

ROBOTICS

# Product specification

## IRB 460



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Skribenta version 5.5.019

## **Product specification**

**IRB 460-110/2.4**

**IRC5**

**Document ID: 3HAC039611-001**

**Revision: Q**

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# Overview of this product specification

## About this product specification

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

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

The specification covers the manipulator using the IRC5 controller.

## Usage

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

The specification is intended for:

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

## References

Reference	Document ID
<i>Product manual - IRB 460</i>	3HAC039842-001
<i>Product specification - Controller IRC5</i> IRC5 with main computer DSQC1000.	3HAC047400-001
<i>Product specification - Controller software IRC5</i> IRC5 with main computer DSQC1000 and RobotWare 5.6x.	3HAC050945-001
<i>Product specification - Controller software IRC5</i> 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

## 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>

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## Overview of this product specification

Continued

Revision	Description
D	<ul style="list-style-type: none"><li>• Base plate drawing updated</li></ul>
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 39</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>

# 1 Description

## 1.1 Structure

### 1.1.1 Introduction

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**Robot family**

IRB 460 is ABB Robotics latest generation of, 4-axis palletizing 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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**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*.

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**Safety**

Safety standards valid for complete robot, manipulator and controller.

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**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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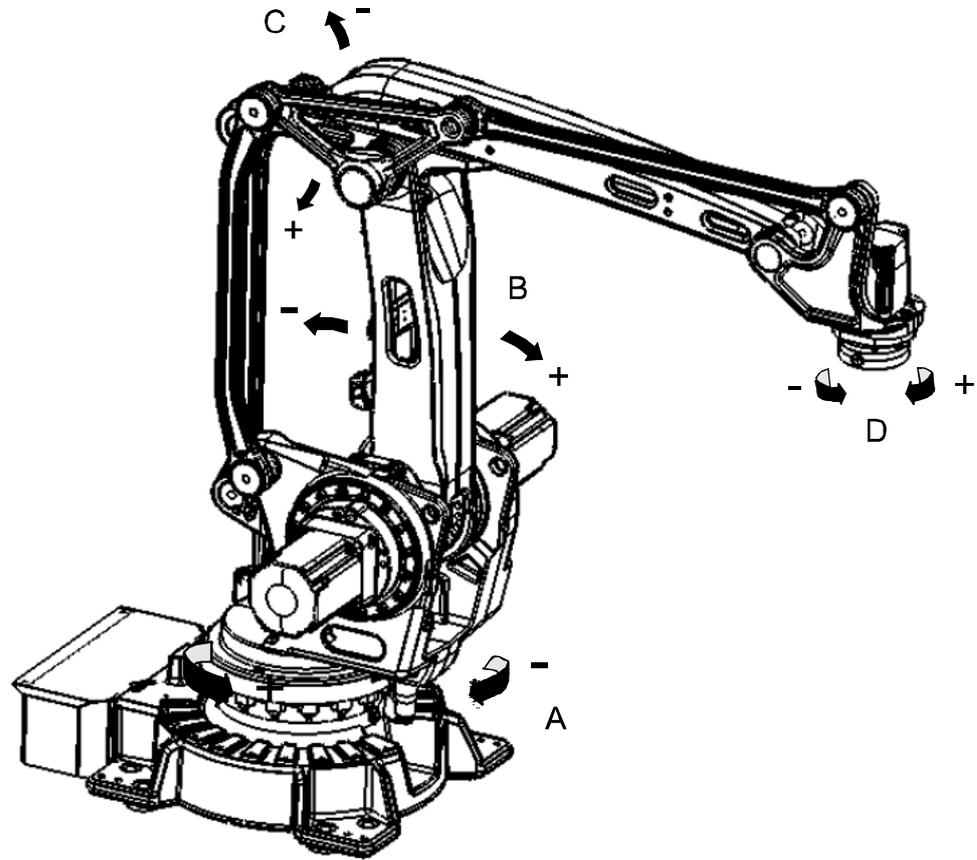
# 1 Description

## 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

Manipulator weight

Robot type	Weight (kg)
IRB 460	925 kg

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).

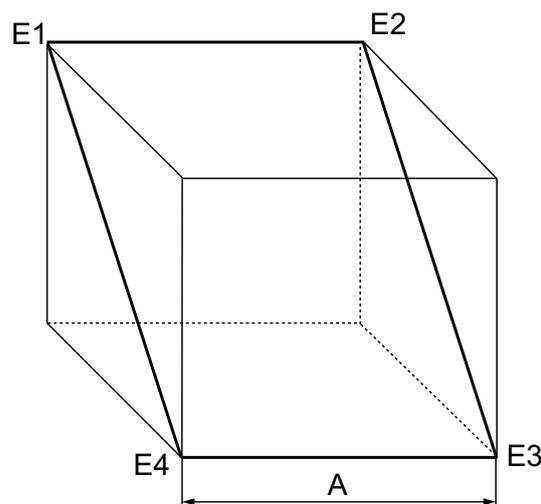
Power consumption at max speed (vmax)

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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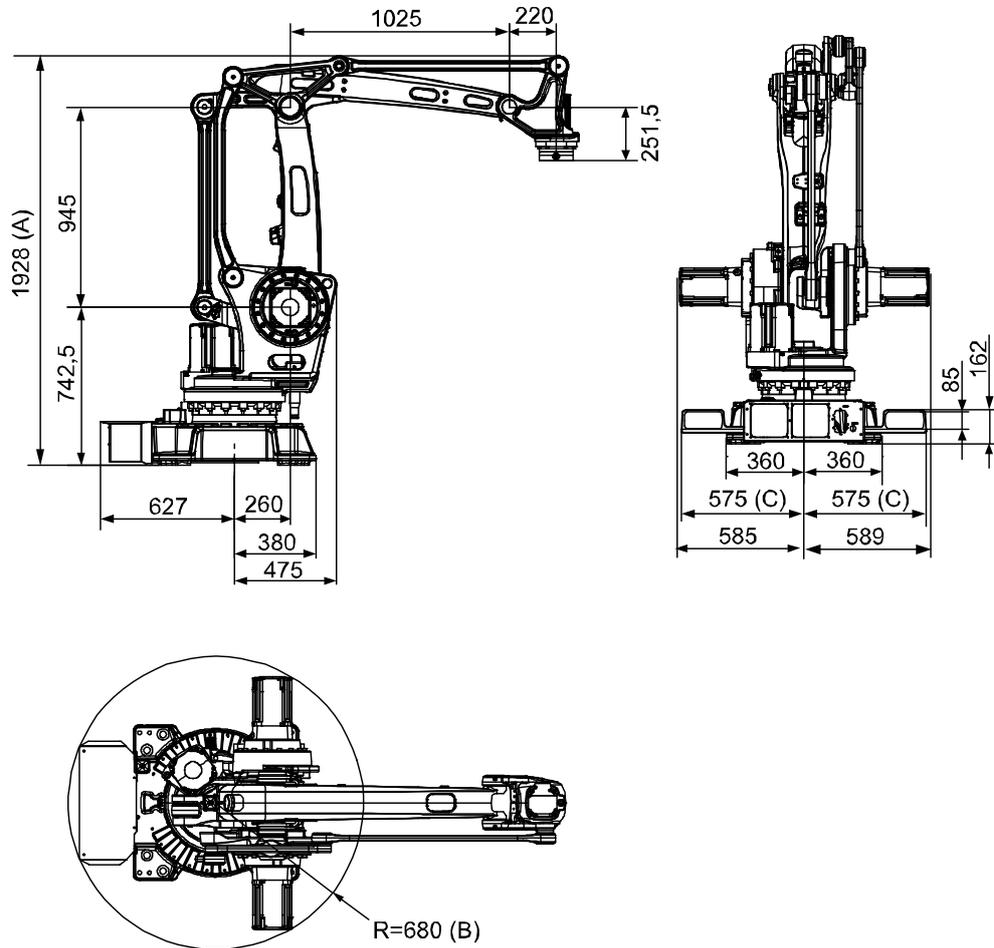
# 1 Description

## 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 Safety standards

### 1.2.1 Applicable standards



#### Note

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

#### General

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

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

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

#### Region specific standards and regulations

Standard	Description
ANSI/RIA R15.06	Safety requirements for industrial robots and robot systems
ANSI/UL 1740	Safety standard for robots and robotic equipment
CAN/CSA Z 434-03	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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## 1.2.1 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.

## 1.3 Installation

### 1.3.1 Introduction

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#### 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 26](#).

#### 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.

# 1 Description

## 1.3.2 Operating requirements

### 1.3.2 Operating requirements

#### Protection standards

Manipulator IP67.

#### Explosive environments

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

#### Ambient temperature

Description	Standard/Option	Temperature
Manipulator during operation	Standard	0° C <sup>i</sup> (32° F) to +45° C (113° F)
For the controller	Standard/Option	See <i>Product specification - Controller IRC5 with FlexPendant.</i>
Complete robot during transportation and storage	Standard	-25° C (-13° F) to +55° C (131° F)
For short periods (not exceeding 24 hours).	Standard	up to +70° C (158° F)

<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. Below 5° C this warm-up phase is mandatory. Otherwise there is a risk that the robot stops or run with lower performance due to temperature dependent oil- and grease viscosity.

#### Relative humidity

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

1.3.3 Mounting the manipulator

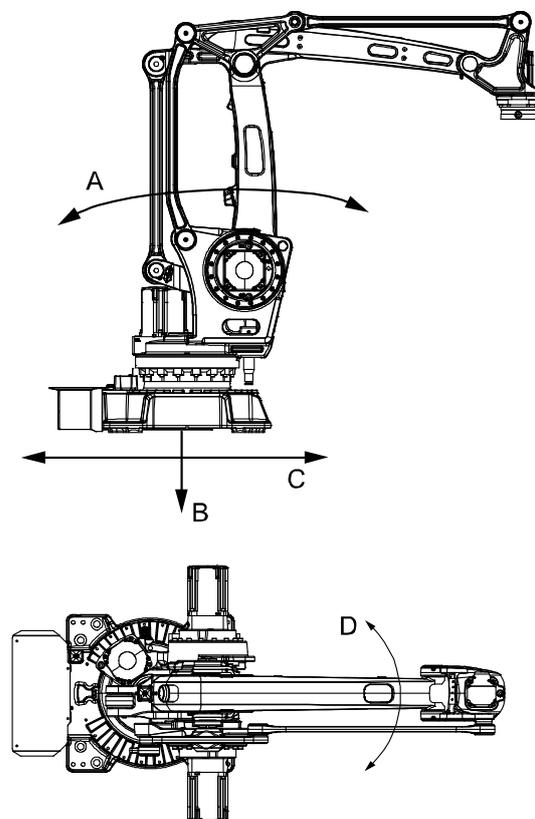
Maximum load

Maximum load in relation to the base coordinate system.

Floor Mounted

Force	Endurance load (in operation)	Max. load (emergency stop)
Force xy	± 6.2 kN	± 10.6 kN
Force z	10 ± 3.8 kN	10 ± 6.5 kN
Torque xy	± 13.7 kNm	± 23 kNm
Torque z	± 5.3 kNm	± 7.9 kNm

The following figure shows the direction of forces.



xx1000001032

A	Torque <sub>xy</sub> (T <sub>xy</sub> )
B	Force <sub>z</sub> (F <sub>z</sub> )
C	Force <sub>xy</sub> (F <sub>xy</sub> )
D	Torque <sub>z</sub> (T <sub>z</sub> )

Note regarding M<sub>xy</sub> and F<sub>xy</sub>

The bending torque (M<sub>xy</sub>) can occur in any direction in the XY-plane of the base coordinate system. The same applies to the transverse force (F<sub>xy</sub>).

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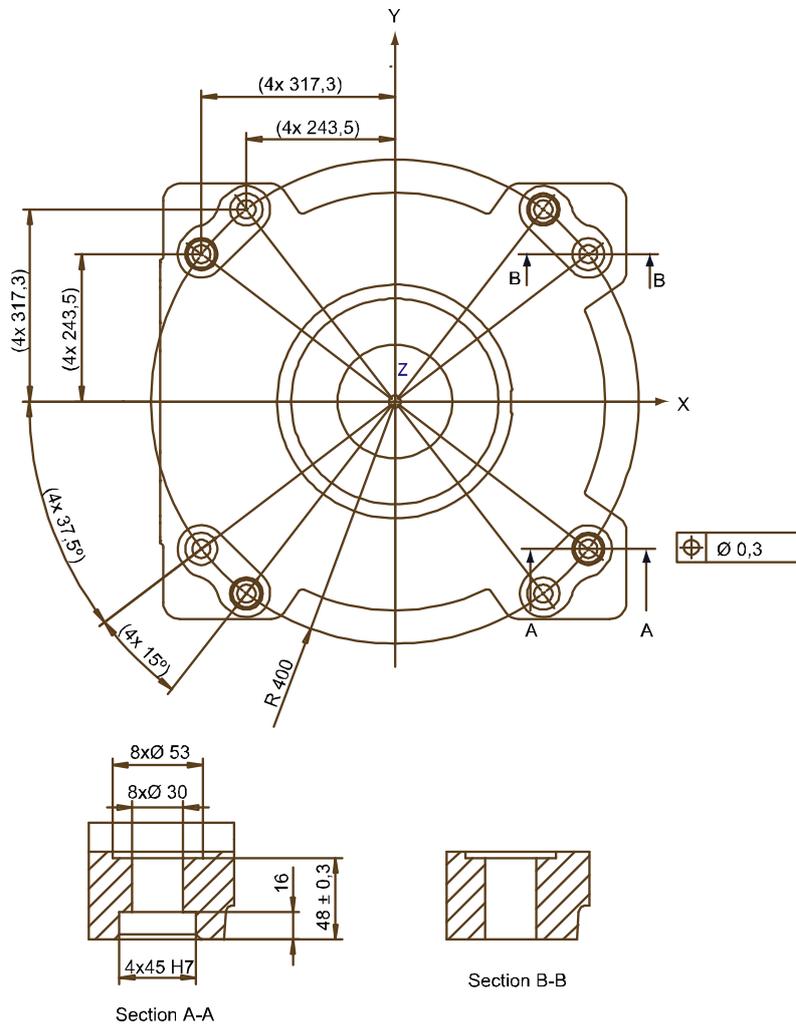
# 1 Description

## 1.3.3 Mounting the manipulator

Continued

### Fastening holes robot base

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



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



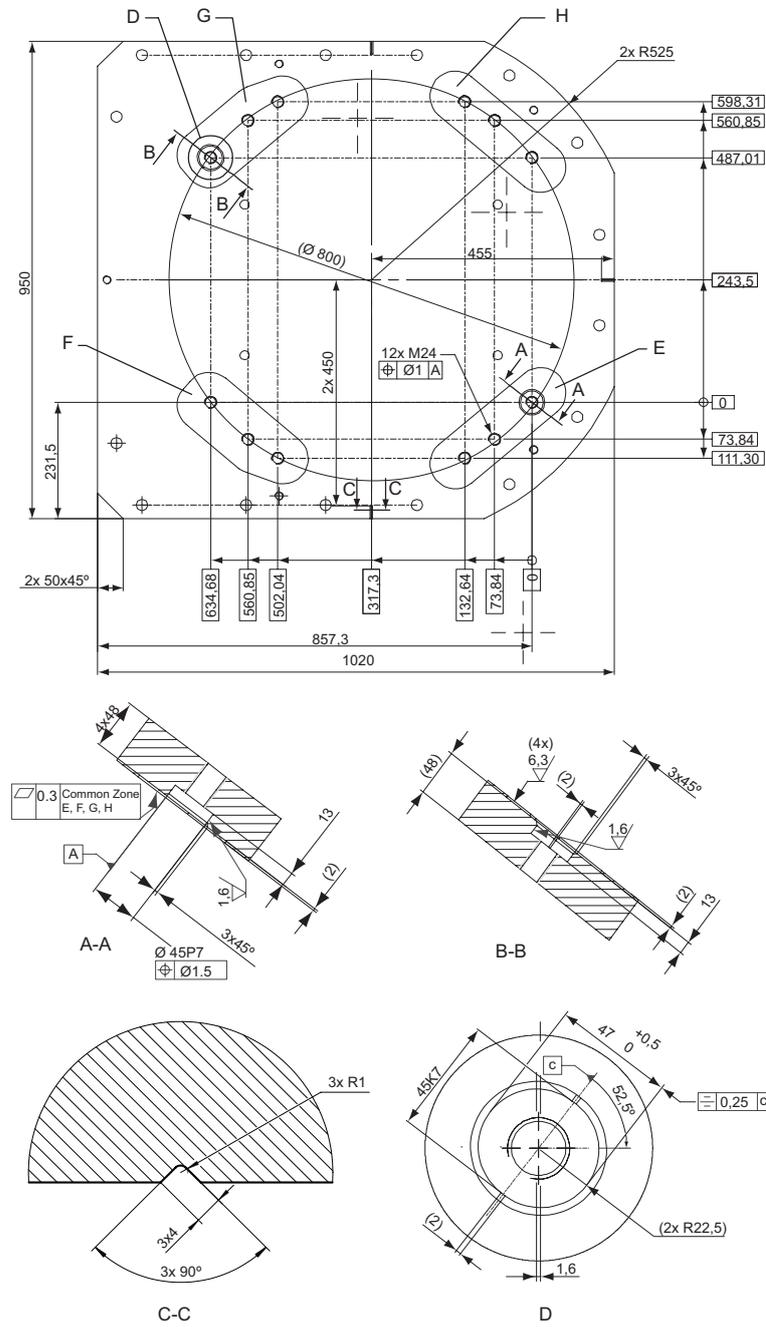
#### Note

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

Base plate drawing

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



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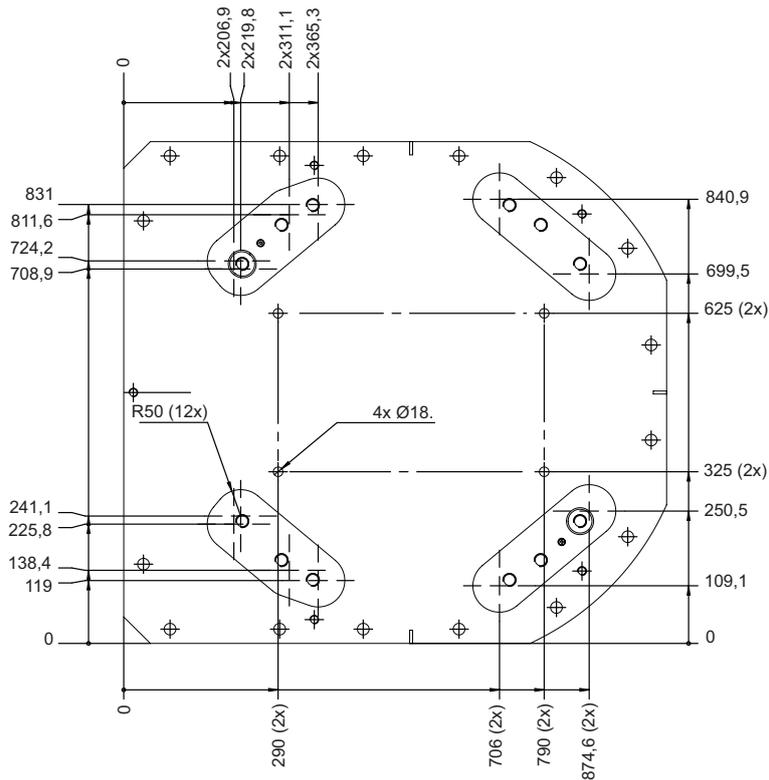
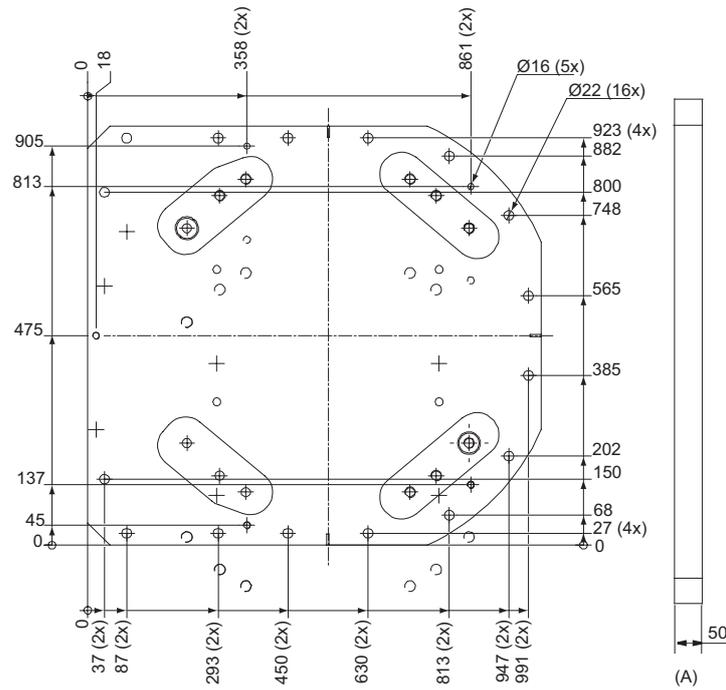
E, F, G, H	Common tolerance zone (accuracy all over the base plate from one contact surface to the other)
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# 1 Description

## 1.3.3 Mounting the manipulator

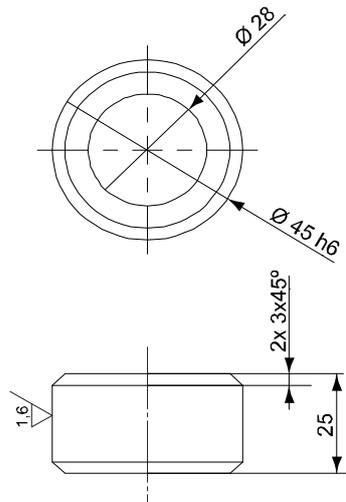
Continued



xx1000001054

Position	Description
A	Color: RAL 9005 Thickness: 80-100 µm

Continues on next page



xx1000001055

Position	Description
A	Guide sleeve protected from corrosion

# 1 Description

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## 1.4.1 Calibration methods

## 1.4 Calibration and references

### 1.4.1 Calibration methods

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#### 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.

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#### Types of calibration

Type of calibration	Description	Calibration method
Standard calibration	The calibrated robot is positioned at calibration position. Standard calibration data is found on the SMB (serial measurement board) or EIB in the robot. For robots with RobotWare 5.04 or older, the calibration data is delivered in a file, calib.cfg, supplied with the robot at delivery. The file identifies the correct resolver/motor position corresponding to the robot home position.	Axis Calibration

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#### 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

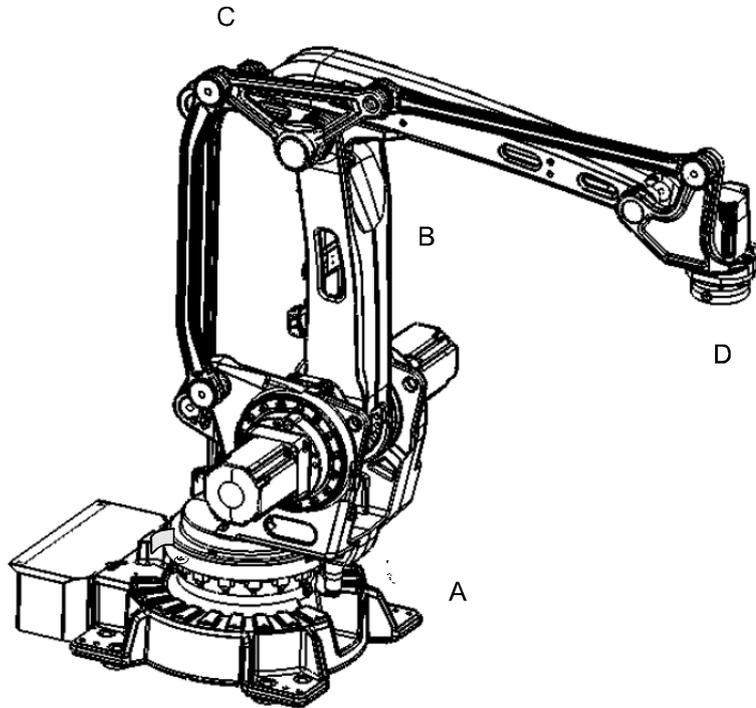
The calibration equipment for Axis Calibration is delivered as a toolkit.

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.

1.4.2 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 Axis 3 to 6 in any position
Calibration of axis 1	Axis 1 in zero position Axis 2 to 6 in any position

# 1 Description

## 1.4.3.1 Synchronization marks and synchronization position for axes

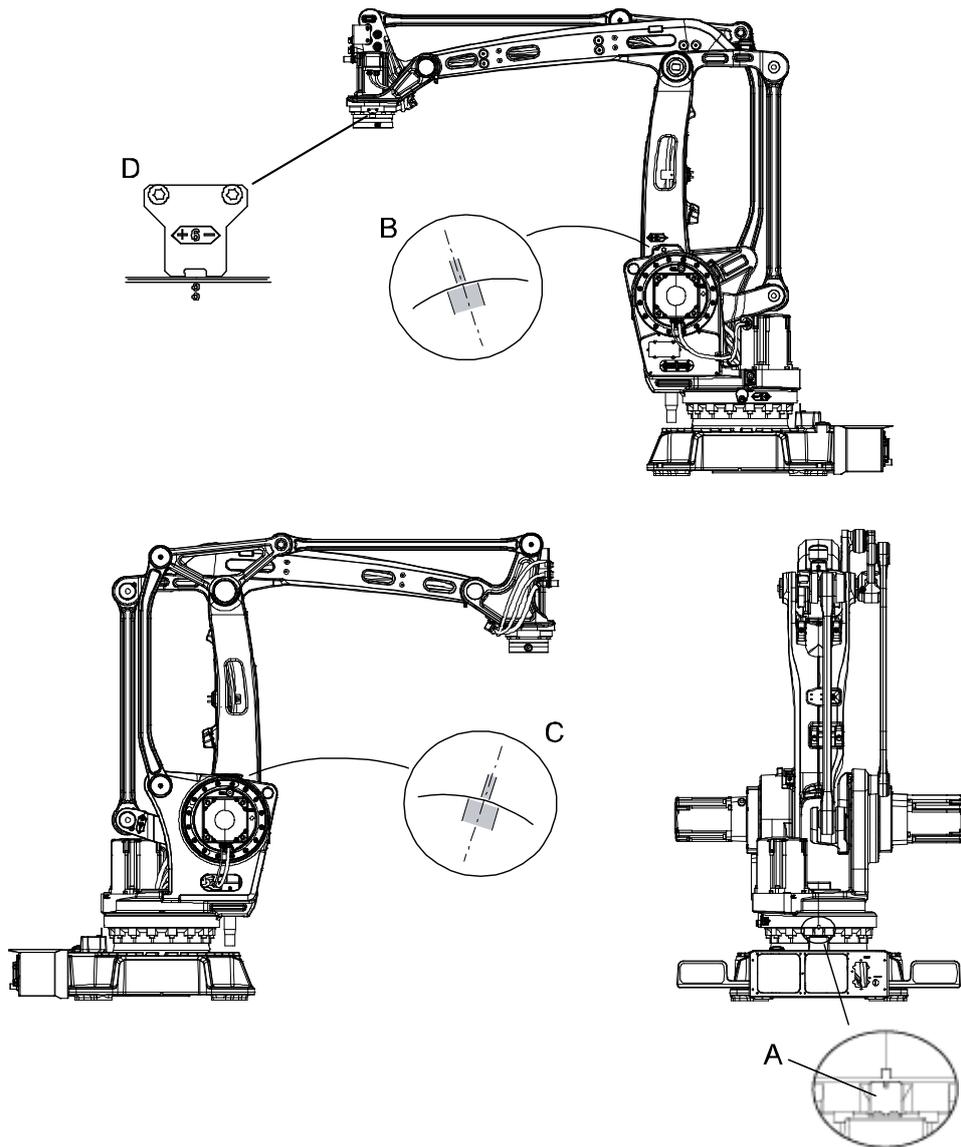
### 1.4.3 Synchronization marks and axis movement directions

#### 1.4.3.1 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

### 1.4.3.2 Calibration movement directions for all axes

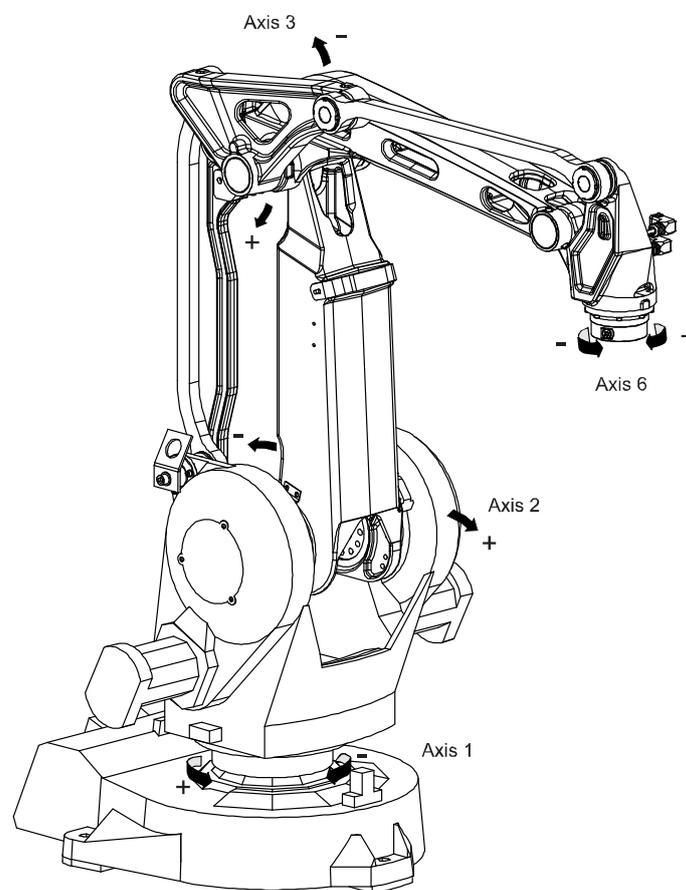
#### Overview

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



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# 1 Description

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## 1.5.1 Introduction to load diagrams

## 1.5 Load diagrams

### 1.5.1 Introduction to load diagrams

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#### 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,  $J_o$  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

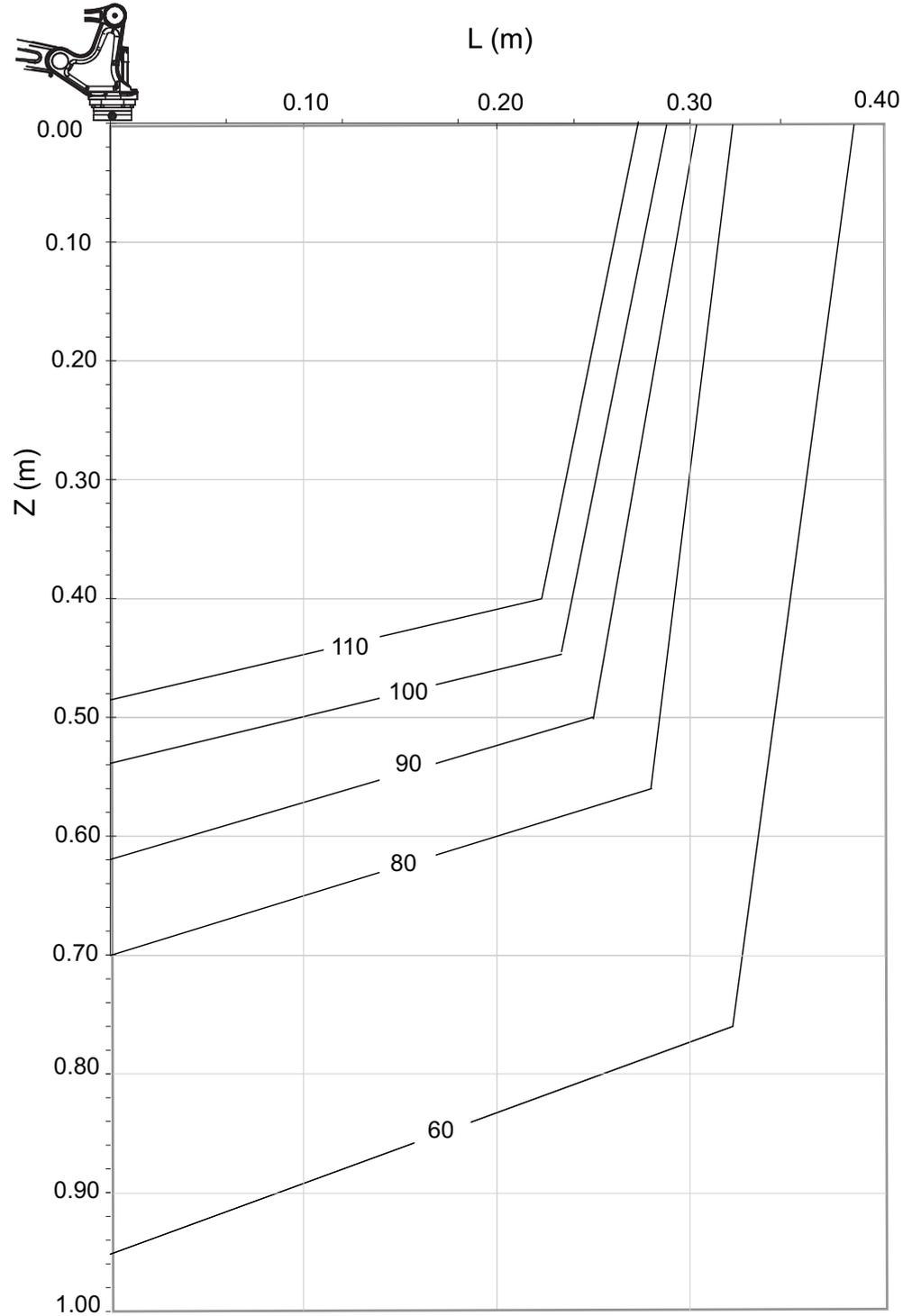
To verify a specific load case, use the RobotStudio add-in RobotLoad.

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.

1.5.2 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).



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# 1 Description

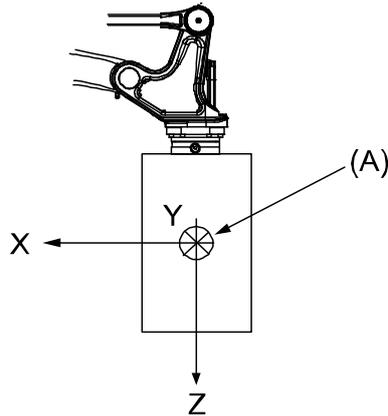
## 1.5.3 Maximum load and moment of inertia

### 1.5.3 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	$J_{a_6} = \text{Load} \times L^2 + J_{0z} \leq 70 \text{ kgm}^2$



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.

## 1.5.4 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 then to use RobotStudio.

### Maximum Cartesian design acceleration for nominal loads

Robot type	E-stop Max acceleration at nominal load COG [m/s <sup>2</sup> ]	Controlled Motion 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 Description

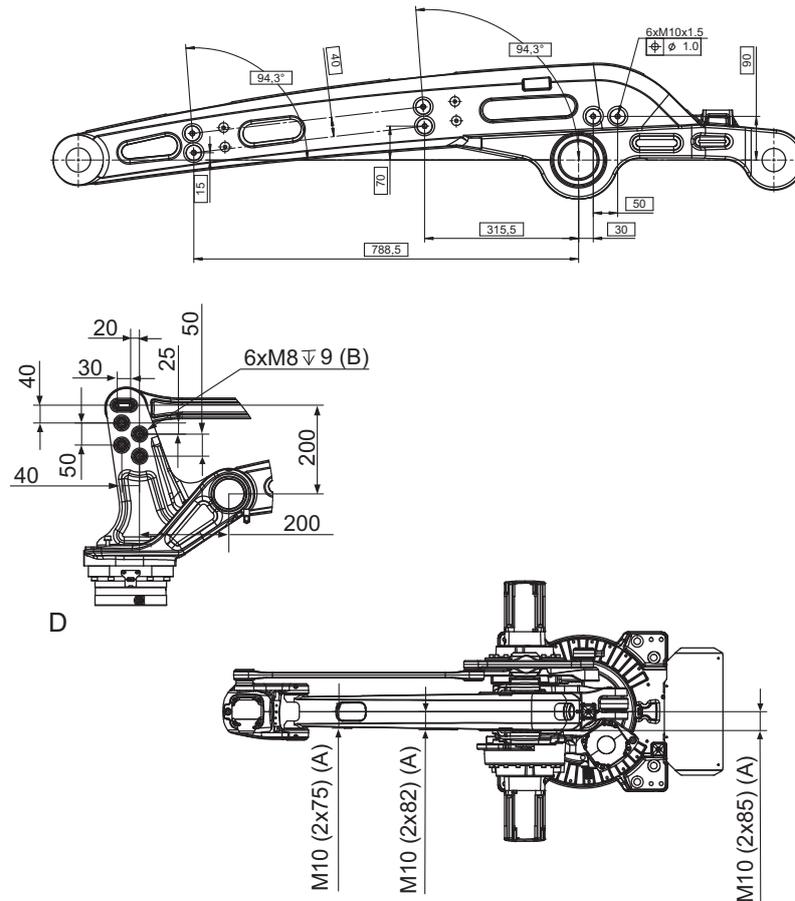
## 1.6 Mounting of equipment

### 1.6 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.



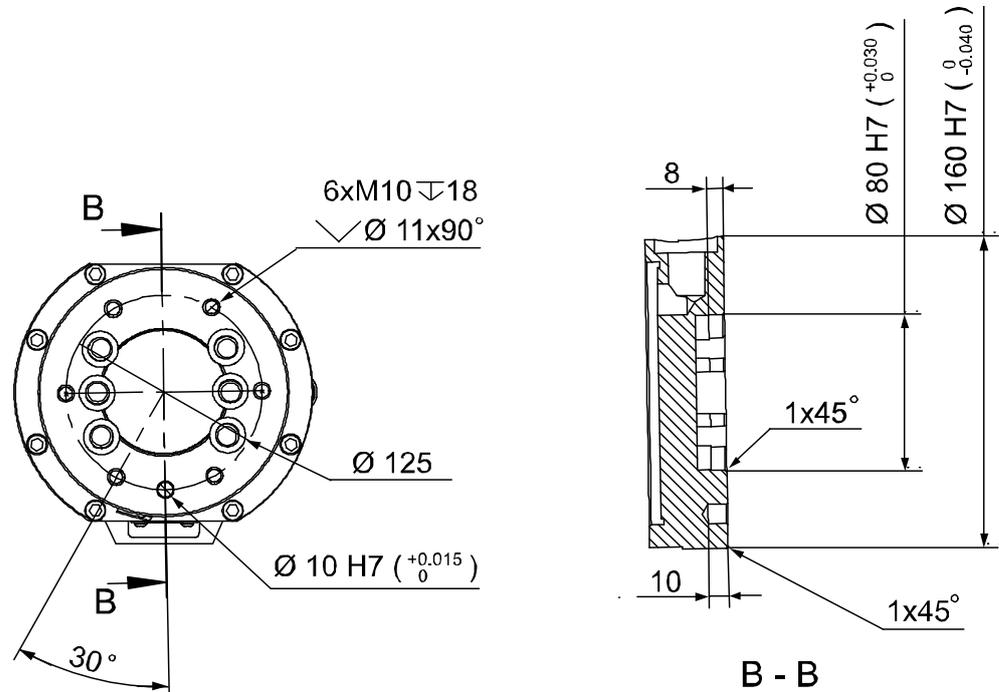
xx1000001041

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

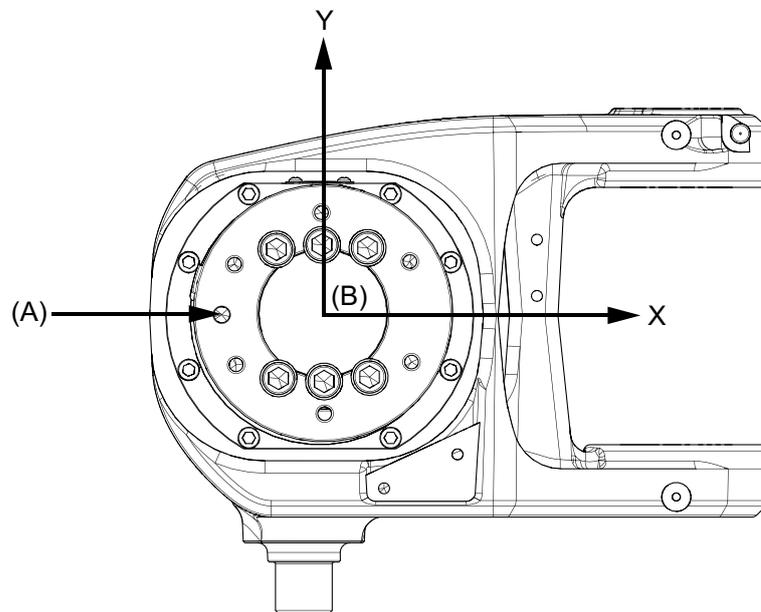
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Robot tool flange

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

# 1 Description

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## 1.6 Mounting of equipment

*Continued*

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### Fastener quality

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

1.7 Robot motion

1.7.1 Introduction

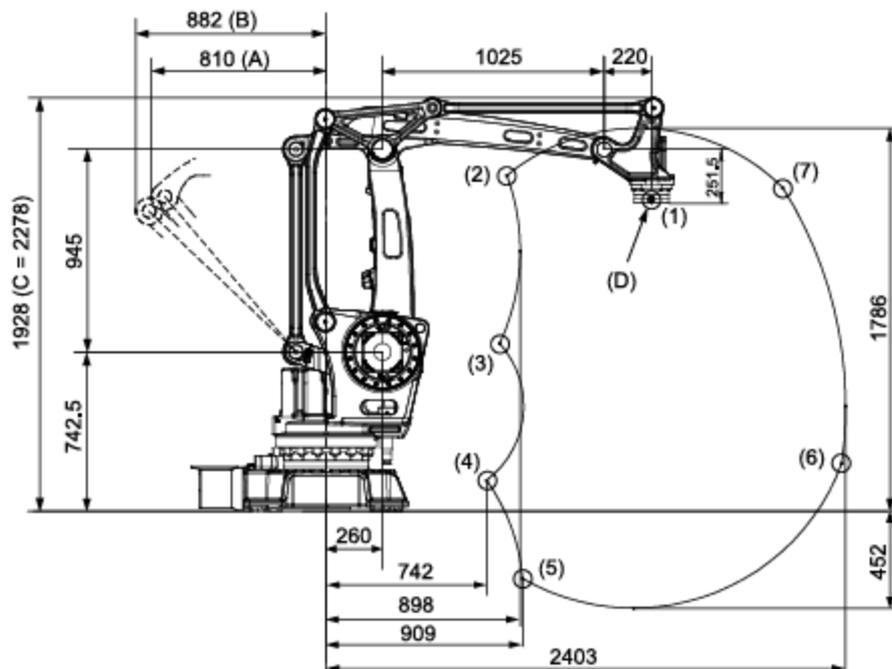
Type of motion

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 +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

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# 1 Description

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## 1.7.1 Introduction

*Continued*

Position	Description
D	Tool flange center

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### Positions at wrist center

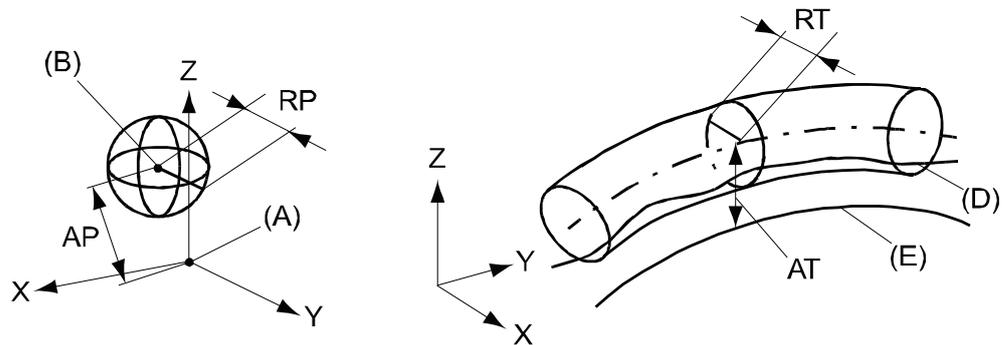
Position number, see figure above	X Position (mm)	Z Position (mm)	Axis 2 Angle (degrees)	Axis 3 Angle (degrees)
1	1505	1437	0	0
2	836	1565	-40	-20
3	802	782	-40	25
4	742	145	55	120
5	909	-314	85	120
6	2385	223	85	20
7	2111	1510	45	-20

1.7.2 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

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 Description

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## 1.7.3 Velocity

### 1.7.3 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.

### 1.7.4 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 Description

---

### 1.8 Cooling fan for axis 1 motor

### 1.8 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.

### 1.9 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 43](#).

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

Type	Application	Specification	Connection type	Supplier Article No.	Comment
Power (CP)	Utility power	4x0.75mm <sup>2</sup> (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") P <sub>Nom</sub> = 16 bar	Parker Push-lock, 1/2" M22x1,5 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> (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") 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*

# 1 Description

## 1.9 Customer connections

Continued

### 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> (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") P <sub>Nom</sub> = 16 bar	Parker Push-lock, 1/2" M22x1,5 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			

## 1.10 Maintenance and troubleshooting

### 1.10.1 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*.

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## 2 Specification of variants and options

### 2.1 Introduction to variants and options

---

#### General

The different variants and options for the IRB 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	Description	Note
209-2	ABB White	The robot is painted in white color.
209-201	NCS 2070-Y60R Orange	The robot is painted in orange.
209-202	ABB Graphite white std.	The robot is painted in graphite white color.
209	RAL code	The robot is painted in chosen RAL - color.



#### Note

Notice that delivery time for painted spare parts will increase for 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 39](#).

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

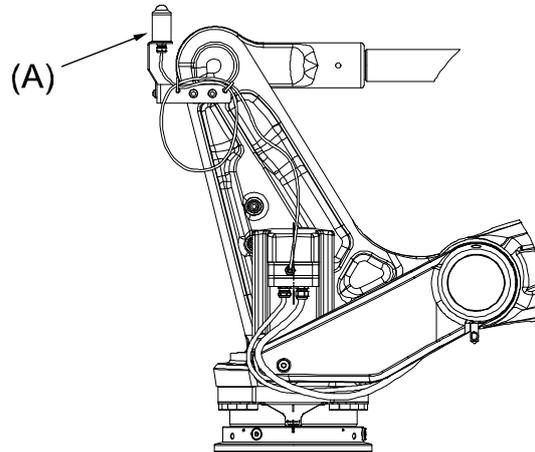
The kit consists of connectors, pins and sockets.

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

### Cooling fans for axis 1 motor

To be used to avoid overheating of motors and gears in application with intensive motion (high average speed and/or high average torque and/or short wait time) of axis 1. IP54 valid for cooling fan.

Option	Description
87-1	Cooling fan for axis 1 motor.

### Fork lift device

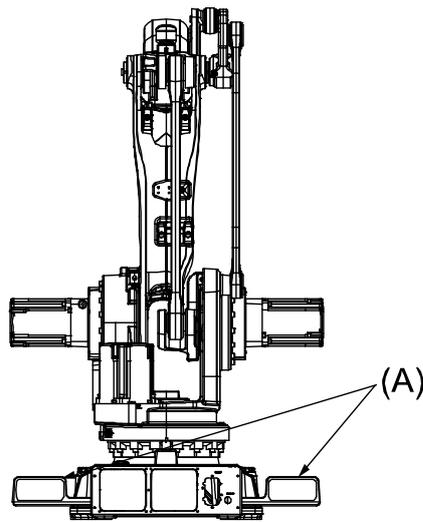
Option	Description
159-1	Lifting device on the manipulator for fork-lift handling.

*Continues on next page*

## 2 Specification of variants and options

### 2.2 Manipulator

Continued



xx1000001164

Position	Description
A	Fork lift device (x4)

#### Base plate

Option	Description
37-1	See <a href="#">Installation on page 15</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.

Continues on next page

### Warranty

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



#### Note

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

Option	Type	Description
438-1	Standard warranty	Standard warranty is 12 months from <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 data-bbox="826 1753 888 1812" data-label="Image"> </div> <div data-bbox="909 1765 976 1796" data-label="Section-Header"> <h4>Note</h4> </div> <div data-bbox="820 1816 1452 1877" data-label="Text"> <p>Special conditions are applicable, see <i>Robotics Warranty Directives</i>.</p> </div>

## 2 Specification of variants and options

### 2.3 Floor cables

### 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 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

## 2.4 User documentation

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### User documentation

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



#### Tip

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

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## 3 Accessories

### 3.1 Introduction to accessories

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#### 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*.

---

#### Robot peripherals

- Motor Units<sup>2</sup>

<sup>2</sup> Not applicable for IRC5 Compact controller.

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