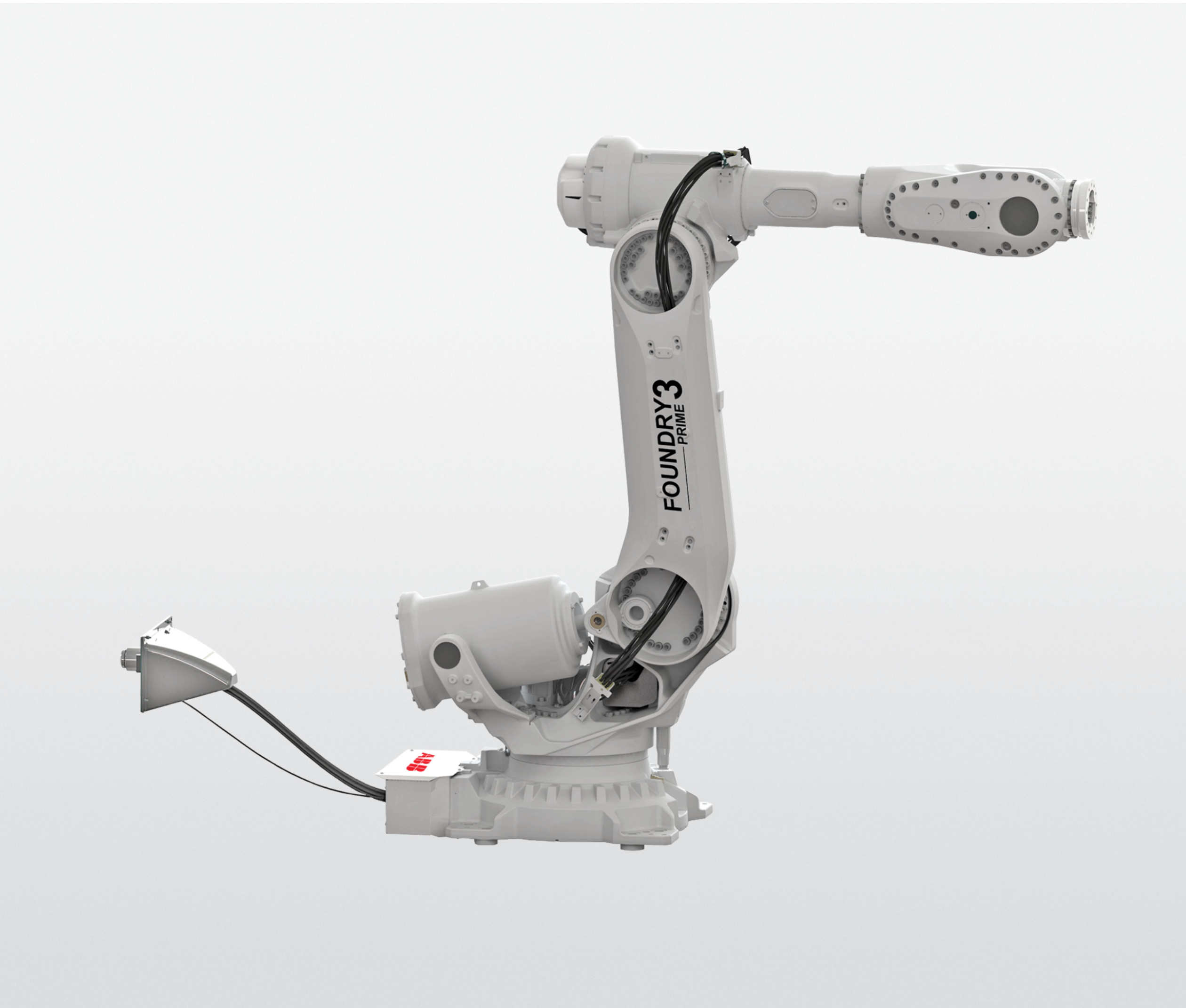
ROBOTICS

Product specification

IRB 6790



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Product specification

IRB 6790 - 235/2.65
IRB 6790 - 205/2.80

OmniCore

Document ID: 3HAC087217-001

Revision: B

Keep for future reference.

Additional copies of this manual may be obtained from ABB.

Original instructions.

Table of contents

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Overview of this product specification

About this product specification

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

- The structure and dimensions prints
- The fulfillment of standards, safety and operating requirements
- The load diagrams, mounting or extra equipment, the motion and the robot reach
- The specification of variants and options available

Usage

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

Users

It is intended for:

- Product managers and product personnel
- Sales and marketing personnel
- Order and customer service personnel
- Robot programmers
- Project leaders
- Design engineers

References

Reference	Document ID
Product specification - OmniCore V line	*3HAC074671-001*
Product manual - IRB 6790 Foundry Prime	*3HAC063331-001*
Product specification - Robot stopping distances according to ISO 10218-1	*3HAC048645-001*
Product specification - Robot user documentation, OmniCore with RobotWare 7	*3HAC065042-001*

Revisions

Revision	Description
A	First edition.
B	Published in release 24D. The following updates are done in this revision: • Updated the section *Technical data on page 17*. • Updated date of overpressure unit change. • Added length of cables between interface plate and manipulator base.

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1 Description

1.1 Structure

1.1.1 Introduction

General

The IRB 6790 series is ABB Robotics 7th generation of high payload, high performance industrial robots. Based on the famous IRB 6700 series, with large working range, the very high wrist torque, the service friendly modular built up and the high availability, significant for ABB's robots.

The IRB 6790 is designed to generally withstand a very harsh environment, including detergents used in spraying applications. Even with this very robust design, some limitations exist:

- Detergents and allowed PH levels are specified in the product manual.
- Warranty will not apply if corrosion happens on structural parts. This corrosion/rust will not influence the functionality of the product.
- Maintenance needs to be performed according to recommendations in the product manuals.

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.

Operating system

The robot is equipped with the OmniCore 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 - OmniCore V line*.

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 - OmniCore V line*.

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Foundry Prime

Robots with protection type Foundry Prime are specially designed to work in harsh environments such as water jet cleaning, high pressure deburring, immersion cleaning, washing and similar applications. To ensure that the protection offers the best reliability, special measures are required during installation and operation. It is required that the environmental and application conditions are fulfilled and that the special maintenance activities and intervals for the Foundry Prime protected robot are followed.

The manipulator can withstand indirect spray from jet pressure (max. 700 bar) and 100% humidity (gaseous mixture only).The manipulator can work with a cleaning bath temperature up to 60°C.

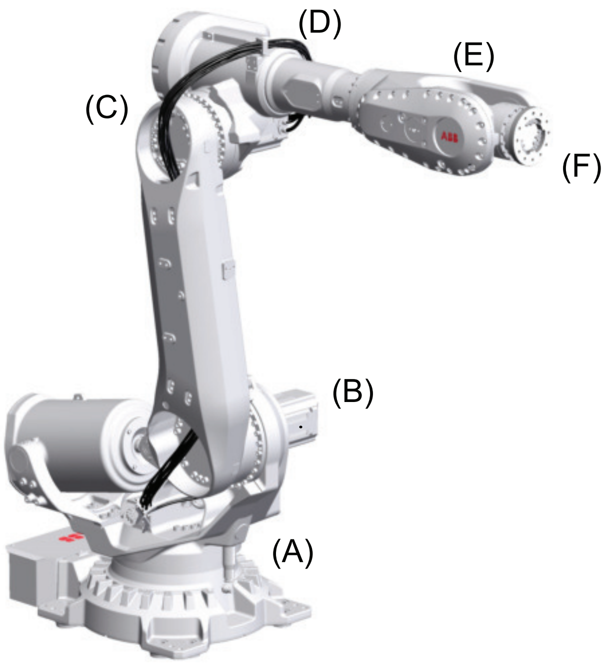
The motors, the balancing device, and the serial measurement board cavity must be pressurized on Foundry Prime robots during operation and shut down. For detailed information of the maintenance program, see chapter Maintenance in the *Product manual - IRB 6790 Foundry Prime*.

Washing and cleaning detergents

General washing detergent requirements:

- Washing and cleaning detergent with pH 7-10. Down to pH6 during short periods provided that the robot is washed carefully with tap water afterwards.
- Max. temperature on washing detergent is 60°C
- The user must follow the supplier's recommendations regarding detergent concentration and pH value
- Washing and cleaning detergents with corrosion inhibitor should be used

Robot axes



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A	Axis 1	B	Axis 2

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C	Axis 3	D	Axis 4
E	Axis 5	F	Axis 6

1.1.2 Different robot variants

General

The IRB 6790 is available in two variants.

Robot variants

The following variants are available.

Robot	Handling capacity (kg)	Reach (m)
IRB 6790	235 kg	2.65 m
IRB 6790	205 kg	2.80 m

1.1.3 Technical data

Available mounting options

	Prefix	Description
Mounting	-	IRB 6790: Floor-mounted manipulator

Manipulator weight

Robot variant	Weight
IRB 6790-235/2.65	1,260 kg
IRB 6790-205/2.80	1,270 kg

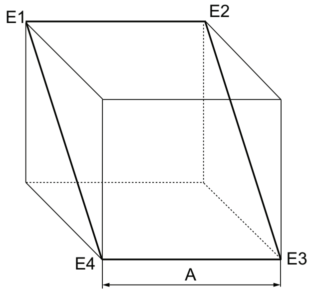
Other technical data

Data	Description	Note
Airborne noise level	The sound pressure level outside the working space.	< 71 dB (A) Leq (acc. to machinery directive 2006/42/EG)

Power consumption at max load

Type of movement	235/2.65	205/2.80
ISO Cube Max. velocity (kW)	2.8	2.8

Robot in calibration position	235/2.65	205/2.80
Brakes engaged (kW)	0.24	0.24
Brakes disengaged (kW)	0.87	0.87



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Pos	Description
A	1,000 mm

Power factor (cos φ)

The power factor is above 0.95 at a steady state power consumption higher than 2.0 kW, when the IRB 6790 is connected to the OmniCore V line.

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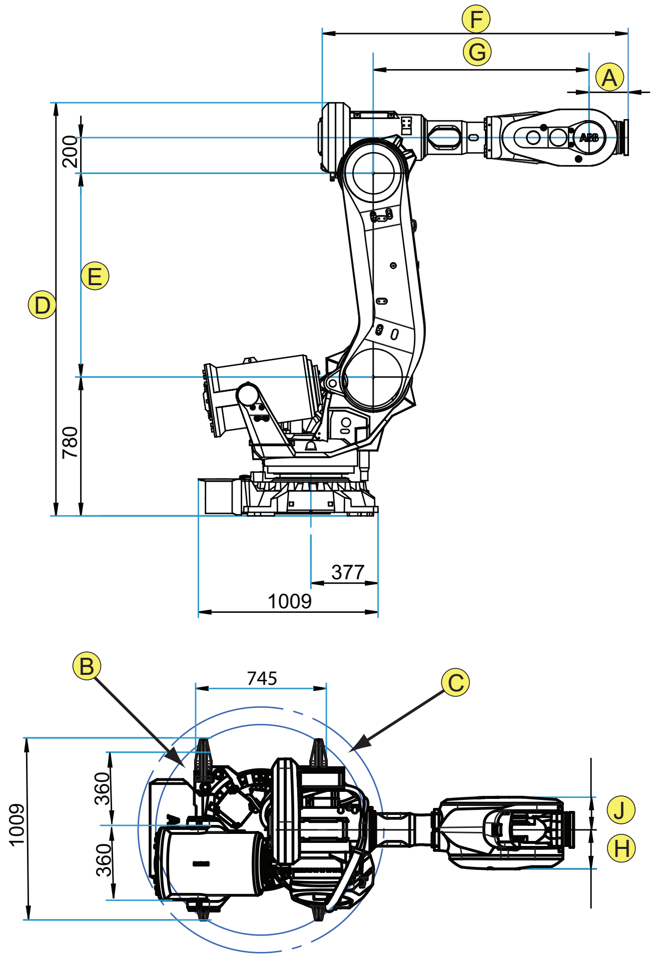
Main dimensions of IRB 6790



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Pos	Description
A	200 mm
B	Radius ax1, front = 532 mm
C	Radius ax1, back = 633 mm

Robot variant	D	E	F	G	H	J
IRB 6790 - 235/2.65	2300	1135	1670	1,182.5	209	186
IRB 6790 - 205/2.80	2445	1280	1670	1,182.5	186	209

1.2 Standards

1.2.1 Applicable standards

General

The product is compliant 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 deviation from ISO 10218-1:2011, these are listed in the declaration of incorporation. The declaration of incorporation is part of the delivery.

Robot standards

Standard	Description
ISO 9283	Manipulating industrial robots – Performance criteria and related test methods
ISO 9787	Robots and robotic devices – Coordinate systems and motion nomenclatures
ISO 9946	Manipulating industrial robots – Presentation of characteristics

Other standards used in design

Standard	Description
IEC 60204-1	Safety of machinery - Electrical equipment of machines - Part 1: General requirements, normative reference from ISO 10218-1
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
ISO 13849-1:2006	Safety of machinery - Safety related parts of control systems - Part 1: General principles for design, normative reference from ISO 10218-1

Consulted guidelines

The following guidelines have inspired and guided the product design:

Guideline	Description
VDI 3397 Part 1	Metalworking Fluids
VDI 3035	Design of machine tools, production lines and peripheral equipment for the use of metalworking fluids
DIN 51385	Lubricants – Processing fluids for forming and machining of materials – Terms
DIN 51485	Lubricants – Processing fluids for forming and machining of materials – Metalworking and forming fluids: Requirements and test methods

1.3 Installation

1.3.1 Introduction to installation

General

IRB 6790 are designed for floor mounting (no tilting allowed around X-axis or Y-axis). Depending on the robot version, an end effector with max. weight of 205 to 235 kg including payload, can be mounted on the tool flange (axis 6). See *Load diagrams on page 30*.

Extra loads

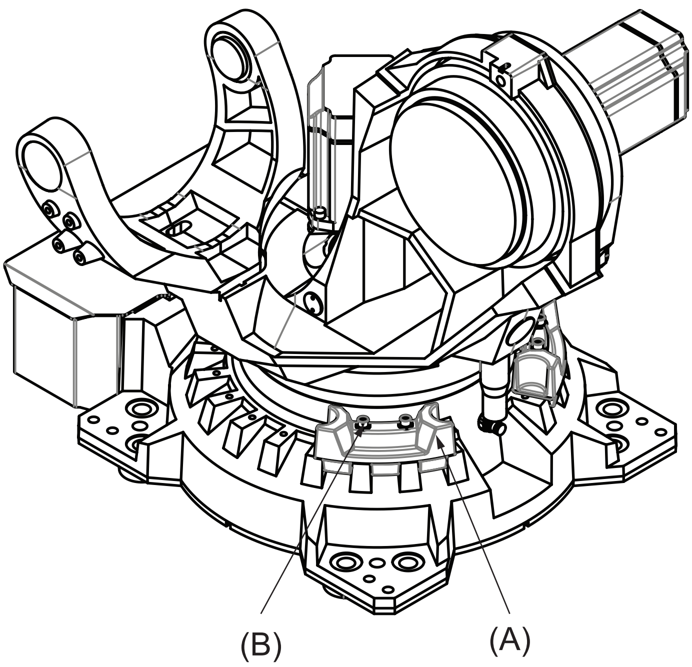
The upper arm can handle an additional load of 50 kg and the frame on axis 1 can handle an additional load of 250 kg.

See *Fitting equipment to the robot on page 39*.

Working range limitation

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

Two stops which allow the working range to be restricted in increments of 15°.



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

i In corrosive environment exchange bolts to stainless steel variants.

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.

Robot model	Weight
IRB 6790	1300 kg

Note

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

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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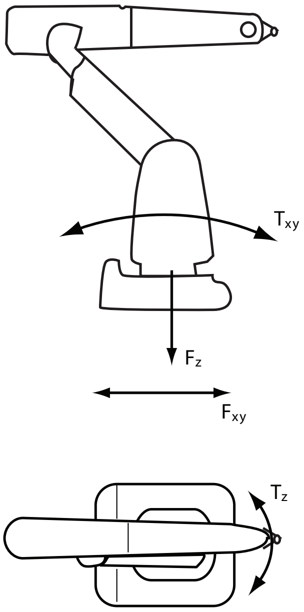
Loads on foundation, robot

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	±19.8 kN
Force z	14.6 ±4.5 kN	14.6 ±15.7 kN
Torque xy	±21.0 kNm	±37.1 kNm
Torque z	±5.0 kNm	±11.4 kNm

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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	100% at constant temperature (gaseous only)

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)

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Parameter	Value
Maximum ambient humidity	100% at constant temperature (gaseous only).

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.

Operating environment, robot

The robot may be exposed to washing detergents with pH 7-10.

For shorter periods, the robot may be exposed to washing detergent between pH 6 to 7, if all parts of the robot are rinsed with tap water afterwards. Organic acids, e.g. acetic acid, are not allowed to be used.

Note

Washing and cleaning detergents with corrosion inhibitor is recommended. Corrosive environment are also depending on tap water quality. To avoid risk with tap water quality, deionized water is recommended together with detergent.

Note

If the pH value or the detergent concentration is varying from its original specification, it can become very corrosive.

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 Foundry Prime	IP69[ii]

i According to IEC 60529.

ii Includes all manipulator electrical compartments, excludes the Harting connector on the connection panel which is IP67.

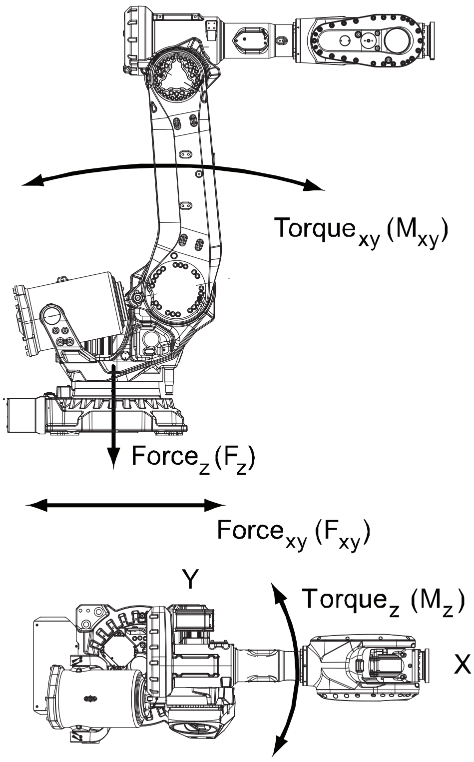
1.3.3 Assembling the manipulator

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	±19.8 kN
Force z	14.6 ±4.5 kN	14.6 ±15.7 kN
Torque xy	±21.0 kNm	±37.1 kNm
Torque z	±5.0 kNm	±11.4 kNm



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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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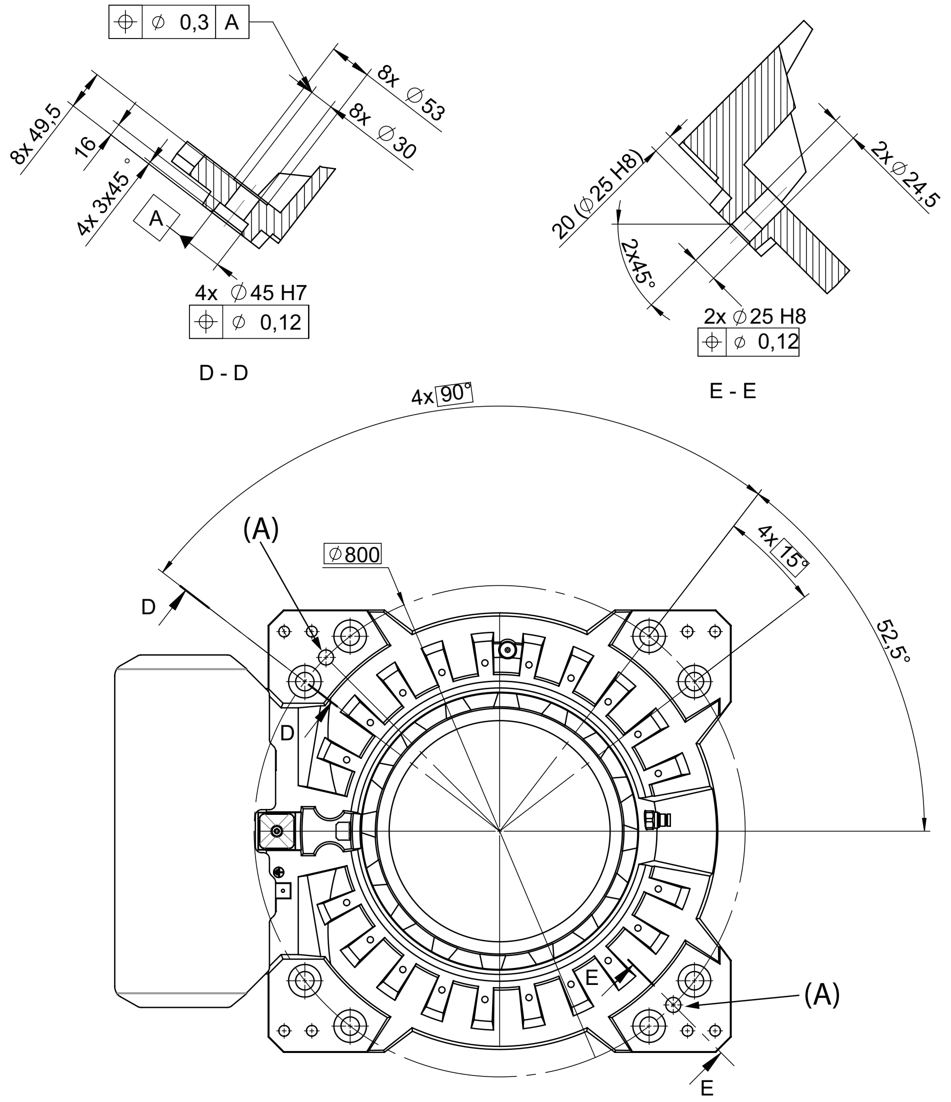
Fastening holes robot base - for all variants



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Pos	Description
A	Holes for guide pins (x2)

Fastener quality

Suitable screws:	M24 x 100[i]
Quality:	8.8
Screw tightening yield point utilization factor (v) (according to VDI2230):	90% (v=0.9)
Suitable washer:	4 mm flat washer[i]
Tightening torque:	550 Nm (screws lubricated with Molykote 1000) 600-725 Nm, typical 650 Nm (screws none or lightly lubricated)

i Stainless steel versions recommended in corrosive environments.

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> **Note**
>
> Only two guide pins shall be used.

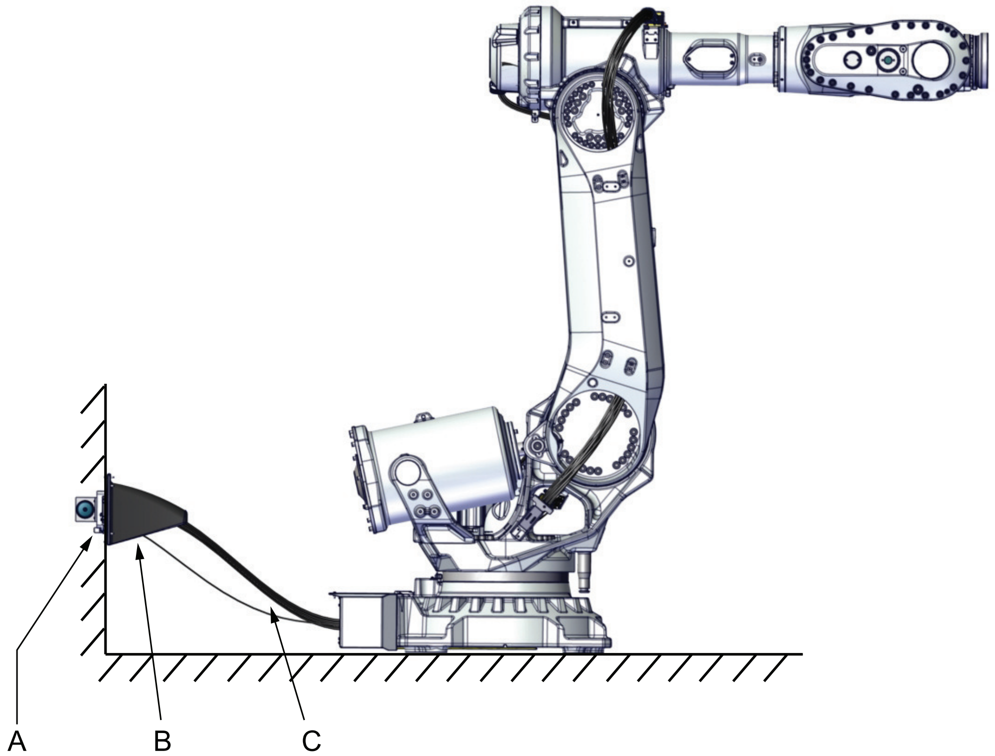
AbsAcc performance

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

Installation on a coherent and conductive structure

The manipulator must be installed on a coherent and conductive metallic structure which reaches the connector point on the wall (unbroken, to be able to connect to ground). The connector point is installed on the outside (dry) wall to protect the connectors from detergents. The flow sensor at the connection point does not withstand fluids.

Protect the interface plate from direct or indirect spray with the harness/interface cover. Put the interface plate where it is not subject to direct or indirect spray.



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A	Connector point / interface plate
B	Harness/interface cover
C	Cables between interface plate and manipulator base (5 m)

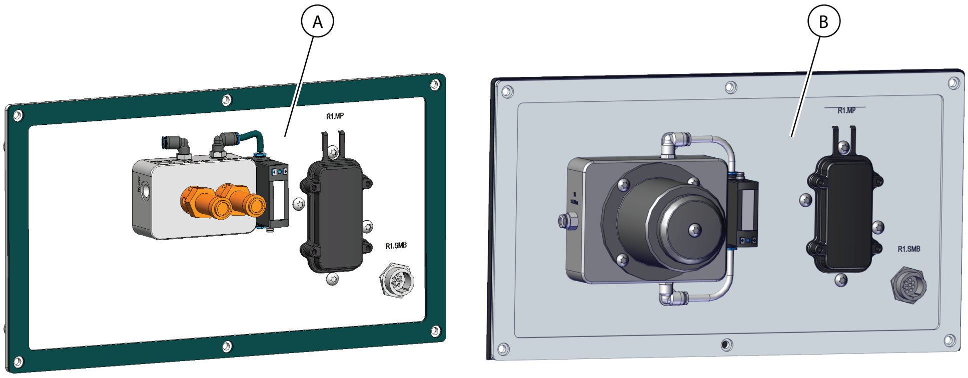
1.3.4 Overpressure system

Overpressure system

The system is equipped with an overpressure device and a flow sensor.

The control system will alert if the air leakage exceeds the preset value.

The overpressure unit is updated during 2024, and can have different appearance, but the function is the same. More information is available in *Product manual - IRB 6790 Foundry Prime*.



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A	Design from November 2024. Requires two pressure regulators.
B	Design before November 2024. Requires one pressure regulator.

Air preparation unit components

Components such as oil absorber, air dryer and pressure regulator are <u>not included</u> in the delivery of the overpressure system.

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
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. A robot calibrated with Absolute accuracy has the option information printed on its name plate (OmniCore). To regain 100% Absolute accuracy performance, the robot must be recalibrated for absolute accuracy after repair or maintenance that affects the mechanical structure.	CalibWare

Brief description of calibration methods

Axis Calibration method

Axis Calibration is a standard calibration method for calibration of IRB 6790 . 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.

Continues on next page

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*.

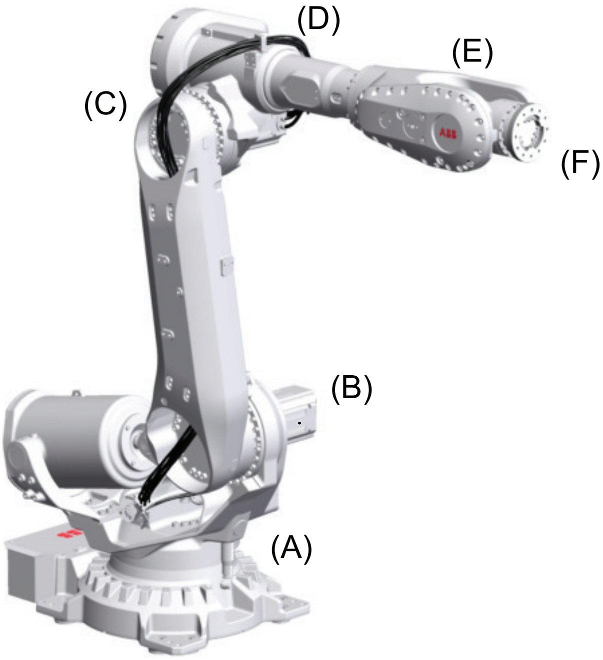
If a service operation is done to a robot with the option Absolute Accuracy, a new absolute accuracy calibration is required in order to establish full performance. For most cases after replacements that do not include taking apart the robot structure, standard calibration is sufficient.

The Absolute Accuracy option varies according to the robot mounting position. This is printed on the robot name plate for each robot. The robot must be in the correct mounting position when it is recalibrated for absolute accuracy.

1.4.2 Fine calibration

General

The fine calibration is done with the Axis calibration method.



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Axes

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

1.4.3 Absolute Accuracy calibration

Purpose

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

Here are some examples of when this accuracy is important:

- Exchangeability of robots
- Offline programming with no or minimum touch-up
- Online programming with accurate movement and reorientation of tool
- Programming with accurate offset movement in relation to 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.

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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 6790-235/2.55	0.35	0.75	100
IRB 6790-205/2.80	0.35	0.75	100

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 - OmniCore*, for detailed information.

WARNING

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

General

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

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

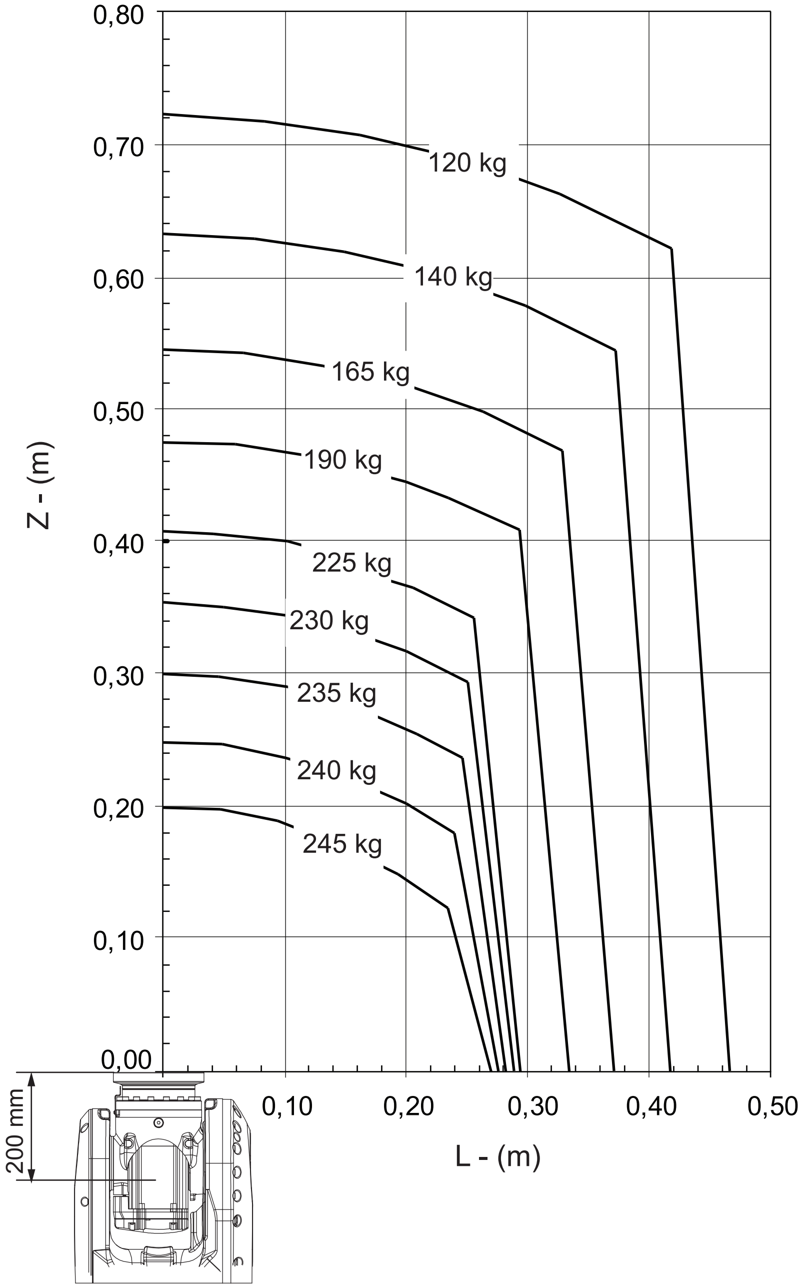
Control of load case with RobotLoad

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

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

1.5.2 Diagrams

IRB 6790-235/2.65



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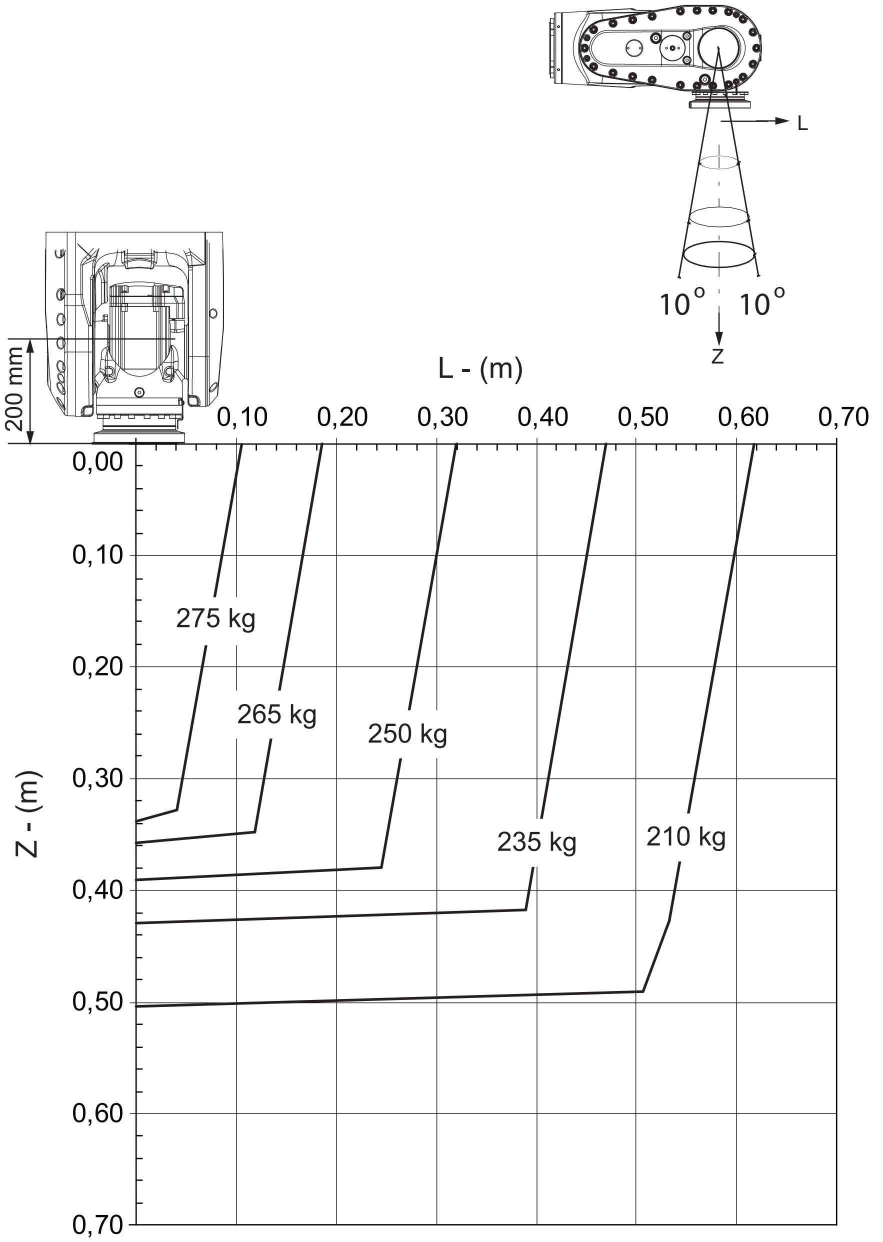
IRB 6790-235/2.65 "Vertical Wrist" (±10°)



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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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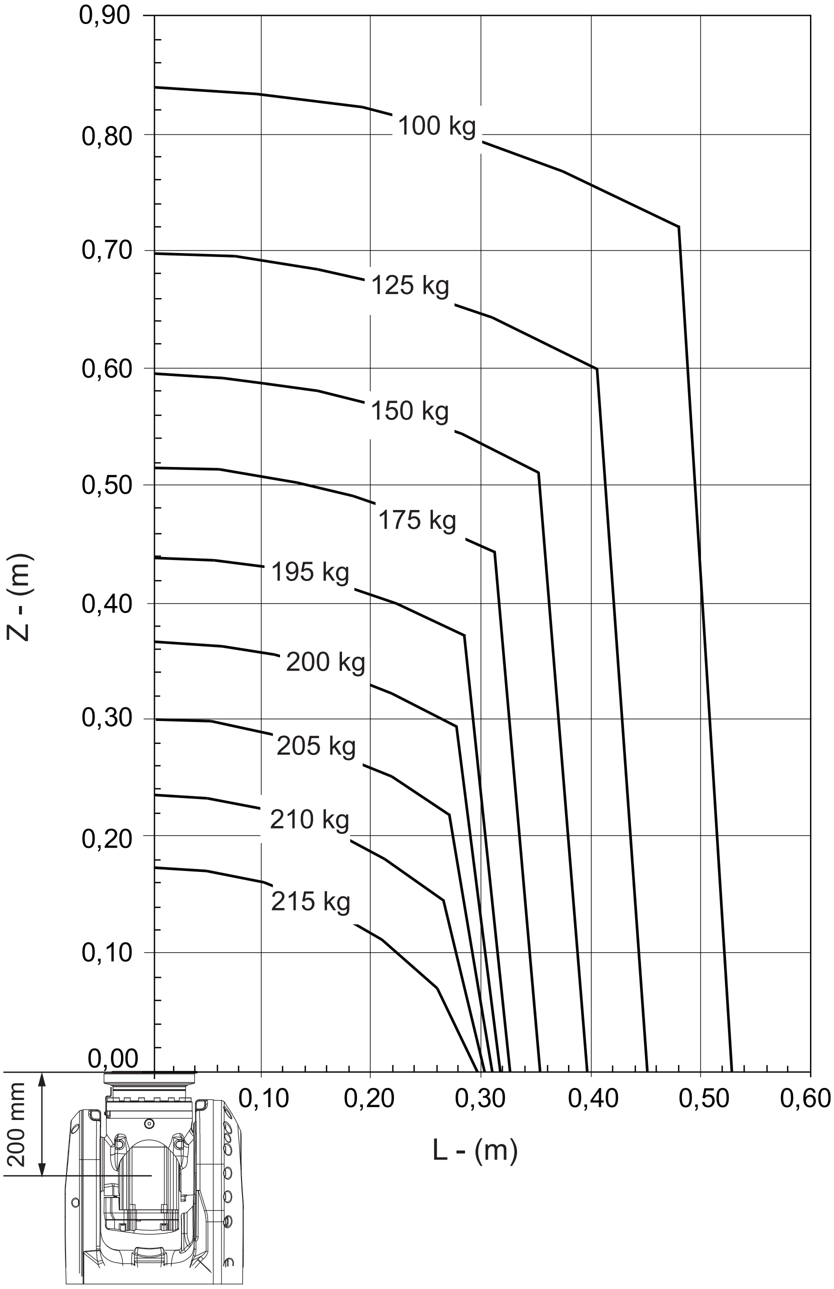
IRB 6790-205/2.80



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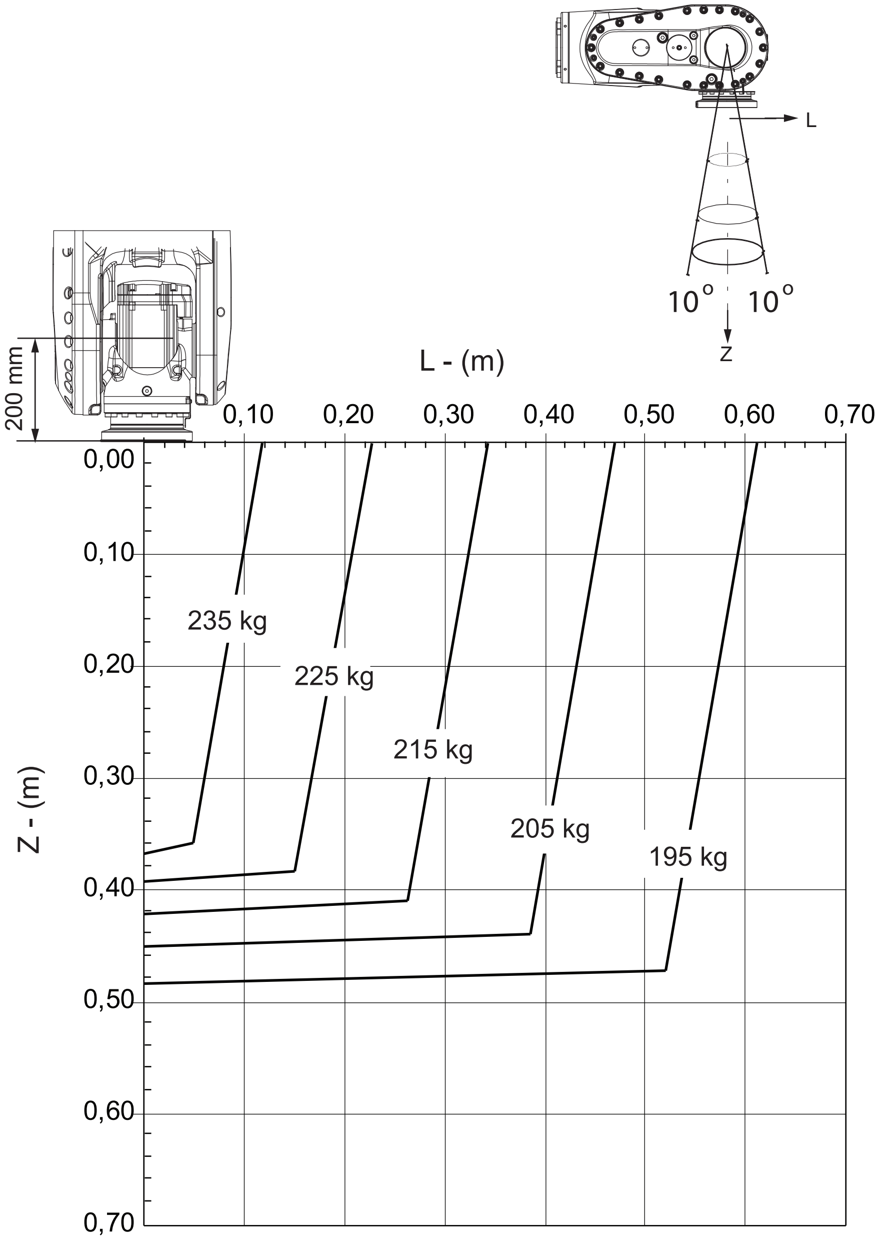
IRB 6790-205/2.80 "Vertical Wrist" (±10°)



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

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

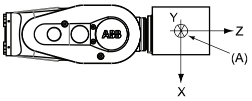
1.5.3 Maximum load and moment of inertia for full and limited axis 5 (center line down) movement

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 6790-235/2.65 IRB 6790-205/2.80	Ja_5 = Load x $((Z + 0{,}200)^2 + L^2)$ + max $(J_{0x}, J_{0y}) \leq 250\ kgm^2$
6	IRB 6790-235/2.65 IRB 6790-205/2.80	Ja_6 = Load x $L^2 + J_{0Z} \leq 185\ kgm^2$



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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.

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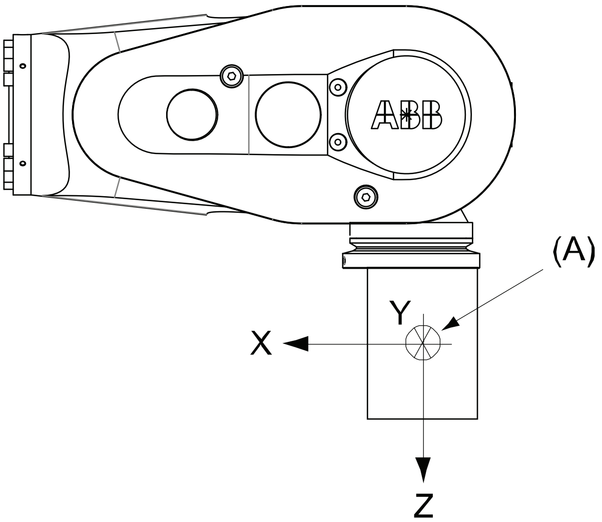
Limited axis 5, center line down

Axis	Robot type	Maximum moment of inertia
5	IRB 6790-235/2.65 IRB 6790-205/2.80	Ja_5 = Load x $((Z + 0{,}200)^2 + L^2)$ + max $(J_{0x}, J_{0y}) \leq 275$ kgm^2
6	IRB 6790-235/2.65 IRB 6790-205/2.80	Ja_6 = Load x $L^2 + J_{0Z} \leq 250$ 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.

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 6790-235/2.65	1324 Nm	650 Nm	225 kg
IRB 6790-205/2.80	1263 Nm	625 Nm	192 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 6790 - 235/2.65	41	22
IRB 6790 - 205/2.8	45	24

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 42*). 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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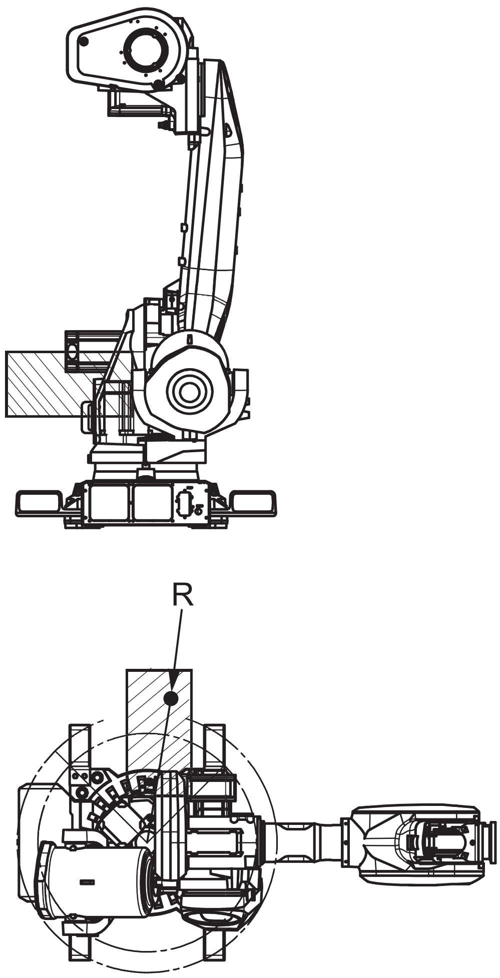

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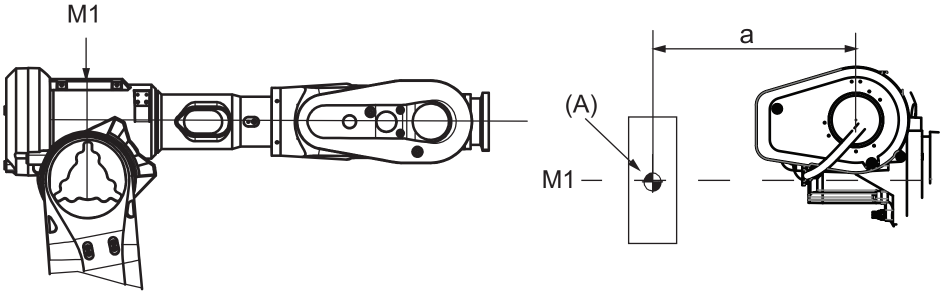
Upper arm

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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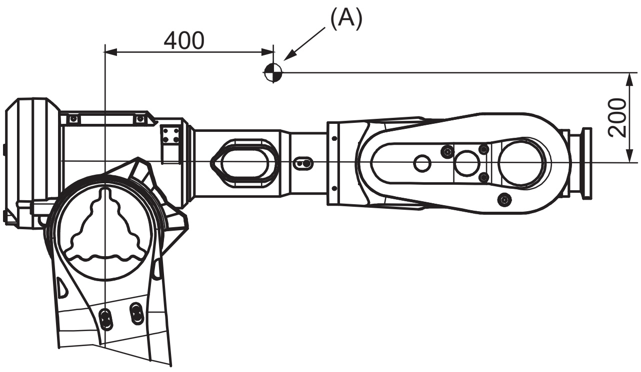

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A	Center of gravity 50 kg

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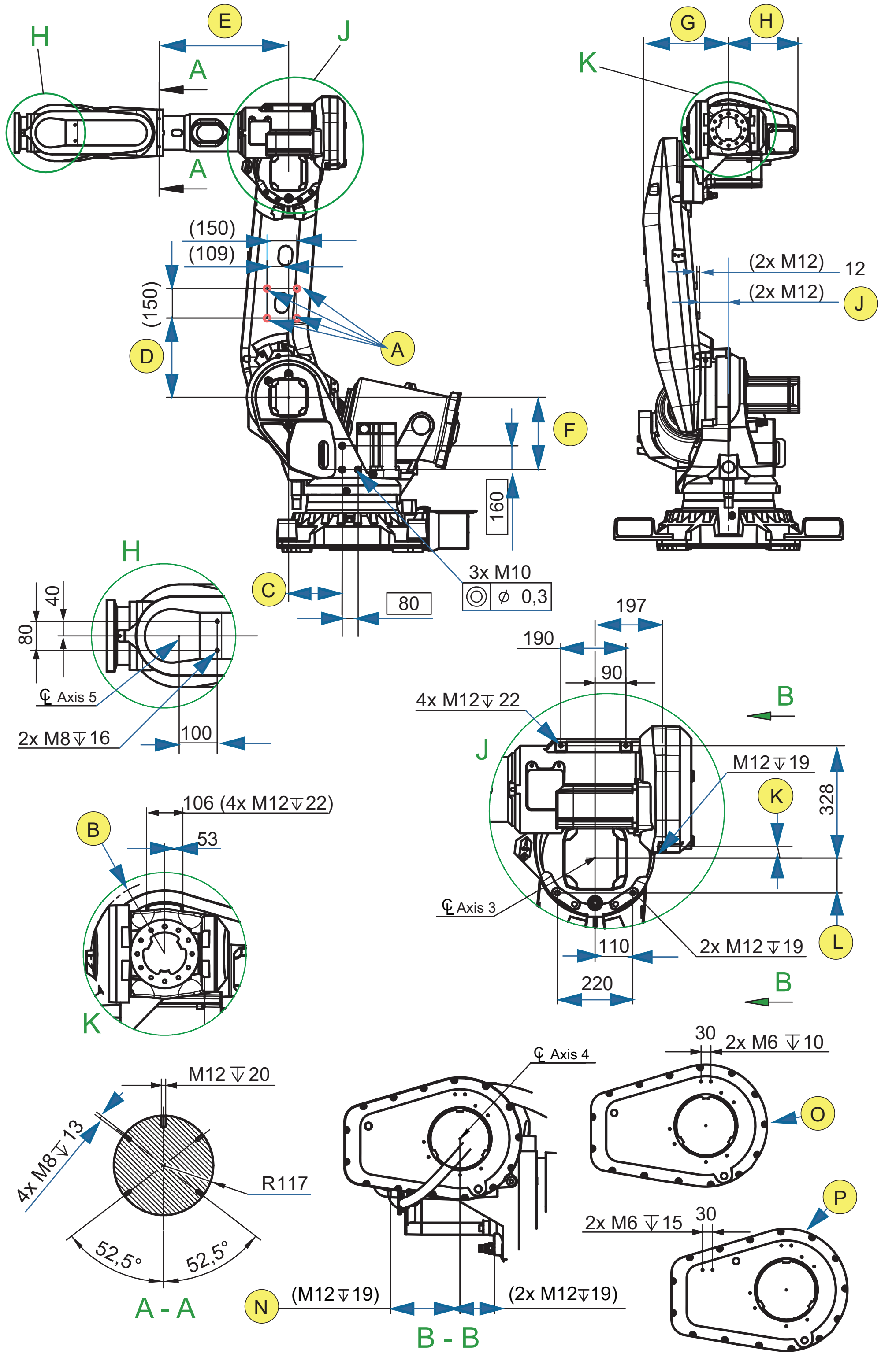
Holes for fitting extra equipment

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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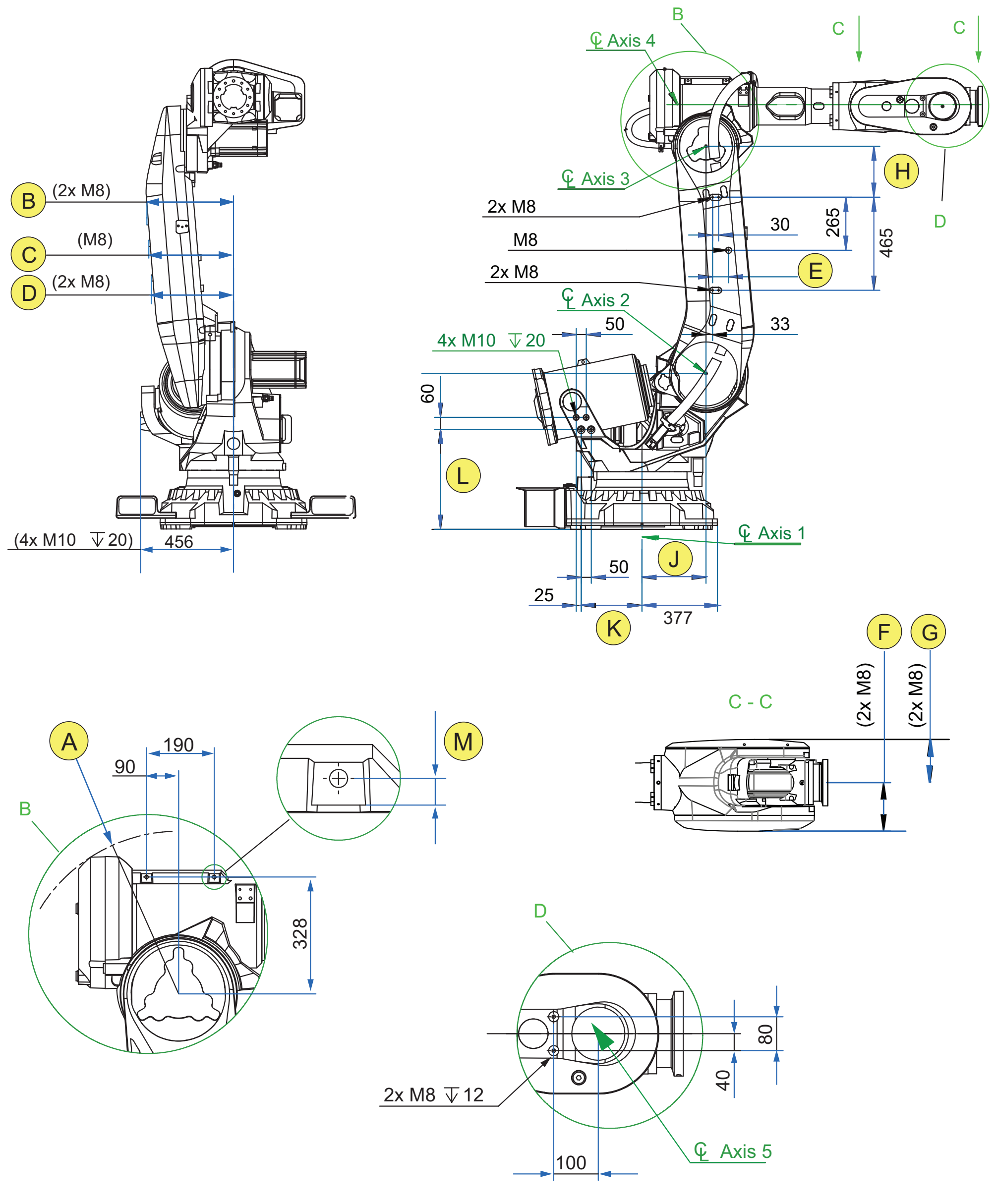
O	Attachment holes on arm house cover for extra equipment IRB 6790 - 235/2.65, IRB 6790 - 205/2.80
P	Attachment holes on arm house cover for extra equipment Not valid for IRB 6790

Variant	B[i]	C	D	E	F	G	H	J	K	L	M	N
IRB 6790 - 235/2.65	R=216	270	400	652.5	365	437	349	147	33	102	104	210
IRB 6790 - 205/2.80	R=216	270	500	652.5	365	437	349	147	33	102	104	210

i Smallest circumscribed radius axis-4.

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 6790 - 235/2.65	R=456	433	418	403	80	208.5	186	255	320	303.5	500	13.8

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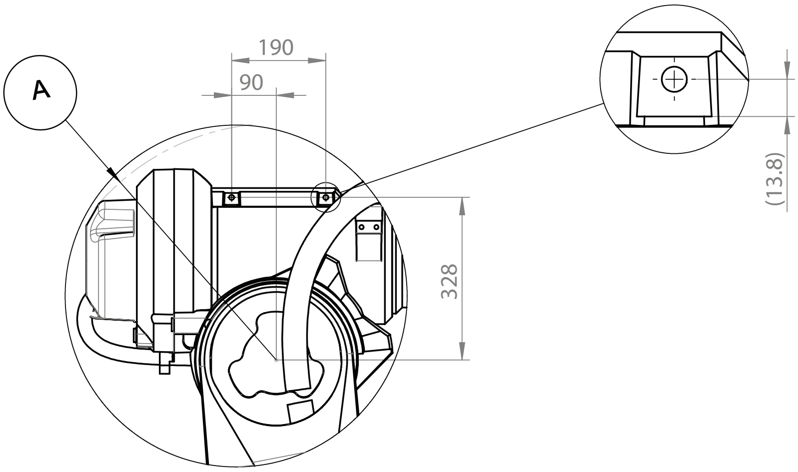
Variant	A[i]	B	C	D	E	F	G	H	J	K	L	M
IRB 6790 - 205/2.80	R=456	438	423	408	80	208.5	186	255	320	303.5	500	13.8

i Smallest circumscribed radius axis-3.

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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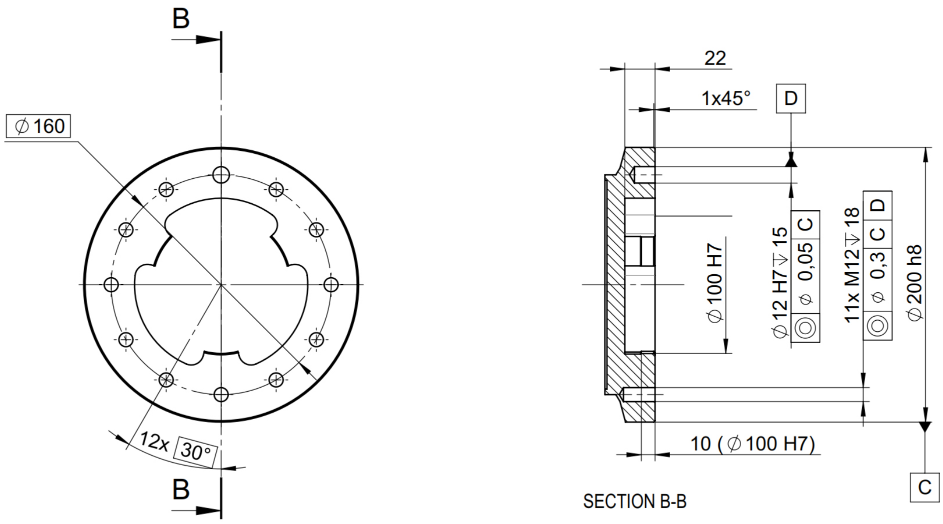
Tool flange, standard

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



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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 *Product manual - IRB 6790 Foundry Prime*.

Warranty

Harsh environments typically involve a lot of different process parameters such as specific fluids, their concentration and certain additives etc. These parameters might affect the visual appearance of selected parts on the robot or cell by means of discoloration, surface or cosmetic corrosion. These cases as well as defects caused by damages in the surface treatment during transport or improper storage that do not directly impact proper function of the robot are excluded from the standard warranty and will not be covered.

1.8 Robot motion

1.8.1 Robot motion

Type of motion

Axis	Type of motion	Range of movement - IRB 6790	Note
Axis 1	Rotation motion	±170° or ±220° (option)	
Axis 2	Arm motion	-65°/+85°	
Axis 3	Arm motion	-180°/+70°	
Axis 4	Wrist motion	±300°	
Axis 5	Bend motion	±130°	
Axis 6	Turn motion	±360°	
		±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* can be used for resetting the revolution counter after the axis has been rotated (no need for "rewinding" the axis).

Working range

Robot variant	Handling capacity (kg)	Reach (m)
IRB 6790	235	2.65

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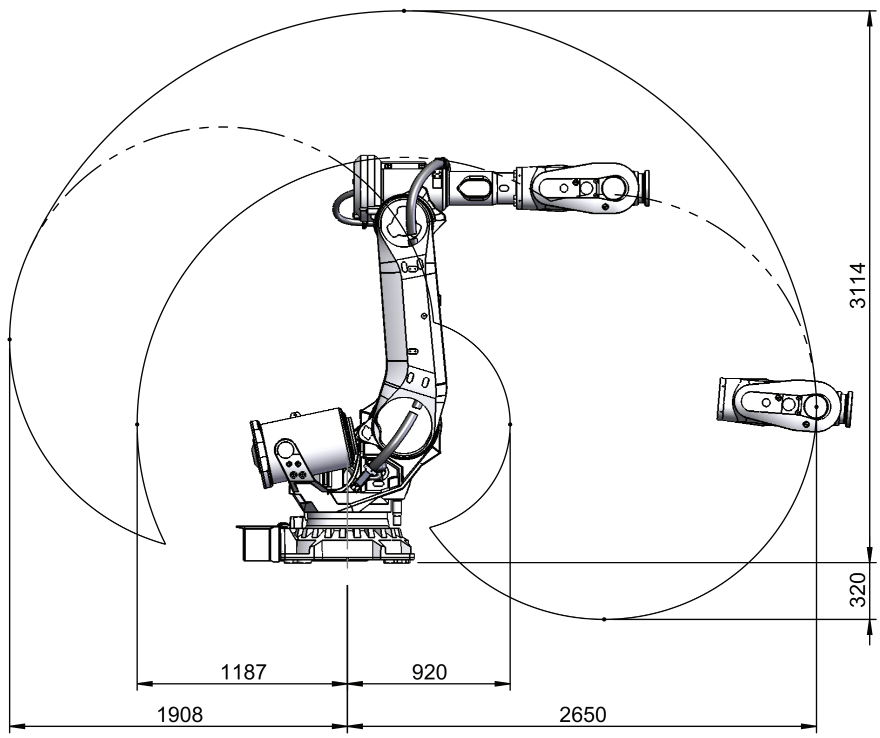

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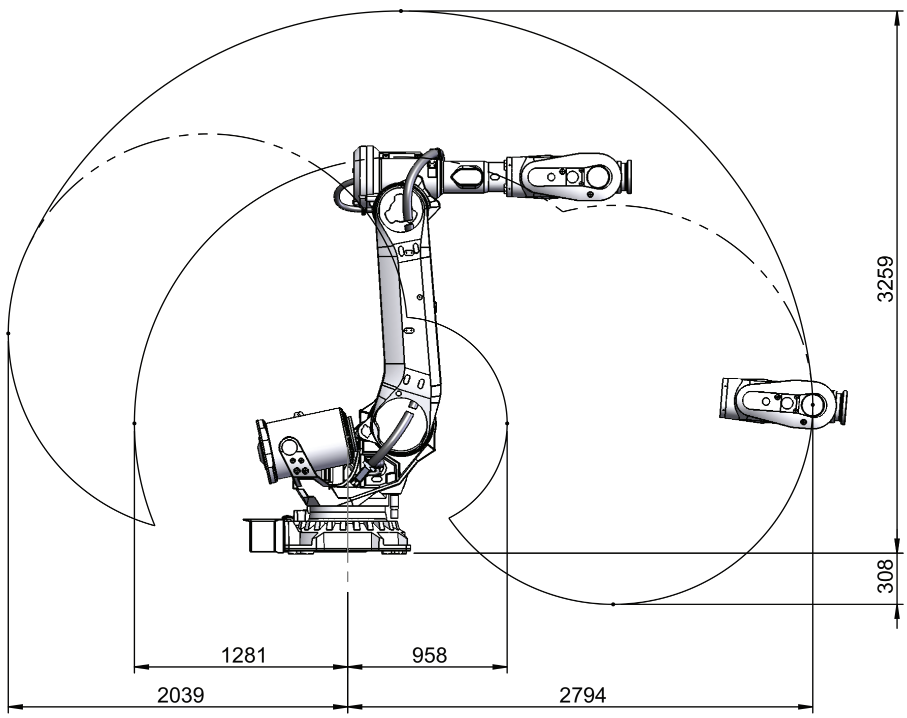
Robot variant	Handling capacity (kg)	Reach (m)
IRB 6790	205	2.80



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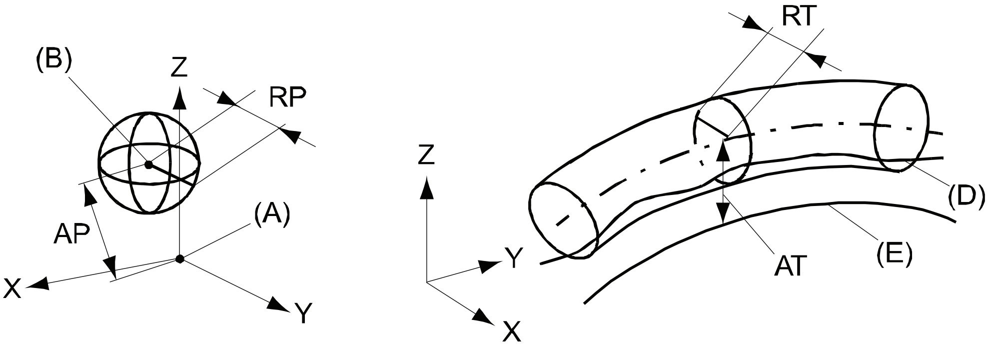
1.8.2 Performance according to ISO 9283

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 6790	235/2.65	205/2.80
Pose accuracy, AP (mm)[i]	0.03	0.06
Pose repeatability, RP (mm)	0.05	0.05
Pose stabilization time, PSt (s) within 0.5 mm of the position	0.16	0.17
Path accuracy, AT (mm)	1.7	1.5
Path repeatability, RT (mm)	0.08	0.08

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 6790-235/2.65	100 °/s	90 °/s	90 °/s	170 °/s	120 °/s	190 °/s
IRB 6790-205/2.80	100 °/s	90 °/s	90 °/s	170 °/s	120 °/s	190 °/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*).

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2 Specification of variants and options

2.1 Introduction to variants and options

General

The different variants and options for the IRB 6790 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.

2.2 Manipulator

Variants

Option	IRB Type	Handling capacity (kg)	Reach (m)
3300-71	6790	235	2.65
3300-72	6790	205	2.80

Manipulator protection

Option	Protection type	Note
3352-18	Foundry Prime 3	IP69 See *Foundry Prime on page 10* for a complete description of protection type Foundry Prime 3.

Requirement

This option requires option [3316-1] Upper arm cover.

Upper arm cover

Option	Description
3316-1	Upper arm cover

The manipulator can be equipped with additional upper arm covers for environmental conditions, where you want to further seal off the upper arm in wet or dirty conditions. These additional covers will prolong the lifetime of the cables, and simplify service/maintenance as the robot is kept more clean under the covers.

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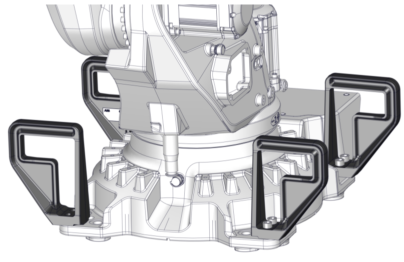
Forklift device

The manipulator can be delivered with forklift devices, allowing a forklift to be used when moving the manipulator.

Option	Description	
3318-1	Forklift device on base Forklift pockets placed on the base gives a low lifting point.	 xx2300001244

Extended working range

Option	Description	
3324-1	Axis 1 to ±220°	The option extends the working range on axis 1 from ±170° to ±220°.

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 SafeMove*.

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.

Limitations

This option is not compatible with *DressPack SW*.

Requirements

This option requires the option *SafeMove* [3043-x].

Flow sensor kit

Option	Protection type	Note
3347-1	Flow sensor kit	Used for the overpressure unit

Requirements

This option requires options [3015-1] 24V 4Amps and [3032-1] Base Dig. 16in/16out.

2.3 Floor cables

Manipulator cable length

Option	Lengths
3200-2	7 m
3200-3	15 m
3200-4	22 m
3200-5	30 m

2.4 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.
438-8	Stock warranty	Maximum 6 months postponed start of standard warranty, starting from factory shipment date. Note that no claims will be accepted for warranties that occurred before the end of stock warranty. Standard warranty commences automatically after 6 months from *Factory Shipment Date* or from activation date of standard warranty in WebConfig. **Note** Special conditions are applicable, see *Robotics Warranty Directives*.

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Index

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