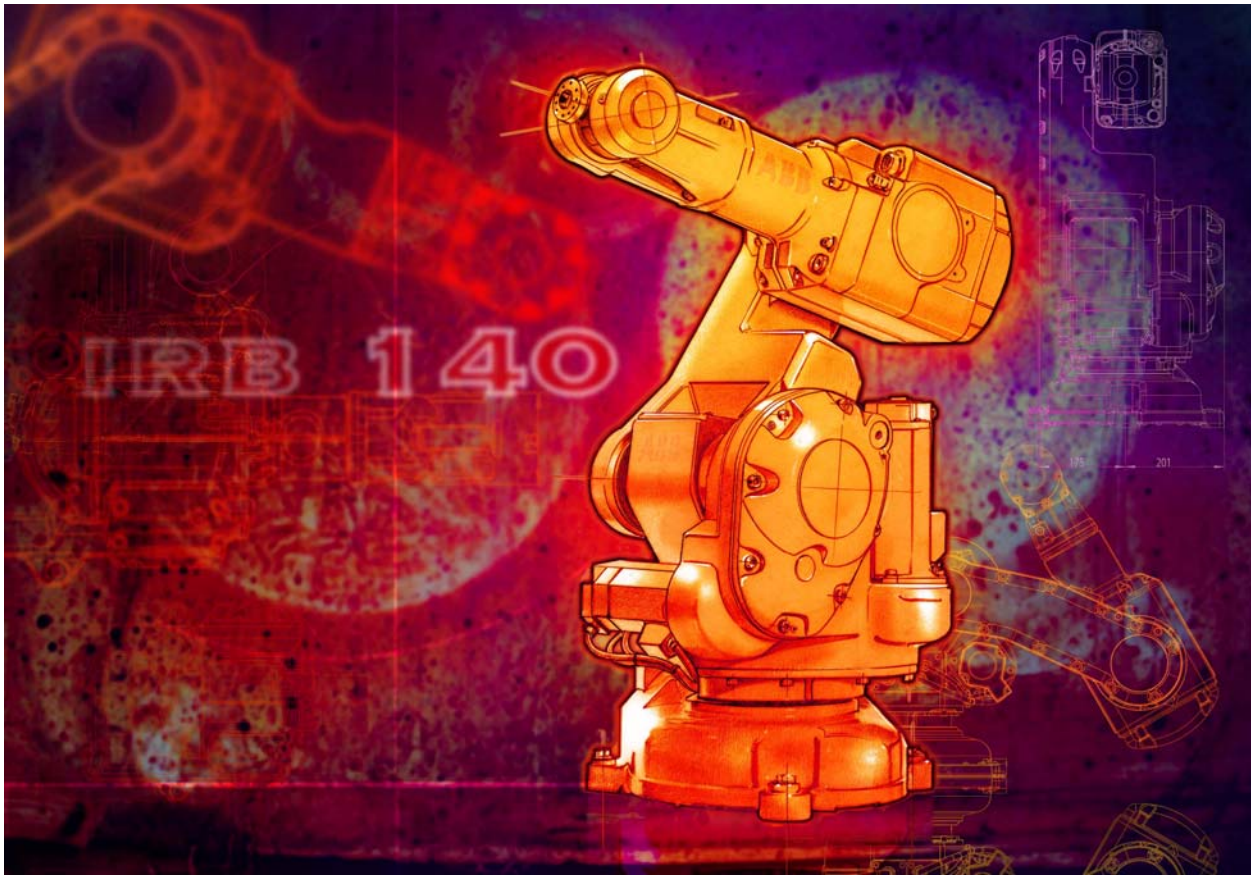
Product specification

Articulated robot

IRB 140-6/0.8
IRB 140T-6/0.8
M2004



Product specification

Articulated robot
3HAC9041-1
Rev.M
IRB 140-6/0.8
IRB 140T-6/0.8

M2004

ABB AB
Robotics Products
SE-721 68 Västerås
Sweden

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Overview

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

Users

It is intended for:

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

Contents

Please see Table of Contents on page 3.

Revisions

Revision	Description
Revision G	- New wrist design (type C) added - Axis 5 Motion changed to ± 115° (from ± 120°) - New values for Performance Acc. to ISO 9283 added - M2000 cancelled - Additional text in chapter 1.4 Load diagram.
Revision H	- Operating system - Calibration and references
Revision J	- Two manipulator variants added - Changes in chapter Standards - Directions of forces - Warranty information for Load diagrams
Revision K	- Old variants removed.
Revision L	- Changes for Calibration data - Work range - Explanation of ISO values (new figure and table) - Stopping distance - User documentation on DVD
Revision M	- General update for 9.1 release

Complementary documentation

Product specification	Description
Controller	IRC5 with FlexPendant, 3HAC021785-001
Controller Software IRC5	RobotWare 5.12, 3HAC022349-001
Robot User Documentation	IRC5 and M2004, 3HAC024534-001
Product Manual	**Description**
Manipulator	IRB 140, 3HAC024400-001

1 Description

1.1 Structure

1.1.1 Introduction

General

IRB 140 is a 6-axis industrial robot, with a payload of 6 kg, designed specifically for manufacturing industries that use flexible robot-based automation. The robot has an open structure that is specially adapted for flexible use, and can communicate extensively with external systems.

Foundry Plus and Wash robots

The Foundry Plus option is designed for harsh environments where the robot is exposed to sprays of coolants, lubricants and metal spits that are typical for die casting applications or other similar applications. The Foundry Plus robot is painted with two-component epoxy on top of a special primer for excellent corrosion protection. To further improve the corrosion protection additional rust preventive are applied to exposed areas, e.g. has the tool flange a special preventive coating. The entire robot is IP67 compliant according to IEC 60529 - from base to wrist, which means that the electrical compartments are virtually sealed against liquid and solid contaminants. Among other things all sensitive parts are highly protected.

Foundry Plus features:

- Improved sealing to prevent damp from penetrating into cavities
- Additional protection of cabling and electronics
- Special covers protecting cavities
- Special connectors

The Foundry Plus robot can be cleaned with adequate washing equipment.

Clean room robots

The clean room robots are classified for room class 6 according to ISO 14644-1.

The clean room robots are protected with a paint appropriate for clean room applications. The paint has been tested regarding outgassing of Volatile Organic Compounds (VOC) and been classified in accordance with ISO 14644-8.

Classification of airborne molecular contamination, see below:

Parameter				Outgassing amount		
Area (m^2)	Test duration (s)	Temp. (^oC)	Performed test	Total detected (ng)	Normed based on 1 m^2 and 1s (g)	Classification in accordance to ISO 14644-8
4.5E-03	3600	23	TVOC	2848	1.7E-07	-6.8
4.5E-03	60	90	TVOC	46524	1.7E-04	-3.8

Classification results in accordance with ISO 14644-8 at different test temperatures. See chapter Specification of Variants and Options for options not selectable together with Clean Room.

Operating system

The robot is equipped with the IRC5 controller and robot control software, RobotWare for M2004. RobotWare and BaseWare OS supports every aspect of the robot system, such as motion control, development and execution of application programs, communication etc. See Product specification - Controller IRC5 with FlexPendant. Safety standards require a controller to be connected to the robot.

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

Manipulator axes

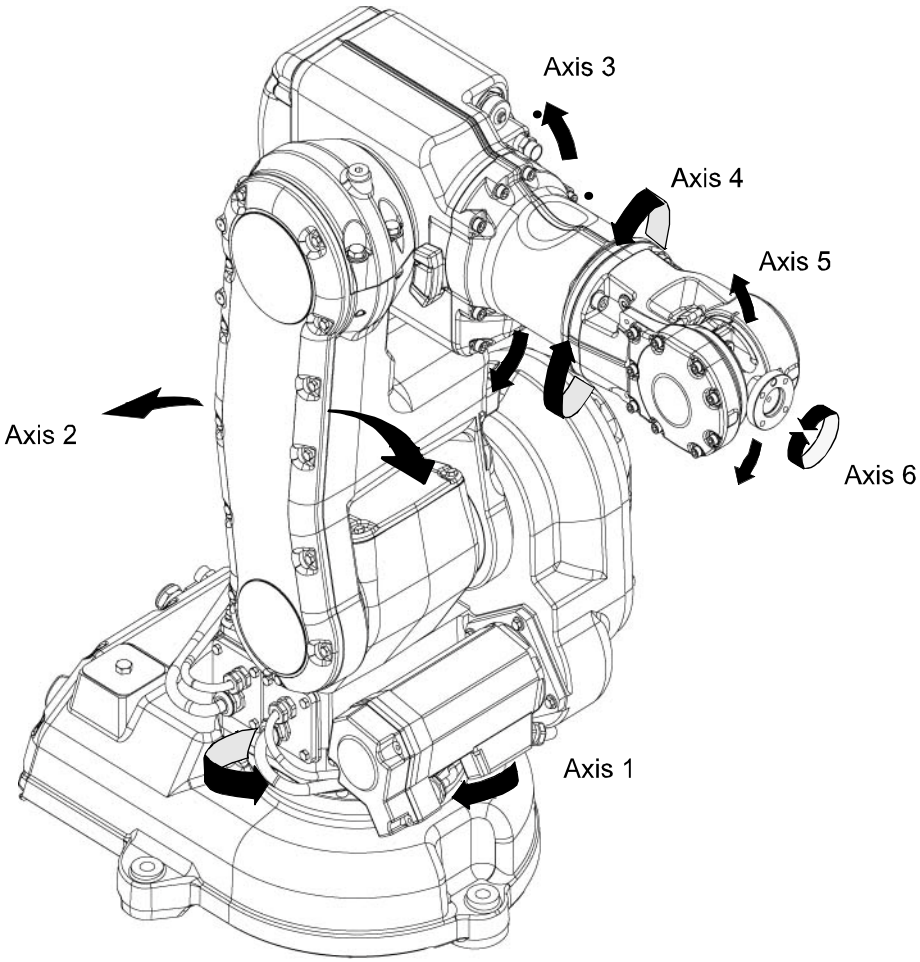


Figure 1 The IRB 140 manipulator has 6 axes.

1.1.2 Different robot versions

General

The IRB 140-6/0.8 is available in a number of different variants. They can all be mounted on floor, inverted or on wall in any angle. The high speed variant, IRB 140T, provides further reduced cycle time:

Environment adaption	Standard performance variants	High speed variants
Standard	IRB 140	IRB 140T
Foundry Plus	IRB 140F	IRB 140TF
Wash	IRB 140CW	IRB 140TCW
Clean room	IRB 140CR	IRB 140TCR

Manipulator Weight

Data	Description
Manipulator	98 kg (excluding the cables to the controller)

Other technical data

Data	Description	Note
Airborne noise level	The sound pressure level outside	< 70 dB (A) Leq (acc. to the working space Machinery directive 89/392 EEC)

Power consumption

Path E-E2-E3-E4 in the ISO Cube, maximum load.

Speed (mm/s)	Power consumption (kW)
Max.	0.44
1000	0.39
500	0.36
100	0.34

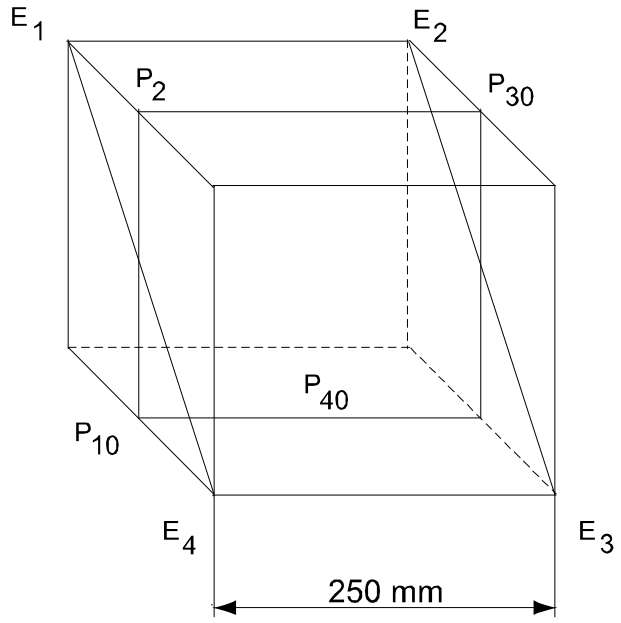


Figure 2 Path E-E2-E3-E4 in the ISO Cube, maximum load.

1.1.2 Different robot versions

Dimensions IRB 140

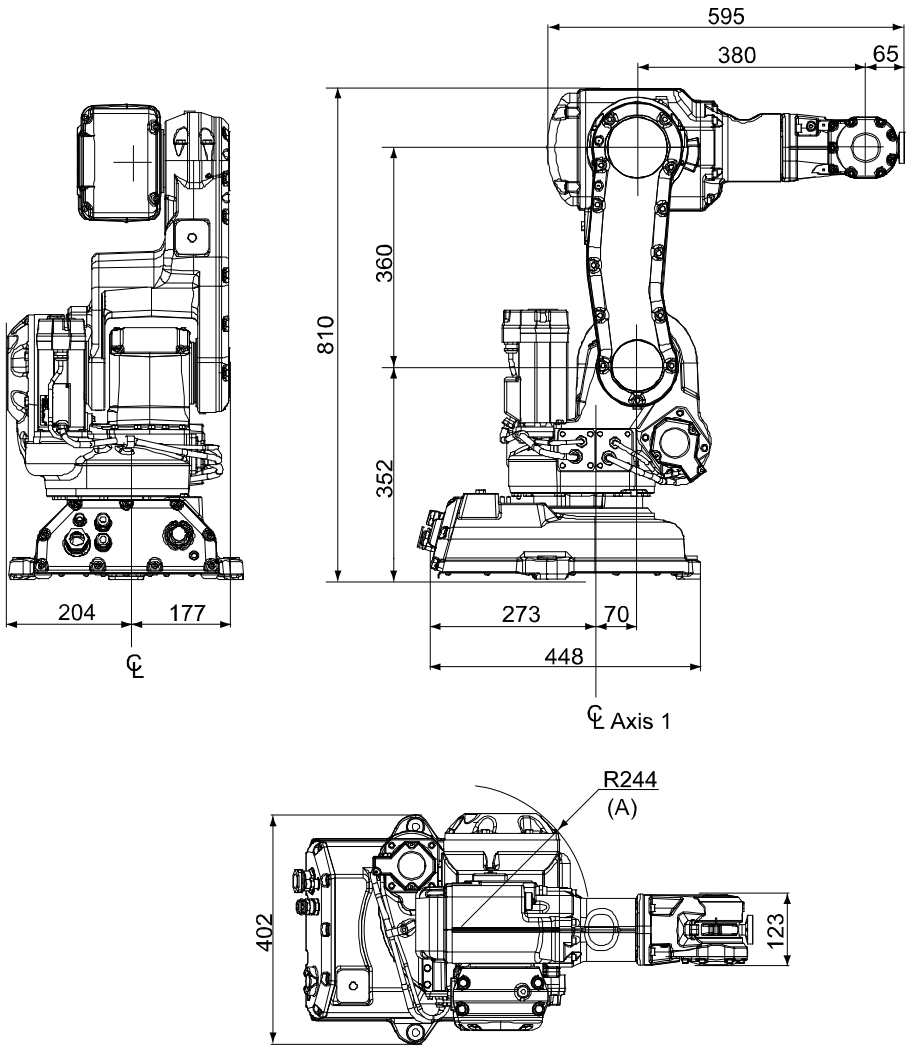


Figure 3 View of the manipulator from the back, side and above (dimensions in mm).

Pos	Description
A	Minimum turning radius

1.2 Safety/Standards

1.2.1 Standards

The robot conforms to the following standards:

Standard	Description
EN ISO 12100-1	Safety of machinery, terminology
EN ISO 12100-2	Safety of machinery, technical specifications
EN 954-1	Safety of machinery, safety related parts of control systems
EN 60204	Electrical equipment of industrial machines
EN ISO 60204-1:2005	Safety of machinery - Electrical equipment of machines
EN ISO 10218-1:2006[a]	Robots for industrial environments - Safety requirements
EN 61000-6-4 (option)	EMC, Generic emission
EN 61000-6-2	EMC, Generic immunity

a. There is a deviation from paragraph 6.2 in that only worst case stop distances and stop times are documented.

Standard	Description
IEC 60529	Degrees of protection provided by enclosures

Standard	Description
ISO 9787	Manipulating industrial robots, coordinate systems and motions
ISO 9409-1	Manipulating industrial robots, mechanical interface

Standard	Description
ANSI/RIA R15.06/1999 (option)	Safety Requirements for Industrial Robots and Robot Systems
ANSI/UL 1740-1998 (option)	Safety Standard for Robots and Robotic Equipment
CAN/CSA Z 434-03 (option)	Industrial Robots and Robot Systems - General Safety Requirements
ISO 14644-1 and ISO 1644-8	Clean room classification

The robot complies fully with the health and safety standards specified in the EEC's Machinery Directives.

Safety function	Description
The Service Information System (SIS)	The service information system gathers information about the robot's usage and determines how hard the robot is used. The usage is characterized by the speed, the rotation angles and the load of every axis. With this data collection, the service interval of every individual robot of this generation can be predicted, optimized and service activities planned ahead. The collection data is available via the FlexPendant or the network link to the robot. The Process Robot Generation is designed with absolute safety in mind. It is dedicated to actively or passively avoid collisions and offers the highest level of safety to the operators and the machines as well as the surrounding and attached equipment. These features are presented in the active and passive safety system. The time the robot is in operation (brakes released) is indicated on the FlexPendant. Data can also be monitored over network, using for example WebWare.

The Active Safety System	Description
General	The active safety system includes those software features that maintain the accuracy of the robot's path and those that actively avoid collisions which can occur if the robot leaves the programmed path accidentally or if an obstacle is put into the robot's path.
The Active Brake System (ABS)	All robots are delivered with an active brake system that supports the robots to maintain the programmed path in General Stop (GS), Auto Stop (AS) and Superior Stop (SS). The ABS is active during all stop modes, braking the robot to a stop with the power of the servo drive system along the programmed path. After a specific time the mechanical brakes are activated ensuring a safe stop. The stopping process is in accordance with a class 1 stop. The maximum applicable torque on the most loaded axis determines the stopping distance. In case of a failure of the drive system or a power interruption, a class 0 stop turns out. Emergency Stop (ES) is a class 0 stop. All stops (GS, AS, SS and ES) are reconfigurable. While programming the robot in manual mode, the enabling device has a class 0 stop.

The Active Safety System	Description
The Self Tuning Performance (STP)	The Process Robot Generation is designed to run at different load configurations, many of which occur within the same program and cycle. The robot's installed electrical power can thus be exploited to lift heavy loads, create a high axis force or accelerate quickly without changing the configuration of the robot. Consequently the robot can run in a "power mode" or a "speed mode" which can be measured in the respective cycle time of one and the same program but with different tool loads. This feature is based on QuickMove™. The respective change in cycle time can be measured by running the robot in NoMotionExecution with different loads or with simulation tools like RobotStudio.
The Electronically Stabilised Path (ESP)	The load and inertia of the tool have a significant effect on the path performance of a robot. The Process Robot Generation is equipped with a system to electronically stabilize the robot's path in order to achieve the best path performance. This has an influence while accelerating and braking and consequently stabilizes the path during all motion operations with a compromise of the best cycle time. This feature is secured through TrueMove™.
Over-speed protection	The speed of the robot is monitored by two independent computers.
Restricting the working space	The movement of each axis can be restricted using software limits.
Collision detection (option)	In case of an unexpected mechanical disturbance, such as a collision, electrode sticking, etc., the robot will detect the collision, stop on the path and slightly back off from its stop position, releasing tension in the tool.

The Passive Safety System	Description
General	The Process Robot Generation has a dedicated passive safety system that by hardware construction and dedicated solutions is designed to avoid collisions with surrounding equipment. It integrates the robot system into the surrounding equipment safely.
Compact robot arm design	The shape of the lower and upper arm system is compact, avoiding interference into the working envelope of the robot. The lower arm is shaped inward, giving more space under the upper arm to re-orientate large parts and leaving more working space while reaching over equipment in front of the robot. The rear side of the upper arm is compact, with no components projecting over the edge of the robot base even when the robot is moved into the home position.
Electronic Position Switches (EPS) on up to 7 axes (option)	EPS offers axes position status signals, fulfilling applicable regulations for personnel safety. Five outputs can each be configured to reflect the position of a single axis or a combination of axes. For each output, the range for each included axis can be set arbitrarily.

1.2.1 Standards

The Internal Safety Concept	Description
General	The internal safety concept of the Process Robot Generation is based on a two-channel circuit that is monitored continuously. If any component fails, the electrical power supplied to the motors shuts off and the brakes engage.
Safety category 3	Malfunction of a single component, such as a sticking relay, will be detected at the next MOTOR OFF/MOTOR ON operation. MOTOR ON is then prevented and the faulty section is indicated. This complies with category 3 of EN 954-1, Safety of machinery - safety related parts of control Systems - Part 1.
Selecting the operating mode	The robot can be operated either manually or automatically. In manual mode, the robot can only be operated via the FlexPendant, that is not by any external equipment.
Reduced speed	In manual mode, the speed is limited to a maximum of 250 mm/s (600 inch/min.). The speed limitation applies not only to the TCP (Tool Center Point), but to all parts of the robot. It is also possible to monitor the speed of equipment mounted on the robot.
Three position enabling device	The enabling device on the FlexPendant must be used to move the robot when in manual mode. The enabling device consists of a switch with three positions, meaning that all robot movements stop when either the enabling device is pushed fully in, or when it is released completely. This makes the robot safer to operate.
Safe manual movement	The robot is moved using a joystick instead of the operator having to look at the FlexPendant to find the right key.
Emergency stop	There is one emergency stop push button on the controller and another on the FlexPendant. Additional emergency stop buttons can be connected to the robot's safety chain circuit.
Safeguarded space stop	The robot has a number of electrical inputs which can be used to connect external safety equipment, such as safety gates and light curtains. This allows the robot's safety functions to be activated both by peripheral equipment and by the robot itself.
Delayed safeguarded space stop	A delayed stop gives a smooth stop. The robot stops the same way as at a normal program stop with no deviation from the programmed path. After approx. 1 second the power supplied to the motors is shut off.
Hold-to-run control	"Hold-to-run" means that you must depress the start button in order to move the robot. When the button is released the robot will stop. The hold-to-run function makes program testing safer.
Fire safety	Both the manipulator and control system comply with UL's (Underwriters Laboratories Inc.) tough requirements for fire safety.
Safety lamp (option)	As an option, the robot can be equipped with a safety lamp mounted on the manipulator. This is activated when the motors are in the MOTORS ON state.

1.3 Installation

1.3.1 Introduction

General

IRB 140 is available in four different environmental adapted variants, one for normal industrial environment, one for foundry, one for other harsh environments, and one for clean room environments. An end effector, weighing a maximum of 6 kg, including payload, can be mounted on the robot's mounting flange (axis 6). Other equipment, weighing a maximum of 1.5 kg, can be mounted on the upper arm.

For more information about mounting of extra equipment, see Figure 8 .

1.3.2 Operating requirements

Robot version/ Protection standard	IEC60529
All variants, manipulator	IP67

Steam washable

Foundry Plus and Wash version

Clean room standards

Clean room manipulator ISO 14644-1 class 6.

Explosive environments

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

Ambient temperature

Description	Standard/Option	Temperature
Manipulator during operation	Standard	+ 5°C (41°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)

Relative humidity

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

Mounting the manipulator

Maximum load in relation to the base coordinate system. See Figure 5:

	Data	Endurance load in operation	Max. load at emergency stop
Force xy	floor suspended wall	± 1020 N ± 1020 N ± 1750 N	± 2000 N ± 2000 N ± 2800 N
Force z	floor suspended wall	-1000 ± 620 N +1000 ± 620 N ± 850 N	-1000 ± 1250 N +1000 ± 1250 N ± 1600 N
Torque Mxy	Floor, suspended	± 700 Nm	± 1500 Nm
Torque Mz	Floor, suspended	± 250 Nm	± 470 Nm
Torque Mxy	Wall mounted	± 1020 Nm	± 1710 Nm
Torque Mz	Wall mounted	± 250 Nm	± 485 Nm

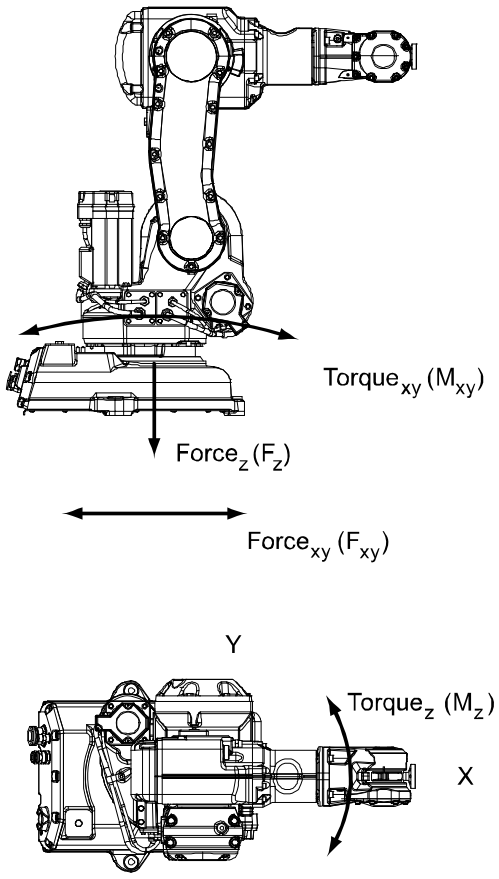


Figure 4 Directions of forces.

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}).

Illustration

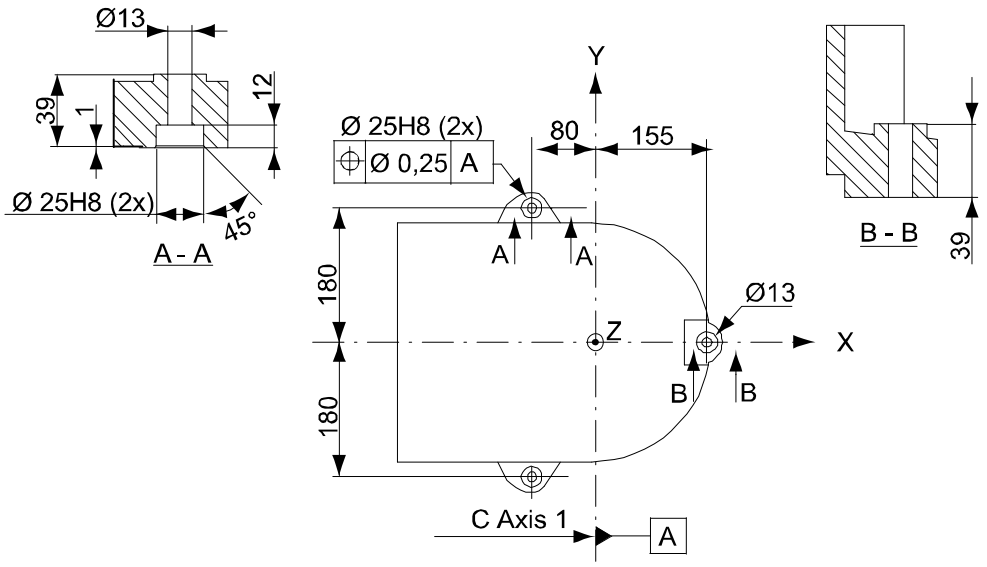


Figure 5 Hole configuration (dimensions in mm).

1.4 Load diagram

1.4.1 Introduction

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 outside load diagram is used the following parts can be damaged due to overload:

- motors
- gearboxes
- mechanical structure

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.

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

General

The load diagram includes a nominal pay load inertia, J_0 of 0.012 kgm^2. At different moment of inertia the load diagram will be changed.

Control of load case by “RobotLoad”

For an easy check of a specific load case, use the calculation program ABB RobotLoad. Please contact your local ABB organization.

1.4.2 Diagrams

The robot is optimized for the rated load according to the load diagram and rated moment of inertia. These have been used in the performance tests. The maximum allowed load and moment of inertia are received from the formulas in the table below Figure 6.

IRB 140-6/0.8

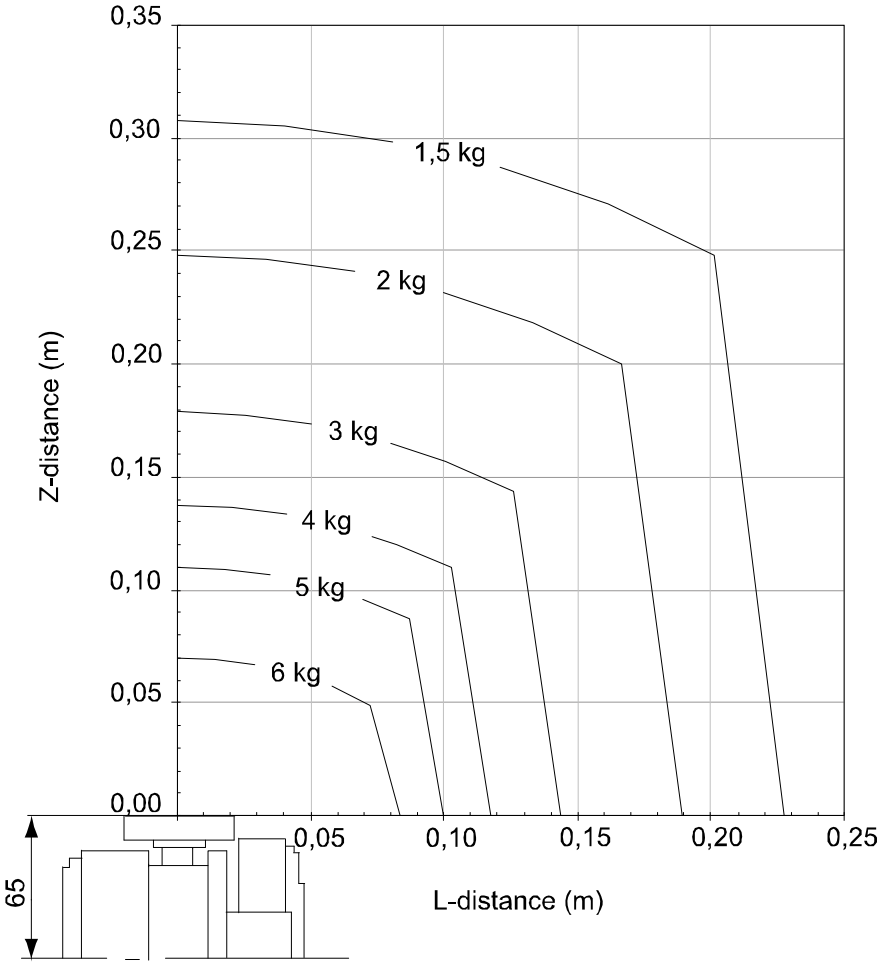


Figure 6 Rated weight for tool mounted on the mounting flange at different positions (center of gravity).

	Description
Z	See the above diagram and the coordinate system in the Product specification - IRC5 with FlexPendant
L	Distance in X-Y plane from Z-axis to the center of gravity
J_0	Rated own moment of inertia on the total handle weight = 0.012 kgm^2

1.4.3 Maximum load and moment of inertia for full and limited axis 5 (center line down) movement

General

Total load given as: Mass in kg, center of gravity (Z and L) in m and moment of inertia (J_{ox}, J_{oy}, J_{ox}) in kgm^2. L= $\sqrt{}$(X2 + Y2), see Figure 7.

Full movement of Axis 5 (±115º)

Axis	Robot Type	Max. value
5	IRB 140(T)-6/0.8	J_5 = Mass x $((Z + 0.065)^2 + L^2)$ + max (J_{ox}, J_{oy}) ≤ 0.42 kgm^2
6	IRB 140(T)-6/0.8	J_6= Mass x L^2 + J_{0Z} ≤ 0.30 kgm^2

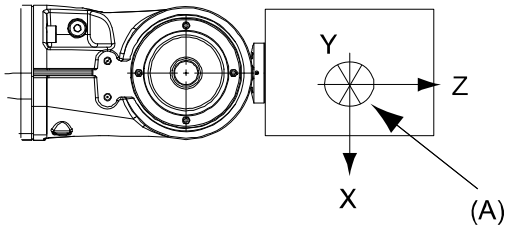


Figure 7 Own moment of inertia.

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.

Wrist torque

The table below shows the maximum permissible torque due to payload.

Note! The values are for reference only, and should not be used for calculating permitted load offset (position of center of gravity) within the load diagram, since those also are limited by main axes torques as well as dynamic loads. Also arm loads will influence the permitted load diagram. For finding the absolute limits of the load diagram, please use the ABB RobotLoad. Please contact your local ABB organization.

Robot type	Max wrist torque axis 4 and 5	Max wrist torque axis 6	Max torque valid at load
IRB 140(T)-6/0.8	8.58 Nm	4.91 Nm	5 kg

1.5 Mounting of equipment

General

Extra loads can be mounted on to the wrist and on to the upper arm housing. Definitions of load areas and permitted load are shown in Figure 8. The center of gravity of the extra load shall be within the marked load areas. The robot is supplied with holes for mounting of extra equipment.

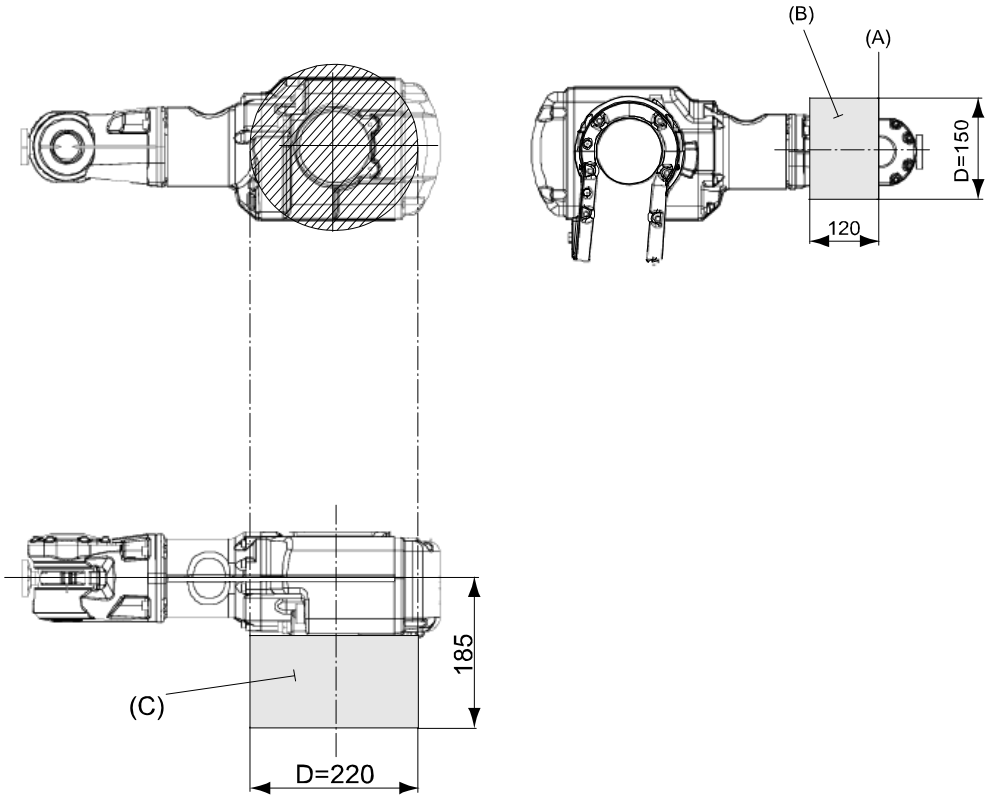
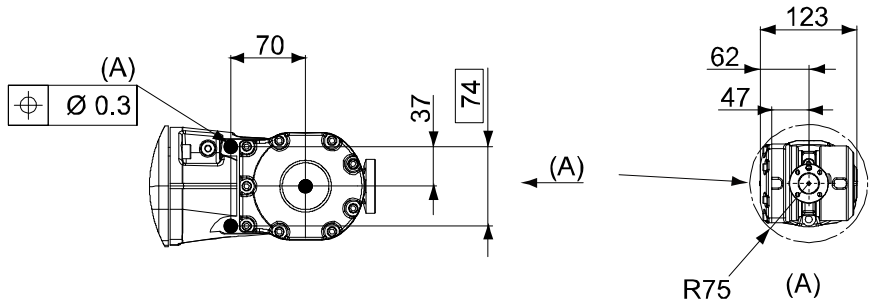


Figure 8 The shaded area indicates the permitted position of the center of gravity for any extra equipment mounted (dimensions in mm).

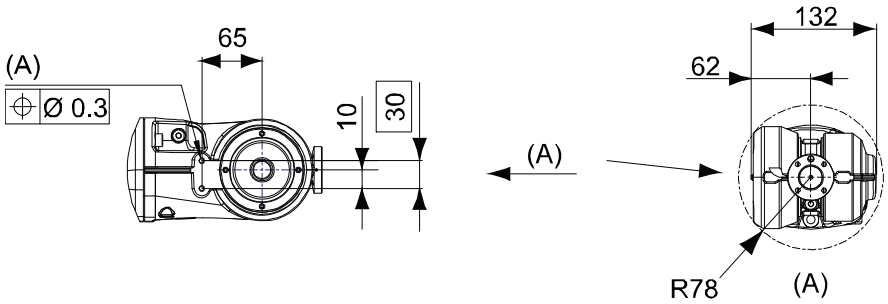
Pos	Description
A	Center line of Axis 5
B	Maximum 0.5 kg when 1.0 kg on to the upper arm house 0 kg when 1.5 kg on to the upper arm house
C	Maximum 1 kg when 0.5 kg on to the wrist 1.5 kg when 0 kg on to the wrist

1.5.1 Holes for mounting of extra equipment

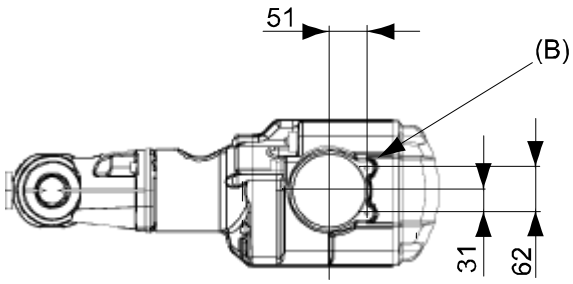
Wrist design IRB 140 M2004



Wrist design IRB 140 M2004, Type C



Upper arm housing



Pos	Description
A	Design until September 2006: 2x M5 depth 7.5, Mounting holes for equipment. Design after September 2006, Type C: 2x M6 depth 10, Mounting holes for equipment.
B	2x M5 depth 7.5, Mounting holes for equipment.

Robot tool flange

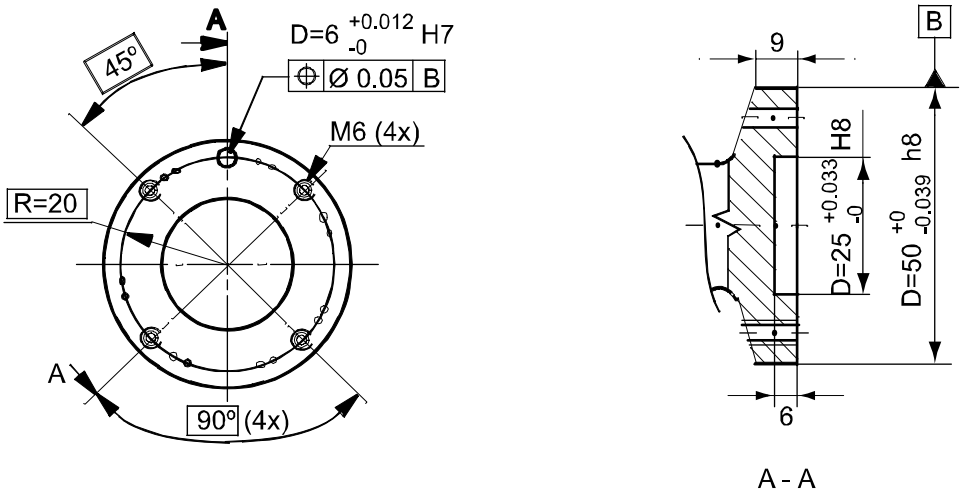


Figure 9 The mechanical interface, mounting flange (dimensions in mm).

1.6 Calibration and references

1.6.1 Fine calibration

General

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

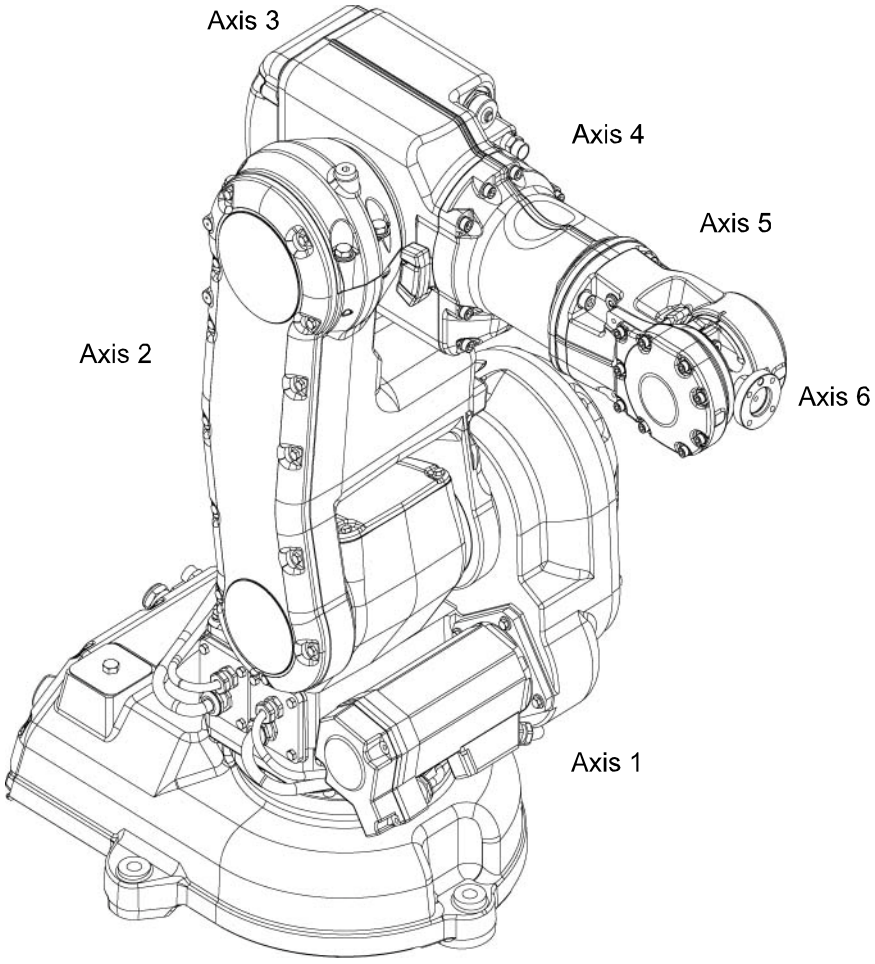


Figure 10 All axes in zero position.

Calibration

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

1.6.2 Absolute Accuracy calibration

General

Requires RobotWare option Absolute Accuracy, please see Product specification - Controller software IRC5 for more details.

The calibration concept

Absolute Accuracy (AbsAcc) is a calibration concept, which ensures a TCP absolute accuracy of better than ± 1 mm in the entire working range.

Absolute accuracy compensates for:

- Mechanical tolerances in the robot structure
- Deflection due to load

Absolute accuracy calibration is focusing on positioning accuracy in the cartesian coordinate system for the robot. It also includes load compensation for deflection caused by the tool and equipment. Tool data from robot program is used for this purpose. The positioning will be within specified performance regardless of load.

Calibration data

The user is supplied with robot calibration data (compensation parameters saved on the manipulator SMB) and a certificate that shows the performance (Birth certificate). The difference between an ideal robot and a real robot without AbsAcc can typically be 8 mm, resulting from mechanical tolerances and deflection in the robot structure.

If there is a difference, at first start-up, between calibration data in controller and the robot SMB, correct by copying data from SMB to controller.

Absolute Accuracy option

Absolute Accuracy option is integrated in the controller algorithms for compensation of this difference and does not need external equipment or calculation.

Absolute Accuracy is a RobotWare option and includes an individual calibration of the robot (mechanical arm).

Absolute Accuracy is a TCP calibration in order to Reach (m) a good positioning in the Cartesian coordinate system.

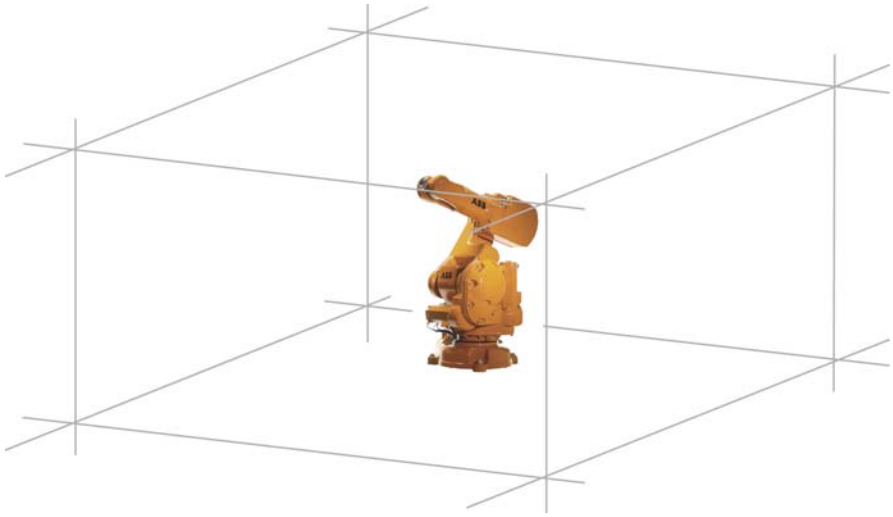


Figure 11 The Cartesian coordinate system.

Production data

Typical production data regarding calibration are:

Robot	Positioning accuracy (mm)		
	Average	Max	% Within 1 mm
IRB 140(T)-6/0.8	0,35	0,75	100

1.7 Maintenance and Troubleshooting

1.7.1 Introduction

General

The robot requires only a minimum of 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 all gear boxes.
- The cabling is routed for longevity, and in the unlikely event of a failure, its modular design makes it easy to change.
- It has a program memory “battery low” alarm.

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.

1.8 Robot Motion

1.8.1 Introduction

Type of motion	Range of movement
Axis 1: Rotation motion	+ 180° to - 180°
Axis 2: Arm motion	+ 110° to - 90°
Axis 3: Arm motion	+ 50° to - 230°
Axis 4: Wrist motion	+ 200° to - 200° Default + 165 revolutions to - 165 revolutions Max.[a]
Axis 5: Bend motion	+ 115° to - 115°
Axis 6: Turn motion	+ 400° to - 400° Default + 163 revolutions to -163 revolutions Max.[a]

a. The default working range for axis 4 and 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).

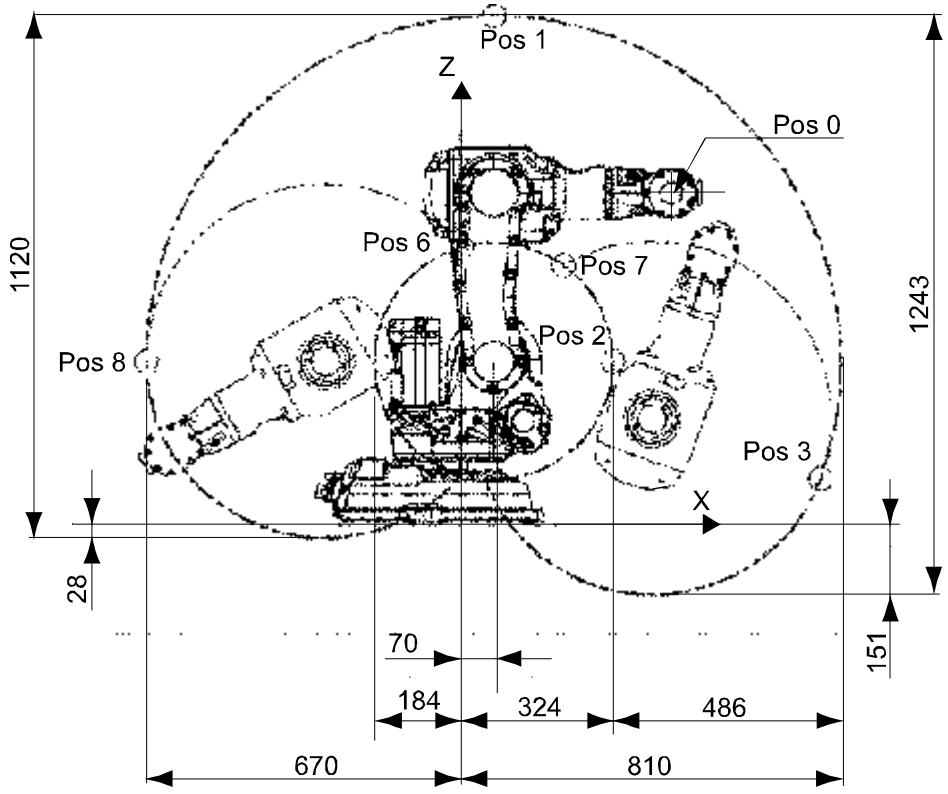


Figure 12 The extreme positions of the robot arm.

Positions at wrist center (mm) and Angle (degrees) for IRB 140:

Position No. (see Figure 12)	Position (mm) X	Position (mm) Z	Angle (degrees) Axis 2	Angle (degrees) Axis 3
0	450	712	0	0
1	70	1092	0	-90
2	314	421	0	+50
3	765	99	110	-90
6	1	596	-90	+50
7	218	558	110	-230
8	-670	352	-90	-90

1.8.2 Performance according to ISO 9283

General

At rated load and 1.6 m/s velocity on the inclined ISO test plane with all six robot axes in motion.

The figures for AP, RP, AT and RT are mesured according to Figure 13.

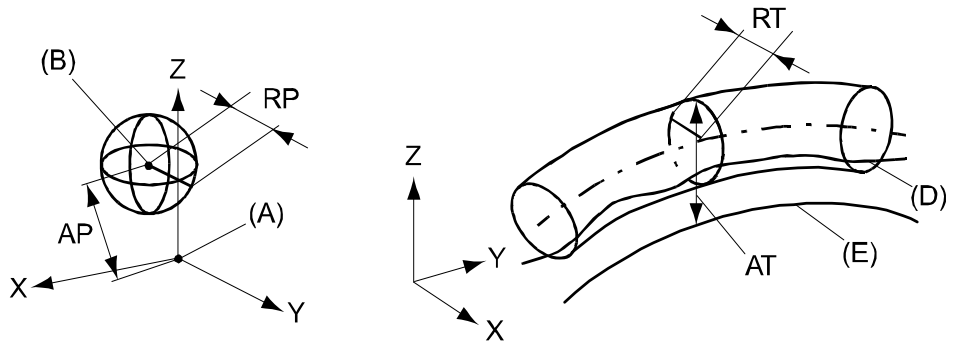


Figure 13 Explanation of ISO values.

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
RP	Tolerance of posiotion B at repeated positioning	RT	Tolerance of the path at repeated program execution

Description	Values
IRB	**140-6/0.8 and 140T-6/0.8**
Pose repeatability, RP (mm)	0.03
Pose accuracy, AP[a] (mm)	0.02
Linear path repeatability, RT (mm)	0.08
Linear path accuracy, AT (mm)	0.67
Pose stabilization time, Pst (s) within 0.2 mm of the position	0.08

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.

Typical values for conveyor tracking

All values measured with PickMaster and IRC5.

Constant conveyor speed (mm/s)	Repeatability (mm)
100	0.4
300	0.7

Start/stop conveyor (mm/s)	Repeatability (mm)
300 (start/stop in 0.5 sec.)	0.7

1.8.3 Velocity

Axis No.	IRB 140-6/0.8	IRB 140T-6/0.8
1	200°/s	250°/s
2	200°/s	250°/s
3	260°/s	260°/s
4	360°/s	360°/s
5	360°/s	360°/s
6	450°/s	450°/s

Supervision is required to prevent overheating in applications with intensive and frequent movements.

Resolution

Approx. 0.01° on each axis.

1.8.4 Stopping distance/time

Stopping distance/time for emergency stop (category 0), program stop (category 1) and at mains power supply failure at max speed, max streched out and max load, categories according to EN 60204-1. All results are from tests on one moving axis.

Robot Type		Category 0		Category 1		Main power failure	
	Axis	A	B	A	B	A	B
IRB 140-6/0.8	1	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	2	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	3	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Robot Type		Category 0		Category 1		Main power failure	
	Axis	A	B	A	B	A	B
IRB 140T-6/0.8	1	23.6	0.17	49.2	0.34	38.7	0.25
	2	22.7	0.19	64.5	0.36	37.8	0.25
	3	18.1	0.13	43.8	0.29	33.8	0.19

	Description
A	Distance in degrees
B	Stop time (s)

1.8.5 Signals

Signal connections on robot arm

To connect extra equipment on the manipulator, there are cables integrated into the manipulator’s cabling from the controller to the upper arm housing.

In the controller, the signals are connected to 12-pole terminals, Phoenix MSTB 2.5/12-ST-5.08, and on the upper arm housing to FCI UT07 14 12SH44N.

Hose for compressed air is also integrated into the manipulator. There is an inlet (R 1 / 4”) at the base and an outlet (R1/4”) on the upper arm housing.

Description	Number	Values
Signals	12	49 V, 500 mA
Air	1	Max. 8 bar, inner hose diameter 6.5 mm

1.8.5 Signals

2 Specification of Variants and Options

2.1 Introduction

2.1.1 General

The different variants and options for the IRB 140 are described below.

The same numbers are used here as in the Specification form.

For controller options, see Product specification - Controller IRC5 with FlexPendant, and for software options, see Product specification - RobotWare Options.

2.1.2 Manipulator

Variants

Option	Variant	Robots
435-87	Standard performance variants	IRB 140-6/0.8 IRB 140F-6/0.8 IRB 140CW-6/0.8 IRB 140CR-6/0.8
435-87	High speed variants	IRB 140T-6/0.8 IRB 140TF-6/0.8 RB 140TCW-6/0.8 IRB 140TCR-6/0.8

Manipulator color

Option	Description
209-1	The robot is painted in color ABB Orange.
209-2	The robot is painted in white color.
209-4--192	The manipulator is painted with the chosen RAL-color

Protection

Option	Description
287-4	Standard
287-3	Foundry Plus The Foundry Plus option is designed for harsh environments where the robot is exposed to sprays of coolants, lubricants and metal spits that are typical for die casting applications or other similar applications. The Foundry Plus robot is painted with two-component epoxy on top of a special primer for excellent corrosion protection. To further improve the corrosion protection additional rust preventive are applied to exposed areas, e.g. has the tool flange a special preventive coating. The entire robot is IP67 compliant according to IEC 60529 - from base to wrist, which means that the electrical compartments are virtually sealed against liquid and solid contaminants. Among other things all sensitive parts are highly protected. Foundry Plus features: • Improved sealing to prevent damp from penetrating into cavities • Additional protection of cabling and electronics • Special covers protecting cavities • Special connectors The Foundry Plus robot can be cleaned with adequate washing equipment.
287-1	Clean room Please see Chapter Clean room robots on page 8. The robot is labeled with “Clean Room”. The robot has special paint quality and is always in white color
287-5	Wash Robot with the same protection as in option 287-3.

Connector kit

Option	Description
431-1	Detached connectors, suitable to the connectors on the upper arm. The kit consists of connectors, pins and sockets.

Safety lamp

Option	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.

Warranty

Option	Type	Description
438-1	Standard Warranty	Standard warranty is 18 months (1 1/2 years)
438-2	Standard + 12 months	18 + 12 months (2 1/2 years)
438-4	Standard + 18 months	18 + 18 months (3 years)
438-5	Standard + 24 months	18 + 24 months (3 1/2 years)
438-6	Standard + 6 months	18 + 6 months (2 years)
438-8	Stock Warranty	Maximum 6 months postponed warranty starting from shipment date ABB Robotics Production unit (PRU) + Option 438-1. Warranty commences automatically after 6 months or from activation date of standard warranty. (See ABB Robotics BA Warranty Rules).

2.1.3 Floor cables

Manipulator cable length

Option	Lengths
210-1	3 m
210-2	7 m
210-3	15 m
210-4	22 m
210-5	30 m

2.1.4 Process

Process module

Option	Type	Description
768-1	Empty cabinet small	See Product specification - Controller IRC5 with FlexPendant, chapter 2.2.1.
768-2	Empty cabinet large	See Product specification - Controller IRC5 with FlexPendant, chapter 2.2.1.
715-1	Installation kit	See Product specification - Controller IRC5 with FlexPendant, chapter 2.2.1.

2.1.5 Documentation

DVD User Documentation

Option	Type	Description
808-1	Documentation on DVD	See Product specification Robot User Documentation

2.1.5 Documentation

3 Accessories

Basic software and software options for robot and PC

For more information, see Product specification - Controller IRC5 with FlexPendant, and Product specification - RobotWare Options.

Robot Peripherals

- Motor Units

3HAC9041-1, Revision M, en

ABB AB
Robotics Products
S-721 68 VÄSTERÅS
SWEDEN
Telephone: +46 (0) 21 344000
Telefax: +46 (0) 21 132592