ROBOTICS

# Product specification

## IRB 1300

Trace back information:
Workspace 21D version a10
Checked in 2021-12-06
Skribenta version 5.4.005

# Product specification

## IRB 1300-11/0.9
## IRB 1300-10/1.15
## IRB 1300-7/1.4

OmniCore

Document ID: 3HAC070393-001

Revision: F

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Original instructions.

# Table of contents

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# Overview of this 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 OmniCore 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

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## References

Documentation referred to in the manual, is listed in the table below.

| Document name | Document ID |
|---|---|
| *Product manual - IRB 1300* | *3HAC070390-001* |
| *Product specification - OmniCore C line* | *3HAC065034-001* |
| *Product manual - OmniCore C30* | *3HAC060860-001* |
| *Product manual - OmniCore C90XT* | *3HAC073706-001* |
| *Product manual, spare parts - IRB 1300* | *3HAC070392-001* |
| *Circuit diagram - IRB 1300* | *3HAC068887-003* |
| *Product specification - OmniCore E line* | *3HAC079823-001* |

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## Revisions

| Revision | Description |
|---|---|
| A | First edition. |
| B | Published in release 20D. The following updates are made in this revision:<br>• Restricted working range updated.<br>• Max. Armload added.<br>• Minor changes.<br>• Warranty section updated. |
| C | Published in release 21A. The following updates are made in this revision:<br>• New protection added. 3350-670 Base 67, 3351-4 Cleanroom 4 and 3352-10 Foundry Plus2 67.<br>• New option 209-2 ABB White std added.<br>• Specification of connectors R1.C3 and R2.C3 is updated.<br>• Type of R1.C3 connector, which is used for cable wiring, is added.<br>• Maximum TCP acceleration added. |
| D | Published in release 21B. The following updates are made in this revision:<br>• Performance data according to ISO 9283 updated.<br>• Modified the air hose diameter description.<br>• Text regarding fastener quality is updated.<br>• Updated the description of option 3303-1/3303-2.<br>• Added a note to remind users that mechanical stop locations cannot be adjusted. See *Adjusting the working range on page 52*.<br>• Absolute Accuracy calibration production data added.<br>• Removed Axis resolution.<br>• Added a note in manipulator protection chapter. |
| E | Published in release 21C. The following updates are done in this revision:<br>• Updated the tool flange standard figure for IP40, IP67 and Clean Room robots.<br>• Supported controller OmniCore E10 is added.<br>• Updated data for maximum axis speed. |
| F | Published in release 21D. The following updates are done in this revision:<br>• Add information that Clean room option is available for IP54 protection class. |

# 1 Description

## 1.1 Structure

### 1.1.1 Introduction

**General**

The IRB 1300 is one of ABB Robotics latest generation of 6-axis industrial robot, with a payload of 7 kg, 10 kg and 11 kg designed specifically for manufacturing industries that use flexible robot-based automation, e.g. 3C industry. The robot has an open structure that is especially adapted for flexible use, and can communicate extensively with external systems.

**Clean room classification**


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Particle emission from the robot (IRB 1300 including gripper and suction cup) fulfill Clean room class 4 standard according to DIN EN ISO 14644-1, -14.

According to IPA test result, the robot IRB 1300 is suitable for use in clean room environments.

The manipulator is suitable for IP54 protection class according to standard IEC 60529 when customer choose clean room as an option.

IRB 1300 in Clean Room protection type is also suitable for working in requiring protection class IP54, as the robot is IP54 compliant according to standard IEC 60529.

Classification of airborne molecular contamination, see below:

| Test environment parameters | | | | |
|---|---|---|---|---|
| Cleanroom Air Cleanliness Class (According to ISO 14644-1) | Airflow velocity | Airflow pattern | Temperature | Relative humidity |
| ISO 1 | 0.45 m/s | vertical laminar flow | 22°C ± 0.5°C | 45% ± 0.5% |

| Test procedure parameters | | |
|---|---|---|
| Capacity | Attached payload | Operation of each axis |
| 50% and 100% | 7 kg | separately |

Test result/Classification:

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When operated under the specified test conditions, the IRB 1300 including gripper and suction cup is suitable for use in cleanrooms fulfilling the specifications of the following Air Cleanliness Classes according to ISO 14644-1.

| Test parameter(s) | Air Cleanliness Class |
|---|---|
| Capacity=50% | 2 |
| Capacity=100% | 4 |
| Overall result | 4 |

**Protection type Foundry Plus 2**

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

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

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
- Additional stainless steel flange as extra protection
- 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

*Continues on next page*

required to maintain the protection, for example can rust preventive be washed off with wrong cleaning method.

Available robot versions

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

See *Specification of variants and options on page 63* for robot versions and other options not selectable together with Foundry Plus 2.

**IP67 protection**

The robot has IP67 as an option. The option will add sealing, machining parts and gasket.

**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 C30/C90/E10 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 *Operating manual - OmniCore*.

**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 communication features - network communication - and advanced functions such as multitasking, sensor control etc. For a complete description on optional software, see the *Product specification - OmniCore C line* and *Product specification - OmniCore E line*.

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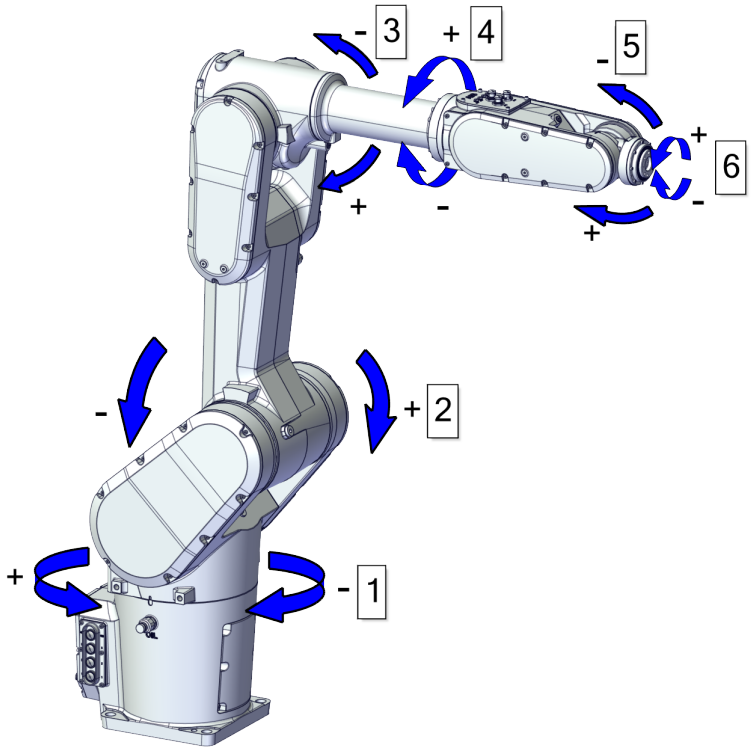
1.1.1 Introduction
*Continued*

**Robot axes**

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| Pos | Description | Pos | Description |
|---|---|---|---|
| 1 | Axis 1 | 2 | Axis 2 |
| 3 | Axis 3 | 4 | Axis 4 |
| 5 | Axis 5 | 6 | Axis 6 |

## 1.1.2 Different robot versions

### General

The IRB 1300 is available in three versions.

### Robot types

The following robot versions are available.

| Robot type | Handling capacity (kg) | Reach (m) |
|---|---|---|
| IRB 1300-11/0.9 | 11 kg | 0.9 m |
| IRB 1300-10/1.15 | 10 kg | 1.15 m |
| IRB 1300-7/1.4 | 7 kg | 1.4 m |

## 1.1.3 Definition of version designations

### 1.1.3.1 Technical data

**Weight, robot**

The table shows the weight of the robot.

| Robot model | Nominal weight |
|---|---|
| IRB 1300 | IRB 1300-11/0.9: 74.5 kg<br>IRB 1300-10/1.15: 77 kg<br>IRB 1300-7/1.4: 78.5 kg |

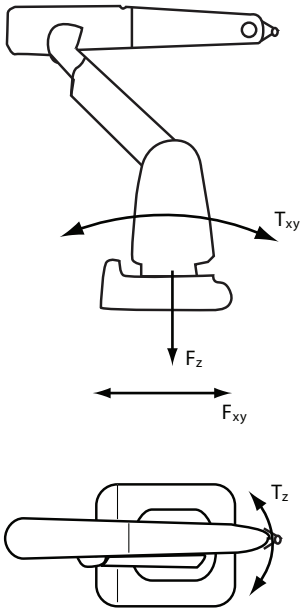
**Note**

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

**Loads on foundation, robot**

The illustration shows the directions of the robots stress forces.

The directions are valid for all floor mounted, suspended and wall mounted 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 |

*Continues on next page*

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) | Maximum load (emergency stop) |
|---|---|---|
| Force xy | ±821 N | ±2186 N |
| Force z | 428 N±1000 N | 1547 N±1000 N |
| Torque xy | ±814 Nm | ±2392 Nm |
| Torque z | ±236 Nm | ±583 Nm |

Wall mounted

| Force | Endurance load (in operation) | Max. load (emergency stop) |
|---|---|---|
| Force xy | ±1478 N | ±2860 N |
| Force z | ±288 N | ±963 N |
| Torque xy | ±1068 Nm | ±2741 Nm |
| Torque z | ±352 Nm | ±863 Nm |

Suspended

| Force | Endurance load (in operation) | Max. load (emergency stop) |
|---|---|---|
| Force xy | ±821 N | ±2186 N |
| Force z | 428 N±1000 N | 1547 N±1000 N |
| Torque xy | ±814 Nm | ±2392 Nm |
| Torque z | ±236 Nm | ±583 Nm |

Tilted

| Force | Endurance load (in operation) | Max. load (emergency stop) |
|---|---|---|
| Force xy | | |
| Force z | | |
| Torque xy | | |
| Torque z | | |

**Note**

Values valid for maximum tilted robot.

*Continues on next page*

1.1.3.1 Technical data
*Continued*

### 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 | 0.1/500 mm | Flat foundations give better repeatability of the resolver calibration compared to original settings on delivery from ABB.<br>The value for levelness aims at the circumstance of the anchoring points in the robot base.<br>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. |
| Maximum tilt | 5° | The limit for the maximum payload on the robot is reduced if the robot is tilted from 0°.<br>Contact ABB for further information about acceptable loads. |
| Minimum resonance frequency | 22 Hz<br>**Note**<br>It may affect the manipulator lifetime to have a lower resonance frequency than recommended. | The value is recommended for optimal performance.<br>Due to foundation stiffness, consider robot mass including equipment. [i]<br>For information about compensating for foundation flexibility, see *Application manual - Controller software OmniCore*, 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 | 95% 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) |

*Continues on next page*

| Parameter | Value |
|---|---|
| Maximum ambient temperature | +45°C (113°F) |
| Maximum ambient humidity | 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 | IP40<br>IP67 (option 3350-670) |
| Manipulator, protection type Foundry Plus 2 | IP67 |
| Manipulator, protection type Clean Room | ISO 4, IP54 |

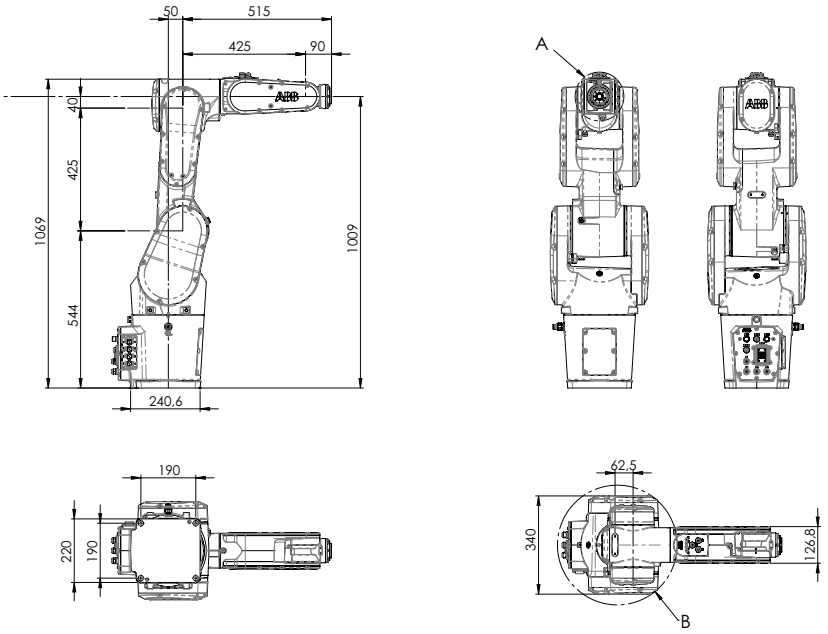
i According to IEC 60529.

### Environmental information

The product complies with IEC 63000. *Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances*.

## 1.1.3.2 Dimensions

### Main dimensions of IRB 1300-11/0.9

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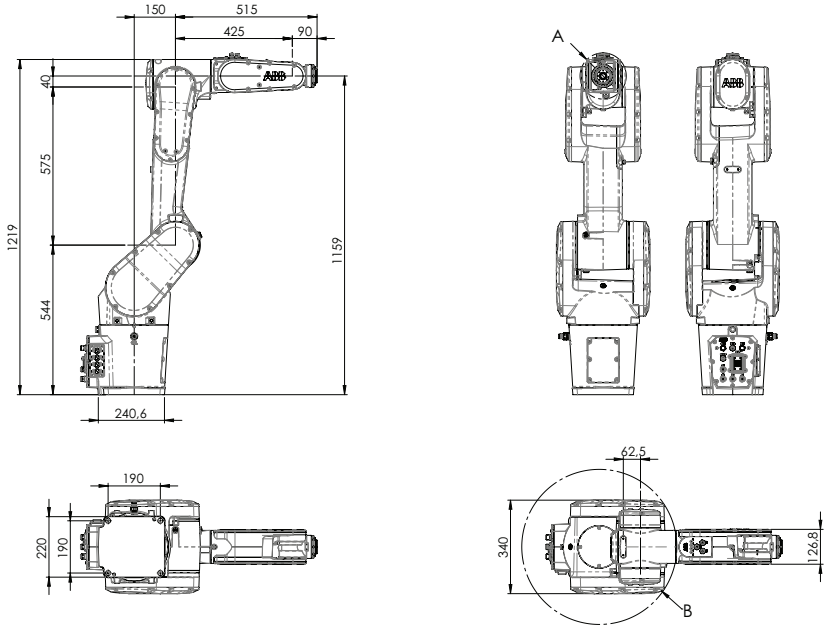
| Pos | Description |
|---|---|
| A | Turning radius: R84 |
| B | Turning radius: R207 |

### Main dimensions of IRB 1300-10/1.15

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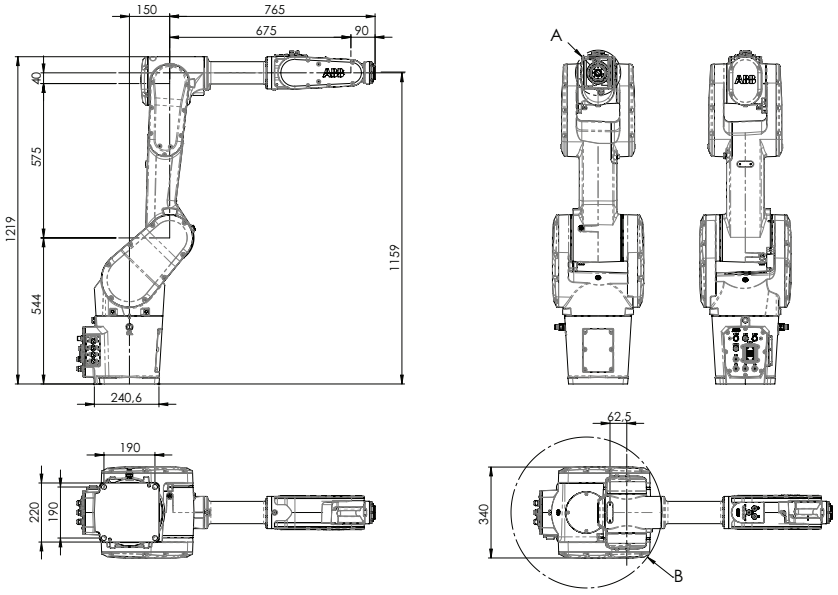
| Pos | Description |
|---|---|
| A | Turning radius: R84 |
| B | Turning radius: R282 |

### Main dimensions of IRB 1300-7/1.4

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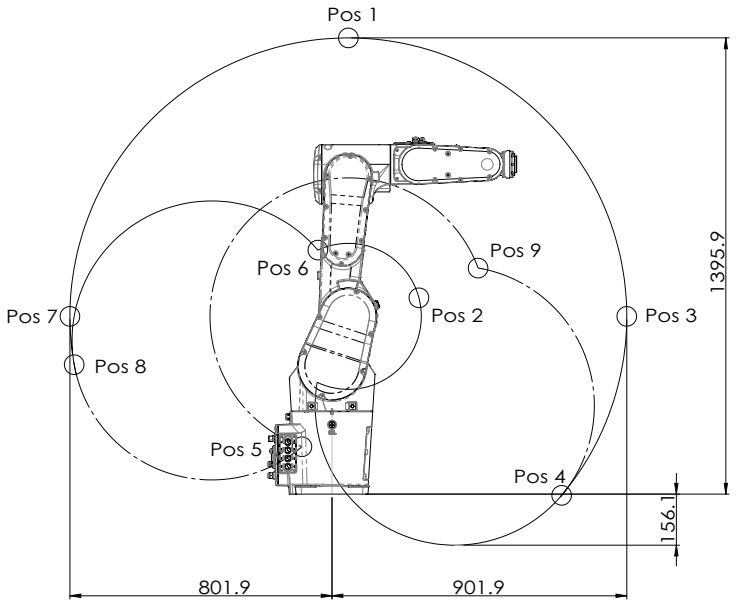
| Pos | Description |
|---|---|
| A | Turning radius: R84 |
| B | Turning radius: R282 |

## 1.1.3.3 Working range

**Illustration, working range IRB 1300-11/0.9**

This illustration shows the unrestricted working range of the robot.

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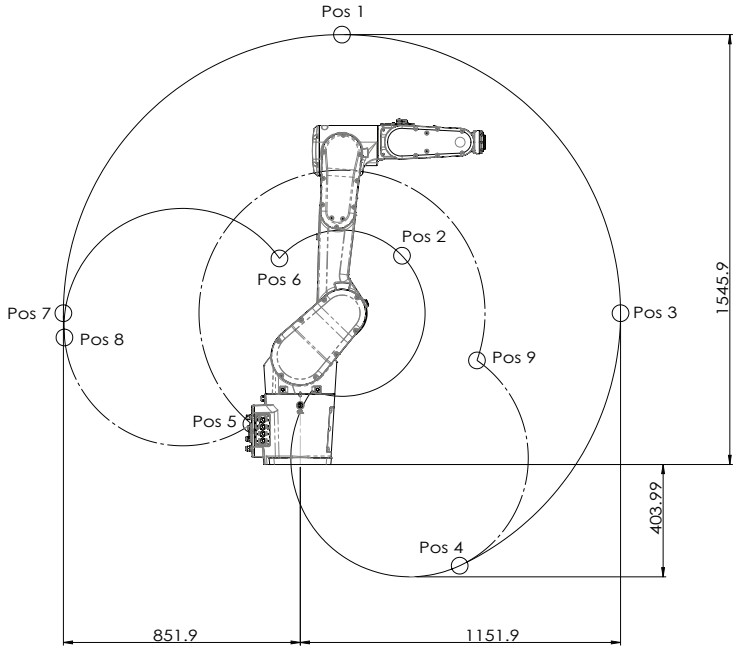
Positions at wrist center and angle of axes 2 and 3

| Position in the figure | Positions at wrist center (mm) | | Angle (degrees) | |
|---|---|---|---|---|
| | X | Z | axis 2 | axis 3 |
| pos0 | 475 | 1009 | 0° | 0° |
| pos1 | 50 | 1,395.9 | 0° | -84.6° |
| pos2 | 265.9 | 600.7 | 0° | 65° |
| pos3 | 901.9 | 544 | 90° | -84.6° |
| pos4 | 702.6 | -3.6 | 130° | -84.6° |
| pos5 | -64.7 | 170.3 | -100° | -210° |
| pos6 | -43.3 | 746.7 | -100° | 65° |
| pos7 | -801.9 | 544 | -90° | -84.6° |
| pos8 | -788.9 | 396.1 | -100° | -84.6° |
| pos9 | 410 | 696.3 | 130° | -210° |

*Continues on next page*

**Illustration, working range IRB 1300-10/1.15**

This illustration shows the unrestricted working range of the robot.

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Positions at wrist center and angle of axes 2 and 3

| Position in the figure | Positions at wrist center (mm) | | Angle (degrees) | |
|---|---|---|---|---|
| | X | Z | axis 2 | axis 3 |
| pos0 | 575 | 1159 | 0° | 0° |
| pos1 | 150 | 1,545.9 | 0° | -84.6° |
| pos2 | 365.9 | 750.7 | 0° | 65° |
| pos3 | 1,151.9 | 544 | 90° | -84.6° |
| pos4 | 573.4 | -364 | 155° | -84.6° |
| pos5 | -146.3 | 168.7 | -95° | -210° |
| pos6 | -74.8 | 741 | -95° | 65° |
| pos7 | -851.9 | 544 | -90° | -84.6° |
| pos8 | -848.1 | 456.9 | -95° | -84.6° |
| pos9 | 604 | 394 | 155° | -210° |

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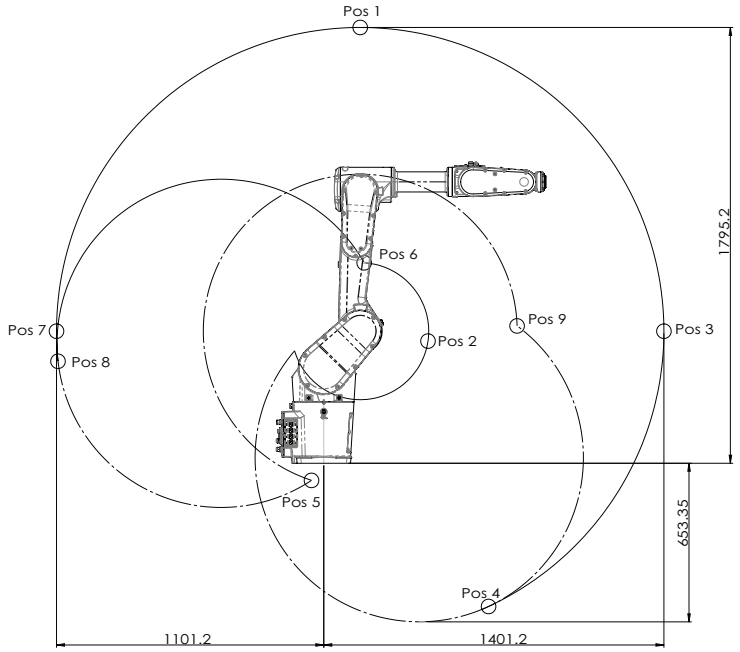
1.1.3.3 Working range
*Continued*

**Illustration, working range IRB 1300-7/1.4**

This illustration shows the unrestricted working range of the robot.

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Positions at wrist center and angle of axes 2 and 3

| Position in the figure | Positions at wrist center (mm) | | Angle (degrees) | |
|---|---|---|---|---|
| | X | Z | axis 2 | axis 3 |
| pos0 | 825 | 1159 | 0° | 0° |
| pos1 | 150 | 1,795.2 | 0° | -86.6° |
| pos2 | 429.2 | 503.2 | 0° | 69° |
| pos3 | 1,401.2 | 544 | 90° | -86.6° |
| pos4 | 678.8 | -590 | 155° | -86.6° |
| pos5 | -2.9 | -36.1 | -95° | -210° |
| pos6 | 166.3 | 825.7 | -95° | 69° |
| pos7 | -1,101.2 | 544 | -90° | -86.6° |
| pos8 | -1,096.4 | 435 | -95° | -86.6° |
| pos9 | 747.4 | 598.7 | 155° | -210° |

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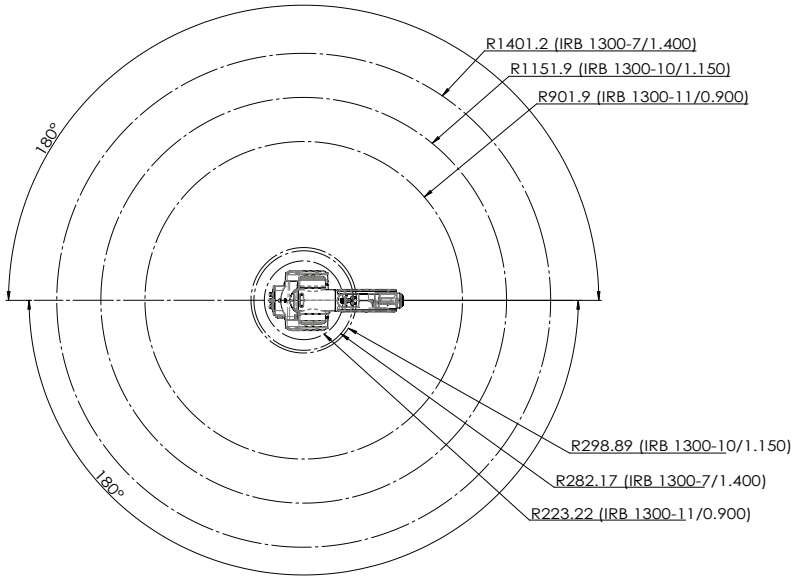
### Top view of working range

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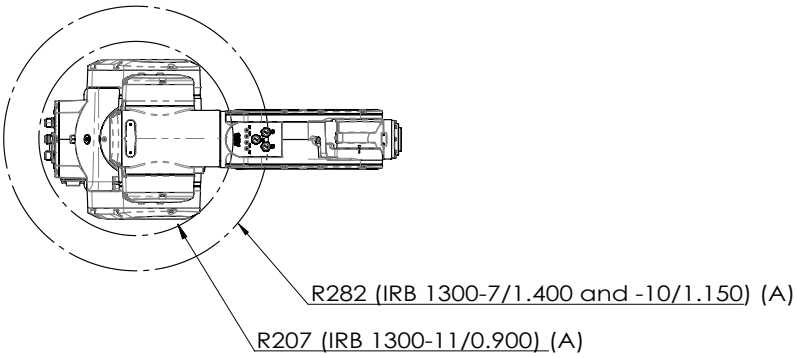


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### Working range

| Axis | Working range | Note |
|---|---|---|
| Axis 1 | ±180° | Wall mounted robot has a work area for axis 1 that depends on payload and the positions of other axes. Simulation in RobotStudio is recommended. |
| Axis 2 | **IRB 1300-10/1.15 and IRB 1300-7/1.4**<br>-95°/+155°<br>**IRB 1300-11/0.9**<br>-100°/+130° | |
| Axis 3 | **IRB 1300-7/1.4**<br>-210°/+69°<br>**IRB 1300-10/1.15 and IRB 1300-11/0.9**<br>-210°/+65° | |

*Continues on next page*

### 1.1.3.3 Working range
*Continued*

| Axis | Working range | Note |
|---|---|---|
| Axis 4 | ±230° | |
| Axis 5 | ±130° | |
| Axis 6 | ±400° | Default value. |
| | ±242 | Maximum revolution value.<br>The default working range for axis 6 can be extended by changing parameter values in the software. |

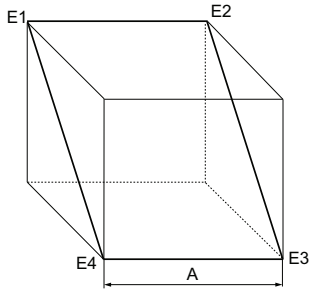
## Other technical data

| Data | Description | Note |
|---|---|---|
| Airborne noise level | The sound pressure level outside the working space. | < 70 dB(A) Leq (acc. to machinery directive 2006/42/EC) |

## Power consumption at max load

| Type of movement | 11/0.9 | 10/1.15 | 7/1.4 |
|---|---|---|---|
| ISO Cube<br>Max. velocity (W) | 494 | 442 | 343 |

| Robot in calibration position | 11/0.9 | 10/1.15 | 7/1.4 |
|---|---|---|---|
| Brakes engaged (W) | 92 | 69 | 63 |
| Brakes disengaged (W) | 219 | 191 | 207 |




xx1000000101

| Pos | Description |
|---|---|
| A | 400 mm |

## 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 | 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 |

**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 434-03 | Industrial robots and robot Systems - General safety requirements |

## 1.3 Installation

### 1.3.1 Introduction to installation

**General**

IRB 1300 is available in three variants and all variants can be floor mounted, inverted/suspended, wall mounted, or tilted mounted (any angle).

Depending on the robot variant, an end effector with max. weight of 7 kg, 10 kg and 11 kg including payload, can be mounted on the tool flange (axis 6). See *Load diagrams on page 35*.

**Extra loads**

The upper arm can handle an additional load of 0.5 kg (1 kg for reach 0.9m).

**Working range limitation**

The working range of axes 1 can be limited by mechanical stops as option. See *Working range on page 23*.

## 1.3.2 Operating requirements

### Protection standard

| Robot variant | Protection standard IEC529 |
|---|---|
| All variants, manipulator | IP40 |
| Option, all variants | IP67 |

### Explosive environments

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

### Working range limitations

EPS will not be selectable. No mechanical limitation.

### Ambient temperature

| Description | Protection class | Temperature |
|---|---|---|
| Manipulator during operation | Standard | + 5°C [i] (41°F) to + 45°C (113°F) |
| For the controller | Standard/Option | See *Product specification - OmniCore C line* |
| Complete robot during transportation and storage | Standard | - 25°C (-13°F) to + 55°C (131°F) |
| For short periods (not exceeding 24 hours) | Standard | up to + 70°C (158°F) |

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

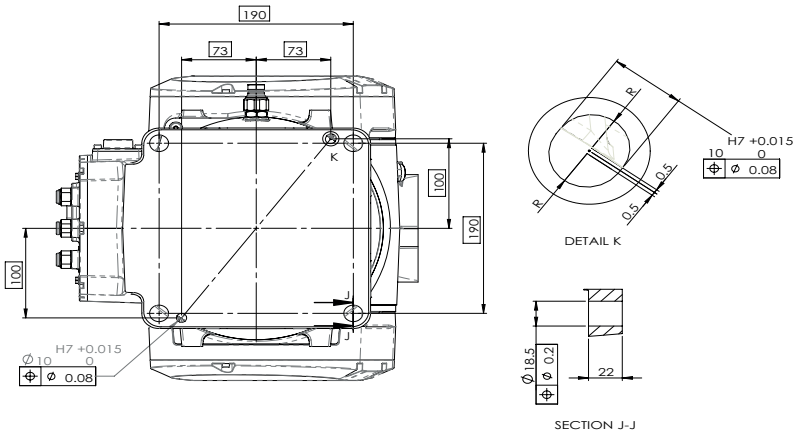
### Relative humidity

| Description | Relative humidity |
|---|---|
| Complete robot during operation, transportation and storage | Max. 95% at constant temperature |

## 1.3.3 Mounting the manipulator

### Hole configuration, base

This illustration shows the hole configuration used when securing the robot.

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### Attachment screws

The table below specifies the type of securing screws and washers to be used for securing the robot to the base plate/foundation.

| | |
|---|---|
| Suitable screws | M16x50 |
| Quantity | 4 pcs |
| Quality | 8.8 |
| Suitable washer | 17 x 30 x 3, steel hardness class 200HV |
| Guide pins | 2 pcs, D10x30, ISO 2338 - 10m6x30 - A1 |
| Tightening torque | 150 Nm±15 Nm |
| Level surface requirements | 0.1/500 mm |

## 1.4 Calibration and references

### 1.4.1 Calibration methods

**Overview**

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

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

More information is available in the product manual.

**Types of calibration**

| Type of calibration | Description | Calibration method |
|---|---|---|
| Standard calibration | The calibrated robot is positioned at calibration position.<br>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:<br>• Mechanical tolerances in the robot structure<br>• Deflection due to load<br>Absolute accuracy calibration focuses on positioning accuracy in the Cartesian coordinate system for the robot.<br>Absolute accuracy calibration data is found on the SMB (serial measurement board) in the robot.<br>A robot calibrated with Absolute accuracy has the option information printed on its name plate.<br>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 1300. 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.

*Continues on next page*

1.4.1 Calibration methods
*Continued*

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.

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*.

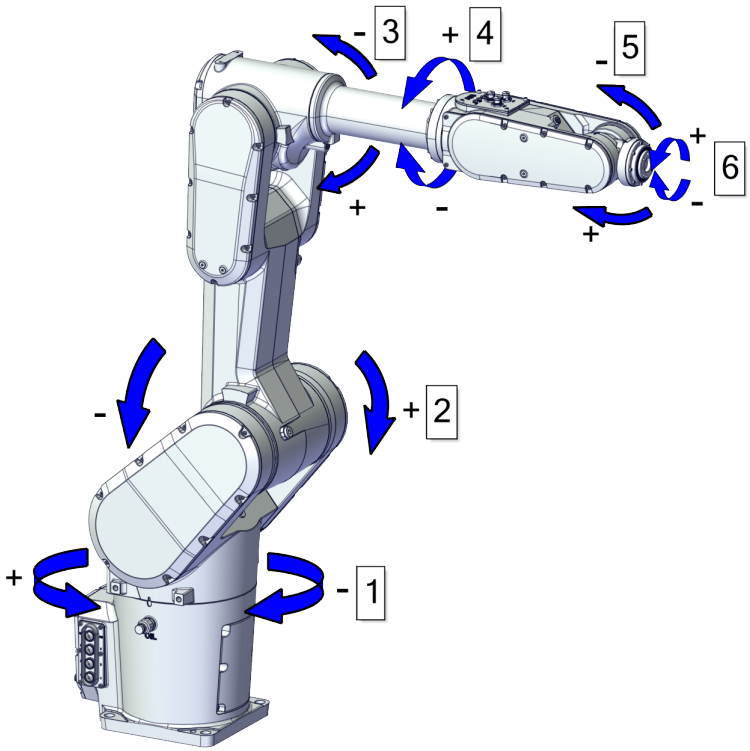
If a service operation is done to a robot with the option Absolute Accuracy, a new absolute accuracy calibration is required in order to establish full performance. For most cases after replacements that do not include taking apart the robot structure, standard calibration is sufficient.

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 |
|---|---|---|---|
| 1 | Axis 1 | 2 | Axis 2 |
| 3 | Axis 3 | 4 | Axis 4 |
| 5 | Axis 5 | 6 | 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.

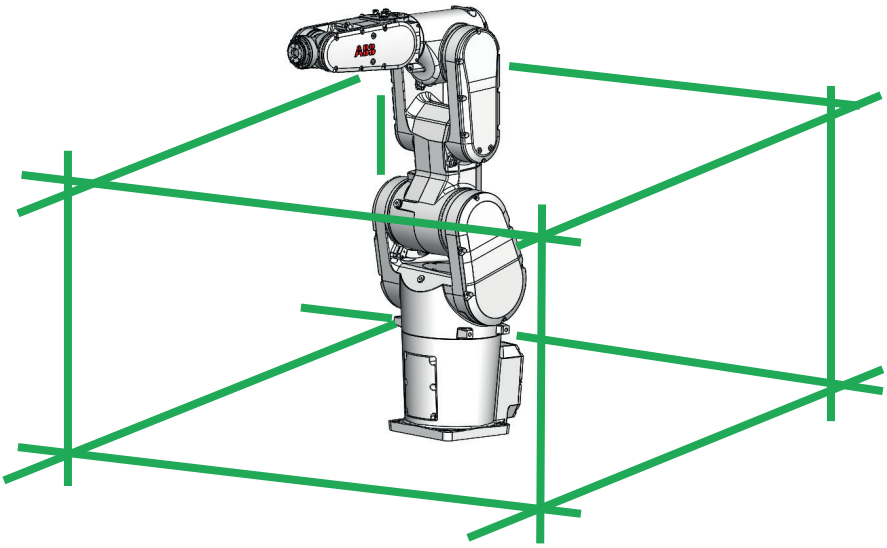
Here are some examples of when this accuracy is important:

- 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.



### What is included

Every *Absolute Accuracy* robot is delivered with:

- compensation parameters saved on the robot's serial measurement board
- a birth certificate representing the *Absolute Accuracy* measurement protocol for the calibration and verification sequence.

*Continues on next page*

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. Compensation parameters saved in the robot's serial measurement board differ depending on which Absolute Accuracy option is selected.

### When is *Absolute Accuracy* being used

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

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

#### 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 1300-11/0.9 | 0.15 | 0.30 | 100 |
| IRB 1300-10/1.15 | 0.15 | 0.35 | 100 |

*Continues on next page*

### 1.4.3 Absolute Accuracy calibration

*Continued*

| Robot | Positioning accuracy (mm) | | |
|---|---|---|---|
| | Average | Max | % Within 1 mm |
| IRB 1300-7/1.4 | 0.20 | 0.40 | 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 0.012 kgm$^2$, and an extra load of 0.5 kg (1 kg for reach 0.9m) 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.

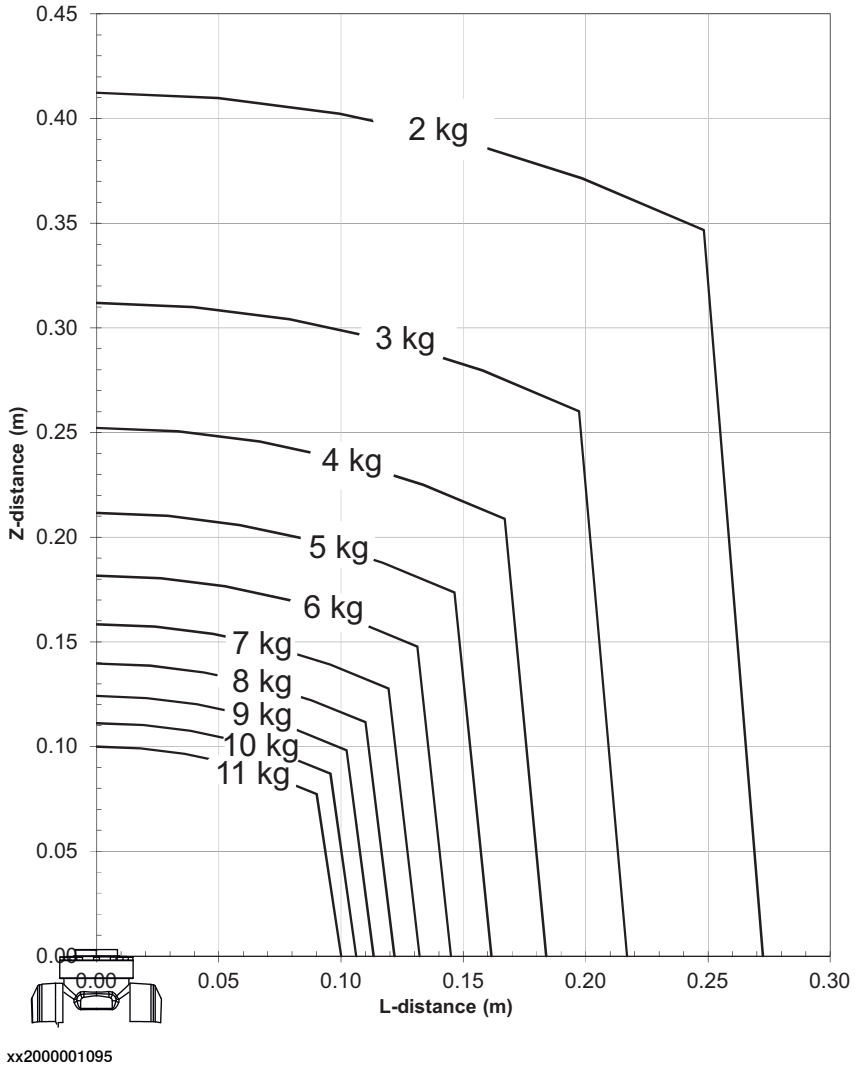
**Control of load case with RobotLoad**

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 1300-11/0.9**

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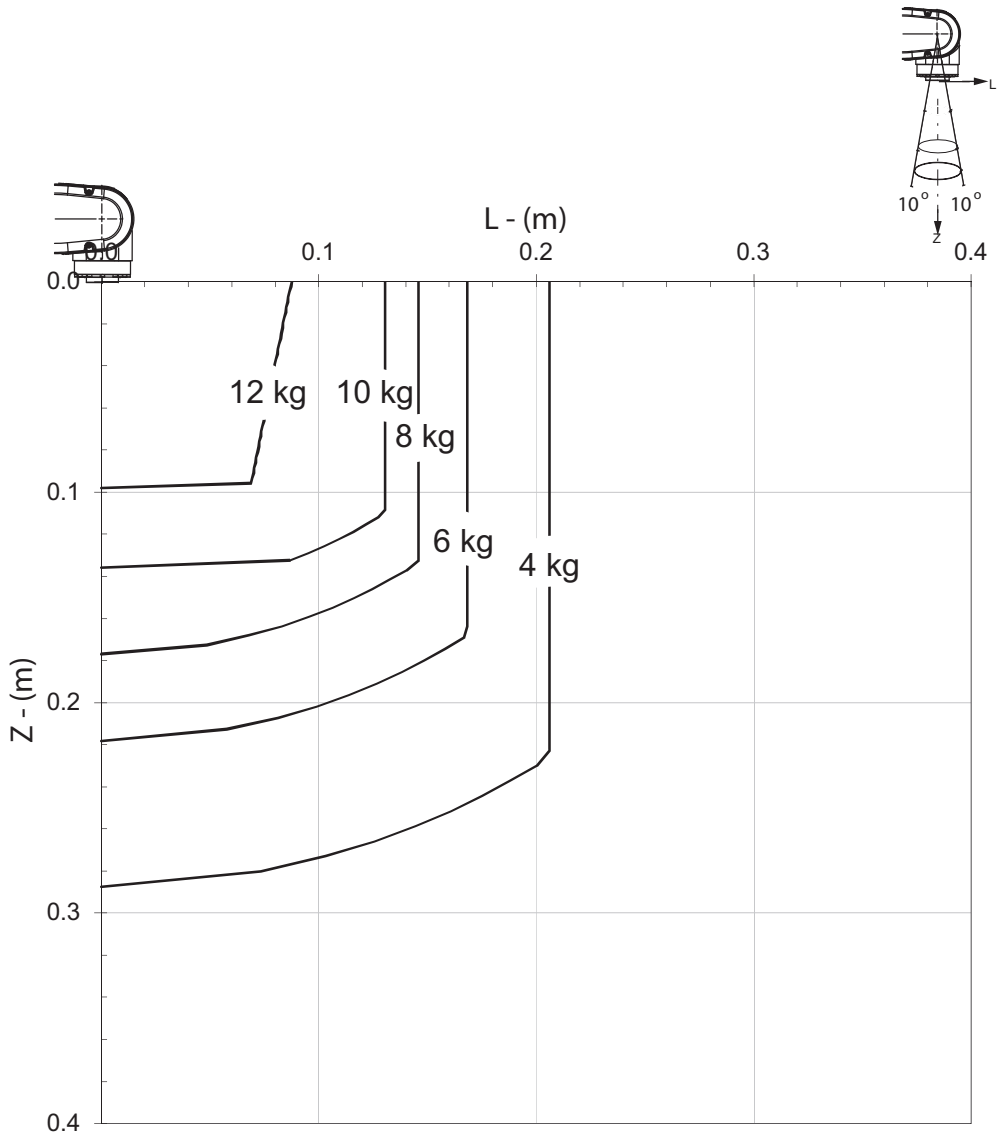
**IRB 1300-11/0.9 "Vertical Wrist" (±10°)**

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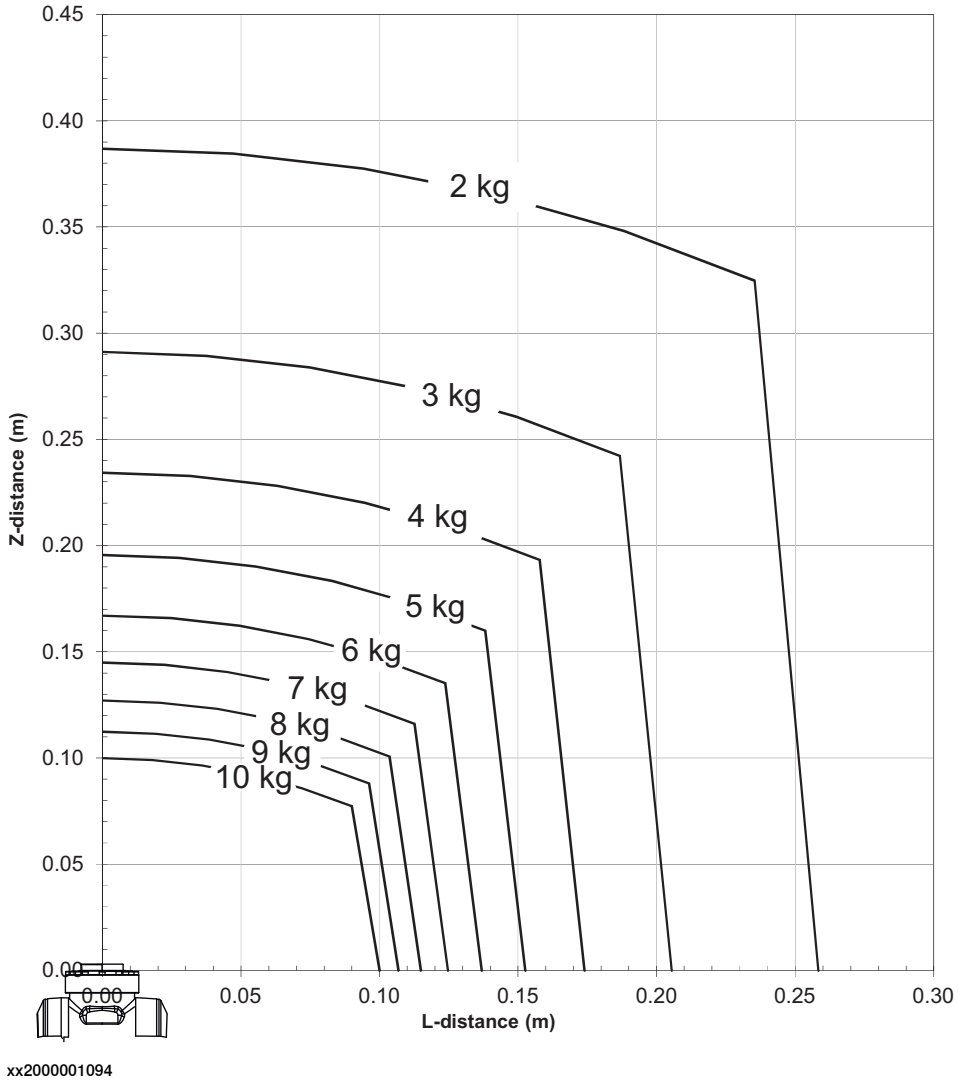
For wrist down (0° deviation from the vertical line).

| | Description |
|---|---|
| Max load | 12 kg |
| $Z_{max}$ | 0.098 m |
| $L_{max}$ | 0.088 m |

*Continues on next page*

1.5.2 Diagrams
*Continued*

**IRB 1300-10/1.15**

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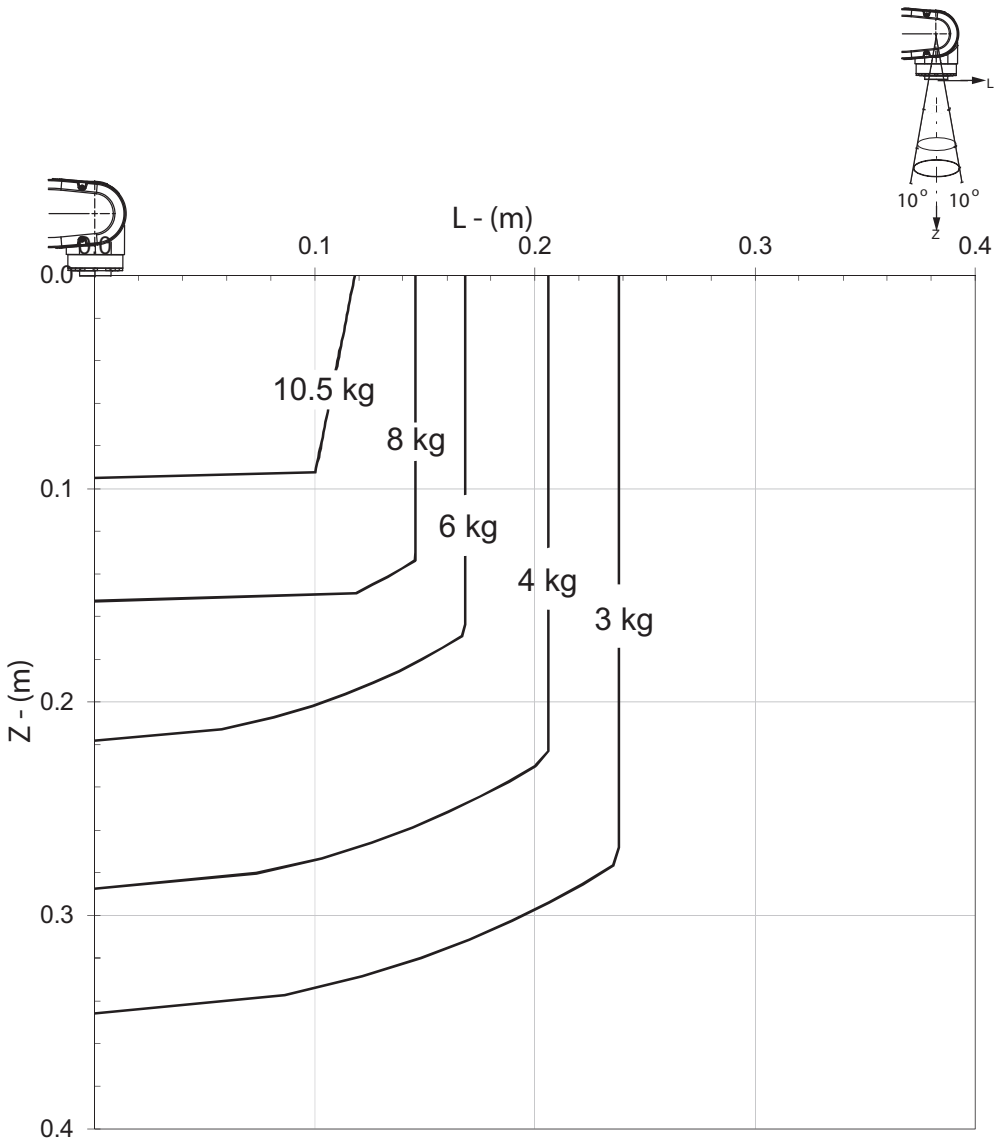
**IRB 1300-10/1.15 "Vertical Wrist" (±10°)**




xx2000001101

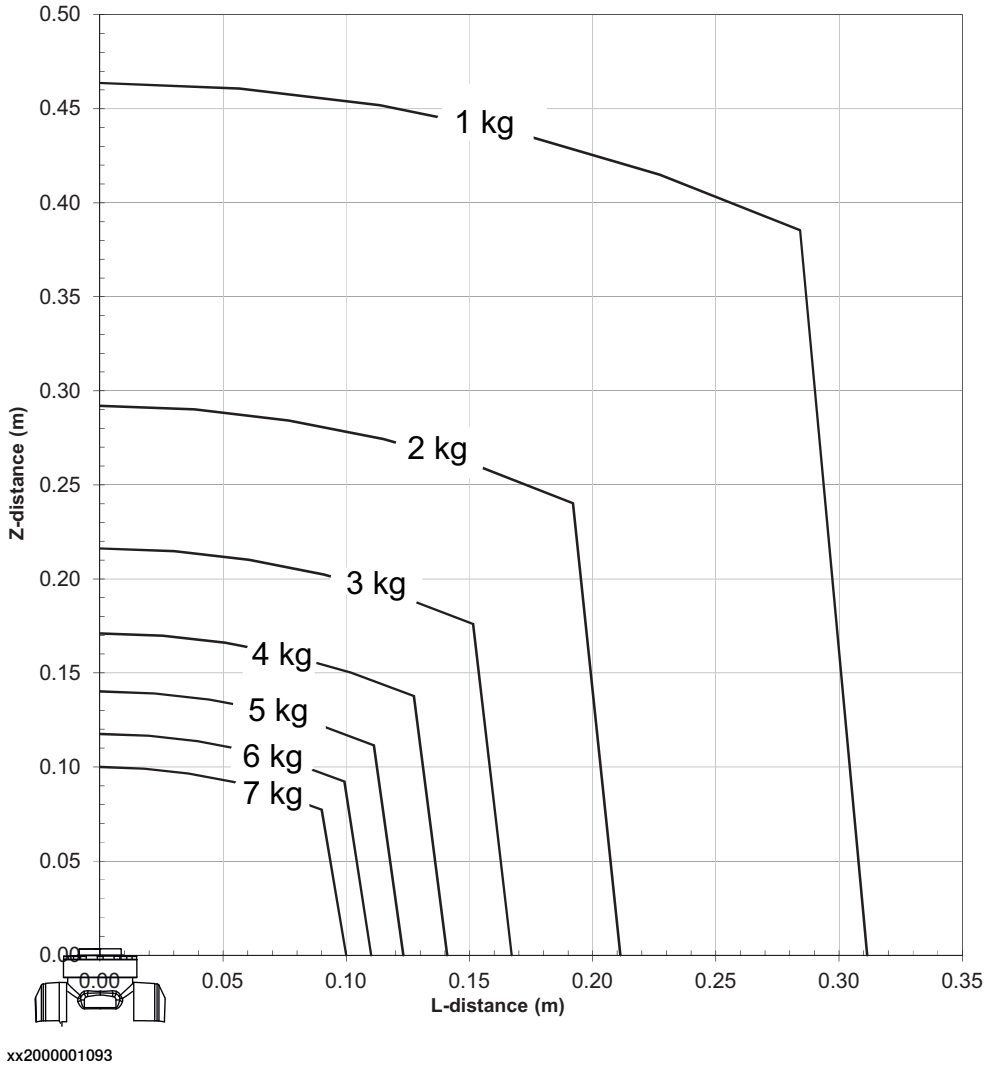
For wrist down (0° deviation from the vertical line).

| | Description |
|---|---|
| Max load | 10.5 kg |
| $Z_{max}$ | 0.095 m |
| $L_{max}$ | 0.118 m |

*Continues on next page*

1.5.2 Diagrams
*Continued*

**IRB 1300-7/1.4**

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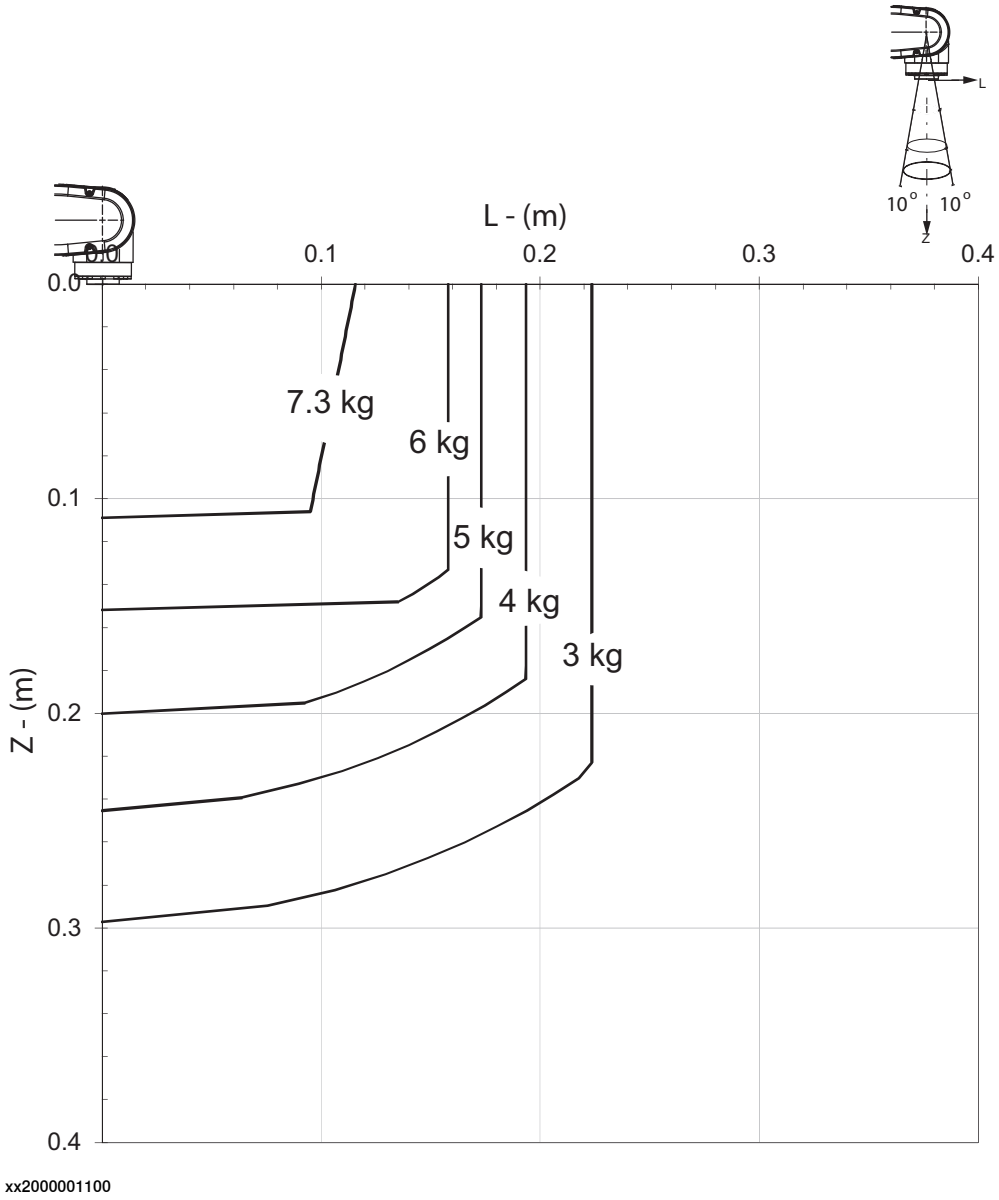
**IRB 1300-7/1.4 "Vertical Wrist" (±10°)**




xx2000001100

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

| | Description |
|---|---|
| Max load | 7.3 kg |
| $Z_{max}$ | 0.109 m |
| $L_{max}$ | 0.116 m |

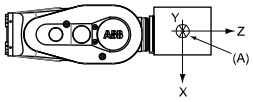
## 1.5.3 Maximum load and moment of inertia for full and limited axis 5 (center line down) movement

**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 (-125°/+120°)**

| Axis | Robot type | Maximum moment of inertia |
|---|---|---|
| 5 | IRB 1300-11/0.9<br>IRB 1300-10/1.15 | $Ja_5$ = Load x ((Z + 0.09)$^2$ + $L^2$) + max ($J_{0x}$, $J_{0y}$) ≤ 0.6 $kgm^2$ |
| 5 | IRB 1300-7/1.4 | $Ja_5$ = Load x ((Z + 0.09)$^2$ + $L^2$) + max ($J_{0x}$, $J_{0y}$) ≤ 0.5 $kgm^2$ |
| 6 | IRB 1300-11/0.9<br>IRB 1300-10/1.15<br>IRB 1300-7/1.4 | $Ja_6$ = Load x $L^2$ + $J_{0Z}$ ≤ 0.2 $kgm^2$ |

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| Pos | Description |
|---|---|
| A | Center of gravity |

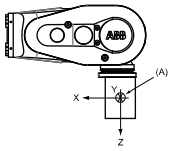
| | Description |
|---|---|
| $J_{ox}$, $J_{oy}$, $J_{oz}$ | Max. moment of inertia around the X, Y and Z axes at center of gravity. |

*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 1300-11/0.9<br>IRB 1300-10/1.15 | $Ja_5$ = Load x $((Z + 0.09)^2 + L^2)$ + max $(J_{0x}, J_{0y}) \leq 0.6$ kgm$^2$ |
| 5 | IRB 1300-7/1.4 | $Ja_5$ = Load x $((Z + 0.09)^2 + L^2)$ + max $(J_{0x}, J_{0y}) \leq 0.5$ kgm$^2$ |
| 6 | IRB 1300-11/0.9<br>IRB 1300-10/1.15<br>IRB 1300-7/1.4 | $Ja_6$ = Load x $L^2 + J_{0Z} \leq 0.2$ kgm$^2$ |




xx1400002029

| 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 1300-11/0.9 | 20.45 Nm | 10.8 Nm | 11 kg |
| IRB 1300-10/1.15 | 18.59 Nm | 9.8 Nm | 10 kg |
| IRB 1300-7/1.4 | 13 Nm | 6.9 Nm | 7 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 then to use RobotStudio.

### Maximum Cartesian design acceleration for nominal loads

| Robot type | E-stop<br>Max acceleration at nominal load COG [m/s$^2$] | Controlled Motion<br>Max acceleration at nominal load COG [m/s$^2$] |
|---|---|---|
| IRB 1300-11/0.9 | 75 | 49.5 |
| IRB 1300-10/1.15 | 68 | 50 |
| IRB 1300-7/1.4 | 82 | 66 |

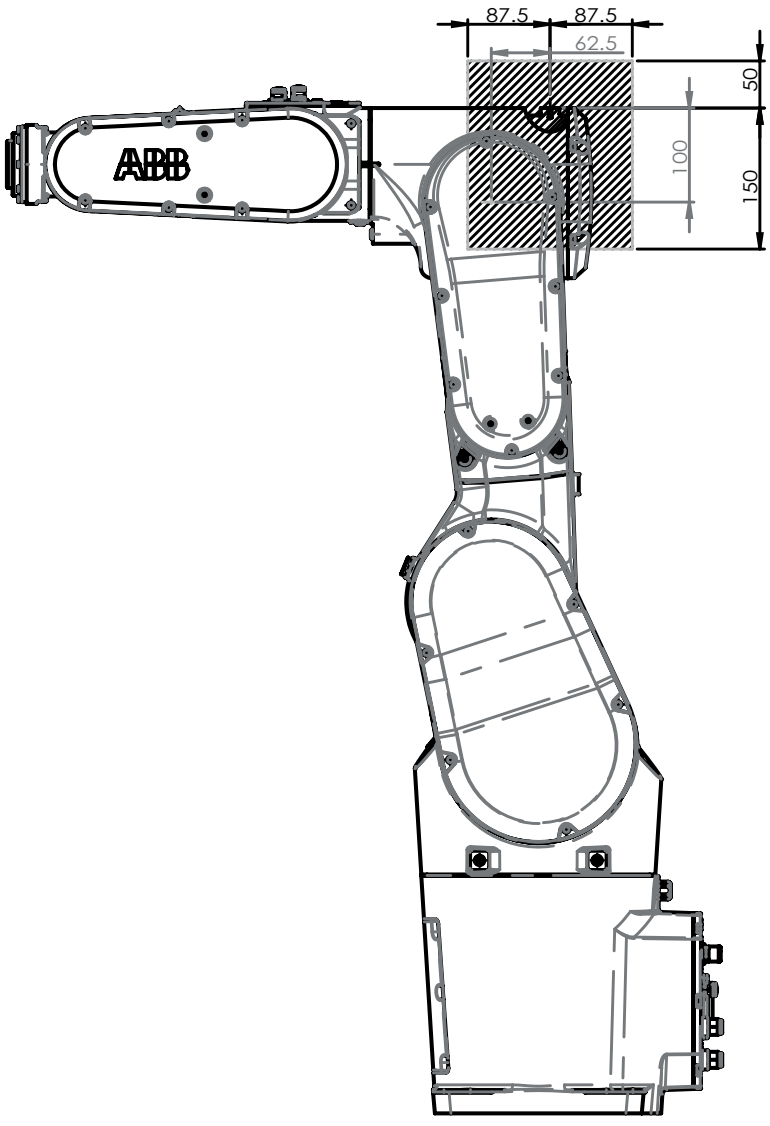
**Note**

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 on the robot (robot dimensions)

**Attachment holes and dimensions**

Extra loads can be mounted on robot. Definitions of load area and permitted load are shown in figure below. The center of gravity of the extra load shall be within the marked load areas. Maximum allowed arm load depends on center of gravity of arm load and robot payload.

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| Variant | Max. armload (kg) |
|---|---|
| IRB 1300-11/0.9 | 1 |
| IRB 1300-10/1.15 | 0.5 |
| IRB 1300-7/1.4 | 0.5 |

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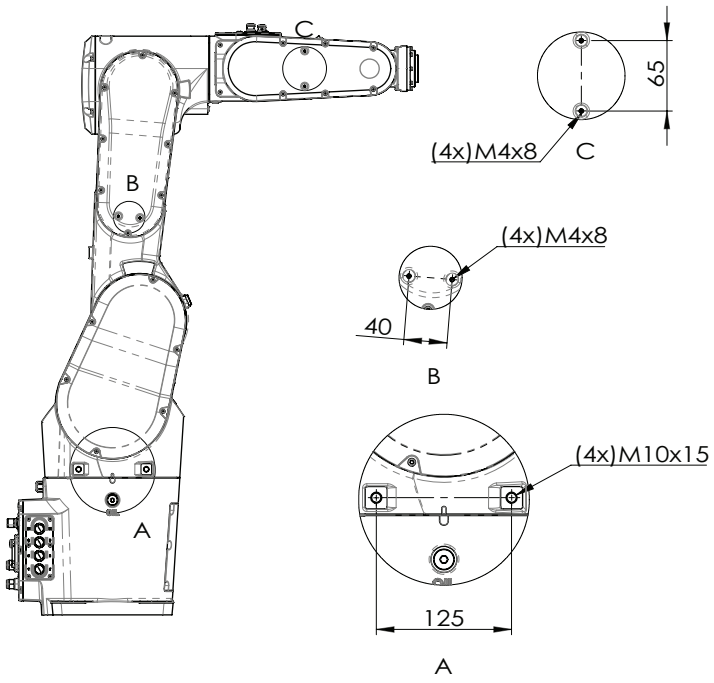
### Holes for fitting extra equipment

The robot is supplied with holes for fitting extra equipment, as shown in the following figures

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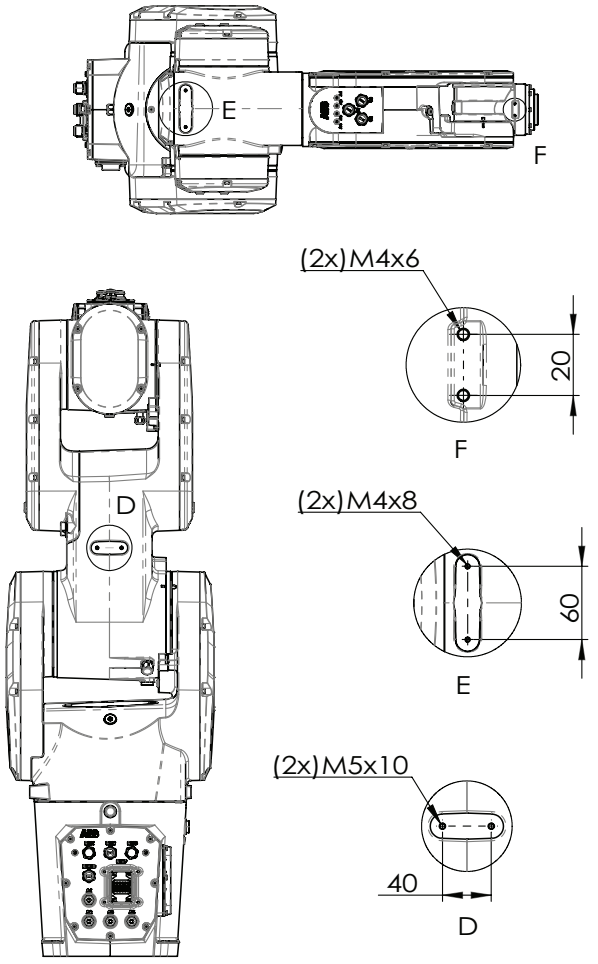
1.6 Fitting equipment on the robot (robot dimensions)
*Continued*

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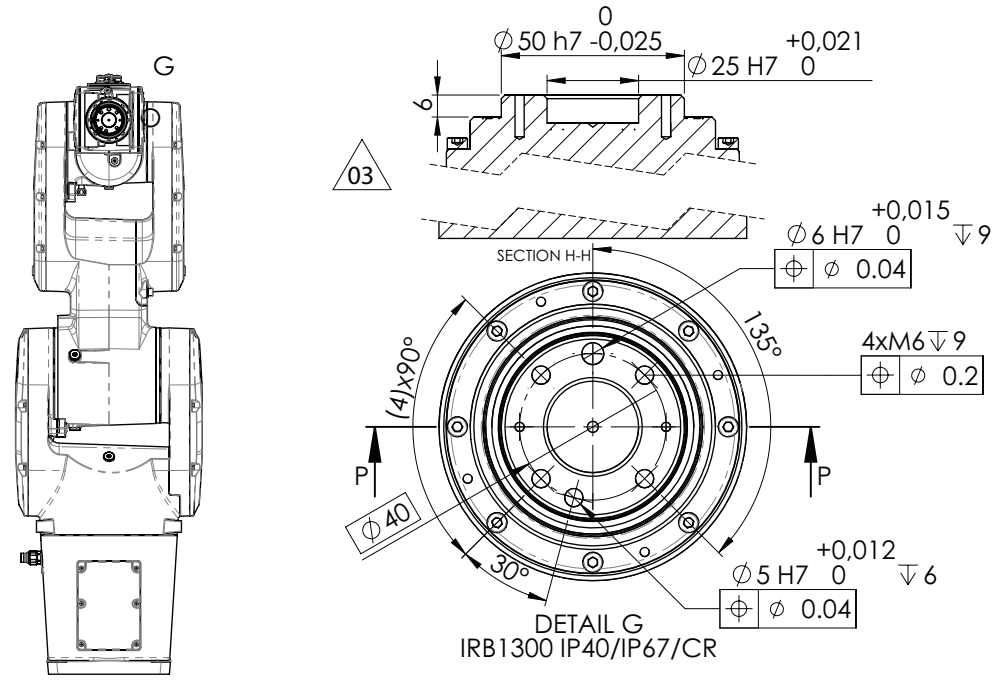
### Tool flange standard

**For robots with protection classes IP40 and IP67, and with protection type Clean Room**

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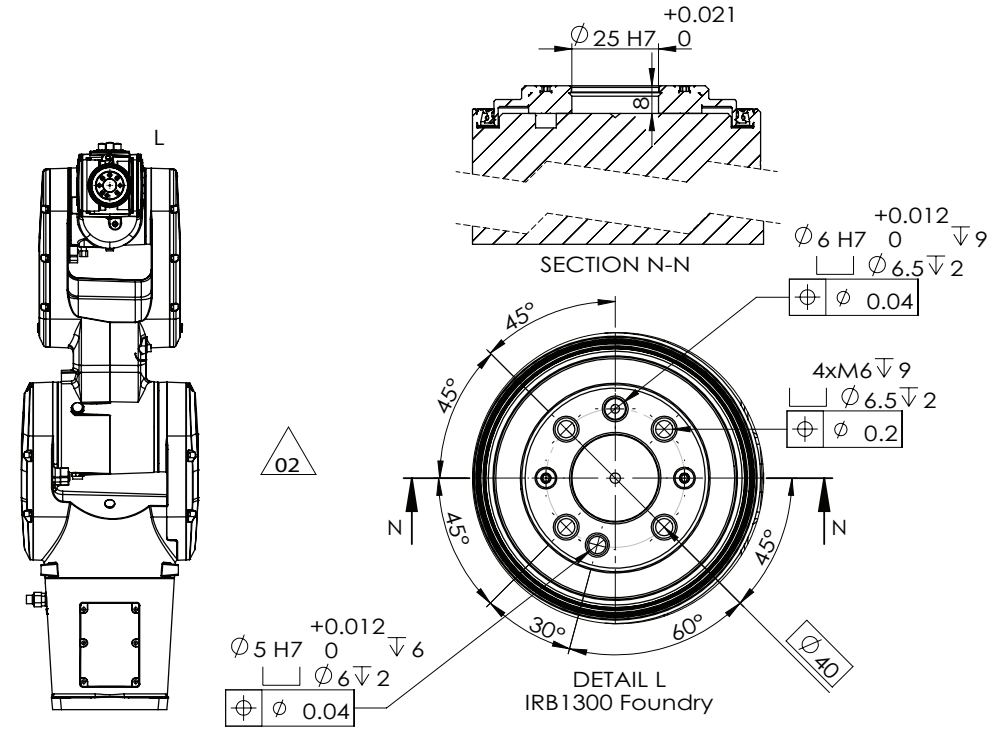
**For robots with protection type Foundry Plus**

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1.6 Fitting equipment on the robot (robot dimensions)
*Continued*

**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 1300*.

## 1.8 Robot motion

### 1.8.1 Adjusting the working range

**Reasons for adjusting the manipulator working range**

The working range of each manipulator axis is configured in the software. If there is a risk that the manipulator may collide with other objects at installation site, its working space should be limited. The manipulator must always be able to move freely within its entire working space.

**Working range configurations**

The parameter values for the axes working range can be altered within the allowed working range and according to available options for the robot, either to limit or to extend a default working range. Allowed working ranges and available options for each manipulator axis are specified in *Working range on page 23*.

**Mechanical stops on the manipulator**

Mechanical stops are and can be installed on the manipulator as limiting devices to ensure that the manipulator axis does not exceed the working range values set in the software parameters.

> **Note**
>
> The mechanical stops are only installed as safety precaution to physically stop the robot from exceeding the working range set. A collision with a mechanical stop always requires actions for repair and troubleshooting.

| Axis | Fixed mechanical stop[i] | Movable mechanical stop[ii] |
|---|---|---|
| Axis 1 | yes | no |
| Axis 2 | yes | no |
| Axis 3 | yes | no |
| Axis 4 | yes | no |
| Axis 5 | yes | no |
| Axis 6 | no | no |

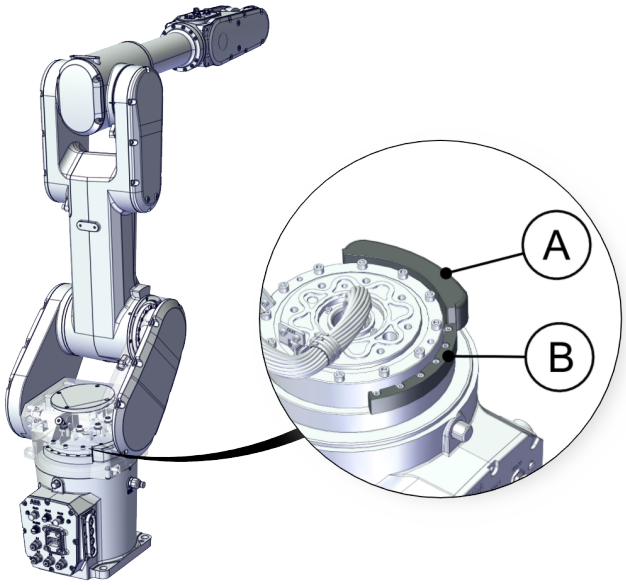
i Part of the casting or fixed on the casting and can not /should not be removed.

ii Can be installed in one or more than one position, to ensure a reduced working range, or be removed to allow extended working range.

## 1.8.2 Mechanically restricting the working range

### Location of mechanical stops

Axis 1

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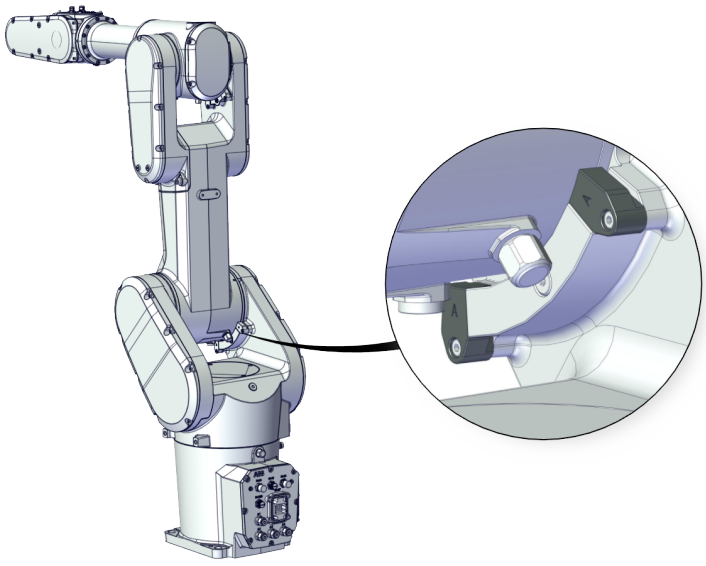
| | |
|---|---|
| A | Mechanical stop, axis 1, slider |
| B | Mechanical stop, axis 1, fixed block |

Axis 2



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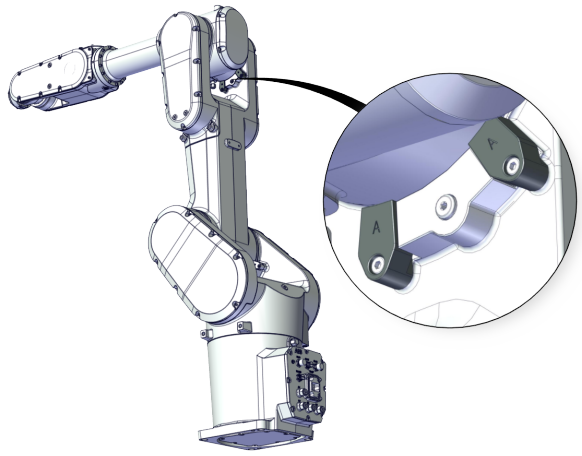
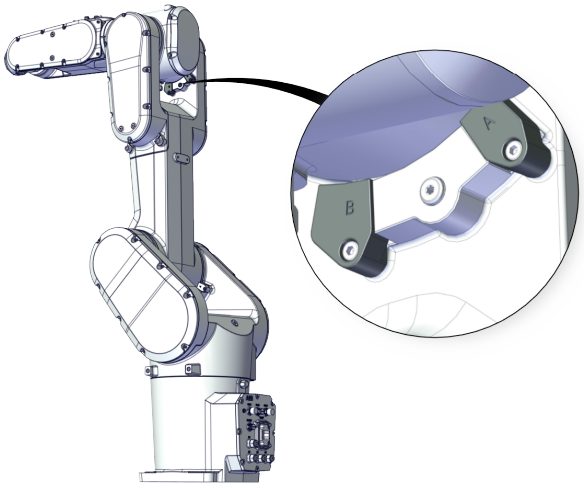
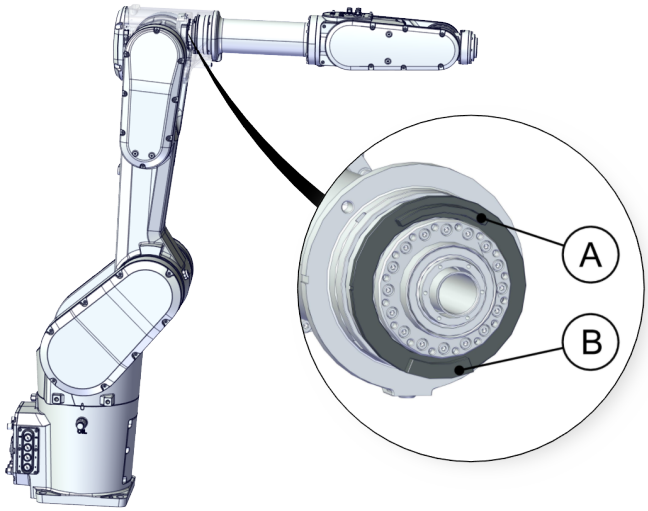
### 1.8.2 Mechanically restricting the working range
*Continued*

Axis 3

| IRB 1300-11/0.9 and IRB 1300-7/1.4 | IRB 1300-10/1.15 |
|---|---|
|  xx2000000408 |  xx2000000471 |

Axis 4

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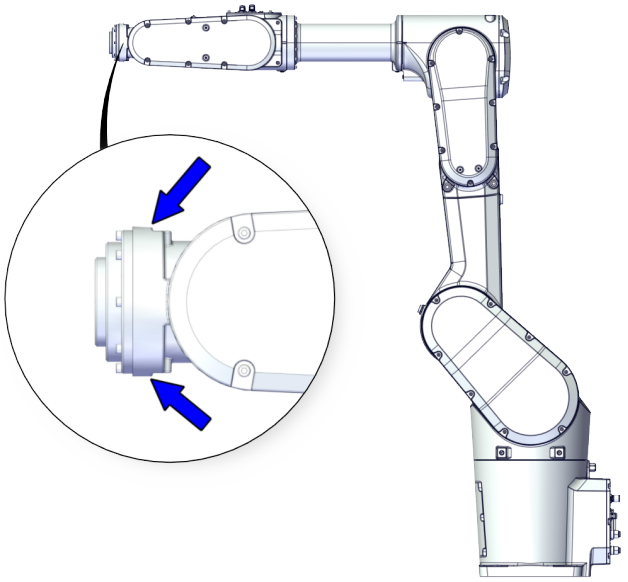
| | |
|---|---|
| A | Mechanical stop, axis 4, flange |
| B | Mechanical stop, axis 4, slider |

*Continues on next page*

Axis 5



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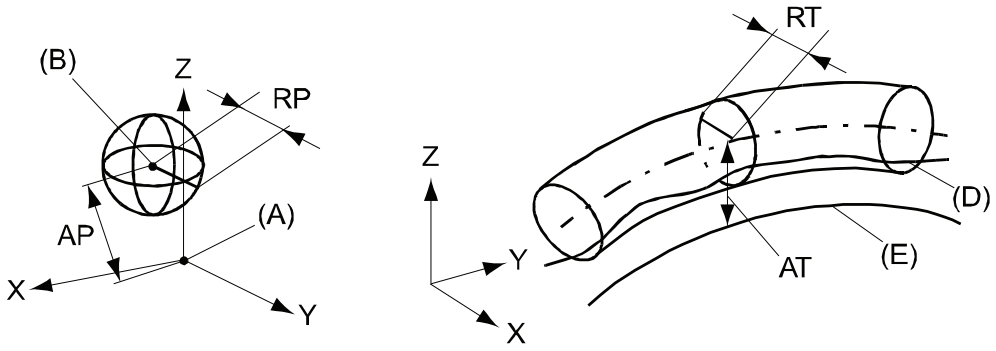
## 1.8.3 Performance according to ISO 9283

### 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 1300 | 11/0.9 | 10/1.15 | 7/1.4 |
|---|---|---|---|
| Pose accuracy, AP[i] (mm) | 0.02 | 0.025 | 0.02 |
| Pose repeatability, RP (mm) | 0.02 | 0.023 | 0.03 |
| Pose stabilization time, PSt (s) within 0.1 mm of the position | 0.28 | 0.27 | 0.38 |
| Path accuracy, AT (mm) | 1.01 | 0.98 | 1.49 |
| Path repeatability, RT (mm) | 0.08 | 0.04 | 0.07 |

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.

## 1.8.4 Velocity

**Maximum axis speed (full performance)**

with OmniCore C30/C90XT

| Robot type | Axis 1 | Axis 2 | Axis 3 | Axis 4 | Axis 5 | Axis 6 |
|---|---|---|---|---|---|---|
| IRB 1300-11/0.9 | 243 °/s | 225 °/s | 330 °/s | 500 °/s | 420 °/s | 720 °/s |
| IRB 1300-10/1.15 | 238 °/s | 228 °/s | 336 °/s | 500 °/s | 420 °/s | 720 °/s |
| IRB 1300-7/1.4 | 249 °/s | 180 °/s | 247 °/s | 500 °/s | 420 °/s | 720 °/s |

with OmniCore E10

| Robot type | Axis 1 | Axis 2 | Axis 3 | Axis 4 | Axis 5 | Axis 6 |
|---|---|---|---|---|---|---|
| IRB 1300-11/0.9 | 280 °/s | 228 °/s | 228 °/s | 392 °/s | 415 °/s | 600 °/s |
| IRB 1300-10/1.15 | 240 °/s | 228 °/s | 336 °/s | 500 °/s | 420 °/s | 720 °/s |
| IRB 1300-7/1.4 | 240 °/s | 124 °/s | 179 °/s | 500 °/s | 416 °/s | 600 °/s |

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

## 1.8.5 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*).

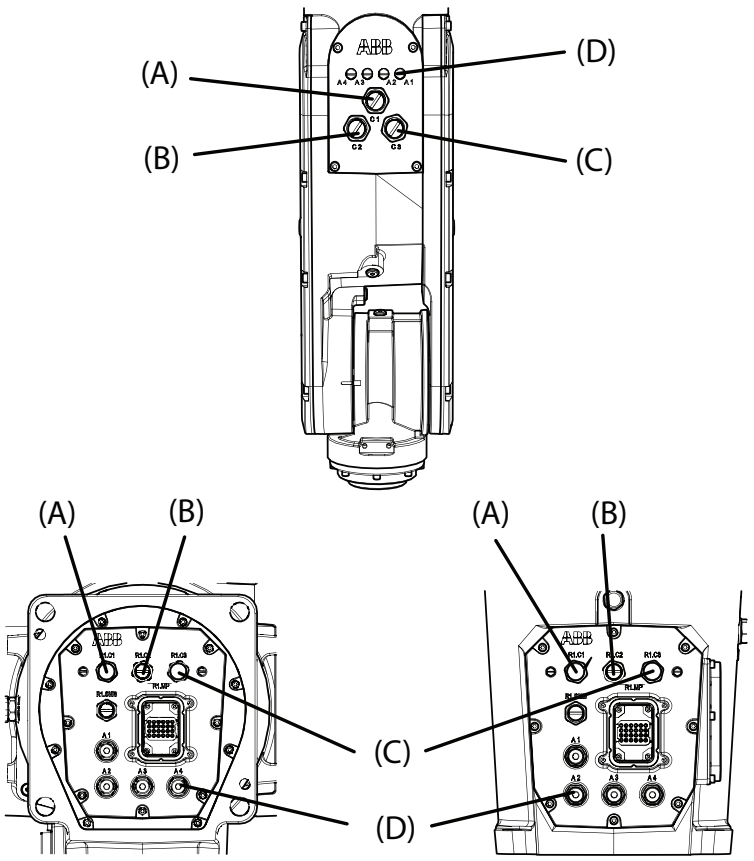
## 1.9 Customer connections

### Introduction to customer connections

The cables for customer connection are integrated in the robot and the connectors are placed on the tubular and one at the base. There are two connectors R2.C1 and R2.C3 at the tubular. Corresponding connectors R1.C1 and R1.C3 are located at the base.

There is also connections for Ethernet, one connector R2.C2 at the tubular and the corresponding connector R1.C2 located at the base.

Hose for compressed air is also integrated into the manipulator. There are 4 inlets at the base (R1/8”) and 4 outlets (M5) on the tubular.

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| Position | Connection | Description | Number | Value |
|---|---|---|---|---|
| A | (R1)R2.C1 | Customer power/signal | 12 wires | 30 V, 1.5 A |
| B | (R1)R2.C2 | Customer power/signal or Ethernet | 8 wires | 30 V, 1 A or 1 Gbits/s |
| C | (R1)R2.C3 | Customer power/signal | 4 wires | 42 V DC or 25 V AC, 4 A[i] |
| D | Air | Max. 6 bar | 4 | Outer diameter of air hose: 6 mm |

[i] Contact ABB for more information if to use the (R1)R2.C3 connection for an application with a higher voltage.

*Continues on next page*

**Connector kits (optional)**

Connector kits, base

R1.C1 and R1.C2 connectors on the base are parts of the CP/CS cable and Ethernet floor cable, respectively. For details about the robot cabling, see "Robot cabling and connection points" in *Product manual - IRB 1300*.

Customers need to do wiring when using the R1.C3 connector on the base. Make sure to use the R1.C3 connector in M12 A-code 4p female type.

Connector kits, tubular

The table describes the CP/CS and Ethernet (if any) connector kits for tubular.

| Position | Description | | | Art. no. |
|---|---|---|---|---|
| Connector kits | CP/CS | R2.C1 | M12 CPCS Male straight connector kits | 3HAC066098-001 |
| | | | M12 CPCS Male angled connector kits | 3HAC066099-001 |
| | | R2.C3 | M12 CPCS Male straight connector kits | 3HAC068412-001 |
| | | | M12 CPCS Male angled connector kits | 3HAC068413-001 |
| | Ethernet | R2.C2 | M12 Ethernet CAT6a Male straight connector kits | 3HAC067413-001 |
| | | | M12 Ethernet CAT6a Male angled connector kits | 3HAC067414-001 |

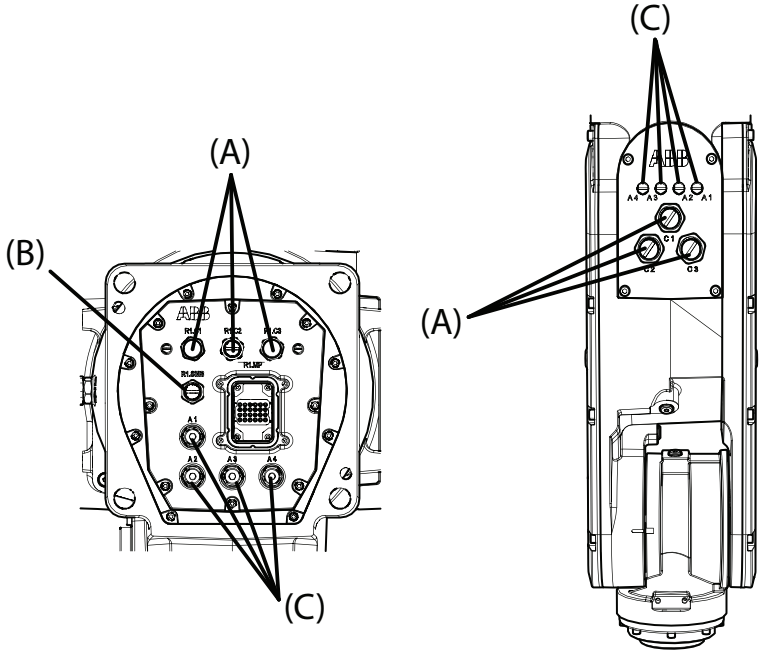
*Continues on next page*

### Protection covers

Protection covers for water and dust proofing

Protection covers are delivered together with the robot and must be well fitted to the connectors in any application requiring water and dust proofing.

Always remember to refit the protection covers after removing them.

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| | |
|---|---|
| A | CP/CS or Ethernet connector protection covers |
| B | SMB connector protection cover |
| C | Air hose connector protection covers |

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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 1300 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

### Manipulator variants

| Option | IRB Type | Handling capacity (kg) | Reach (m) |
|---|---|---|---|
| 3300-8 | 1300 | 11 | 0.9 |
| 3300-9 | 1300 | 10 | 1.15 |
| 3300-10 | 1300 | 7 | 1.4 |

### Manipulator color

| Option | Description |
|---|---|
| 209-2 | ABB White std, required 3351-4 clean room |
| 209-202 | ABB Graphite White std |

**Note**

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

### Manipulator protection

| Option | Description |
|---|---|
| 3350-400 | Base 40,IP40 |
| 3350-670 | Base 67,IP67 |
| 3351-4 | Clean Room 4, ISO Class 4 |
| 3352-10 | Foundry Plus2 67, IP67 |

**Note**

Base 40 includes IP40, according to standard IEC 60529.

Base 67 includes IP67, according to standard IEC 60529.

Clean Room class 4 includes ISO class 4 standard, according to DIN EN ISO 14644-1, -14. The robot selected with option Clean Room is also available for IP54 applications, according to standard IEC 60529.

### Signs on manipulator

| Option | Description |
|---|---|
| 3302-1 | ABB |

### Robot cabling routing

| Option | Description |
|---|---|
| 3309-1 | Under the base |
| 3309-2 | From side of base |

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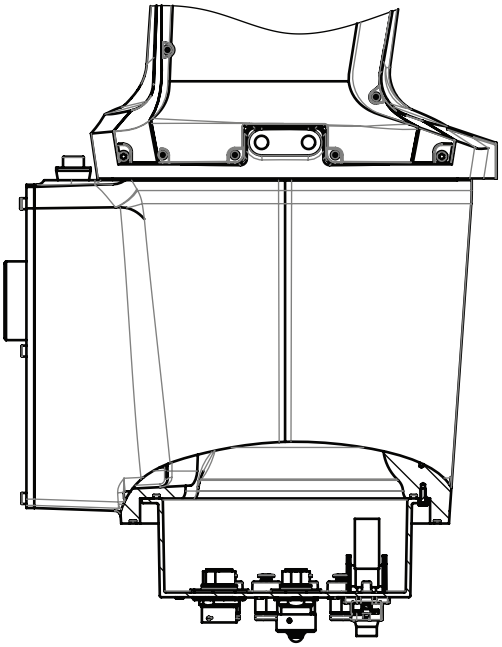

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### Media & Communication

When 3303-1 Parallel & Air is selected then 3304-1 and 3305-1 options are activated for selecting.

When 3303-2 Ethernet, Parallel, Air is selected then 3304-1,3305-1,3306-1 and 3307-1 are activated for selecting.

| Option | Type | Description |
|---|---|---|
| 3303-1 | Parallel & Air | Includes CP/CS (C1) and air. |
| 3303-2 | Ethernet, Parallel, Air | Includes CP/CS (C1,C3) + PROFINET or Ethernet (C2), and air. |

### Connector kits manipulator

The kit consists of connectors, pins and sockets.

| Option | Description |
|---|---|
| 3304-1 | Male-type, Straight arm connector kits |
| 3305-1 | Male-type, Angled arm connector kits |
| 3306-1 | Male-type, Straight arm Ethernet connector kits |
| 3307-1 | Male-type, Angled arm Ethernet connector kits |

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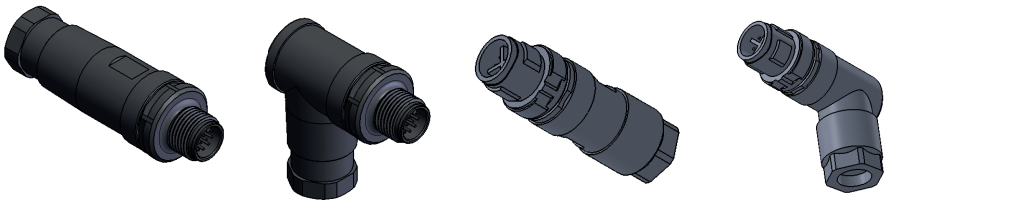
2.2 Manipulator
*Continued*

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**Note**

The image shown here is indicative only. If there is inconsistency between the image and the actual product, the actual product shall govern.

The kits are designed and used for connectors on upper arm.

## Warranty

For the selected period of time, ABB will provide spare parts and labour 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 in the ABB Ability service *Condition Monitoring & Diagnostics* 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. |

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| Option | Type | Description |
|---|---|---|
| 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.<br>  **Note**<br>Special conditions are applicable, see *Robotics Warranty Directives*. |

## 2.3 Floor cables

### Manipulator cable length

| Option | Lengths |
|---|---|
| 3200-1 | 3 m |
| 3200-2 | 7 m |
| 3200-3 | 15 m |

### Connection of parallell communication

Required 3303-1 Parallel & Air or 3303-2 Ethernet, Parallel, Air.

| Option | Lengths |
|---|---|
| 3201-1 | 3 m |
| 3201-2 | 7 m |
| 3201-3 | 15 m |

### Connection of Ethernet

Required 3303-2 Ethernet, Parallel, Air and occupies 1 Ethernet port.

| Option | Lengths |
|---|---|
| 3202-2 | 7 m |
| 3202-3 | 15 m |

# 3 Accessories

**General**

There is a range of tools and equipment available.

**Basic software and software options for robot and PC**

For more information, see *Application manual - Controller software OmniCore*, *Product specification - OmniCore C line* and *Product specification - OmniCore E line*.

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3HAC070393-001, Rev F, en