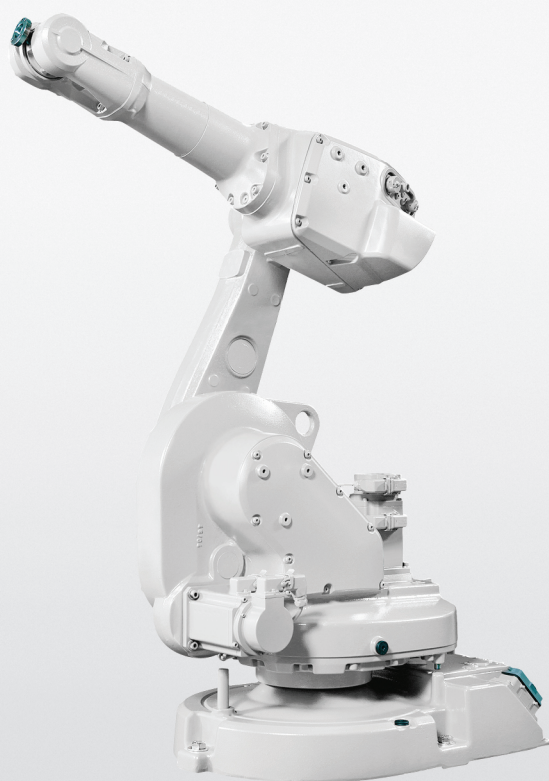


ROBOTICS

# Product specification

## IRB 1600/1660



Trace back information:

Workspace OmniCore and R19C version a16

Checked in 2019-09-16

Skribenta version 5.3.012

## **Product specification**

**IRB 1600 - 6/1.2**

**IRB 1600 - 6/1.45**

**IRB 1600 - 10/1.2**

**IRB 1600 - 10/1.45**

**IRB 1660ID - 6/1.55**

**IRB 1660ID - 4/1.55**

**Document ID: 3HAC023604-001**

**Revision: AK**

The information in this manual is subject to change without notice and should not be construed as a commitment by ABB. ABB assumes no responsibility for any errors that may appear in this manual.

Except as may be expressly stated anywhere in this manual, nothing herein shall be construed as any kind of guarantee or warranty by ABB for losses, damages to persons or property, fitness for a specific purpose or the like.

In no event shall ABB be liable for incidental or consequential damages arising from use of this manual and products described herein.

This manual and parts thereof must not be reproduced or copied without ABB's written permission.

Keep for future reference.

Additional copies of this manual may be obtained from ABB.

Original instructions.

© Copyright 2004-2019 ABB. All rights reserved.  
Specifications subject to change without notice.

# Table of contents

|  |           |
|--|-----------|
| Overview of this manual .....  | 7         |
| <b>1 Description</b> .....   | <b>11</b> |
| 1.1 Structure .....  | 11        |
| 1.1.1 Introduction .....   | 11        |
| 1.1.2 Different robot variants .....   | 14        |
| 1.2 Standards .....  | 18        |
| 1.2.1 Applicable standards .....   | 18        |
| 1.3 Installation .....   | 20        |
| 1.3.1 Introduction .....   | 20        |
| 1.3.2 Operating requirements .....   | 21        |
| 1.3.3 Mounting the manipulator .....   | 22        |
| 1.4 Calibration and references .....   | 27        |
| 1.4.1 Calibration methods .....  | 27        |
| 1.4.2 Fine calibration with Calibration Pendulum .....   | 30        |
| 1.4.3 Absolute Accuracy calibration .....  | 31        |
| 1.5 Robot load and load diagrams .....   | 34        |
| 1.5.1 Introduction .....   | 34        |
| 1.5.2 Load diagrams .....  | 35        |
| 1.5.3 Maximum load and moment of inertia for full and limited axis 5 (center line down) movement ..... | 42        |
| 1.5.4 Wrist torque .....   | 44        |
| 1.5.5 Mounting of equipment .....  | 45        |
| 1.5.6 Maximum TCP acceleration .....   | 51        |
| 1.6 Robot motion .....   | 52        |
| 1.6.1 Working range .....  | 52        |
| 1.6.2 Performance according to ISO 9283 .....  | 57        |
| 1.6.3 Velocity .....   | 59        |
| 1.6.4 Robot stopping distances and times .....   | 60        |
| 1.7 Typical cycle times .....  | 61        |
| 1.8 Customer connectors on the robot .....   | 62        |
| 1.9 Maintenance and trouble shooting .....   | 65        |
| <b>2 Specification of variants and options</b> .....   | <b>67</b> |
| 2.1 Introduction to variants and options .....   | 67        |
| 2.2 Manipulator .....  | 68        |
| 2.3 Positioners .....  | 77        |
| 2.4 Floor cables .....   | 78        |
| 2.4.1 Manipulator .....  | 78        |
| 2.4.2 Positioner .....   | 79        |
| 2.5 Process .....  | 80        |
| 2.5.1 DressPack .....  | 80        |
| 2.5.2 Process equipment .....  | 81        |
| 2.5.3 AW Safety options .....  | 82        |
| 2.6 User documentation .....   | 84        |
| <b>3 Accessories</b> .....   | <b>85</b> |
| 3.1 Introduction to accessories .....  | 85        |
| <b>Index</b> .....   | <b>87</b> |

**This page is intentionally left blank**

# Overview of this manual

## About this product specification

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

- The structure and dimensional prints
- The fulfilment of standards, safety and operating requirements
- The load diagrams, mounting of extra equipment, the motion and the robot reach
- The specification of variant and options available

## Usage

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

## Users

It is intended for:

- Product managers and Product personnel
- Sales and Marketing personnel
- Order and Customer Service personnel

## References

| Reference   | Document ID    |
|---|----------------|
| <i>Product specification - Controller IRC5</i><br>IRC5 with main computer DSQC1000.                             | 3HAC047400-001 |
| <i>Product specification - Controller software IRC5</i><br>IRC5 with main computer DSQC1000 and RobotWare 5.6x. | 3HAC050945-001 |
| <i>Product specification - Controller software IRC5</i><br>IRC5 with main computer DSQC1000 and RobotWare 6.    | 3HAC050945-001 |
| <i>Product manual - IRB 1600/1660</i>   | 3HAC026660-001 |
| <i>Product specification - Robot user documentation, IRC5 with RobotWare 6</i>                                  | 3HAC052355-001 |

## Revisions

| Revision | Description  |
|----------|--|
| 3        | - Calibration positions and Absolute Accuracy information added in chapter 1.4<br>- New Inside address for ABB RobotLoad<br>- New wrist, Type A added in chapter 1.5.5<br>- Figures for customer connections added |
| D        | - Option 287-5 Wash removed  |

Continues on next page

## Overview of this manual

Continued

| Revision | Description  |
|----------|--|
| E        | <ul style="list-style-type: none"> <li>- New versions IRB 1600ID-4/1.5, IRB 1600-6/x and IRB 1600-8/x added</li> <li>- Changes in Safety/Standards</li> <li>- Directions of forces added</li> <li>- Increased payloads for standard robots</li> <li>- Arc welding options added</li> <li>- Warranty information for load diagrams</li> </ul> |
| F        | <ul style="list-style-type: none"> <li>- Old versions removed and AW offer changed.</li> </ul>   |
| G        | <ul style="list-style-type: none"> <li>- Changes for Calibration data</li> <li>- Work range</li> <li>- Explanation of ISO values (new figure and table)</li> <li>- Stopping distance</li> <li>- Changes in chapter Specification of Variants and Options, Track Motion and Process equipment</li> <li>- User documentation on DVD</li> </ul> |
| H        | <ul style="list-style-type: none"> <li>- Added information about mounting equipment on upper arm</li> </ul>  |
| J        | <ul style="list-style-type: none"> <li>- General update for 9.1 release</li> </ul>   |
| K        | <ul style="list-style-type: none"> <li>- Updated/Corrected Clean Room Class</li> <li>- Option 17/6 removed in Variants and Options</li> </ul>  |
| L        | <ul style="list-style-type: none"> <li>- Foundry Plus 2</li> <li>- Clean Room removed</li> </ul>   |
| M        | <ul style="list-style-type: none"> <li>- Text for Standards updated</li> </ul>   |
| N        | <ul style="list-style-type: none"> <li>- Information regarding 1-phase power supply</li> </ul>   |
| P        | <ul style="list-style-type: none"> <li>- Figure for standard tool flange corrected</li> </ul>  |
| Q        | <ul style="list-style-type: none"> <li>- Option 864-1 added</li> </ul>   |
| R        | <ul style="list-style-type: none"> <li>- Table for ambient temperature adjusted</li> </ul>   |
| S        | <ul style="list-style-type: none"> <li>• Machinery directive updated</li> <li>• ISO value for IRB 1600ID updated</li> <li>• Info regarding tilted IRB 1600ID added</li> <li>• Corrected figure in section <a href="#">Working range on page 52</a>.</li> </ul>   |
| T        | <ul style="list-style-type: none"> <li>• Minor corrections/update</li> <li>• Missing measures for mounting holes axis 4 added</li> </ul>   |
| U        | <ul style="list-style-type: none"> <li>• Minor corrections/update</li> <li>• IRB 1600-8 upgraded to 10 kg</li> <li>• Added mounting holes on the lower arm.</li> </ul>   |
| V        | <ul style="list-style-type: none"> <li>• Minor corrections/update</li> </ul>   |
| X        | <ul style="list-style-type: none"> <li>• Text for ISO test adjusted</li> <li>• Robot stopping distances and times for category 0 and category 1 stops are moved to a separate document, <i>Product specification - Robot stopping distances according to ISO 10218-1</i></li> </ul>  |
| Y        | <ul style="list-style-type: none"> <li>• Text for Foundry Plus updated.</li> <li>• Minor corrections/update</li> </ul>   |
| Z        | <ul style="list-style-type: none"> <li>• Minor corrections/update</li> </ul>   |
| AA       | <ul style="list-style-type: none"> <li>• Tilting around X-axis added</li> </ul>  |

Continues on next page



| Revision | Description  |
|----------|--|
| AB       | <ul style="list-style-type: none"> <li>Added a new variant IRB 1600ID - 6/1.55.</li> <li>Section Track motion with options 1001-1, 1000-5 and 1000-6 removed from manual.</li> <li>Updated the maximum load values of the robot. See <a href="#">General on page 22</a>.</li> <li>Updated design of extra equipment mounting holes for IRB 1600ID-4/1.5.</li> </ul>  |
| AC       | <ul style="list-style-type: none"> <li>Rename the variant IRB 1600ID - 6/1.55 to IRB 1660ID - 6/1.55.</li> <li>Updated the manipulator weight of IRB 1660ID - 6/1.55, see <a href="#">Manipulator weight on page 14</a>.</li> <li>Updated the load diagram of IRB 1660ID - 6/1.55 with vertical wrist, see <a href="#">IRB 1660ID-6/1.55 "Vertical Wrist" (<math>\pm 10^\circ</math>) on page 40</a>.</li> <li>Updated robot tool flange dimension drawing of IRB 1660ID - 6/1.55, see <a href="#">Robot tool flange for IRB 1660ID on page 50</a>.</li> <li>Updated the turning radius drawing, see <a href="#">Turning radius on page 56</a>.</li> </ul> |
| AD       | <p>Published in release R16.2. The following updates are done in this revision:</p> <ul style="list-style-type: none"> <li>Added a new variant IRB 1660ID - 4/1.55.</li> <li>Wall mounting available to IRB 1660ID - X/1.55.</li> </ul>  |
| AE       | <p>Published in release R17.1. The following updates are done in this revision:</p> <ul style="list-style-type: none"> <li>Tilting around X-axis added for IRB 1660ID.</li> <li>IRB 1600ID removed.</li> <li>Restriction of load diagram added.</li> <li>Axis Calibration method added.</li> </ul>   |
| AF       | <p>Published in release R17.2. The following updates are done in this revision:</p> <ul style="list-style-type: none"> <li>Updated list of applicable standards.</li> <li>TCP acceleration information added</li> </ul>  |
| AG       | <p>Published in release R18.1. The following updates are done in this revision:</p> <ul style="list-style-type: none"> <li>Updated drawing on robot tool flange.</li> </ul>  |
| AH       | <p>Published in release R18.2. The following updates are done in this revision:</p> <ul style="list-style-type: none"> <li>Updated information of holes for mounting of extra equipment for IRB 1600, see <a href="#">Holes for mounting of extra equipment for IRB 1600 on page 46</a>.</li> <li>Removed the phased out options: welding torch package options [878-X], option AristoMig 5000i [1029-14], current/hose set options [1030-X], and feed kit options [1033-X].</li> </ul>  |
| AJ       | <p>Published in release 19B. The following updates are done in this revision:</p> <ul style="list-style-type: none"> <li>Vertical dimensions of IRB 1660ID-X/1.55 and IRB 1600-X/1.2 (1.45) added. See <a href="#">Different robot variants on page 14</a>.</li> <li>Updated information about <i>Absolute Accuracy</i>.</li> </ul>  |
| AK       | <p>Published in release 19C. The following updates are done in this revision:</p> <ul style="list-style-type: none"> <li>Note added about need to calibrate if the robot is other than floor mounted. See <a href="#">Calibration methods on page 27</a>.</li> </ul>   |

**This page is intentionally left blank**

# 1 Description

## 1.1 Structure

### 1.1.1 Introduction

---

#### Robot family

A number of new possibilities open up with ABB's IRB 1600 robot. It is available in seven versions, two of which are AW robot variants, IRB 1660ID-6/1.55 and IRB 1660ID-4/1.55 with an compact AW-dressed process upper arm.

The IRB 1600/1660ID family is ideal for Arc Welding, Machine Tending, Material Handling, Gluing and Deburring/Grinding applications.

---

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

---

#### 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 the *Product specification - Controller software IRC5*.

---

*Continues on next page*

# 1 Description

---

## 1.1.1 Introduction

*Continued*

---

### Foundry Plus 2

The Foundry Plus option is 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 for washing applications or other similar applications). Special care must be taken in regard to operational and maintenance requirements for applications in foundry as well as in other applications areas. Please contact ABB Robotics Sales organization if in doubt regarding specific application feasibility for the Foundry Plus protected robot. The Foundry Plus 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 liquid and solid contaminants. Among other things all sensitive parts are better protected than the standard offer.

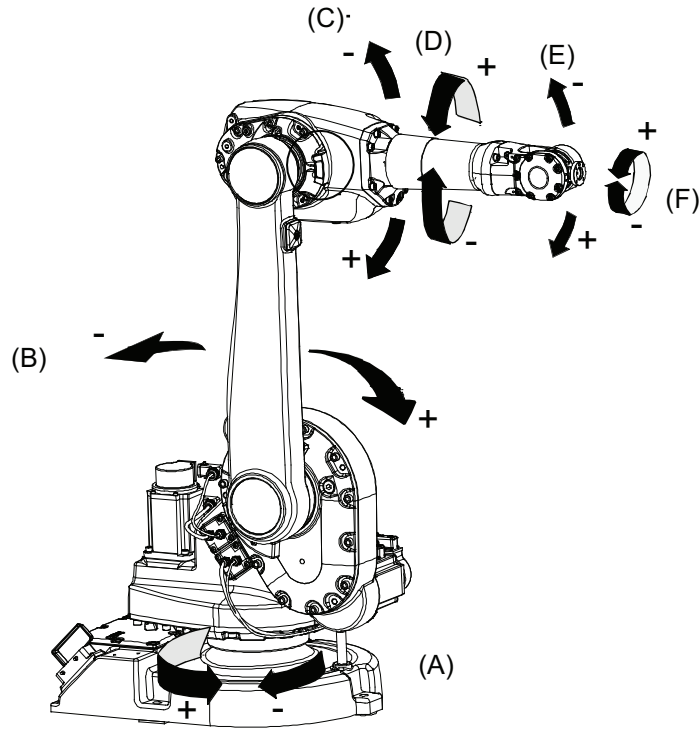
Selected Foundry Plus/Foundry Plus 2 features:

- Improved sealing to prevent penetration into cavities to secure IP67
- Additional protection of cabling and electronics
- Special covers protecting cavities
- Well-proven connectors
- Nickel coated tool flange (Foundry Plus 2)
- Rust preventives on screws, washers and unpainted/machined surfaces

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

*Continues on next page*

Manipulator axes



xx150000244

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

# 1 Description

---

## 1.1.2 Different robot variants

### 1.1.2 Different robot variants

---

#### General

The IRB 1600/1660ID is available in seven versions and they can be mounted on the floor, wall, tilted (up to 55 degrees around the Y-axis or X-axis) or inverted. See [Robot motion on page 52](#) for limitations.

| Robot type | Handling capacity (kg) | Reach (m) |
|------------|------------------------|-----------|
| IRB 1600   | 6 kg                   | 1.2 m     |
| IRB 1600   | 6 kg                   | 1.45 m    |
| IRB 1600   | 10 kg                  | 1.2 m     |
| IRB 1600   | 10 kg                  | 1.45 m    |
| IRB 1660ID | 4 kg                   | 1.55 m    |
| IRB 1660ID | 6 kg                   | 1.55 m    |

#### 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/EG) |

#### Manipulator weight

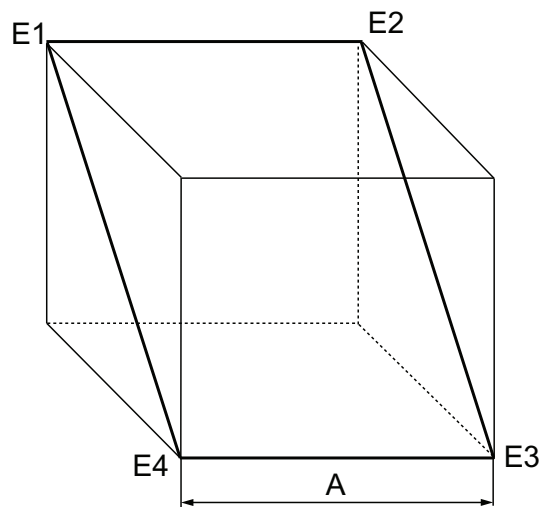
| Robot             | Weight |
|-------------------|--------|
| IRB 1600-X/1.2    | 250 kg |
| IRB 1600-X/1.45   | 250 kg |
| IRB 1660ID-X/1.55 | 260 kg |

*Continues on next page*

### Power consumption

Path E1-E2-E3-E4 in the ISO Cube, max.load.

| Speed (mm/s) | Power consumption (kW) |                 |                   |                   |
|--------------|------------------------|-----------------|-------------------|-------------------|
|              | IRB 1600-X/1.2         | IRB 1600-X/1.45 | IRB 1660ID-6/1.55 | IRB 1660ID-4/1.55 |
| Max.         | 0.57                   | 0.58            | 0.62              | 0.64              |
| 1000         | 0.46                   | 0.47            | 0.46              | 0.45              |
| 500          | 0.39                   | 0.42            | 0.40              | 0.39              |
| 100          | 0.34                   | 0.39            | 0.37              | 0.36              |



xx1000000101

|   |        |
|---|--------|
| A | 400 mm |
|---|--------|

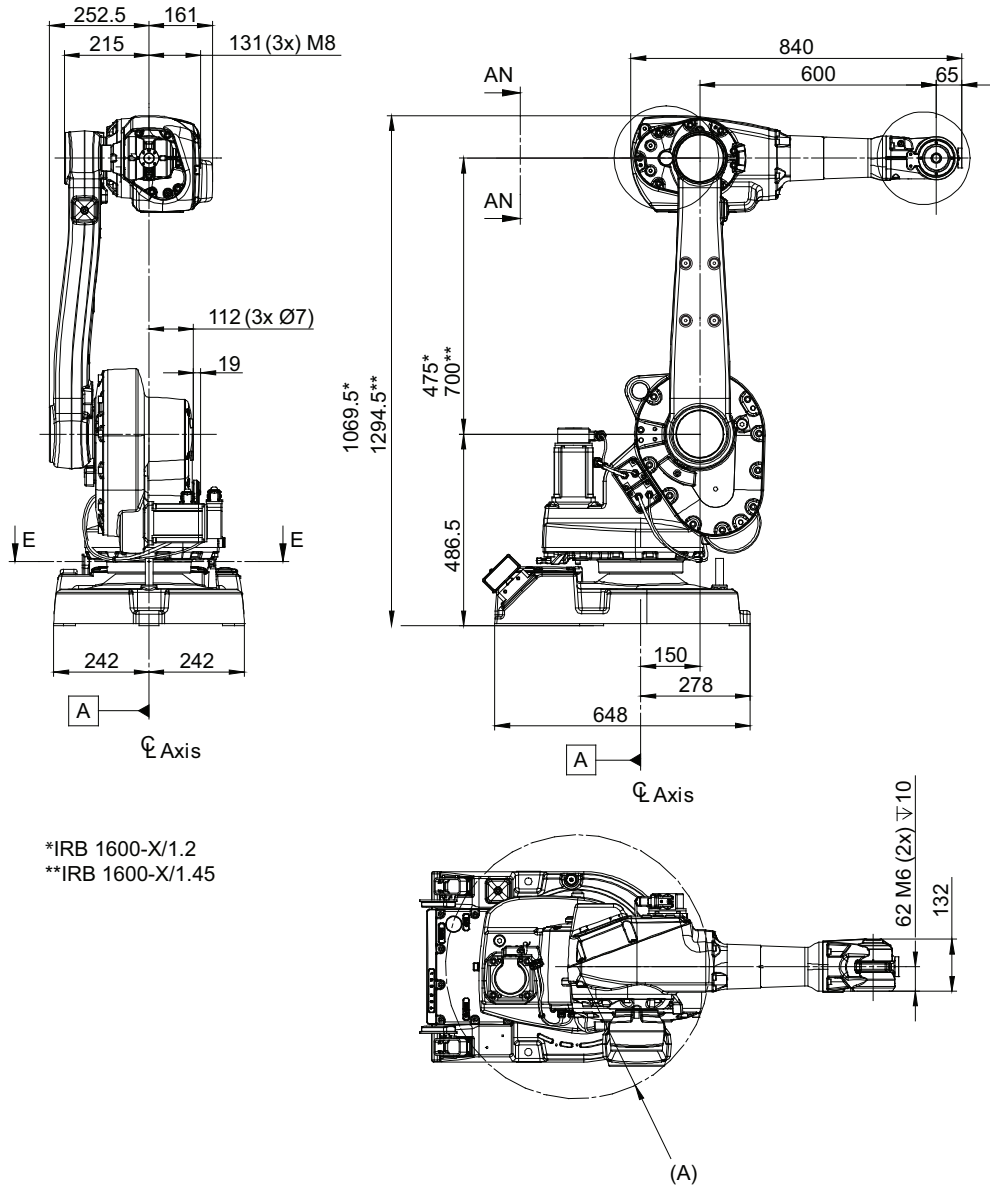
*Continues on next page*

# 1 Description

## 1.1.2 Different robot variants

Continued

### Dimensions IRB 1600-X/1.2 (1.45)



\*IRB 1600-X/1.2  
\*\*IRB 1600-X/1.45

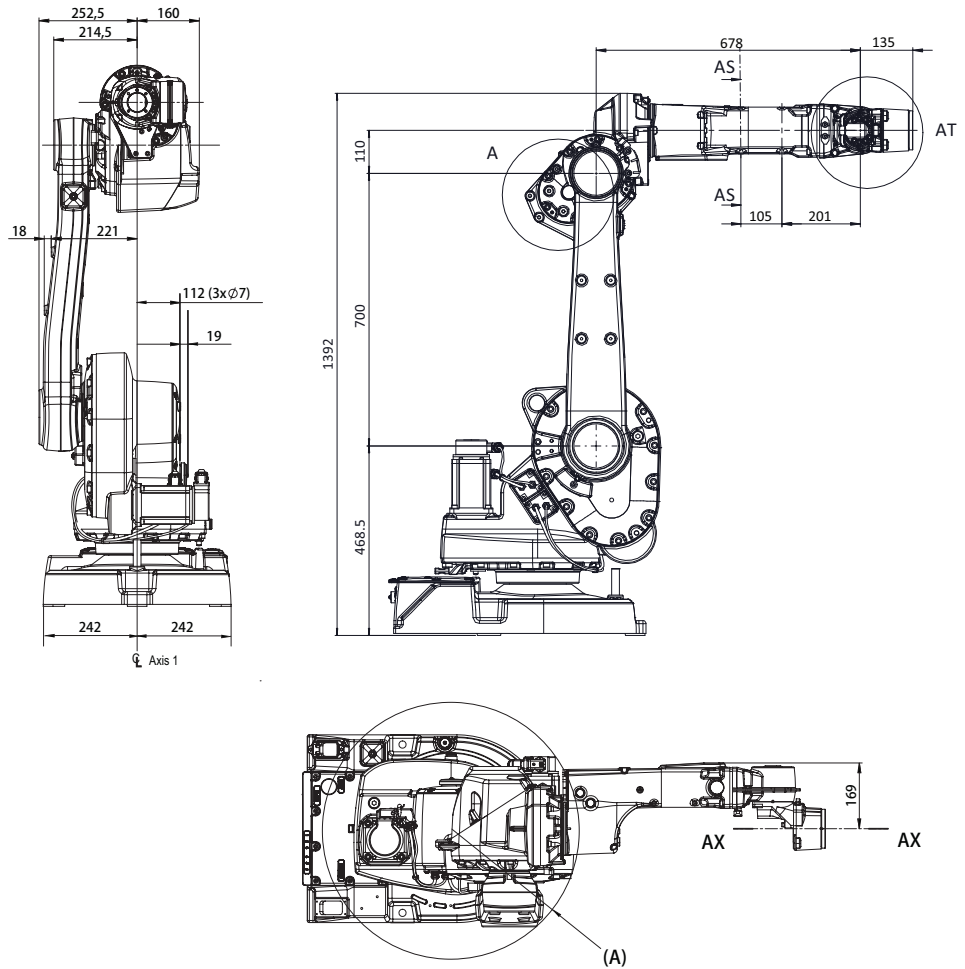
xx100000972

|   |                                  |
|---|----------------------------------|
| A | R= 335 mm minimum turning radius |
|---|----------------------------------|

Continues on next page



### Dimensions IRB 1660ID-X/1.55



xx1500001250

|   |                             |
|---|-----------------------------|
| A | R335 Minimum turning radius |
|---|-----------------------------|

# 1 Description

## 1.2.1 Applicable standards

## 1.2 Standards

### 1.2.1 Applicable standards



#### Note

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

### Standards, EN ISO

The product is designed in accordance with the requirements of:

| Standard  | Description  |
|---|--|
| EN ISO 12100:2010   | Safety of machinery - General principles for design - Risk assessment and risk reduction             |
| EN ISO 13849-1:2015   | Safety of machinery, safety related parts of control systems - Part 1: General principles for design |
| EN ISO 13850:2015   | Safety of machinery - Emergency stop - Principles for design   |
| EN ISO 10218-1:2011   | Robots for industrial environments - Safety requirements -Part 1 Robot                               |
| ISO 9787:2013   | Robots and robotic devices -- Coordinate systems and motion nomenclatures                            |
| ISO 9283:1998   | Manipulating industrial robots, performance criteria, and related test methods                       |
| EN ISO 14644-1:2015 <sup>i</sup>  | Classification of air cleanliness  |
| EN ISO 13732-1:2008   | Ergonomics of the thermal environment - Part 1   |
| EN 61000-6-4:2007 + A1:2011<br>IEC 61000-6-4:2006 + A1:2010<br>(option 129-1) | EMC, Generic emission  |
| EN 61000-6-2:2005<br>IEC 61000-6-2:2005                                       | EMC, Generic immunity  |
| EN IEC 60974-1:2012 <sup>ii</sup>   | Arc welding equipment - Part 1: Welding power sources  |
| EN IEC 60974-10:2014 <sup>ii</sup>  | Arc welding equipment - Part 10: EMC requirements  |
| EN IEC 60204-1:2006   | Safety of machinery - Electrical equipment of machines - Part 1 General requirements                 |
| IEC 60529:1989 + A2:2013  | Degrees of protection provided by enclosures (IP code)   |

<sup>i</sup> Only robots with protection Clean Room.

<sup>ii</sup> Only valid for arc welding robots. Replaces EN IEC 61000-6-4 for arc welding robots.

### European standards

| Standard                | Description  |
|-------------------------|--|
| EN 614-1:2006 + A1:2009 | Safety of machinery - Ergonomic design principles - Part 1: Terminology and general principles |

*Continues on next page*

# 1 Description

## 1.2.1 Applicable standards

*Continued*

| Standard              | Description   |
|-----------------------|---|
| EN 574:1996 + A1:2008 | Safety of machinery - Two-hand control devices - Functional aspects - Principles for design |

### Other standards

| 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 434-14 | Industrial robots and robot Systems - General safety requirements |

# 1 Description

## 1.3.1 Introduction

## 1.3 Installation

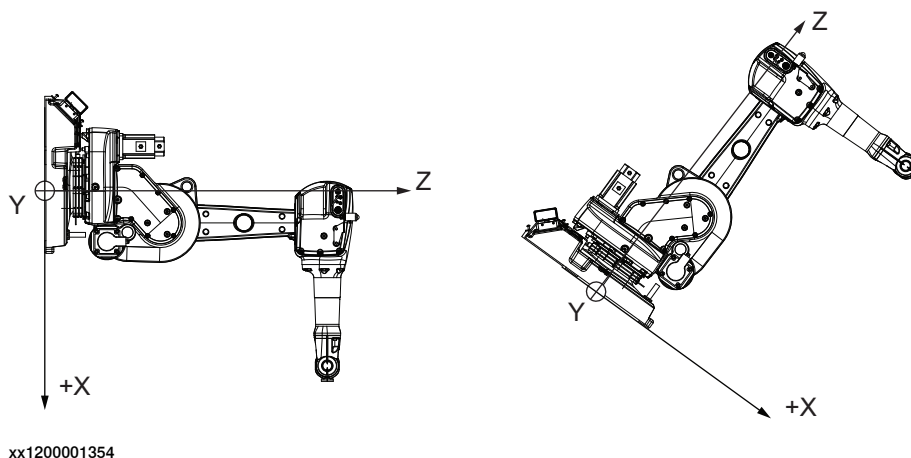
### 1.3.1 Introduction

#### General

IRB 1600 can be mounted on the floor, wall, tilted (up to 55 degrees around the Y-axis or X-axis, also valid for inverted robot, for more details see *Product manual - IRB 1600/1660*) or inverted. An end effector with max. weight of 6 kg or 10 kg (depending on variant) can be mounted on the tool flange (axis 6). See figure below for wall/tilted mounting position, regarding the X direction of the base coordinate system. See [Robot motion on page 52](#) for limitations.

IRB 1660ID-X/1.55 can be mounted on the floor or inverted and generally be tilted up to 45 degrees, around the Y-axis or X-axis, with a  $\pm 180$  degrees working range on axis 1 (at full payload and arm load). It can also be mounted on the wall, with a  $\pm 45$  degrees working range on axis 1 (at full payload and arm load), a larger working range is possible with a lower load. For IRB 1660ID-6/1.55, an end effector with max. weight of 6 kg can be mounted on the tool flange (axis 6); for IRB 1660ID-4/1.55, an end effector with max. weight of 4 kg can be mounted on the tool flange (axis 6). See [Load diagrams on page 35](#).

Extra equipment can be mounted on to the hip and on the upper arm. See [Mounting of equipment on page 45](#).



#### Extra Loads

Extra load, which is included in the load diagrams, can be mounted on the upper arm. An extra load of 15 kg can also be mounted on the frame of axis 1. See [Holes for mounting of extra equipment for IRB 1600 on page 46](#).

#### Working Range

The working range of axes 1-3 of IRB 1600-X/1.2 (1.45) and axes 1-2 of 1660ID can be limited by mechanical stops. Electronic Position Switches can be used on all axes for position indication of the manipulator.

## 1.3.2 Operating requirements

### Protection standards

| Robot version             | Protection Standard IEC60529 |
|---------------------------|------------------------------|
| Standard manipulator      | IP 54                        |
| Protection Foundry Plus 2 | IP 67                        |
| IRB 1660ID-X/1.55         | IP 40 (Wrist: IP 67)         |

### Explosive environments

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

### Ambient temperature

| Description   | Standard/Option | Temperature   |
|---|-----------------|---|
| Manipulator during operation  | Standard        | + 5° C <sup>i</sup> (+ 41° F) to + 45° C (+ 113° F)                 |
| For the controller  | Standard/Option | See <i>Product specification - Controller IRC5 with FlexPendant</i> |
| Complete robot (incl. controller) 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)  |

<sup>i</sup> At low environmental temperature < 10° C 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 Description

## 1.3.3 Mounting the manipulator

### 1.3.3 Mounting the manipulator

#### General

Maximum load in relation to the base coordinate system. See the following figure.

#### Floor Mounted

| Force     | Endurance load (in operation) | Max. load (emergency stop) |
|-----------|-------------------------------|----------------------------|
| Force xy  | $\pm 1850$ N                  | $\pm 3900$ N               |
| Force z   | $- 2700 \pm 1150$ N           | $- 2700 \pm 2200$ N        |
| Torque xy | $\pm 1750$ Nm                 | $\pm 4000$ Nm              |
| Torque z  | $\pm 855$ Nm                  | $\pm 1500$ Nm              |

#### Wall Mounted

| Force     | Endurance load (in operation) | Max. load (emergency stop) |
|-----------|-------------------------------|----------------------------|
| Force xy  | $\pm 3900$ N                  | $\pm 5300$ N               |
| Force z   | $\pm 1400$ N                  | $\pm 2800$ N               |
| Torque xy | $\pm 2310$ Nm                 | $\pm 3850$ Nm              |
| Torque z  | $\pm 855$ Nm                  | $\pm 1550$ Nm              |

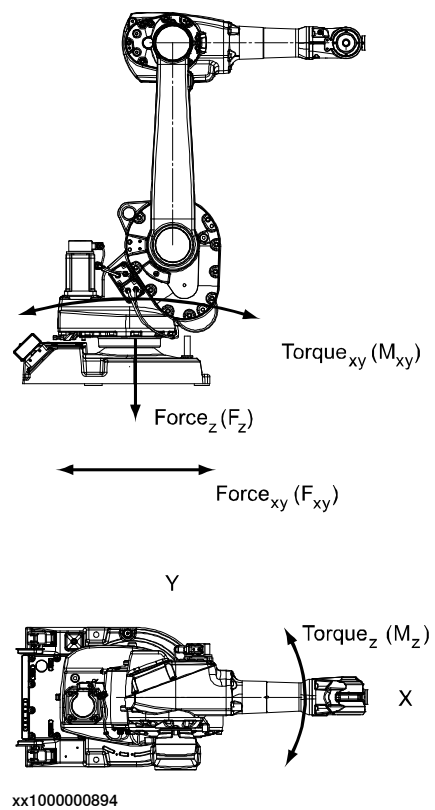
#### Suspended

| Force     | Endurance load (in operation) | Max. load (emergency stop) |
|-----------|-------------------------------|----------------------------|
| Force xy  | $\pm 1850$ N                  | $\pm 3900$ N               |
| Force z   | $+ 2700 \pm 1150$ N           | $+ 2700 \pm 2200$ N        |
| Torque xy | $\pm 1750$ Nm                 | $\pm 4000$ Nm              |
| Torque z  | $\pm 855$ Nm                  | $\pm 1500$ Nm              |

#### Tilted

| Force     | Endurance load (in operation) | Max. load (emergency stop) |
|-----------|-------------------------------|----------------------------|
| Force xy  | $\pm 2900$ N                  | $\pm 6000$ N               |
| Force z   | $+ 2100 \pm 1700$ N           | $+ 2100 \pm 3000$ N        |
| Torque xy | $\pm 1700$ Nm                 | $\pm 4300$ Nm              |
| Torque z  | $\pm 855$ Nm                  | $\pm 1550$ Nm              |

*Continues on next page*



### 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.

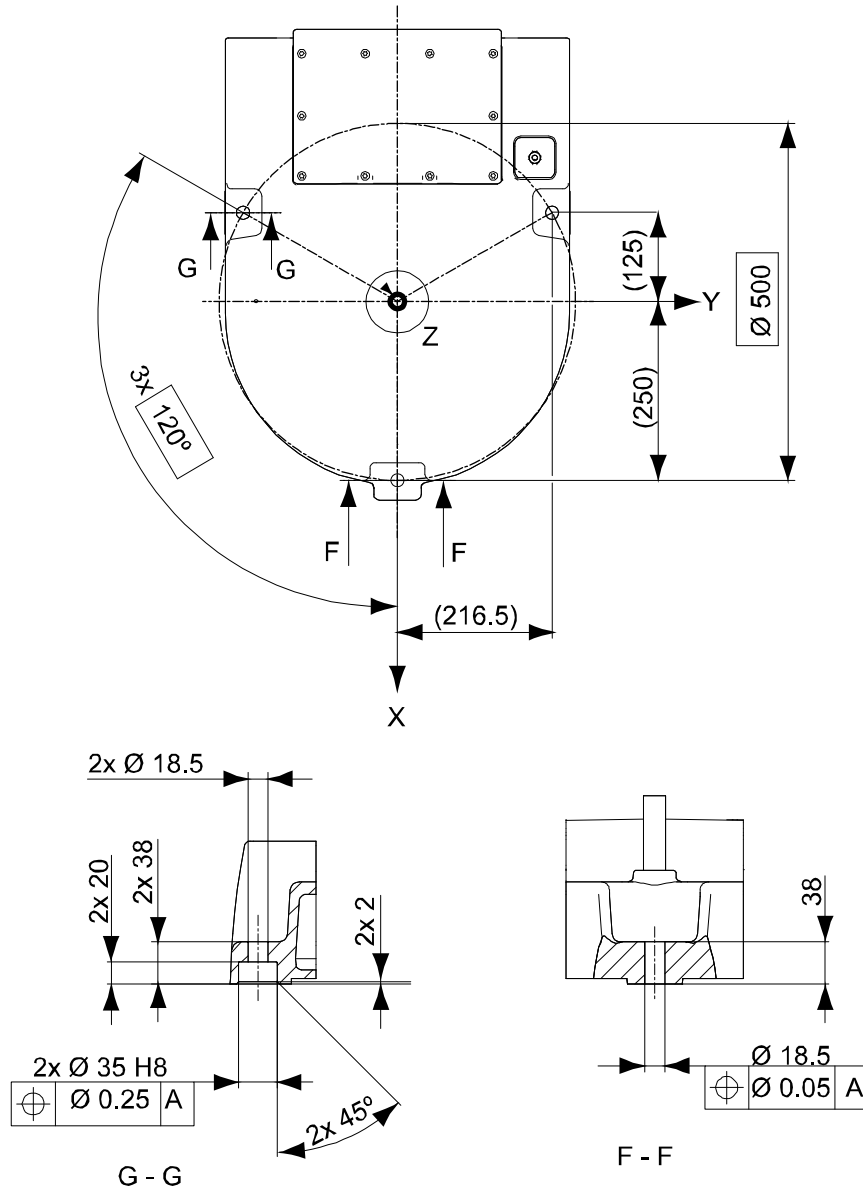
The same applies to the transverse force ( $F_{xy}$ ).

# 1 Description

## 1.3.3 Mounting the manipulator

Continued

### Fastening holes on the robot base



### Attachment bolts, specification

The table below specifies required bolts and washers for securing the robot at installation site.

| Specification           | Description   |
|-------------------------|---|
| Attachment bolts, 3 pcs | M16 x 60 (installation directly on foundation)<br>M16 x 70/80 (installation on foundation or base plate, using guiding sleeves) |
| Washers, 3 pcs          | 17 x 30 x 3   |
| Quality                 | Quality 8.8, wall mounted quality 12.9  |
| Tightening torque       | 200 Nm  |

Continues on next page





# 1 Description

---

## 1.3.3 Mounting the manipulator

*Continued*

| Position | Description   |
|----------|---|
| A        | Surface treatment, ISO 2081 Fe/Zn 8 c2, Guide bushing |
| B        | View D  |
| C        | 3x common zone  |

## 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 | <p>The calibrated robot is positioned at calibration position.</p> <p>Standard calibration data is found on the SMB (serial measurement board) or EIB in the robot.</p> <p>For robots with RobotWare 5.04 or older, the calibration data is delivered in a file, <code>calib.cfg</code>, supplied with the robot at delivery. The file identifies the correct resolver/motor position corresponding to the robot home position.</p> | Axis Calibration or Calibration Pendulum <sup>1</sup> |

*Continues on next page*

# 1 Description

## 1.4.1 Calibration methods

Continued

| Type of calibration                      | Description  | Calibration method |
|--|--|--------------------|
| Absolute accuracy calibration (optional) | <p>Based on standard calibration, and besides positioning the robot at synchronization position, the Absolute accuracy calibration also compensates for:</p> <ul style="list-style-type: none"> <li>• Mechanical tolerances in the robot structure</li> <li>• Deflection due to load</li> </ul> <p>Absolute accuracy calibration focuses on positioning accuracy in the Cartesian coordinate system for the robot.</p> <p>Absolute accuracy calibration data is found on the SMB (serial measurement board) in the robot.</p> <p>For robots with RobotWare 5.05 or older, the absolute accuracy calibration data is delivered in a file, <code>absacc.cfg</code>, supplied with the robot at delivery. The file replaces the <code>calib.cfg</code> file and identifies motor positions as well as absolute accuracy compensation parameters.</p> <p>A robot calibrated with Absolute accuracy has a sticker next to the identification plate of the robot.</p> <p>To regain 100% Absolute accuracy performance, the robot must be recalibrated for absolute accuracy after repair or maintenance that affects the mechanical structure.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;">  <div style="display: inline-block; vertical-align: middle; margin-left: 10px;"> <p><b>ABSOLUTE ACCURACY</b></p> <p style="font-size: small;">3HAC 14257-1</p> </div> </div> <p style="font-size: x-small; margin-top: 5px;">xx0400001197</p> | CalibWare          |

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

### Brief description of calibration methods

#### Calibration Pendulum method

Calibration Pendulum is a standard calibration method for calibration of all ABB robots (except IRB 6400R, IRB 640, IRB 1400H, and IRB 4400S).

Two different routines are available for the Calibration Pendulum method:

- Calibration Pendulum II
- Reference calibration

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

#### Axis Calibration method

Axis Calibration is a standard calibration method for calibration of IRB 1600/1660ID and is the most accurate method for the standard calibration. It is the recommended method in order to achieve proper performance.

Continues on next page

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.

### CalibWare - Absolute Accuracy calibration

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

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

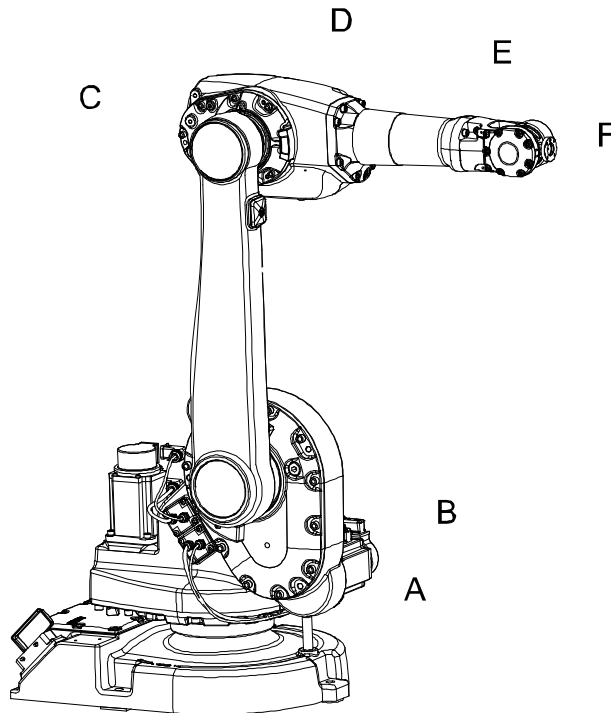
# 1 Description

## 1.4.2 Fine calibration with Calibration Pendulum

### 1.4.2 Fine calibration with Calibration Pendulum

#### General

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



xx100000891

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

#### Calibration

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

### 1.4.3 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:

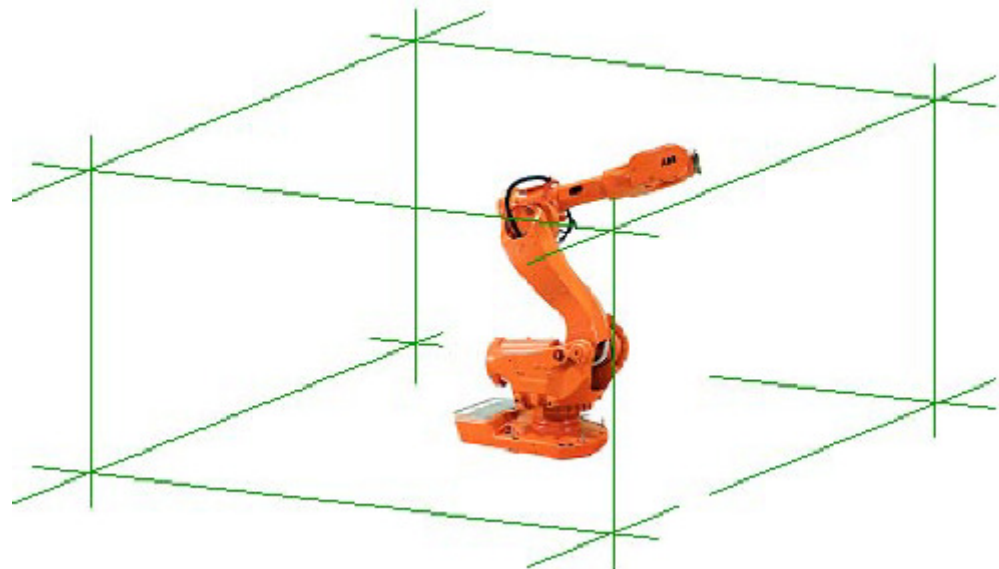
- Exchangeability of robots
- Offline programming with non or minimum touch-up
- Online programming with accurate movement and reorientation of tool
- Accurate cell alignment for MultiMove coordinated motion
- Programming with accurate offset movement in relation to eg. vision system or offset programming
- 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.



xx100000897

#### What is included

Every Absolute Accuracy robot is delivered with:

- compensation parameters saved on the robot's serial measurement board

*Continues on next page*

# 1 Description

---

## 1.4.3 Absolute Accuracy calibration

*Continued*

- a birth certificate representing the Absolute Accuracy measurement protocol for the calibration and verification sequence.

A robot with Absolute Accuracy calibration is marked on the manipulator.

Absolute Accuracy supports both floor mounted and inverted installations. The compensation parameters differ depending on if the robot is floor mounted or inverted.

---

### 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.

*Continues on next page*



### MultiMove

If the main robot in a MultiMove system has the Absolute Accuracy option, it opens up Absolute Accuracy capability for all the robots in the system. However, each robot needs to be calibrated individually.



#### Note

Note that this is the only RobotWare option that is relevant for an additional robot.



#### Note

It is possible to mix robots with and without the option Absolute Accuracy arbitrarily in a MultiMove system.

### Production data

Typical production data regarding calibration are:

| Robot   | Positioning accuracy (mm) |      |               |
|---|---------------------------|------|---------------|
|   | Average                   | Max  | % Within 1 mm |
| IRB 1600-6/1.2 0.30<br>0.65<br>-6/1.45<br>-10/1.2<br>-10/1.45 | 0.30                      | 0.65 | 100           |
| IRB 1660ID-6/1.55<br>-4/1.55                                  | 0.30                      | 0.55 | 100           |

# 1 Description

---

## 1.5.1 Introduction

## 1.5 Robot load and load diagrams

### 1.5.1 Introduction

---

#### Information



#### WARNING

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

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

- motors
- gearboxes
- mechanical structure



#### WARNING

In the robot system is the service routine LoadIdentify available, which allows the user to make an automatic definition of the tool and load, to determine correct load parameters. Please see *Operating Manual - IRC5 with FlexPendant*, art. No. 3HAC16590-1, for detailed information.



#### WARNING

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

---

#### General

The load diagrams include a nominal pay load inertia,  $J_0$  of  $0.012 \text{ kgm}^2$ , and an extra load of 15 kg for the IRB 1600-6/x variants, 5 kg for the IRB 1600-10/x variants, 10 kg for IRB 1660ID-6/1.55, 12 kg for IRB 1660ID-4/1.55, at the upper arm housing. At different moment of inertia the load diagram will be changed. For robots that are allowed tilted, wall or inverted mounted, the load diagrams as given are valid and thus it is also possible to use RobotLoad within those tilt and axis limits.

---

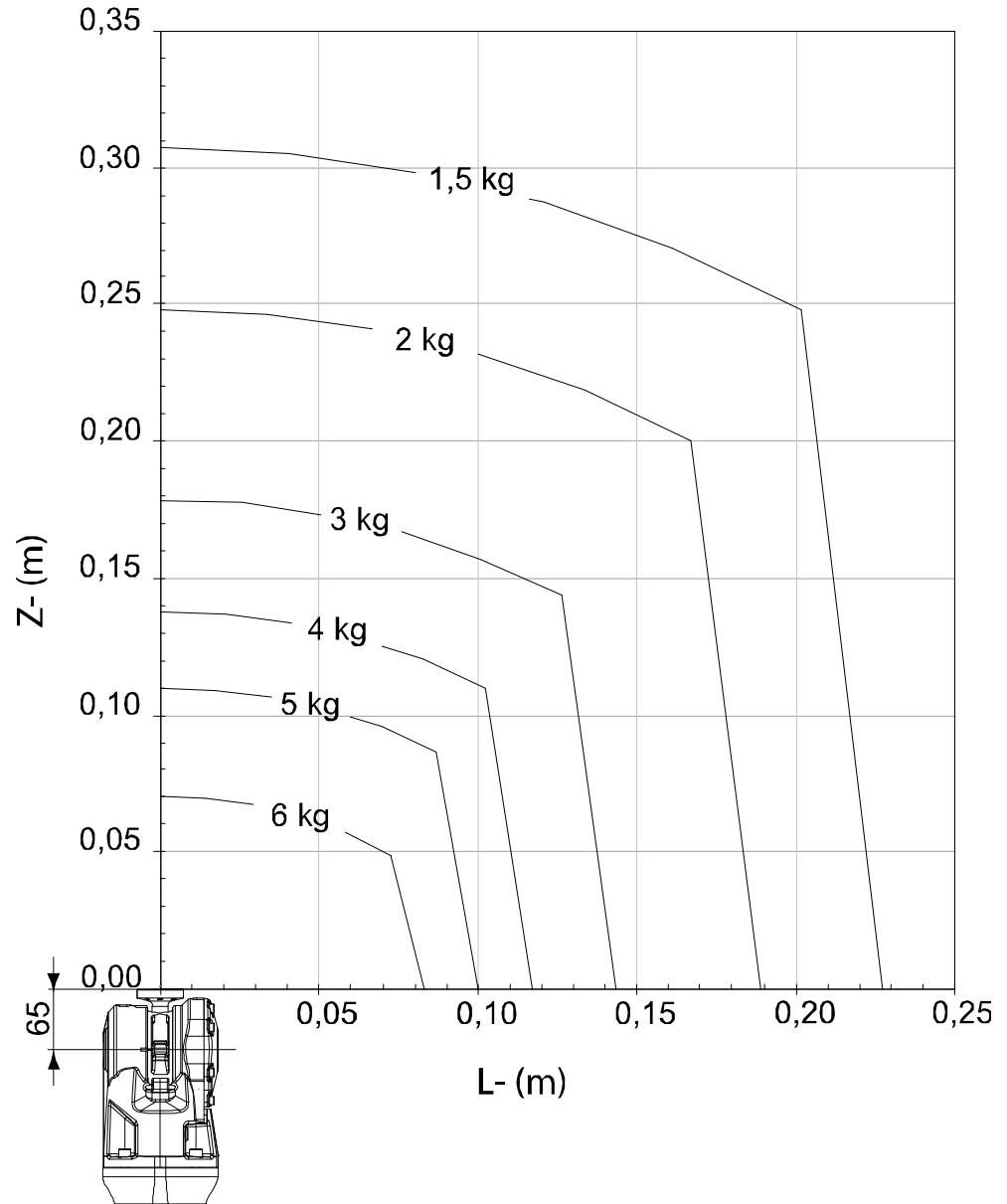
#### Control of load case by "RobotLoad"

To easily control a specific load case, use the calculation program ABB RobotLoad. Contact your local ABB organization for more information.

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

1.5.2 Load diagrams

IRB 1600-6/1.2, IRB 1600-6/1.45



xx100000899

Extra load of 15 kg at the upper arm housing included in the load diagram.

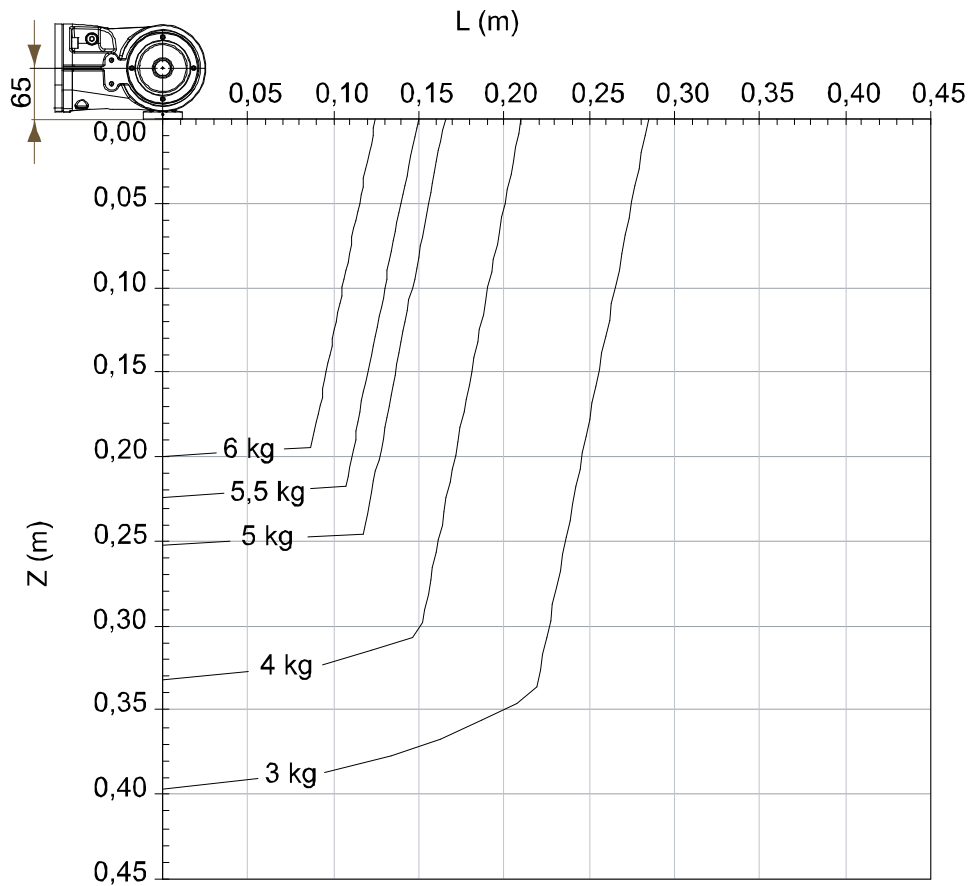
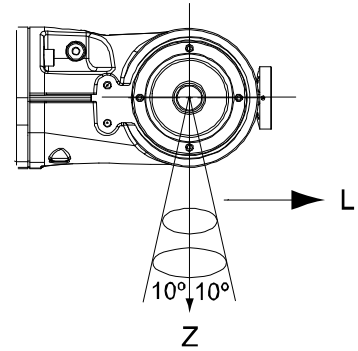
Continues on next page

# 1 Description

## 1.5.2 Load diagrams

Continued

### IRB 1600-6/1.2, IRB 1600-6/1.45 "Vertical Wrist" ( $\pm 10^\circ$ )



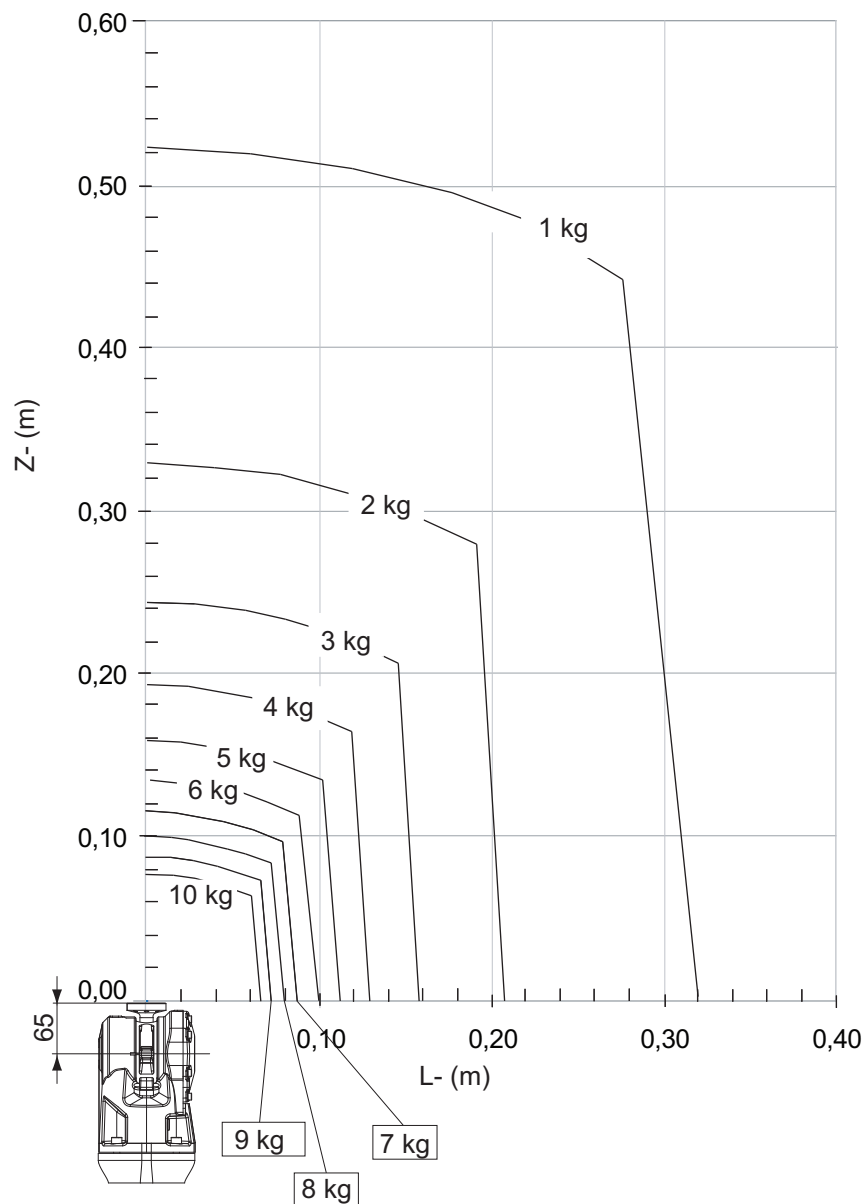
xx100000901

Extra load of 15 kg at the upper arm housing included in the load diagram.

| Description  | Values   |
|--|--|
| For wrist down ( $0^\circ$ deviation from the vertical line) and no arm loads. | Max load = 13 kg<br>$Z_{Max} = 0.057$ m<br>$L_{Max} = 0.031$ m |

Continues on next page

IRB 1600-10/1.2, IRB 1600-10/1.45



xx1200001333

Extra load of 5 kg at the upper arm housing included in the load diagram.

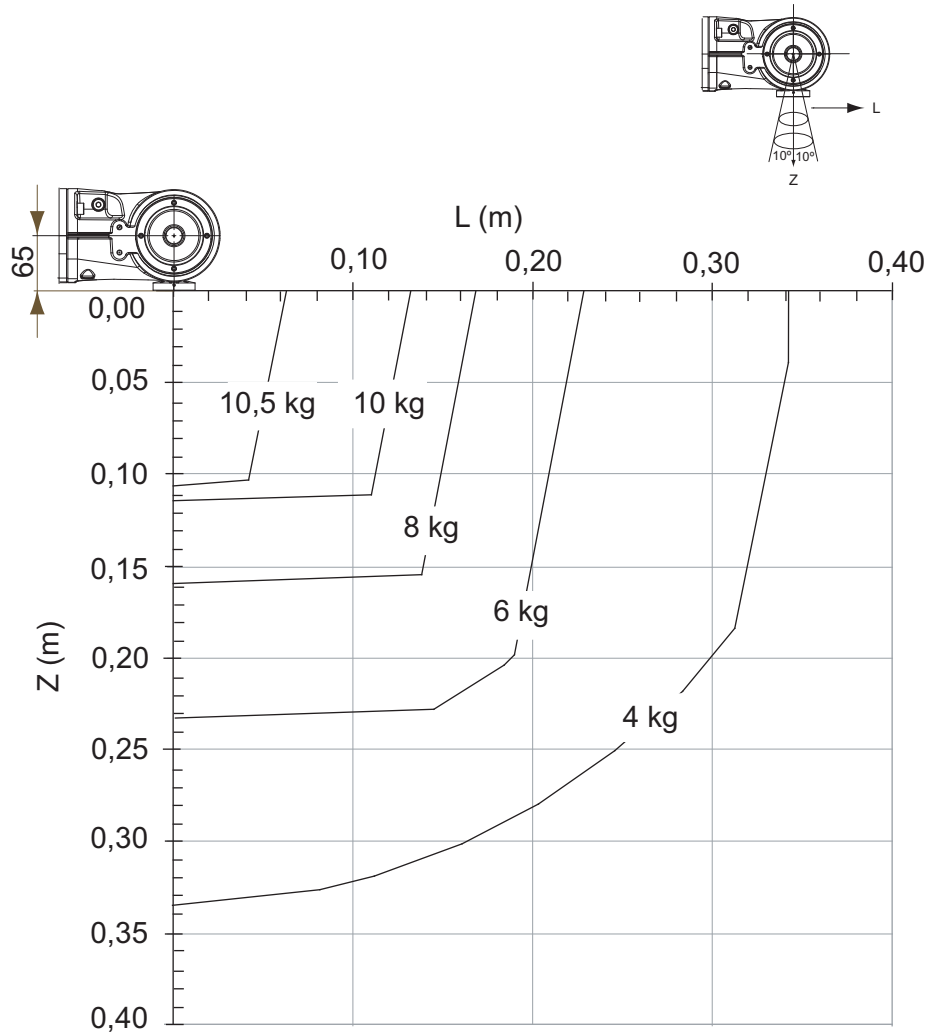
Continues on next page

# 1 Description

## 1.5.2 Load diagrams

Continued

### IRB 1600-10/1.2, IRB 1600-10/1.45 "Vertical Wrist" ( $\pm 10^\circ$ )



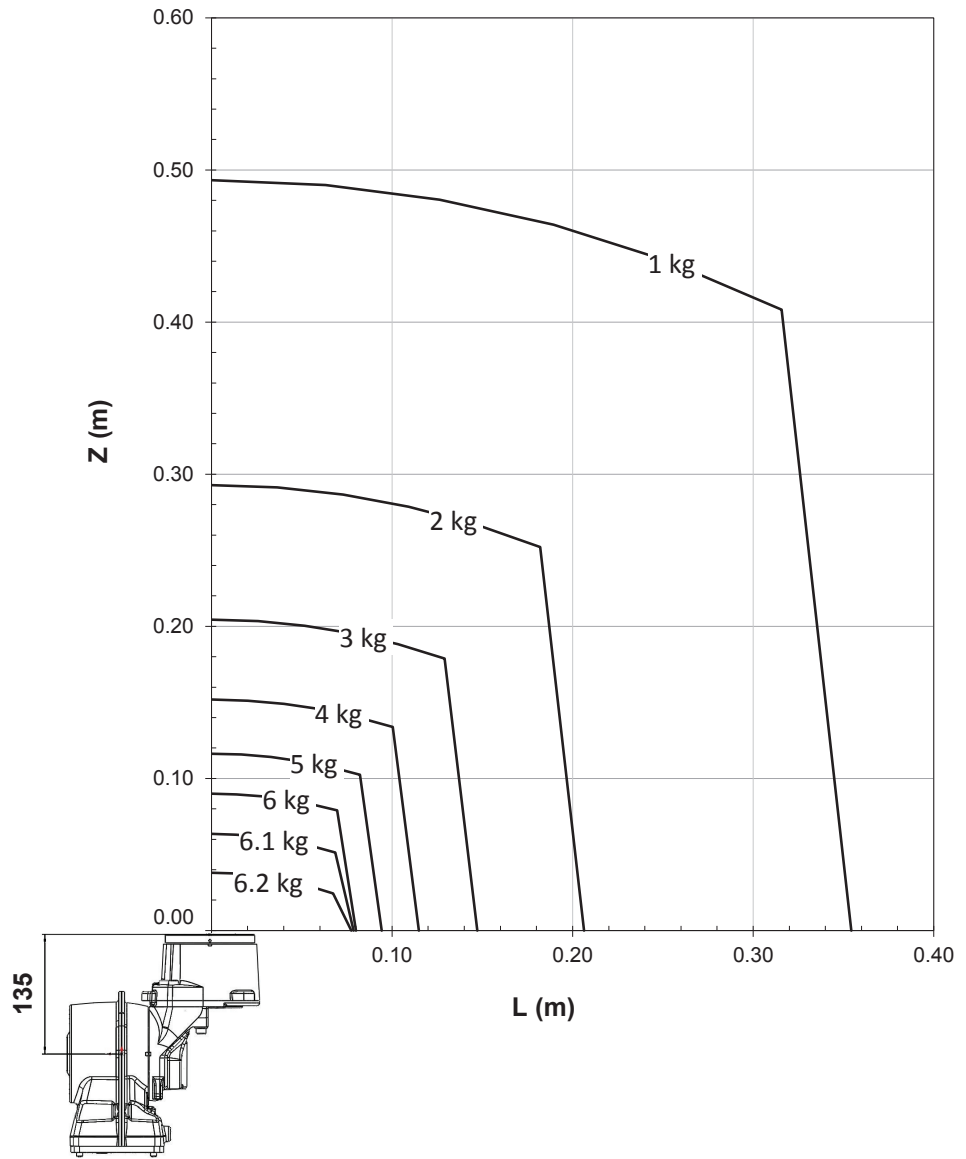
xx1200001334

Extra load of 5 kg at the upper arm housing included in the load diagram.

| Description  | Values   |
|--|--|
| For wrist down ( $0^\circ$ deviation from the vertical line) and no arm loads. | Max load = 12 kg<br>ZMax = 0.055 m<br>LMax = 0.017 m |

Continues on next page

IRB 1660ID-6/1.55



xx1500003069

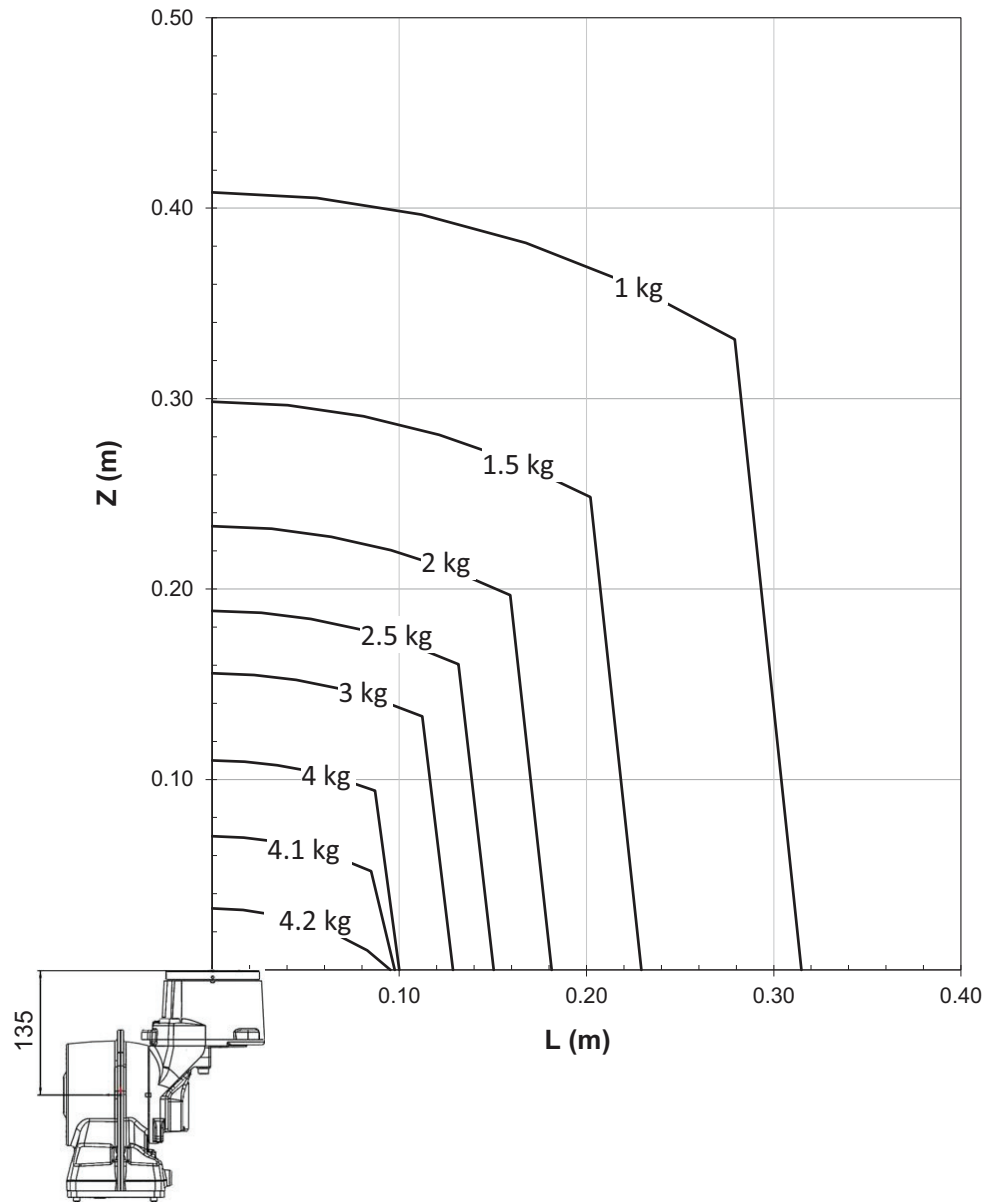
Extra load of 10 kg at the upper arm housing included in the load diagram.

Continues on next page





IRB 1660ID-4/1.55



xx1600001188

Extra load of 12 kg at the upper arm housing included in the load diagram.

# 1 Description

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

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

#### General

Total load given as: Mass in kg, center of gravity (Z and L) in m and moment of inertia ( $J_{ox}$ ,  $J_{oy}$ ,  $J_{oz}$ ) in  $\text{kgm}^2$ .  $L = \sqrt{X^2 + Y^2}$ , see Figure below.

#### Full movement of Axis 5 ( $\pm 115^\circ$ )

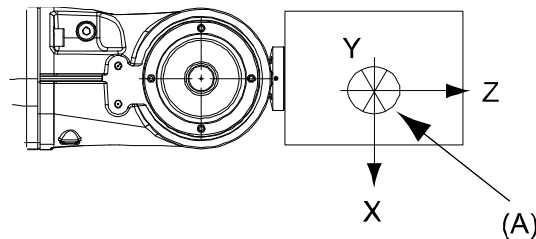
| Axis | Robot Type   | Max. value  |
|------|--------------|---|
| 5    | IRB 1600-6/x | $J_5 = \text{Mass} \times ((Z + 0.065)^2 + L^2) + \max(J_{ox}, J_{oy}) \leq 0.42 \text{ kgm}^2$ |
| 6    | IRB 1600-6/x | $J_6 = \text{Mass} \times L^2 + J_{oz} \leq 0.30 \text{ kgm}^2$                                 |

| Axis | Robot Type    | Max. value   |
|------|---------------|--|
| 5    | IRB 1600-10/x | $J_5 = \text{Mass} \times ((Z + 0.065)^2 + L^2) + \max(J_{ox}, J_{oy}) \leq 0.6 \text{ kgm}^2$ |
| 6    | IRB 1600-10/x | $J_6 = \text{Mass} \times L^2 + J_{oz} \leq 0.4 \text{ kgm}^2$                                 |

#### Full movement of Axis 5 ( $+120^\circ$ to $-120^\circ$ )

| Axis | Robot Type        | Max. value  |
|------|-------------------|---|
| 5    | IRB 1660ID-6/1.55 | $J_5 = \text{Mass} \times ((Z + 0.135)^2 + L^2) + \max(J_{ox}, J_{oy}) \leq 0.70 \text{ kgm}^2$ |
| 6    | IRB 1660ID-6/1.55 | $J_6 = \text{Mass} \times L^2 + J_{oz} \leq 0.36 \text{ kgm}^2$                                 |

| Axis | Robot Type        | Max. value  |
|------|-------------------|---|
| 5    | IRB 1660ID-4/1.55 | $J_5 = \text{Mass} \times ((Z + 0.135)^2 + L^2) + \max(J_{ox}, J_{oy}) \leq 0.60 \text{ kgm}^2$ |
| 6    | IRB 1660ID-4/1.55 | $J_6 = \text{Mass} \times L^2 + J_{oz} \leq 0.24 \text{ kgm}^2$                                 |



xx100000903

| 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. |

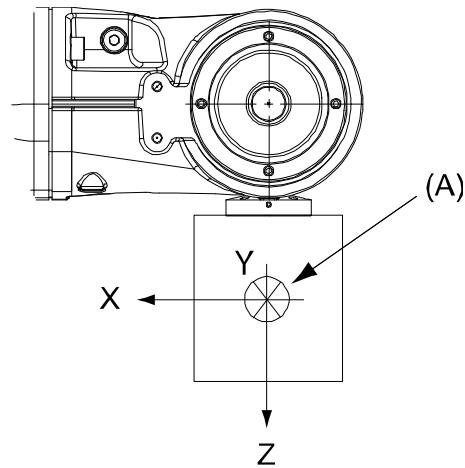
#### Limited axis 5, Center line down

| Axis | Robot Type    | Max. value  |
|------|---------------|---|
| 5    | IRB 1600-6/x  | $J_5 = \text{Mass} \times ((Z + 0.065)^2 + L^2) + \max(J_{ox}, J_{oy}) \leq 0.55 \text{ kgm}^2$ |
| 5    | IRB 1600-10/x | $J_5 = \text{Mass} \times ((Z + 0.065)^2 + L^2) + \max(J_{ox}, J_{oy}) \leq 0.65 \text{ kgm}^2$ |

Continues on next page

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

| Axis | Robot Type        | Max. value  |
|------|-------------------|---|
| 5    | IRB 1660ID-6/1.55 | $J_5 = \text{Mass} \times ((Z + 0.135)^2 + L^2) + \max(J_{ox}, J_{oy}) \leq 0.70 \text{ kgm}^2$ |
| 6    | IRB 1600-6/x      | $J_6 = \text{Mass} \times L^2 + J_{0z} \leq 0.40 \text{ kgm}^2$                                 |
| 6    | IRB 1600-10/x     | $J_6 = \text{Mass} \times L^2 + J_{0z} \leq 0.48 \text{ kgm}^2$                                 |
| 6    | IRB 1660ID-6/1.55 | $J_6 = \text{Mass} \times L^2 + J_{0z} \leq 0.36 \text{ kgm}^2$                                 |



xx100000904

| 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 Description

---

## 1.5.4 Wrist torque

### 1.5.4 Wrist torque

---

#### General

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



#### Note

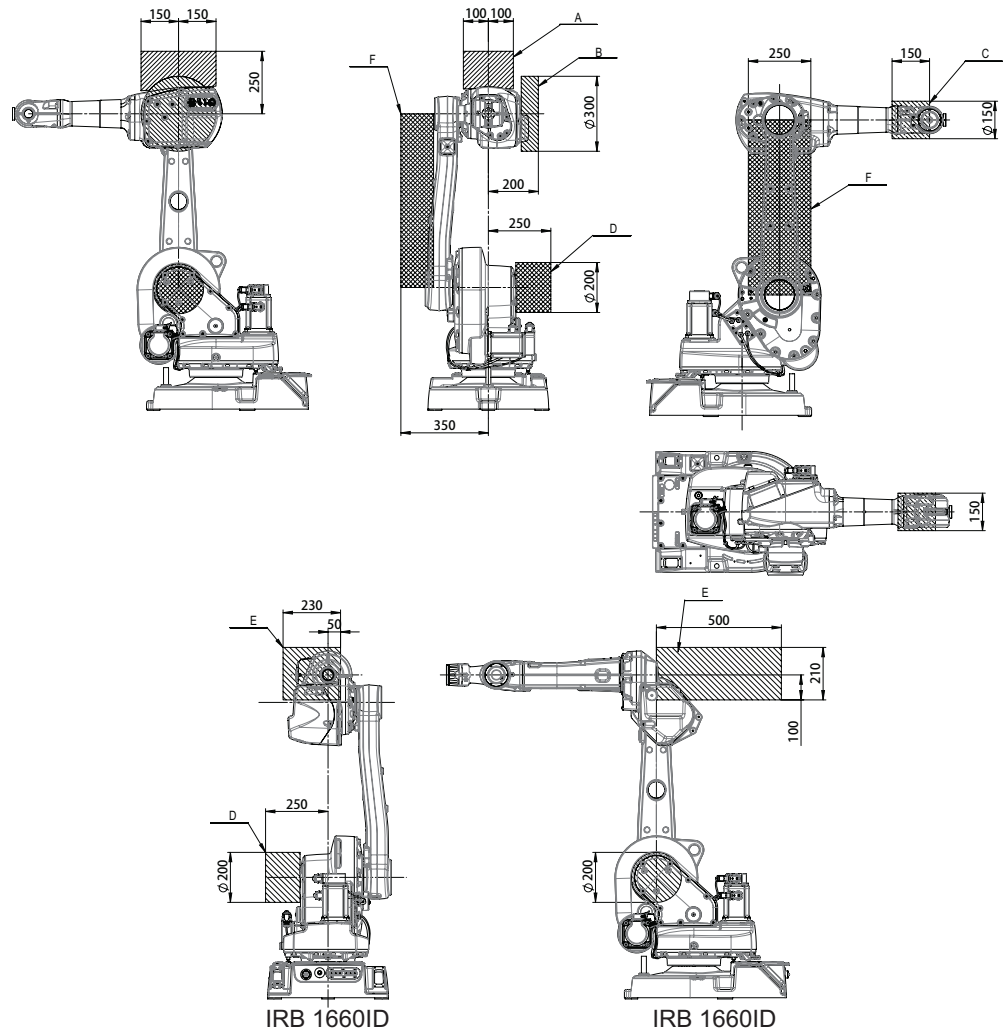
Note! The values are for reference only, and should not be used for calculating permitted load offset (position of center of gravity) within the load diagram, since those also are limited by main axes torques as well as dynamic loads. Also arm loads will influence the permitted load diagram. For finding the absolute limits of the load diagram, please use the ABB RobotLoad. Please contact your local ABB organization.

| Robot type            | Max wrist torque axis 4 and 5 | Max wrist torque axis 6 | Max torque valid at load |
|-----------------------|-------------------------------|-------------------------|--------------------------|
| IRB 1600-6/1.2(1.45)  | 8.58 Nm                       | 4.91 Nm                 | 5 kg                     |
| IRB 1600-10/1.2(1.45) | 13.93 Nm                      | 6.47 Nm                 | 10 kg                    |
| IRB 1660ID-6/1.55     | 13.24 Nm                      | 4.71 Nm                 | 6 kg                     |
| IRB 1660ID-4/1.55     | 9.61 Nm                       | 3.92 Nm                 | 4 kg                     |

1.5.5 Mounting of equipment

Load areas

Extra loads can be mounted on the wrist, the upper arm housing, and on the frame. Load areas and permitted loads are shown in graphic below. The center of gravity of the extra load shall be within the marked load areas.



xx1500001249

| Robot             | Maximum load in load area |      |        |       |       |       |       |       |
|-------------------|---------------------------|------|--------|-------|-------|-------|-------|-------|
|                   | A                         | B    | C      | D     | E     | F     | A+B+F | E+F   |
| IRB 1600-6/X      | 15 kg                     | 5 kg | 0.5 kg | 15 kg | -     | 15 kg | 15 kg | -     |
| IRB 1600-10/X     | 5 kg                      | 5 kg | 0.5 kg | 15 kg | -     | 5 kg  | 5 kg  | -     |
| IRB 1660ID-6/1.55 | -                         | -    | -      | 15 kg | 10 kg | 15 kg | -     | 15 kg |
| IRB 1660ID-4/1.55 | -                         | -    | -      | 15 kg | 12 kg | 15 kg | -     | 15 kg |

Continues on next page

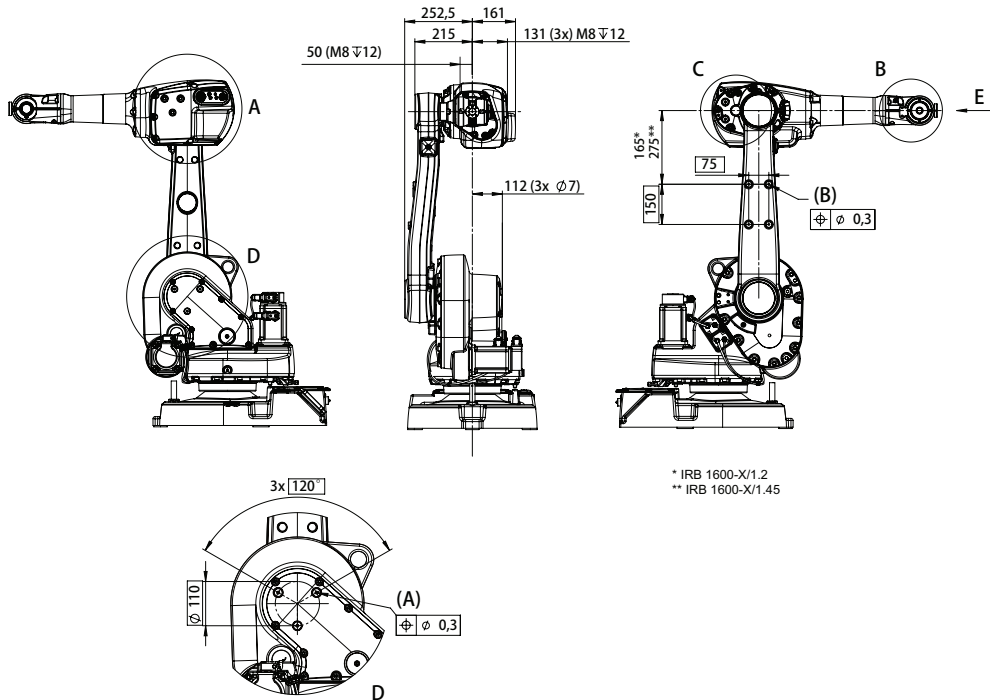
# 1 Description

## 1.5.5 Mounting of equipment

Continued

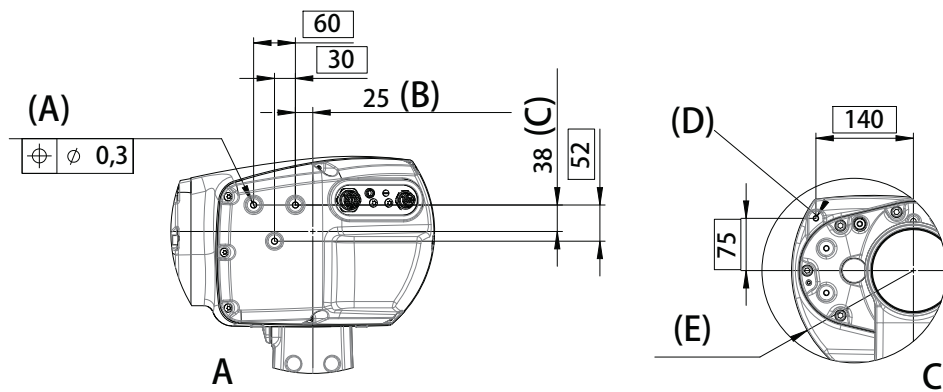
### Holes for mounting of extra equipment for IRB 1600

The robot has holes for mounting extra equipment.



xx1500003258

|   |   |
|---|---|
| A | 3x∅7 maximum depth 27, mounting holes for equipment |
| B | 4xM8 depth 12, mounting holes for equipment         |



xx1500003262

|   |   |
|---|---|
| A | 3xM8 depth 12, mounting holes for equipment |
| B | From center line axis 3                     |
| C | From center line axis 4                     |
| D | 3xM8 depth 16, mounting holes for equipment |
| E | R175, Axis 3 turning radius                 |

Continues on next page

# 1 Description

## 1.5.5 Mounting of equipment

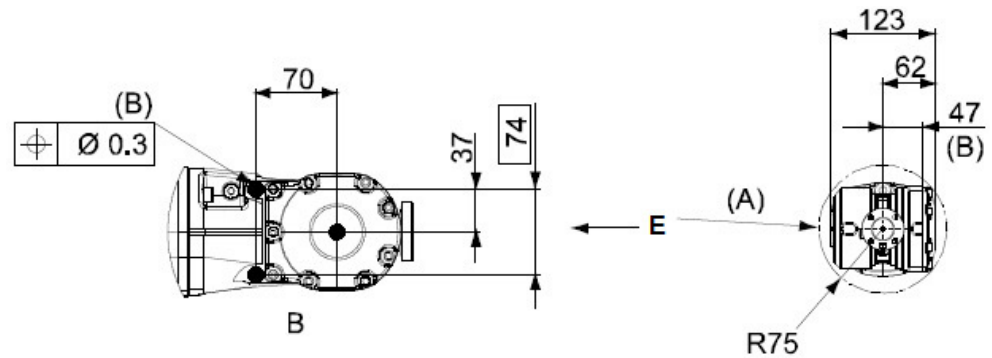
*Continued*



### Note

Note! When mounting heavier equipment, for example wire feeders in holes (A), the bracket must be supported in the opposite holes (D).

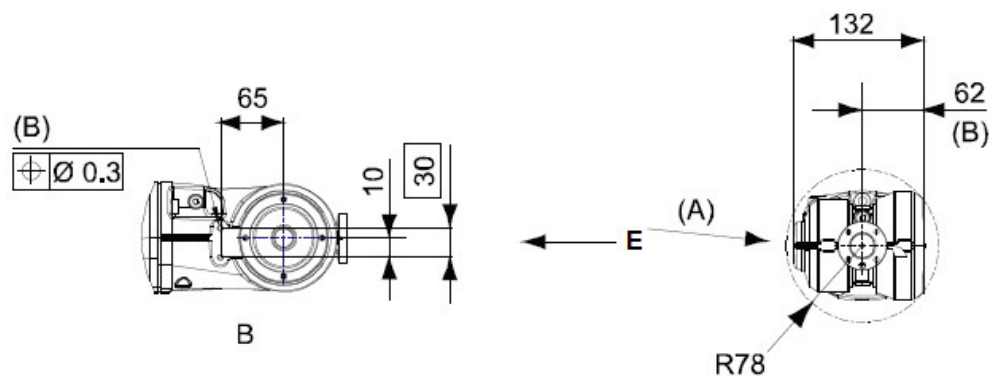
Design until June 2006



xx1500003259

|   |  |
|---|--|
| A | View from E                                  |
| B | 2xM5 depth 7.5, mounting holes for equipment |

Design after June 2006, type A



xx1500003260

|   |   |
|---|---|
| A | View from E                                 |
| B | 2xM6 depth 10, mounting holes for equipment |

*Continues on next page*

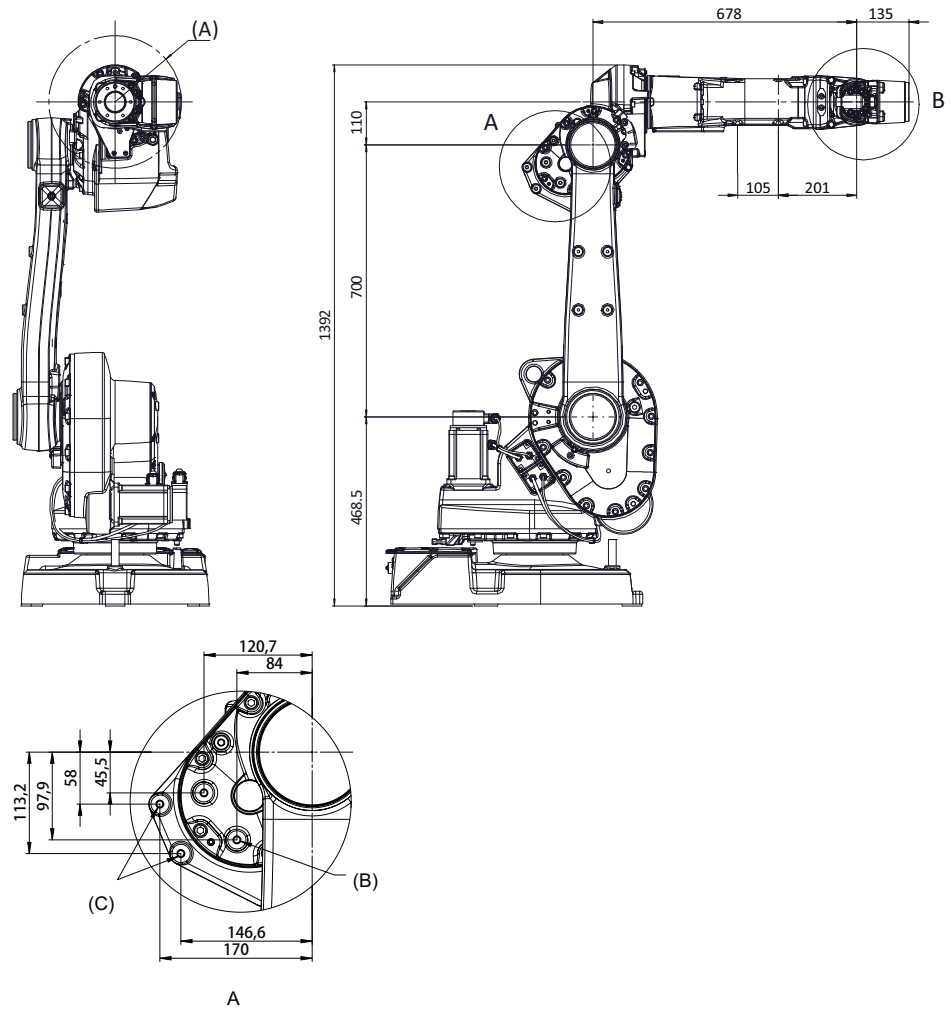
# 1 Description

## 1.5.5 Mounting of equipment

Continued

### Holes for mounting of extra equipment for IRB 1660ID

IRB 1660ID-X/1.55



xx1500001253

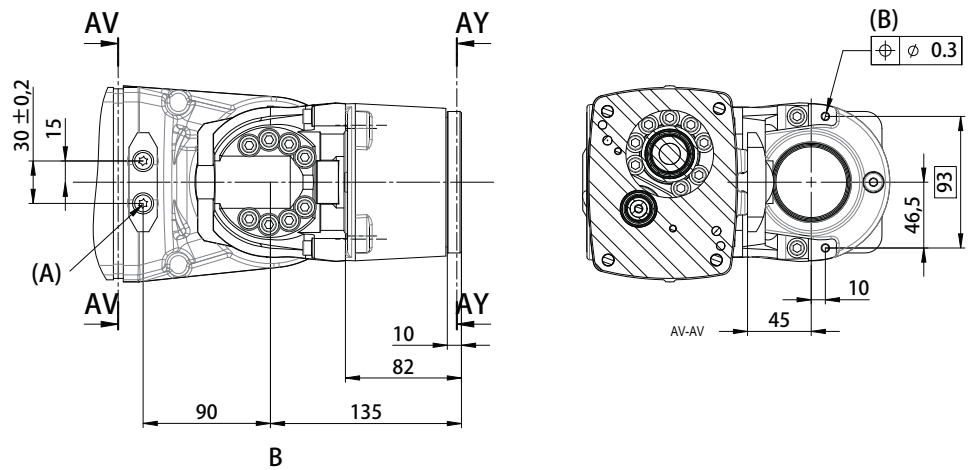
|   |   |
|---|---|
| A | R170.4, smallest circumscribed radius of axis 4 |
| B | 2xM8 depth 16, mounting holes for equipment     |
| C | 2xM8, mounting holes for equipment              |

Continues on next page



# 1 Description

## 1.5.5 Mounting of equipment Continued



xx1500001251

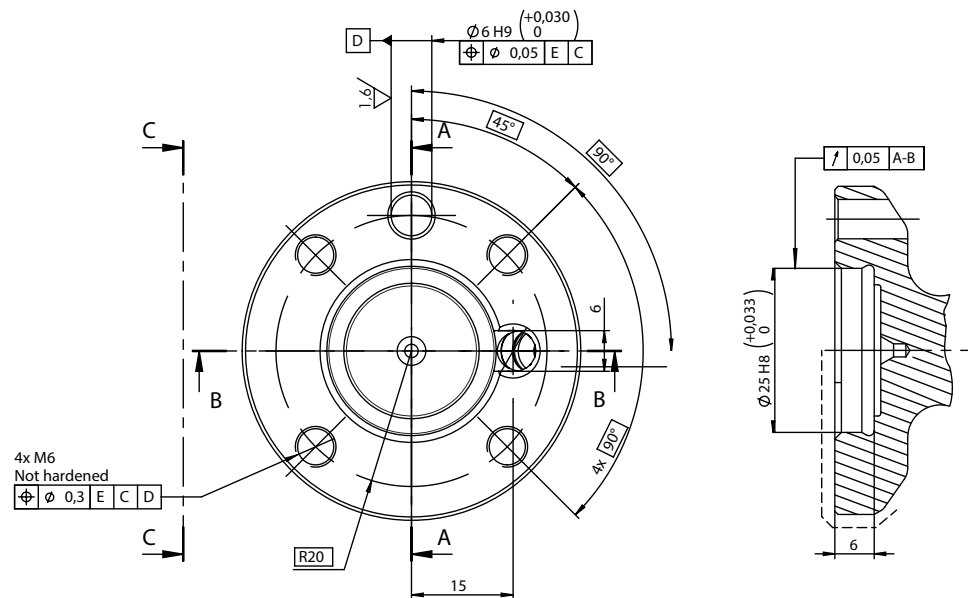
|   |   |
|---|---|
| A | 2xM6 depth 12, mounting holes for equipment |
| B | 2xM6 depth 18, mounting holes for equipment |



### Note

Lower arms among IRB 1600 and IRB 1660ID are the same. For holes on the lower arm, see [Holes for mounting of extra equipment for IRB 1600 on page 46](#).

## Robot tool flange for IRB 1600



xx1000000912

Continues on next page

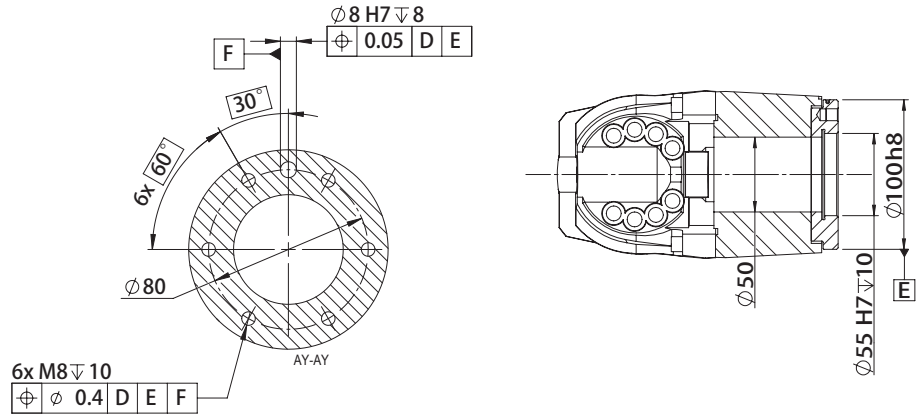
# 1 Description

## 1.5.5 Mounting of equipment

Continued

### Robot tool flange for IRB 1660ID

IRB 1660ID-X/1.55



xx1500001254

## 1.5.6 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<br>COG [m/s <sup>2</sup> ] | Controlled Motion<br>Max acceleration at nominal load<br>COG [m/s <sup>2</sup> ] |
|-------------------|---|--|
| IRB 1600 - 6/1.xx | 120   | 45   |



#### Note

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

# 1 Description

## 1.6.1 Working range

## 1.6 Robot motion

### 1.6.1 Working range

#### Range of movement - IRB 1600

| Axis | Type of motion  | Range of movement 1.2 m reach   | Range of movement 1.45 m reach  |
|------|-----------------|---|---|
| 1    | Rotation motion | +180° to -180° <sup>i</sup>   | +180° to -180° <sup>i</sup>   |
| 2    | Arm motion      | +110° to -63°<br>+136° to -63° (with axis 1 limited to ±100°)                         | +120° to -90°<br>+150° to -90° (with axis 1 limited to ±95°)                          |
| 3    | Arm motion      | +55° to -235°   | +65° to -245°   |
| 4    | Rotation motion | +200° to -200° default<br>+190 rev. <sup>ii</sup> to -190 rev. maximum <sup>iii</sup> | +200° to -200° default<br>+190 rev. <sup>ii</sup> to -190 rev. maximum <sup>iii</sup> |
| 5    | Bend motion     | +115° to -115°  | +115° to -115°  |
| 6    | Turn motion     | +400° to -400° default<br>+288 rev. <sup>ii</sup> to -288 rev. maximum <sup>iii</sup> | +400° to -400° default<br>+288 rev. <sup>ii</sup> to -288 rev. maximum <sup>iii</sup> |

- <sup>i</sup> The working range of axis 1 has the following limitations for wall mounted robots:
- IRB 1600-6/x: ± 20°
  - IRB 1600-10/x: ± 60°
- If the robot is tilted, the following combinations of tilt angles and axis 1 working ranges are allowed:
- IRB 1600-6/x: axis 1 ± 45° with tilt angles up to 30°
  - IRB 1600-10/x: axis 1 ± 180° with tilt angles up to 55°
- <sup>ii</sup> rev. = Revolutions
- <sup>iii</sup> The default working range for axis 4 and 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).

#### Range of movement - IRB 1660ID

| Axis | Type of motion  | Range of movement 1.55 m reach  |
|------|-----------------|---|
| 1    | Rotation motion | +180° to -180° <sup>i</sup>   |
| 2    | Arm motion      | +150° to -90°   |
| 3    | Arm motion      | +79° to -238°   |
| 4    | Rotation motion | +175° to -175°  |
| 5    | Bend motion     | +120° to -120°  |
| 6    | Turn motion     | +400° to -400°<br>+191 rev. <sup>ii</sup> to -191 rev. maximum <sup>iii</sup> |

- <sup>i</sup> The working range of axis 1 has the following limitations for wall mounted robots:
- IRB 1660ID-X/1.55: ±45°
- If the robot is tilted, the working range with tilt angles is:
- ± 180° with tilt angles up to 45°
- <sup>ii</sup> rev. = Revolutions
- <sup>iii</sup> 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).

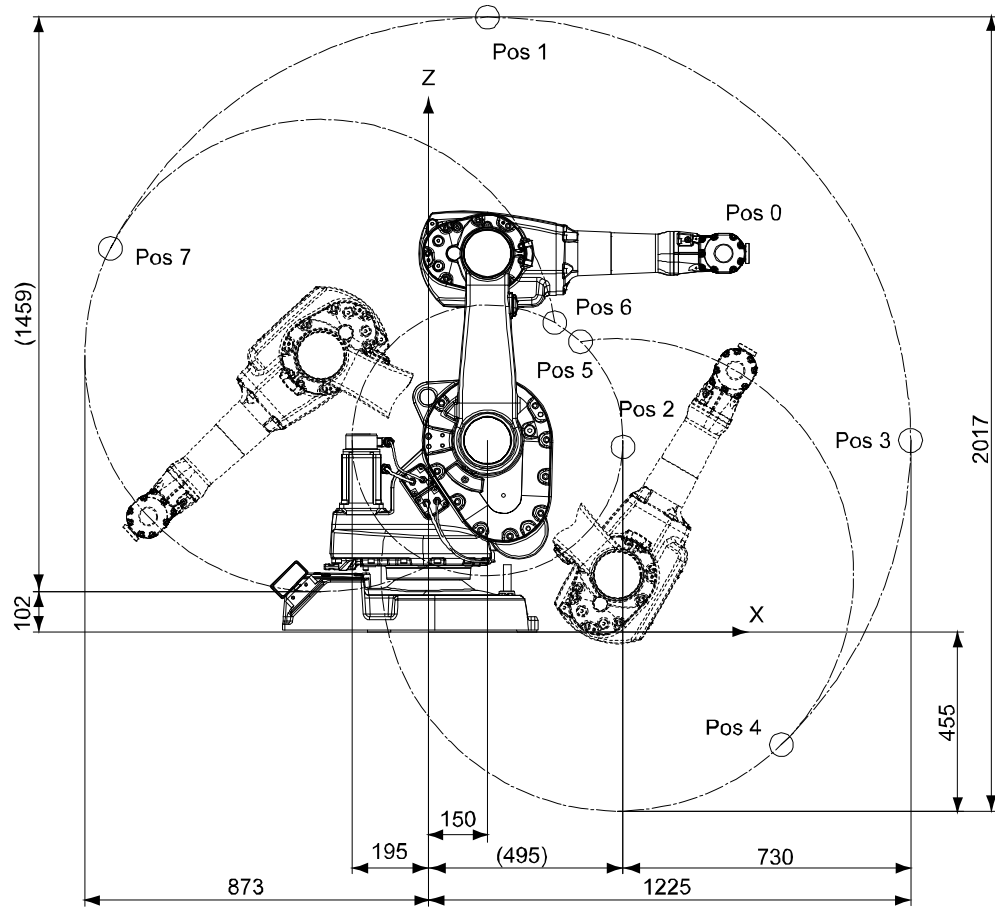
Continues on next page

# 1 Description

## 1.6.1 Working range

*Continued*

### Positions at wrist center 1.2 m reach



xx1000000914

| Position | X (mm) | Z (mm) | Axis 2 angle (degrees) | Axis 3 angle (degrees) |
|----------|--------|--------|------------------------|------------------------|
| 0        | 750    | 962    | 0                      | 0                      |
| 1        | 150    | 1562   | 0                      | -90                    |
| 2        | 494    | 470    | 0                      | +55                    |
| 3        | 1225   | 487    | +90                    | -90                    |
| 4        | 897    | -287   | +136                   | -90                    |
| 5        | 386    | 737    | +136                   | -235                   |
| 6        | 321    | 786    | -63                    | +55                    |
| 7        | -808   | 975    | -63                    | -90                    |

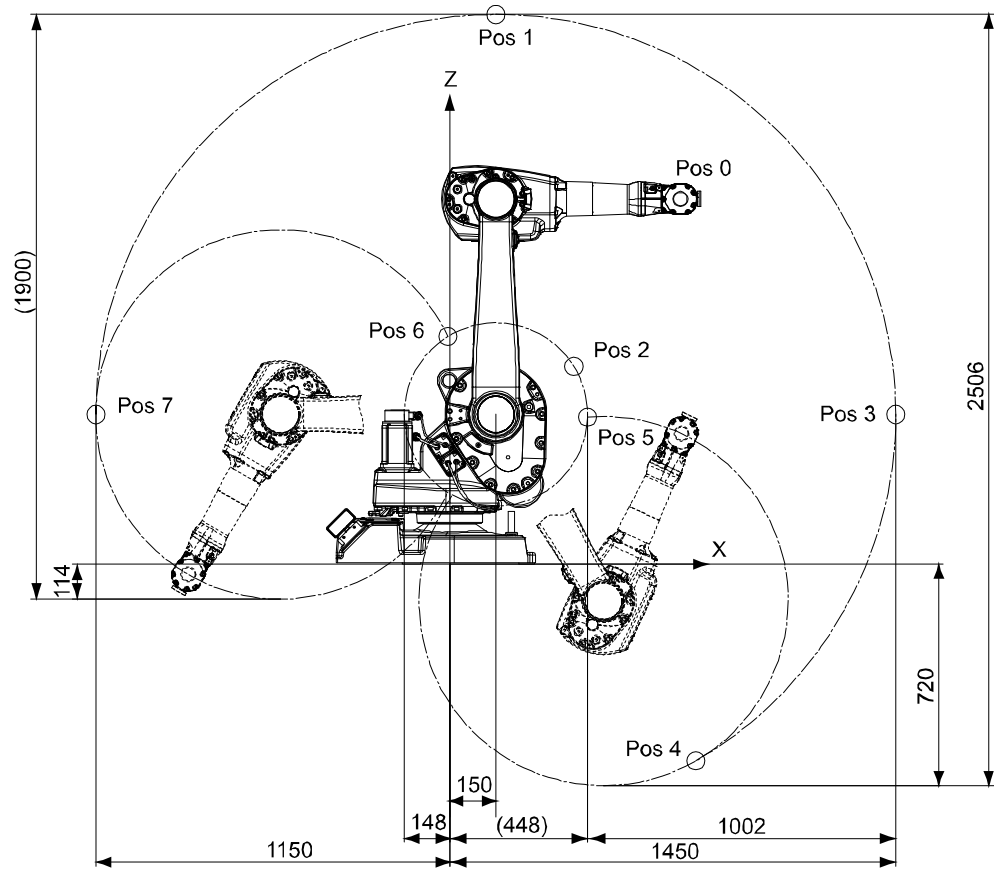
*Continues on next page*

# 1 Description

## 1.6.1 Working range

Continued

### Positions at wrist center 1.45 m reach



xx100000915

| Position | X (mm) | Z (mm) | Axis 2 angle (degrees) | Axis 3 angle (degrees) |
|----------|--------|--------|------------------------|------------------------|
| 0        | 750    | 1187   | 0                      | 0                      |
| 1        | 150    | 1787   | 0                      | -90                    |
| 2        | 404    | 643    | 0                      | +65                    |
| 3        | 1450   | 487    | +90                    | -90                    |
| 4        | 800    | -639   | +150                   | -90                    |
| 5        | 448    | 478    | +150                   | -245                   |
| 6        | -6     | 740    | -90                    | +65                    |
| 7        | -1150  | 487    | -90                    | -90                    |

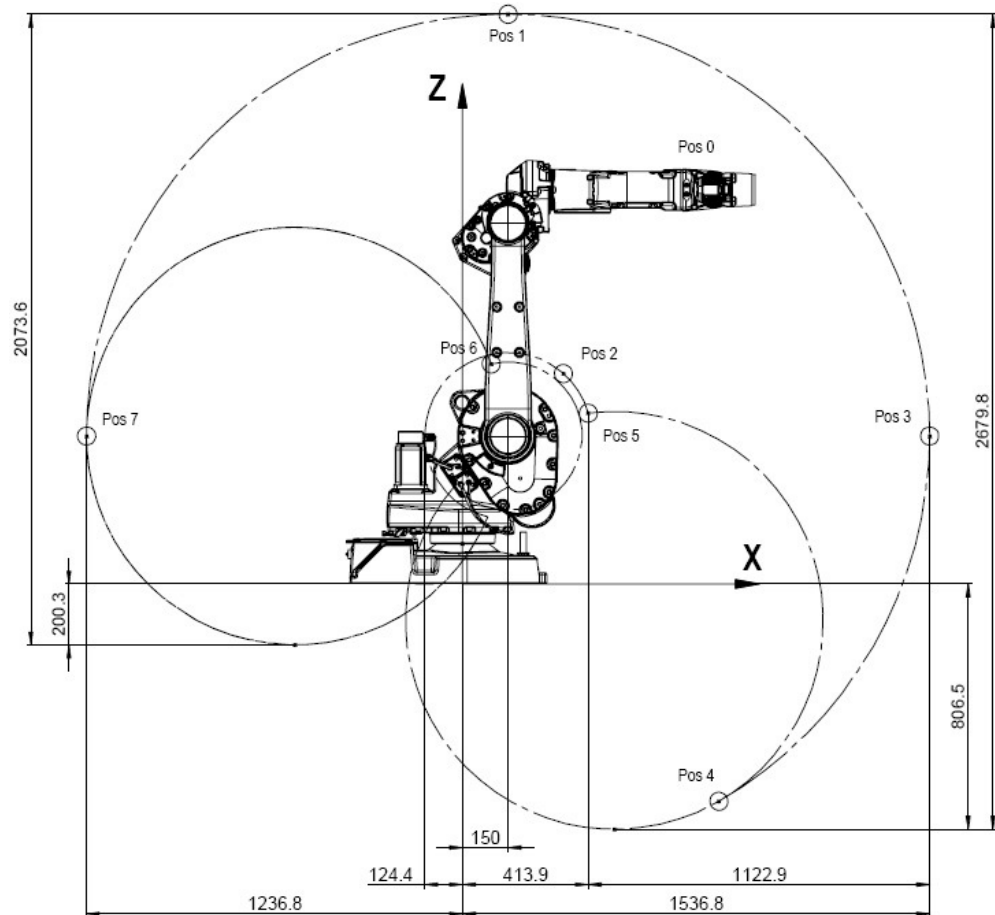
Continues on next page

# 1 Description

## 1.6.1 Working range Continued

### Positions at wrist center IRB 1660ID

IRB 1660ID-X/1.55



xx1500001246

| Position | X (mm)   | Z (mm)  | Axis 2 angle (degrees) | Axis 3 angle (degrees) |
|----------|----------|---------|------------------------|------------------------|
| 0        | 828      | 1,296.5 | 0                      | 0                      |
| 1        | 150      | 1,873.3 | 0                      | -81                    |
| 2        | 332.2    | 691.7   | 0                      | +79                    |
| 3        | 1,536.8  | 486.5   | +90                    | -81                    |
| 4        | 843.4    | -714.5  | +150                   | -81                    |
| 5        | 413.9    | 561.7   | +150                   | -238                   |
| 6        | 94.6     | 723.7   | -90                    | +79                    |
| 7        | -1,236.8 | 486.5   | -90                    | -81                    |

Continues on next page

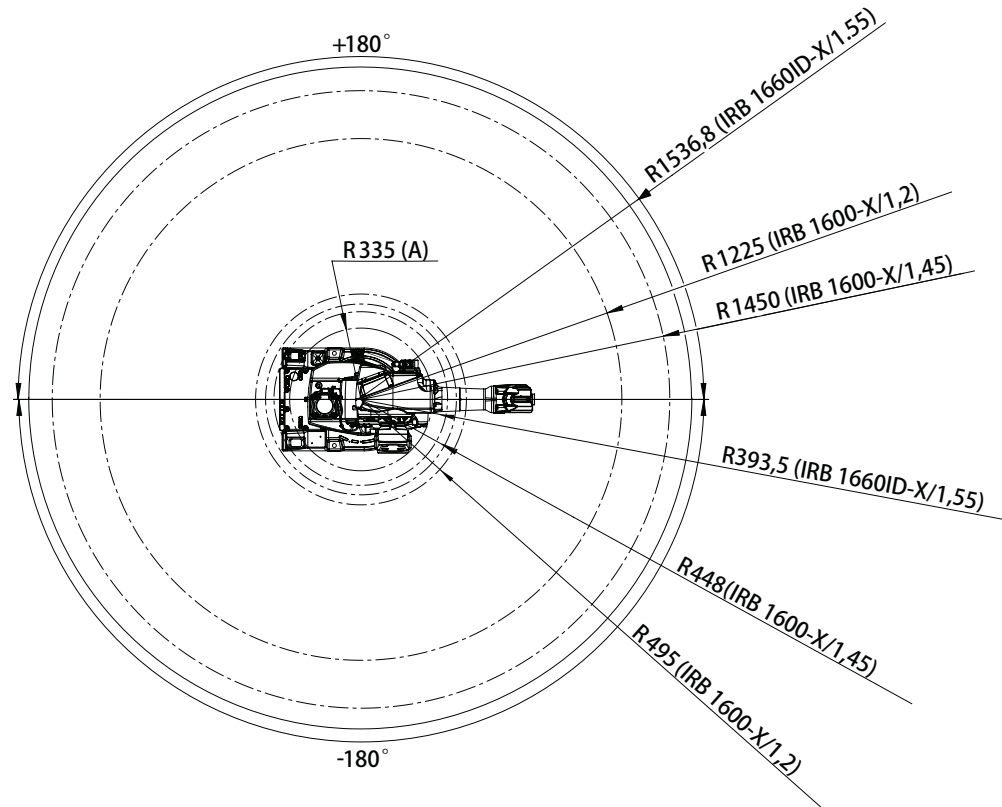
# 1 Description

## 1.6.1 Working range

Continued

### Turning radius

The turning radius for the robot is shown in the figure below. Notice the differences depending on the length of the lower arm.



xx1500002817

|     |  |
|-----|--|
| (A) | Minimum turning radius axis 1 (all models) |
|-----|--|

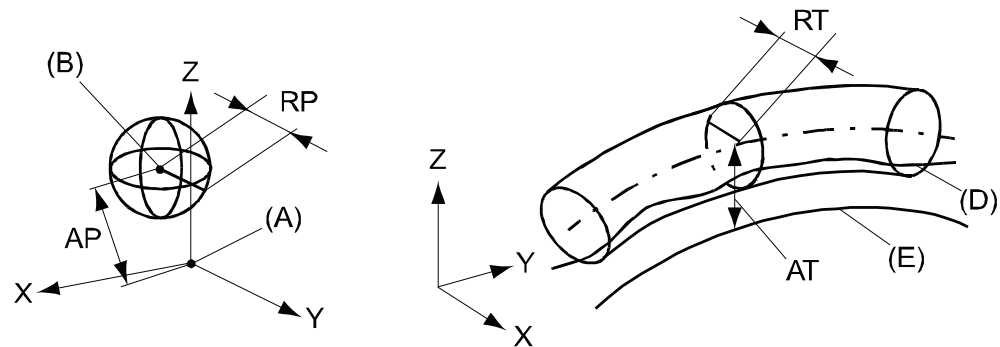


1.6.2 Performance according to ISO 9283

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.



xx080000424

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

| Description   | IRB 1600 |         |                    |                    | IRB 1660ID         |                    |
|---|----------|---------|--------------------|--------------------|--------------------|--------------------|
|   | -6/1.2   | -6/1.45 | -10/1.2            | -10/1.45           | -6/1.55            | -4/1.55            |
| Pose repeatability, RP (mm)   | 0.02     | 0.02    | 0.02               | 0.05               | 0.02               | 0.02               |
| Pose accuracy, AP <sup>i</sup> (mm)                                 | 0.04     | 0.04    | 0.01               | 0.02               | 0.02               | 0.03               |
| Linear path repeatability, RT (mm)                                  | 0.13     | 0.19    | 0.06 <sup>ii</sup> | 0.13 <sup>ii</sup> | 0.05               | 0.08               |
| Linear path accuracy, AT (mm)                                       | 0.97     | 1.03    | 0.20 <sup>ii</sup> | 0.26 <sup>ii</sup> | 0.25 <sup>ii</sup> | 0.23 <sup>ii</sup> |
| Pose stabilization time, (PSt) to within 0.2 mm of the position (s) | 0.11     | 0.11    | 0.09               | 0.09               | N/A                | N/A                |

Continues on next page

# 1 Description

---

## 1.6.2 Performance according to ISO 9283

*Continued*

| Description   | IRB 1600 |         |         |          | IRB 1660ID |         |
|---|----------|---------|---------|----------|------------|---------|
|   | -6/1.2   | -6/1.45 | -10/1.2 | -10/1.45 | -6/1.55    | -4/1.55 |
| Pose stabilization time, (PSt) to within 0.1 mm of the position (s) | N/A      | N/A     | N/A     | N/A      | 0.20       | 0.13    |

- 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.
- ii Measured at a velocity of 250 mm/s.

The above values are the range of average test results from a number of robots.

### 1.6.3 Velocity

#### 3-phase power supply

| Axis No. | IRB 1600-6/1.2<br>IRB 1600-6/1.45 | IRB 1600-10/1.2<br>IRB 1600-10/1.45 | IRB 1660ID-6/1.55<br>IRB 1660ID-4/1.55 |
|----------|-----------------------------------|-------------------------------------|--|
| 1        | 150°/s                            | 180°/s                              | 180°/s                                 |
| 2        | 160°/s                            | 180°/s                              | 180°/s                                 |
| 3        | 170°/s                            | 185°/s                              | 180°/s                                 |
| 4        | 320°/s                            | 385°/s                              | 320°/s                                 |
| 5        | 400°/s                            | 400°/s                              | 360°/s                                 |
| 6        | 460°/s                            | 460°/s                              | 500°/s                                 |

#### 1-phase power supply

When the robot uses a single phase power supply, like with Compact controller, the performance regarding max axis speed is reduced, see table below. The reduced top speed can be increased if the power supply minimum voltage is higher than the default setting 187 V (220x0.85). See, "Mains tolerance min", in the Technical reference manual - System Parameters "How to optimize drive system parameters".

Note that the robot acceleration is not affected by the single phase power supply. Thus the cycle time may not be affected at all. To test the cycle RobotStudio can be used. The RobotStudio also allows modification of "Mains tolerance min".

| Axis No. | IRB 1600-6/1.2<br>IRB 1600-6/1.45 | IRB 1600-10/1.2<br>IRB 1600-10/1.45 | IRB 1660ID-6/1.55 | IRB 1660ID-4/1.55 |
|----------|-----------------------------------|-------------------------------------|-------------------|-------------------|
| 1        | 144°/s                            | 144°/s                              | 142°/s            | 142°/s            |
| 2        | 130°/s                            | 139°/s                              | 141°/s            | 141°/s            |
| 3        | 153°/s                            | 163°/s                              | 157°/s            | 157°/s            |
| 4        | 320°/s                            | 376°/s                              | 320°/s            | 320°/s            |
| 5        | 364°/s                            | 354°/s                              | 329°/s            | 329°/s            |
| 6        | 460°/s                            | 460°/s                              | 368°/s            | 371°/s            |

#### Axis Resolution

Approx. 0.001° on each axis.

# 1 Description

---

## 1.6.4 Robot stopping distances and times

### 1.6.4 Robot stopping distances and times

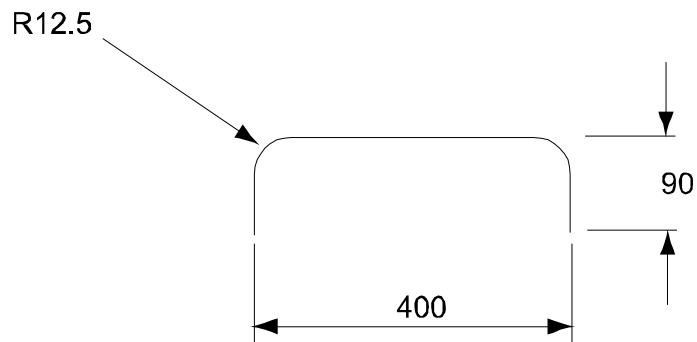
---

#### Introduction

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

1.7 Typical cycle times

General



xx1000000917

Approximate cycle times

|                         | IRB 1600-6/x | IRB 1600-10/x |
|-------------------------|--------------|---------------|
| Pay load at wrist down  | 7 kg         | 10 kg         |
| Cycle time Packer cycle | 0.95 s       | 1.01 s        |

# 1 Description

## 1.8 Customer connectors on the robot

### 1.8 Customer connectors on the robot

#### General

Customer connections are options, the cables for them are integrated in the robot and the connectors are placed on the upper arm housing.

The customer connections are:

- The standard connections for signals, power and air.
- The integrated wire feed cabling for signals and power.
- The 7-axis connection.

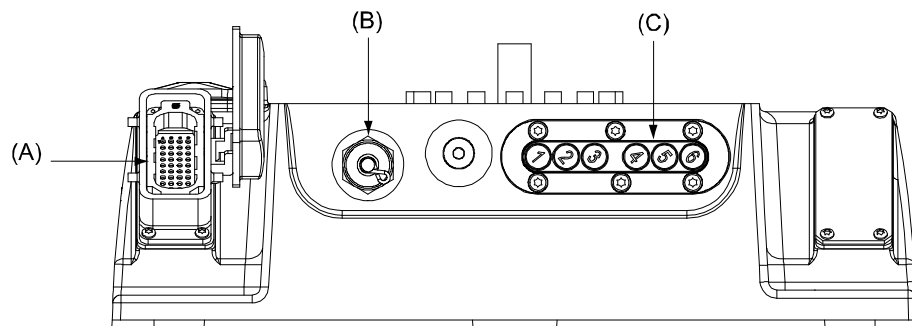


#### Note

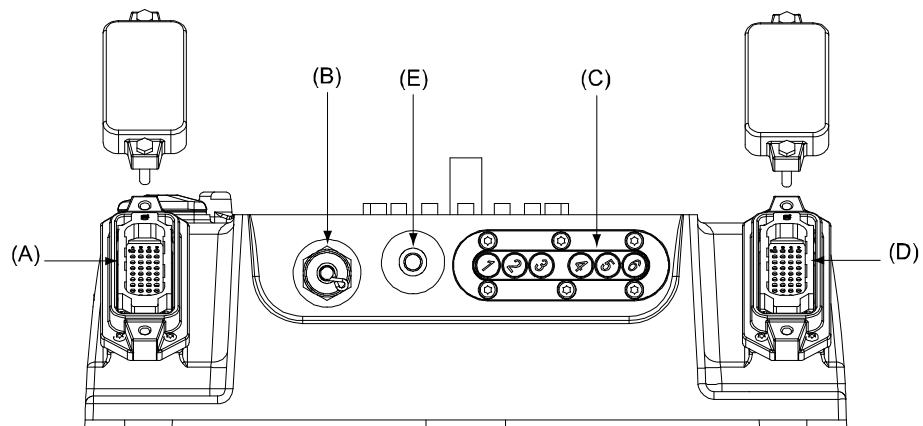
No customer/application connections are available for IRB 1660ID.

#### Connections at robot base

The graphics below show the customer connections on the robot base. For description of all connection types see [Connection table on page 63](#).

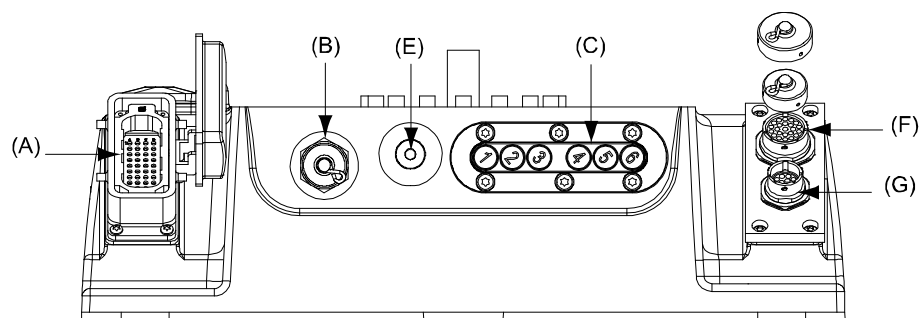


xx100000918

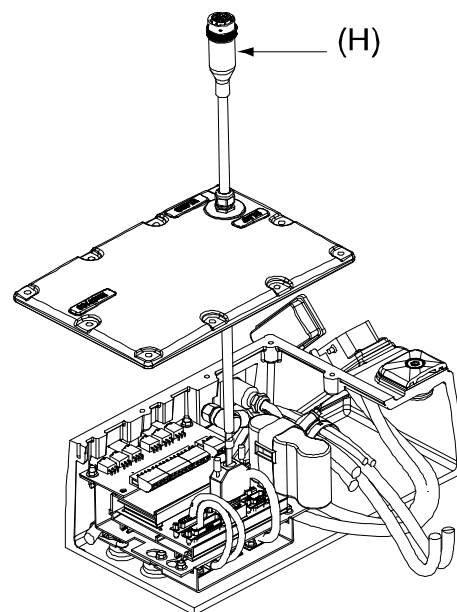


xx100000919

Continues on next page



xx100000920



xx100000921

### Connection table

| Pos | Connection type | Description                                       |
|-----|-----------------|---|
| A   | R1.MP           | Motor power                                       |
| B   | R1.SMB          | Serial measurement board signal                   |
| C   | -               | Robot axes brake release buttons                  |
| D   | R.1 CP/CS       | Standard customer power and customer signal       |
| E   | R.1Air          | Standard air                                      |
| F   | R1.CS           | Customer signal for integrated wirefeed interface |
| G   | R1.CP           | Customer power for integrated wirefeed interface  |
| H   | R1.FB7          | Axis 7 connection, 1.5 m cable                    |

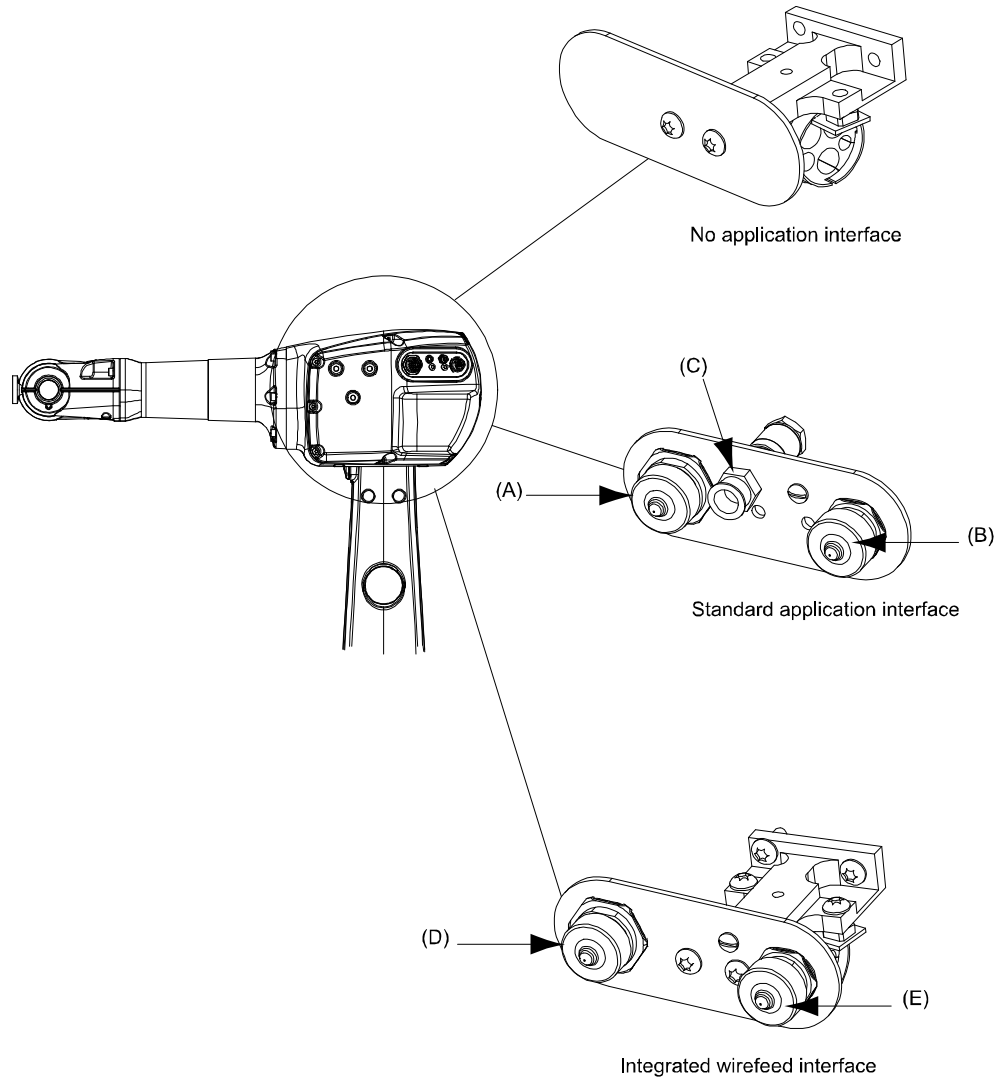
*Continues on next page*

# 1 Description

## 1.8 Customer connectors on the robot

Continued

### Connections on upper arm



xx100000922

| Pos | Connection type | Description                                       |
|-----|-----------------|---|
| A   | R2.CP           | Standard customer power                           |
| B   | R2.CS           | Standard customer signal                          |
| C   | R2.Air          | Standard air                                      |
| D   | R2.CP           | Customer power for integrated wirefeed interface  |
| E   | R2.CS           | Customer signal for integrated wirefeed interface |



### 1.9 Maintenance and trouble shooting

---

#### General

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

- Maintenance-free AC motors are used.
- Oil and grease are used for the gear boxes.
- The cabling is routed for longevity, and in the unlikely event of a failure, its modular design makes it easy to change.
- It has a program memory “battery low” alarm.

---

#### Maintenance

The maintenance intervals depend on the use of the robot, the required maintenance activities also depends on selected options. For detailed information on maintenance procedures, see *Product manual - IRB 1600/1660*.

**This page is intentionally left blank**

## 2 Specification of variants and options

### 2.1 Introduction to variants and options

---

#### General

The different variants and options for the IRB 1600/1660ID 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 Specification of variants and options

---

### 2.2 Manipulator

### 2.2 Manipulator

---

#### Variants

| Option  | IRB Type | Handling capacity (kg)/Reach (m) |
|---------|----------|----------------------------------|
| 435-89  | 1600     | 10/1.2                           |
| 435-90  | 1600     | 10/1.45                          |
| 435-91  | 1600     | 6/1.2                            |
| 435-92  | 1600     | 6/1.45                           |
| 435-133 | 1660ID   | 4/1.55                           |
| 435-134 | 1660ID   | 6/1.55                           |

---

#### Manipulator color

| Option     | Name                              | Note           |
|------------|-----------------------------------|----------------|
| 209-1      | ABB Orange standard               |                |
| 209-2      | ABB White standard                |                |
| 209-202    | ABB Graphite White standard       | Standard color |
| 209-4--192 | Painted with the chosen RAL-color |                |



#### Note

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

---

#### Protection

| Option | Name     | Description |
|--------|----------|-------------|
| 287-4  | Standard | IP 54       |

*Continues on next page*

| Option | Name         | Description   |
|--------|--------------|---|
| 287-3  | Foundry Plus | <p>The Foundry Plus option is 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 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 robot. The Foundry Plus 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.</p> <p>Selected Foundry Plus/Foundry Plus 2 features:</p> <ul style="list-style-type: none"> <li>• Improved sealing to prevent penetration into cavities to secure IP67</li> <li>• Additional protection of cabling and electronics</li> <li>• Special covers protecting cavities</li> <li>• Well-proven connectors</li> <li>• Rust preventives on screws, washers and unpainted/machined surfaces</li> <li>• Extended service and maintenance program</li> </ul> <p>Selected Foundry Plus/Foundry Plus 2 features: The Foundry Plus 2 robot can be cleaned with appropriate washing equipment.</p> <p>Not valid for IRB 1660ID.</p> |

### Application interface Connected to

| Option | Name                 | Description   |
|--------|----------------------|---|
| 16-1   | Cabinet <sup>i</sup> | <p>The signals are connected to 12-pole screw terminals, Phoenix MSTB 2.5/12-ST-5.08, to the Control Module. Not together with option 17-6 Integrated wire feed cabling.</p> <p>Not valid for IRB 1660ID.</p> |

<sup>i</sup> Note! In a MultiMove application, additional robots have no Control Module. The screw terminal with internal cabling are then delivered separately to be mounted in the main robot Control Module or in another encapsulation, for example a PLC cabinet.

*Continues on next page*

## 2 Specification of variants and options

### 2.2 Manipulator

Continued

#### Application interface Connection type

| Option            | Name                          | Description   |   |
|-------------------|-------------------------------|---|---|
| 17-5 <sup>i</sup> | Standard                      | One Souriau UTOW6 1210 P-H<br>One Souriau UTOW6 1626 P-H<br>Signals 23<br>Power 10<br>Air 1 | 50 V, 250 mA<br>250 V, 2 A<br>Max. 8 bar, hose inner diameter<br>8 mm. R 1/4" at base and upper<br>arm. |
| 17-7              | No applica-<br>tion interface |   |   |

<sup>i</sup> Not valid for IRB 1660ID.

#### Connector kit upper arm

The kit consists of connector, pins and sockets, fitting connectors in option 17-5.

| Option | Name      | Description                                    |
|--------|-----------|--|
| 431-1  | Upper arm | Customer Power (CP) and Customer Signals (CS). |

#### Resolver connection, axis 7

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

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

#### Safety lamp

| Option | Name        | Description   |
|--------|-------------|---|
| 213-1  | Safety lamp | It has an orange fixed light, is active in MOTORS ON mode and is std. on an UL/UR approved robot. |

#### Electronic Position Switches (EPS)

The mechanical position switches indicating the position of the three main axes are replaced with electronic position switches for up to 7 axes, for increased flexibility and robustness. For more detailed information, see *Product specification - Controller IRC5* and *Application manual - Electronic Position Switches*.

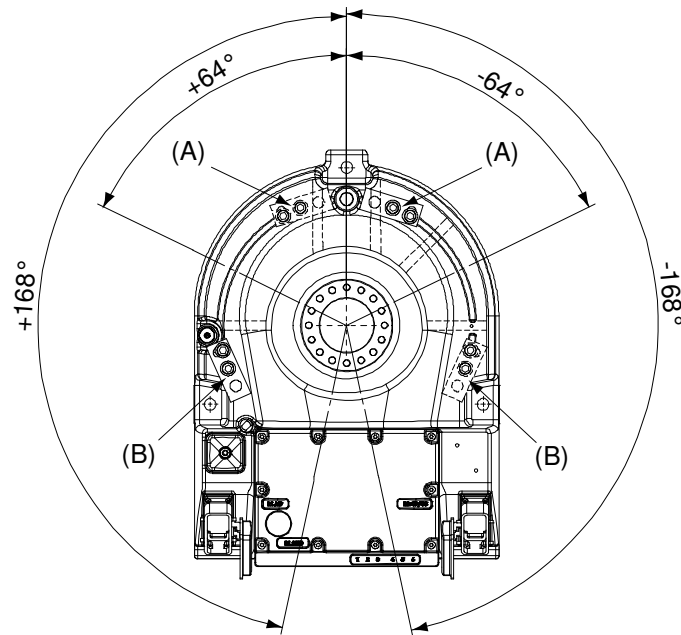
#### Working range limit

To increase the safety of the robot, the working range of axis 1, 2 and 3 can be restricted.

| Option | Name                             | Description   |
|--------|----------------------------------|---|
| 28-1   | Axis 1<br>Working range<br>limit | One or two mechanical stops for restricting the working range of axis 1. The option includes two stops. See Figure below. |

Continues on next page

The working range can be restricted freely within the shown scope, depending on where the mechanical stop is installed along the casted groove.



xx100000958

| Pos | Description  |
|-----|--|
| A   | Mounting position of two additional stops for maximum working area (+/- 168°). |
| B   | Mounting position of two additional stops for maximum working area (+/- 64°).  |

Continues on next page

## 2 Specification of variants and options

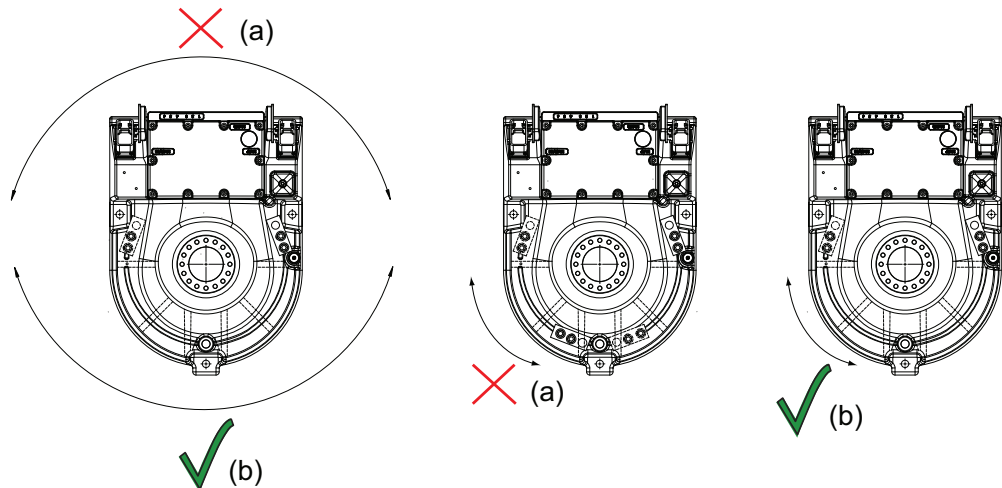
### 2.2 Manipulator

Continued

Negative directions in axis 1 have extra gravity force (tilted or wall mounted robots)

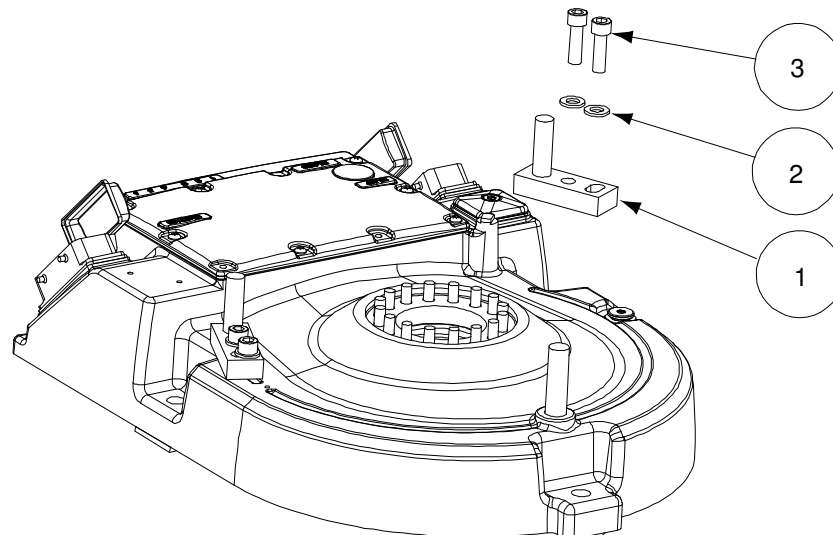
If the robot is wall mounted or mounted in a tilted position, the additional mechanical stop pin restricts the robot when the axis 1 moves in a positive direction, for example from 0° and upwards to 90° (b).

The stop pin does not manage the extra gravity force that comes from when axis 1 moves in a negative direction, for example from 180° downwards to 90° (a).



xx130000180

|     |  |
|-----|--|
| (a) | The additional stop pin does not manage the extra gravity force in this restricted working area (for tilted or wall mounted robots). |
| (b) | The additional stop pin manages to restrict this working area (for tilted or wall mounted robots).                                   |



xx1000000957

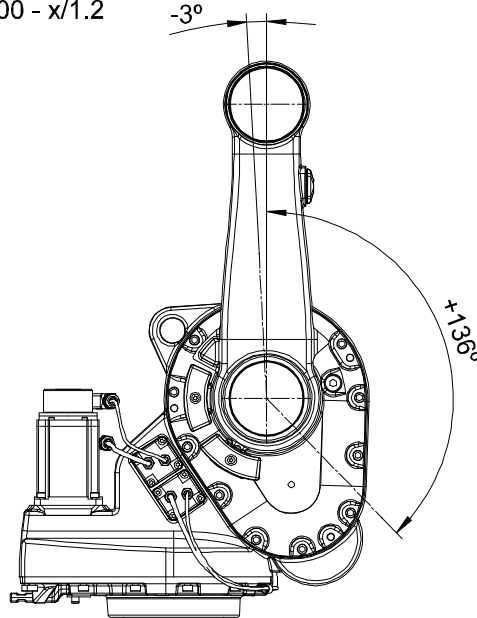
| Pos | Description          |
|-----|----------------------|
| 1   | Mechanical stop (x2) |
| 2   | Washers (x4)         |
| 3   | Screws (x4)          |

Continues on next page



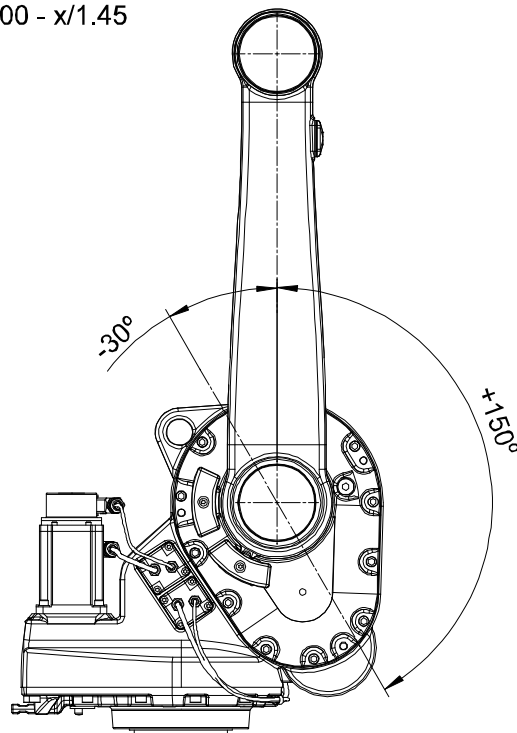
| Option | Name                       | Description  |
|--------|----------------------------|--|
| 32-1   | Axis 2 working range limit | An additional mechanical stop for restricting the working range of axis 2 can be mounted on the frame. The working range can only be restricted backwards as shown in Figure below. Notice the different working range for the different models. |

IRB 1600 - x/1.2



xx0400001289

IRB 1600 - x/1.45



xx0400001290

Continues on next page

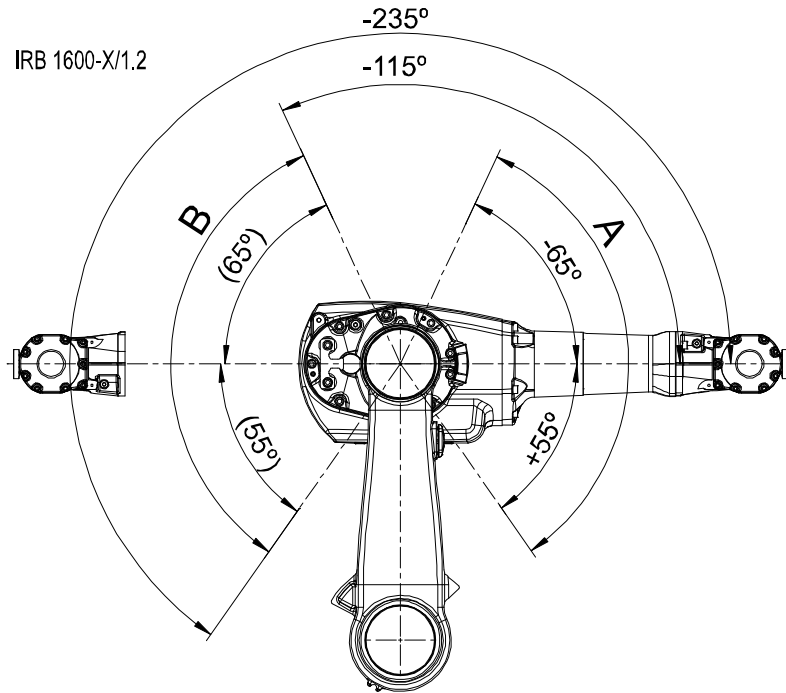
## 2 Specification of variants and options

### 2.2 Manipulator

Continued

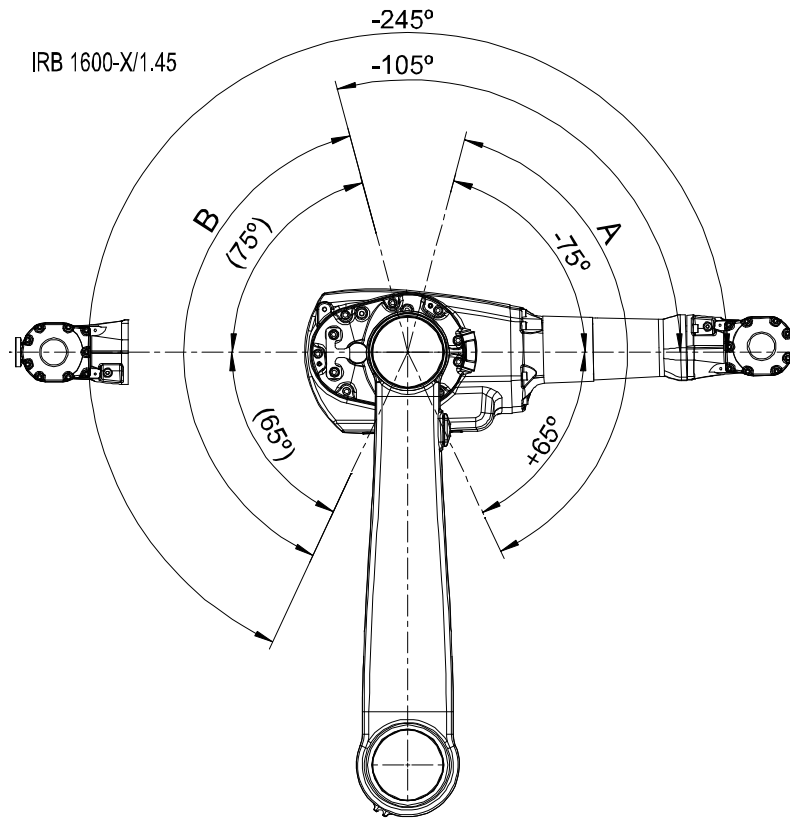
| Option            | Name                       | Description  |
|-------------------|----------------------------|--|
| 34-1 <sup>i</sup> | Axis 3 working range limit | The mechanical stop to restrict the working range within zone A and B for axis 3 can be mounted at the upper arm housing. See Figure 4. Notice the different working range for the different models. |

<sup>i</sup> Not valid for IRB 1660ID.



xx0400001283

Continues on next page



### Warranty

| Option | Type                          | Description   |
|--------|-------------------------------|---|
| 438-1  | Standard warranty             | Standard warranty is 12 months from <i>Customer Delivery Date</i> or latest 18 months after <i>Factory Shipment Date</i> , whichever occurs first. Warranty terms and conditions apply. |
| 438-2  | Standard warranty + 12 months | Standard warranty extended with 12 months from end date of the standard warranty. Warranty terms and conditions apply. Contact Customer Service in case of other requirements.          |
| 438-4  | Standard warranty + 18 months | Standard warranty extended with 18 months from end date of the standard warranty. Warranty terms and conditions apply. Contact Customer Service in case of other requirements.          |
| 438-5  | Standard warranty + 24 months | Standard warranty extended with 24 months from end date of the standard warranty. Warranty terms and conditions apply. Contact Customer Service in case of other requirements.          |
| 438-6  | Standard warranty + 6 months  | Standard warranty extended with 6 months from end date of the standard warranty. Warranty terms and conditions apply.   |
| 438-7  | Standard warranty + 30 months | Standard warranty extended with 30 months from end date of the standard warranty. Warranty terms and conditions apply.  |


Continues on next page

## 2 Specification of variants and options

---

### 2.2 Manipulator

*Continued*

| Option | Type           | Description  |
|--------|----------------|--|
| 438-8  | Stock warranty | <p>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 <i>Factory Shipment Date</i> or from activation date of standard warranty in WebConfig.</p> <p> <b>Note</b></p> <p>Special conditions are applicable, see <i>Robotics Warranty Directives</i>.</p> |

## 2.3 Positioners

---

### General

Regarding positioners, see *Product specification - IRBP /D2009, 3HAC038208-001*.

## 2 Specification of variants and options

---

### 2.4.1 Manipulator

## 2.4 Floor cables

### 2.4.1 Manipulator

---

#### Manipulator cable length

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

---

#### Connection of Parallel communication

| Option | Lengths |
|--------|---------|
| 94-1   | 7 m     |
| 94-2   | 15 m    |
| 94-4   | 30 m    |

## 2.4.2 Positioner

## Positioner cable 1

| Option | Lengths                |
|--------|------------------------|
| 1067-1 | 7 m                    |
| 1067-2 | 10 m (Standard length) |
| 1067-3 | 15 m                   |

## Positioner cable 2

| Option | Lengths                |
|--------|------------------------|
| 1068-1 | 7 m                    |
| 1068-2 | 10 m (Standard length) |
| 1068-3 | 15 m                   |

## Positioner cable type

| Option | Type     | Description  |
|--------|----------|--|
| 1048-1 | Flexible | Only available with one or two MTC 250/500/750/2000/5000 |

## Weld return cable

| Option | Lengths  |
|--------|----------|
| 1056-1 | 7 m      |
| 1056-2 | 7 m x 2  |
| 1056-3 | 10 m     |
| 1056-4 | 10 m x 2 |
| 1056-5 | 15 m     |
| 1056-6 | 15 m x 2 |

## Return cable

| Option | Type                | Description          |
|--------|---------------------|----------------------|
| 1057-1 | OKC<br>T-connection | Choose quantity, 1-2 |

## 2 Specification of variants and options

---

### 2.5.1 DressPack

## 2.5 Process

### 2.5.1 DressPack

---

#### Process module

| Option | Type                | Description   |
|--------|---------------------|---|
| 768-1  | Empty cabinet small | See <i>Product specification - Controller IRC5 with FlexPendant</i> , see chapter 2.2.1 |
| 768-2  | Empty cabinet large | See <i>Product specification - Controller IRC5 with FlexPendant</i> , chapter 2.2.1     |

---

#### WeldGuide III

| Option | Type     | Description   |
|--------|----------|---|
| 958-1  | Basic    | Only together with ArsitoMig 4000i/5000i, MigRob and TPS power sources. Digital I/O or AD Combi I/O is needed for WeldGuide functions. Requires option WeldGuide MultiPass [815-2]. |
| 958-2  | Advanced | Only together with ArsitoMig 4000i/5000i, MigRob and TPS power sources. Digital I/O or AD Combi I/O is needed for WeldGuide functions. Requires option WeldGuide MultiPass [815-2]. |

---

#### Installation kit

| Option | Type             | Description   |
|--------|------------------|---|
| 715-1  | Installation kit | See <i>Product specification - Controller IRC5 with FlexPendant</i> , chapter 2.2.1 |



### 2.5.2 Process equipment

#### Torch service

| Option | Type     | Description               |
|--------|----------|---------------------------|
| 1037-1 | ABB TSC  | ABB Torch Service Center. |
| 1037-2 | ABB TC96 | ABB Torch cleaner.        |
| 1037-5 | BullsEye | BullsEye stand alone.     |

## 2 Specification of variants and options

### 2.5.3 AW Safety options

### 2.5.3 AW Safety options

#### Working area

| Option | Type              | Description |
|--------|-------------------|-------------|
| 1072-1 | One working area  |             |
| 1072-2 | Two working areas |             |

#### Operator panel

| Option | Type                        | Description                                     |
|--------|-----------------------------|---|
| 1054-1 | Operator panel 1 area       | For one working area                            |
| 1054-2 | Operator panel 2 areas      | For two working areas.                          |
| 1054-3 | 2 x operators panel 2 areas | Two operator panels, one for each working area. |

#### AW Safety interface

| Option | Type             | Description                            |
|--------|------------------|--|
| 1058-1 | Safety interface | SIB                                    |
| 1058-2 | Active relay     | Active relay supervision (open relay). |

#### Gate switch

| Option | Type                    | Description |
|--------|-------------------------|-------------|
| 1060-1 | Gate switch             |             |
| 1060-2 | Gate switch/ ext. reset |             |

#### Lightbeam

| Option | Type      | Description   |
|--------|-----------|---|
| 1059-1 | Lightbeam | Qty 1 or 2, one working area requires one PC of "two level light beams".<br>Two working areas require two PCs of "two level light beams". |

#### Home position switch

| Option | Type                 | Description   |
|--------|----------------------|---|
| 1061-1 | Home position switch | Home position switch for IRB 1600/2400, one working area. |

*Continues on next page*

## 2 Specification of variants and options

### 2.5.3 AW Safety options

*Continued*

#### Station indication

| Option | Type               | Description  |
|--------|--------------------|--|
| 1062-1 | Station indication | Station indication for IRB 1600/2400, two working areas. |

#### Pre-reset unit

| Option | Type           | Description  |
|--------|----------------|--|
| 1063-1 | Pre-reset unit | Qty 1 or 2, one working area requires one PC of "Pre-reset". Two working areas require two PCs of "Pre-reset". |

#### Activation unit

| Option | Type            | Description   |
|--------|-----------------|---|
| 1064-1 | Activation unit | Qty 1 or 2, one requires one PC of "Activation unit". Two working areas require two PCs of "Activation unit". |

#### Extended EM stop

| Option | Type             | Description   |
|--------|------------------|---|
| 1065-1 | Extended EM stop | Required when using external EM-stop push buttons and when ordering a dual arc system (two welding packages). |

## 2 Specification of variants and options

---

### 2.6 User documentation

### 2.6 User documentation

---

#### User documentation

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

All documents can be found via myABB Business Portal, [www.myportal.abb.com](http://www.myportal.abb.com).

## 3 Accessories

### 3.1 Introduction to accessories

---

#### General

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

---

#### Basic software and software options for robot and PC

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

---

#### Robot peripherals

- The Track Motion is not adapted for the remote connector plate on IRB 6790 and the air supply needed for the overpressure in manipulator and the air pressure supervision.
- Motor Units

**This page is intentionally left blank**

# Index

## A

Absolute Accuracy, 31  
  MultiMove, 33  
Absolute Accuracy, calibration, 29  
accessories, 85

## C

calibration  
  Absolute Accuracy type, 28  
  standard type, 27  
calibration, Absolute Accuracy, 29  
Calibration Pendulum, 30  
CalibWare, 28  
category 0 stop, 60  
category 1 stop, 60  
compensation parameters, 31

## D

dimensions, IRB 1660ID, 17  
documentation, 84

## E

Electronic Position Switches, 70  
EPS, 70

## F

fine calibration, 30

## I

instructions, 84

## L

load areas, 45  
load areas, mounting holes, 46, 48

## M

manuals, 84  
mounting holes for equipment, 46, 48

## O

options, 67

## P

positions at wrist center  
  IRB 1600 - 1.2 m reach, 53  
  IRB 1600 - 1.45 m reach, 54  
  IRB 1660ID, 55  
product standards, 18

## R

range of movement  
  IRB 1600, 52  
  IRB 1660ID, 52

## S

safety standards, 18  
service instructions, 84  
standards, 18  
  ANSI, 19  
  CAN, 19  
  EN, 18  
  EN IEC, 18  
  EN ISO, 18  
standard warranty, 75  
stock warranty, 75  
stopping distances, 60  
stopping times, 60

## T

turning radius, 56

## U

user documentation, 84

## V

variants, 67

## W

warranty, 75  
working range, 52









**ABB AB, Robotics**

**Robotics and Motion**

S-721 68 VÄSTERÅS, Sweden

Telephone +46 (0) 21 344 400

**ABB AS, Robotics**

**Robotics and Motion**

Nordlysvegen 7, N-4340 BRYNE, Norway

Box 265, N-4349 BRYNE, Norway

Telephone: +47 22 87 2000

**ABB Engineering (Shanghai) Ltd.**

Robotics and Motion

No. 4528 Kangxin Highway

PuDong District

SHANGHAI 201319, China

Telephone: +86 21 6105 6666

**ABB Inc.**

**Robotics and Motion**

1250 Brown Road

Auburn Hills, MI 48326

USA

Telephone: +1 248 391 9000

**[abb.com/robotics](http://abb.com/robotics)**