ROBOTICS

Product specification

IRBT 4004/6004/7004

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Product specification

IRBT 4004
IRBT 6004
IRBT 7004

Document ID: 3HEA802965-001

Revision: AD

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Original instructions.

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Overview of this specification

About this product specification

This product specification describes the performance of the track motion 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 reach
- The specification of variants 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.

Users

It 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 - IRBT 4004/6004/7004	*3HAC028506-001*
Product manual - IRB 4400	*3HAC022032-001*
Product manual - IRB 6620	*3HAC027151-001*
Product manual - IRB 6640	*3HAC026876-001*
Product manual - IRB 6640 Foundry Prime	*3HAC040586-001*
Product manual - IRB 6660	*3HAC028197-001*
Product manual - IRB 7600	*3HAC022033-001*
Product specification - Robot user documentation, IRC5 with RobotWare 6	*3HAC052355-001*

Revisions

Revision	Description
-	New product specification

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Continued

Revision	Description
A	Updates in chapter Variants and Options
B	Adapted for IRB 6640 and IRB 6620
C	Tip Dresser deleted
D	Warranty text added
E	Added information about SafeMove
F	Adapted for IRB 4600
G	Options Zone division and position switches removed
H	Updated Customer communication options
J	Text for Standards updated
K	Double and Mirrored carriage added
L	• Table for ambient temperature adjusted • Minor corrections • Clarifying how to order a double carriage
M	• Cable length for central lubrication changed • Diameter of a hole in the stand has changed from 24 mm to 25 mm, see *Hole configuration on page 32*.
N	• General updates/corrections • Several corrections and completions are added to the section for technical data and measurements, regarding required space for installation etc., see *Technical data for the track motion on page 13*. • Measurement is added to the figure Dimension in section *Hole configuration on page 32*.
P	• Added info regarding performance • Info regarding forces corrected
Q	• Minor corrections/update • Dimensions for new version of cable chain added
R	• Minor corrections/update
S	• Color options are added
T	This revision includes following updates/corrections: • Added note about fatigue calculations to Force table, see *Forces on page 30*. • Updated measurements due to removal of guide hole, see *Introduction on page 34*. • Updated measurement of position A for travel lengths of single and double carriage, see *Travel length on page 13*. • Updated length of Murrplastik cable chain, see *Formula for single carriage track on page 15*. • Added stopping distance and positioning time for IRB 6700, see *Stopping distance/time on page 40*, and *Positioning time on page 39*. • Added maximum floor loads for IRB 6700, see *Operating requirements on page 29*.
U	• Measures for required space for single carriage track adjusted
V	• Option *1011-1 Brake release unit* removed.
X	• Updated list of applicable standards.
Y	Published in release R18.1. The following updates are done in this revision: • Minor changes in Mounting of manipulator on track section.

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Revision	Description
Z	Published in release R19B The following updates are done in this revision: • Add guiding pins for robot pedestal of IRB 6700. • Graphic in Installation of standard and mirrored track section improved.
AA	Published in release R19D The following updates are done in this revision: • Weight of pedestal for IRBT 4004 changed. See *Weight of pedestal on page 18*.
AB	Published in release R20C The following updates are done in this revision: • Weights for IRBT 4004 and 6004/7004 single and double carriage have been revised and updated.
AC	Published in release R20D The following updates are done in this revision: • Description of 1008-2 Foundry IP65 updated. See *Protection on page 52*. • Warranty section updated.
AD	Published in release R23B The following updates are done in this revision: • Updated the figure and legend in section dimensions.

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1 Description

1.1 Structure

1.1.1 Introduction

General

Track Motion IRBT 4004, IRBT 6004 and IRBT 7004 expands the movement pattern of the robot with a an extra degree of programmable freedom. Two more types are now available, one mirrored track and one with double carriages.

The movement on the track motion is programmed using the robot FlexPendant in the same way as the robot's other axes.

Foundry

In addition to the standard protection version, that is designed for tough environment, the foundry protection version has further improved level of protection against more harsh environments and is recommended where the system is exposed to more particles (particularly hot) and dust or more corrosive environment than dry air at normal room temperature.

Operating system

The IRBT is equipped with the IRC5 controller and robot control software, RobotWare. RobotWare supports every aspect of the robot system, such as motion control, development and execution of application programs, communication etc. See *Product specification - Controller IRC5 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 features - network communication - and advanced functions such as multitasking, sensor control etc. For a complete description on optional software, see the *Product specification - Controller software IRC5*

Performance

The IRBT track motion and its respective robot is a seven-axis dynamic model. ABB's unique QuickMove and TrueMove can be fully exploited, which means optimal movement for the robot and the track motion with actual load. Furthermore, path accuracy and speed are optimized. ABB's track motion is the first on the market with this feature.

The speed, position–to–position, which is the real benchmark of the capability of the track motion, has improved by more than 40% compared to earlier models.

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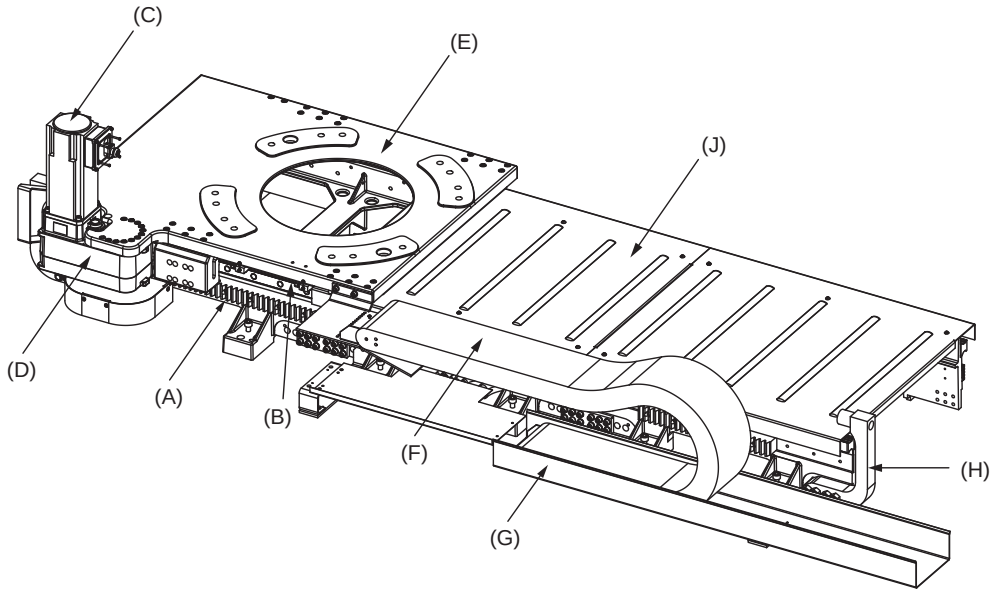
1.1.1 Introduction
Continued

Limitations

The option 610-1, Independent Axis is not possible to use together with track motion, IRBT.

Track Motion



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Pos	Description	Pos	Description
A	Gear rack	F	Cable chain
B	Linear guides	G	Cable tray
C	Motor	H	Mechanical stop
D	Gearbox	J	Protecting plate
E	Carriage		

1.1.2 Technical data for the track motion

Travel length

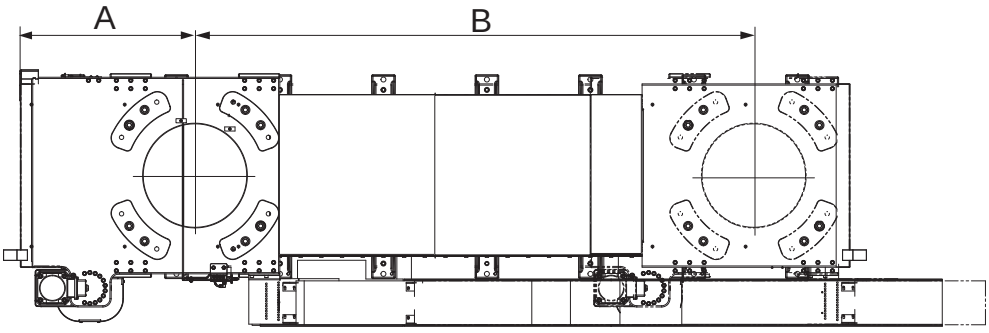
The IRBT track motion is available in 3 different types.

IRBT type	Designed for	Travel length (m) [i]	
		Singe carriage (standard track)	Double carriage
IRBT 4004	IRB 4400 (all versions) IRB 4600 (all versions)	1.9 to 19.9 (in steps of 1 m)	3.7 to 18.7 (in steps of 1 m)
IRBT 6004	IRB 6650S (all versions) IRB 6620 IRB 6640 (all versions) IRB 6700 (all versions)	1.7 to 19.7 (in steps of 1 m)	3.3 to 18.3 (in steps of 1 m)
IRBT 7004	IRB 7600 (all versions)	1.7 to 19.7 (in steps of 1 m)	3.3 to 18.3 (in steps of 1 m)

[i] Travel length is the distance the carriage(s) can move.

Single carriage

Below is an example of travel length for a 4 m stand with single carriage.



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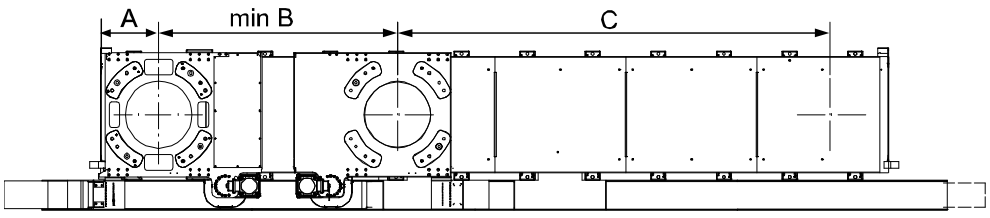
Pos	Description
A	IRBT 4004 L=646 mm IRBT 6004/7004 L=841 mm
B	IRBT 4004 Travel length= 2.9 m IRBT 6004/7004 Travel length=2.7 m

Double carriage

Below is an example of travel length for a 6 m stand with double carriage.



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1.1.2 Technical data for the track motion
Continued

Pos	Description
A	IRBT 4004 L= 646 mm IRBT 6004/7004 L= 461 mm
B	IRBT 4004 L= 1200 mm IRBT 6004/7004 L= 1780 mm
C	IRBT 4004 Travel length= 3700 mm IRBT 6004/7004 Travel length=3300 mm

Required space for installation of single carriage track (standard)

Note

The tables only give the space that the track motion itself requires. In addition there propably needs to be additional space at the ends of the track motion at the installation site. Add space as required.

Required space for installation - with cable chain Murrplastik

The table below shows the required space for installation of single carriage track motions with different travel lengths, when using the cable chain Murrplastik.

Travel length (m) [i]		Sections (pcs)	Required space for installation (m) [ii iii]
IRBT 4004	IRBT 6004/ 7004	Value of N	
1.9	1.7	3	4.231
2.9	2.7	4	5.231
3.9	3.7	5	6.231
4.9	4.7	6	7.231
5.9	5.7	7	8.231
6.9	6.7	8	9.231
7.9	7.7	9	10.231
8.9	8.7	10	11.231
9.9	9.7	11	12.231
10.9	10.7	12	13.231
11.9	11.7	13	14.231
12.9	12.7	14	15.231
13.9	13.7	15	16.231
14.9	14.7	16	17.231
15.9	15.7	17	18.231
16.9	16.7	18	19.231
17.9	17.7	19	20.231
18.9	18.7	20	21.231
19.9	19.7	21	22.231

i The travel length is illustrated in *Travel length on page 13*.
ii The measurement for the required space is valid when using the cable chain Murrplastik.
iii How to calculate the required space is described in *Formula for single carriage track on page 15*.

Continues on next page

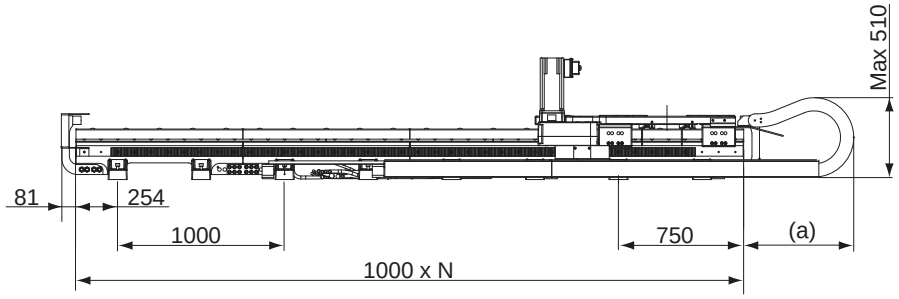
Formula for single carriage track

Required space for a single carriage track is determined with the following formula:

Required space (mm) = 81 + (1000 x N) + (a)

Value of N is equal to the number of sections, defined in previous tables.

For the number (a), see figure.



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(a)	Cable chain Murrplastik: max. 1150 mm

Required space for installation of double carriage track (option 1088-2)

Note

The tables only give the space that the track motion itself requires. In addition there propably needs to be additional space at the ends of the track motion at the installation site. Add space as required.

Required space for installation - with cable chain Murrplastik

The table below shows the required space for installation of double carriage track motions with different travel lengths, when using the cable chain Murrplastik.

Travel length (m) [i]		Sections (pcs)	Required space for installation (m) [ii iii]
IRBT 4004	IRBT 6004/ 7004	Value of N	
3.7	3.3	6	8.300
4.7	4.3	7	9.300
5.7	5.3	8	10.300
6.7	6.3	9	11.300
7.7	7.3	10	12.300
8.7	8.3	11	13.300
9.7	9.3	12	14.300
10.7	10.3	13	15.300
11.7	11.3	14	16.300
12.7	12.3	15	17.300
13.7	13.3	16	18.300
14.7	14.3	17	19.300
15.7	15.3	18	20.300

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1.1.2 Technical data for the track motion
Continued

Travel length (m) [i]		Sections (pcs)	Required space for installation (m) [ii iii]
16.7	16.3	19	21.300
17.7	17.3	20	22.300
18.7	18.3	21	23.300

i The travel length is illustrated in *Travel length on page 13*.
ii The measurement for the required space is valid when using the cable chain Murrplastik on the track motion.
iii How to calculate the required space is described in *Formula for double carriage track on page 16*.

Formula for double carriage track

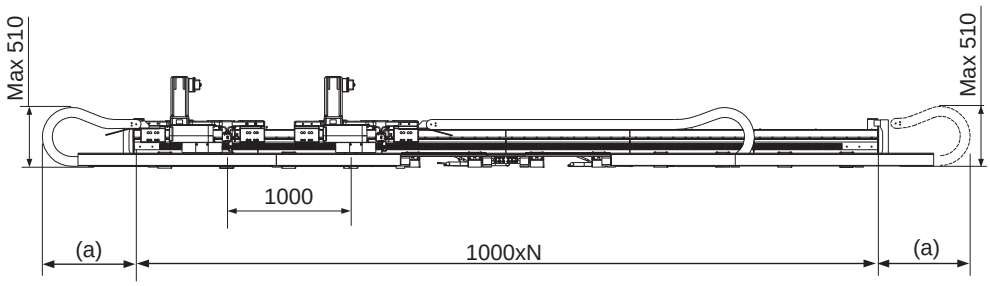
To install track motions with two carriages (double carriage) the cable chain requires to be fitted differently at the frame than when fitting it on a single carriage. The different fitting makes the cable chain stand out more on a double than on a single carriage.

Required space for a double carriage track is determined with the following formula:

Required space (mm) = a + (1000xN) + a

Value of N is equal to the number of sections, defined in previous tables.

For the number (a), see figure.



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(a)	Cable chain Murrplastik: max. 1150 mm

Example: there are 6 sections in a double carriage for travel length 3.7 m (IRBT 4004). The required space, if using a cable chain from Murrplastik, is therefor: 1150 + (1000x6) + 1150 = 8300 mm.

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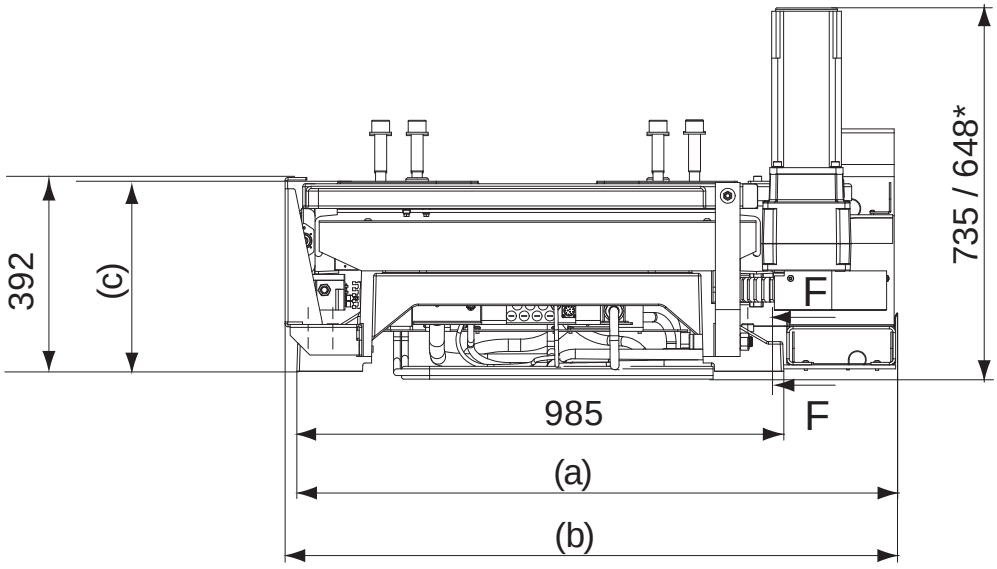
Dimensions



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*	Valid for track motions with motor type A (the motor is marked with an "A" on its side).
(a)	Cable chain Murrplastik: 1325 mm
(b)	Cable chain Murrplastik: 1350 mm
(c)	For IRBT 6004/7004: 384.5 mm For IRBT 4004: 374.5 mm

Mechanical stops

There are no adjustable mechanical stops on the IRBT. This needs to be considered while doing a risk assessment of the complete installation, the track can however be order in different lengths.

Weight of track with carriage excluding packaging

Weight of track with single carriage excluding packaging

Travel length (m) [i]		Weight (kg)	
IRBT 4004	IRBT 6004/ 7004	IRBT 4004	IRBT 6004/ 7004
1.9	1.7	1050	1079
2.9	2.7	1259	1288
3.9	3.7	1468	1497
4.9	4.7	1677	1706
5.9	5.7	1886	1915
6.9	6.7	2095	2124
7.9	7.7	2304	2333
8.9	8.7	2513	2542
9.9	9.7	2722	2751

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1.1.2 Technical data for the track motion

Continued

Travel length (m) [i]		Weight (kg)	
10.9	10.7	2931	2960
11.9	11.7	3140	3169
12.9	12.7	3349	3378
13.9	13.7	3558	3587
14.9	14.7	3767	3796
15.9	15.7	3976	4005
16.9	16.7	4185	4214
17.9	17.7	4394	4423
18.9	18.7	4603	4632
19.9	19.7	4812	4841

[i] The travel length is illustrated in *Travel length on page 13*.

Weight of track with double carriage excluding packaging

Travel length (m) [i]		Weight (kg)	
IRBT 4004	IRBT 6004/ 7004	IRBT 4004	IRBT 6004/7004
3.7	3.3	2104	2215
4.7	4.3	2313	2424
5.7	5.3	2522	2633
6.7	6.3	2731	2842
7.7	7.3	2940	3051
8.7	8.3	3149	3260
9.7	9.3	3358	3469
10.7	10.3	3567	3678
11.7	11.3	3776	3887
12.7	12.3	3985	4096
13.7	13.3	4194	4305
14.7	14.3	4403	4514
15.7	15.3	4612	4723
16.7	16.3	4821	4932
17.7	17.3	5030	5141
18.7	18.3	5239	5350

[i] The travel length is illustrated in *Travel length on page 13*.

Weight of pedestal

Robot pedestal	IRBT 4004	IRBT 6004/ IRBT 7004
Height: 250 mm	238 kg	230 kg
Height: 500 mm [i]	288 kg	330 kg

[i] Only available for IRBT 4004 and 6004.

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Airborne noise level

The sound pressure level outside the working space.

IR(B)T type	Level
IRBT 4004	< 77 dB (A) / 1m
IRBT 6004	< 76 dB (A) / 1m
IRBT 7004	< 73 dB (A) / 1m

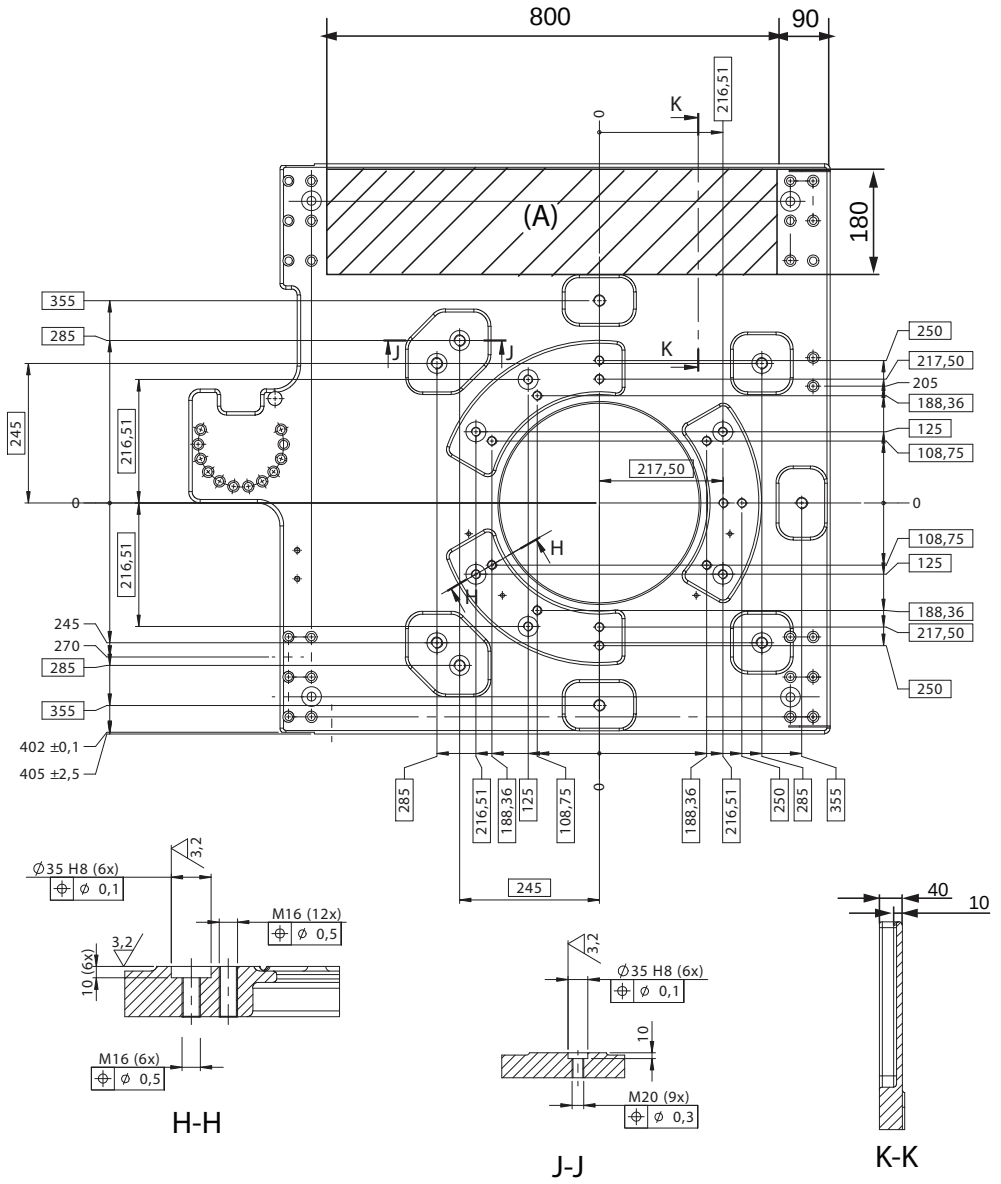
Power consumption at max load

Type of Movement	IR(B)T
-	Within specification for respective robot. A power consumption measurement of a track motion with manipulator could be done with a simulated cycle in RobotStudio. See *Operating manual - RobotStudio*.

1.1.3 Measures of the carriage table

IRBT 4004

Use the hole configuration for the manipulator when designing fixures to be used on the track. The figure below shows the dimensions in mm. Both tables on double track are the same.



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Pos	Description
A	Drilling allowed within the marked area.

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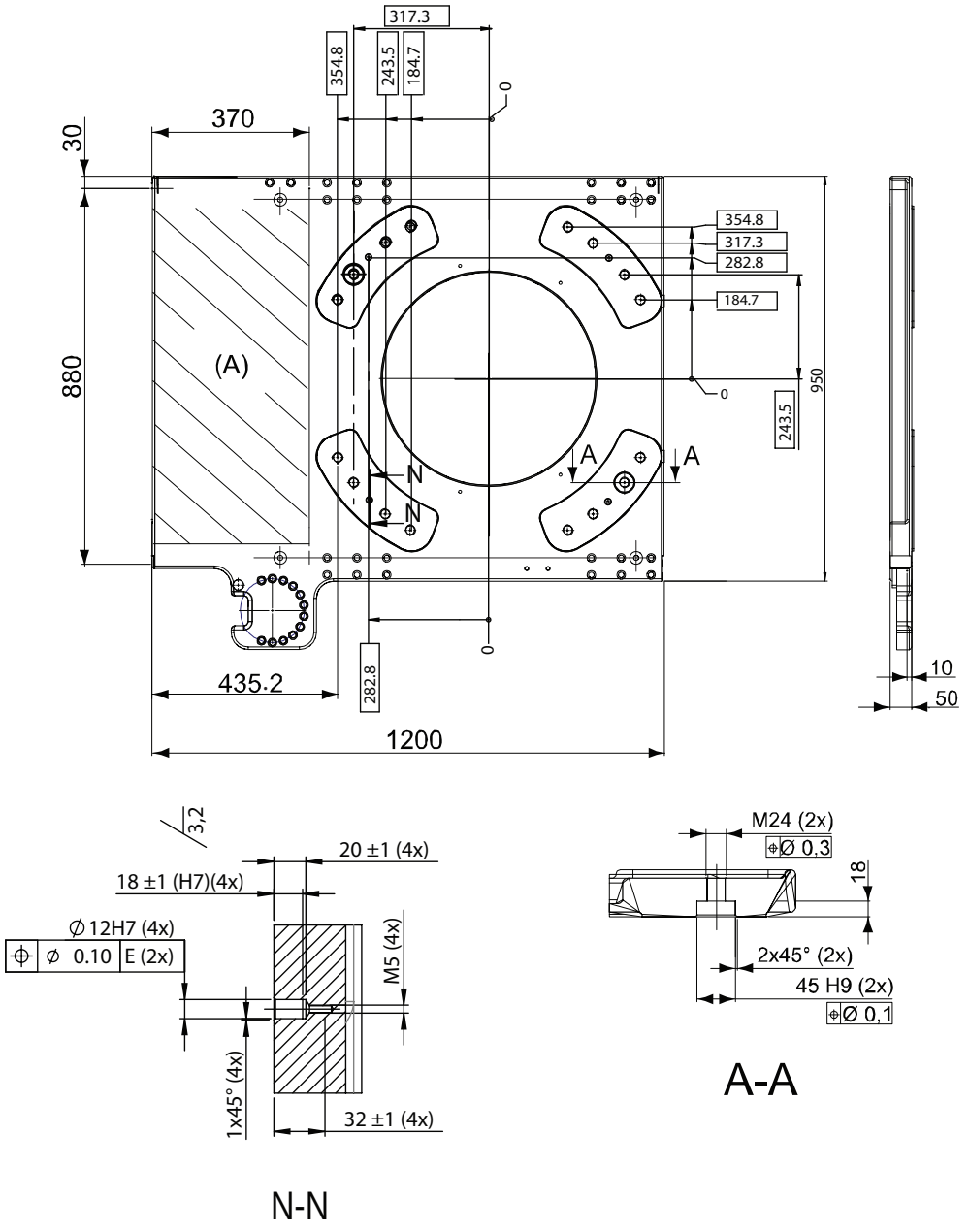
IRBT 6004 and IRBT 7004

Standard carriage

The figure below shows the standard carriage for IRBT 6004/7004.



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Pos	Description
A	Drilling allowed within the marked area.

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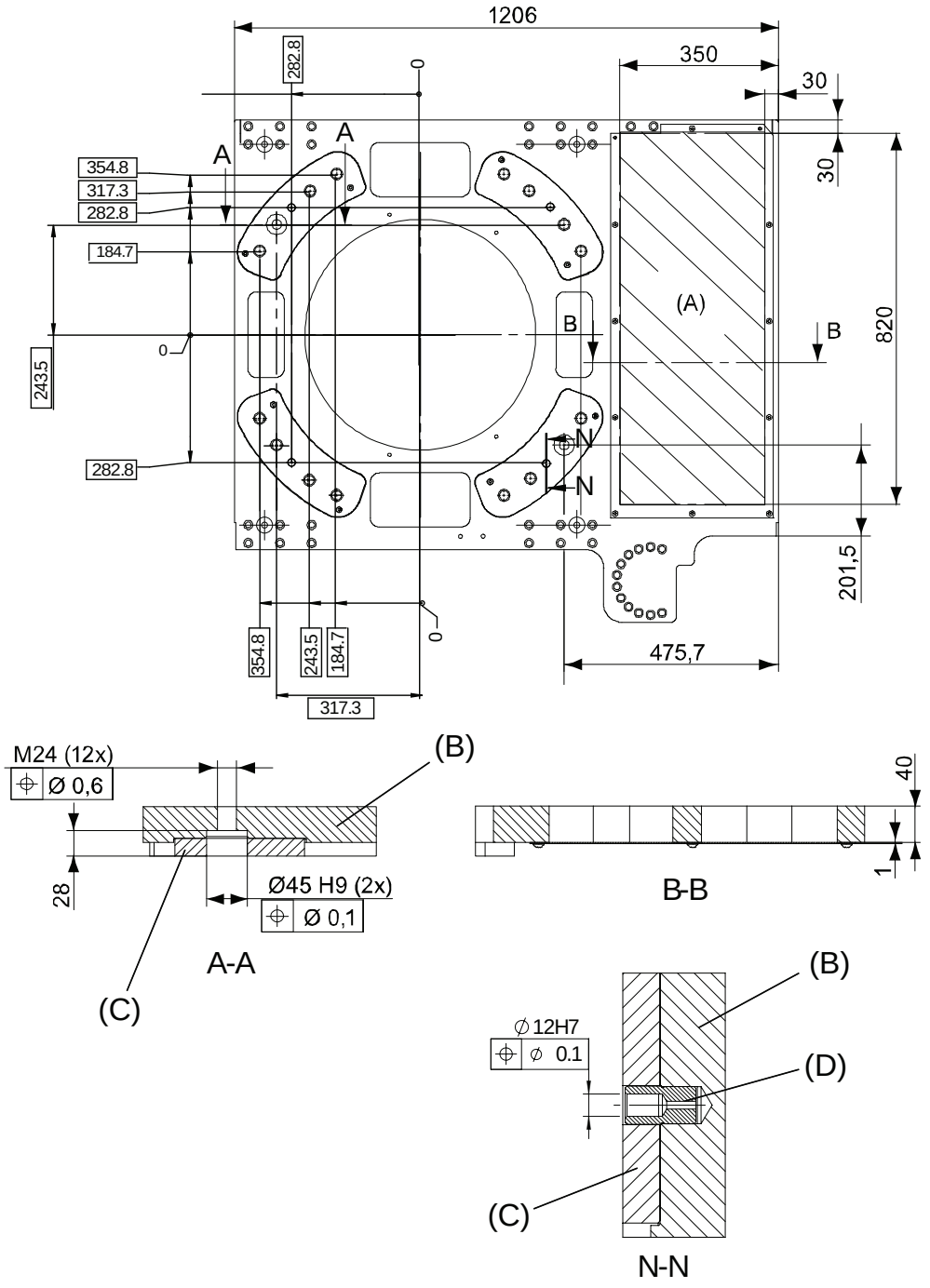
1.1.3 Measures of the carriage table
Continued

Carriage plate

The figure below shows the carriage plate that is used as a second added carriage for a double track or as a single carriage as mirrored, for track motions IRBT 6004/7004.



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Pos	Description
(A)	Drilling allowed within the marked area.
(B)	Carriage plate

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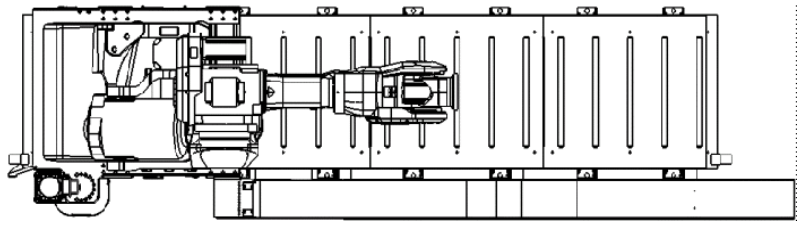
Pos	Description
(C)	Distance plate (fitted to the carriage at delivery)
(D)	Adapter for guide pin (fitted to the carriage at delivery)

1.1.4 Mounting of manipulator on track

General

The manipulator can be mounted in two directions, in line or 90 degrees, see Figures below. Other mounting positions not allowed.



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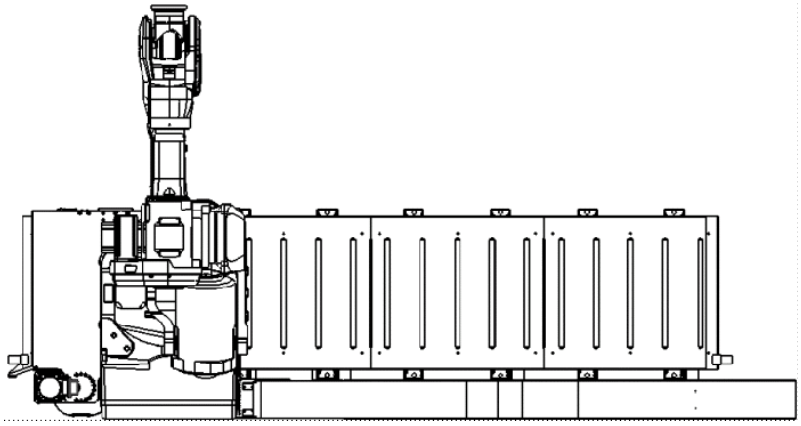

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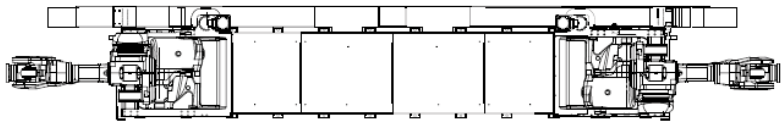
Below figures shows the mounting on double carriage, option 1088-2.



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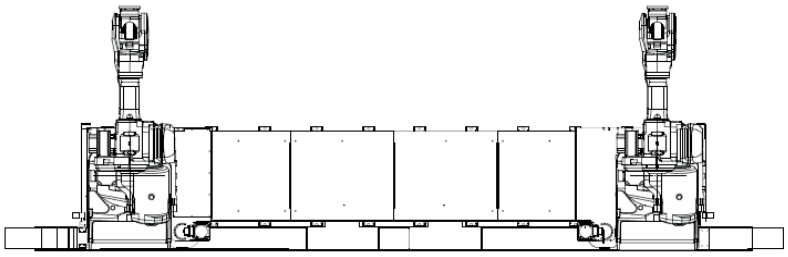

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1.2 Standards

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.

General

The product is designed in accordance with ISO 10218-1:2011, Robots for industrial environments - Safety requirements -Part 1 Robots, and applicable parts in the normative references, as referred to from ISO 10218-1:2011. In case of deviations from ISO 10218-1:2011, these are listed in the declaration of incorporation which is part of the product delivery.

Normative standards as referred to from ISO 10218-1

Standard	Description
ISO 9283:1998	Manipulating industrial robots - Performance criteria and related test methods
ISO 10218-2	Robots and robotic devices - Safety requirements for industrial robots - Part 2: Robot systems and integration
ISO 12100	Safety of machinery - General principles for design - Risk assessment and risk reduction
ISO 13849-1:2006	Safety of machinery - Safety related parts of control systems - Part 1: General principles for design
ISO 13850	Safety of machinery - Emergency stop - Principles for design
IEC 60204-1	Safety of machinery - Electrical equipment of machines - Part 1: General requirements

Deviations from ISO 10218-1:2011 for IRBT 4004/6004/7004

Deviations from the standard are motivated for IRBT 4004/6004/7004 in the table below.

Requirement	Deviation for IRBT 4004/6004/7004	Motivation
§5.12.1 Limiting the range of motion by adjustable stops (§5.12.2) or by safety functions (§5.12.3).	IRBT 4004/6004/7004 does not have adjustable mechanical stops.	The track motion is designed as segments, which can be reduced to limit the range of motion.

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

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1.2.1 Applicable standards
Continued

Standard	Description
CAN/CSA Z 434-03	Industrial robots and robot Systems - General safety requirements

Other standards used in design

Standard	Description
ISO 9787:2013	Robots and robotic devices -- Coordinate systems and motion nomenclatures
IEC 61000-6-2	Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity standard for industrial environments
IEC 61000-6-4	Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments
ISO 13732-1:2006	Ergonomics of the thermal environment - Part 1
IEC 60974-1:2012[i]	Arc welding equipment - Part 1: Welding power sources
IEC 60974-10:2014[i]	Arc welding equipment - Part 10: EMC requirements
ISO 14644-1:2015[ii]	Classification of air cleanliness
IEC 60529:1989 + A2:2013	Degrees of protection provided by enclosures (IP code)

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

1.3 Installation

1.3.1 Introduction

General

The IRBT´s are intended for floor mounting. Detailed information regarding mechanical installation can be found in the Product Manual.

Maximum load

The maximum load for the different tracks:

Type	Permitted load/carriage [i]
IRBT 4004	The weight of IRB 4400/4600 payload + pedestal + 50 kg
IRBT 6004	The weight of IRB 66X0 payload + pedestal + 100 kg
IRBT 7004	The weight of IRB 7600 payload + pedestal + 100 kg

[i] Max payload included, weight of pedestal according to *Technical data for the track motion on page 13*

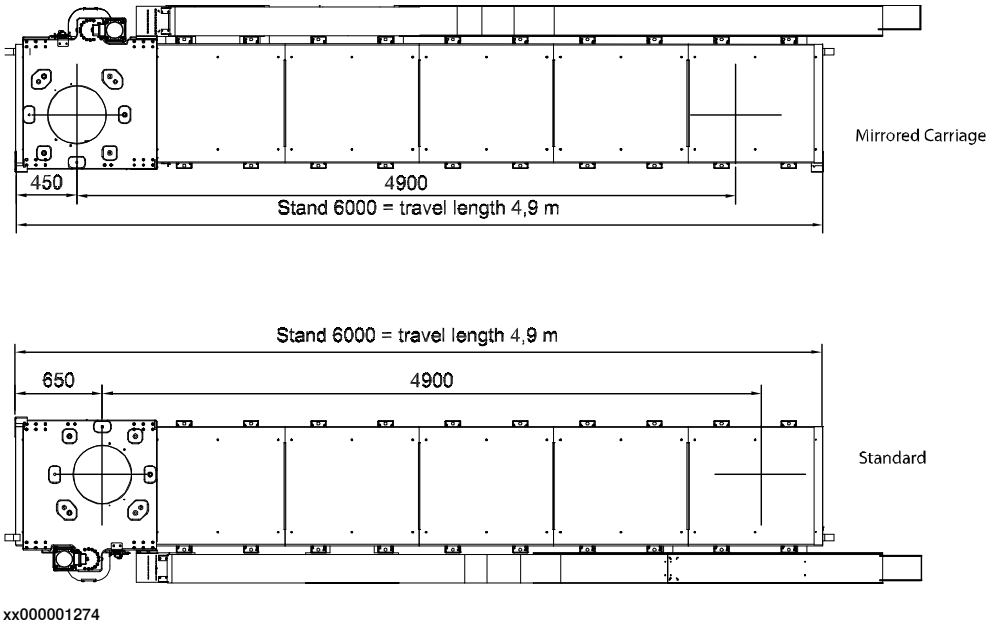
Robot payload is specified in the Product Specification for the robot.

Installation of standard and mirrored track

Below are examples of installed mirrored and standard track shown.

For IRBT 6004 and IRBT 7004 there will be different distance from center of robot to the edge of the track, but for IRBT 4004 it is the same.

IRBT 4004



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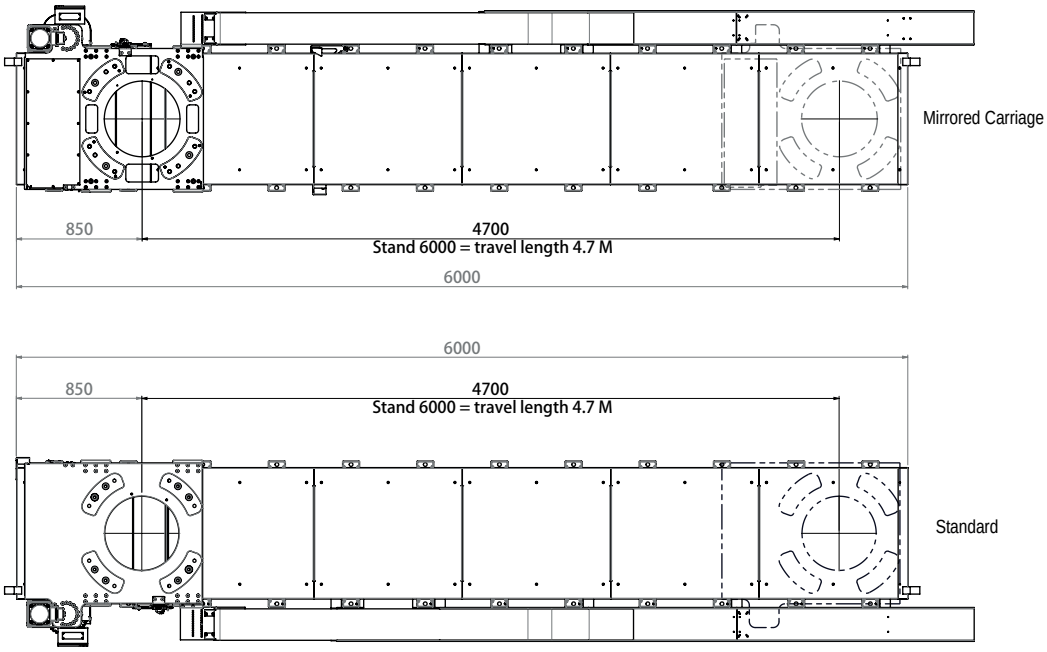
1.3.1 Introduction
Continued

IRBT 6004/7004



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1.3.2 Operating requirements

Protection standards

Protection type	Protection class
Standard	IP65
Foundry	IP65

Explosive environments

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

Ambient temperature

Description	Standard/Option	Temperature
Track motion during operation	Standard	+5°C[i] (41°F) to + 50°C (122°F)
For the controller	Standard/Option	See *Product specification - Controller IRC5 with FlexPendant*
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. 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 track during transportation and storage	Max. 95% at constant temperature
Complete track during operation	Max. 95% at constant temperature

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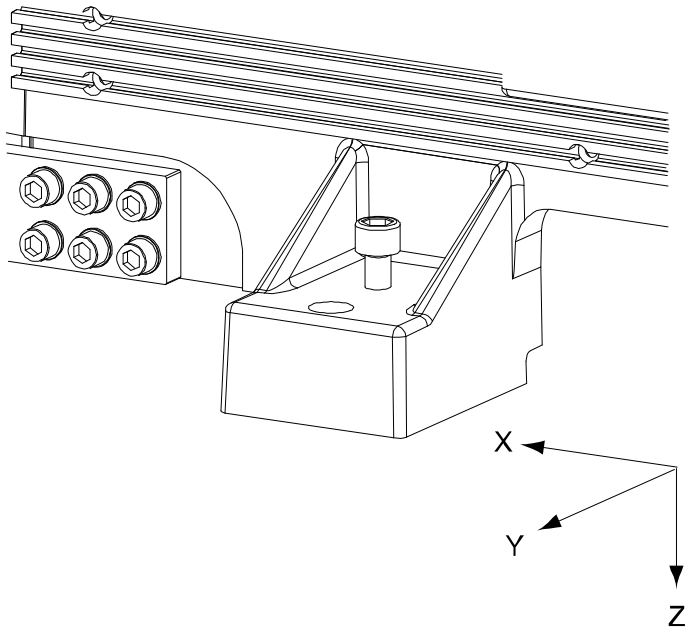
1.3.2 Operating requirements
Continued

Forces

Maximum floor loads in relation to the base coordination system and indicated per each stand of the section of the track, see figure below.



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Robot	Endurance load in operation (kN)		Max. load at Emergency stop (kN)	
	Fxy	Fz	Fxy	Fz
IRB 4400	± 3	1.5 ± 5	± 6.5	3 ± 9
IRB 4600	± 3	1.5 ± 5	± 6.5	1.5 ± 9
IRB 4600 with pedestal	± 3	1.5 ± 6	± 6.5	1.5 ± 10
IRB 6650S	± 7	5 ±15	± 14	5 ± 30
IRB 6650S with pedestal	± 7	5 ±18	± 14	5 ± 36
IRB 6620	± 3	3 ±19	± 9	3 ± 34
IRB 6620 with pedestal	± 3	3 ±18	± 9	3 ± 35
IRB 6640	± 4	5 ±24	± 10	5 ± 42
IRB 6640 with pedestal	± 4	5 ±25	± 10	5 ± 45
IRBT 6004/IRB 6700-200 kg[i]	± 3.5	4.5 ±22	± 8	4.5 ± 43
IRBT 6004/IRB 6700-200 kg[i] with pedestal	± 3.5	5.5 ±24	± 8	5.5 ±45
IRBT 6004/IRB 6700-235 kg[ii]	± 3.5	5 ±23	± 8	5 ±49
IRBT 6004/IRB 6700-235kg[ii] with pedestal	± 3.5	5.5 ±24	± 8	5.5 ±51
IRBT 6004/IRB 6700-300 kg[iii]	± 4	5.5 ±27	± 11	5.5 ±51

Continues on next page

Robot	Endurance load in operation (kN)		Max. load at Emergency stop (kN)	
	Fxy	Fz	Fxy	Fz
IRBT 6004/IRB 6700-300 kg[iii] with pedestal	± 4	6.5 ±28	± 11	6.5 ±55
IRB 7600	± 11	8 ± 24	± 22	8 ± 51
IRB 7600 with pedestal	± 11	8 ± 26	± 22	8 ± 56

i IRB 6700-200/2.60, IRB 6700-155/2.85
ii IRB 6700-235/2.65, IRB 6700-205/2.80, IRB 6700-175/3.05, IRB 6700-150/3.20
iii IRB 6700-300/2.70, IRB 6700-245/3.00

Note

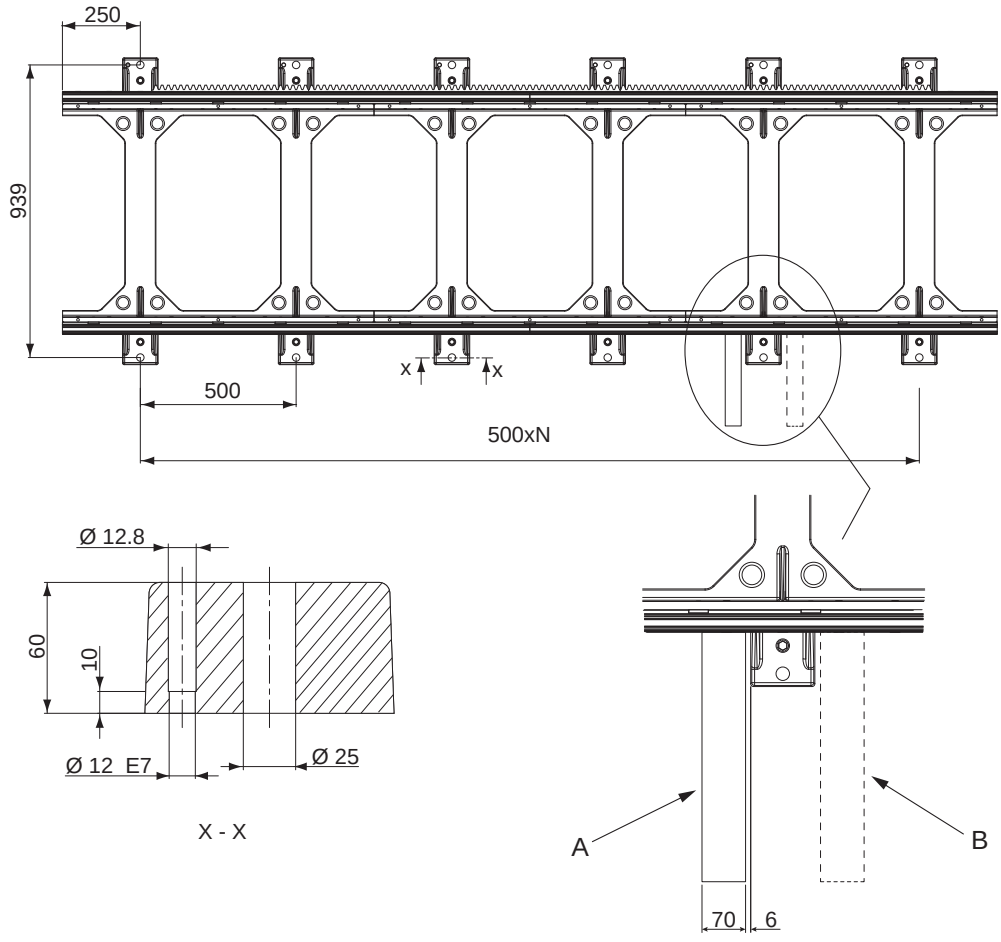
If doing fatigue calculations with combined tension (Fz) and shear loads (Fxy), the shear loads (Fxy) are allowed to be reduced with a factor 0.7.

1.3.3 Hole configuration

Dimension

Note

The cable tray brackets will be installed on the track motion right next to and inline with the the ground plates. If installing mounting plates beneath the ground plates (optional), make sure that the mounting plate bolt heads will not interfere with the cable tray brackets to be installed.



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A	Cable tray bracket, position for standard (non-mirrored) track motion
B	Cable tray bracket, position for mirrored track motion

The table shows the value of N in the previous figure with different travel lengths.

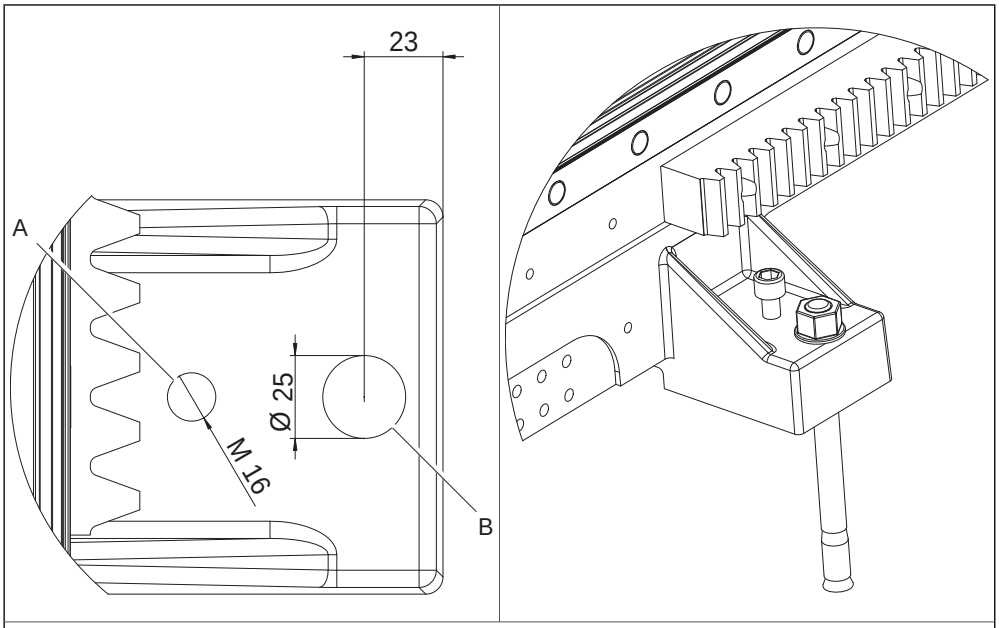
Travel length IRBT 4004 / IRBT 6006 and IRBT 7004	Total length of the stand	Quantity N
1.9 / 1.7 m	3 m	5
2.9 / 2.7 m	4 m	7
3.9 / 3.7 m	5 m	9

Continues on next page

Travel length IRBT 4004 / IRBT 6006 and IRBT 7004	Total length of the stand	Quantity N
etc.		

Hole configuration

The stand's ground plates have holes for assemble. The hole configuration on the right side (shown in figure) is the same as the hole configuration on the left side.



A Holes for leveling / leveling screw
B Holes for expansion-shell bolts with a diameter of M20 / chemical bolt

Screws for fastening manipulator to base

Recommended screws for fastening the manipulator to the base	
Steel structure	M20 x 90 8.8 with 4 mm flat washer
Concrete floor	M20 [i]

[i] The type and dimension of screws depend on the foundation conditions. See description for maximum floor loads in *Operating requirements on page 29*.

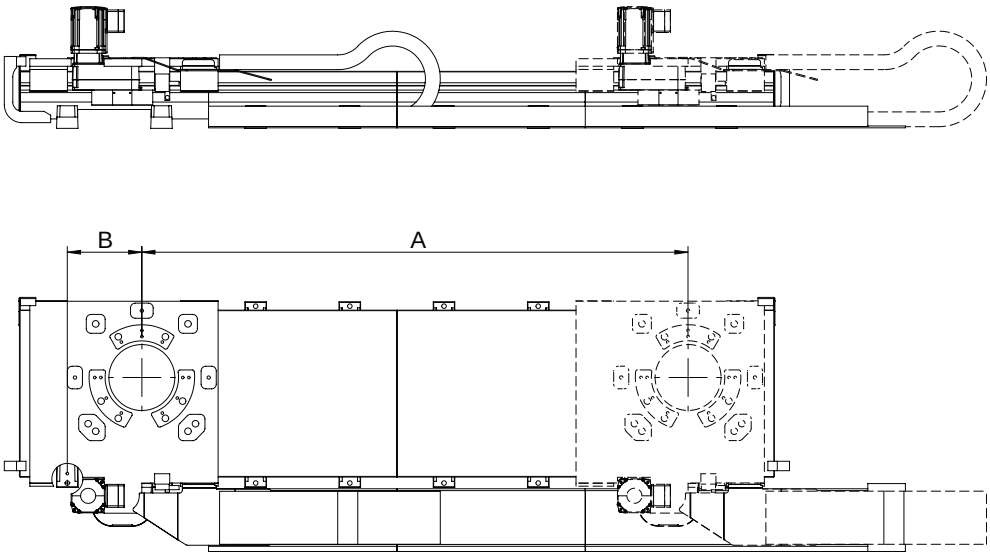
1.4 Motion

1.4.1 Introduction

Type of motion

Standard carriage track

The standard track has a linear motion with a travel length between 1.9 (IRBT 4004) / 1.7 (IRBT 6004, IRBT 7004) to 19.9 (IRBT 4004) / 19.7 m (IRBT 6004, IRBT 7004).



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Pos	Description
A	Travel length (TL)
B	Distance from the stand´s first ground plate assembly hole (see position B in figure *Hole configuration on page 33*) to the centre of the carrier table. IRBT 4004: 396 mm IRBT 6004 / 7004: 591 mm

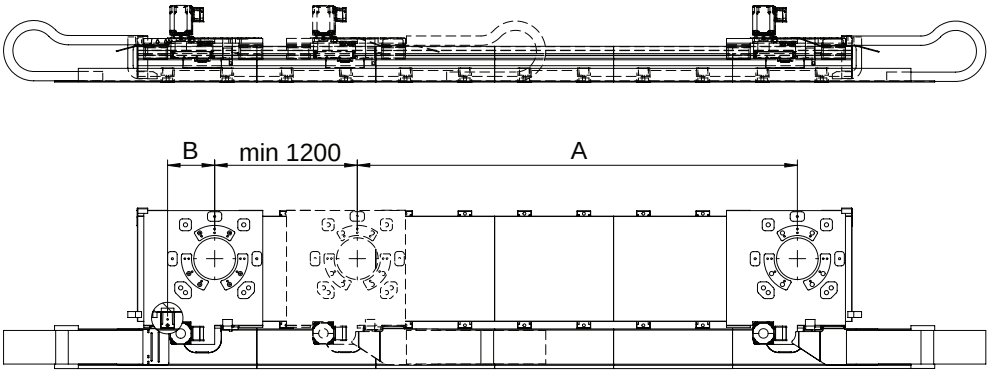
Continues on next page

Double carriage track

The double carriage track has a motion with a travel length between 3.7 m (IRBT 4004) / 3.3 m (IRBT 6004, IRBT 7004) to 18.7 m (IRBT 4004) / 18.3 m (IRBT 6004, IRBT 7004).

IRBT 4004

Below figure shows IRBT 4004 with option 1088-2 Double carriage:

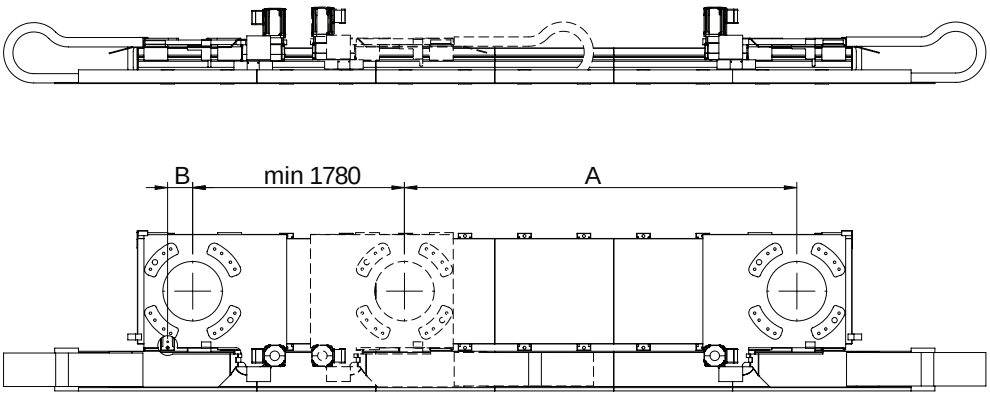


xx1000001429

Pos	Description
A	Travel length (TL)
B	Distance from the stand´s first ground plate assembly hole (see position B in figure *Hole configuration on page 33*) to the centre of the carrier table. IRBT 4004: 396 mm

IRBT 6004/7004

Below figure shows IRBT 6004/7004 with option 1088-2 Double carriage:



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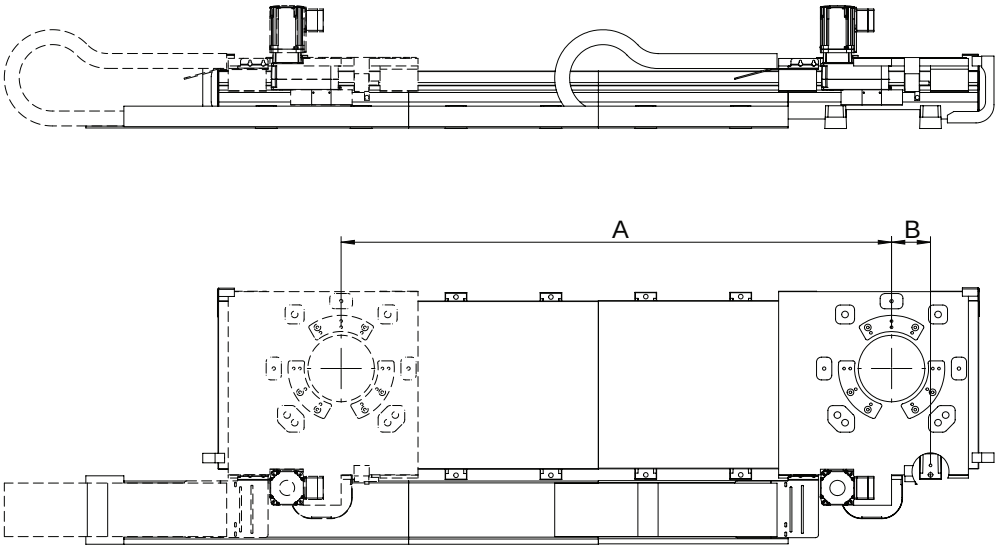
Pos	Description
A	Travel length (TL)
B	Distance from the stand´s first ground plate assembly hole (see position B in figure *Hole configuration on page 33*) to the centre of the carrier table. IRBT 6004 / 7004: 211 mm

Continues on next page

1.4.1 Introduction
Continued

Mirrored carriage track

The mirrored carriage track has a motion with a travel length between 1.9 (IRBT 4004) / 1.7 (IRBT 6004, IRBT 7004) to 19.9 (IRBT 4004) / 19.7 m (IRBT 6004, IRBT 7004).



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Pos	Description
A	Travel length (TL)
B	Distance from the stand´s first ground plate assembly hole (see position B in figure *Hole configuration on page 33*) to the centre of the carrier table. IRBT 4004: 206 mm IRBT 6004 / 7004: 591 mm

1.4.2 Performance

General

IRBT 4004/6004/7004	Performance
Pose repeatability, RP (mm) [i]	< ± 0.08
Pose stabilization time, PSt (s)	< 0.5

[i] Repeated stopping in a travel direction, at the same point.

1.4.3 Velocity

Maximum axis speeds

TrackMotion Type	Speed
IRBT 4004	2.0 m/s
IRBT 6004	1.6 m/s
IRBT 7004	1.2 m/s

1.4.4 Positioning time

Positioning time at different travel distance

Typical positioning times, with manipulator + nominal load.

Track motion and robot	Travel length				
	1m	2m	3m	4m	5m
IRBT 4004/IRB 4400	< 1.3 s	< 1.8 s	< 2.3 s	< 2.8 s	< 3.3 s
IRBT 4004/IRB 4600	< 1.2 s	< 1.7 s	< 2.2 s	< 2.6 s	< 3.2 s
IRBT 6004/IRB 6650S	< 1.6 s	< 2.2 s	< 2.8 s	< 3.4 s	< 4.1 s
IRBT 6004/IRB 6620	< 1.3 s	< 1.7 s	< 2.2 s	< 2.7 s	< 3.2 s
IRBT 6004/IRB 6640	< 1.4 s	< 2.0 s	< 2.6 s	< 3.3 s	< 3.9 s
IRBT 6004/IRB 6700	< 1.4 s	< 2.0 s	< 2.6 s	< 3.3 s	< 3.9 s
IRBT 7004/IRB 7600	< 1.7 s	< 2.5 s	< 3.4 s	< 4.2 s	< 5.0 s

1.4.5 Stopping distance/time

General

Stopping distance/time for emergency stop (category 0) and program stop (category 1) at max speed and max load, categories according to EN 60204-1.

Track motion and robot	Category 0		Category 1	
	Distance (mm)	Stop time (s)	Distance (mm)	Stop time (s)
IRBT 4004/IRB 4400	550	0.55	600	0.6
IRBT 4004/IRB 4600	370	0.37	400	0.39
IRBT 6004/IRB 6600	500	0.65	600	0.75
IRBT 6004/IRB 6620	550	0.55	600	0.6
IRBT 6004/IRB 6640	500	0.5	600	0.6
IRBT 6004/IRB 6700-200 kg[i]	440	0.5	670	0.8
IRBT 6004/IRB 6700-235 kg[ii]	450	0.5	690	0.8
IRBT 6004/IRB 6700-300 kg[iii]	500	0.6	770	0.9
IRBT 7004	450	0.7	500	0.8

[i] IRB 6700-200/2.60, IRB 6700-155/2.85
[ii] IRB 6700-235/2.65, IRB 6700-205/2.80, IRB 6700-175/3.05, IRB 6700-150/3.20
[iii] IRB 6700-300/2.70, IRB 6700-245/3.00

1.5 Maintenance and troubleshooting

1.5.1 Introduction

General

The track motion requires only the minimum maintenance during operation. It has been designed to make it as easy for services as possible:

- Maintenance-free AC motor is 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 track motion. For detailed information about maintenance procedures, see *Maintenance* in the product manual.

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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 IRBT 4004/6004/7004 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 Track motion

Drives needed in robot controller

Below is a table showing the drives that are used in the robot controller together with different types of track motion.

IRBT	For IRB	Drives
4004	4400	option 907-1, drive ADU-790-A
4004	4600	option 907-1, drive ADU-790-A
6004/7004	6600/6620/6640/6700/7600	option 907-1, drive ADU-790-A

Note

The track motion uses the FB7 at robot base, option 864-1 on robot specification form, exception IRB 4400 that use SMB included in the track, as option 864-1 not avaialble for IRB 4400.

All system with 8th axis will get an extra SMB, included in the track.

Track motion type

Option	IRBT Type	Reach (m)
1000-1	4004 i	For IRB 4400/4600, with a travel length of 1.9 m. Available travel length 1,9 to 19,9 in steps of 1 m
1000-2	6004 i	For IRB 6600/6620/6640/6700, with a travel length of 1.7 m. Available travel length 1,7 to 19,7 in steps of 1 m
1000-3	7004	For IRB 7600, with a travel length of 1.7 m. Available travel length 1,7 to 19,7 in steps of 1 m

i Selection of robot type must be made, see Valid for product.

For additional travel length in steps of 1 m, see option 1001-1 below.

Manipulator colour

Option	Description	
209-1	ABB Orange Standard	
209-202	ABB Graphite White Standard	Standard colour

Additional travel length

Option	Description	Note
1001-1	(1-18) Add travel length	Chose additional travel length in meter, above the min. length under Track Motion Type. Additional length more than 6 m NOT available together with Protection Foundry, option 1008-2. The selection 1 adds 1m travel length, 2 adds 2m travel length and so on...

Continues on next page

Example of ordering a track motion IRBT 4004, with a requested travel length of 12 m:

Track Motion Type:

- 1000-1 IRBT 4004
- 1001-1 Add travel length

In this case, option 1000-1 specify a track motion with a travel length of 1.9 m, option 1001-1 adds 11 meters to that, ending up with a total travel length of 12.9 m.

External axis configuration

Option	Description	Note
1002-2	7 axis	Robot mounted on the track, equipped with Robot Servo Gun, as axis 7. See Product Specification for IRB 6600/7600, chapter Servo Gun.

Valid for product

Due to different options for different robots must the used robot be specified.

Option	Description	Note
1086-1	IRB 4400	Track motion adapted for IRB 4400.
1086-2	IRB 4600	Track motion adapted for IRB 4600.
1086-6	IRB 6650S	Track motion adapted for IRB 6650S.
1086-7	IRB 6620	Track motion adapted for IRB 6620.
1086-8	IRB 6640	Track motion adapted for IRB 6640.
1086-9	IRB 6700	Track motion adapted for IRB 6700

Type of carriage

Option	Description	Note
1088-1	Mirrored carriage [i]	A standard track with mirrored carriage and cable chain.
1088-2	Double carriage [ii]	A track with two carriages. Min travel length 3.3/3.7 m, max travel length 18.3/18.7 m. Additional travel length max. 15 m for protection standard and max. 4 m for protection Foundry. Both carriages will get the same selected options.

[i] To be used when two tracks are installed in a opposite way, against each other, see *Installation of standard and mirrored track on page 27*. No needs for mirrored carriage option for double track as the double track are symmetrical.

[ii] Two different types of manipulators can be used on a double track. In those cases a quotation is needed. Both manipulators must have the same selection of options e.g. MH and type of communication. It's not allowed to have e.g. one Spot Welding robot and one Material Handling robot on a track with double carriages. This option overrides the defult value for min/max travel length specified for option 1000-X. Valid travel lengths shown above.

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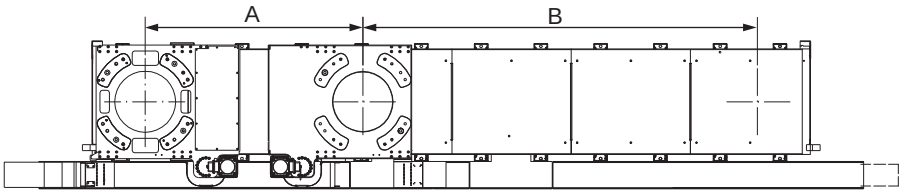
2.2 Track motion
Continued



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Pos	Description
A	IRBT 4004= 1200 mm
	IRBT6004/7004= 1780 mm
B	IRBT 4004, Min 3.7 m
	IRBT6004/7004, Min 3.3 m

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.

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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

TrackMotion cable - Length

Option	Type
1004-1	7 m
1004-2	15 m
1004-3	22 m

Note

30 m floor cable not available for track motion, due to too long cables, therefore not to be selected for robot in the Robot Specification Form.

Lubrication

Option	Type	Description
1005-1	Prepared for local adaptation	Prepared for customers own lubrication system. All tubes and so on are mounted on the track. A local lubrication system has to be connected by the customer, according to requirements and Figure below. Requirements: Max working pressure: 350 bar Quantity of grease: 0.4 cm3 / hour Type of grease: See Product Manual, 3HAC028506-001. Regarding type of connection see Figure below.

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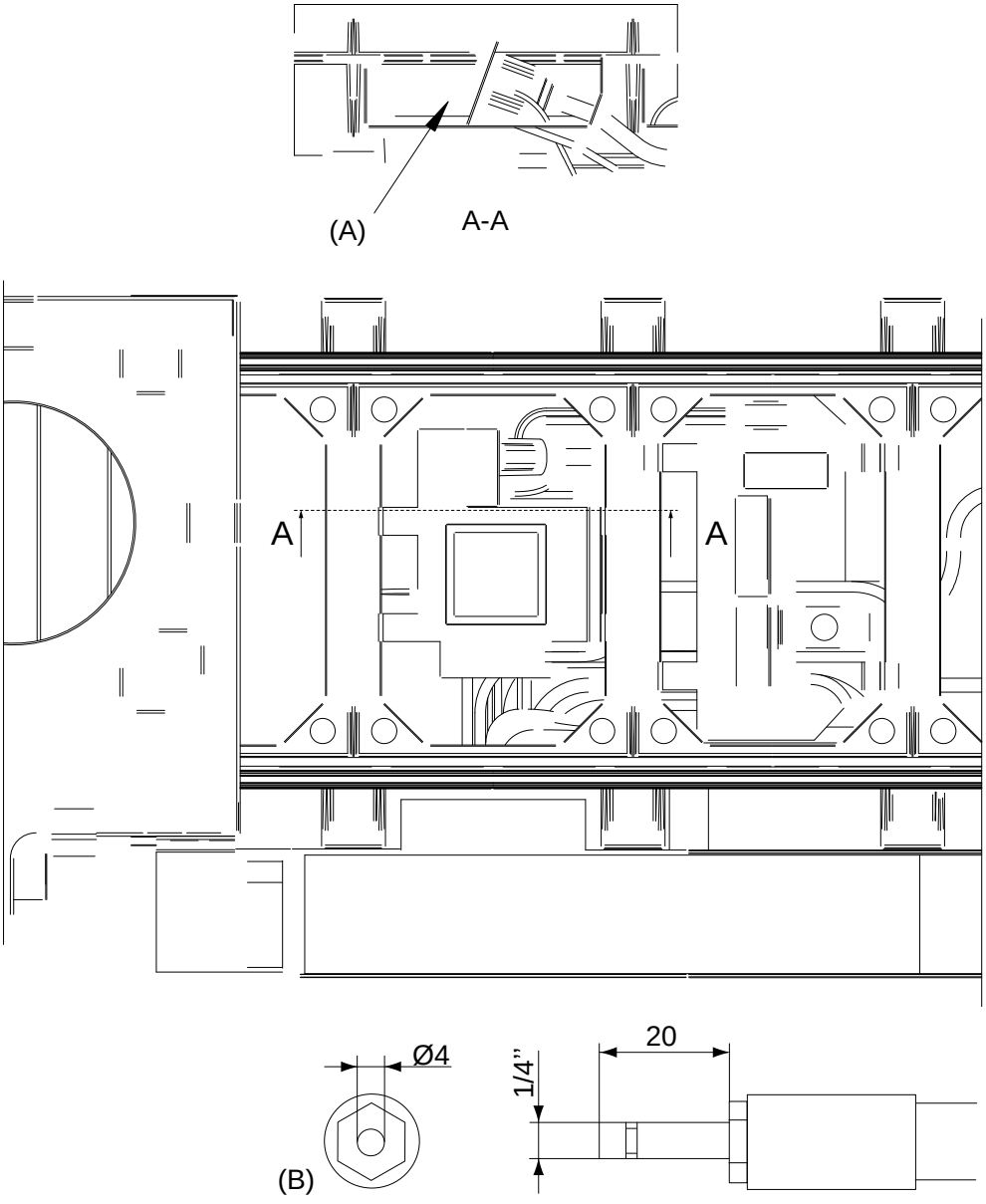

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Pos	Description
A	Location of connection for local lubrication system
B	Dimensions of customer connection

1005-2	Central system	A fully automatic lubrication system, see figure below. The System is delivered with a 15 m long cable (from controller to lubrication unit) and a 10 m long hose (from lubrication unit to connection point at the track). Mandatory with protection Foundry option 1008-2. For more detailed information, see Product Manual, 3HAC028506-001
1005-3	Standard	Requires manual lubrication of the track with a grease gun and brush. See Product Manual, chapter Maintenance.

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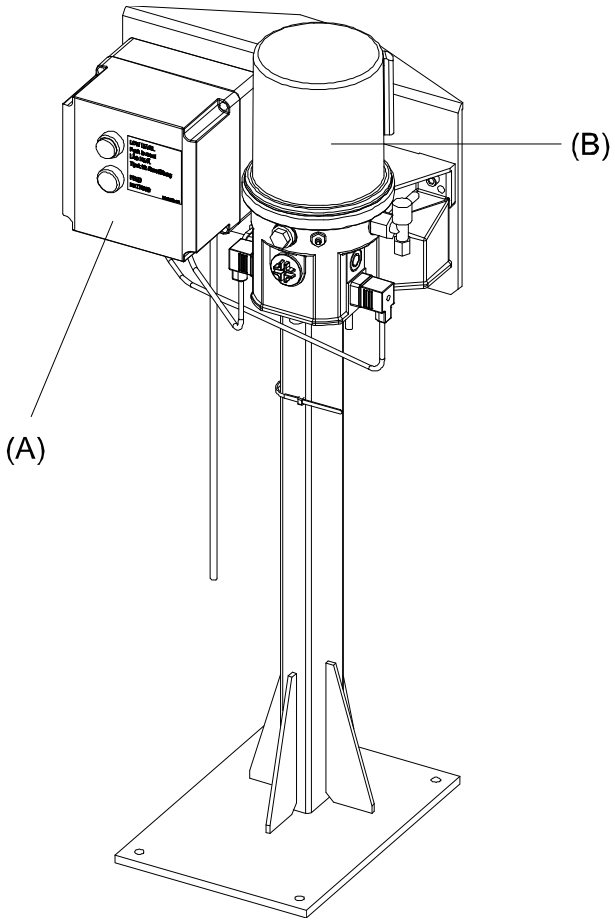
2.3 Floor cables
Continued



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Pos	Description
A	Control unit
B	Grease container

Safe Move

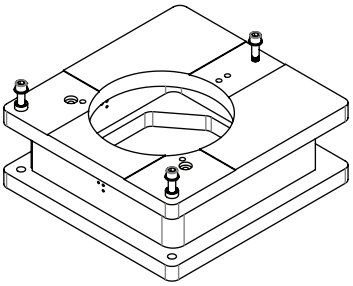
To indicating the position of the carriage, can Safe Move be used, option 810-2.
For more detailed information see *Product specification - Controller software IRC5*.

Continues on next page

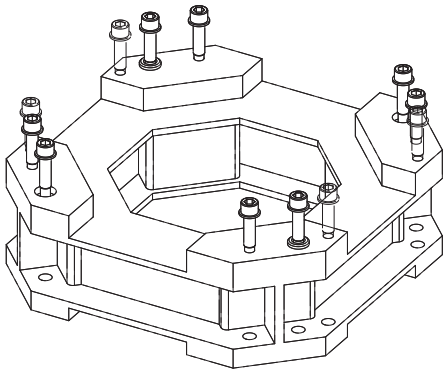
Robot pedestal

Option	Type	Description
1007-2	H= 250 mm	To raise the robot 250 mm from the carriage table
1007-4	H= 500 mm	To raise the robot 500 mm from the carriage table. Not together with IRBT 7004, option 1000-3

Screws, washers and guide sleeves are included.



IRB 4400/4600



IRB 6650S/6620/6640

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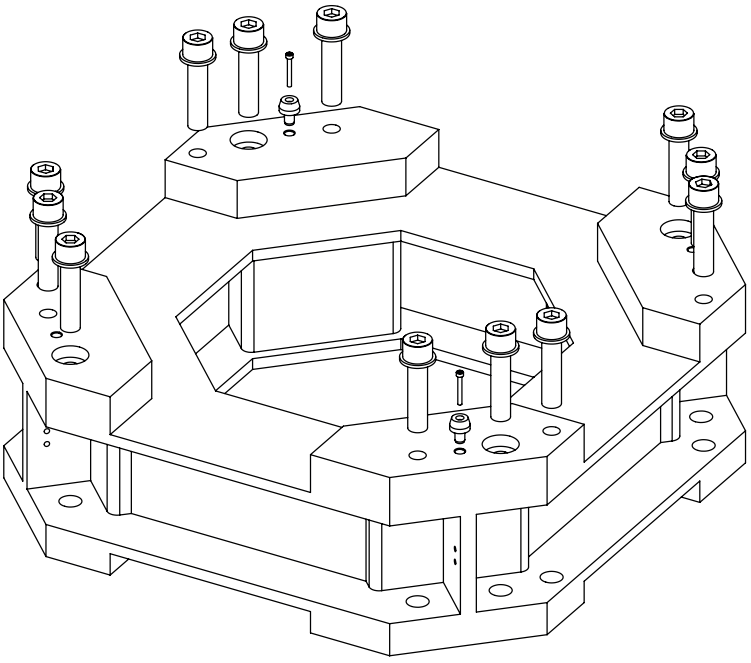

IRB 6700

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2.3 Floor cables
Continued

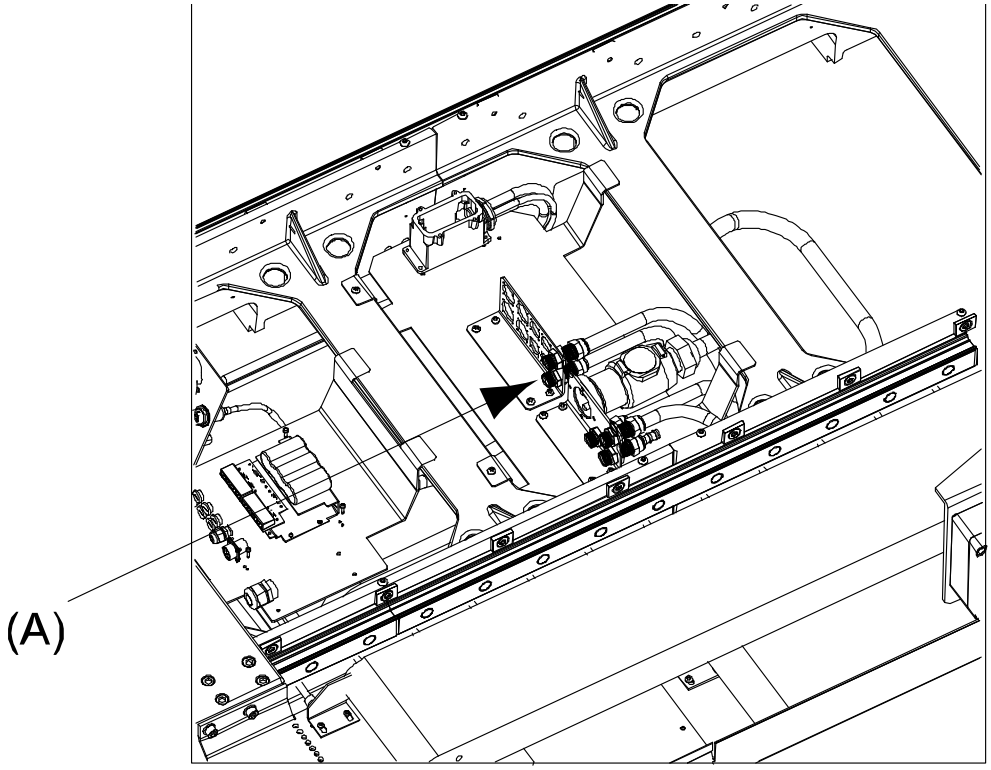
Protection

Option	Type	Note
1008-1	Standard	IP65
1008-2	Foundry	In addition to the standard protection version, that is designed for tough environment, the foundry protection version has further improved level of protection against more harsh environments and is recommended where the system is exposed to more particles (particularly hot) and dust or more corrosive environment than dry air at normal room temperature. The extra protection for foundry version is realized by: • guide rails have additional surface treatment protection • metallic covers on cable chain links • protection cover at harness entrance into the track • central lubrication system (always included in Foundry version) Max travel length 7.7m (7.9 m)

2.4 DressPack Floor

Media hoses

Option	Description
1012-1	One additional hose, customer connection G ½" thread
1012-2	Four additional hoses, customer connection G ½" thread



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Pos	Description
A	Connection point of media hoses.

Spot welding media supply

Option	Description	Note
1013-1 [i]	Power cable, 35 mm2	NOT together with IRBT 4004 [option 1000-1]

[i] Corresponds to option 791-1/-2 in the Robot Specification Form

Split box

Option	Description	Note
1066-1 [i]	Split box cable	NOT together with IRBT 4004 [option 1000-1]

[i] Corresponds to option 797-1/-2/-3/-4 in the Robot Specification Form.

Continues on next page

Customer communication

Option	Description	Note
1014-1 [i]	CP/CS Parallel	For IRBT 4004. Not together with option 1086-2, IRB 4600.
1014-2 [i]	CP/CS CANBUS	For IRBT 6004, IRBT 4004 with option 1086-2 and IRBT 7004
1014-3 [i]	CP/CS ProfiBus	For IRBT 6004 and IRBT 7004
1014-5 [i]	CP/CS Parallel	For IRBT 6004, IRBT 7004. For IRBT 4004 if option 1086-2, IRB 4600 is selected
1014-6	CP/CS Ethernet	For IRBT 4004, 6004 and 7004, CP/CS Parallel included. Not togheter with option 1086-1, IRB 4400.

i Corresponds to option 94-X, 90-X, 92-X and 859-X in the Robot Specification Form.

2.5 User documentation

User documentation

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

Tip

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

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