ROBOTICS

Product specification

IRB 660

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Product specification

IRB 660-180/3.15
IRB 660-250/3.15

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Revision: T

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Original instructions.

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Overview of this specification

About this Product specification

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

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

Usage

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

Who should read this manual?

This manual is intended for:

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

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 5.6x.	*3HAC050945-001*
Product specification - Controller software IRC5 IRC5 with main computer DSQC1000 and RobotWare 6.	*3HAC050945-001*
Product manual - IRB 660	*3HAC025755-001*
Product specification - Robot user documentation, IRC5 with RobotWare 6	*3HAC052355-001*

Revisions

Revision	Description
-	- New Product specification
A	- General corrections
B	- Changes in Figure 3 and Figure 16.
C	- Update Customer connections- Interbus removed - Footnote added to “Pose accuracy” - Stock Warranty

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Continued

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D	- Changes in chapter Standards - Directions of forces - Warranty information for Load diagrams
E	- Position switches removed.
F	- Work range - Explanation of ISO values (new figure and table) - Stopping distance - User documentation on DVD
G	- General update for 9.1 release
H	- Text for Standards updated
J	- Tightening torque adjusted
K	• Table for ambient temperature adjusted • New picture of tool flange • Minor corrections of foundation forces
L	• Machinery directive updated • Minor corrections
M	• Base plate drawing updated
N	• Minor corrections/update
P	• Text for ISO test adjusted
Q	• Minor corrections/update
R	Published in release R17.1. The following updates are done in this revision: • Axis Calibration method added • Restriction of load diagram added.
S	Published in release R17.2. The following updates are done in this revision: • Updated list of applicable standards. • TCP acceleration information added
T	Published in release R18.2. The following updates are done in this revision: • Added locating hole position in tool flange view.

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Contents

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References

Reference	Document ID
Product specification - Controller IRC5 with FlexPendant	*3HAC041344-001*
Product specification - Controller software IRC5	*3HAC022349-001*
Product specification - Robot user documentation, IRC5 with RobotWare 5	*3HAC024534-001*
Product manual - IRB 660	*3HAC025755-001*

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1 Description

1.1 Structure

1.1.1 Introduction

Robot family

IRB 660 is ABB Robotics latest generation of 4-axis palletizing robot, designed with a focus on its high production capacity, short cycle time at a high payload, long reach together with the very high uptime, which is significant for ABB's robots.

It is available in two versions; a handling capacity of 180 kg and 250 kg, both with a reach of 3.15 m.

Customer connections such 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 and so on. For more information, see *Product specification - Controller IRC5 with FlexPendant*.

Safety

Safety standards valid for complete robot, manipulator and controller.

Additional functionality

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

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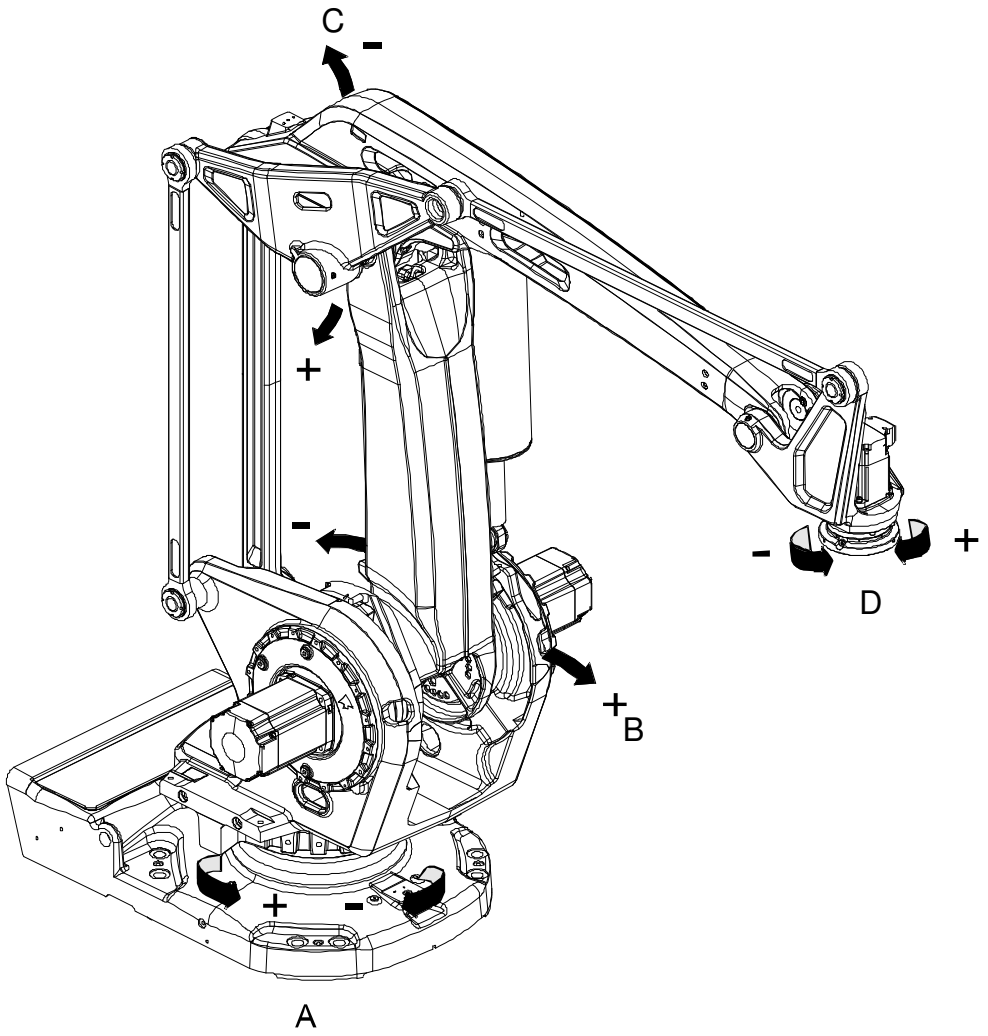
1.1.1 Introduction
Continued

Manipulator axes

The IRB 660 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 Different robot versions

General

The IRB 660 is available in two versions.

Robot type	Handling capacity (kg)	Reach (m)
IRB 660	180	3.15
IRB 660	250	3.15

1.1.3 Definition of version designation

IRB 660 Mounting

Handling capacity/ Reach

	Prefix	Description
Mounting	-	Floor-mounted manipulator
Handling capacity	yyy	Indicates the maximum handling capacity (kg)
Reach	x.x	Indicates the maximum reach at wrist center (m)

Manipulator weight

Robot type	Handling capacity (kg)	Reach (m)	Weight (kg)
IRB 660	180	3.15	1750
IRB 660	250	3.15	1750

Other technical data

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

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Power consumption at max load

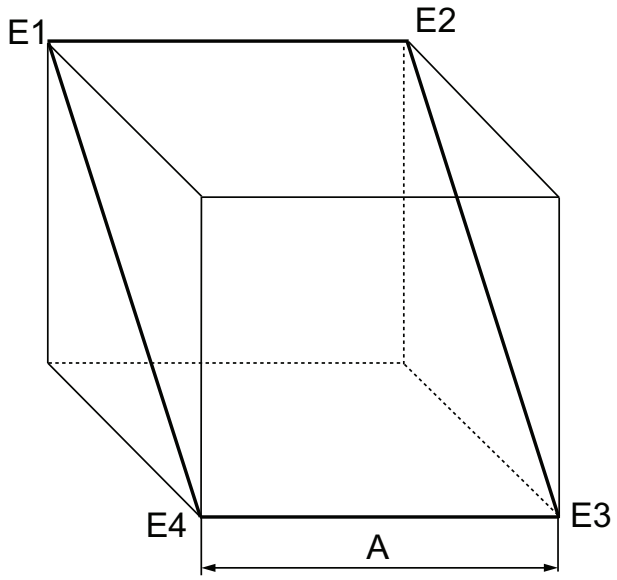
Path E1-E2-E3-E4 in the ISO Cube.

ISO Cube Speed [mm/s]	Power consumption [kW]	
	IRB 660-180/3.15	IRB 660-250/3.15
Max.	3.17	2.36
1000	1.31	1.50
500	0.89	1.02
100	0.61	0.70

General Palletizing movements in 48s. at maximum speed.

General Palletizing movements	Power consumption [kW]	
	IRB 660-180/3.15	IRB 660-250/3.15
Max. speed	3.08	2.34

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



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Pos	Description
A	1000mm

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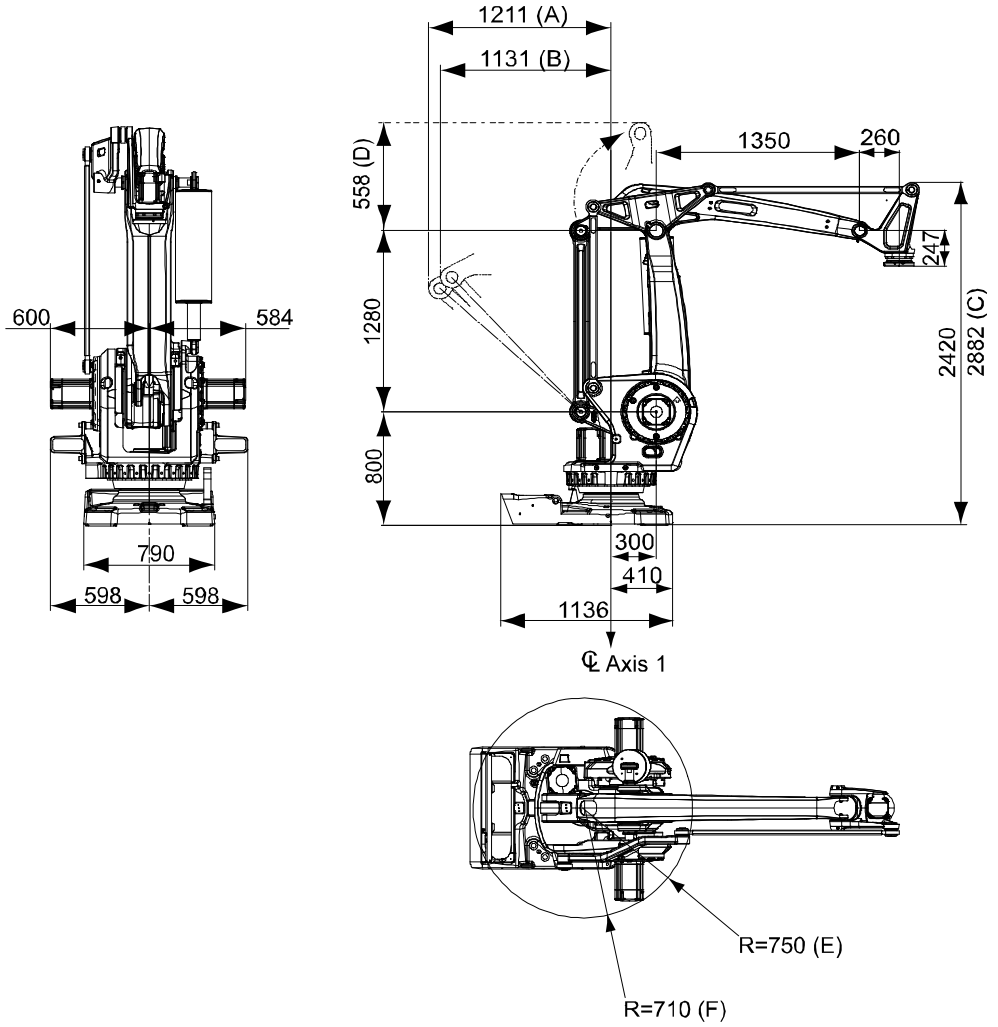
1.1.3 Definition of version designation
Continued

Dimensions IRB660

The following figure shows the front, side, and top view of the IRB660 manipulator (dimensions in mm). Allow 200 mm behind the manipulator foot for cables.



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Position	Description
A	At mechanical stop
B	At max. working range axis 2
C	At max. working range axis 3
D	At min. working range axis 3
E	Radius for fork lift pocket
F	Radius for axis 3 motor

1.2 Standards

1.2.1 Applicable standards

Note

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

Standards, EN ISO

The product is designed in accordance with the requirements of:

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

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

European standards

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

Continues on next page

1.2.1 Applicable standards

Continued

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

Other standards

Standard	Description
ANSI/RIA R15.06	Safety requirements for industrial robots and robot systems
ANSI/UL 1740	Safety standard for robots and robotic equipment
CAN/CSA Z 434-14	Industrial robots and robot Systems - General safety requirements

1.3 Installation

1.3.1 Introduction

General

IRB 660 is designed for floor mounting (no tilting allowed around X or Y axis). Depending on the robot version, an end effector with maximum weight of 180 to 250 kg including payload, can be mounted on the mounting flange (axis 6). For more information on Load diagrams, see *Load diagrams on page 30*.

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.

External Mains Transformer

Include an external transformer for mains voltage 200V and 220V.

1.3.2 Operating requirements

Protection standards

Manipulator IP67.

Explosive environments

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

Ambient temperature

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

[i] At low environmental temperature < 10° C is, as with any other machine, a warm-up phase recommended to be run with the robot. Below 5° C this warm-up phase is mandatory. Otherwise there is a risk that the robot stops or run with lower performance due to temperature dependent oil and grease viscosity.

Relative humidity

Description	Relative humidiy
Complete robot during operation, transportation and storage	Maximum 95% at constant temperature

1.3.3 Mounting the manipulator

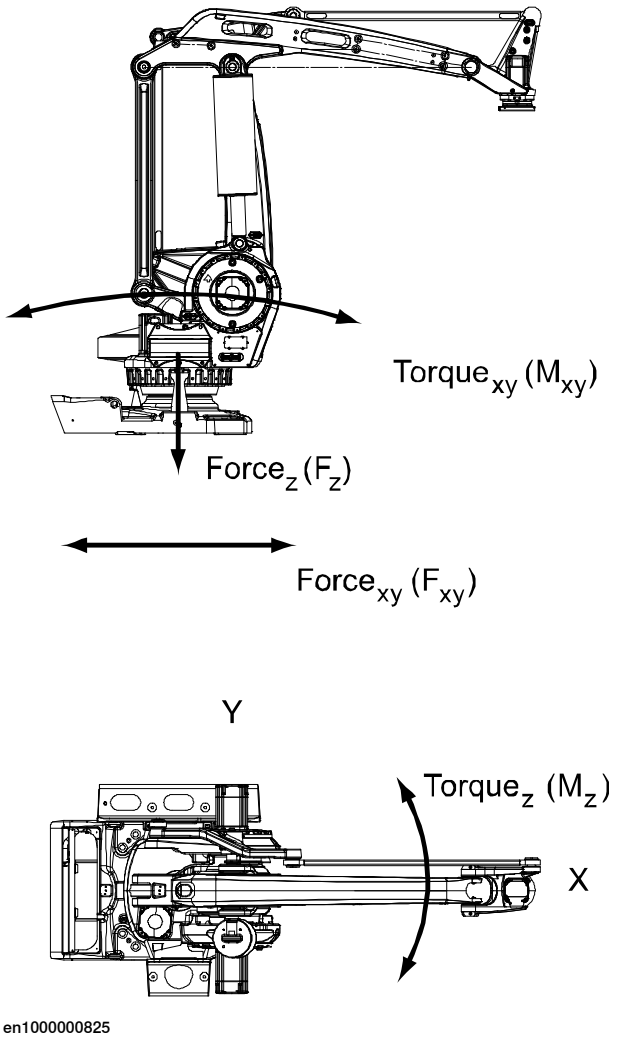
Maximum Load

Maximum load in relation to the base coordinate system.

Floor Mounted

Force	Endurance load (in operation)	Max. load (emergency stop)
Force xy	± 8.0 kN	± 11.7 kN
Force z	18.0 ±4.9 kN	18.0 ±8.2 kN
Torque xy	± 23.2 kNm	± 31.2 kNm
Torque z	± 7.7 kNm	± 9.9 kNm

The following figure shows the direction of forces.



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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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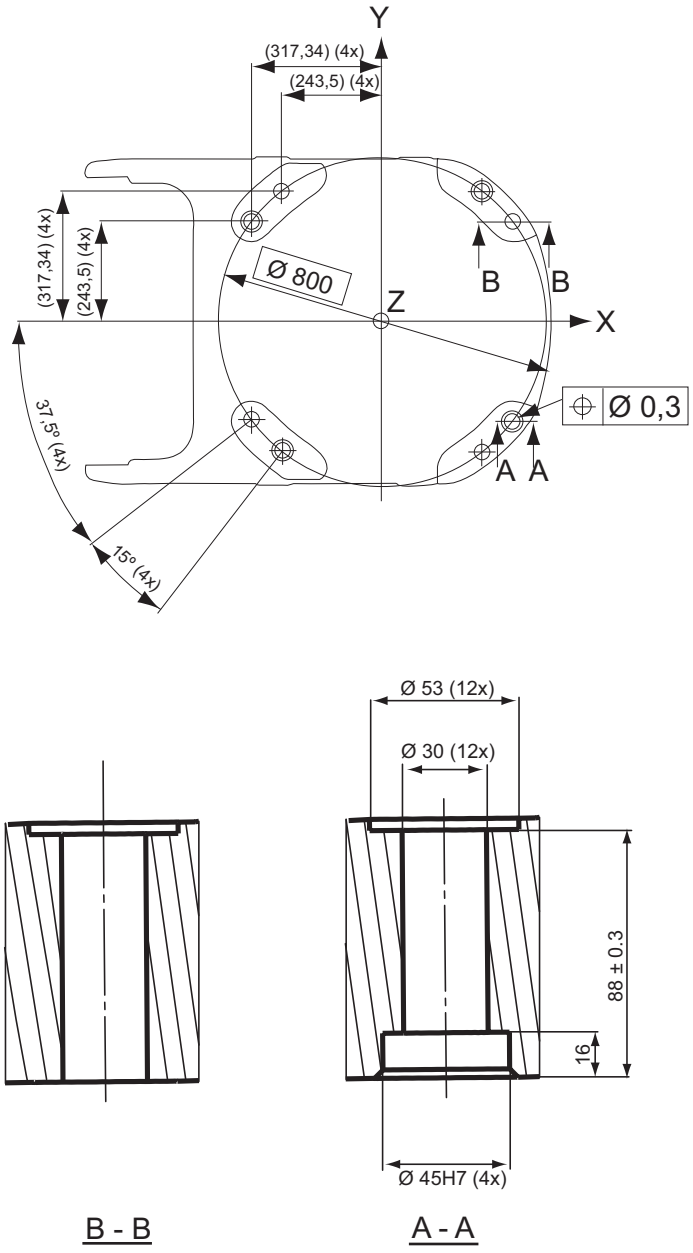
1.3.3 Mounting the manipulator
Continued

Fastening holes robot base

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



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Recommended screws for fastening the manipulator to a base plate:

- M24 x 140 8.8 with 4 mm flat washer. Torque value 725 Nm.

Note

Only two guiding sleeves shall be used. The corresponding holes in the base plate shall be circular and oval according to the following base plate drawing.

Regarding AbsAcc performance, the recommended are the chosen guide holes those are according to the following base plate drawing.

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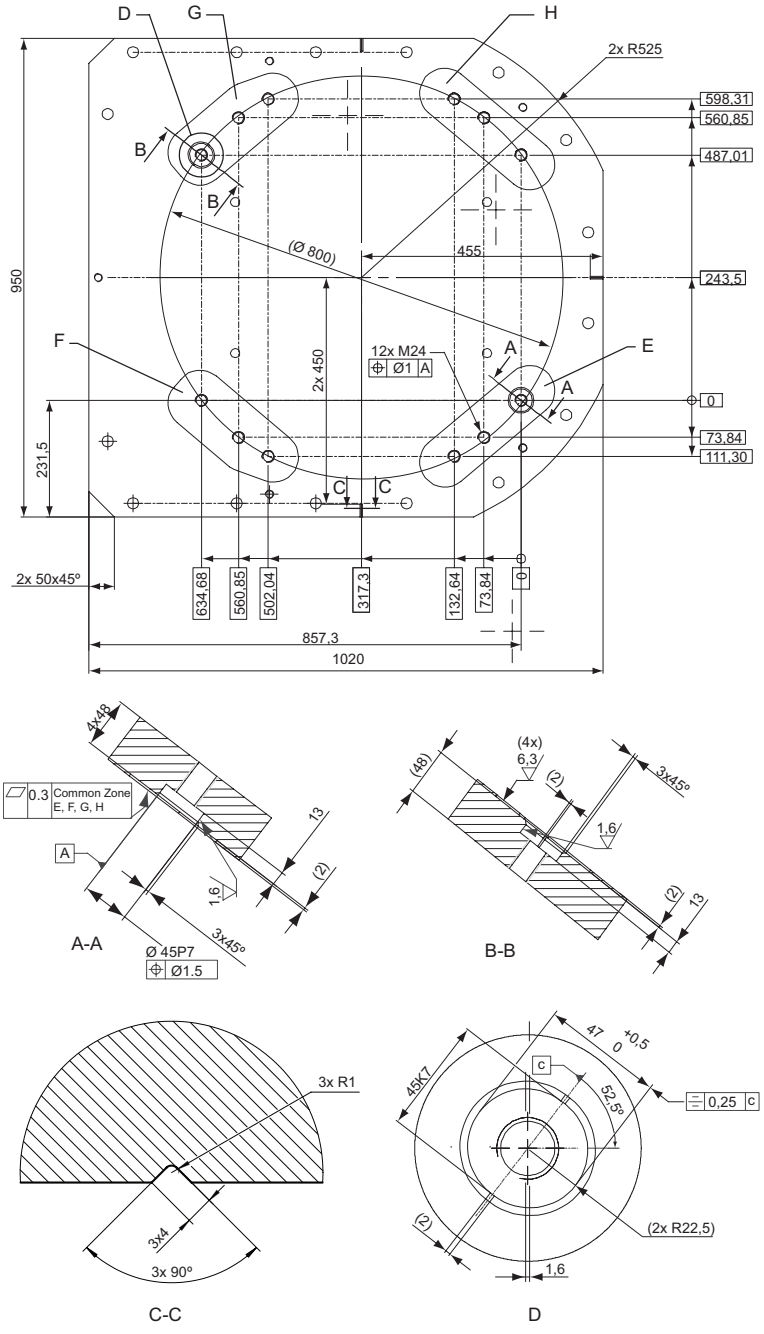
Base plate drawing

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



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

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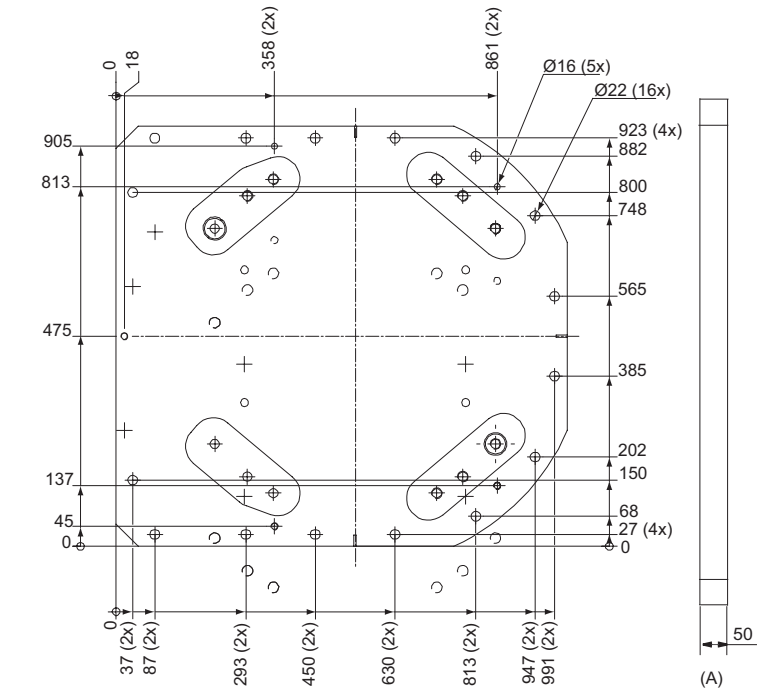
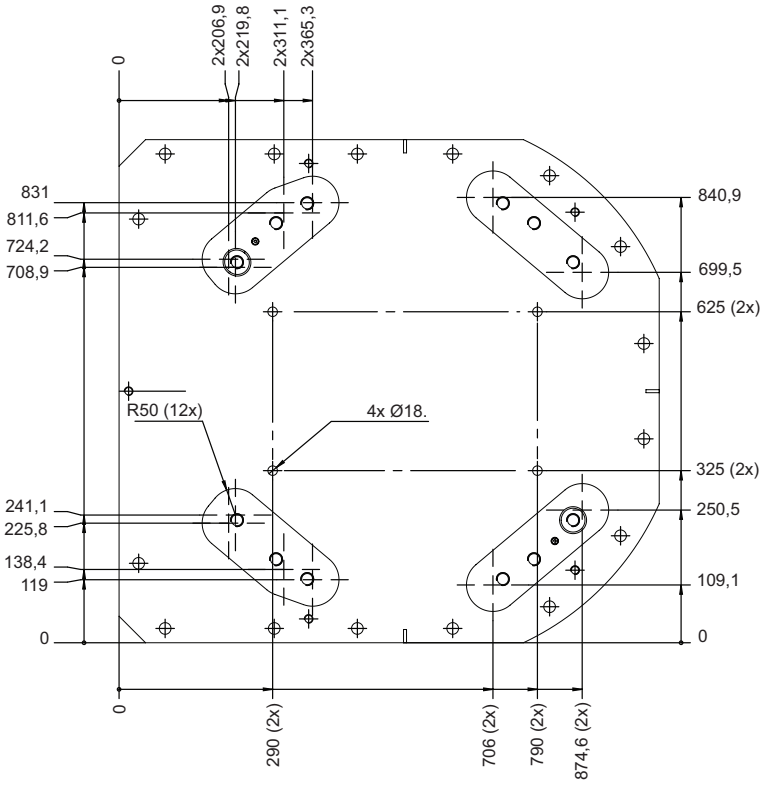
1.3.3 Mounting the manipulator

Continued





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

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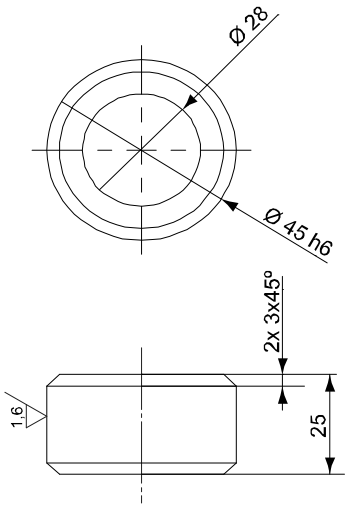

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Pos	Description
A	Guide sleeve protected from corrosion

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.

Types of calibration

Type of calibration	Description	Calibration method
Standard calibration	The calibrated robot is positioned at calibration position. Standard calibration data is found on the SMB (serial measurement board) or EIB in the robot. For robots with RobotWare 5.04 or older, the calibration data is delivered in a file, calib.cfg, supplied with the robot at delivery. The file identifies the correct resolver/motor position corresponding to the robot home position.	Axis Calibration or Calibration Pendulum [i]
Absolute accuracy calibration (optional)	Based on standard calibration, and besides positioning the robot at synchronization position, the Absolute accuracy calibration also compensates for: • Mechanical tolerances in the robot structure • Deflection due to load Absolute accuracy calibration focuses on positioning accuracy in the Cartesian coordinate system for the robot. Absolute accuracy calibration data is found on the SMB (serial measurement board) in the robot. For robots with RobotWare 5.05 or older, the absolute accuracy calibration data is delivered in a file, absacc.cfg, supplied with the robot at delivery. The file replaces the calib.cfg file and identifies motor positions as well as absolute accuracy compensation parameters. A robot calibrated with absolute accuracy has a sticker next to the identification plate of the robot. To regain 100% absolute accuracy performance, the robot must be recalibrated for absolute accuracy!  xx0400001197	CalibWare

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

Continues on next page

Brief description of calibration methods

Axis Calibration method

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 calibration is described in the product manual for the robot.

Calibration Pendulum method

Calibration Pendulum is a standard calibration method for calibration of many of 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.

CalibWare - Absolute Accuracy calibration

To achieve a good positioning in the Cartesian coordinate system, Absolute Accuracy calibration is used as a TCP calibration. The CalibWare tool guides through the calibration process and calculates new compensation parameters. This is further detailed in the *Application manual - CalibWare Field 5.0*.

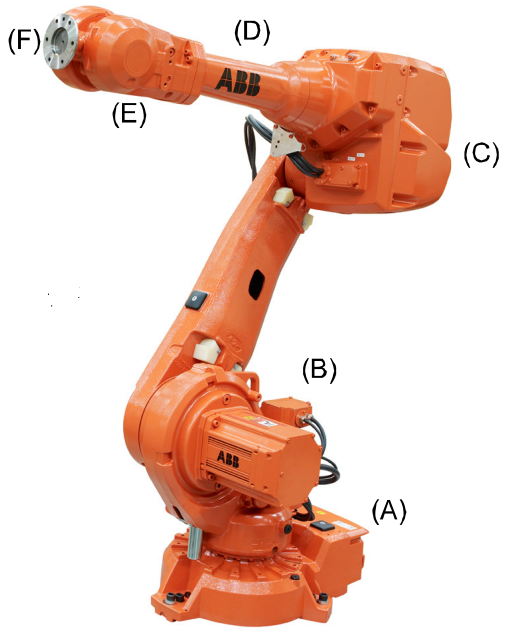
If a service operation is done to a robot with the option Absolute Accuracy, a new absolute accuracy calibration is required in order to establish full performance. For most cases after motor and transmission replacements that do not include taking apart the robot structure, standard calibration is sufficient.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

1.4.2 Fine calibration with Calibration Pendulum

Overview

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	Pos	Description
A	Axis 1	B	Axis 2
C	Axis 3	D	Axis 4
E	Axis 5	F	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 and/or loads are outside load diagram is used the following parts can be damaged due to overload:

- motors
- gearboxes
- mechanical structure

WARNING

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

WARNING

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

General

The load diagrams include a nominal payload inertia, J_0 of 15 kgm^2, and an extra load of 50 kg at the upper arm housing.

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

Control of load case by "RobotLoad"

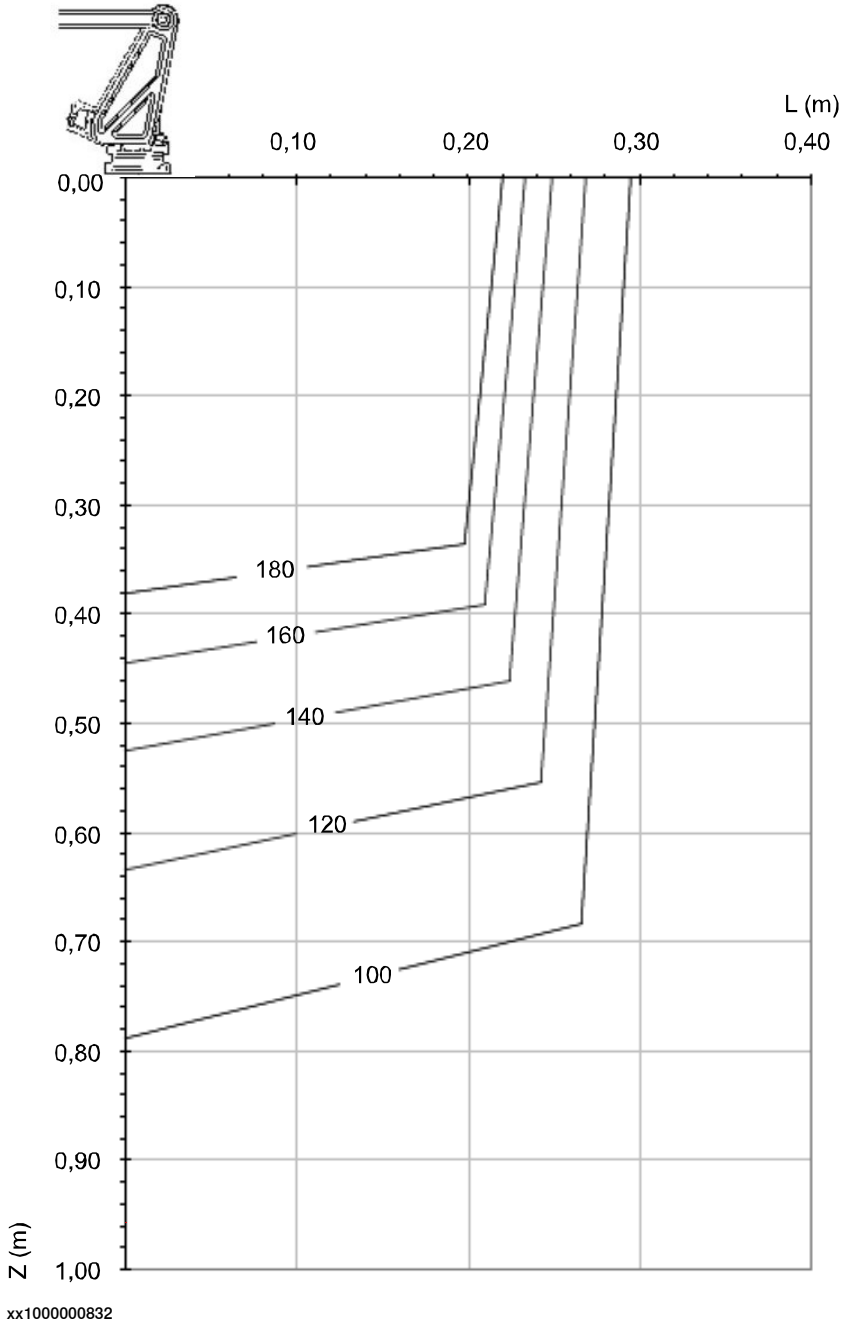
To easily control a specific load case, use the calculation program ABB RobotLoad. Contact your local ABB organization for more information.

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

1.5.2 Load diagrams

IRB 660-180/3.15

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



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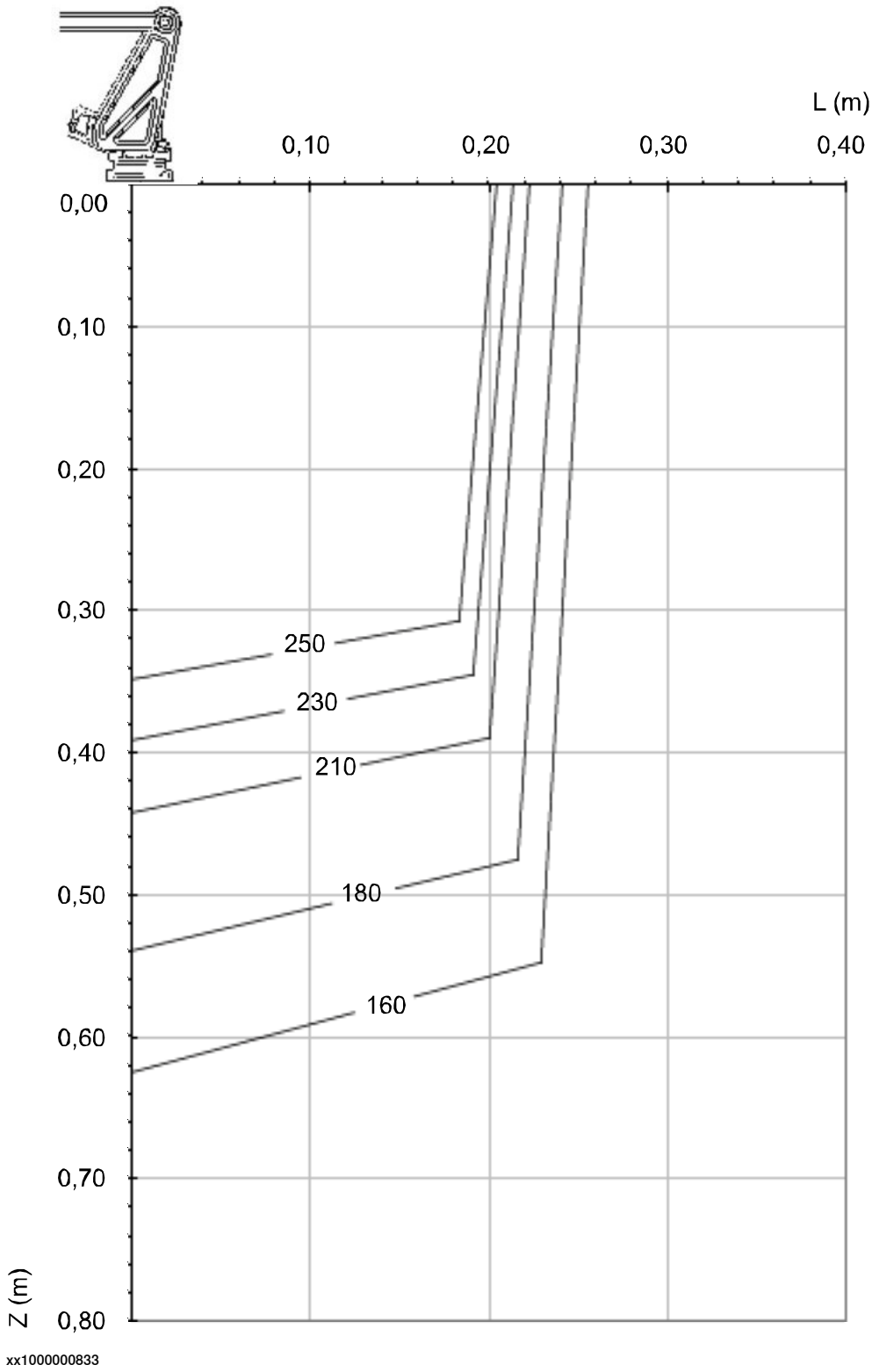
IRB 660-250/3.15

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

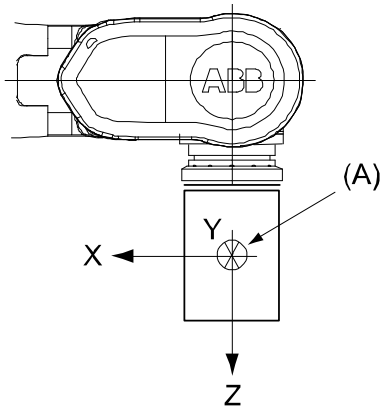


1.5.3 Maximum load and moment of inertia

Overview

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

Axis	Maximum moment of inertia
6	Ja6 = Load x L^2 + $J_{0Z} \leq$ 250 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 then 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 660 - 250/3.15	31	18
IRB 660 - 180/3.15	37	24

Note

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

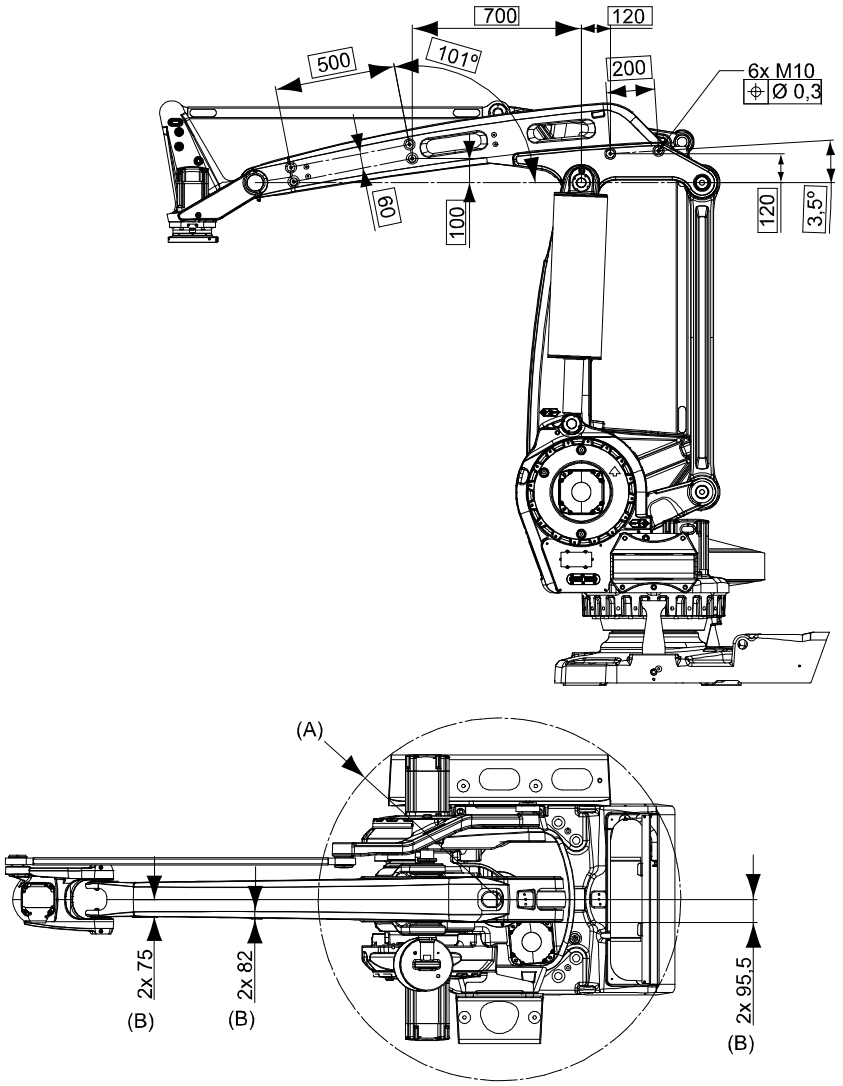
1.6 Mounting of equipment

1.6.1 Overview

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 following figures.

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



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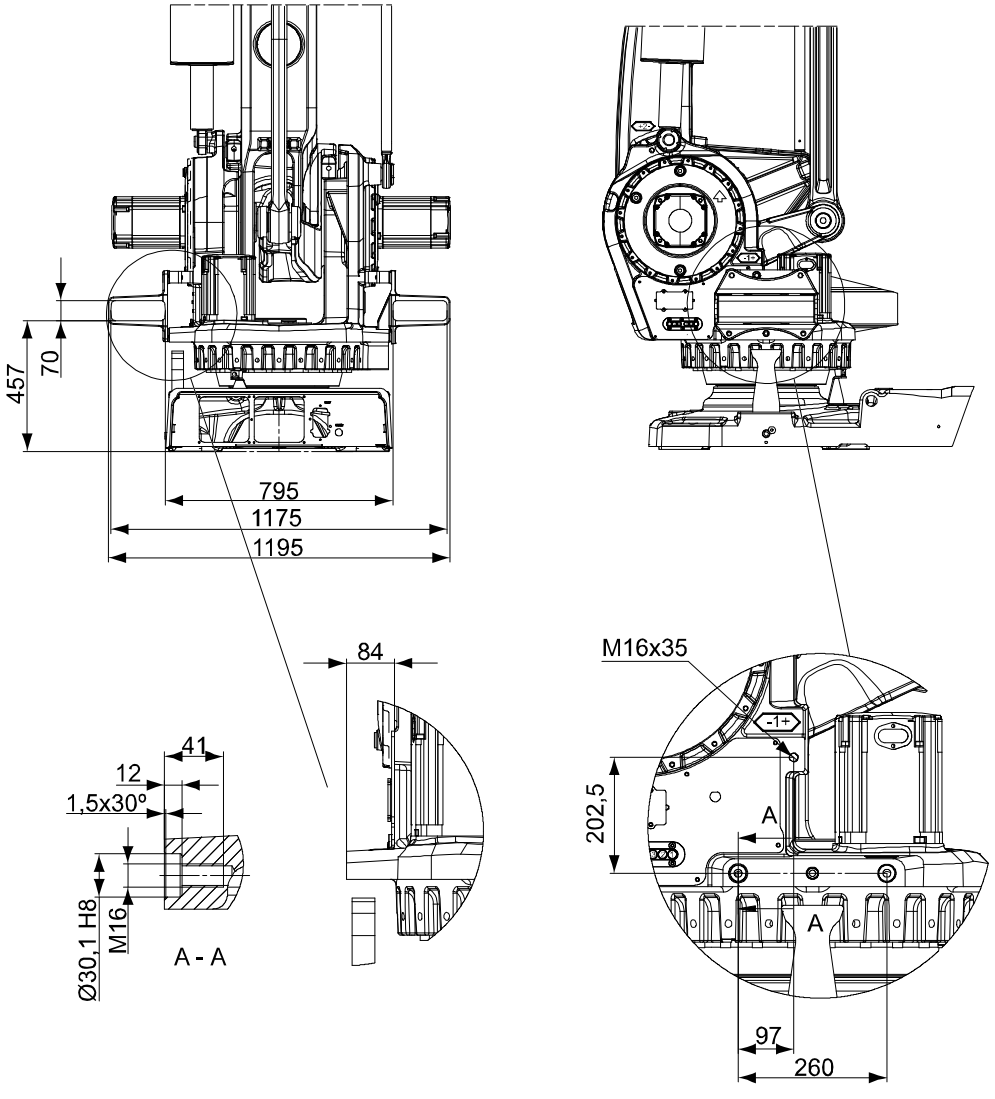
Position	Description
A	R750 Right fork lift pocket
B	M10 Mounting hole, upper arm

Continues on next page

Frame

For mounting of extra load on to the frame there are three holes on the left side (see the following figure). The maximum weight of the extra load is 150kg and the maximum moment of inertia is 120kgm^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 as shown in the following figure	$J_H = J_{H0} + M \times R^2$ J_{H0} is the moment of inertia (kgm^2) for the extra load. R is the radius (m) from the center of axis1. M is the total mass (kg) of the extra load.



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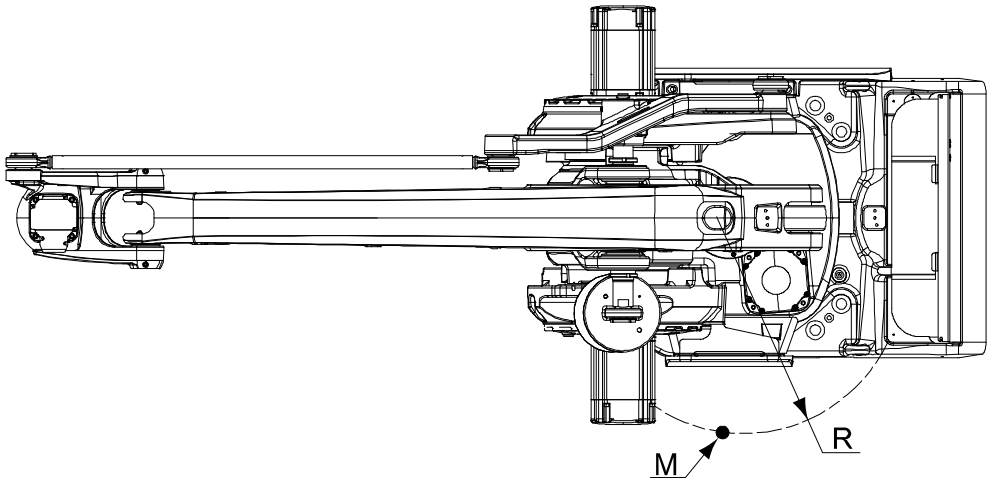
1.6.1 Overview
Continued

The following figure shows the radius for extra load on frame.



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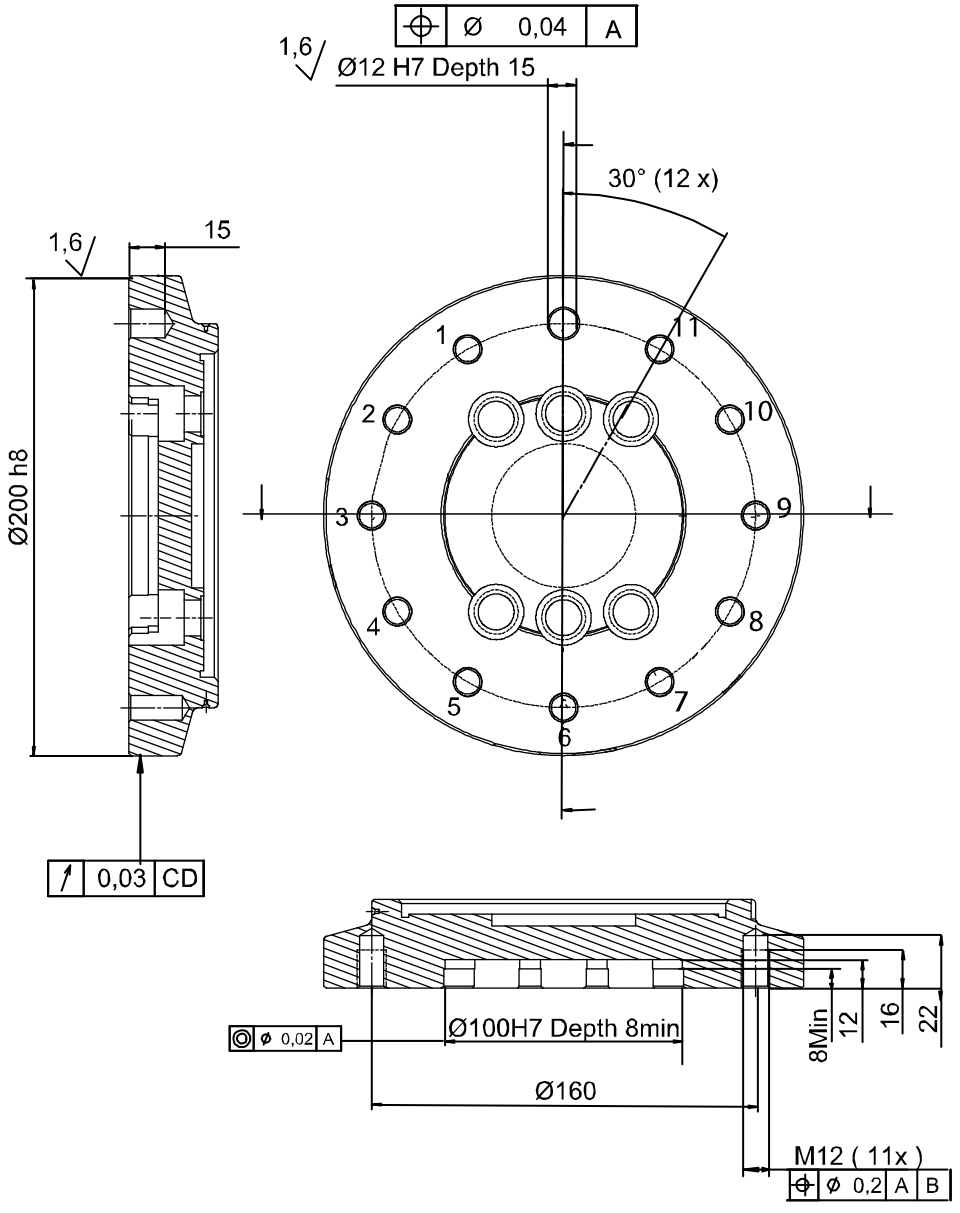
Robot tool flange

The following figure shows the robot tool flange SS-EN ISO 9409-1;2004 (dimensions in mm).



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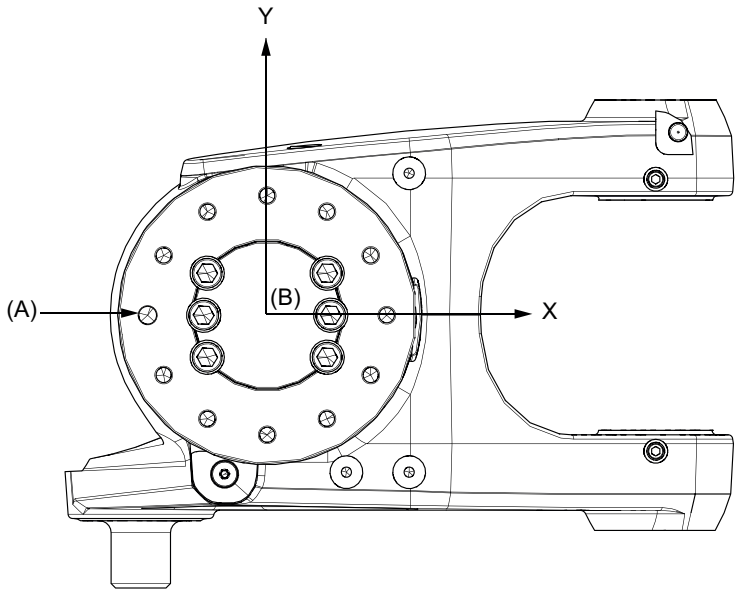
1.6.1 Overview
Continued



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

For fastening of gripper-tool-flange to robot-tool-flange all bolt holes for 11 bolts quality class 12.9 shall be used.

1.7 Robot motion

1.7.1 Introduction

Type of Motion

Axis	Type of motion	Range of movement	Option
1	Rotation motion	+180° to -180°	+220° to -220°
2	Arm motion	+85° to -42°	
3	Arm motion	+120° to -20°	
6	Turn motion	+300° to -300° Default +150 revolutions to -150 revolutions Max (see the following note)	

Note

- The default working range for axis 6 can be extended by changing parameter values in the software.
- Option 610-1 *Independent axis* can be used for resetting the revolution counter after the axis has been rotated (no need for “rewinding” the axis).

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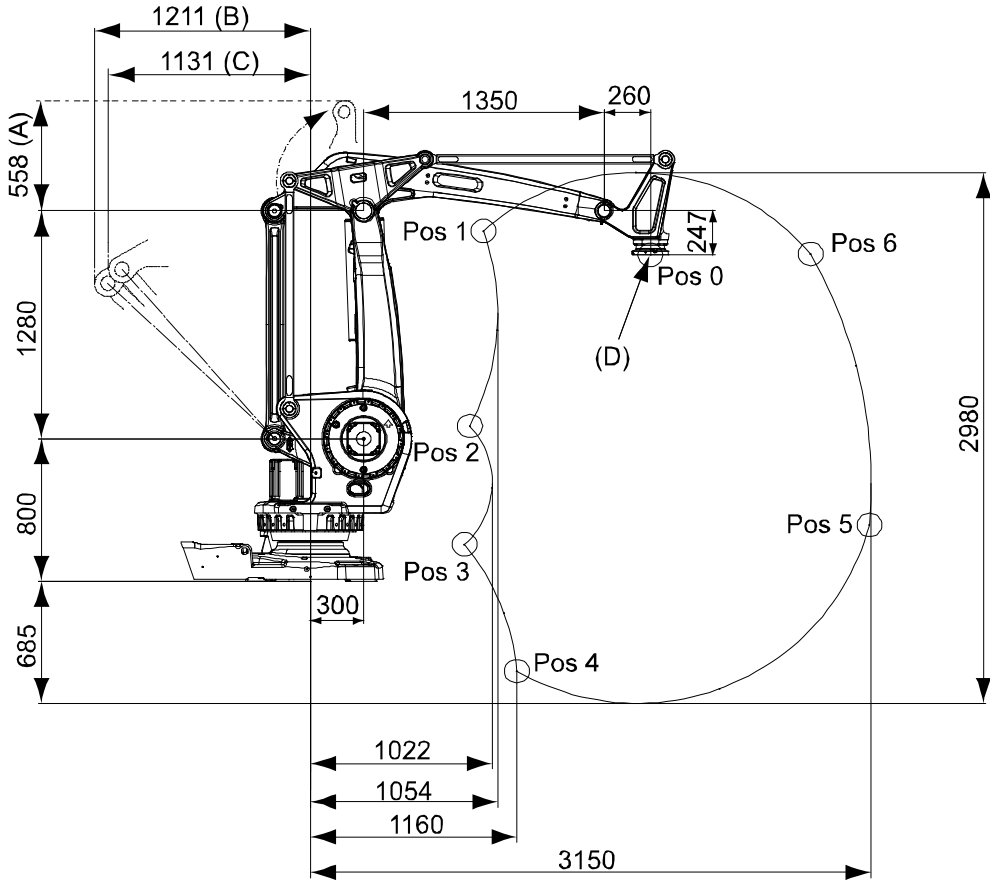
1.7.1 Introduction
Continued

Illustration

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



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Position	Description
A	Min. working stop
B	Mechanical stop
C	Max. working stop
D	Tool flange center

Positions at wrist center

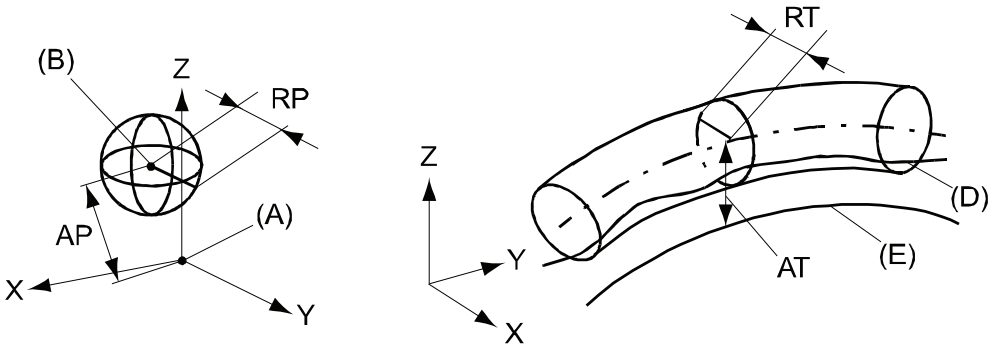
Position number (see preceding figure)	X Position (mm)	Z Position (mm)	Axis2 Angle (degrees)	Axis3 Angle (degrees)
0	1910	1833	0	0
1	972	1966	-42	-20
2	895	870	-42	28
3	866	207	50	120
4	1160	-505	85	120
5	3139	315	85	15
6	2809	1837	50	-20

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 660-180/3.15	IRB 660-250/3.15
Undirectional pose accuracy, AP[i] (mm)	0.20	0.20
Unidirectional pose repeatability, RP (mm)	0.05	0.05
Linear path repeatability, RT (mm)	0.23	0.17
Linear path accuracy, AT (mm)	2.20	2.13
Pose stabilization time PST (s)	0.17	0.22

i AP according to the ISO test above, is the difference between the teached position (position manually modified in the cell) and the average position obtained during program execution.
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 660-180/3.15	IRB 660-250/3.15
1	130°/s	95°/s
2	130°/s	95°/s
3	130°/s	95°/s
6	300°/s	240°/s

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

Axis Resolution

Approx. 0.01º on each axis.

1.7.4 Stopping distance/time

Overview

Stopping distance/time for emergency stop (category 0), program stop (category1) and at mains power supply failure at maximum speed, maximum streched out, and maximumload, categories according to EN 60204-1. All results are from tests on one moving axis. All stop distances are valid for floor mounted robot, without any tilting.

Robot type		Category 0		Category 1		Main power failure	
	Axis	A	B	A	B	A	B
IRB 660-180/3.15	1	55.8	0.86	80.7 i	1.18 *i*	91.7	1.31
	2	26.7	0.41	36.4	0.55	32.4	0.46
	3	20.8	0.32	34.5	0.50	28.8	0.38

i Test made with RobotWare 5.06 (not correct brake performance).

Robot type		Category 0		Category 1		Main power failure	
	Axis	A	B	A	B	A	B
IRB 660-250/3.15	1	36.0	0.77	105.2 i	1.59 *i*	60.1	1.31
	2	18.3	0.38	24.0	0.50	23.1	0.43
	3	15.1	0.32	22.6	0.52	31.7	n.a.

i Test made with RobotWare 5.06 (not correct brake performance).

	Description
A	Stopping distance in degrees
B	Stop time (s)

1.8 Customer connections

1.8.1 Introduction

General

The customer connection is an option, the cables and the hoses for them are integrated in the robot and the connectors are placed at axis 6.

- Power, Signals, Bus and 2x Air (CP/CS/BUS/AIR)

For further information on the customer connection, see *Application interface connection type on page 51*.

Specification

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	1x0.75 mm^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
Signals (CS)		5x2AWG24 (50V/1A)	3-module Harting, shell size 10B, HD	Female, HD, 25 pin9 140 253 101	Sep. Screened
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			
Air (AIR)	Utility air	2x12.7 (1/2”) P Nom = 16 bar	Parker Push-lock,1/2” M22x1,5 Brass 24 degree 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 *Product manual - IRB 660*, chapter *Maintenance*.

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2 Specification of variants and options

2.1 Introduction to variants and options

General

The different variants and options for the IRB 660 are described in the following sections. The same option numbers are used here as in the specification form.

Related information

For the controller see *Product specification - Controller IRC5*.

For the software options see *Product specification - Controller software IRC5*.

2.2 Manipulator

Variants

Option	IRB Type	Handling capacity (kg)	Reach (m)
435-58	660	180	3.15
435-59	660	250	3.15

Manipulator color

Option	Description	Note
209-1	ABB Orange standard	
209-3	ABB White standard	
209-202	ABB Graphite White standard	Standard color
209-3 --192	The robot is painted in chosen RAL - color	

Note

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

Equipment

Option	Type	Description
213-1	Safety lamp	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.
159-1	Fork lift device	Lifting device on the manipulator for fork-lift handling.
37-1	Base plate	Can also be used for IRB 7600. See dimension drawing in *Mounting the manipulator on page 21*.

Resolver connection, axis 7

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

Electronic Position Switches (EPS)

The mechanical position switches indicating the position of the three main axes are replaced with electronic position switches for up to 7 axes, for increased flexibility and robustness. For more detailed information, see *Product specification - Controller IRC5 with FlexPendant* and `[1 Could not get value of expression: Reference.AM.EPS: Unknown variable: Reference.AM.EPS]` ???.

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Work 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 degrees	Two stops which allow the working range to be restricted in increments of 7.5°.

Extended work range

Option	Type	Description
561-1	Extended work range axis 1	To extend the working range on Axis1 from ±180° to ±220°. When the option is used the mechanical stop shall be disassembled. *Electronic Position Switches*, option 810-1, is required.

Warranty

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*.

2.3 Floor cables

General

Additional floor cables for customer connections see *Process on page 51*.

Manipulator cable length

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

2.4 Process

Application interface connection type

Option	Description	
16-1	Cabinet [i]	The signals are connected to 12-pole screw terminals, Phoenix MSTB 2.5/12-ST-5.08, to the control module.

[i] 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.

Communication

Option	Type	Description
455-6	Parallel, Bus and Air Communication	Includes Customer Signals (CS), Customer Power (CP), Bus signals and two hoses for Air (inner diameter 12.5 mm)

CAN/DeviceNet/Profibus

The following information specifies the cable length for Parallel/CAN/DeviceNet/Profibus for connection to cabinet.

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

Empty cabinet

Option	Type	Description
768-1	Empty cabinet small	See *Product specification - Controller IRC5 with FlexPendant*
715-1	Installation kit	See *Product specification - Controller IRC5 with FlexPendant*

Connector kits upper arm

Option	Type	Description
431-1	Upper arm	Connector for customer Power/Signals/ and bus at axis 6 tool side.

2.5 User documentation

User documentation

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

All documents can be found via myABB Business Portal, *www.myportal.abb.com*.

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 *Product specification - Controller software IRC5*.

Robot peripherals

- Motor Units[1]

[1] Not applicable for IRC5 Compact controller.

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Warnings

1 *Could not get value of expression: Reference.AM.EPS: Unknown variable: Reference.AM.EPS*

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