ROBOTICS

Product specification

IRB 6700

Trace back information:
Workspace Main version a641
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Product specification

IRB 6700-235/2.65
IRB 6700-205/2.80
IRB 6700-175/3.05
IRB 6700-150/3.20
IRB 6700-200/2.60
IRB 6700-155/2.85
IRB 6700-300/2.70
IRB 6700-245/3.00

IRC5

Document ID: 3HAC044265-001
Revision: Y

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Original instructions.

Table of contents

Overview of this product specification

About this product specification

This product specification 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 equipment
- The load diagrams, mounting or extra equipment, the motion, and the robot reach
- The specification of available variants and options

The specification covers the manipulator using the IRC5 controller.

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.

The specification is intended for:

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

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 6.	*3HAC050945-001*
Product manual - IRB 6700	*3HAC044266-001*
Product specification - Robot user documentation, IRC5 with RobotWare 6	*3HAC052355-001*

Revisions

Revision	Description
-	First release
A	• The variants IRB 6700-200/2.60 and IRB 6700-155/2.85 are added. • Minor corrections/updates
B	• DressPack & SpotPack updated
C	• Text for Foundry Plus updated. • Two variants added, IRB 6700-300/2.70 and IRB 6700-245/3.00. • Minor corrections/update

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Revision	Description
D	• AbsAcc data added • New loads for IRB 6700-300 and -245 added • Values for power consumption, brakes engaged/disengaged added • Tightening torque for robot adjusted • The use of guide pins for robot base added • Updated data (ISO, weight) for IRB 6700-200 and IRB 6700-155
E	• Minor corrections/update • Updated standard tool flange drawing • Guide pins for base plate changed to two cylindrical
F	• Information regarding warranty for upper arm dress pack added. • Minor corrections/update • Section *SpotWelding cabinet* updated.
G	• Warranty information for DressPack updated. • Dimensions (measure D), for products -150/3.20 and -205/2.80 in table *Holes for fitting extra equipment* are changed from 400 mm to 500 mm. • Illustration in section *Fastening holes robot base* is updated regarding guide holes. • Illustration regarding centering diameters on tool flange updated.
H	Published in release R17.1. The following updates are done in this revision: • Illustration for *Tool flange, standard* is updated. • Major structural change is made on chapter *Specifications of variants and options*. • IRB 6700Inv is added. • Restriction of load diagram added. • Working range axis 2 and 3 added.
J	Published in release R17.2. The following updates are done in this revision: • Updated list of applicable standards. • Delete option 828-1, 828-2, 768-3 and 782-1 as they were all phased out. • 635-1,3,4,5 option phased out and replaced by 636-6. • Type HS and S are phased out. • 782-7, 796-1 phased out.
K	Published in release R18.1. The following updates are done in this revision: • Water and air unit updated.
L	Published in release R18.2. The following updates are done in this revision: • Customer signal wire information for Type H/HSe Ethernet updated.
M	Published in release 19B. The following updates are done in this revision: • Minor corrections/updates • Updated information about *Absolute Accuracy*.
N	Published in release 19C. The following updates are done in this revision: • Updated option description of Extended working range. • Note added about need to calibrate if the robot is other than floor mounted. See *Calibration methods on page 31*. • Graphics for DressPack updated. See *Interface descriptions for DressPack on page 109*
P	Published in release 20A. The following updates are done in this revision: • M8 cable lug description added in DressPack section.

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Revision	Description
Q	Published in release 20C. The following updates are done in this revision: • Made minor changes in Dresspack section.
R	Published in release 20D. The following updates are done in this revision: • Warranty section updated
S	Published in release 21A. The following updates are done in this revision: • Minor changes
T	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.
U	Published in release 21D. The following updates are done in this revision: • Updated the available type for DressPack Type H/HS/HSe and Type Se.
V	Published in release 23C. The following updates are done in this revision: • Added RAL code in manipulator color introduction. • Updated information regarding pose stabilization time. • Corrections done in the DressPack connector kits, see *Connector kits on page 136*.
W	Published in release 24B. The following updates are done in this revision: • Updated data in *Performance according to ISO 9283 on page 91*
X	Published in release 24D. The following updates are done in this revision: • Updated the section *Technical data on page 18*.
Y	Published in release 24D. The following updates are done in this revision: • IRB 6700Inv is phased out.

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1 Description

1.1 Structure

1.1.1 Introduction

General

The IRB 6700 series is ABB Robotics 7th generation of high payload, high performance industrial robots. Based on the famous IRB 6640 series, with large working range, the very high wrist torque, the service friendly modular built up and the availability, significant for ABB's robots, the IRB 6700 robot family goes even further. With focus on high production capacity, compact design and low weight, simple service and low maintenance cost. The IRB 6700 is ideal for process applications, regardless of industry.

Typical areas are for example Material Handling, Machine Tending, Spot Welding.

Software product range

We have added a range of software products - all falling under the umbrella designation of Active Safety - to protect not only personnel in the unlikely event of an accident, but also robot tools, peripheral equipment and the robot itself.

Options

There are a large number of options for material handling and spot welding integrated in the robot. For a complete description of Material handling see *DressPack on page 101*.

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.

Continues on next page

1.1.1 Introduction
Continued

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.

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 143* for robot versions and other options not selectable together with Foundry Plus 2.

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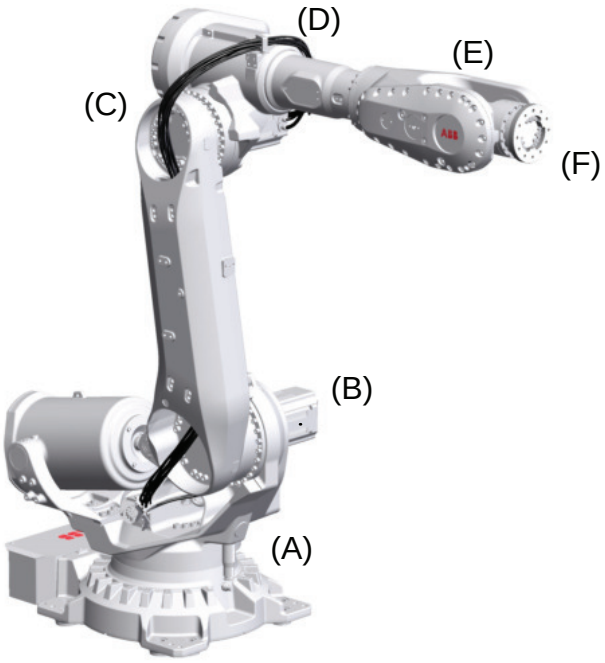
Robot axes



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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

1.1.2 Different robot variants

Robot variants

The following standard robot variants are available.

Robot version	Handling capacity (kg)	Handling capacity for LeanID (kg)	Reach (m)
IRB 6700	235 kg	220 kg	2.65 m
IRB 6700	205 kg	200 kg	2.80 m
IRB 6700	200 kg	175 kg	2.60 m
IRB 6700	175 kg	155 kg	3.05 m
IRB 6700	155 kg	140 kg	2.85 m
IRB 6700	150 kg	145 kg	3.20 m
IRB 6700	300 kg	270 kg	2.70 m
IRB 6700	245 kg	220 kg	3.00 m

Note

If option 780-4, LeanID is selected, the payload will decrease as stated above, for detailed information see *Load diagrams on page 40*

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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1.2.1 Applicable standards
Continued

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.

1.3 Installation

1.3.1 Introduction to installation

General

IRB 6700 are designed for floor mounting (no tilting allowed around X-axis or Y-axis).

Depending on the robot variant, an end effector with max. weight of 150 to 300 kg including payload, can be mounted on the tool flange (axis 6). See *Load diagrams on page 40*.

Extra loads

Extra load (valve packages, transformers, DressPack) of 50 kg, which is included in the load diagrams, can be mounted on the upper arm. An extra load of 250 kg can also be mounted on the frame of axis 1.

See *Fitting equipment to the robot on page 72*.

Working range limitation

The working range of axes 1 can be limited by mechanical stops as option. See *Working range limitation on page 145*.

Explosive environments

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

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 6700	1300 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°	

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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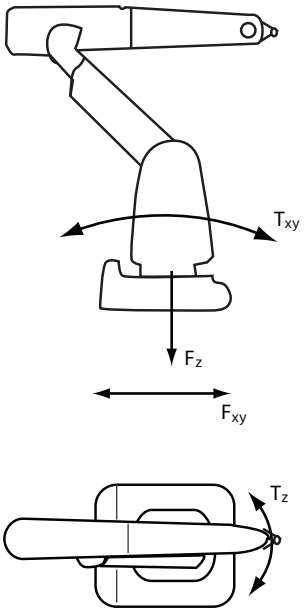
Loads on foundation, robot

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	±7.4 kN[i] / ±8.7 kN[ii]	±19.8 kN[i] / ±21.8 kN[ii]
Force z	14.6 ±4.5 kN[i] / 18.0 ±5.4 kN[ii]	14.6 ±15.7 kN[i] / 18.0 ±17.4 kN[ii]
Torque xy	±21.0 kNm[i] / ±24.9 kNm[ii]	±37.1 kNm[i] / ±45.3 kNm[ii]

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1.3.2 Technical data
Continued

Force	Endurance load (in operation)	Max. load (emergency stop)
Torque z	±5.0 kNm[i] / ±6.5 kNm[ii]	±11.4 kNm[i] / ±15.5 kNm[ii]

i Valid for IRB 6700-200/2.60, IRB 6700-155/2.85, IRB 6700-235/2.65, IRB 6700-205/2.80, IRB 6700-175/3.05, IRB 6700-150/3.20.
ii Valid for IRB 6700-300/2.70, IRB 6700-245/3.00.

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 (-13°F)
Maximum ambient temperature	+55°C (+131°F)
Maximum ambient temperature (less than 24 hrs)	+70°C (+158°F)
Maximum ambient humidity	Maximum 95% at constant temperature.

Continues on next page

Operating conditions, robot

The table shows the allowed operating conditions for the robot:

Parameter	Value
Minimum ambient temperature	+5 °C [i] (41 °F)
Maximum ambient temperature	+50 °C (122 °F)
Maximum ambient humidity	Maximum 95% at constant temperature.

[i] At low environmental temperature (below 10° C) a warm-up phase is recommended to be run with the robot. Otherwise there is a risk that the robot stops or runs with lower performance due to temperature dependent oil and grease viscosity.

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	IP67
Manipulator, protection type Foundry Plus	IP67

[i] According to IEC 60529.

1.3.3 Assembling the manipulator

Maximum load

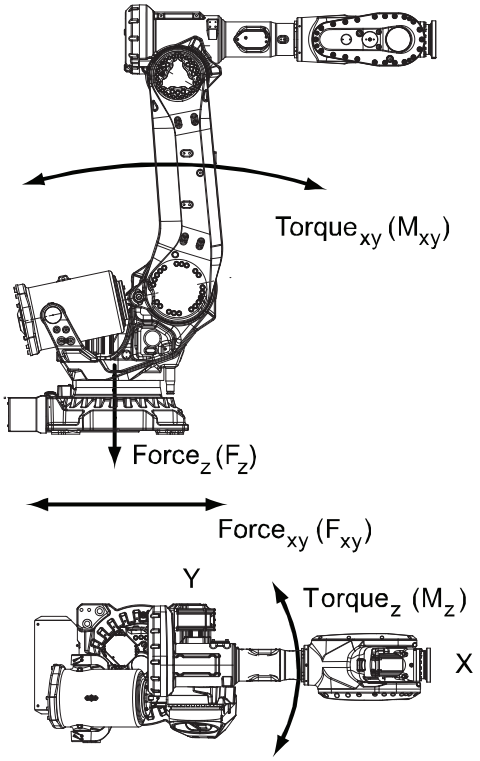
Maximum load in relation to the base coordinate system.

Floor mounted

Force	Endurance load (in operation)	Max. load (emergency stop)
Force xy	±7.4 kN[i] / ±8.7 kN[ii]	±19.8 kN[i] / ±21.8 kN[ii]
Force z	14.6 ±4.5 kN[i] / 18.0 ±5.4 kN[ii]	14.6 ±15.7 kN[i] / 18.0 ±17.4 kN[ii]
Torque xy	±21.0 kNm[i] / ±24.9 kNm[ii]	±37.1 kNm[i] / ±45.3 kNm[ii]
Torque z	±5.0 kNm[i] / ±6.5 kNm[ii]	±11.4 kNm[i] / ±15.5 kNm[ii]

i Valid for IRB 6700-200/2.60, IRB 6700-155/2.85, IRB 6700-235/2.65, IRB 6700-205/2.80, IRB 6700-175/3.05, IRB 6700-150/3.20.

ii Valid for IRB 6700-300/2.70, IRB 6700-245/3.00.



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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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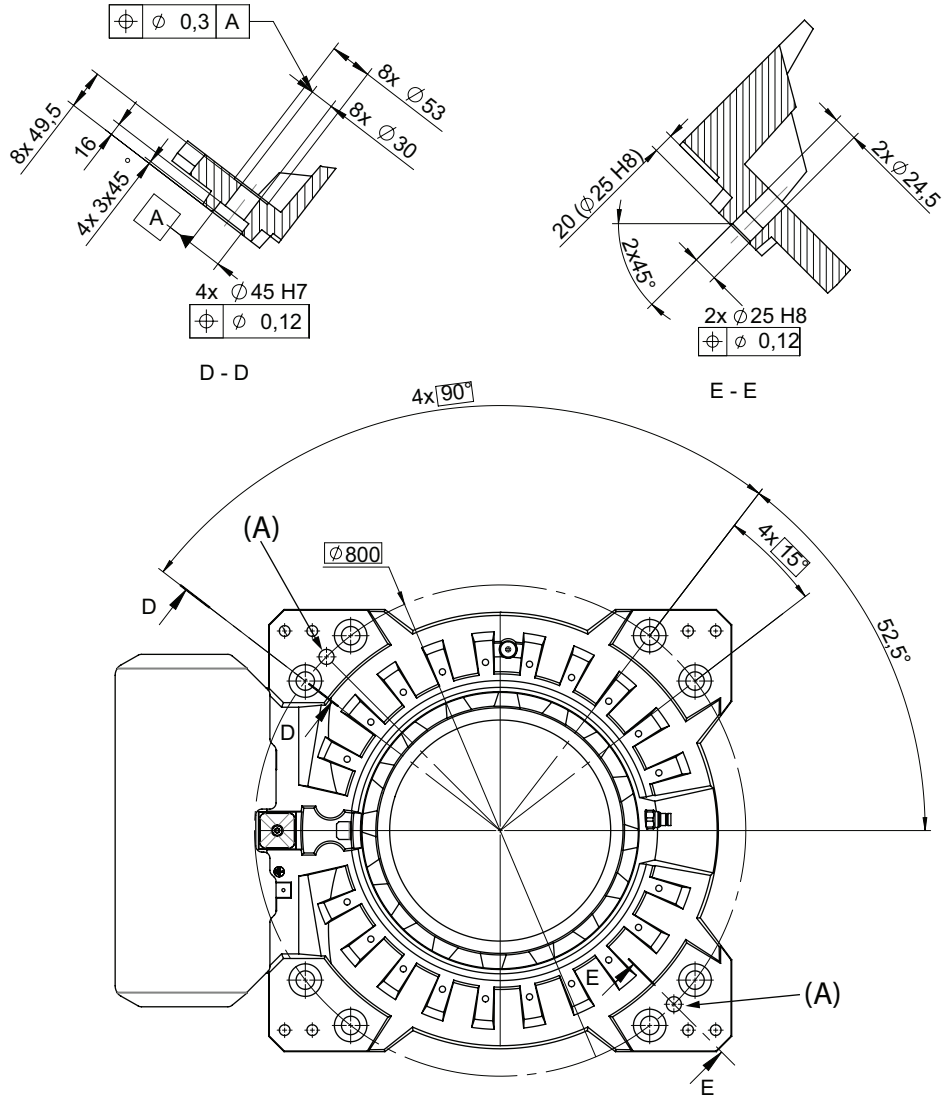
Fastening holes robot base - for all variants



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Pos	Description
A	Holes for guide pins (x2)

Note

Holes for guide pins (x2) Rear hole straight slot. See *Guide pins on page 28*.

Fastener quality

Suitable screws:	M24 x 100 (installation on base plate/foundation)
Quality:	8.8
Screw tightening yield point utilization factor (v) (according to VDI2230):	90% (v=0.9)
Suitable washer:	4 mm flat washer

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1.3.3 Assembling the manipulator

Continued

Tightening torque:	550 Nm (screws lubricated with Molykote 1000) 600-725 Nm, typical 650 Nm (screws none or lightly lubricated)

Note

Only two guide pins shall be used. The corresponding holes in the base plate shall be circular according to figure *Base plate drawing on page 25*.

AbsAcc performance

Regarding AbsAcc performance, the use of guide pins are mandatory.

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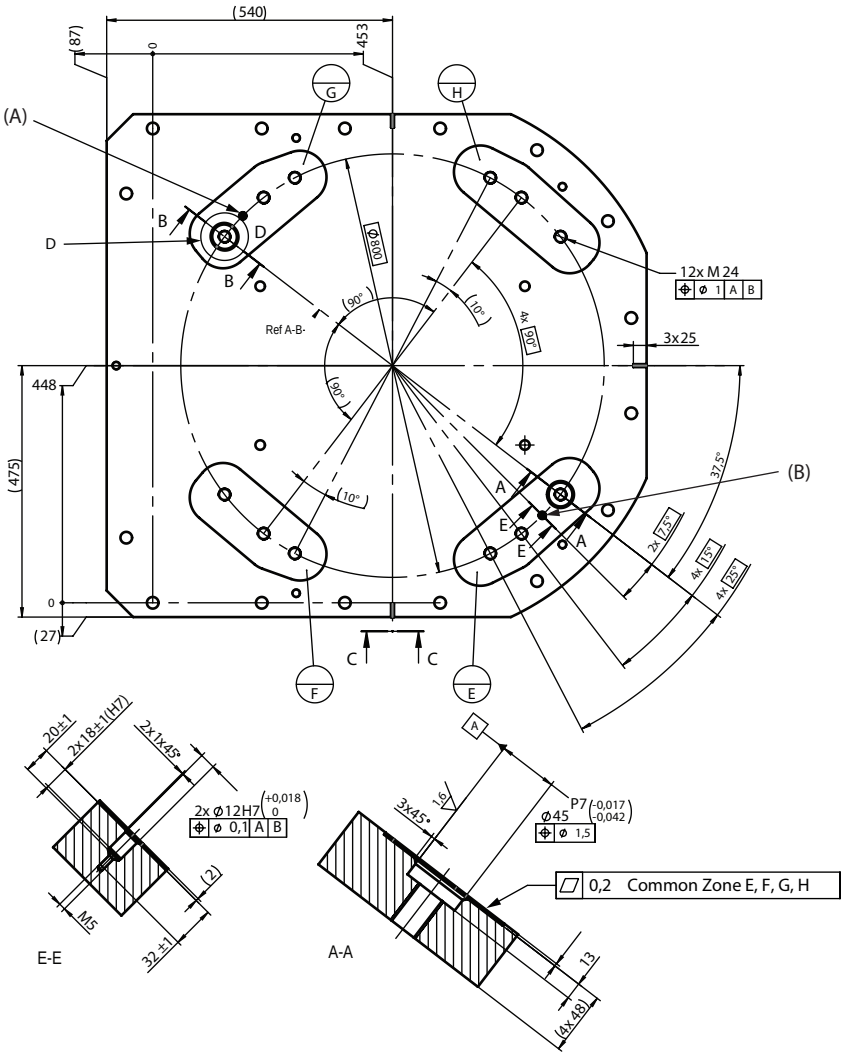
Base plate drawing

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



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Pos	Description
A, B	Hole for guide pin, cylindrical, see *Guide pins on page 28*
E, F, G, H	Common tolerance zone (accuracy all over the base plate from one contact surface to the other)

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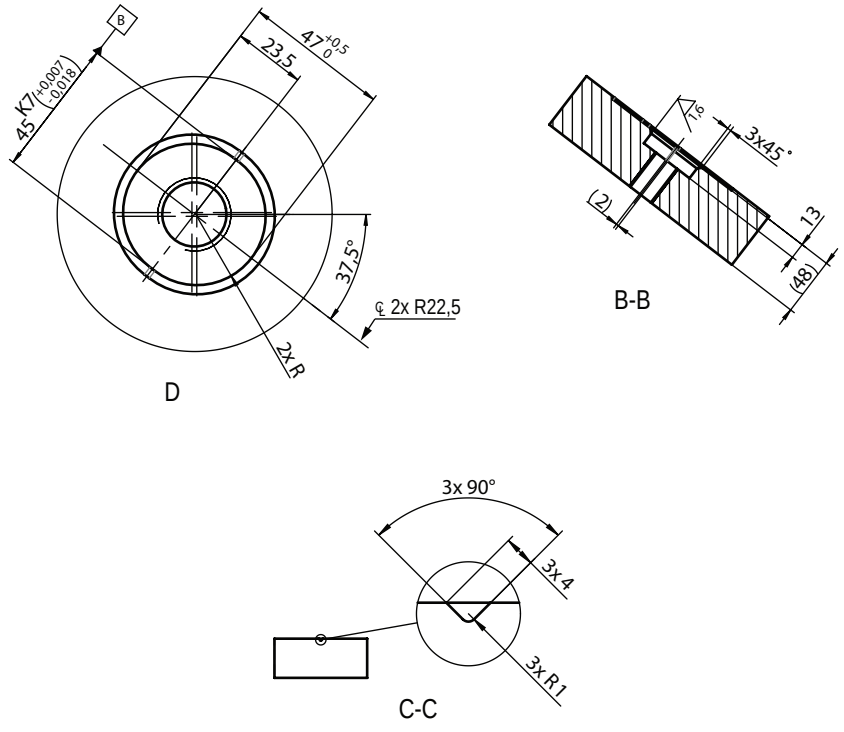
1.3.3 Assembling the manipulator

Continued



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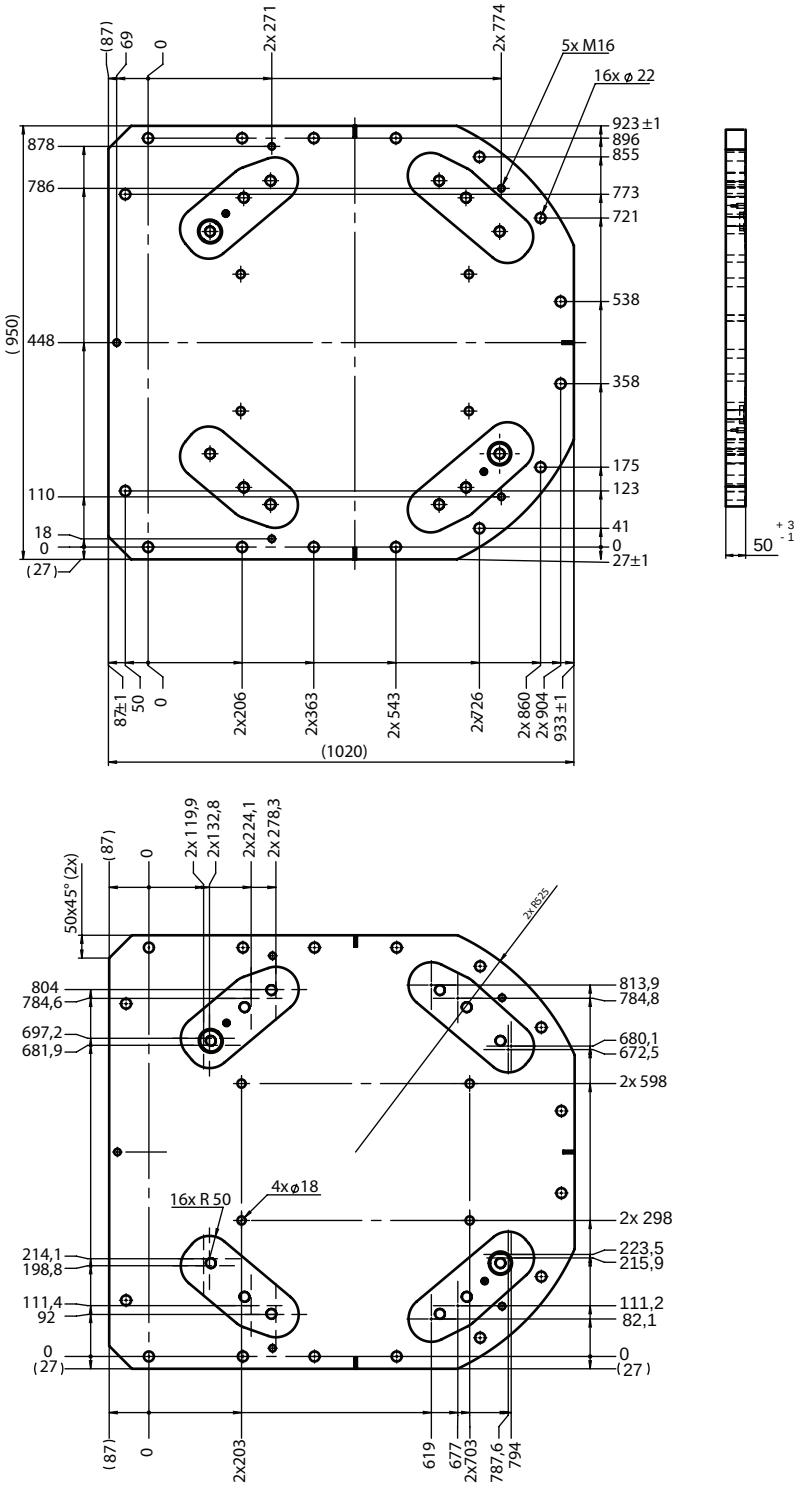

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A	Color: RAL 9005 Thickness: 80-100 µm Weight: 360 kg

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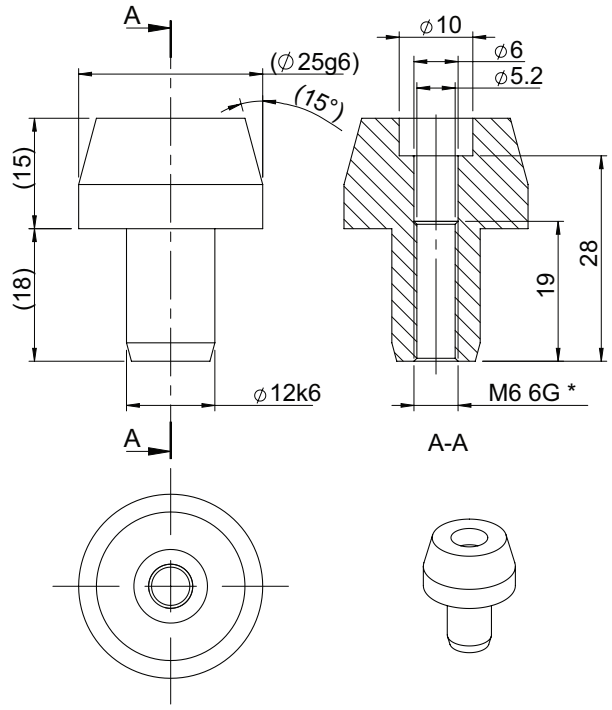
1.3.3 Assembling the manipulator
Continued

Guide pins



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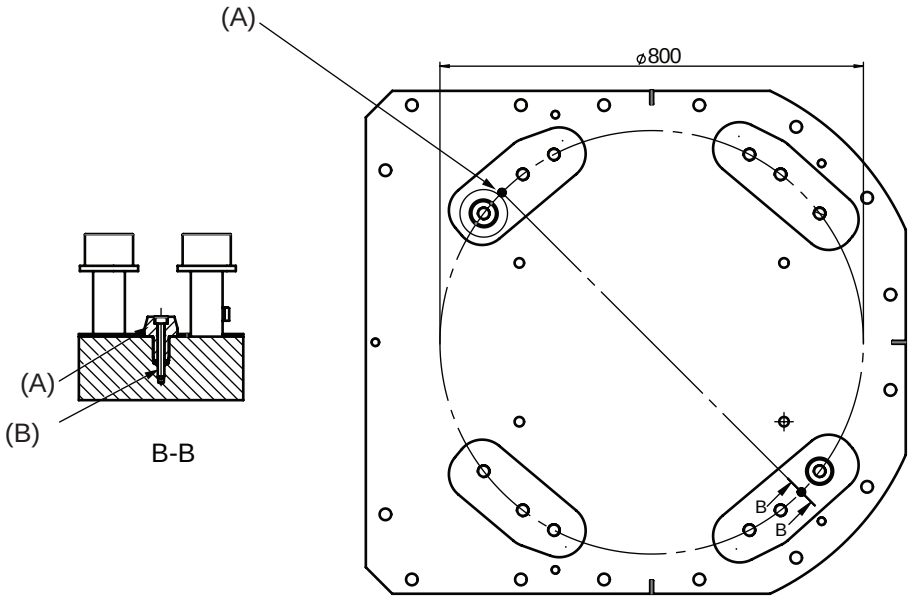
Pos	Description
A	Cylindrical guide pin (x2)

Assembly of guide pins



Pos	Description
A	Cylindrical guide pin (x2)
B	M5 x 40. Tightening torque 6 Nm. (x2)

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Note

All screws and pins are delivered in a plastic bag together with the base plate.

1.3.4 Mechanically restricting the working range of axis 1

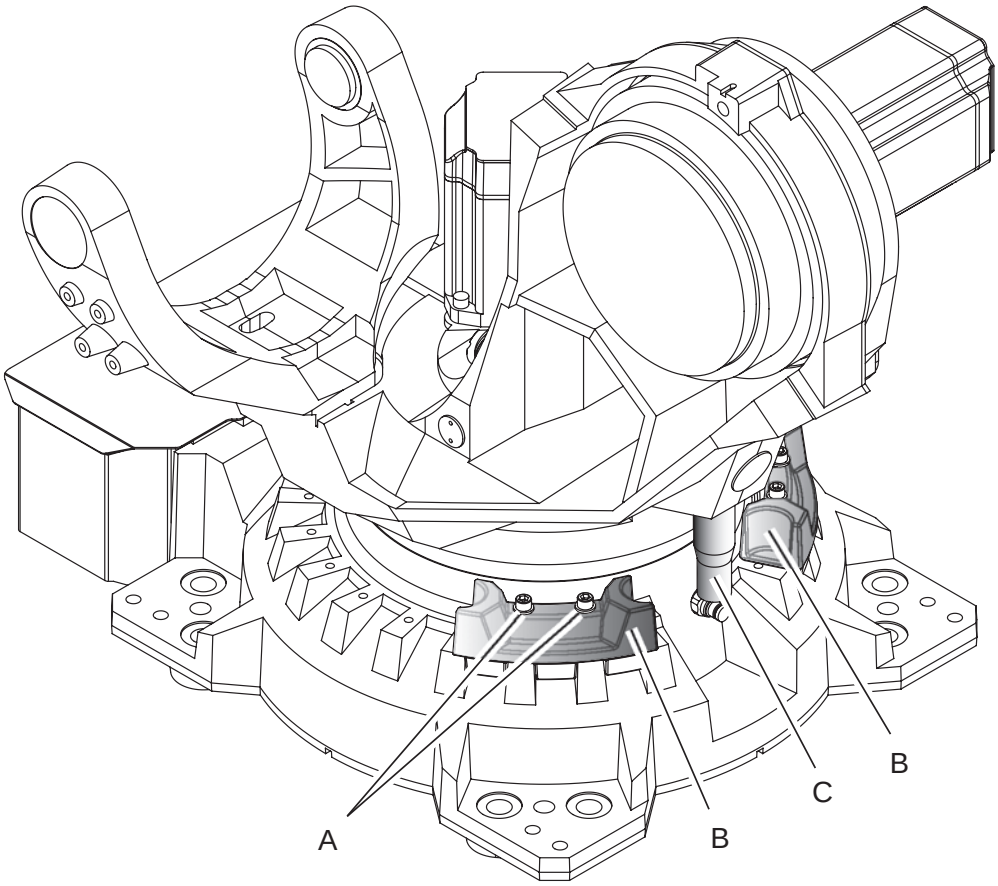
General

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 15° graduation, between ±5° and ±125° in both directions.

Mechanical stops, axis 1

The illustration shows the mounting position of the stop pin and one of the additional mechanical stops available for axis 1.

IRB 6700



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A	Attachment screws M12x70 quality 12.9 Gleitmo 603 (2 pcs per additional mechanical stop)
B	Movable mechanical stop
C	Mechanical stop pin axis-1

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.

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]
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
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.

Continues on next page

1.4.1 Calibration methods
Continued

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 6700. 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*.

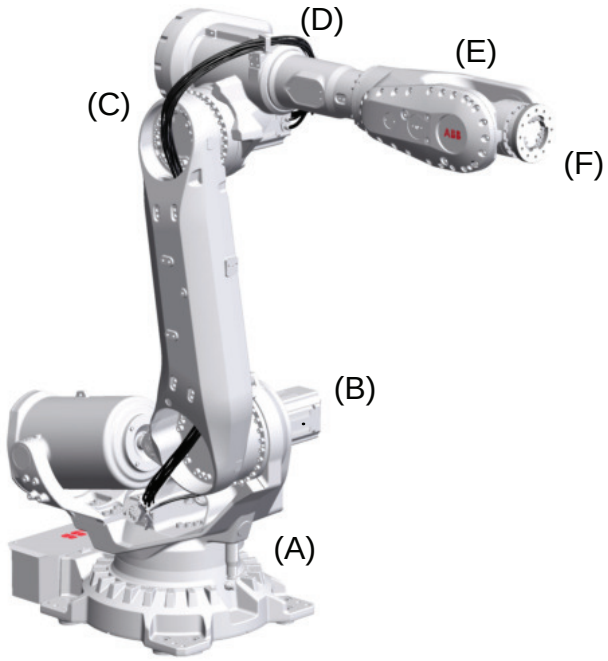
If a service operation is done to a robot with the option Absolute Accuracy, a new absolute accuracy calibration is required in order to establish full performance. For most cases after replacements that do not include taking apart the robot structure, standard calibration is sufficient.

1.4.2 Fine calibration

General

Fine calibration is made using the Calibration Pendulum, see *Operating manual - Calibration Pendulum* or Axis calibration, see *Product manual - IRB 6700*

Axes



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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

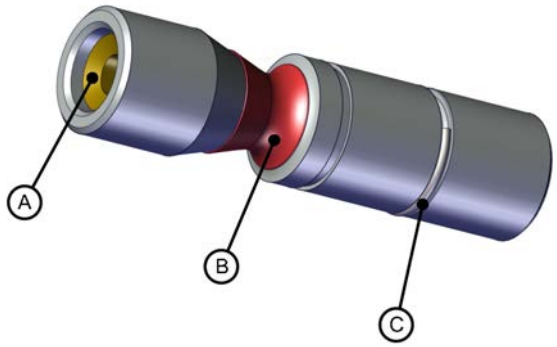
Calibration	Position
Calibration of all axes	All axes are in zero position
Calibration of axis 1 and 2	Axis 1 and 2 in zero position
	Axis 3 to 6 in any position
Calibration of axis 1	Axis 1 in zero position
	Axis 2 to 6 in any position

1.4.3 Calibration tools for Axis Calibration

Calibration tools

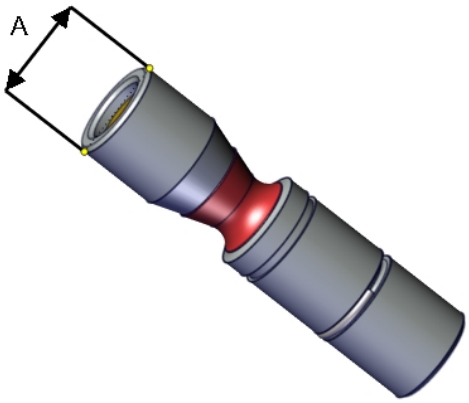
WARNING

If any part is missing or damaged, the tool must be replaced immediately.



xx1500001914

A	Tube insert
B	Plastic protection
C	Steel spring ring



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A	Outer diameter

If including the calibration tool in a local periodic check system, the following measures should be checked.

- Outer diameter within Ø12g4 mm, Ø8g4 mm or Ø6g5 mm (depending on calibration tool size).
- Straightness within 0.005 mm.

1.4.4 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 eg. vision system 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.

Continues on next page

1.4.4 Absolute Accuracy calibration
Continued

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

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 6700 (all variants except LeanID)	0.35	0.75	100
IRB 6700 LeanID (all variants)	0.40	0.85	100

1.4.5 Synchronization marks and axis movement directions

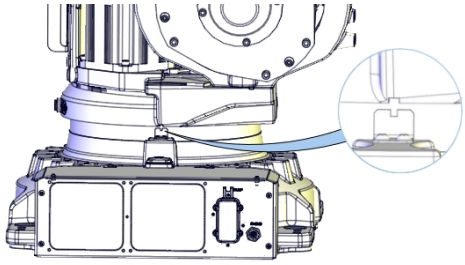
1.4.5.1 Synchronization marks and synchronization position for axes

Introduction

This section shows the position of the synchronization marks and the synchronization position for each axis.

Synchronization marks, IRB 6700

Axis 1



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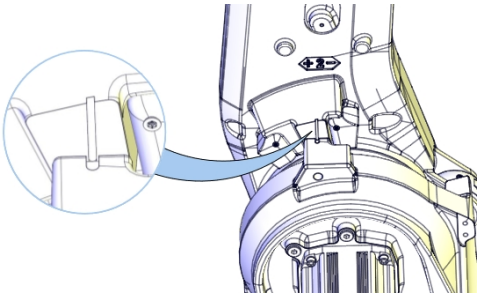
Axis 2



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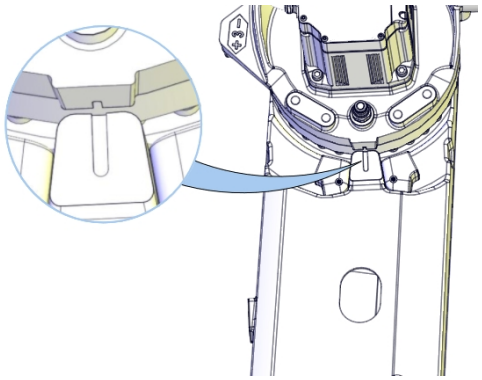
Axis 3



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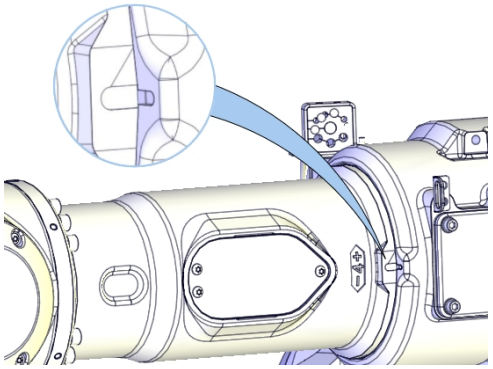
Axis 4



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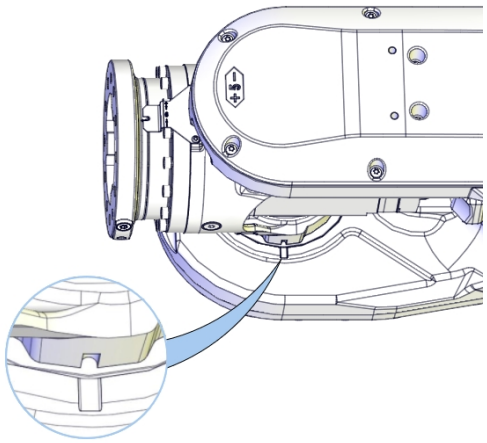
1.4.5.1 Synchronization marks and synchronization position for axes

Continued

Axis 5



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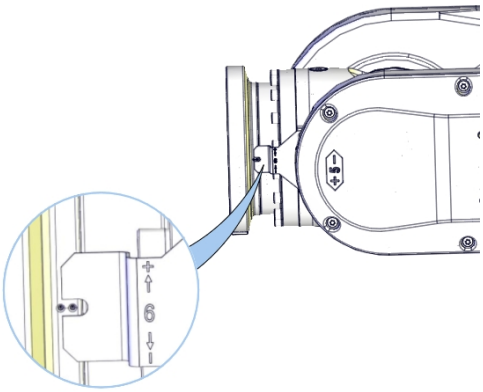
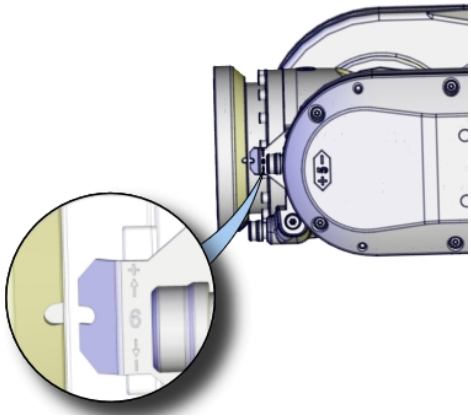
Axis 6

Two variants of synchronization mark plates.



xx1300000873



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1.4.5.2 Calibration movement directions for all axes

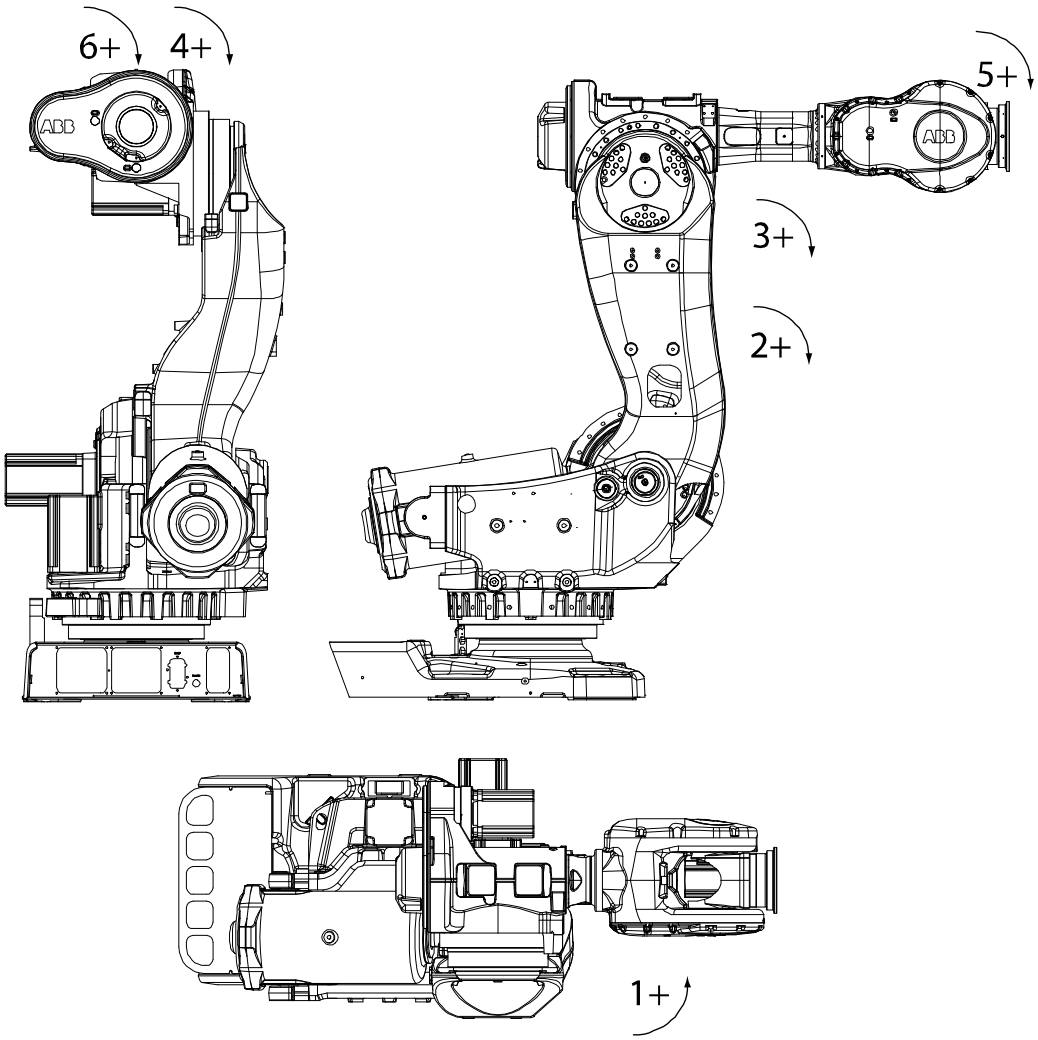
Overview

When calibrating, the axis must consistently be run towards the calibration position in the same direction in order to avoid position errors caused by backlash in gears and so on. Positive directions are shown in the graphic below.

Calibration service routines will handle the calibration movements automatically and these might be different from the positive directions shown below.

Manual movement directions, 6 axes

Note! The graphic shows an IRB 7600. The positive direction is the same for all 6-axis robots, except the positive direction of axis 3 for IRB 6400R, which is in the opposite direction!



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1.5 Load diagrams

1.5.1 Introduction

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.

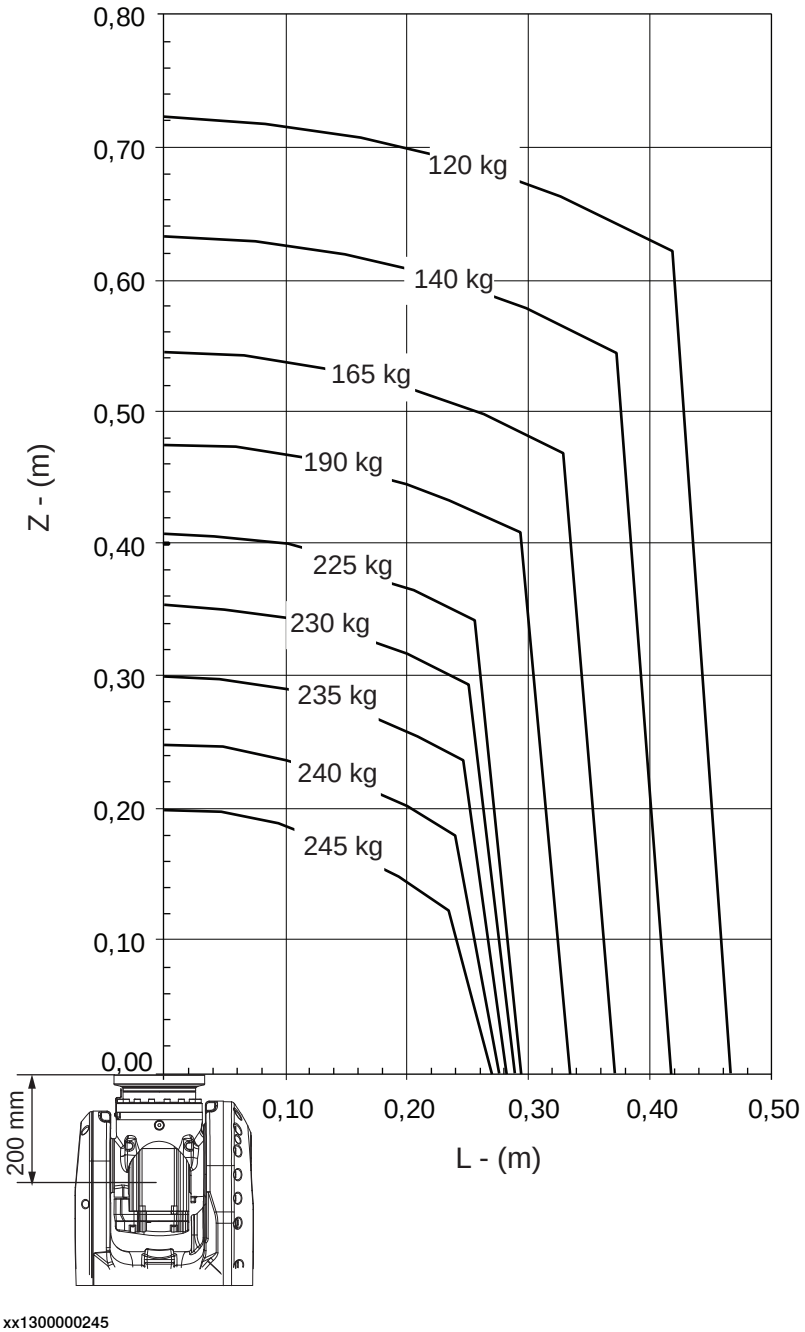
Control of load case by "RobotLoad"

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.

1.5.2 Diagrams

IRB 6700-235/2.65



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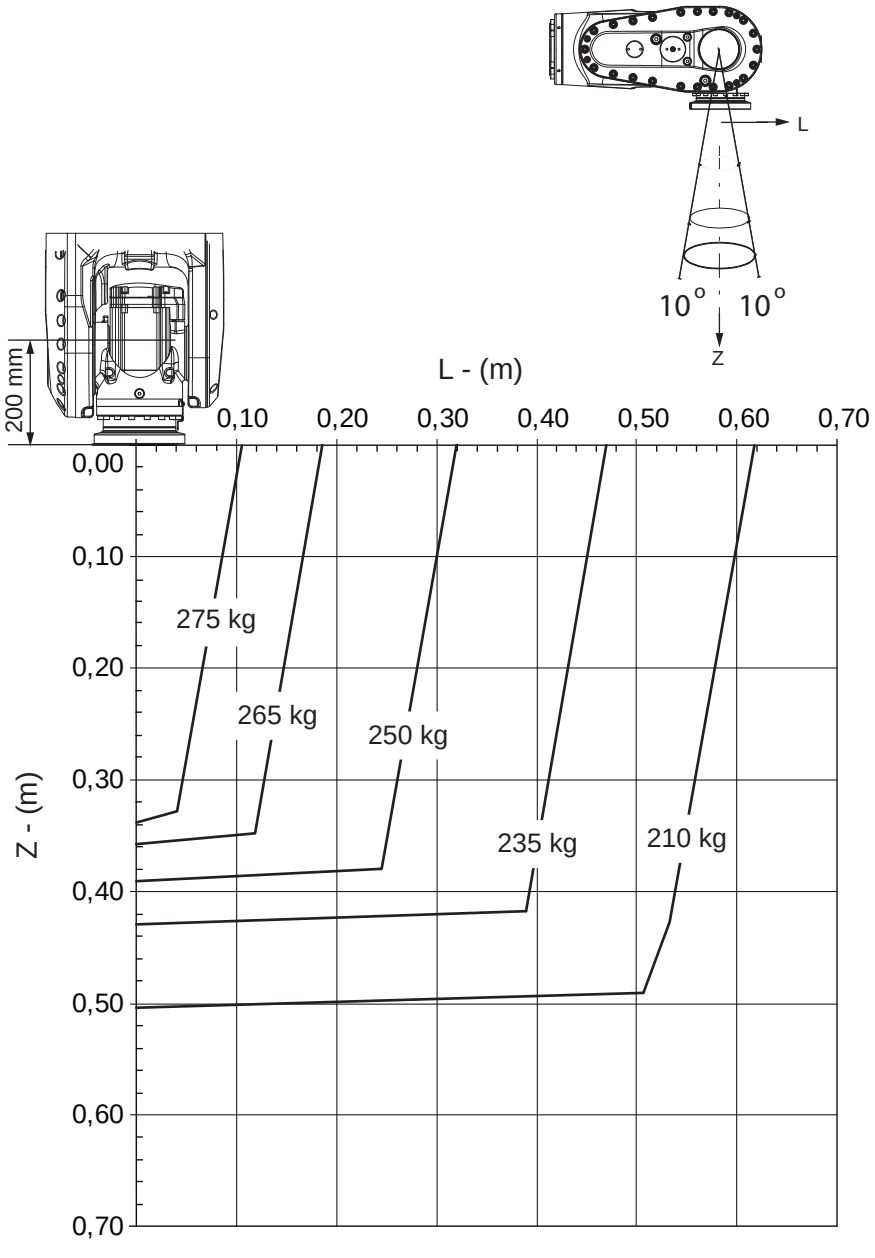
1.5.2 Diagrams
Continued

IRB 6700-235/2.65 "Vertical Wrist" (±10°)



xx1300000246

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

	Description
Max load	280 kg
Z_{max}	0.327 m
L_{max}	0.100 m

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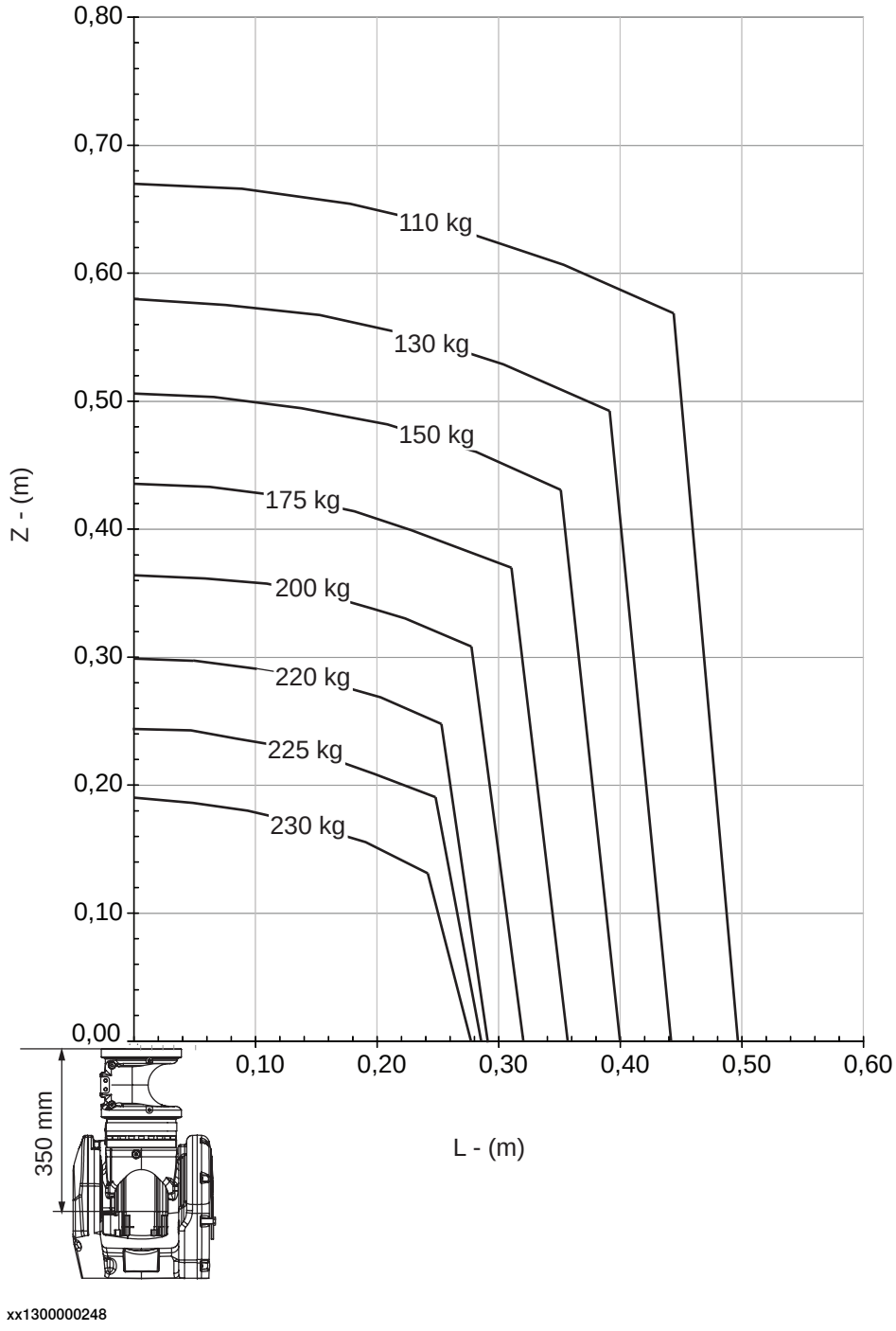
IRB 6700-235/2.65 " LeanID", option 780-4



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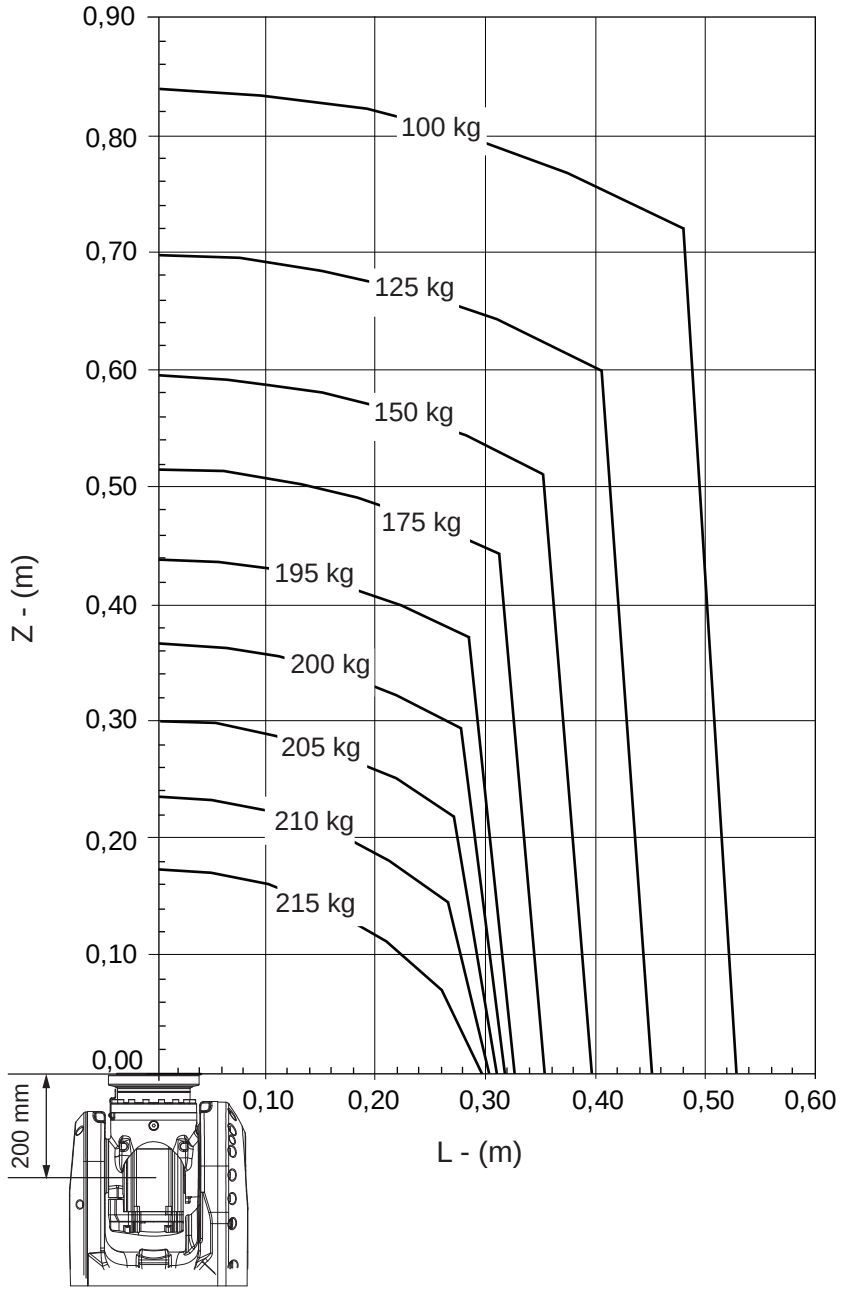
1.5.2 Diagrams
Continued

IRB 6700-205/2.80



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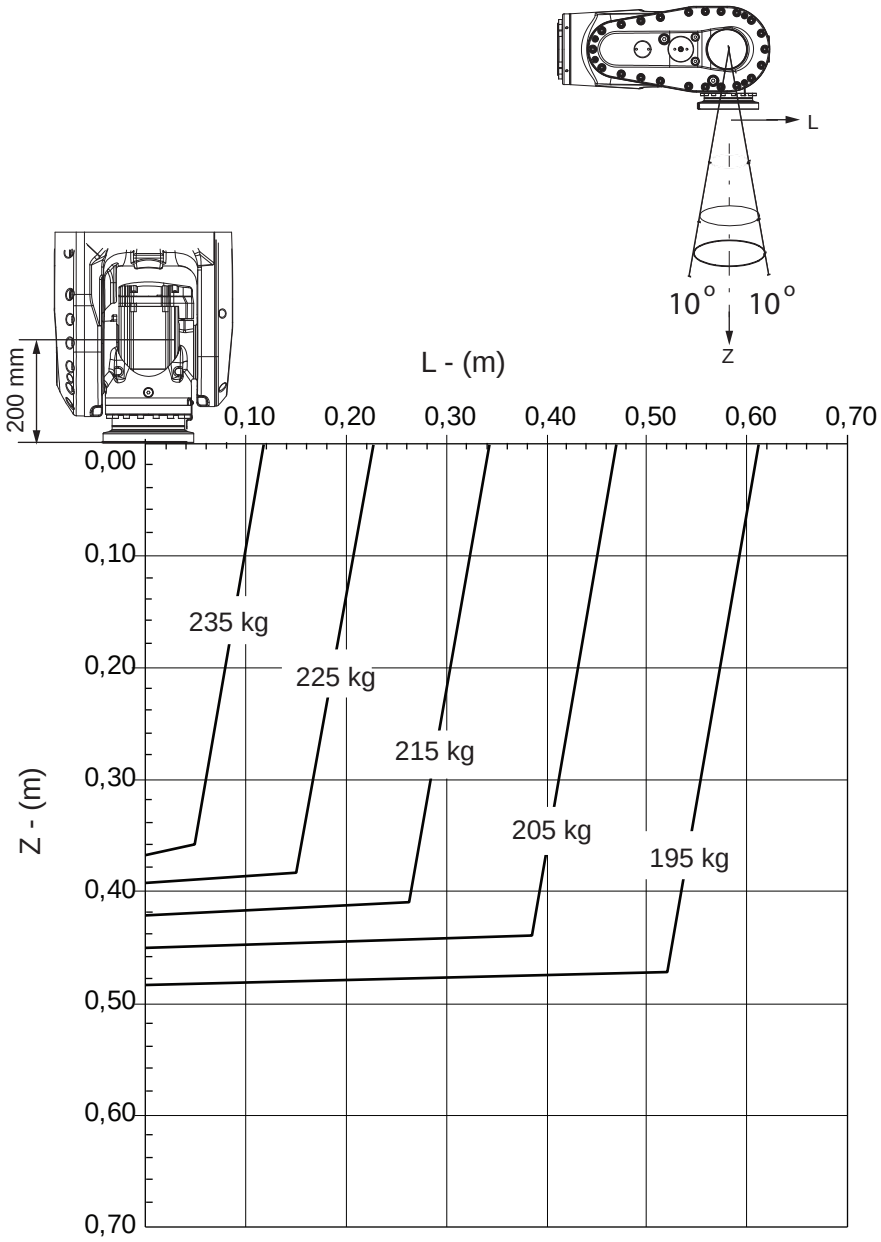
IRB 6700-205/2.80 "Vertical Wrist" (±10°)



xx1300000250

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

	Description
Max load	240 kg
Z_{max}	0.355 m
L_{max}	0.103 m

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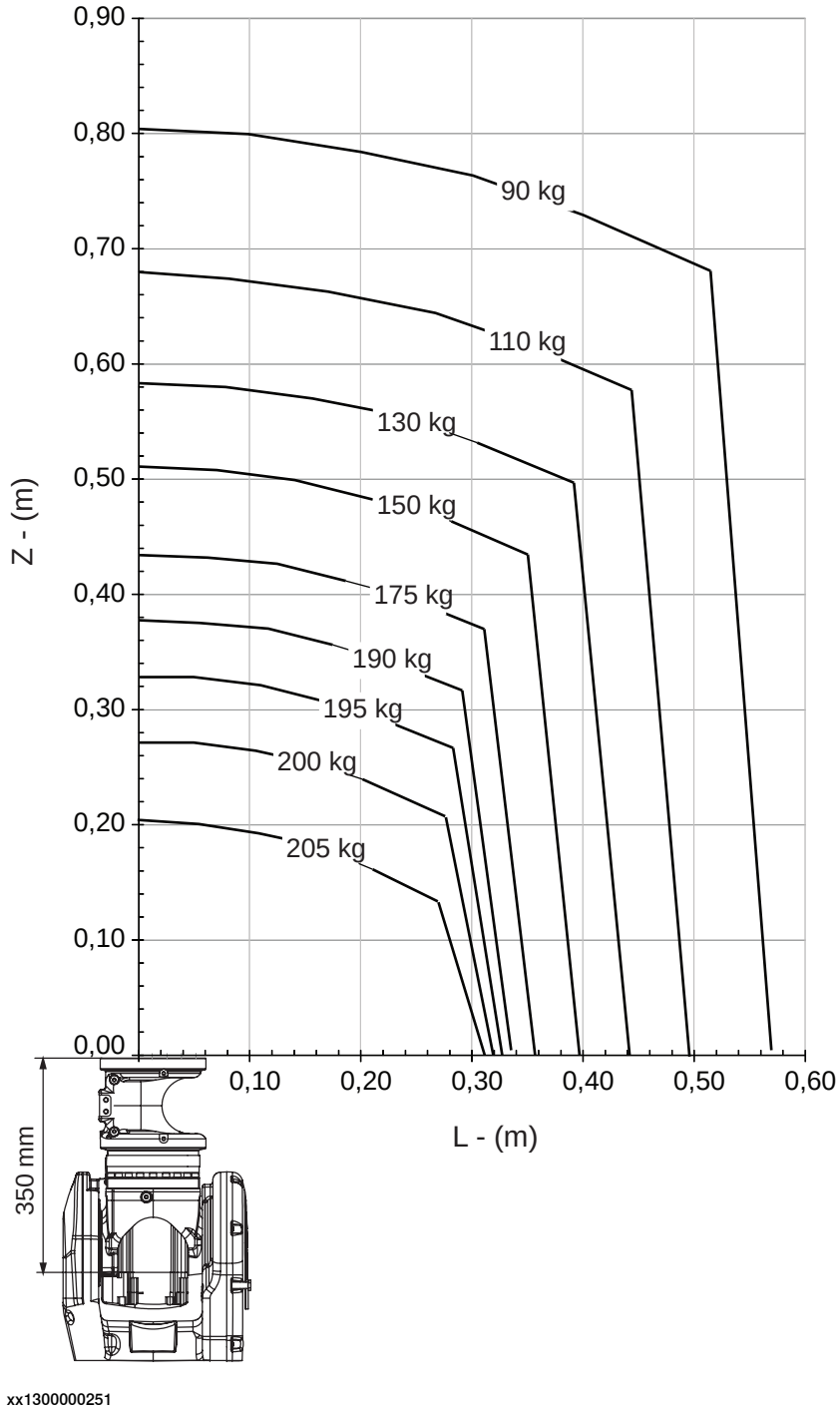
1.5.2 Diagrams
Continued

IRB 6700-205/2.80 "LeanID", option 780-4



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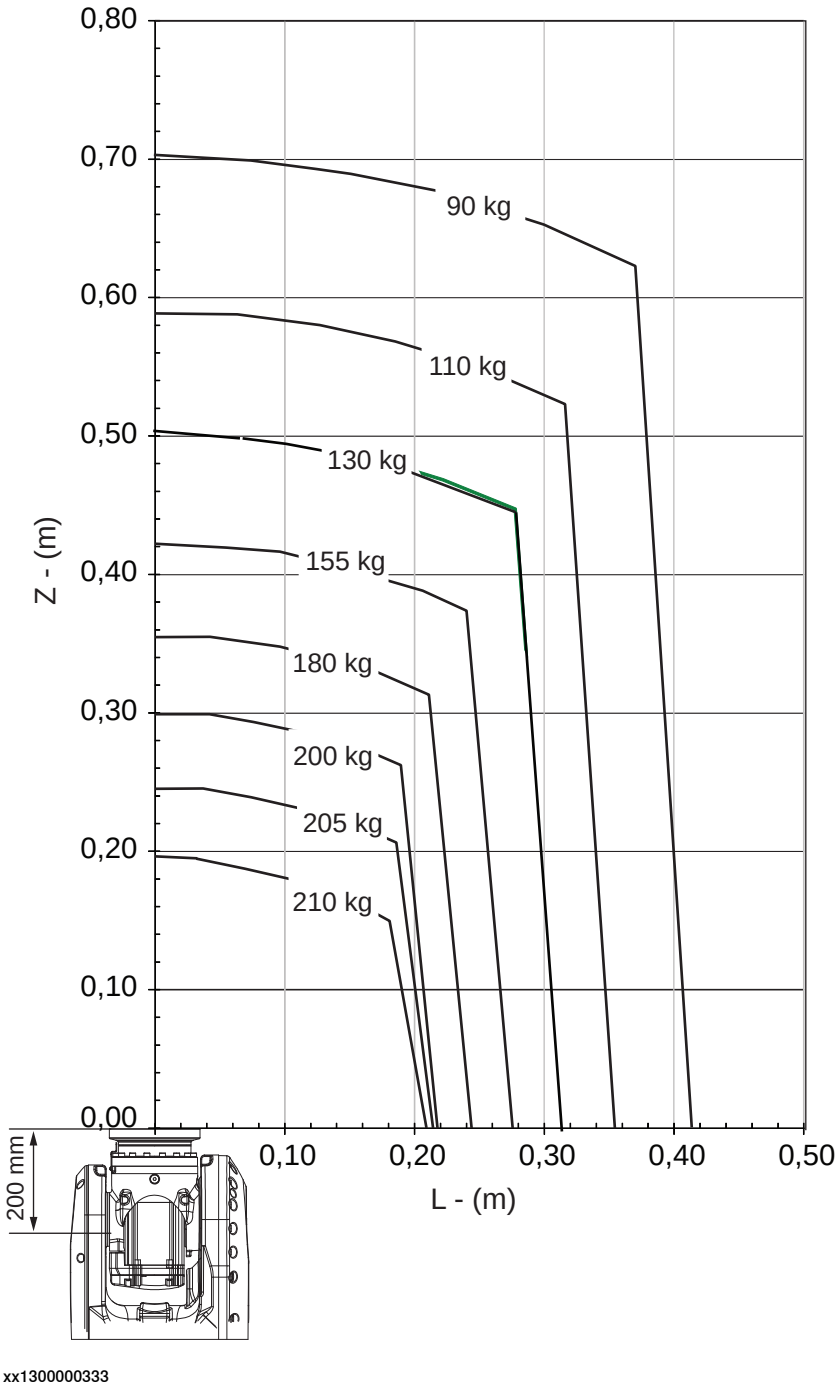
IRB 6700-200/2.60



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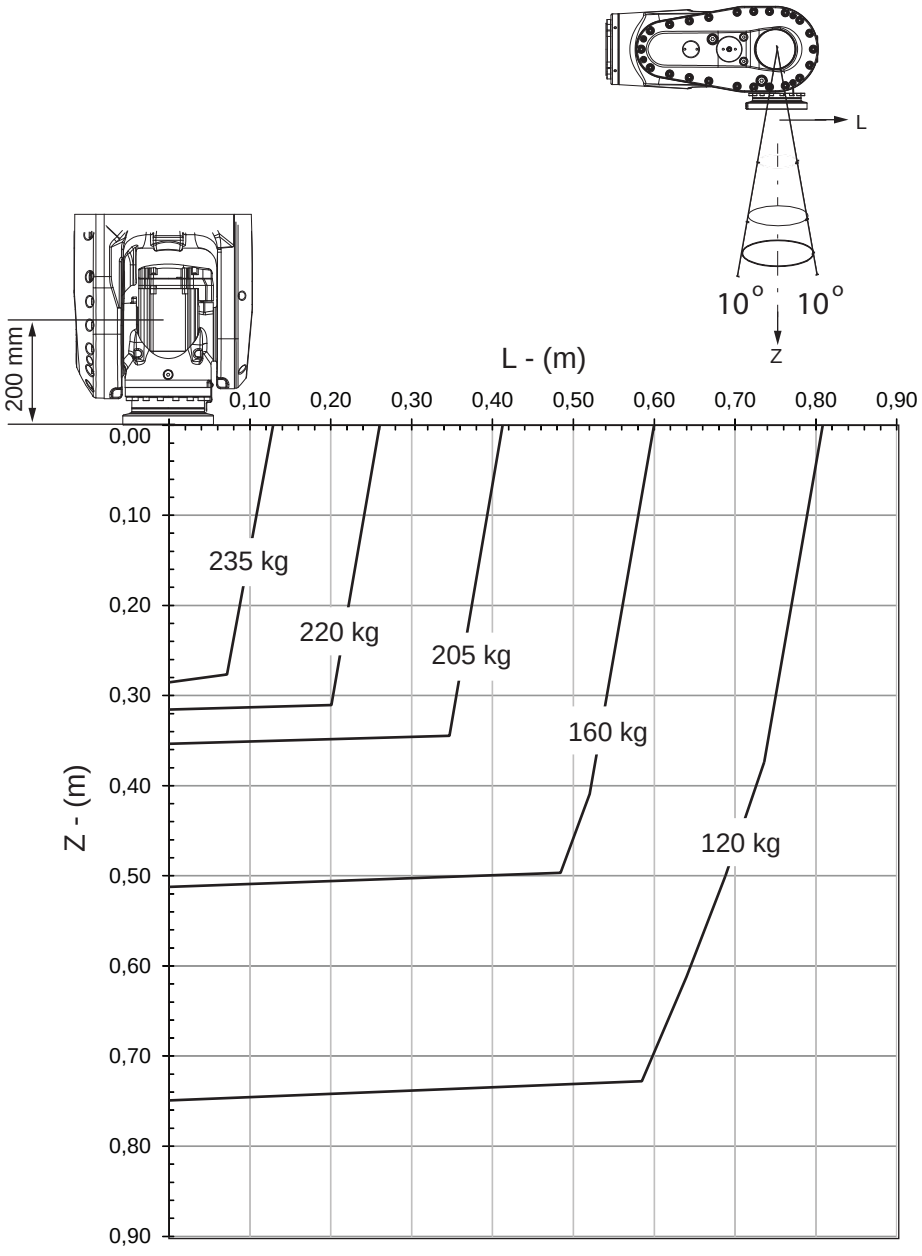
1.5.2 Diagrams
Continued

IRB 6700-200/2.60 "Vertical Wrist" (±10°)



xx1300000334

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

	Description
Max load	242 kg
Z_{max}	0.27 m
L_{max}	0.104 m

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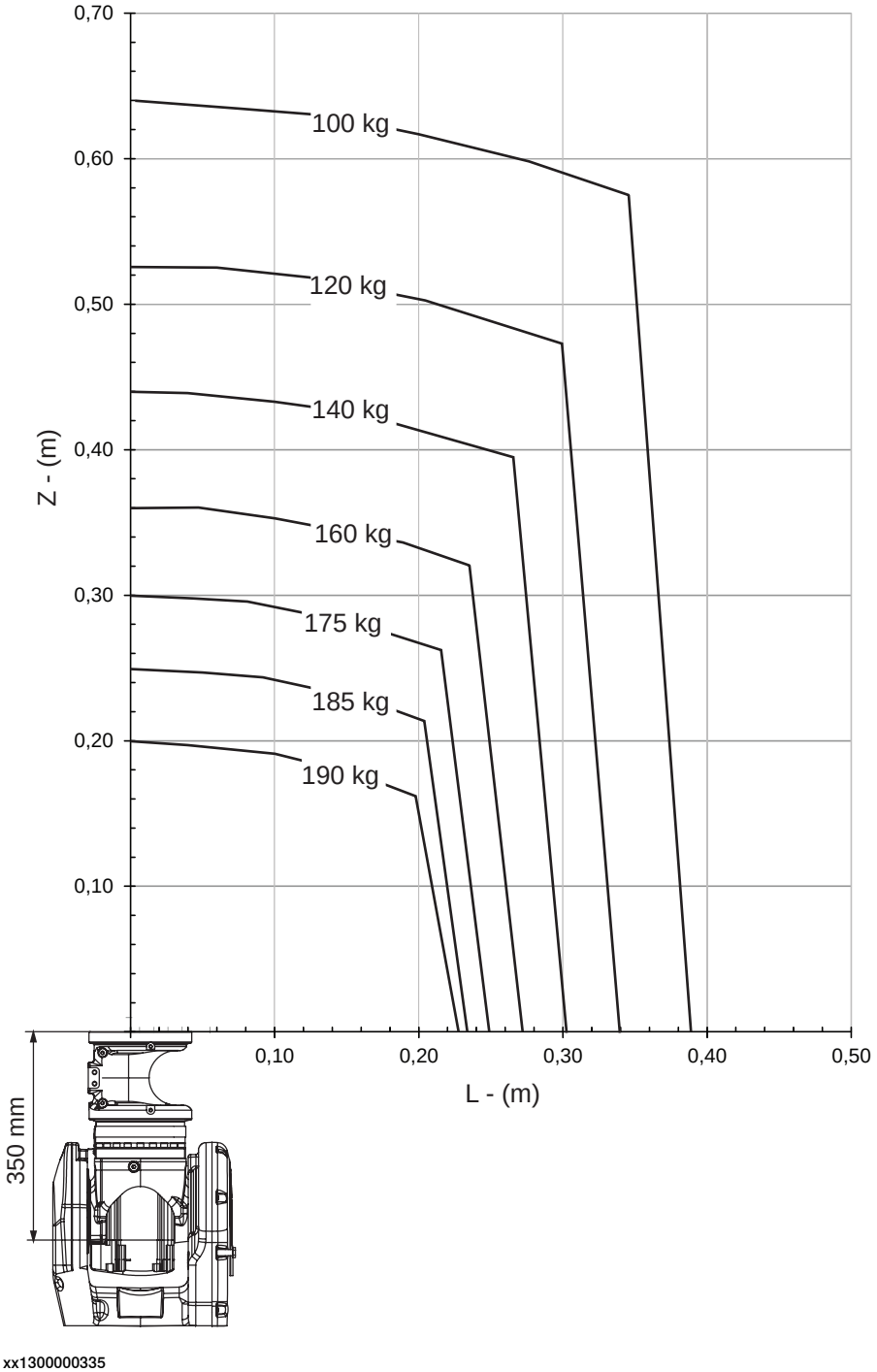
IRB 6700-200/2.60 "LeanID", option 780-4



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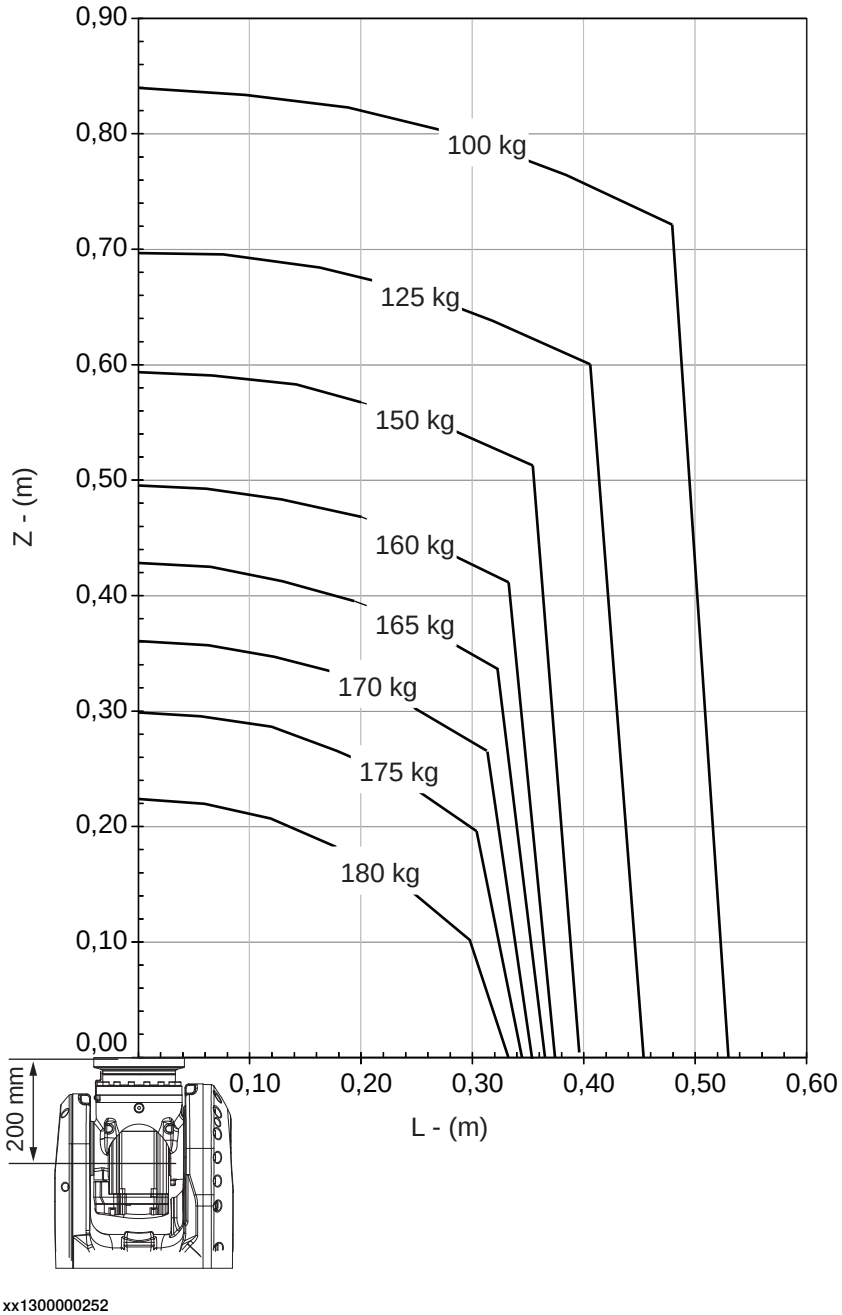
1.5.2 Diagrams
Continued

IRB 6700-175/3.05



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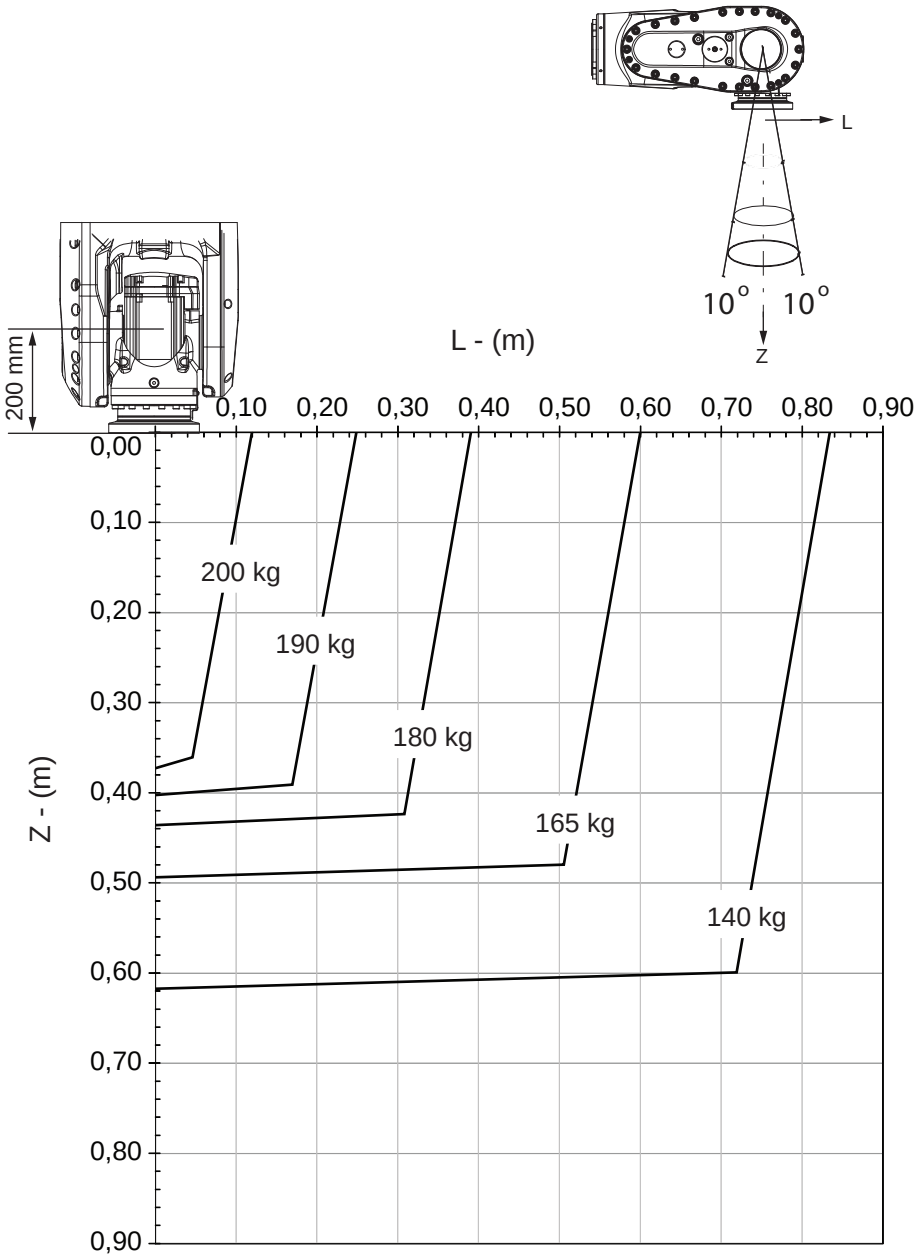
IRB 6700-175/3.05 "Vertical Wrist" (±10°)



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	Description
Max load	204 kg
Z_{max}	0.360 m
L_{max}	0.101 m

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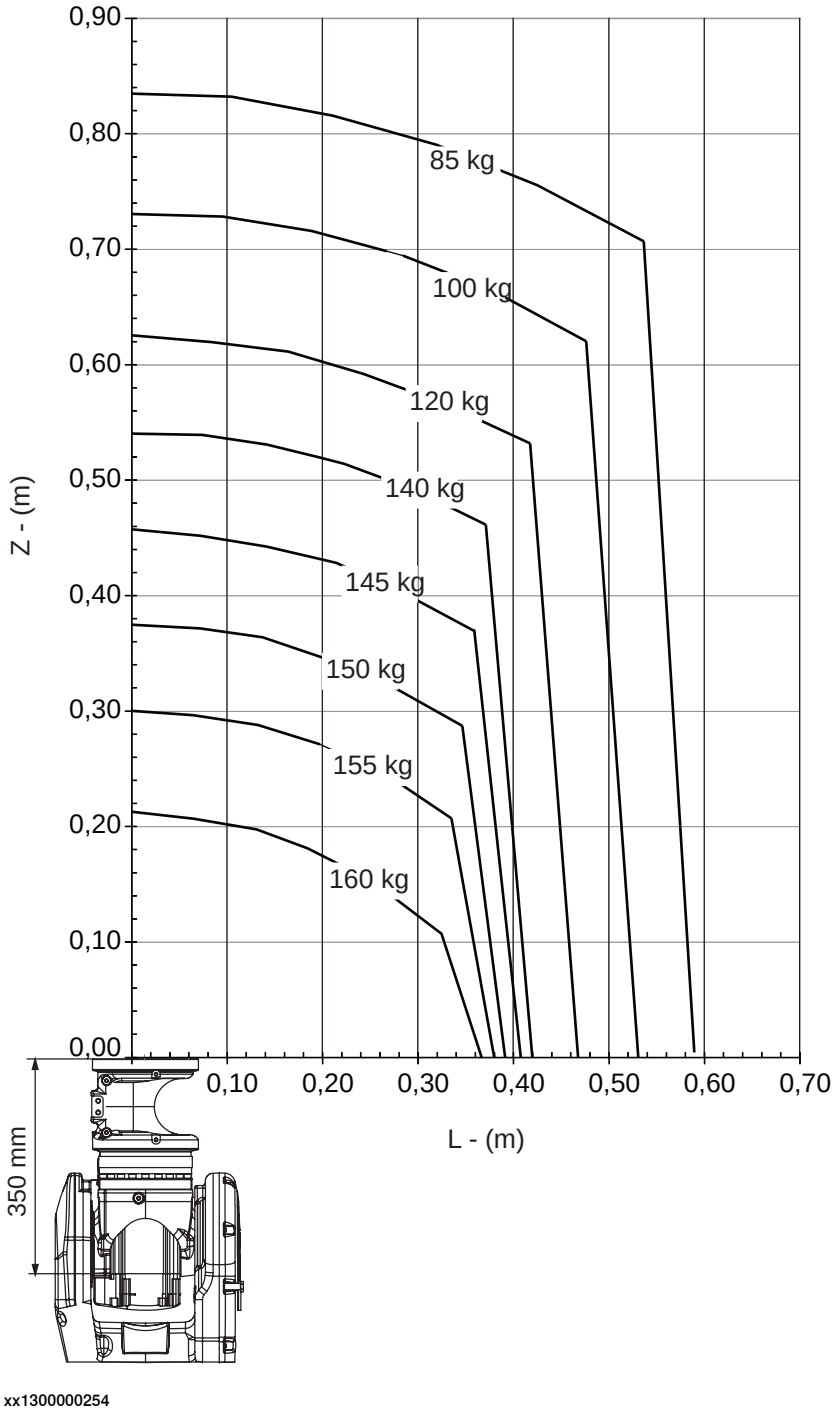
1.5.2 Diagrams
Continued

IRB 6700-175/3.05 "LeanID", option 780-4



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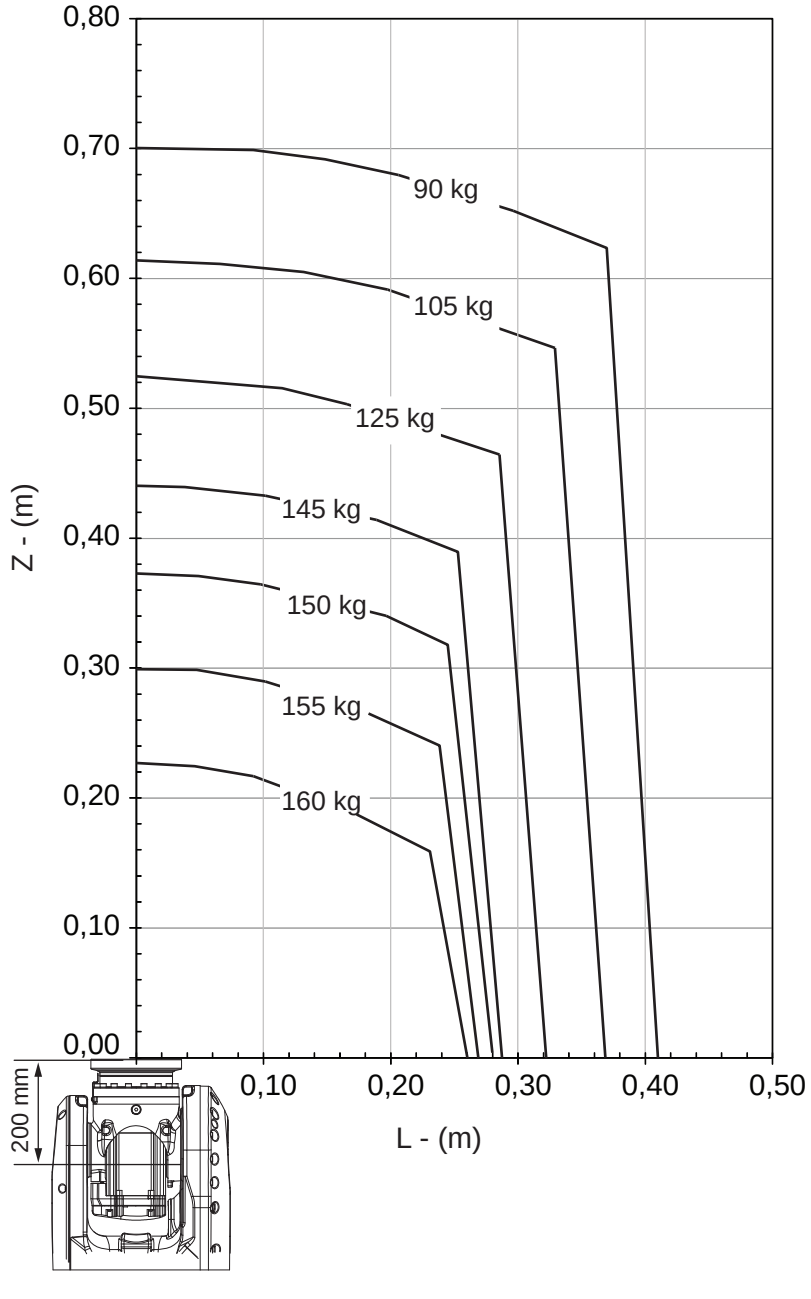
IRB 6700-155/2.85



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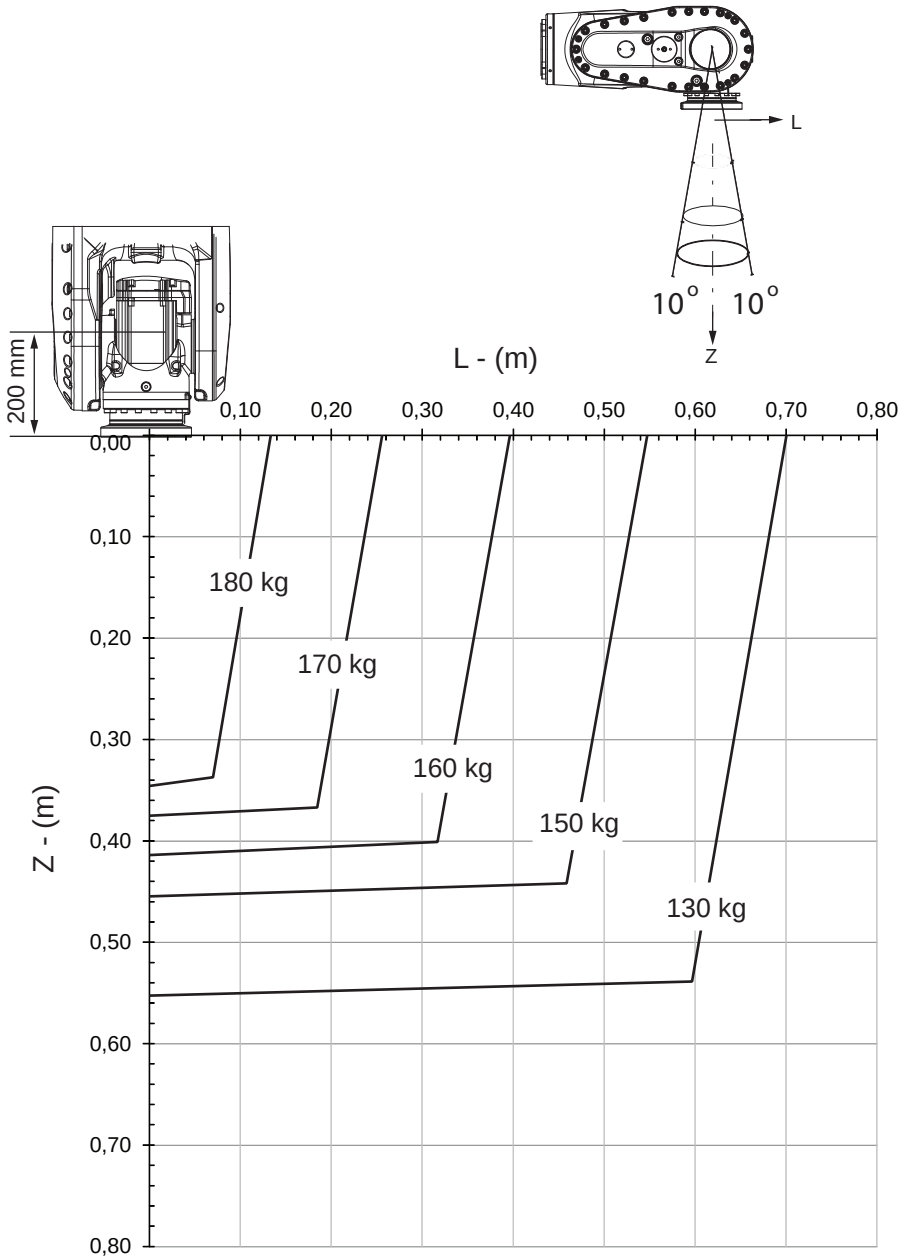
1.5.2 Diagrams
Continued

IRB 6700-155/2.85 "Vertical Wrist" (±10°)



xx1300000337

	Description
Max load	186 kg
Z_{max}	0.327 m
L_{max}	0.101 m

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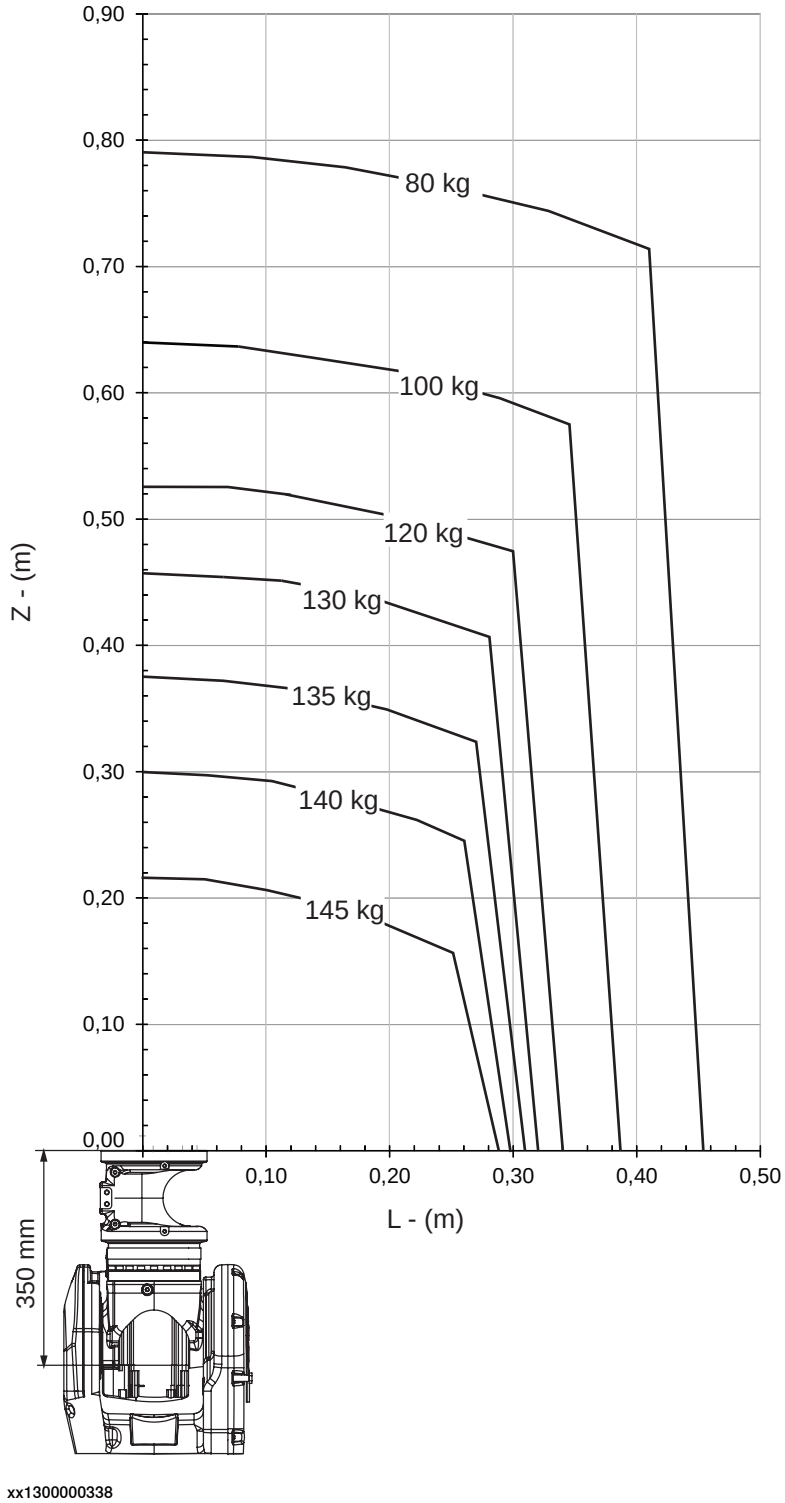
IRB 6700-155/2.85 "LeanID", option 780-4



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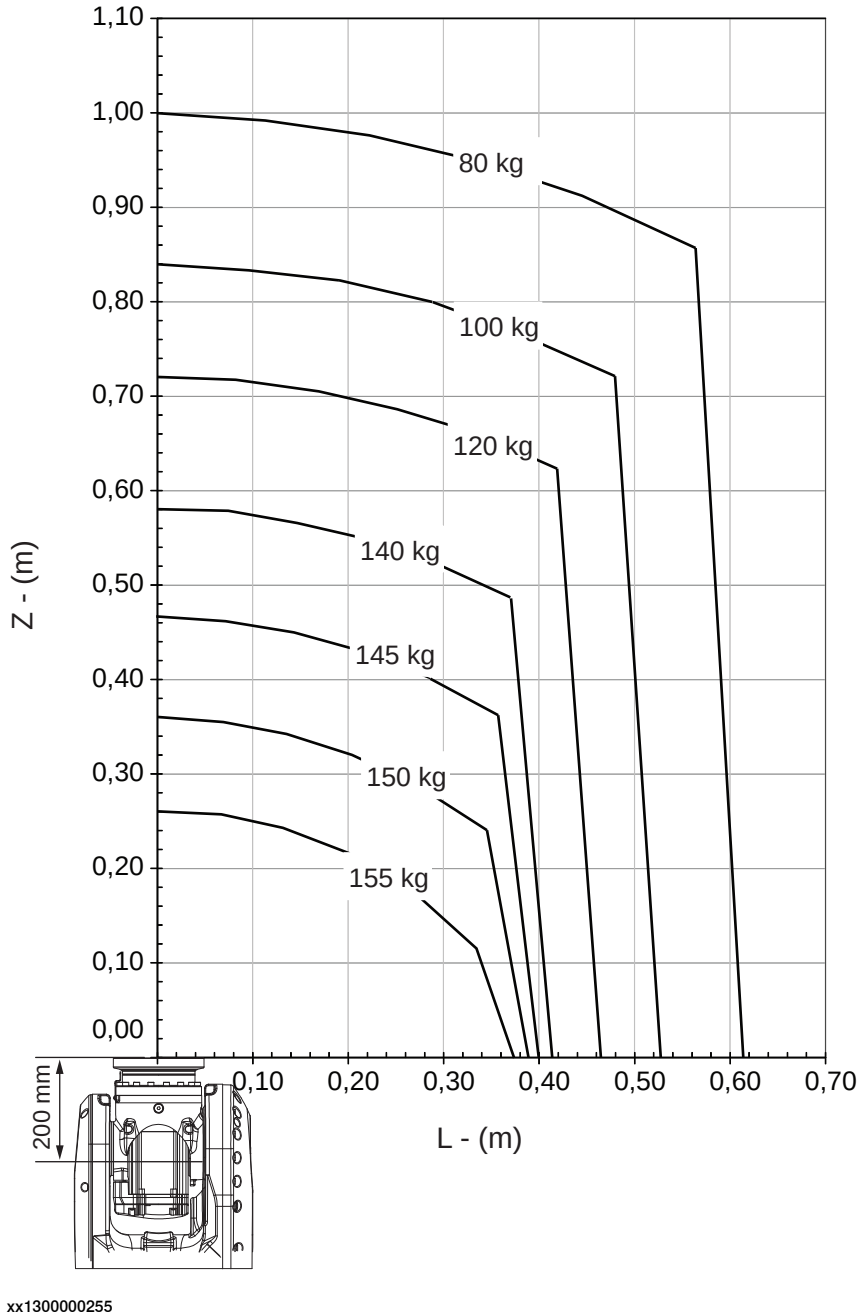
1.5.2 Diagrams
Continued

IRB 6700-150/3.20



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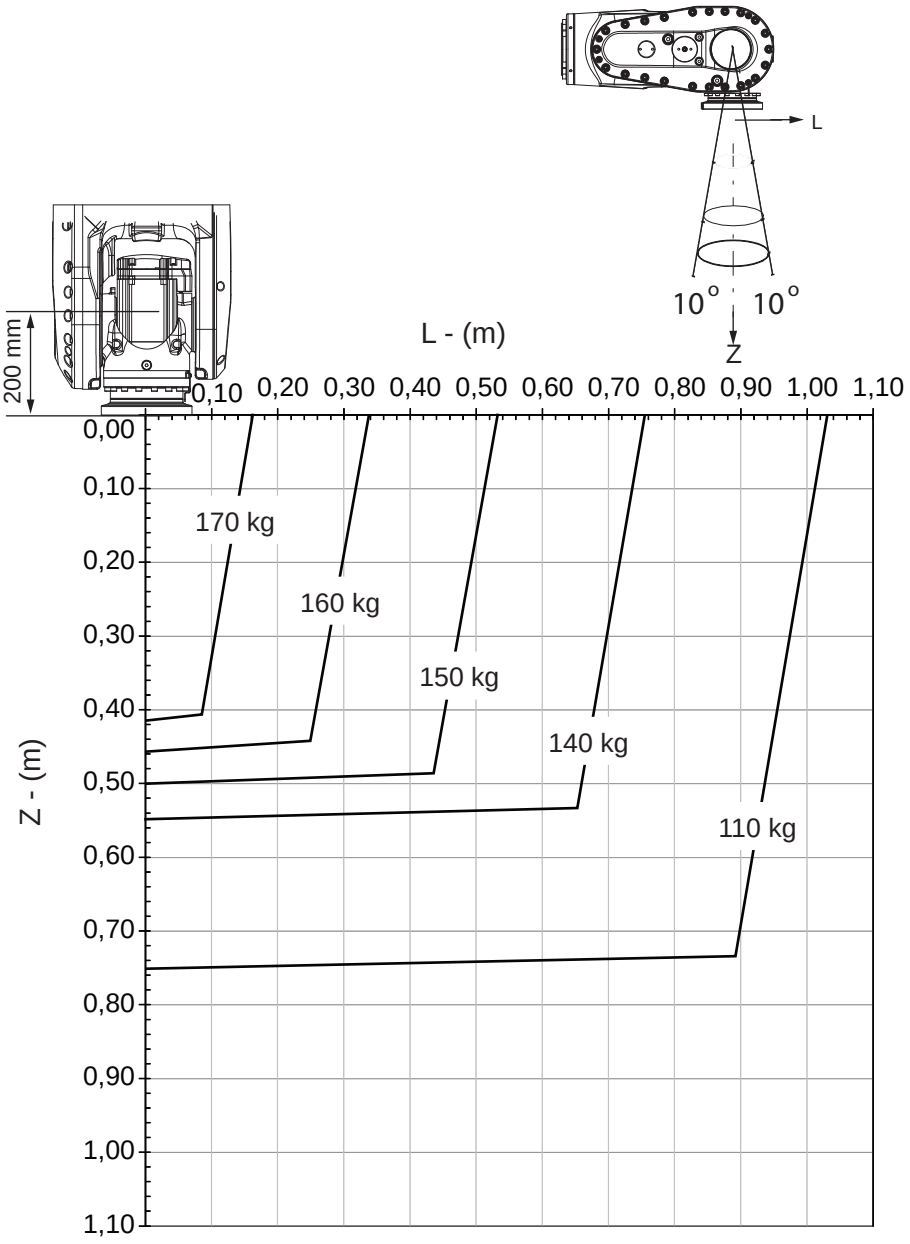
IRB 6700-150/3.20 "Vertical Wrist" (±10°)



xx1300000256

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

	Description
Max load	177 kg
Z_{max}	0.394 m
L_{max}	0.106 m

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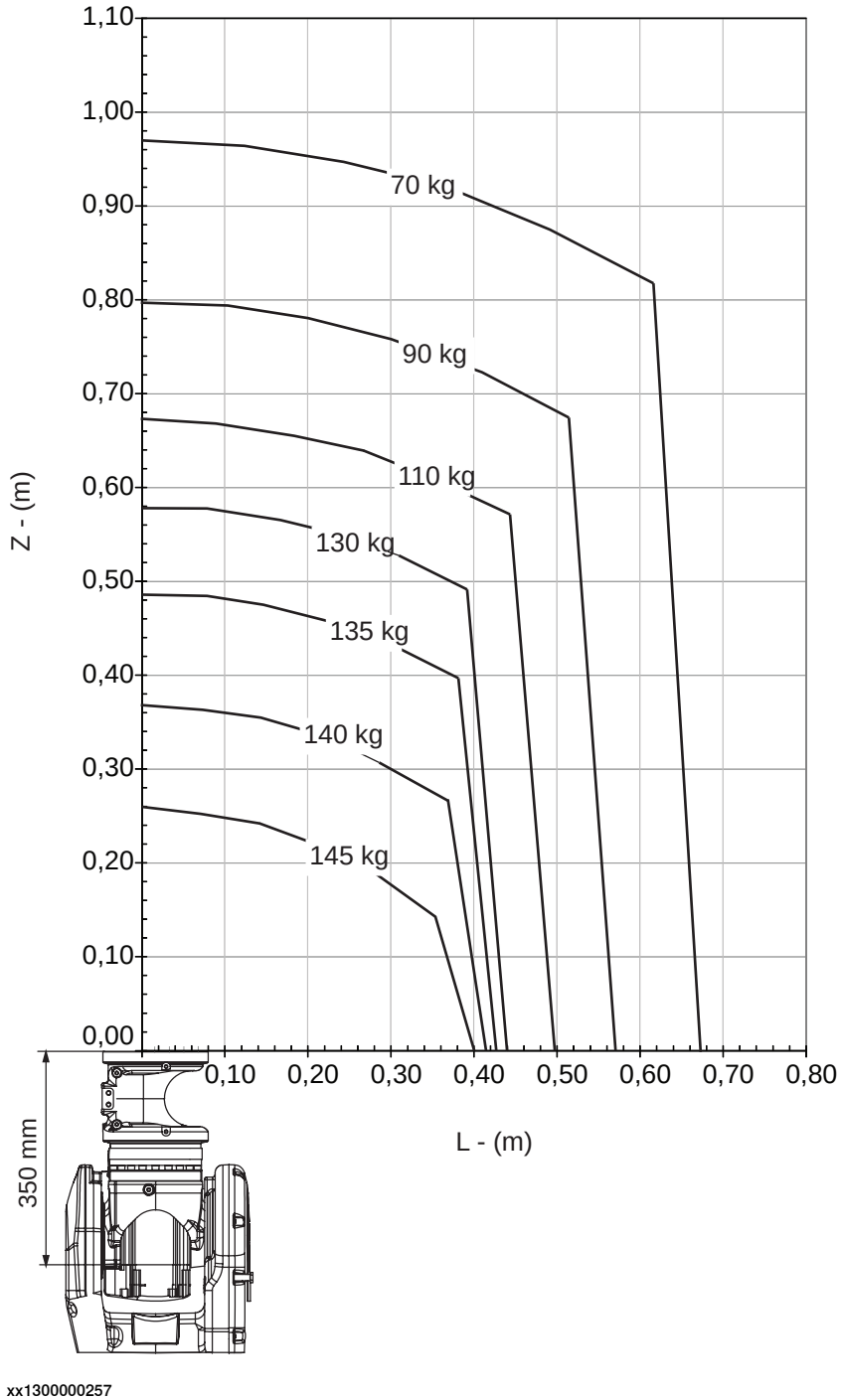
1.5.2 Diagrams
Continued

IRB 6700-150/3.20 "LeanID", option 780-4



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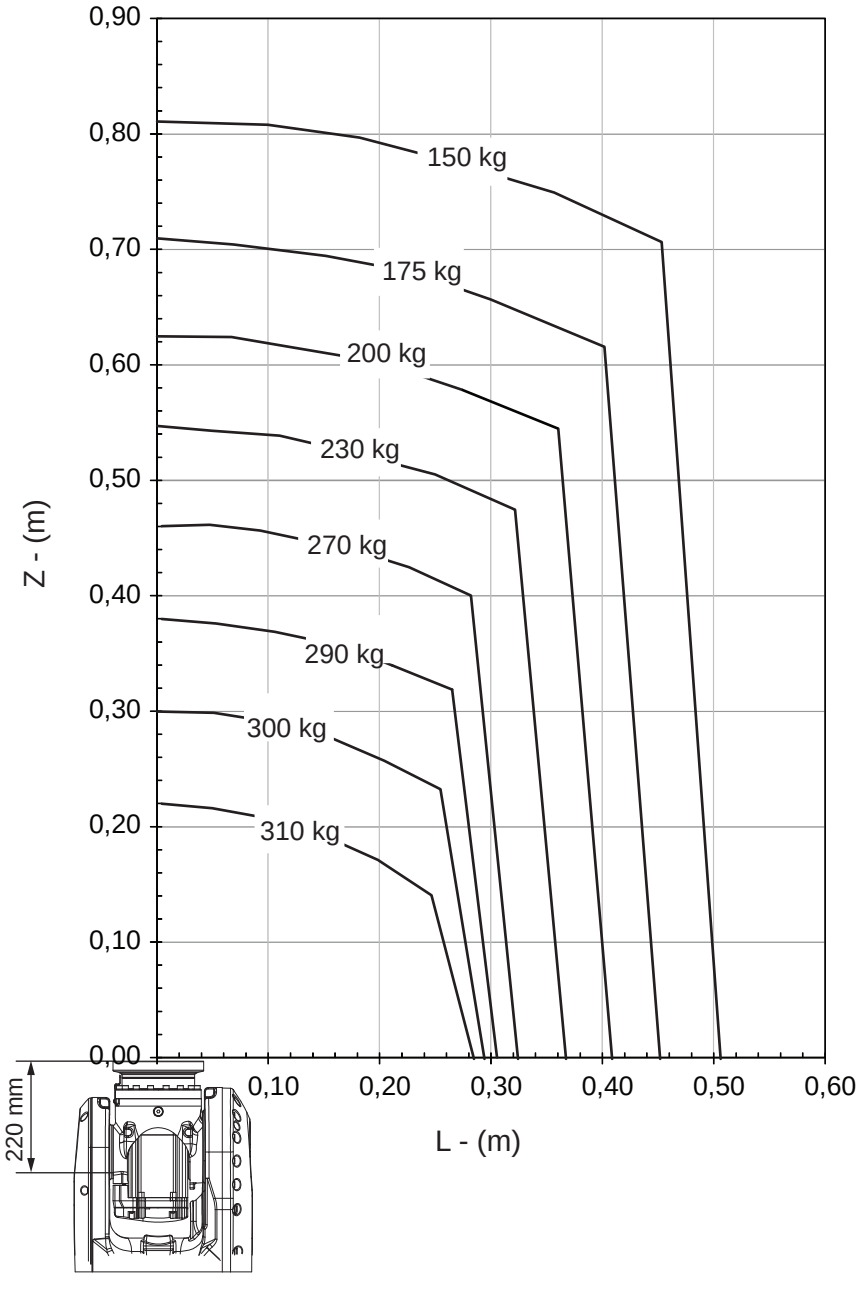
IRB 6700-300/2.70



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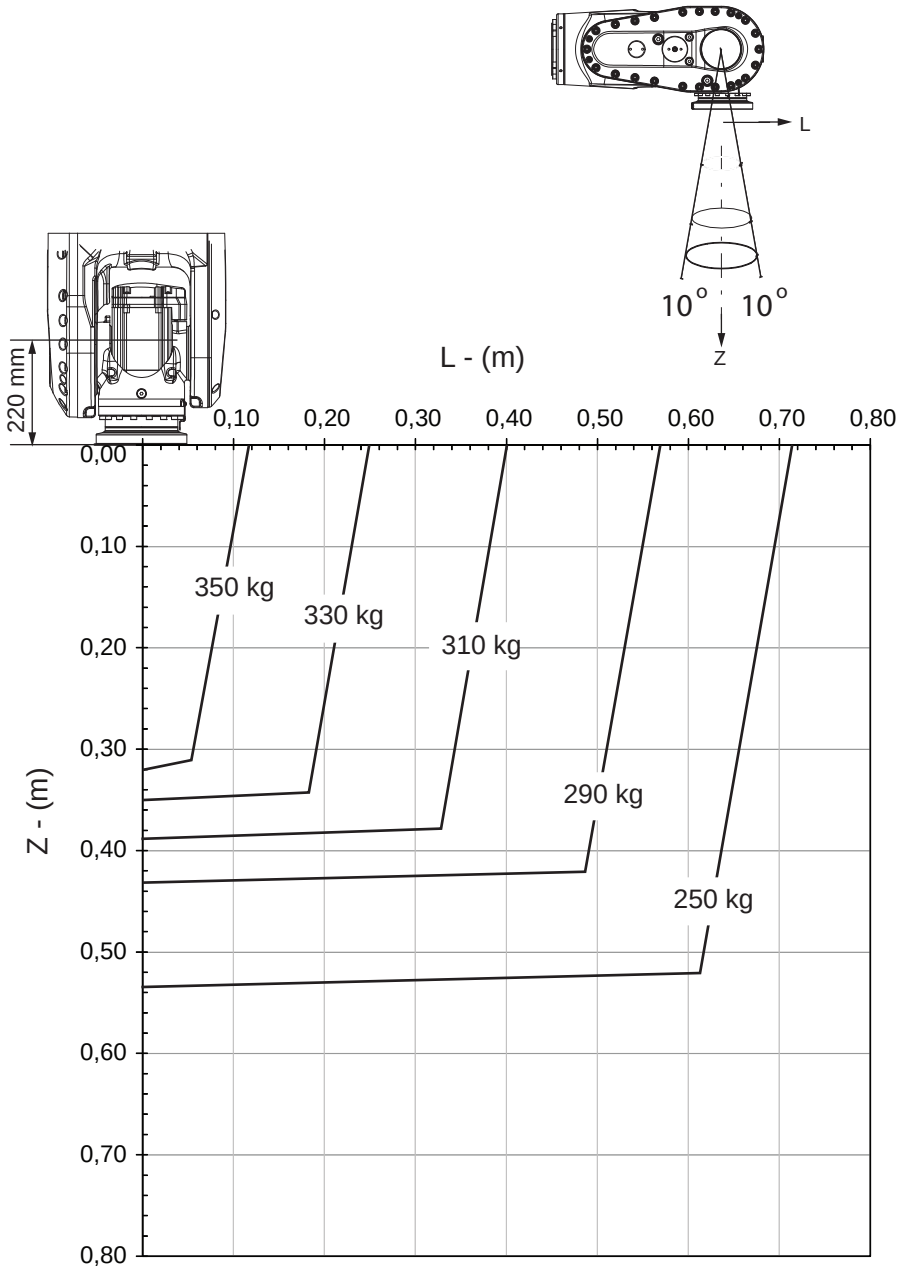
1.5.2 Diagrams
Continued

IRB 6700-300/2.70 "Vertical Wrist" (±10°)



xx1400002045

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

	Description
Max load	357 kg
Z_{max}	0.308 m
L_{max}	0.102 m

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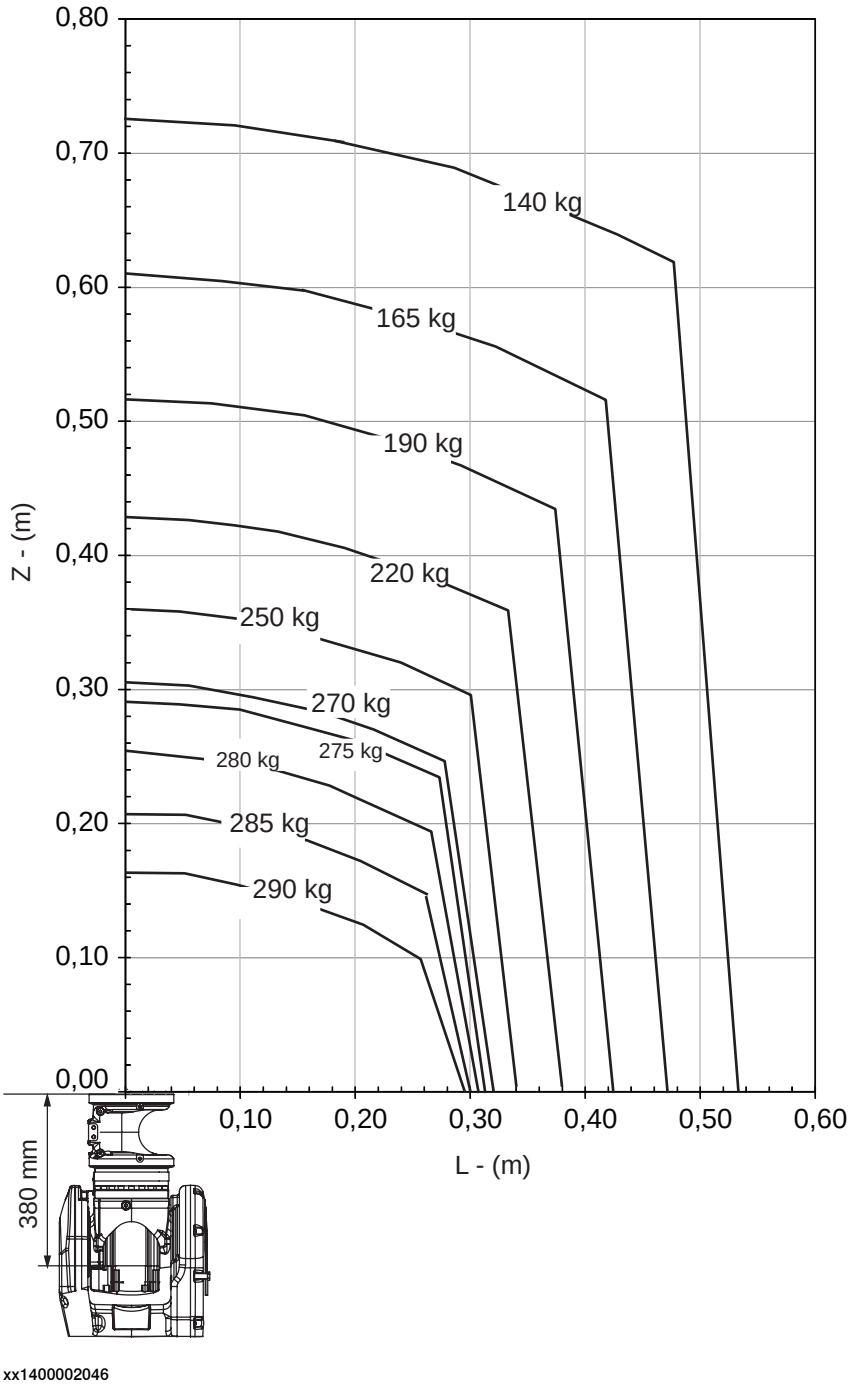
IRB 6700-300/2.70 "LeanID", option 780-4



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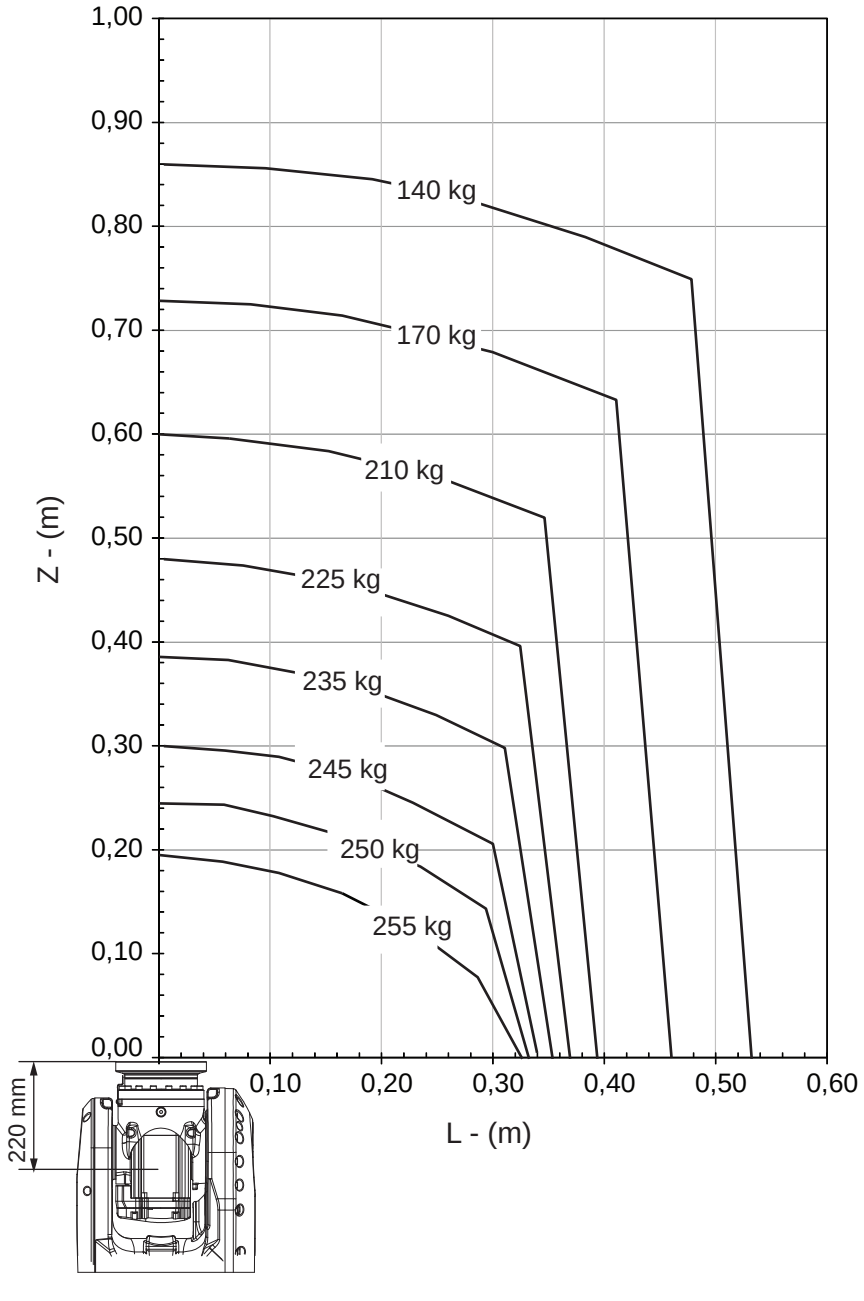
1.5.2 Diagrams
Continued

IRB 6700-245/3.00



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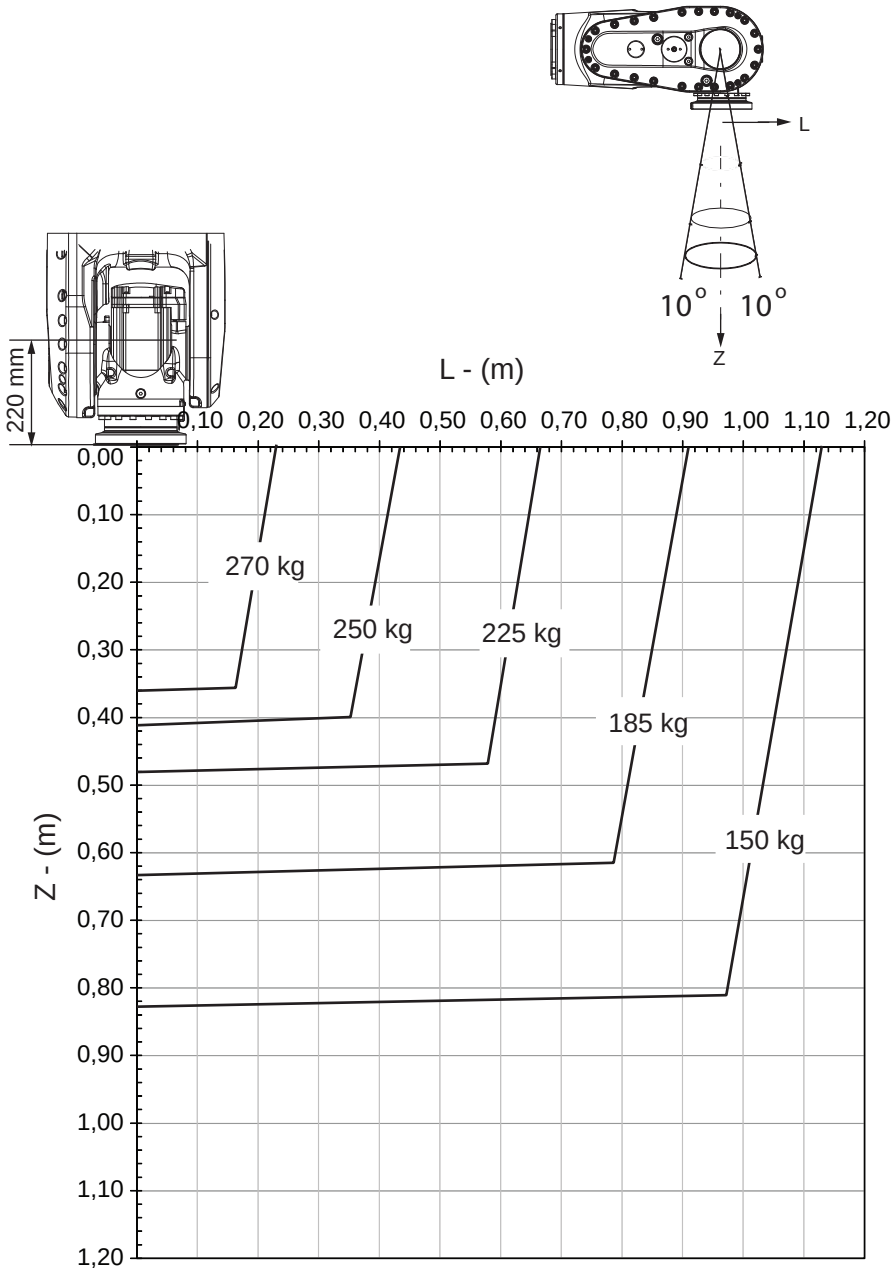
IRB 6700-245/3.00 "Vertical Wrist" (±10°)



xx1400002042

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

	Description
Max load	315 kg
Z_{max}	0.280 m
L_{max}	0.102 m

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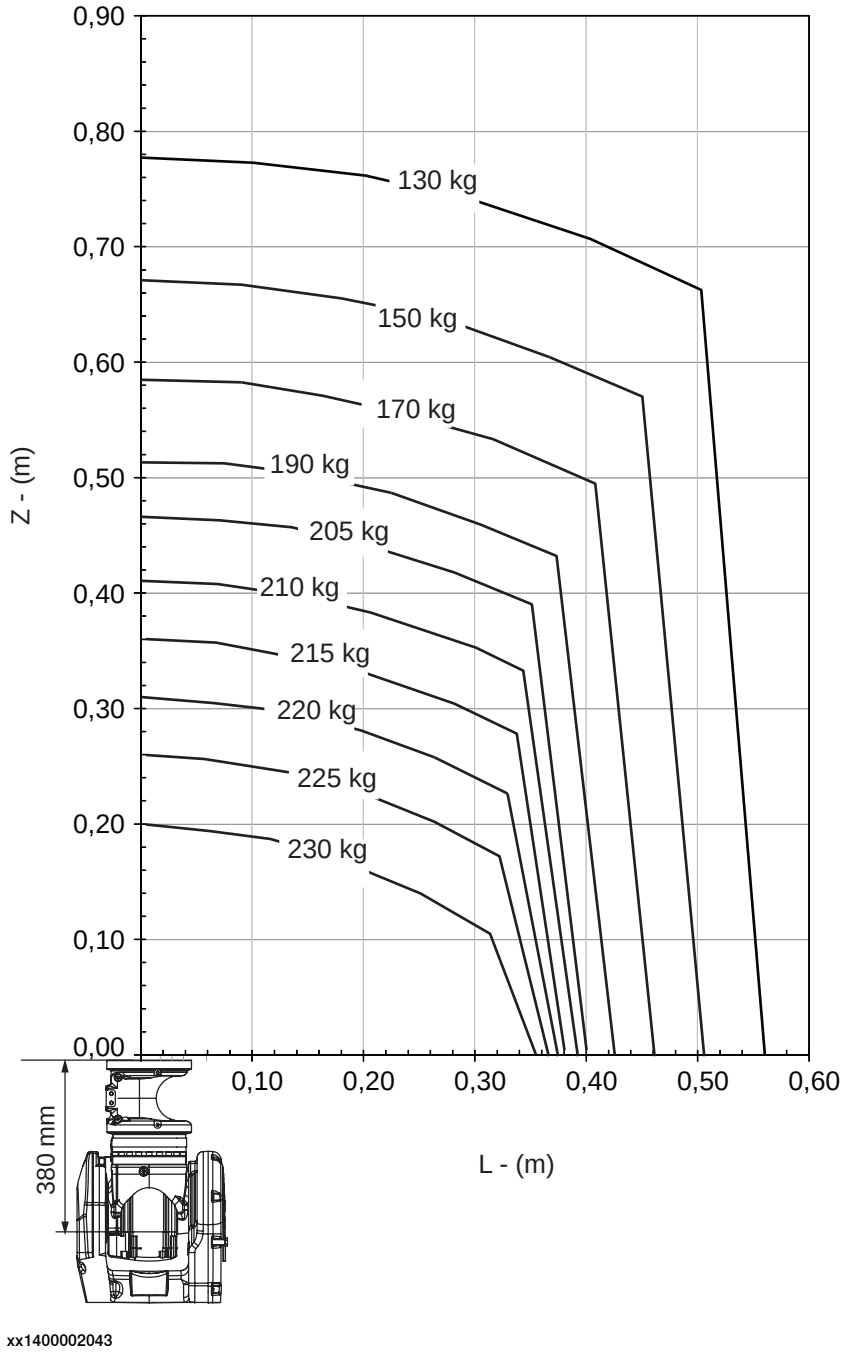
1.5.2 Diagrams
Continued

IRB 6700-245/3.00 "LeanID", option 780-4



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

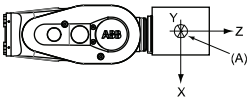
Note

Total load given as: mass in kg, center of gravity (Z and L) in meters and moment of inertia (J_{ox}, J_{oy}, J_{oz}) in kgm^2. L= sqr ($X^2 + Y^2$), see the following figure.

Full movement of axis 5 (±130°)

Axis	Robot type	Maximum moment of inertia
5	IRB 6700-235/2.65 IRB 6700-205/2.80 IRB 6700-175/3.05 IRB 6700-150/3.20	Ja_5 = Load x $((Z + 0.200^{i})^2 + L^2)$ + max (J_{0x}, J_{0y}) ≤ 250 kgm^2
	IRB 6700-200/2.60 IRB 6700-155/2.85	Ja_5 = Load x $((Z + 0.200^{i})^2 + L^2)$ + max (J_{0x}, J_{0y}) ≤ 195 kgm^2
	IRB 6700-300/2.70 IRB 6700-245/3.00	Ja_5 = Load x $((Z + 0.220^{ii})^2 + L^2)$ + max (J_{0x}, J_{0y}) ≤ 325 kgm^2
6	IRB 6700-235/2.65 IRB 6700-205/2.80 IRB 6700-175/3.05 IRB 6700-150/3.20	Ja_6 = Load x L^2 + J_{0Z} ≤ 185 kgm^2
	IRB 6700-200/2.60 IRB 6700-155/2.85	Ja_6 = Load x L^2 + J_{0Z} ≤ 145 kgm^2
	IRB 6700-300/2.70 IRB 6700-245/3.00	Ja_6 = Load x L^2 + J_{0Z} ≤ 225 kgm^2

i For option 780-4, LeanID = 0.350 m
ii For option 780-4, LeanID = 0.380 m



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Pos	Description
A	Center of gravity

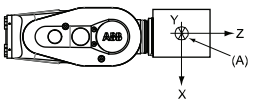
	Description
J_{ox}, J_{oy}, J_{oz}	Max. moment of inertia around the X, Y and Z axes at center of gravity.

Continues on next page

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

Full movement of axis 5 (±130°)

Axis	Robot type	Maximum moment of inertia
5	IRB 6700-235/2.65 IRB 6700-205/2.80 IRB 6700-175/3.05 IRB 6700-150/3.20	$Ja_5 = Load \times ((Z + 0.200)^2 + L^2) + max (J_{0x}, J_{0y}) \leq 250\ kgm^2$
	IRB 6700-220/2.65 LID IRB 6700-200/2.80 LID IRB 6700-155/3.05 LID IRB 6700-145/3.20 LID	$Ja_5 = Load \times ((Z + 0.350)^2 + L^2) + max (J_{0x}, J_{0y}) \leq 250\ kgm^2$
	IRB 6700-200/2.60 IRB 6700-155/2.85	$Ja_5 = Load \times ((Z + 0.200)^2 + L^2) + max (J_{0x}, J_{0y}) \leq 195\ kgm^2$
	IRB 6700-175/2.60 LID IRB 6700-140/2.85 LID	$Ja_5 = Load \times ((Z + 0.350)^2 + L^2) + max (J_{0x}, J_{0y}) \leq 195\ kgm^2$
	IRB 6700-300/2.70 IRB 6700-245/3.00	$Ja_5 = Load \times ((Z + 0.220)^2 + L^2) + max (J_{0x}, J_{0y}) \leq 325\ kgm^2$
	IRB 6700-270/2.70 LID IRB 6700-220/3.00 LID	$Ja_5 = Load \times ((Z + 0.380)^2 + L^2) + max (J_{0x}, J_{0y}) \leq 325\ kgm^2$
6	IRB 6700-235/2.65 IRB 6700-220/2.65 LID IRB 6700-205/2.80 IRB 6700-200/2.80 LID IRB 6700-175/3.05 IRB 6700-155/3.05 LID IRB 6700-150/3.20 IRB 6700-145/3.20 LID	$Ja_6 = Load \times L^2 + J_{0Z} \leq 185\ kgm^2$
	IRB 6700-200/2.60 IRB 6700-175/2.60 LID IRB 6700-155/2.85 IRB 6700-140/2.85 LID	$Ja_6 = Load \times L^2 + J_{0Z} \leq 145\ kgm^2$
	IRB 6700-300/2.70 IRB 6700-270/2.70 LID IRB 6700-245/3.00 IRB 6700-220/3.00 LID	$Ja_6 = Load \times L^2 + J_{0Z} \leq 225\ kgm^2$



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Pos	Description
A	Center of gravity

	Description
J_{ox}, J_{oy}, J_{oz}	Max. moment of inertia around the X, Y and Z axes at center of gravity.

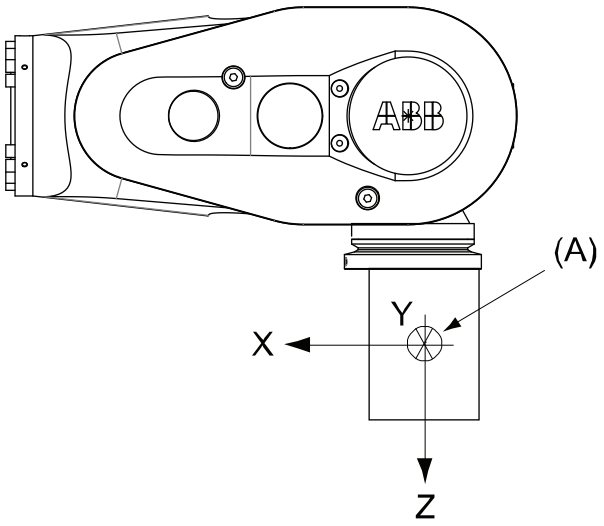
Continues on next page

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

Limited axis 5, center line down

Axis	Robot type	Maximum moment of inertia
5	IRB 6700-235/2.65 IRB 6700-205/2.80 IRB 6700-175/3.05 IRB 6700-150/3.20	$Ja_5 = Load \times ((Z + 0.200^{i})^2 + L^2) + max (J_{0x}, J_{0y}) \leq 275\ kgm^2$
	IRB 6700-200/2.60 IRB 6700-155/2.85	$Ja_5 = Load \times ((Z + 0.200^{i})^2 + L^2) + max (J_{0x}, J_{0y}) \leq 215\ kgm^2$
	IRB 6700-300/2.70 IRB 6700-245/3.00	$Ja_5 = Load \times ((Z + 0.220^{ii})^2 + L^2) + max (J_{0x}, J_{0y}) \leq 360\ kgm^2$
6	IRB 6700-235/2.65 IRB 6700-205/2.80 IRB 6700-175/3.05 IRB 6700-150/3.20	$Ja_6 = Load \times L^2 + J_{0Z} \leq 250\ kgm^2$
	IRB 6700-200/2.60 IRB 6700-155/2.85	$Ja_6 = Load \times L^2 + J_{0Z} \leq 195\ kgm^2$
	IRB 6700-300/2.70 IRB 6700-245/3.00	$Ja_6 = Load \times L^2 + J_{0Z} \leq 320\ kgm^2$

i For option 780-4, LeanID = 0,350 m
ii For option 780-4, LeanID = 0,380 m



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Pos	Description
A	Center of gravity

	Description
J_{ox}, J_{oy}, J_{oz}	Max. moment of inertia around the X, Y and Z axes at center of gravity.

Continues on next page

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

Limited axis 5, center line down

Axis	Robot type	Maximum moment of inertia
5	IRB 6700-235/2.65 IRB 6700-205/2.80 IRB 6700-175/3.05 IRB 6700-150/3.20	$Ja_5 = Load \times ((Z + 0.200)^2 + L^2) + max (J_{0x}, J_{0y}) \leq 275\ kgm^2$
	IRB 6700-220/2.65 LID IRB 6700-200/2.80 LID IRB 6700-155/3.05 LID IRB 6700-145/3.20 LID	$Ja_5 = Load \times ((Z + 0.350)^2 + L^2) + max (J_{0x}, J_{0y}) \leq 275\ kgm^2$
	IRB 6700-200/2.60 IRB 6700-155/2.85	$Ja_5 = Load \times ((Z + 0.200)^2 + L^2) + max (J_{0x}, J_{0y}) \leq 215\ kgm^2$
	IRB 6700-175/2.60 LID IRB 6700-140/2.85 LID	$Ja_5 = Load \times ((Z + 0.350)^2 + L^2) + max (J_{0x}, J_{0y}) \leq 215\ kgm^2$
	IRB 6700-300/2.70 IRB 6700-245/3.00	$Ja_5 = Load \times ((Z + 0.220)^2 + L^2) + max (J_{0x}, J_{0y}) \leq 360\ kgm^2$
	IRB 6700-270/2.70 LID IRB 6700-220/3.00 LID	$Ja_5 = Load \times ((Z + 0.380)^2 + L^2) + max (J_{0x}, J_{0y}) \leq 360\ kgm^2$
6	IRB 6700-235/2.65 IRB 6700-220/2.65 LID IRB 6700-205/2.80 IRB 6700-200/2.80 LID IRB 6700-175/3.05 IRB 6700-155/3.05 LID IRB 6700-150/3.20 IRB 6700-145/3.20 LID	$Ja_6 = Load \times L^2 + J_{0Z} \leq 250\ kgm^2$
	IRB 6700-200/2.60 IRB 6700-175/2.60 LID IRB 6700-155/2.85 IRB 6700-140/2.85 LID	$Ja_6 = Load \times L^2 + J_{0Z} \leq 195\ kgm^2$
	IRB 6700-300/2.70 IRB 6700-270/2.70 LID IRB 6700-245/3.00 IRB 6700-220/3.00 LID	$Ja_6 = Load \times L^2 + J_{0Z} \leq 320\ kgm$

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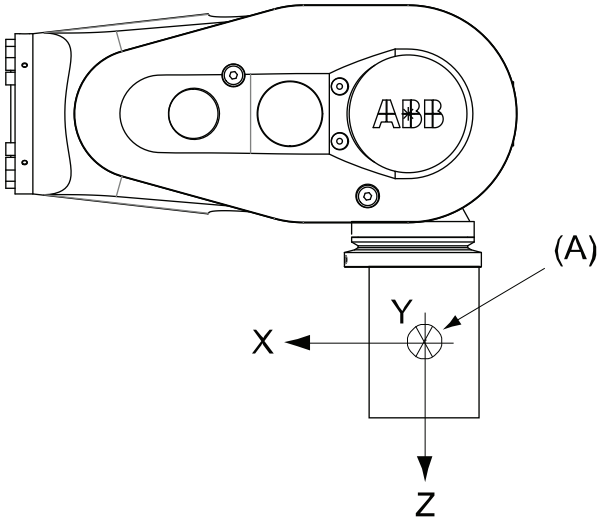
1.5.3 Maximum load and moment of inertia for full and limited axis 5 (center line down) movement
Continued



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Pos	Description
A	Center of gravity

	Description
J_{ox}, J_{oy}, J_{oz}	Max. moment of inertia around the X, Y and Z axes at center of gravity.

1.5.4 Wrist torque

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.

Torque

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

Robot type	Max wrist torque axis 4 and 5	Max wrist torque axis 6	Max torque valid at load
IRB 6700 - 235/2.65	1,324 Nm	650 Nm	225 kg
IRB 6700 - 205/2.80	1,263 Nm	625 Nm	192 kg
IRB 6700 - 200/2.60	981 Nm	429 Nm	175 kg
IRB 6700 - 175/3.05	1,179 Nm	589 Nm	154 kg
IRB 6700 - 155/2.85	927 Nm	410 Nm	144 kg
IRB 6700 - 150/3.20	1,135 Nm	570 Nm	137 kg
IRB 6700 - 300/2.70	1,825 Nm	865 Nm	280 kg
IRB 6700 - 245/3.00	1,693 Nm	815 Nm	214 kg
	1,825 Nm	865 Nm	280 kg

Torque for LeanID variants

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

Robot type	Max wrist torque axis 4 and 5	Max wrist torque axis 6	Max torque valid at load
IRB 6700 - 270/2.70 LID	1,825 Nm	865 Nm	280 kg
IRB 6700 - 220/3.00 LID	1,693 Nm	815 Nm	214 kg
IRB 6700 - 220/2.65 LID	1,324 Nm	650 Nm	225 kg
IRB 6700 - 200/2.80 LID	1,263 Nm	625 Nm	192 kg
IRB 6700 - 175/2.60 LID	981 Nm	429 Nm	175 kg
IRB 6700 - 155/3.05 LID	1,179 Nm	589 Nm	154 kg
IRB 6700 - 140/2.85 LID	927 Nm	410 Nm	144 kg
IRB 6700 - 145/3.20 LID	1,135 Nm	570 Nm	137 kg

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 6700 - 235/2.65	41	22
IRB 6700 - 205/2.8	45	24
IRB 6700 - 175/3.05	42	25
IRB 6700 - 150/3.2	47	24
IRB 6700 - 200/2.6	51	23
IRB 6700 - 155/2.85	47	29
IRB 6700 - 300/2.7	39	21
IRB 6700 - 245/3.0	44	27

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).

1.6 Fitting equipment to the robot

General

Extra loads can be fitted on the upper arm housing, the lower arm, and on the frame. Definitions of distances and masses are shown in the following figures. The robot is supplied with holes for fitting extra equipment (see figure in *Holes for fitting extra equipment on page 75*). Maximum allowed arm load depends on center of gravity of arm load and robot payload.

Note

All equipment and cables used on the robot, must be designed and fitted not to damage the robot and/or its parts.

Frame (hip load)

Extra load can be fitted on the frame.

	Description
Permitted extra load on frame	$J_H = 100\ kgm^2$
Recommended position (see the following figure)	$J_H = J_{H0} + M4 \times R^2$ where: • J_{H0} is the moment of inertia of the equipment • R is the radius (m) from the center of axis 1 • M4 is the total mass (kg) of the equipment including bracket and harness (≤ 250 kg)

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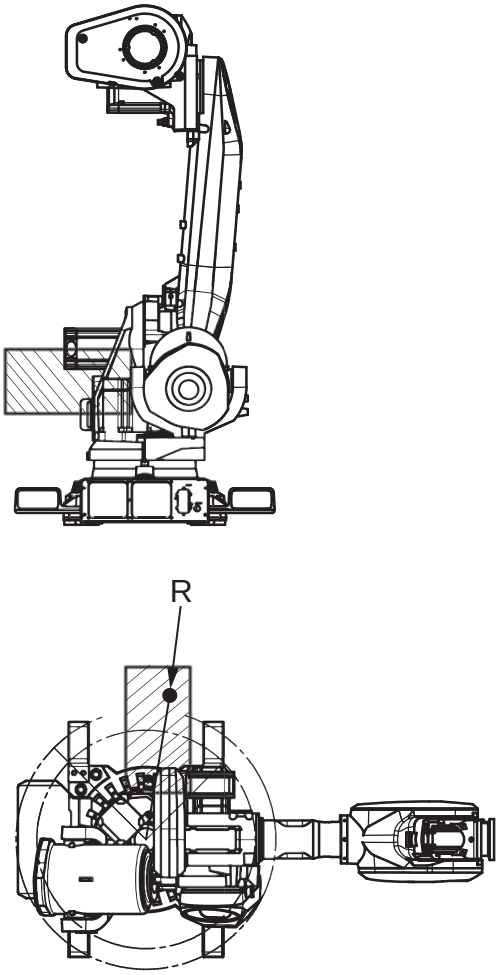

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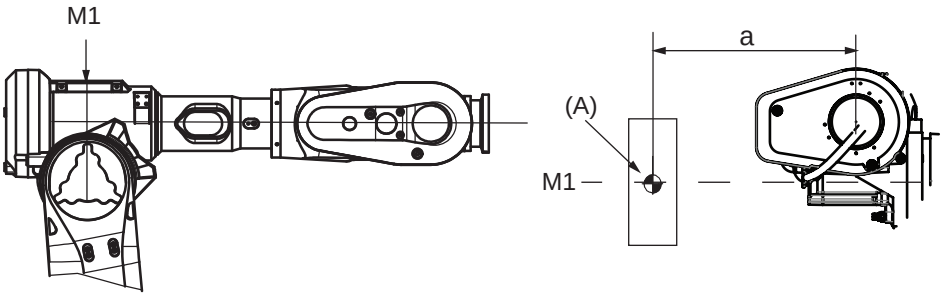
Upper arm

Allowed extra load on the upper arm housing, in addition to the maximum handling weight, is M1 ≤ 50 kg with a distance (a) ≤ 500 mm from the center of gravity in the axis-3 extension.



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A	Mass center

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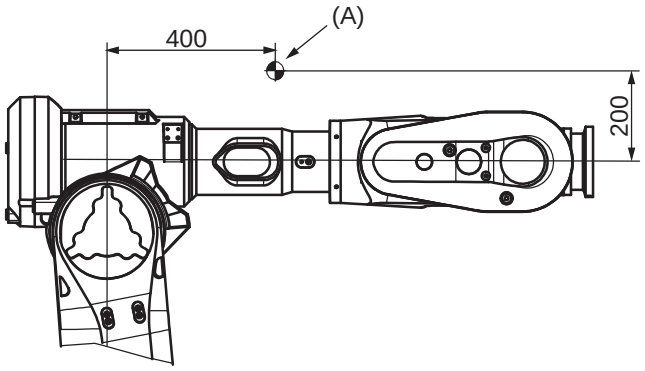
1.6 Fitting equipment to the robot
Continued



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A	Center of gravity 50 kg

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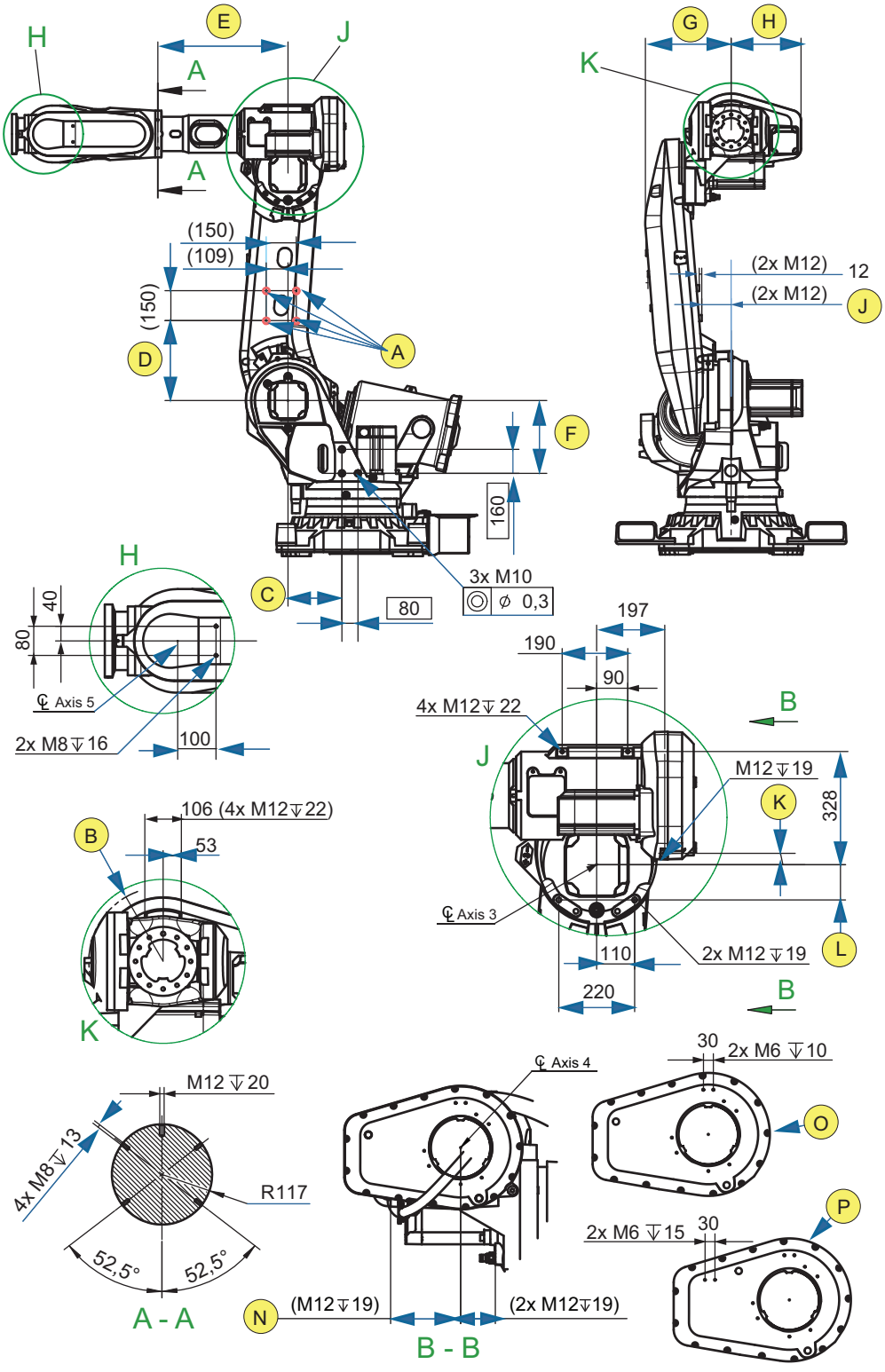
Holes for fitting extra equipment

Position of attachment holes - drawing 1



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A	Allowed position for attachment holes, M12 through. Be careful not to touch the cables when drilling.

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1.6 Fitting equipment to the robot
Continued

O	Attachment holes on arm house cover for extra equipment IRB 6700-235/2.65, IRB 6700-205/2.80, IRB 6700-175/3.05, IRB 6700-150/3.20 IRB 6700-200/2.60, IRB 6700-155/2.85
P	Attachment holes on arm house cover for extra equipment IRB 6700-300/2.70, IRB 6700-245/3.00

Variant	B[i]	C	D	E	F	G	H	J	K	L	M	N
IRB 6700-235/2.65	R=216	270	400	652.5	365	437	349	147	33	102	104	210
IRB 6700-205/2.80	R=216	270	500	652.5	365	437	349	147	33	102	104	210
IRB 6700-175/3.05	R=216	270	400	652.5	365	437	349	147	33	102	104	210
IRB 6700-150/3.20	R=216	270	500	652.5	365	437	349	147	33	102	104	210
IRB 6700-200/2.60	R=204.5	270	400	650.5	365	437	315	143	43	102	95	210
IRB 6700-155/2.85	R=204.5	270	400	650.5	365	437	315	143	43	102	95	210
IRB 6700-300/2.70	R=230	310	450	652.5	376	467	405	152	12	117	98.5	215.5
IRB 6700-245/3.00	R=230	310	450	652.5	376	467	405	152	12	117	98.5	215.5

i Smallest circumscribed radius axis-4.

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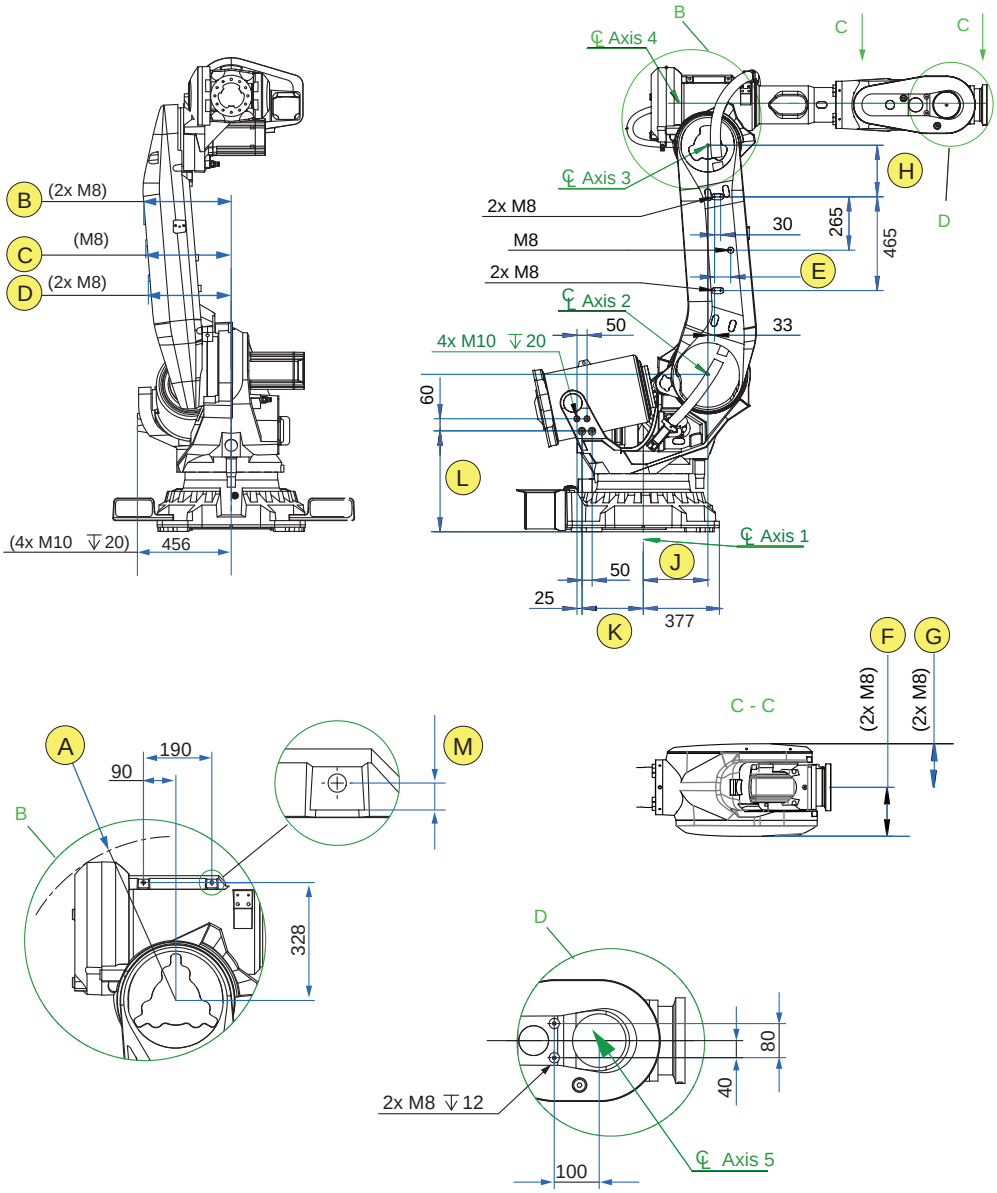
Position of attachment holes - drawing 2



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Variant	A[i]	B	C	D	E	F	G	H	J	K	L	M
IRB 6700-235/2.65	R=456	433	418	403	80	208.5	186	255	320	303.5	500	13.8
IRB 6700-205/2.80	R=456	438	423	408	80	208.5	186	255	320	303.5	500	13.8
IRB 6700-175/3.05	R=465	433	418	403	80	208.5	186	255	320	303.5	500	13.8
IRB 6700-150/3.20	R=456	438	423	408	80	208.5	186	255	320	303.5	500	13.8
IRB 6700-200/2.60	R=440	425	410	395	113	197	193	255	320	303.5	500	13.8
IRB 6700-155/2.85	R=440	425	410	395	113	197	193	255	320	303.5	500	13.8
IRB 6700-300/2.70	R=468	453	438	423	80	222.5	187	265	350	273.5	523.5	15
IRB 6700-245/3.00	R=468	453	438	423	80	222.5	187	265	350	273.5	523.5	15

i Smallest circumscribed radius axis-3.

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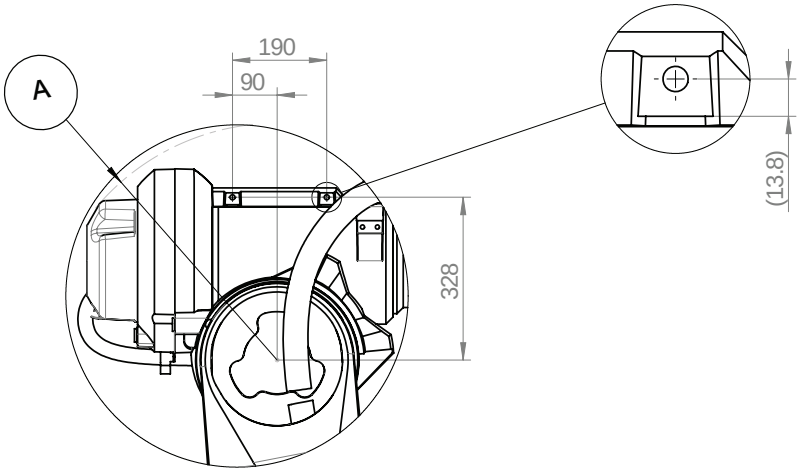
1.6 Fitting equipment to the robot
Continued

Extra cover

There is an extra upper arm cover for LID (LeanID) variants, which causes the value A to be different for the LID variants.



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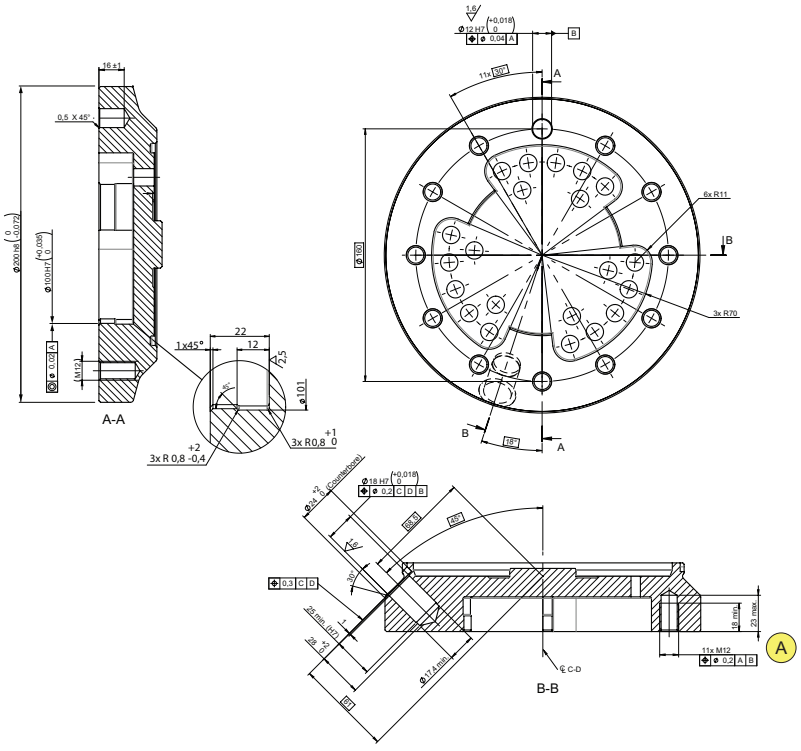
Tool flange, standard

Below is the standard tool flange. The guide pin hole is, in calibration position, pointing upwards in Z-direction.



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A	Thread length: 18 mm.

The turning disc for robot variants IRB 6700-200/2.60 and IRB 6700-155/2.85 was redesigned when Axis Calibration was introduced for IRB 6700. Prior to Axis

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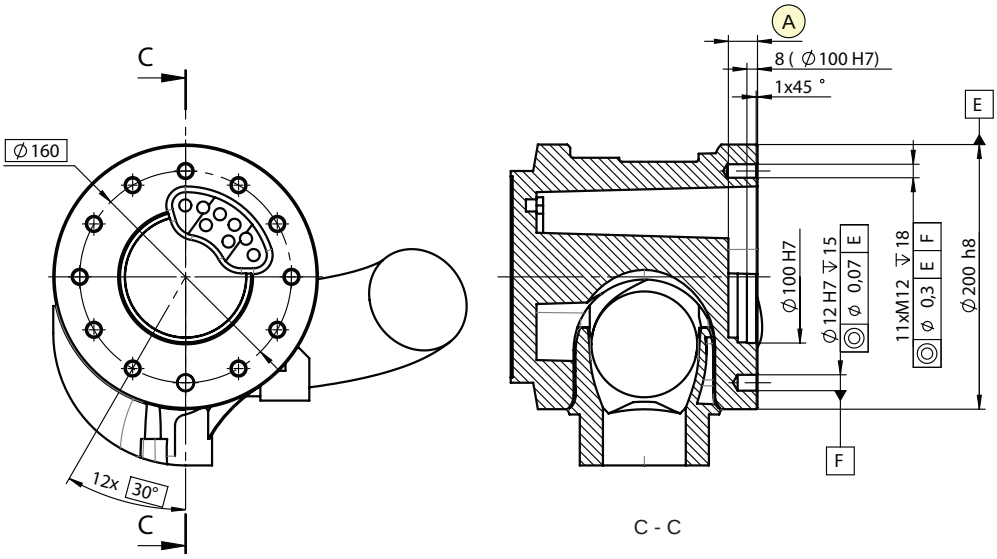
Calibration the holes on the disc were through. On the current turning disc the holes are not through.

Tool flange, LeanID

Below is the tool flange for option 780-4, LeanID. The guide pin hole is, in calibration position, pointing upwards in Z-direction.



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A	Thread length: 18 mm.

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.

1.7 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 gearboxes.
- 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 depend on the selected options. For detailed information on maintenance procedures, see the maintenance section in the product manuals.

1.8 Robot motion

1.8.1 Robot motion

Type of motion

Axis	Type of motion	Range of movement - IRB 6700	Note
Axis 1	Rotation motion	±170° or ±220° (option)	
Axis 2	Arm motion	-65°/+85° [i]	
Axis 3	Arm motion	-180°/+70°	
Axis 4	Wrist motion	±300°	
Axis 5	Bend motion	±130° [ii]	
Axis 6	Turn motion	±360° [iii]	
		±93.7 revolutions	Maximum value. The default working range for axis 6 can be extended by changing parameter values in the software. Option 610-1 *Independent axis*

i Working range for variants IRB 6700-300/2.70, IRB 6700-245/3.00:
+85° to -65° when axis 3 is within +70° to -45°
+85° to -58° when axis 3 is within +70° to -180°

ii Working range +120° to -120° for robots with LeanID, option 780-4.

iii Working range +220° to -220° for robots with LeanID, option 780-4.

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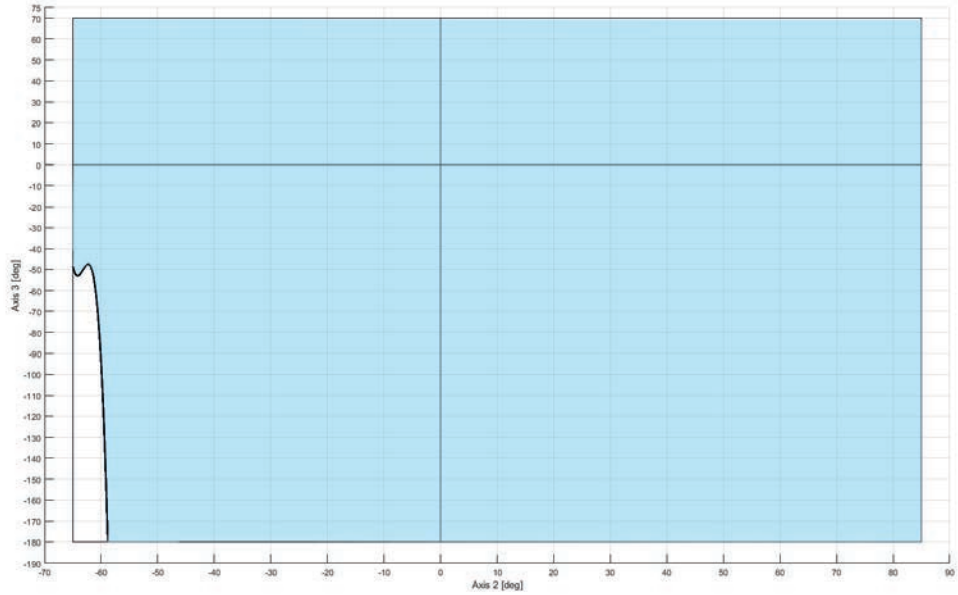
1.8.1 Robot motion
Continued

Working range axis 2 and axis 3 for IRB 6700-300/2.70 and -245/3.00

Limited in some areas to avoid collision with balancing.



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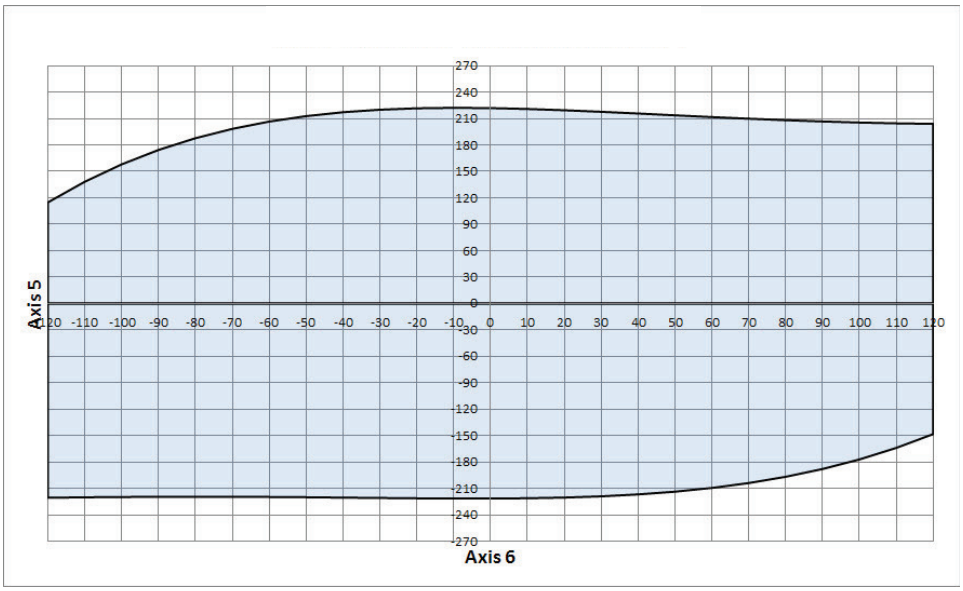
Working range axis 5 and axis 6 for LeanID, option 780-4

Allowed working area for axis 6 related to axis 5 position is shown in the figure below.



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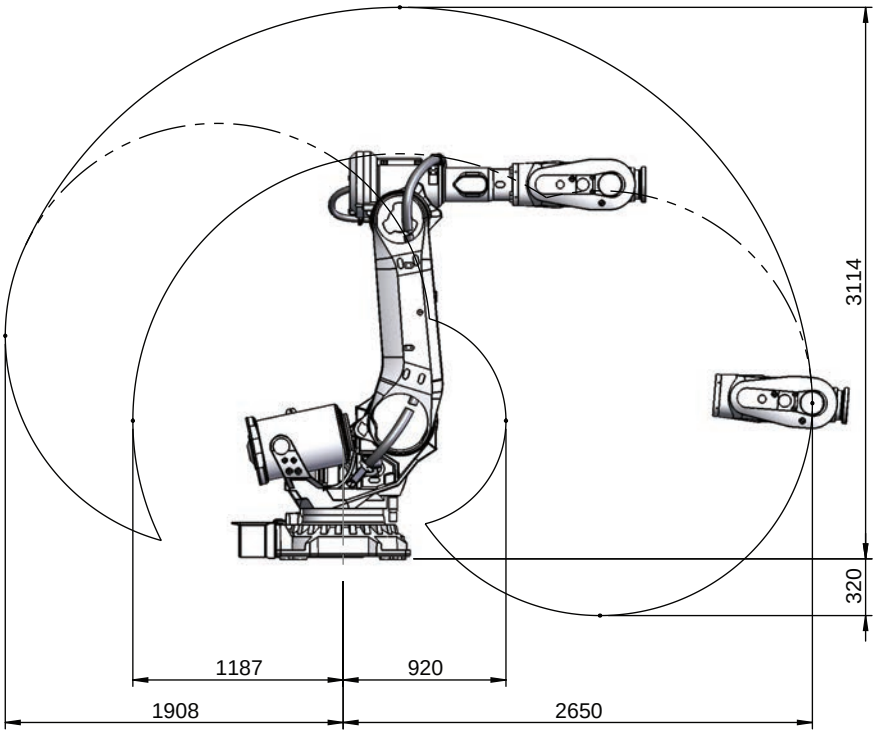
Working range

Robot	Handling capacity (kg)	Reach (m)
IRB 6700	235	2.65



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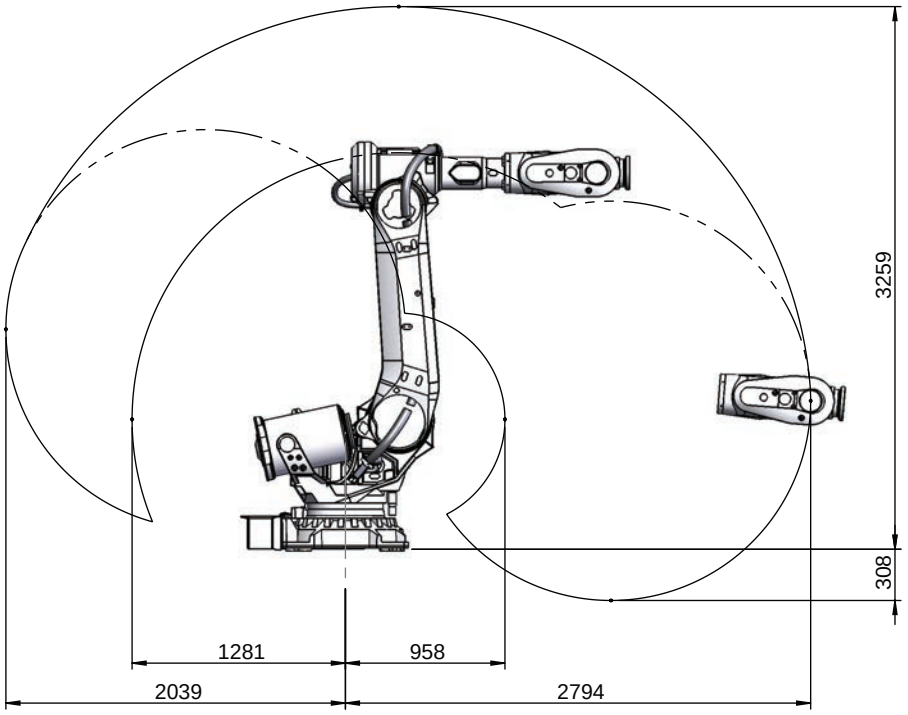
1.8.1 Robot motion

Continued

Robot	Handling capacity (kg)	Reach (m)
IRB 6700	205	2.80



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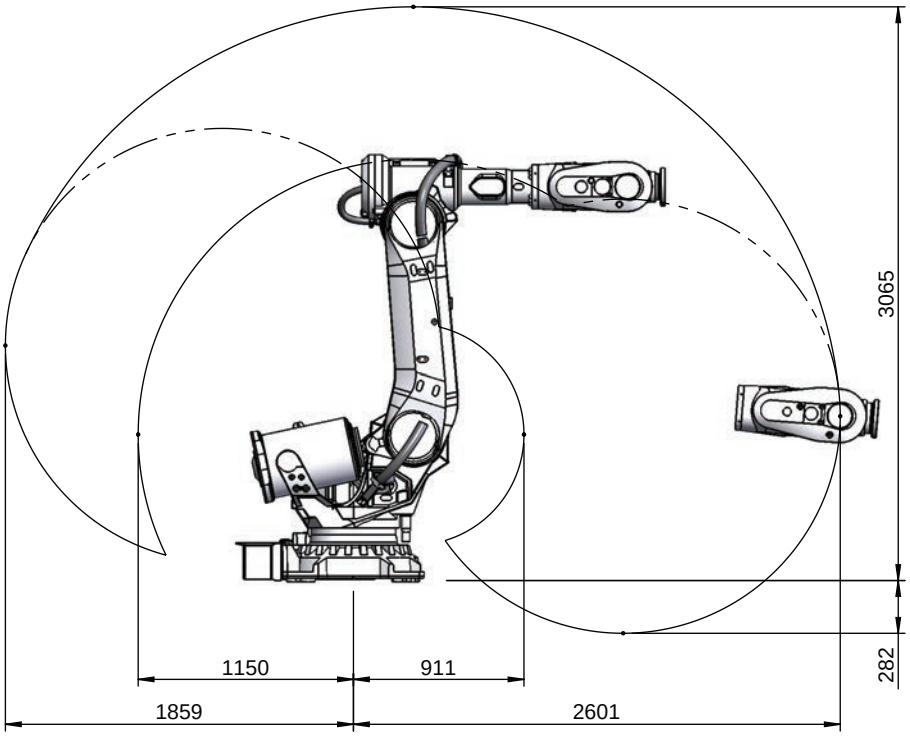
1.8.1 Robot motion
Continued

Robot	Handling capacity (kg)	Reach (m)
IRB 6700	200	2.60



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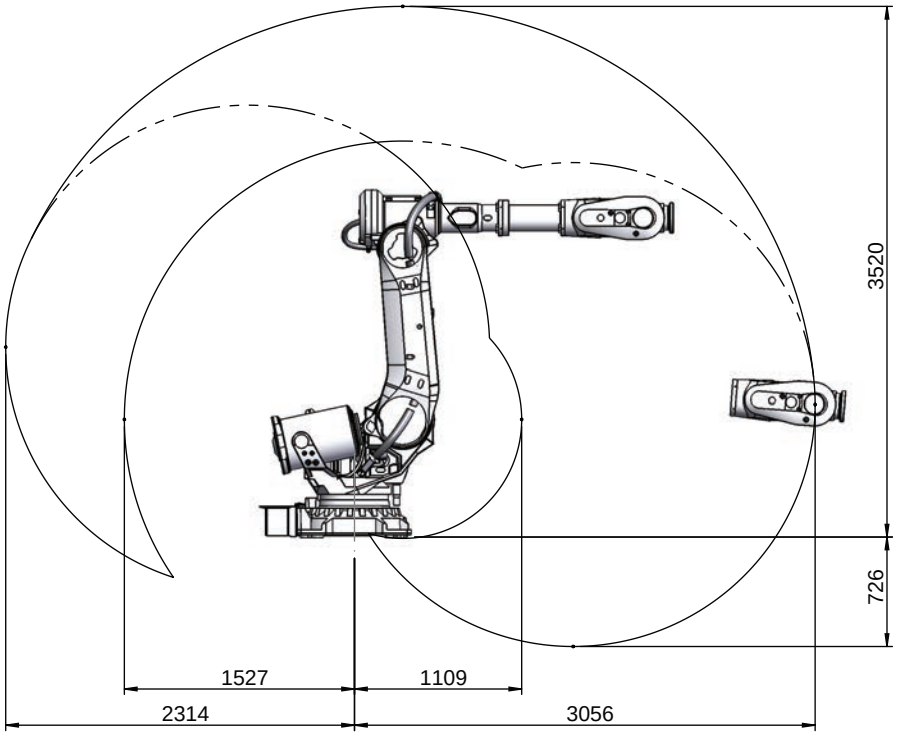
1.8.1 Robot motion

Continued

Robot	Handling capacity (kg)	Reach (m)
IRB 6700	175	3.05



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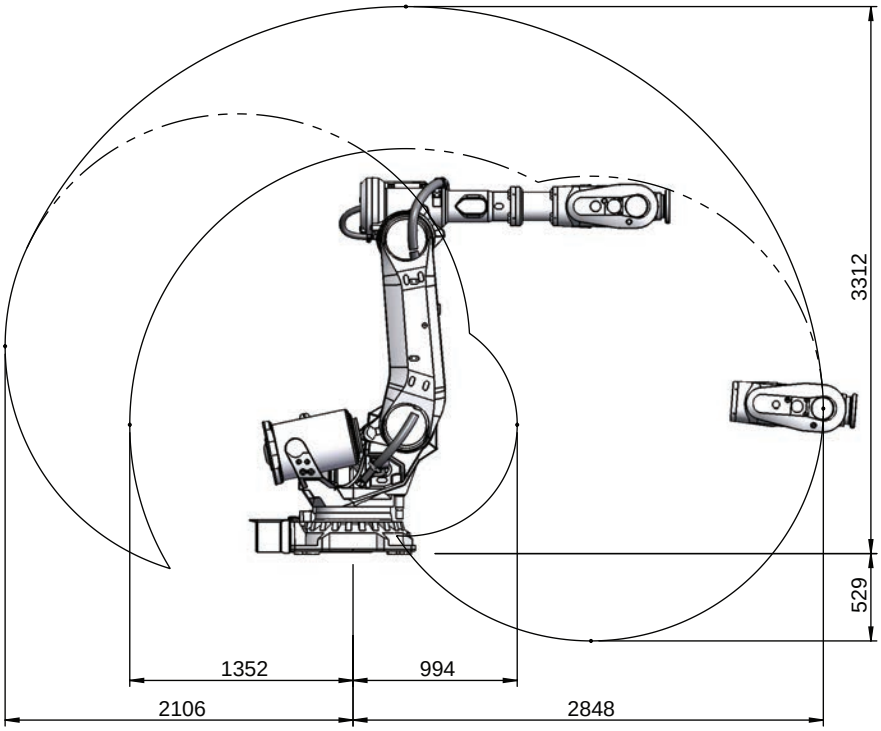
Robot	Handling capacity (kg)	Reach (m)
IRB 6700	155	2.85



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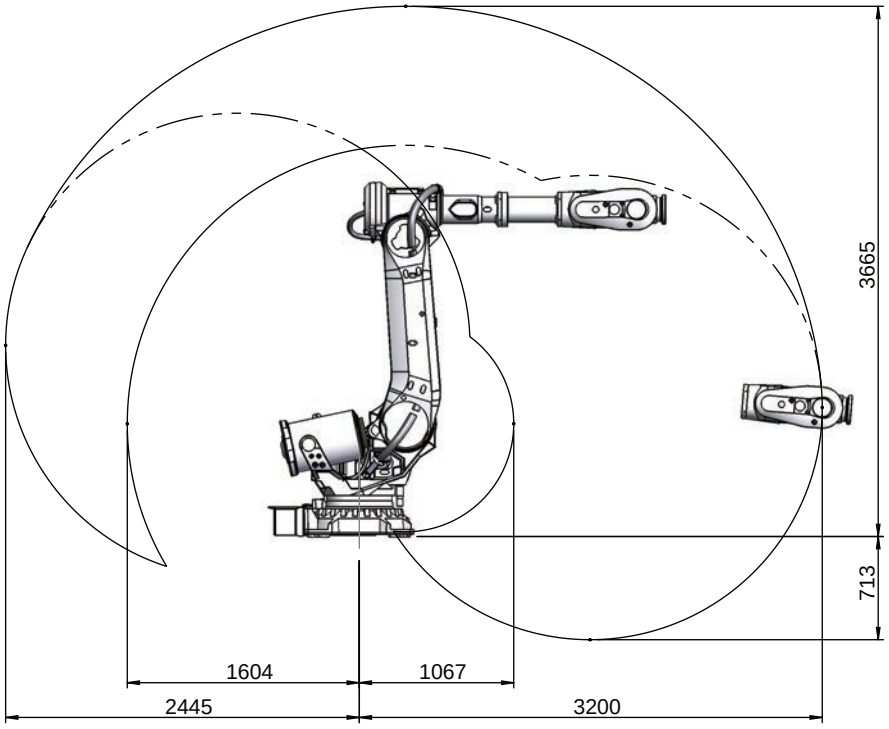
1.8.1 Robot motion

Continued

Robot	Handling capacity (kg)	Reach (m)
IRB 6700	150	3.20



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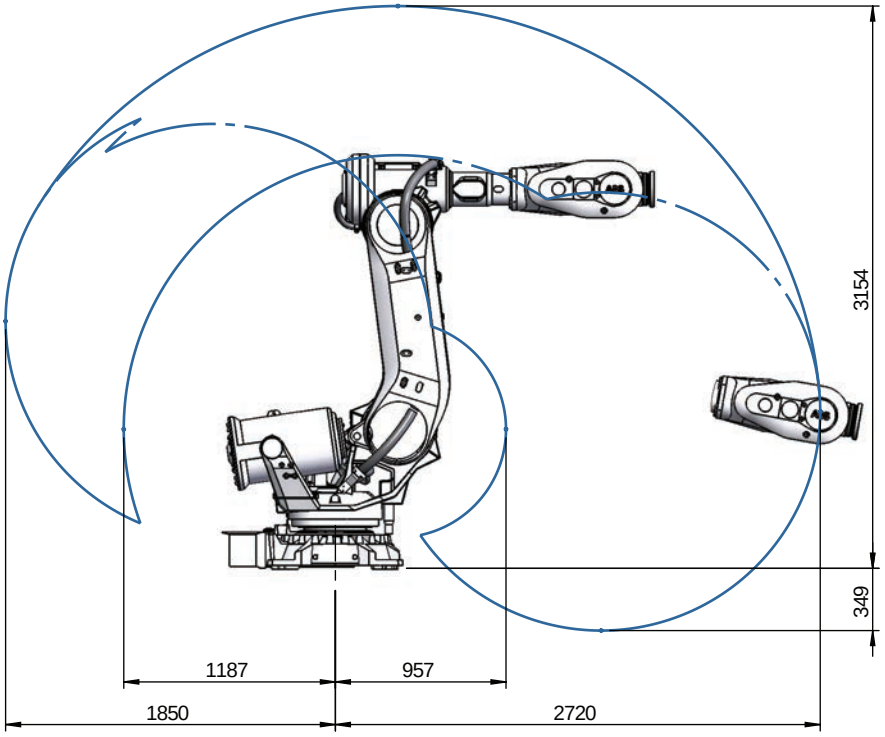
Robot	Handling capacity (kg)	Reach (m)
IRB 6700	300	2.70



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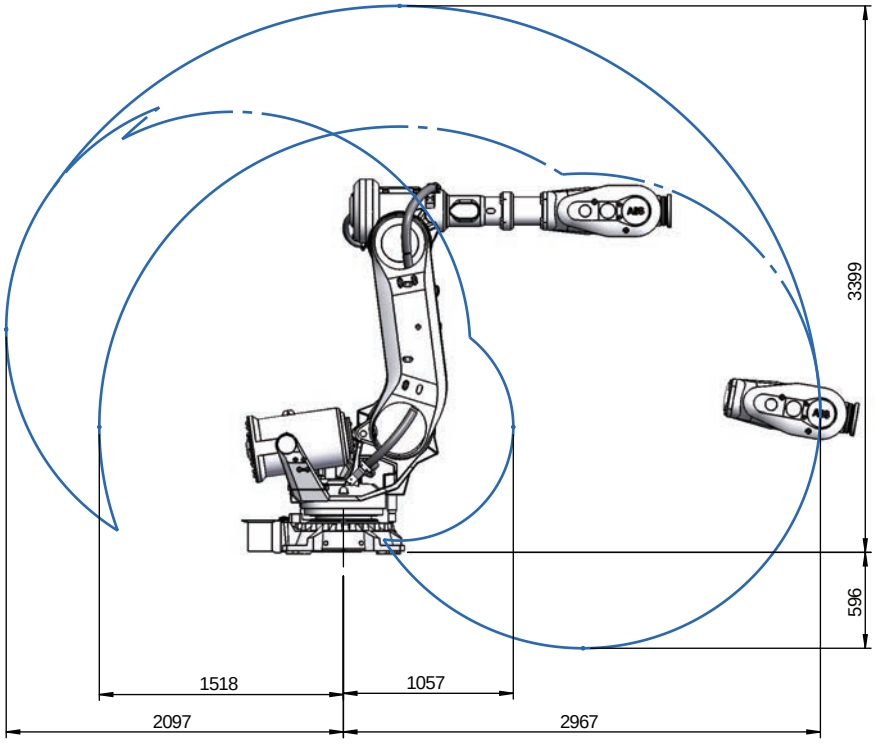
1.8.1 Robot motion

Continued

Robot	Handling capacity (kg)	Reach (m)
IRB 6700	245	3.00



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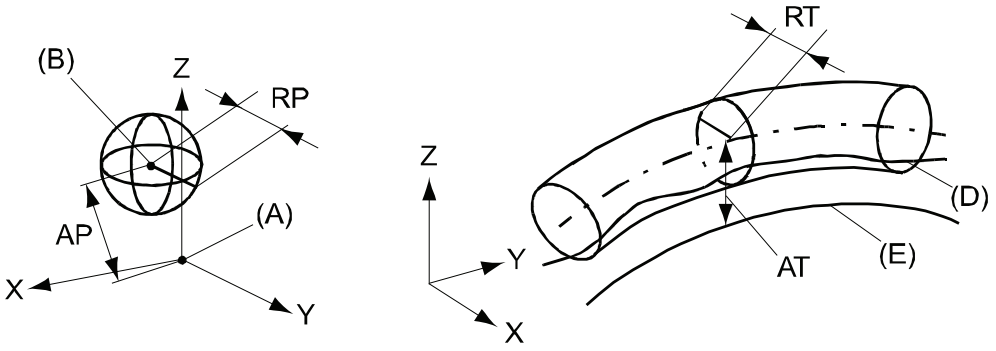
1.8.2 Performance according to ISO 9283

General

At rated maximum load, maximum offset and 1.6 m/s velocity on the inclined ISO test plane, 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

IRB 6700	235/2.65	205/2.80	175/3.05	150/3.20
Pose accuracy, AP (mm)[i]	0.03	0.06	0.04	0.05
Pose repeatability, RP (mm)	0.05	0.05	0.05	0.06
Pose stabilization time, PSt (s) within 0.5 mm of the position	0.16	0.17	0.28	0.34
Path accuracy, AT (mm)	1.7	1.5	1.9	1.6
Path repeatability, RT (mm)	0.08	0.08	0.12	0.14

[i] 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.

Continues on next page

1.8.2 Performance according to ISO 9283

Continued

IRB 6700	200/2.60	155/2.85	300/2.70	245/3.00
Pose accuracy, AP (mm)[i]	0.03	0.05	0.07	0.02
Pose repeatability, RP (mm)	0.05	0.05	0.06	0.05
Pose stabilization time, PSt (s) within 0.5 mm of the position	0.07	0.17	0.11	0.14
Path accuracy, AT (mm)	1.8	1.7	1.4	1.5
Path repeatability, RT (mm)	0.06	0.12	0.07	0.12

[i] 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.

1.8.3 Velocity

Maximum axis speed

Robot type	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6
IRB 6700-235/2.65	100 °/s	90 °/s	90 °/s	170 °/s	120 °/s	190 °/s
IRB 6700-205/2.80	100 °/s	90 °/s	90 °/s	170 °/s	120 °/s	190 °/s
IRB 6700-200/2.60	110 °/s	110 °/s	110 °/s	190 °/s	150 °/s	210 °/s
IRB 6700-175/3.05	100 °/s	90 °/s	90 °/s	170 °/s	120 °/s	190 °/s
IRB 6700-155/2.85	110 °/s	110 °/s	110 °/s	190 °/s	150 °/s	210 °/s
IRB 6700-150/3.20	100 °/s	90 °/s	90 °/s	170 °/s	120 °/s	190 °/s
IRB 6700-300/2.70	100 °/s	88 °/s	90 °/s	140 °/s	110 °/s	180 °/s
IRB 6700-245/3.00	100 °/s	88 °/s	90 °/s	140 °/s	110 °/s	180 °/s
	100 °/s	88 °/s	90 °/s	140 °/s	110 °/s	180 °/s
	100 °/s	88 °/s	90 °/s	140 °/s	110 °/s	180 °/s
	100 °/s	88 °/s	90 °/s	140 °/s	110 °/s	180 °/s

There is a supervision function to prevent overheating in applications with intensive and frequent movements (high duty cycle).

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*).

1.9 Cooling fan for axis 1 motor

Introduction

To be used to avoid overheating of motors and gears in applications with intensive motion (high average speed and /or high average torque and/or short wait time) of axis 1.

Valid protection for cooling fan is IP54. Fan failure stops the robot. The option is not allowed to select when the robot is placed on a track motion, IRBT.

To determine the use of cooling fan for axis 1 motor use the function **Gearbox Heat Prediction Tool** in RobotStudio. Reliable facts for the decision of need for fan or not will be achieved by entering the ambient temperature for a specific cycle. Contact your local ABB organization.

1.10 Servo gun

1.10.1 Introduction

General

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

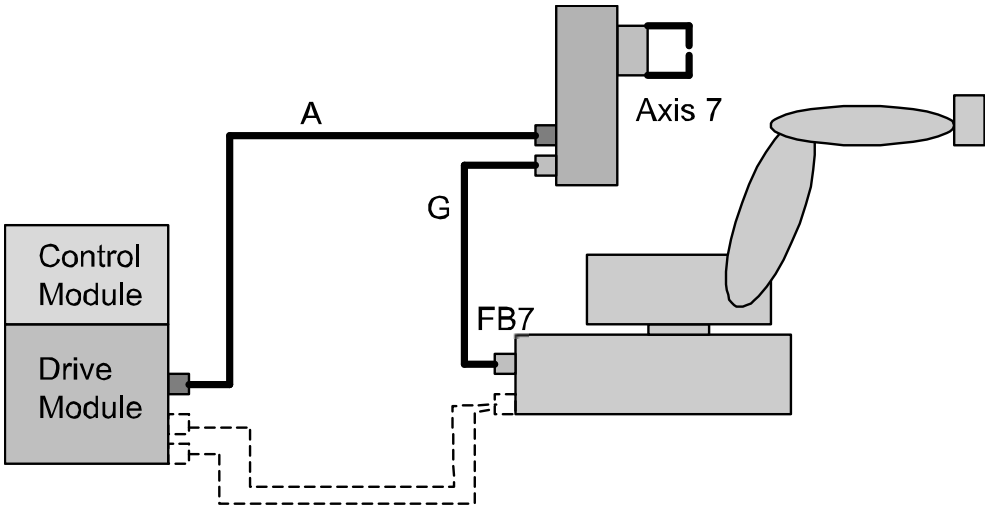
- Stationary gun
- Robot gun
- Robot gun and track motion
- Track motion

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.

1.10.2 Stationary gun

General



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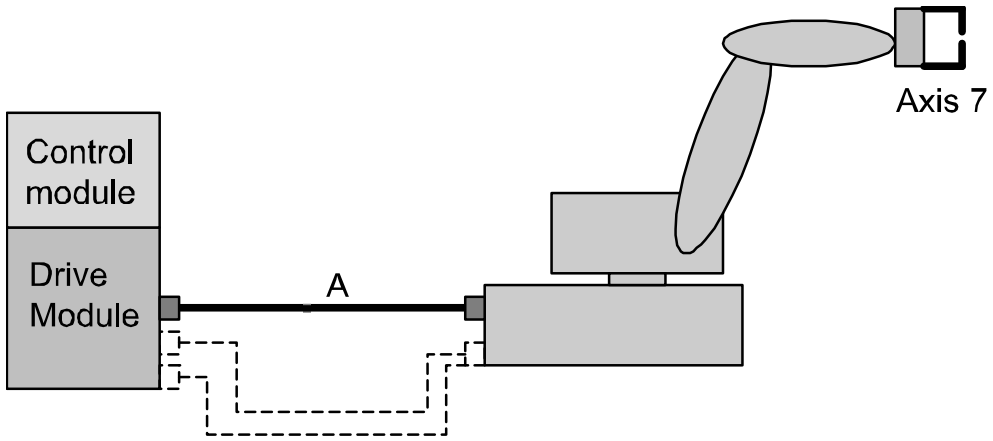
Options

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.	
864-1	Resolver connection, axis 7, on base.	
907-1	First additional drive. Drive unit for 7th axis with corresponding cables assembled inside drive module.	*Product specification - Controller IRC5*
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.	
635-6	Spot 6. This option includes Spot Servo and Spot Servo Equalizing.	*Product specification - Controller IRC5*

1.10.3 Robot gun

General



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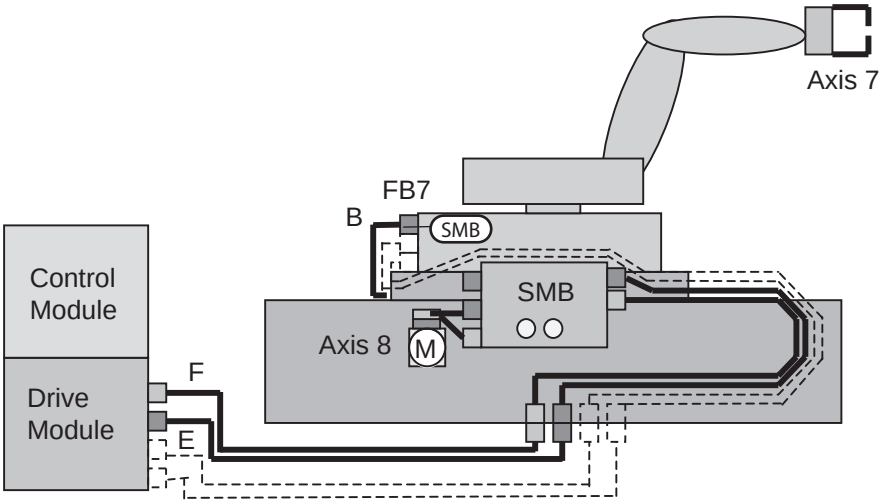
Option

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).	
907-1	First additional drive. Drive unit for 7th axis with corresponding cables assembled inside drive module.	*Product specification - Controller IRC5*
786-1, -2, -3, -4	Connection to first drive. Cable A (7-30 m) between drive module and robot base for servo drive power.	
635-6	Spot 6, Spot Servo, or Spot Servo Equalizing.	*Product specification - Controller IRC5*

1.10.4 Robot gun and track motion

General



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Options

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

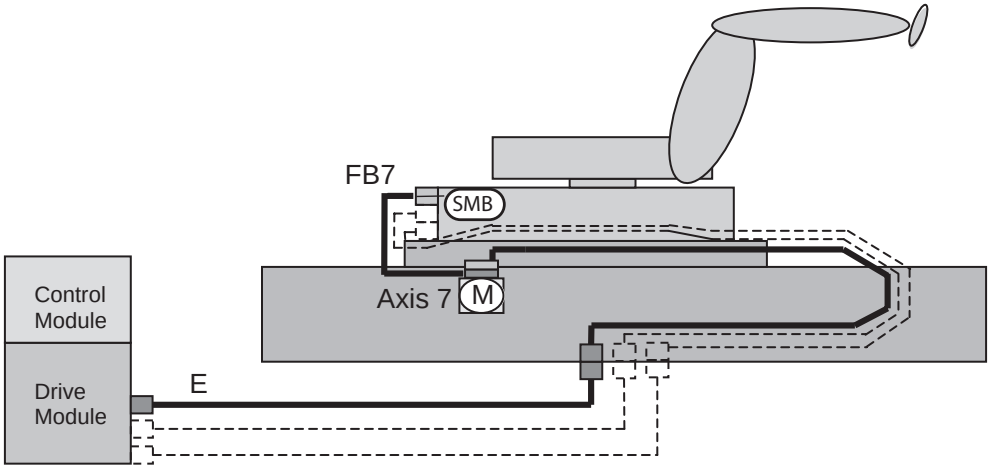
Option	Description	Product specification
785-1 +1002-2[i]	Robot Gun - Track Motion. This option includes cables within manipulator for servo power signals (servo gun/axis 7).	*Product specification - IRBT 4004/6004/7004*
Track motion delivery includes	Serial measurement box (SMB2, Split box) for distribution 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.	*Product specification - IRBT 4004/6004/7004*
907-1	First additional drive. Drive unit for 7th axis with corresponding cables assembled inside drive module.	*Product specification - Controller IRC5*
907-1	Second additional drive. Drive unit for 8th axis with corresponding cables assembled inside drive module.	*Product specification - Controller IRC5*
635-6	Spot 6, Spot Servo, or Spot Servo Equalizing.	*Product specification - 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.

1.10.5 Track motion

General

The robot can be supplied with a track motion, see *Product specification - IRBT 4004/6004/7004*. For configuration and specification of hardware see the following figure.



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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.	*Product specification - IRBT 4004/6004/7004*
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).	

2 DressPack

2.1 Introduction

2.1.1 Included options

DressPack

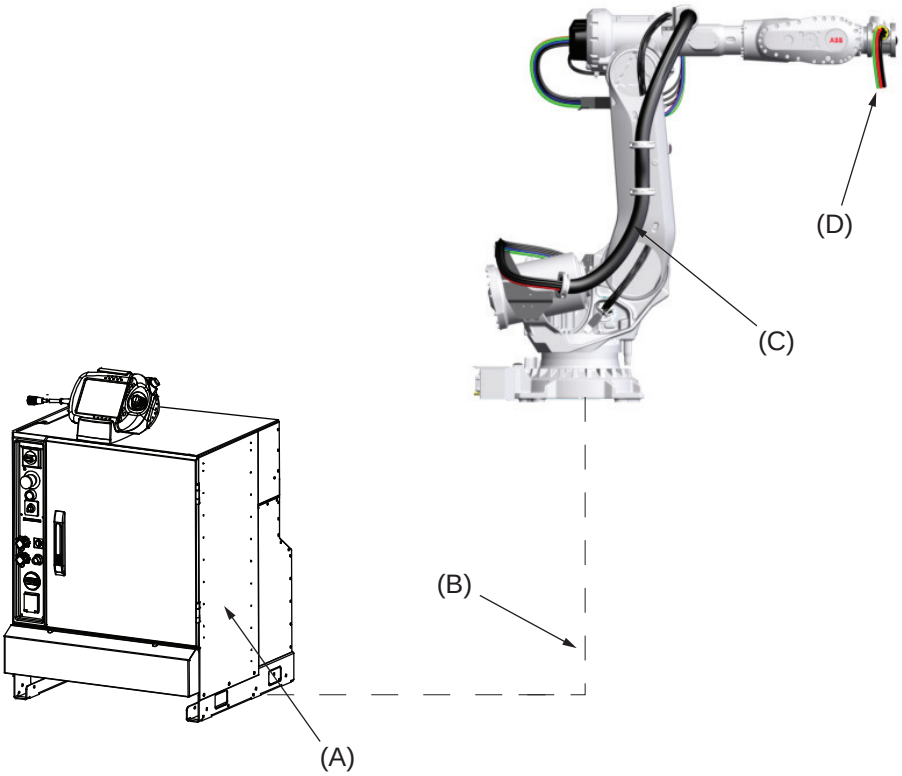
Includes options for upper arm, lower arm and floor pos B, C and D, see the following figure. These are described separately below but are designed as a complete package for various applications.

The DressPack for the floor contains customer signals.

The DressPack for upper and lower arm contains process cable packages including signals, 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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Pos	Description
A	Robot controller, (including 7th axis drive for servo gun)
B	DressPack, floor
C	DressPack, lower arm
D	DressPack, upper arm

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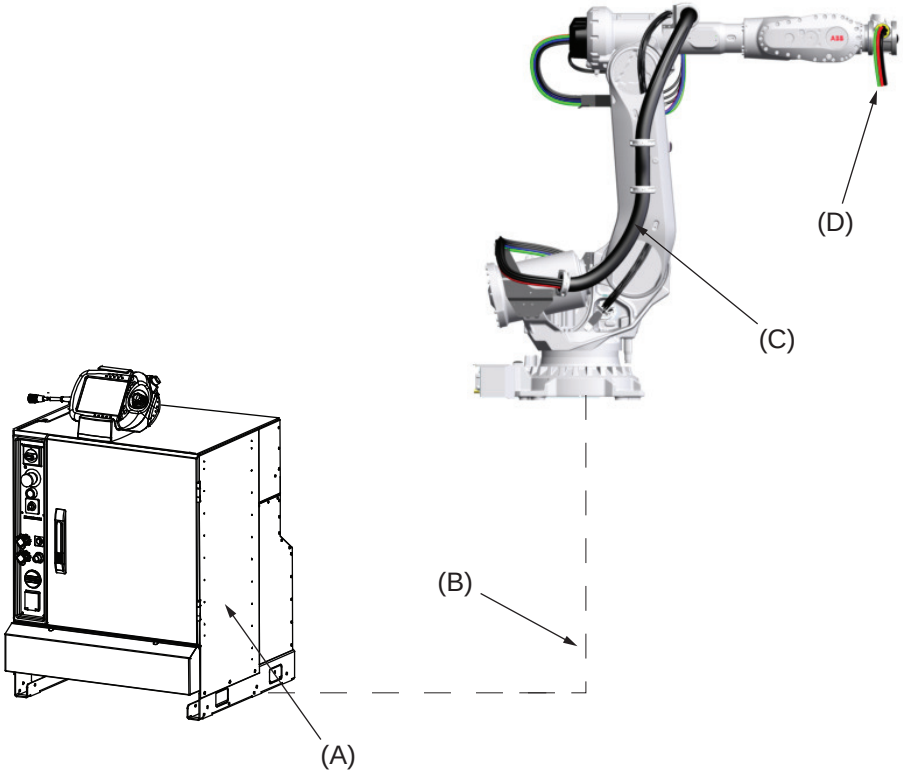
2.1.1 Included options
Continued

Spotwelding

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



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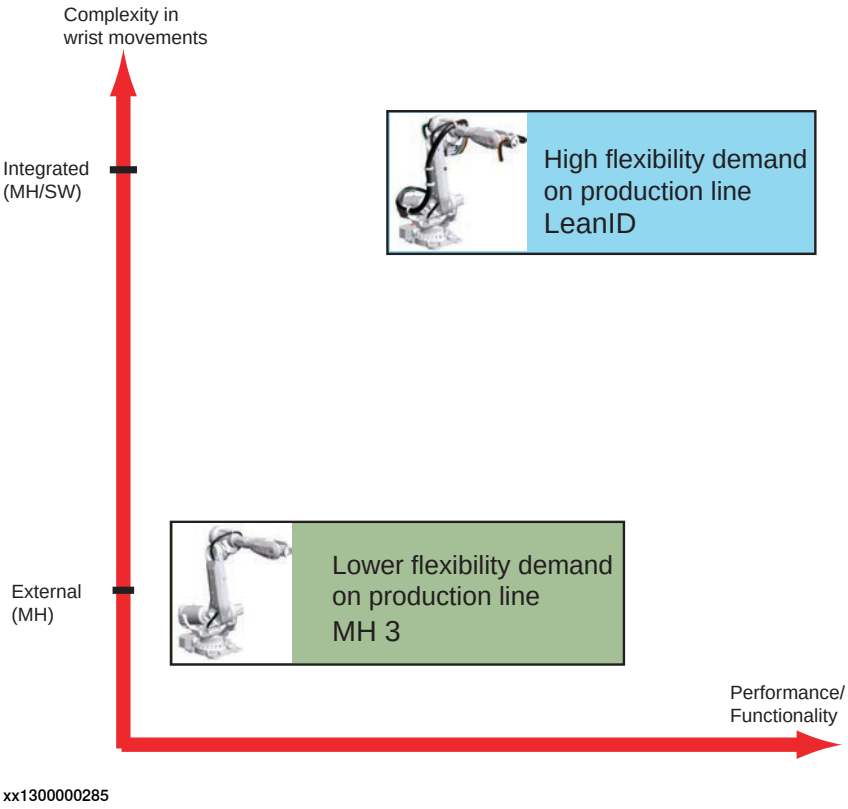
Pos	Description
A	Robot controller, (including 7th axis drive for servo gun)
B	DressPack, floor
C	DressPack, lower arm
D	DressPack, upper arm

2.1.2 Product range

DressPack solutions for different users needs

The different robot types can be equipped with the well integrated cable and hose packages in the DressPack options. 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 users need of flexibility, depending of the complexity of the operation/wrist movements, there are two major levels of dress pack solutions available, see Figure below.



Integrated

This type of dress pack is intended for a production where there are many complex wrist movements and the need for flexibility in changing products is high.

Available options are 798-3 and 780-4 for material handling/spot welding, the LeanID concept.

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 798-3 and 780-3 for material handling.

2.1.3 Limitations of robot movements

General

When using DressPack options on the upper arm the robot movements will be limited.

- In bending backwards positions there are limitations due to interference with manipulator.
- Might restrict working range, see *Working range axis 5 and axis 6 for LeanID, option 780-4 on page 82*.

Note

For more details, contact your local ABB office.

Restrictions for LeanID, option 780-4

Limitation for axis 5 and 6 depends on how the dress pack is assembled at the tool and how adjustment has been done.

Axis	Working range
Axis 5	120° to -120°
Axis 6	220° to -220°

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.

2.1.5 Information structure

General

The information for DressPack is structured in the following way.

The DressPack can be delivered in two versions developed for two different applications. Each type is described in a separate section.

Section	Option	Description
2.2	DressPack	DressPack includes general description DressPack with common information.

Material handling application DressPack

Section	Option	Description
2.3	Type H	DressPack for Material Handling.
	Type Hse	DressPack for handling the part against electrical servo driven transformer guns stationary mounted.

Spot welding application DressPack

Section	Option	Description
2.4	Type Se	DressPack for electrical servo driven transformer guns carried by the robot manipulator.

Connector kits

Section	Option	Description
2.3	Connector Kits	Includes general description of connector kits for DressPack.

2.2 DressPack

2.2.1 Introduction

Available DressPack configurations for Material Handling

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

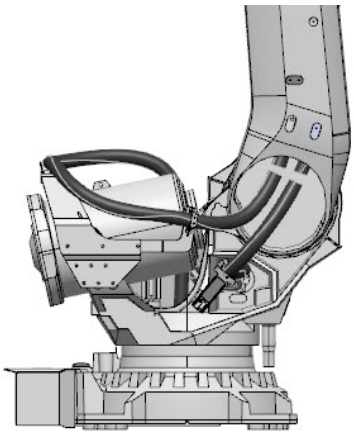
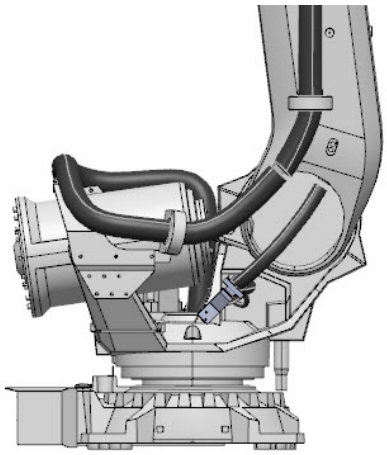
	Lower arm	Upper arm
Option 778-1 Material Handling	Option 798-3, Base to axis 3 Internal routing in lower arm	Option 780-3, Axis 3 to 6 External routing
		Option 780-4, Axis 3 to axis 6 (LeanID) Internal routing

Available DressPack configurations for Spot Welding

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

	Lower arm	Upper arm
Option 778-2 Spot Welding	Option 798-3 Base to axis 3	Option 780-4 Int. Axis 3 to 6 (LeanID) Internal routing
	Option 798-2 Base to axis 2	Option 780-2 Ext. Axis 2 to axis 6 External routing

Lower arm

	
Internal routing in lower arm Option 778-1 (Material handling) Option 798-3, Base to axis 3 Option 3325-1x, Base to axis 3	External routing Option 798-3, Base to axis 3 Option 3325-1x, Base to axis 3

2.2.2 Built-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.
- One version for all IRB 6700 variants.
- Adjustment for optimal hose/cable lengths.
- Easy exchange of DressPack

Internal

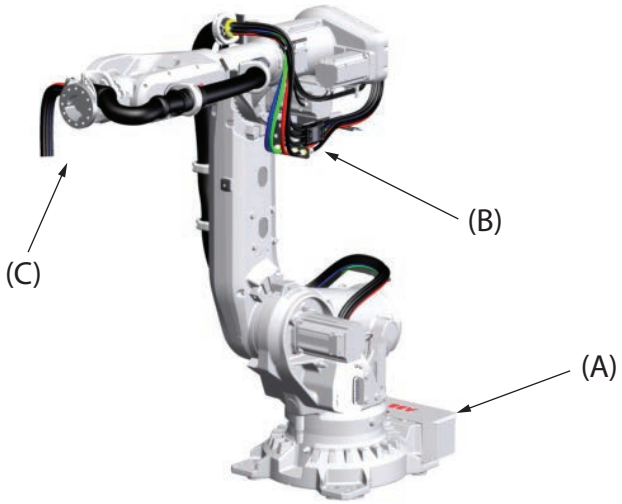
Spot welding and Material handling (option 780-4):

- Partly internal routing through the upper arm.
- Suitable for complex movements.
- High demands for flexibility and accessibility.
- Longer life time
- Predictable movements
- Easy exchange of DressPack

2.2.3 Interface descriptions for DressPack

General

Below is an overview showing the different DressPack options connection points, and their locations. For detailed information see the circuit diagram, and product manual for the manipulator.



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Pos	Location	Description	Options
A	Base	FB7, CP/CS/CBUS/Ethernet	864-1, 798-3
B	Axis 3	CP/CS/CBUS/Ethernet	798-3
C	Axis 6	CP/CS/CBUS/Ethernet, WELD	780-3, 780-4

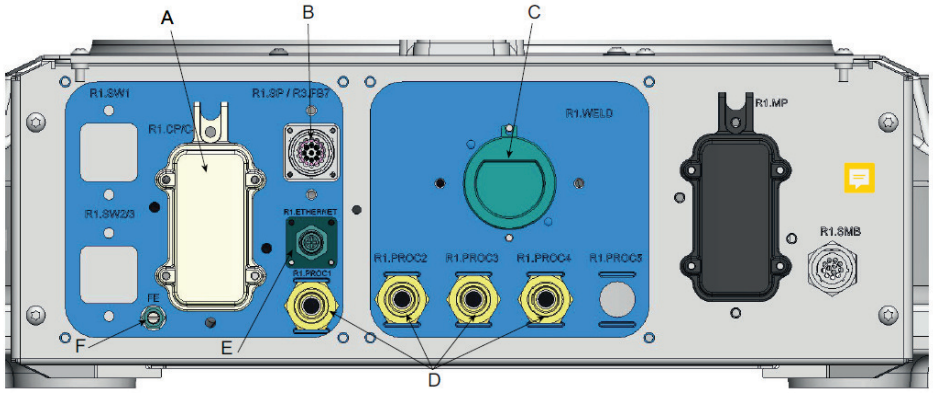
Base

Material handling (option 798-3), see figure below:

- Included are: A, one D (Proc 1).

Spot welding (option 798-3), see figure below:

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



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For corresponding parts of the tool, see *Connector kits on page 136*.

Pos	Description
A	R1.CP/CS
B	R1.SP (spot welding servo gun) or FB7 (resolver connection)
C	R1.WELD 3x35mm^2 (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)
F	FE (functional earth, when EtherNet communication is selected)

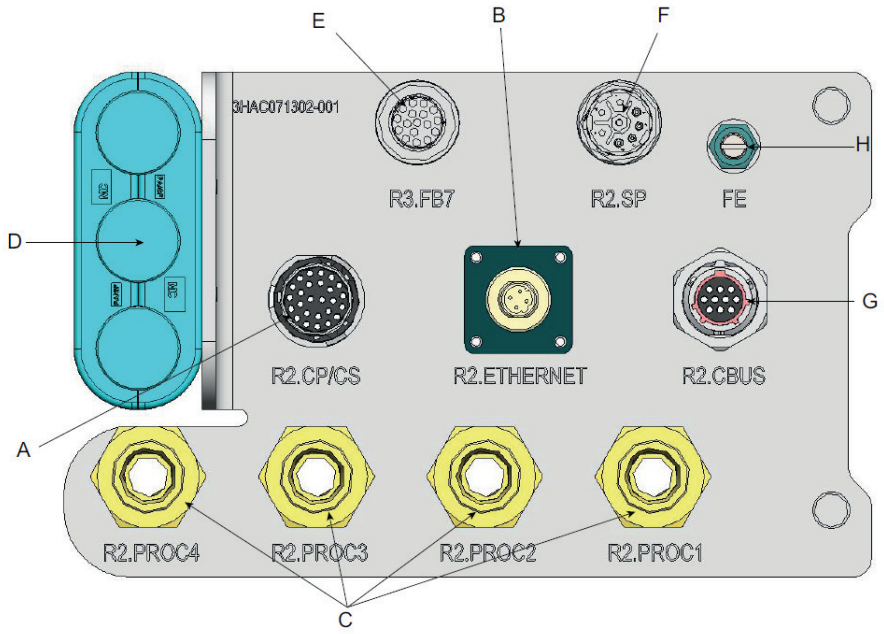
Axis 3

Material Handling (option 798-3), see figure below:

- Included are: A and one C (Proc 1).

Spot welding (option 798-3), see figure below:

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



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For corresponding parts of the tool, see *Connector kits on page 136*.

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)
D	R2.WELD 3x35mm^2 (spot welding)
E	R2.FB7
F	R2.SP (spot welding servo gun)

Continues on next page

Pos	Description
G	R2.CBUS (UTOW connector when DeviceNet communication is selected)
H	FE (functional earth, when EtherNet communication is selected)

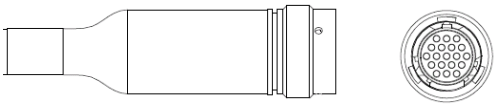
Axis 6

External

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

- Hose and cable free length, min. 1,000 mm
- Air hose ends with free end.

The cable ends with a connector, the main parts are described in the list below (for corresponding parts of the tool, see *Connector kits on page 136*):



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Material handling connector

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

- Cable free length, min. 1,000 mm
- Signals are connected with an M12 connector.

The different main parts within the connector are described in the list below, both with name and Harting article number (for corresponding parts of the tool, see within the Harting product offer).

Name	Harting article
PIN connector, R3.ETHERNET	21 03 881 1405
PIN	61 03 000 0094

xx1100000956

Material handling connector (LeanID)

Material handling/spot welding option 780-4 (LeanID), see figure below:

- Hose and cable free length, min. 1,160 mm
- Hoses and weld power cable (only for spot welding) end with free end.

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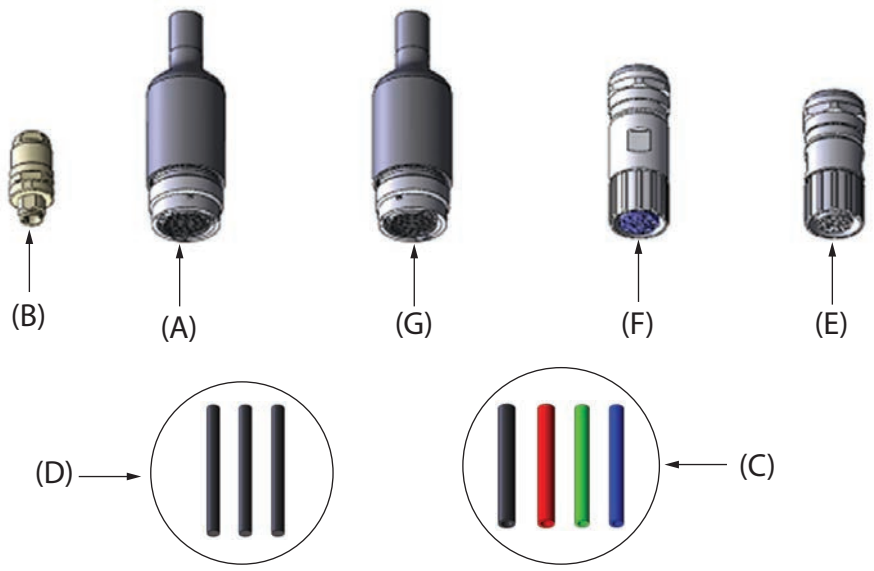
2.2.3 Interface descriptions for DressPack
Continued

The cable ends with connectors, for corresponding parts of the tool, see *Connector kits on page 136* and within the UTOW product offer.



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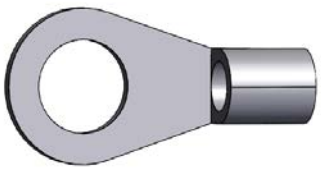
Pos	Description
A	R3.CP/CS (UTOW connector 26p) Customer signals and power
B	R3.ETHERNET (M12 connector) EtherNet signals (when EtherNet communication is selected)
C	R3.PROC 1-2 (1/2", free end) R3.PROC 2-4 (3/8", free end) Media hoses
D	R3.WELD 3x25mm^2 (free end) Spot Welding power
E	R3.FB7 (M23 connector 17p) Servo motor feedback (when Spot Welding Servo gun is selected)
F	R3.SP (M23 connector 8p) Servo motor power (when Spot Welding Servo gun is selected)
G	R3.CBUS (UTOW connector 10p) BUS signals (when Profibus or DeviceNet communication is selected)

- FE (M8 cable lug) Functional Earth 10 mm^2 (when Parallel and Ethernet communication is selected)



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2.2.4 Dimensions

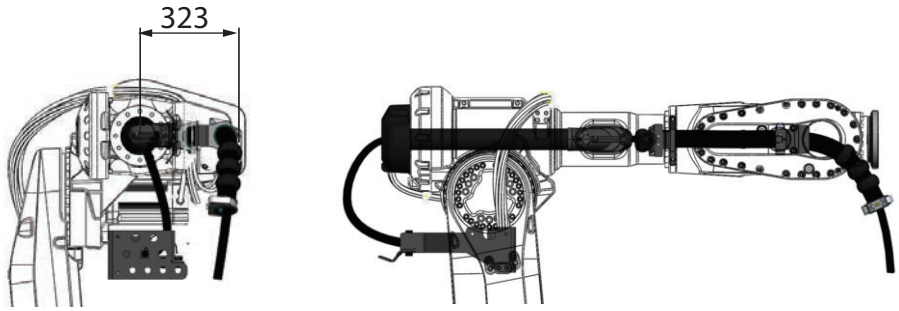
Dimensions for robot with DressPack

Note

Dimensions for specific variant can be measured in 3D-Cad models.

Dimensions are shown in figures below.

Axis 3 to axis 6 (option 780-3)



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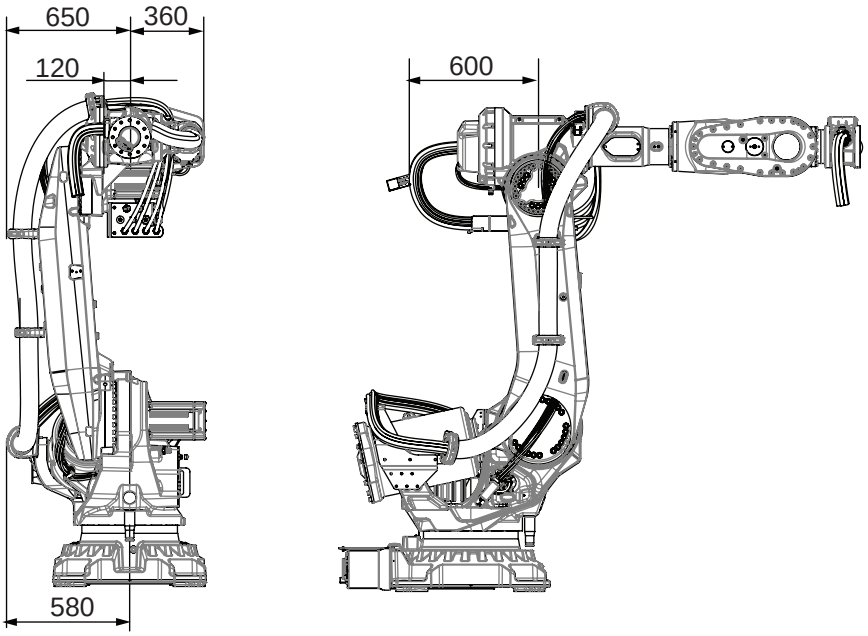
Spotwelding option 778-2 + Option 798-3 (Base to axis 3) + Option 780-4 (Axis 3 to axis 6)



xx1300000287

Base to axis 3 + Axis 3 to axis 6 (option 798-3 + 780-4)

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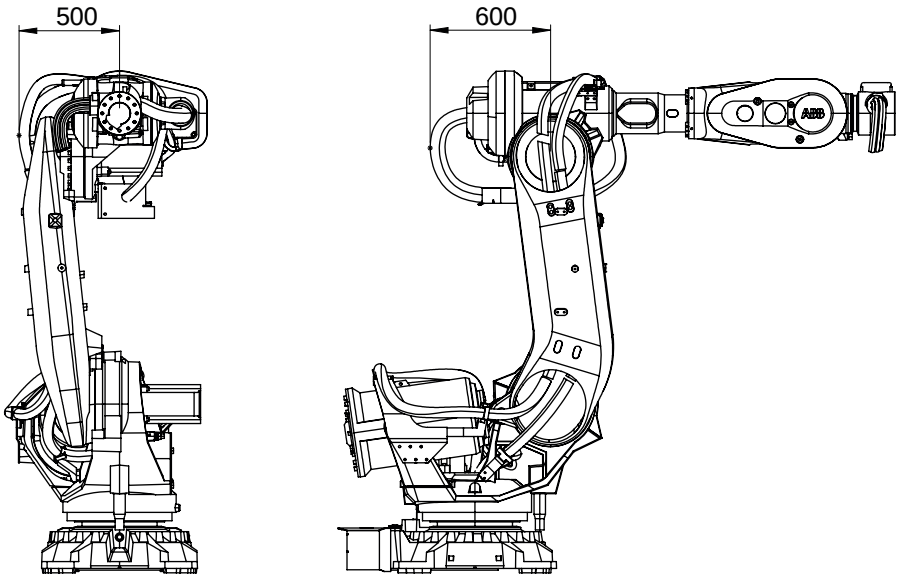
2.2.4 Dimensions
Continued

Material handling option 778-1 + Option 798-3 (Base to axis 3) + Option 780-4 (Axis 3 to axis 6)



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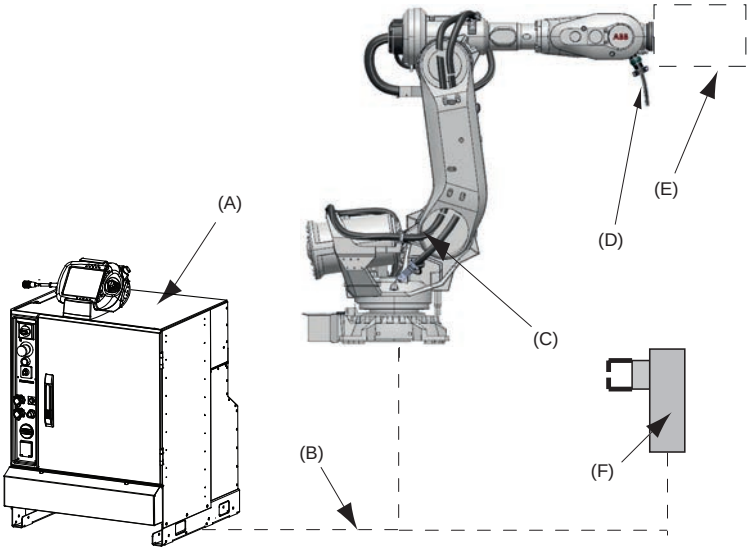
2.3 Type H/HSe

2.3.1 Introduction

General

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



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Pos	Name	
A	Robot controller	Incl. 7:th axis drive for servo gun, HSe
B	DressPack, Floor	
C	DressPack, Lower arm	
D	DressPack, Upper arm	For type H and HSe
E	Robot Gripper	
F	Stationary gun	Pneumatic or servo controlled and HSe

Available configurations with linked 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-X for parallel communication. Option 90-X for parallel communication and field bus communication with Can/DeviceNet. Option 92-X for parallel communication and field bus communication with Profibus.

Continues on next page

2.3.1 Introduction
Continued

Option	Type	Description
455-1	Parallel communication	Offers the signal cables needed for parallel communication in lower and upper arm DressPack. To be combined with option 94-X.
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-X or 92-X.
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-X. Requires selection of option 94-X.

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

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

DressPack

	Lower arm	Upper arm
Option 778-1. Material Handling	Option 798-3, Base to axis 3 Internal routing in lower arm	Option 780-3, Axis 3 to 6 External routing
		Option 780-4, Axis 3 to 6 Internal routing

2.3.2 Configuration result for Type H 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.

DressPack Type H/HSe. Parallel communication

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

One of the options:

- Option 780-3 (and Option 798-3). External routing
- Option 780-4 (and option 798-3) Internal routing

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

Type	At terminals in cabinet	At connection point. Base, Axis 3 or axis 6	Cable/part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0.75 mm^2	250 VAC, 5 A rms
Protective earth		1	0.75 mm^2	250 VAC
Customer Signals (CS)				
Signals	13	13	0.2 mm^2	50 V DC, 1 A rms
Signals separate shielded	8	8 (4x2)	0.2 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

Continues on next page

2.3.2 Configuration result for Type H HSe
Continued

DressPack Type H/HSe. Parallel and field bus communication, Can/DeviceNet

- Option 16-1 with Connection to cabinet
- (Option 90-X to specify cable length)
- Option 455-4. Parallel and bus communication
- Option 778-1 Material Handling
- Option 798-3. Internal routing, DressPack Lower arm

One of the options:

- Option 780-3 (and Option 798-3). External routing
- Option 780-4 (and option 798-3). Internal routing

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

Type	At terminals in cabinet	At Connection point. Base, Axis 3 or axis 6	Cable/part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0.75 mm^2	250 VAC, 5 A rms
Protective earth		1	0.75 mm^2	250 VAC
Customer Signals (CS)				
Signals	13	13	0.2 mm^2	50 V DC, 1 A rms
Signals separate shielded	8	8 (4x2)	0.2 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 signals	At bus board	2	0.2 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

Continues on next page

DressPack Type H/HSe. Parallel and field bus communication, Profibus

- Option 16-1 with Connection to cabinet
- (Option 92-X to specify cable length)
- Option 455-4. Parallel and bus communication
- Option 778-1. Material Handling
- Option 798-3. Internal routing, DressPack Lower arm

One of the options:

- Option 780-3 (and Option 798-3). External routing
- Option 780-4 (and option 798-3) Internal routing

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

Type	At terminals in cabinet	At connection point. Base, Axis 3 or axis 6	Cable/part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0.75 mm^2	250 VAC, 5 A rms
Protective earth		1	0.75 mm^2	250 VAC
Customer Signals (CS)				
Signals	13	13	0.2 mm^2	50 V DC, 1 A rms
Signals separate shielded	8	8 (4x2)	0.2 mm^2	50 V DC, 1 A rms
Customer bus (CBus)				
Bus signals	At bus board	4	0.14 mm^2	Profibus 12 Mbit/s spec
Media				
Air (PROC 1)		1	12.5 mm inner diameter	Max. air pressure 16 bar/230 PSI

Continues on next page

2.3.2 Configuration result for Type H HSe
Continued

DressPack Type H/HSe. Parallel and field bus communication, Ethernet

- Option 16-1 with Connection to cabinet
- (Option 859-X to specify cable length)
- (Option 94-X to specify cable length)
- Option 455-8. Parallel and Ethernet communication
- Option 778-1. Material Handling
- Option 798-3. Internal routing, DressPack Lower arm

One of the options:

- Option 780-3 (and Option 798-3). External routing
- Option 780-4 (and option 798-3). Internal routing

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

Type	At terminals in cabinet	At connection point. Base, Axis 3 or axis 6	Cable/part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0.75 mm^2	250 VAC, 5 A rms
Protective earth		1	0.75 mm^2	250 VAC
Customer Signals (CS)				
Signals	13	13	0.2 mm^2	50 V DC, 1 A rms
Signals separate shielded	8	8 (4x2)	0.2 mm^2	50 V DC, 1 A rms
Customer bus (Ethernet)				
Bus signals	4	4	0.4 mm^2	Ethernet CAT 5e, 100 Mbit [i]
Media				
Air (PROC 1)		1	12.5 mm inner diameter	Max. air pressure 16 bar/230 PSI

[i] Ethernet with wire colors according to PROFINET standard, M12-connectors.

Continues on next page

Required general options for Type HSe

To enable the spot welding function on the IRB 6700 a number of general standard robot options are required. These standard options are further described under other chapters and are also mentioned in this chapter.

- Option 727-1. 24V 8 Amps power supply
- Option 635-6. Spot. Software option for pneumatic guns

Required additional options for servo gun Type HSe

To enable the spot welding function to run with a servo controlled gun, some additional (additional to those described in *Summary options required for Type HSe on page 123*) servo drive options are required. These standard options are described under other chapters and are also mentioned below in this chapter.

- Option 907-1. First additional 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 635-6. Spot 6

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

2.3.3 Summary common options Type H HSe

General

The following options are the minimum required to form a complete spotwelding function DressPack Type H/HSe:

- Option 16-1. Connection to cabinet (Cable length and communication type to be stated)
- Option 455-1, 455-4 or 455-8. Parallel, Parallel and Bus communication or EtherNet (Communication type to be stated)
- Option778-1. Material Handling
- Option 798-3. DressPack Lower arm (Internal routing in lower arm)
- Option 780-3, -4. DressPack Upper arm (External or internal routing)

2.3.4 Summary options required for Type HSe

Servo gun

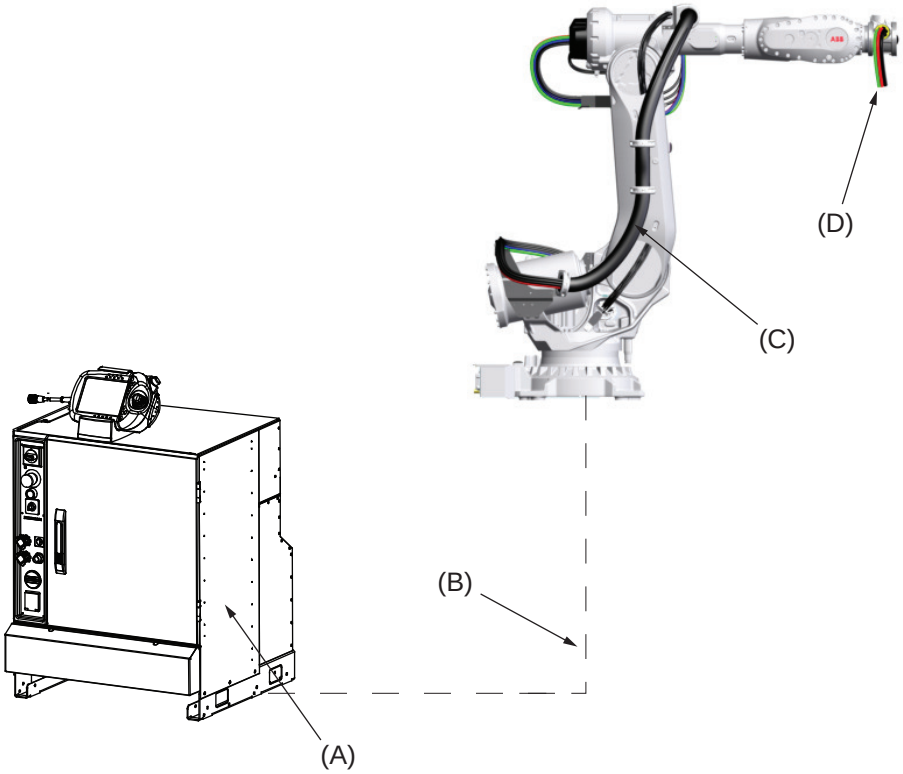
- Option 907-1. First additional drive
- Option 785-5. Stationary gun
- Option 786-1. Connection to first drive (other lengths available)
- Option 635-6. Spot 6

2.4 Type Se

2.4.1 Introduction

General

Variant Type 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.



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Position	Name
A	Robot controller (including 7th axis drive), Se
B	DressPack, Floor
C	DressPack, Lower arm
D	DressPack, Upper arm

Available configurations with linked option numbers are described below. To achive the specific servo motor connections within the DressPack for Type Se option *785-1 Robot gun* must also to be chosen. See *Robot gun on page 98* for details.

Continues on next page

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-X for parallel communication Option 90-X for parallel communication and field bus communication with Can/DeviceNet Option 92-X 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-X.
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-X or 92-X.
455-8	Parallel and Ethernet	Offers the signal cables needed for the Ethernet communication in combination in lower and upper arm DressPack. To be combined with option 859-X. Requires selection of option 94-X.

Application Interface connected to Option 16-1, Cabinet	Option 455-1, Parallel communication	Option 94-X Cable length, Parallel communication	Option 778-2, Spot Welding
	Option 455-4, Parallel and Bus communication	Option 90-X Option 92-X Cable length, Parallel and Bus communication	
	Option 455-8, Parallel and Ethernet communication	Option 859-X Cable length, Ethernet communication	

DressPack

	Lower arm	Upper arm
Option 778-2 Spot Welding	Option 798-3, Base to axis 3 External routing	Option 780-4, Axis 3 to 6 Internal routing

2.4.2 Configuration result for Type 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 Type Se. Parallel communication

- Option 16-1 with Connection to cabinet
- (Option 94-X to specify cable length)
- Option 455-1. Parallel communication
- Option 778-2. Spot Welding
- Option 798-3. External routing, DressPack Lower arm

and:

- Option 780-4 (and Option 798-3). Internal routing, DressPack Upper arm

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

Type S	At terminals in cabinet	At connection point. Base, axis 3 or axis 6	Cable/part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0.75 mm^2	250 VAC, 5 A rms
Protective earth		1	0.75 mm^2	250 VAC
Customer Signals (CS)				
Signals	13	13	0.2 mm^2	50 V DC, 1 A rms
Signals separate shielded	8	8 (4x2)	0.2 mm^2	50 V DC, 1 A rms
Media				
Water/Air (PROC 1-4)		4	12.5 mm inner diameter [i]	Max. air pressure 16 bar/ 230 PSI Max. water pressure 10 bar/ 145 PSI
Welding power (WELD)				
Lower and Upper arm		2	35 mm^2 [ii]	600 VAC, 150 A rms at 20 °C (68 °F)
Protective earth (Lower and Upper arm)		1		

[i] For LeanID 2x1/2" + 2x3/8", only upper arm
[ii] For LeanID upper arm 25 mm^2, only upper arm, 135 A rms

Continues on next page

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

Type Se	At terminals in cabinet	At connection point. Base, axis 2/3 or axis 6	Cable/part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0.75 mm^2	250 VAC, 5 A rms
Protective earth		1	0.75 mm^2	250 VAC
Customer Signals (CS)				
Signals	13	13	0.2 mm^2	50 V DC, 1 A rms
Signals separate shielded	8	8 (4x2)	0.2 mm^2	50 V DC, 1 A rms
Servo motor signals				
Servo motor power	At drive	3	1.5 mm^2	600 VAC, 12 A rms
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 1-4)		4	12.5 mm inner diameter [i]	Max. air pressure 16 bar/ 230 PSI. Max. water pressure 10 bar/ 145 PSI
Welding power (WELD)				
Lower and Upper arm		2	35 mm^2 [ii]	600 VAC, 150 A rms at 20°C (68°F)
Protective earth (Lower and Upper arm)		1		

i For LeanID 2x1/2" + 2x3/8", only upper arm
ii For LeanID upper arm 25 mm^2, only upper arm, 135 A rms

Continues on next page

2.4.2 Configuration result for Type Se
Continued

DressPack Type Se. Parallel and field bus communication, Can/DeviceNet

- Option 16-1 with Connection to cabinet
- (Option 90-X to specify cable length)
- Option 455-4. Parallel and bus communication
- Option 778-2. Spot Welding
- Option 798-3. External routing, DressPack Lower arm

and:

- Option 780-4 (and option 798-3). Internal routing, DressPack Upper arm

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

Type S	At terminals in cabinet	At connection point. Base, axis 3 or axis 6	Cable/part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0.75 mm^2	250 VAC, 5 A rms
Protective earth		1	0.75 mm^2	250 VAC
Customer signals (CS)				
Signals	13	13	0.2 mm^2	50 V DC, 1 A rms
Signals separate shielded	8	8 (4x2)	0.2 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 signals	At bus board	2	0.23 mm^2	50 V DC, 1 A rms
Media				
Water/Air (PROC 1-4)		4	12.5 mm inner diameter [i]	Max. air pressure 16 bar/230 PSI Max. water pressure 10 bar/145 PSI.
Welding power (WELD)				
Lower and Upper arm		2	35 mm^2 [ii]	600 VAC, 150 A rms at 20°C (68°F)
Protective earth (Lower and Upper arm)		1		

i For LeanID 2x1/2" + 2x3/8", only upper arm
ii For LeanID upper arm 25 mm^2, only upper arm, 135 A rms

Continues on next page

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

Type Se	At terminals in cabinet	At connection point. Base, axis 3 or axis 6	Cable/part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0.75 mm^2	250 VAC, 5 A rms
Protective earth		1	0.75 mm^2	250 VAC
Customer signals (CS)				
Signals	13	13	0.2 mm^2	50 V DC, 1 A rms
Signals separate shielded	8	8 (4x2)	0.2 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 signals	At bus board	2	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, 12 A rms
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 1-4)		4	12.5 mm inner diameter [i]	Max. air pressure 16 bar/230 PSI. Max. water pressure 10 bar/145 PSI.
Welding power (WELD)				
Lower and Upper arm		2	35 mm^2 [ii]	600 VAC, 150 A rms at 20 °C (68 °F)
Protective earth (Lower and Upper arm)		1		

[i] For LeanID 2x1/2" + 2x3/8", only upper arm
[ii] For LeanID upper arm 25 mm^2, only upper arm, 135 A rms

Continues on next page

2.4.2 Configuration result for Type Se
Continued

DressPack Type Se. Parallel and field bus communication, Profibus

- Option 16-1 with Connection to cabinet
- (Option 92-X to specify cable length)
- Option 455-4. Parallel and bus communication
- Option 778-2. Spot Welding
- Option 798-3. External routing, DressPack Lower arm

and:

- Option 780-4 (and option 798-3). Internal routing, DressPack Upper arm

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

Type S	At terminals in cabinet	At connection point. Base, axis 3 or axis 6	Cable/part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0,75 mm^2	250 VAC, 5 A rms
Protective earth		1	0,75 mm^2	250 VAC
Customer signals (CS)				
Signals	13	13	0,2 mm^2	50 V DC, 1 A rms
Signals separate shielded	8	8 (4x2)	0,2 mm^2	50 V DC, 1 A rms
Customer bus (CBus)				
Bus signals	At bus board	4	0,14 mm^2	Profibus 12 Mbit/s spec
Media				
Water/Air (PROC 1-4)		4	12,5 mm inner diameter [i]	Max. air pressure 16 bar/230 PSI Max. water pressure 10 bar/145 PSI.
Welding power (WELD)				
Lower and Upper arm		2	35 mm^2 [ii]	600 VAC, 150 A rms at 20 °C (68 °F)
Protective earth (Lower and Upper arm)		1		

i For LeanID 2x1/2" + 2x3/8", only upper arm
ii For LeanID upper arm 25 mm^2, only upper ar, 135 A rms

Continues on next page

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

Type Se	At terminals in cabinet	At connection point. Base, axis 3 or axis 6	Cable/part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0,75 mm^2	250 VAC, 5 A rms
Protective earth		1	0,75 mm^2	250 VAC
Customer signals (CS)				
Signals	13	13	0,2 mm^2	50 V DC, 1 A rms
Signals separate shielded	8	8 (4x2)	0,2 mm^2	50 V DC, 1 A rms
Customer bus (CBus)				
Bus signals	At bus board 6	6 (3x2)	0,14 mm^2	Profibus 12 Mbit/s spec
Servo motor signals				
Servo motor power	At drive	3	1,5 mm^2	600 VAC, 12 A rms
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 1-4)		4	12,5 mm inner diameter [i]	Max. air pressure 16 bar/230 PSI. Max. water pressure 10 bar/145 PSI.
Welding power (WELD)				
Lower and Upper arm		2	35 mm^2 [ii]	600 VAC, 150 A rms at 20°C (68°F)
Protective earth (Lower and Upper arm)		1		

[i] For LeanID 2x1/2" + 2x3/8", only upper arm
[ii] For LeanID upper arm 25 mm^2, only upper arm, 135 A rms

Continues on next page

2.4.2 Configuration result for Type Se
Continued

DressPack Type Se. Parallel and field bus communication, Ethernet

- Option 16-1 with Connection to cabinet
- (Option 859-X to specify cable length)
- (Option 94-X to specify cable length)
- Option 455-8. Parallel and Ethernet communication
- Option 778-2. Spot Welding
- Option 798-3. External routing, DressPack Lower arm

and:

- Option 780-4 (and Option 798-3). Internal routing, DressPack Upper arm

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

Type S	At terminals in cabinet	At connection point. Base, axis 3 or axis 6	Cable/part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0.75 mm^2	250 VAC, 5 A rms
Protective earth		1	0.75 mm^2	250 VAC
Customer signals (CS)				
Signals	13	13	0.2 mm^2	50 V DC, 1 A rms
Signals separate shielded	8	8 (4x2)	0.2 mm^2	50 V DC, 1 A rms
Customer bus (Ethernet)				
Bus signals	4	4	0.4 mm^2	Ethernet CAT 5e, 100 Mbit [i]
Media				
Water/Air (PROC 1-4)		4	12.5 mm inner diameter [ii]	Max. air pressure 16 bar/230 PSI Max. water pressure 10 bar/145 PSI.
Welding power (WELD)				
Lower and Upper arm		2	35 mm^2 [iii]	600 VAC, 150 A rms at 20°C (68°F)
Protective earth (Lower and Upper arm)		1		

[i] Ethernet with wire colors according to PROFINET standard, M12-connectors.
[ii] For LeanID 2x1/2" + 2x3/8"
[iii] For LeanID upper arm 25 mm^2, 135 A rms

Continues on next page

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

Type Se	At terminals in cabinet	At connection point. Base, axis 2/3 or axis 6	Cable/part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0.75 mm^2	250 VAC, 5 A rms
Protective earth		1	0.75 mm^2	250 VAC
Customer signals (CS)				
Signals	13	13	0.2 mm^2	50 V DC, 1 A rms
Signals separate shielded	8	8 (4x2)	0.2 mm^2	50 V DC, 1 A rms
Customer bus (Ethernet)				
Bus signals	4	4	0.4 mm^2	Ethernet CAT 5e, 100 Mbit [i]
Servo motor signals				
Servo motor power	At drive	3	1.5 mm^2	600 VAC, 12 A rms
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 1-4)		4	12.5 mm inner diameter [ii]	Max. air pressure 16 bar/230 PSI. Max. water pressure 10 bar/145 PSI.
Welding power (WELD)				
Lower and Upper arm		2	35 mm^2 [iii]	600 VAC, 150 A rms at 20°C (68°F)
Protective earth (Lower and Upper arm)		1		

[i] Ethernet with wire colors according to PROFINET standard, M12-connectors.
[ii] For LeanID 2x1/2" + 2x3/8"
[iii] For LeanID upper arm 25 mm^2, 135 A rms

Continues on next page

2.4.2 Configuration result for Type Se
Continued

Required options for servo gun, type Se

To enable the spot welding function to run with a servo controlled gun, some additional servo drive options are required. These standard options are described under other chapters and are also mentioned below in this chapter.

- Option 907-1. First additional 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 635-6. Spot 6.

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

Continues on next page

2.4.3 Summary common options for Type Se

General

The following options are the minimum required to form a complete SpotPack Type S/Se:

- Option 16-1. Connection to cabinet, (Cable length and communication type to be stated)
- Option 455-1, 455-4 or 455-8. Parallel, Parallel and Bus communication or EtherNet (Communication type to be stated)
- Option 778-2. Spot Welding
- Option 798-3. External routing, DressPack Lower arm
- Option 780-4 Internal routing, DressPack Upper arm

Servo gun type Se

- Option 907-1. First additional drive
- Option 785-1. Robot Gun
- Option 786-1,-2,-3,-4. Connection to first drive (cable length to be stated)
- Option 635-6. Spot 6

2.5 Connector kits

General

For detailed information on connection location see *Interface descriptions for DressPack on page 109*.

Below is an example of how a connector kit and its parts can look like.

xx1300000223

Note

Some connector kits listed in the overview tables are not available for all manipulators. See the available options in the specification forms.

Continues on next page

2.5.1 Base - Connector kits

Available options

		DressPack options	Resolver conn., axis 7	Description
Option	Name	798-3	864-1	
459-1	CP/CS, Proc 1 on base	X		
453-1	FB 7		X	

Note

Ethernet and Servo power connection kits not available.

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

R1. CP/CS and Proc 1 on base for option 798-3.

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

- 1 Hose fittings (swivel nut adapter, (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
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 FB7 - 453-1

R3. FB 7 on base for option 864-1

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)	UTOW
1 pcs Adapter	8 pin
8 pcs Pin	For 0.13 - 0.25 mm^2

Continues on next page

2.5.1 Base - Connector kits
Continued

Assembly Accessories to complete connector	
Assembly instruction	

2.5.2 Axis 3 - Connector kits

Available options

		DressPack options	Description
Option	Name	798-3	
458-1	CP/CS, CBUS/SP/SS, Proc 1 axis 3	X	UTOW

Option CP/CS/CBus/SP/SS, Proc 1 axis 3 - 458-1

CP/CS/CBus/SP/SS, Proc 1 axis 3 on tool side for option 780-3 and 780-4.

This kit offers a kit with connectors to be mounted at toolside of axis 3.

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:

CP/CS	
1 pcs UTOW Pin connector 26p, bayonet	UTOW61626PH, Shell size 16
26 pcs Pin	RM18W3K, 0.5-0.82 mm^2
CBUS	
1 pcs UTOW Pin connector 10p, bayonet	UTOW61210PH, Shell size 12
10 pcs Pin	RM18W3K, 0.5-0.82 mm^2
Ethernet	
1 pcs Pin connector M12	Harting 21 03 881 1405
4 pcs Pin	Harting 09670005576, 0.13-0.33 mm^2
SP (Servo Power)	
1 pc Straight connector M23 8p	
4 pcs Crimp pin 1 mm	AWG 24-17
4 pcs Crimp pin 2 mm	AWG 18-14
SS (Servo Signal)	
1 pcs Straight connector M23 17p	
17 pcs Pin	AWG 28-20
Assembly Accessories to complete connector	
Assembly instruction	

2.5.3 Axis 6 - Connector kits

Available options

				Description
Option	Name	780-3 (MH)	780-4 (LeanID)	
543-1	CP/CS/CBUS/SP/SS Proc 1 axis 6	X	X	UTOW
452-1	Weld Proc 1-4 axis 6		X	MC, Separate conductors

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

CP/CS/CBus/SP/SS, Proc 1 axis 6 on tool side for option 780-3 and 780-4.

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 (swivel nut adapter (1/2", M22x1.5 Brass, 24 degree seal))
- Connector with:

CP/CS	
1 pcs UTOW Pin connector 26p, bulkhead	UTOW71626PH05, Shell size 16
26 pcs Pin	RM18W3K, 0.5-0.82 mm^2
CBUS	
1 pcs UTOW Pin connector 10p, bulkhead	UTOW71210PH05, Shell size 12
10 pcs Pin	RM18W3K, 0.5-0.82 mm^2
Ethernet	
1 pcs Socket connector M12	Harting 21 03 881 2425
4 pcs Socket	Harting 09670005476, 0.13-0.33 mm^2
SP (Servo Power)	
1 pcs Bulkhead contact M23	
4 pcs Crimp pin 1 mm	AWG 24-17
4 pcs Crimp pin 2 mm	AWG 18-14
SS (Servo Signal)	
1 pcs Bulkhead contact M23	
17 pcs Pin	AWG 28-20
Assembly Accessories to complete connector	
Assembly instruction	

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

Weld and Proc 1-4 axis 6 on manipulator side for option 780-4

The process cable package from axis 6 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.

Continues on next page

The kit contains:

- 4 Hose fittings (Swivel Nut adapter, (2 x ½", M22x1.5) and (2x 3/8", M16x1.5))
- 1 Multi contact connector (Female) type including:
-

1 pc Welding connector	3x25 mm^2
1 pc Cable gland	Diameter 24-28 mm
1 pc End housing	0.21-0.93 mm^2
1 pcs Reducing coupling	PG36/PG29
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 6700 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.

3.2 Manipulator

Variants

Option	IRB Type	Handling capacity (kg)	Reach (m)
435-111	6700	235	2.65
435-112	6700	205	2.80
435-113	6700	175	3.05
435-114	6700	150	3.20
435-115	6700	200	2.60
435-116	6700	155	2.85
435-126	6700	300	2.70
435-127	6700	245	3.00

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

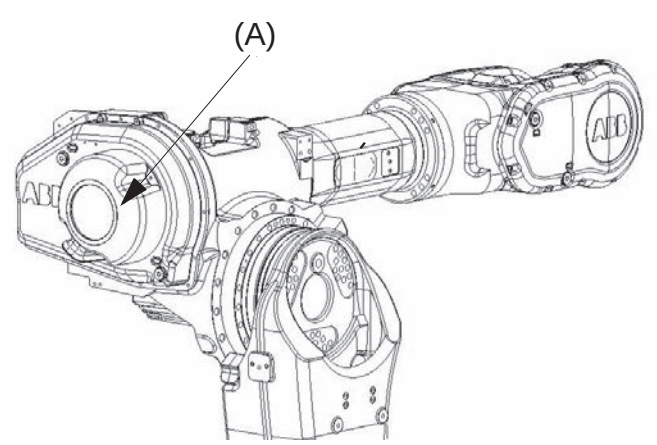
Notice that delivery time for painted spare parts will increase for ABB none standard colors.

Protection types

Option	Protection type	Note
287-4	Standard	IP67
287-3	Foundry Plus 2	See *Protection type Foundry Plus 2 on page 11* for a complete description of protection type Foundry Plus 2.

Continues on next page

Upper arm cover



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Pos	Description
A	Option 430-1

Foundry Plus Cable Guard

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

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

Fork lift device

Option	Type	Description
159-1	Fork lift device IRB 6700 [i]	Lifting device on the IRB 6700 floor standing 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.

[i] Its recommended to remove the fork lift devices after use

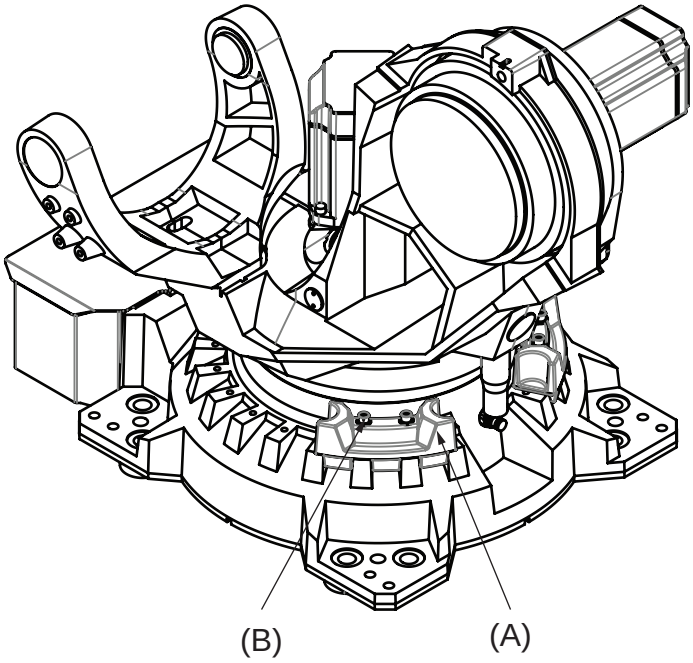
Working range limitation

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

Option	Description
29-1	Two stops which allow the working range to be restricted in increments of 15°.

Continues on next page

3.2 Manipulator
Continued



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Pos	Description
A	Two mechanical stops
B	Bolt tightening torque: 60 Nm

Extended working range

Option	Type	Description
561-1	Axis 1 to ±220°	The option extends the working range on axis 1 from ±170° to ±220°. When the option is used, the mechanical stop can after a risk-assessment 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.

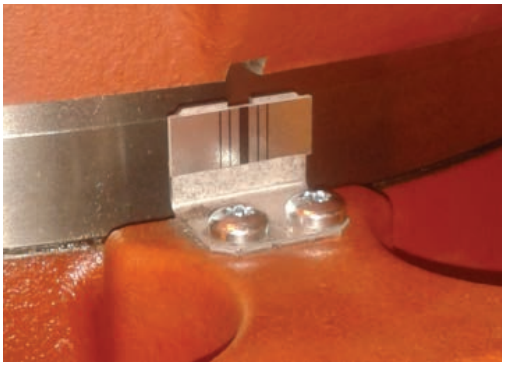
3.3 Equipment

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.
37-1	Base plate	Can also be used for IRB 7600. See *Installation on page 17*, for dimension drawing.
87-1	Cooling fan for axis 1 motor (IP54)	For in use recommendations see *Cooling fan for axis 1 motor on page 95*. Not for protection Foundry Plus. Not together with track motion.
430-1	Upper arm covers	See Figure in *Upper arm cover on page 145*. Included in protection Foundry.
804-1	Labels for synchronization markings	For a more accurate marking of the synchronization position of the robot. Assembly instructions are included. See Figure for Synchronize labels, Axis 1 - 6.

Synchronization labels

The option contains labels for each axis. Below is an example of the synchronization labels.



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

Resolver connection, axis 7

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

Continues on next page

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.

3.4 Floor cables

Manipulator cable length

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

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.

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 and CAN/DeviceNet or Profibus for process cable package.
455-8	Parallel and Ethernet communication	Includes CP, customer signals and PROFINET or Ethernet/IP for process cable package

3.6 DressPack floor cables

Connection to Parallel/CAN DeviceNet/Profibus/Ethernet

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

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

3.7 DressPack Lower and Upper arm

DressPack process configuration

Note

For more information about the process cable packages, see *DressPack on page 107*

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
798-3	Routing from base to axis 3	Material Handling/Spot Welding

DressPack upper arm

Option	Description	Note
780-3	External routing from axis 3 to axis 6	Requires option 778-1 and option 798-3
780-4	Internal routing from axis 3 to axis 6	Requires option 798-3.

Note

If option 780-4, LeanID, is selected the payload will decrease, for detailed information see *Load diagrams on page 40*

3.8 Connector kits

General

The connectors fit to the connectors at the manipulator base, axis 3 and 6 respectively.

Content

The kit consists of connectors, pins and sockets. For technical description, see *Connector kits on page 136*.

Option	Type	Description
459-1	R1.CP/CS, 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.
458-1	R2.CP/CS, PROC1	For the Customer Power/Customer Signal connector and one Process connector at axis 3. Pins for bus communication are included.
452-1	Weld, PROC1-4 axis 6	Weld connector and four Process connectors at axis 6, the manipulator side.
543-1	CP/CS/BUS, PROC1 axis 6	Connector for customer power/customer signal/customer bus at axis 6 tool side.

3.9 Servo Gun

Content

For technical description see *Servo gun on page 96*.

Option	Lengths
785-1	For robot handled Servo Gun.
785-2	For Stationary Servo Gun.

Connection to first drive

Following information specifies the cable length for Connection to first drive. For further information see *Servo gun on page 96*.

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

3.10 Warranty

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*.

Continues on next page

Warranty for DressPack

Note

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

Note

Option 780-4 DressPack LeanID is covered by the warranty.

4 Accessories

4.1 Introduction to accessories

General

There is a range of tools and equipment available, especially designed for the manipulator.

Basic software and software options for robot and PC

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

Robot peripherals

- Track Motion
- Motor Units

4.2 User documentation

User documentation

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

Tip

All documents can be found via myABB Business Portal, *www.abb.com/myABB*.

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