ROBOTICS

Product specification

IRB 6620

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Product specification
IRB 6620 - 150/2.2

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Overview of this specification

About this product specification

It describes the performance of the manipulator or a complete family of manipulators in terms of:

- The structure and dimensional prints
- The fulfilment of standards, safety and operating requirements
- The load diagrams, mounting of extra equipment, the motion and the robot reach
- The integrated auxiliary equipment as that is: Customer Connections, Servo Gun, DressPack for material handling and spot welding
- The specification of variant 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 manual is intended for:

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

References

Reference	Document ID
Product specification - Controller IRC5 IRC5 with main computer DSQC1000.	*3HAC047400-001*
Product specification - Controller software IRC5 IRC5 with main computer DSQC1000 and RobotWare 5.6x.	*3HAC050945-001*
Product specification - Controller software IRC5 IRC5 with main computer DSQC1000 and RobotWare 6.	*3HAC050945-001*
Product specification - Linear Axis	*3HAC036094-001*
Product manual - IRB 6620	*3HAC027151-001*
Product manual - DressPack IRB 6620	*3HAC027309-001*
Product specification - Robot user documentation, IRC5 with RobotWare 6	*3HAC052355-001*

Revisions

Revision	Description
-	New product specification

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Continued

Revision	Description
A	• Ambient temperature for the spot welding cabinet added • Updated the section *Performance according to ISO 9283 on page 51*. • Removed the options 91-2,-3,-4,-5 Interbus • Added the option 785-2
B	• Added footnote Safety/Standards, see *Applicable standards on page 16* • Added section *Robot Gun and Track Motion on page 57* • Added section *Track Motion IRBT 6004 on page 58*
C	• Dedicated MH • Directions of forces • Warranty information for load diagrams
D	• SpotPack Basic
E	• Foundry Plus • Changes for Calibration data • Work range • Explanation of ISO values (new figure and table) • Stopping distance • User documentation on DVD
F	• General update for R09.1
G	• Added new variant: IRB 6620LX-150/1.9
H	• New document Structure • Minor corrections
J	• Foundry Plus 2 • ISO Cube
K	• Minor corrections
L	• Table for ambient temperature adjusted
M	• Machinery directive updated • General corrections/update
N	• Base plate drawing updated • General update and minor corrections
P	• General update and minor corrections
Q	• Minor corrections/update
R	• Text for ISO test adjusted • Robot stopping distances and times for category 0 and category 1 stops are moved to a separate document, *Product specification - Robot stopping distances according to ISO 10218-1*
S	• Text for Foundry Plus updated. • Information regarding performance when using double carriages for IRB 6620LX.
T	• Minor corrections/update
U	• Minor corrections/update • Tilting around X-axis added
V	• Updated section "SpotWelding cabinet" • Axis Calibration method added
X	• Warranty information for DressPack added

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Revision	Description
Y	Published in release R17.1. The following updates are done in this revision: • Axis Calibration method added. • Restriction of load diagram added.
Z	Published in release R17.2. The following updates are done in this revision: • Updated list of applicable standards. • TCP acceleration information added. • Delete option 828-1, 828-2, 768-3 and 782-1 as they were all phased out.
AA	Published in release 19C. The following updates are done in this revision: • Updated information about *Absolute Accuracy*. • Note added about need to calibrate if the robot is other than floor mounted. See *Calibration methods on page 29*.
AB	Published in release 20D. The following updates are done in this revision: • Warranty section updated.
AC	Published in release 21A. The following updates are done in this revision: • Minor changes
AD	Published in release 21C. The following updates are done in this revision: • Text regarding fastener quality is updated. • Removed Axis resolution. • Updated information about the option *Extended working range*. • Removed options (SpotPack phase out)782-13 Bosch MFDC ProfiNet, 858-1 Bosch Adaptive control, 788-1 Forced air cooling, 789-1 Earth fault protection unit, 790-1 Contactor for weld power, 791-1 Weld power cable, 7 m, 791-2 Weld power cable, 15 m, 809-1 process cable to stationary gun, 7 m, 809-2 process cable to stationary gun, 15 m, 792-1 Type S, 792-2 Type HS, 793-1 Second water return, 797-1 7m, 797-2 15m, 797-3 22m, 797-4 30m.
AE	Published in release 22C. The following updates are done in this revision: • Update the Manipulator color table in the specification chapter. • Added more descriptions in Working range limit option introduction.
AF	Published in release 24D. The following updates are done in this revision: • Updated the section *Technical data on page 19*.
AG	Published in release 26B. The following updates are made in this revision: • Corrected color code for option 209-1 ABB orange standard.

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1 Description

1.1 Structure

1.1.1 Introduction to Structure

Robot family

The IRB 6620 is one of ABB Robotics' generation of high payload, high performance industrial robots.

Based on the famous IRB 6600 robot family, with the highly flexible bending backwards concept, the very high wrist torque, the service friendly modular built up and the very high availability, significant for ABB's robots, the IRB 6620 goes even further, towards the excellence as a flexible tooling in automatic manufacturing.

With a focus on the very high production capacity, the compact design with an extremely low weight, the highly flexible mounting, the simple service and the low maintenance cost, the IRB 6620 is the most profitable alternative in automation of for example Spot Welding, Material Handling and Machine Tending applications.

Operating system

The robot is equipped with the IRC5 controller and robot control software, RobotWare. RobotWare supports every aspect of the robot system, such as motion control, development and execution of application programs, communication etc. See *Product specification - Controller IRC5*.

Safety

Safety standards valid for complete robot, manipulator and controller.

Additional functionality

For additional functionality, the robot can be equipped with optional software for application support - for example gluing and welding, communication features - network communication - and advanced functions such as multitasking, sensor control etc. For a complete description on optional software, see *Product specification - Controller software IRC5*.

Protection type Foundry Plus 2

Robots with the option Foundry Plus 2 are designed for harsh environments where the robot is exposed to sprays of coolants, lubricants and metal spits that are typical for die casting applications or other similar applications.

Typical applications are spraying insertion and part extraction of die-casting machines, handling in sand casting and gravity casting, etc. (Please refer to Foundry Prime robots for washing applications or other similar applications). Special care must be taken in regard to operational and maintenance requirements for applications in foundry are as well as in other applications areas. Please contact ABB Robotics Sales organization if in doubt regarding specific application feasibility for the Foundry Plus 2 protected robot.

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1.1.1 Introduction to Structure
Continued

The robot is painted with two-component epoxy on top of a primer for corrosion protection. To further improve the corrosion protection additional rust preventive are applied to exposed and crucial areas, e.g. has the tool flange a special preventive coating. Although, continuous splashing of water or other similar rust formation fluids may cause rust attach on the robots unpainted areas, joints, or other unprotected surfaces. Under these circumstances it is recommended to add rust inhibitor to the fluid or take other measures to prevent potential rust formation on the mentioned.

The entire robot is IP67 compliant according to IEC 60529 - from base to wrist, which means that the electrical compartments are sealed against water and solid contaminants. Among other things all sensitive parts are better protected than the standard offer.

Selected Foundry Plus 2 features:

- Improved sealing to prevent penetration into cavities to secure IP67
- Additional protection of cabling and electronics
- Special covers that protect cavities
- Well-proven connectors
- Nickel coated tool flange
- Rust preventives on screws, washers and unpainted/machined surfaces
- Extended service and maintenance program

The Foundry Plus 2 robot can be cleaned with appropriate washing equipment according to the robot product manual. Appropriate cleaning and maintenance is required to maintain the protection, for example can rust preventive be washed off with wrong cleaning method.

Available robot variants

The option Foundry Plus 2 might not be available for all robot variants.

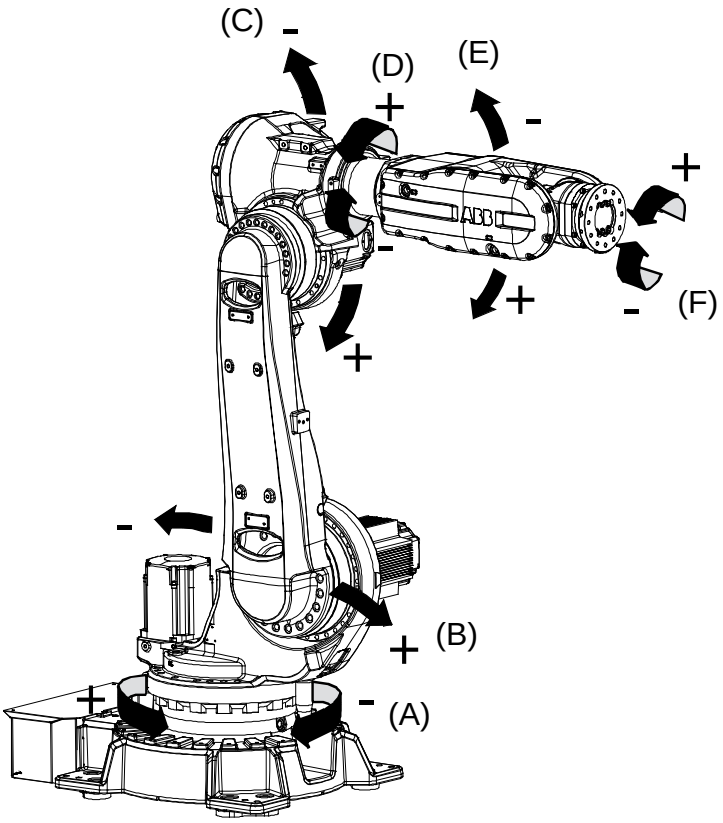
See *Specification of variants and options on page 101* for robot versions and other options not selectable together with Foundry Plus 2.

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Manipulator axes

IRB 6620



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Pos	Description	Pos	Description
A	Axis 1	B	Axis 2
C	Axis 3	D	Axis 4
E	Axis 5	F	Axis 6

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1.1.2 The robot

General

The IRB 6620 can be mounted on to the floor or inverted, a tilting of ±15º (around the Y-axis or X-axis) is allowed for both mountings.

Robot Type	Handling capacity (kg)	Reach (m)
IRB 6620	150	2.2

Manipulator weight

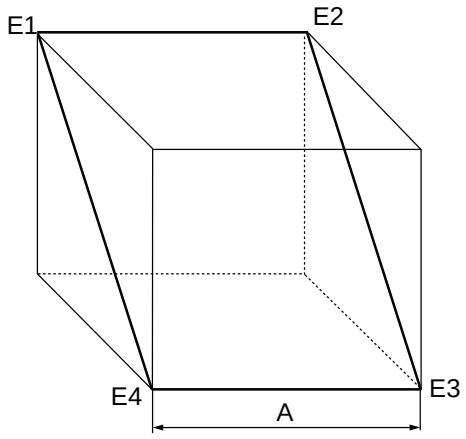
Robot type	Weight
IRB 6620-150/2.2	880 kg

Other technical data

Data	Description	Note
Airborne noise level	The sound pressure level outside the working space.	< 74 dB(A) Leq (acc. to Machinery directive 2006/42/EG)

Power consumption at max load

Type of Movement	IRB6620
ISO Cube	2.8 kW



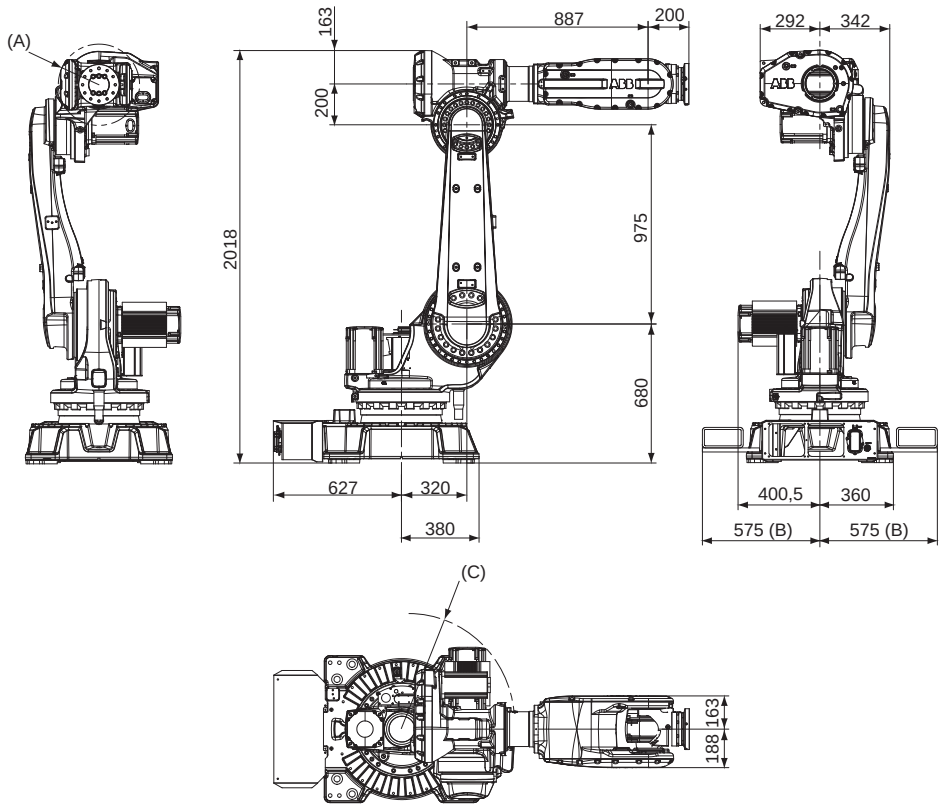
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Pos	IRB 6620
A	1000 mm

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Dimensions IRB 6620



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Pos	Description
A	R 199 mm for wrist rotation
B	Forklift width 1150mm
C	R 568 mm for Axis2 motor

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1.2 Standards

1.2.1 Applicable standards

> **Note**
>
> The listed standards are valid at the time of the release of this document. Phased out or replaced standards are removed from the list when needed.

General

The product is designed in accordance with ISO 10218-1:2011, Robots for industrial environments - Safety requirements -Part 1 Robots, and applicable parts in the normative references, as referred to from ISO 10218-1:2011. In case of deviations from ISO 10218-1:2011, these are listed in the declaration of incorporation which is part of the product delivery.

Normative standards as referred to from ISO 10218-1

Standard	Description
ISO 9283:1998	Manipulating industrial robots - Performance criteria and related test methods
ISO 10218-2	Robots and robotic devices - Safety requirements for industrial robots - Part 2: Robot systems and integration
ISO 12100	Safety of machinery - General principles for design - Risk assessment and risk reduction
ISO 13849-1:2006	Safety of machinery - Safety related parts of control systems - Part 1: General principles for design
ISO 13850	Safety of machinery - Emergency stop - Principles for design
IEC 60204-1	Safety of machinery - Electrical equipment of machines - Part 1: General requirements

Region specific standards and regulations

Standard	Description
ANSI/RIA R15.06	Safety requirements for industrial robots and robot systems
ANSI/UL 1740	Safety standard for robots and robotic equipment
CAN/CSA Z 434	Industrial robots and robot Systems - General safety requirements

Other standards used in design

Standard	Description
ISO 9787:2013	Robots and robotic devices -- Coordinate systems and motion nomenclatures
IEC 61000-6-2	Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity standard for industrial environments
IEC 61000-6-4	Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments

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Standard	Description
ISO 13732-1:2006	Ergonomics of the thermal environment - Part 1
IEC 60974-1:2012[i]	Arc welding equipment - Part 1: Welding power sources
IEC 60974-10:2014[i]	Arc welding equipment - Part 10: EMC requirements
ISO 14644-1:2015[ii]	Classification of air cleanliness
IEC 60529:1989 + A2:2013	Degrees of protection provided by enclosures (IP code)

i Only valid for arc welding robots. Replaces IEC 61000-6-4 for arc welding robots.
ii Only robots with protection Clean Room.

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1.3 Installation

1.3.1 Introduction to installation

General

The IRB 6620 can be mounted on to the floor or inverted. Both mountings can be tilted to ±15º (around the Y-axis or X-axis, for more details see *Product manual - IRB 6620*).

Extra loads

An extra load of 50 kg (for instance DressPack) can be mounted on to the upper arm. An extra load of 100 kg can be mounted on to the frame, for IRB 6620. See *Mounting of equipment on page 43*.

Working range limitation

The working range of axis 1 and axis 3 can be limited by mechanical stops as options. For axis 1 there are four stops and for axis 3 there is one stop. See *Equipment on page 105*, working range limit.

Explosive environments

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

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1.3.2 Technical data

Weight, robot

The table shows the weight of the robot.

The weight does not include the weight of the DressPack.

Robot model	Weight
IRB 6620	900 kg

Note

The weight does not include tools and other equipment fitted on the robot.

The weight does not include the weight of the DressPack.

Mounting positions

The table shows valid mounting options for the manipulator.

Mounting option	Installation angle	Note
Floor mounted	0-15°	
Suspended	0-15°	
Tilted	0-15°	Contact ABB for further information about acceptable loads.

Note

The actual mounting angle must always be configured in the system parameters, otherwise the performance and lifetime is affected. See the product manual for details.

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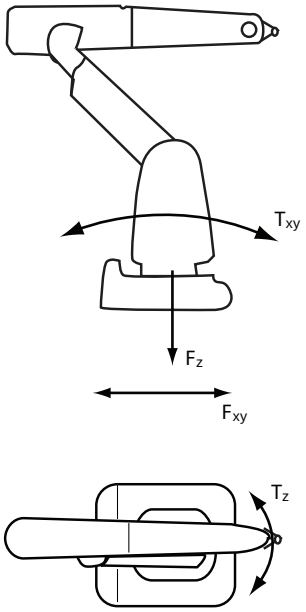
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1.3.2 Technical data
Continued

Loads on foundation, robot

The illustration shows the directions of the robots stress forces.

The directions are valid for all floor mounted, suspended and inverted robots.



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F_{xy}	Force in any direction in the XY plane
F_z	Force in the Z plane
T_{xy}	Bending torque in any direction in the XY plane
T_z	Bending torque in the Z plane

The table shows the various forces and torques working on the robot during different kinds of operation.

Note

These forces and torques are extreme values that are rarely encountered during operation. The values also never reach their maximum at the same time!

WARNING

The robot installation is restricted to the mounting options given in following load table(s).

Floor mounted

Force	Endurance load (in operation)	Max. load (emergency stop)
Force xy	± 7.3 kN	± 15.5 kN
Force z	11.0 ±2.0 kN	11.0 ±3.7 kN
Torque xy	± 18.0 kNm	± 37.2 kNm
Torque z	± 4.4 kNm	± 10.4 kNm

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Suspended

Force	Endurance load (in operation)	Max. load (emergency stop)
Force xy	± 7.3 kN	± 15.5 kN
Force z	- 11.0 ±2.0 kN	- 11.0 ±3.7 kN
Torque xy	± 18.0 kNm	± 37.2 kNm
Torque z	± 4.4 kNm	± 10.4 kNm

Requirements, foundation

The table shows the requirements for the foundation where the weight of the installed robot is included:

Requirement	Value	Note
Flatness of foundation surface	0.3 mm	Flat foundations give better repeatability of the resolver calibration compared to original settings on delivery from ABB. The value for levelness aims at the circumstance of the anchoring points in the robot base. In order to compensate for an uneven surface, the robot can be recalibrated during installation. If resolver/encoder calibration is changed this will influence the absolute accuracy.
Minimum resonance frequency	22 Hz **Note** It may affect the manipulator lifetime to have a lower resonance frequency than recommended.	The value is recommended for optimal performance. Due to foundation stiffness, consider robot mass including equipment. [i] For information about compensating for foundation flexibility, see the application manual of the controller software, section *Motion Process Mode*.

[i] The minimum resonance frequency given should be interpreted as the frequency of the robot mass/inertia, robot assumed stiff, when a foundation translational/torsional elasticity is added, i.e., the stiffness of the pedestal where the robot is mounted. The minimum resonance frequency should not be interpreted as the resonance frequency of the building, floor etc. For example, if the equivalent mass of the floor is very high, it will not affect robot movement, even if the frequency is well below the stated frequency. The robot should be mounted as rigid as possibly to the floor.

Disturbances from other machinery will affect the robot and the tool accuracy. The robot has resonance frequencies in the region 10 – 20 Hz and disturbances in this region will be amplified, although somewhat damped by the servo control. This might be a problem, depending on the requirements from the applications. If this is a problem, the robot needs to be isolated from the environment.

Storage conditions, robot

The table shows the allowed storage conditions for the robot:

Parameter	Value
Minimum ambient temperature	-25° C
Maximum ambient temperature	+55° C
Maximum ambient temperature (less than 24 hrs)	+70° C
Maximum ambient humidity	95% at constant temperature (gaseous only)

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1.3.2 Technical data
Continued

Operating conditions, robot

The table shows the allowed operating conditions for the robot:

Parameter	Value
Minimum ambient temperature	+5° C
Maximum ambient temperature	+50° C
Maximum ambient humidity	Max. 95% at constant temperature

Protection classes, robot

The table shows the available protection types of the robot, with the corresponding protection class.

Protection type	Protection class [i]
Manipulator, protection type Standard	IP 54 [ii]
Manipulator, protection type Foundry Plus	IP 67

i According to IEC 60529.
ii The upper arm, including the wrist, has protection class IP 67.

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1.3.3 Mounting the manipulator

Maximum Load

Maximum load in relation to the base coordinate system.

Floor Mounted

Force	Endurance load (in operation)	Max. load (emergency stop)
Force xy	± 7.3 kN	± 15.5 kN
Force z	11.0 ±2.0 kN	11.0 ±3.7 kN
Torque xy	± 18.0 kNm	± 37.2 kNm
Torque z	± 4.4 kNm	± 10.4 kNm

Suspended

Force	Endurance load (in operation)	Max. load (emergency stop)
Force xy	± 7.3 kN	± 15.5 kN
Force z	- 11.0 ±2.0 kN	- 11.0 ±3.7 kN
Torque xy	± 18.0 kNm	± 37.2 kNm
Torque z	± 4.4 kNm	± 10.4 kNm

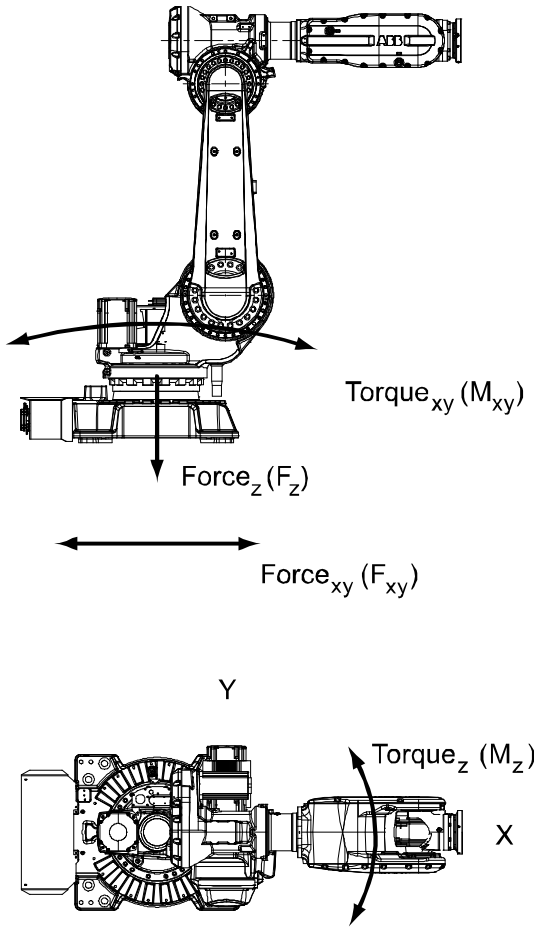
Tilted

Force	Endurance load (in operation)	Max. load (emergency stop)
Force xy	± 7.3 kN	± 15.5 kN
Force z	11.0 ±2.0 kN	11.0 ±3.7 kN
Torque xy	± 18.0 kNm	± 37.2 kNm
Torque z	± 4.4 kNm	± 10.4 kNm

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1.3.3 Mounting the manipulator
Continued



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Note regarding M_{xy} and F_{xy}

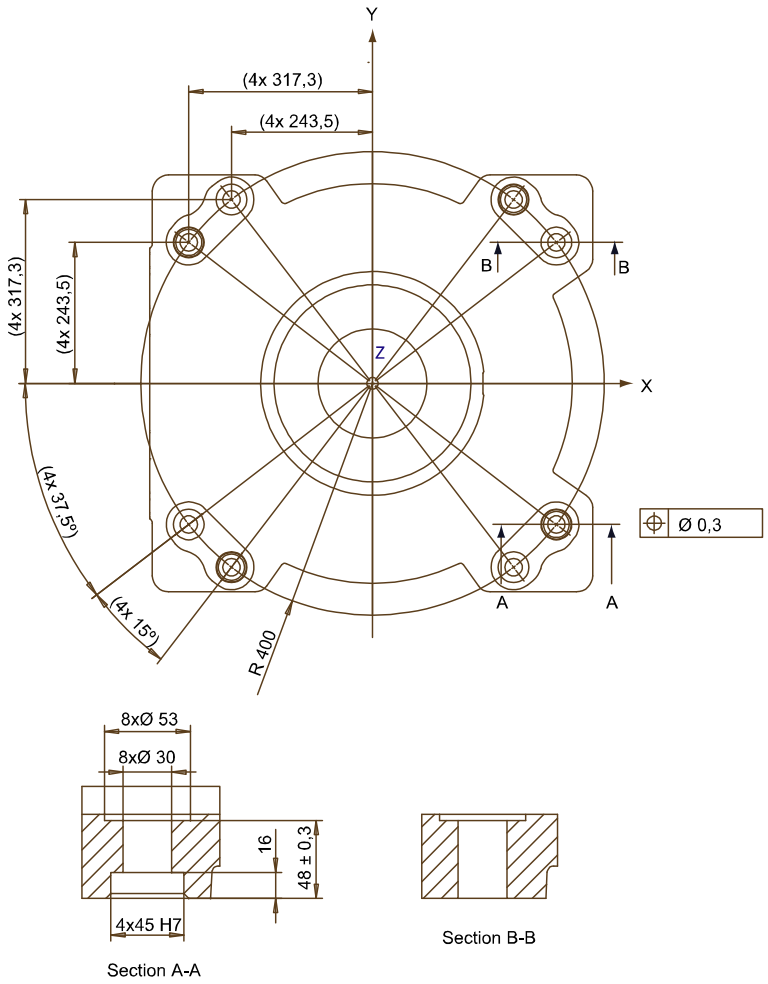
The bending torque (M_{xy}) can occur in any direction in the XY-plane of the base coordinate system.

The same applies to the transverse force (F_{xy}).

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Fastening holes robot base



xx0900000457

Recommended screws for fastening the manipulator to the base	M24 x 100 8.8 with 4 mm flat washer
Torque value	725 Nm

Note

Only two guiding sleeves shall be used. The corresponding holes in the base plate shall be circular and oval according to Figures below

Regarding AbsAcc performance, the chosen guide holes according to Figure above and in the last Figure of this chapter.

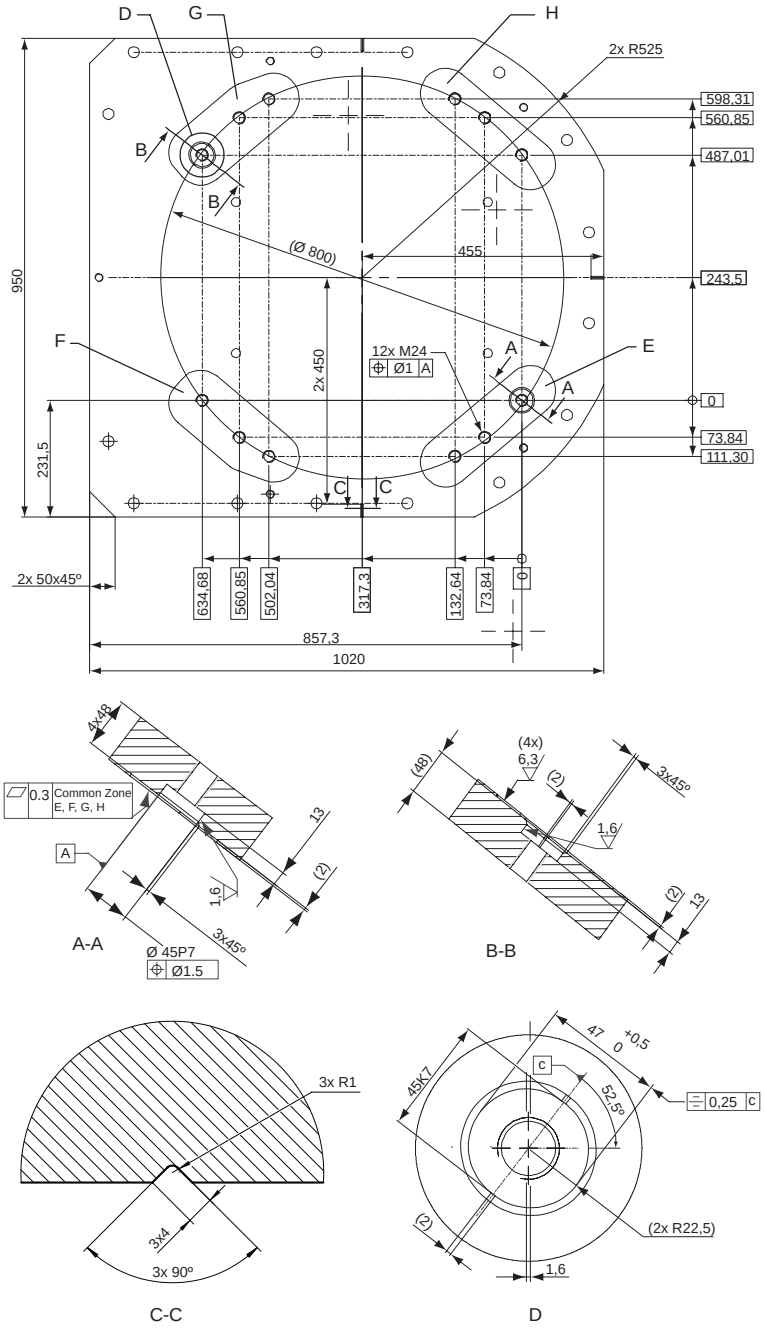
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1.3.3 Mounting the manipulator
Continued

Base plate drawing

The following figure shows the option base plate (dimensions in mm).

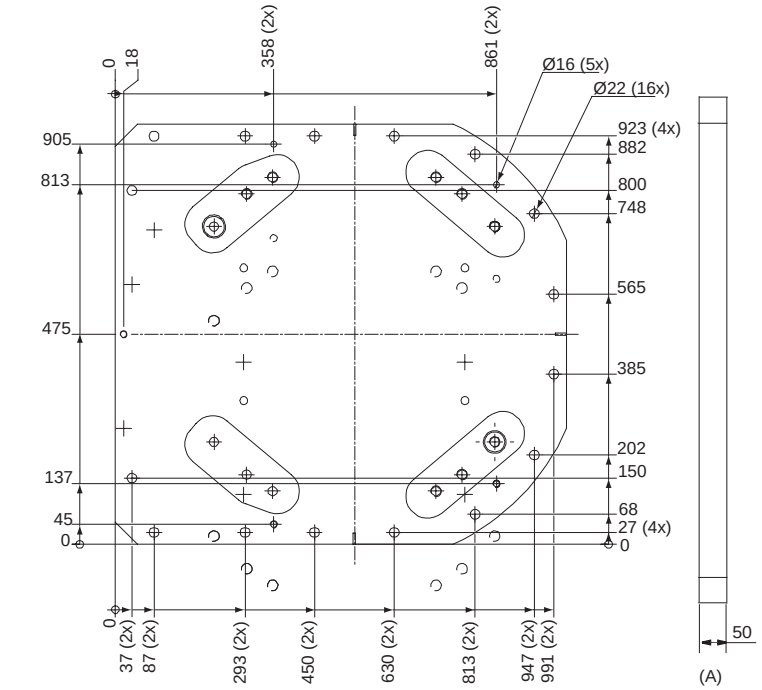


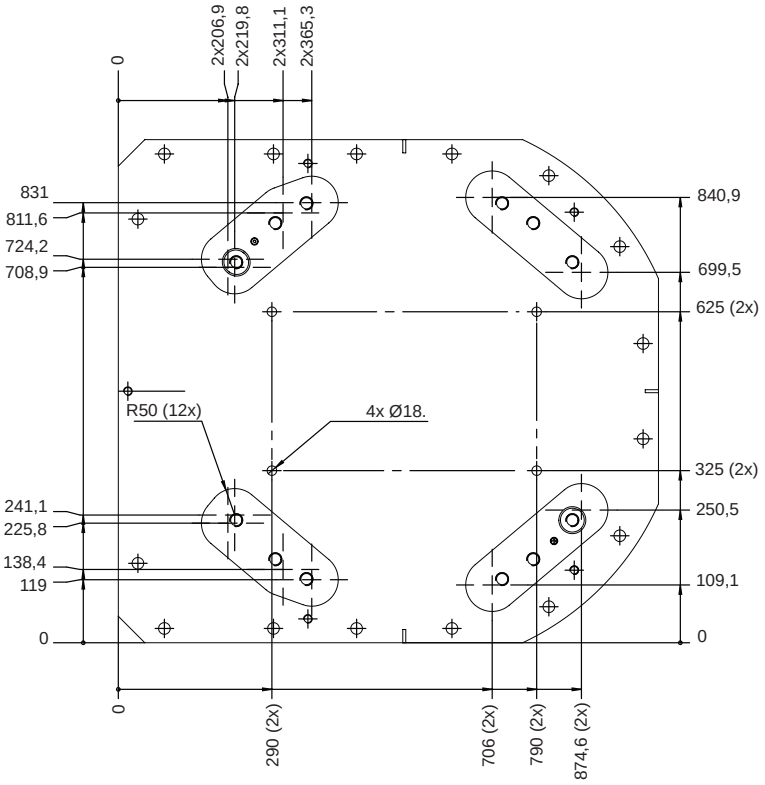
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E, F, G, H	Common tolerance zone (accuracy all over the base plate from one contact surface to the other)

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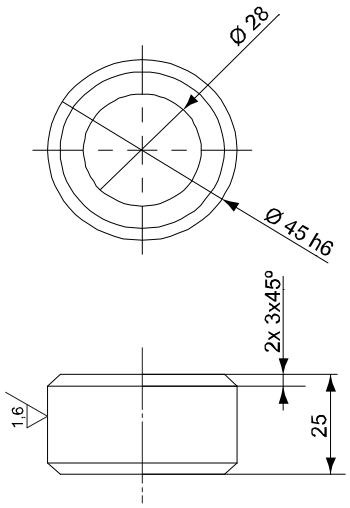
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Pos	Description
A	Color: RAL 9005 Thickness: 80-100 µm

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1.3.3 Mounting the manipulator
Continued



xx1000001055

Pos	Description
A	Guide sleeve protected from corrosion

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1.4 Calibration and references

1.4.1 Calibration methods

Overview

This section specifies the different types of calibration and the calibration methods that are supplied by ABB.

The original calibration data delivered with the robot is generated when the robot is floor mounted. If the robot is not floor mounted, then the robot accuracy could be affected. The robot needs to be calibrated after it is mounted.

More information is available in the product manual.

Types of calibration

Type of calibration	Description	Calibration method
Standard calibration	The calibrated robot is positioned at calibration position. Standard calibration data is found on the SMB (serial measurement board) or EIB in the robot.	Axis Calibration or Calibration Pendulum i Levelmeter calibration (alternative method)
Absolute accuracy calibration (optional)	Based on standard calibration, and besides positioning the robot at synchronization position, the Absolute accuracy calibration also compensates for: • Mechanical tolerances in the robot structure • Deflection due to load Absolute accuracy calibration focuses on positioning accuracy in the Cartesian coordinate system for the robot. Absolute accuracy calibration data is found on the serial measurement board (SMB) or other robot memory. For IRC5 robots, the absolute accuracy calibration data is delivered in a file, absacc.cfg, supplied with the robot at delivery. The file replaces the calib.cfg file and identifies motor positions as well as absolute accuracy compensation parameters. A robot calibrated with Absolute accuracy has a sticker next to the identification plate of the robot (IRC5). To regain 100% Absolute accuracy performance, the robot must be recalibrated for absolute accuracy after repair or maintenance that affects the mechanical structure.  xx0400001197	CalibWare

Continues on next page

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1.4.1 Calibration methods
Continued

Type of calibration	Description	Calibration method
Optimization	Optimization of TCP reorientation performance. The purpose is to improve reorientation accuracy for continuous processes like welding and gluing. Wrist optimization will update standard calibration data for axes 4 and 5.	Wrist Optimization

i The robot is calibrated by either Calibration Pendulum or Axis Calibration at factory. Always use the same calibration method as used at the factory.
Information about valid calibration method is found on the calibration label or in the calibration menu on the FlexPendant.
If no data is found related to standard calibration, contact the local ABB Service.

Brief description of calibration methods

Calibration Pendulum method

Calibration Pendulum is a standard calibration method for calibration of some ABB robots.

Two different routines are available for the Calibration Pendulum method:

- Calibration Pendulum II
- Reference calibration

The calibration equipment for Calibration Pendulum is delivered as a complete toolkit, including the *Operating manual - Calibration Pendulum*, which describes the method and the different routines further.

Axis Calibration method

Axis Calibration is a standard calibration method for calibration of IRB 6620. It is the recommended method in order to achieve proper performance.

The following routines are available for the Axis Calibration method:

- Fine calibration
- Update revolution counters
- Reference calibration

The calibration equipment for Axis Calibration is delivered as a toolkit.

The actual instructions of how to perform the calibration procedure and what to do at each step is given on the FlexPendant. You will be guided through the calibration procedure, step by step.

Wrist Optimization method

Wrist Optimization is a method for improving reorientation accuracy for continuous processes like welding and gluing and is a complement to the standard calibration method.

The actual instructions of how to perform the wrist optimization procedure is given on the FlexPendant.

CalibWare - Absolute Accuracy calibration

The CalibWare tool guides through the calibration process and calculates new compensation parameters. This is further detailed in the *Application manual - CalibWare Field*.

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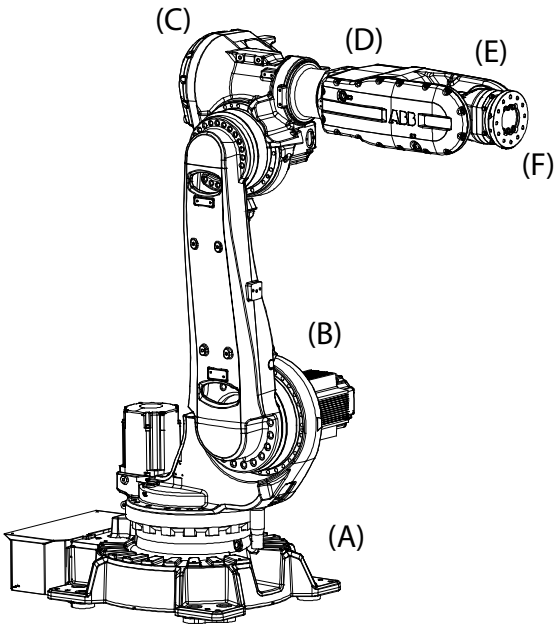
If a service operation is done to a robot with the option Absolute Accuracy, a new absolute accuracy calibration is required in order to establish full performance. For most cases after replacements that do not include taking apart the robot structure, standard calibration is sufficient.

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1.4.2 Fine calibration with Calibration Pendulum

General

Fine calibration can be made using the Calibration Pendulum, see *Operating manual - Calibration Pendulum*.



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Pos	Description	Pos	Description
A	Axis 1	B	Axis 2
C	Axis 3	D	Axis 4
E	Axis 5	F	Axis 6

Calibration

Calibration	Position
Calibration of all axes	All axes are in zero position
Calibration of axis 1 and 2	Axis 1 and 2 in zero position
	Axis 3 to 6 in any position
Calibration of axis 1	Axis 1 in zero position
	Axis 2 to 6 in any position

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1.4.3 Absolute Accuracy calibration

Purpose

Absolute Accuracy is a calibration concept that improves TCP accuracy. The difference between an ideal robot and a real robot can be several millimeters, resulting from mechanical tolerances and deflection in the robot structure. *Absolute Accuracy* compensates for these differences.

Here are some examples of when this accuracy is important:

- Exchangeability of robots
- Offline programming with no or minimum touch-up
- Online programming with accurate movement and reorientation of tool
- Programming with accurate offset movement in relation to, for example, vision systems or offset programming
- Re-use of programs between applications

The option *Absolute Accuracy* is integrated in the controller algorithms and does not need external equipment or calculation.

Note

The performance data is applicable to the corresponding RobotWare version of the individual robot.

Note

Singularities might appear in slightly different positions on a real robot compared to RobotStudio, where *Absolute Accuracy* is off compared to the real controller.

What is included

Every *Absolute Accuracy* robot is delivered with:

- compensation parameters saved in the robot memory
- a birth certificate representing the *Absolute Accuracy* measurement protocol for the calibration and verification sequence.

A robot with *Absolute Accuracy* calibration has a label with this information on the manipulator.

Absolute Accuracy supports floor mounted, wall mounted, and ceiling mounted installations. The compensation parameters that are saved in the robot memory differ depending on which Absolute Accuracy option is selected.

When is *Absolute Accuracy* being used

Absolute Accuracy works on a robot target in Cartesian coordinates, not on the individual joints. Therefore, joint based movements (e.g. `MoveAbsJ`) will not be affected.

If the robot is inverted, the Absolute Accuracy calibration must be performed when the robot is inverted.

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1.4.3 Absolute Accuracy calibration
Continued

Absolute Accuracy active

Absolute Accuracy will be active in the following cases:

- Any motion function based on robtargets (e.g. `MoveL`) and ModPos on robtargets
- Reorientation jogging
- Linear jogging
- Tool definition (4, 5, 6 point tool definition, room fixed TCP, stationary tool)
- Work object definition

Absolute Accuracy not active

The following are examples of when Absolute Accuracy is not active:

- Any motion function based on a jointtarget (`MoveAbsJ`)
- Independent joint
- Joint based jogging
- Additional axes
- Track motion

Note

In a robot system with, for example, an additional axis or track motion, the Absolute Accuracy is active for the manipulator but not for the additional axis or track motion.

RAPID instructions

There are no RAPID instructions included in this option.

Production data

Typical production data regarding calibration are:

Robot	Positioning accuracy (mm)		
	Average	Max	% Within 1 mm
IRB 6620-150/2.2	0.5	0.95	100

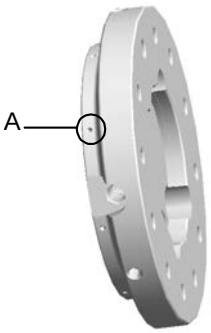
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1.4.4 Robot references

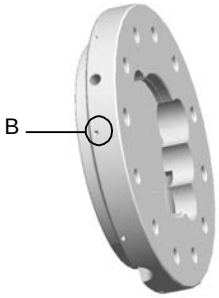
General

The holes shown in Figures below are used for measuring the robot position when integrated in a production cell.

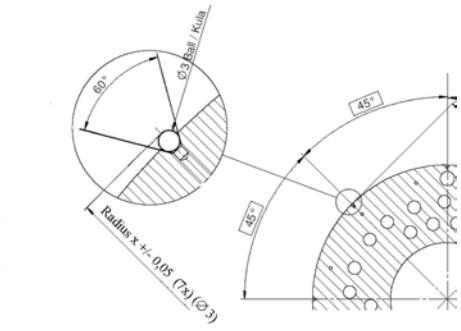
The holes are not available for Foundry Plus.



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Robot	Radius X (mm) for references on tool flange	
	Standard	Insulated
IRB 6620 - 150/2.2	R=81,5	R=101,5

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1.5 Load diagrams

1.5.1 Introduction to Load diagrams

Information

WARNING

It is very important to always define correct actual load data and correct payload of the robot. Incorrect definitions of load data can result in overloading of the robot.

If incorrect load data is used, and/or if loads outside the load diagram are used, the following parts can be damaged due to overload:

- motors
- gearboxes
- mechanical structure

WARNING

In RobotWare, the service routine LoadIdentify can be used to determine correct load parameters. The routine automatically defines the tool and the load.

See *Operating manual - IRC5 with FlexPendant*, for detailed information.

WARNING

Robots running with incorrect load data and/or with loads outside the load diagram, will not be covered by robot warranty.

General

The load diagrams include a nominal payload inertia, J_0 of 15 kgm^2, and an extra load of 50 kg at the upper arm housing.

At different moment of inertia the load diagram will be changed. For robots that are allowed tilted, wall or inverted mounted, the load diagrams as given are valid and thus it is also possible to use RobotLoad within those tilt and axis limits.

Control of load case with RobotLoad

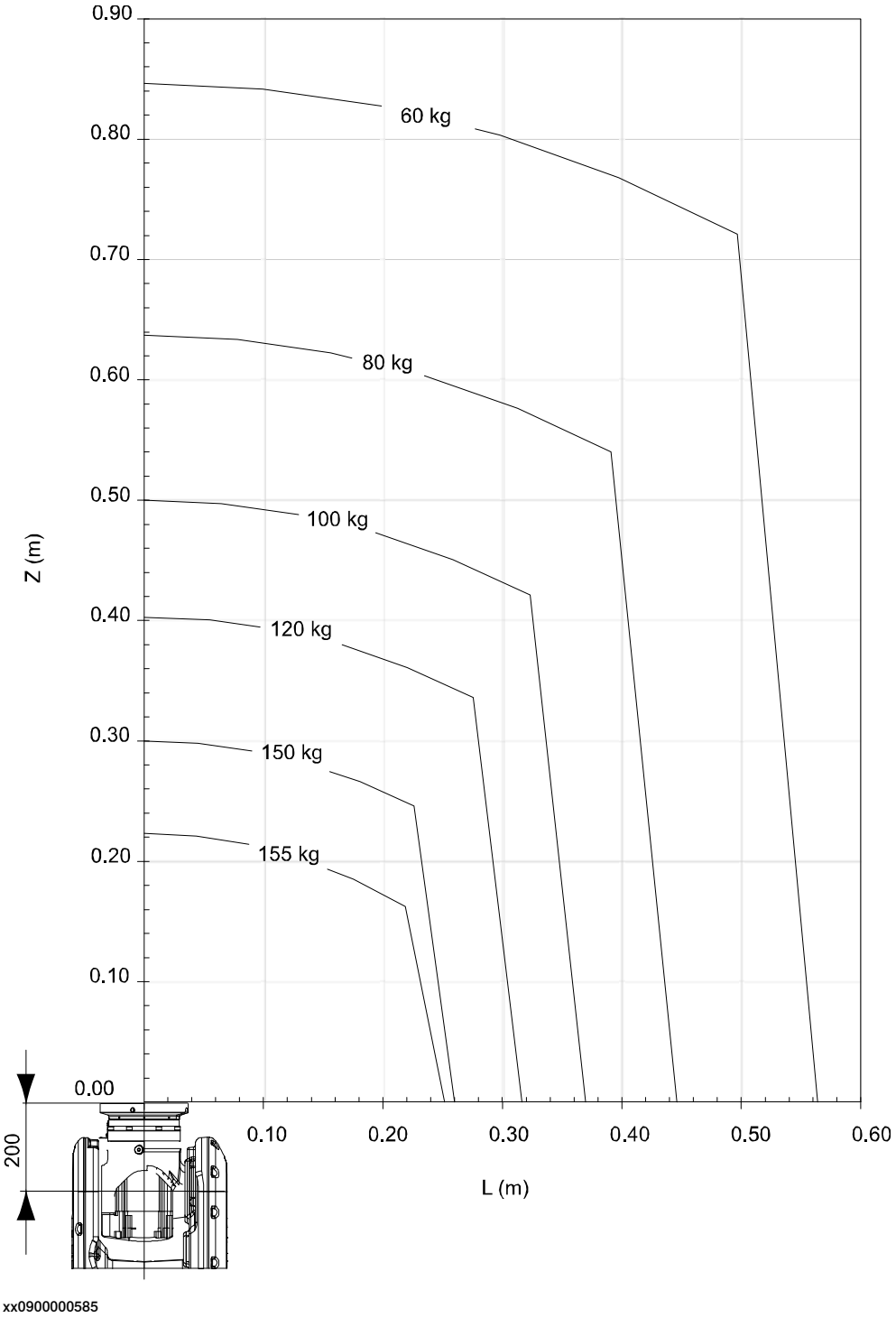
To verify a specific load case, use the RobotStudio add-in RobotLoad.

The result from RobotLoad is only valid within the maximum loads and tilt angles. There is no warning if the maximum permitted arm load is exceeded. For over-load cases and special applications, contact ABB for further analysis.

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1.5.2 Load diagrams

IRB 6620-150/2.2

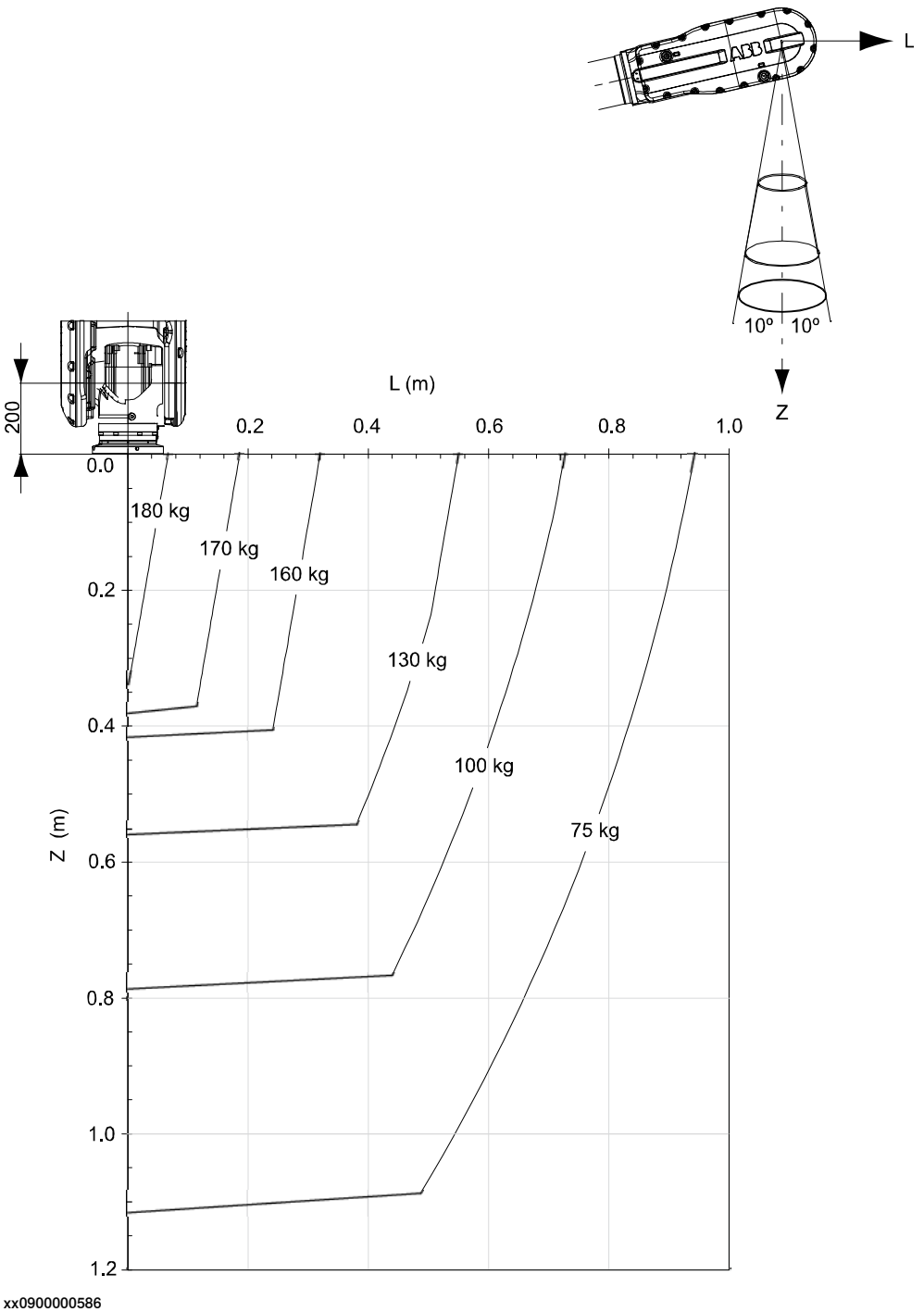


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1.5.2 Load diagrams
Continued

IRB 6620-150/2.2“ Vertical Wrist” (±10o)



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For wrist down (0º deviation from the vertical line).

	Without extra arm load	With 50kg arm load
Max load	215kg	180kg
Z_{max}	0.26m	0.34m
L_{max}	0.088m	0.066m

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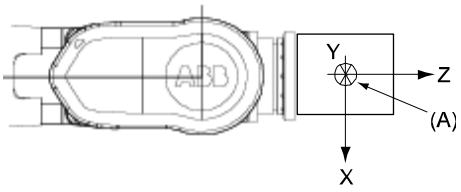
1.5.3 Maximum load and moment of inertia for full and limited axis 5 (center line down) movement

Note

Total load given as: Mass in kg, center of gravity (Z and L) in meter and moment of inertia (Jox, Joy, Joz) in kgm^2. $L = \sqrt{(X^2 + Y^2)}$.

Full movement of axis 5

Axis	Robot Type	Maximum moment of inertia
5	IRB 6620-150/2.2	$Ja5 = Load \times ((Z + 0{,}200)^2 + L^2) + max (J_{0x}, J_{0y}) \leq 138\ kgm^2$
6	IRB 6620-150/2.2	$Ja6 = Load \times L^2 + J_{0Z} \leq 107\ kgm^2$



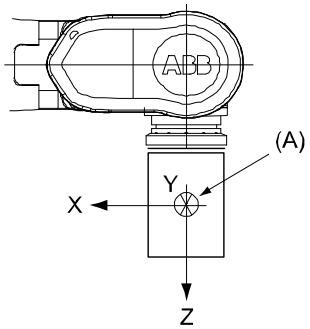
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Pos	Description
A	Center of gravity

	Description
Jox, Joy, Joz	Max. moment of inertia around the X, Y and Z axes at center of gravity.

Limited axis 5, center line down

Axis	Robot type	Maximum moment of inertia
5	IRB 6620-150/2.2	$Ja5 = Load \times ((Z + 0{,}200)^2 + L^2) + max (J_{0x}, J_{0y}) \leq 138\ kgm^2$
6	IRB 6620-150/2.2	$Ja6 = Load \times L^2 + J_{0Z} \leq 107$ kgm2



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Pos	Description
A	Center of gravity

Continues on next page

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1.5.3 Maximum load and moment of inertia for full and limited axis 5 (center line down) movement
Continued

	Description
Jox, Joy, Joz	Max. moment of inertia around the X, Y and Z axes at center of gravity.

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1.5.4 Wrist torque

General

The table below shows the maximum permissible torque due to payload.

Note

The wrist torque values are for reference only, and should not be used for calculating permitted load offset (position of center of gravity) within the load diagram, since those also are limited by main axes torques as well as dynamic loads. Furthermore, arm loads will influence the permitted load diagram. To find the absolute limits of the load diagram, use the RobotStudio add-in RobotLoad.

Robot type	Max wrist torque axis 4 and 5	Max wrist torque axis 6	Max torque valid at load
IRB 6620 - 150/2.20	736 Nm	383 Nm	150 kg

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1.5.5 Maximum TCP acceleration

General

Higher values can be reached with lower loads than the nominal because of our dynamical motion control QuickMove2. For specific values in the unique customer cycle, or for robots not listed in the table below, we recommend to use RobotStudio.

Maximum Cartesian design acceleration for nominal loads

Robot type	E-stop Max acceleration at nominal load COG [m/s^2]	Controlled Motion Max acceleration at nominal load COG [m/s^2]
IRB 6620 - 150/2.2	48	28

Note

Acceleration levels for emergency stop and controlled motion includes acceleration due to gravitational forces. Nominal load is defined with nominal mass and cog with max offset in Z and L (see the load diagram).

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1.6 Mounting of equipment

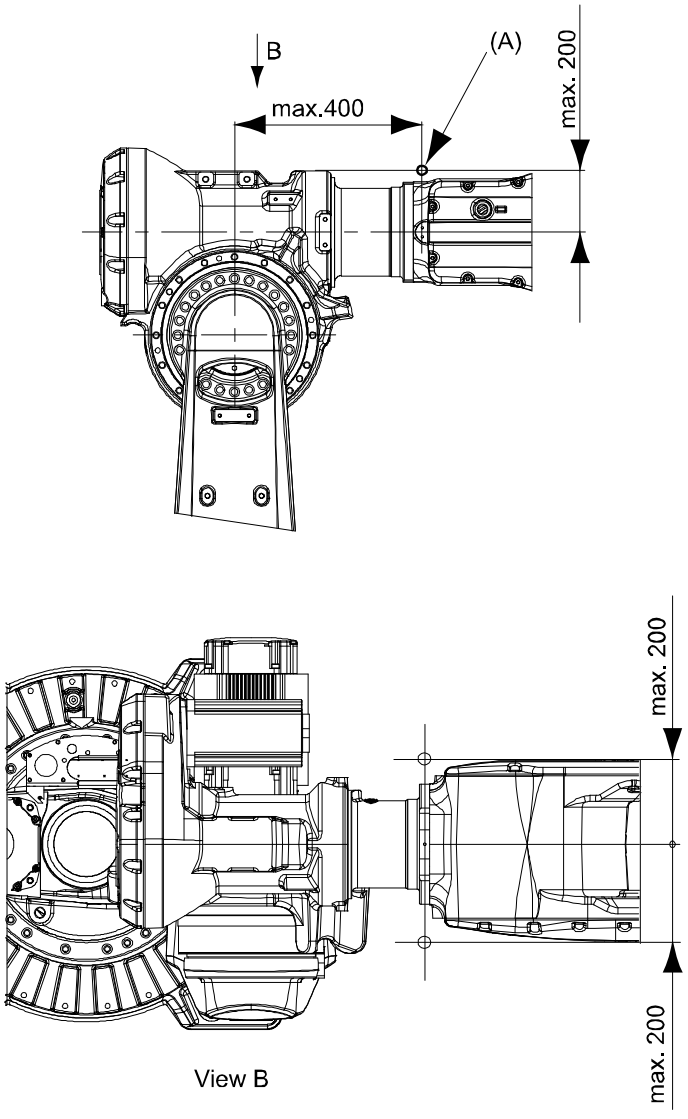
1.6.1 Mounting of equipment

General

Extra loads can be mounted on the upper arm housing and on the frame. Definitions of distances and mass are shown in Figure below. The robot is supplied with holes for mounting extra equipment (see Figure on next two pages).

Upper arm

Permitted extra load on to the upper arm ≤ 50 kg.



View B

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Pos	Description
A	Center of gravity for permitted extra load ≤ 50 kg.

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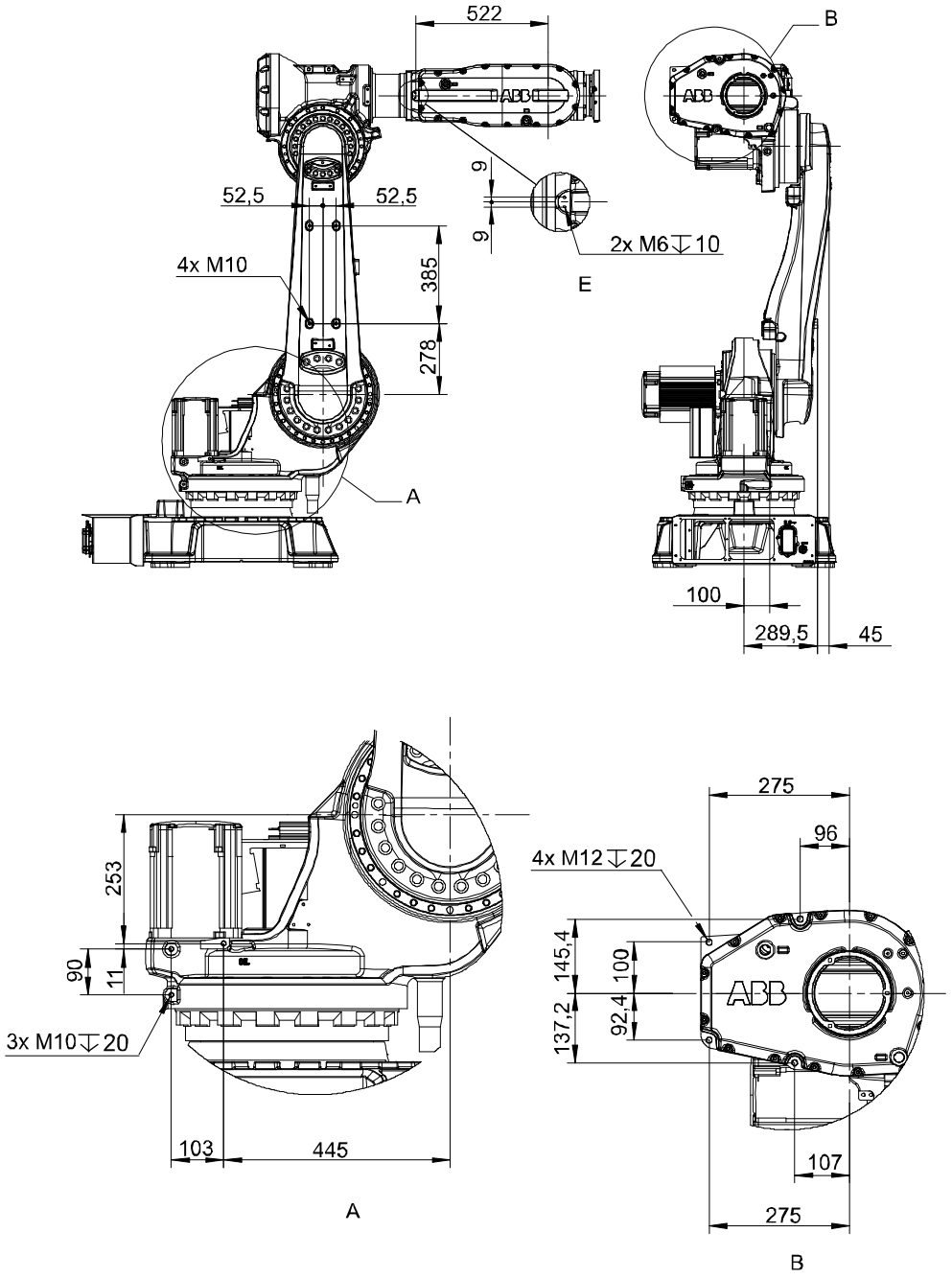
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1.6.1 Mounting of equipment
Continued

Frame

Permitted extra load on the frame is 100kg.

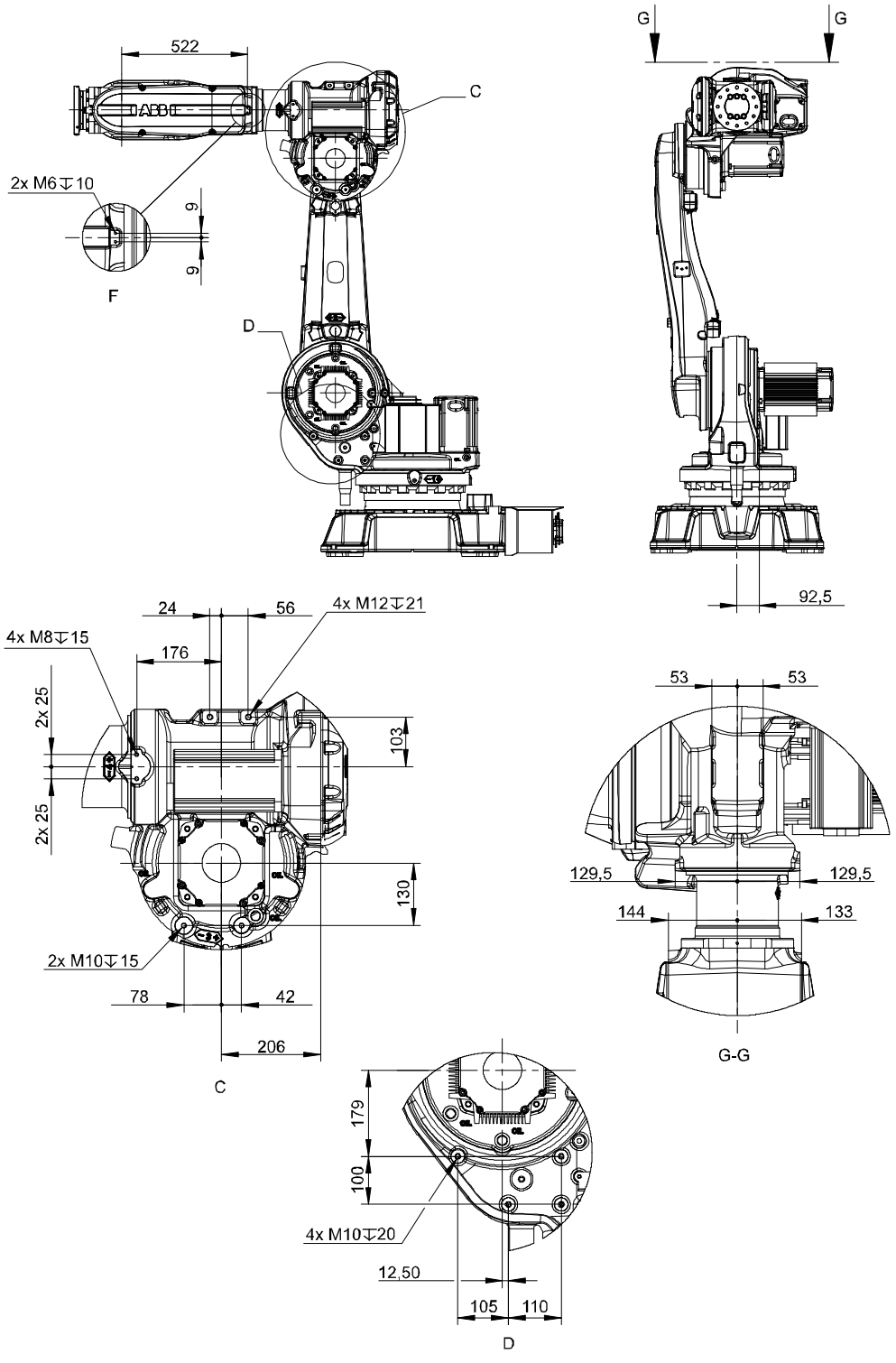
Holes for mounting extra equipment



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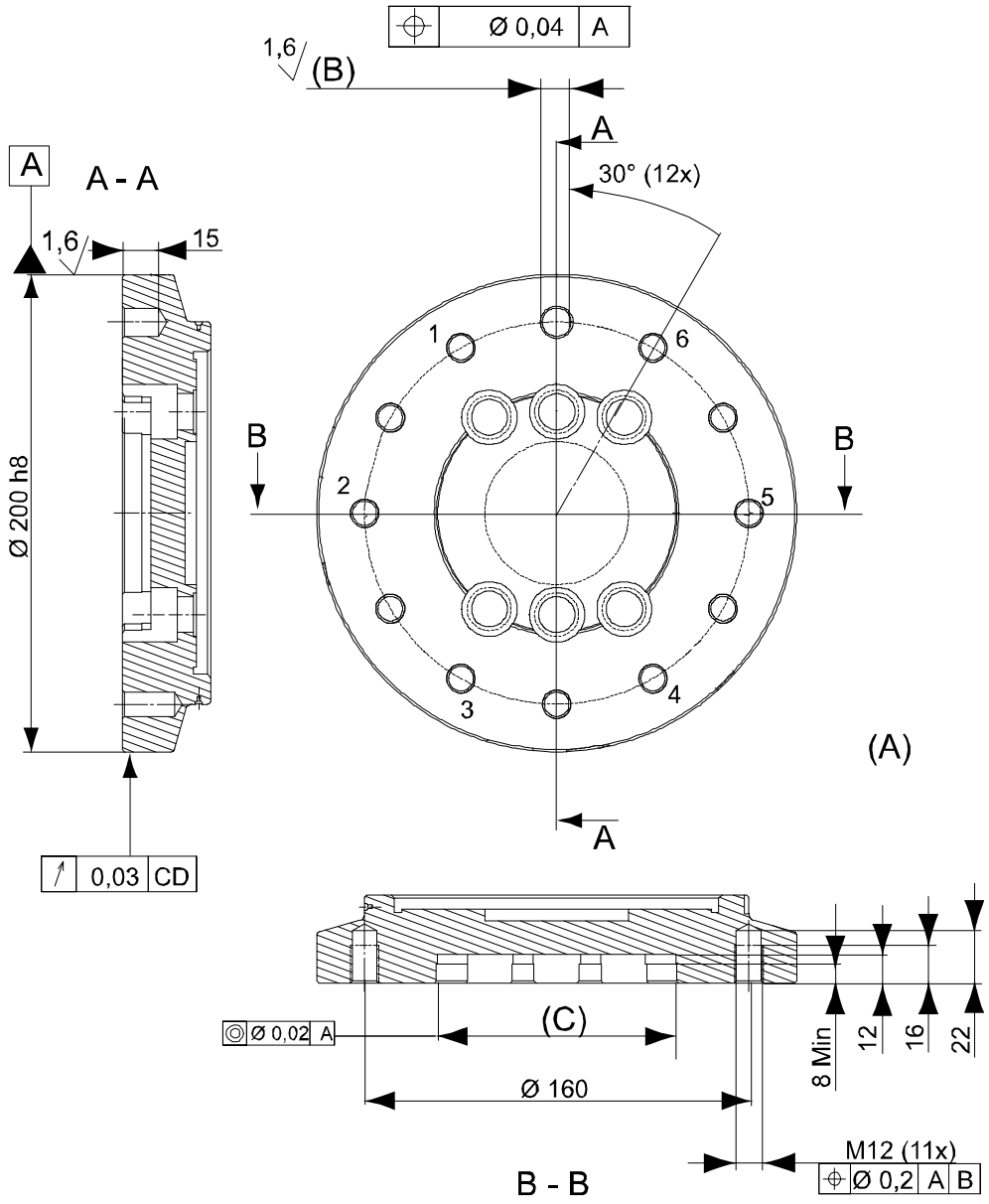
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1.6.1 Mounting of equipment
Continued

Robot Tool Flange



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Pos	Description
A	Minimum thread length for screws in M12-hole is 9 mm.
B	Ø 12 H7 Depth 15
C	Ø 100 H7 Depth 8 min

Fastener quality

When fitting tools on the tool flange, only use screws with quality 12.9. For other equipment use suitable screws and tightening torque for your application.

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1.7 Maintenance and troubleshooting

1.7.1 Introduction to Maintenance and Troubleshooting

General

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

- Maintenance-free AC motors are 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 robot, the required maintenance activities also depends on selected options. For detailed information on maintenance procedures, see Maintenance section in the Product Manual.

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1.8 Robot motion

1.8.1 Introduction to Robot Motion

Type of Motion - IRB 6620-150/2.2

Axis	Type of motion	Range of movement
		IRB 6620-150/2.2
1	Rotation motion	+ 170° to - 170°
2	Arm motion	+ 140° to - 65°
3	Arm motion	+ 70° to - 180°
4	Wrist motion	+ 300° to - 300°
5	Bend motion	+ 130° to - 130° (Limitations with DressPack)
6	Turn motion	+ 300° to - 300° default Max. ± 96 Revolutions[a]

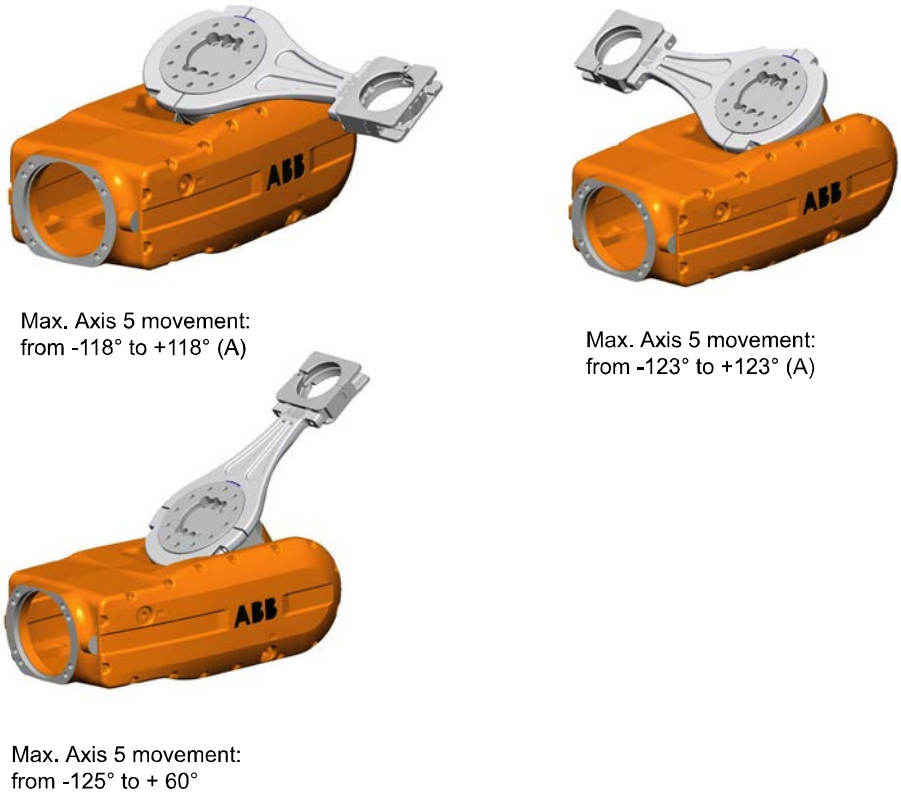
a. The default working range for axis 6 can be extended by changing parameter values in the software. Option 610-1 “Independent axis” can be used for resetting the revolution counter after the axis has been rotated (no need for “rewinding” the axis).

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Limitations Axis5 with DressPack Holder

Due to the DressPack holder at Axis6 there are the following limitations for Axis5 movement when DressPack Upper arm is used. See Figure below.



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Pos	Description
A	Different limitations for the DressPack Holder are due to the asymmetric fork of the robot wrist

IRB6620-150/2.2

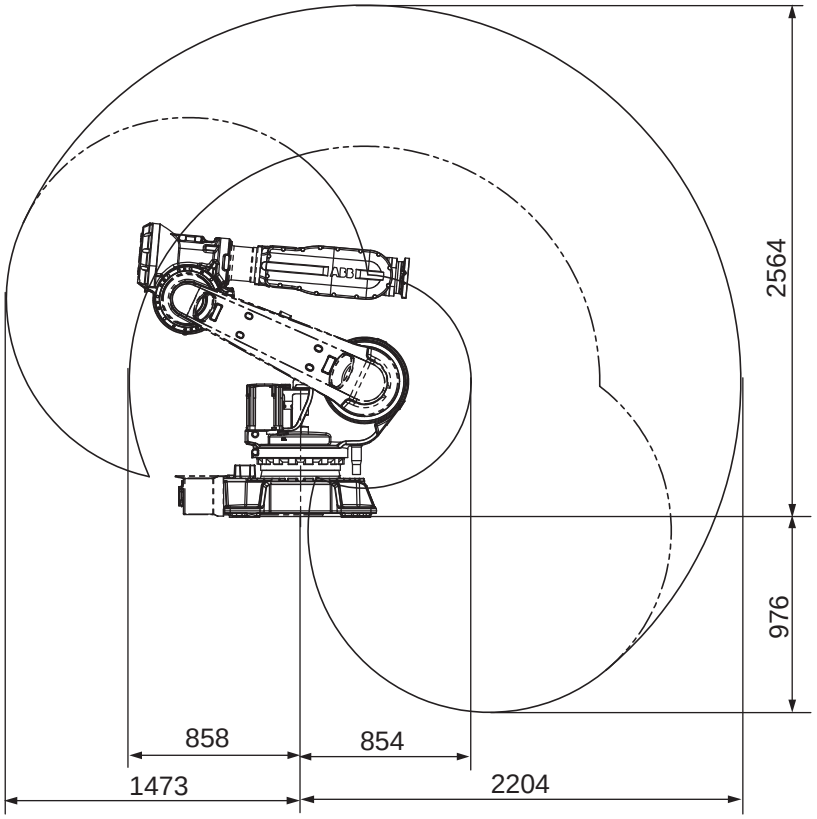
Robot type	Handling capacity (kg)	Reach (m)
IRB 6620-150/2.2	150	2.2

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1.8.1 Introduction to Robot Motion

Continued



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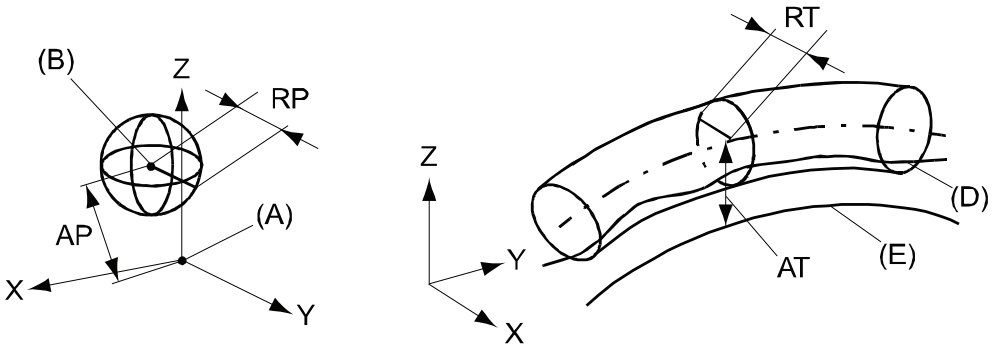
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1.8.2 Performance according to ISO 9283

General

At rated maximum load, maximum offset and 1.6 m/s velocity on the inclined ISO test plane, 1m cube with all six axes in motion. Values in the table below are the average result of measurements on a small number of robots. The result may differ depending on where in the working range the robot is positioning, velocity, arm configuration, from which direction the position is approached, the load direction of the arm system. Backlashes in gearboxes also affect the result.

The figures for AP, RP, AT and RT are measured according to figure below.



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Pos	Description	Pos	Description
A	Programmed position	E	Programmed path
B	Mean position at program execution	D	Actual path at program execution
AP	Mean distance from programmed position	AT	Max deviation from E to average path
RP	Tolerance of position B at repeated positioning	RT	Tolerance of the path at repeated program execution

Description	Performance
	IRB 6620-150/2.2
Pose accuracy, AP[a] (mm)	0.12
Pose repeatability, RP (mm)	0.03
Pose stabilization time, PSt (s)	0.08
Path accuracy, AT (mm)	3.03
Path repeatability, RT(mm)	0.62

Performance may differ slightly depending on hardware configuration. The data is measured with a side mounted manipulator, linear axis height 2.5 m and a leg distance of 6 m. The ISO-cube running is done in the middle between legs.

a. AP according to the ISO test above, is the difference between the teached position (position manually modified in the cell) and the average position obtained during program execution.

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1.8.3 Velocity

Maximum axis speeds

Robot Type	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6
IRB 6620-150/2.2	100°/s	90°/s	90°/s	150°/s	120°/s	190°/s

a. Travel speed for Linear Axis, 3.3 m/s

There is a supervision function to prevent overheating in applications with intensive and frequent movements.

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1.8.4 Robot stopping distances and times

Introduction

The stopping distances and times for category 0 and category 1 stops, as required by EN ISO 10218-1 Annex B, are listed in *Product specification - Robot stopping distances according to ISO 10218-1* (*3HAC048645-001*).

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1.9 Servo gun

1.9.1 Introduction to Servo Gun

General

The robot can be supplied with hardware and software for control of the following configurations:

- Stationary Gun
- Robot Gun
- Robot Gun and Track Motion
- Track motion

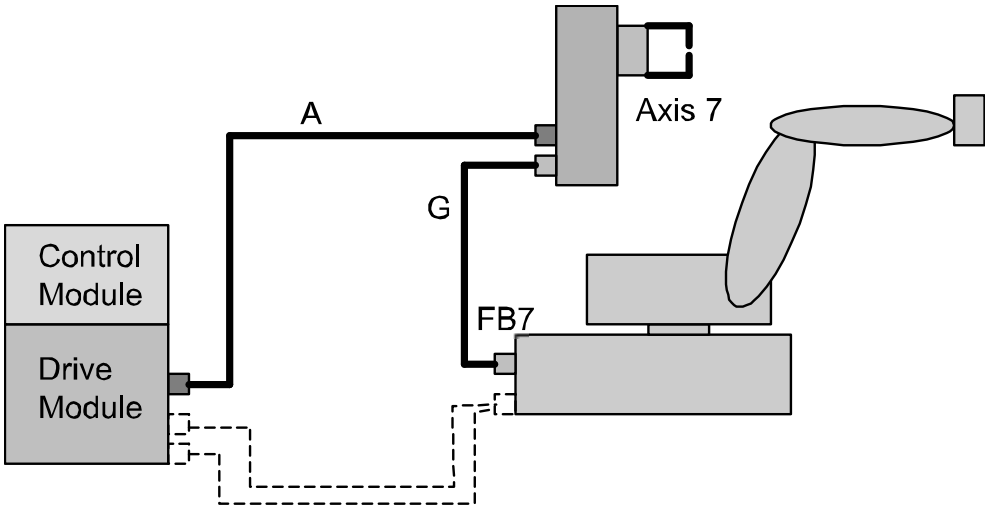
The specific parts related to the servo motor control for electrical welding guns and for track motion configurations are shown in the conceptual pictures below. The major parts and required options are also stated in the configurations lists below each picture.

The cables for control of the basic robot are shown in the pictures with dotted lines.

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1.9.2 Stationary Gun

General



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Option

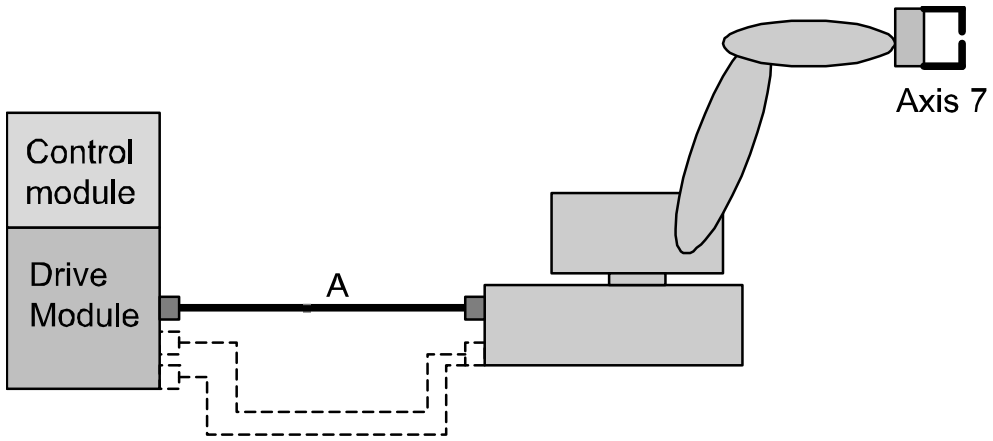
Options according to the table below are required to complete the delivery. For further details on each option see corresponding Product specification.

Option	Description	Product specification
785-5	Stationary gun.This option includes: Cable G (7 m length) for resolver signals from robot base (FB7) to stationary gun/axis 7.	
770-4	First additional drive. Drive unit for 7th axis with corresponding cables assembled inside Drive Module.	Controller IRC5 with FlexPendant
786-1,-2,-3,-4	Connection to first drive. Cable A (7-30 m) between Drive Module and stationary gun/axis 7 for servo drive power.	
635-3, -4 or -5	Spot Servo, Spot Servo Multiple Guns or Spot Servo Equalizing.	Controller software IRC5

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1.9.3 Robot Gun

General



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Option

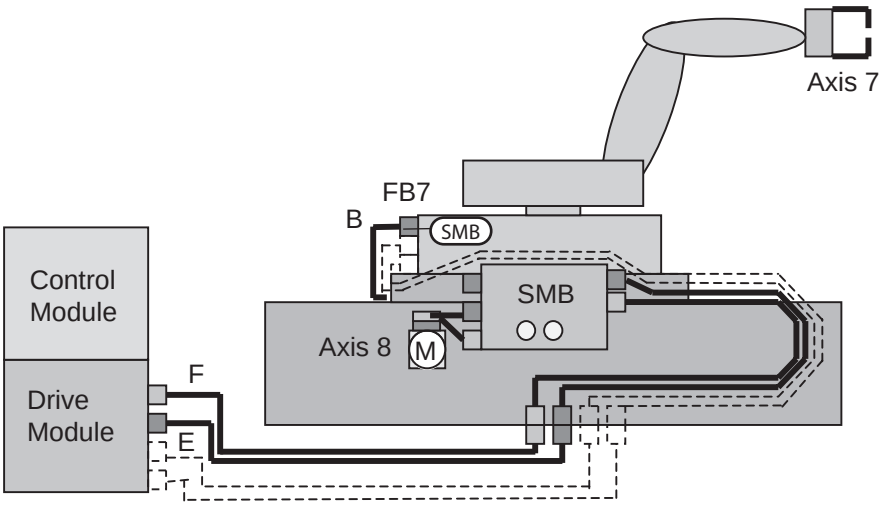
Options according to table below are required to complete the delivery. For further details on each option see corresponding Product specification.

Option	Description	Product specification
785-1	Robot gun. This option includes: Cables within manipulator for servo power signals (servo gun/axis 7).	
770-4	First additional drive. Drive unit for 7th axis with corresponding cables assembled inside Drive Module.	Controller IRC5 with FlexPendant
786-1,-2,-3,-4	Connection to first drive. Cable A (7-30 m) between Drive Module and robot base for servo drive power.	
635-3, -4 or -5	Spot Servo, Spot Servo Multiple Guns or Spot Servo Equalizing.	Controller software IRC5

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1.9.4 Robot Gun and Track Motion

General



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Option

Options according to table below are required to complete the delivery. For further details on each option see corresponding Product specification.

Option	Description	Product specification
785-1 + 1002-2 [i]	Robot Gun + Track Motion. This option includes: Cables within manipulator for servo power signals (servo gun/axis 7).	Track motion IRBT6004 + IRB 6620
Track motion delivery includes	Serial measurement box (SMB2, Split box) for distribution of servo power to axis 8. The box is placed on the track motion. Cables from serial measurement box to track motion. Cable B for servo power (1,5 m length).Connection to first and second drive. Cable E and F (7-22 m) between Drive Module and serial measurement box for dual servo drive power/resolver signals.	Track motion IRBT6004
907-1	First additional drive. Drive unit for 7th axis with corresponding cables assembled inside Drive Module.	Controller IRC5 with FlexPendant
907-1	Second additional drive. Drive unit for 8th axis with corresponding cables assembled inside Drive Module.	Controller IRC5 with FlexPendant
635-3, -4 or -5	Spot Servo, Spot Servo Multiple Guns or Spot Servo Equalizing.	Controller software IRC5
864-1	Resolver connection, axis 7, on base (FB7).	

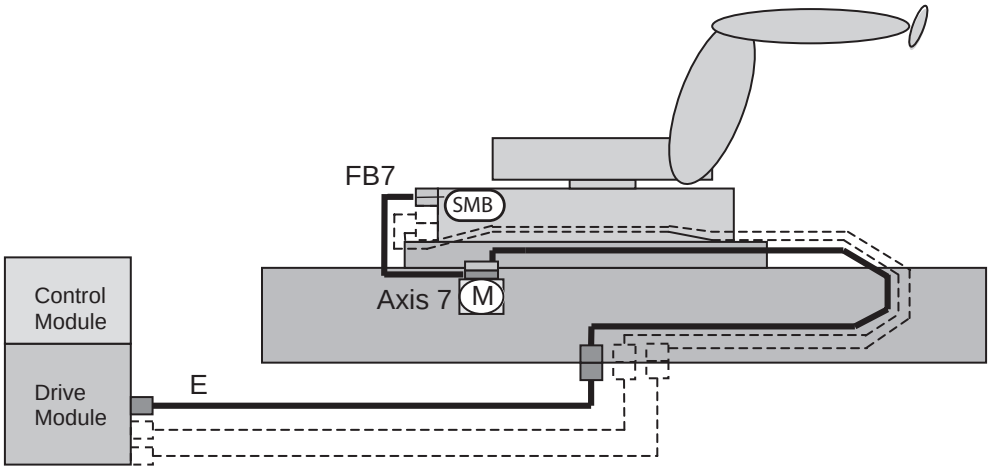
[i] To specify robot on track equipped with servo gun. Option 1002-2 from specification form for Track Motion.

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1.9.5 Track Motion IRBT 6004

General

The robot can be supplied with a Track Motion, see Product specification - IRBT6004. For configuration and specification of hardware see Figure below.



xx1000000504

Note

General. The robot can be combined with a Track Motion, for further details see Product specification - IRBT6004/IRBT7004.

Options

Options according to table below are required to complete the delivery. For further details on each option see corresponding Product specification.

Option	Description	Product specification
Track motion delivery includes	Serial measurement (SMB) in manipulator is used, together with option 864-1, FB7 for signals to axis 7/Track motion. Cable E for between Drive Module and track motion servo for drive power.	Track motion IRBT6004/IRBT7004
907-1	First additional drive. Drive unit for 7th axis with corresponding cables assembled inside Drive Module.	
864-1	Resolver connection, axis 7, on base (FB7).	

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2 DressPack

2.1 Introduction

2.1.1 General

DressPack

Includes options for Upper arm, Lower arm and Floor pos B, and C, see Figure below. These are described separately below but are designed as a complete package for various applications.

The DressPack for the floor contains customer signals.

The DressPack for upper and lower arm contains process cable packages including signals, process media (water and/or air) and power feeding (for Spot Welding power) for customer use.

Necessary supports and brackets are also included.

The routing of the process cable package on the robot is available in different configurations.

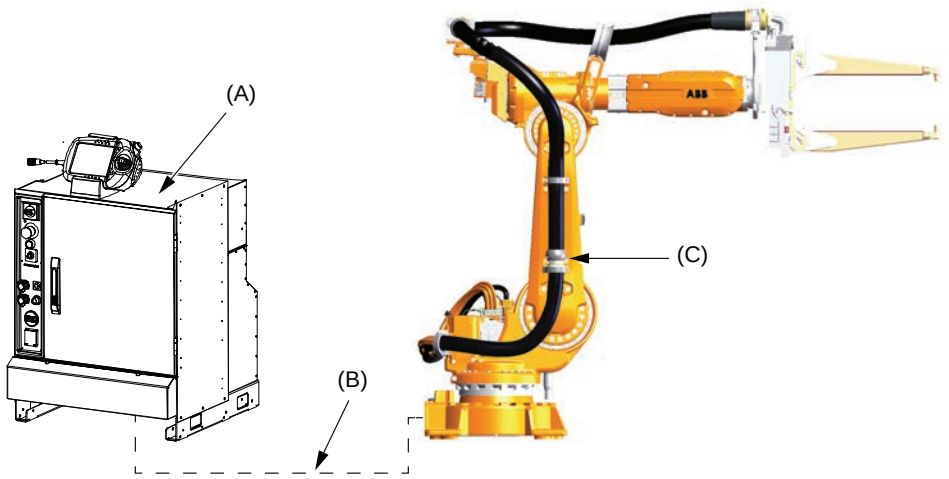
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2.1.1 General
Continued

Spotwelding

The package supplies above described DressPack, transformer gun/gripper with necessary media and software, see the following figure.



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Pos	Description
A	Robot controller, (including 7th axis drive for servo gun)
B	DressPack, Floor
C	DressPack, Routing base to Axis 6

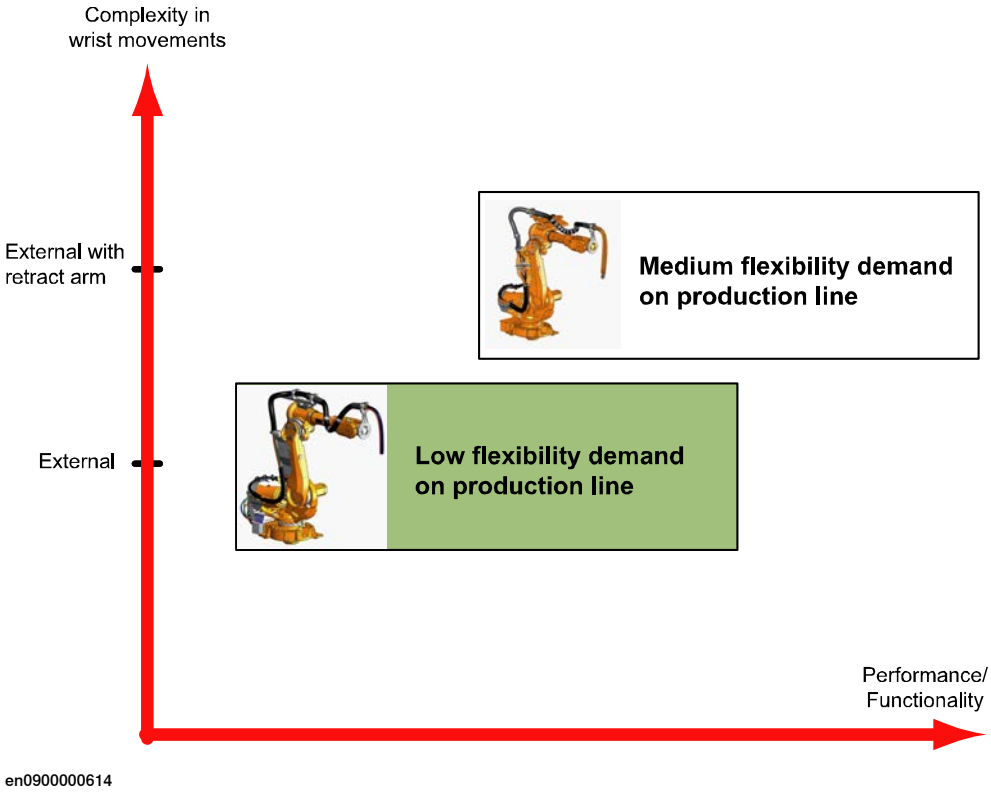
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2.1.2 Product range

DressPack solutions for different user's needs

The robot can be equipped with the well integrated cable and hose packages in the DressPack option. The DressPack is designed in close conjunction with the development of the manipulator and is therefore well synchronized with the robot.

As there is a big span between different user's need of flexibility, depending of the complexity of the operation/wrist movements, there are three major levels of dress pack solutions available, see Figure below.



External with retract arm

This type of dress pack is recommended for production where there are limited complexity in wrist movements. This normally occurs when there are not to many different products running in the same production cell.

Available option is 781-1 for spot welding.

External

This type of dress pack is recommended where there are less complexity in wrist movements. This normally occurs when there are not many different products running in the production cell. This package requires more individual adjustment to optimize towards robot program at set up.

Available options are 780-3 for material handling and 781-1 for spot welding.

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2.1.3 Limitations of robot movements

General

When using DressPack options on the upper arm the robot movements will be limited. The position of bracket installed on axis 6 must be taken in consideration when optimizing the possible robot movements.

- The axis 5 working range is limited to +/- 110 degrees due to the axis 6 bracket attachment (when applicable).
- In bending backwards positions there are limitations due to interference with manipulator or Water and Air unit (if such is mounted).

Note

For more detail information please contact Serop Product support/SEROP/ABB.

E-mail address: serop.product_support@se.abb.com

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2.1.4 Impact on MH3 DressPack lifetime

General

There are some robot movements/positions that shall be avoided in the robot production program. This will improve the lifetime significantly of external upper arm MH3 DressPack and wear parts e.g. protection hose, hose reinforcement and protective sleeves.

- The axis 5 movement is not allowed to press the DressPack against the robot upper arm.
- Combined rotation of the wrist axes must be limited so that the DressPack is not wrapped hard against the upper arm.

See the Product Manual for more detailed information and recommended set-up adjustments.

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2.1.5 Chapter Structure

General

The chapter DressPack are structured in the following way.

The DressPack can be delivered in three versions developed for two different applications. Each type is described under separate chapters.

Chapter	Option	Description
2.2	DressPack	DressPack includes general description DressPack common information.

Material Handling application DressPack

Chapter	Option	Description
2.3	Type H	DressPack for Material Handling.

Spot Welding application DressPack

Chapter	Option	Description
2.4	Type S/Se	DressPack for electrical servo driven or pneumatic transformer guns carried by the robot manipulator.
2.5	Type HS/HSe	DressPack for handling the part against electrical servo driven or pneumatic transformer guns stationary mounted.

Connector Kits

Chapter	Option	Description
2.8	Connector kits	General description of Connector Kits

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2.2 DressPack

2.2.1 Introduction to DressPack

Available DressPack configurations for Material Handling

The table below shows the different DressPack configurations available for Material Handling.

	Lower(/upper) arm	Upper arm
Option 778-1, Material Handling	Option 798-1, Base to axis 3	Option 780-3, Axis 3 to axis 6 External routing
	Option 781-1, Base to axis 6	

Available DressPack configurations for Spot Welding

The table below shows the different DressPack configurations available for Spot Welding.

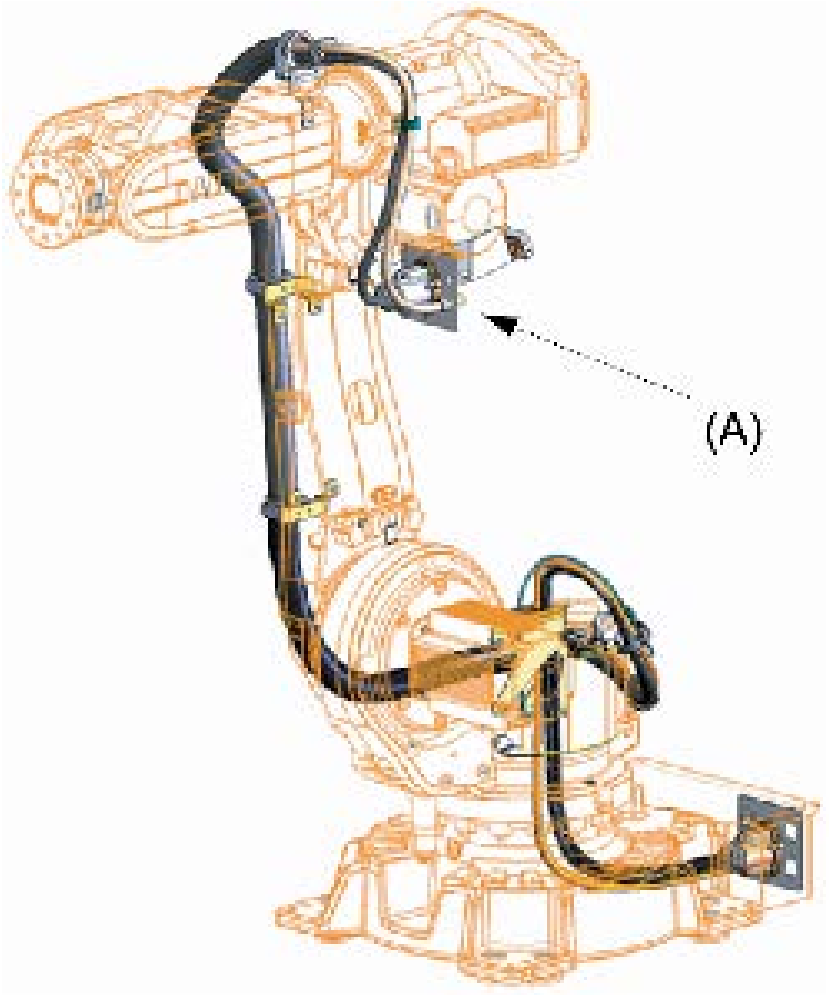
	Lower/upper arm
Option 778-2, Spot Welding	Option 781-1, Base to axis 6 External routing

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DressPack lower arm

For the Material Handling application there is one routing for the lower arm, shown below in Figure below. This is designed to fit to the upper arm routing.



xx0900000617

Pos	Description
A	Connection point at axis 3. Base to axis 3, option 798-1.

Continues on next page

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DressPack upper arm

There is one alternative for the Material Handling application, shown in Figure below.



xx0900000619

Ext. Axis 3 to axis 6, option 780-3.

Continues on next page

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2.2.1 Introduction to DressPack
Continued

DressPack Upper/Lower arm

For Spot Welding application there are one alternative available, without connection point between lower and upper arm, see Figure below.



xx0900000620

Base to axis 6, option 781-1.

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2.2.2 Build-in features for upper arm DressPack

External

Material handling (option 780-3):

- Internal routing through the rear part of the upper arm.
- Protection hose can easily be replaced if damaged.
- Adjustment for optimal hose/cable lengths.

External with retract arm

Spot welding and Material handling (option 781-1):

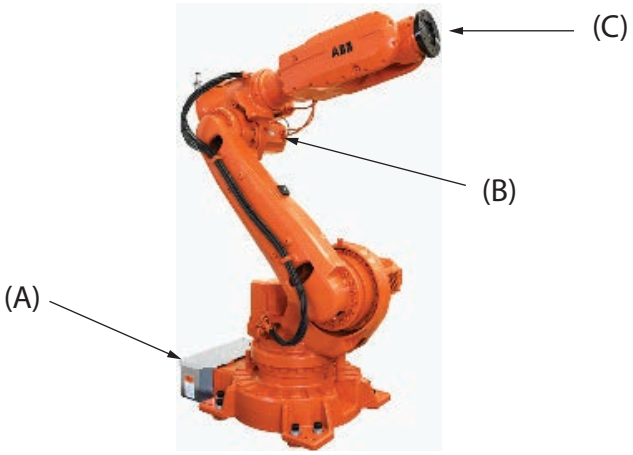
- Adjustable bracket axis 6 with position marking.
- Adjustable retracting force to optimize the system depending on cycle and hose package.

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2.2.3 Interface descriptions for DressPack

General

Below is an overview showing the different DressPack options and locations. For detailed information see the circuit diagram, see *Product manual - DressPack IRB 6620*



xx1300000215

Pos	Location	Options
A	Base	798-1, 781-1 and 864-1
B	Axis 3	798-1
C	Axis 6	780-3 and 781-1

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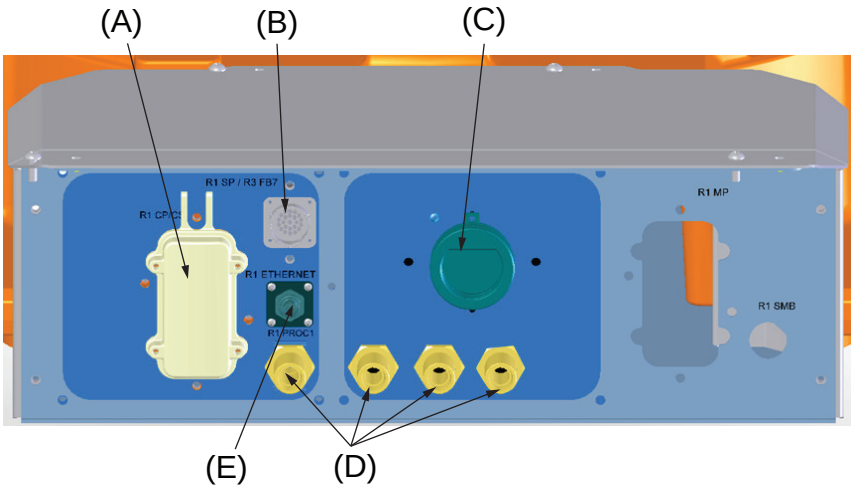
Base

Material handling (option 798-1), see figure below:

- Included are: A, B (if applicable), one D (Proc 1) and E (if applicable).

Spot welding (option 781-1), see figure below:

- Included are: A, B (if applicable), C, D (Proc 1-4) and E (if applicable).



xx1000000619

For corresponding parts of the tool, see *Connection kits on page 95*.

Pos	Description
A	R1.CP/CS
B	R1.SP (Spot Welding Servo gun) or FB7 (Resolver connection)
C	R1.WELD 3x35mm2. (Spot Welding)
D	R1.PROC 1 (Material Handling/Spot Welding 1/2”, M22x1.5, 24 degree seal) R1.PROC 2 - 4 (Spot Welding 1/2”, M22x1.5, 24 degree seal)
E	R1.ETHERNET (M12 connector, when EtherNet communication is selected)

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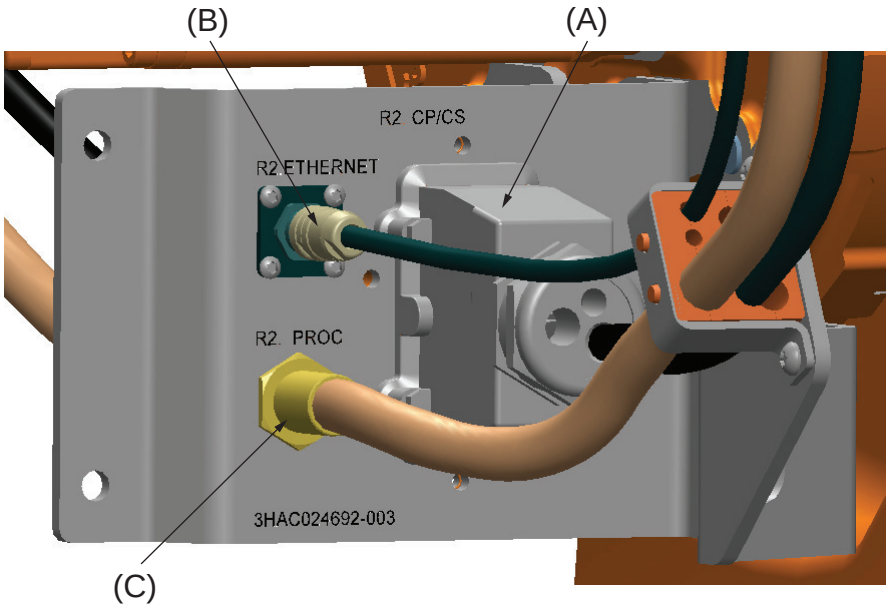
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2.2.3 Interface descriptions for DressPack
Continued

Axis 3

Material handling (option 798-1), see figure below:

- Included are: A, B (if applicable) and one C (Proc 1).



xx1100000958

For corresponding parts of the tool, see *Connection kits on page 95*.

Pos	Description
A	R2.CP/CS
B	R2.ETHERNET (M12 connector, when EtherNet communication is selected)
C	R2.PROC 1 (Material Handling 1/2”, M22x1.5, 24 degree seal) R2.PROC 2-4 (Spot Welding 1/2”, M22x1.5, 24 degree seal)

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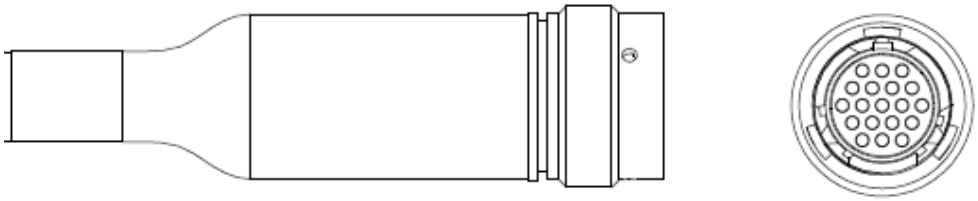
Axis 6

External

Material handling (option 780-3), see figure below:

- Hose and cable free length, min. 1000 mm.
- Air hose ends with free end.

The cable ends with a connector, for corresponding parts of the tool, see *Connection kits on page 95*:



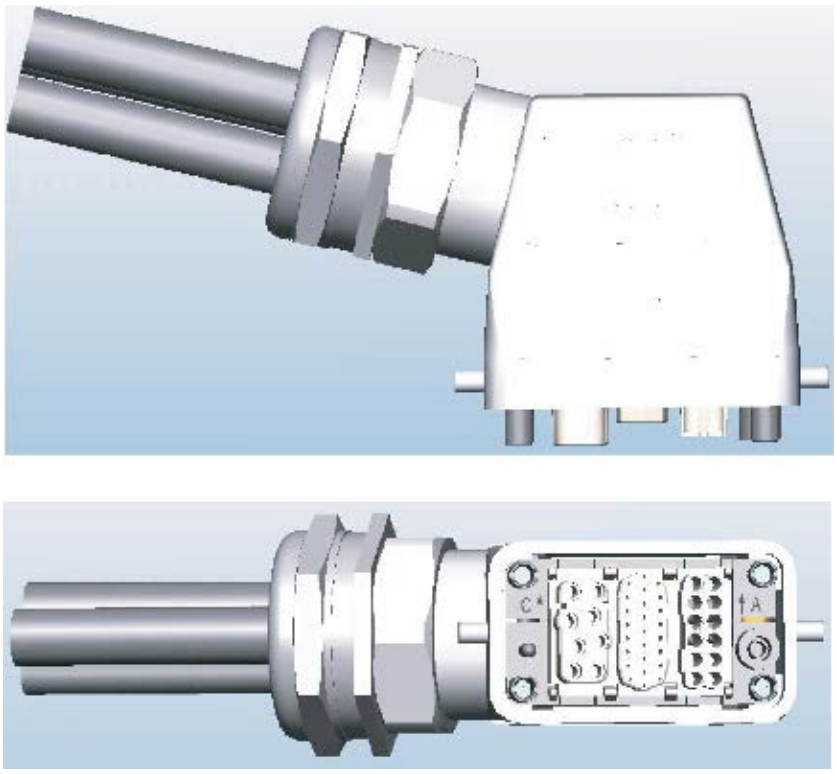
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External with retract arm

Spot welding (option 781-1), see figure below:

- Hose and cable free length, min. 1000 mm.
- Hoses and weld power cable (only for spot welding) end with free end.
- All signals are connected with a Harting connector.

The cable ends with a connector, for corresponding parts of the tool, see *Connection kits on page 95* and within the Harting product offer.



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2.2.3 Interface descriptions for DressPack
Continued

EtherNet connector

Spot welding/Material handling (option 780-3), see figure below:

- Cable free length, min. 1000 m.
- Signals are connected with a M12 connector.

The cable ends with a connector, the different main parts within the connector are described in the list below, for corresponding parts of the tool, see within the Phoenix product offer.

Name	Harting article
PIN connector, R3.ETHERNET	21 03 882 1405
PIN	61 03 000 0094
Sealing cap M12x1	3HAC033600-001 ABB article



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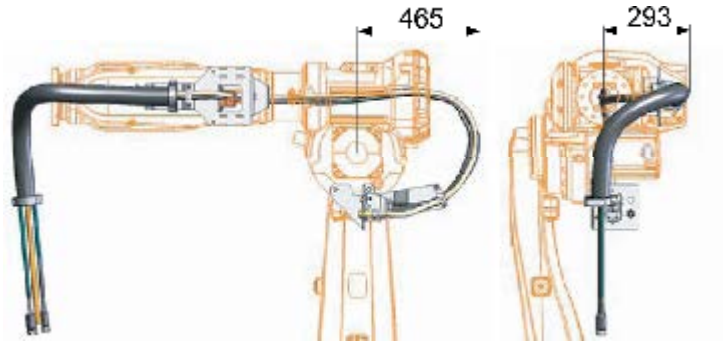
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2.2.4 Dimensions

General

Dimensions are shown in Figures below.

Axis 3 - to axis 6 (option 798-1 + 780-3)



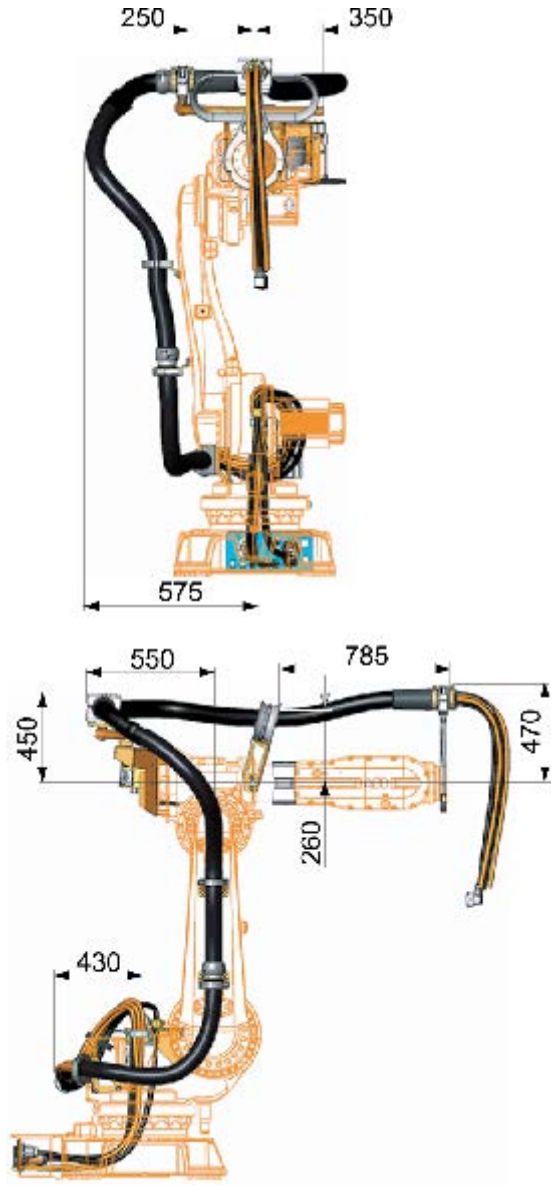
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2.2.4 Dimensions
Continued

Base to axis 6 (option 781-1)



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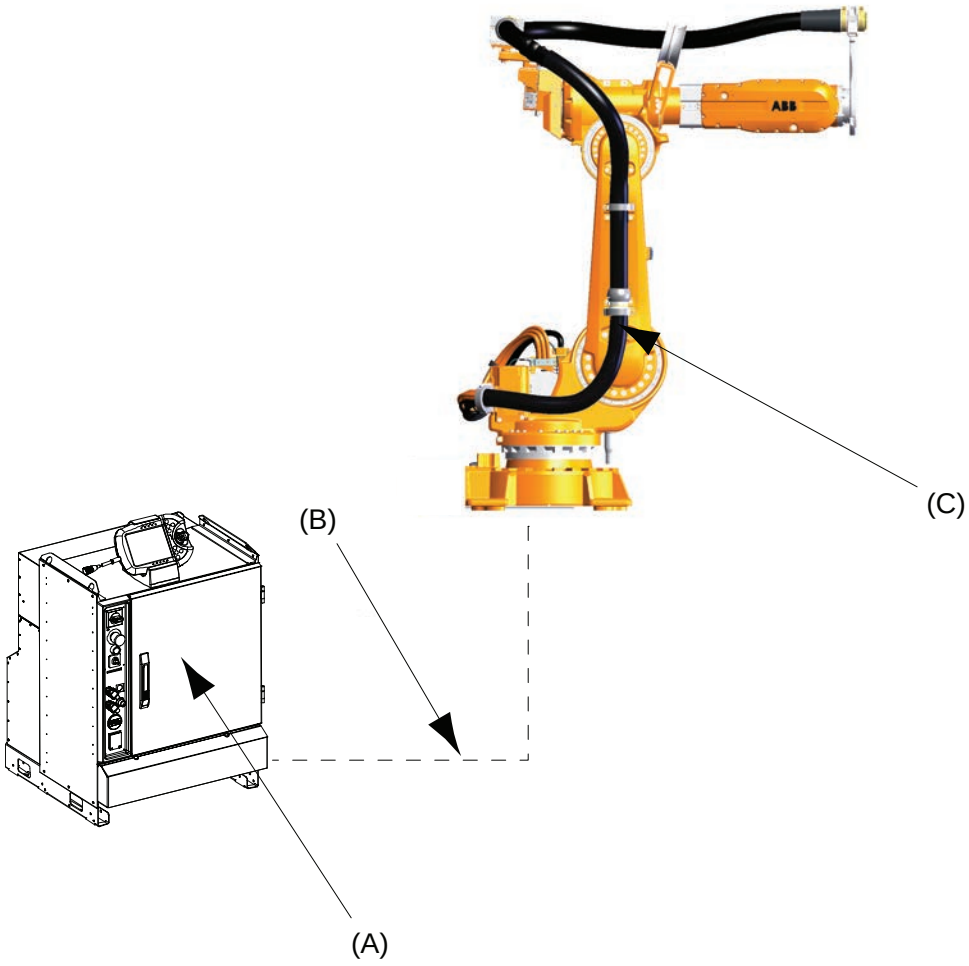
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2.3 Type H

2.3.1 Introduction to TypeH

General

Variant Type H is designed for Material Handling (MH) application. Included modules are shown in Figure below.



xx0900000733

Pos	Name
A	Robot Cabinet IRC5
B	DressPack, Floor: Connection of Parallel Communication, Can/DeviceNet or Profibus
C	DressPack, Routing base to Axis 6

Available configurations with linked option numbers are described below.

Continues on next page

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2.3.1 Introduction to TypeH
Continued

Option description

Option	Type	Description
16-1	Connection to cabinet	Floor cables and connections inside the I/O section for the DressPack are chosen. The length and configuration of the floor harness is specified under the options below. Option 94-1,-2,-3,-4 for parallel communication. Option 90-2,-3,-4,-5 for parallel communication and field bus communication with Can/DeviceNet. Option 92-2,-3 for parallel communication and field bus communication with Profibus.
455-1	Parallel communication	Offers the signal cables needed for parallel communication in lower and upper arm DressPack. To be combined with option 94-1,-2,-3,-4,-5.
455-4	Parallel and Bus communication	Offers the signal cables needed for the combination of parallel and bus communication in lower and upper arm DressPack. To be combined with option90-2,-3,-4,-5 or 92-2,-3.
455-8	Parallel and Ethernet communication	Offers the signal cables needed for the bus communication in lower and upper arm DressPack. To be combined with option 859-1,-2,-3,-4. Requires selection of option 94-X.

- Option 778-1. For the application Material Handling.

  Lower arm
- Option 798-1. Base to axis 3. Offers DressPack Lower arm for Material Handling application with internal routing from base to axis 3.

  Upper arm
- Option 780-3 (and Option 798-1). Axis 3 to 6. Offers DressPack upper arm for Material Handling application with external routing from axis 3 to 6.

  Lower/upper arm
- Option 781-1. External base to axis 6. Offers DressPack Lower and Upper arm external routing with intermediate connection point only for signals.

The available alternatives and allowed combinations are shown in the schematic Figure below.

Application Interface connected to Option 16-1, Cabinet	Option 455-1, Parallel communication	Option 94-1, -2, -3, -4 Cable length, Parallel communication	Option 778-1, Material Handling
	Option 455-4, Parallel and bus communication	Option 90-2, -3, -4, -5 Option 92-2, -3 Cable length, Parallel and bus communication	
	Option 455-8, Parallel and Ethernet communication	Option 859-1, -2, -3, -4 Cable length, Ethernet communication	

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Continued

	Lower(/upper) arm	Upper arm
Option 778-1, Material Handling	Option 798-1, Base to axis 3	Option 780-3, Axis 3 to 6 External routing
	Option 781-1, Base to axis 6	

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2.3.2 Configuration result for TypeH

General

Depending on the choice of options above the DressPack will have different content. The choice of routing will not affect the content. See tables for signal content below.

DressPack. Parallel communication

- Option 16-1 with Connection to cabinet (Option 94-1,-2,-3,-4 to specify cable length)
- Option 455-1. Parallel communication
- Option 778-1. Material Handling
- Option 798-1. Internal routing, DressPack Lower arm

One of the options:

- Option 780-3 (and Option 798-1). External routing
- Option 781-1. External routing with retract arm

The table below shows the available type of wires/media.

Type	At terminals in cabinet	At Connection point. Base, axis6	Cable/part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0,5 mm^2	250 VAC, 5 A rms [a]
Protective earth		1	0,5 mm^2	250 VAC [a]
Customer Signals (CS)				
Signals twisted pair	20	20 (10x2) [b]	0,23 mm^2	50 V DC, 1 A rms
Signals twisted pair and separate shielded	8	8 (4x2)	0,23 mm^2	50 V DC, 1 A rms
Media				
Air (PROC 1)		1	12,5 mm inner diameter	Max. Air pressure 16 bar/230 PSI

a. For option 780-3 50 VAC / 60 VDC.

b. For option 780-3 8 signals instead of 20

Parallel and Can/DeviceNet

The table below shows the available type of wires/media.

Type	At terminals in cabinet	At Connection point. Base, axis6	Cable/part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0,5 mm^2	250 VAC, 5 A rms [a]
Protective earth		1	0,5 mm^2	250 VAC [a]
Customer Signals (CS)				
Signals twisted pair	20	20 (10x2) [b]	0,23 mm^2	50 V DC, 1 A rms

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Type	At terminals in cabinet	At Connection point. Base, axis6	Cable/part area	Allowed capacity
Signals twisted pair and separate shielded	8	8 (4x2)	0,23 mm^2	50 V DC, 1 A rms
Customer bus (CBus)				
Bus signals	At bus board	2	0,14 mm^2	Can/DeviceNet spec
Bus Power	At bus board	2	0,23 mm^2	50 V DC, 1 A rms
Signals twisted pair	6	6 (3x2)	0,14 mm^2	50 V DC, 1 A rms
Media				
Air (PROC 1)		1	12,5 mm inner diameter	Max. Air pressure 16 bar/230 PSI

a. For option 780-3 50 VAC / 60 VDC.

b. For option 780-3 8 signals instead of 20.

Parallel and Profibus

The table below shows the available type of wires/media.

Type	At terminals in cabinet	At connection point. Base, axis 6	Cable/part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0,5 mm^2	250 VAC, 5 A rms [a]
Protective earth		1	0,5 mm^2	250 VAC [a]
Customer signals (CS)				
Signals twisted pair	22	22 (11x2) [b]	0,23 mm^2	50 V DC, 1 A rms
Signals twisted pair and separate shielded	8	8 (4x2)	0,23 mm^2	50 V DC, 1 A rms
Customer bus (CBus)				
Bus signals	At bus board	2	0,14 mm^2	Profibus 12 Mbit/s spec
Signals twisted pair	6	6 (3x2)	0,14 mm^2	50 V DC, 1 A rms
Media				
Air (PROC 1)		1	12,5 mm inner diameter	Max. air pressure 16bar/230 PSI

a. For option 780-3 50 VAC / 60 VDC.

b. For option 780-3 8 signals instead of 20.

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2.3.2 Configuration result for TypeH
Continued

Parallel and Ethernet

The table below shows the available type of wires/media.

Type	At terminals in cabinet	At connection point. Base, axis 6	Cable/part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0,5 mm^2	250 VAC, 5 A rms [i]
Protective earth		1	0,5 mm^2	250 VAC
Customer signals (CS)				
Signals twisted pair	20	20 (10x2) [ii]	0,23 mm^2	50 V DC, 1 A rms
Signals twisted pair and separate shielded	8	8 (4x2)	0,23 mm^2	50 V DC, 1 A rms
Customer bus (Ethernet)				
Bus signals	4	4	0,4 mm^2	Ethernet CAT 5e, 100 Mbit [iii]
Media				
Air (PROC 1)		1	12,5 mm inner diameter	Max. air pressure 16bar/230 PSI

i For option 780-3 50 VAC / 60 VDC.
ii For option 780-3 8 signals instead of 20.
iii Ethernet with wire colors according to PROFINET standard, M12-connectors.

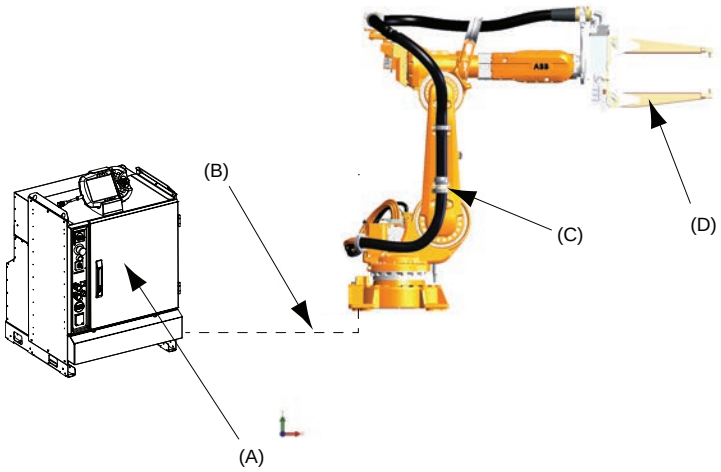
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2.4 Type S/Se

2.4.1 Introduction to TypeSe

General

Variant Type S is designed for robot handled pneumatic gun and Se is designed for robot handled servo-controlled tool (electrical gun). Included modules are shown in Figure below. Available configurations with linked option numbers are described below.



xx0900000736

Pos	Name
A	Robot Cabinet IRC5 (including 7th axis drive)
B	DressPack, Floor
C	DressPack, Routing base to axis 6
D	Robot Gripper

Available configurations and allowed combinations with linked option numbers are described below.

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2.4.1 Introduction to TypeSe
Continued

Option Description

Option	Type	Description
16-1	Connection to cabinet	Floor cables and connections inside the I/O section for the DressPack are chosen. The length and configuration of the floor harness is specified under the options below. Option 94-1,-2,-3,-4 for parallel communication Option 90-2,-3,-4,-5 for parallel communication and field bus communication with Can/DeviceNet Option 92-2,-3 for parallel communication and field bus communication with Profibus
455-1	Parallel communication	Offers the signal cables needed for parallel communication in lower and upper arm DressPack. To be combined with option 94-1,-2.
455-4	Parallel and Bus communication	Offers the signal cables needed for the combination of parallel and bus communication in combination in lower and upper arm DressPack. To be combined with option 90-2,-3,-4,-5 or 92-2,-3.
455-8	Parallel and Ethernet communication	Offers the signal cables needed for the bus communication in lower and upper arm DressPack. To be combined with option 859-1,-2,-3,-4. Requires selection of option 94-X.

- Option 778-2. For the application Spot Welding.

  Lower/upper arm
- Option 781-1 (and option 778-2). External base to axis 6, Offers DressPack Lower and Upper arm external routing without intermediate connection point.

The available alternatives and allowed combinations are shown in the schematic Figure below.

Application interface connected to option 16-1, Cabinet	Option 455-1 Parallel communication	Option 94-1, -2, -3, -4 Cable length, Parallel communication	Option 778-2, Spot Welding
	Option 455-4 Parallel and bus communication	Option 90-2, -3, -4, -5 Option 92-2, -3 Cable length, Parallel and bus comminucation	
	Option 455-8, Parallel and Ethernet communication	Option 859-1, -2, -3, -4 Cable length, Ethernet communication	

Continued

	Lower/upper arm
Option 778-2, Spot Welding	Option 781-1, Base to axis 6 External routing

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2.4.2 Configuration result for Type S/Se

General

Depending on the choice of options above (combined with option 785-1 Robot gun) the DressPack will have different content. The choice of routing will not affect the content. See tables for signal content below.

DressPack. Parallel communication

- Option 16-1 with Connection to cabinet (not valid for 781-2) (Option 94-1,-2,-3,-4 to specify cable length)
- Option 455-1. Parallel communication
- Option 778-2. Spot Welding
- Option 781-1. Routing base to axis 6, with retract arm

The table below shows the available type of wires/media.

Type	At terminals in cabinet	At connection point. Base, axis6	Cable/part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0,5 mm^2	250 VAC, 5 A rms
Protective earth		1	0,5 mm^2	250 VAC
Customer Signals (CS)				
Signals twisted pair	20	20 (10x2)	0,23 mm^2	50 V DC, 1 A rms
Signals twisted pair and separate shielded	8	8 (4x4)	0,23 mm^2	50 V DC, 1 A rms
Servo motor signals				
Servo motor power	At drive	3	1,5 mm^2	600 VAC, 12Arms
Protective earth	At drive	1	1,5 mm^2	600 VAC
Signals twisted pair for resolver	-	6	0,23 mm^2	50 V DC, 1 A rms
Brake	- -	2	0,23 mm^2	50 V DC, 1 A rms
Temperature control/PTC	-	2	0,23 mm^2	50 V DC, 1 A rms
Media				
Water/Air (PROC 1-3)		3	12,5 mm inner diameter	Max. air pressure 16 bar/ 230 PSI. Max water pressure 10bar/ 145PSI
Welding power (WELD)				
Lower/Upper arm		2	35 mm^2	600 VAC, 150 A rms at 20°C (68°F)
Protective earth (Lower/Upper arm)		1	35 mm^2	

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2.4.2 Configuration result for Type S/Se
Continued

Parallel and Can/DeviceNet

The table below shows the available type of wires/media.

Type	At terminals in cabinet	At connection point. Base, axis6	Cable/part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0,5 mm^2	250 VAC, 5 A rms
Protective earth		1	0,5 mm^2	250 VAC
Customer Signals (CS)				
Signals twisted pair	14	14 (7x2)	0,23 mm^2	50 V DC, 1 A rms
Signals twisted pair and separate shielded	4	4 (2x2)	0,23 mm^2	50 V DC, 1 A rms
Servo motor signals				
Servo motor power	At drive	3	1,5 mm^2	600 VAC, 12Arms
Protective earth	At drive	1	1,5 mm^2	600 VAC
Signals twisted pair for resolver	-	6	0,23 mm^2	50 V DC, 1 A rms
Brake	-	2	0,23 mm^2	50 V DC, 1 A rms
Temperature control/PTC	-	2	0,23 mm^2	50 V DC, 1 A rms
Media				
Water/Air (PROC 1-3)		3	12,5 mm inner diameter	Max. air pressure 16 bar/ 230 PSI. Max water pressure 10bar/ 145PSI
Welding power (WELD)				
Lower/Upper arm		2	35 mm^2	600 VAC, 150 A rms at 20 °C (68 °F)
Protective earth (Lower/Upper arm)		1	35 mm^2	

Parallel and Profibus

The table below shows the available type of wires/media.

Type	At terminals in cabinet	At connection point. Base, axis6	Cable/part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0,5 mm^2	250 VAC, 5 A rms
Protective earth		1	0,5 mm^2	250 VAC
Customer Signals (CS)				
Signals twisted pair	16	16 (8x2)	0,23 mm^2	50 V DC, 1 A rms
Signals twisted pair and separate shielded	4	4 (2x2)	0,23 mm^2	50 V DC, 1 A rms
Customer bus (CBus)				
Bus signals	At bus board	2	0,14 mm^2	Profibus 12 Mbit/s spec

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Type	At terminals in cabinet	At connection point. Base, axis6	Cable/part area	Allowed capacity
Signals twisted pair	6	6 (3x2)	0,14 mm^2	50 V DC, 1 A rms
Servo motor signals				
Servo motor power	At drive	3	1,5 mm^2	600 VAC, 12Arms
Protective earth	At drive	1	1,5 mm^2	600 VAC
Signals twisted pair for resolver	-	6	0,23 mm^2	50 V DC, 1 A rms
Brake	-	2	0,23 mm^2	50 V DC, 1 A rms
Temperature control/PTC	-	2	0,23 mm^2	50 V DC, 1 A rms
Media				
Water/Air (PROC 1-3)		3	12,5 mm inner diameter	Max. air pressure 16 bar/ 230 PSI. Max water pressure 10bar/ 145PSI
Welding power (WELD)				
Lower/Upper arm		2	35 mm2	600 VAC, 150 A rms at 20°C (68°F)
Protective earth (Lower/Upper arm)		1	35 mm2	

Parallel and Ethernet

The table below shows the available type of wires/media.

Type	At terminals in cabinet	At connection point. Base, axis6	Cable/part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0,5 mm^2	250 VAC, 5 A rms
Protective earth		1	0,5 mm^2	250 VAC
Customer Signals (CS)				
Signals twisted pair	20	20 (10x2)	0,24 mm^2	50 V DC, 1 A rms
Signals twisted pair and separate shielded	8	8 (4x2)	0,24 mm^2	50 V DC, 1 A rms
Customer bus (Ethernet)				
Bus signals	4	4	0,4 mm^2	Ethernet CAT 5e, 100 Mbit[ii]
Servo motor signals				
Servo motor power	At drive	3	1,5 mm^2	600 VAC, 12Arms
Protective earth	At drive	1	1,5 mm^2	600 VAC
Signals twisted pair for resolver	-	6	0,23 mm^2	50 V DC, 1 A rms
Brake	-	2	0,23 mm^2	50 V DC, 1 A rms
Temperature control/PTC	-	2	0,23 mm^2	50 V DC, 1 A rms

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2.4.2 Configuration result for Type S/Se
Continued

Type	At terminals in cabinet	At connection point. Base, axis6	Cable/part area	Allowed capacity
Media				
Water/Air (PROC 1-3)		3	12,5 mm inner diameter	Max. air pressure 16 bar/ 230 PSI. Max water pressure 10bar/ 145PSI
Welding power (WELD)				
Lower/Upper arm		2	35 mm2	600 VAC, 150 A rms at 20°C (68°F)
Protective earth (Lower/Upper arm)		1	35 mm2	

ii Ethernet with wire colors according to PROFINET standard, M12-connectors.

Required general options

To enable the spot welding function package IRB 6200 to perform as intended, general robot options are required. These standard options are further described under other chapters and are also mentioned in this chapter:

- Option 716-1. 1 pc. Digital 24 VDC I/O 16 inputs/ 16 outputs
- Option 727-1. 24V 8 Amps power supply
- Option 635-1. Spot. Software option for pneumatic guns

Required options for servo gun

To enable the spot welding function package IRB6620 to run with a servo controlled gun, some additional (additional to those described in previous section "Required general options") servo drive options are required. These standard options are described under other chapters ad are also mentioned below in this chapter:

- Option 770-4. First additional drive, W Drive
- Option 864-1. Resolver connection, axis 7
- Option 785-1. Robot Gun
- Option 786-1,-2,-3,-4. Connection to first drive (cable length to be stated)
- Option 635-3. Spot Servo. Software option for servo controlled guns. (software option 635-4 and option 635-5 could also be used)

Also option 630-1, Servo tool change, should be added if servo gun tool change is required.

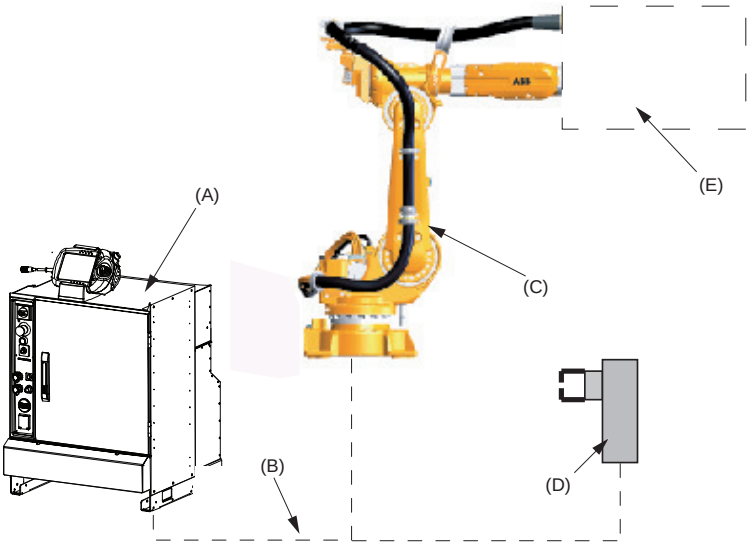
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2.5 Type HS/HSe

2.5.1 Introduction to Type HS/HSe

General

Variant Type H is designed for Material Handling (MH) application and HS(e) to handling parts against a stationary Spot Welding gun (pneumatic or servo controlled). Included main modules are shown in Figure below.



xx0900000739

Pos	Description
A	Robot Cabinet IRC5 (incl. 7th axis drive)
B	DressPack, Floor
C	DressPack, Routing base to Axis 6
D	Stationary gun with axis7
E	Robot Gripper

Available configurations with liked option numbers are described below.

Option description

Option	Type	Description
16-1	Connection to cabinet	Floor cables and connections inside the I/O section for the DressPack are chosen. The length and configuration of the floor harness is specified under the options below. Option 94-1,-2,-3,-4 for parallel communication. Option 90-2,-3,-4,-5 for parallel communication and field bus communication with Can/DeviceNet. Option 92-2,-3 for parallel communication and field bus communication with Profibus.
455-1	Parallel communication	Offers the signal cables needed for parallel communication in lower and upper arm DressPack. To be combined with option 94-1,-2,-3,-4,-5.

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2.5.1 Introduction to Type HS/HSe
Continued

Option	Type	Description
455-4	Parallel and Bus communication	Offers the signal cables needed for the combination of parallel and bus communication in lower and upper arm DressPack. To be combined with option 90-2,-3,-4,-5 or 92-2,-3,-4,-5.
455-8	Parallel and Ethernet communication	Offers the signal cables needed for the bus communication in lower and upper arm DressPack. To be combined with option 859-1,-2,-3,-4. Requires selection of option 94-X.

- Option 778-1. for the application Material Handling.

  Lower arm
- Option 798-1. Base to axis 3. Offers DressPack Lower arm for Material Handling application with internal routing from base to axis 3.

  Upper arm
- Option 780-3 (and option 798-1). Axis 3 to 6. Offers DressPack upper arm for Material Handling application with external routing from axis 3 to 6.

  Lower/upper arm
- Option 781-1. External base to axis 6. Offers DressPack Lower and Upper arm external routing without intermediate connection point.

The available alternatives and allowed combinations are shown in the schematic Figure below.

Application Interface connected to option 16-1, Cabinet	Option 455-1, Parallel communication	Option 94-1, -2, -3, -4 Cable length, Parallel communication	Option 778-1, Material Handling
	Option 455-4, Parallel and bus communication	Option 90-2, -3, -4, -5 Option 92-2, -3 Cable length, Parallel and bus communication	
	Option 455-8, Parallel and Ethernet communication	Option 859-1, -2, -3, -4 Cable length, Ethernet communication	

Contiued

	Lower(/upper) arm	Upper arm
Option 778-1, Material Handling	Option 798-1, Base to axis 3	Option 780-3, Axis 3 to 6 External routing
	Option 781-1, Base to axis 6	

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2.5.2 Configuration result for Type HS/HSe

General

Depending on the choice of options above the DressPack will have different content. The choice of routing will not affect the content. See tables for signal content below.

Parallel communication

The table below shows the available type of wires/media.

Type	At terminals in cabinet	At Connection point. Base, axis6	Cable/part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0,5 mm^2	250 VAC, 5A rms [a]
Protective earth		1	0,5 mm^2	250 VAC
Customer Signals (CS)				
Signals twisted pair	20	20 (10x2) [b]	0,23 mm^2	50 V DC, 1 A rms
Signals twisted pair and separate shielded	8	8 (4x2)	0,23 mm^2	50 V DC, 1 A rms
Media				
Air (PROC 1)		1	12,5 mm inner diameter	Max. Air pressure 16bar/230 PSI

a. For option 780-3 60 VAC / 60 VDC

b. For option 780-3 8 signals instead of 20

Parallel and Can/DeviceNet

The table below shows the available type of wired/media.

Type	At terminals in cabinet	At connection point. Base, axis6	Cable/ part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0,5 mm^2	250 VAC, 5A rms [a]
Protective earth		1	0,5 mm^2	250 VAC
Customer Signals (CS)				
Signals twisted pair	20	20 (10x2) [b]	0,23 mm^2	50 V DC, 1 A rms
Signals twisted pair and separate shielded	8	8 (4x2)	0,23 mm^2	50 V DC, 1 A rms
Customer bus (CBus)				
Bus signals	At bus board	2	0,14 mm^2	Can/DeviceNet spec
Bus Power	At bus board	2	0,23 mm^2	50 V DC, 1 A rms
Signals twisted pair		6 (3x2)	0,14 mm^2	50 V DC, 1 A rms
Media				

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2.5.2 Configuration result for Type HS/HSe
Continued

Type	At terminals in cabinet	At connection point. Base, axis6	Cable/ part area	Allowed capacity
Air (PROC 1)		1	12,5 mm inner diameter	Max. Air pressure 16bar/230 PSI

a. For option 780-3 50 VAC / 60 VDC

b. For option 780-3 8 signals instead of 20

Parallel and Profibus

The table below shows the available type of wired/media.

Type	At terminals in cabinet	At Connection point. Base Axis2/3 or axis6	Cable/ part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0,5 mm^2	250 VAC, 5A rms [a]
Protective earth		1	0,5 mm^2	250 VAC
Customer Signals (CS)				
Signals twisted pair	22	22 (11x2) [b]	0,23 mm^2	50 V DC, 1 A rms
Signals twisted pair and separate shielded	8	8 (4x2)	0,23 mm^2	50 V DC, 1 A rms
Customer bus (CBus)				
Bus signals	At bus board	2	0,14 mm^2	Profibus 12 Mbit/s spec
Signals twisted pair	6	6 (3x2)	0,14 mm^2	50 V DC, 1A rms
Media				
Air (PROC 1)		1	12,5 mm inner diameter	Max. air pressure 16 bar/230 PSI

a. For option 780-3 50 VAC / 60 VDC

b. For option 780-3 8 signals instead of 20

Parallel and Ethernet

The table below shows the available type of wired/media.

Type	At terminals in cabinet	At Connection point. Base Axis2/3 or axis6	Cable/ part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0,5 mm^2	250 VAC, 5A rms [i]
Protective earth		1	0,5 mm^2	250 VAC
Customer Signals (CS)				
Signals twisted pair	20	20 (10x2) [ii]	0,24 mm^2	50 V DC, 1 A rms
Signals twisted pair and separate shielded	8	8 (4x2)	0,24 mm^2	50 V DC, 1 A rms

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Type	At terminals in cabinet	At Connection point. Base Axis2/3 or axis6	Cable/ part area	Allowed capacity
Customer bus (Ethernet)				
Bus signals	4	4	0,4 mm^2	Ethernet CAT 5e, 100 Mbit [iii]
Signals twisted pair	6	6 (3x2)	0,14 mm^2	50 V DC, 1A rms
Media				
Air (PROC 1)		1	12,5 mm inner diameter	Max. air pressure 16 bar/230 PSI

i For option 780-3 60 VAC / 60 VDC.
ii For option 780-3 8 signals instead of 20.
iii Ethernet with wire colors according to PROFINET standard, M12-connectors.

Required general options

To enable the spot welding function package IRB 6200 to perform as intended, general standard robot options are required. These standard options are further described under other chapters and are also mentioned in this chapter.

- Option 716-1. 1 pc- Digital 24 VDC I/O 16 inputs/ 16 outputs
- Option 727-1. 24V 8 Amps power supply

Required options for servo gun

To enabled spot welding function package IRB 6620 to run with a servo controlled gun, some additional (additional to those described in previous section "Required general options") servo drive options are required. These standard options are described under other chapters and are also mentioned below in this chapter.

- Option 770-4. First additional drive, W Drive
- Option 864-1. Resolver connection, axis 7
- Option 785-5. Stationary gun
- Option 786-1,-2,-3,-4. Connection to first drive (cable length to be stated)
- Option 635-3. Spot Servo. Software option for servo controlled guns. (Software option option 635-5 could also be used)

Also option 630-1, Servo tool change, should be used if servo gun tool change is required

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2.5.3 Interface description stationary gun

General

The interface towards the stationary gun includes 3 common parts and 2 extra for servo gun.

Common parts:

- Signal interface with a signal connector type modular Harthing (Cable option 809-1, -2). The connector configurations are described in the tables below. Signals with (parenthesis) are to be connected by customer. Other signals are connected if a complete DressPack Type HS is ordered.
- Power cable with a Multi Contact interface (Cable option 791-1 or option 791-2) (Ending Multi contact type MC TSB 150/35).
- Water and air connections are made by the customer directly on the water and air unit (See chapter Water and Air unit)

Extra for servo gun:

- Servo power cable (Option 786-1,-2,-3 or -4). Cable goes from robot control cabinet to stationary gun and ends with a 23 pin Souriau connector (Type UT 061823SH).
- Resolver signal cable, 7 m length (included in option 785-5). cable goes from the robot foot R3.FB7 t o stationary gun and ends with a 8 pin Souriau connector (Type UT 06128SH).
- The connector configurations are described in the circuit diagram included in the Product Manual DressPack IRB6620, art No. 3HAC027309-001.

The Harting connector is shown below. The different main parts within the connector are showed both with name and Harting article number. Corresponding parts at the tool are available within the Harting product offer.

Name	Harting article No.
Hood	09 30 010 0543
Hinged frame, hood	09 14 010 0303
*Multicontact, female (HD) (25 pin)	09 14 025 3101
*Multicontact, female (DD) (12 pin)	09 14 012 3101
*Multicontact, female (EE) (8 pin)	09 14 008 3101

For the contacts above corresponding female crimp-contacts for the different cable diameters are required.

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2.6 Connection kits

General

For detailed information on connection location see *Interface descriptions for DressPack on page 70*

Below is an example of a connector kit and its parts.



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Base - Connector kits

		DressPack options		Resolver conn., axis 7	Description
Option	Name	798-1	781-1	864-1	
459-1	CP/CS, Proc 1 on base	X	X		
453-1	FB 7			X	

Option 459-1, CP/CS, Proc 1 on base

R1. CP/CS and Proc 1 on base.

This option offers a kit with connectors. This must be assembled by the customer. The kit contains:

- 1 Hose fittings (Parker Pushlock, (½", M22x1,5 Brass, 24 degree seal))
- Connector with:

1 pcs Hood Foundry (Harting)	HAN EMC / M 40
1 pcs Hinged frame (Harting)	Shell size 16
2 pcs Multicontact, female (Harting)	Type HD (25 pin)
1 pcs Multicontact, female (Harting)	Type DD (12 pin)
1 pcs Multicontact, female (Harting)	Type EE (8 pin)
10 pcs Female crimp contacts	For 1,5 mm^2

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2.6 Connection kits
Continued

10 pcs Female crimp contacts	For 0,5 mm^2
10 pcs Female crimp contacts	For 1,0 mm^2
10 pcs Female crimp contacts	For 2,5 mm^2
12 pcs Female crimp contacts	For 0,14– 0,37 mm^2
45 sockets	For 0,2– 0,56 mm^2
Assembly Accessories to complete connector	
Assembly instruction	

Option 453-1, FB 7

R3. FB 7 on base

This option offers a kit with a connector. This must be assembled by the customer. The kit contains:

- Connector with:

1 pcs Multiple connector (pin)	Souriau
1 pcs Adaptor	8 pin
15 pcs Pin	for 0,13-0,25 mm^2
Assembly Accessories to complete connector	
Assembly instruction	

Axis 3 - Connector kits

		DressPack options	Description
Option	Name	798-1 (MH 1)	
458-1	CP/CS, Proc 1 axis 3	X	4 Module Harting

Option 458-1, CP/CS, Proc 1 axis 3

R2. CP/CS and Proc 1 on axis 3

This option offers a kit with connectors. This must be assembled by the customer.

The kit contains:

- 1 Hose fittings (Parker Pushlock, (½", M22x1,5 Brass, 24 degree seal))
- Connector with:

1 pcs Hood Foundry (Harting)	HAN EMC / M 40
1 pcs Hinged frame (Harting)	Shell size 16
2 pcs Multicontact, male (Harting)	Type HD (25 pin)
1 pcs Multicontact, male (Harting)	Type DD (12 pin)
1 pcs Multicontact, male (Harting)	Type EE (8 pin)
10 pcs Male crimp contacts	For 1,5 mm^2
10 pcs Male crimp contacts	For 0,5 mm^2
10 pcs Male crimp contacts	For 1,0 mm^2
10 pcs Male crimp contacts	For 2,5 mm^2
12 pcs Male crimp contacts	For 0,14 – 0,37 mm^2

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45 pin	For 0,2 – 0,56 mm^2
Assembly Accessories to complete connector	
Assembly instruction	

Axis 6 - Connector kits

				Description
Option	Name	780-3 (MH 3)	781-1	
452-1	Weld, Proc 1-4 axis 6		X	MC
543-1	CP/CS/BUS Proc 1 axis 6	X	X	UTOW

Option 543-1, CP/CS/CBus, Proc 1 axis 6

Harting

CP/CS/CBus, Proc 1 axis 6 on tool side for option 781-1.

This kit offers a kit with connectors to be mounted at toolside of axis 6.

This must be assembled by the customer.

The kit contains:

- 1 Hose fitting (Parker Push lock (1/2”, M22x1,5 Brass, 24 degree seal))
- Connector with:

1 pcs Hood Foundry (Harting)	HAN
1 pcs Hinged frame (Harting)	Shell size 10
1 pcs Multicontact, male (Harting)	Type HD (25 pin)
1 pcs Multicontact, male (Harting)	Type DD (12 pin)
1 pcs Multicontact, male (Harting)	Type EE (8 pin)
10 pcs Male crimp contacts	For 1,5 mm^2
10 pcs Male crimp contacts	For 0,5 mm^2
10 pcs Male crimp contacts	For 1,0 mm^2
10 pcs Male crimp contacts	For 2,5 mm^2
15 pcs Male crimp contacts	For 0,14 – 0,37 mm^2
30 pins	For 0,2 – 0,56 mm^2
Assembly Accessories to complete connector	
Assembly instruction	

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2.6 Connection kits

Continued



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Souriau

CP/CS/CBus, Proc 1 axis 6 on tool side for option 780-3.

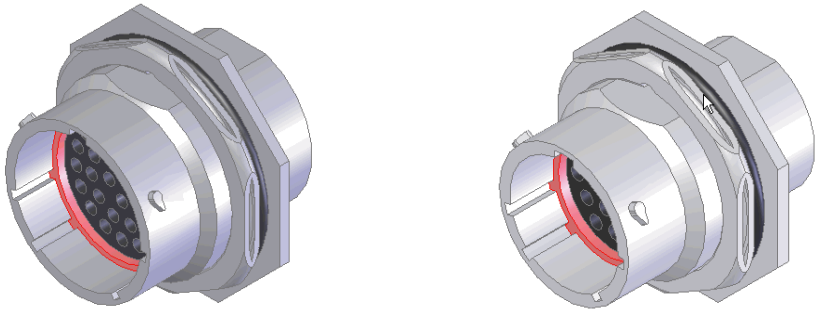
This kit offers a kit with connectors to be mounted at toolside of axis 6.

This must be assembled by the customer.

The kit contains:

- 1 Hose fitting (Parker Push lock (1/2”, M22x1,5 Brass, 24 degree seal))
- Connector with:

1 pcs UTOW Pin connector 32p (Souriau)	Shell size 18
1 pcs Backshell (Souriau)	Shell size 14
1 pcs Cable cland, EMC (Souriau)	M20 D=11,0-14,0
1 pcs UTOW Pin connector 19p (Souriau)	Shell size 14
1 pcs Backshell (Souriau)	Shell size 18
1 pcs Cable gland, EMC	M25 D=13,0-16,0
40 pcs Pin	0.21-0.93 mm^2
Assembly Accessories to complete connector	
Assembly instruction	



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Option 452-1, Weld, Proc 1-4 axis 6

Weld and Proc 1-4 axis 6 on manipulator side

The process cable package from axis 2 to axis 6 (option 781-1) ends with free end for media and for weld power cable. The option 452-1 offers a kit for connectors. This must be assembled by the customer when hoses and power cable has been cut to required length.

The kit contains:

- 4 Hose fittings (Parker Pushlock, (½”, M22x1,5 Brass, 24 degree seal))
- 1 Multi contact connector (Female) type including:

1 pc Welding connector socket incl. housing	3x35 mm^2 (35 mm^2 socket)
1 pc Cable gland	
1 pc End housing	
Assembly Accessories to complete connector	
Assembly instruction	

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3 Specification of variants and options

3.1 Introduction to variants and options

General

The different variants and options for the IRB 6620 are described in the following sections. The same option numbers are used here as in the specification form.

The variants and options related to the robot controller are described in the product specification for the controller.

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3.2 Manipulator

Variants

Option	IRB Type	Handling capacity (kg)	Reach (m)
435-64	6620	150	2.2

Option	Option
• 209-2 ABB White standard • 209 RAL code159-1 Fork lift device • 37-1 Base plate • 804-1 Synchronize labels • 806-1 Base connector protection • 872-1 Manipulator Cable protection • 908-1 Foundry Plus Cable Guard • 29-1/-2 Working range limit - Axis 1 • 34-1 Working range limit - Axis 3 • 561-1 Extended working range axis 1 • 1070-1 Prep. for IRBT • 429-1 Underwriters Laboratory • 210-4 / -5 Manipulator cables, 22 / 30 m • 810-2 Position supervision computer	• 603-1 Absolute Accuracy • 606-1 Conveyor Tracking • 885-1 SoftMove • 642-1 PickMaster 3 • 661-2 Force Control • 778-2 SpotWelding • 781-1 DressPack Base to axis 6 • 453-1 FB7 • 452-1 Weld Proc 1-4 axis 6 • 785-1 Robot Servo Gun • 791-4 / -5 Weld power cable, 7 / 15 m

Manipulator color

Option	Color	RAL code [i]
209-1	ABB orange standard Standard color with protection option 287-3 Foundry Plus	NCS 2070-Y60R
209-2	ABB white standard	RAL 9003
209-202	ABB Graphite White std Standard color with protection option 287-4 Standard	RAL 7035
209	RAL code should be specified (ABB non-standard colors)	

[i] The colors can differ depending on supplier and the material on which the paint is applied.

Note

Notice that delivery time for painted spare parts will increase for ABB none standard colors.

Protection types

Option	Protection type	Note
287-4	Standard	IP 54 [i]
287-3	Foundry Plus 2	See *Protection type Foundry Plus 2 on page 11* for a complete description of protection type Foundry Plus 2.

[i] The upper arm, including the wrist, has protection class IP 67.

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Warranty

For the selected period of time, ABB will provide spare parts and labor to repair or replace the non-conforming portion of the equipment without additional charges. During that period, it is required to have a yearly *Preventative Maintenance* according to ABB manuals to be performed by ABB. If due to customer restrains no data can be analyzed with ABB Connected Services for robots with OmniCore controllers, and ABB has to travel to site, travel expenses are not covered. The *Extended Warranty* period always starts on the day of warranty expiration. Warranty Conditions apply as defined in the *Terms & Conditions*.

Note

This description above is not applicable for option *Stock warranty* [438-8]

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*.

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Warranty for DressPack

Note

Option 780-2 upper arm DressPack SW/MH2 is not covered by the warranty.

Note

Option 780-3 upper arm DressPack MH3 is not covered by the warranty.

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3.3 Equipment

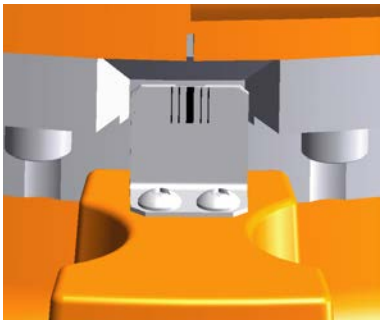
General

Option	Type	Description
213-1	Safety lamp	A safety lamp with an orange fixed light can be mounted on the manipulator. The lamp is active in MOTORS ON mode. The safety lamp is required on a UL/UR approved robot.
159-1	Fork lift device	Lifting device on the manipulator for fork-lift handling. Note. When Cooling Fan for axis 1 motor unit is used, this must be disassembled in order to use fork lift device.
37-1	Base plate	Can also be used for IRB 6600 and IRB 7600. See *Mounting the manipulator on page 23*, for dimension drawing.
804-1	Synchronize labels	For a more accurate marking of the synchronization position of the robot. Assembly instructions are included. See Figures on next page to Base connector protection chapter.

Synchronize labels

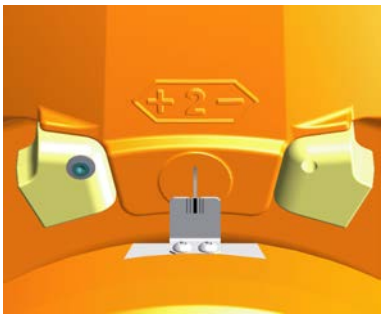
The option contains synchronize labels for each axis.

Synchronize labels for Axis 1



xx0900000764

Synchronize labels for Axis 2



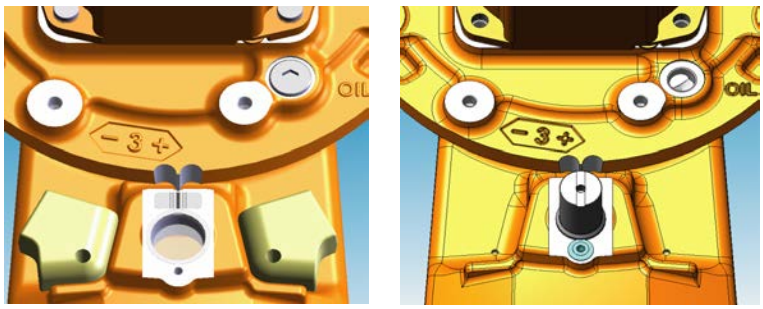
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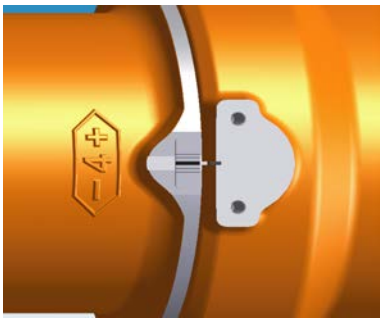
3.3 Equipment
Continued

Synchronize labels for Axis 3



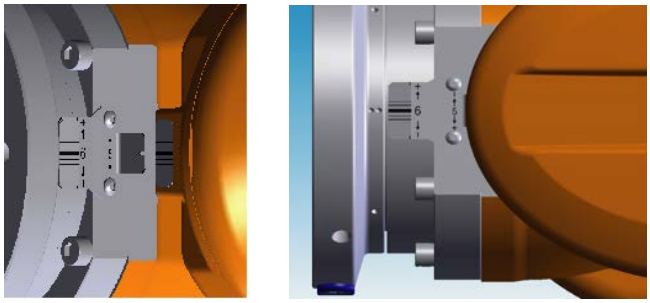
xx0900000763

Synchronize labels for Axis 4



xx0900000766

Synchronize labels for Axis 5 and 6



xx0900000767

Resolver connection, axis 7

A connector for resolver signals for axis 7 located on the base.

Option	Description	Remark
864-1	On base	Used together with first additional drive, option 907-1.

Electronic Position Switches (EPS)

Electronic Position Switches (EPS) is an additional safety computer in the controller, with the purpose of providing safe output signals representing the position of robot axes. The output signals are typically connected to cell safety circuitry and/or a safety PLC which takes care of interlocking the robot cell, for example in order to

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prevent robot and operator to enter a common area simultaneously. See *Application manual - Electronic Position Switches*.

Foundry Plus Cable Guard

The manipulator cables are equipped with an additional protection of aluminized leather against e.g. aluminium spitz and flashes and chips from machining. Process cable for material handling from base to axis 3, option 798-1 has the same protection.

Option	Description	Remark
908-1	Foundry Plus Cable Guard	For extra protection of cables. Requires option 287-3 Foundry Plus.

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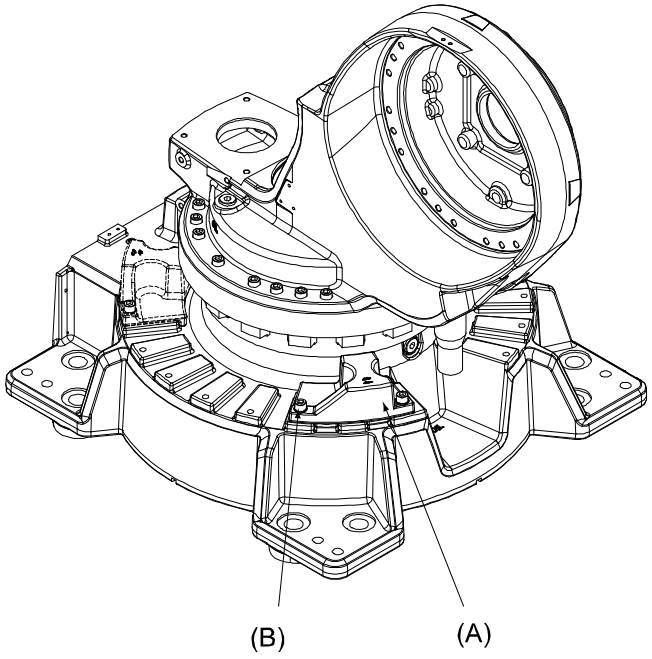
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Working Range Limit

To increase the safety of the robot, the working range of axes 1 and 3 can be restricted by extra mechanical stops.

The working range of axis 1 is limited by fixed mechanical stops and adjustment of the system parameter configuration. The working range can be reduced by adding additional mechanical stops giving 7.5 or 15 graduation, between 22.5° and 135° in both directions.

Option	Type	Description
29-1	Axis 1,15 degrees	Two stops which allow the working range to be restricted in increments of 15°.
29-2	Axis 1, 7.5 degrees	Two stops which allow the working range to be restricted in increments of 7.5° intervals.
34-1	Work range limit Axis3	One stop which limits the working range to -90°. No bending backwards motion. See Figure below.

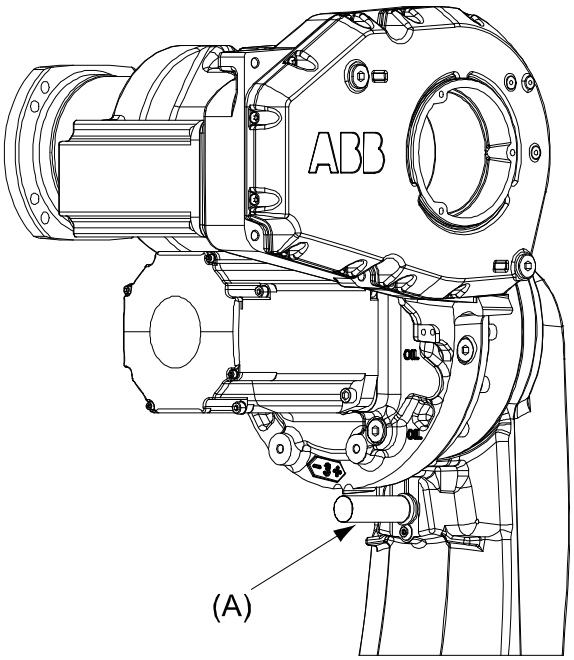


xx0900000771

Pos	Description
A	Four mechanical stops
B	Bolt tightening torque: 120Nm

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xx0900000772

Pos	Description
A	One mechanical stop axis 3

Extended working range

Option	Type	Description
561-1	Extended working range axis 1	To extend the working range on axis 1 from ± 170° to ± 220° When the option is used the mechanical stop shall be removed. Requires options SafeMove or EPS (Electronic Position Switches).

CAUTION

The option *Extended work range* enables an extension of the working range for axis 1, through a software configuration. With this option installed, the working range can exceed the range limited by the mechanical stop on axis 1. The working range shall be limited through the option SafeMove.

A risk analysis must be done to ensure that no risks remain when using option *Extended work range*, to limit the working range, and before removing the mechanical stops.

For information about the option SafeMove, see *Application manual - Functional safety and SafeMove2*.

If the mechanical stop is removed, then the manipulator should have a marking for this, for example, a label. If the robot is delivered with the option *Extended work range*, then such a label is included on delivery.

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Standard calibration method

Option	Type	Description
1999-1	Axis calibration	Preferred standard calibration method. Robust, high performance axis calibration using only mechanical calibration stops and software.
1999-2	Calibration Pendulum	Previous standard calibration method only to be used in special cases if customers would like to harmonize calibration with already installed base.

Note

The calibration methods are not interchangeable.

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3.4 Floor cables

General

Additional floor cables for DressPack options, see chapter DressPack Floor.

Manipulator cable length

Option	Lengths
210-2	7 m
210-3	15 m
210-4	22 m
210-5	30 m

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3.5 Process DressPack

Connection to

Option	Connection to	Description
16-1	Cabinet	The signals CP/CS are connected to 12-pole screw terminals, Phoenix MSTB 2.5/12-ST-5.08, in the controller. The cable between R1.CP/CS and the controller is supplied. For information about the limited number of signals available, see Type H to Type S.

Communication

Option	Type	Description
455-1	Parallel communication	Includes customer power (CP), customer signals (CS).
455-4	Parallel and bus communication	Includes CP, customer signals, CAN/DeviceNet and Profibus for process cable package.
455-8	Parallel and Ethernet communication	Includes customer (CP), customer signals PROFINET or Ethernet/IP process cable package.

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3.6 DressPack Floor

Connection to Parallel/CAN/DeviceNet/Profibus and Ethernet

Following information specifies the cable length for Parallel, CAN/DeviceNet/Profibus and Ethernet for connection to cabinet.

Option	Lengths	Description
94-1/90-2/92-2/859-1	7 m	
94-2/90-3/92-3/859-2	15 m	
90-4/92-4/859-3	22 m	
94-4/90-5/92-5/859-4	30 m	

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3.7 DressPack Lower/Upper arm

DressPack process configuration

Option	Description	Note
778-1	Material Handling	Includes signals and one air hose.
778-2	Spot Welding	Includes signals, weld power cable, one air hose and three media hoses.

DressPack lower arm

Option	Description	Note
798-1	Material Handling from base to axis 3	Requires option 778-1.

DressPack upper arm

Option	Description	Note
780-3	External routing from axis 3 to axis 6	Requires option 778-1 and option 798-1.

DressPack lower and upper arm

Option	Description	Note
781-1	Routing Base to Axis6	Routing without change-over connection.

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3.8 Connection Kits

General

The connectors fit to the connectors at the manipulator base and axis 6 respectively.

Content

The kit consists of connectors, pins and sockets. For technical description, see Connector kits.

Option	Type	Description
459-1	R1.CP/CS and PROC1	For the Customer Power/Customer Signal connector and one Process connector on the manipulator base. Sockets for bus communication are included.
453-1	R3.FB7	For the 7-axis connector on the manipulator base.
452-1	R3.WELD and PROC1-3 axis 6	Weld connector and four Process connectors at axis6, the manipulator side.
543-1	R3.CP/CS/BUS, PROC1 axis 6	Connector for customer power/customer signal/customer bus at axis 6 tool side.

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3.9 Servo Gun

Content

For technical description see chapter 1.9 Servo Gun.

Option	Description
785-1	For robot handled Servo Gun
785-5	For Stationary Servo Gun

Connection to first drive

Following information specifies the cable length for Connection to first drive. For further information see chapter Servo Gun

Option	Lengths
786-1	7 m
786-2	15 m
786-3	22 m
786-4	30 m

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3.10 Spot Welding Floor Cables

Weld Power Cable

Following information specifies the cable length for the Weld Power cable, from the Spot Welding process cabinet to the manipulator base.

Option	Lengths	Description
791-1	7 m	
791-2	15 m	

Process Cable to Stationary Gun

Following information specifies the cable length for the Process Cable to the Stationary Gun, from the Spot Welding process cabinet to the Stationary Gun.

Option	Lengths
809-1	7 m
809-2	15 m

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3.11 User documentation

User documentation

The user documentation describes the robot in detail, including service and safety instructions.



Tip

All documents can be found via ABB Robotics One, *https://one.robotics.abb.com/en/knowledge-hub*.

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4 Accessories

4.1 Introduction to accessories

General

There is a range of tools and equipment available.

Basic software and software options for robot and PC

For more information, see *Product specification - Controller IRC5* and *Application manual - Controller software IRC5*.

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