ROBOTICS

Product specification

IRB 760

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Product specification

IRB 760-450/3.2
IRB 760-445/3.2

IRC5

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Original instructions.

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Overview

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
Product specification - Controller IRC5 IRC5 with main computer DSQC1000.	*3HAC047400-001*
Product specification - Controller software IRC5 IRC5 with main computer DSQC1000 and RobotWare 6.	*3HAC050945-001*
Product manual - IRB 760	*3HAC039838-001*
Product specification - Robot user documentation, IRC5 with RobotWare 6	*3HAC052355-001*
Product specification - Robot stopping distances according to ISO 10218-1	*3HAC048645-001*

Revisions

Revision	Description
-	First edition.
A	• Table for ambient temperature adjusted • Minor corrections
B	• Machinery directive updated
C	• The maximum allowed deviation in levelity of the base plate is changed, see *Mounting the manipulator on page 21*.
D	• Minor corrections/update

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Continued

Revision	Description
E	• Text for ISO test adjusted
F	• Minor corrections/update
G	• Graphite white color added
H	• Minor corrections/update
J	• Axis Calibration method added
K	Published in release R17.1. The following updates are done in this revision: • Restriction of load diagram added.
L	Published in release R17.2. The following updates are done in this revision: • Updated list of applicable standards.
M	Published in release R18.1. The following updates are done in this revision: • TCP acceleration added.
N	Published in release R18.2. The following updates are done in this revision: • Added locating hole position in tool flange view.
P	Published in release R20C The following updates are done in this revision: • New variants IRB 760-445/3.2 added.(only for press tending application)
Q	Published in release R20D The following updates are done in this revision: • New customer option cable harness (with ethernet cable) added. • Warranty section updated.
R	Published in release R21C. The following updates are done in this revision: • Text regarding fastener quality is updated. • Removed Axis resolution. • Updated information about the option *Extended working range*.
S	Published in release 23D. The following updates are done in this revision: • The data for robot stopping distances is removed. See *Product specification - Robot stopping distances according to ISO 10218-1* (*3HAC048645-001*) • Added RAL code in manipulator color introduction.
T	Published in release 24D. The following updates are done in this revision: • Updated the section *Technical data on page 17*.

1 Description

1.1 Structure

1.1.1 Introduction

Robot family

IRB 760 is ABB Robotics dedicated full layer palletizer, 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 robots.

It is available in two variants with a handling capacity of 450 kg and 445 kg and a reach of 3.18 m. The IRB 760-445/3.2 variant has a modified morphology of the tilt housing.

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

Operating system

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

Safety

Safety standards valid for complete robot, manipulator and controller.

Additional functionality

For additional functionality, the robot can be equipped with optional software for application support - for example gluing and welding, communication features - network communication - and advanced functions such as multitasking, sensor control etc. For a complete description on optional software, see *Product specification - Controller software IRC5*.

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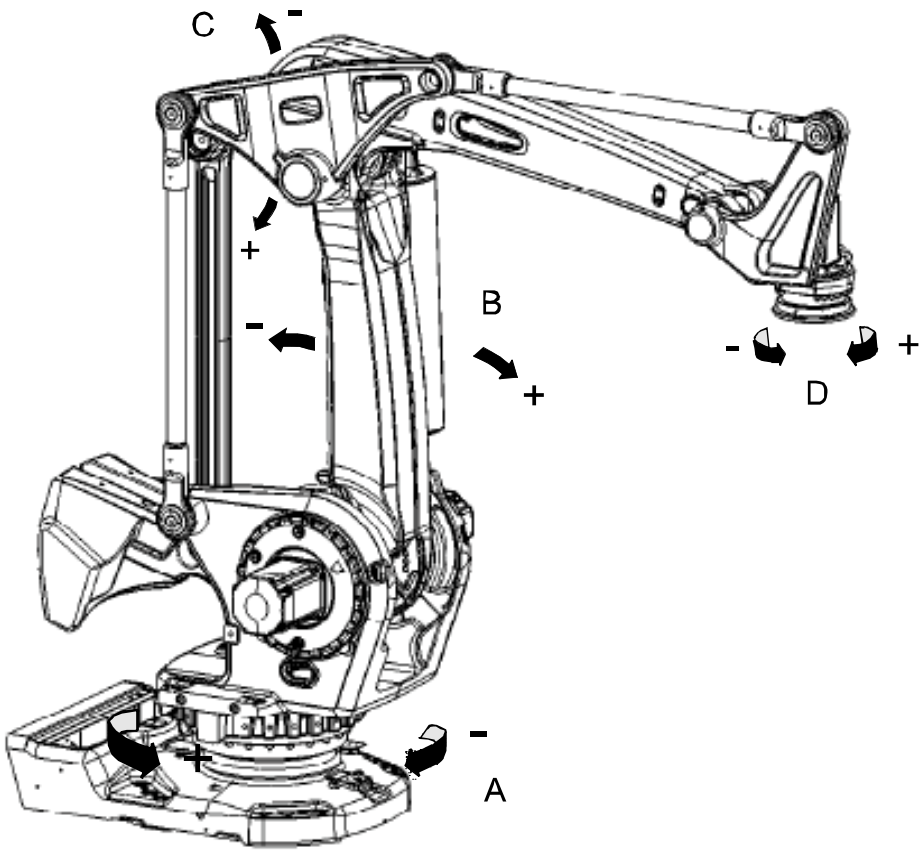
1.1.1 Introduction
Continued

Manipulator axes

The IRB 760 manipulator has 4 axes as shown in the following figure.



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Pos	Description
A	Axis 1
B	Axis 2
C	Axis 3
D	Axis 6

1.1.2 Technical data

Available variants

The IRB 760 is available in two variants, for floor mounting (no tilting around X or Y axis).

Robot variant	Handling capacity	Reach (m)
IRB 760-450/3.2	450 kg	3.18 m
IRB 760-445/3.2	445 kg	3.18 m

Manipulator weight

Robot	Weight (kg)
IRB 760	2,300 kg

Other technical data

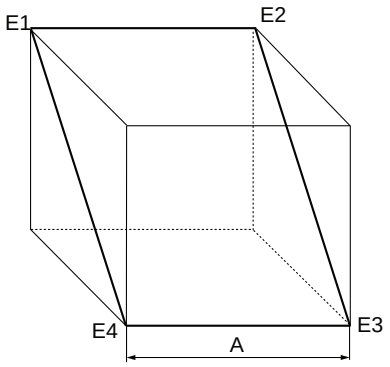
Data	Description	Note
Airborne noise level	The sound pressure level outside the working space	< 70 dB (A) Leq (acc. to Machinery directive 2006/42/EG).

Power consumption at max load

Type of movement	IRB 760-450/3.2 IRB 760-445/3.2
ISO cube maximum velocity	2.75 kW
General palletizing movements	2.95 kW

Robot in calibration position	IRB 760-450/3.2 IRB 760-445/3.2
Brakes engaged	0.20 kW
Brakes disengaged	0.98 kW

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



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	Description
A	1,000 mm

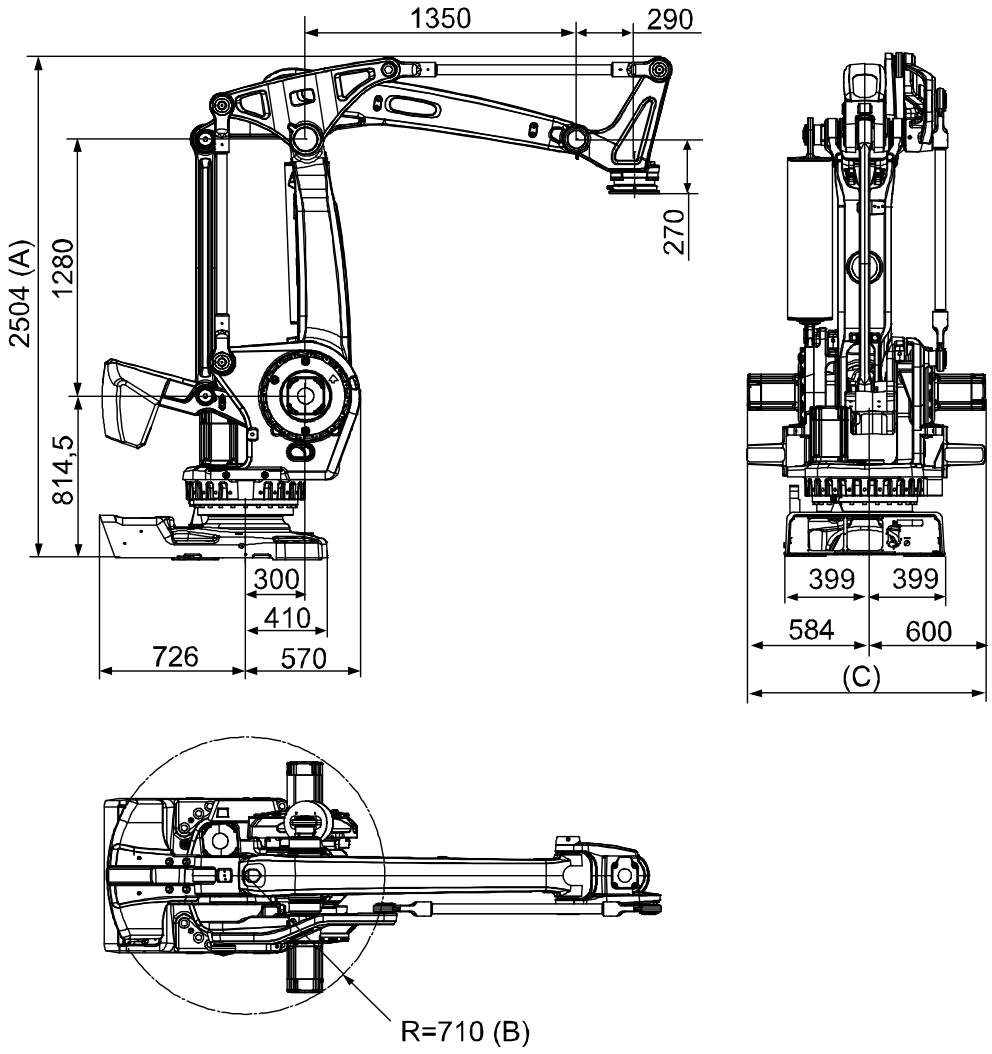
Continues on next page

1.1.2 Technical data
Continued

Dimensions IRB 760

The following figure shows the rear, side and top view of the IRB 760 manipulator (dimensions in mm).

IRB 760-450/3.2



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	Description
A	2966 mm max working range
B	Radius for axis 3 motor 750 mm radius for fork lift pocket (option)
C	Max forklift width 1195 mm

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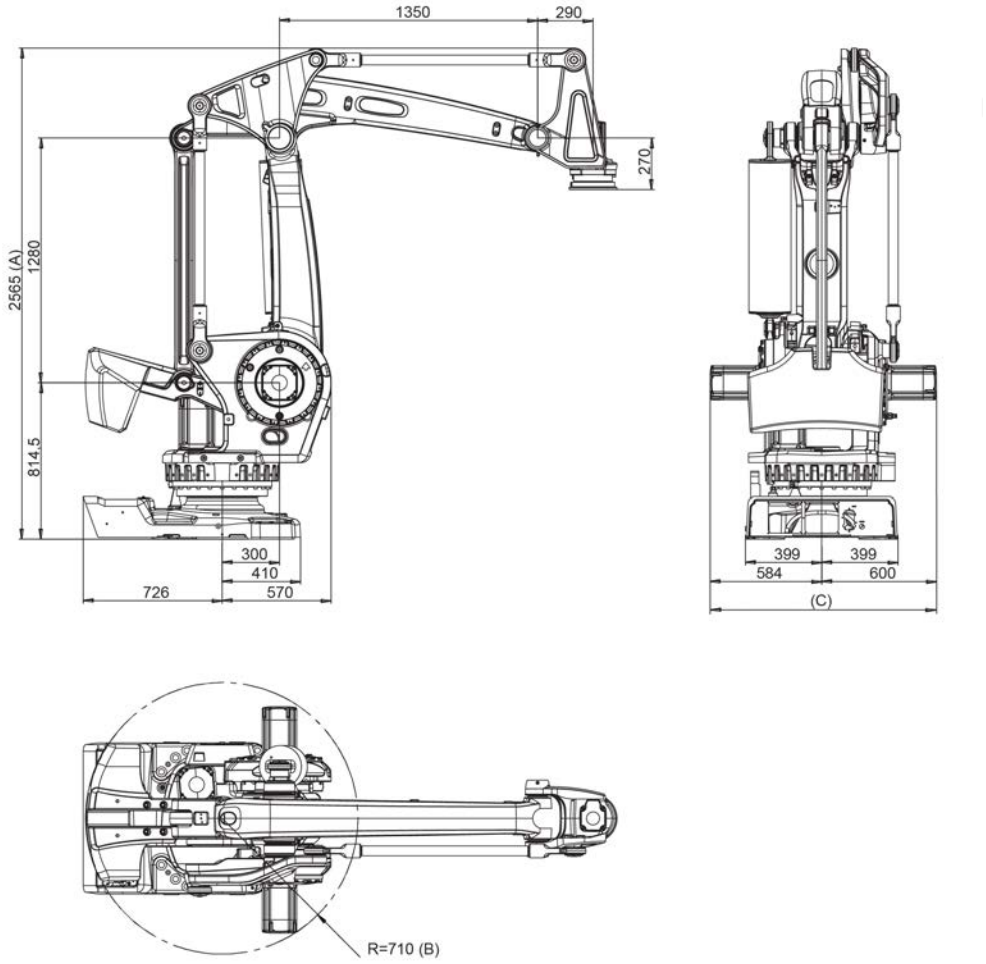
IRB 760-445/3.2



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	Description
A	3027 mm max working range
B	Radius for axis 3 motor 750 mm radius for fork lift pocket (option)
C	Max forklift width 1195 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	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

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

i Only valid for arc welding robots. Replaces IEC 61000-6-4 for arc welding robots.
ii Only robots with protection Clean Room.

1.3 Installation

1.3.1 Introduction

General

IRB 760 is designed for floor mounting (no tilting around X or Y axis), end effector with max. weight of 450 kg and 445 kg including payload, can be mounted on the mounting flange (axis 6). For more information on Load Diagrams, see *Load diagrams on page 29*.

Working range

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

1.3.2 Technical data

Weight, robot

The table shows the weight of the robot.

Robot model	Weight
IRB 760	2300 kg

Note

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

Mounting positions

The table shows valid mounting options for the manipulator.

Mounting option	Installation angle	Note
Floor mounted	0°	

Note

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

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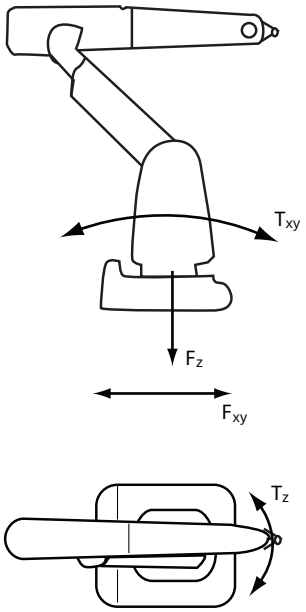
1.3.2 Technical data
Continued

Loads on foundation, robot

The illustration shows the directions of the robots stress forces.

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



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

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

Note

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

WARNING

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

Floor mounted

Force	Endurance load (in operation)	Max. load (emergency stop)
Force xy	± 9.1 kN	± 17.7 kN
Force z	+ 26.7 ± 3.6 kN	+ 26.7 ± 7.9 kN
Torque xy	± 28.9 kNm	± 38.5 kNm
Torque z	± 6.2 kNm	± 14.2 kNm

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Requirements, foundation

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

Requirement	Value	Note
Flatness of foundation surface	0.3 mm	Flat foundations give better repeatability of the resolver calibration compared to original settings on delivery from ABB. The value for levelness aims at the circumstance of the anchoring points in the robot base.
Minimum resonance frequency	15 Hz **Note** It may affect the manipulator lifetime to have a lower resonance frequency than recommended.	The value is recommended for optimal performance. Due to foundation stiffness, consider robot mass including equipment. [i] For information about compensating for foundation flexibility, see the application manual of the controller software, section *Motion Process Mode*.

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

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

Storage conditions, robot

The table shows the allowed storage conditions for the robot:

Parameter	Value
Minimum ambient temperature	-25° C
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	+50° C
Maximum ambient humidity	Max. 95% at constant temperature

Continues on next page

1.3.2 Technical data
Continued

Protection classes, robot

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

Protection type	Protection class[i]
Manipulator, protection type Standard	IP 67

[i] According to IEC 60529.

1.3.3 Mounting the manipulator

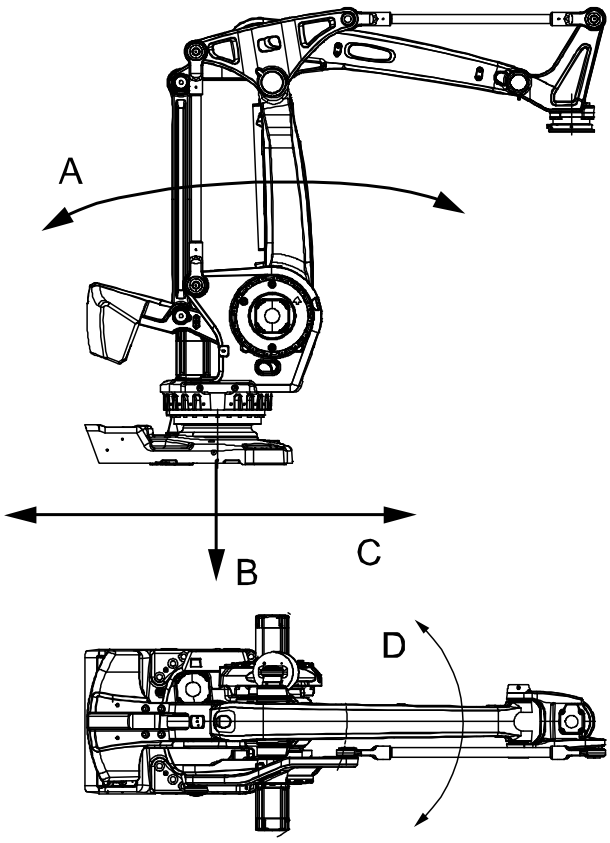
Maximum Load

Maximum load in relation to the base coordinate system.

Floor Mounted

Force	Endurance load (in operation)	Max. load (emergency stop)
Force xy	± 9.1 kN	± 17.7 kN
Force z	+ 26.7 ± 3.6 kN	+ 26.7 ± 7.9 kN
Torque xy	± 28.9 kNm	± 38.5 kNm
Torque z	± 6.2 kNm	± 14.2 kNm

The following figure shows the direction of forces.



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A	$Torque_{xy}$ (T_{xy})
B	$Force_z$ (F_z)
C	$Force_{xy}$ (F_{xy})
D	$Torque_z$ (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}).

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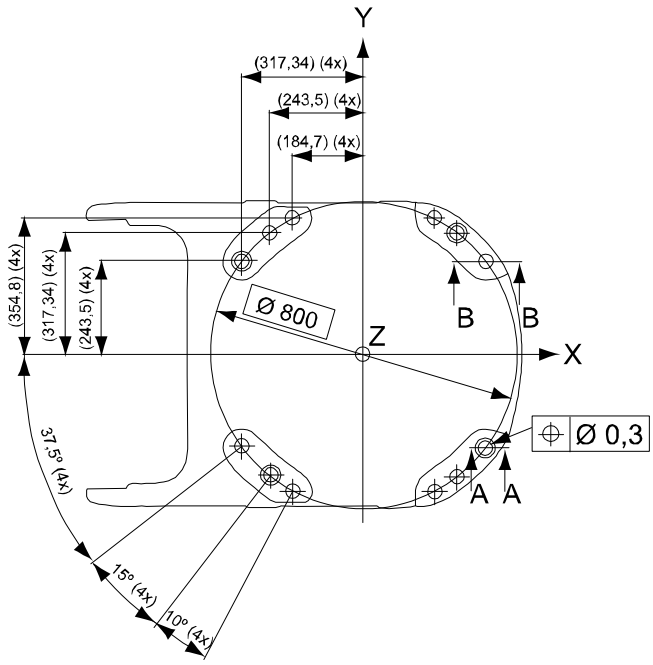
1.3.3 Mounting the manipulator
Continued

Fastening holes robot base

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



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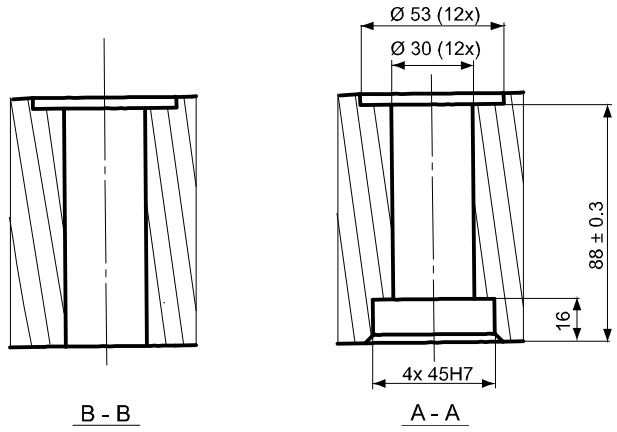

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Recommended screws for fastening the manipulator to the base	M24 x 140 8.8 with 4 mm flat washer.
Torque value	725 Nm

Two guiding sleeves required, dimensions see figures in this chapter.

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 next two figures.

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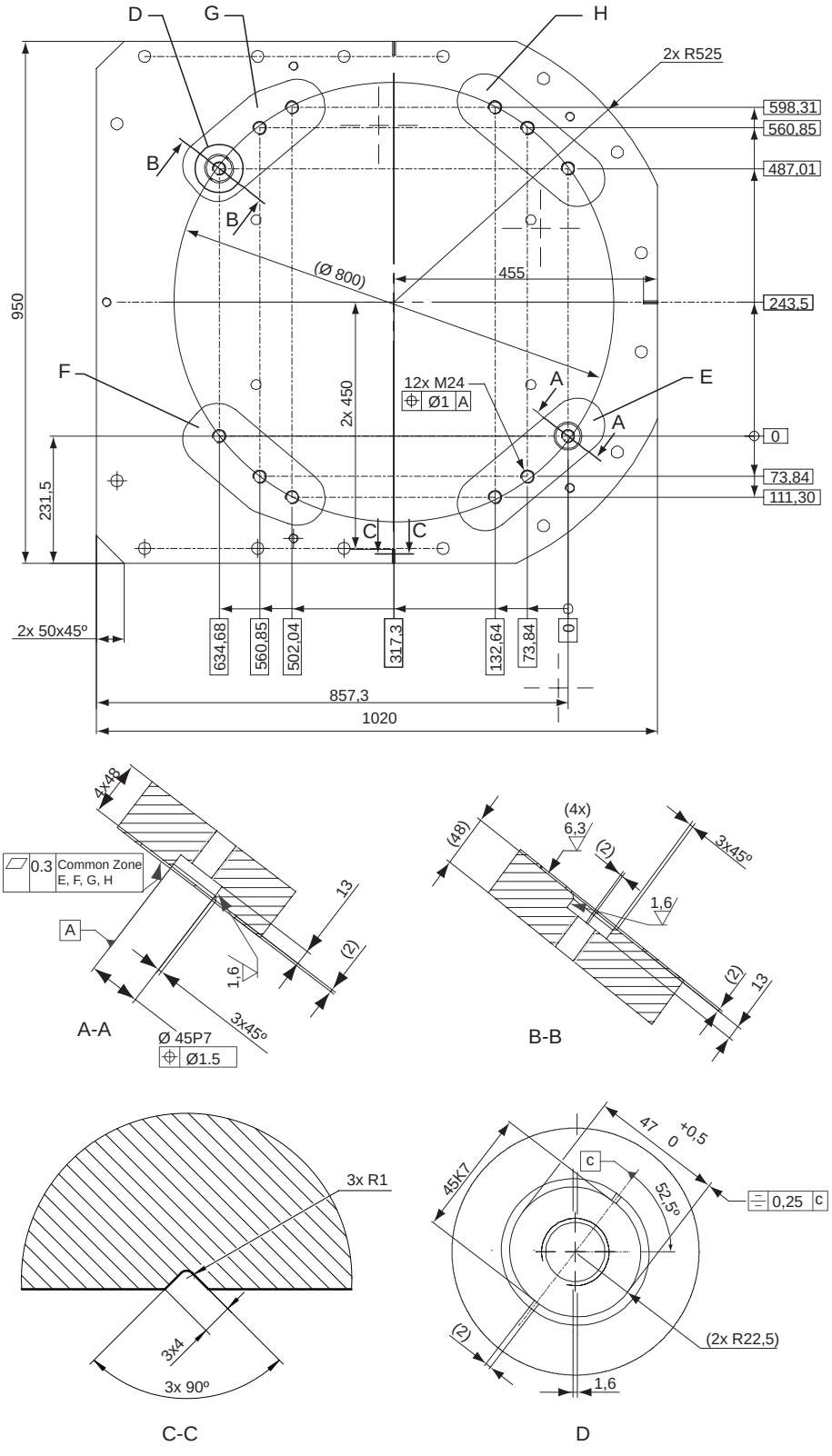
Base plate drawing

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



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1.3.3 Mounting the manipulator
Continued

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

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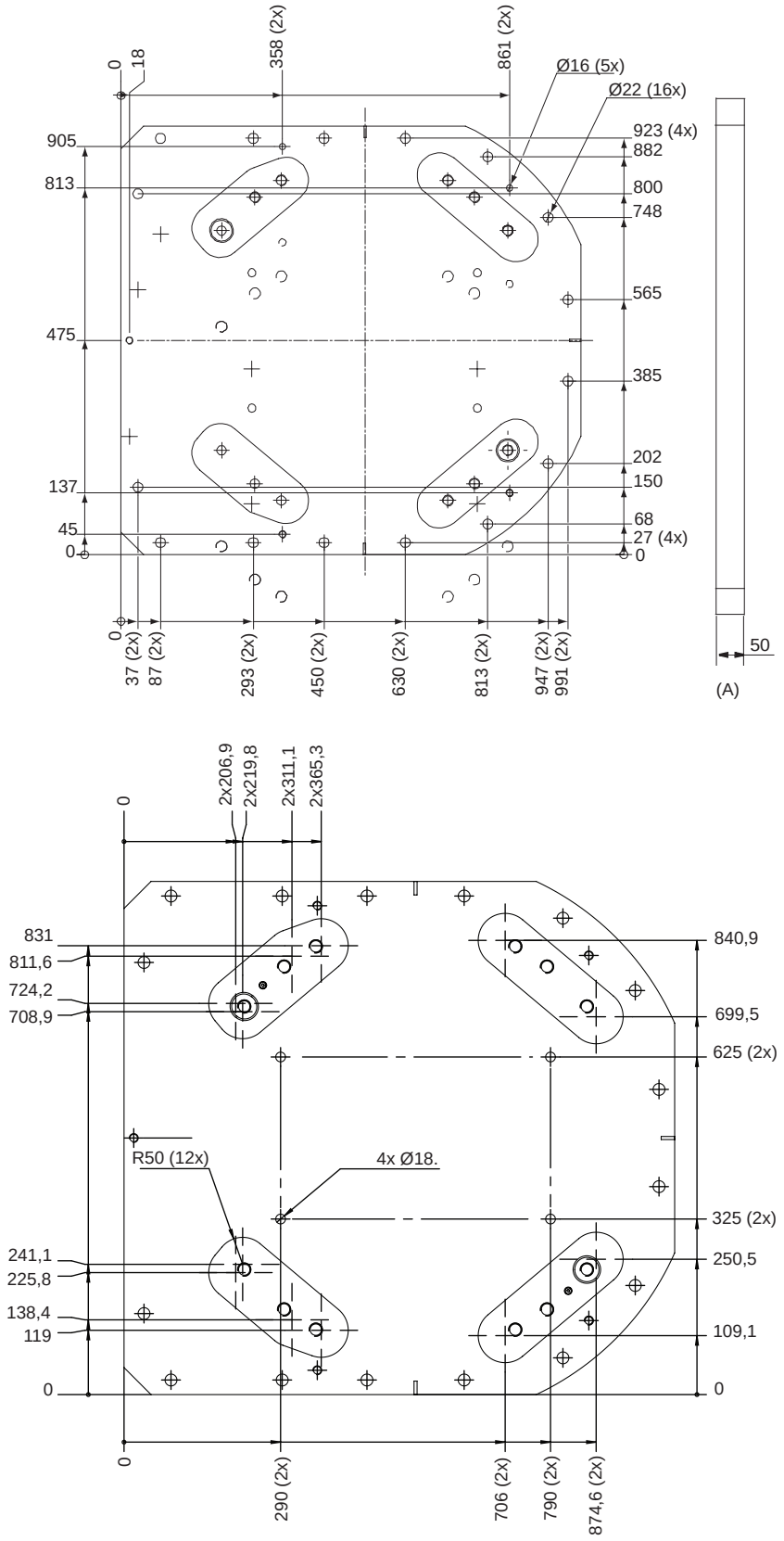

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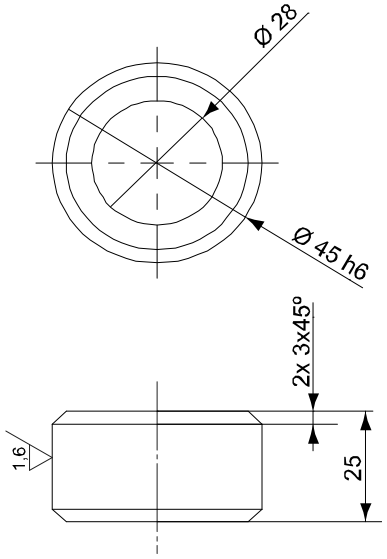
1.3.3 Mounting the manipulator
Continued

Pos	Description
A	Color: RAL 9005. Thickness: 80-100 µm



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Pos	Description
-	Guide sleeve, protected from corrosion

1.4 Calibration

1.4.1 Calibration methods

Overview

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

More information is available in the product manual.

Types of calibration

Type of calibration	Description	Calibration method
Standard calibration	The calibrated robot is positioned at calibration position. Standard calibration data is found on the SMB (serial measurement board) or EIB in the robot.	Axis Calibration or Calibration Pendulum [i]

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

Brief description of calibration methods

Calibration Pendulum method

Calibration Pendulum is a standard calibration method for calibration of some ABB robots.

Two different routines are available for the Calibration Pendulum method:

- Calibration Pendulum II
- Reference calibration

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

Axis Calibration method

Axis Calibration is a standard calibration method for calibration of IRB 760. 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.

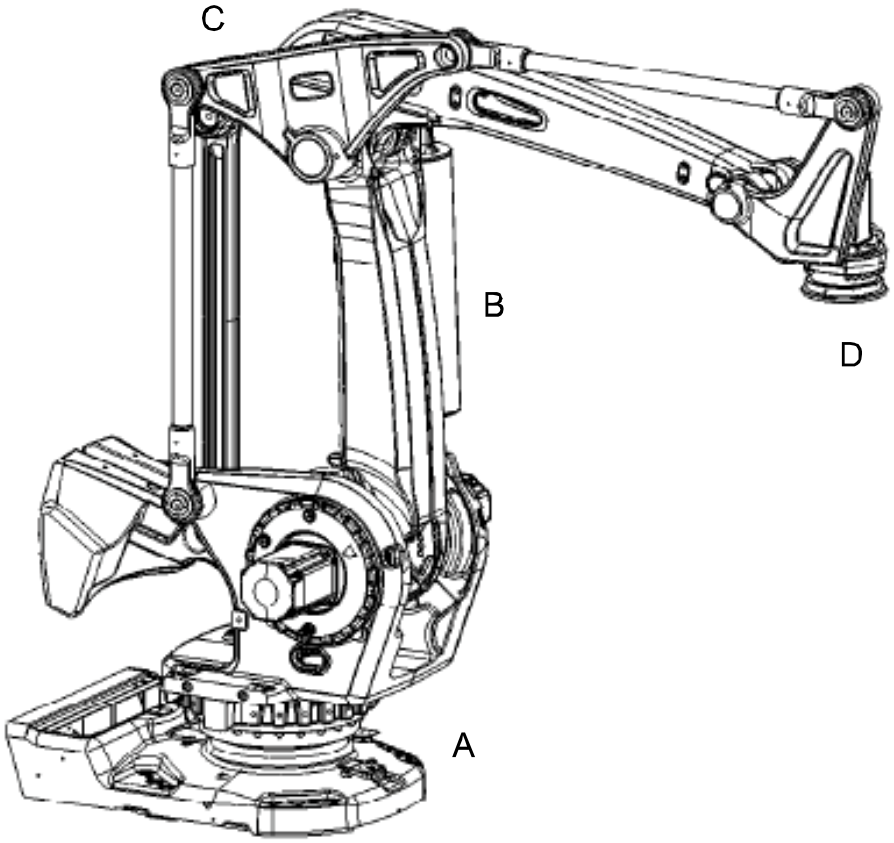
The actual instructions of how to perform the calibration procedure and what to do at each step is given on the FlexPendant. You will be guided through the calibration procedure, step by step.

1.4.2 Fine calibration

General

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

The following figure shows all axes in zero position.



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Pos	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

1.5 Load diagrams

1.5.1 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 is valid up to max moment of inertia for axis 6. 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

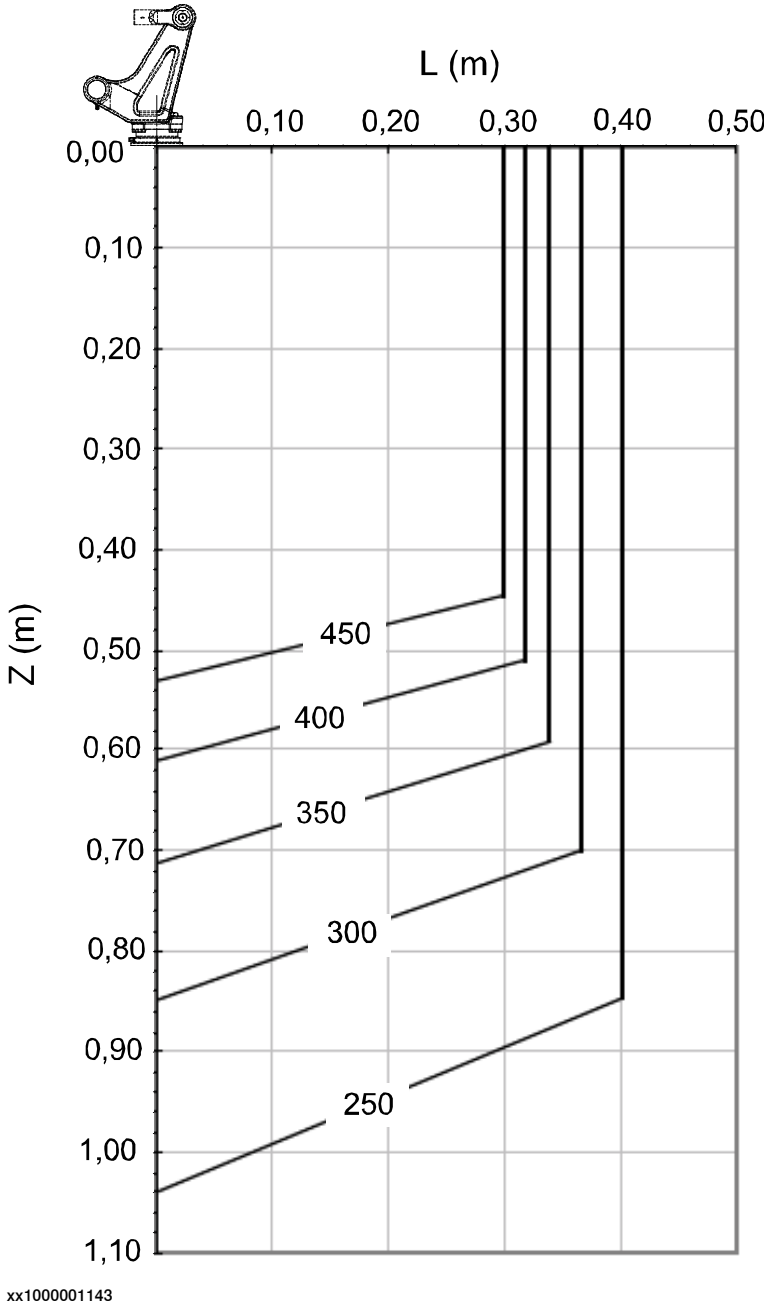
To verify a specific load case, use the RobotStudio add-in RobotLoad.

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 760-450/3.2

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



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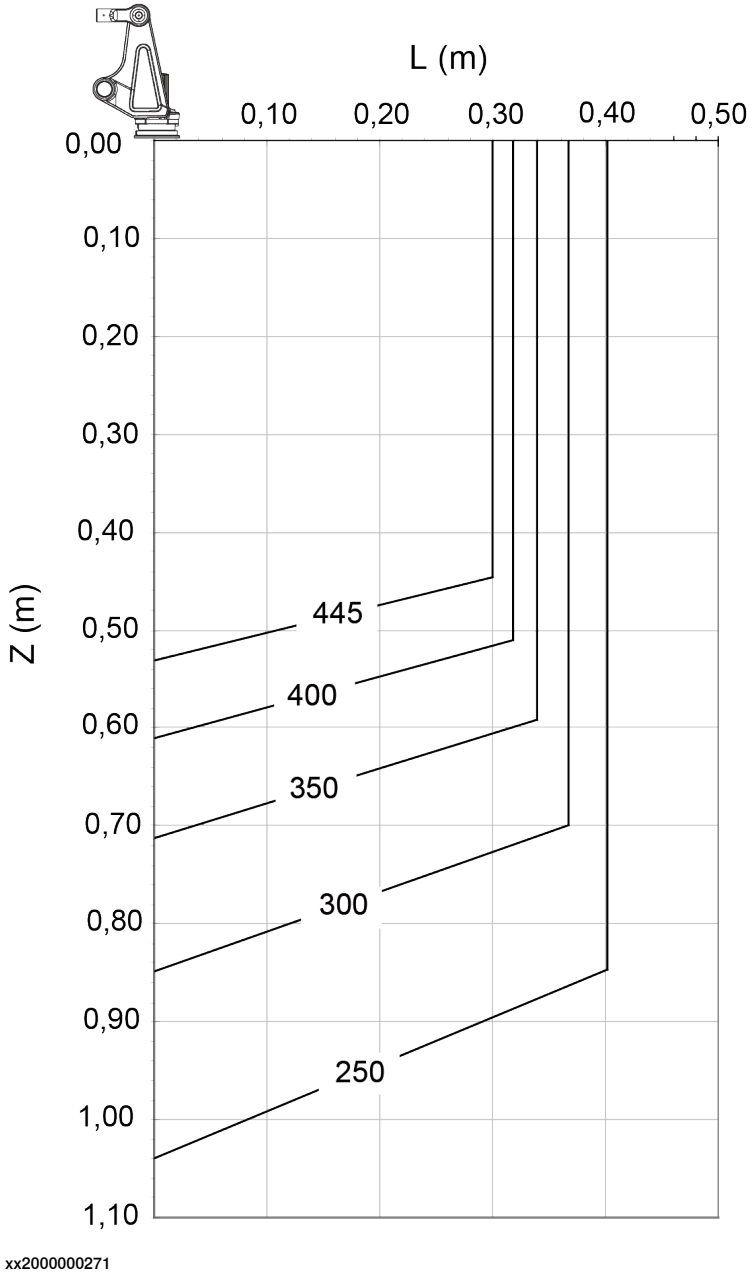
IRB 760-445/3.2

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



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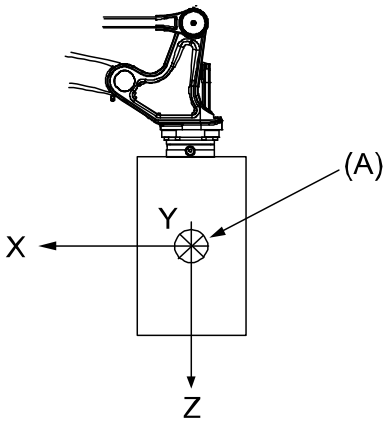
1.5.3 Maximum load and moment of inertia

General

Load in kg, Z and L in m and J in kgm^2.

Axis	Maximum moment of inertia
6	Ja6 = Load x L^2 + $J_{0Z} \leq$ 400 kgm^2



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Pos	Description
A	Center of gravity

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

1.5.4 Maximum TCP acceleration

General

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

Maximum Cartesian design acceleration for nominal loads

Robot type	E-stop Max acceleration at nominal load COG [m/s^2]	Controlled Motion Max acceleration at nominal load COG [m/s^2]
IRB 760	23	17

Note

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

1.6 Mounting of equipment

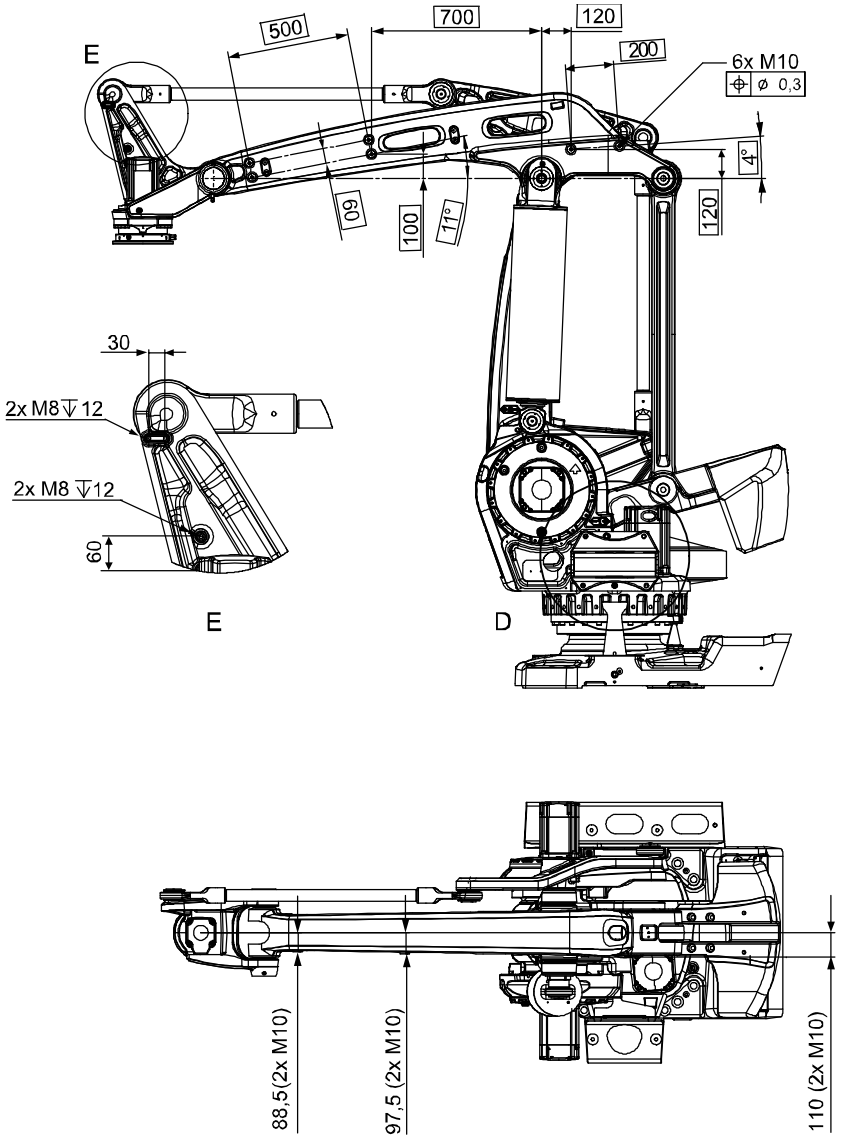
1.6.1 Introduction

General

Extra loads can be mounted on to the upper arm and on to the left side of the frame. Holes and definitions of masses are shown in figure below.

For mounting of an external vacuum hose there are six holes on the upper arm figure below. 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.

IRB 760-450/3.2



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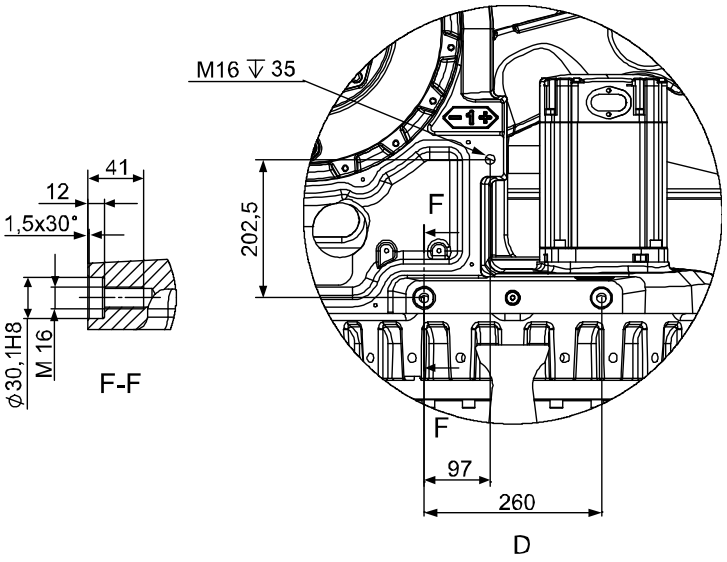

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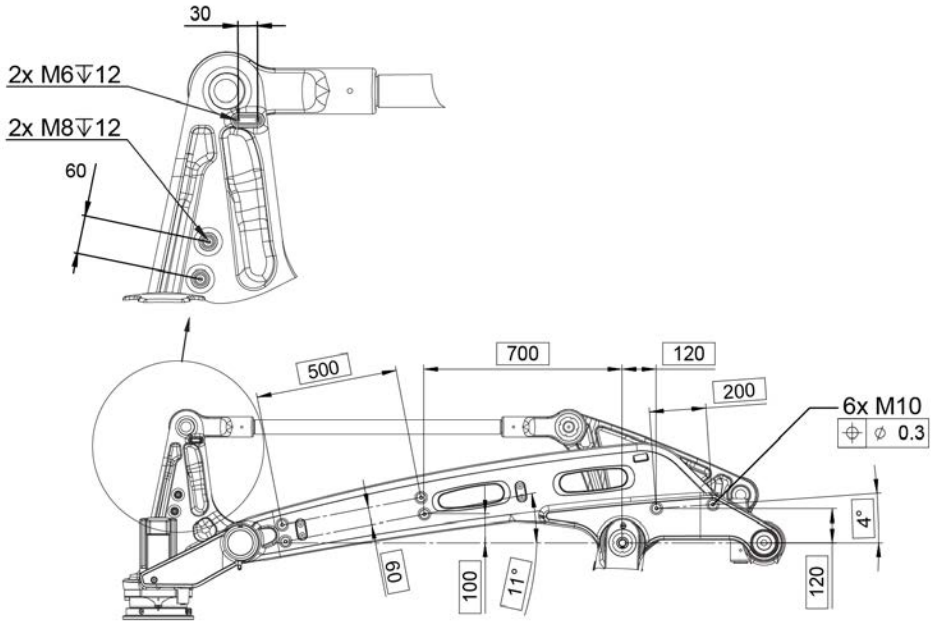
IRB 760-445/3.2



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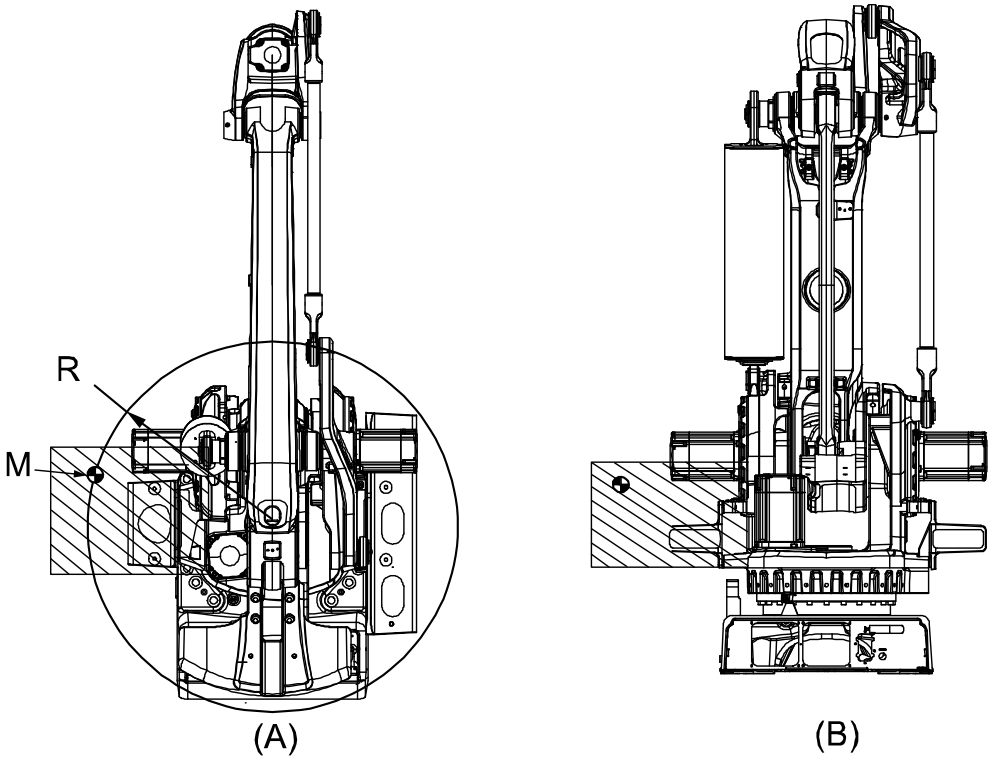
1.6.1 Introduction
Continued

Frame

For mounting of extra load on to the frame there are three holes on the left side (see previous figure). The max. weight of the extra load is 150 kg and the max. moment of inertia is 120 kgm^2.

Description	Value and definition
Permitted extra load on frame	M = 150 kg
Max. moment of inertia for extra load	J_H = 120 kgm^2
Recommended position, see figure below	$J_H = J_{H0} + M \times R^2$ J_{H0} is the moment of inertia (kgm^2) for the extra load.R is the radius (m) from the center of axis 1.M is the total mass (kg) of the extra load.



xx1000001149

Pos	Description
A	View from above
B	View from the rear
M	Center of gravity of hip load
R	Radius to CoG of (M)

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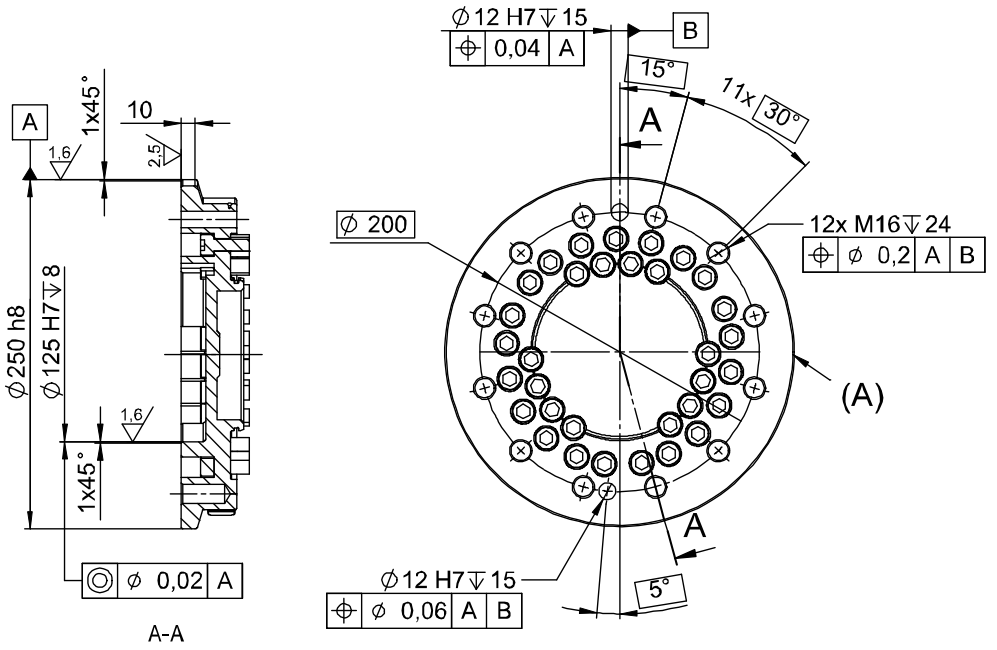
Robot tool flange

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



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Pos	Description
A	Calibration mark

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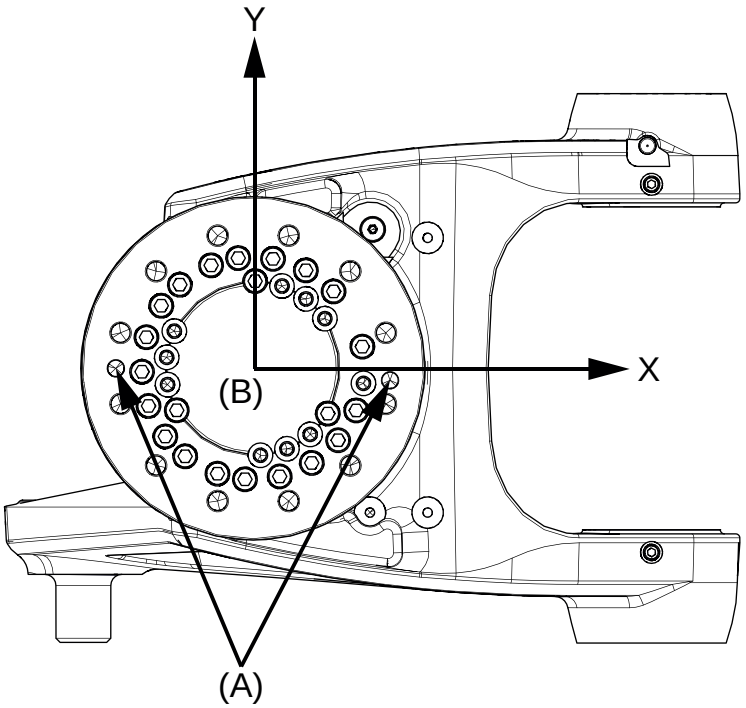
1.6.1 Introduction
Continued



xx1800001403

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

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

The table below specifies the types and ranges of the robot motion in every axis.

Axis	Type of motion	Range of motion
1	Rotation motion	-180° to +180° Can be extended, with use of option, to: -220° to +220° (option 561-1)
2	Arm motion	-42° to +85°
3	Arm motion	-20° to +120° IRB 760 - 445/3.2: -20° to +80°
2-3	Arm motion	20° to 160°
6	Turn motion	-300° to +300° - 67 revolutions to +67 revolutions [1)]

[1)] The default working range for axis 6 can be extended by changing parameter values in the software. Option "Independent axis" can be used for resetting the revolution counter after the axis has been rotated (no need for "rewinding" the axis).

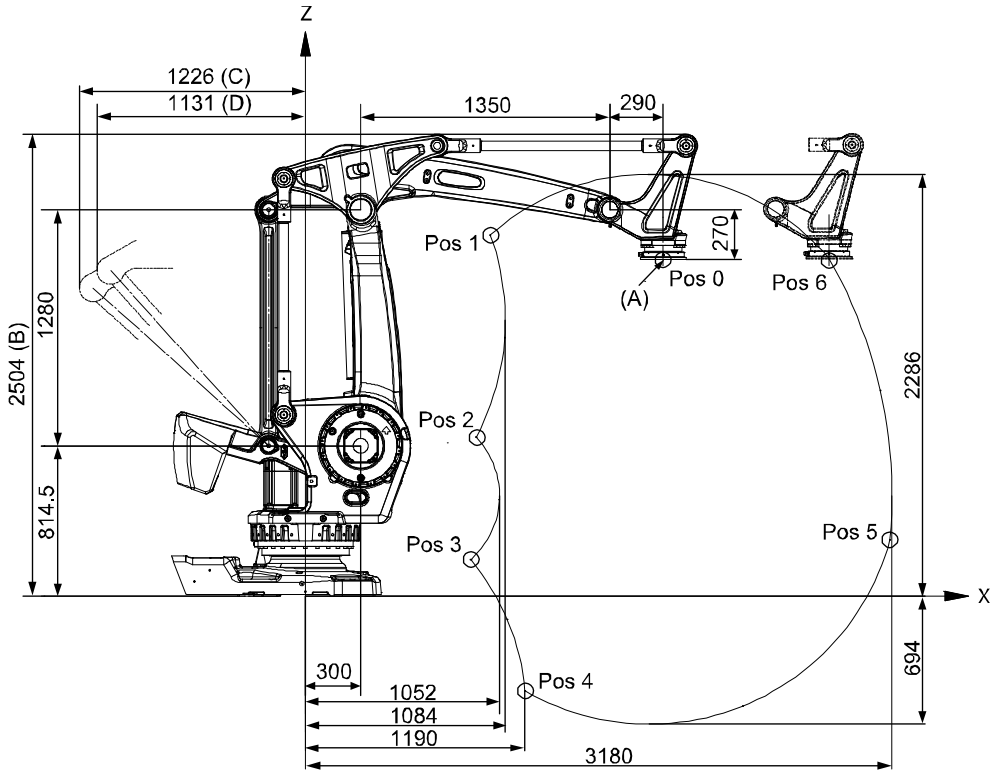
Continues on next page

1.7.1 Introduction
Continued

Illustration

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

IRB 760 - 450/3.2



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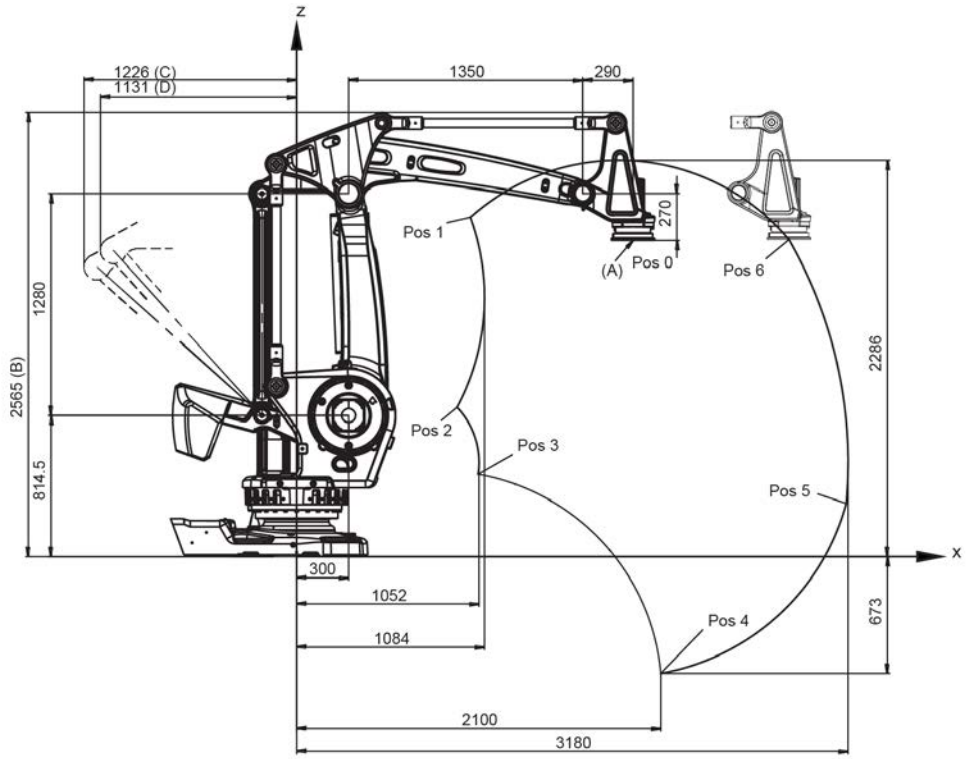
Pos	Description
A	Tool flange center
B	Max working range 2966 mm
C	Mechanical stop
D	Max working range

Continues on next page

IRB 760 - 445/3.2



xx2000000272

Pos	Description
A	Tool flange center
B	Max working range 3027 mm
C	Mechanical stop
D	Max working range

Positions at wrist center

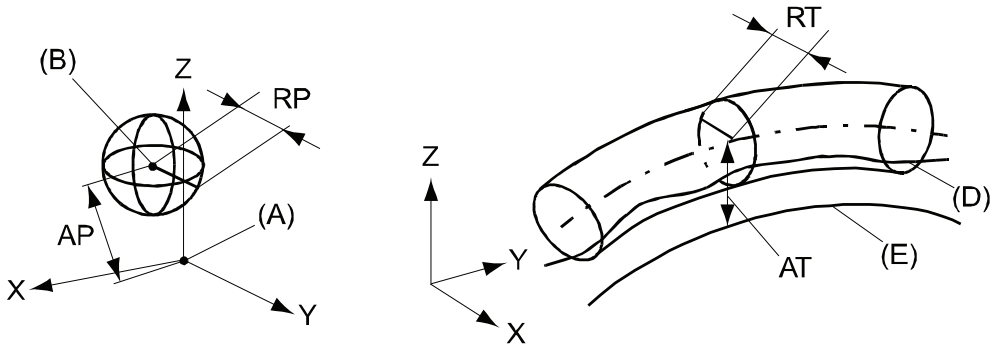
Pos no. see Figure 16	X Position (mm)	Z Position (mm)	Axis 2 Angle (degrees)	Axis 3 Angle (degrees)
0	1940	1824,5	0	0
1	1002	1957	-42	-20
2	925	862	-42	28
3	896	198	50	120
4	1190	-513	85	120
5	3169	307	85	15
6	2839	1829	50	-20

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.



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

Description	IRB 760-450/3.2 IRB 760-445/3.2
Pose accuracy, AP[a] (mm)	0.20
Pose repeatability, RP (mm)	0.05
Linear path repeatability, RT (mm)	0.80
Linear path accuracy, AT (mm)	3.30
Pose stabilization time, PSt (s) to within 0.5 mm of the position	0.13

a. AP according to the ISO test above, is the difference between the teached position (position manually modified in the cell) and the average position obtained during program execution.

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

1.7.3 Velocity

Maximum axis speeds

Axis No.	IRB 760-450/3.2 IRB 760-445/3.2
1	85°/s
2	85°/s
3	85°/s
6	160°/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*).

1.8 Customer connections

1.8.1 Introduction

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, Application interface Connection type.

Media & Communication, Ethernet, parallel communication and air

Type	Application	Specification	Connection type	Supplier Article No.	Comment
Functional Earth (FE)		10mm^2	M8 Cable lug		
Power (CP)	Utility power	4x0.75mm^2 (5A/250VAC)	3-module Harting, shell size 10B, EE	Female, EE, 8 pin9 140 083 101	1x0.75mm^2 protective earth
Signals (CS)	Parallel communication	16x AWG24 + 10x AWG24 (50V/1A)	3-module Harting, shell size 10B, HD+EE	Female, HD, 25 pin9 140 253 101	4 quad twisted, 5 screened pair twisted
Air (AIR)	Utility air	2x12.7 (1/2") P_{Nom} = 16 bar	Parker Push-lock,1/2" M22x1,5 Brass 24 degree seal		
Bus communication (BUS)	Ethernet/IP, PROFINET	4x0.4mm^2	M12, 4-poles, D-coded, male	Harting 21038821425	Ethernet CAT5e 100 Mbit[1].

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

Type	Application	Specification	Connection type	Harting Article No.	Comment
Power (CP)	Utility power	4x0.75mm^2 (5A/250VAC)	3-module Harting, shell size 10B, EE	Female, EE, 8 pin9 140 083 101	1x0.75mm^2 protective earth
Signals (CS)	Parallel communication	16x AWG24 + 10x AWG24 (50V/1A)	3-module Harting, shell size 10B, HD+EE	Female, HD, 25 pin9 140 253 101	4 quad twisted, 5 screened pair twisted
Bus Communication (BUS)	Profibus	2xAWG26, Z=150 Ohm (1MHz)	3-module Harting, shell size 10B, DD	Female, DD, 12 pin9 140 123 101	
	CANBus	2xAWG26, Z=120 Ohm (1MHz)			
	BUS power & BUS utility	2x2 AWG24			

1 Ethernet with wire colors according to PROFINET standard

Continues on next page

1.8.1 Introduction
Continued

Type	Application	Specification	Connection type	Harting Article No.	Comment
Air (AIR)	Utility air	2x12.7 (1/2”) P_{Nom} = 16 bar	Parker Push-lock,1/2” M22x1,5 Brass 24 de-gree seal		

1.9 Maintenance and troubleshooting

1.9.1 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 Maintenance section in the Product Manual.

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2 Specifications of variants and options

2.1 Introduction to variants and options

General

The different variants and options for the IRB 760 are described in the following sections. The same option numbers are used here as in the specification form.

The variants and options related to the robot controller are described in the product specification for the controller.

2.2 Manipulator

Variants

Option	IRB Type	Handling capacity (kg)	Reach (m)
435-106	760	450	3.18
435-144 (only for press tending application)	760	445	3.18

Manipulator color

Option	Color	RAL code[i]
209-2	ABB white standard	RAL 9003
209-201	NCS 2070-Y60R Orange	NCS 2070-Y60R
209-202	ABB Graphite White std Standard color	RAL 7035
209	RAL code should be specified (ABB non-standard colors)	

i 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 45*.

Option	Description	Note
803-2	Ethernet cable, parallel communication and air	Includes CP, CS, Ethernet + air
803-3	DeviceNet, parallel communication and air	Includes CP, CS and DeviceNet + air
803-4	PROFIBUS	Includes CP, CS and PROFIBUS + air

Connector kits

The kit consists of connectors, pins and sockets.

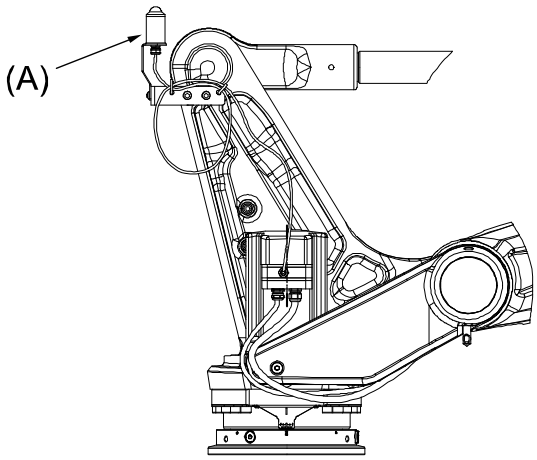
Option	Description
431-1	For the connectors on the upper arm.

Continues on next page

Option	Description
239-1	For connectors on base.

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.



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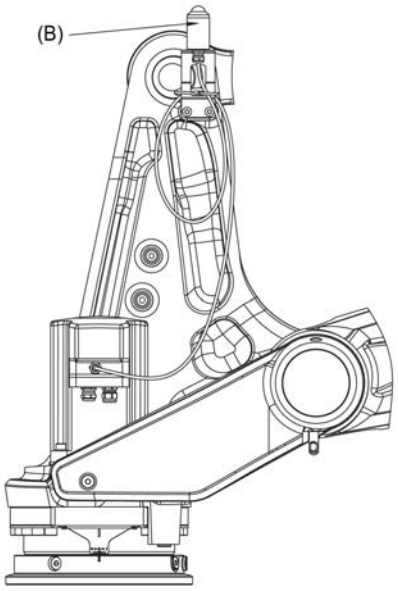
Pos	Description
A	Safety lamp for IRB 760 - 450/3.2



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Pos	Description
B	Safety lamp for IRB 760 - 445/3.2

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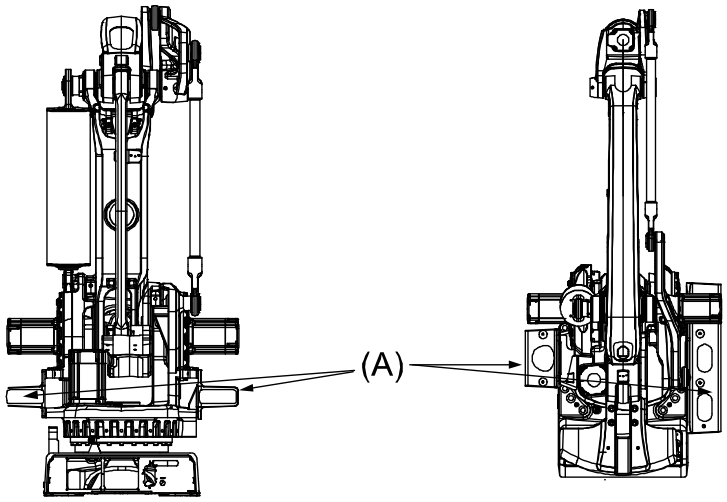
2.2 Manipulator
Continued

Fork lift device

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



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Pos	Description
A	Fork lift pockets (x2)

Baseplate

Option	Description
37-1	Can also be used for IRB 7600. See *Installation on page 16*for dimension drawing.

Resolver connection, axis 7

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

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°	Two stops which allows the working range to be restricted in increments of 7.5°.

Continues on next page

Extended work range

Option	Type	Description
561-1	Extended work range axis 1	To extend the working range on axis 1 from ±180° to ±220°. When the option is used the mechanical stop shall be removed. Requires options SafeMove or EPS (Electronic Position Switches).

CAUTION

The option *Extended work range* enables an extension of the working range for axis 1, through a software configuration. With this option installed, the working range can exceed the range limited by the mechanical stop on axis 1. The working range shall be limited through the option SafeMove.

A risk analysis must be done to ensure that no risks remain when using option *Extended work range*, to limit the working range, and before removing the mechanical stops.

For information about the option SafeMove, see *Application manual - Functional safety and SafeMove2*.

If the mechanical stop is removed, then the manipulator should have a marking for this, for example, a label. If the robot is delivered with the option *Extended work range*, then such a label is included on delivery.

Warranty

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

Note

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

Option	Type	Description
438-1	Standard warranty	Standard warranty is 12 months from *Customer Delivery Date* or latest 18 months after *Factory Shipment Date*, whichever occurs first. Warranty terms and conditions apply.
438-2	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.

Continues on next page

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

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[a]	The signals are connected to 12-pole screw terminals, Phoenix MSTB 2.5/12-ST-5.08, to the Control Module.

a) 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 connection floor cables for connections between cabinets and manipulator.

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

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 myABB Business Portal, *www.abb.com/myABB*.

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 *Customer Delivery Date* or latest 18 months after *Factory Shipment Date*, whichever occurs first. Warranty terms and conditions apply.
438-2	Standard warranty + 12 months	Standard warranty extended with 12 months from end date of the standard warranty. Warranty terms and conditions apply. Contact Customer Service in case of other requirements.
438-4	Standard warranty + 18 months	Standard warranty extended with 18 months from end date of the standard warranty. Warranty terms and conditions apply. Contact Customer Service in case of other requirements.
438-5	Standard warranty + 24 months	Standard warranty extended with 24 months from end date of the standard warranty. Warranty terms and conditions apply. Contact Customer Service in case of other requirements.
438-6	Standard warranty + 6 months	Standard warranty extended with 6 months from end date of the standard warranty. Warranty terms and conditions apply.
438-7	Standard warranty + 30 months	Standard warranty extended with 30 months from end date of the standard warranty. Warranty terms and conditions apply.
438-8	Stock warranty	Maximum 6 months postponed start of standard warranty, starting from factory shipment date. Note that no claims will be accepted for warranties that occurred before the end of stock warranty. Standard warranty commences automatically after 6 months from *Factory Shipment Date* or from activation date of standard warranty in WebConfig. **Note** Special conditions are applicable, see *Robotics Warranty Directives*.

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Warranty for DressPack

Note

Option 780-3 upper arm DressPack MH3 is not covered by the warranty.

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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Index

ABB AB
Robotics & Discrete Automation
S-721 68 VÄSTERÅS, Sweden
Telephone +46 10-732 50 00

ABB AS
Robotics & Discrete Automation
Nordlysvegen 7, N-4340 BRYNE, Norway
Box 265, N-4349 BRYNE, Norway
Telephone: +47 22 87 2000

ABB Engineering (Shanghai) Ltd.
Robotics & Discrete Automation
No. 4528 Kangxin Highway
PuDong New District
SHANGHAI 201319, China
Telephone: +86 21 6105 6666

ABB Inc.
Robotics & Discrete Automation
1250 Brown Road
Auburn Hills, MI 48326
USA
Telephone: +1 248 391 9000

abb.com/robotics

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