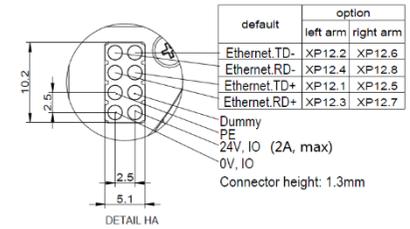
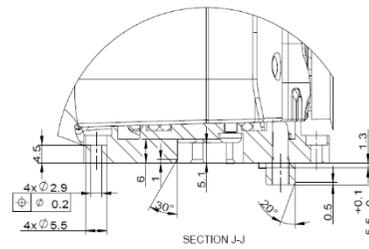
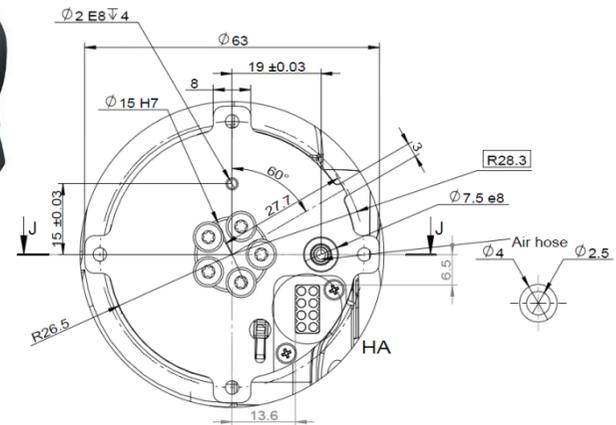


Easy integration

I/O: Customer interfaces

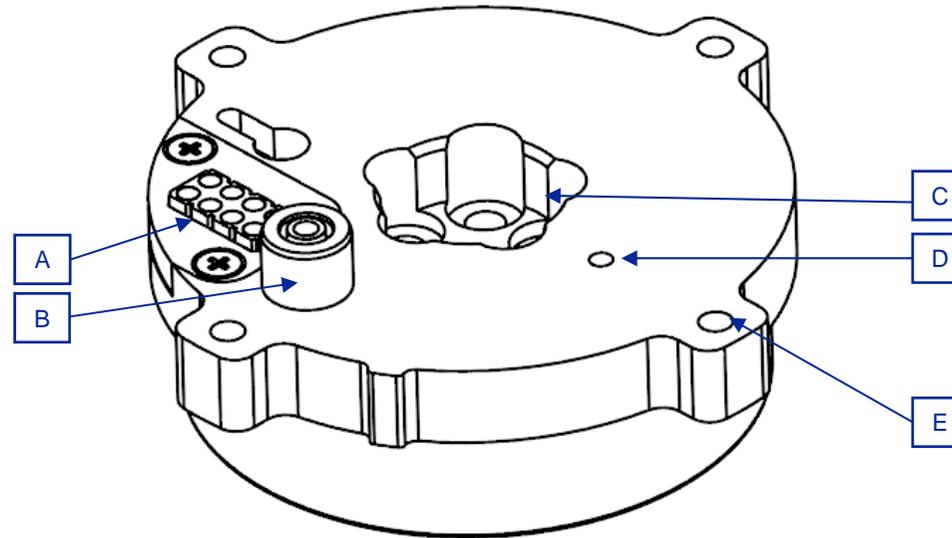


Tool connector type:
 Spring-Loaded Header
 Double Row
 Example : Mill-Max 813-22-008-30-000101



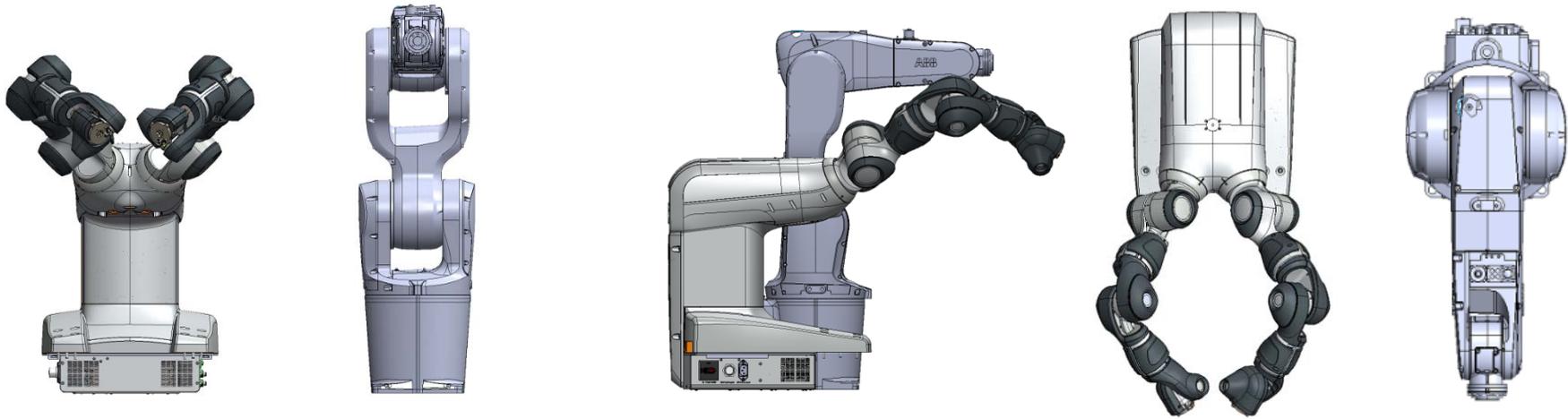
Easy integration

Mounting interfaces



A	8 pad Millmax connector for 24V and Ethernet or IO
B	7.5e8 and 4.4F10 for air
C	15H7 for alignment
D	2E8 pin hole for alignment
E	4 x 2.9 thru holes for M2.5 screws

IRB 14000 0.5/0.55 vs IRB 1200-7/0.7 Outline manipulator

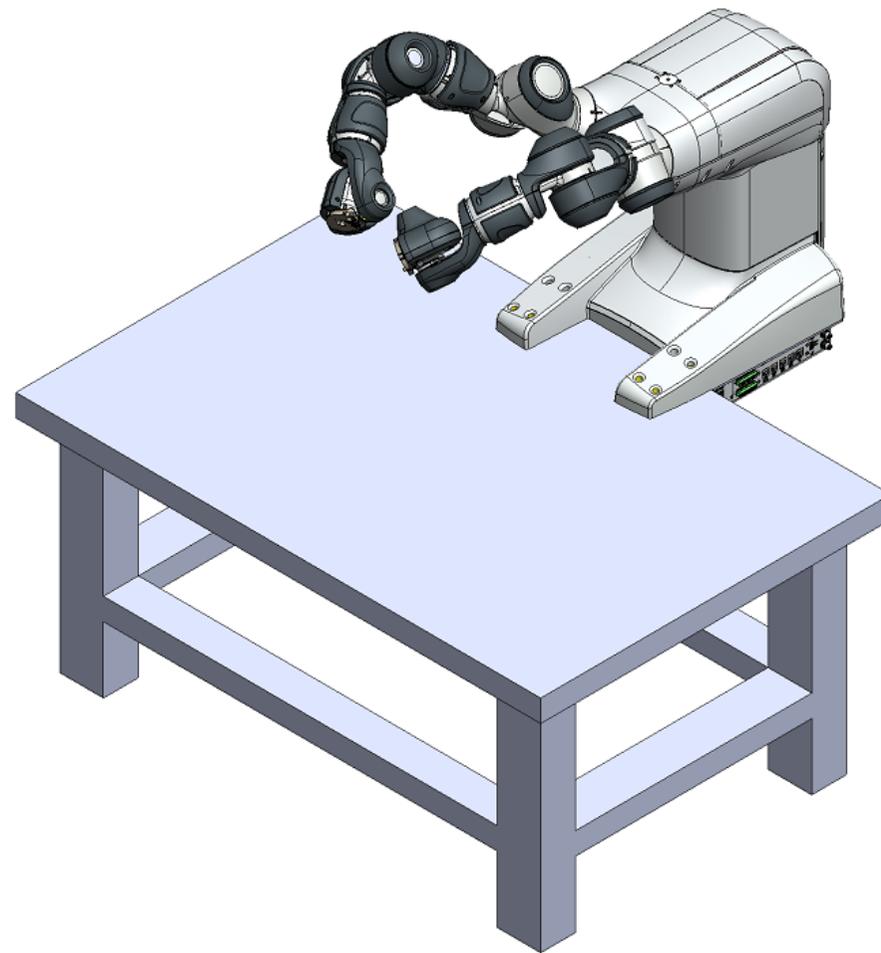


Front view

Side view

Top view

YuMi: IRB 14000 Table mounting



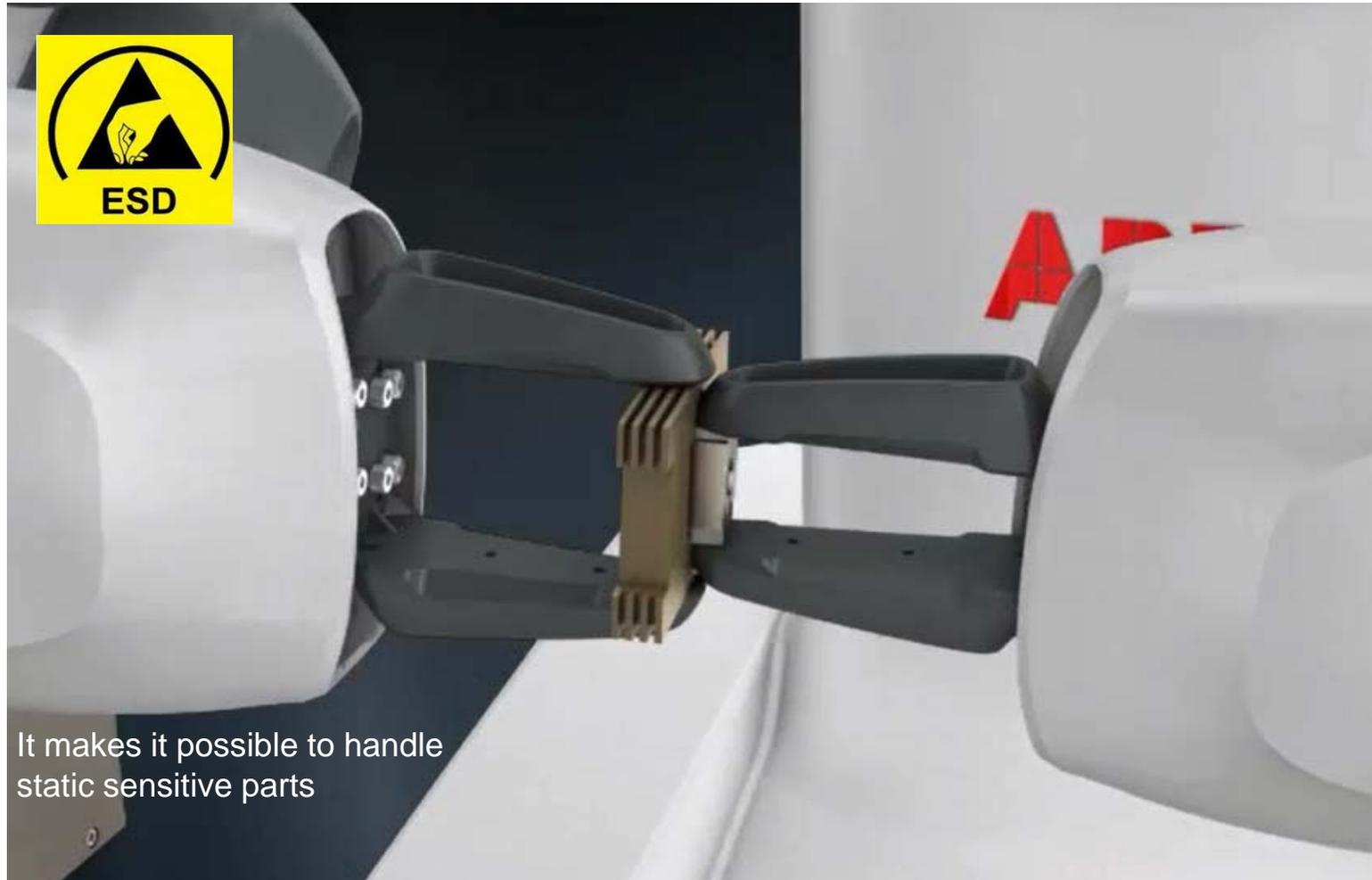
IP protection



IP 30 (Standard)

- It is sufficient for assembly

ESD protection



It makes it possible to handle static sensitive parts

YuMi: IRB 14000 Controller



- Embedded controller based on IRC5
- Portable (38kg)
- External connectors
- Built-in 8 in /8 out

Customer benefits



- **Padded arms** - Including internal wiring and air
- **Integral controller** - New in ABB portfolio
- **Light construction** – Makes the robot portable
- **Ease-of-use**– Lead Through Programing
- **Enclosed design** – Lower maintenance
- **Wide range of communications options** – easy to interface
- **High speed 1500mm**- ROI is increased
- **Dual arm** – Multi-tasking
- **Integrated vision** – Built in to product
- **ESD compliance** – Can work with open electronics
- **Safety certified** - Certified by an independent body
- **Integrated hand** – Easy to integrate

Customer benefits



Padded arms

- Adds to safety of operators if there is an unlikely contact during operation
- The robot can be run faster due to added protection
- Faster robot means the ROI will be greater

Customer benefits



Integral controller

- Saves working space
- Better cell layout
- Equipment can be placed closer to, or around, robot without interference
- Robot is more streamlined and easy to relocate
- No floor cables or control cables

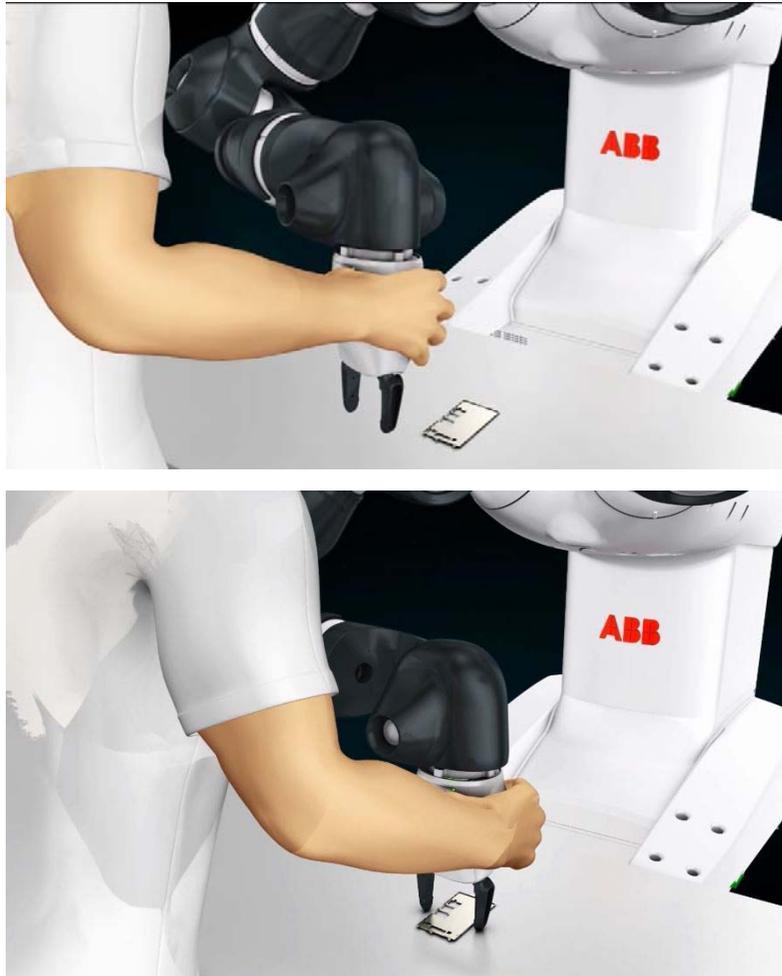
Customer benefits



Lightweight construction

- Makes the robot portable
- Added to safety of the robot
- Smaller frame to mount the robot

Customer benefits



Ease-of-use

- Lead-Through Programming makes the programming easy
- Integrated vision can pick unsorted parts
- Tablet programming can be wireless saving the need for wires
- Standard IRC5 rapid as other ABB robots

Customer benefits



Enclosed design, which allows all wiring and air to go through the inside of the robot

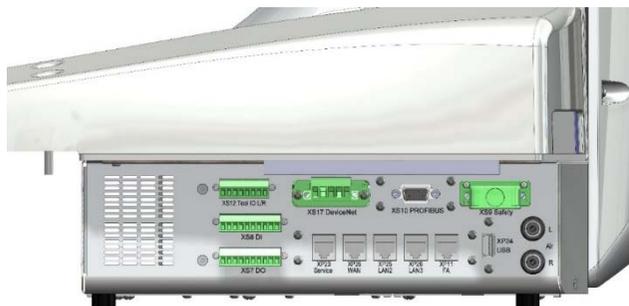
- Reduced maintenance
- Less risk of cable and air hose damaged
- Can be used in confined spaces
- Easy to keep clean
- No risk of dust collecting on cables

Customer benefits



Wide range of communications options

- No problem to connect other devices
- Not locked into one option
- Pick your standard so you do not have to train your staff



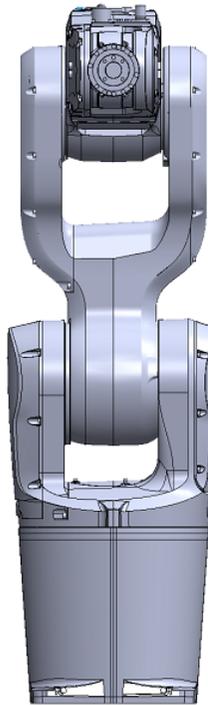
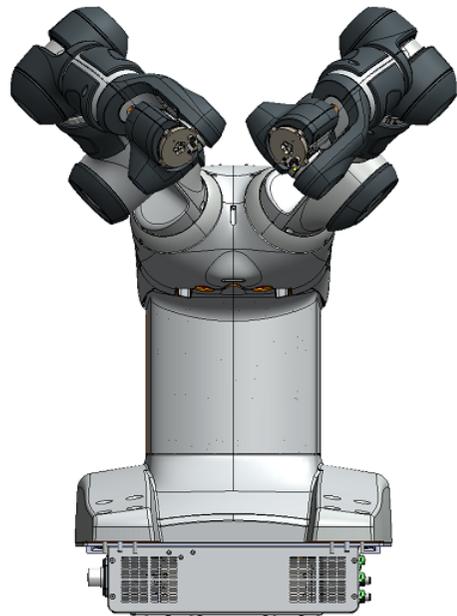
Customer benefits



Best in class 1500 mm/sec collaboration speed

- Higher output, increases productivity
- Speed and safety at the same time
- Cutting-edge design standards

Customer benefits



Dual arm

- Possible to achieve contact force assembly between arms
- Can process two tasks at the same time
- Operation similar to a human assembling

Customer benefits



Integrated vision

- Cameras embedded in gripper
- Integrated hands makes it possible to use the hand for vision guided
- Can be used for simple inspection

Customer benefits



ESD compliance

- No problems with static discharge
- Perfect for electronic assembly
- No need to test as we have certified the robot

Customer benefits

FUNCTIONAL SAFETY



LISTED

Safety certified

- No need to certify the robot
- Can be included in your risk assessment of the cell
- Independent body has certified the robot
- PL b Cat b

Customer benefits



Integrated hand

- No need to design your own hand
- Multi-option hand with five options
- Integrated communications and air
- Servo
- Vacuum
- Camera

Key applications and segments

- **Applications**

- **Be suitable for**

- Small Parts Assembly
 - Collaborative Assembly
 - Accurate and fast assembly
 - Testing and packaging

- **Be not suitable for**

- Paint
 - Food grade
 - Clean room

- **Segments**

- Electronics assembly

- Collaborative Assembly
 - Packaging of small goods
 - Multi-functional hand for odd sized components

- Toy industry

- Collaborative Assembly
 - (plastics)
 - Use of feeding and vision options

Key applications and segments

Assembly



Small Parts Assembly

- IRB 14000 is the perfect alternative/complementary for IRB 120 or IRB 1200 in small parts assembly
- Safe collaborative assembly
- Precise 0.02 repeatability for small tasks

Key applications and segments



Vision Guided-Assembly

- Vision included in hands as package
- Vision can also be connected to robot for external devices like flex feeders
- This makes it possible to have less jigging and move to a more flexible cell design

Key applications and segments

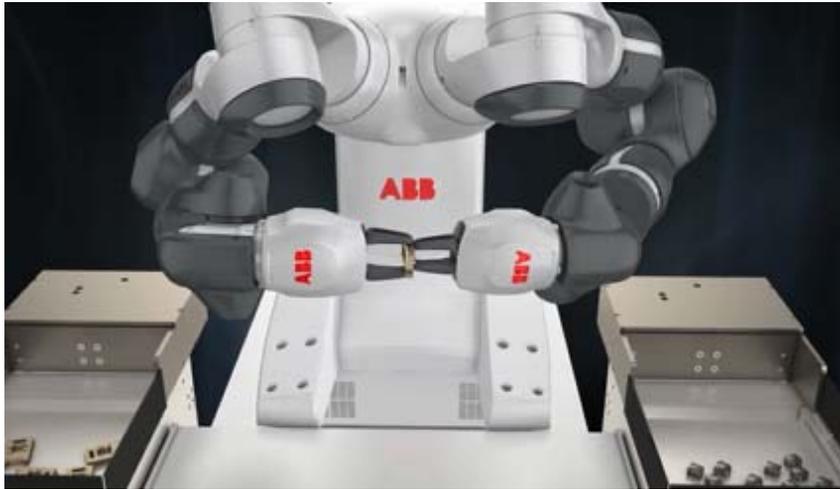


Small Parts Assembly using the FlexFeeder™s and ABB gripper

- Gripper and FlexFeeders make it possible to have a complete solution from part handling to assembly
- Odd sorted parts can be placed in FlexFeeders and presented to the robot in a two dimensional plane



Key applications and segments



Small Parts Material Handling

- After the assembly process is complete the robot can place the finished product in box ready for shipment
- YuMi working side-by-side handing finished parts to be packed



Summary



Safe and collaborative

- No cages needed
- Padded arms and light weight design
- Speed limited

Increased ROI

- fast accurate assembly, lower maintenance costs

Ease-of-integration

- Wide range of communications interfaces
- Integrated hand equipped with vision
- Integrated controller
- Light weight and portable

Ease-of-use

- Lead-Through Programming

Power and productivity
for a better world™

