ROBOTICS

Product specification

IRB 365

Trace back information:
Workspace 22B version a12
Checked in 2022-06-20
Skribenta version 5.5.019

Product specification

IRB 365 1.5/1100

OmniCore

Document ID: 3HAC079184-001

Revision: A

The information in this manual is subject to change without notice and should not be construed as a commitment by ABB. ABB assumes no responsibility for any errors that may appear in this manual.

Except as may be expressly stated anywhere in this manual, nothing herein shall be construed as any kind of guarantee or warranty by ABB for losses, damage to persons or property, fitness for a specific purpose or the like.

In no event shall ABB be liable for incidental or consequential damages arising from use of this manual and products described herein.

This manual and parts thereof must not be reproduced or copied without ABB's written permission.

Keep for future reference.

Additional copies of this manual may be obtained from ABB.

Original instructions.

Table of contents

This page is intentionally left blank

Overview of this specification

About this product specification

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

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

The specification covers the manipulator using the 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

References

Reference	Document ID
Product manual - OmniCore C30	*3HAC060860-001*
Application manual - Controller software OmniCore	*3HAC066554-001*
Product manual - IRB 365	*3HAC079185-001*
Product specification - OmniCore C line	*3HAC065034-001*

Tip

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

Revisions

Revision	Description
-	First edition.

This page is intentionally left blank

1 Description

1.1 Structure

1.1.1 Introduction to structure

Robot family

IRB 365 FlexPicker™ is specially designed for high speed top loading pick & place processes.

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 C line*.

Safety

The safety standards are valid for the complete robot, manipulator and controller.

Additional functionality

For additional functionality, the robot can be equipped with optional software for application support - communication features - network communication - and advanced functions such as multi-tasking, sensor control, etc. For a complete description on optional software, see *Product specification - OmniCore C line*.

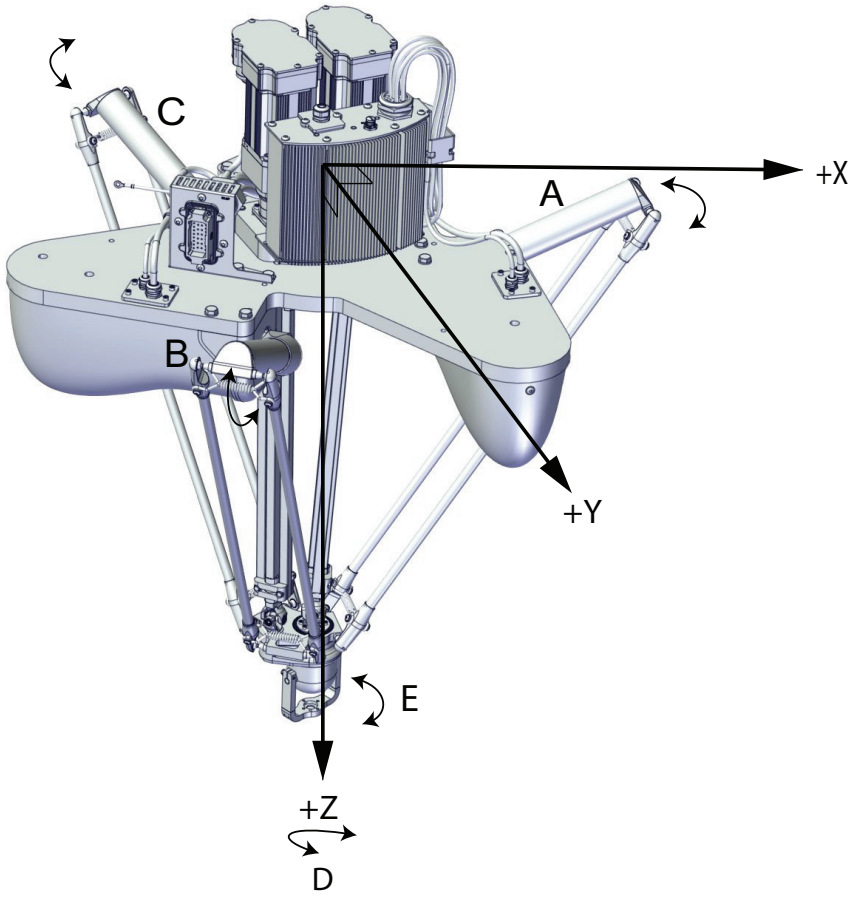
PickMaster® is a specific application software for vision guided picking with high speed conveyors. It provides a task-oriented programming and execution of random flow pick and place operations on the fly, see *Product specification - PickMaster® Twin*.

Continues on next page

1.1.1 Introduction to structure

Continued

Robot axes



xx2200000237

Pos	Description	Pos	Description
A	Axis 1	B	Axis 2
C	Axis 3	D	Axis 4
E	Axis 5		

1.1.2 Different robot variants

Robot variants

The IRB 365 is available in the following variants.:

Robot variant	Handling capacity (kg)
IRB 365 1.5/1100	1.5 kg

1.1.3 Definition of version designation

1.1.3.1 Technical data

Weight, robot

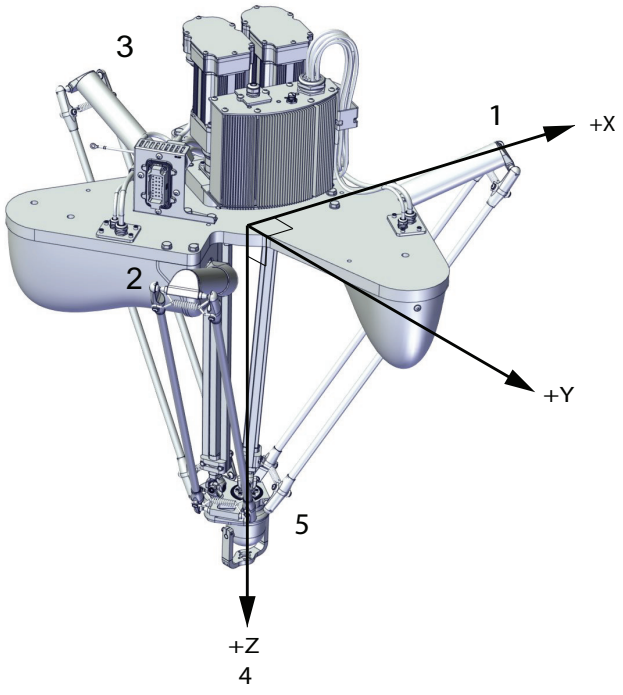
The table shows the weight of the robot.

Robot model	Nominal weight
IRB 365	86 kg

Note

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

Loads on foundation, robot



xx2200000421

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!

Continues on next page

WARNING

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

Suspended in robot frame

Force	Endurance load (in operation)	Maximum load (emergency stop)
Force xy	±0.3 kN	±2.2 kN
Force z	0.97 ± 0.2 kN	1.5 ± 0.77 kN
Torque xy	0.21 kNm	1.55 kNm
Torque z	0.09 kNm	0.5 kNm

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.
Maximum tilt	0°	
Minimum resonance frequency	35 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 *Application manual - Controller software OmniCore*, 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	60°C
Maximum ambient temperature (less than 24 hrs)	90°C

Continues on next page

1.1.3.1 Technical data
Continued

Parameter	Value
Maximum ambient humidity	90% at constant temperature

Operating conditions, robot

The table shows the allowed operating conditions for the robot:

Parameter	Value
Minimum ambient temperature	0°C [i]
Maximum ambient temperature	45°C
Maximum ambient humidity	90% at constant temperature

[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.

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	IP54

[i] According to IEC 60529.

Environmental information

The product complies with IEC 63000. *Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances*.

Other technical data

Data	Description	Note
Airborne noise level	The sound pressure level outside the working space	< 59 dB (A) Leq (acc. to Machinery directive 2006/42/EG)

Representative power consumption at nominal payload

Type of movement	IRB 365 - 1.5/1100
ISO Plane (630 x 630 mm) Average power consumption (kW)	0.35

Robot in calibration position	IRB 365 - 1.5/1100
Brakes engaged (W)	90
Brakes disengaged (W)	170

1.2 Safety standards

1.2.1 Applicable standards

General

The product is compliant with ISO 10218-1:2011, *Robots for industrial environments - Safety requirements - Part 1 Robots*, and applicable parts in the normative references, as referred to from ISO 10218-1:2011. In case of deviation from ISO 10218-1:2011, 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
IEC 60204	Safety of machinery - Electrical equipment of machines - Part 1: General requirements, normative reference from ISO 10218-1
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
ISO 13849-1:2006	Safety of machinery - Safety related parts of control systems - Part 1: General principles for design, normative reference from ISO 10218-1

Region specific standards and regulations

Standard	Description
ANSI/RIA R15.06	Safety requirements for industrial robots and robot systems
ANSI/UL 1740	Safety standard for robots and robotic equipment
CAN/CSA Z 434-03	Industrial robots and robot Systems - General safety requirements
EN ISO 10218-1	Robots and robotic devices — Safety requirements for industrial robots — Part 1: Robots

1.3 Installation

1.3.1 Introduction to installation

General

IRB 365 is adapted for normal industrial environment. Depending on robot version an end effector of max weight 1.5 kg including payload, can be mounted on the robot mounting flange. See *Load diagrams on page 30*.

Extra loads

The upper and lower arms can handle a load up to 350 grams each, see *Extra equipment attached to the manipulator arms on page 23*.

Working range limitation

Working range can only be limited by software, not mechanically. Customer can set cartesian workspace limits if needed.

1.3.2 Operating requirements

Protection standard

Robot variant	Protection standard IEC529
All variants, manipulator	IP54

Explosive environments

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

Working range limitations

EPS will not be selectable. No mechanical limitation.

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	*Product specification - Controller IRC5*
Complete robot during transportation and storage	Standard	-25°C (-13°F) to +60°C(+140°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.

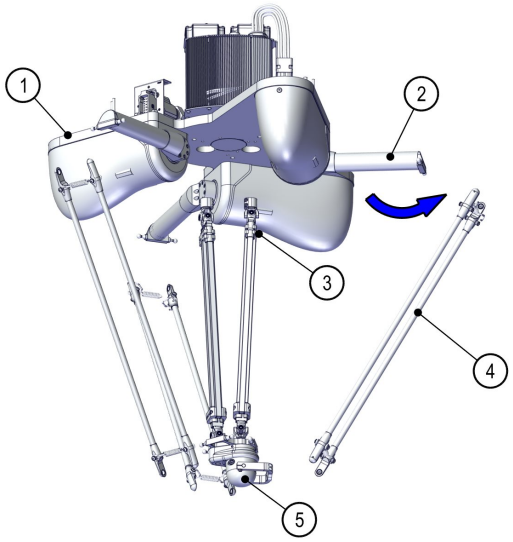
Relative humidity

Description	Relative humidity
Complete robot during transportation and storage	Max. 90% at constant temperature
Complete robot during operation	Max. 90% at constant temperature

1.3.3 Mounting the manipulator

Overview of the assembly order

The IRB 365 is delivered in sub-assemblies which are assembled in the following order:

	Assembly order	Illustration
1	Install the base unit.	 xx2100000836
2	Move the upper arms into calibration position (horizontal).	
3	Attach the upper end of the telescopic shafts to the motor axes (axes 4 and 5).	
4	Attach the lower arms to the upper arms.	
5	Attach the lower arms to the delta unit.	
6	**Note** Make sure not to over extend the length of telescope shafts due to slide bearing damage	

Detailed procedures for each step are given further on in this section.

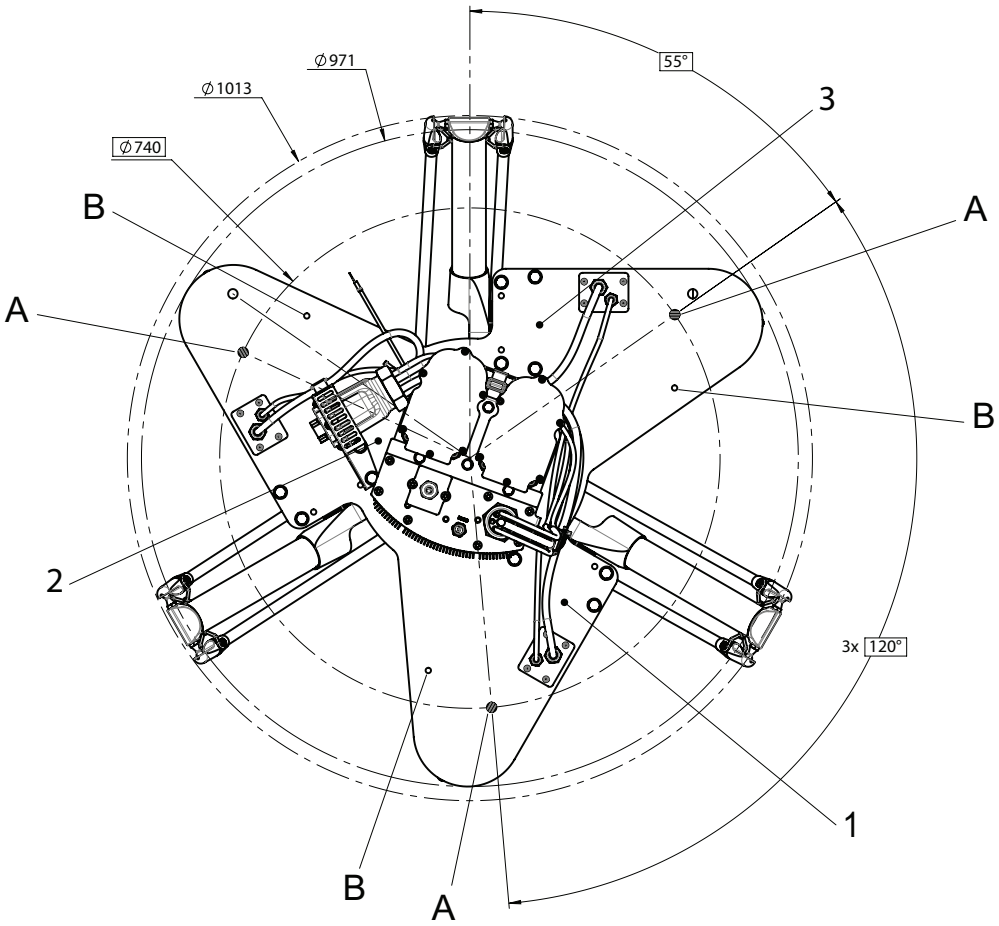
Note regarding M_{xy} and F_{xy}

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}).

Continues on next page

Hole configuration, base

This illustration shows the hole configuration used when securing the robot.



xx2100000837

1	Axis-1 gearbox
2	Axis-2 gearbox
3	Axis-3 gearbox
A	Robot mounting holes
B	Attachment holes M8 for lifting eyes

The three support points of the manipulator base box shall be mounted against three flat surfaces with a flatness within the specification. Use shims if necessary.

See specification in *Requirements, foundation on page 13*.

Attachment screws

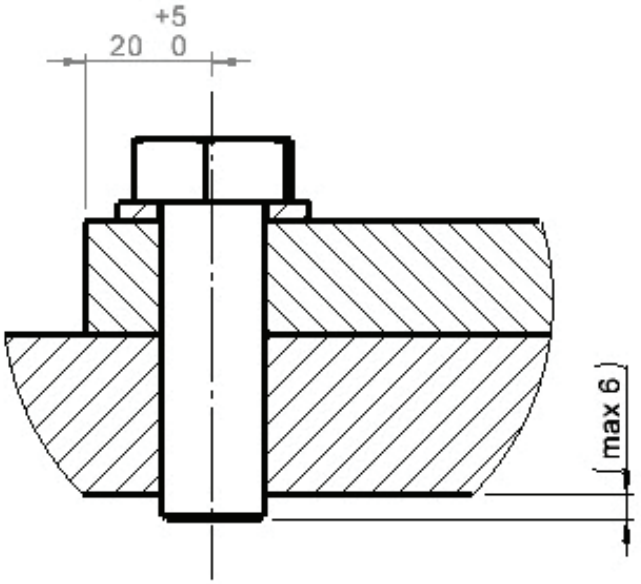
The table below specifies the type of securing screws and washers to be used for securing the robot to the base foundation.

Suitable screws	M16. Minimum length of thread engagement: 25 mm
Quantity	3 pcs

Continues on next page

1.3.3 Mounting the manipulator
Continued

Minimum screw quality	Screw class 8.8 with Yield Strength 640 MPa
Suitable washer	17x25x3 coated stainless steel 3HAC060866-005
Tightening torque	200 Nm
Level surface requirements	0.3 mm



xx2200000282

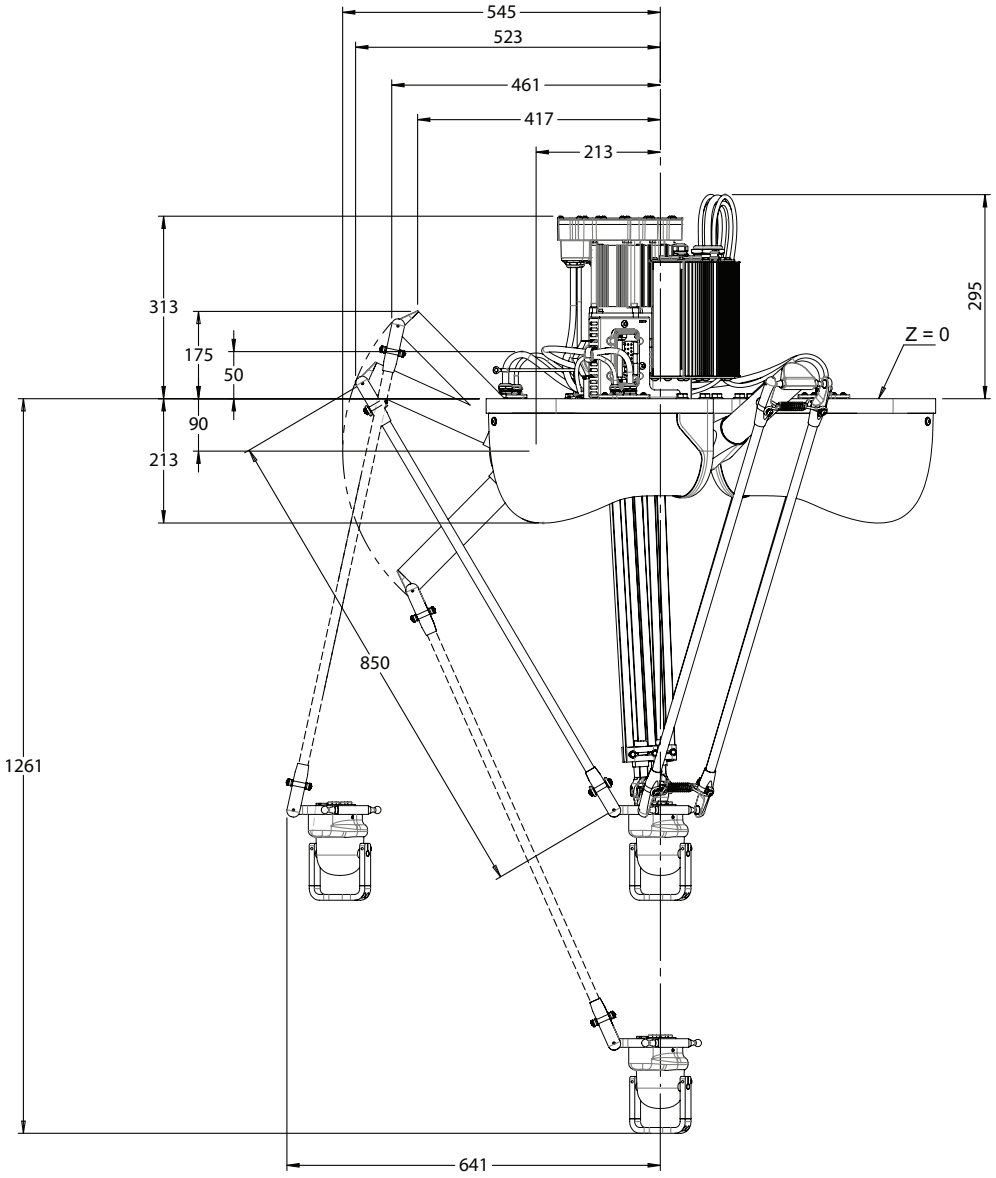
Note

Loctite 5700 is needed on the thread.

1.3.4 Fitting equipment on the robot (robot dimensions)

Robot dimensions

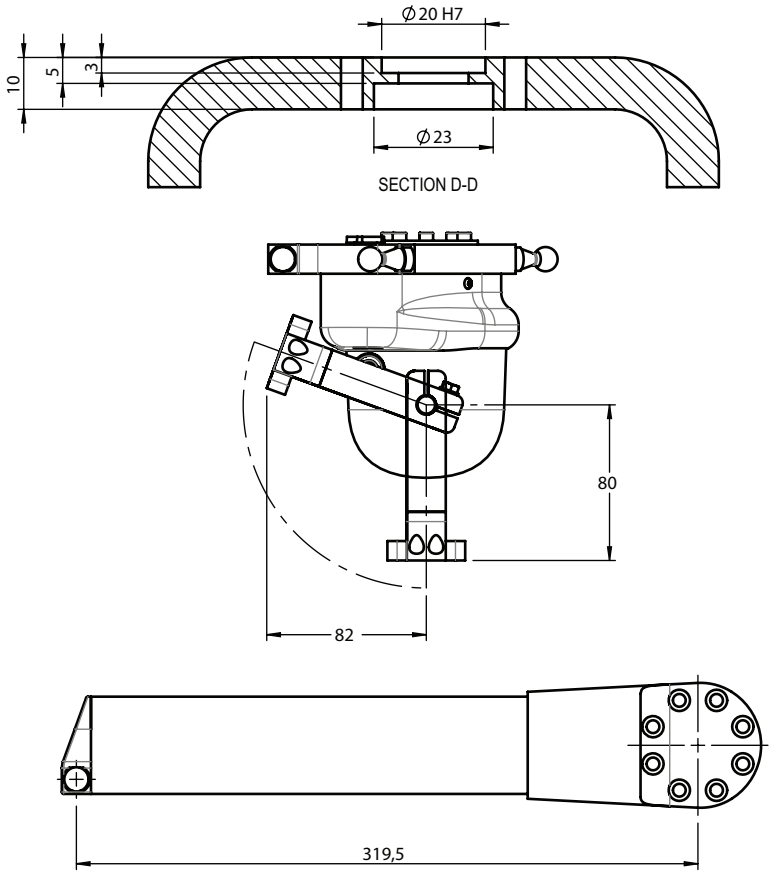
The figure shows the dimension of the robot.



xx2200000423

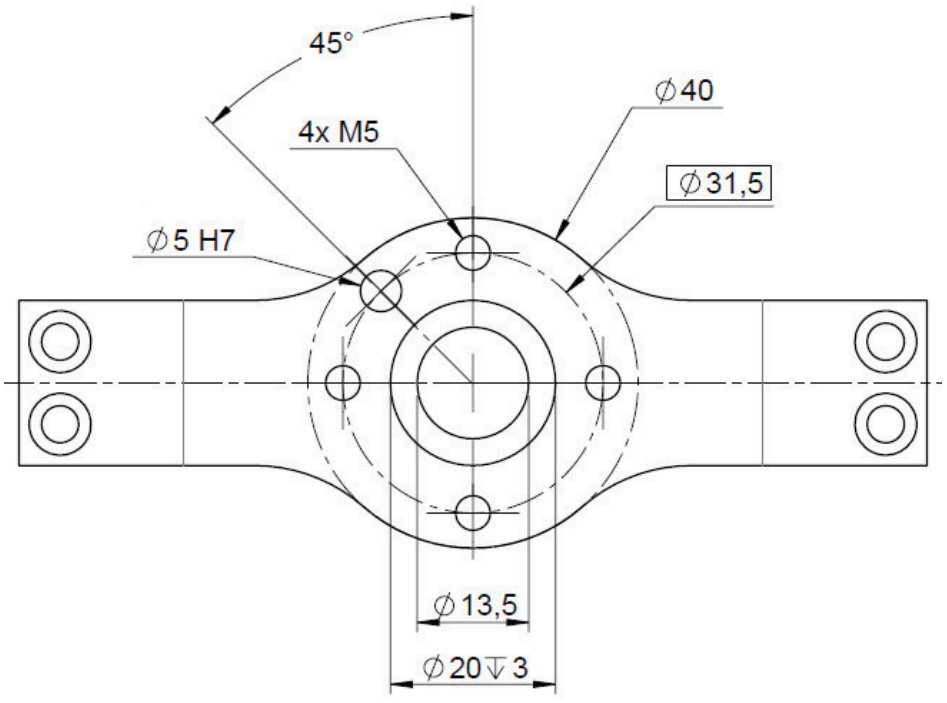
Continues on next page

1.3.4 Fitting equipment on the robot (robot dimensions)
Continued



xx2200000433

Mechanical interface of the tool flange



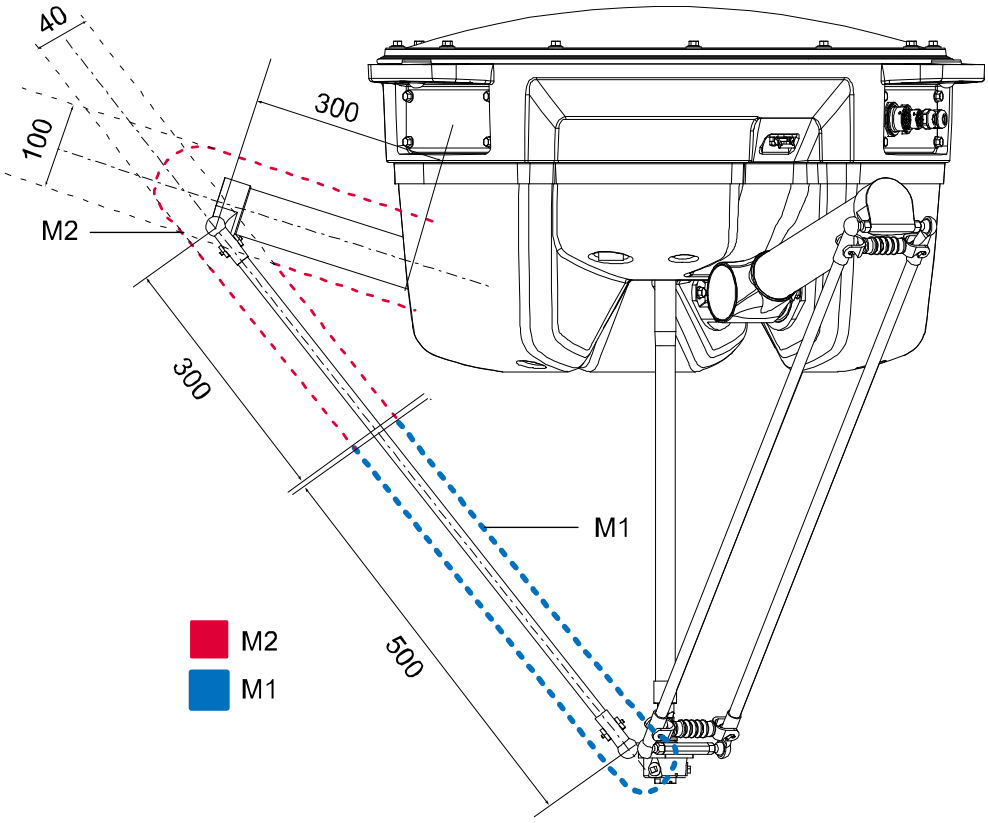
xx2100000962

Continues on next page

Extra equipment attached to the manipulator arms

Extra loads can be mounted on the manipulator. Definitions of dimensions and masses are shown in the following figures. Maximum allowed arm load depends on center of gravity of arm load and robot payload.

Center of gravity for extra loads on upper and lower arms



xx0700000716

M1	Limitation lines for center of gravity for M1
M2	Limitation lines for center of gravity for M2

Attachment of extra loads on the upper and lower arms

No holes for fitting extra equipment are available on the upper and lower arms. If attaching extra equipment to the arms, use shaped clamping blocks. Plastic cable ties can be used but risk of damaging surfaces. Do not use metal directly on the lower arms. Maximum extra load: 0.35 kg to either M1 or M2.

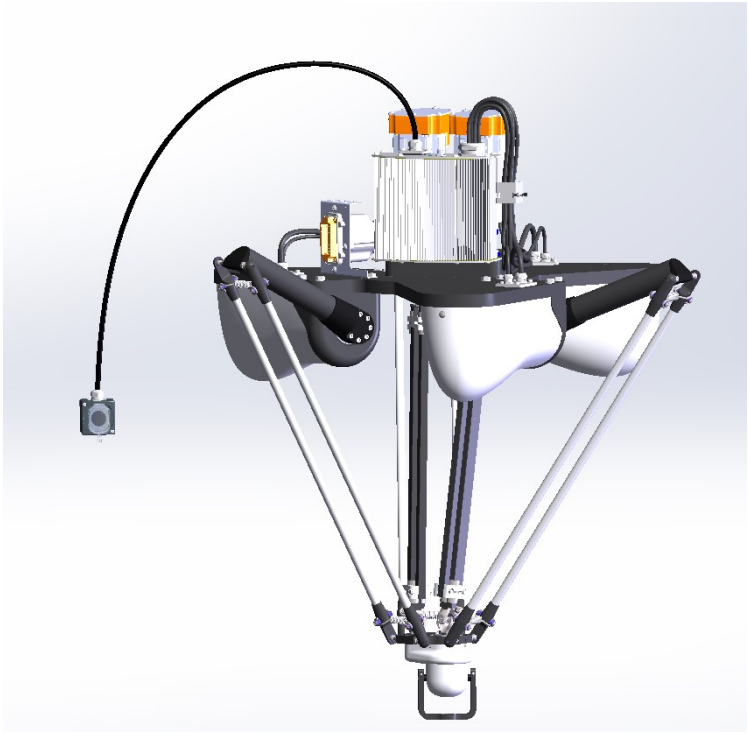
Equipment attached to M1 and/or M2 should be calculated as a point load located in the same position as TCPO. This point load needs to be added to the calculation of the users normal tool load and declared in used tool data.

1.3.5 Installing a brake release unit

Brake release box installation

The figure shows a routed cable from the brake release unit to the SMB battery compartment located on top of the base unit.

The brake release unit is located as shown in the figure.



xx2100002498

CAUTION

Risk of unintended contact with the push button. Place the brake release box in a way that eliminates the risk of unintended contact with the push button.

Technical specification

Function	Data
Signal	24V DC
Current	13A continuously

1.4 Electrical connections

1.4.1 Robot cabling and connection points

Introduction

Connect the robot and controller to each other after securing them to the foundation. The lists below specify which cables to use for each respective application.

DANGER

Turn off the main power before connecting any cables.

CAUTION

Verify that the robot serial number is according to the number(s) in the *Declaration of Incorporation* (DoI).

Main cable categories

The following table specifies cabling categories between the robot and the controller. Some of the cabling belong to optional applications.

Cable category	Description
Robot cables	Handles power supply to and control of the robot's motors as well as feedback from the serial measurement board. Specified in the table *Robot cables on page 25*.
Customer cables	Handles communication with equipment fitted on the robot by the customer, low voltage signals and high voltage power supply + protective ground. The customer cables also handle databus communication. See the product manual for the controller, see document number in *References on page 7*.

Robot cables

These cables are included in the standard delivery. They are completely pre-manufactured and ready to plug in.

Cable sub-category	Description	Connection point, cabinet	Connection point, robot
Robot cables, power	Transfers drive power from the drive units in the control cabinet to the robot motors.	XS1	R1.MP
Robot cable, signals	Transfers resolver data from and power supply to the serial measurement board.	XS2	R1.SMB

Robot cable, power

Power cable length	Article number
Power cable 3 m	3HAC079766-008
Power cable 7 m	3HAC079766-001

Continues on next page

1.4.1 Robot cabling and connection points
Continued

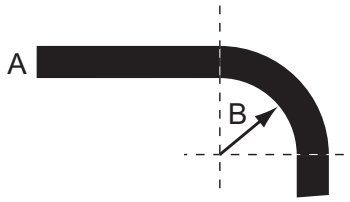
Power cable length	Article number
Power cable 15 m	3HAC079766-004
Power cable 22 m	3HAC079766-005
Power cable 30 m	3HAC079766-006

Robot cable, signals

Signal cable length	Article number
Signal cable, shielded: 3 m	3HAC067446-001
Signal cable, shielded: 7 m	3HAC067446-002
Signal cable, shielded: 15 m	3HAC067446-003
Signal cable, shielded: 22 m	
Signal cable, shielded: 30 m	3HAC067446-004

Bending radius for static floor cables

The minimum bending radius is 10 times the cable diameter for static floor cables.



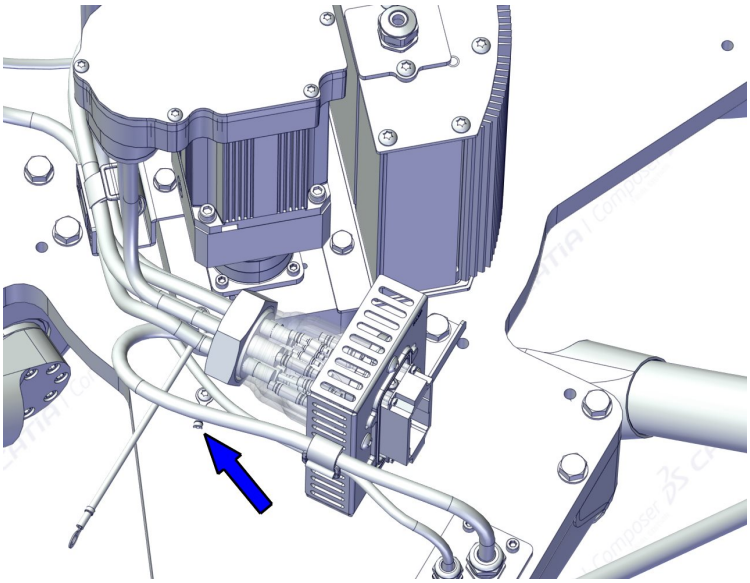
xx1600002016

A	Diameter
B	Diameter x10

Continues on next page

Grounding and bonding point on manipulator

There is a grounding/bonding point on the manipulator base. The grounding/bonding point is used for potential equalizing between control cabinet, manipulator and any peripheral devices.



xx2200000123

1.5 Calibration and references

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.	Manual calibration

Brief description of calibration methods

Manual calibration method

With the manual calibration method, the robot's axes are positioned in specific calibration positions using calibration tools. Under this condition, the position of the axis to be calibrated is pre-determined. The axes must be calibrated one at a time.

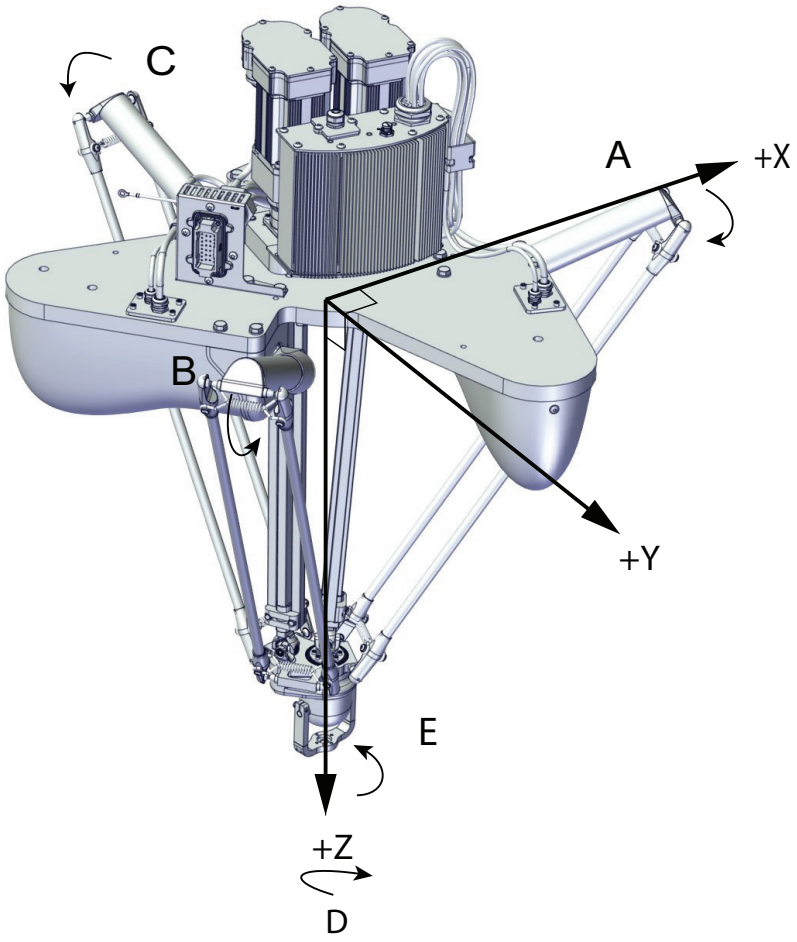
1.5.2 Calibration movement directions for all axes

Overview

When calibrating, the axis must consistently be run towards the calibration position in the same direction in order to avoid position errors caused by backlash in gears and so on. Positive directions are shown in the graphic below.

Calibration service routines will handle the calibration movements automatically and these might be different from the positive directions shown below.

Manual movement directions



xx2200000237

Pos	Description	Pos	Description
A	Axis 1	B	Axis 2
C	Axis 3	D	Axis 4
E	Axis 5		

1.6 Load diagrams

1.6.1 Introduction

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

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

General

The load diagrams include a nominal payload inertia. The J_0 for the IRB 365 1.5/1100 is 0.08 kgm^2. High inertia payloads affect performance.

The IRB 365 can only be used mounted horizontally in a robot frame, other orientations are not allowed.

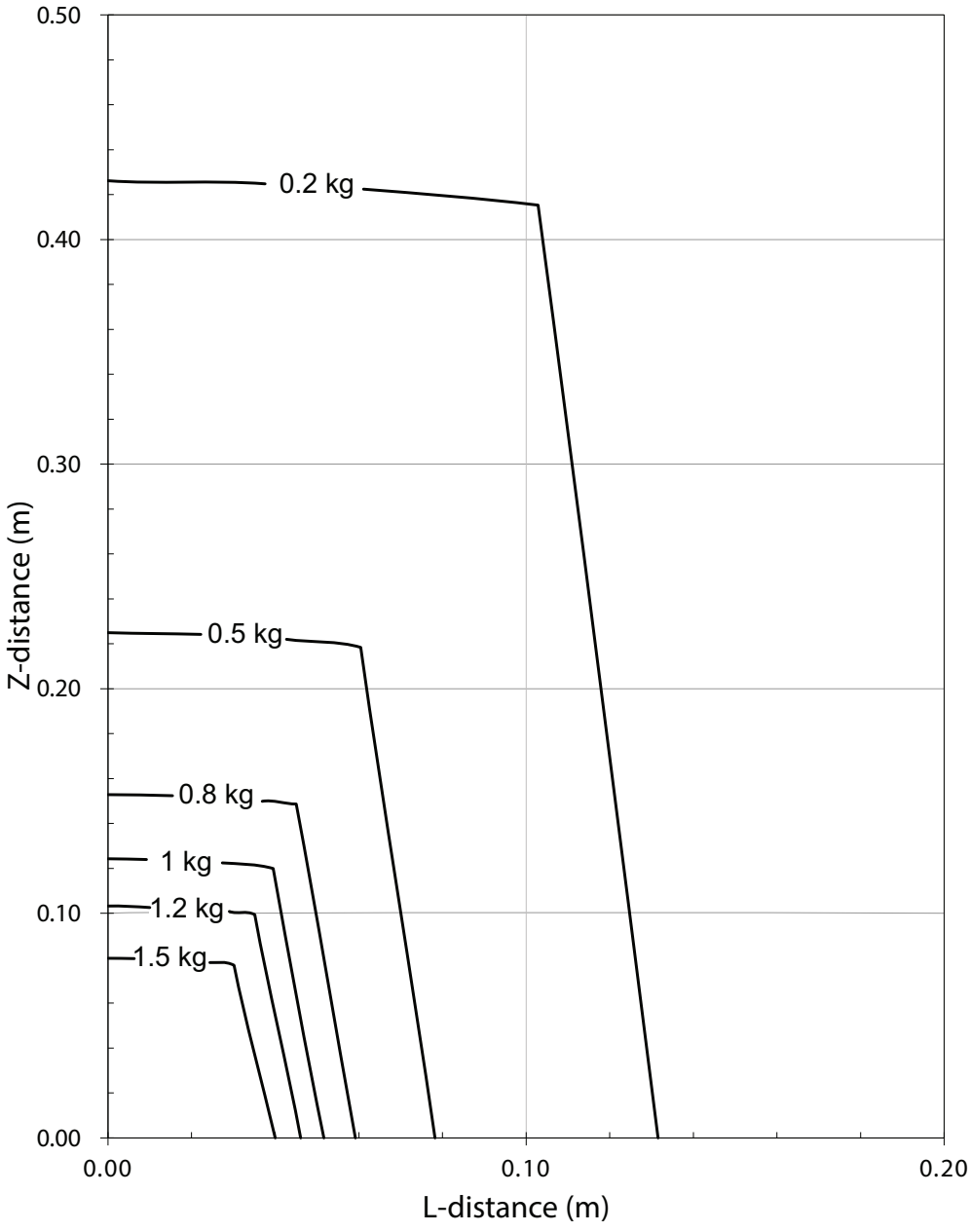
1.6.2 Load diagrams

Note

The weight permitted for loads includes grippers etc.

The data types `loaddata` and `tooldata` with moment of inertia must be used!

IRB 365 1.5/1100



xx2200000478

1.6.3 Maximum TCP acceleration

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 365 1.5/1100	205	100

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).

1.7 Maintenance and troubleshooting

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.
- Maintenance-free gearboxes are used..
- All cabling is fixed, no movements. 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 365*.

Expected life depends on usage

The expected life of a specific component of the robot can vary greatly depending on how hard it is run.

Expected component life

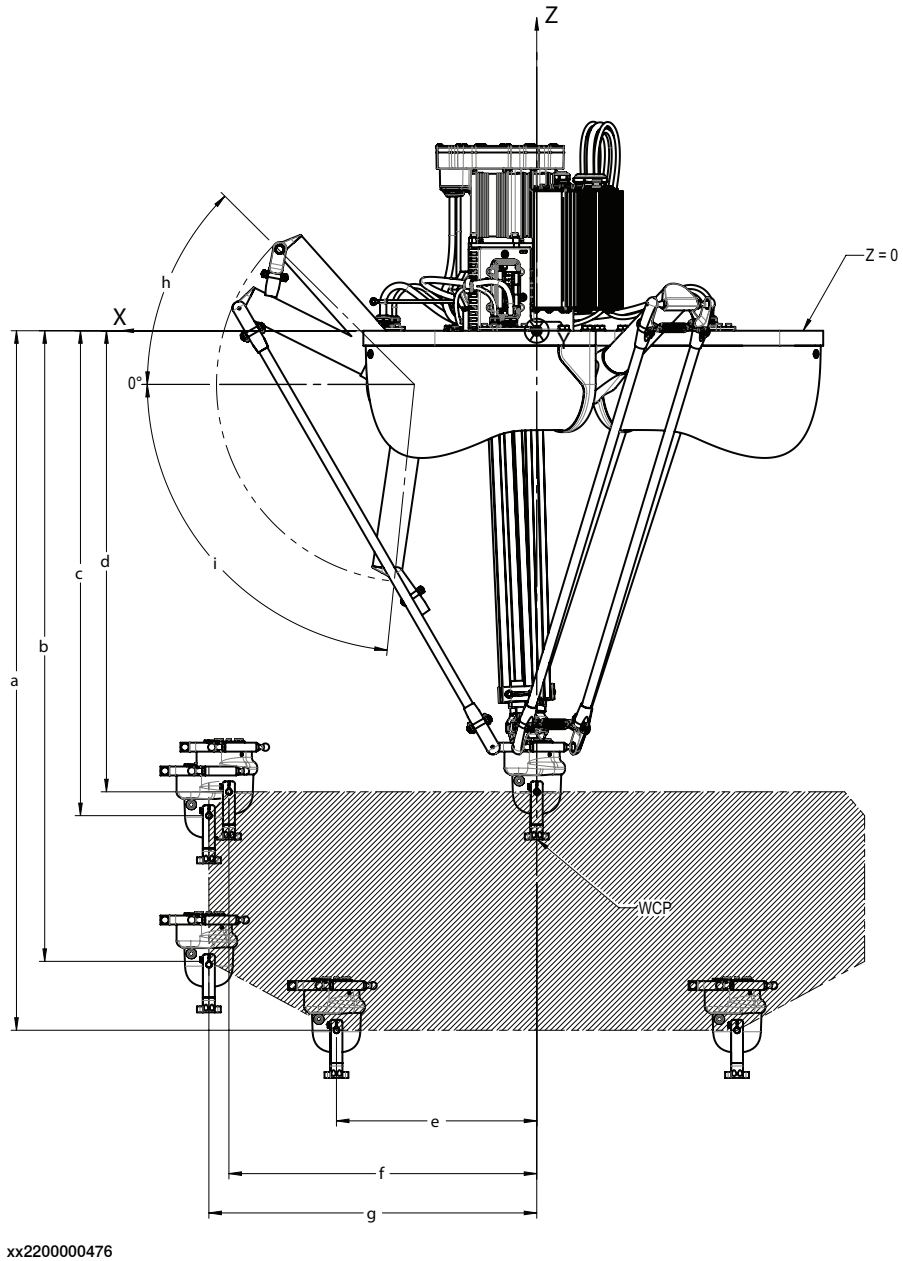
Component	Expected life	Note
Gearboxes	20,000 hours	

1.8 Robot motion

1.8.1 Working range

Illustration, working range

This illustration shows the unrestricted working range of the robot.

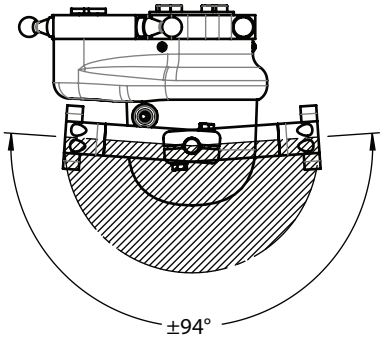


xx2200000476

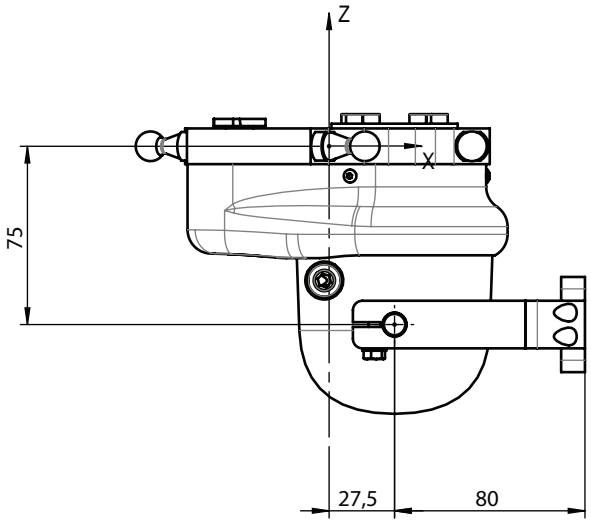
Dimensions

Variant	a	b	c	d	e	f	g	h	i
IRB 365 1.5/1100	1181	1031	821	781	335	516	550	-42°	+72°

Continues on next page



Axis 5



xx2200000477

1.8.2 The unit is sensitive to ESD

Description

ESD (electrostatic discharge) is the transfer of electrical static charge between two bodies at different potentials, either through direct contact or through an induced electrical field. When handling parts or their containers, personnel not grounded may potentially transfer high static charges. This discharge may destroy sensitive electronics.

Safe handling

Use one of the following alternatives:

- Use a wrist strap.

  Wrist straps must be tested frequently to ensure that they are not damaged and are operating correctly.
- Use an ESD protective floor mat.

  The mat must be grounded through a current-limiting resistor.
- Use a dissipative table mat.

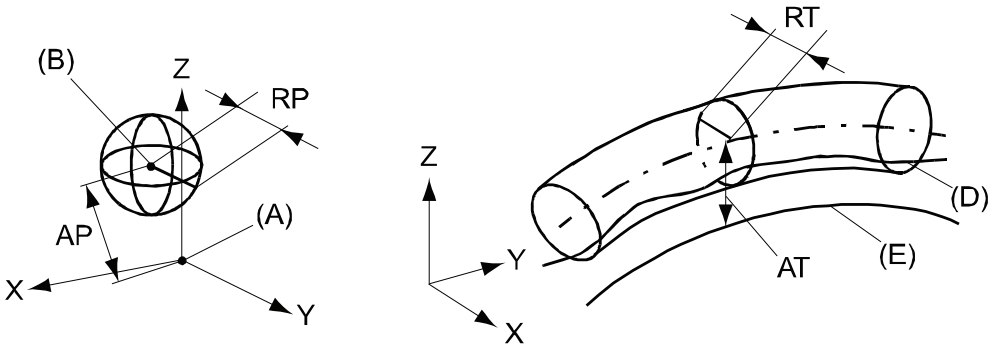
  The mat should provide a controlled discharge of static voltages and must be grounded.

1.8.3 Performance according to ISO 9283

General

At rated load and 1.6 m/s velocity on ISO test plane with all four robot axes in motion, with different payload. 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.



xx0800000424

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

IRB 365	IRB 365 1.5/1100
Pose accuracy, AP[i] (mm)	0.05
Pose repeatability, RP (mm)	0.05
Pose stabilization time, PSt (s) within 0.1 mm of the position	0.25
Pose stabilization overshoot, PSo	0.53
Path accuracy, AT (mm)	2.02
Path repeatability, RT (mm)	0.09

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.

Backlash axis 4 and 5

Protection class	Value
Standard	1.0 degrees

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 Typical cycle times

1.9.1 Introduction to typical cycle times

General

Both cycles incorporate an air activation time of 35 ms for picking and 35 ms for placing. Air activation takes place during the cycle time.

Description of typical cycles
Cycle 1 is a 90 - 400 - 90 movement, with 90 degrees rotation of axis 4.
Cycle 2 is a 50 - 800 - 50 movement, with 90 degrees rotation of axis 4.

Approximate cycle times

	IRB 365 1.5/1100	
Payload	1.0 kg	1.5 kg
Cycle 1	0.66 s	0.69 s
Cycle 2	0.79 s	0.84 s

This page is intentionally left blank

2 Specification of variants and options

2.1 Introduction to variants and options

General

The different variants and options for the IRB 365 are described in the following sections. The same option numbers are used here as in the specification form.

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

2.2 Manipulator

Variants

Option	Description
3300-27	IRB 365-1.5/1100

Protection class

Option	Description
3350-540	Base 54,IP54

Note

Base 54 includes IP54, according to standard IEC 60529.

Warranty

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

Note

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

Option	Type	Description
438-1	Standard warranty	Standard warranty is 12 months from *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.

Continues on next page

Option	Type	Description
438-7	Standard warranty + 30 months	Standard warranty extended with 30 months from end date of the standard warranty. Warranty terms and conditions apply.
438-8	Stock warranty	Maximum 6 months postponed start of standard warranty, starting from factory shipment date. Note that no claims will be accepted for warranties that occurred before the end of stock warranty. Standard warranty commences automatically after 6 months from *Factory Shipment Date* or from activation date of standard warranty in WebConfig.  **Note** Special conditions are applicable, see *Robotics Warranty Directives*.

2.3 Floor cables

Manipulator cable - length

Option	Description
3200-1	3 m
3200-2	7 m
3200-3	15 m
3200-5	30 m

Index

ABB AB
Robotics & Discrete Automation
S-721 68 VÄSTERÅS, Sweden
Telephone +46 (0) 21 344 400

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

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

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

abb.com/robotics

3HAC079184-001, Rev A, en