



ROBOTICS

# Product specification

## IRB 460



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## **Product specification**

**IRB 460-110/2.4**

**IRC5**

**Document ID: 3HAC039611-001**

**Revision: U**

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# Overview of this product specification

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## About this product specification

This product specification describes the performance of the manipulator or a complete family of manipulators in terms of:

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

The specification covers the manipulator using the IRC5 controller.

---

## Usage

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

The specification is intended for:

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

## References

| Reference                                                                                                    | Document ID    |
|--------------------------------------------------------------------------------------------------------------|----------------|
| <i>Product manual - IRB 460</i>                                                                              | 3HAC039842-001 |
| <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 6. | 3HAC050945-001 |
| <i>Product specification - Robot user documentation, IRC5 with RobotWare 6</i>                               | 3HAC052355-001 |
| <i>Product specification - Robot stopping distances according to ISO 10218-1</i>                             | 3HAC048645-001 |

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## Revisions

| Revision | Description                                                                                                                              |
|----------|------------------------------------------------------------------------------------------------------------------------------------------|
| -        | New product specification                                                                                                                |
| A        | Minor corrections                                                                                                                        |
| B        | Table for ambient temperature adjusted                                                                                                   |
| C        | <ul style="list-style-type: none"><li>• Machinery directive updated</li><li>• Updated load diagram</li><li>• Minor corrections</li></ul> |
| D        | <ul style="list-style-type: none"><li>• Base plate drawing updated</li></ul>                                                             |

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## Overview of this product specification

Continued

| Revision | Description                                                                                                                                                                                                                                                                                                                                                   |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| E        | <ul style="list-style-type: none"><li>• Minor corrections/update</li><li>• Option 87-1 added</li></ul>                                                                                                                                                                                                                                                        |
| F        | <ul style="list-style-type: none"><li>• Text for ISO test adjusted</li></ul>                                                                                                                                                                                                                                                                                  |
| G        | <ul style="list-style-type: none"><li>• Graphite white color added</li></ul>                                                                                                                                                                                                                                                                                  |
| H        | <ul style="list-style-type: none"><li>• Minor corrections/update</li></ul>                                                                                                                                                                                                                                                                                    |
| J        | Published in release R17.1. The following updates are done in this revision: <ul style="list-style-type: none"><li>• Axis Calibration method added</li><li>• Restriction of load diagram added</li></ul>                                                                                                                                                      |
| K        | Published in release R17.2. The following updates are done in this revision: <ul style="list-style-type: none"><li>• Updated list of applicable standards.</li></ul>                                                                                                                                                                                          |
| L        | Published in release R18.1. The following updates are done in this revision: <ul style="list-style-type: none"><li>• TCP acceleration added.</li></ul>                                                                                                                                                                                                        |
| M        | Published in release R18.2. The following updates are done in this revision: <ul style="list-style-type: none"><li>• TCP acceleration information updated.</li><li>• Added locating hole position in tool flange view.</li></ul>                                                                                                                              |
| N        | Published in release R20D The following updates are done in this revision: <ul style="list-style-type: none"><li>• Minor changes.</li><li>• New customer option cable harness (with ethernet cable) added. See details in <a href="#">Customer connections on page 50</a>.</li><li>• Warranty section updated.</li></ul>                                      |
| P        | Published in release 21D. The following updates are done in this revision: <ul style="list-style-type: none"><li>• Text regarding fastener quality is updated.</li><li>• Removed Axis resolution.</li><li>• The data for robot stopping distances is removed. See <i>Product specification - Robot stopping distances according to ISO 10218-1</i>.</li></ul> |
| Q        | Published in release 22B. The following updates are done in this revision: <ul style="list-style-type: none"><li>• Updated data for power consumption.</li><li>• Updated table of positions at wrist center in Robot motion section.</li><li>• Updated the drawing of fitting extra equipment on upper arm.</li></ul>                                         |
| R        | Published in release 24D. The following updates are done in this revision: <ul style="list-style-type: none"><li>• Added RAL code in manipulator color</li><li>• Updated the section <a href="#">Technical data on page 24</a>.</li></ul>                                                                                                                     |
| S        | Published in release 25.3. The following updates are done in this revision: <ul style="list-style-type: none"><li>• Company name updated to reflect current legal entities.</li><li>• Updated portal name from myABB to ABB Robotics One.</li></ul>                                                                                                           |
| T        | Published in release 26.1. The following updates are made in this revision: <ul style="list-style-type: none"><li>• Removed duplication of robot weight specification.</li><li>• Company name updated to reflect current legal entities.</li></ul>                                                                                                            |

Continues on next page

| Revision | Description                                                                                                                                                                                               |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| U        | Published in release 26B. The following updates are made in this revision: <ul style="list-style-type: none"><li>Added section <i>Impacting robot lifetime</i> and section <i>Intended use</i>.</li></ul> |

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# 1 Description

## 1.1 Structure

### 1.1.1 Introduction

---

**Robot family**

IRB 460 is ABB Robotics latest generation of 4-axis robot, designed with a focus on its high production capacity, short cycle time at a high payload, long reach together with the very high uptime, which is significant for ABB's robots.

It is available in one version with a handling capacity of 110 kg and a reach of 2.4 m.

Customer connections as power, signals, Bus signals and one air are integrated in the robot, from the robot base to connections at the robot tool flange.

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**Intended use**

IRB 460 is ideal for use in palletizing, material handling, gluing and cutting in food and beverage, Electric Vehicle (EV), automotive, and the general industries.

See [Impacting robot lifetime on page 15](#).

---

**IRC5 and RobotWare**

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 and so on. For more information, 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 a complete description of optional software, see the *Product specification - Controller software IRC5*.

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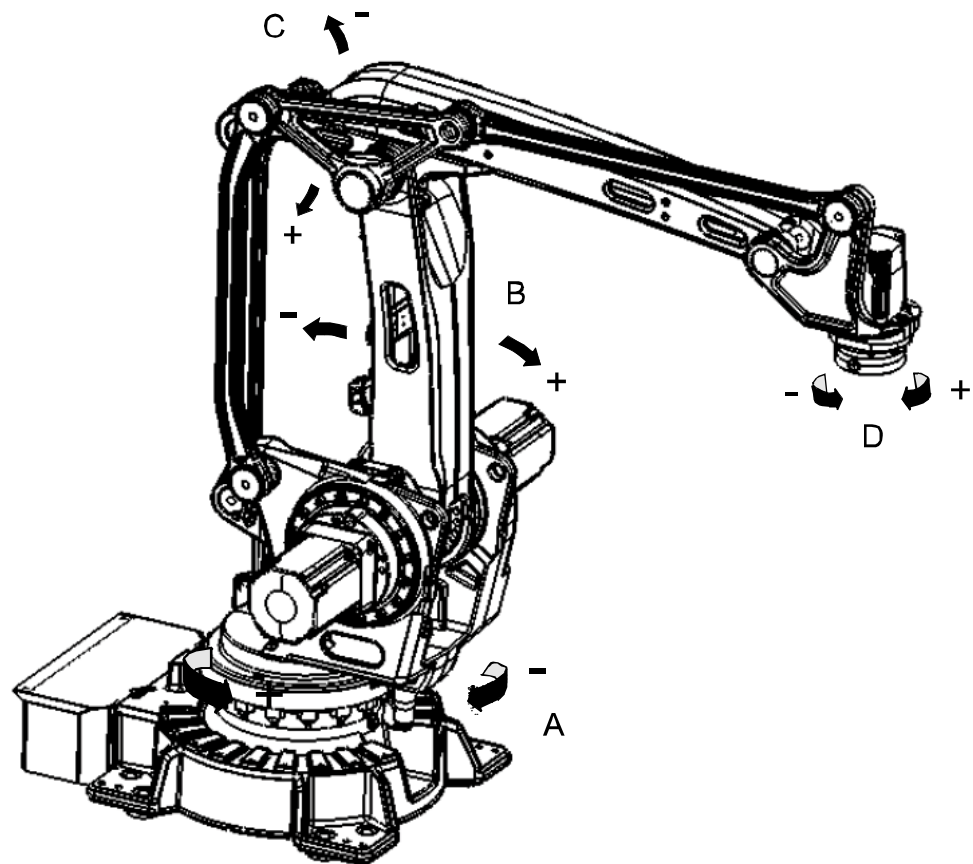
# 1 Description

## 1.1.1 Introduction

*Continued*

### Manipulator axes

The IRB 460 manipulator has 4 axes as shown in the following figure.



xx1000001337

| Position | Description |
|----------|-------------|
| A        | Axis 1      |
| B        | Axis 2      |
| C        | Axis 3      |
| D        | Axis 6      |

## 1.1.2 Different robot versions

## General

The IRB 460 is available in one version, for floor mounting (no tilting allowed around X or Y axis).

| Robot type | Handling capacity (kg) | Reach (m) |
|------------|------------------------|-----------|
| IRB 460    | 110 kg                 | 2.4 m     |

## Airborne noise level

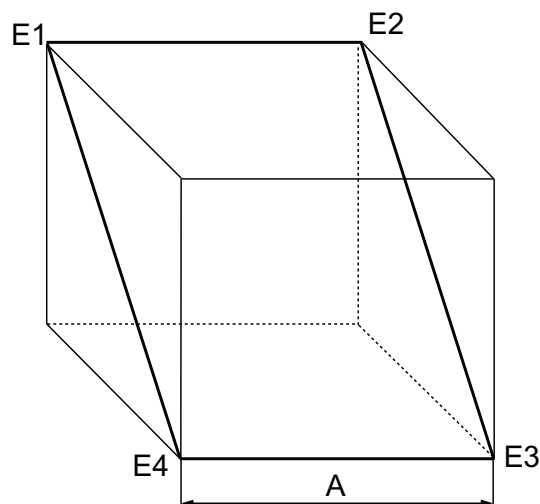
| Data                 | Description                                        | Note                                                      |
|----------------------|----------------------------------------------------|-----------------------------------------------------------|
| Airborne noise level |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

## Power consumption at max speed (vmax)

| Type of movement              | IRB 460 |
|-------------------------------|---------|
| ISO cube Max. velocity        | 3.5 kW  |
| General palletizing movements | 4.31 kW |

| Robot in calibration position | IRB 460 |
|-------------------------------|---------|
| Brakes engaged                | 0.11 kW |
| Brakes disengaged             | 0.38 kW |

The path E1-E2-E3-E4 in the ISO cube is shown in the following figure.



xx1000000101

| Position | Description |
|----------|-------------|
| A        | 1,000 mm    |

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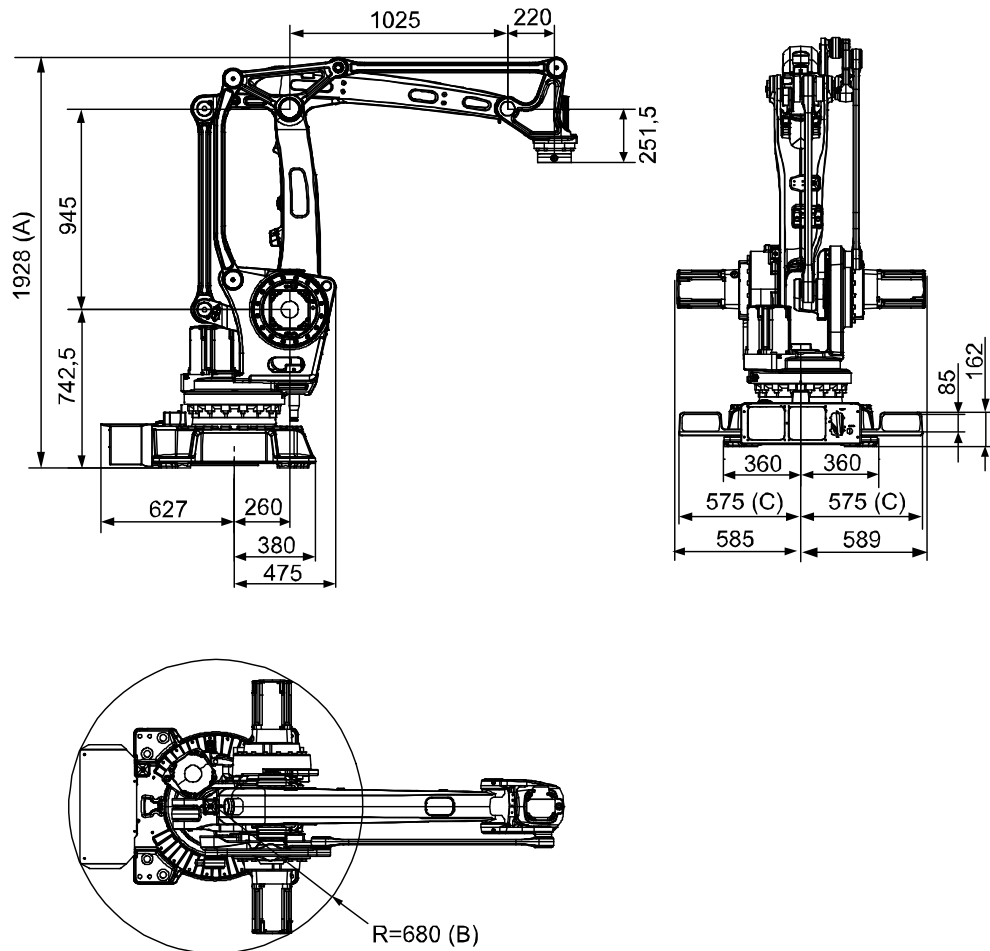
# 1 Description

## 1.1.2 Different robot versions

Continued

### Dimensions of IRB 460

The following figure shows the rear, side and top view of the IRB 460 manipulator (dimensions in mm). Allow 200 mm behind the manipulator for cables.



xx1000001031

| Position | Description               |
|----------|---------------------------|
| A        | 2278 mm max working range |
| B        | Radius for axis 3 motor   |
| C        | Forklift width 1150 mm    |

## 1.2 Impacting robot lifetime

### Introduction

The expected lifetime of a robot is an important factor when planning an installation. This information is aiming to help you to maximize the lifetime of your robot and avoid unnecessary downtime or repair.

The lifetime of a robot is influenced by the following, but not limited to, factors:

- [Robot type selection on page 15](#)
- [Duty factor on page 15](#)
- [Environmental conditions on page 16](#)
- [Application and usage on page 16](#)
- [Design limitations on page 18](#)
- [Maintenance on page 18](#)
- [Individual lifetime variability on page 18](#)
- [Extreme usage on page 18](#)

### Robot type selection

Selecting the right robot for the application is generally done based on payload and reach criteria, but other factors can influence the selection, such as the duty factor. Selecting the most suitable variant is crucial to achieve the expected high performance, uptime, and lifetime. Always select a robot in accordance with the intended use, see [Intended use on page 11](#).

ABB robots are capable of high accelerations and speeds. It is generally recommended to use RobotStudio to find out if a robot model is suitable for a specific application and duty factor. RobotStudio is an excellent tool to help with the assessment of the duty factor and the selection of the most suitable robot variant.

In the case of intense use of robots, optional cooling fans may be required, and the expected component life of gearboxes and motors may be affected. Contact ABB for cooling fan solution.

This robot is not specifically designed for use in demanding applications with a very high duty factor. If used in such conditions, a significant reduction in lifetime is possible for all axes, depending on the cycle. See [Extreme usage on page 18](#).

When selecting the robot variant, consider using application-specific robot, and suitable protection type.



#### Note

Use the Mechanical Analysis add-in in RobotStudio (see details below) for help with the assessment, or get technical support from ABB.

### Duty factor

Duty factor is the percentage of time the robot is moving divided by the total time, including movement and wait time during the complete robot work cycle. It is a

*Continues on next page*

# 1 Description

---

## 1.2 Impacting robot lifetime

*Continued*

measurement of how much the robot is being used. Gearbox lifetime is reduced more rapidly by a higher duty cycle than by a lower one. See [Extreme usage on page 18](#).



### Note

The duty factor impact on lifetime can be analyzed in the add-in *Mechanical Analysis* in RobotStudio (see details below) and *Service Information System* (SIS) data in the controller. Contact ABB to analyze the SIS data.

---

### Environmental conditions

Following factors within environmental conditions of the robot has an impact on the robot lifetime:

- Temperature:

The robot usage at high temperatures or extreme usage can lead to gearbox and motor cooling problems. Observe operating temperature limits stated in manipulator product manual. Extreme usage normally requires means of reduction of motor and gearbox oil heat.

The option to add a cooling fan to some of the axes, will allow the robot to run even with an extreme usage. See the description of the available options in section [Motor cooling on page 56](#).



### Note

The add-in Mechanical Analysis in RobotStudio (see details below) or technical support from ABB can provide recommendation on using fans.

- Exposure to chemicals might impact sealings, which can cause oil leakage.
- Vibrations caused by not following the foundation requirements might cause reduction of lifetime, for example for bearings. See [Requirements, foundation on page 26](#).
- Cleaning. Wrong cleaning can cause particles entering the sealings which can cause oil leakage. Proper cleaning is described in *Product manual - IRB 460*.

---

### Application and usage

Following factors within robot application and usage has an impact on the robot lifetime:

- Payload definition and overload:

It is important to define the payload within specification and correctly defined tool data. See section [Load diagrams on page 37](#), and *Technical reference manual - RAPID Overview*.

The service routine for load identification, *LoadIdentify*, is available to support tool data definition. See *Operating manual - IRC5 with FlexPendant*.

- Acceleration/deceleration:

*Continues on next page*

The gearbox lifetime is reduced more rapidly by high accelerations/decelerations than by lower ones.



### Note

Smoother movements bring reduced energy consumption.



### Note

Acceleration/deceleration can be modified with the instruction AccSet. See *Technical reference manual - RAPID Overview*.

Acceleration/deceleration is optimized by using automatic path planning functionality, either offline, or in RobotStudio, or using the online software.

- Limited movements:

If the range or the rotation angle for an axis is 10° or less, the expected life of the reduction gears may be reduced due to poor lubrication of internal parts or the internal parts being subject to a concentrated load. Add extra lubrication motion to the robot program or to maintenance schedule.



### Note

Use RobotStudio *Signal Analyzer* or get technical support from ABB.

- High forces applied externally to the manipulator:

Some applications or not correctly programmed paths apply external forces to the manipulator, which might reduce its lifetime. Example of external force: gripper under constraint when gripping a part or load sharing between multiple robots.

- Number of collisions:

Collisions, especially at high speed and/or with high loads reduce the lifetime of the gearboxes. Avoid collisions and set collision detection sensitivity to the appropriate level.



### Note

See the application manual for the controller software, section *Collision detection*, listed in [References on page 7](#).

- Number of emergency stops:

Emergency stops, especially at high speed and/or high loads reduce the lifetime of the gearboxes. Whenever permitted by risk assessment, set the robot stopping functions to stop category 1.



### Note

See the product manual for the robot controller, listed in [References on page 7](#).

*Continues on next page*

# 1 Description

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## 1.2 Impacting robot lifetime

*Continued*

---

### Design limitations

See the section *Expected component life* in *Product manual - IRB 460*.

---

### Maintenance

The maintenance and use of the robot will affect the performance and lifetime. For example:

- Preventive maintenance will optimize the lifetime of the robot. The recommended maintenance activities and intervals are described in *Product manual - IRB 460*.
- Observance of lubricant types and maintenance periods recommended by ABB.
- Possible pollution of the lubricant by an external cause, for example, water in the oil caused by high humidity.
- Extreme usage, for example high duty factor or environmental factors, will affect the maintenance schedule, for example, shorter intervals for oil change.

Contact your local ABB office to get technical support from ABB.

---

### Individual lifetime variability

The lifetime varies with individual robots. For example, a cycle with a lower duty factor may fail earlier than one with a higher duty factor. But a cycle with a higher duty factor is more likely to fail earlier than a cycle with lower duty factor.

---

### Extreme usage

Examples of extreme usage in regard to movement: a stress index range that shows up as red (51) in the RobotStudio add-in *Mechanical Analysis*, press tending application, very severe palletizing applications, major use of axis 1, 2, or 3 movement.

The controller can issue a duty factor warning on the FlexPendant, if applicable. See the chapter *Troubleshooting* in *Product manual - IRB 460*.

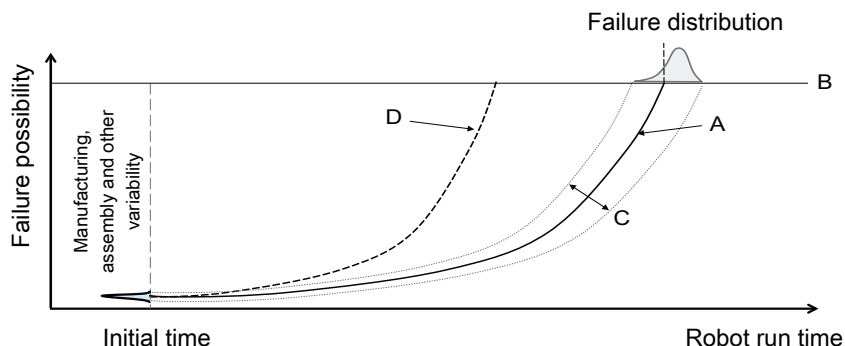
Extreme usage normally requires usage of cooling fans.

Extreme usage requires specific maintenance, for example, shorter interval for oil change. See *Maintenance schedule* in *Product manual - IRB 460*.

*Continues on next page*

## Summary

The diagram illustrates the relationship between robot run time and failure possibility.



xx2500001942

|   |                              |
|---|------------------------------|
| A | Design lifetime              |
| B | Failure threshold            |
| C | Individual variability       |
| D | Negatively affected lifetime |

The curve (A) represents the design lifetime, showing how failure probability increases over time following a normal distribution pattern. The failure threshold (B) indicates the point at which component failure becomes likely.

Individual variability between robots is shown by the dotted lines (C), representing the natural variation in component life due to manufacturing, assembly, and other factors. This variability means that while most robots will follow the design lifetime curve, some individual units may experience earlier or later failures within the normal distribution.

As highlighted with the curve (D) in the diagram, robot lifetime can be negatively affected by not following best practices in the key areas discussed in this chapter:

- [Robot type selection on page 15](#)
- [Duty factor on page 15](#)
- [Environmental conditions on page 16](#)
- [Application and usage on page 16](#)
- [Maintenance on page 18](#)

By adhering to the recommendations outlined in each of these sections, users can maximize their robot's operational lifetime and ensure performance stays within the design lifetime curve, avoiding premature failure and unnecessary downtime.

*Continues on next page*

# 1 Description

## 1.2 Impacting robot lifetime

*Continued*

### Available tools

There are several tools available throughout the lifecycle of an ABB robot, from support with selecting the most suitable manipulator and optimizing its lifetime, to operation, maintenance, and repair:

| ABB toolbox                                                          | Type                                                | Product lifecycle |                             |                                |
|----------------------------------------------------------------------|-----------------------------------------------------|-------------------|-----------------------------|--------------------------------|
|                                                                      |                                                     | Sales, pre-study  | Installation, commissioning | Operation, maintenance, repair |
| Product specification                                                | Document                                            | x                 | x                           |                                |
| Product manual                                                       | Document                                            |                   | x                           | x                              |
| Mechanical Analysis add-in                                           | Add-in in RobotStudio                               | x                 | x                           | x                              |
| Service Information System (SIS) / Condition Based Maintenance (CBM) | RobotWare functionality / Customer service analysis |                   | x                           | x                              |
| Connected Services                                                   | Hardware and Software                               |                   | x                           | x                              |
| Automatic Path Planning                                              | RobotStudio functionality and online software       | x                 | x                           | (x)                            |
| Signal Analyzer / TuneMaster                                         | RobotStudio functionality / Software                | x                 | x                           | x                              |
| ABB support                                                          | Customer support                                    | x                 | x                           | x                              |

## 1.3 Safety standards

### 1.3.1 Applicable standards



#### Note

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

#### General

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

#### Normative standards as referred to from ISO 10218-1

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

#### Region specific standards and regulations

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

#### Other standards used in design

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

*Continues on next page*

# 1 Description

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## 1.3.1 Applicable standards

*Continued*

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

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

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

## 1.4 Installation

### 1.4.1 Introduction

---

#### General

IRB 460 is designed for floor mounting (no tilting allowed around X or Y axis), end effector with max. weight of 110 kg including payload, can be mounted on the mounting flange (axis 6). For more information, see [Load diagrams on page 37](#).

---

#### Working range

The working range of axis 1 can be limited by mechanical stops.

The option *Electronic Position Switches* can be used on all axes, for position indication of the manipulator.

---

#### Explosive environments

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

# 1 Description

## 1.4.2 Technical data

### 1.4.2 Technical data

#### Weight, robot

The table shows the weight of the robot.

| Robot model | Weight |
|-------------|--------|
| IRB 460     | 925 kg |



#### Note

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

#### Mounting positions

The table shows valid mounting options for the manipulator.

| Mounting option | Installation angle | Note |
|-----------------|--------------------|------|
| Floor mounted   | 0°                 |      |



#### Note

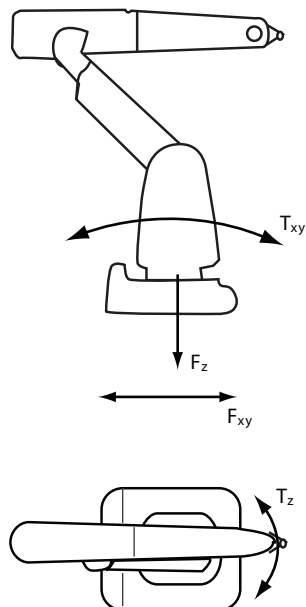
The actual mounting angle must always be configured in the system parameters, otherwise the performance and lifetime is affected. See the product manual for details.

*Continues on next page*

**Loads on foundation, robot**

The illustration shows the directions of the robots stress forces.

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



xx1100000521

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

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

**Note**

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

**WARNING**

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

**Floor mounted**

| Force     | Endurance load (in operation) | Max. load (emergency stop) |
|-----------|-------------------------------|----------------------------|
| Force xy  | $\pm 6.2 \text{ kN}$          | $\pm 10.6 \text{ kN}$      |
| Force z   | $10 \pm 3.8 \text{ kN}$       | $10 \pm 6.5 \text{ kN}$    |
| Torque xy | $\pm 13.7 \text{ kNm}$        | $\pm 23 \text{ kNm}$       |
| Torque z  | $\pm 5.3 \text{ kNm}$         | $\pm 7.9 \text{ kNm}$      |

Continues on next page

# 1 Description

## 1.4.2 Technical data

Continued

### Requirements, foundation

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

| Requirement                    | Value                                                                                                                                                                                                   | Note                                                                                                                                                                                                                                                                                                  |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Flatness of foundation surface | 0.3 mm                                                                                                                                                                                                  | Flat foundations give better repeatability of the resolver calibration compared to original settings on delivery from ABB.<br>The value for levelness aims at the circumstance of the anchoring points in the robot base.                                                                             |
| Minimum resonance frequency    | 20 Hz<br> <b>Note</b><br>It may affect the manipulator life-time to have a lower resonance frequency than recommended. | The value is recommended for optimal performance.<br>Due to foundation stiffness, consider robot mass including equipment. <sup>i</sup><br>For information about compensating for foundation flexibility, see the application manual of the controller software, section <i>Motion Process Mode</i> . |

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

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

### Storage conditions, robot

The table shows the allowed storage conditions for the robot:

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

### Operating conditions, robot

The table shows the allowed operating conditions for the robot:

| Parameter                   | Value                       |
|-----------------------------|-----------------------------|
| Minimum ambient temperature | 0° C                        |
| Maximum ambient temperature | +45° C                      |
| Maximum ambient humidity    | 95% at constant temperature |

Continues on next page

---

**Protection classes, robot**

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

| Protection type                       | Protection class <sup>i</sup> |
|---------------------------------------|-------------------------------|
| Manipulator, protection type Standard | IP 67                         |

<sup>i</sup> According to IEC 60529.

# 1 Description

## 1.4.3 Mounting the manipulator

### 1.4.3 Mounting the manipulator

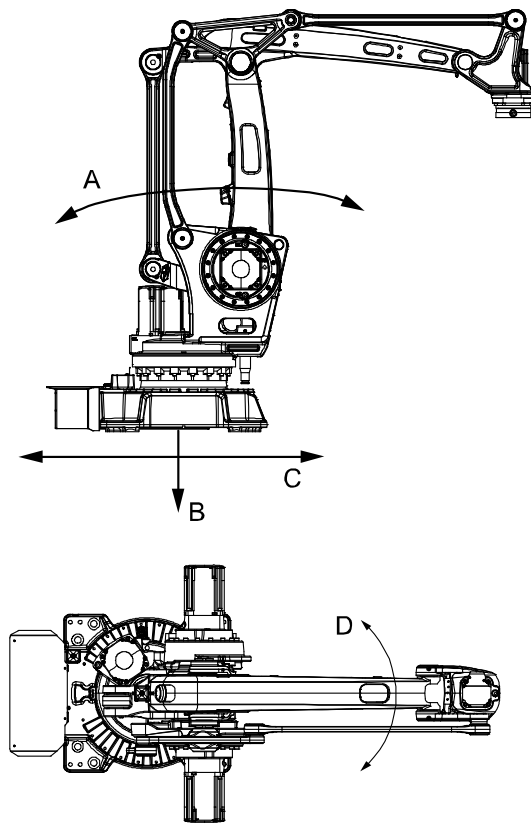
#### Maximum load

Maximum load in relation to the base coordinate system.

#### Floor Mounted

| Force     | Endurance load (in operation) | Max. load (emergency stop) |
|-----------|-------------------------------|----------------------------|
| Force xy  | $\pm 6.2 \text{ kN}$          | $\pm 10.6 \text{ kN}$      |
| Force z   | $10 \pm 3.8 \text{ kN}$       | $10 \pm 6.5 \text{ kN}$    |
| Torque xy | $\pm 13.7 \text{ kNm}$        | $\pm 23 \text{ kNm}$       |
| Torque z  | $\pm 5.3 \text{ kNm}$         | $\pm 7.9 \text{ kNm}$      |

The following figure shows the direction of forces.



xx1000001032

|   |                                   |
|---|-----------------------------------|
| A | Torque <sub>xy</sub> ( $T_{xy}$ ) |
| B | Force <sub>z</sub> ( $F_z$ )      |
| C | Force <sub>xy</sub> ( $F_{xy}$ )  |
| D | Torque <sub>z</sub> ( $T_z$ )     |

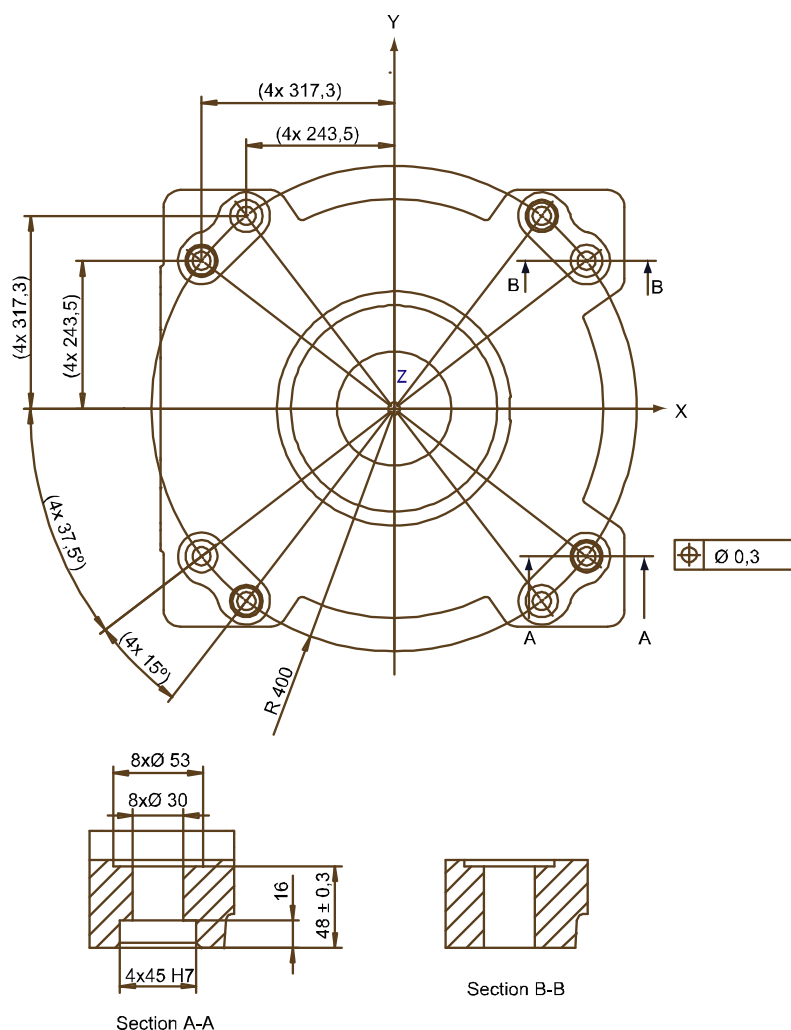
#### Note regarding $M_{xy}$ and $F_{xy}$

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 ( $F_{xy}$ ).

*Continues on next page*

### Fastening holes robot base

The following figure shows the hole configuration (dimensions in mm).



xx1000001033

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



#### Note

Only two guiding sleeves shall be used. The corresponding holes in the base plate shall be circular and oval according to the following base plate drawing. Regarding AbsAcc performance, the recommended are the chosen guide holes those are according to the following base plate drawing.

Continues on next page

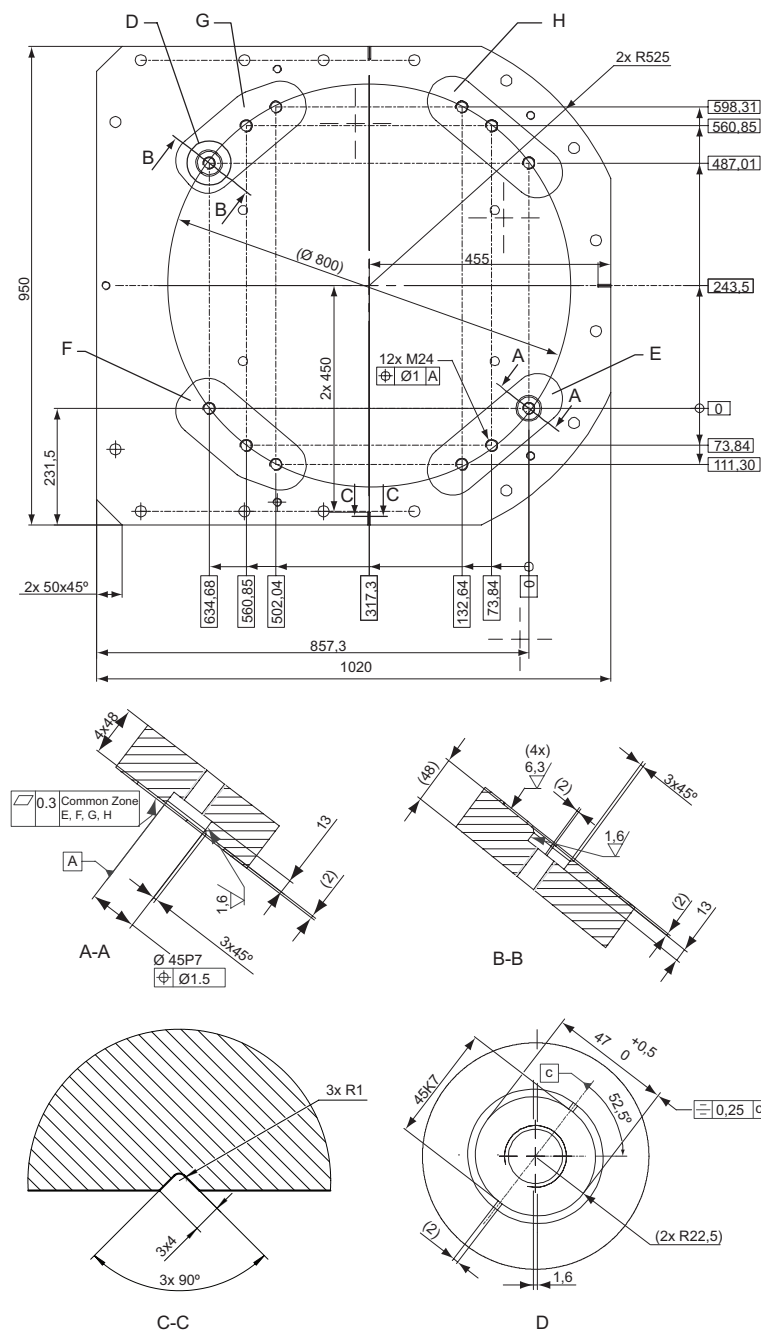
# 1 Description

## 1.4.3 Mounting the manipulator

Continued

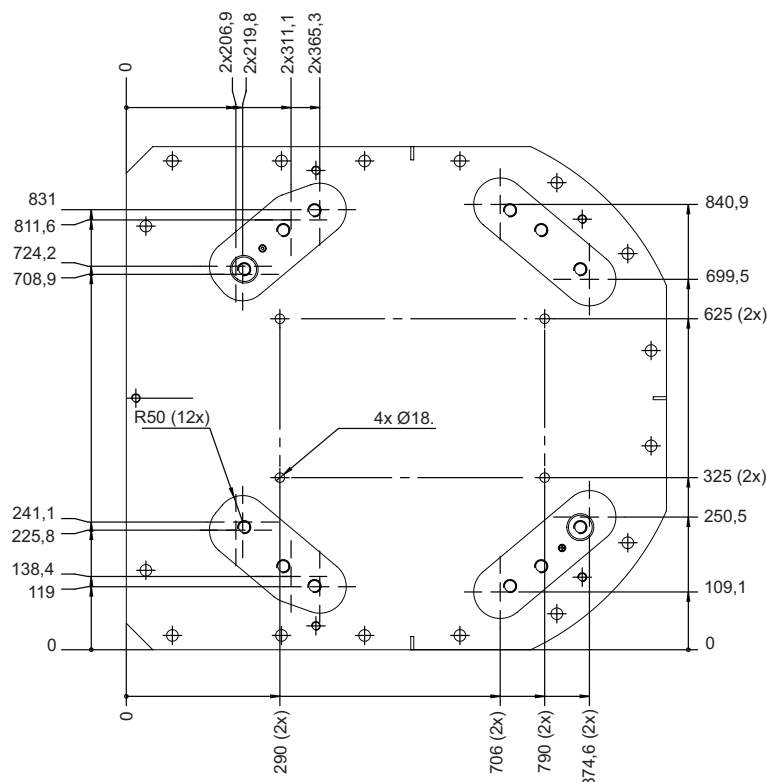
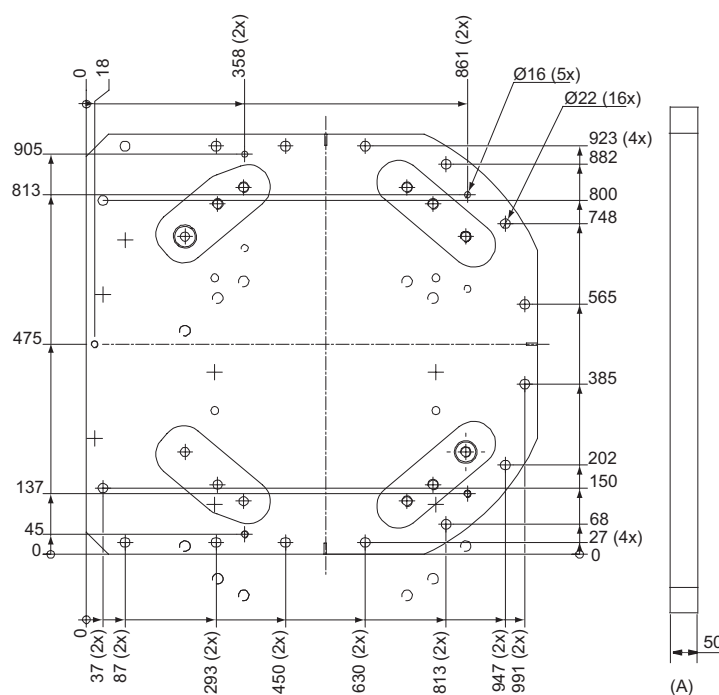
### Base plate drawing

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



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

Continues on next page



xx1000001054

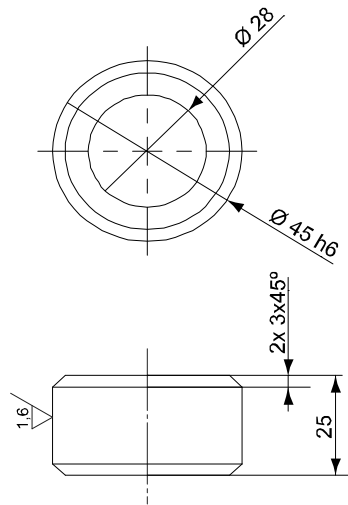
| Position | Description                             |
|----------|-----------------------------------------|
| A        | Color: RAL 9005<br>Thickness: 80-100 µm |

*Continues on next page*

## 1 Description

### 1.4.3 Mounting the manipulator

*Continued*



xx1000001055

| Position | Description                           |
|----------|---------------------------------------|
| A        | Guide sleeve protected from corrosion |

## 1.5 Calibration and references

### 1.5.1 Calibration methods

#### Overview

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

More information is available in the product manual.

#### Types of calibration

| Type of calibration  | Description                                                                                                                                                  | Calibration method |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| Standard calibration | The calibrated robot is positioned at calibration position.<br>Standard calibration data is found on the SMB (serial measurement board) or EIB in the robot. | Axis Calibration   |

#### Brief description of calibration methods

##### Axis Calibration method

Axis Calibration is a standard calibration method for calibration of IRB 460. It is the recommended method in order to achieve proper performance.

The following routines are available for the Axis Calibration method:

- Fine calibration
- Update revolution counters
- Reference calibration

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

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

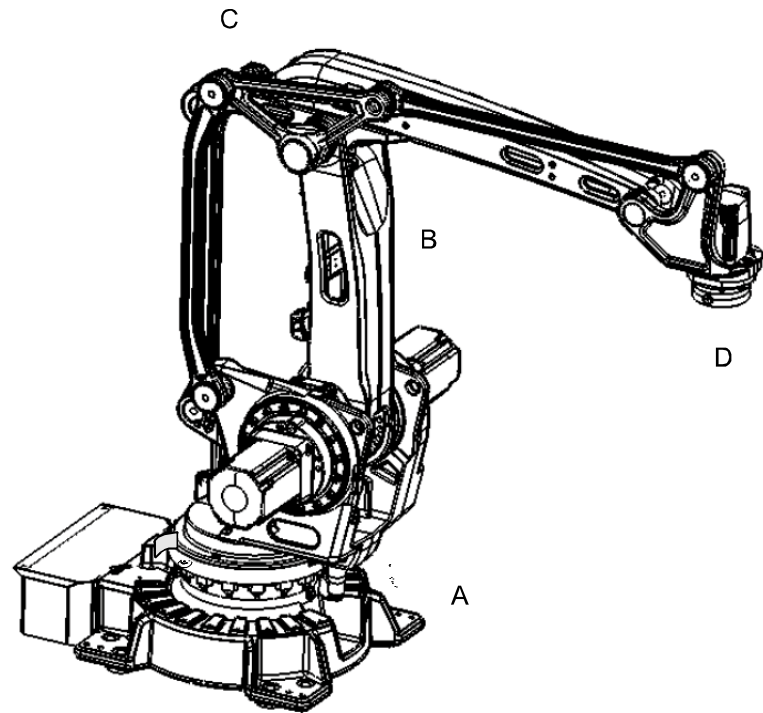
# 1 Description

## 1.5.2 Fine calibration

### 1.5.2 Fine calibration

#### General

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



xx1000001038

| Position | Description |
|----------|-------------|
| A        | Axis 1      |
| B        | Axis 2      |
| C        | Axis 3      |
| D        | Axis 6      |

| 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<br>Axis 3 to 6 in any position |
| Calibration of axis 1       | Axis 1 in zero position<br>Axis 2 to 6 in any position       |

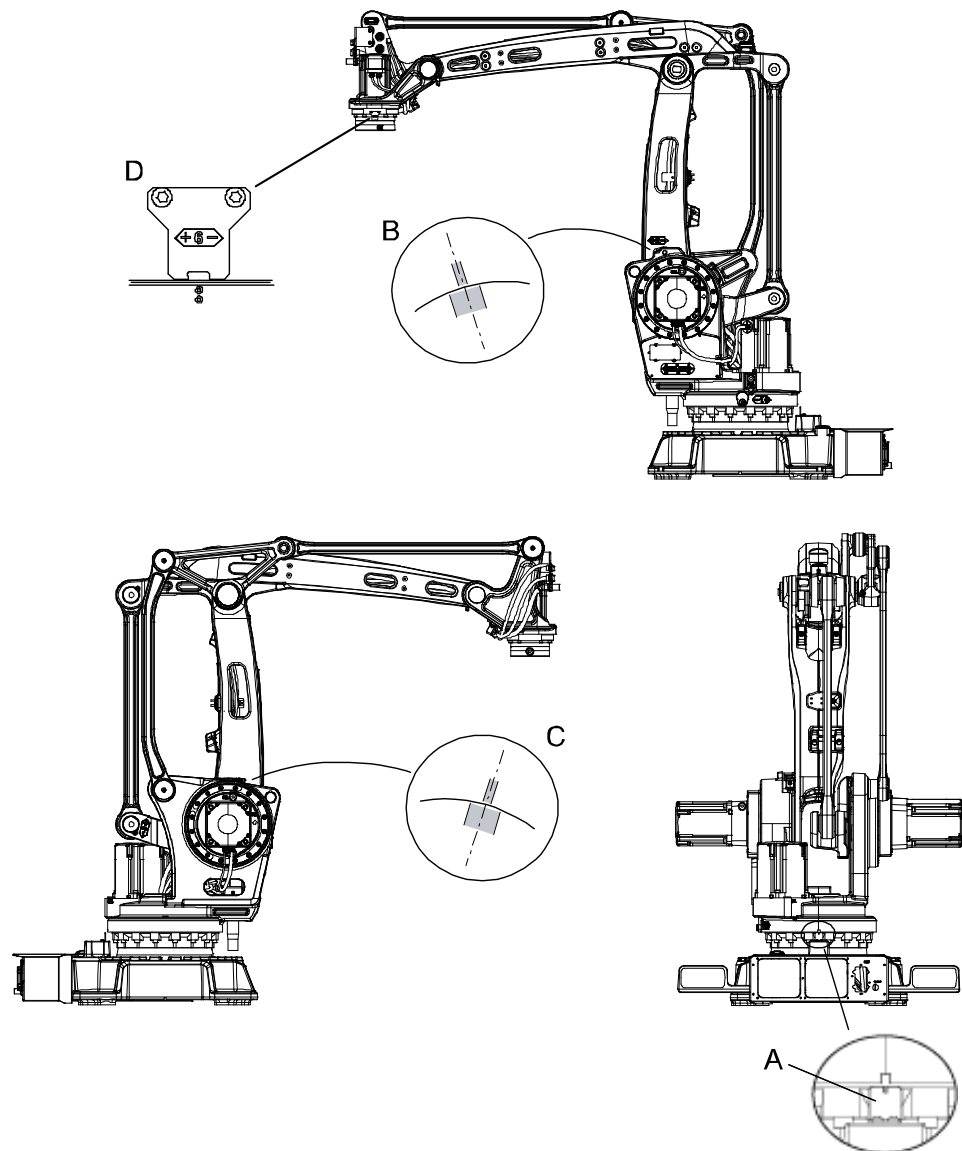
### 1.5.3 Synchronization marks and axis movement directions

#### 1.5.3.1 Synchronization marks and synchronization position for axes

##### Introduction

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

##### Synchronization marks, IRB 460



xx1000001433

|   |                                       |
|---|---------------------------------------|
| A | Calibration plate, axis 1             |
| B | Calibration mark, axis 2              |
| C | Calibration mark, axis 3              |
| D | Calibration plate and marking, axis 6 |

# 1 Description

---

## 1.5.3.2 Calibration movement directions for all axes

### 1.5.3.2 Calibration movement directions for all axes

---

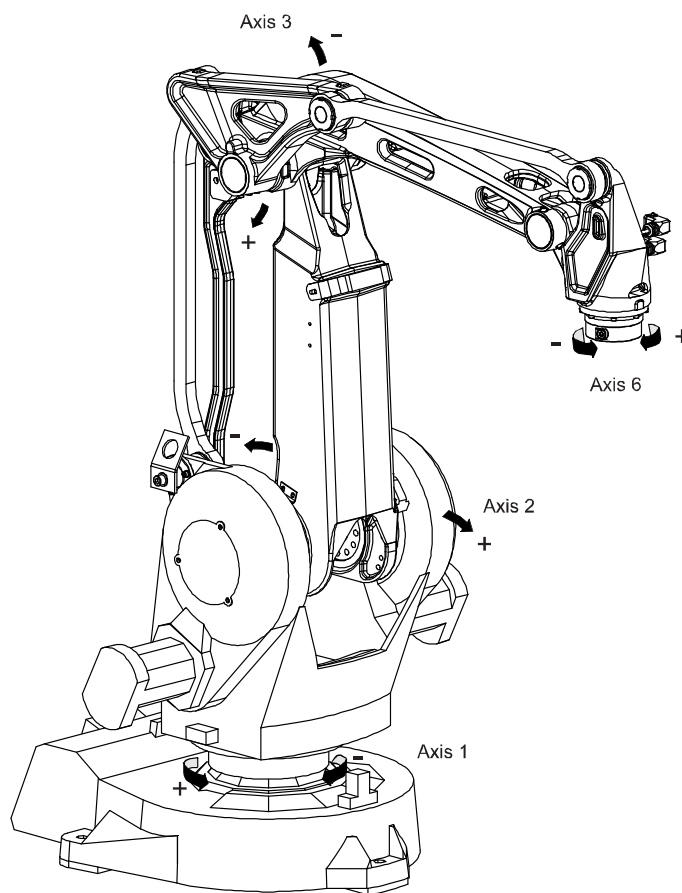
#### Overview

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

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

#### Manual movement directions, 4 axes

**Note!** The graphic shows an IRB 260. The positive direction is the same for all 4-axis robots



xx0500001927

## 1.6 Load diagrams

### 1.6.1 Introduction to load diagrams

#### Information

**WARNING**

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

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

- motors
- gearboxes
- mechanical structure

**WARNING**

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

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

**WARNING**

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

#### General

The load diagram include a nominal payload inertia,  $J_0$  of  $5 \text{ kgm}^2$ . No extra load on upper arm.

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

#### Control of load case with RobotLoad

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

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

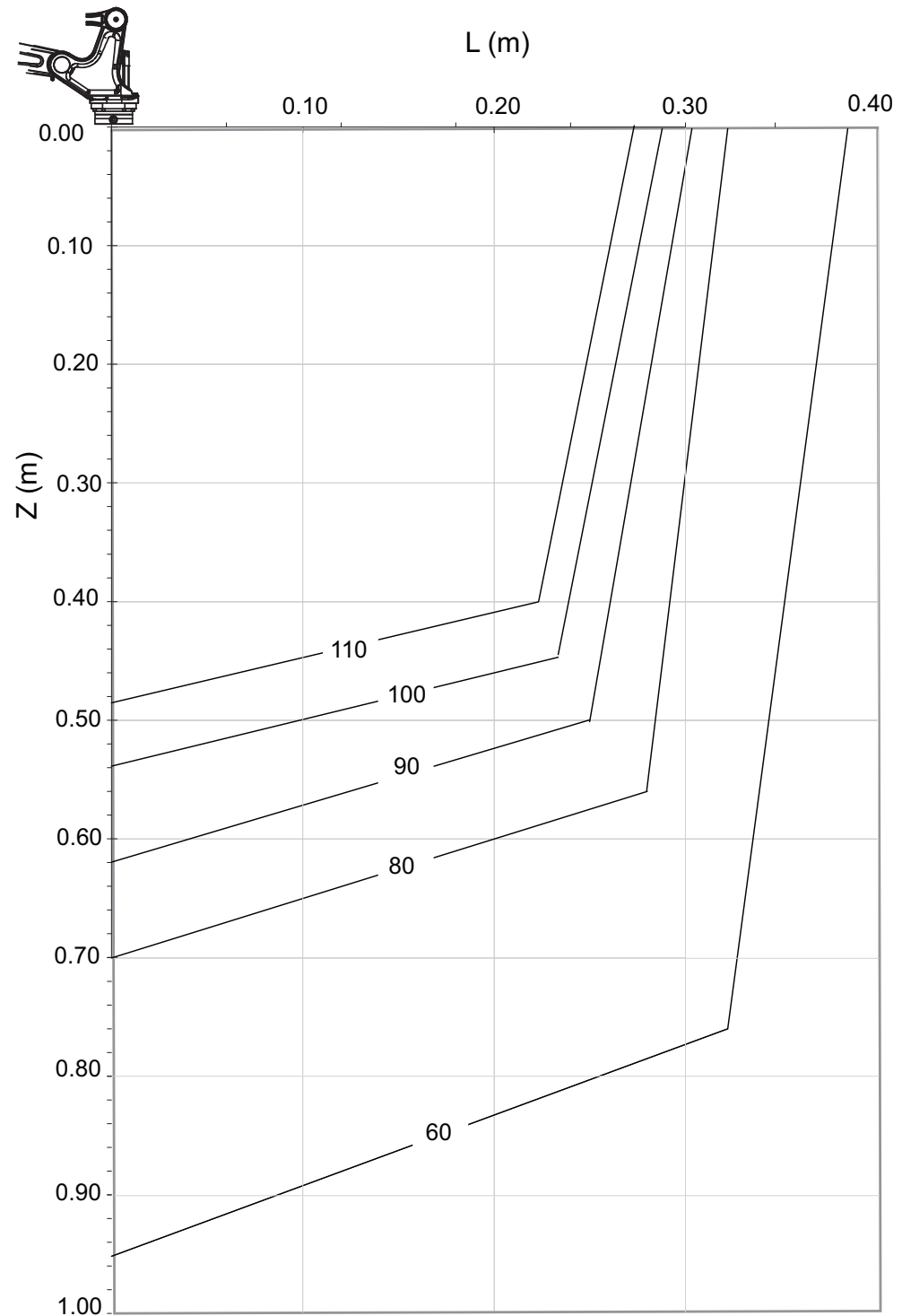
# 1 Description

## 1.6.2 Load diagrams

### 1.6.2 Load diagrams

#### IRB 460-110/2.4

The following figure shows the maximum permitted load mounted on the robot tool flange at different positions (center of gravity).



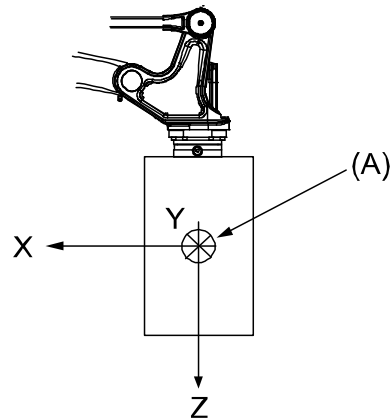
xx1000001039

## 1.6.3 Maximum load and moment of inertia

## General

Load in kg, Z and L in m and J in  $\text{kgm}^2$ 

| Axis | Maximum moment of inertia                                        |
|------|------------------------------------------------------------------|
| 6    | $J_{a6} = \text{Load} \times L^2 + J_{0Z} \leq 70 \text{ kgm}^2$ |



xx1000001078

| Position                 | Description                                                             |
|--------------------------|-------------------------------------------------------------------------|
| A                        | Center of gravity                                                       |
| Description              |                                                                         |
| $J_{0X}, J_{0Y}, J_{0Z}$ | Max. moment of inertia around the X, Y and Z axes at center of gravity. |

## 1 Description

---

### 1.6.4 Maximum TCP acceleration

### 1.6.4 Maximum TCP acceleration

---

#### General

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

---

#### Maximum Cartesian design acceleration for nominal loads

| Robot type | E-stop                                                   | Controlled Motion                                        |
|------------|----------------------------------------------------------|----------------------------------------------------------|
|            | Max acceleration at nominal load COG [m/s <sup>2</sup> ] | Max acceleration at nominal load COG [m/s <sup>2</sup> ] |
| IRB 460    | 45                                                       | 28                                                       |



#### Note

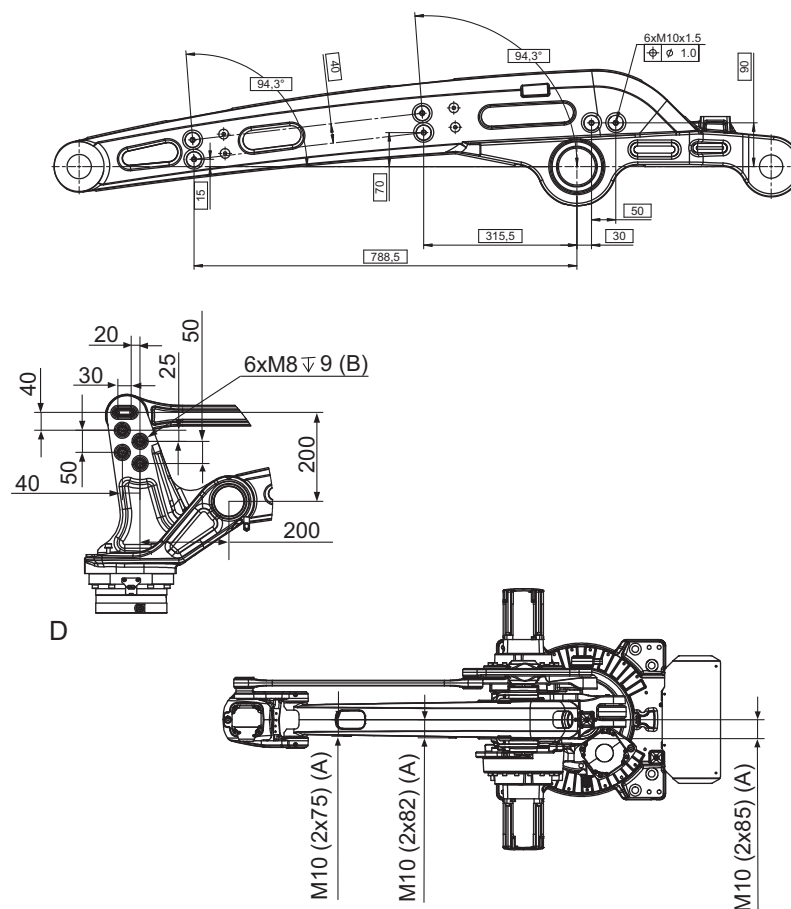
Acceleration levels for emergency stop and controlled motion includes acceleration due to gravitational forces. Nominal load is defined with nominal mass and cog with max offset in Z and L (see the load diagram).

## 1.7 Mounting of equipment

### General

Extra loads can be mounted on to the upper arm. Holes and definitions of masses are shown in the following figures.

For mounting of an external vacuum hose there are six holes on the upper arm. The max. weight for the vacuum hose and fastening device is 35 kg. When using the holes, the weight of the vacuum hose shall be reduced from the max. Handling capacity, for each variant respectively.



xx1000001041

| Position | Description                |
|----------|----------------------------|
| A        | Mounting hole on upper arm |
| B        | Drill depth 15 mm          |

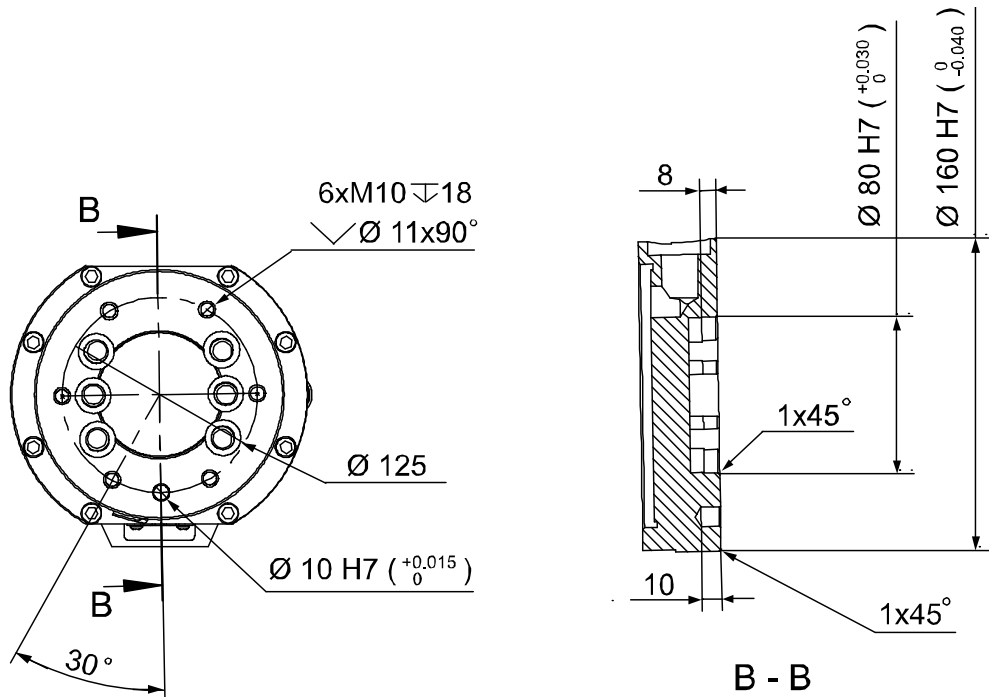
*Continues on next page*

1 Description

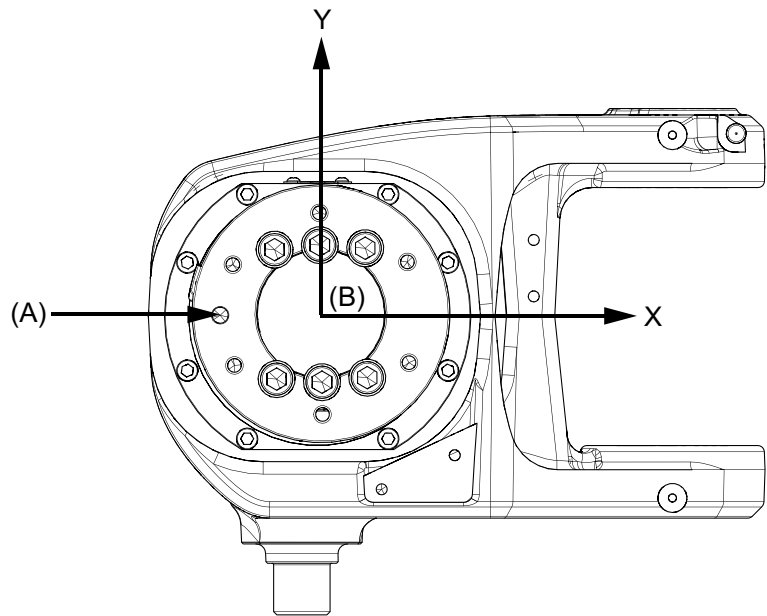
1.7 Mounting of equipment  
Continued

Robot tool flange

The following figure shows the robot tool flange SS-EN ISO 9409;2004 (dimensions in mm).



xx1000001042



xx1800001402

|   |                            |
|---|----------------------------|
| - | Tool flange in bottom view |
| A | Locating hole              |
| B | Tool coordinate system     |

Continues on next page

---

#### Fastener quality

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

# 1 Description

## 1.8.1 Introduction

## 1.8 Robot motion

### 1.8.1 Introduction

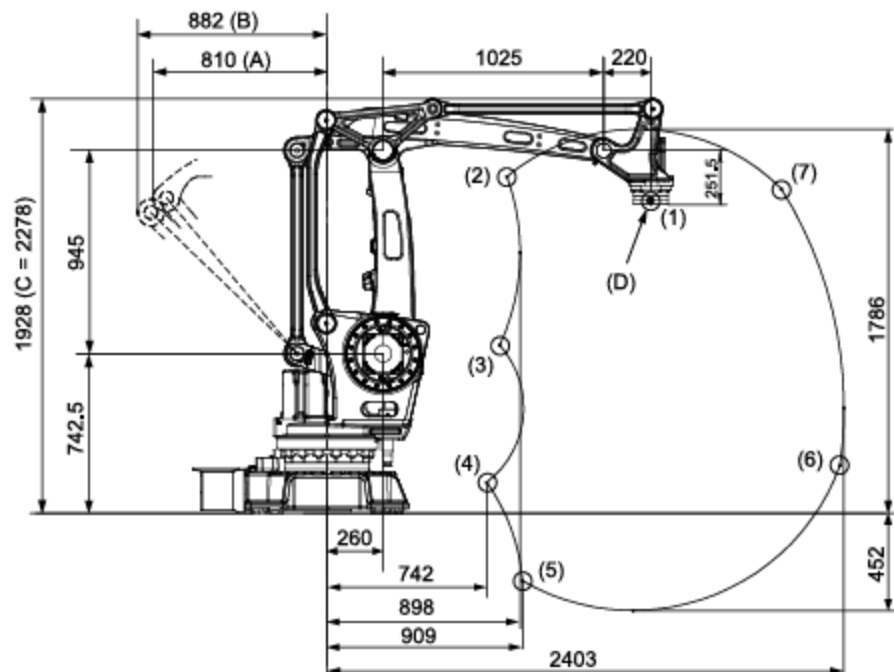
#### Type of motion

| Axis | Type of motion  | Range of movement                                                                   |
|------|-----------------|-------------------------------------------------------------------------------------|
| 1    | Rotation motion | +165° to -165°                                                                      |
| 2    | Arm motion      | +85° to -40°                                                                        |
| 3    | Arm motion      | +120° to -20°                                                                       |
| 6    | Turn motion     | +300° to -300° Default<br>+150 revolutions to -150 revolutions maximum <sup>i</sup> |

<sup>i</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).

#### Illustration

The following figure shows the extreme positions of the robot arm specified at tool flange center (dimensions in mm).



xx1000001043

| Position | Description        |
|----------|--------------------|
| A        | Max. working range |
| B        | Mechanical stop    |
| C        | Max. working range |

Continues on next page

| Position | Description        |
|----------|--------------------|
| D        | Tool flange center |

---

**Positions at wrist center**

| Position number, see figure above | X Position (mm) | Z Position (mm) | Axis 2 Angle (degrees) | Axis 3 Angle (degrees) |
|-----------------------------------|-----------------|-----------------|------------------------|------------------------|
| 1                                 | 1505            | 1437            | 0                      | 0                      |
| 2                                 | 836             | 1565            | -40                    | -20                    |
| 3                                 | 802             | 782             | -40                    | 25                     |
| 4                                 | 742             | 145             | 55                     | 120                    |
| 5                                 | 909             | -314            | 85                     | 120                    |
| 6                                 | 2385            | 223             | 85                     | 20                     |
| 7                                 | 2111            | 1510            | 45                     | -20                    |

# 1 Description

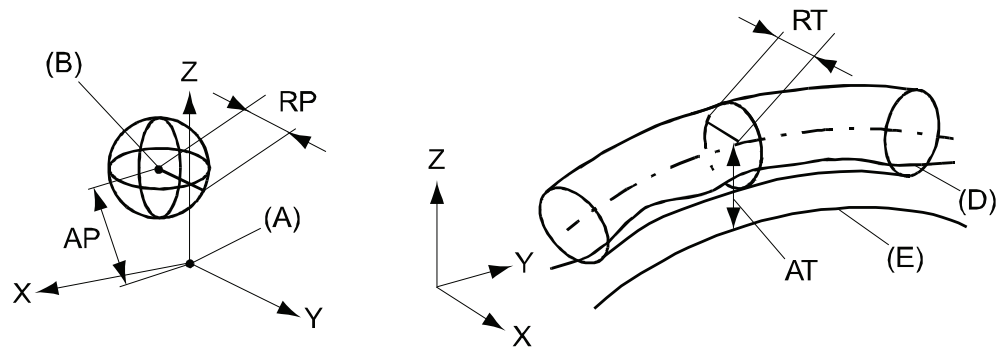
## 1.8.2 Performance according to ISO 9283

### 1.8.2 Performance according to ISO 9283

#### General

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

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



xx0800000424

| Position | Description                                     | Position | 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 460-110/2.4 |
|-------------------------------------|-----------------|
| Pose accuracy, AP <sup>i</sup> (mm) | 0.20            |
| Pose repeatability, RP (mm)         | 0.20            |
| Linear path repeatability, RT (mm)  | 0.11            |
| Linear path accuracy, AT (mm)       | 3.89            |
| Pose stabilization time, PSt (s)    | 0.65            |

<sup>i</sup> AP according to the ISO test above, is the difference between the taught position (position manually modified in the cell) and the average position obtained during program execution.

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

### 1.8.3 Velocity

---

**Maximum axis speed**

| Axis number | IRB 460-110/2.4 |
|-------------|-----------------|
| 1           | 145 °/s         |
| 2           | 110 °/s         |
| 3           | 120 °/s         |
| 6           | 400 °/s         |

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

## 1 Description

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### 1.8.4 Robot stopping distances and times

### 1.8.4 Robot stopping distances and times

---

#### Introduction

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

### 1.9 Cooling fan for axis 1 motor

---

#### Option 87-1

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

Valid protection for cooling fan is IP54.

# 1 Description

## 1.10 Customer connections

### 1.10 Customer connections

#### General

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

For further information of the customer connection, see [Specification of variants and options on page 53](#).

#### Media & Communication, Parallel communication and air

| Type         | Application            | Specification                              | Connection type                                        | Supplier Article No. | Comment                                 |
|--------------|------------------------|--------------------------------------------|--------------------------------------------------------|----------------------|-----------------------------------------|
| Power (CP)   | Utility power          | 4x0.75mm <sup>2</sup><br>(5A/250VAC)       | UTOW socket connector 26p, Bulkhead                    | UTOW 71626SH06       | 1x0.75mm <sup>2</sup> protective earth  |
| Signals (CS) | Parallel communication | 11x AWG24 + 5x2 AWG24                      | UTOW socket connector 26p, Bulkhead                    | UTOW 71626SH06       | 3 Quad twisted, 5 screened pair twisted |
| Air (AIR)    | Utility air            | 1x12.7 (1/2")<br>P <sub>Nom</sub> = 16 bar | Parker Push-lock, 1/2" M22x1,5<br>Brass 24 degree seal |                      |                                         |

#### Media & Communication, Ethernet, parallel communication and air

| Type                    | Application            | Specification                              | Connection type                                     | Supplier Article No. | Comment                                 |
|-------------------------|------------------------|--------------------------------------------|-----------------------------------------------------|----------------------|-----------------------------------------|
| Functional Earth (FE)   |                        | 10mm <sup>2</sup>                          | M8 Cable lug                                        |                      |                                         |
| Power (CP)              | Utility power          | 4x0.75mm <sup>2</sup><br>(5A/250VAC)       | UTOW socket connector 26p, Bulkhead                 | UTOW 71626SH06       | 1x0.75mm <sup>2</sup> protective earth  |
| Signals (CS)            | Parallel communication | 11x AWG24 + 5x2 AWG24                      | UTOW socket connector 26p, Bulkhead                 | UTOW 71626SH06       | 3 Quad twisted, 5 screened pair twisted |
| Air (AIR)               | Utility air            | 1x12.7 (1/2")<br>P <sub>Nom</sub> = 16 bar | Parker Push-lock, 1/2" M22x1,5 Brass 24 degree seal |                      |                                         |
| Bus communication (BUS) | Ethernet/IP, PROFINET  | 4x0.4mm <sup>2</sup>                       | M12, 4-poles, D-coded, male                         | Harting 21038821425  | Ethernet CAT5e 100 Mbit <sup>1</sup> .  |

<sup>1</sup> Ethernet with wire colors according to PROFINET standard

*Continues on next page*

### Media & Communication, DeviceNet/Profibus, parallel communication and air

| Type                    | Application             | Specification                              | Connection type                                        | Supplier Article No. | Comment                                 |
|-------------------------|-------------------------|--------------------------------------------|--------------------------------------------------------|----------------------|-----------------------------------------|
| Power (CP)              | Utility power           | 4x0.75mm <sup>2</sup><br>(5A/250VAC)       | UTOW socket connector 26p, Bulkhead                    | UTOW 71626SH06       | 1x0.75mm <sup>2</sup> protective earth  |
| Signals (CS)            | Parallel communication  | 11x AWG24 + 5x2 AWG24                      | UTOW socket connector 26p, Bulkhead                    | UTOW 71626SH06       | 3 Quad twisted, 5 screened pair twisted |
| Air (AIR)               | Utility air             | 1x12.7 (1/2")<br>P <sub>Nom</sub> = 16 bar | Parker Push-lock, 1/2" M22x1,5<br>Brass 24 degree seal |                      |                                         |
| Bus communication (BUS) | Profibus                | 2xAWG26 Z=150 Ohm (1MHz)                   | UTOW socket connector 10p, Bulkhead                    | UTOW 71210SH06       |                                         |
|                         | DeviceNet               | 2xAWG26 Z=120 Ohm (1MHz)                   |                                                        |                      |                                         |
|                         | BUS power & BUS utility | 2x2 AWG24                                  |                                                        |                      |                                         |

# 1 Description

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## 1.11.1 Introduction

## 1.11 Maintenance and troubleshooting

### 1.11.1 Introduction

---

#### General

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

- Maintenance-free AC motors are used
- Oil is used for the gear boxes
- The cabling is routed for longevity, and in the unlikely event of a failure, its modular design makes it easy to change

---

#### Maintenance

The maintenance intervals depend on the use of the robot, the required maintenance activities also depends on selected options. For detailed information on maintenance procedures, see *Product manual - IRB 460*.

## 2 Specification of variants and options

### 2.1 Introduction to variants and options

---

#### General

The different variants and options for the IRB 460 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) |
|---------|----------|------------------------|-----------|
| 435-107 | 460      | 110                    | 2.4       |

#### Manipulator color

| Option  | Color                                                  | RAL code <sup>i</sup> |
|---------|--------------------------------------------------------|-----------------------|
| 209-2   | ABB white standard<br>Standard color                   | RAL 9003              |
| 209-201 | NCS 2070-Y60R Orange                                   | NCS 2070-Y60R         |
| 209-202 | ABB Graphite White std                                 | RAL 7035              |
| 209     | RAL code should be specified (ABB non-standard colors) |                       |

<sup>i</sup> The colors can differ depending on supplier and the material on which the paint is applied.



#### Note

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

#### Protection

| Option | Description |
|--------|-------------|
| 287-4  | Standard    |

#### Media & communication

Air supply and signals for extra equipment upper arm, see [Customer connections on page 50](#).

| Option | Description                                    | Note                                |
|--------|------------------------------------------------|-------------------------------------|
| 803-1  | Parallel communication and air                 | Includes CP/CS and air.             |
| 803-2  | Ethernet cable, parallel communication and air | Include CP/CS and Ethernet + air    |
| 803-3  | DeviceNet, parallel communication and air      | Includes CP, CS and DeviceNet + air |
| 803-4  | PROFIBUS, parallel communication and air       | Includes CP, CS and PROFIBUS + air  |

#### Connector kits

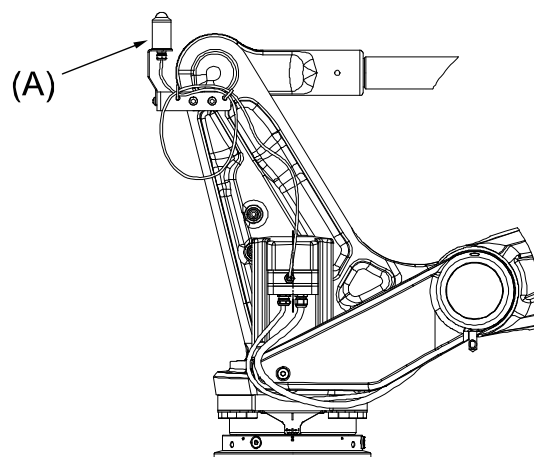
The kit consists of connectors, pins and sockets.

| Option | Description                          |
|--------|--------------------------------------|
| 431-1  | For the connectors on the upper arm. |
| 239-1  | For connectors on foot               |

*Continues on next page*

### Safety lamp

| Option | Description                                                                                                                                                              |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 213-1  | A safety lamp with an orange fixed light can be mounted on the manipulator. The lamp is active in MOTORS ON mode. The safety lamp is required on a UL/UR approved robot. |

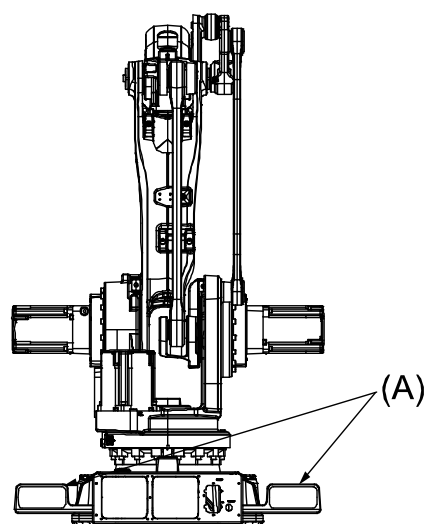


xx1000001163

| Position | Description |
|----------|-------------|
| A        | Safety lamp |

### Fork lift device

| Option | Description                                               |
|--------|-----------------------------------------------------------|
| 159-1  | Lifting device on the manipulator for fork-lift handling. |



xx1000001164

| Position | Description           |
|----------|-----------------------|
| A        | Fork lift device (x4) |

Continues on next page

## 2 Specification of variants and options

---

### 2.2 Manipulator

*Continued*

---

#### Motor cooling

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

| Option | Description        |
|--------|--------------------|
| 87-1   | Cooling fan axis 1 |

The cooling fan has protection class IP54.

To determine the need of cooling fans on the motors, use the add-in **Mechanical Analysis** in RobotStudio. For more information, contact your local ABB office.

#### Limitations

Cannot be combined with UL/CSA (429-1).

---

#### Base plate

| Option | Description                                   |
|--------|-----------------------------------------------|
| 37-1   | See <a href="#">Installation on page 23</a> . |

---

#### Electronic Position Switches (EPS)

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

---

#### Working range limit axis 1

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

| Option | Type                   | Description                                                                                   |
|--------|------------------------|-----------------------------------------------------------------------------------------------|
| 29-2   | Axis 1, 7.5/15 degrees | Two stops which allows the working range to be restricted in increments of 7.5 or 15 degrees. |

## 2.3 Floor cables

### Manipulator cable length

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

### Application interface connection

| Option | Description                                                                                                          |
|--------|----------------------------------------------------------------------------------------------------------------------|
| 16-1   | Cabinet<br>The signals are connected to 12-pole screw terminals, Phoenix MSTB 2.5/12-ST-5.08, to the control module. |



#### 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.

### Connection of Parallel/DeviceNet/Profibus/Ethernet connection

Following information specifies the cable length for Parallel/DeviceNet/Profibus/Ethernet floor cables for connections between cabinets and manipulator.

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

## 2 Specification of variants and options

---

### 2.4 User documentation

### 2.4 User documentation

---

#### User documentation

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



#### Tip

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

## 2.5 Warranty

### Warranty

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



#### Note

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

| Option | Type                          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 438-1  | Standard warranty             | Standard warranty is 12 months from <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.                                                                                                                                                                                                                                                                                                                                                     |
| 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> <div> <h4>Note</h4> <p>Special conditions are applicable, see <i>Robotics Warranty Directives</i>.</p> </div> |

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## 3 Accessories

### 3.1 Introduction to accessories

---

#### General

There is a range of tools and equipment available.

---

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

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

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