ROBOTICS

Product specification

IRB 760

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Product specification

IRB 760-450/3.2

OmniCore

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Revision: G

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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 OmniCore controller.

Usage

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

The specification is intended for:

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

References

Reference	Document ID
Product specification - OmniCore V line RW 7	*3HAC074671-001*
Product manual - IRB 760	*3HAC039838-001*
Product specification - Robot stopping distances according to ISO 10218-1	*3HAC048645-001*
Product specification - OmniCore V line RW 7 (RobotWare 7)	*3HAC074671-001*
Product specification - OmniCore V line RW 8 (RobotWare 8)	*3HAC098717-001*

Revisions

Revision	Description
A	First edition.
B	Published in release 24A. The following updates are done in this revision: • Added DressPack options for CC-Link.
C	Published in release 24B. The following updates are done in this revision: • Added DressPack options for EtherCat.
D	Published in release 24D. The following updates are done in this revision: • Updated the section *Technical data on page 21*. • Corrected the description of the connector kit options for DressPack.

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Revision	Description
E	Published in release 25.3. The following updates are done in this revision: • Company name updated to reflect current legal entities. • Updated portal name from myABB to ABB Robotics One.
F	Published in release 26.1. The following updates are made in this revision: • Removed duplication of robot weight specification. • Company name updated to reflect current legal entities. • Added support for RobotWare 8.
G	Published in release 26B. The following updates are made in this revision: • Added section *Impacting robot lifetime* and section *Intended use*. • Removed variant IRB 760-445/3.2.

1 Description

1.1 Structure

1.1.1 Introduction

Robot family

IRB 760 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 variant with a handling capacity of 450 kg and a reach of 3.18 m.

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.

Intended use

IRB 760 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 13*.

Operating system

The robot is equipped with the OmniCore 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 - OmniCore V line RW 7*.

The IRB 760 manipulator can be connected to the following robot controllers:

- OmniCore V250XT
- OmniCore V400XT

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 - OmniCore V line RW 7*.

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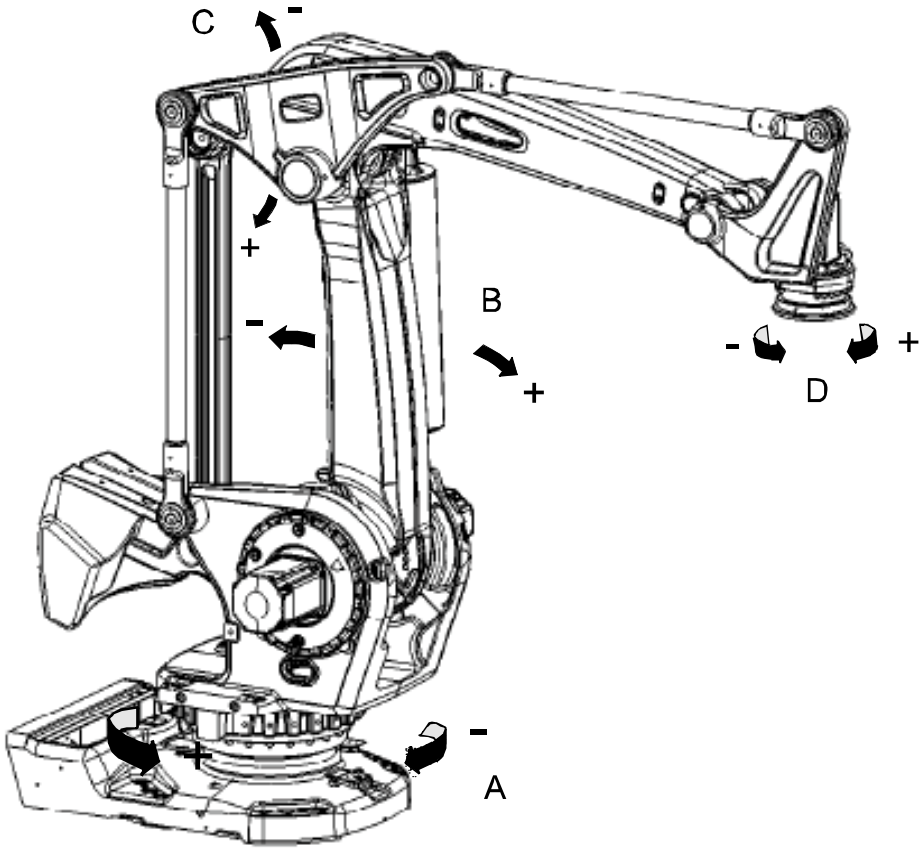
1.1.1 Introduction
Continued

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 following 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

Other technical data

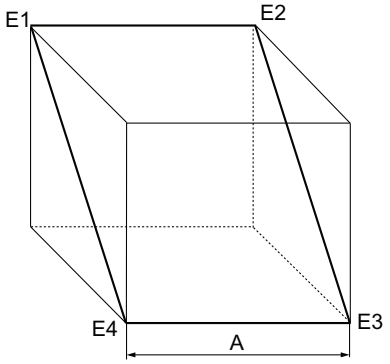
Data	Description	Note
Airborne noise level	The sound pressure level outside the working space	< 70 dB (A) Leq (acc. to Machinery directive 2006/42/EG).

Power consumption at max load

Type of movement	IRB 760-450/3.2
ISO cube maximum velocity	2.1 kW
General palletizing movements	2.1 kW

Robot in calibration position	IRB 760-450/3.2
Brakes engaged	0.24 kW
Brakes disengaged	0.84 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

Power factor (cos φ)

The power factor is above 0.95 at a steady state power consumption higher than 2.0 kW, when the IRB 760 is connected to the OmniCore V line.

Dimensions IRB 760

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

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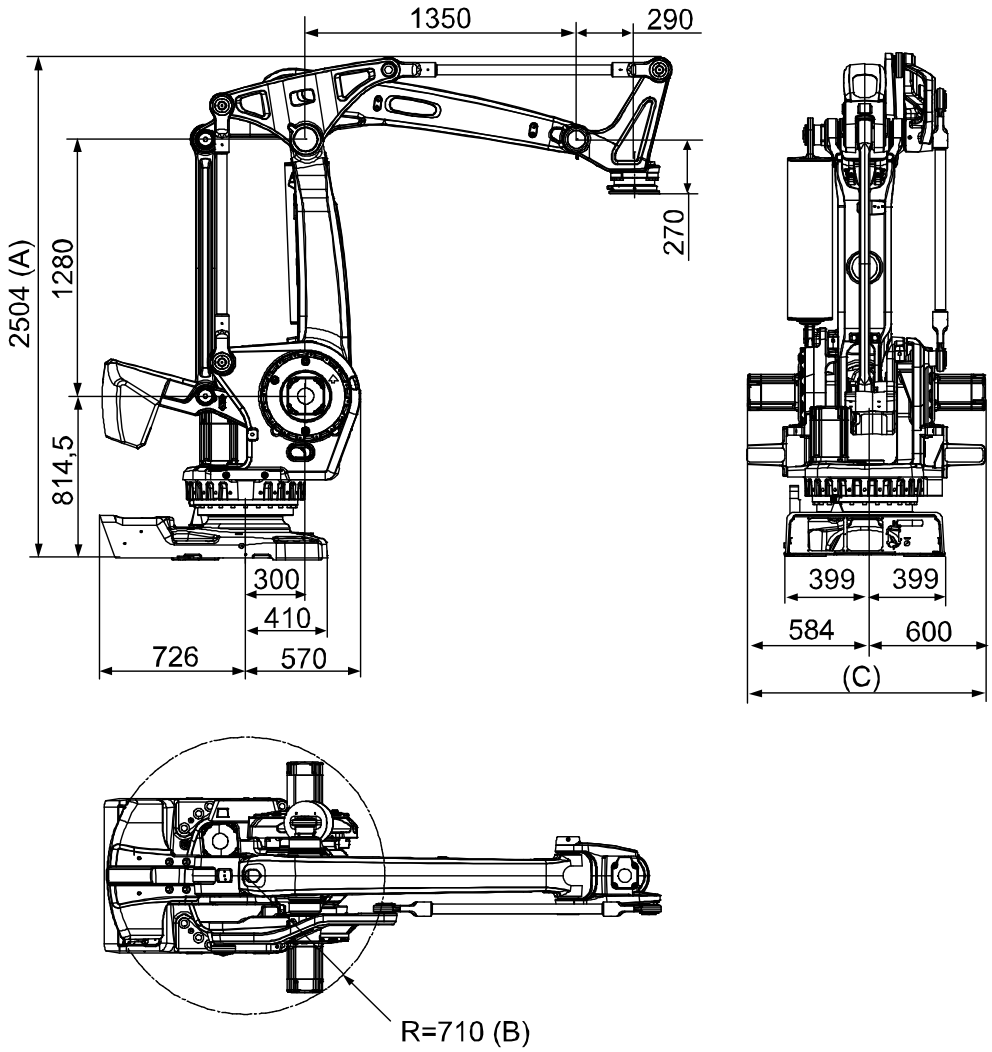
1.1.2 Technical data
Continued

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

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 13*
- *Duty factor on page 13*
- *Environmental conditions on page 14*
- *Application and usage on page 14*
- *Design limitations on page 15*
- *Maintenance on page 16*
- *Individual lifetime variability on page 16*
- *Extreme usage on page 16*

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 9*.

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.

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 16*.

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 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 16*.

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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.

  Note

  The add-in Mechanical Analysis in RobotStudio (see details below) or technical support from ABB can provide recommendation whether means of reduction of motor and gearbox oil heat is required.

- 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 23*.
- Cleaning. Wrong cleaning can cause particles entering the sealings which can cause oil leakage. Proper cleaning is described in *Product manual - IRB 760*.

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 34*, and *Technical reference manual - RAPID Overview*.

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

- Acceleration/deceleration:

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

  Note

  Smoother movements bring reduced energy consumption.

Continues on next page

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*.

Design limitations

See the section *Expected component life* in *Product manual - IRB 760*.

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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 760*.
- 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

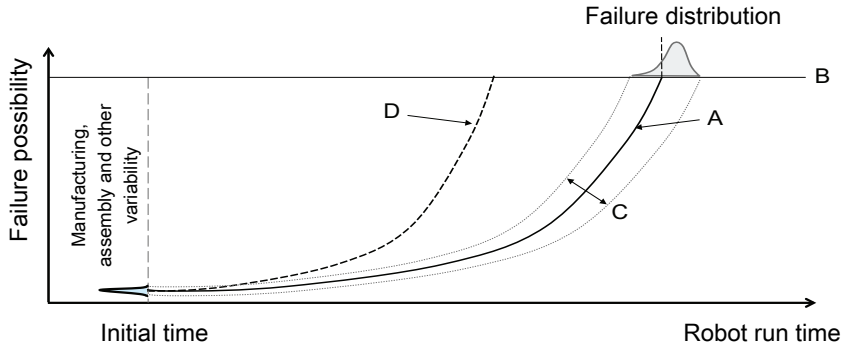
Examples of extreme usage in regard to movement: a stress index range that shows up as red (51) in the RobotStudio add-in *Mechanical Analysis*, press tending application, very severe palletizing applications, major use of axis 1, 2, or 3 movement.

The controller can issue a duty factor warning on the FlexPendant, if applicable. See the chapter *Troubleshooting* in *Product manual - IRB 760*.

Extreme usage requires specific maintenance, for example, shorter interval for oil change. See *Maintenance schedule* in *Product manual - IRB 760*.

Summary

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



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A	Design lifetime

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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 13*
- *Duty factor on page 13*
- *Environmental conditions on page 14*
- *Application and usage on page 14*
- *Maintenance on page 16*

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.

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)

Continues on next page

ABB toolbox	Type	Product lifecycle		
		Sales, pre-study	Installation, commissioning	Operation, maintenance, repair
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

General

This product is designed according to the global product standard ISO 10218-1:2025, *Robots for industrial environments - Safety requirements - Part 1 Robots*, In case of deviation from ISO 10218-1:2025, these are listed in the declaration of incorporation. The declaration of incorporation is part of the delivery.

Robot standards

Standard	Description
ISO 9283	Manipulating industrial robots – Performance criteria and related test methods
ISO 9787	Robots and robotic devices – Coordinate systems and motion nomenclatures
ISO 9946	Manipulating industrial robots – Presentation of characteristics

Other standards used in design

Standard	Description
ISO 9283	Manipulating industrial robots - Performance criteria and related test methods
ISO 9787	Robots and robotic devices -- Coordinate systems and motion nomenclatures
ISO 9946	Manipulating industrial robots - Presentation of characteristics
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
IEC 61326-3-1	Immunity requirements for safety-related systems and for equipment intended to perform safety-related functions (functional safety) – General industrial applications

Region specific standards

Standard	Description
UL 1740 (option) CSA Z434 (option)	Standards For Safety - Robots and Robotic Equipment Industrial robots and robot Systems - General safety requirements Valid for USA and Canada.

1.4 Installation

1.4.1 Introduction

General

IRB 760 is designed for floor mounting (no tilting around X or Y axis), end effector with max. weight of 450 kg including payload, can be mounted on the mounting flange (axis 6). For more information on Load Diagrams, see *Load diagrams on page 33*.

Working range

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

Explosive environments

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

1.4.2 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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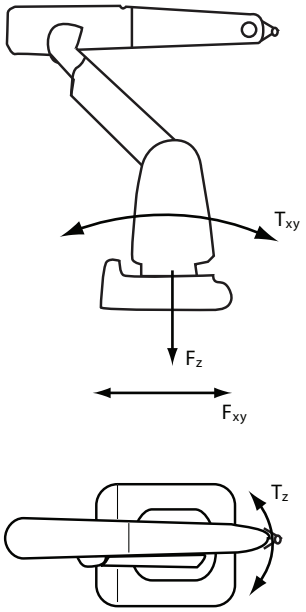
1.4.2 Technical data
Continued

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

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1.4.2 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.

1.4.3 Mounting the manipulator

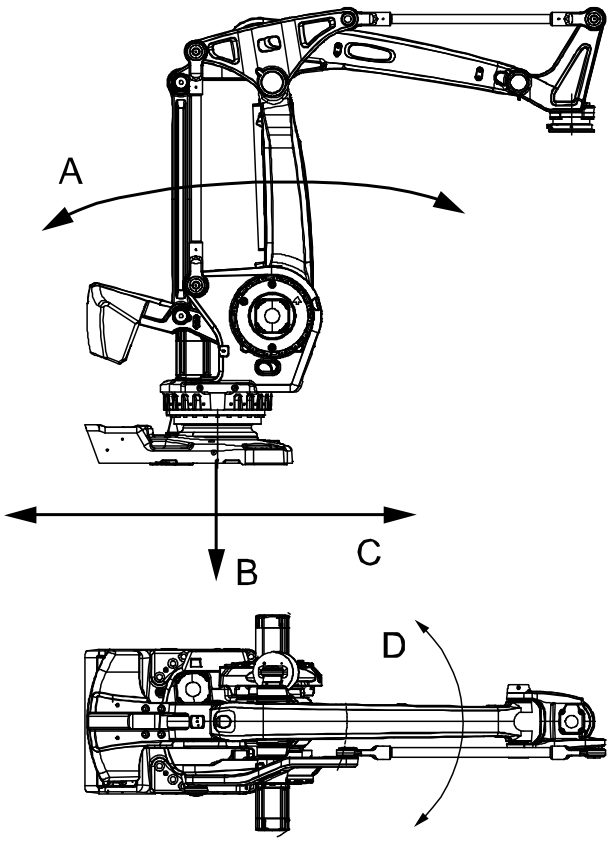
Maximum Load

Maximum load in relation to the base coordinate system.

Floor Mounted

Force	Endurance load (in operation)	Max. load (emergency stop)
Force xy	± 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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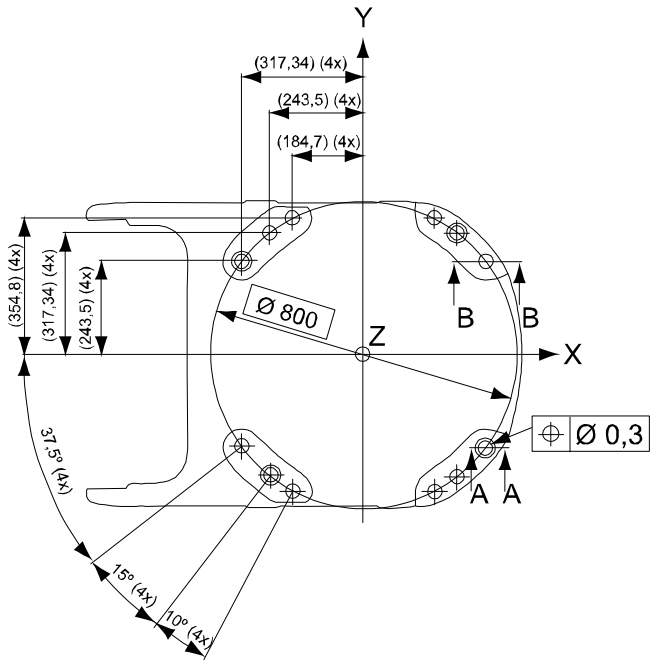
1.4.3 Mounting the manipulator
Continued

Fastening holes robot base

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



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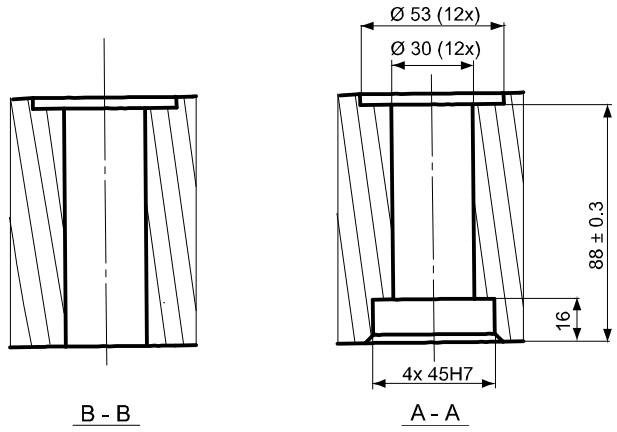

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Recommended screws for fastening the manipulator to the base	M24 x 140 8.8 with 4 mm flat washer.
Torque value	725 Nm

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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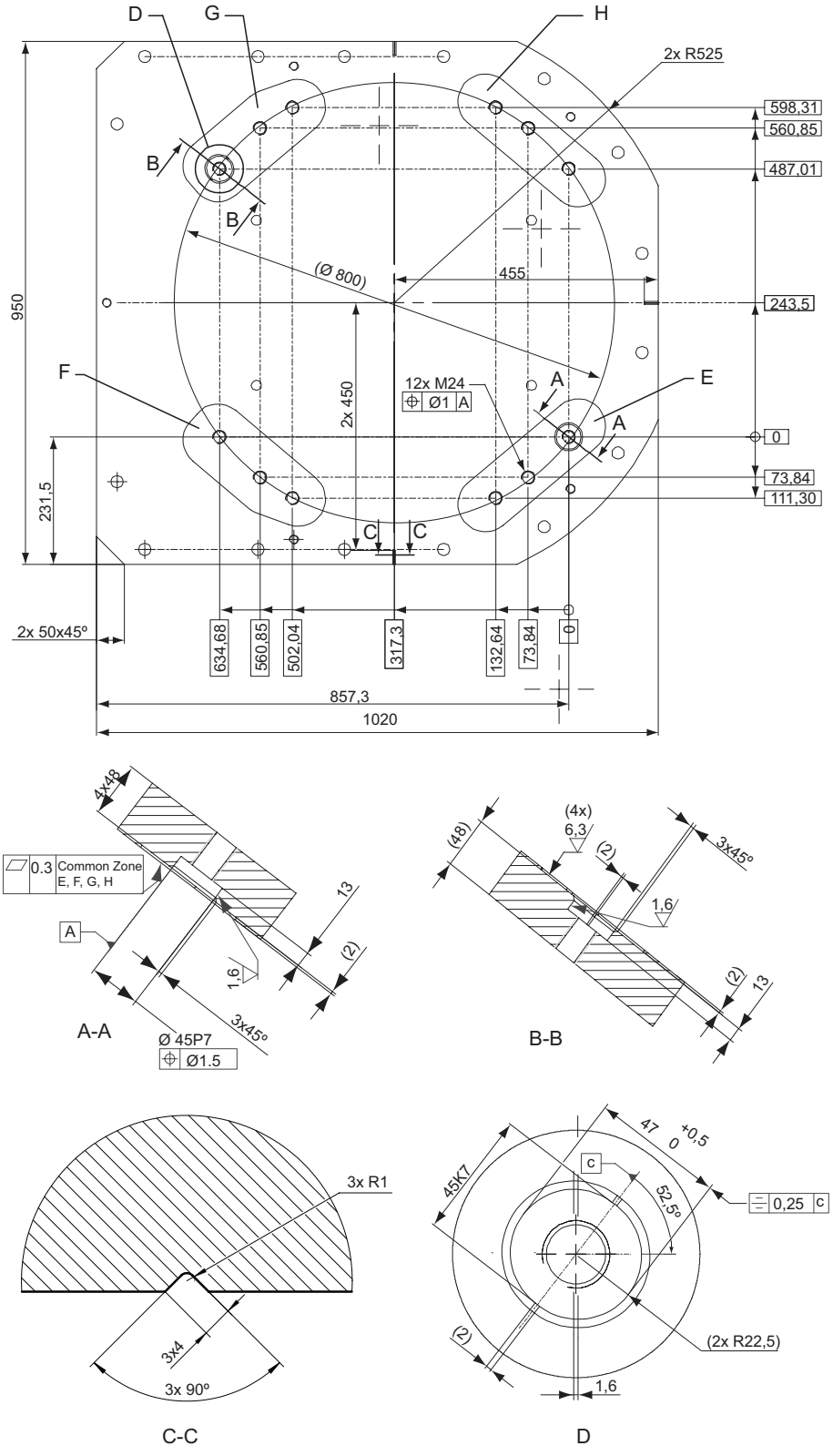
Base plate drawing

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



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1.4.3 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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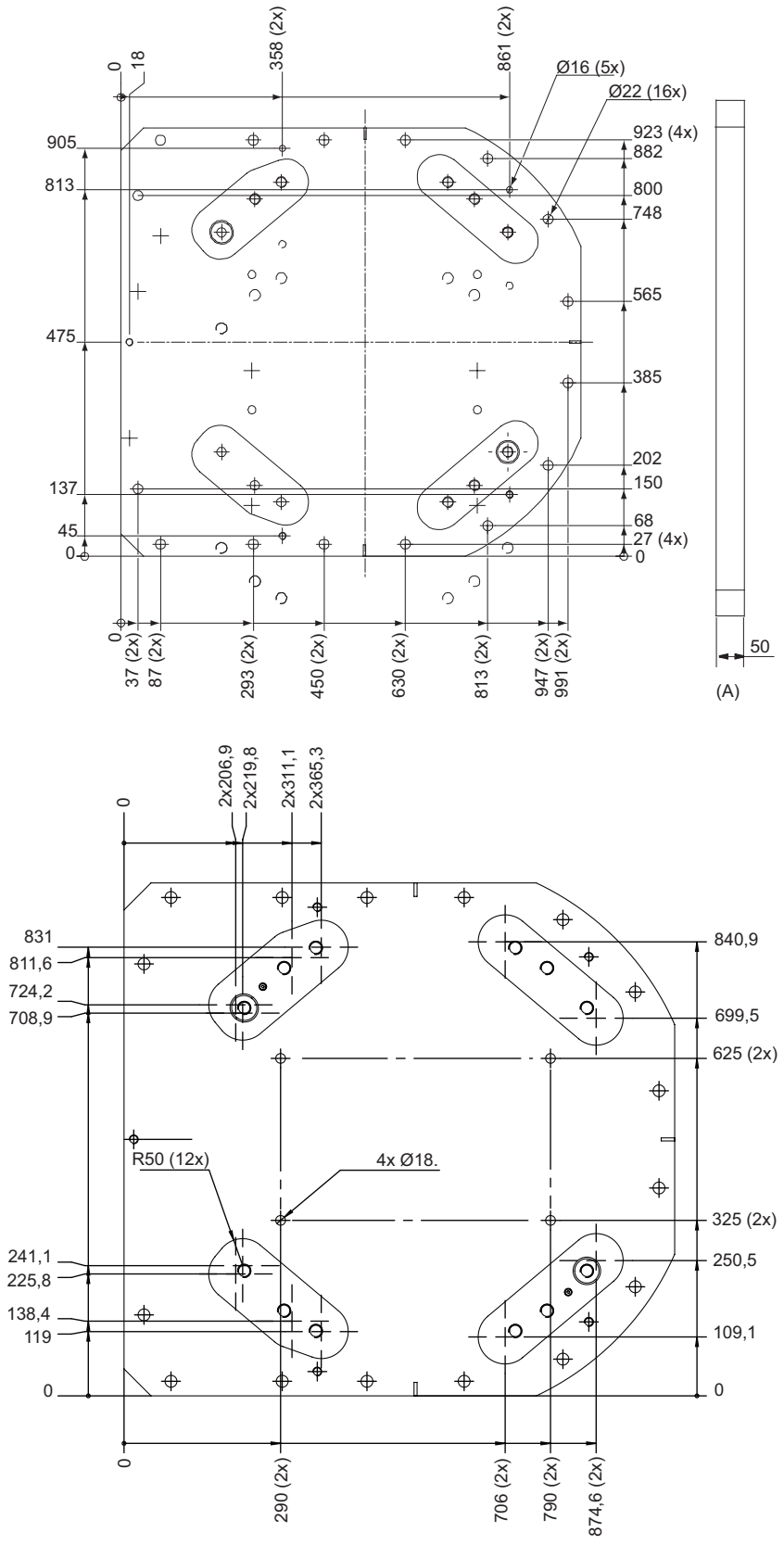

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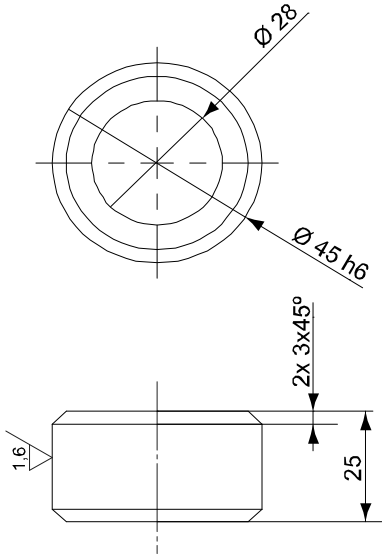
1.4.3 Mounting the manipulator
Continued

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



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Pos	Description
-	Guide sleeve, protected from corrosion

1.5 Calibration

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. 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. On OmniCore, this calibration method is only used on IRB 1510, IRB 1520, IRB 2400, and IRB 4400.

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.

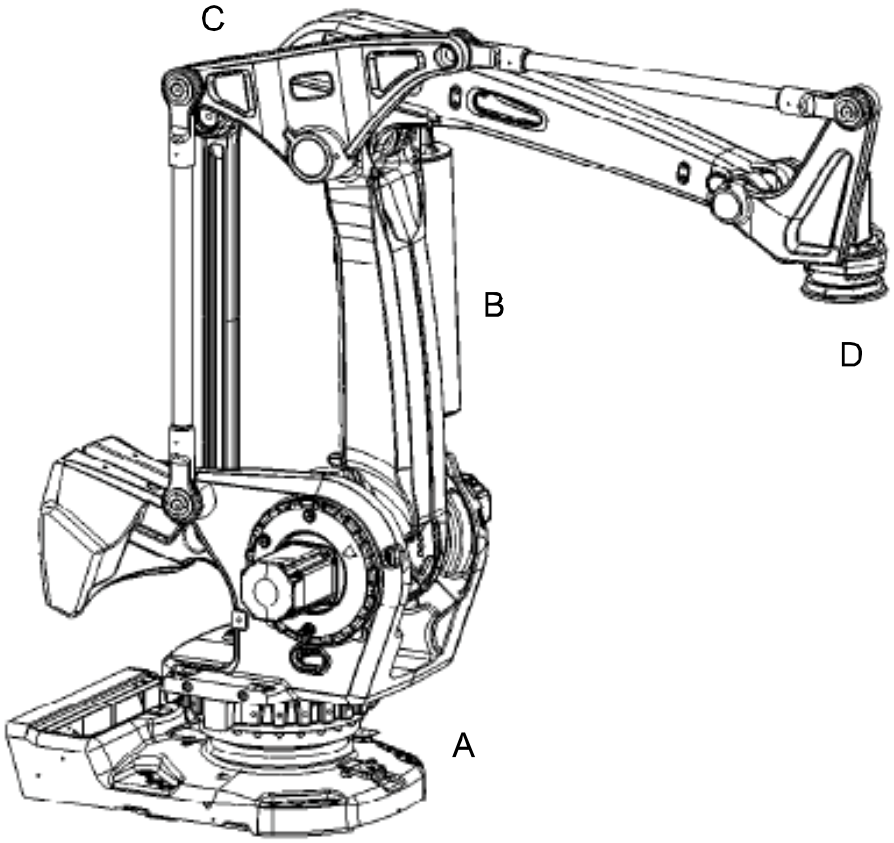
The actual instructions of how to perform the calibration procedure and what to do at each step is given on the FlexPendant. You will be guided through the calibration procedure, step by step.

1.5.2 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

1.6 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 - OmniCore*, for detailed information.

WARNING

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

General

The load 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

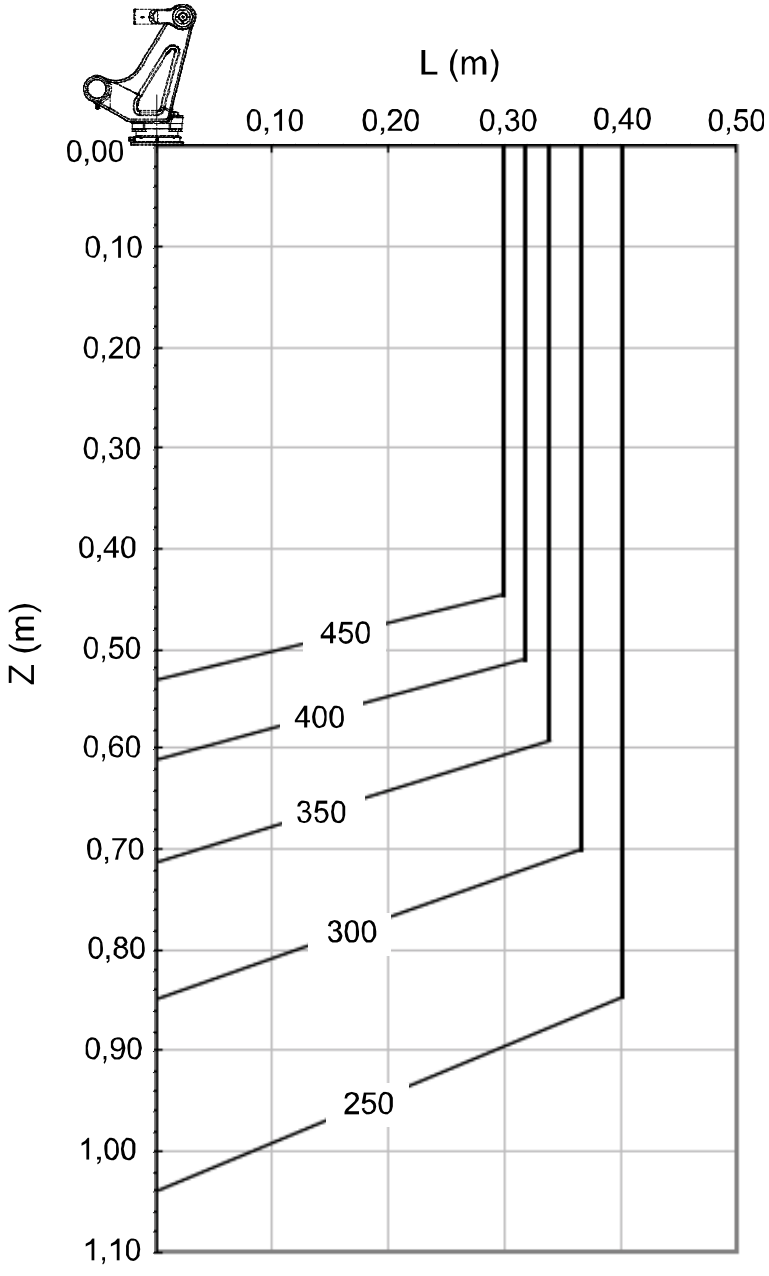
To verify a specific load case, use the RobotStudio add-in RobotLoad.

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.

1.6.2 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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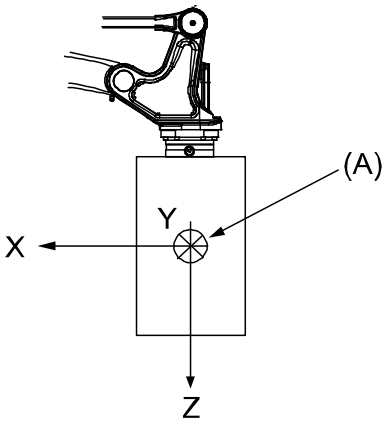
1.6.3 Maximum load and moment of inertia

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.

1.6.4 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 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).

1.7 Mounting of equipment

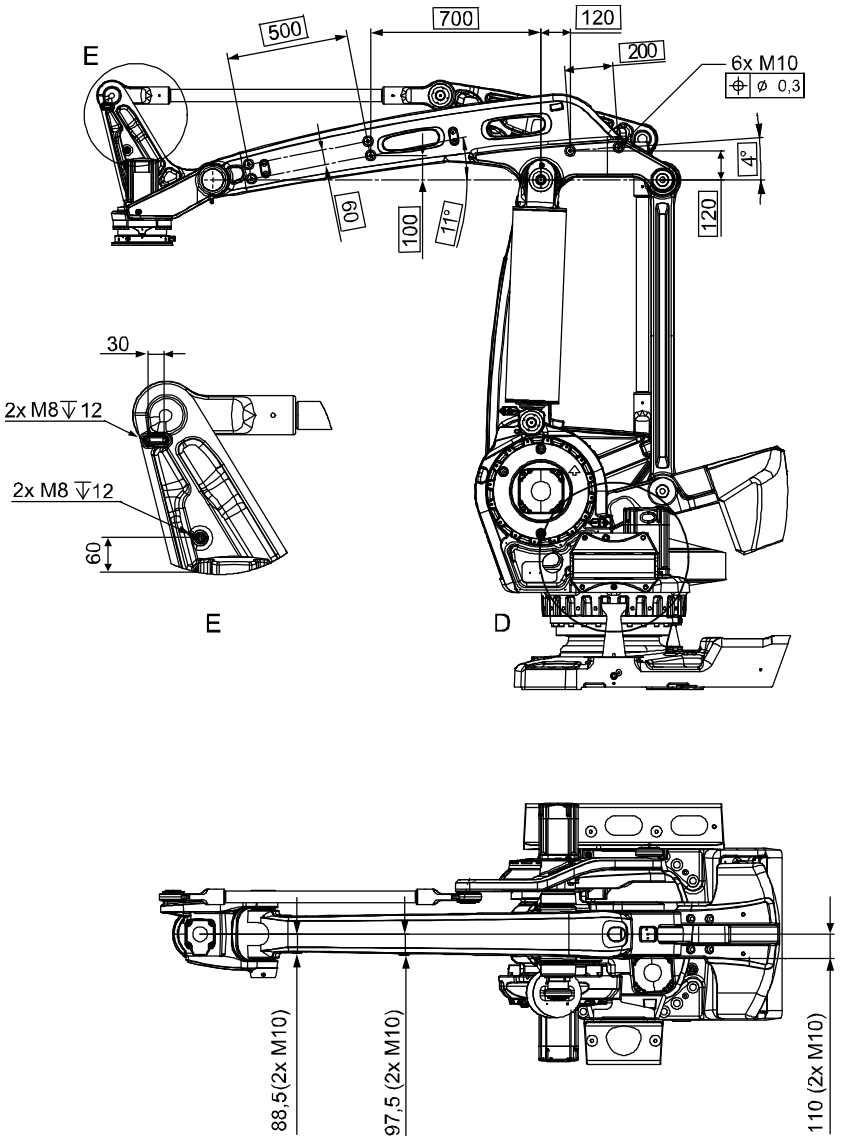
1.7.1 Introduction

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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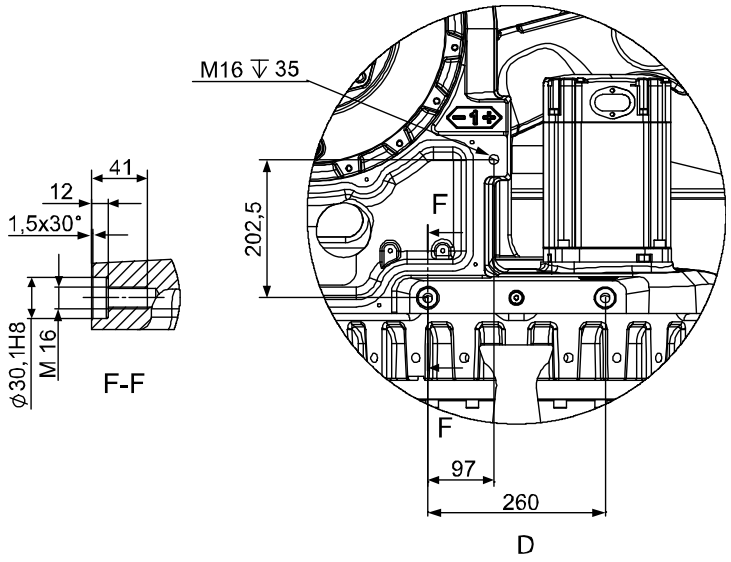
1.7.1 Introduction

Continued



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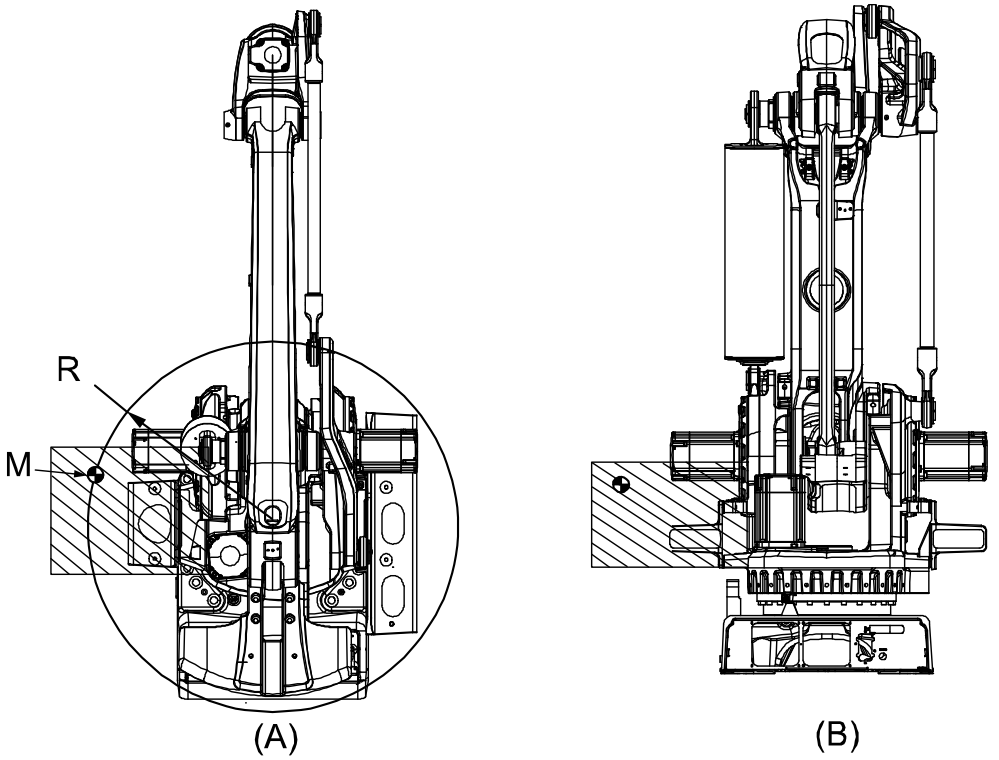
Frame

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.



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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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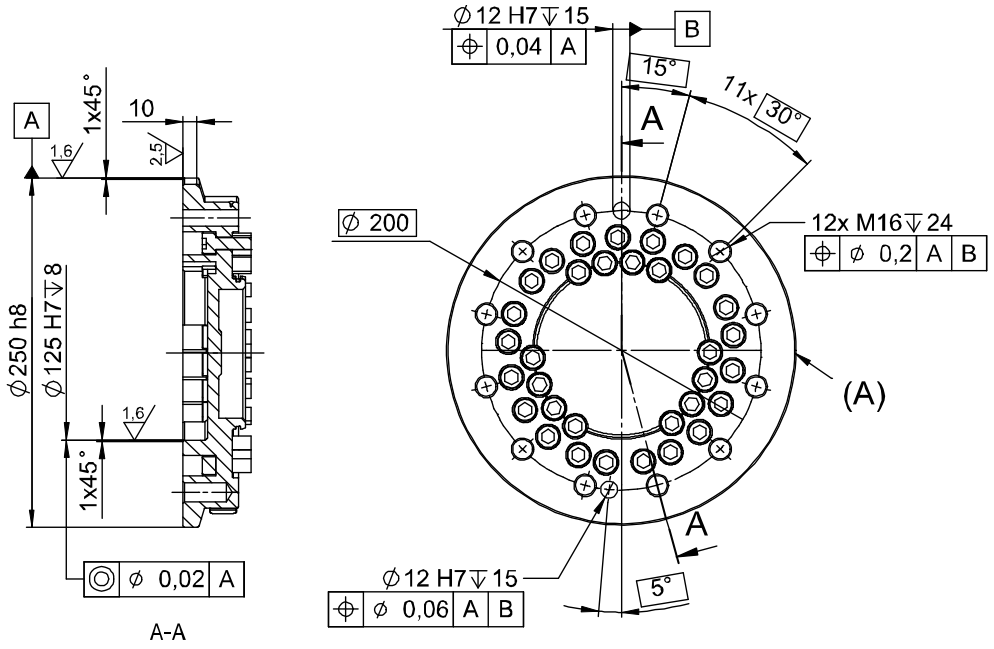
1.7.1 Introduction
Continued

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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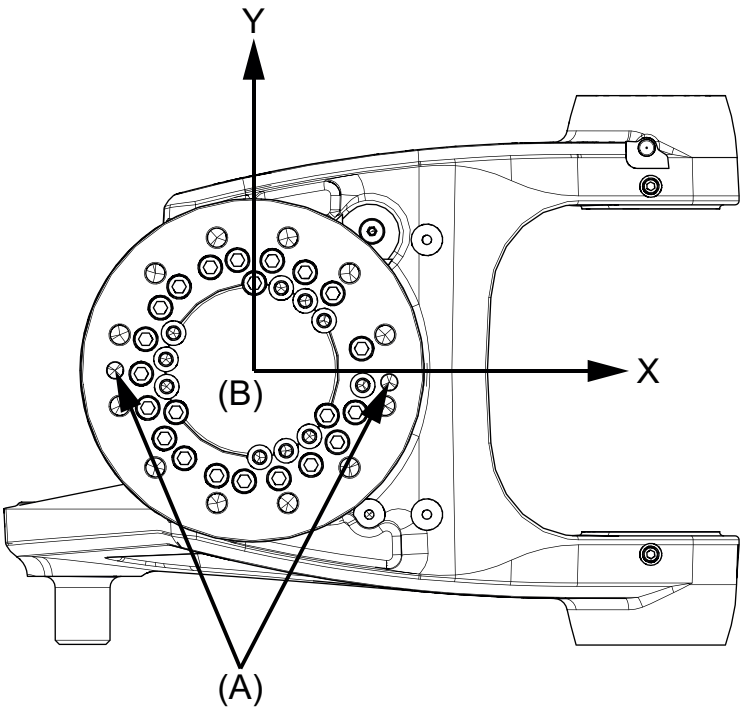

xx1800001403

-	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.

1.8 Robot motion

1.8.1 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 3324-1)
2	Arm motion	-42° to +85°
3	Arm motion	-20° to +120°
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).

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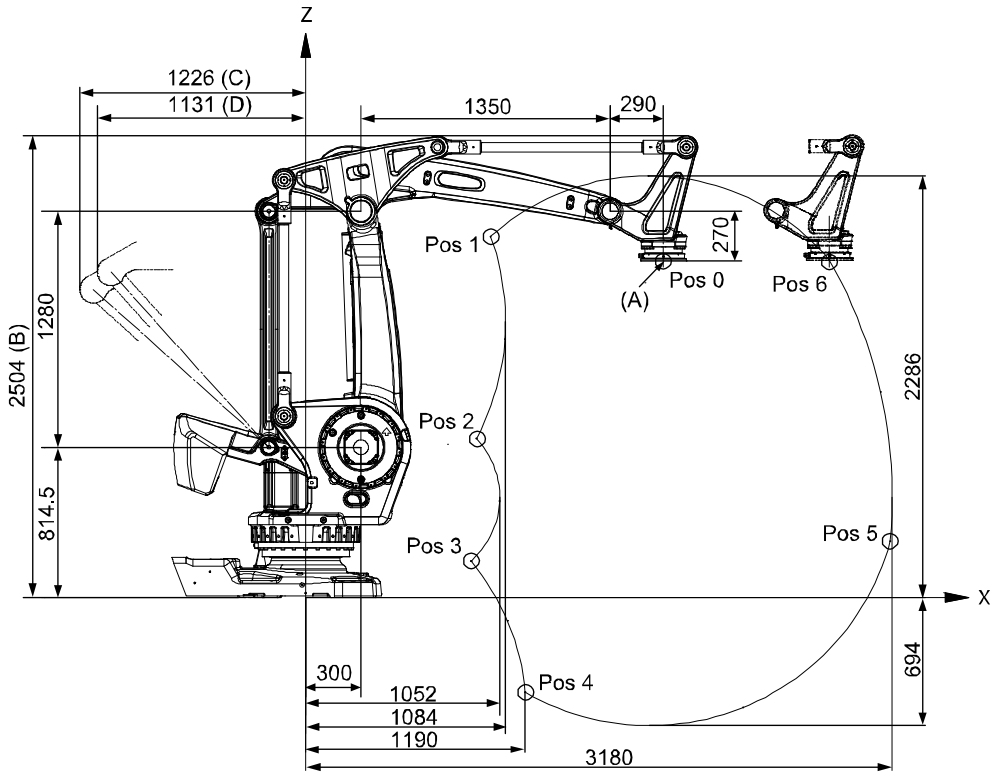
Illustration

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

Positions at wrist center

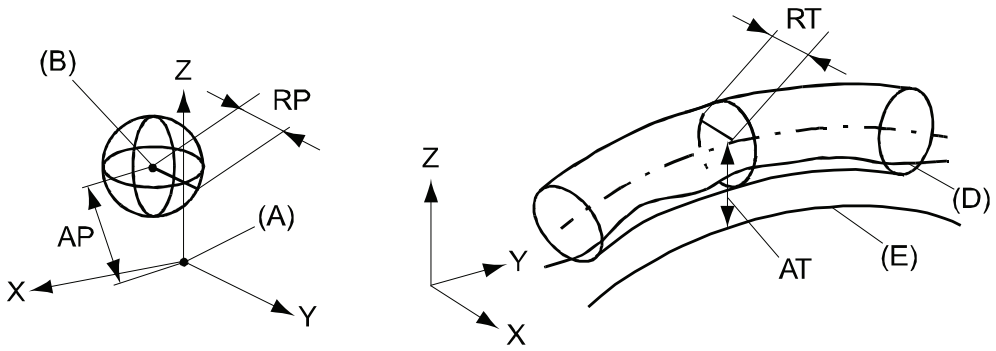
Pos no. see Figure 16	X Position (mm)	Z Position (mm)	Axis 2 Angle (degrees)	Axis 3 Angle (degrees)
0	1940	1824,5	0	0
1	1002	1957	-42	-20
2	925	862	-42	28
3	896	198	50	120
4	1190	-513	85	120
5	3169	307	85	15
6	2839	1829	50	-20

1.8.2 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.



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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
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.

1.8.3 Velocity

Maximum axis speeds

Axis No.	IRB 760-450/3.2
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.

1.8.4 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 Customer connections

1.9.1 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

1.9.1 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		

1.10 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 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

Manipulator variant

Option	Variant	Handling capacity (kg)	Reach (m)
3300-82	760-450/3.2	450	3.18

Manipulator color

Option	Color	RAL code[i]
209-2	ABB white standard	RAL 9003
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

The delivery time for painted spare parts is longer for non-standard colors.

Manipulator protection

Option	Description
3350-670	Base 67, IP67

Requirements

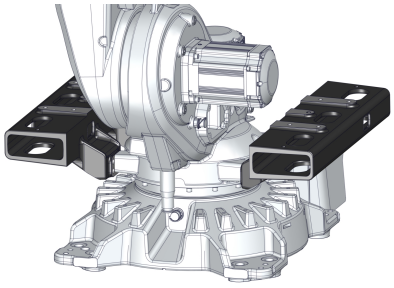
The option *Foundry Plus2 67* [3352-10] requires option *Upper arm cover* [3316-1].

Note

Base 67 includes IP67, according to standard IEC 60529.

Forklift device

The manipulator can be delivered with forklift devices, allowing a forklift to be used when moving the manipulator.

Option	Description	
3318-2	Forklift device on frame Fork lift pockets placed on the frame gives a more balanced lifting point. This can be used together with special tool to invert a robot.	 xx2300001243

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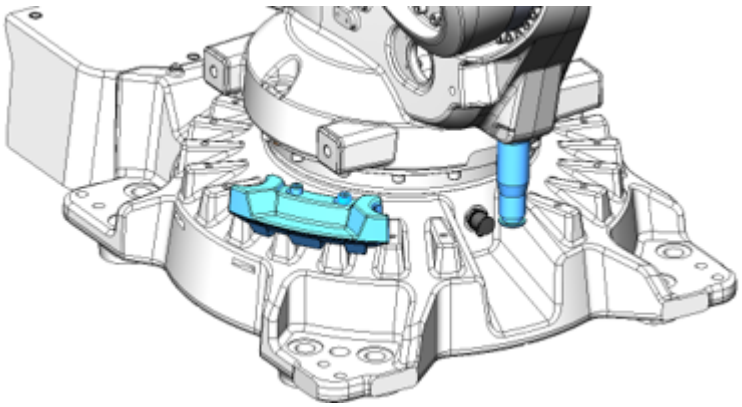
Resolver connection 7th axis

Option	Description
3322-1	On base

Limited working range

Option	Description
3323-1	Axis 1 adjustable 15°
3323-3	Axis 1 adjustable 7.5°

The manipulator can be equipped with adjustable mechanical stops. This is to mechanically limit the working range on axis 1. The mechanical stops are delivered alongside the robot (not installed). The stops can be placed in steps according to the option.



xx2100002595

Tip

An alternative to mechanical stops is to use safe supervision of the working range limitations. This requires the option *SafeMove Standard+*. See the product specification for the respective robot controller.

Extended working range

Option	Description	
3324-1	Axis 1 to ±220°	The option extends the working range on axis 1 from ±170° to ±220°.

Continues on next page

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 SafeMove*.

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.

Requirements

This option requires the option *SafeMove* [3043-x].

2.3 Floor cables

Note

To comply with the EMC directive, the total cable length (including cables for the motor connection box) must not exceed 30 m between:

Controller and robot (IRB)

Controller and motor & gear units (MU/GU) or track motion (IRT)

Controller and positioner (IRP)

Manipulator cable length

Option	Lengths
3200-2	7 m
3200-3	15 m
3200-4	22 m
3200-5	30 m

2.4 Application manipulator

DressPack base-axis 6

Option	Description	Additional information
3337-12	MH DeviceNet	Includes parallel signals
3337-13	MH EtherNet	Includes parallel signals. Supports ProfiNet, EtherNetIP
3337-14	MH CC-Link	Includes parallel signals
3337-15	MH EtherCat	Includes parallel signals

2.5 Connector kits manipulator

General

Below is an example of how a connector kit and its parts can look like.

xx1300000223

Note

Some connector kits listed in the overview tables are not available for all manipulators. See the available options in the specification forms.

Continues on next page

2.5.1 Base - Connector kits

Available options

Option	Name	3337-x
3330-2	CP/CS, Proc 1 base	X

Note

Servo power connection kits are not available.

Option CP/CS, Proc 1 on base - 3330-2

R1. CP/CS and Proc 1 on base

This option offers a kit with connectors. This must be assembled by the customer. The kit contains:

- 1 Hose fittings (swivel nut adapter, (½", M22x1.5 Brass, 24 degree seal))
- Connector with:

1 pcs Hood Foundry (Harting)	HAN EMC / M 40
1 pcs Hinged frame (Harting)	Shell size 16
2 pcs Multicontact, female (Harting)	Type HD (25 pin)
1 pcs Multicontact, female (Harting)	Type DD (12 pin)
1 pcs Multicontact, female (Harting)	Type EE (8 pin)
10 pcs Female crimp contacts	For 1.5 mm^2
10 pcs Female crimp contacts	For 0.5 mm^2
10 pcs Female crimp contacts	For 1.0 mm^2
10 pcs Female crimp contacts	For 2.5 mm^2
12 pcs Female crimp contacts	For 0.14 - 0.37 mm^2
45 sockets	For 0.2 - 0.56 mm^2
Assembly Accessories to complete connector	
Assembly instruction	

2.5.2 Axis 6 - Connector kits

Available options

Option	Name	3337-x	Description
3334-2	CP/CS bus axis 6	X	UTOW

Option CP/CS/CBus, Proc 1 axis 6 - 3334-2

CP/CS/CBus, Proc 1 axis 6 on tool side for option 3337-x.

This kit offers a kit with connectors to be mounted at toolside of axis 6.

This must be assembled by the customer.

The kit contains:

- 1 Hose fitting (swivel nut adapter (1/2", M22x1.5 Brass, 24 degree seal))
- Connector with:

CP/CS	
1 pcs UTOW Pin connector 26p, bulkhead	UTOW71626PH05, Shell size 16
26 pcs Pin	RM18W3K, 0.5-0.82 mm^2
CBUS	
1 pcs UTOW Pin connector 10p, bulkhead	UTOW71210PH05, Shell size 12
10 pcs Pin	RM18W3K, 0.5-0.82 mm^2
Ethernet	
1 pcs Socket connector M12	Harting 21 03 881 2425
4 pcs Socket	Harting 09670005476, 0.13-0.33 mm^2

2.6 Application floor cables

Ethernet cable - Length

Note

Occupies 1 Ethernet port.

Option	Description	Note
3202-2	7 m	Includes Parallel cable
3202-3	15 m	Includes Parallel cable
3202-4	22 m	Includes Parallel cable
3202-5	30 m	Includes Parallel cable

DeviceNet cable - Length

Option	Description	Note
3204-2	7 m	Includes Parallel cable
3204-3	15 m	Includes Parallel cable
3204-4	22 m	Includes Parallel cable
3204-5	30 m	Includes Parallel cable

CC-Link cable - Length

Option	Description	Note
3205-2	7 m	Includes Parallel cable
3205-3	15 m	Includes Parallel cable
3205-4	22 m	Includes Parallel cable
3205-5	30 m	Includes Parallel cable

Servo cable 1 axis - Length

Option	Description	Note
3206-2	7 m	
3206-3	15 m	
3206-4	22 m	
3206-5	30 m	

EtherCat cable - Length

Note

Occupies 1 Ethernet port.

Option	Description	Note
3210-2	7 m	Includes Parallel cable

Continues on next page

Option	Description	Note
3210-3	15 m	Includes Parallel cable
3210-4	22 m	Includes Parallel cable
3210-5	30 m	Includes Parallel cable

2.7 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 3326-11/13 upper arm DressPack MH3 is not covered by the warranty.

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