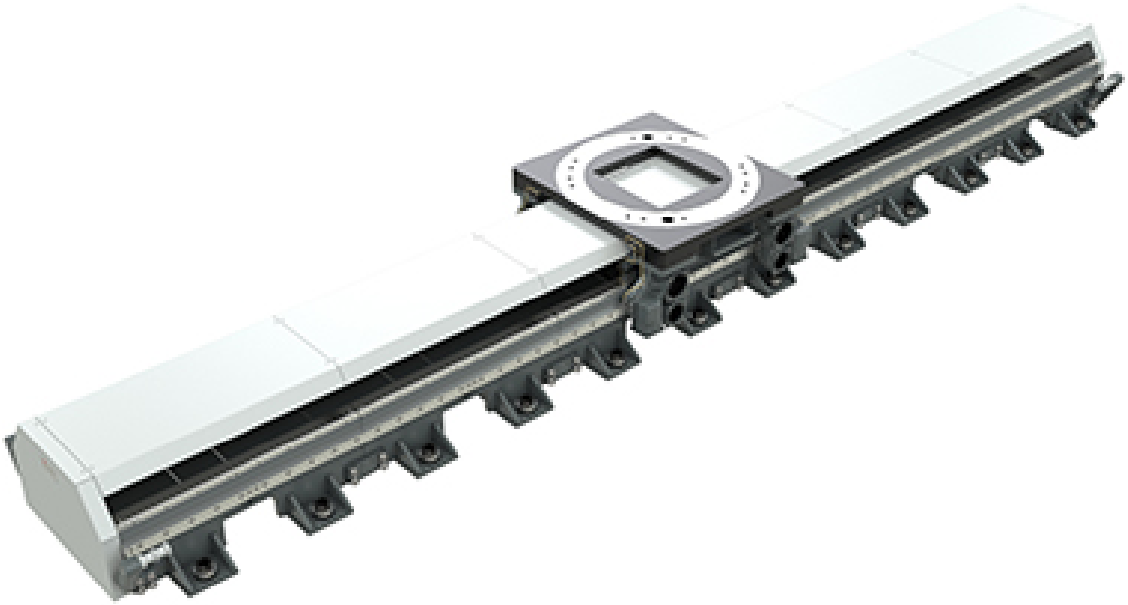
ROBOTICS

Product manual

IRT 710 OmniCore



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Product manual

IRT 710 OmniCore

OmniCore

Document ID: 3HKA00000213430-001

Revision: B

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Keep for future reference.

Additional copies of this manual may be obtained from ABB.

Original instructions.

Table of contents

Overview of this manual

About this manual

This manual contains instructions for:

- mechanical and electrical installation of the IRT 710 OmniCore
- maintenance of the IRT 710 OmniCore
- mechanical and electrical repair of the IRT 710 OmniCore

The robot described in this manual has the following protection types:

- *Standard*

Product manual scope

The manual covers all variants and designs of the IRT 710 OmniCore. Some variants and designs may have been removed from the business offer and are no longer available for purchase.

Usage

This manual should be used during:

- installation and commissioning, from lifting the product to its work site and securing it to the foundation, to making it ready for operation
- maintenance work
- repair work
- decommissioning work

Note

The Track Motion is designed for intermittent motion. The minimum duty cycle interval time to avoid damage to the reducer or driven model is recommended as 14 seconds.

If any more critical application is needed, please contact edp.customersupport@cn.abb.com.

Note

It is the responsibility of the integrator to conduct a risk assessment of the final application.

It is the responsibility of the integrator to provide safety and user guides for the robot system.

Who should read this manual?

This manual is intended for:

- installation personnel
- maintenance personnel
- repair personnel.

Continues on next page

Continued

Prerequisites

A maintenance/repair/installation craftsman working with an ABB robot must:

- be trained by ABB and have the required knowledge of mechanical and electrical installation/repair/maintenance work.
- be trained to respond to emergencies or abnormal situations.

References

Documentation referred to in the manual, is listed in the table below.

For OmniCore

Document name	Document ID
Product spare parts- IRT 710	3HKA00000213432
Product specification - IRT 710	3HKA00000214178
Product manual - V250XT_Type A	3HAC084692-001
Product manual - OmniCore V250XT Type B	*3HAC087112-001*
Product manual - OmniCore V400XT	*3HAC081697-001*
Operating manual - OmniCore	*3HAC065036-001*
Technical reference manual - System parameters	*3HAC065041-001*
Application manual - Additional axes RW7	3HAC082287-001
IRB 7600 product manual	3HAC056372-001
IRB 6740 product manual	3HAC085701-001
IRB 6730 product manual	3HAC085699-001
IRB 6720 product manual	3HAC085697-001
IRB 6710 product manual	3HAC085695-001
IRB 6700 product manual	3HAC044270-001
IRB 6650 product manual	3HAC055424-001
IRB 5720 product manual	3HAC079195-001
IRB 5710 product manual	3HAC075184-001
IRB 4600 product manual	3HAC033453-001
IRB 4400 product manual	3HAC022032-001
IRB 760 product manual	3HAC039838-001
IRB 660 product manual	3HAC025755-001
IRB 460 product manual	3HAC039842-001

Revisions

Revision	Description
A	First edition.

Continues on next page

Revision	Description
B	• Added a note to *Usage on page 9*. • Added a note to *Safety during troubleshooting on page 55*. • Added a note for IRB 7600 to *IRT 710 OmniCore carriage overview on page 77*. • Added new special tool assisted tool set and the drawing in *Assembling the sections on page 122*. • Removed the lubrication feedback in HPS and updated the lubrication feedback in EPS, see *Lubrication on page 192* • Updated the cam roller replenishing procedure in *Replenishing oil, cam roller unit on page 235*. • Added base frame configuration, robot on track in *Track motion IRT 710 OmniCore layout on page 81*. • Updated the table in *Number of sections on pallets on page 72*. • Updated the lubricant from CASTROL Longtime PD0 to CASTROL Tribol GR 100-0 PD. • Minor correction.

Product documentation

Categories for user documentation from ABB Robotics

The user documentation from ABB Robotics is divided into a number of categories. This listing is based on the type of information in the documents, regardless of whether the products are standard or optional.

Tip

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

Product manuals

Manipulators, controllers, DressPack, and most other hardware is delivered with a **Product manual** that generally contains:

- Safety information.
- Installation and commissioning (descriptions of mechanical installation or electrical connections).
- Maintenance (descriptions of all required preventive maintenance procedures including intervals and expected life time of parts).
- Repair (descriptions of all recommended repair procedures including spare parts).
- Calibration.
- Troubleshooting.
- Decommissioning.
- Reference information (safety standards, unit conversions, screw joints, lists of tools).
- Spare parts list with corresponding figures (or references to separate spare parts lists).
- References to circuit diagrams.

Technical reference manuals

The technical reference manuals describe reference information for robotics products, for example lubrication, the RAPID language, and system parameters.

Application manuals

Specific applications (for example software or hardware options) are described in **Application manuals**. An application manual can describe one or several applications.

An application manual generally contains information about:

- The purpose of the application (what it does and when it is useful).
- What is included (for example cables, I/O boards, RAPID instructions, system parameters, software).
- How to install included or required hardware.
- How to use the application.

Continues on next page

- Examples of how to use the application.

Operating manuals

The operating manuals describe hands-on handling of the products. The manuals are aimed at those having first-hand operational contact with the product, that is production cell operators, programmers, and troubleshooters.

How to read the product manual

Reading the procedures

The procedures contain all information required for the installation or service activity and can be printed out separately when needed for a certain service procedure.

Safety information

The manual includes a separate safety chapter that must be read through before proceeding with any service or installation procedures. All procedures also include specific safety information when dangerous steps are to be performed.

Read more in the chapter *Safety on page 15*.

Illustrations

The product is illustrated with general figures that does not take painting or protection type in consideration.

Likewise, certain work methods or general information that is valid for several product models, can be illustrated with illustrations that show a different product model than the one that is described in the current manual.

1 Safety

1.1 Safety information

1.1.1 Limitation of liability

Limitation of liability

Any information given in this manual regarding safety must not be construed as a warranty by ABB that the IRT 710 OmniCore (hereinafter, the Product) will not cause injury or damage even if all safety instructions are complied with.

The information does not cover how to design, install and operate a complete system, nor does it cover all peripheral equipment that can influence the safety of the entire system.

In particular, liability cannot be accepted if injury/damage has been caused for any of the following reasons:

- Use of the Product in other ways than intended.
- Incorrect operation or maintenance.
- Operation of the Product when the safety devices are defective, not in their intended location or in any other way not working.
- When instructions for operation and maintenance are not followed.
- Non-authorized design modifications made in or around the Product.
- Repairs carried out by in-experienced or non-qualified personnel.
- Foreign objects.
- Force majeure.

Nation/region specific regulations

To protect personnel, the complete system must be designed and installed in accordance with the safety requirements set forth in the standards and regulations of the country where the Product is installed.

To be observed by the supplier of the complete system

The integrator is responsible that the safety devices necessary to protect people working with the Product are designed and installed correctly.

When integrating the Product with external devices and machines:

- The supplier of the complete system must ensure that all circuits used in the safety function are interlocked in accordance with the applicable standards for that function.
- The supplier of the complete system must ensure that all circuits used in the emergency stop function are interlocked in a safe manner, in accordance with the applicable standards for the emergency stop function.

Continues on next page

1.1.1 Limitation of liability
Continued

The integrator of the final application is required to perform an assessment of the hazards and risks (HRA).

> **Note**
>
> The integrator is responsible for the safety of the final application.

Safe access

The Product shall be designed to allow safe access to all areas where intervention is necessary during operation, adjustment, and maintenance.

Where it is necessary to perform tasks within the safeguarded space there shall be safe and adequate access to the task locations.

Safety zones, which must be crossed before admittance, must be set up in front of the Product's working space. Light beams or sensitive mats are suitable devices.

Turntables or the like should be used to keep the operator out of the Product's working space.

A safety fence is recommended to ensure safeguarded space. Sufficient space must be provided around the Product to protect those working with or on it from hazards such as crushing.

The fence or enclosure must be dimensioned to withstand the force created if the load being handled by the Product is dropped or released at maximum speed.

Also consider the maximum possible impact caused by a breaking or malfunctioning rotating tool or other device fitted to the Product.

Safe handling

Users shall not be exposed to hazards, including slipping, tripping, and falling hazards.

It must be possible to safely turn off tools, such as milling cutters, etc. Make sure that guards remain closed until the cutters stop rotating.

It should be possible to release parts by manual operation (valves).

Safe design

Emergency stop buttons must be positioned in easily accessible places so that the Product can be stopped quickly. If any of the buttons do not stop all the product workcell motion, each emergency stop button must be marked, if more than one is provided, to indicate its designated safety function.

Grippers/end effectors must be designed so that they retain work pieces in the event of a power failure or a disturbance to the controller.

Unauthorized modifications of the originally delivered product/system are prohibited. Without the consent of ABB it is forbidden to attach additional parts through welding, riveting, or drilling of new holes into the castings. The strength could be affected.

> **CAUTION**
>
> Ensure that a gripper is prevented from dropping a work piece, if such is used.

1.1.2 Requirements on personnel

General

Only personnel with appropriate training are allowed to install, maintain, service, repair, and use the robot. This includes electrical, mechanical, hydraulics, pneumatics, and other hazards identified in the risk assessment.

Persons who are under the influence of alcohol, drugs or any other intoxicating substances are not allowed to install, maintain, service, repair, or use the robot.

The plant liable must make sure that the personnel is trained on the robot, and on responding to emergency or abnormal situations.

Personal protective equipment

Use personal protective equipment, as stated in the instructions.

1.1.3 Safeguarded space

Light curtain to protect hands from entering hazardous areas

d<40 mm

When the detection diameter of the light curtain sensor **d**<40 mm, this type of light curtain can be used to protect the hands and fingers from entering the dangerous area.

The calculation formula corresponding to the minimum safety distance is:

S = K*T+C

K = 2000 mm/s (Approaching speed of the hands)

T = The maximum time for the machine to stop + Light curtain response time

C = 8(d-14) (Traverse distance)

d = Light curtain detection capability

d>40 mm

When the detection diameter of the sensor **d**>40 mm, it cannot detect the intrusion of the hand, but can only detect the body.

The calculation formula corresponding to the minimum safety distance is:

S = K*T+C

K = 2000 mm/s (Approaching speed of the walking human)

T = The maximum time for the machine to stop + Light curtain response time

C = 850 mm (Traverse distance)

d = Light curtain detection capability

Note

If the recalculated value ≤ 500mm, then S should be set as 500 mm.

Note

The used light curtain should follow type 4 from IEC61496 standards.

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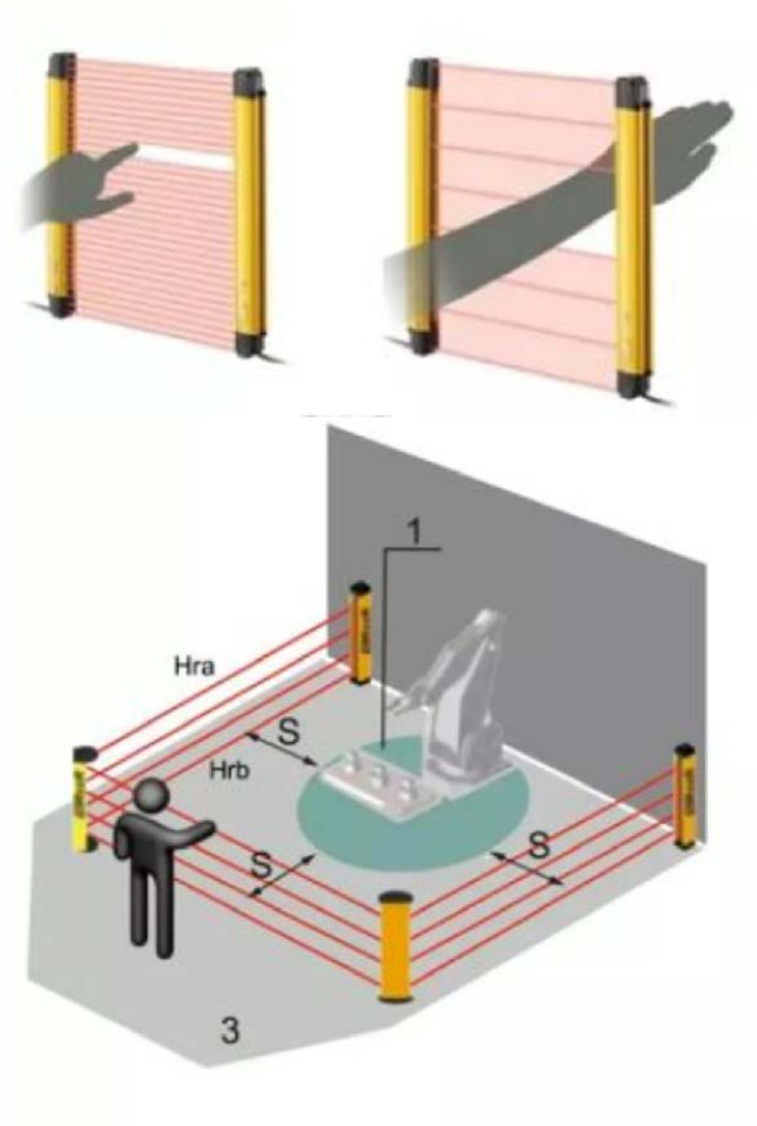

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Safety door with interlock device for mechanical safety fence

The calculation formula corresponding to the minimum safety distance is:

S = K*T+C

K = 2000 mm/s (Approaching speed of the walking human)

T = The maximum time for the machine to stop + Interlock response time

C = 850 mm (Traverse distance)

Note

If the recalculated value ≤ 500mm, then S should be set as 500 mm.

Note

The interlock device should follow the dual channel requirements.

Continues on next page

1.1.3 Safeguarded space
Continued

Safety fence to protect body from entering hazardous areas

Regular openings for persons of 14 years of age and above

The following table gives s_r for regular openings for persons of 14 years of age and above.

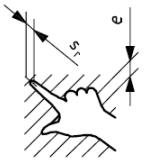
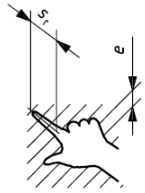
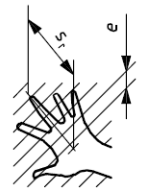
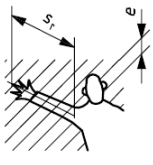
The dimensions of openings, e, correspond to the side of a square opening, the diameter of a round opening and the narrowest dimension of a slot opening.

For openings > 120 mm, safety distances in accordance with 4.2.2 shall be used.

Note

Measures for children's protection against strangulation are not covered by this International Standard.

Reaching through regular openings — Persons of 14 years of age and above

Part of body	Illustration	Opening	Safety distance, s_r		
			Slot	Square	Round
Fingertip	 xx2200000857	e≤4	≥2	≥2	≥2
		4<e≤6	≥10	≥5	≥5
Finger up to knuckle joint	 xx2200000858	6<e≤8	≥20	≥15	≥5
		8<e≤10	≥80	≥25	≥20
Hand	 xx2200000859	10<e≤12	≥100	≥80	≥80
		12<e≤20	≥120	≥120	≥120
		20<e≤30	≥850 [i]	≥120	≥120
Arm up to junction with shoulder	 xx2200000860	30<e≤40	≥850	≥200	≥120
		40<e≤100	≥850	≥850	≥850

[i] If the length of the slot opening is ≤ 65 mm, the thumb will act as a stop and the safety distance can be reduced to 200 mm.

Note

The height of the fence should be at least or higher than 2200 mm.

Continues on next page

Note

The height of the opening between the ground and the bottom of the fence should no exceed 180 mm.

1.2 Safety actions

1.2.1 Personal protective equipment

Note

Always wear non-slip safety shoes for any commissioning/maintenance/repair procedure.

1.2.2 Fire extinguishing

Note

Use a CARBON DIOXIDE (CO_2) extinguisher in the event of a fire in the Product or controller.

1.2.3 Emergency release

Description

In an emergency situation, the brakes can be released manually by pushing a brake release button.

How to release the brakes is described in the section *Releasing the brake on page 119*.

Increased injury

Before releasing the brakes, make sure that the weight of any part of the Product does not increase the pressure on the trapped person, further increasing any injury.

DANGER

When releasing the holding brakes, the Product parts may move very quickly and sometimes in unexpected ways.

Make sure no personnel is near or beneath the Product.

1.2.4 Make sure that the main power has been switched off

Description

Working with high voltage is potentially lethal. Persons subjected to high voltage may suffer cardiac arrest, burn injuries, or other severe injuries. To avoid these personal injuries, switch off the main power on the controller before proceeding work.

1.3 Safety risks

1.3.1 Safety risks during installation and service work

Requirements on personnel

Only persons who know the Product and are trained in the operation and handling of the Product are allowed to maintain the Product. Persons who are under the influence of alcohol, drugs or any other intoxicating substances are not allowed to install, maintain, repair, or use the Product.

- Those in charge of operations must make sure that safety instructions are available for the installation in question.
- Those who install or service/maintain the Product must have the appropriate training for the equipment in question and in any safety matters associated with it.
- Personnel should be trained on responding to emergency or abnormal situations.

General risks during installation and service

The instructions in the product manual must always be followed.

- Never turn the power on to the Product before it is properly fixed and bolted to its foundation/support.
- Make sure that no one else can turn on the power to the controller and Product while you are working with the system. A good method is to always lock the main switch on the controller cabinet with a safety lock.
- Make sure that no one else can turn on the power to the controller and Product while you are working with the system. A good method is to remove the power cable to the controller.
- If the Product is installed at a height, hanging, or other than standing directly on the floor, there may be additional risks than those for a Product standing directly on the floor.
- Energy stored in the Product for the purpose of counterbalancing certain axes may be released if the Product, or parts thereof, are dismantled.
- Never use the Product as a ladder, which means, do not climb on the controller, motors, or other parts during service work. There is a risk of slipping because of the high temperature of the motors and oil spills that can occur on the Product. There is also a risk of the Product being damaged.
- To avoid damaging the Product, make sure that there are no loose screws, turnings, or other parts inside the Product after work has been performed.

Safety risks during operational disturbances

Corrective maintenance must only be carried out by qualified personnel who are familiar with the entire installation as well as the special risks associated with its different parts.

Continues on next page

If the working process is interrupted, extra care must be taken due to risks other than those associated with regular operation. Such an interruption may have to be rectified manually.

Spare parts and special equipment

ABB does not supply spare parts and special equipment which have not been tested and approved by ABB. The installation and/or use of such equipment could negatively affect the structural properties of the Product and as a result of that affect the active or passive safety operation. ABB is not liable for damages caused by the use of non-original spare parts and special equipment. ABB is not liable for damages or injuries caused by unauthorized modifications to the Product.

Connection of external safety devices

Apart from the built-in safety functions, the Product is also supplied with an interface for the connection of external safety devices. An external safety function can interact with other machines and peripheral equipment via this interface. This means that control signals can act on safety signals received from the peripheral equipment as well as from the Product.

Personal protective equipment

Always use suitable personal protective equipment, based on the risk assessment for the Product installation.

Allergenic material

See *Environmental information on page 381* for specification of allergenic materials in the Product, if any.

1.3.2 Moving equipment is potentially lethal

Description

Any moving equipment is a potentially lethal machine.

When running, the Product may perform unexpected and sometimes irrational movements. Moreover, all movements are performed with great force and may seriously injure any personnel and/or damage any piece of equipment located within the working range of the Product.

Safe handling

	Action	Note
1	Before attempting to run the Product, make sure all emergency stop equipment is correctly installed and connected.	Emergency stop equipment such as gates, tread mats, light curtains, etc.
2	Usually the hold-to-run function is active only in manual full speed mode. To increase safety it is also possible to activate hold-to-run for manual reduced speed with a system parameter. The hold-to-run function is used in manual mode, not in automatic mode.	How to use the hold-to-run function is described in section *How to use the hold-to-run function* in the *Operating manual - OmniCore*.
3	Make sure no personnel are present within the working range of the Product before pressing the start button.	

1.3.3 First test run may cause injury or damage

Description

After installation and performing service activities, there are several safety risks to take into consideration before the first test run.

Safe handling

Use this procedure when performing the first test run after installation, maintenance, or repair.

DANGER

Running the Product without fulfilling the following aspects, may involve a risk of injury and cause severe damage to the Product.

	Action
1	Remove all tools and foreign objects from the Product and its working area.
2	Verify that the Product is properly secured to its position by all screws, before it is powered up.
3	Verify that any safety equipment installed to secure the position or restrict the Product motion during service activity is removed.
4	Verify that the fixture and work piece are well secured, if applicable.
5	Install all safety equipment properly.
6	Make sure all personnel are standing at a safe distance from the Product, and is out of its reach behind safety fences, or similar.
7	Verify that all required covers or paddings are properly secured to the Product, if any.
8	If maintenance or repair has been done, pay special attention to the function of the part that was serviced.

Collision risks

CAUTION

When programming the movements of the Product, always identify potential collision risks before the first test run.

1.3.4 Work inside the working range of the Product

WARNING

If work must be carried out within the work area of the Product, then the following points must be observed:

- The operating mode selector on the controller must be in the manual mode position to render the three-position enabling device operational and to block operation from a computer link or remote control panel.
- Also, be aware of any danger that may be caused by rotating tools or other devices mounted on the Product or inside the cell. Keep away from rotating and moving parts to not get entangled with hair or clothing.
- Keep clear of moving parts so that limbs, hands, or fingers do not get trapped or crushed by the Product.
- To prevent anyone else from taking control of the Product, always put a safety lock on the cell door and bring the three-position enabling device with you when entering the working space.

WARNING

NEVER, under any circumstances, stay beneath any part of the Product! There is always a risk that the Product will move unexpectedly when its parts are moved using the three-position enabling device or during other work inside the working range of the Product.

1.3.5 Enabling device and hold-to-run functionality

Three-position enabling device

The three-position enabling device is a manually operated, constant pressure push-button which, when continuously activated in one position only, allows potentially hazardous functions but does not initiate them. In any other position, hazardous functions are stopped safely.

The three-position enabling device is of a specific type where you must press the push-button only half-way to activate it. In the fully in and fully out positions, operating the Product is impossible.

Note

The three-position enabling device is a push-button located on the teach pendant which, when pressed halfway in, switches the system to MOTORS ON. When the enabling device is released or pushed all the way in, the Product switches to the MOTORS OFF state.

To ensure safe use of the teach pendant, the following must be implemented:

- The enabling device must never be rendered inoperational in any way.
- During programming and testing, the enabling device must be released as soon as there is no need for the Product to move.
- Anyone entering the working space of the Product must always hold the teach pendant. This is to prevent anyone else from taking control of the Product without his/her knowledge.

Hold-to-run function

The hold-to-run function allows movement when a button connected to the function is actuated manually and immediately stops any movement when released. The hold-to-run function can only be used in manual mode.

How to operate the hold-to-run function is described in *Operating manual - OmniCore*.

1.3.6 Risks associated with live electric parts

Voltage related risks, general

Work on the electrical equipment of the Product must be performed by a qualified electrician in accordance with electrical regulations.

Although troubleshooting may, on occasion, need to be carried out while the power supply is turned on, the Product must be turned off (by setting the main switch to OFF) when repairing faults, disconnecting electric leads, and disconnecting or connecting units.

The main supply to the Product must be connected in such a way that it can be turned off from outside the working space of the Product.

Make sure that no one else can turn on the power to the controller and Product while you are working with the system. A good method is to always lock the main switch on the controller cabinet with a safety lock.

The necessary protection for the electrical equipment and Product during installation, commissioning, and maintenance is guaranteed if the valid regulations are followed.

Voltage related risks, product

A danger of low voltage is associated with the Product in:

- The power supply for the motors.
- The user connections for tools or other parts of the installation.

Voltage related risks, tools, material handling devices, etc.

Tools, material handling devices, etc., may be live even if the Product system is in the OFF position. Power supply cables which are in motion during the working process may be damaged.

1.3.7 Hot parts may cause burns

Description

During normal operation, many parts become hot. Touching these may cause burns.

There is also a risk of fire if flammable materials are put on hot surfaces.

Safe handling

Always use your hand, at some distance, to feel if heat is radiating from the potentially hot component before actually touching it.

Wait until the potentially hot component has cooled if it is to be removed or handled in any other way.

Do not put anything on hot metal surfaces, e.g. paper or plastic.

1.3.8 Brake testing

When to test

During operation, the holding brake of each axis normally wears down. A test can be performed to determine whether the brake can still perform its function.

How to test

The function of the holding brake of each axis motor may be verified as described below:

1. Run each axis to a position where the combined weight of the Product and any load is maximized (maximum static load).
2. Switch the motor to the MOTORS OFF.
3. Try to move the carriage manually.
4. Inspect and verify that the axis maintains its position.

   If the manipulator does not change position as the motors are switched off, then the brake function is adequate.

Note

It is recommended to run the service routine *BrakeCheck* as part of the regular maintenance, see the operating manual for the robot controller.

For Products with the option SafeMove, the *Cyclic Brake Check* routine is recommended. See the manual for SafeMove in *References on page 10*.

1.3.9 Safety risks during handling of batteries

Description

Under normal conditions of use, the electrode materials and liquid electrolyte in the batteries are not exposed to the outside, provided the battery integrity is maintained and seals remain intact.

There is a risk of exposure only in case of abuse (mechanical, thermal, electrical) which leads to the activation of safety valves and/or the rupture of the battery container. Electrolyte leakage, electrode materials reaction with moisture/water or battery vent/explosion/fire may follow, depending upon the circumstances.

Note

Appropriate disposal regulations must be observed.

Safe handling

Use safety glasses when handling the batteries.

In the event of leakage, wear rubber gloves and chemical apron.

In the event of fire, use self-contained breathing apparatus.

Do not short circuit, recharge, puncture, incinerate, crush, immerse, force discharge or expose to temperatures above the declared operating temperature range of the product. Risk of fire or explosion.

Operating temperatures are listed in *Pre-installation procedure on page 71*.

1.3.10 Safety risks during work with gearbox lubricants (oil or grease)

Description

When handling gearbox lubricants, there is a risk of both personal injury and product damage occurring. The following safety information must be regarded before performing any work with lubricants in the gearboxes.

Note

When handling oil, grease, or other chemical substances the safety information of the manufacturer must be observed.

Note

When aggressive media is handled, an appropriate skin protection must be provided. Gloves and goggles are recommended.

Note

Appropriate disposal regulations must be observed.

Note

Take special care when handling hot lubricants.

Safe handling

Warning	Description	Elimination/Action
 **Hot oil or grease**	Changing and draining gearbox oil or grease may require handling hot lubricant heated up to 90 °C.	Make sure that protective gear like goggles and gloves are always worn during this activity.
 **Allergic reaction**	When working with gearbox lubricant there is a risk of an allergic reaction.	Make sure that protective gear like goggles and gloves are always worn.
 **Possible pressure build-up in gearbox**	When opening the oil or grease plug, there may be pressure present in the gearbox, causing lubricant to spray from the opening.	Open the plug carefully and keep away from the opening. Do not overfill the gearbox when filling.

Continues on next page

Warning	Description	Elimination/Action
 **Do not overfill**	Overfilling of gearbox lubricant can lead to internal over-pressure inside the gearbox which in turn may: • damage seals and gaskets • completely press out seals and gaskets • prevent the parts of the Product from moving freely.	Make sure not to overfill the gearbox when filling it with oil or grease. After filling, verify that the level is correct.
 **Specified amount depends on drained volume**	The specified amount of oil or grease is based on the total volume of the gearbox. When changing the lubricant, the amount refilled may differ from the specified amount, depending on how much has previously been drained from the gearbox.	After filling, verify that the level is correct.
 **Contaminated oil in gear boxes**	When draining the oil make sure that as much oil as possible is drained from the gearbox. The reason for this is to drain as much oil sludge and metal chips as possible from the gearbox. The magnetic oil plugs will take care of any remaining metal chips.	

1.4 Safety signals and symbols

1.4.1 Safety signals in the manual

Introduction to safety signals

This section specifies all safety signals used in the user manuals. Each signal consists of:

- A caption specifying the hazard level (DANGER, WARNING, or CAUTION) and the type of hazard.
- Instruction about how to reduce the hazard to an acceptable level.
- A brief description of remaining hazards, if not adequately reduced.

Hazard levels

The table below defines the captions specifying the hazard levels used throughout this manual.

Symbol	Designation	Significance
	DANGER	Signal word used to indicate an imminently hazardous situation which, if not avoided, will result in serious injury.
	WARNING	Signal word used to indicate a potentially hazardous situation which, if not avoided, could result in serious injury.
	ELECTRICAL SHOCK	Signal word used to indicate a potentially hazardous situation related to electrical hazards which, if not avoided, could result in serious injury.
	CAUTION	Signal word used to indicate a potentially hazardous situation which, if not avoided, could result in slight injury.
	NOTE	Signal word used to indicate important facts and conditions.
	TIP	Signal word used to indicate where to find additional information or how to do an operation in an easier way.

1.4.2 Safety symbols on product labels

Introduction to labels

This section describes safety symbols used on labels (stickers) on the product.

Symbols are used in combinations on the labels, describing each specific warning. The descriptions in this section are generic, the labels can contain additional information such as values.

Note

The safety and health symbols on the labels on the product must be observed. Additional safety information given by the system builder or integrator must also be observed.

Types of labels

Both the Product and the controller are marked with several safety and information labels, containing important information about the product. The information is useful for all personnel handling the Product, for example during installation, service, or operation.

The safety labels are language independent, they only use graphics. See *Symbols on safety labels on page 39*.

The information labels can contain information in text (English, German, and French).

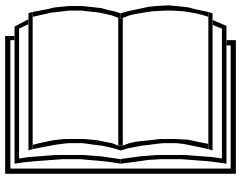
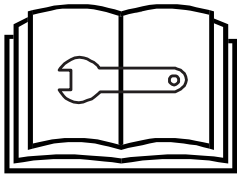
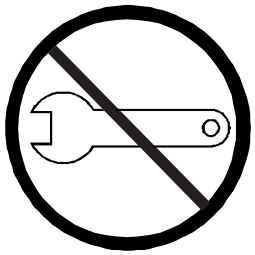
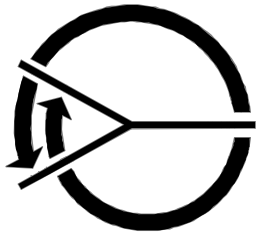
Symbols on safety labels

Symbol	Description
 xx0900000812	**Warning!** Warns that an accident *may* occur if the instructions are not followed that can lead to serious injury, possibly fatal, and/or great damage to the product. It applies to warnings that apply to danger with, for example, contact with high voltage electrical units, explosion or fire risk, risk of poisonous gases, risk of crushing, impact, fall from height, etc.
 xx0900000811	**Caution!** Warns that an accident may occur if the instructions are not followed that can result in injury and/or damage to the product. It also applies to warnings of risks that include burns, eye injury, skin injury, hearing damage, crushing or slipping, tripping, impact, fall from height, etc. Furthermore, it applies to warnings that include function requirements when fitting and removing equipment where there is a risk of damaging the product or causing a breakdown.
 xx0900000839	**Prohibition** Used in combinations with other symbols.

Continues on next page

1.4.2 Safety symbols on product labels

Continued

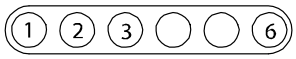
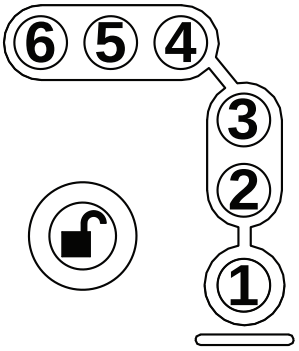
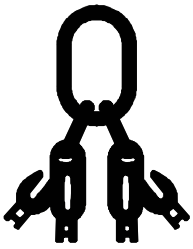
Symbol	Description
 xx0900000813	**See user documentation** Read user documentation for details. Which manual to read is defined by the symbol: • No text: *Product manual*.
 xx0900000816	**Before disassemble, see product manual**
 xx0900000815	**Do not disassemble** Disassembling this part can cause injury.
 xx0900000814	**Extended rotation** This axis has extended rotation (working area) compared to standard.
 xx0900000808	**Brake release** Pressing this button will release the brakes. This means that the parts of the Product can fall down.

Continues on next page

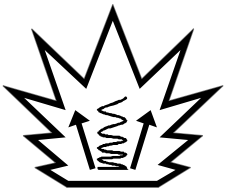
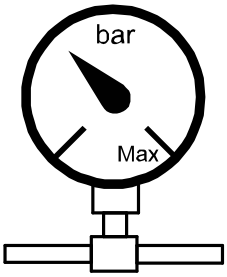
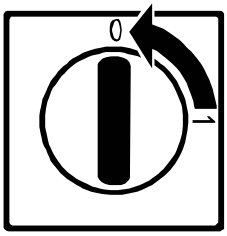
Symbol	Description
  xx0900000817	**Crush** Risk of crush injuries.
 xx0900000818  xx1300001087	**Heat** Risk of heat that can cause burns. (Both signs are used)

Continues on next page

1.4.2 Safety symbols on product labels
Continued

Symbol	Description
 xx0900000820  xx1000001140  xx2100002463	**Brake release buttons**
 xx0900000821	**Lifting bolt**
 xx1000001242	**Chain sling with shortener**
 xx0900000823	**Oil** Can be used in combination with prohibition if oil is not allowed.

Continues on next page

Symbol	Description
 xx0900000824	**Mechanical stop**
 xx1000001144	**No mechanical stop**
 xx0900000825	**Stored energy** Warns that this part contains stored energy. Used in combination with *Do not disassemble* symbol.
 xx0900000826	**Pressure** Warns that this part is pressurized. Usually contains additional text with the pressure level.
 xx0900000827	**Shut off with handle** Use the power switch on the controller.
 xx1400002648	**Do not step** Warns that stepping on these parts can cause damage to the parts.

Continues on next page

1.4.2 Safety symbols on product labels

Continued

Symbol	Description
 xx1800002608	**Must wear safety helmet**
 xx2200001149	**Must wear non-slip safety shoes**
 xx1800002609	**No entering** Warns that entering the working areas can cause injuries or damages.

1.5 Product stopping functions

Protective stop and emergency stop

The protective stops and emergency stops are described in the product manual for the controller.

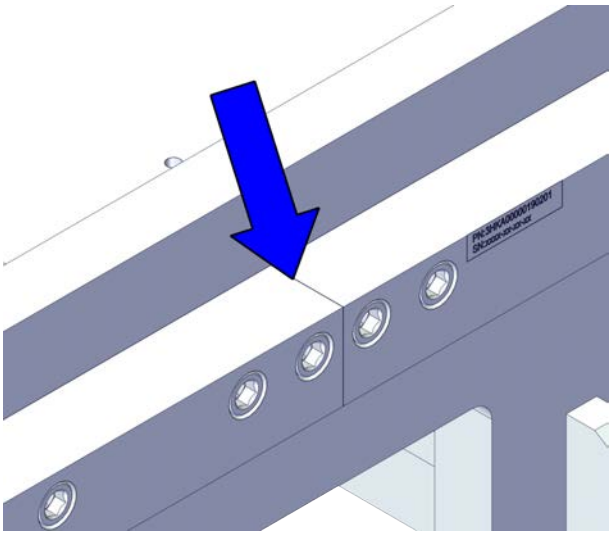
For more information see:

- *Product manual - OmniCore V400XT*

After emergency stop triggered

Check the rectangular rail where the robot stopped for:

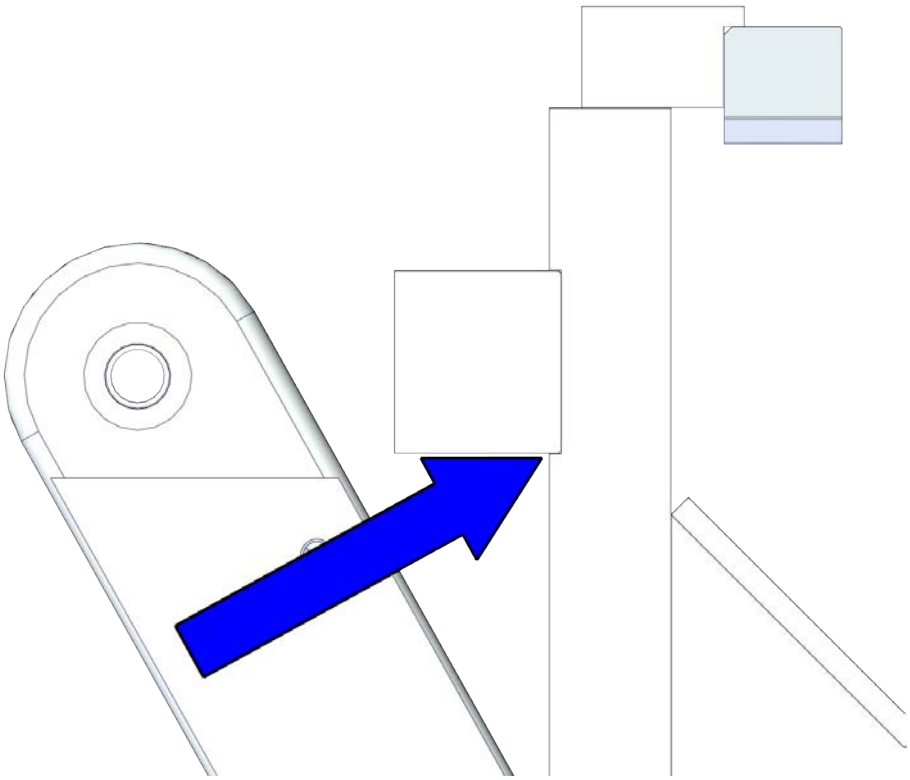
- no "step" while passing the rectangular rail junction;



xx2200001185

Continues on next page

- no gap between the rectangular rail and section.



xx2200001192

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1.6 Safety during installation and commissioning

National or regional regulations

The integrator of the robot system is responsible for the safety of the robot system.

The integrator is responsible that the robot system is designed and installed in accordance with the safety requirements set forth in the applicable national and regional standards and regulations.

The integrator of the robot system is required to perform a risk assessment.

Layout

The Product integrated to a robot system shall be designed to allow safe access to all spaces during installation, operation, maintenance, and repair.

If robot movement can be initiated from an external control panel then an emergency stop must also be available.

Consider exposure to hazards, such as slipping, tripping, and falling.

Hazards due to the working position and posture for a person working with or near the robot shall be considered.

Hazards due to noise emission from the Product needs to be considered.

Consider hazards from other equipment in the robot system, for example, that guards remain active until identified hazards are reduced to an acceptable level.

Allergenic material

See *Environmental information on page 381* for specification of allergenic materials in the product, if any.

Securing the robot to the foundation

The robot must be properly fixed to its foundation/support, as described in the respective product manual.

When the robot is installed at a height, hanging, or other than mounted directly on the floor, there will be additional hazards.

Electrical safety

Incoming mains must be installed to fulfill national regulations.

The power supply wiring to the Product must be sufficiently fused and if necessary, it must be possible to disconnect it manually from the mains power.

The power to the robot must be turned off with the main switch and the mains power disconnected when performing work inside the controller cabinet. Lock and tag shall be considered.

Harnesses between controller and manipulator shall be fixed and protected to avoid tripping and wear.

Continues on next page

Wherever possible, power on/off or rebooting the robot controller shall be performed with all persons outside the safeguarded space.

Note

Use a CARBON DIOXIDE (CO_2) extinguisher in the event of a fire in the robot.

Safety devices

The integrator is responsible for that the safety devices necessary to protect people working with the robot system are designed and installed correctly.

When integrating the robot with external devices to a robot system:

- The integrator of the robot system must ensure that emergency stop functions are interlocked in accordance with applicable standards.
- The integrator of the robot system must ensure that safety functions are interlocked in accordance with applicable standards.

Other hazards

The product may perform unexpected limited movement.

WARNING

Product movements can cause serious injuries on users and may damage equipment.

The risk assessment should also consider other hazards arising from the application, such as, but not limited to:

- Water
- Compressed air
- Hydraulics

End-effector hazards require particular attention for applications which involve close human collaboration with the robot.

Verify the safety functions

Before the robot system is put into operation, verify that the safety functions are working as intended and that any remaining hazards identified in the risk assessment are mitigated to an acceptable level.

1.7 Safety during operation

Automatic operation

Verify the application in the operating mode manual reduced speed, before changing mode to automatic and initiating automatic operation.

Unexpected movement of product

WARNING

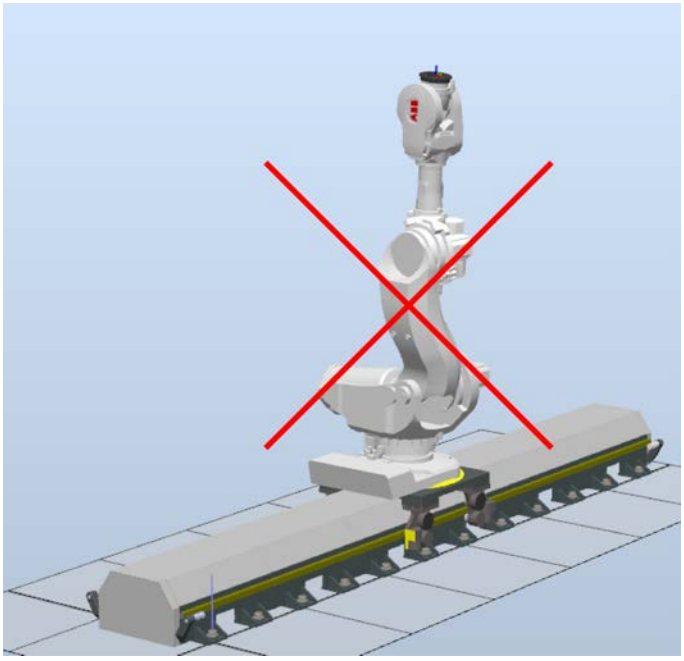
Hazards due to the use of brake release devices and/or gravity beneath the manipulator shall be considered.

Continues on next page

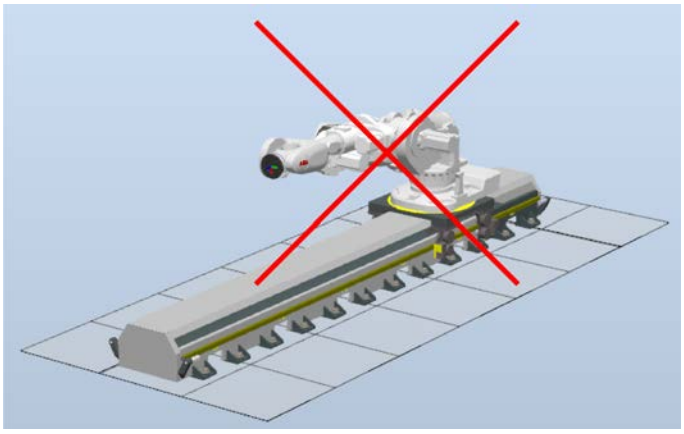
Note

The robot should avoid the arm to be totally straightened horizontally or vertically during high-speed movement.

This may lead to unexpected hazards.



xx2200001196



xx2200001197

1.8 Safety during maintenance and repair

1.8.1 Safety during maintenance and repair

General

Corrective maintenance must only be carried out by personnel trained on the robot system.

Maintenance or repair must be done with all electrical, pneumatic, and hydraulic power switched off, that is, no remaining hazards.

Hazards due to stored mechanical energy in the Product for the purpose of counterbalancing axes must be considered before maintenance or repair.

Never use the Product as a ladder, which means, do not climb on the controller, manipulator, including motors, or other parts. There are hazards of slipping and falling. The Product might be damaged.

Make sure that there are no loose screws, turnings, or other unexpected parts remaining after work on the robot has been performed.

When the work is completed, verify that the safety functions are working as intended.

Hot surfaces

Surfaces can be hot after running the Product, and touching these may result in burns. Allow the surfaces to cool down before maintenance or repair.

Allergic reaction

Warning	Description	Elimination/Action
 **Allergic reaction**	When working with lubricants there is a risk of an allergic reaction.	Make sure that protective gear like goggles and gloves are always worn.

Gearbox lubricants (oil or grease)

When handling oil, grease, or other chemical substances the safety information of the respective manufacturer must be observed.

> **Note**
>
> Take special care when handling hot lubricants.

Warning	Description	Elimination/Action
 **Hot oil or grease**	Changing and draining gearbox oil or grease may require handling hot lubricant heated up to 90 °C.	Make sure that protective gear like goggles and gloves are always worn during this activity.

Continues on next page

1.8.1 Safety during maintenance and repair
Continued

Warning	Description	Elimination/Action
 **Allergic reaction**	When working with lubricants there is a risk of an allergic reaction.	Make sure that protective gear like goggles and gloves are always worn.
 **Possible pressure build-up in gearbox**	When opening the oil or grease plug, there may be pressure present in the gearbox, causing lubricant to spray from the opening.	Open the plug carefully and keep away from the opening. Do not overfill the gearbox when filling.
 **Do not overfill**	Overfilling of gearbox lubricant can lead to internal over-pressure inside the gearbox which in turn may: • damage seals and gaskets • completely press out seals and gaskets • prevent the robot from moving freely.	Make sure not to overfill the gearbox when filling it with oil or grease. After filling, verify that the level is correct.
 **Specified amount depends on drained volume**	The specified amount of oil or grease is based on the total volume of the gearbox. When changing the lubricant, the amount refilled may differ from the specified amount, depending on how much has previously been drained from the gearbox.	After filling, verify that the level is correct.
 **Contaminated oil in gearboxes**	For lifetime reasons always drain as much oil as possible from the gearbox. The magnetic oil plugs will gather residual metal chips.	

Hazards related to batteries

Under rated conditions, the electrode materials and liquid electrolyte in the batteries are sealed and not exposed to the outside.

There is a hazard in case of abuse (mechanical, thermal, electrical) which leads to the activation of safety valves and/or the rupture of the battery container. As a result under certain circumstances, electrolyte leakage, electrode materials reaction with moisture/water or battery vent/explosion/fire may follow.

Do not short circuit, recharge, puncture, incinerate, crush, immerse, force discharge or expose to temperatures above the declared operating temperature range of the product. Risk of fire or explosion.

Operating temperatures are listed in *Operating conditions on page 61*.

See safety instructions for the batteries in *Material/product safety data sheet - Battery pack* (*3HAC043118-001*).

Continues on next page

Unexpected movement of robot arm

WARNING

Hazards due to the use of brake release devices and/or gravity beneath the manipulator shall be considered.

Related information

See also the safety information related to installation and operation.

1.8.2 Emergency release of the Product axes

Description

In an emergency situation, the brakes on a Product axis can be released manually by pushing a brake release button.

How to release the brakes is described in the section:

- *Releasing the brake on page 119*.

The carriage may be moved manually if no block in the rail.

Increased injury

Before releasing the brakes, make sure that the weight of the carriage does not result in additional hazards, for example, even more severe injuries on a trapped person.

DANGER

When releasing the holding brakes, the Product axes may move very quickly and sometimes in unexpected ways.

Make sure no personnel is near or beneath the robot.

1.9 Safety during troubleshooting

General

When troubleshooting requires work with power switched on, special considerations must be taken:

- Safety circuits might be muted or disconnected.
- Electrical parts must be considered as *live*.
- The product can move unexpectedly at any time.

DANGER

Troubleshooting on the controller while powered on must be performed by personnel trained by ABB or by ABB field engineers.

CAUTION

Risk of hot surfaces that can cause burns.

A risk assessment must be done to address both product and robot system specific hazards.

WARNING

Hazards due to the use of brake release devices and/or gravity beneath the manipulator shall be considered.

Product may perform unexpected limited movement.

WARNING

Manipulator movements can cause serious injuries on users and may damage equipment.

Related information

See also the safety information related to installation, operation, maintenance, and repair.

Note

If there is any cable disconnection and connection, please verify that the connection is totally correct.

1.10 Safety during decommissioning

General

See section *Decommissioning on page 381*.

Unexpected movement of product

WARNING

Hazards due to the use of brake release devices and/or gravity beneath the manipulator shall be considered.

2 Technical data

2.1 Technical data

Protection standards

Protection type	Protection class
Standard	IP65[i]

[i] Only the electrical parts.

Explosive environments

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

Required space for installation

Note

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

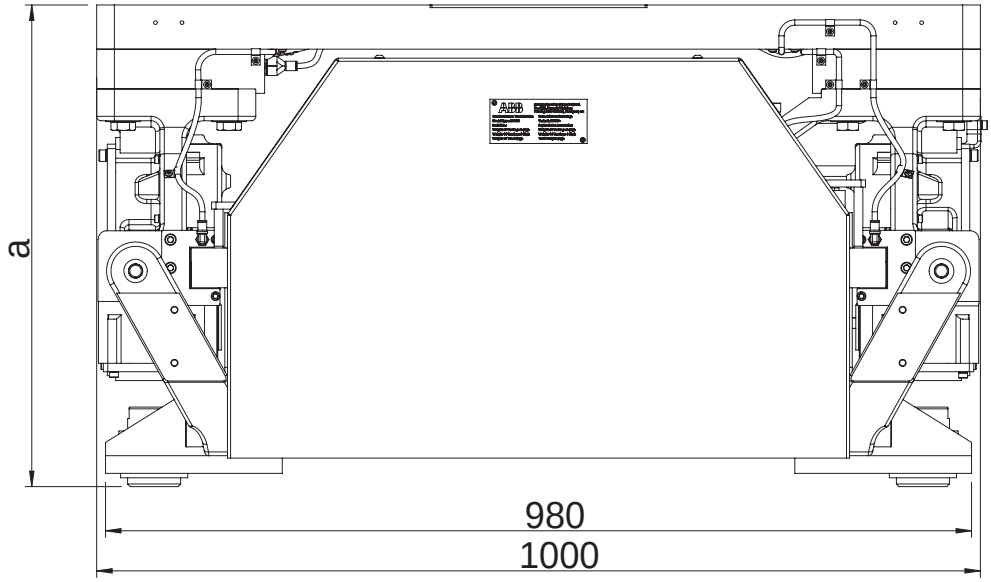
Formula for carriage tracks

Required space for carriage tracks is determined with the following formula:

Required space (mm) = 1000 x N[1] + 2 x 66 + 500[2]

Dimensions

Without external cable chain



xx2200001281

1 Value of N is equal to the number of sections.

2 Valid if the length is N + 0.5 m

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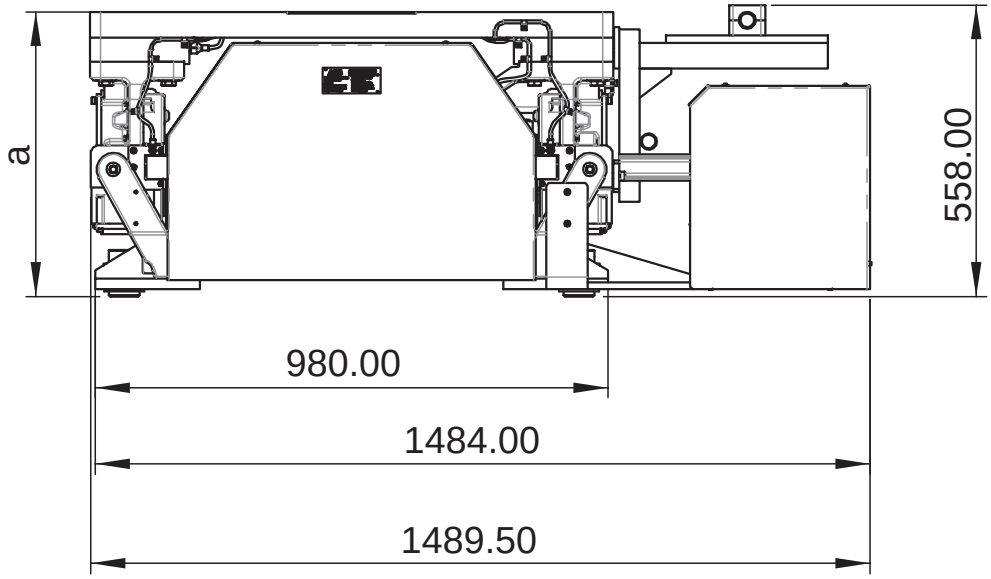
2.1 Technical data
Continued

Item	Description	Value
a	For IRB 4600/IRB 4400	530 mm
	For IRB 460/IRB 660/IRB 760/IRB 5710/IRB 5720/IRB 6650S/IRB 6700/IRB 6710/IRB 6720/IRB 6730/IRB 6740/IRB 7600	545 mm

With external cable chain



xx2200000400

Item	Description	Value
a	For IRB 4600/IRB 4400	530 mm
	For IRB 460/IRB 660/IRB 760/IRB 5710/IRB 5720/IRB 6650S/IRB 6700/IRB 6710/IRB 6720/IRB 6730/IRB 6740/IRB 7600	545 mm

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	1 mm/m (movement direction) 0.5 mm/m (Perpendicular to movement direction) Overall height difference ≤ 10 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.

Mechanical stops

There are no adjustable mechanical stops on the IRT 710 OmniCore. This needs to be considered while doing a risk assessment of the complete installation, the track can however be order in different lengths.

Continues on next page

Weight, robot

For the detailed weight of each robot, see the robot product manual.

Weight, pedestal

Robot Pedestal	Height	Weight	IRB 7600	IRB 760	IRB 6740	IRB 6730	IRB 6720	IRB 6710	IRB 6700	IRB 6650S	IRB 660	IRB 5720	IRB 5710	IRB 4600	IRB 4400	IRB 460
3HKA00000190345	250 mm	213 kg	√	√	√	√	√	√	√	√	√	√	√			√
3HKA00000190346	500 mm	288 kg				√	√	√	√		√	√	√			√
3HKA00000190348	250 mm	220 kg												√	√	
3HKA00000190349	500 mm	276 kg												√	√	
3HKA00000190350	750 mm	331 kg												√		

Weight, track motion excluding harness and pedestal

The following table shows the weight of the track motion excluding harness and pedestal.

Note

This weight include the harness for the track motor (power and signal). But do not include the harness which connected to the robot or tooling, such as the robot power cable, CP/CS harness, welding cables, media pipes and etc.

Tip

There are three types carriages used in IRT 710 OmniCore. For more information, see *IRT 710 OmniCore carriage overview on page 77*.

The following table takes the large robot carriage weight into count. If any robot carriage or transfer carriage is used, please minus the corresponding weight. For more information on the carriages weight, see *Weight, Carriages on page 77*.

Carriage NO.	1 Carriage		2 Carriages	
Length/m	only internal cable tray (Kg)	only external cable tray (Kg)	only internal cable tray (Kg)	only external cable tray (Kg)
3	1611	1783	X	X
3.5	1719	1891	X	X
4	1945	2160	2509	2767
4.5	2053	2268	2617	2875
5	2276	2534	2846	3147
5.5	2384	2642	2954	3255
6	2610	2911	3177	3521
6.5	2718	3019	3285	3629
7	2941	3285	3514	3901
7.5	3049	3393	3622	4009
8	3275	3662	3845	4275

Continues on next page

2.1 Technical data
Continued

Carriage NO.	1 Carriage		2 Carriages	
Length/m	only internal cable tray (Kg)	only external cable tray (Kg)	only internal cable tray (Kg)	only external cable tray (Kg)
8.5	3383	3770	3953	4383
9	3606	4036	4182	4655
9.5	3714	4144	4290	4763
10	3940	4413	4513	5029
10.5	4048	4521	4621	5137
11	4271	4787	4850	5409
11.5	4379	4895	4958	5517
12	4605	5164	5181	5783
12.5	4713	5272	5289	5891
13	4936	5538	5518	6163
13.5	5044	5646	5626	6271
14	5270	5915	5849	6537
14.5	5378	6023	5957	6645
15	5601	6289	6186	6917
15.5	5709	6397	6294	7025
16	5935	6666	6517	7291
16.5	6043	6774	6625	7399
17	6266	7040	6854	7671
17.5	6374	7148	6962	7779
18	6600	7417	7185	8045
18.5	6708	7525	7293	8153
19	6931	7791	7522	8425
19.5	7039	7899	7630	8533
20	7265	8168	7853	8799
20.5	7373	8276	7961	8907
21	7596	8542	8190	9179
21.5	7704	8650	8298	9287

Note

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

Airborne noise level

The sound pressure level outside the working space.

IR(B)T type	Level
IRT 710 OmniCore	< 75 dB (A) / 1m

Continues on next page

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.

Storage conditions

The table shows the allowed storage conditions for the robot:

Parameter	Value
Minimum ambient temperature	5 °C
Maximum ambient temperature	45 °C
Maximum ambient temperature (less than 24 hrs)	70 °C
Maximum ambient humidity	Maximum 95% at constant temperature.
Maximum ambient altitude	1,000 m

Operating conditions

The table shows the allowed operating conditions for the robot:

Parameter	Value
Minimum ambient temperature	+5 °C [i] (41 °F)
Maximum ambient temperature	+ 45 °C (113 °F)
Maximum ambient humidity	Maximum 95% at constant temperature.
Maximum ambient altitude	1,000 m

[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.

Note

In arc welding applications, it is necessary to avoid arc welding spatter from falling onto the surface of the rectangular rail.

Note

In gluing or sealing applications, it is necessary to avoid the glue from falling onto the surface of the rectangular rail.

Power consumption at max load

Type of Movement	IRT
-	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*.

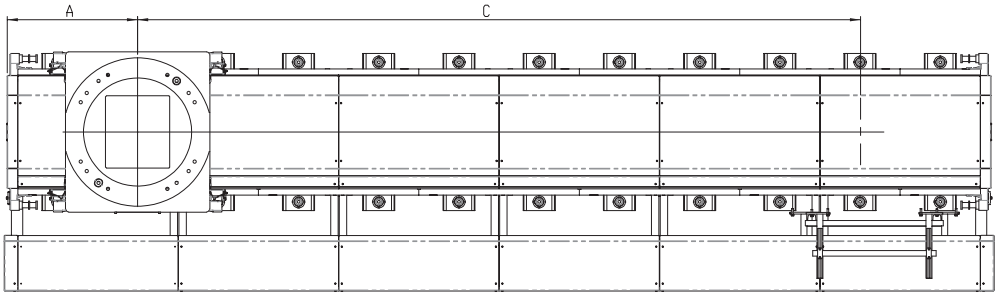
2.2 Working range

Note

If there are more than one carriage on a track, all carriages should be interlocked to avoid collision.

Single carriage

Please check the layout of work range attached file and dimension information.



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Pos	Description
A	813 mm
C	Stroke

Carriage quantity is 1.				
	First Carriage			
	Stand-ard/Mirrored	Work range		
Track Length		Start	End	Stroke
3	Standard>	-309	1197	1506
3	Mirrored	-309	1197	1506
3.5	Standard>	-309	1697	2006
4	Standard>	-309	2197	2506
4	Mirrored	-309	2197	2506
4.5	Standard>	-309	2697	3006
5	Standard>	-309	3197	3506
5	Mirrored	-309	3197	3506
5.5	Standard>	-309	3697	4006
6	Standard>	-309	4197	4506
6	Mirrored	-309	4197	4506
6.5	Standard>	-309	4697	5006
7	Standard>	-309	5197	5506
7	Mirrored	-309	5197	5506
7.5	Standard>	-309	5697	6006

Continues on next page

Carriage quantity is 1.				
	First Carriage			
	Stand-ard/Mirrored	Work range		
Track Length		Start	End	Stroke
8	Standard>	-309	6197	6506
8	Mirrored	-309	6197	6506
8.5	Standard>	-309	6697	7006
9	Standard>	-309	7197	7506
9	Mirrored	-309	7197	7506
9.5	Standard>	-309	7697	8006
10	Standard>	-309	8197	8506
10	Mirrored	-309	8197	8506
10.5	Standard>	-309	8697	9006
11	Standard>	-309	9197	9506
11	Mirrored	-309	9197	9506
11.5	Standard>	-309	9697	10006
12	Standard>	-309	10197	10506
12	Mirrored	-309	10197	10506
12.5	Standard>	-309	10697	11006
13	Standard>	-309	11197	11506
13	Mirrored	-309	11197	11506
13.5	Standard>	-309	11697	12006
14	Standard>	-309	12197	12506
14	Mirrored	-309	12197	12506
14.5	Standard>	-309	12697	13006
15	Standard>	-309	13197	13506
15	Mirrored	-309	13197	13506
15.5	Standard>	-309	13697	14006
16	Standard>	-309	14197	14506
16	Mirrored	-309	14197	14506
16.5	Standard>	-309	14697	15006
17	Standard>	-309	15197	15506
17	Mirrored	-309	15197	15506
17.5	Standard>	-309	15697	16006
18	Standard>	-309	16197	16506
18	Mirrored	-309	16197	16506
18.5	Standard>	-309	16697	17006
19	Standard>	-309	17197	17506
19	Mirrored	-309	17197	17506

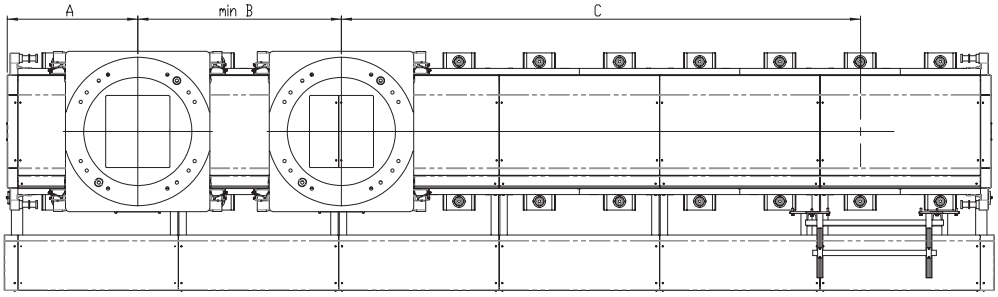
Continues on next page

2.2 Working range
Continued

Carriage quantity is 1.				
	First Carriage			
	Stand-ard/Mirrored	Work range		
Track Length		Start	End	Stroke
19.5	Standard>	-309	17697	18006
20	Standard>	-309	18197	18506
20	Mirrored	-309	18197	18506
20.5	Standard>	-309	18697	19006
21	Standard>	-309	19197	19506
21	Mirrored	-309	19197	19506
21.5	Standard>	-309	19697	20006

Double carriages

Please check the layout of work range attached file and dimension information.



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Pos	Description
A	813 mm
B minim-um	1270 mm
C	Stroke

Carriage quantity is 2.							
	First Carriage			Second Carriage			
	Stand-ard/Mirrored	Work range		Stand-ard/Mirrored	Work range		
Track Length		Start	End		Start	End	Stroke
4	Standard	-309	927	Standard	-1039	197	1236
4	Standard	-309	927	Mirrored	-309	927	1236
4	Mirrored	-1039	197	Mirrored	-309	927	1236
4.5	Standard	-309	1427	Standard	-1539	197	1736
5	Standard	-309	1927	Standard	-2039	197	2236
5	Standard	-309	1927	Mirrored	-309	1927	2236
5	Mirrored	-2039	197	Mirrored	-309	1927	2236
5.5	Standard	-309	2427	Standard	-2539	197	2736

Continues on next page

Carriage quantity is 2.							
	First Carriage			Second Carriage			
	Stand-ard/Mirrored	Work range		Stand-ard/Mirrored	Work range		
Track Length		Start	End		Start	End	Stroke
6	Standard	-309	2927	Standard	-3039	197	3236
6	Standard	-309	2927	Mirrored	-309	2927	3236
6	Mirrored	-3039	197	Mirrored	-309	2927	3236
6.5	Standard	-309	3427	Standard	-3539	197	3736
7	Standard	-309	3927	Standard	-4039	197	4236
7	Standard	-309	3927	Mirrored	-309	3927	4236
7	Mirrored	-4039	197	Mirrored	-309	3927	4236
7.5	Standard	-309	4427	Standard	-4539	197	4736
8	Standard	-309	4927	Standard	-5039	197	5236
8	Standard	-309	4927	Mirrored	-309	4927	5236
8	Mirrored	-5039	197	Mirrored	-309	4927	5236
8.5	Standard	-309	5427	Standard	-5539	197	5736
9	Standard	-309	5927	Standard	-6039	197	6236
9	Standard	-309	5927	Mirrored	-309	5927	6236
9	Mirrored	-6039	197	Mirrored	-309	5927	6236
9.5	Standard	-309	6427	Standard	-6539	197	6736
10	Standard	-309	6927	Standard	-7039	197	7236
10	Standard	-309	6927	Mirrored	-309	6927	7236
10	Mirrored	-7039	197	Mirrored	-309	6927	7236
10.5	Standard	-309	7427	Standard	-7539	197	7736
11	Standard	-309	7927	Standard	-8039	197	8236
11	Standard	-309	7927	Mirrored	-309	7927	8236
11	Mirrored	-8039	197	Mirrored	-309	7927	8236
11.5	Standard	-309	8427	Standard	-8539	197	8736
12	Standard	-309	8927	Standard	-9039	197	9236
12	Standard	-309	8927	Mirrored	-309	8927	9236
12	Mirrored	-9039	197	Mirrored	-309	8927	9236
12.5	Standard	-309	9427	Standard	-9539	197	9736
13	Standard	-309	9927	Standard	-10039	197	10236
13	Standard	-309	9927	Mirrored	-309	9927	10236
13	Mirrored	-10039	197	Mirrored	-309	9927	10236
13.5	Standard	-309	10427	Standard	-10539	197	10736
14	Standard	-309	10927	Standard	-11039	197	11236
14	Standard	-309	10927	Mirrored	-309	10927	11236
14	Mirrored	-11039	197	Mirrored	-309	10927	11236

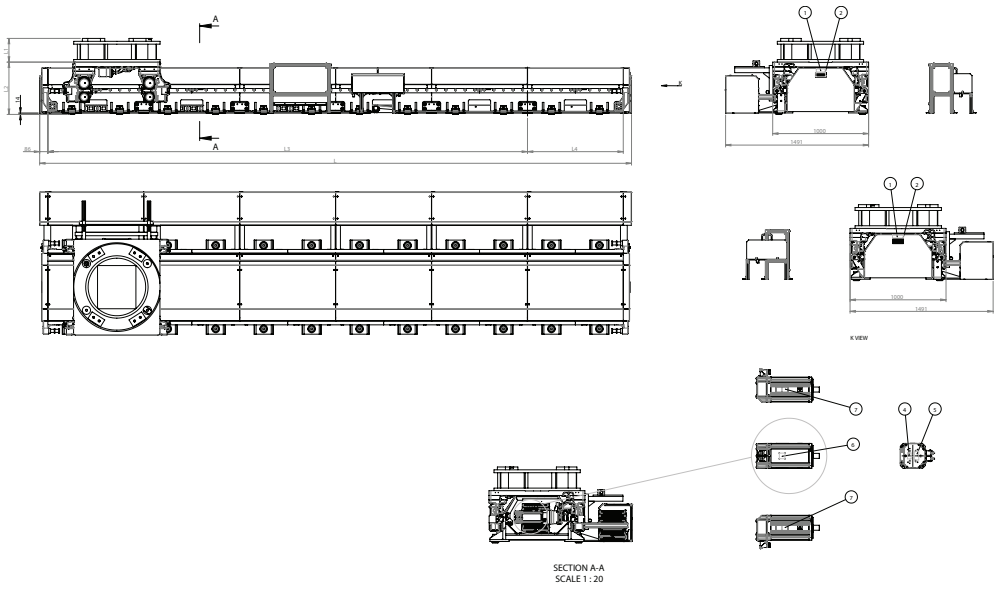
Continues on next page

2.2 Working range
Continued

Carriage quantity is 2.							
	First Carriage			Second Carriage			
	Stand-ard/Mirrored	Work range		Stand-ard/Mirrored	Work range		
Track Length		Start	End		Start	End	Stroke
14.5	Standard	-309	11427	Standard	-11539	197	11736
15	Standard	-309	11927	Standard	-12039	197	12236
15	Standard	-309	11927	Mirrored	-309	11927	12236
15	Mirrored	-12039	197	Mirrored	-309	11927	12236
15.5	Standard	-309	12427	Standard	-12539	197	12736
16	Standard	-309	12927	Standard	-13039	197	13236
16	Standard	-309	12927	Mirrored	-309	12927	13236
16	Mirrored	-13039	197	Mirrored	-309	12927	13236
16.5	Standard	-309	13427	Standard	-13539	197	13736
17	Standard	-309	13927	Standard	-14039	197	14236
17	Standard	-309	13927	Mirrored	-309	13927	14236
17	Mirrored	-14039	197	Mirrored	-309	13927	14236
17.5	Standard	-309	14427	Standard	-14539	197	14736
18	Standard	-309	14927	Standard	-15039	197	15236
18	Standard	-309	14927	Mirrored	-309	14927	15236
18	Mirrored	-15039	197	Mirrored	-309	14927	15236
18.5	Standard	-309	15427	Standard	-15539	197	15736
19	Standard	-309	15927	Standard	-16039	197	16236
19	Standard	-309	15927	Mirrored	-309	15927	16236
19	Mirrored	-16039	197	Mirrored	-309	15927	16236
19.5	Standard	-309	16427	Standard	-16539	197	16736
20	Standard	-309	16927	Standard	-17039	197	17236
20	Standard	-309	16927	Mirrored	-309	16927	17236
20	Mirrored	-17039	197	Mirrored	-309	16927	17236
20.5	Standard	-309	17427	Standard	-17539	197	17736
21	Standard	-309	17927	Standard	-18039	197	18236
21	Standard	-309	17927	Mirrored	-309	17927	18236
21	Mirrored	-18039	197	Mirrored	-309	17927	18236
21.5	Standard	-309	18427	Standard	-18539	197	18736

2.3 Information labels

Illustration



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Item	Description
1	ABB Logo
2	Rating Label
3	Lifting Label
4	NO SHOCK Warning Label
5	Instruction Plate
6	Electric shock Warning Label
7	High Temperature Warning Label
8	WEEE label

2.4 IRT 710 OmniCore terms

About these terms

Some words have a specific meaning when used in this manual. Definitions of these words in this manual are listed below.

Term list

Words that have italic font style in the definition column are included in the term list and have their own definitions.

Term	Definition
Robotic system	The robot and the IRT 710 OmniCore .
Robot	The manipulator and the controller.
Manipulator	The 6 axis mechanical unit of the robot.
Controller	The motion system used to control the manipulator & IRT 710 OmniCore (i.e. ABB OmniCore V400XT).
Translation unit	The complete carriage assembly including all moving parts (cable track, lubrication system, sensors, and so on).
Carriage	The moving part of the IRT 710 OmniCore. The top plate receives the tooling / robot.
Track	The static part of the IRT 710 OmniCore. The track is delivered as modules to be assembled by the customer, as described in *Assembling the track motion IRT 710 OmniCore on page 122*.
Travel length	Maximum stroke of the carriage.
SMB	The Serial Measurement Board is a integrated circuit board used to measure and store the position of each robot axes.
MCB	The Motor Connection Box is a control box which includes the SMB for the IRT 710 OmniCore axis as well as the resolver position backup battery.
Rectangular rail	Is the lubricated rail (steel beam) on which the cam roller unit slides.
Cam roller unit	Is the roller which translates on the rectangular rail.

3 Installation and commissioning

3.1 Introduction to installation and commissioning

General

This chapter contains assembly instructions and information for installing the IRT 710 OmniCore at the working site.

See also the product manual for the robot controller.

The installation must be done by qualified installation personnel in accordance with the safety requirements set forth in the applicable national and regional standards and regulations.

Safety information

Before any installation work is commenced, all safety information must be observed.

There are general safety aspects that must be read through, as well as more specific safety information that describes the danger and safety risks when performing the procedures. Read the chapter *Safety on page 15* before performing any installation work.

Note

Always connect the IRT 710 OmniCore and the robot to protective earth and residual current device (RCD) before connecting to power and starting any installation work.

For more information see:

- *Product manual - OmniCore V400XT*

3.2 Overview of installation and commissioning procedure

Installation and commissioning steps

Carry out the following steps after delivery, to install and commission the track motion IRT 710 OmniCore.

	Action	Reference
1	Unpack the track motion.	Compare the delivery check to the identification plate and verify for acceptance according to *Acceptance inspection on page 73*.
2	Read through and follow the information and instructions for on-site installation of the track motion.	*Installation and commissioning on page 69*.
3	Lift the track motion.	*Lifting track motion using lifting slings*.
4	Assemble the track motion.	*Assembling the track motion IRT 710 OmniCore on page 122*
5	Assembling the pedestal (option).	*Assembling the pedestal (option) on page 153*
6	Assemble the manipulator.	*Assembly of the manipulator on page 155*.
7	Electrical installation.	*Electrical installation on page 161*.
8	Software installation.	*Software installation on page 187*
9	Update the revolution counters.	*Updating revolution counters on page 363*.

3.3 Unpacking

3.3.1 Pre-installation procedure

Introduction

This section is intended for use when unpacking and installing the product for the first time. It also contains information useful during later re-installation of the product.

Prerequisites for installation personnel

Installation personnel working with an ABB product must:

- Be trained by ABB and have the required knowledge of mechanical and electrical installation/maintenance/repair work.
- Conform to all national and local codes.

Checking the pre-requisites for installation

	Action
1	Make a visual inspection of the packaging and make sure that nothing is damaged.
2	Remove the packaging.
3	Check for any visible transport damage. **Note** Stop unpacking and contact ABB if transport damages are found.
4	Check the contents in delivery according to the attached product list.
5	Clean the unit with a lint-free cloth, if necessary. **Note** Do not clean any of the pre lubricated parts of the track motion IRT 710 OmniCore.
6	Make sure that the lifting accessory used (if required) is suitable to handle the weight of the product as specified in: *Weight, robot on page 59*
7	If the product is not installed directly, it must be stored as described in: *Storage conditions on page 61*
8	Make sure that the expected operating environment of the product conforms to the specifications as described in: *Operating conditions on page 61*
9	Before taking the product to its installation site, make sure that the site conforms to: • *Protection standards on page 57* • *Requirements, foundation on page 58*
10	Before moving the robot, please observe the stability of the robot.
11	When these prerequisites are met, the robot can be taken to its installation site as described in section: *Installation and commissioning on page 69*
12	Install required equipment, if any.

Continues on next page

3.3.1 Pre-installation procedure
Continued

Number of sections on pallets

If the complete track motion IRT 710 OmniCore consists of more than 6 sections, the delivery is divided on several pallets. The table below specifies the number of sections on each pallet.

Carriage NO.	1 Carriage	2 Carriages
7/7.5	4*+3/3.5	4*+3*/3.5*
8/8.5	5*+3/3.5	4*+4*/4.5*
9/9.5	5*+4/4.5	5*+4*/4.5*
10/10.5	5*+5/5.5	5*+5*/5.5*
11/11.5	6*+5/5.5	6*+5*/5.5*
12/12.5	6*+6/6.5	6*+6*/6.5*
13/13.5	5*+5+3/3.5	5*+3+5*/5.5*
14/14.5	5*+4+5/5.5	5*+4+5*/5.5*
15/15.5	5*+5+5/5.5	5*+5+5*/5.5*
16/16.5	5*+6+5/5.5	5*+6+5*/5.5*
17/17.5	6*+6+5/5.5	6*+6+5*/5.5*
18/18.5	6*+6+6/6.5	6*+6+6*/6.5*
19/19.5	5*+5+5+4/4.5	5*+5+5+4*/4.5*
20/20.5	5*+5+5+5/5.5	5*+5+5+5*/5.5*
21/21.5	6*+5+5+5/5.5	6*+5+5+5*/5.5*

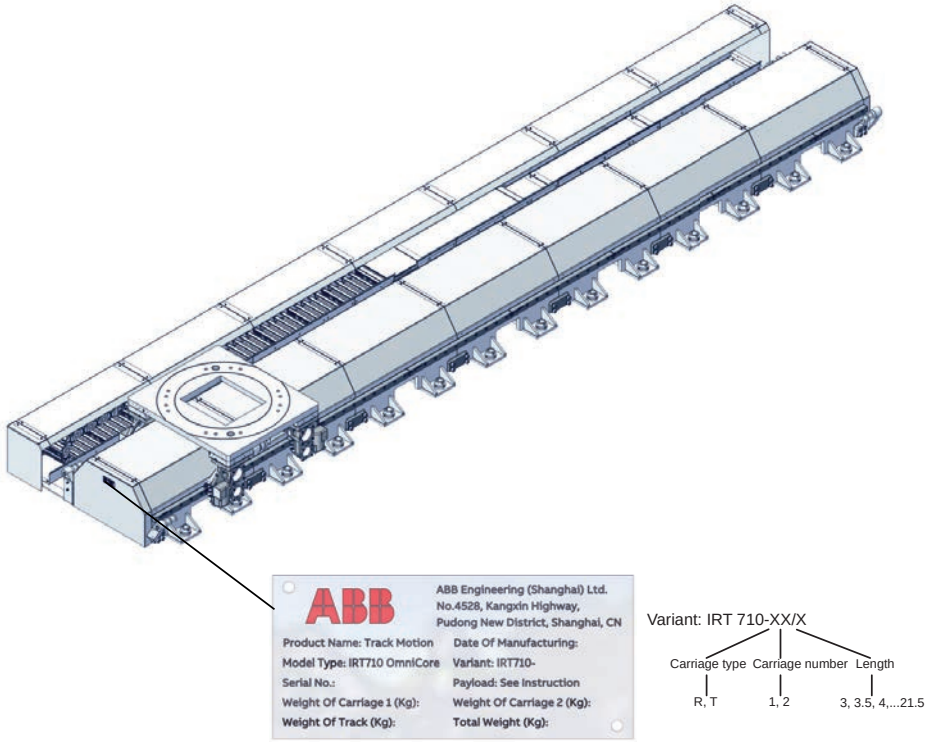
3.3.2 Acceptance inspection

Identification plate

> **Tip**
>
> Always try to determine if the goods are as ordered, and that the package is not damaged before unpacking.

To identify the delivery, check the identification plate and compare it to the delivery note.

The identification plates are shown in the figure.



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*: R represents Robot; T represents Transfer.

3.3.3 Storage

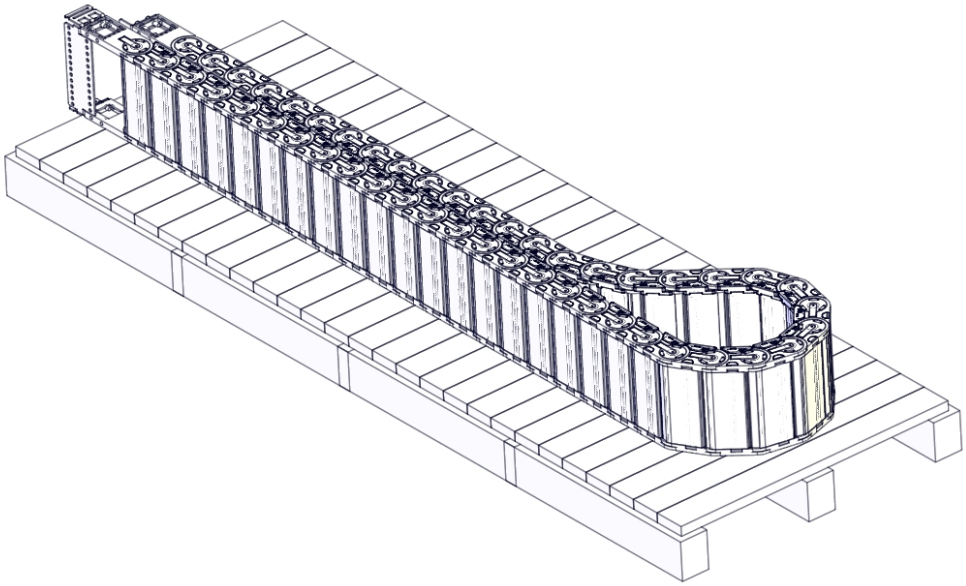
3.3.3.1 Storing the cable chain

Two methods for storage

There are two methods for storing spare / not in use cable chains.

Method 1: folded in half

For complete chains with strapping in place and the strapping plates attached to the chains, the chain can only be folded in half. The chain can either be folded so that the chain is lying on itself or laid on its side.



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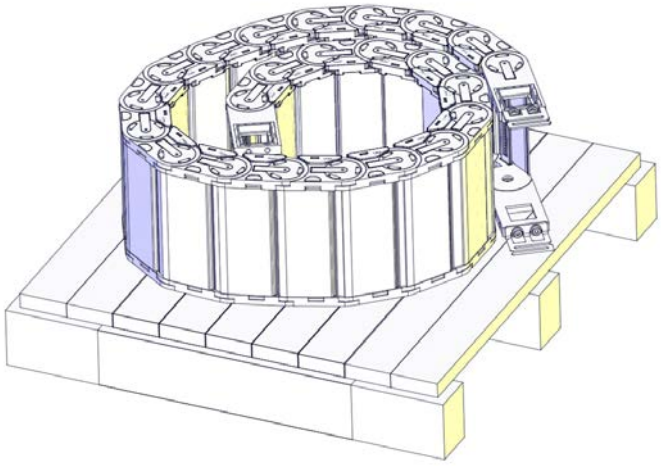
Method 2: rolled up

For complete chains with or without strapping in place or strapping in place and the strapping plate not connected to the chain, the chain can be rolled up and stored lying on its side



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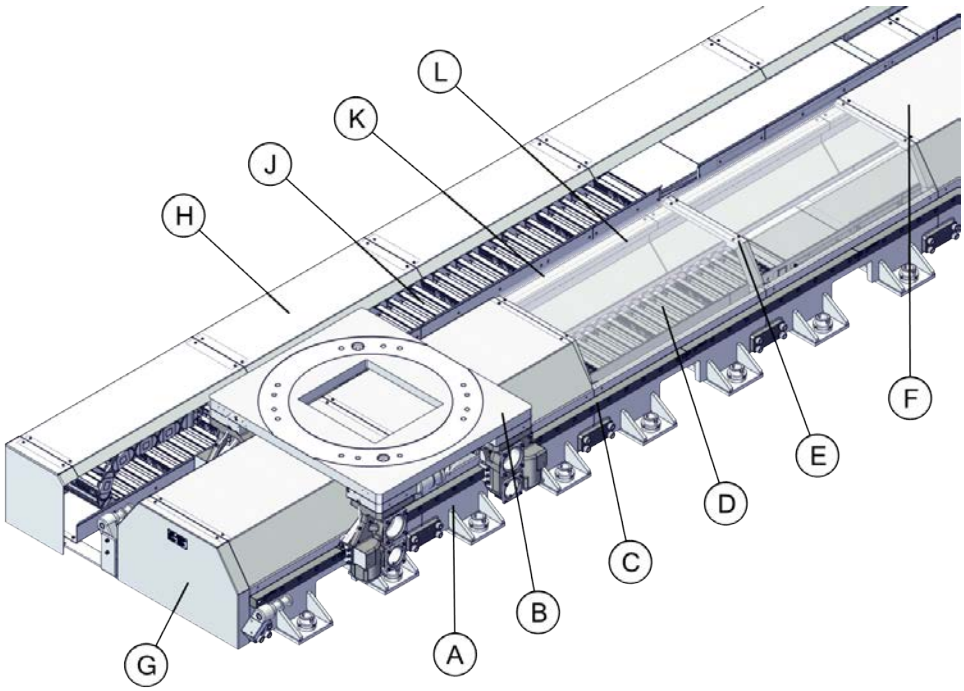
3.4 On-site installation

3.4.1 Track motion IRT 710 OmniCore overview

IRT 710 OmniCore overview



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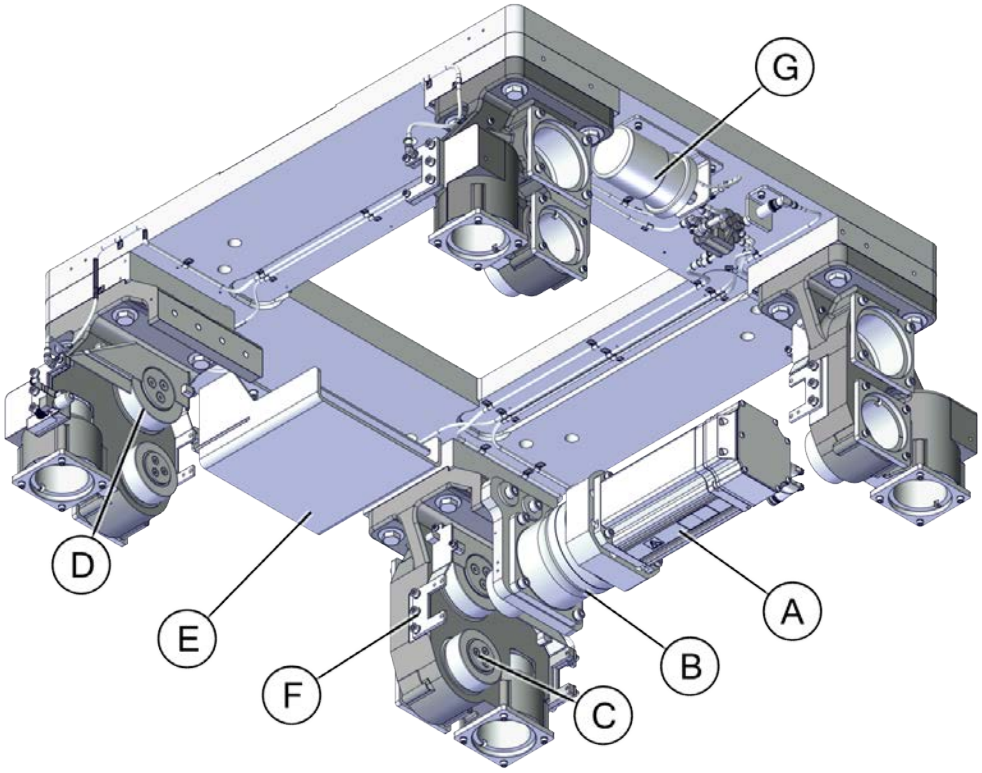
A	Section
B	Carriage
C	Rectangular Rail
D	Internal cable chain
E	Cover bracket
F	Track cover
G	Terminal cover
H	External cable chain cover
J	External cable chain
K	Rack cover
L	Rack

The same components are used in different layout variants.

Continues on next page

IRT 710 OmniCore carriage overview



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A	Motor
B	Reducer
C	90 mm Cam roller holder unit
D	110 mm Cam roller holder unit
E	Scraper unit
F	Cable drawer
G	Lubrication system

Weight, Carriages

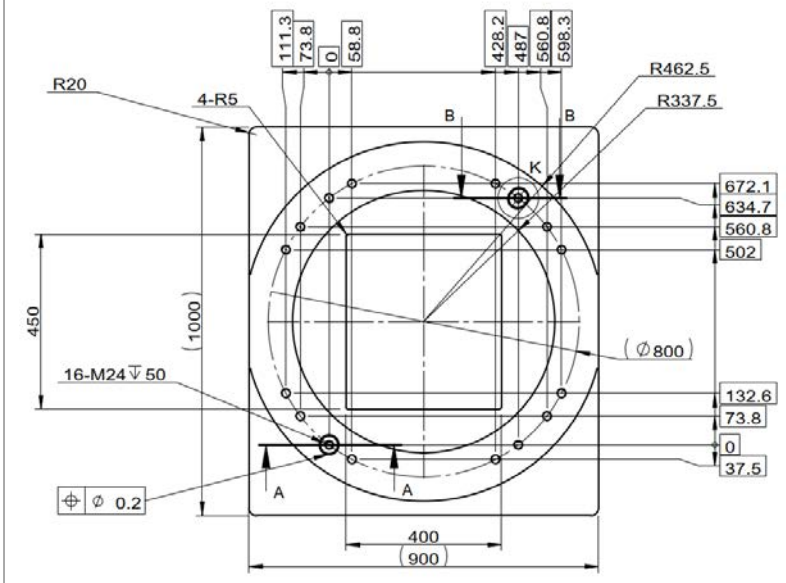
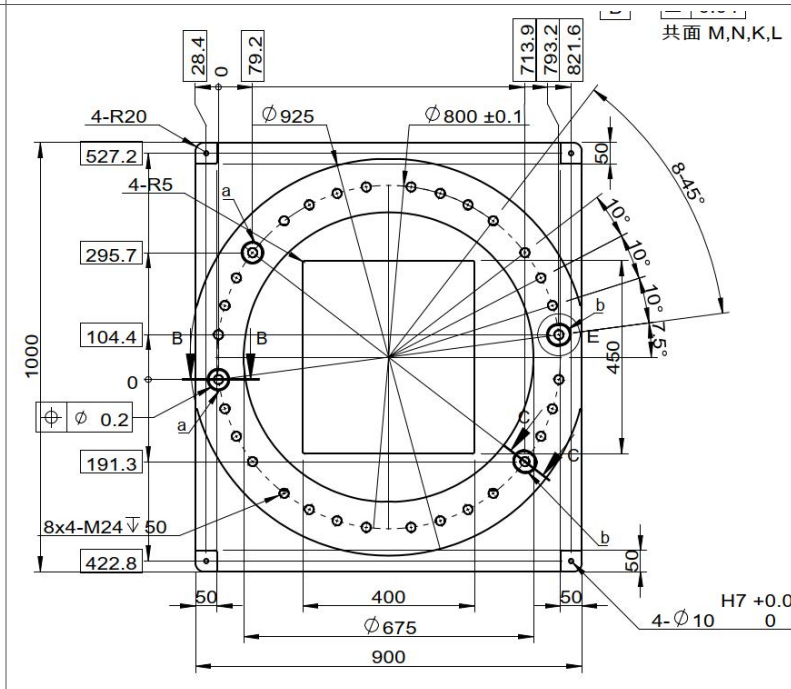
Carriage type	Large robot carriage	Medium robot carriage
Weight	556 kg	517 kg

Continues on next page

3.4.1 Track motion IRT 710 OmniCore overview
Continued

Large robot carriage mounting plate , IRB 460/IRB 660/IRB 760/IRB 5710/IRB 5720/IRB 6650S/IRB 6700/IRB 6710/IRB 6720/IRB 6730/IRB 6740/IRB 7600

The large robot carriage mounting plate is used for IRB 460/IRB 660/IRB 760/IRB 5710/IRB 5720/IRB 6650S/IRB 6700/IRB 6710/IRB 6720/IRB 6730/IRB 6740/IRB 7600.

90° per step	 xx2200000605
45° per step	 xx2200000606

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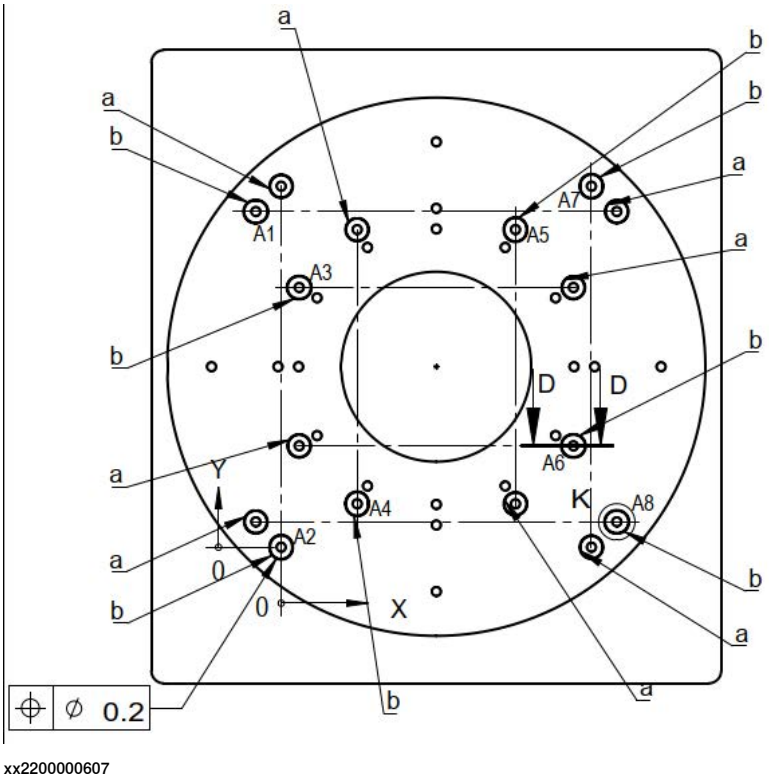
Note

When installing the IRB 7600 onto IRT 710 without pedestal, the torque for bolt through the location ring hole is 550 Nm. For the other bolts torque, see IRB 7600 product manual.

Medium robot carriage mounting plate, IRB 4600, 4400

The medium robot carriage mounting plate is used for IRB 4600 and 4400.

90° per step	

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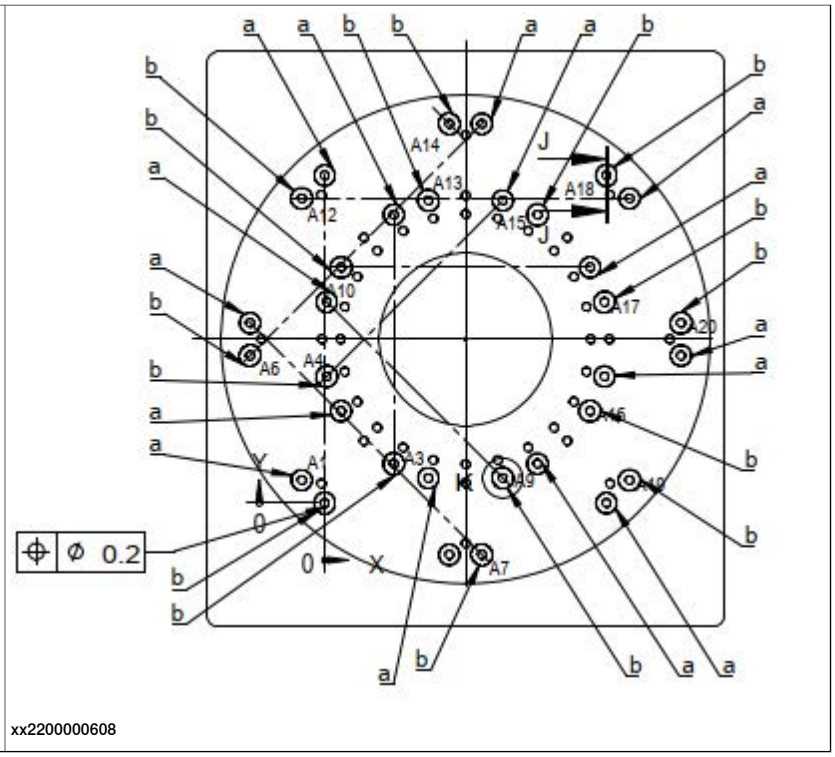
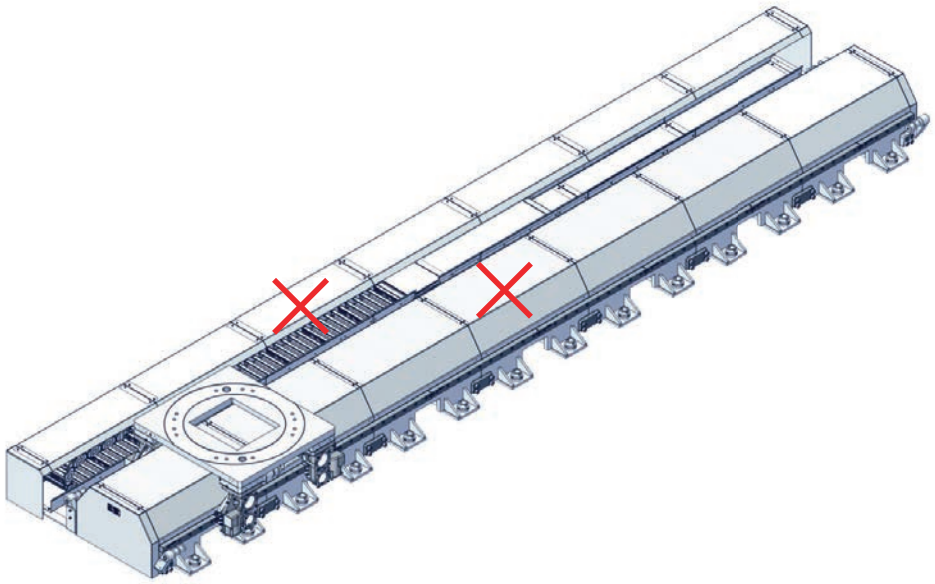
3.4.1 Track motion IRT 710 OmniCore overview

Continued

45° per step	

Easily damaged parts on the track motion

Do not step on the locations marked in the figure since they are easily damaged.



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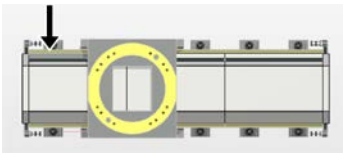
3.4.2 Track motion IRT 710 OmniCore layout

Tip

The arrow in the illustration refers to the rack side.

One carriage



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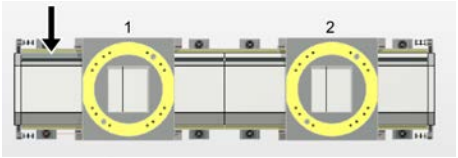
Two carriages



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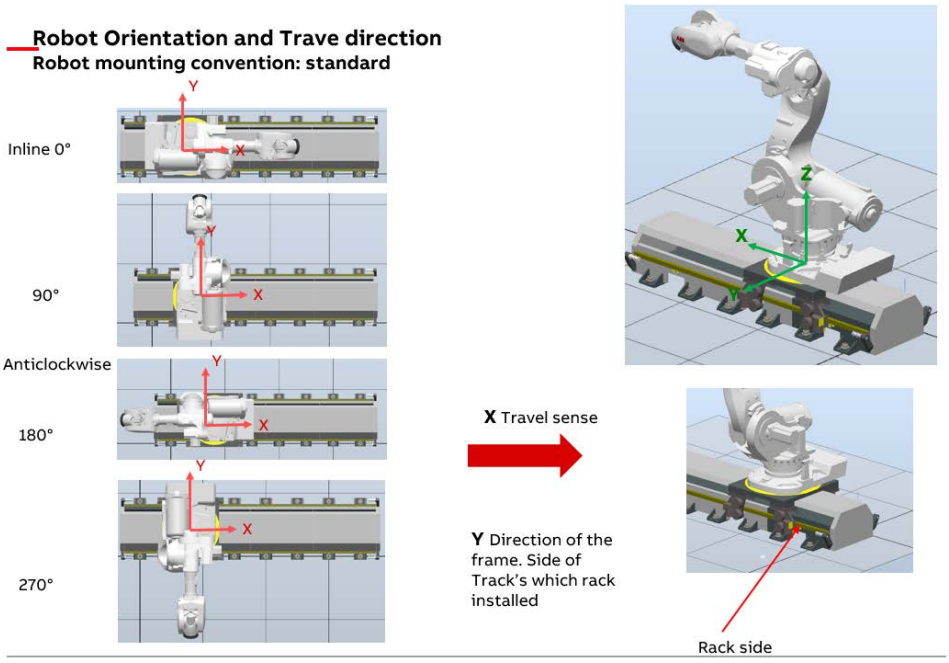
Direction of travel

Standard mounting



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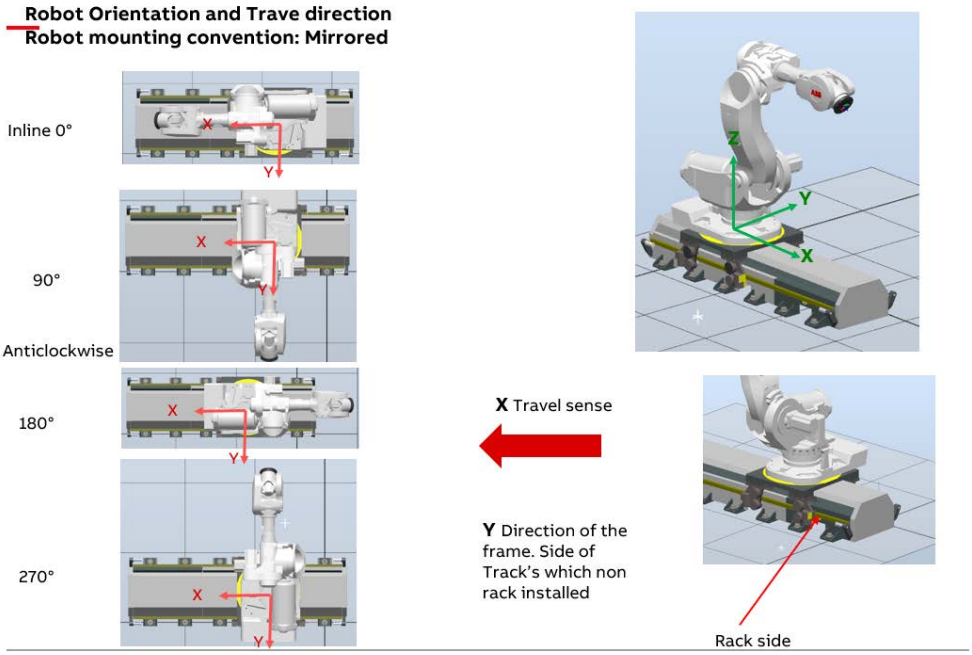
3.4.2 Track motion IRT 710 OmniCore layout
Continued

Mirrored mounting



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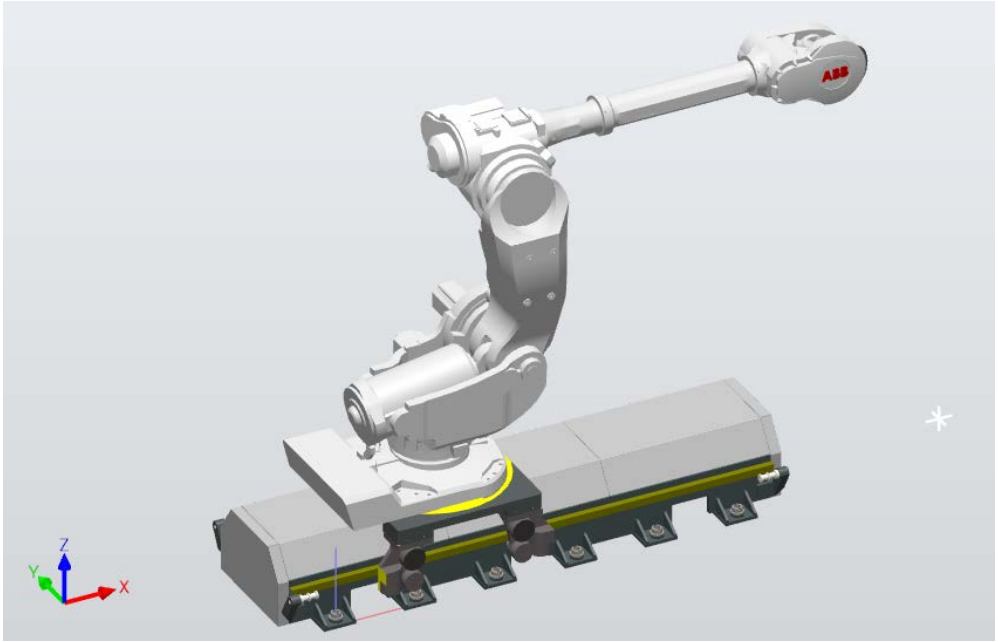
Base frame configuration, robot on track

Standard carriage, Robot in line 0°

In World positive travel direction, x Positive track transmission (JOINT track1)



xx2400001328

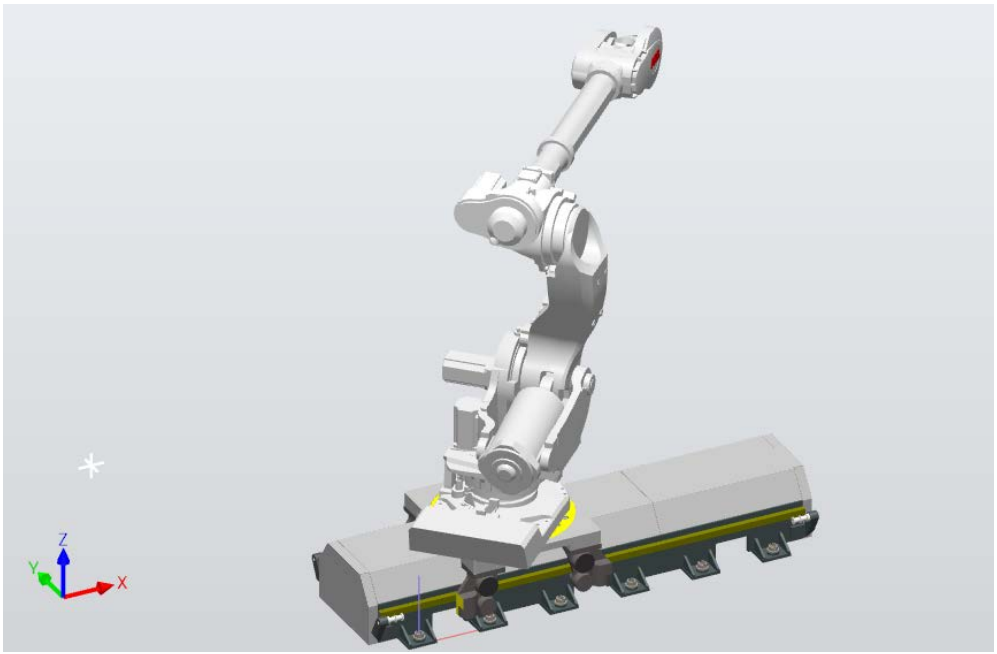
ROBOT (Robot)	Value	SINGLE (Track)	
Base Frame q1	1	Base Frame q1	1

Continues on next page

ROBOT (Robot)	Value	SINGLE (Track)	
Base Frame q2	0	Base Frame q2	0
Base Frame q3	0	Base Frame q3	0
Base Frame q4	0	Base Frame q4	0
Gamma Rotation	0		

Standard carriage, Robot in line 45°

In World positive travel direction, x Positive track transmission (JOINT track1)



xx2400001329

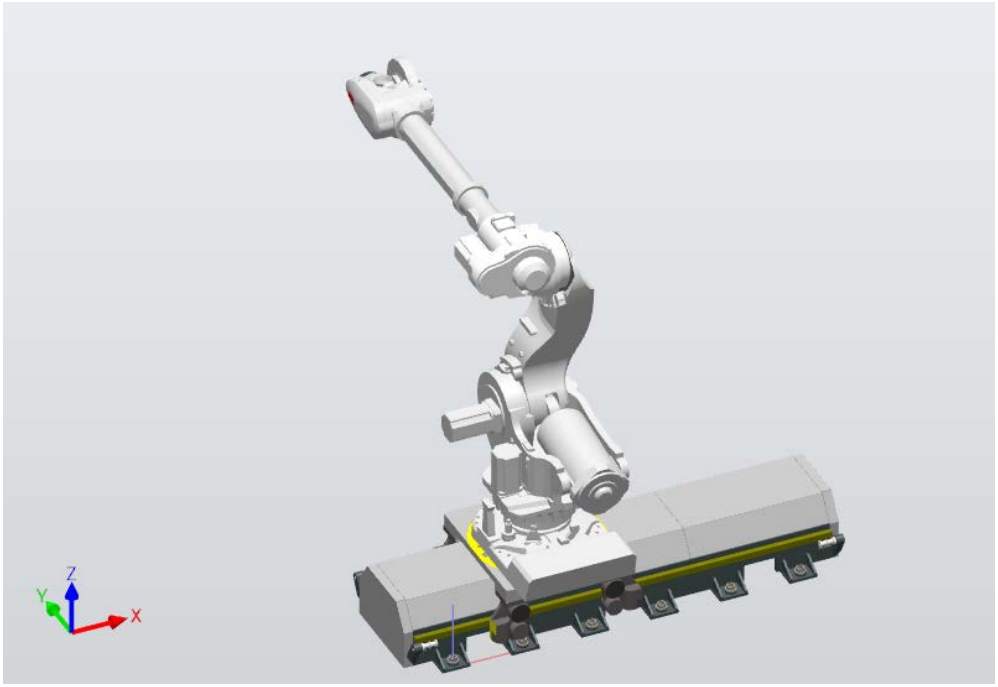
ROBOT (Robot)	Value	SINGLE (Track)	
Base Frame q1	0.92388	Base Frame q1	1
Base Frame q2	0	Base Frame q2	0
Base Frame q3	0	Base Frame q3	0
Base Frame q4	0.38268	Base Frame q4	0
Gamma Rotation	0.785398		

Continues on next page

3.4.2 Track motion IRT 710 OmniCore layout
Continued

Standard carriage, Robot in line 90°

In World positive travel direction, x Positive track transmission (JOINT track1)



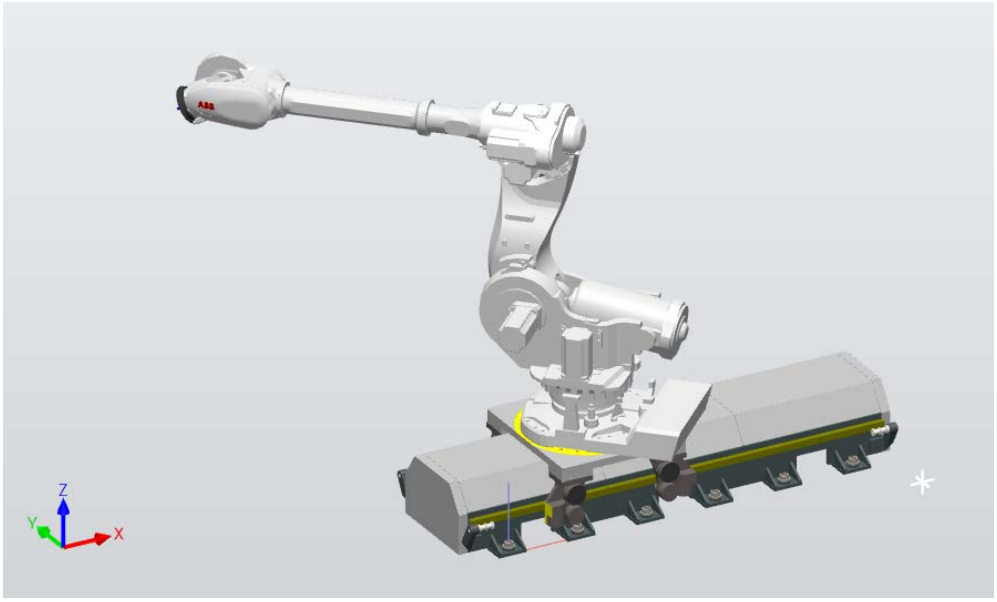
xx2400001330

ROBOT (Robot)	Value	SINGLE (Track)	
Base Frame q1	0.707107	Base Frame q1	1
Base Frame q2	0	Base Frame q2	0
Base Frame q3	0	Base Frame q3	0
Base Frame q4	0.707107	Base Frame q4	0
Gamma Rotation	1.5708		

Continues on next page

Standard carriage, Robot in line 135°

In World positive travel direction, x Positive track transmission (JOINT track1)

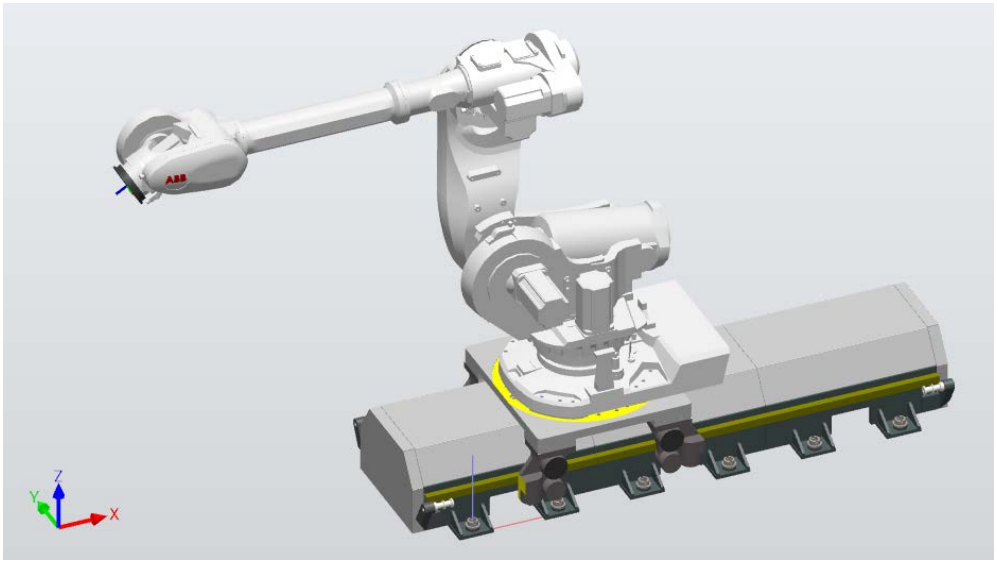


xx2400001331

ROBOT (Robot)	Value	SINGLE (Track)	
Base Frame q1	0.38268	Base Frame q1	1
Base Frame q2	0	Base Frame q2	0
Base Frame q3	0	Base Frame q3	0
Base Frame q4	0.92388	Base Frame q4	0
Gamma Rotation	2.35619		

Standard carriage, Robot in line 180°

In World positive travel direction, x Positive track transmission (JOINT track1)



xx2400001332

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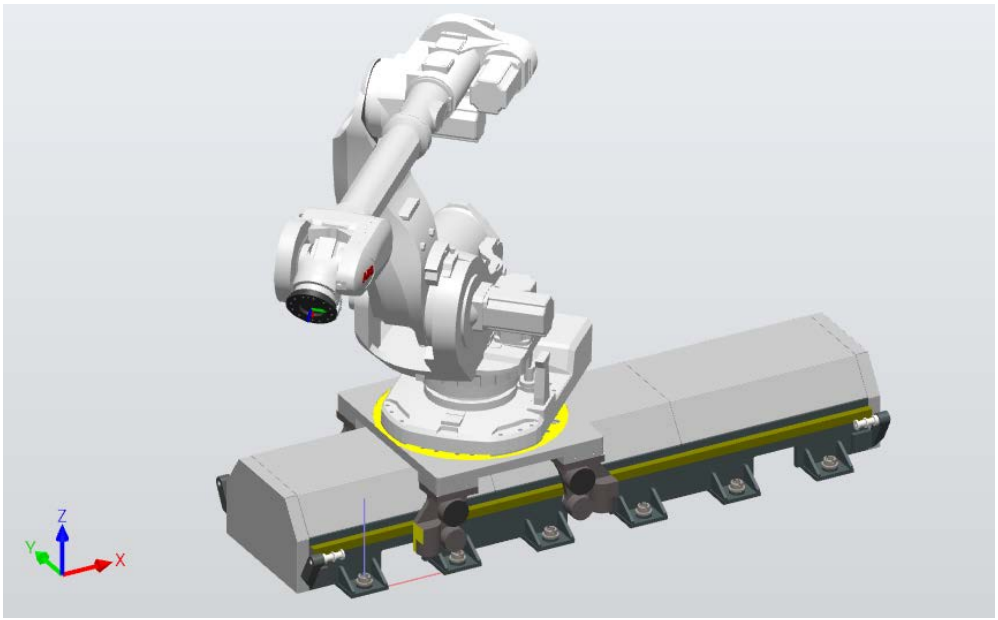
3.4.2 Track motion IRT 710 OmniCore layout
Continued

ROBOT (Robot)	Value	SINGLE (Track)	
Base Frame q1	0	Base Frame q1	1
Base Frame q2	0	Base Frame q2	0
Base Frame q3	0	Base Frame q3	0
Base Frame q4	1	Base Frame q4	0
Gamma Rotation	3.14159		

Standard carriage, Robot in line 225°

In World positive travel direction, x Positive track transmission (JOINT track1)



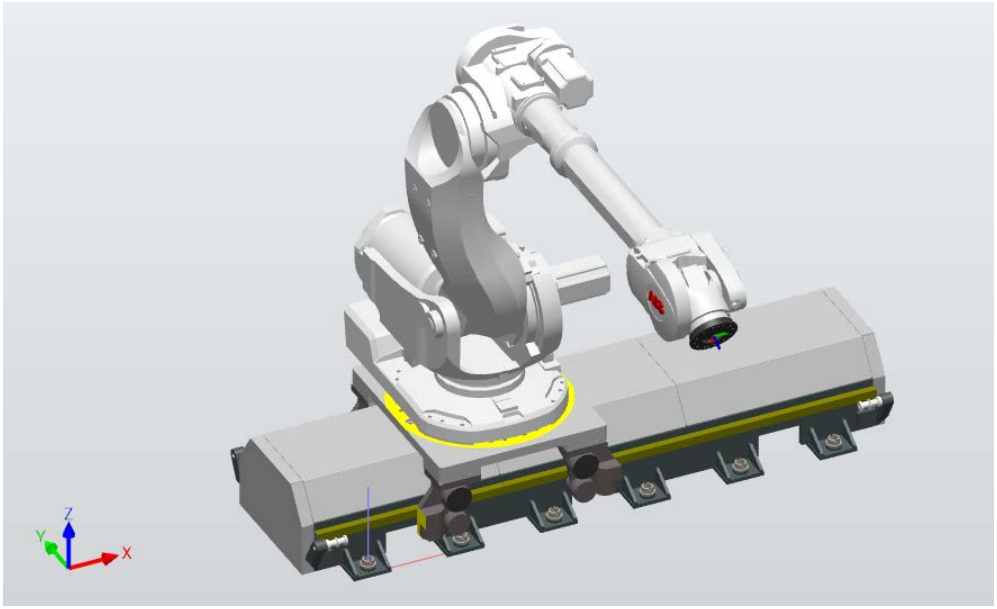
xx2400001333

ROBOT (Robot)	Value	SINGLE (Track)	
Base Frame q1	0.38268	Base Frame q1	1
Base Frame q2	0	Base Frame q2	0
Base Frame q3	0	Base Frame q3	0
Base Frame q4	-0.92388	Base Frame q4	0
Gamma Rotation	3.92699		

Continues on next page

Standard carriage, Robot in line 270°

In World positive travel direction, x Positive track transmission (JOINT track1)



xx2400001334

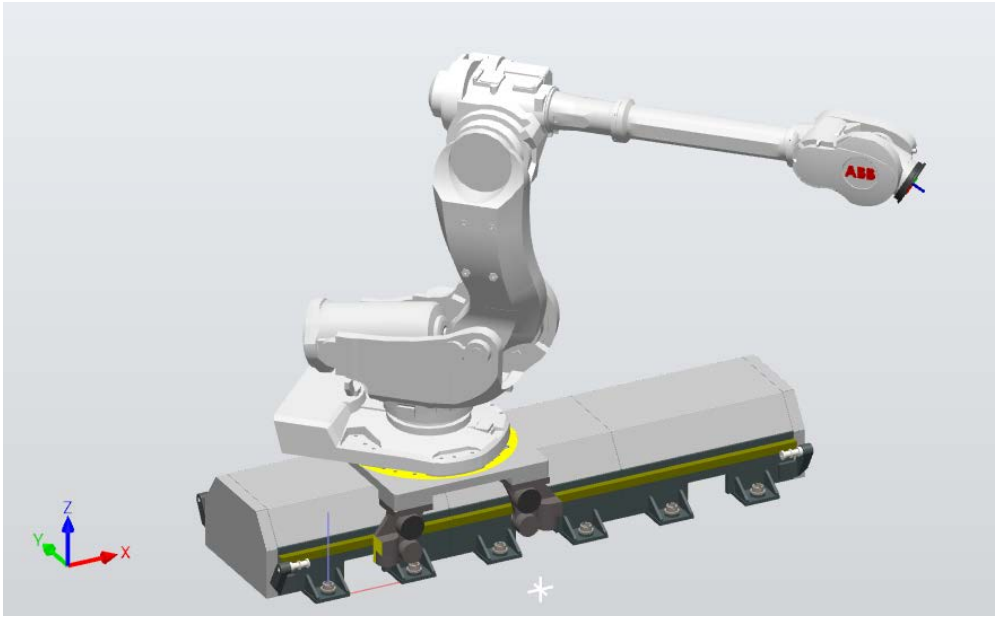
ROBOT (Robot)	Value	SINGLE (Track)	
Base Frame q1	0.707107	Base Frame q1	1
Base Frame q2	0	Base Frame q2	0
Base Frame q3	0	Base Frame q3	0
Base Frame q4	-0.707107	Base Frame q4	0
Gamma Rotation	4.71239		

Continues on next page

3.4.2 Track motion IRT 710 OmniCore layout
Continued

Standard carriage, Robot in line 315°

In World positive travel direction, x Positive track transmission (JOINT track1)



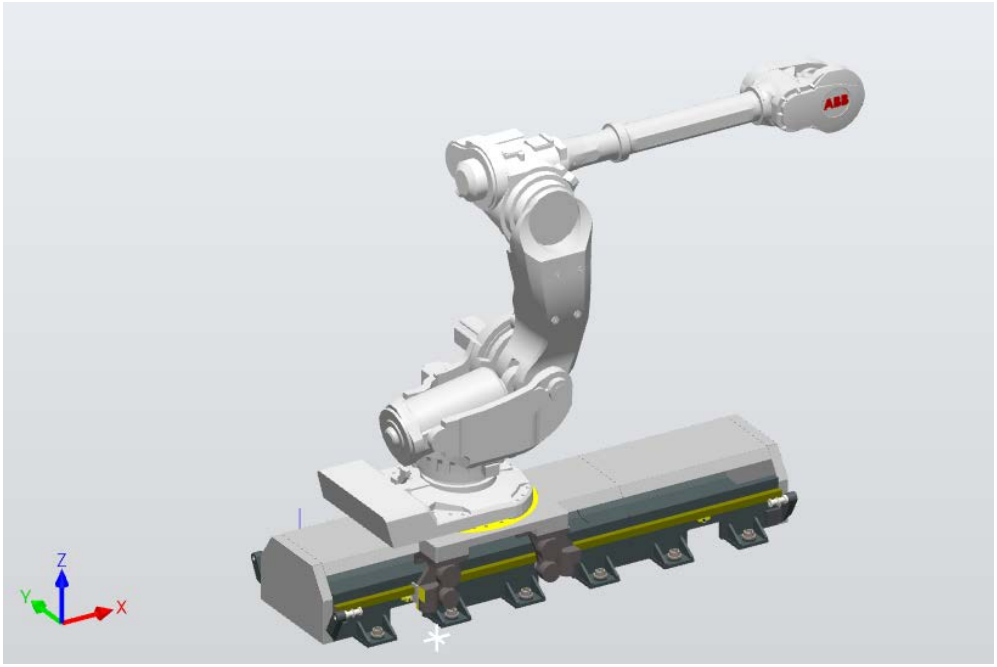
xx2400001335

ROBOT (Robot)	Value	SINGLE (Track)	
Base Frame q1	0.92388	Base Frame q1	1
Base Frame q2	0	Base Frame q2	0
Base Frame q3	0	Base Frame q3	0
Base Frame q4	-0.38268	Base Frame q4	0
Gamma Rotation	5.49779		

Continues on next page

Mirrored carriage, Robot in line 0°

In World positive travel direction, x Negative track transmission (JOINT track1)



xx2400001336

ROBOT (Robot)	Value	SINGLE (Track)	
Base Frame q1	1	Base Frame q1	1
Base Frame q2	0	Base Frame q2	0
Base Frame q3	0	Base Frame q3	0
Base Frame q4	0	Base Frame q4	0
Gamma Rotation	0		

Continues on next page

3.4.2 Track motion IRT 710 OmniCore layout
Continued

Mirrored carriage, Robot in line 45°

In World positive travel direction, x Negative track transmission (JOINT track1)

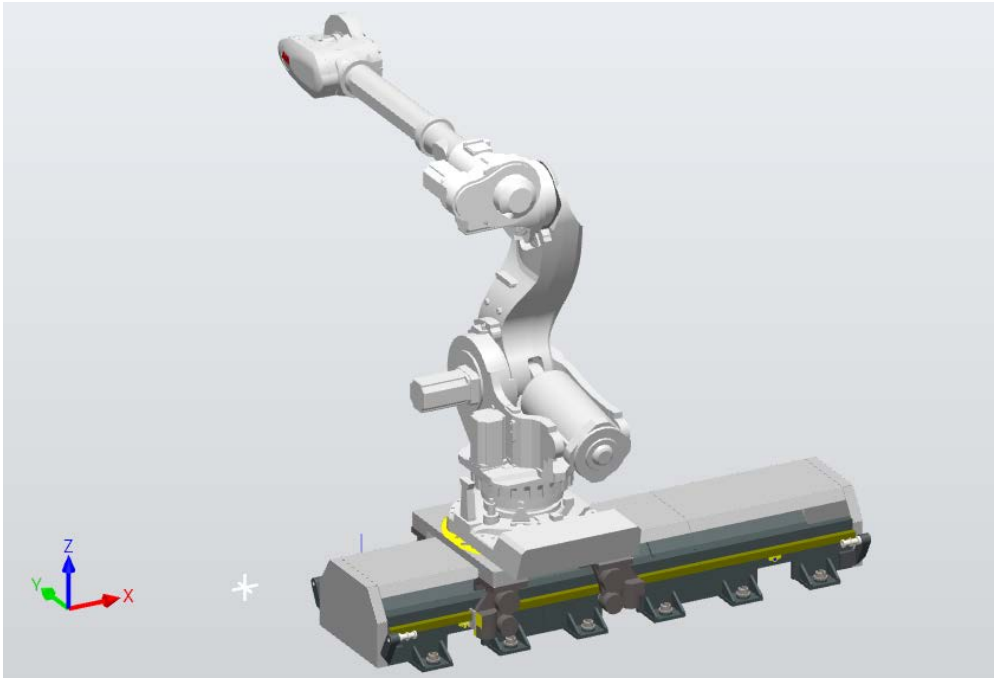
xx2400001337

ROBOT (Robot)	Value	SINGLE (Track)	
Base Frame q1	0.92388	Base Frame q1	1
Base Frame q2	0	Base Frame q2	0
Base Frame q3	0	Base Frame q3	0
Base Frame q4	0.38268	Base Frame q4	0
Gamma Rotation	0.785398		

Continues on next page

Mirrored carriage, Robot in line 90°

In World positive travel direction, x Negative track transmission (JOINT track1)



xx2400001338

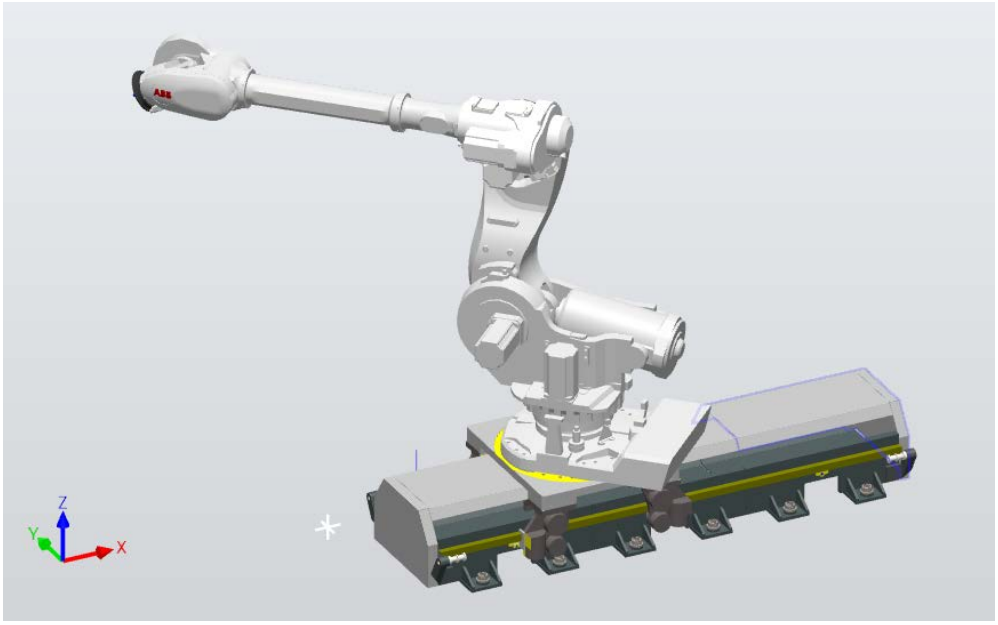
ROBOT (Robot)	Value	SINGLE (Track)	
Base Frame q1	0.707107	Base Frame q1	1
Base Frame q2	0	Base Frame q2	0
Base Frame q3	0	Base Frame q3	0
Base Frame q4	0.707107	Base Frame q4	0
Gamma Rotation	1.5708		

Continues on next page

3.4.2 Track motion IRT 710 OmniCore layout
Continued

Mirrored carriage, Robot in line 135°

In World positive travel direction, x Negative track transmission (JOINT track1)



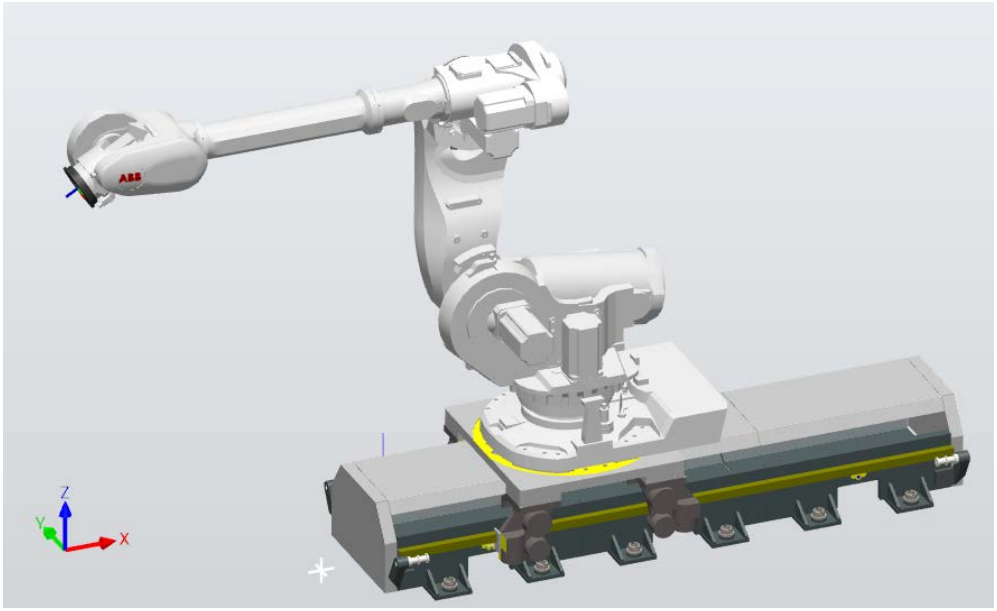
xx2400001339

ROBOT (Robot)	Value	SINGLE (Track)	
Base Frame q1	0.38268	Base Frame q1	1
Base Frame q2	0	Base Frame q2	0
Base Frame q3	0	Base Frame q3	0
Base Frame q4	0.92388	Base Frame q4	0
Gamma Rotation	2.35619		

Continues on next page

Mirrored carriage, Robot in line 180°

In World positive travel direction, x Negative track transmission (JOINT track1)



xx2400001340

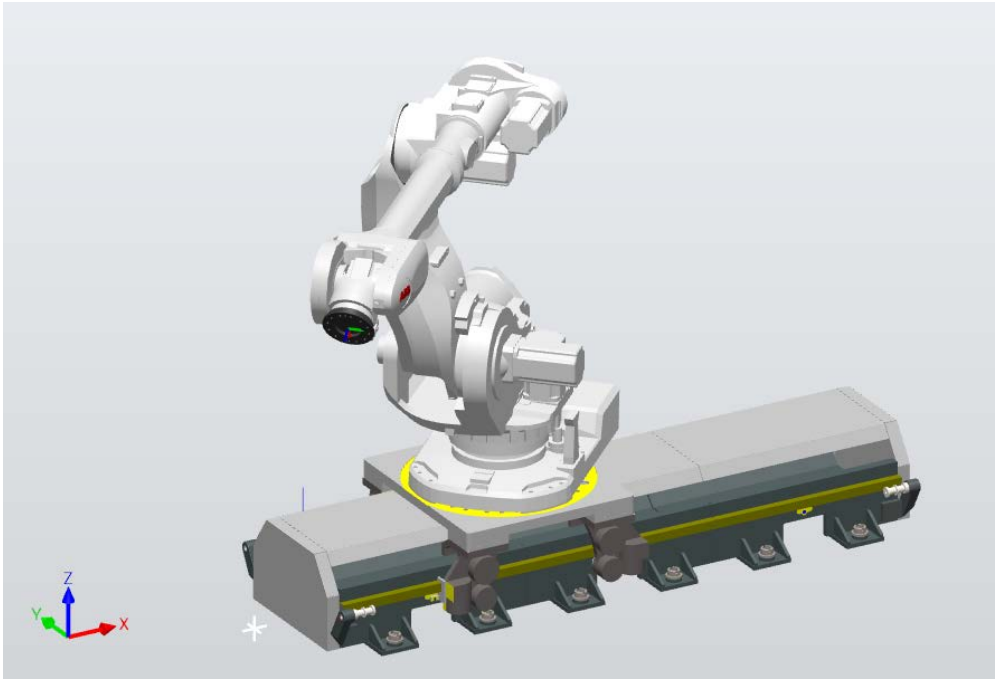
ROBOT (Robot)	Value	SINGLE (Track)	
Base Frame q1	0	Base Frame q1	1
Base Frame q2	0	Base Frame q2	0
Base Frame q3	0	Base Frame q3	0
Base Frame q4	1	Base Frame q4	0
Gamma Rotation	3.14159		

Continues on next page

3.4.2 Track motion IRT 710 OmniCore layout
Continued

Mirrored carriage, Robot in line 225°

In World positive travel direction, x Negative track transmission (JOINT track1)



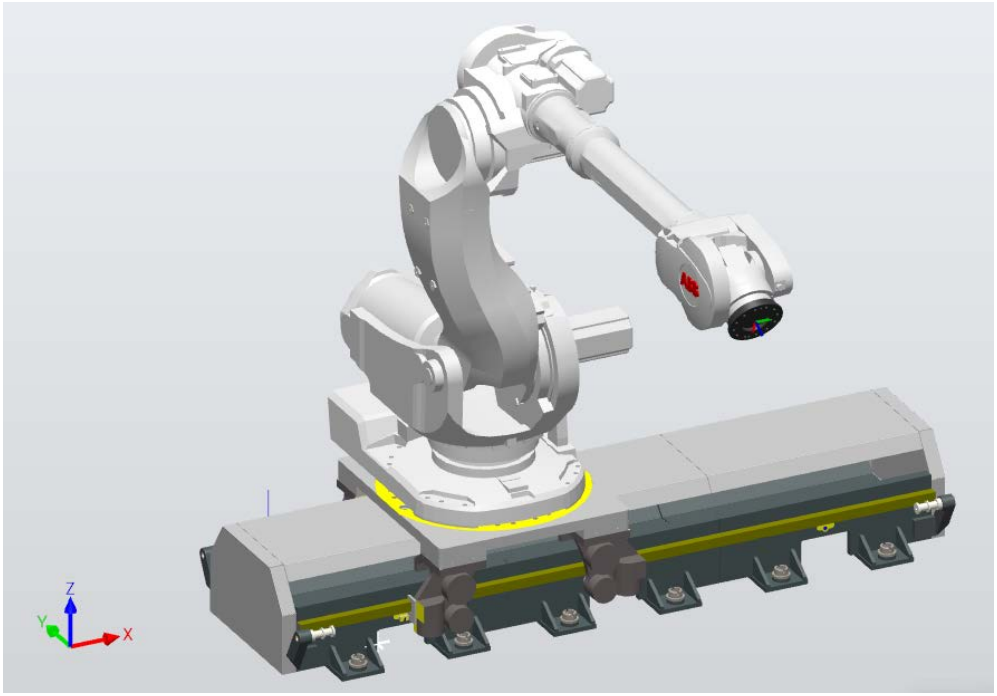
xx2400001341

ROBOT (Robot)	Value	SINGLE (Track)	
Base Frame q1	0.38268	Base Frame q1	1
Base Frame q2	0	Base Frame q2	0
Base Frame q3	0	Base Frame q3	0
Base Frame q4	-0.92388	Base Frame q4	0
Gamma Rotation	3.92699		

Continues on next page

Mirrored carriage, Robot in line 270°

In World positive travel direction, x Negative track transmission (JOINT track1)



xx2400001342

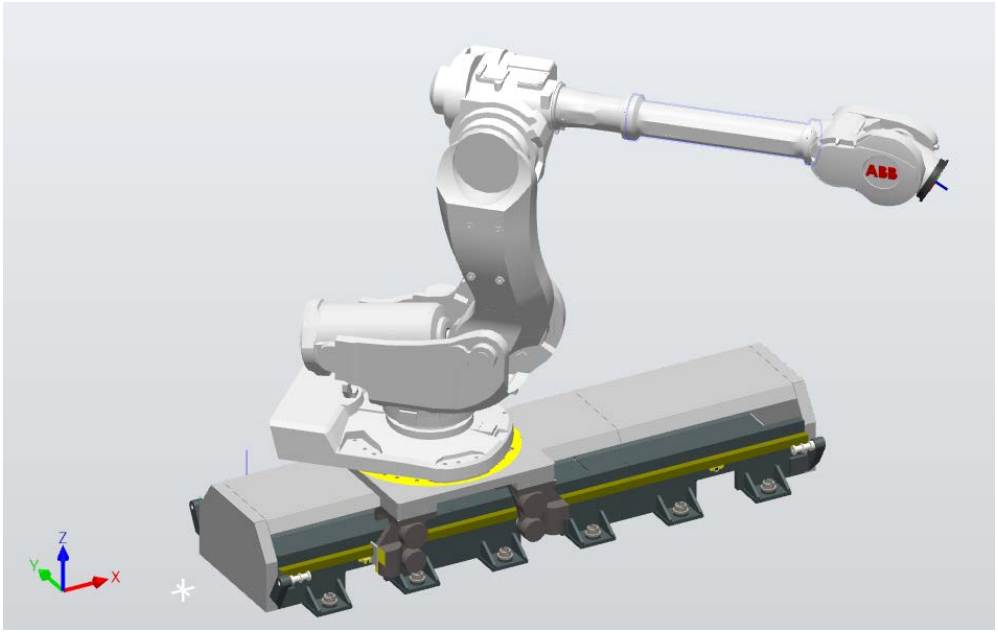
ROBOT (Robot)	Value	SINGLE (Track)	
Base Frame q1	0.707107	Base Frame q1	1
Base Frame q2	0	Base Frame q2	0
Base Frame q3	0	Base Frame q3	0
Base Frame q4	-0.707107	Base Frame q4	0
Gamma Rotation	4.71239		

Continues on next page

3.4.2 Track motion IRT 710 OmniCore layout
Continued

Mirrored carriage, Robot in line 315°

In World positive travel direction, x Negative track transmission (JOINT track1)



xx2400001343

ROBOT (Robot)	Value	SINGLE (Track)	
Base Frame q1	0.92388	Base Frame q1	1
Base Frame q2	0	Base Frame q2	0
Base Frame q3	0	Base Frame q3	0
Base Frame q4	-0.38268	Base Frame q4	0
Gamma Rotation	5.49779		

3.4.3 Required installation space

Clean space required on the ends of the track

xx2400000381

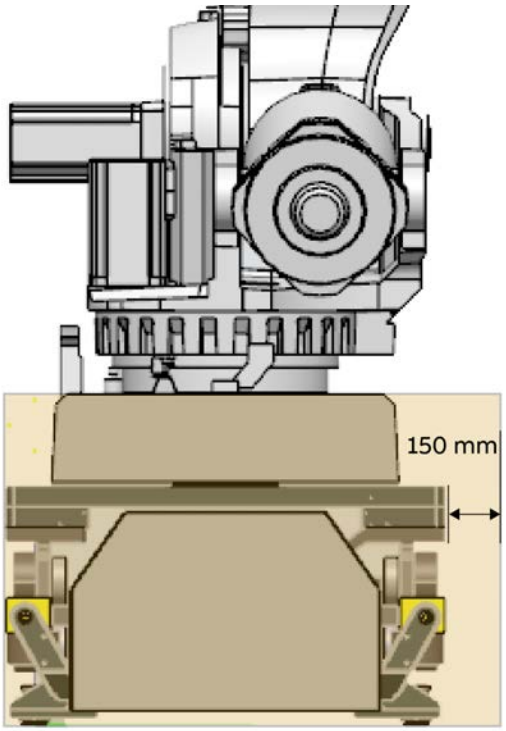
Clean space for the carriage cabling(Track without external cable chain)

Clean space around the track is required when installing the track due to the cable from internal cable chain to robot base on the carriage.

The clean space is different when the robot is installed in different angle on the track.

In line with the track, 0° or 180°

When the robot is installed in line with the track, the clean space is as the following illustration.



xx2400000483

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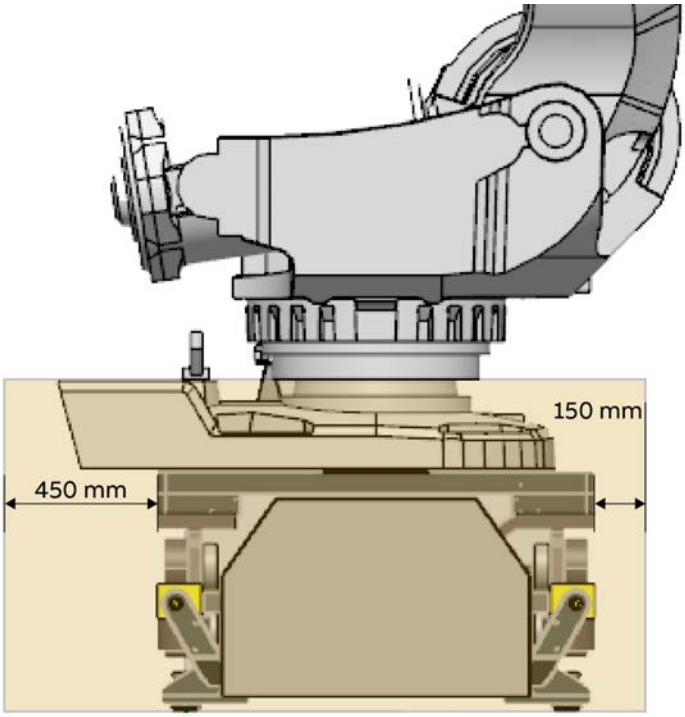
3.4.3 Required installation space
Continued

Standard 45° , 90°,, 135° or Mirrored 225° , 270°,, 315°

When the robot is installed on the track between 0° to 180°, the clean space is as the following illustration.

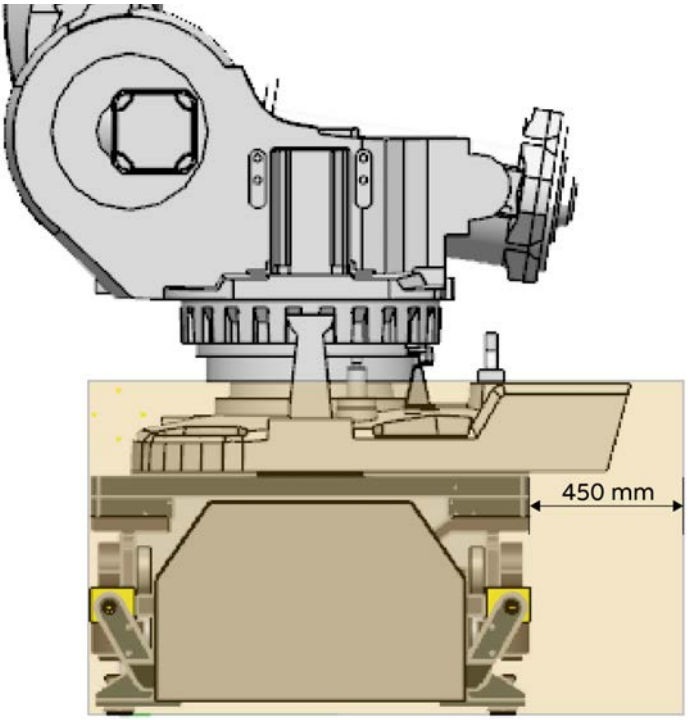


xx2400000484

Continues on next page

Standard 225° , 270°,, 315°4 or Mirrored 45° , 90°,, 135°

When the robot is installed on the track between 180° to 360°, the clean space is as the following illustration.



xx2400000485

3.4.4 Lifting with lifting accessories

3.4.4.1 Lifting and moving track motion IRT 710 OmniCore

Actions before lifting

CAUTION

Read through the safety instructions carefully, before the track motion IRT 710 OmniCore is unpacked and installed.

WARNING

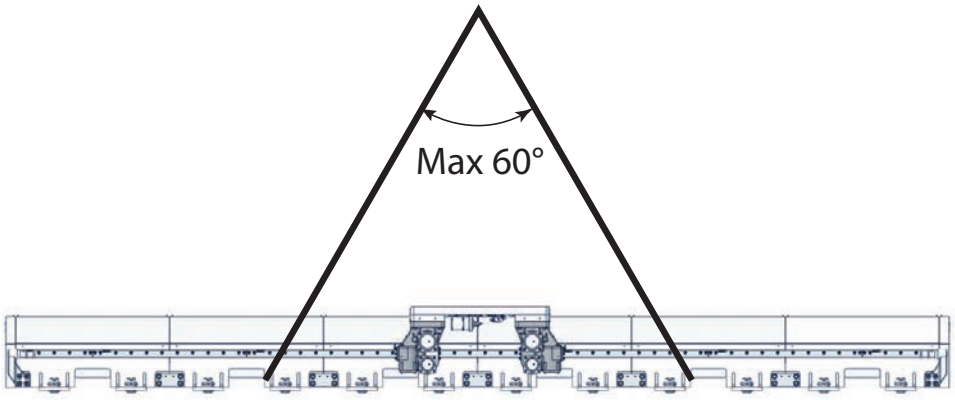
Never lift the track motion IRT 710 OmniCore in sections longer than 6.5 meters.

To prevent damage only use the lifting position according to the tables in *Lifting zones on page 100*, *Lifting position on page 101* and *Lifting weight on page 109*.

Required equipment

Equipment	Article number	Note
Overhead crane	-	
Lifting chain(including two short belts)/ lifting belt	-	> 5,000 kg (capacity)

Lifting zones



xx2200000645

WARNING

Never place lifting straps wider than a combined angle of max. 60°.

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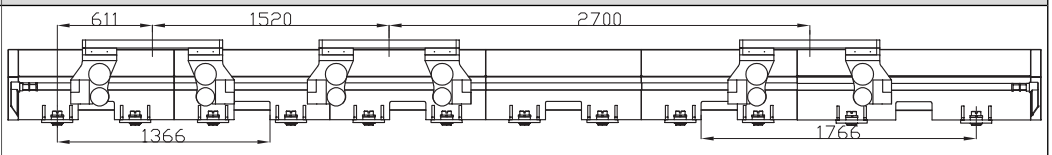
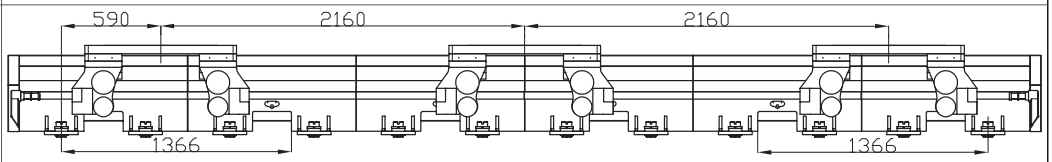
Lifting position

The illustration shows the lifting position on the track motion IRT 710 OmniCore where the lifting straps should be placed.

Carriage No.	Length (m)	Carriage and lifting position
3	6.5	 xx2200000406
	6	 xx2200000407

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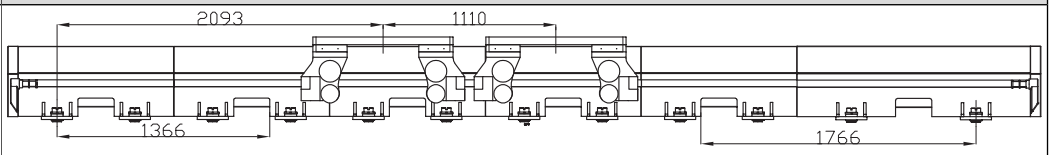
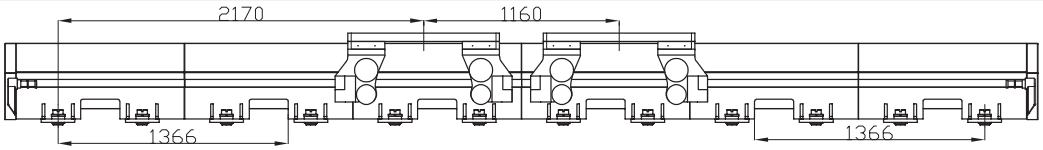
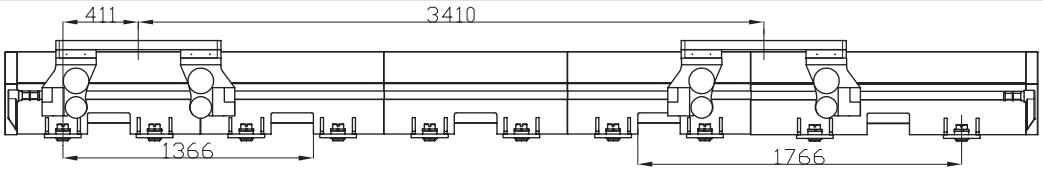
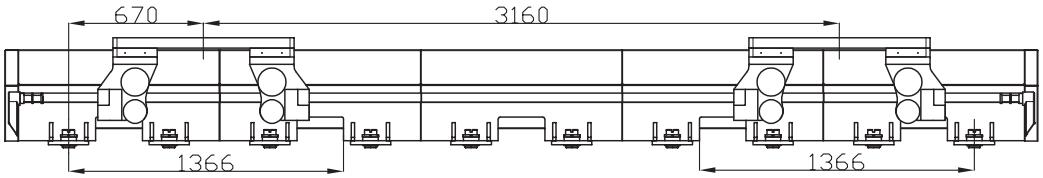
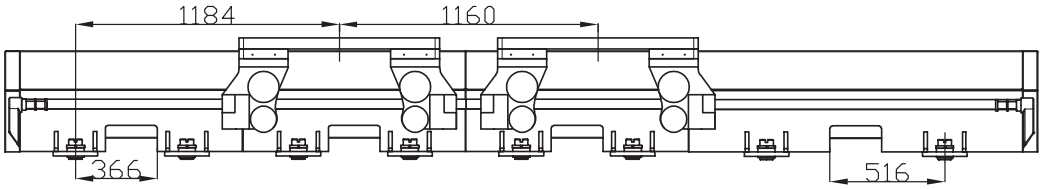
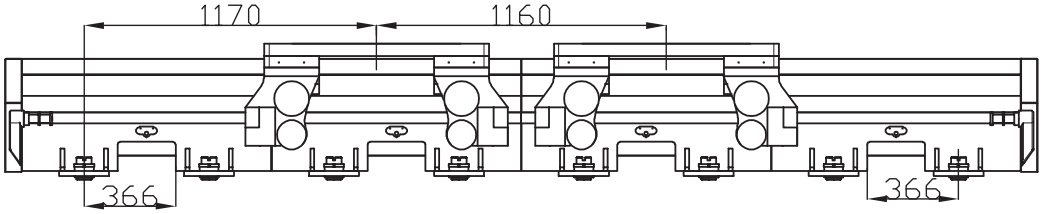
3.4.4.1 Lifting and moving track motion IRT 710 OmniCore

Continued

Carriage No.	Length (m)	Carriage and lifting position
2	6.5	 xx2200000646
	6	 xx2200000647
	5.5	 xx2200000648
	5	 xx2200000649
	4.5	 xx2200000650
	4	 xx2200000651

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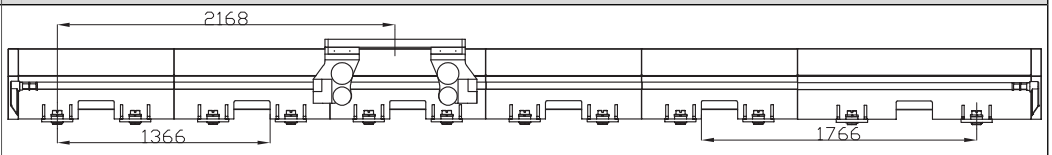
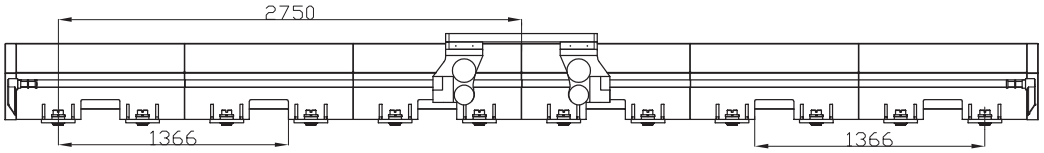
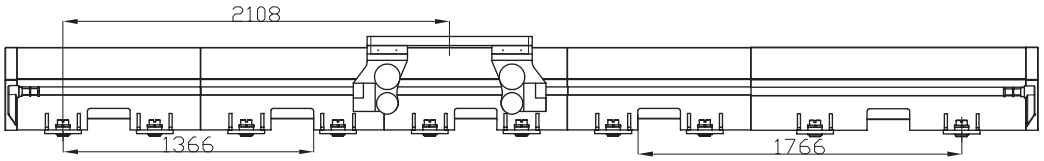
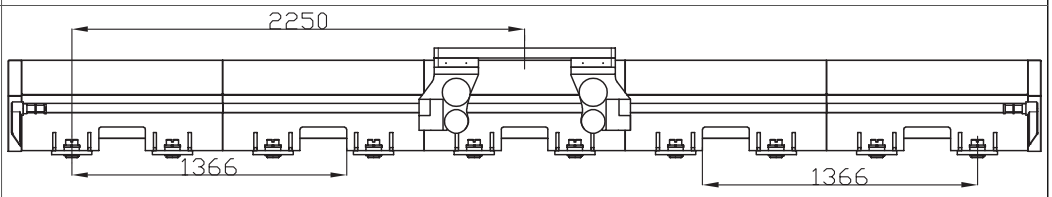
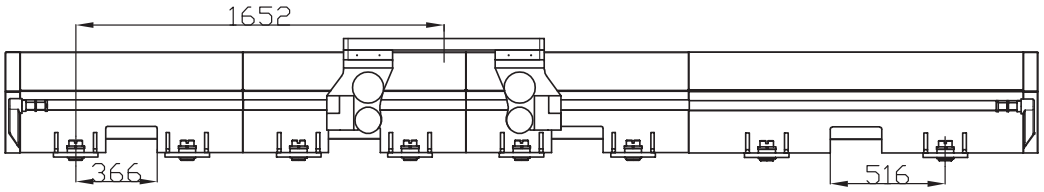
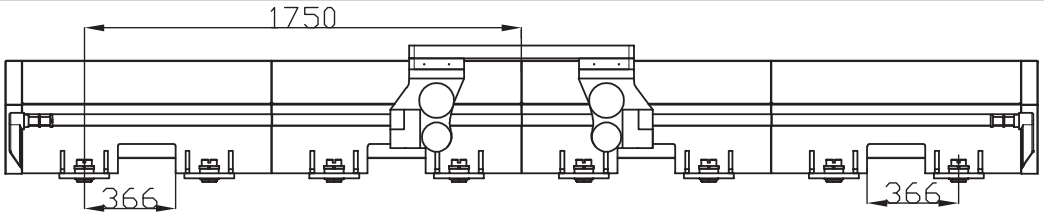
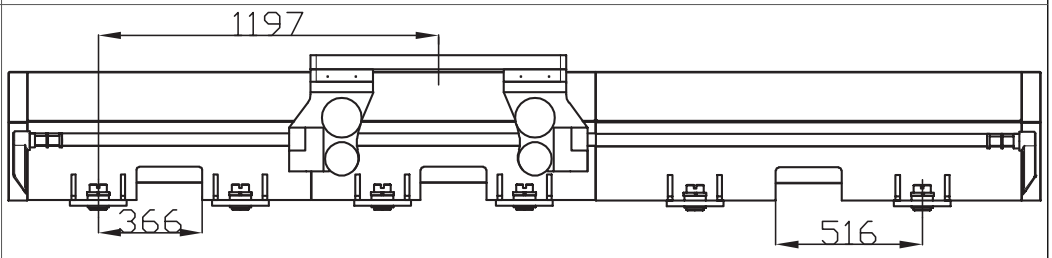
Carriage No.	Length (m)	Carriage and lifting position
1	6.5	 xx2200000652
	6	 xx2200000653
	5.5	 xx2200000654
	5	 xx2200000655
	4.5	 xx2200000656
	4	 xx2200000657
	3.5	 xx2200000658
	3	

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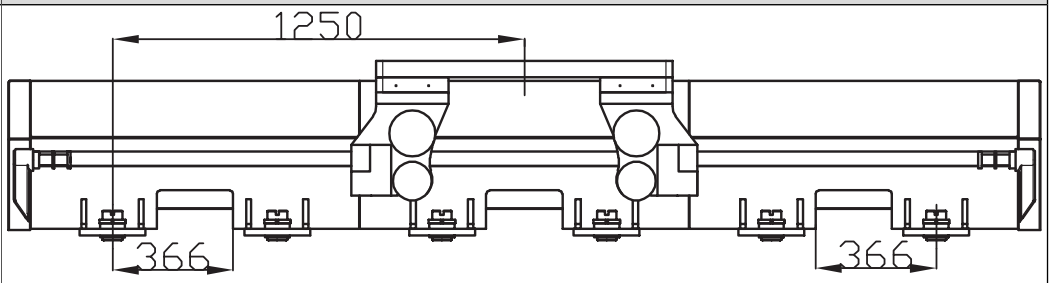
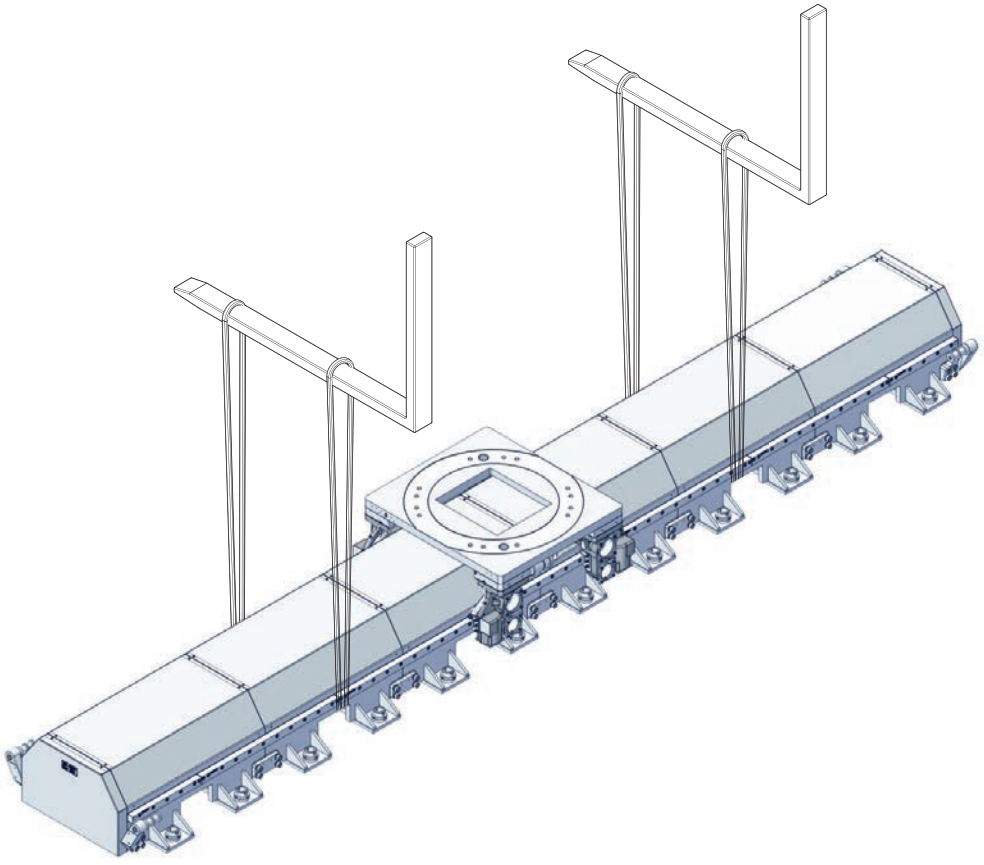
3.4.4.1 Lifting and moving track motion IRT 710 OmniCore
Continued

Car-riage No.	Length (m)	Carriage and lifting position
		 xx2200000659

Lifting using fork lift

Proceed as follows to lift the track motion IRT 710 OmniCore using the fork lift.



xx2200000789

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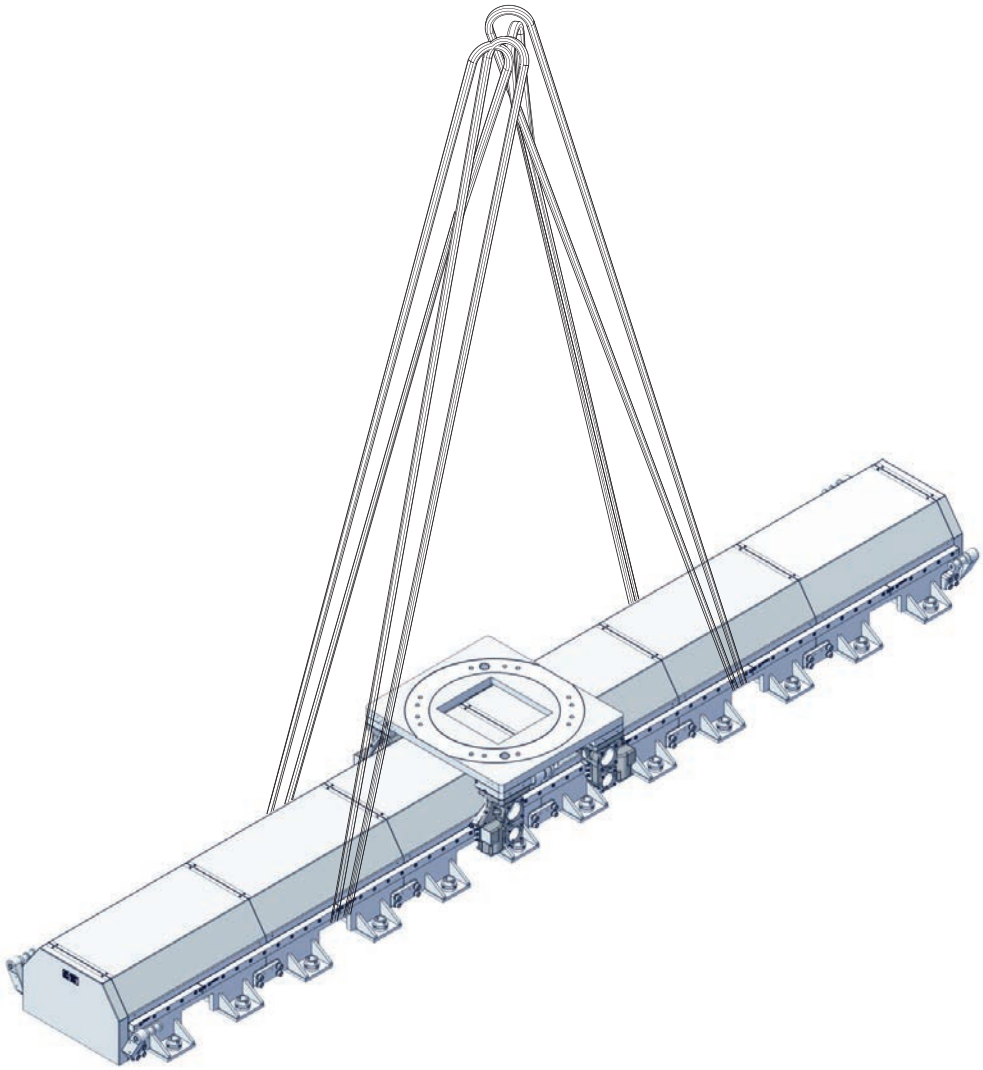
Lifting using an overhead crane

Proceed as follows to lift the track motion IRT 710 OmniCore using an overhead crane.



xx2200000790

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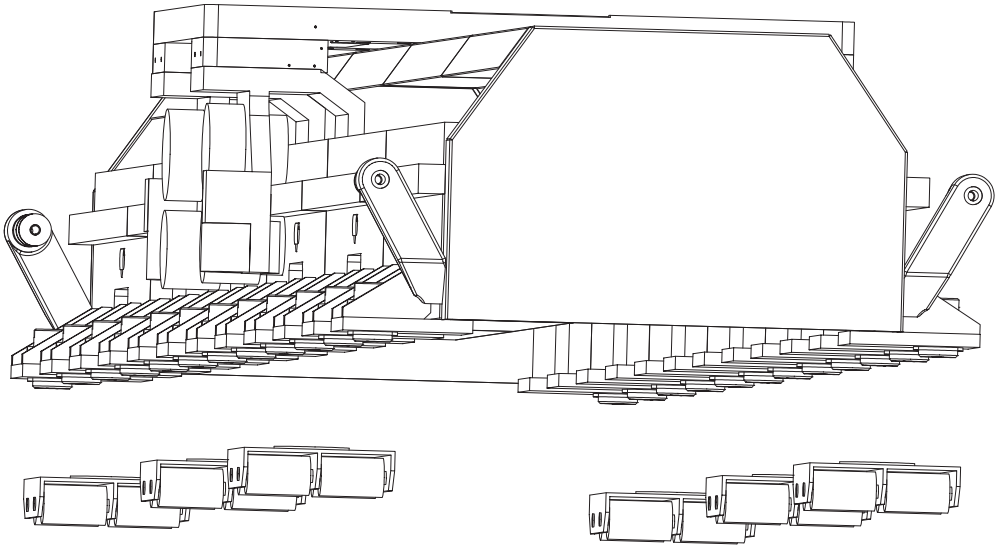
3.4.4.1 Lifting and moving track motion IRT 710 OmniCore
Continued

Moving the track motion using roller dollies

Lift the IRT 710 OmniCore according to lifting instructions, and place roller dollies under the stand's ground plates. Depending on the lenght of the track motion, the number of roller dollies varies. See table for information.



xx2200000660

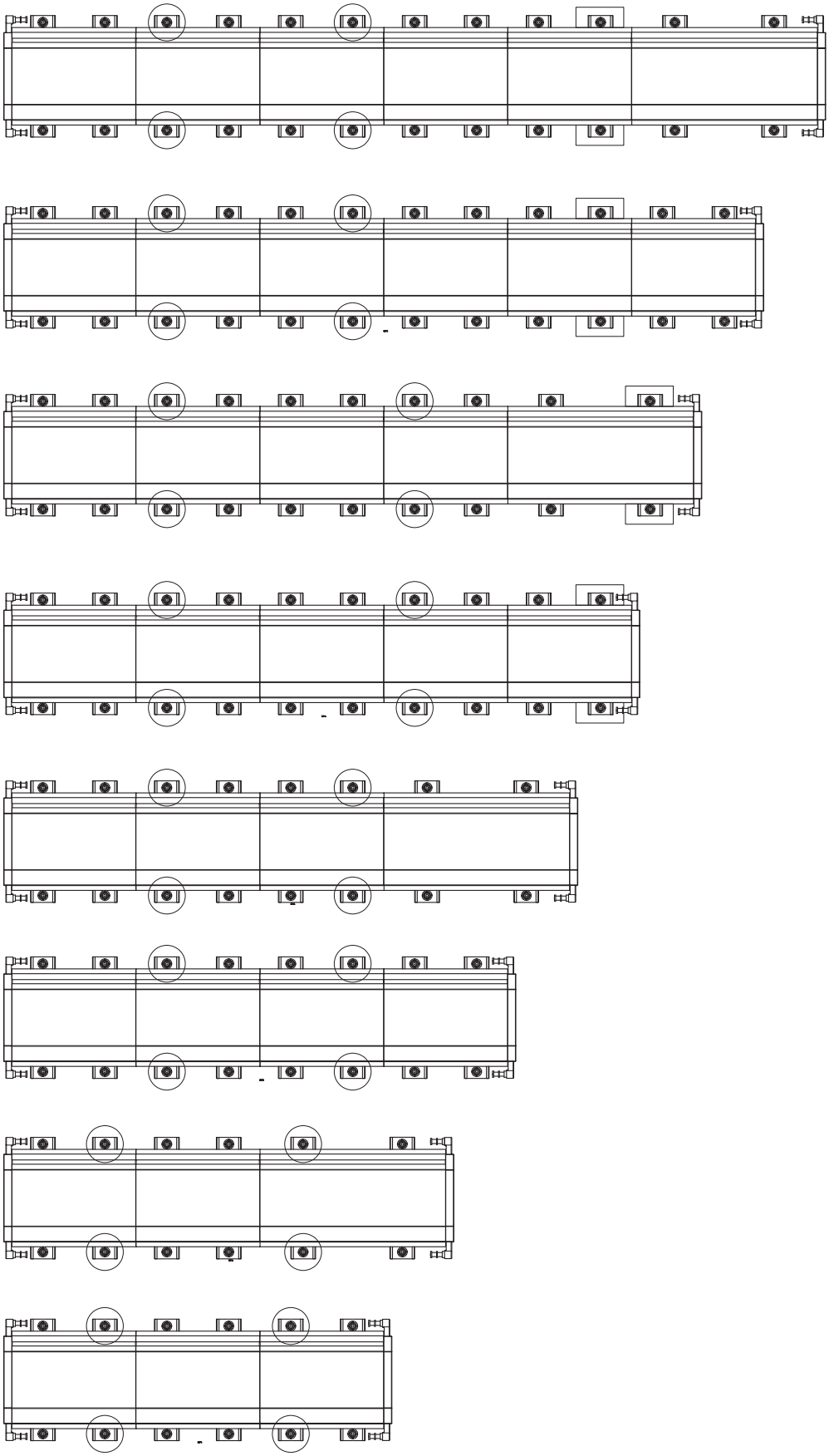
Continues on next page

The type of roller dolly and the placement of the two types is shown in the following illustration and table.

Continues on next page

3.4.4.1 Lifting and moving track motion IRT 710 OmniCore

Continued



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xx2200000677

Track motion length	Roller dollies with steering	Fixed roller dollies
6 sections	4 pcs	2 pcs
5 sections	4 pcs	2 pcs
4 sections	4 pcs	-
3 sections	4 pcs	-

Lifting weight

For accurate weight, read the identification plates on the track motion IRT 710 OmniCore. The position of the identification plates are described in *Identification plate on page 73*.

The weight of the IRT 710 OmniCore depends on its type, length, and number of carriages. The total weight can be determined with the following formulas:

W = *Weight, robot on page 59* + *Weight, pedestal on page 59* + *Weight, track motion excluding harness and pedestal on page 59*

Lifting the IRT 710 OmniCore

WARNING

The transportation brackets cannot be removed until the product is secured to the foundation.

Use this procedure to lift the IRT 710 OmniCore.

	Action	Note
1	Move the product to the appropriate lifting position.	
2	**CAUTION** The weight of the IRT 710 OmniCore is in *Lifting weight on page 109*. All lifting accessories used must be sized accordingly.	
3	**WARNING** Personnel must not, under any circumstances, be present under the suspended load.	
4	Attach the lifting roundslings to the product.	Lifting capacity for the lifting chain is specified in *Required equipment on page 100*.
5	Carefully stretch the roundslings by lifting the crane slowly. This prevents the product from falling down when it is unfastened. Do not overstretch the roundslings if the product is fastened because there is a risk of the product being damaged.	

Continues on next page

3.4.4.1 Lifting and moving track motion IRT 710 OmniCore

Continued

	Action	Note
6	Remove the bundled packing tape (if the product is fastened).	
7	Raise the overhead crane to lift the product.	

3.4.5 Foundation

Robustness

The foundation must with stand the static loads caused by the weight of the equipment and the dynamic loads generated by the movement of the carriage and the manipulator. The minimum thickness of the concrete floor is 160 mm.

The concrete quality class must be at least C20/25 (or B25) to insure a good resistance of the anchor. Class C30/37 (or B35) is advisable.

The concrete compressive strength can be tested according to the European norm EN 206-1.

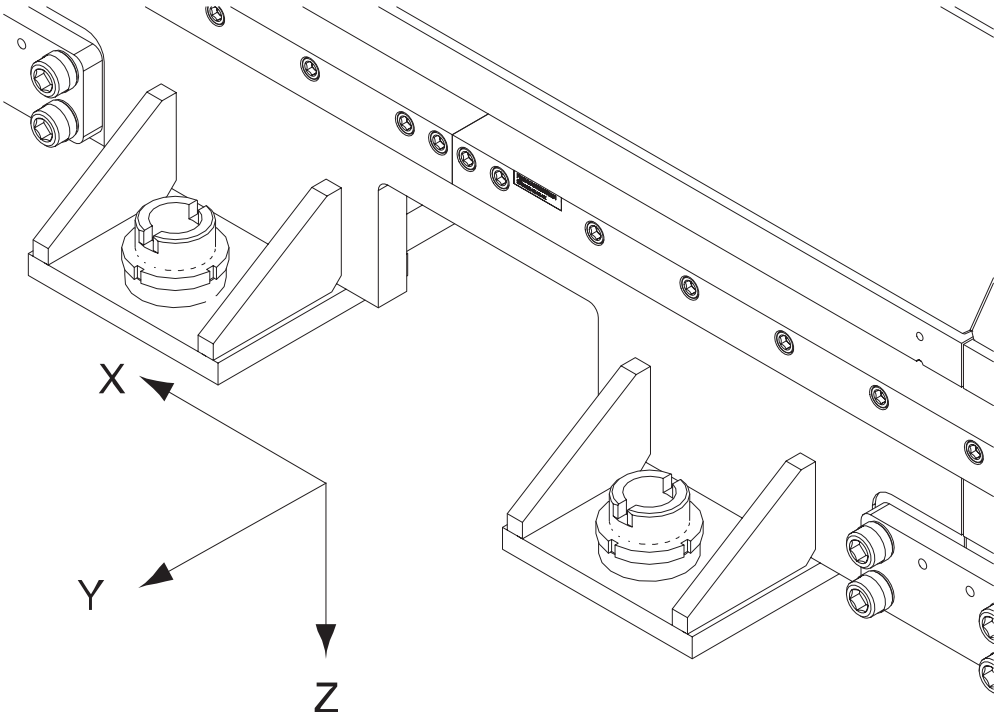
When IRT 710 OmniCore is mounted on the steel platform, M16 class 12.9 screws are required. Depth of thread must be min. 30 mm.

Inclination and flatness

The levelling of the track is done by screwing / unscrewing the M60 screws. However, in order to insure a good levelling, the concrete floor inclination must not exceed 1mm / meter in the translation direction, and 0.5mm / meter cross section. The levelling screws can also compensate a poor flatness of the slab and small bumps up to 20 mm. However, the surface under the levelling screw must be flat. A concrete surfacing grinder should be used to correct the flatness locally if necessary.

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.



xx2200001254

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3.4.5 Foundation
Continued

Robot	max. load at normal operation (KN)			max. load at emergency stop (KN)		
	Fxy max	Fz min	Fz max	Fxy max	Fz min	Fz max
4400	3.4	-4.3	10	4.7	-6.8	14
4400+riser	3.8	-4.8	12	5.1	-7.3	15
4600	2.2	-1.7	6.2	4.5	-7.3	13
4600+riser	2.8	-2.1	7.7	5.0	-8.1	14
5710	3.2	-4.9	11	5.9	-12	20
5710+riser	3.2	-4.9	11	6.2	-12	20
5720	3.6	-4.9	12	7.9	-17	28
5720+riser	3.8	-5.2	12	8.3	-17	30
6650S	7.2	-10	26	10	-17	31
6650S+riser	7.4	-10	26	11	-18	33
6700	5.2	-5.4	15	9.3	-16	27
6700+riser	5.6	-5.8	16	10	-18	30
6710	3.6	-4.9	12	7.8	-17	28
6710+riser	3.8	-5.2	12	8.2	-17	30
6720	3.8	-5.1	12	8.1	-17	29
6720+riser	3.9	-5.4	13	8.6	-18	31
6730	3.9	-5.3	13	8.5	-18	30
6730+riser	4.1	-5.6	13	8.9	-19	32
6740	4.1	-5.5	13	8.8	-19	32
6740+riser	4.3	-5.8	14	9.3	-20	33
660	7.7	-8.4	21	8.6	-12	25
660+riser	7.8	-8.6	21	8.9	-12	26
760	6.9	-8.8	23	13	-14	31
760+riser	6.9	-8.8	23	13	-14	31
460	4.4	-3.6	12	6.2	-8.1	17
460+riser	4.7	-3.8	12	6.5	-8.4	17
7600	7.6	-12	26	14	-28	47
7600+riser	7.6	-12	26	15	-29	49

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.

Floor plate

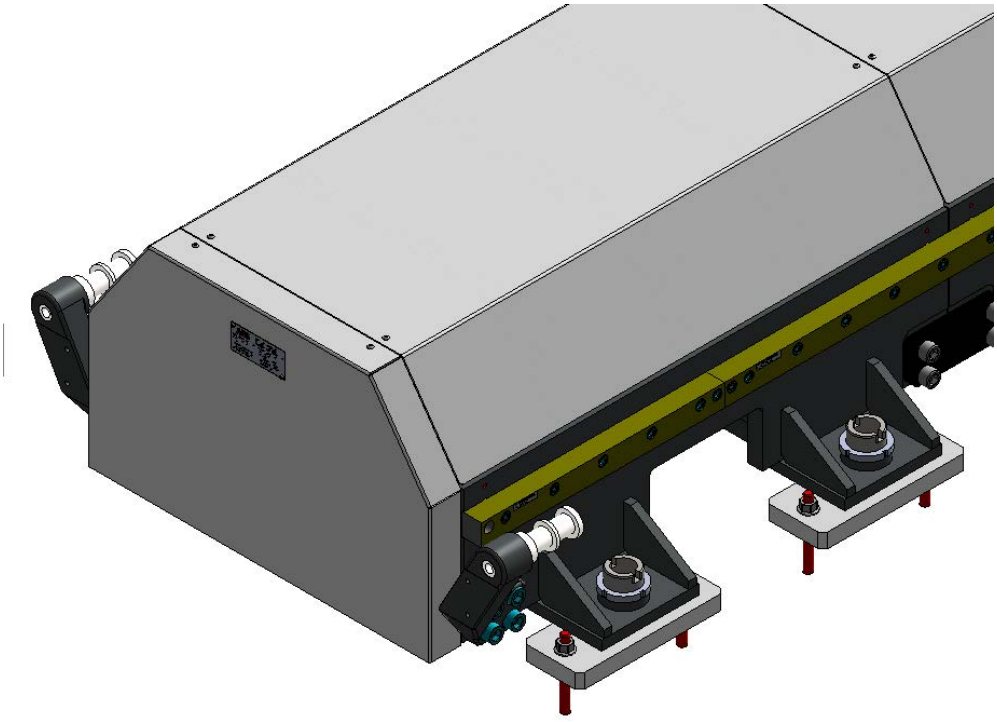
For these robots application, it is recommended to not put track on ground straightly, put one plate as interface surface to make it more stable. This is not a standard option in list, any request can reach the sales office for help.

Continues on next page

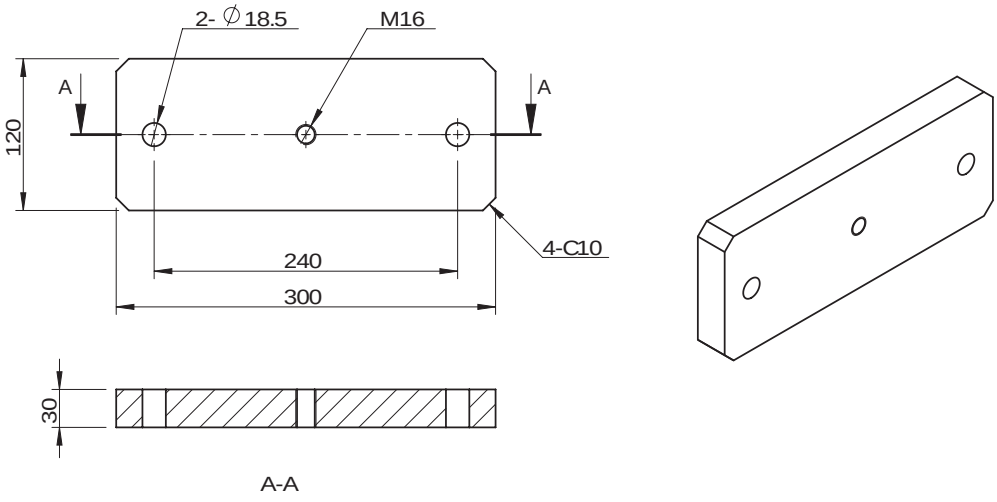
The following images show the two types base plate of the IRT 710 OmniCore.

For general condition 1

This type base plate is used for better floor quality with lower cost.



xx2200001199



xx2200001282

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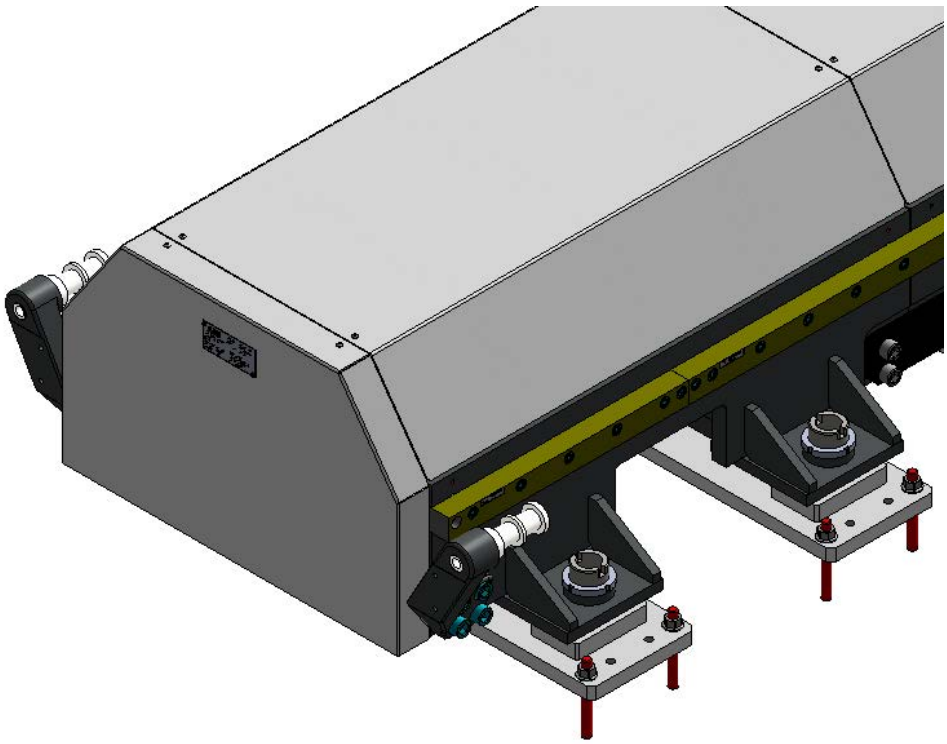
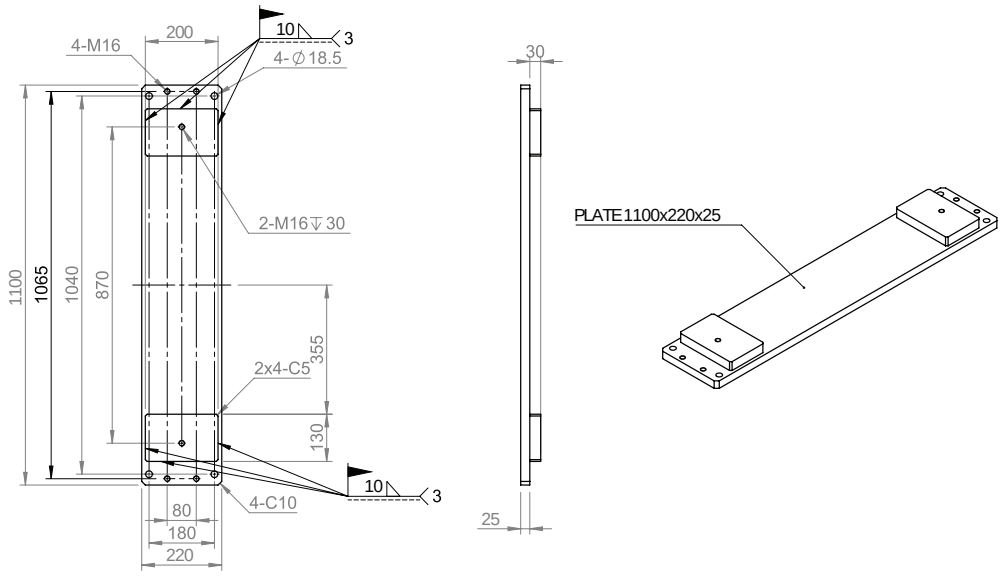
3.4.5 Foundation
Continued

For general condition 2

This type base plate is used for worse floor quality but easier for adjustment onsite.



xx2200001200



xx2200001283

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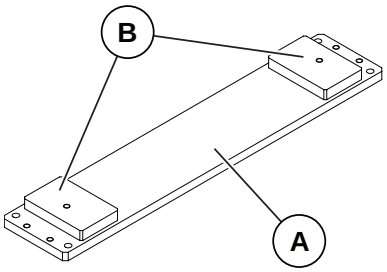
Note

The small plate and large plate only could be welded during the geometric alignment of track. Welding them together in advance will result in the geometric alignment failure.



xx2400001020

A	Large plate
B	Small plate

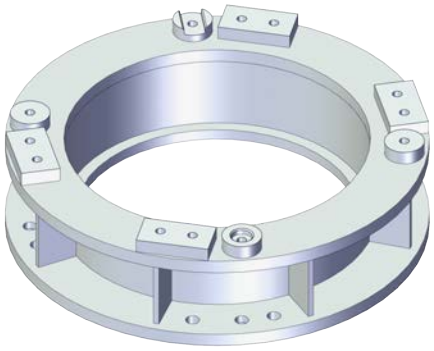
Robot compatible with floor plate

Robot compatible	IRB 7600	IRB 760	IRB 6740	IRB 6730	IRB 6720	IRB 6710	IRB 6700	IRB 6650S	IRB 660	IRB 5720	IRB 5710	IRB 4600	IRB 4400	IRB 460
Without floor plate												√	√	
With floor plate	√	√	√	√	√	√	√	√	√	√	√			√

Robot capabilities

The following table shows the robot capabilities of the IRT 710 OmniCore.

Standard pedestals are generally allowed between the robot but their height is limited and dependent on the type of robot.

3HKA00000190345	 xx2200000661

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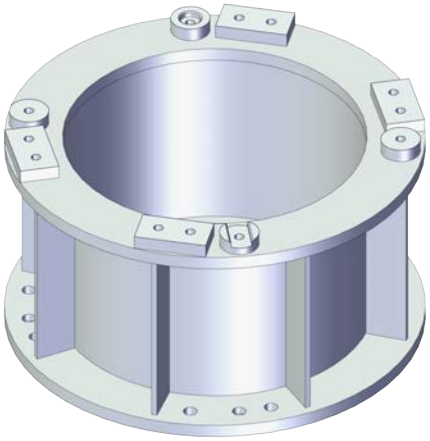
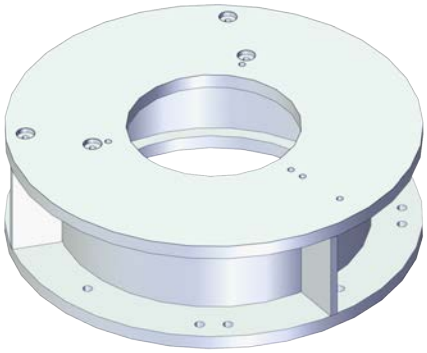
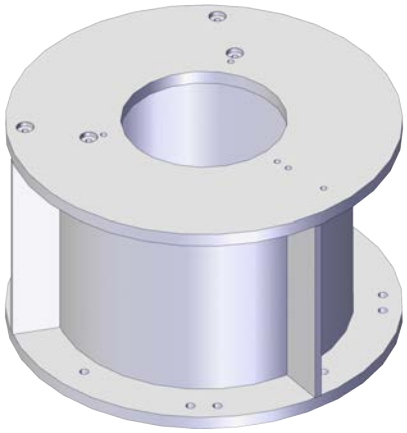
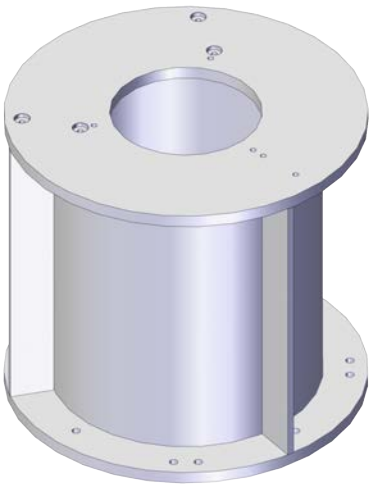
3.4.5 Foundation
Continued

3HKA00000190346	 xx2200000663
3HKA00000190348	 xx2200000662
3HKA00000190349	 xx2200000664

Continues on next page

3HKA00000190350	 xx2200000665

Weight, pedestal

Robot Pedestal	Height	Weight	IRB 7600	IRB 760	IRB 6740	IRB 6730	IRB 6720	IRB 6710	IRB 6700	IRB 6650S	IRB 660	IRB 5720	IRB 5710	IRB 4600	IRB 4400	IRB 460
3HKA00000190345	250 mm	213 kg	√	√	√	√	√	√	√	√	√	√	√			√
3HKA00000190346	500 mm	288 kg				√	√	√	√		√	√	√			√
3HKA00000190348	250 mm	220 kg												√	√	
3HKA00000190349	500 mm	276 kg												√	√	
3HKA00000190350	750 mm	331 kg												√		

3.4.6 Screw joints

General

This section details how to tighten the various types of screw joints on the robot and the IRT 710 OmniCore.

The instructions and torque values are valid for screw joints comprised of metallic materials and do not apply to soft or brittle materials.

Screw class

Class 12.9 screw is recommended by ABB for certain screw joints. These screws are high grade quality and extremely resistant to fatigue. Whenever used, this is specified in the instructions, and in such cases, no other type of replacement screw is allowed! Using other types of screws will void any warranty and may potentially cause serious damage or injury!

Loctite 243

A thread lock should be used on all screws that have a specified torque and only where stated. This is required to prevent the risk of the screw loosening due to vibrations over the lifetime of the product. Loctite 243 is the recommended thread lock and should be applied to the screws before assembly and tightening to their recommend torque.

Tightening torque

Before tightening any screw, note the following:

- Determine whether a standard tightening torque or special torque is to be applied. The standard torques is specified in the tables below. Any special torques is specified in the *Repair on page 237*, *Maintenance on page 199* or Installation procedure description. Any special torque specified overrides the standard value.
- Use the *correct tightening torque* for each type of screw joint.
- Only use *correctly calibrated torque* keys.
- Always *tighten the joint by hand*, and never use pneumatic tools.

Use the *correct tightening technique*, i.e. do not jerk. Tighten the screw in a slow, flowing motion.

- Maximum allowed total deviation from the specified value is 3%!

3.4.7 Moving the carriage manually

CAUTION

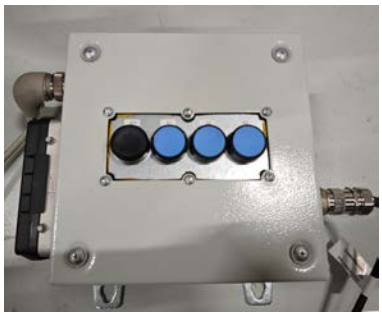
The carriage must never be moved manually if the motor or the drive unit are removed from the track motion.

Releasing the brake

The carriage can be moved manually by connecting the power cable to the controller and then releasing the brake.

It is recommended that the carriage is manually pushed along its complete stroke after being installed and before running the track using the controller. This is to ensure that there is no risk of collision other equipment in the vicinity of the track.

If there is no voltage to the motor, 24 V can be connected directly to the motor as described in *Release the brake (external 24V DC) on page 120*.

	Action	Note/Illustration
1	Connect all cables to the controller as described in *Cables connections on page 179*.	
2	Start up the controller as described in *Connectors on OmniCore controller on page 172* on page.	
3	With MCB, press in the brake release button EN and the corresponding axis button shows in the figure. Without MCB, press the two buttons shows in the figure at the same time.	With MCB  xx2400000591 With Power static harness  xx2400000592
4	Push the carriage by hand to the desired location.	

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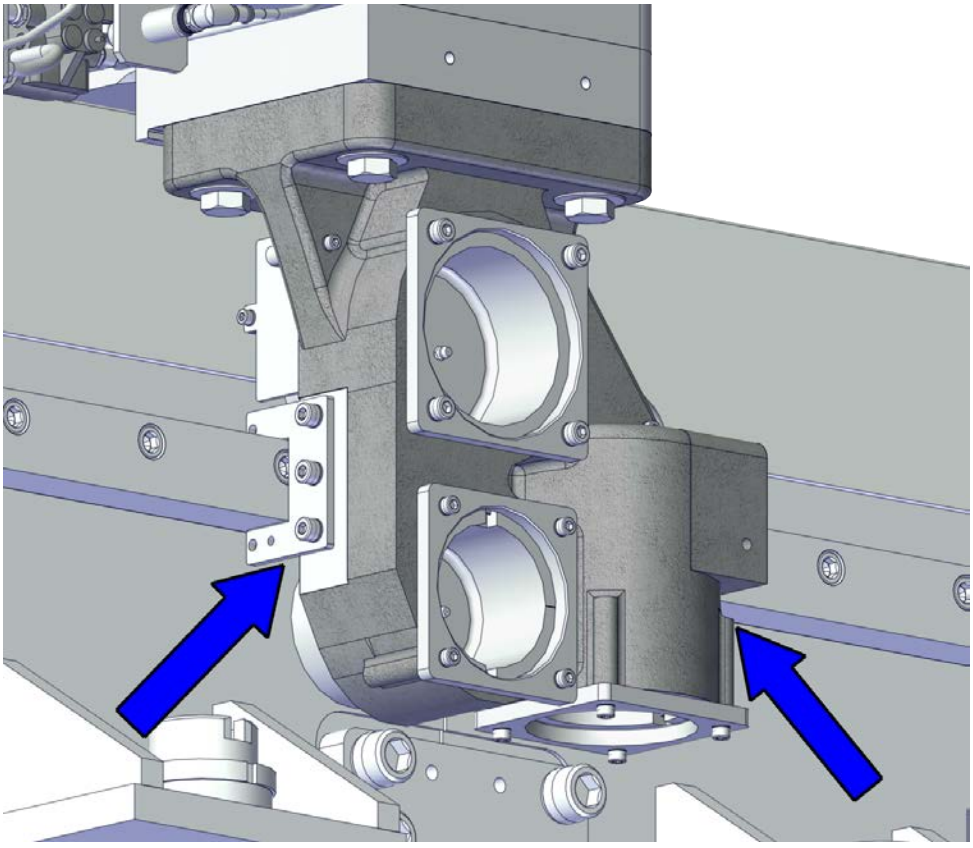
3.4.7 Moving the carriage manually
Continued

Note

Care should be taken when moving the track manually.

Users should remain clear of these locations when moving the track.

xx1800001868



xx2200000666

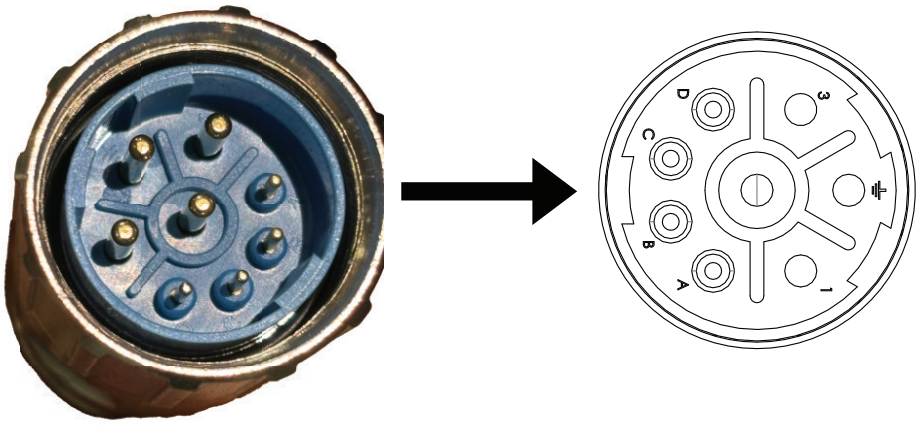
Release the brake (external 24V DC)

If there is no voltage to the motor, 24V DC can be connected directly to the motor or motor power movement cable.

	Action
1	Unplug the Motor power cable from the MCB/Power static harness that runs to the IRT 710 OmniCore motor.
2	Using pins, connect the +24VCC to the A pin (see figure).

Continues on next page

	Action
3	Connect the 0VCC to the B pin.



xx2400000593

Note

Painting: Half black color. Except the mounting surface.

Note

Mating connectors are not offered.

WARNING

The motor breaks on the IRT 710 OmniCore are phase dependent. Fault connection can cause damage to vital parts.

3.4.8 Assembling the track motion IRT 710 OmniCore

3.4.8.1 Assembling the sections

General

When the track sections number is seven or more, it's always speared as several shot track for lifting and transportation during delivering. The track needs to be combined on site well before alignment and levelling.

The IRT 710 OmniCore should be assembled as set out in the procedure below. Detailed descriptions of each stage can be found in the following sections.

Required spare parts

Note

The spare part numbers that are listed in the table can be out of date. See the latest spare parts of the IRT 710 OmniCore via myABB Business Portal, *www.abb.com/myABB*.

Spare part	Article number	Note
Track cover L=1M (graphite white color)	3HKA00000186234A	
Track cover L=1M (orange color)	3HKA00000186234B	
Track cover L=1.5M (graphite white color)	3HKA00000186240A	
Track cover L=1.5M (orange color)	3HKA00000186240B	
Rack cover L=1M (graphite white color)	3HKA00000186236A	
Rack cover L=1M (orange color)	3HKA00000186236B	
Rack cover L=1.5M (graphite white color)	3HKA00000186243A	
Rack cover L=1.5M (orange color)	3HKA00000186243B	
Retangular rail L=0.5M kit	3HKA00000190206	
Retangular rail L=1M kit	3HKA00000190201	
Rack L=0.5M	3HKA00000186246	ZST 300-221-500-R1
Rack L=1M	3HKA00000186248	ZST 300-221-1000-R1

Required equipment

Qty	Tool
1	Inner Hexagon Spanner 3 mm, 4 mm, 5 mm, 6 mm, 8 mm and 10 mm
1	Torque wrench 10 Nm -140 Nm
1	Adjustable wrench
1	Loctite 243

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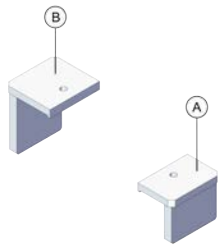
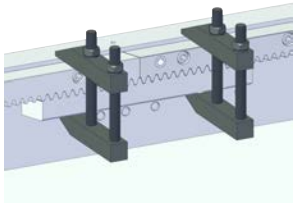
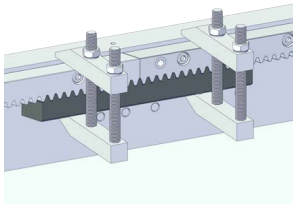
Qty	Tool	Article number	Picture
6 (3 A+ 3 B)	Rail tool	A:Non-rack side 3HKA00000189982 B:Rack side 3HKA00000189983	 xx2200001179
4	Rack clamp	3HAW107700357	 xx2200001171
2	Rack mounting block	3HAWL000011	 xx2200001170
1	Calibration pin	3HKA00000190563	 xx2200000667
1	Calibration tool 12 mm	3HAC055412-001	 xx2200001173

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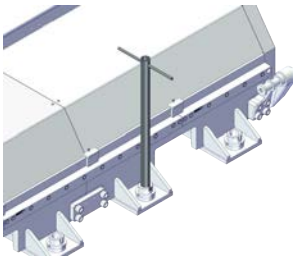
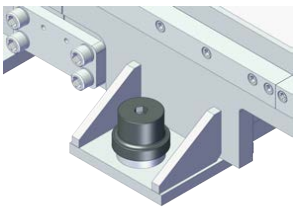
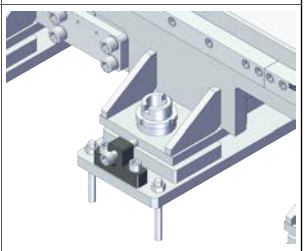
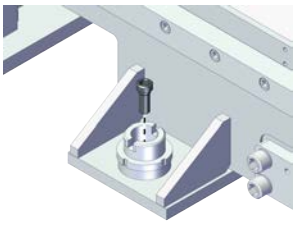
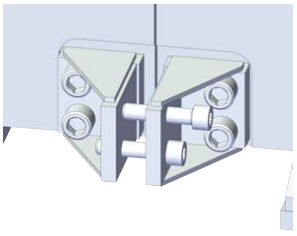
3.4.8.1 Assembling the sections

Continued

Qty	Tool	Article number	Picture
1	Levelling tool	3HAW107700360	 xx2200001172
1	Tool for levelling screw nut tightening	3HKA00000216892	 xx2200001189
-	Axis Y adjusting tool For the drawing, see *Axis Y adjusting tool drawing on page 125*.	3HKA00000192738	 xx2400000728
-	Tooling bolt M16x35 For the drawing, see *Tooling bolt M16x35 drawing on page 125*.	3HKA00000216860	 xx2400000729
-	Assisted tool set For the drawing, see *Assisted tool set drawing on page 126*.	3HKA00000216893 3HKA00000216894	 xx2400001324

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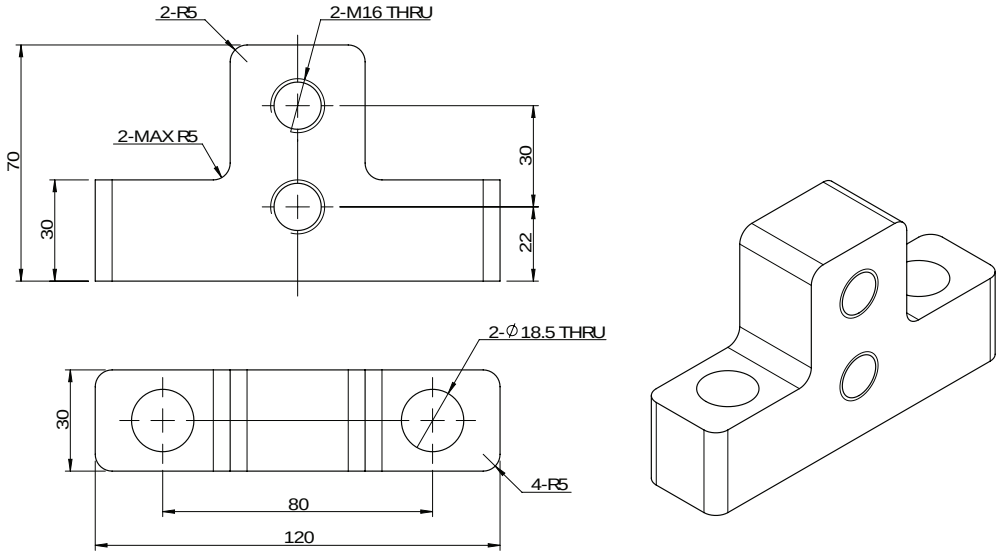
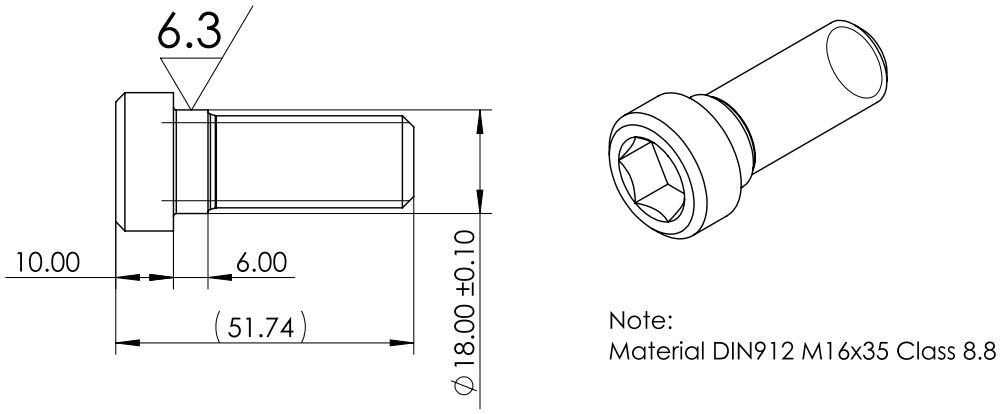
Axis Y adjusting tool drawing



xx2400000490

Tooling bolt M16x35 drawing



Note:
Material DIN912 M16x35 Class 8.8

xx2400000489

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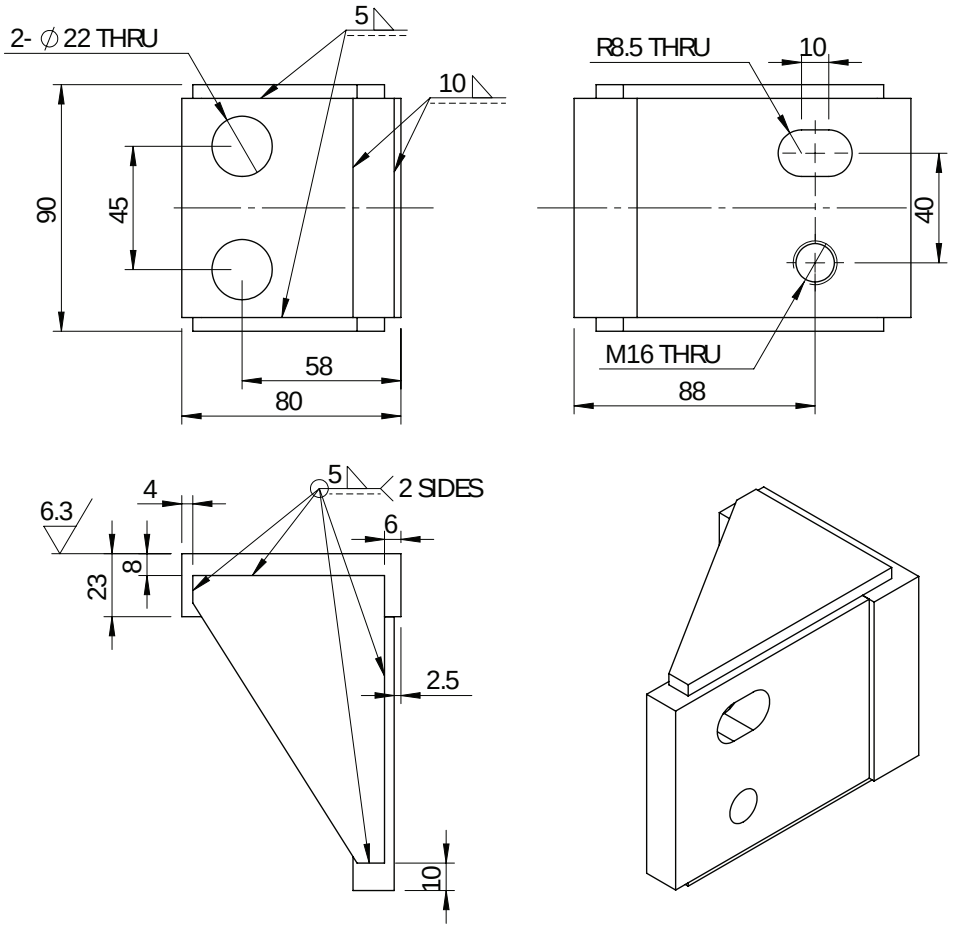
3.4.8.1 Assembling the sections

Continued

Assisted tool set drawing

3HKA00000216893



xx2400001321

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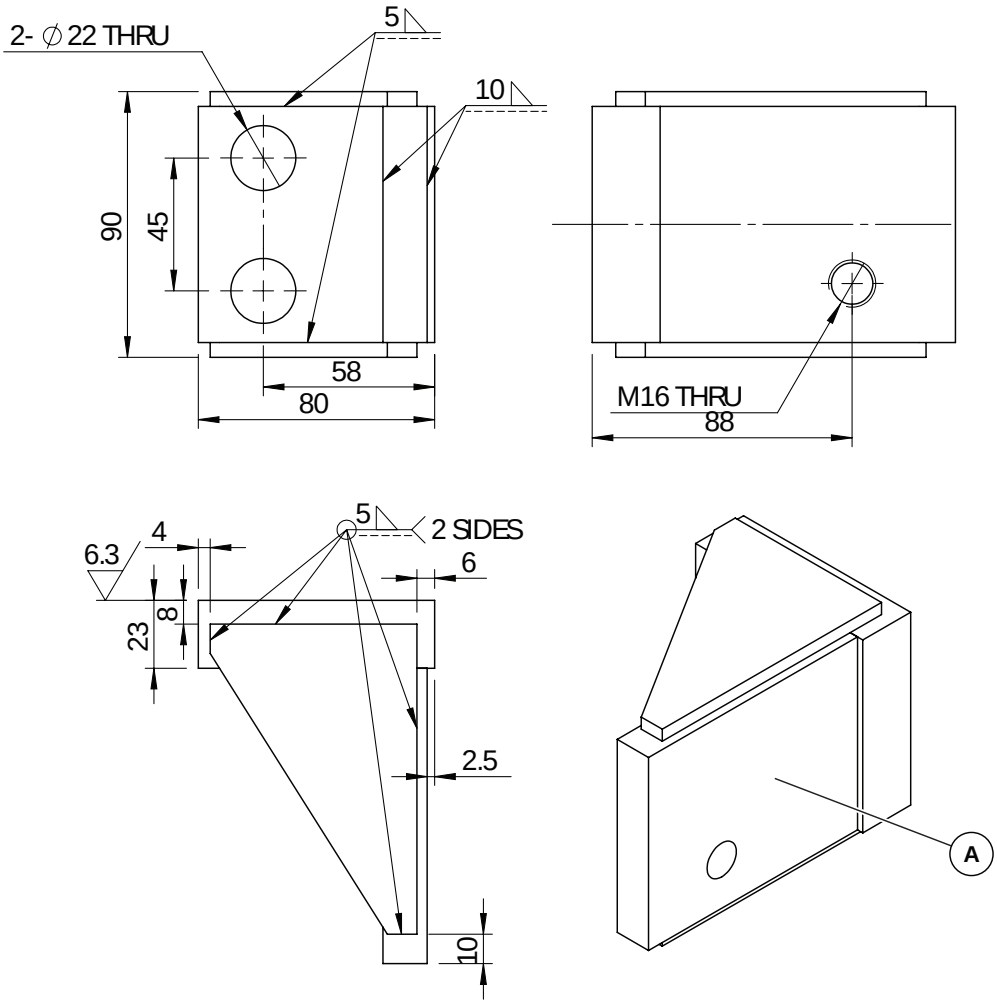
3HKA00000216894



xx2400001322

A Hardening, HRC48 + 4, H >= 0.5 mm

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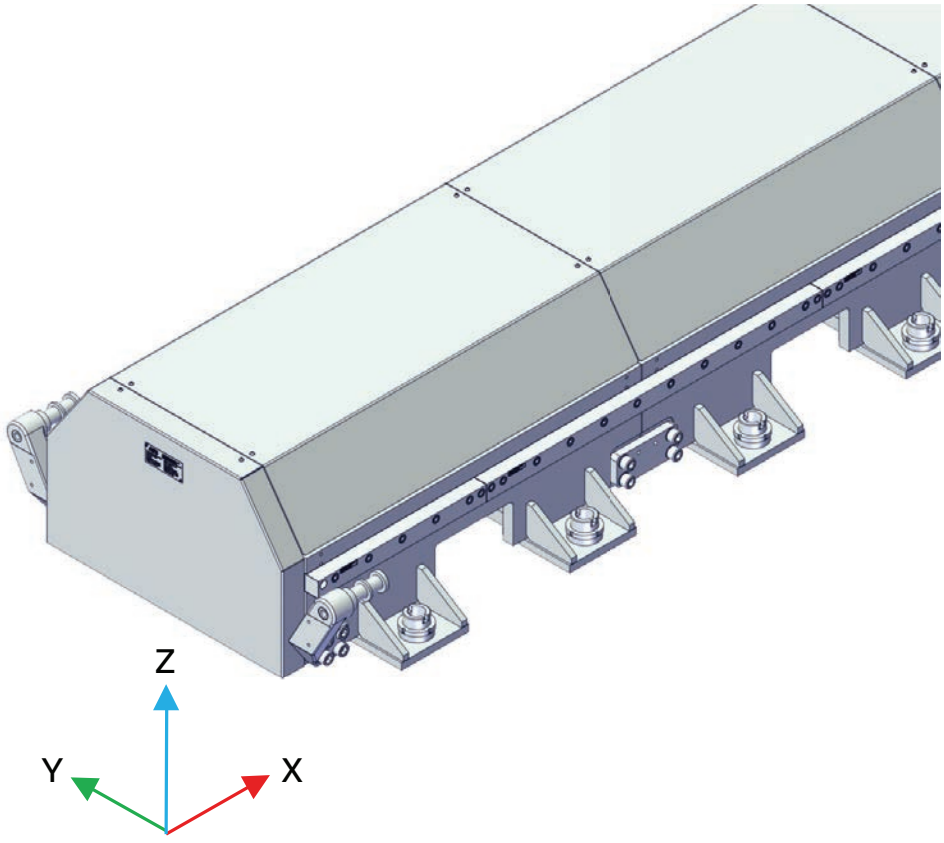
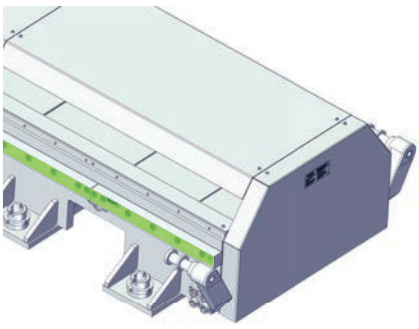
3.4.8.1 Assembling the sections
Continued

Track combination

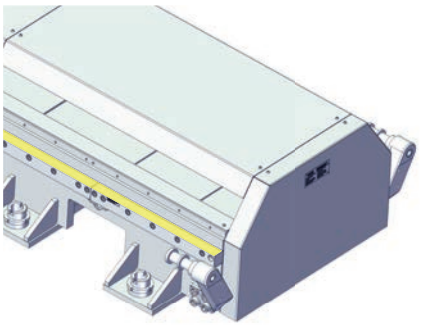
Before assembling the track sections, it is better to locate the corresponding position of track motion position in factory or workstation coordinate system.



xx2400000877

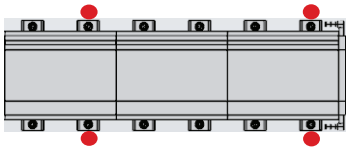
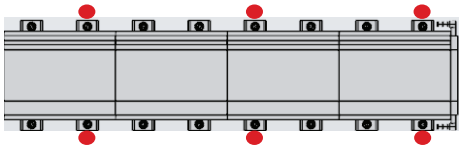
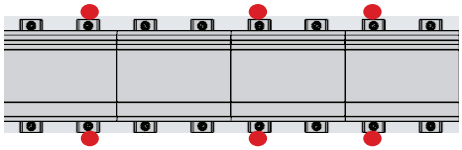
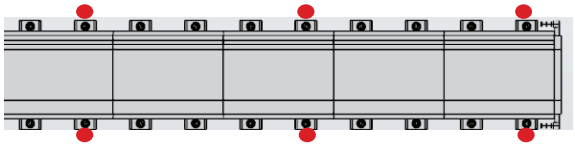
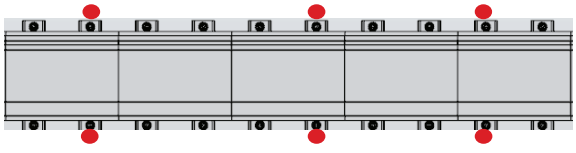
	Description	Alignment calibrating panel on the track
Y	The side plane of the rectangular rail on the rack side	 xx2400000878

Continues on next page

	Description	Alignment calibrating panel on the track
Z	The plane of the rectangular rail upper surface	 xx2400000879

Recommended segmental sections reference feet

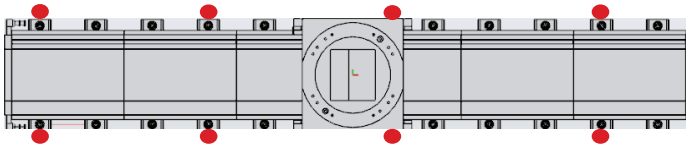
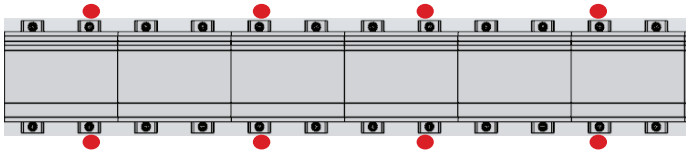
Before the assembling, the sections should be aligned on the reference feet to ensure that the rail and rack can be installed to the track. The following is the recommended reference feet and measurement position for segmental sections assembly.

Segmental sections	Recommended reference feet
3 sections with terminal section	 xx2400001009
4 sections with terminal section	 xx2400001010
4 sections without terminal section	 xx2400001011
5 sections with terminal section	 xx2400001012
5 sections without terminal section	 xx2400001013

Continues on next page

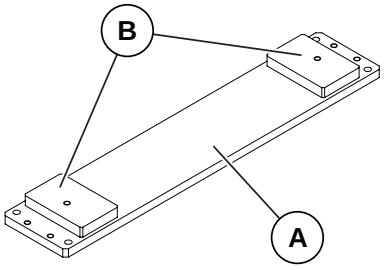
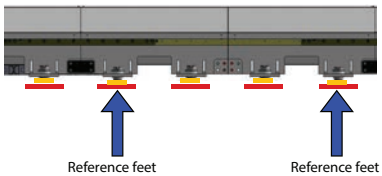
3.4.8.1 Assembling the sections

Continued

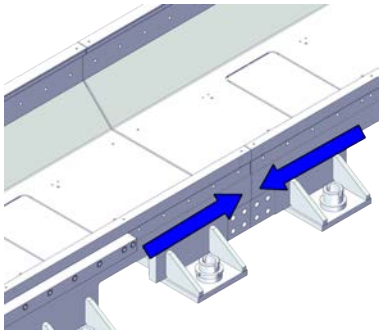
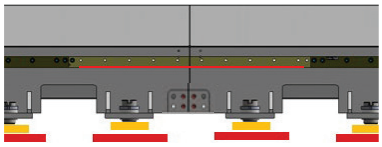
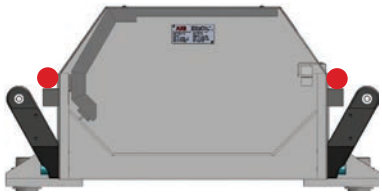
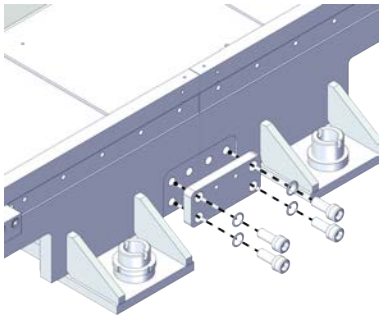
Segmental sections	Recommended reference feet
6 sections with terminal section	 xx2400001014
6 sections without terminal section	 xx2400001015

Assembling procedure

The following table describes all necessary steps to achieve a correct assembly of the IRT 710 OmniCore track:

	Action	Note/Illustration
1	Markup on a clean floor for the IRT 710 OmniCore. Markup also the position of each section.	
2	Place the floor plate large plate (A) according field marking.	 xx2400001020 A Large plate B Small plate
3	Install the chemical anchor according to *Installation of chemical anchors on page 141*.	
4	Position the preassembled carriage & track section on the large plate at the predetermined position.	
5	Place the small plate (B) under the track feet with the tooling bolts M16x35.	
6	Lift the segmental sections with the M60 levelling screws and stand on the segmental sections reference feet. For more information about segmental sections reference feet, see *Recommended segmental sections reference feet on page 129*.	 xx2400001022

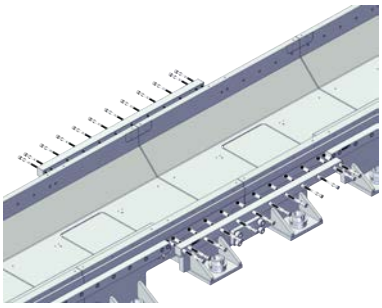
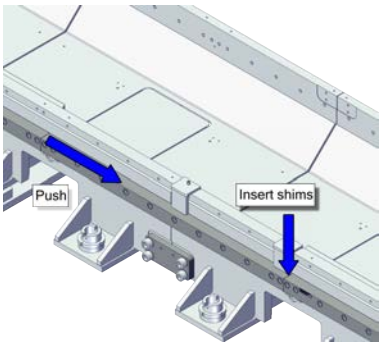
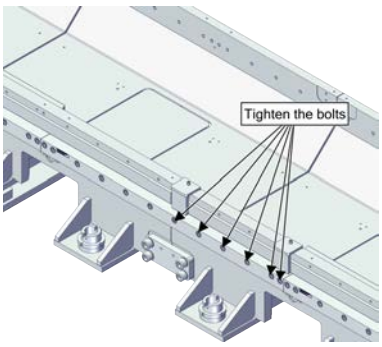
Continues on next page

	Action	Note/Illustration
7	Install the axis Y adjusting tools to the alignment reference feet. For more information on the alignment reference feet, see *Recommended alignment reference feet on page 146*.	
8	Connect the preassembled sections with screws not mounted.	 xx2200000668
9	Level the track with the M60 screws to ensure that the shoulders of 2 sections can be aligned as the illustration. **Note** Ensure the geometric alignment of the IRT 710 OmniCore with an optical level or a laser tracker. According timely measurement result, • the deviation on Z direction should be within +/- 0.1mm/m. Close to 0 is the best.	 xx2400001021  xx2400001050
10	Install the connecting plate and secure without fully tighten the screws. Install the joint plate to do a rough alignment on Y direction.	 xx2200000670 Screws: ISO 4762 M20x45 Class 8.8 Washers: BN 792 M20 Washer Tightening torque: 150 Nm
11	Prepare the shims which thickness is same as indicated rail joint gap value under the rails joint on the side of the rail on the rack side that is near to the first foot.	 xx2400000870

Continues on next page

3.4.8.1 Assembling the sections

Continued

	Action	Note/Illustration
12	Apply Loctite 243 on the thread of the screws and bolts before the assembling.	
13	Assemble the rails to the sections without fully tightened.	 xx2400000884 Screws: ISO 4762 M12x55 Class12.9
14	Install the rail pressing tool to the side of the rail which will be tightened first.	 xx2400000885
15	Put the shims into the rail joint position and push the rail by hand from the other direction.	
16	Pull the shims out to check that the shims can move under the squeezing force in the joint.	
17	Tighten the rail pressing tool to push the rail to the section tightly.	
18	Tighten with the mounting bolts on the half of the rail which has been checked with the shims.	 xx2400000886 Screws: ISO 4762 M12x55 Class12.9 Tightening torque: 128 Nm ±3%
19	Remove the rail pressing tool.	

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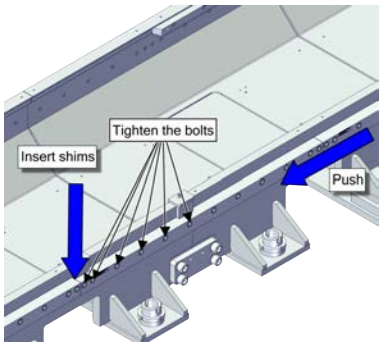
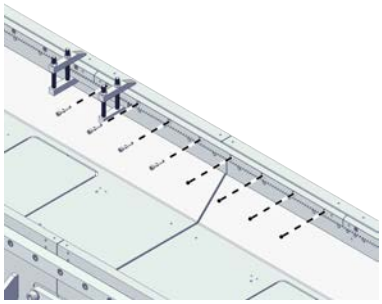
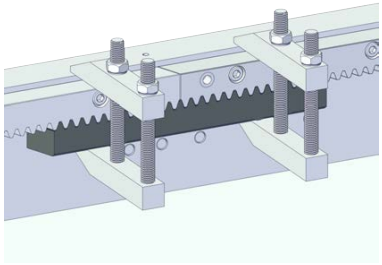
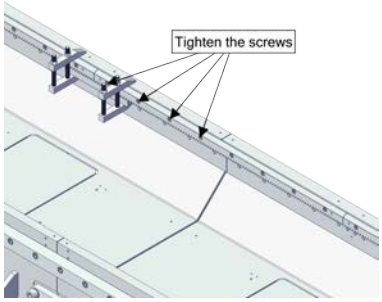
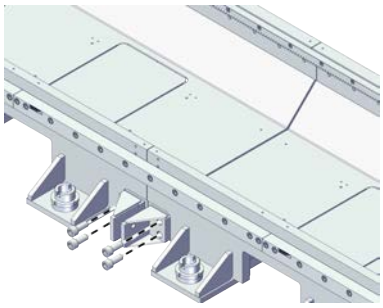
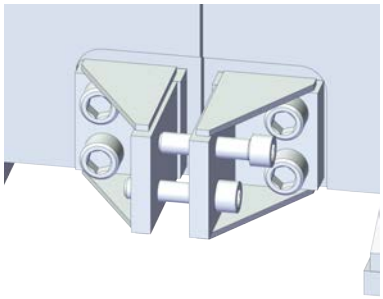
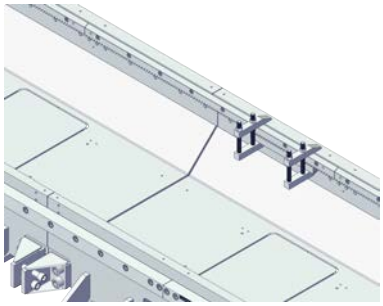
	Action	Note/Illustration
20	Repeat the steps to install the same side of the rail on the non-rack side.	 xx2400000887
21	Install the rack to the section with the rack mounting block and the rack clamps. **Note** There should be no gap between the rack mounting surface and the section mounting surface. **Note** Use the clamping and mounting racks at the ends of the rack section to make sure that the racks are pushed against the section mounting surface and perfectly aligned with each other.	 xx2400000912  xx2200001170 Screws: ISO 4762 M8x40 Class12.9
22	Secure the rack with screws as illustrated.	 xx2400000913 Tightening torque: 43 Nm
23	Remove the rack mounting block and the rack clamps after the securing the half part of the rack.	
24	Remove the connecting plate.	

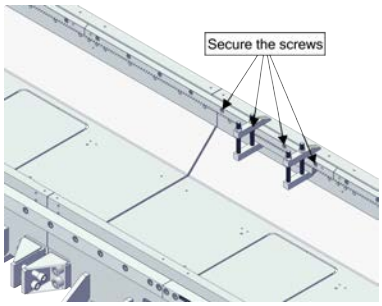
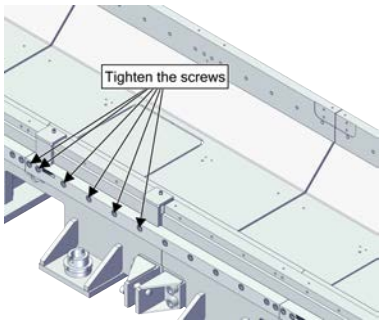
Continues on next page

3.4.8.1 Assembling the sections

Continued

	Action	Note/Illustration
25	Install the assisted tool to make that the sections could to mini-move in track direction.	 xx2400000872 Screws: ISO 4762 M20x45 Class 8.8 Washers: BN 792 M20 Washer Tightening torque: 150 Nm
26	Connect the assisted tool with two M16X50mm screws.	 xx2400001324
27	Reassembly the rack mounting block and the rack clamp to make the other side of the rack could be attached to section's upper shoulder well. **Tip** Do not tighten the rack clamps too much. This may make the adjusting more difficult.	 xx2400000914
28	Use crowbars to mini lift the sections on both side around the center of gravity. This will make the track leave the floor to decrease the friction during movement. **Tip** The center of gravity should be at the center of the two lifting positions.	 xx2400001051

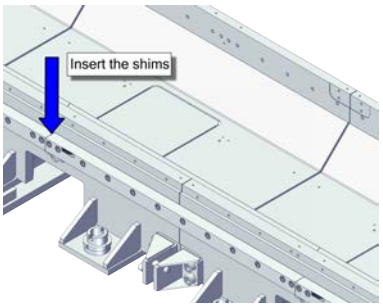
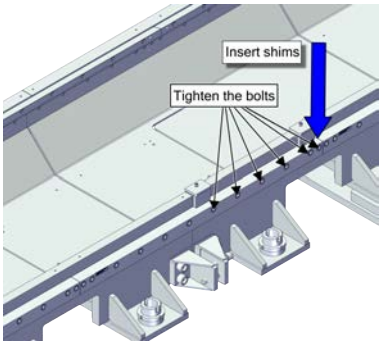
Continues on next page

	Action	Note/Illustration
29	Ensure that there is a gap between the racks before the adjusting.	 xx2400000915
30	Adjust the assisted tool with tightening the screws until there is not gap between the rack and rack tool.	 xx2400000873
31	Tighten the rack clamps.	
32	Secure the rack with the remained screws.	 xx2400000888 Tightening torque: 43 Nm
33	Remove the rack mounting block and the rack clamps.	
34	Install the rail pressing tool to the same side of the rail on the rack side.	 xx2400000917 Tightening torque: 128 Nm ±3%
35	Secure the rail on the rack side with the remained mounting bolts.	

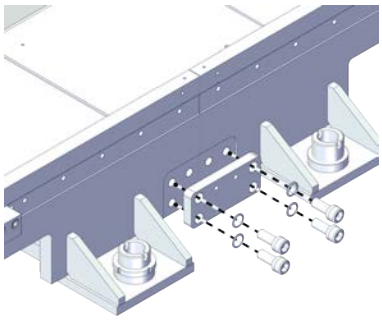
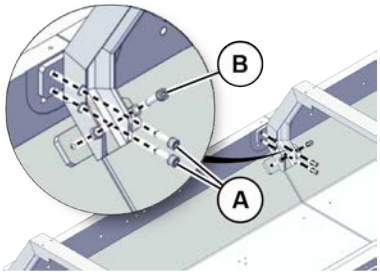
Continues on next page

3.4.8.1 Assembling the sections

Continued

	Action	Note/Illustration
36	Use the shims to check how much gap remained between rail joint on this side of the rack. The gap should be less than 0.2 mm. Check the difference and record the value.	 xx2400000916
37	Remove the rail pressing tool.	
38	Prepare the shims which thickness is same as indicated rail joint gap value under the rails joint on the same side of the rail on the non rack side.	 xx2400001073
39	Install the rail pressing tool to the same side of the rail on the non-rack side.	 xx2400000918 Screws: ISO 4762 M12x55 Class12.9 Tightening torque: 128 Nm ±3%
40	Put the shims in rail joint position.	
41	Use a crowbar to mini lift the sections in the center position. This will make the track leave the floor to decrease the friction during movement.	
42	Adjust the joint gap with the assisted tool according to the gap value.	
43	Check that the shims can move under the squeezing force in the joint.	
44	Tighten the rail pressing tool to push the rail to the section tightly.	
45	Tighten the rail with the remained mounting bolts. **Note** There should be no gap between the rail mounting surface and the section mounting surface.	
46	Remove the shims and rail pressing tools.	
47	Make marks on the bolts.	
48	Remove the assisted tool.	

Continues on next page

	Action	Note/Illustration
49	Install the connecting plates and secure with fully tightening the screws after applying Loctite 243 on their thread.	 xx2200000670 Screws: ISO 4762 M20x45 Class 8.8 Washers: BN 792 M20 Washer **Tightening torque: 290 Nm**
50	Do the geometric alignment of the IRT 710 OmniCore as described in *Geometric alignment of track motion IRT 710 OmniCore on page 144*.	
51	Release the carriage brake and push the carriage manually to check the rails alignment: if the rails are correctly aligned, you should sense no “step” while passing the rails junction. **Tip** For more information on moving carriage manually, see *Moving the carriage manually on page 119*.	
52	Use a brush to lubricate the rails and racks.	
53	Secure the cover bracket at the joints with two screws(A) .	 xx2200001323 A Screw ISO 4762 M8x25 Class 8.8 B Screw ISO 4762 M8x30 Class 12.9 Screws: ISO 4762 M8x25 Class 8.8 (2 pcs) Washers: BN 792 M8 Washer (2 pcs) Tightening torque: 25 Nm

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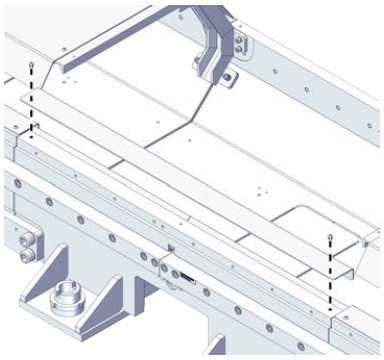
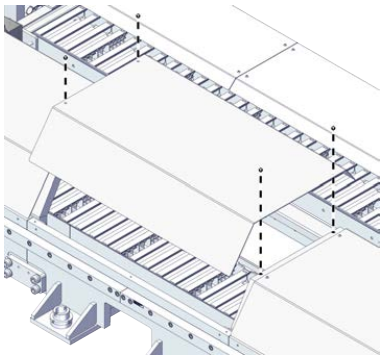
3.4.8.1 Assembling the sections

Continued

	Action	Note/Illustration
54	Refit the screw(B) and nut manually and stop when the screw touches the section.	Screws: ISO 4762 M8x30 Class 12.9 (1 pcs) Nut: ISO 4032 M8 Class 8.8 (1 pcs) Washers: BN 792 M8 Washer (1 pcs) Tightening torque: 3 Nm Nut tightening torque: 25 Nm
55	Tighten the nut.	
56	Install the rack covers.	 xx2200000830 Screws: ISO 7380-2 M6x12 Class 10.9 (2 pcs) Tightening torque: 8 Nm
57	Install the rail covers on the cover brackets.	 xx2200000616 Screws: ISO 7380-2 M6x12 Class 10.9 (4 pcs) Tightening torque: 8 Nm
58	**CAUTION** Once again, release the carriage brake and push the carriage manually along the length of its stroke. Check that there is no interference between the covers and the carriage.	

3.4.8.2 Recommendations for floor mounting

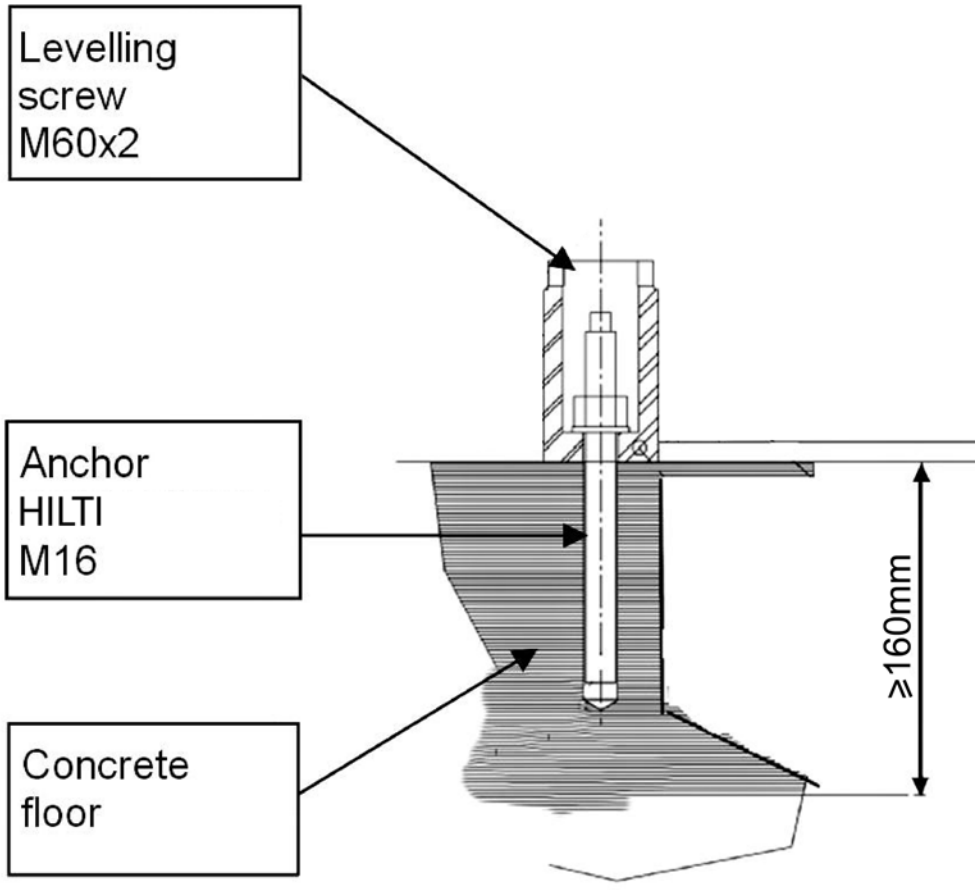
Mounting bolts

Chemical anchor bolts are recommended to secure the track motion IRT 710 OmniCore to the floor. However, the mounting bolts are not supplied since they must be selected on the basis of the material the foundation is made of.

Choose mounting bolts so that they:

- Are suitable for the foundation.
- Can bear the dynamic loads.
- Are able to bear the combined dynamic loads that can occur when the manipulator and carriage move.
- Fit in the holes in the stand, Ø 18.5 mm.

Section view of the IRT 710 OmniCore anchor



xx2200001274

Anchor length 190 mm is recommended.

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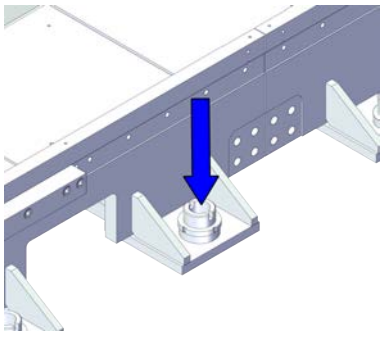
3.4.8.2 Recommendations for floor mounting
Continued

Securing the assembled track to the floor

	Action
1	After assembly, all the levelling screws should touch the floor. Adjust if necessary and tighten the locking nut.
2	Move the carriage all along the track way, and check the levelling with a levelling device or a laser tracker. The levelness of the top plate must be satisfying in the translational direction, but also cross section. If you have moved the carriage manually, you probably need to initialize the resolver position, see *Updating revolution counters on page 363*.
3	Drill the holes in the floor through the levelling screws opening, see the following section.
4	Install the anchors and secure the cross members to the floor.

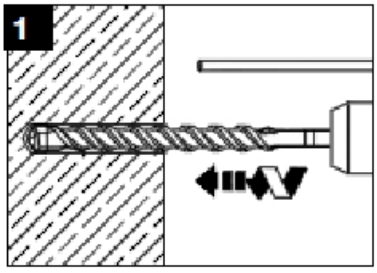
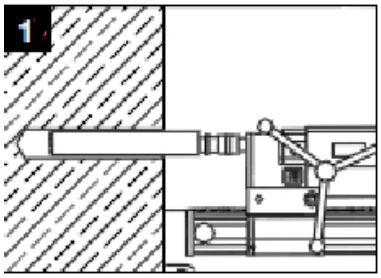
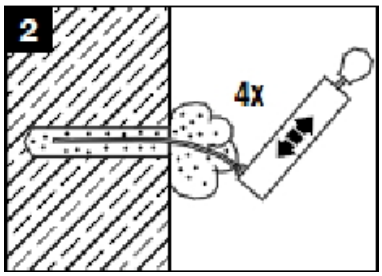
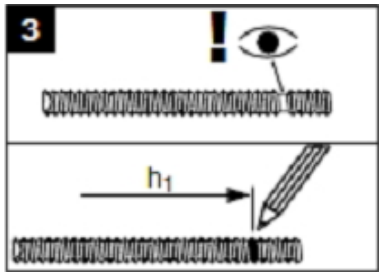
Securing a section

	Action	Note/Illustration
1	Position the sections on the floor.	 xx2200000669
2	Adjust the horizontality of the IRT 710 OmniCore with the M60 levelling screw.	
3	Check that all the levelling screws are touching the floor.	
4	Tighten the M60 nuts.	

Continues on next page

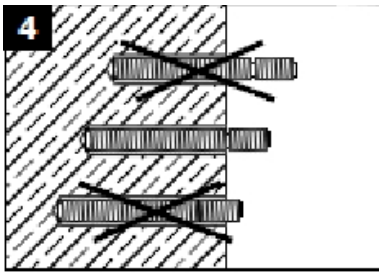
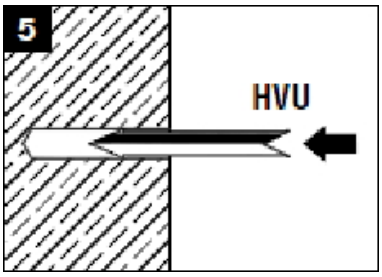
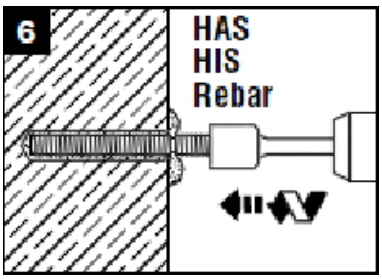
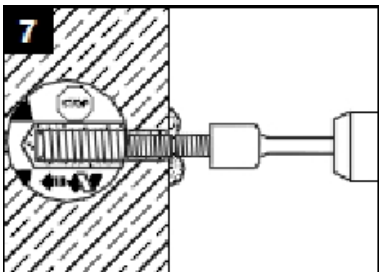
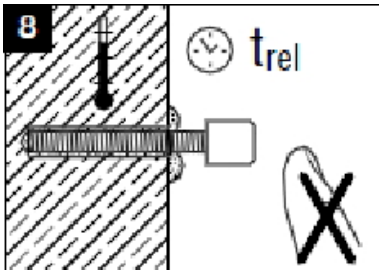
Installation of chemical anchors

Please respect the following procedure for chemical anchors installation. No mechanical anchors allowed. Chemical anchors used in IRT 710 OmniCore is HILTI M16x125 anchors.

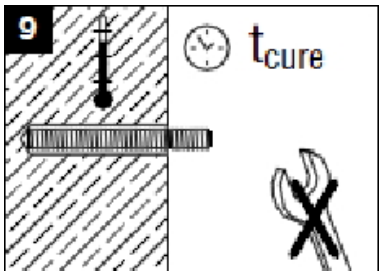
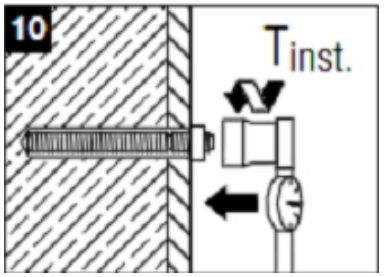
	Action	Note
1	Drill the hole with rotary hammer and set the depth gauge to the correct drilling depth. Diamond coring: Mark the correct drilling depth on the height adjustment mechanism.	 xx1700001665  xx1700001666
2	Clean the hole immediately before setting the anchor. Remove drilling dust and standing water from the base of the hole by blowing out well with at least 4 strokes of the blow-out pump, or using compressed air or an industrial vacuum cleaner. The anchor holes must be free of dust, water, ice, oil, bitumen, chemicals or any other foreign matter or contaminants. Poorly-cleaned holes leads to poor hold.	 xx1700001667
3	Ensure that the specified setting depth is marked on the anchor rod. If not, add an embedment mark, for example with tape or marker.	 xx1700001668

Continues on next page

3.4.8.2 Recommendations for floor mounting
Continued

	Action	Note
4	Check that the hole is drilled to the correct depth before setting the anchor, hole depth is correct when the anchor rod contacts the base of the hole and the setting depth mark coincides with the concrete surface.	 xx1700001669
5	Push the anchor rod into the drilled hole.	 xx1700001670
6	Use the setting tool at a speed of 250-1000 r.p.m to drive the anchor rod into the hole, applying moderate pressure and with the hammering action switched on.	 xx1700001671
7	Switch off the rotary hammer drill immediately when the specified setting depth is reached (refer to mark on the anchor rod). After setting, adhesive mortar must fill the annular gap completely right up to the concrete surface. **CAUTION** Prolonged rotary action may cause mortar to be forced out of the hole. resulting in reduced anchor loading capacity.	 xx1700001672
8	The working time 't_{rel}' which depends on base material temperature, must be observed. The screwed-on setting tool may be removed only after the time 't_{rel}' has elapsed.	 xx1700001673

Continues on next page

	Action	Note
9	After reaching the end of the working time 't_{rel}' do not manipulate or disturb the anchor rod in any way until the curing time 't_{cure}' has elapsed.	 xx1700001674
10	A load may be applied to the anchor only after the curing time 't_{cure}' has elapsed. Torque: 80 Nm	 xx1700001675
11	Curing time 't_{cure}' which depend on base material temperature must be observed!	Curing time (Based on ETA-05/0255)
12	Check whether the floor plate is well touched with the floor concrete. If not, it's recommended to fill the epoxy resin to the gap.	

Temperature of the base material	Minimum curing time t_{cure}
20℃ to 40℃	20 mins
10℃ to 19℃	30 mins
0℃ to 9℃	1 hour
-5℃ to -1℃	5 hours

WARNING

It is of the utmost importance that all screw joints be tightened with the correct torque. Failure to do so may result in damage to the equipment or personal.

3.4.8.3 Geometric alignment of track motion IRT 710 OmniCore

Instruction

The geometric alignment of the IRT 710 OmniCore should be done based on the position of the linear rails. This section details how to adjust the IRT 710 OmniCore using a laser tracker.

Tool list

Tool	Illustration
Absolute Tracker. Reading must allow estimating 0.1 mm. Example: Leica AT960 Absolute Tracker	 xx1800001905
Reflector Example: Leica Reflector	 xx1800001906
Magnetic block Example: Leica Magnetic block	 xx1800001907
ABB levelling tool (3HAW107700360)	

Continues on next page

Track alignment in Z and Y

Note

The origin of coordinates is located in the manipulator's base zero.

Alignment in Z direction

The figure shows the possible variation along the Z-axis.

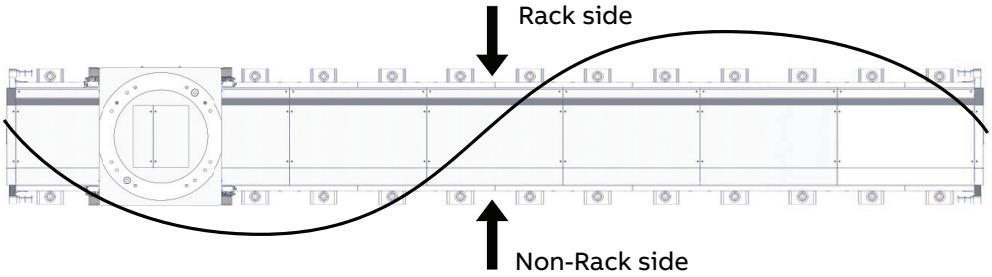
The track should be laser aligned to within 0.1 mm/m from the origin per meter, along the entire X-axis.

xx2200000787

Alignment in Y direction

The figure shows the possible variation along the Y-axis.

The track should be laser aligned to within 0.2 mm/m from the origin per meter on the rack side, along the entire X-axis.



xx2200000788

Alignment reference feet

During the assembling, the track will be aligned for several times. Except the fine alignment, all other alignment should be done on the reference feet to speed up the alignment procedure.

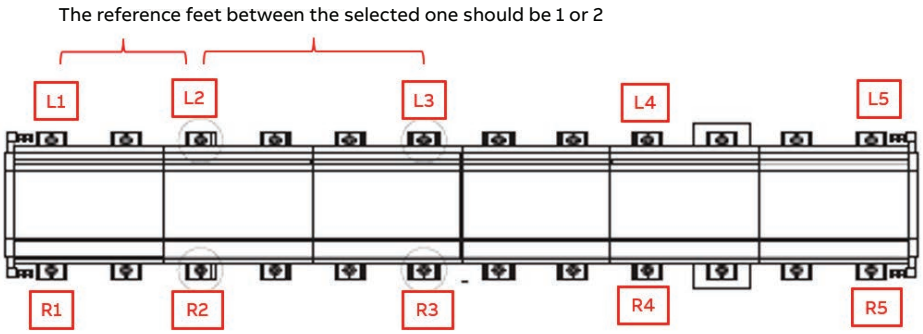
The rules for selecting alignment reference feet:

- Starts from the terminal section of the track (L1 - L5, R1 - R5 in the example).
- The quantity of screws between the chosen feet should be 1 or 2 (2 is Recommended)

Continues on next page

3.4.8.3 Geometric alignment of track motion IRT 710 OmniCore
Continued

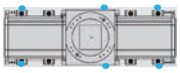
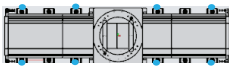
For example:



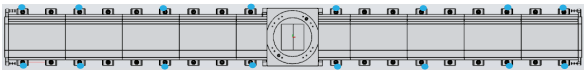
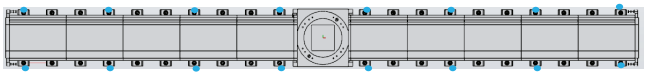
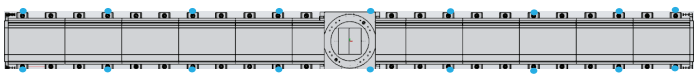
xx2400001025

Recommended alignment reference feet

The following is the recommended reference feet and measurement position for rough alignment.

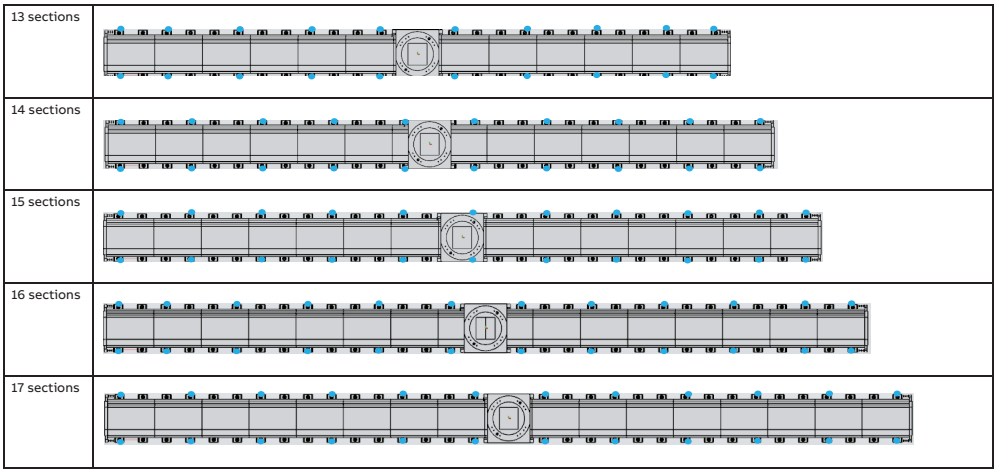
3 sections	
4 sections	
5 sections	
6 sections	
7 sections	

xx2400001016

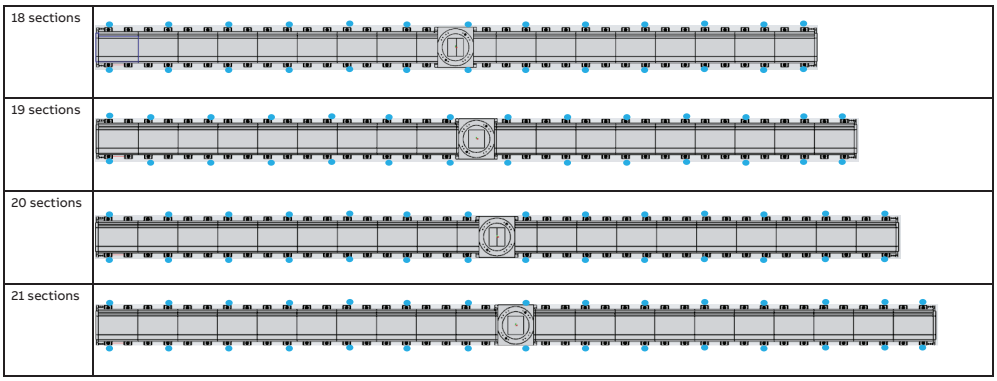
8 sections	
9 sections	
10 sections	
11 sections	
12 sections	

xx2400001017

Continues on next page



xx2400001018



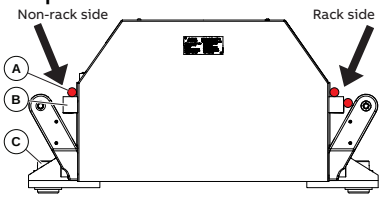
xx2400001019

Procedure

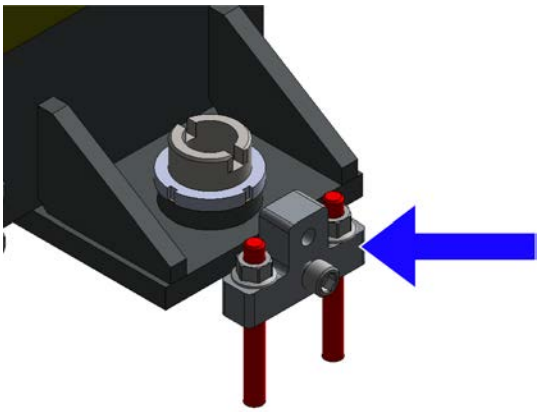
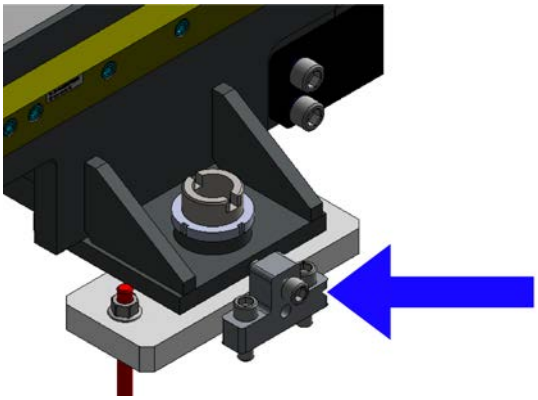
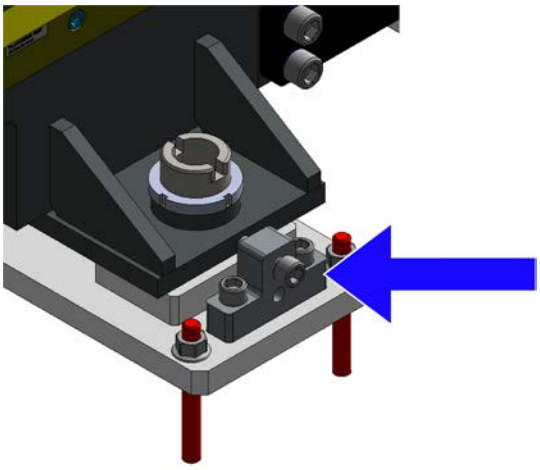
	Action	Note/Illustration
1	Place the absolute tracker at a position where could be able to measure the reflector position on the linear rails.	
2	Make sure that the absolute tracker is parallel to the sea level or the factory coordinated system.	
3	Rotate the levelling screw to make small plate a little separated to large plate (gap > 3 mm is recommended) on the non-reference feet. For more information on the alignment reference feet, see *Recommended alignment reference feet on page 146*.	

Continues on next page

3.4.8.3 Geometric alignment of track motion IRT 710 OmniCore
Continued

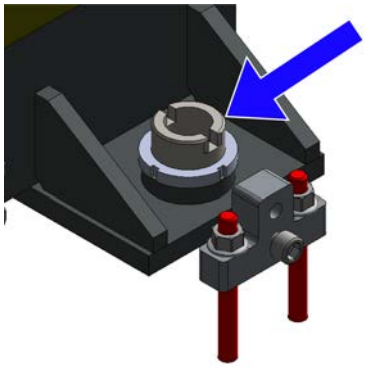
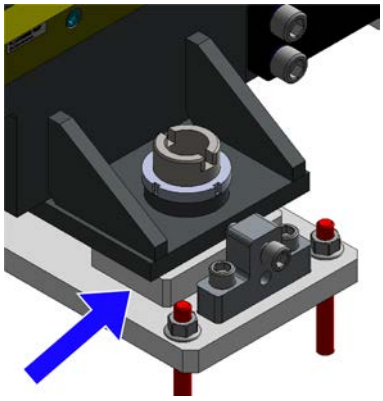
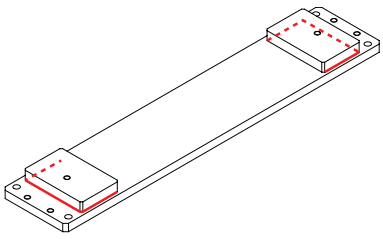
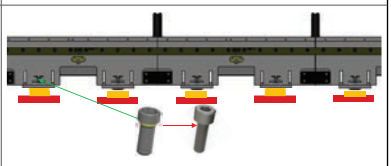
	Action	Note/Illustration
4	Do the rough alignment on the alignment reference feet. Measure the level of the IRT 710 OmniCore linear rails at different locations of the IRT 710 OmniCore. Measurements should be made on both sides of the alignment reference feet.	 xx2400000919 The magnetic base attached to the reflector must be in contact with the rail upper surface or side surface. See the contact surfaces in red on the picture below:  xx2200000797 A Reflector & Magnetic block B Linear Rail C Levelling Screw

Continues on next page

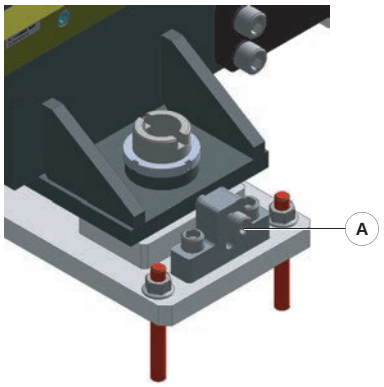
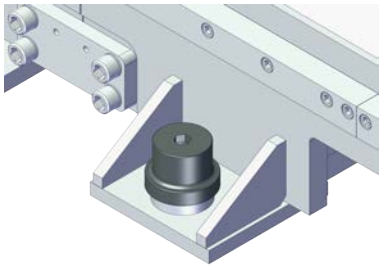
	Action	Note/Illustration
	Tip The axis Y adjusting tool (3HKA00000192738 which working with three M16 x 55 screws) are used in adjusting the linear rails on linear movement direction. For track without base plate:  xx2200001201 For track with base plate:  xx2200001202  xx2200001203	

Continues on next page

3.4.8.3 Geometric alignment of track motion IRT 710 OmniCore
Continued

	Action	Note/Illustration
5	Use the ABB levelling tool 3HAW107700360 to adjust the levelling screws until all the measured points, on both sides of the IRT 710 OmniCore, are at the same level. According timely measurement result, • the deviation on Z direction should be within +/- 0.1mm/m. Close to 0 is the best. • the deviation on Y direction should be within +/- 0.2mm/m. Close to 0 is the best.	It is recommended to use one of the highest points of the IRT 710 OmniCore as reference: It is easier to bring the crossmember to a higher level rather than to bring it to a lower level.  xx2200001204
6	Rotate the levelling screws (non-reference feet) to make that small plate under the non-reference feet touch the large plate.	
7	If the condition 2 base plate is used under the track, weld the small plate to the large plate.	 xx2200001205  xx2400001023
8	Replace the temporary M16x35 mm tool bolts by standard DIN 912 M16x45 mm Class12.9 bolts with glue and washers (DIN 6796 M16). **Note** Make sure that all temporary M16x35 mm tool bolts are replaced by standard DIN 912 M16x45 mm Class12.9 bolts.	 xx2400001024

Continues on next page

	Action	Note/Illustration
9	Rotate the levelling screw (non-reference feet) to make levelling screw a little separated to small plate. For more information on the alignment reference feet, see *Recommended alignment reference feet on page 146*.	
10	Do the rough alignment on the reference feet once again. According timely measurement result, • the deviation on Z direction should be within +/- 0.075mm/m on both sides. Close to 0 is the best. • the deviation on Y direction should be within +/- 0.15mm/m on rack side. Close to 0 is the best. **Tip** At some potions where the levelling screw cannot be adjusted any more, but the measured z-value is still higher than the desired value, tight the DIN 912 M16x45 mm Class12.9 bolts to pull down the rail at this position.	
11	Rotate all the levelling screw to make them touch the small plate.	
12	Do a fine alignment of the linear rails on all feet with the levelling screws on Z direction and axis Y adjustment tool on the Y direction. According timely measurement result, • the deviation on Z direction should be within +/- 0.075mm/m. Close to 0 is the best. • the deviation on Y direction should be within +/- 0.15mm/m. Close to 0 is the best.	 xx2200001206 A Axis Y fine adjustment screw
13	Tighten the M60x2 lock nut with the tool for levelling screw nut tightening. (**Tightening torque: 150 Nm**)	 xx2200001189

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3.4.8.3 Geometric alignment of track motion IRT 710 OmniCore
Continued

	Action	Note/Illustration
14	Tighten the DIN 912 M16x45 mm Class12.9 bolts which in levelling screws. (**Tightening torque: 150 Nm**)	
15	Check the rails alignment according to *Track alignment in Z and Y on page 145*.  **Tip** If only one discontinuous position is within 0.15 mm/m on Z direction and 0.3 mm/m on Y direction, this is acceptable.	
16	Adjust on the feet which cannot reach the accuracy target.	
17	Tighten the DIN 912 M16x45 mm Class12.9 bolts which in levelling screws. (**Tightening torque: 280 Nm**)	
18	Do a final measurement to verify and record measurement data.	
19	Use a brush to lubricate the linear rails.	

3.4.9 Assembling the pedestal (option)

Overview

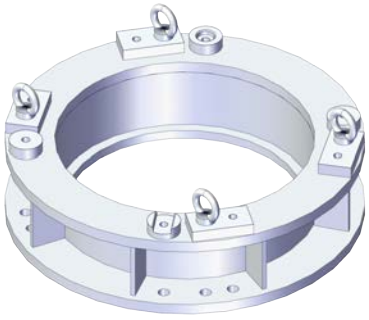
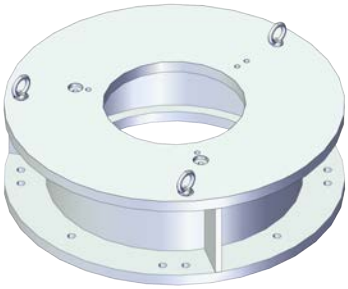
The pedestal, if ordered, is not mounted to the track motion at delivery.

Install the pedestal to the track motion according to this section.

Required equipment

Equipment	Pedestal	Article number	Note
Lifting eye, M24	3HKA00000190345 3HKA00000190346	-	4 pcs
Lifting eye, M16	3HKA00000190348 3HKA00000190349 3HKA00000190350	-	3 pcs
Lifting slings	All	-	Lifting capacity according to *Weight, pedestal on page 59*.

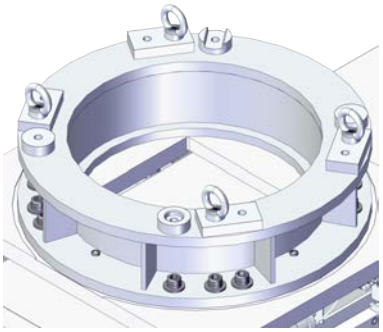
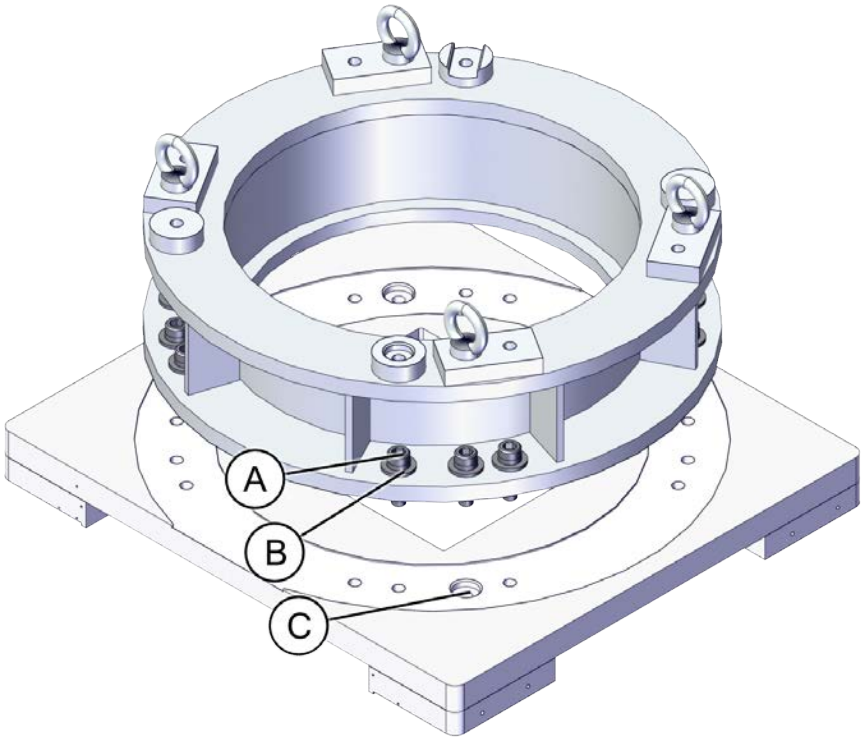
Assembling the pedestal

	Action	Note
1	Verify that the guide sleeves are installed in the track motion carriage.	
2	Fit lifting eyes to the pedestal.	Lifting eye, M24 (4 pcs)  xx2200000799 Lifting eye, M16 (3 pcs)  xx2200000798
3	Lift the pedestal to the mounting position using lifting slings.	Weight is specified in *Weight, pedestal on page 59*.

Continues on next page

3.4.9 Assembling the pedestal (option)

Continued

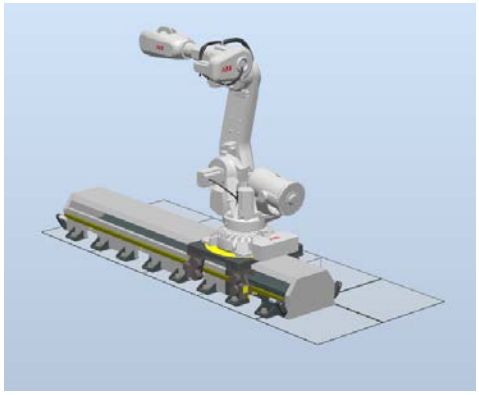
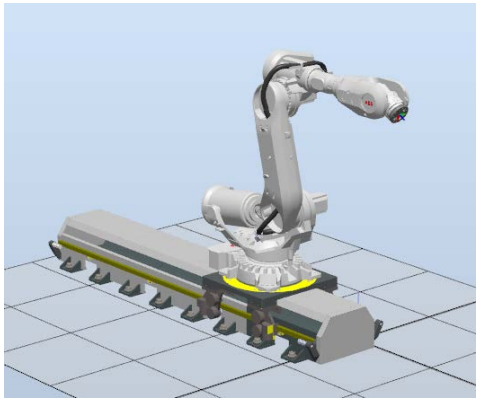
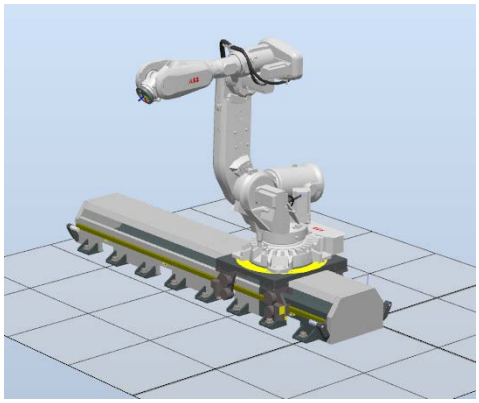
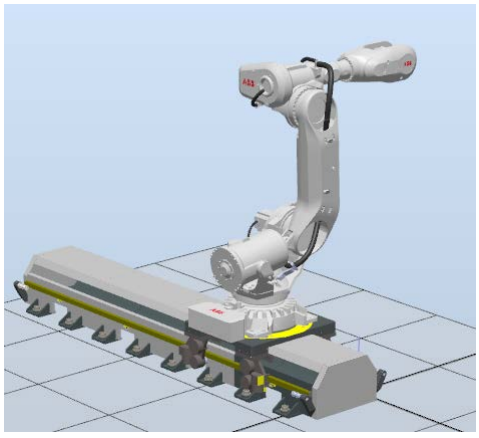
	Action	Note
4	Insert washers and screws in two of the attachment screw holes, to use as guidance when lowering the pedestal against the mounting interface of the track motion. 9ABA450017P0623 Hexagon socket head cap screw: 9ABA450017P0623 (ISO 4762_M24X80 Class 8.8) Plain washer: 9ADA312-12 (25x44x4 Steel - A2F)	 xx2200000800
5	Lower the pedestal to the track motion and secure with enclosed attachment screws and washers. Tightening torque: 550 Nm ± 10%. **Note** The robot mounting hole pattern is not equal on all sides of the pedestal. Make sure to orient the pedestal as shown in the figure.  xx2200000806 A Hexagon socket head cap screw: 9ABA450017P0623 (ISO 4762_M24X80 Class 8.8, 12 pcs) B Plain washer: 9ADA312-12 (25x44x4 Steel - A2F, 12 pcs) C Guide sleeve, 2 pcs **Note** If a IRB 4400/IRB 4600 need be turned 90° in any direction, the pedestal must also be rotated in the same direction due to the fact that the guide pins only fit the manipulator base according to the illustration.	

3.4.10 Assembly of the manipulator

Overview

When the IRT 710 OmniCore is carrying an IRB robot it behaves like an integrated 7th axis. The robot should be ordered with an additional drive unit (907-1) for the IRT 710 OmniCore motor, and optionally a resolver connection for 7th axis on the robot base (864-1).

The IRT 710 OmniCore unit is designed to be controlled with ABB OmniCore controller. For compatibility with other control systems please contact ABB.

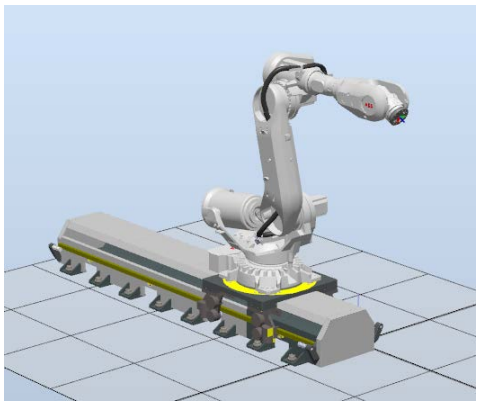
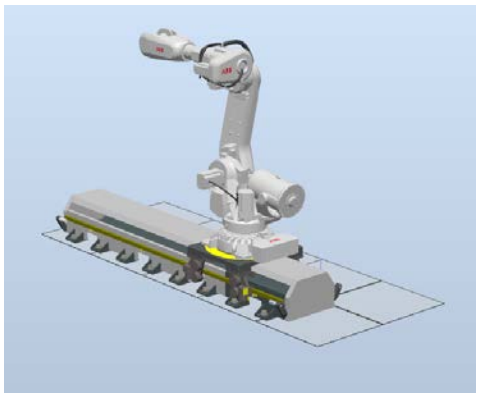
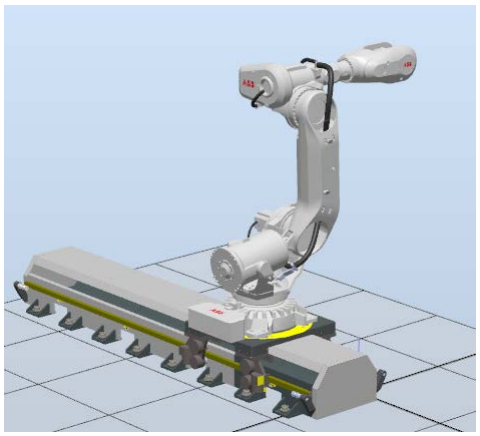
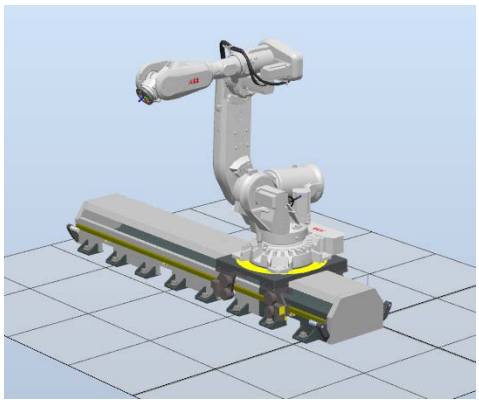
<table>
<tr><th colspan="5">Robot position on the carriage - 4 possibilities:</th></tr>
<tr><td rowspan="2">Stand-ard[i]</td><td>In line with the track, 0°</td><td> 
xx2200000636</td><td>180°</td><td> 
xx2200000638</td></tr>
<tr><td>90°</td><td> 
xx2200000637</td><td>270°</td><td> 
xx2200000639</td></tr>
</table>

i The illustration described the manipulator installation orientation 0°, 90°,180° and 270° on robot base and it deduced the manipulator installation orientation 45°, 135°,225° and 315° from this.

Continues on next page

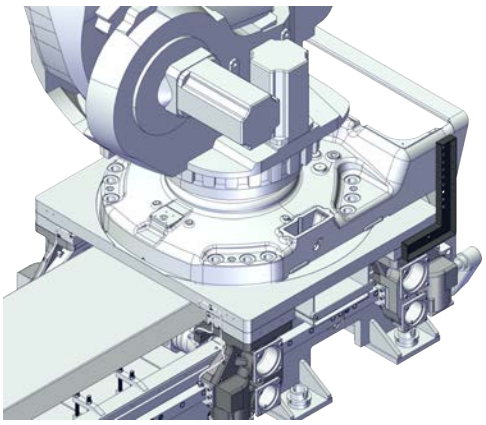
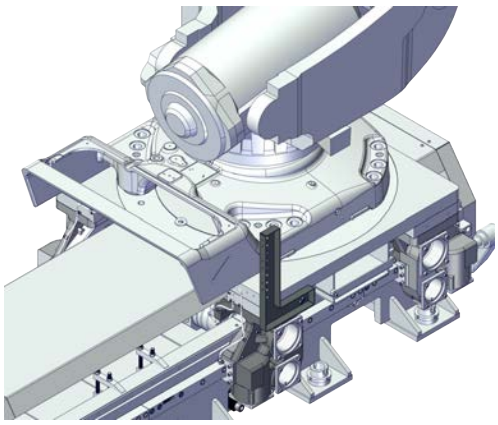
3.4.10 Assembly of the manipulator

Continued

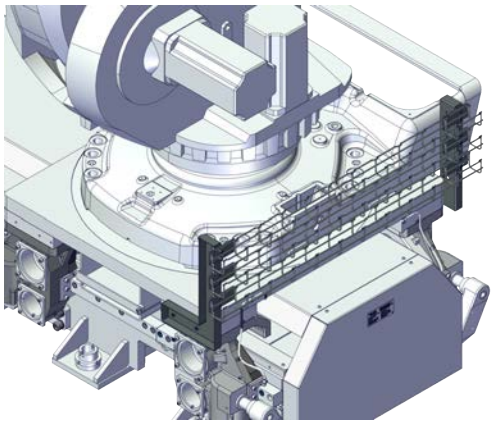
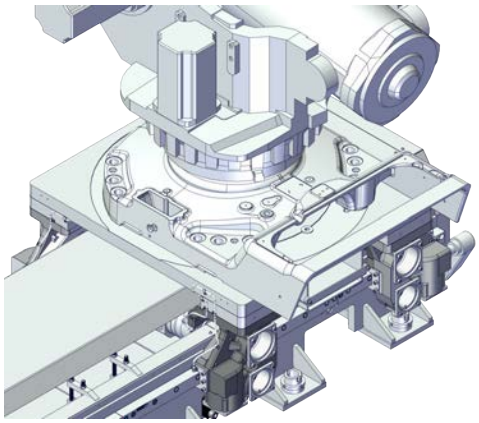
Robot position on the carriage - 4 possibilities:				
Mirrored[i]	In line with the track, 0°	 xx2200000640	180°	 xx2200000642
	90°	 xx2200000641	270°	 xx2200000643

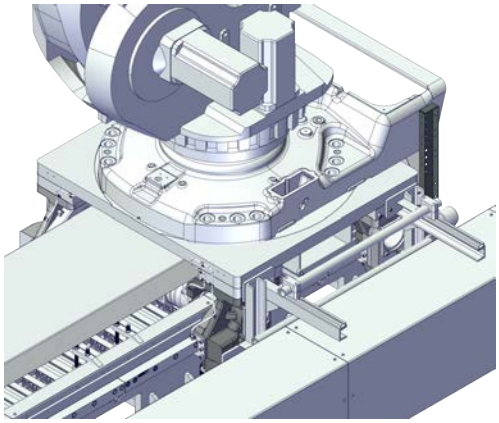
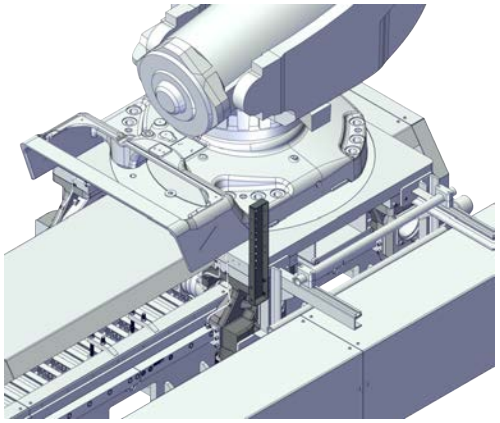
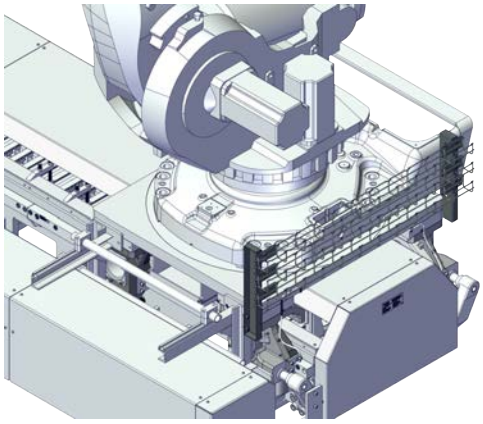
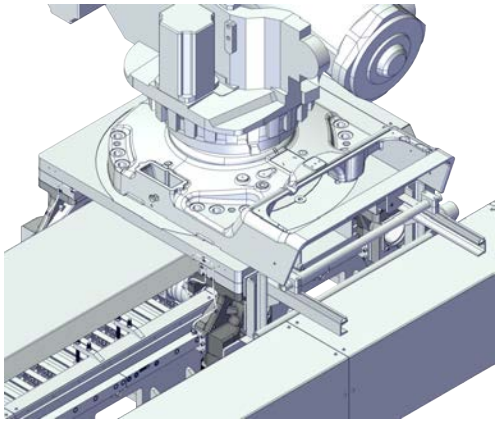
i The illustration described the manipulator installation orientation 0°, 90°,180° and 270° on robot base and it deduced the manipulator installation orientation 45°, 135°,225° and 315° from this.

Cable bracket for routing robot cables

Cable brackets on the carriage - Without external cable chain			
In line with the track, Standard 0° Mirrored 180°	 xx2400000961	Standard 180° Mirrored 0°	 xx2400000895

Continues on next page

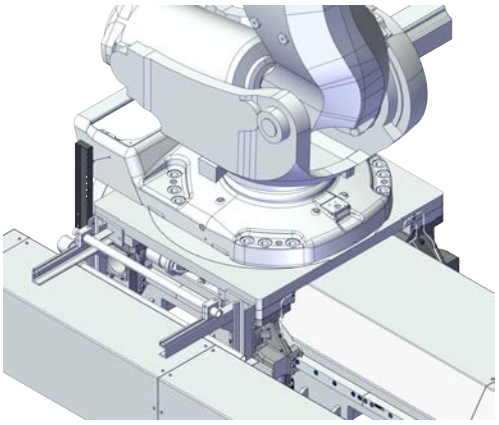
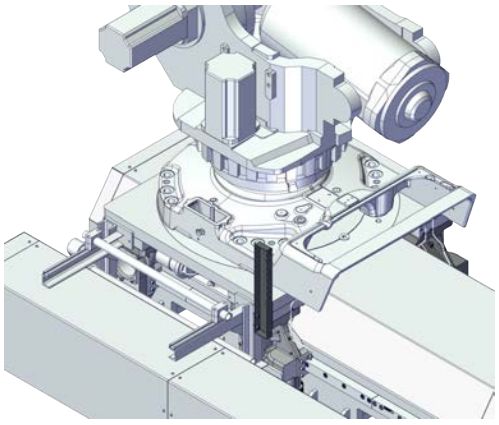
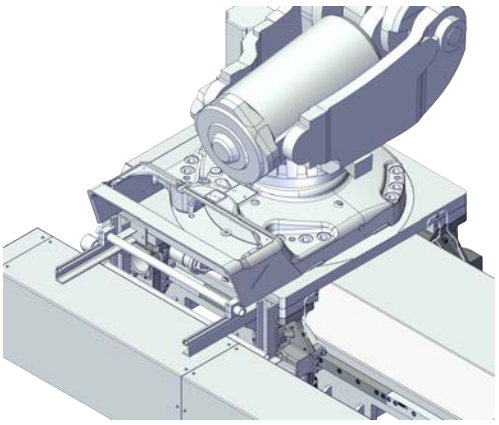
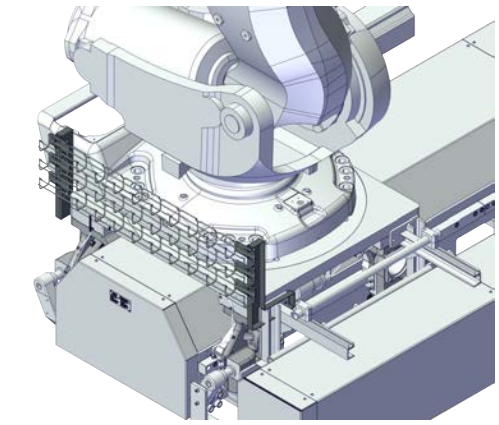
Cable brackets on the carriage - Without external cable chain			
Standard 90° Mirrored 270°	 xx2400000894	Standard 270° Mirrored 90°	 xx2400000962

Cable brackets on the carriage - With external cable chain on the rack side			
In line with the track, Standard 0° Mirrored 180°	 xx2400000963	Standard 180° Mirrored 0°	 xx2400000897
Standard 90° Mirrored 270°	 xx2400000896	Standard 270° Mirrored 90°	 xx2400000964

Continues on next page

3.4.10 Assembly of the manipulator

Continued

Cable brackets on the carriage - With external cable chain on the non-rack side			
In line with the track, Standard 0° Mirrored 180°	 xx2400000967	Standard 180° Mirrored 0°	 xx2400000965
Standard 90° Mirrored 270°	 xx2400000966	Standard 270° Mirrored 90°	 xx2400000968

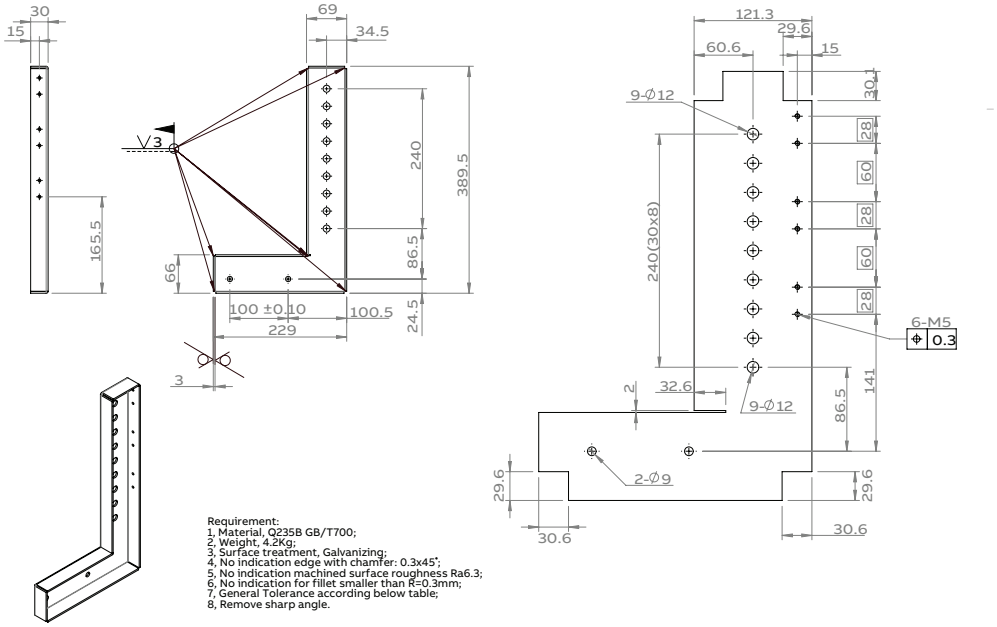
Drawing

Tip

The bracket left and bracket right are installed on the carriage.

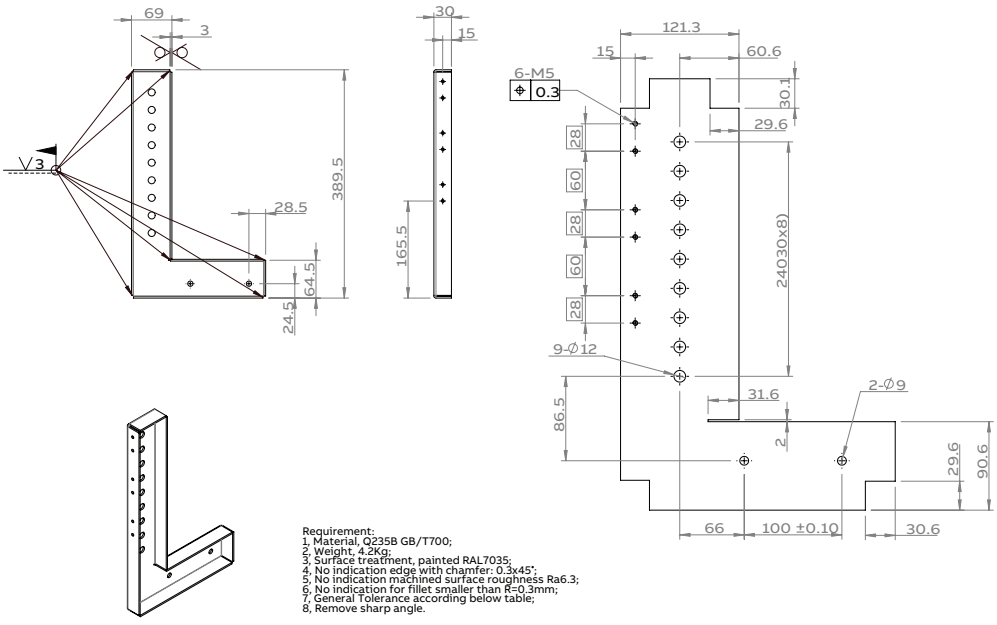
The straight cable bracket is installed on the external cable chain bracket.

Continues on next page



xx2400000866

Figure 3.1: Cable bracket left



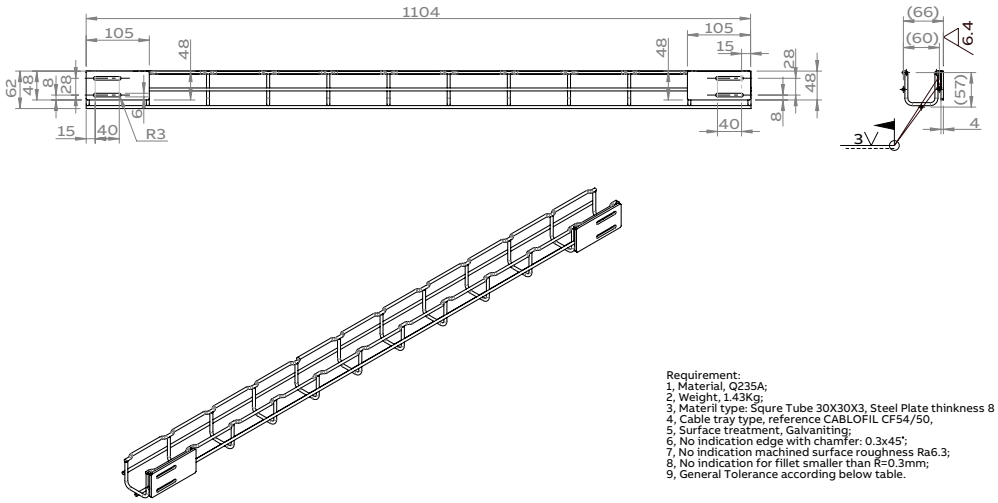
xx2400000867

Figure 3.2: Cable bracket right

Continues on next page

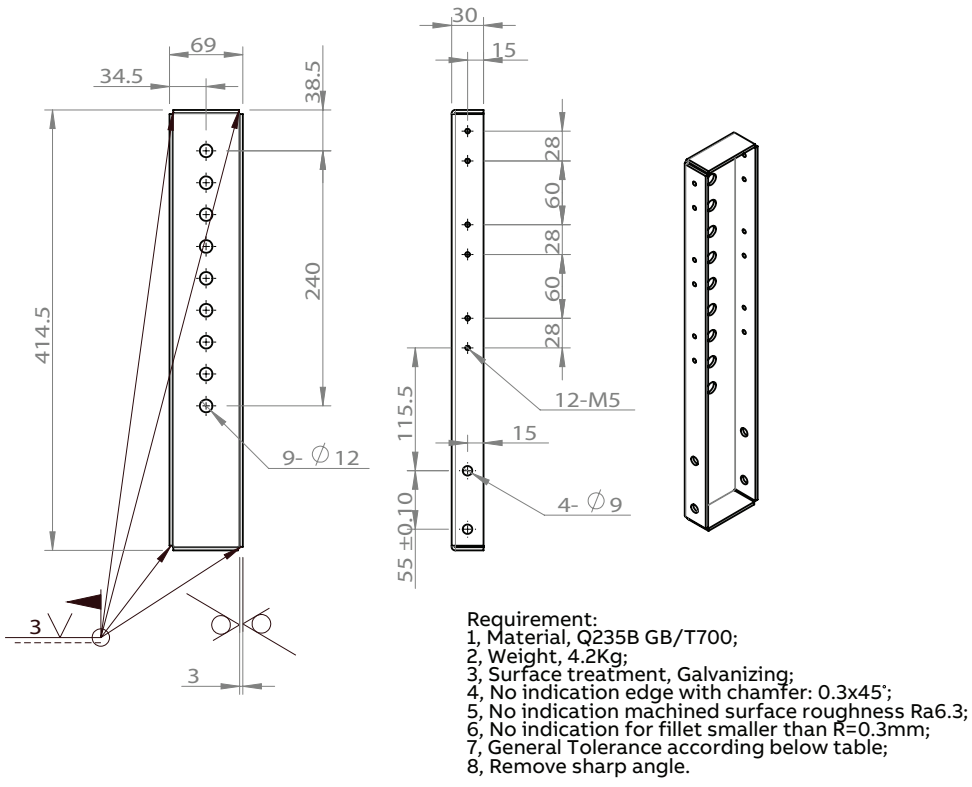
3.4.10 Assembly of the manipulator

Continued



xx2400000868

Figure 3.3: Cable bridge



xx2400000869

Figure 3.4: Straight cable bracket

3.5 Electrical installation

3.5.1 Cabling of the IRT 710 OmniCore

Description

The IRT 710 OmniCore has an internal cable chain which carries flexible movement cables. The IRT 710 OmniCore motor can be controlled through a MCB, external SMB box, or through the integrated SMB card of a manipulator.

Static cables connect to the controller.

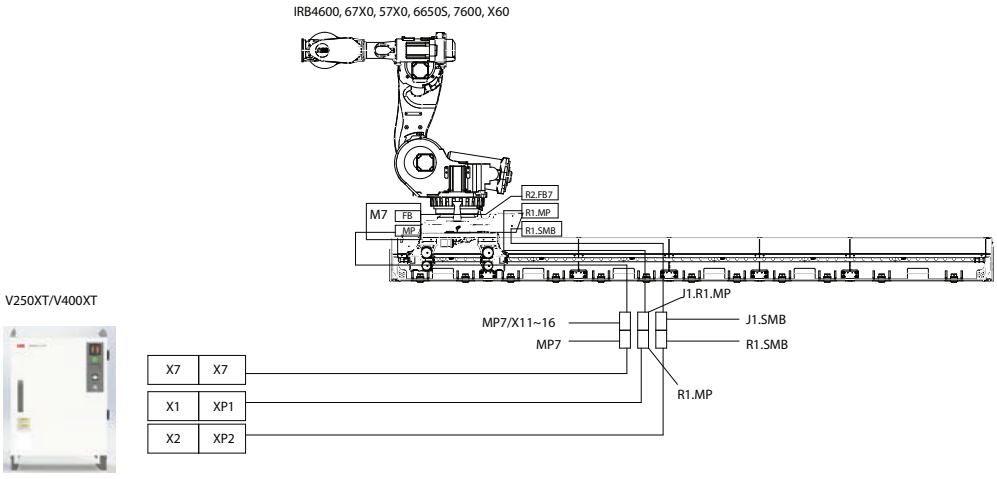
The maximum allowed resolver cable length is 30 m, from the resolver to the serial measurement board (SMB)/ motion control board (MCB).

The total length for all resolver cables using the same excitation must not exceed 70 m.

Schema

The schema below shows the typical control architecture of IRT 710 OmniCore:

Track with robot (except IRB 4400 and IRB 460)



xx2400000636

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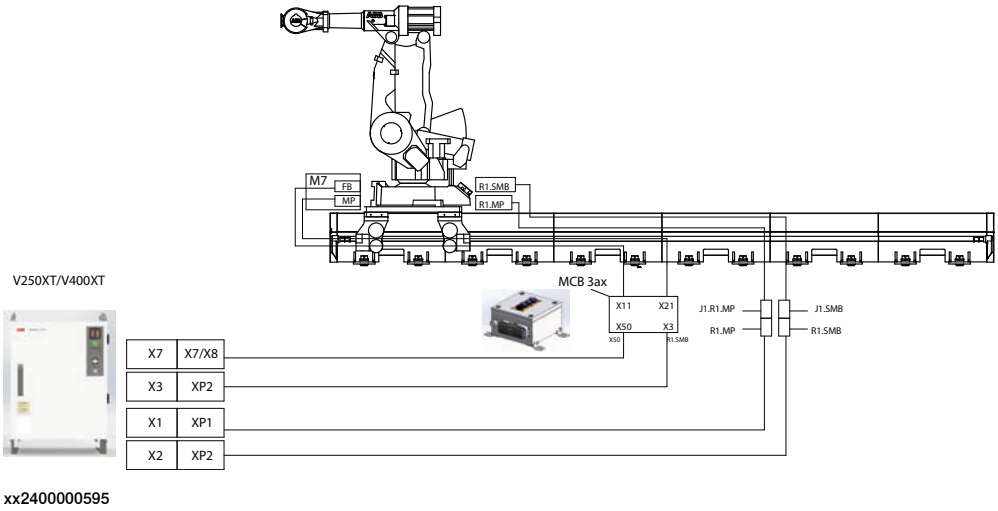
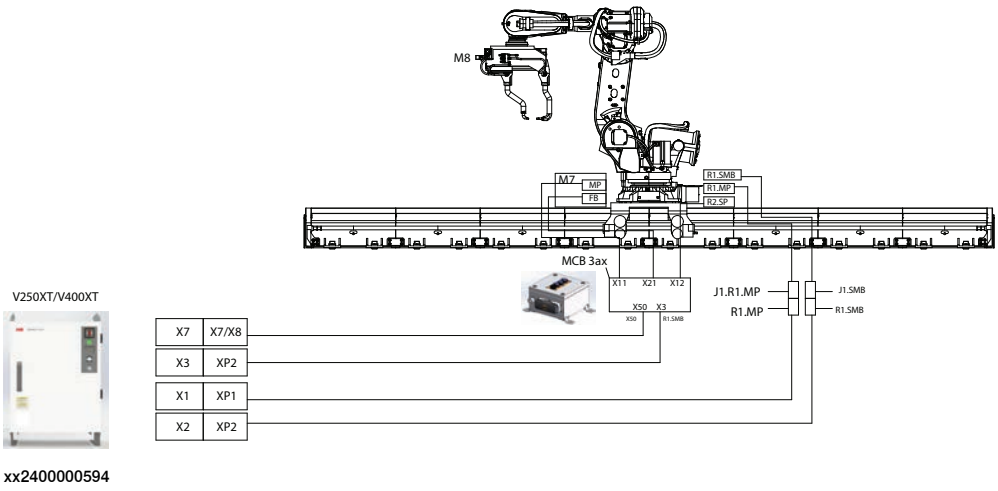
3.5.1 Cabling of the IRT 710 OmniCore
Continued

Track with IRB 4400 and IRB 460



xx2400000595

Track with spot welding



xx2400000594

The flexible movement cables exit the track at the middle of the stroke of the carriage and are selected from standard lengths based on the travel length of the carriage based on the total stroke of the carriage.

IRT 710 OmniCore cables lengths

For more details on the cable lengths, see *Spare parts on page 399*.

Robot cables

If the IRT 710 OmniCore is ordered prepared for a manipulator, the cable chain should contain the suitable flexible movement cables for the robot. Robot floor cables should be ordered with the robot.

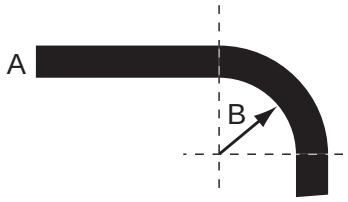
Tip

It is important to indicate the robot mounting orientation in the order form in order to get the correct robot cable length.

Continues on next page

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

3.5.2 Specifications of the movement cables

Movement cables diameter and weight

The internal cable chain usually contains the IRT 710 OmniCore motor power and resolver cables. When additional cables are used, it is important to ensure that they can all fit in. In particular, if a number n of cables are used, you must make sure that:

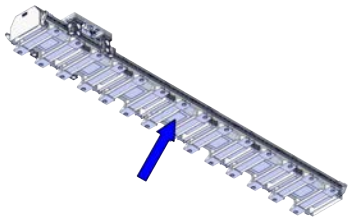
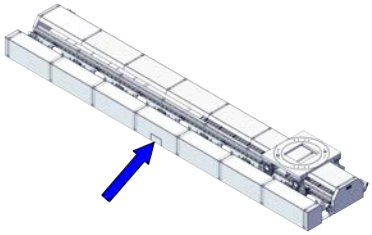
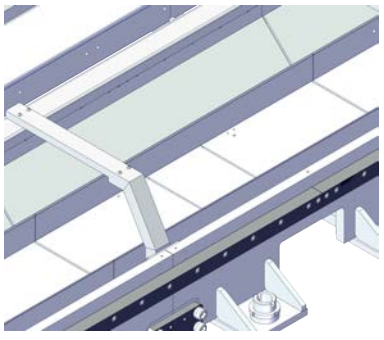
- The total width of all the cables added together, as well as the width of n-1 separators (5 mm each), does not exceed the internal width of the cable chain (250 mm).
- The total weight of all cables does not exceed 6.5 kg/m.

3.5.3 Installation of the cable chain

WARNING

The IRT 710 OmniCore cable chain is delivered assembled in the IRT 710 OmniCore. If the cable chain and/or its content must be modified upon installation, make sure that the following recommendations are strictly followed. Improper installation of the cable chain will result in premature wear or damages of the chain and the flexible cables.

Checklist

	Action	Note/Illustration
1	An opening should be made in the internal cable tray to let all the cables exit the IRT 710 OmniCore. All cables should exit the IRT 710 OmniCore immediately at the end of the chain. An opening should be made in the external cable tray to let all the cables exit the IRT 710 OmniCore. All cables should exit the IRT 710 OmniCore immediately at the end of the chain. If necessary, the edges of the cut tray area should be covered with rubber seal strip.	For internal cable tray (Make the opening at proper position)  xx2200000807 For external cable tray  xx2200000808
2	The cable tray should be absolutely free of any object (cable, screw, etc.). The bottom of the cable tray must be perfectly flat, without bump.	 xx2200000809

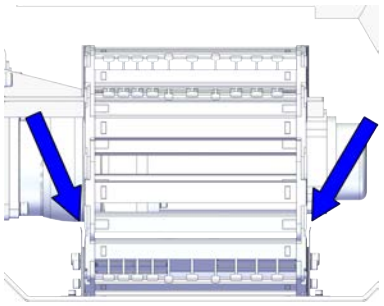
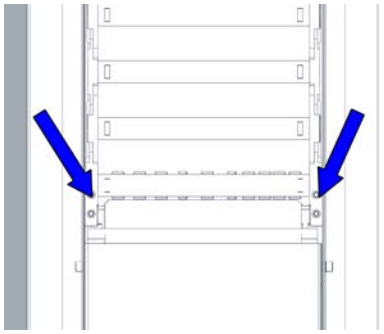
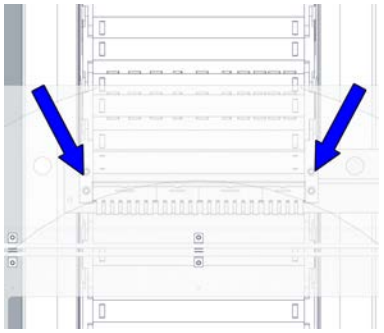
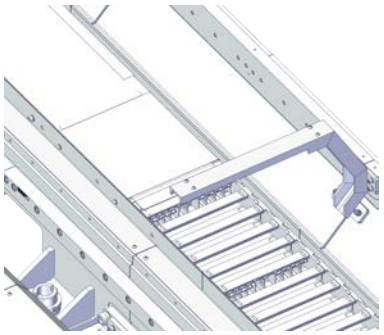
Continues on next page

3.5.3 Installation of the cable chain

Continued

	Action	Note/Illustration
3	In the cable chain, the cables should be separated by the "separators", at least every 4 links. That the mass of the cables and pipes inside the chain should be balanced. Having all heavy cables on the same side of the chain could cause premature wear.	 xx2200000856
4	The cables should be firmly attached on the tie-wrap plate at the end of the cable chain on the carriage side.	 xx2200000877

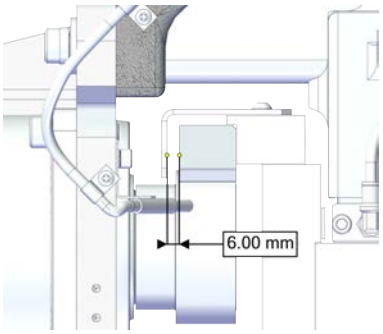
Continues on next page

	Action	Note/Illustration
5	The cable chain should be perfectly aligned with the IRT 710 OmniCore chain tray. In order to achieve a correct alignment, it is recommended to fix both ends of the chain when the carriage is at the end of its stroke, and the chain is entirely unrolled in the duct.	 xx2200001257  xx2200001258  xx2200001287
6	For very long chains, a ramp should be used to prevent the chain from running on the cables exiting the cable chain. If the cable chain appears to be rubbing the cables and no ramp is installed, please order the following from ABB: • The internal cable tray ramp up: 1pc 3HAW107700646 and 1pc 3HAW107700647. • The external cable tray ramp up: 1pc 3HAW107700646.	 xx2200001259

Continues on next page

3.5.3 Installation of the cable chain

Continued

	Action	Note/Illustration
7	Verify that there is a clearance of approximately 6 mm between the rack covers and the rack (see figure). If not, unscrew the cover screws and push the cover away from the rack. Tighten the cover screws.	 xx2200001260
8	Move the carriage to both ends in manual mode at low speed. Verify that the cable chain is not rubbing on the covers during the carriage movement, and that no moving part shows abnormal wear. Check also that the stationary cables are not interfering with moving elements.	
9	Check that the cable chain is long enough to reach the ends of the stroke without damage. At least 1 chain link should remain horizontal to avoid unnecessary pulling on the chain fixing element. Verify again that the chain is parallel with the cable tray when unwind. If not, adjust the orientation of the fixed point of the chain as described in *step5*.	

3.5.4 MCB

Description

The IRT 710 OmniCore motor is controlled by controller through an ABB Serial Measurement Board. For IRT 710 OmniCore used to move a manipulator, it is possible to connect the motor resolver to FB7 on the manipulator or MCB.

3-axis MCB

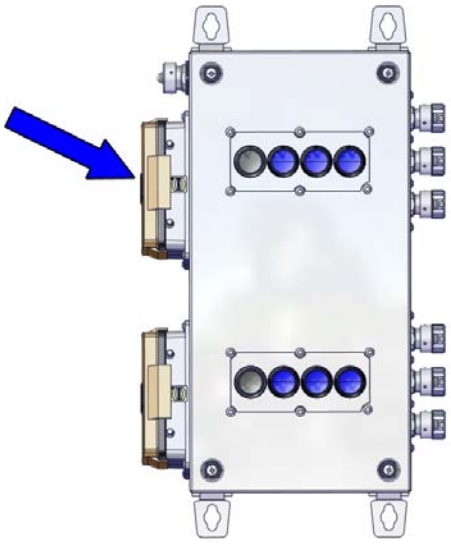
xx2400000383

3.5.5 Installing the motor connection box

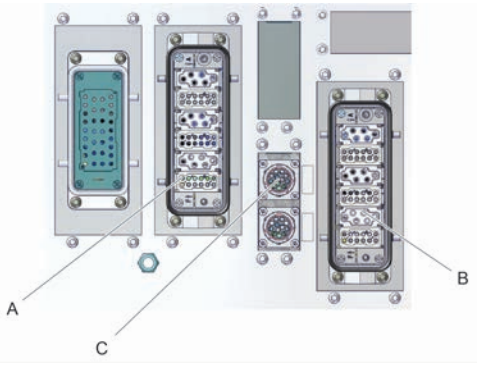
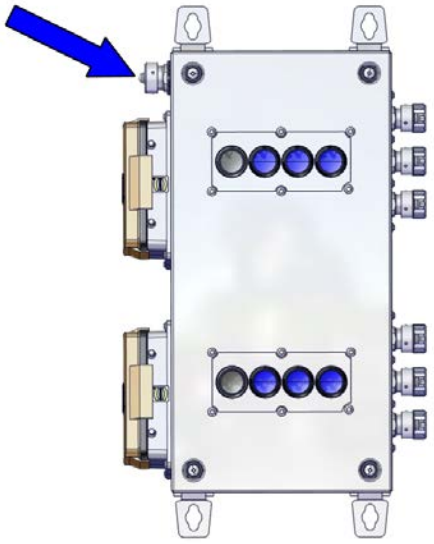
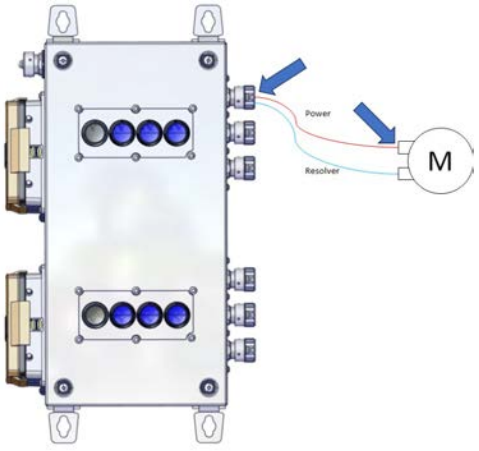
Location

The motor connection box location is decided by the customer.

Installing the motor connection box

	Action	Note/Illustration
1	**DANGER** Before doing any work inside the cabinet, disconnect the mains power. For more information, see *Electrical safety on page 47*.	
2	Fit the motor connection box in its location. Secure with screws.	**Note** Due to the stiffness of the floor cables, the minimum required space beside the motor connection box is 330 on the left side and 180 on the right side.
3	If third party motors are to be connected, install a quenching circuit.	
4	Connect the motor cable to the motor connection box.	 xx2300001746

Continues on next page

	Action	Note/Illustration
5	Connect the cables from the motor connection box to the connectors for ADU 1-3 (A) and ADU 4-6 (B) on the cabinet.	 xx2300001919
6	Connect the SMB cable to the SMB connector for ADU 1-6 (C) on the cabinet.	
7	Connect the SMB cable to the motor connection box.	 xx2300001747
8	Connect motor cables and resolver cables to the auxiliary equipment motor.	
9	Connect motor cables and resolver cables to the motor connection box.	 xx2300001850

3.5.6 Connectors on OmniCore controller

General

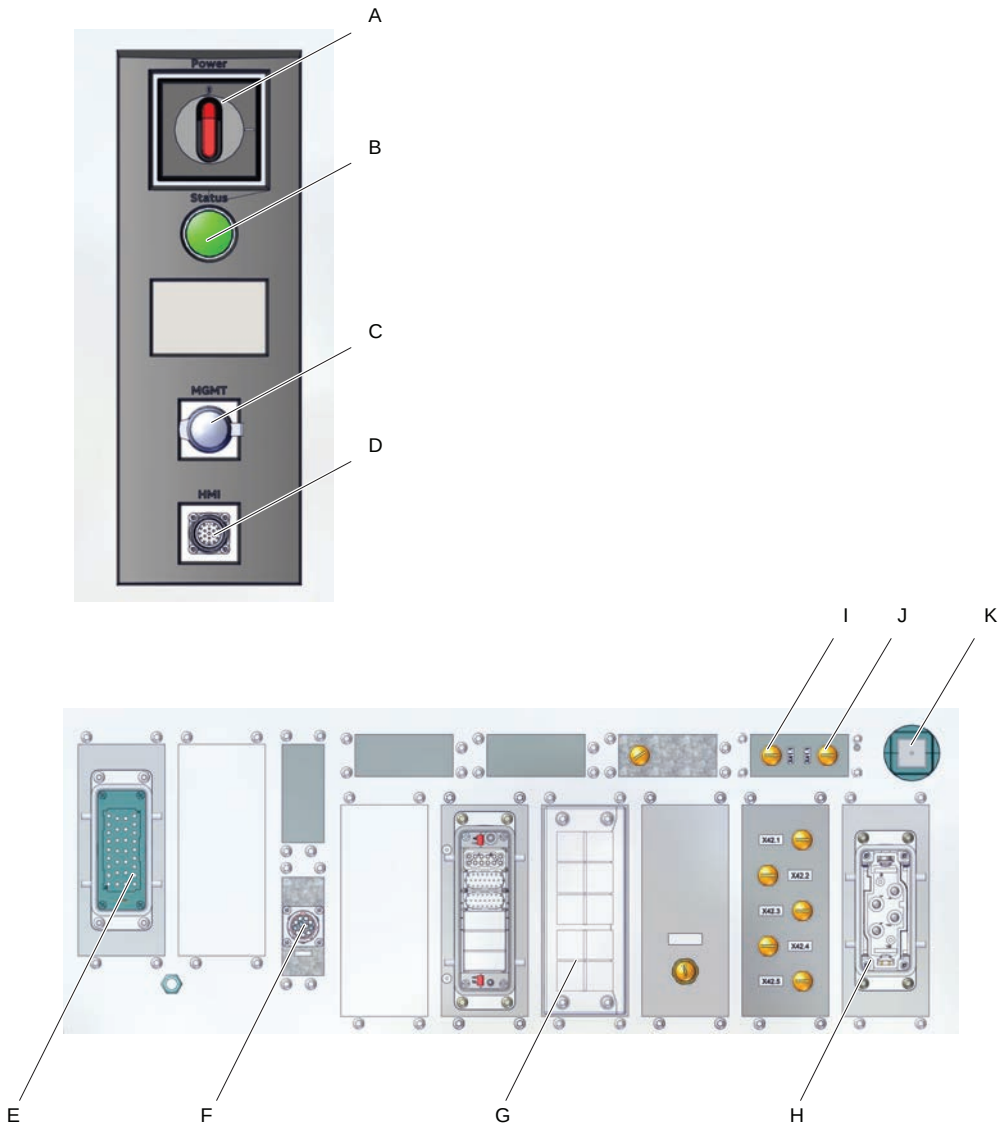
The following section describes the connectors on the IRT 710 OmniCore controller.

> **CAUTION**
>
> Always inspect the connector for dirt or damage before connecting it to the controller. Clean or replace any damaged parts.

Connectors

The following details the connection interface on the IRT 710 OmniCore controller.

V250XT TypeA



xx2000001277

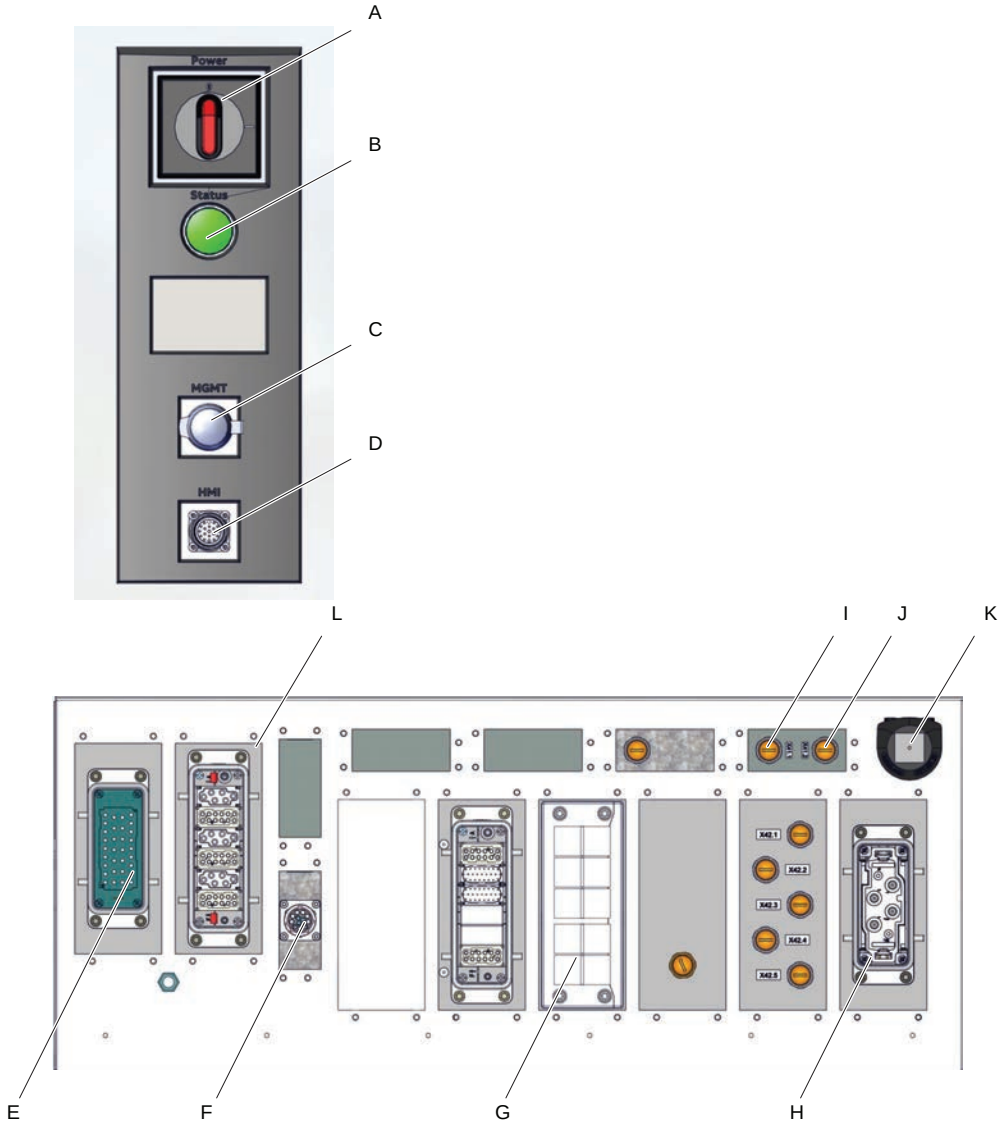
Continues on next page

	Description
A	Incoming mains switch
B	Motors on lamp
C	Ethernet outlet connector, MGMT (Management)
D	FlexPendant connector (HMI)
E	Motor connector
F	Manipulator signal connector (SMB)
G	Cable grommet assembly
H	Incoming mains connector
I	Ethernet outlet connector, LAN3
J	Ethernet outlet connector, WAN
K	Connected Services antenna connector (3G/WiFi)

Continues on next page

3.5.6 Connectors on OmniCore controller
Continued

V250XT TypeB



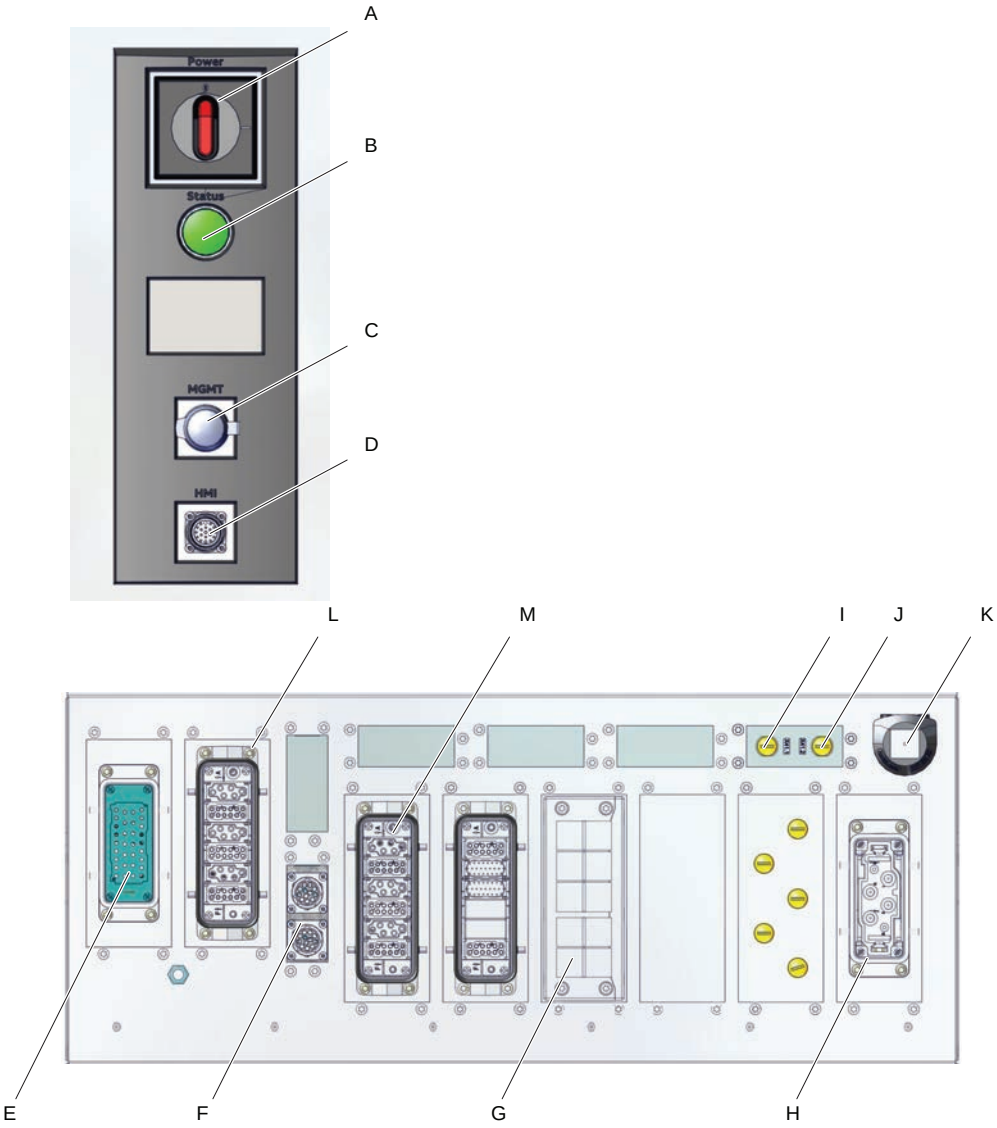
xx2200001457

	Description
A	Incoming mains switch
B	Motors on lamp
C	Ethernet outlet connector, MGMT (Management)
D	FlexPendant connector (HMI)
E	Motor connector
F	Manipulator signal connector (SMB)
G	Cable grommet assembly
H	Incoming mains connector
I	Ethernet outlet connector, LAN3
J	Ethernet outlet connector, WAN

Continues on next page

	Description
K	Cable grommet for Connected Services antenna (3G/4G/WiFi)
L	ADU (additional drive unit) connector

V400XT



xx2300002001

	Description
A	Incoming mains switch
B	Motors on lamp
C	Ethernet outlet connector, MGMT (Management)
D	FlexPendant connector (HMI)
E	Motor connector
F	Manipulator signal connector (SMB)
G	Cable grommet assembly

Continues on next page

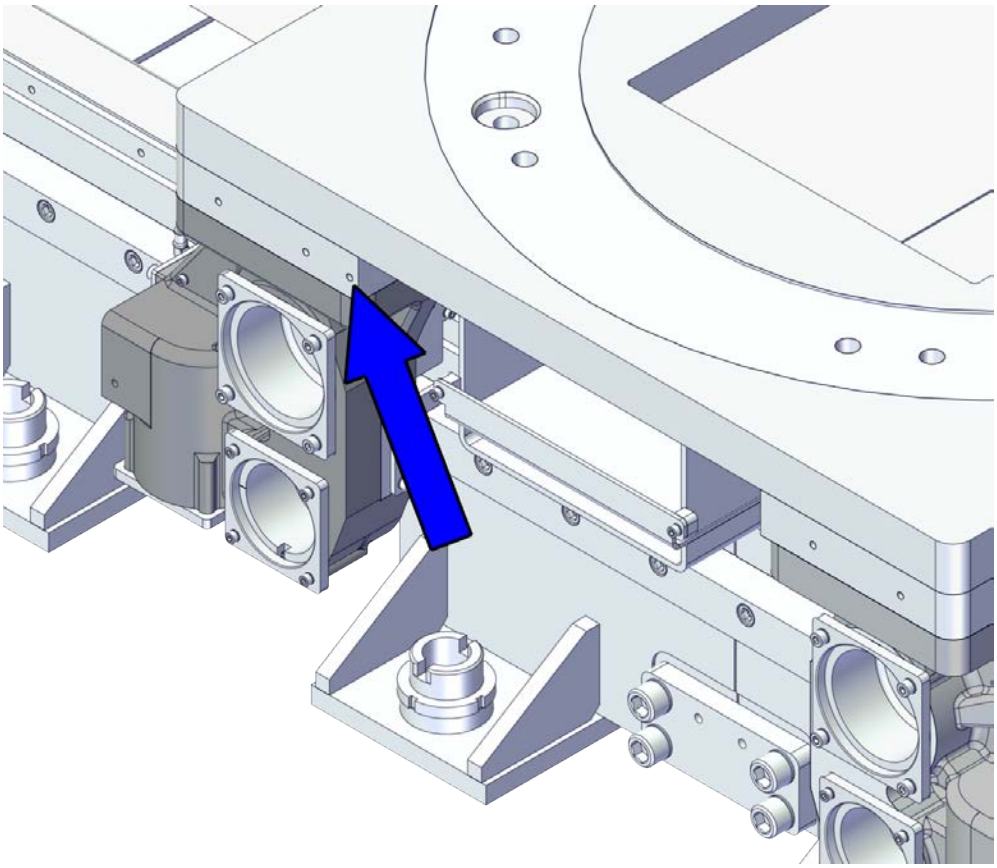
3.5.6 Connectors on OmniCore controller
Continued

	Description
H	Incoming mains connector
I	Ethernet outlet connector, LAN3
J	Ethernet outlet connector, WAN
K	Cable grommet for Connected Services antenna (3G/4G/WiFi)
L	ADU (additional drive unit) connector, 1-3
M	ADU (additional drive unit) connector, 4-6

3.5.7 Grounding point

Grounding and bonding point on track motion

There are two grounding/bonding points on both sides of the carriage. The grounding/bonding point is used for potential equalizing between control cabinet, track motion and any peripheral devices.



xx2200000678

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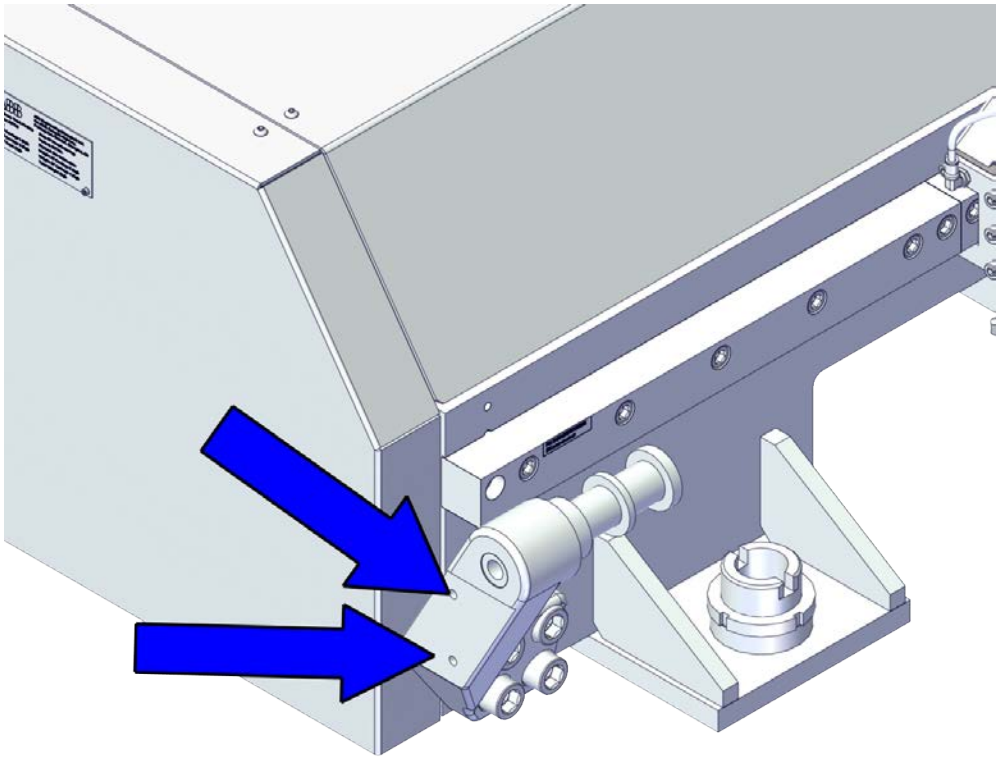
3.5.7 Grounding point
Continued

Grounding point for track motion stand

There is also M8 grounding/bonding points for the track motion stand, located at the mechanical stop.



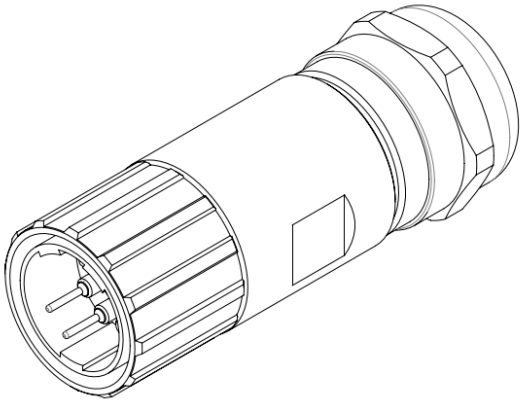
xx2200001186

3.5.8 Cables connections

Instruction

If the IRT 710 OmniCore is controlled through a robot integrated SMB card, the IRT 710 OmniCore resolver cable (3HAC039602-0xx) should be connected from the motor resolver connector to the FB7 on the robot base, the IRT 710 OmniCore power moving cable (3HAC088222-0xx) should be connected from the motor power connector to the IRT 710 OmniCore power static harness (3HAC087425-0xx), and the IRT 710 OmniCore static power cable should be connected to the X7 socket on the OmniCore controller.

If the system is controlled through MCB, the connections should be made as shown below:

Description	Note/Illustration
Connect the static resolver cables and static power cables from the controller to the MCB.	For more information, see *OmniCore controller product manual*.
Connect the resolver cable (3HAC039602-0xx) and power moving cable (3HAC088222-0xx) from the carriage to the MCB.	 xx2400000704
With spot welding application or other application required PTC, for all power sockets on the MCB that are unused, a PTC plug is required.	 xx2400000700

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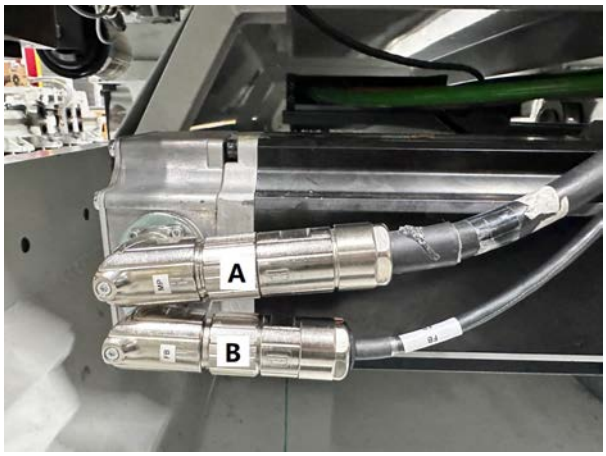
3.5.8 Cables connections
Continued

Description	Note/Illustration
Ensure that the movement cables are properly connected to the motor.	 xx2400000699 A – Power cable B – Signal cable

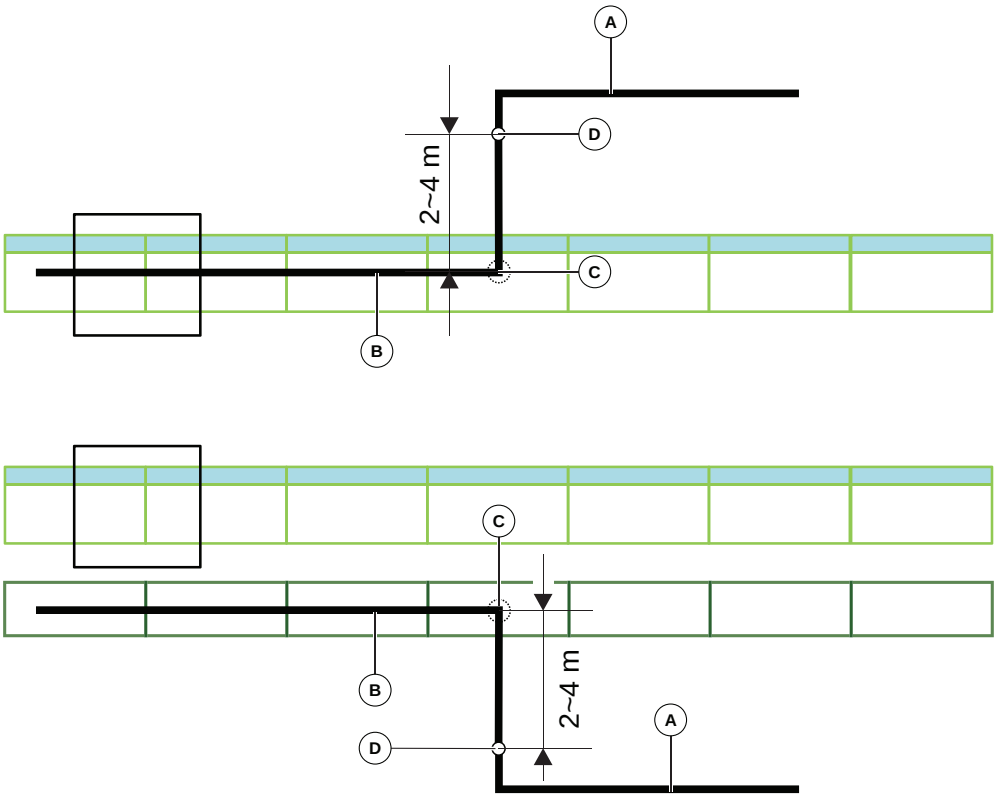
The wiring diagrams are described in section *Circuit diagrams on page 401*.

3.5.9 Harness outlet

Instruction

The exact situation will vary according to the numbers of the carriage and the sections to keep the stroke of the track.

The length of the cable from the fixed end of the cable chain to the joint position of the movement cable and the static cable should be within 2 to 4 meters.



xx2400001097

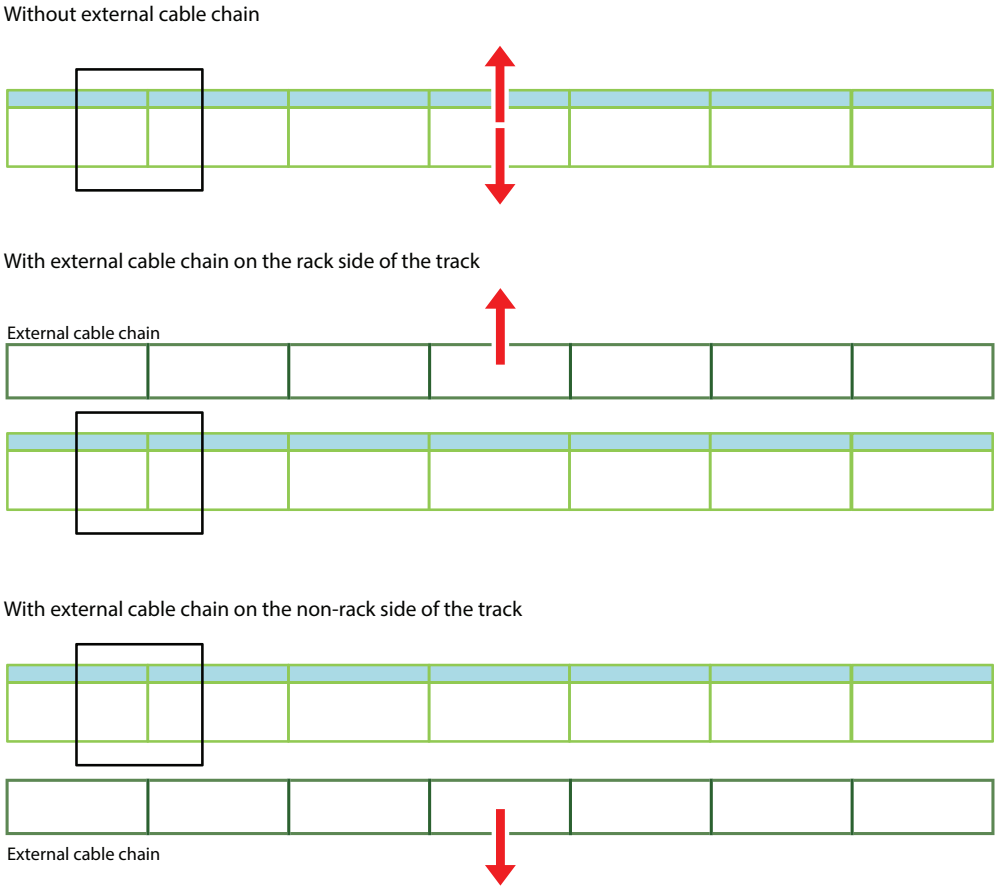
Item	Description
A	Static cable
B	Movement cable to robot base
C	Fixed end of the cable chain
D	Joint position of the movement cable and the static cable

Continues on next page

3.5.9 Harness outlet
Continued

Harness outlet - One carriage with odd sections

The harness should go out from the outlet on the central section of the track.



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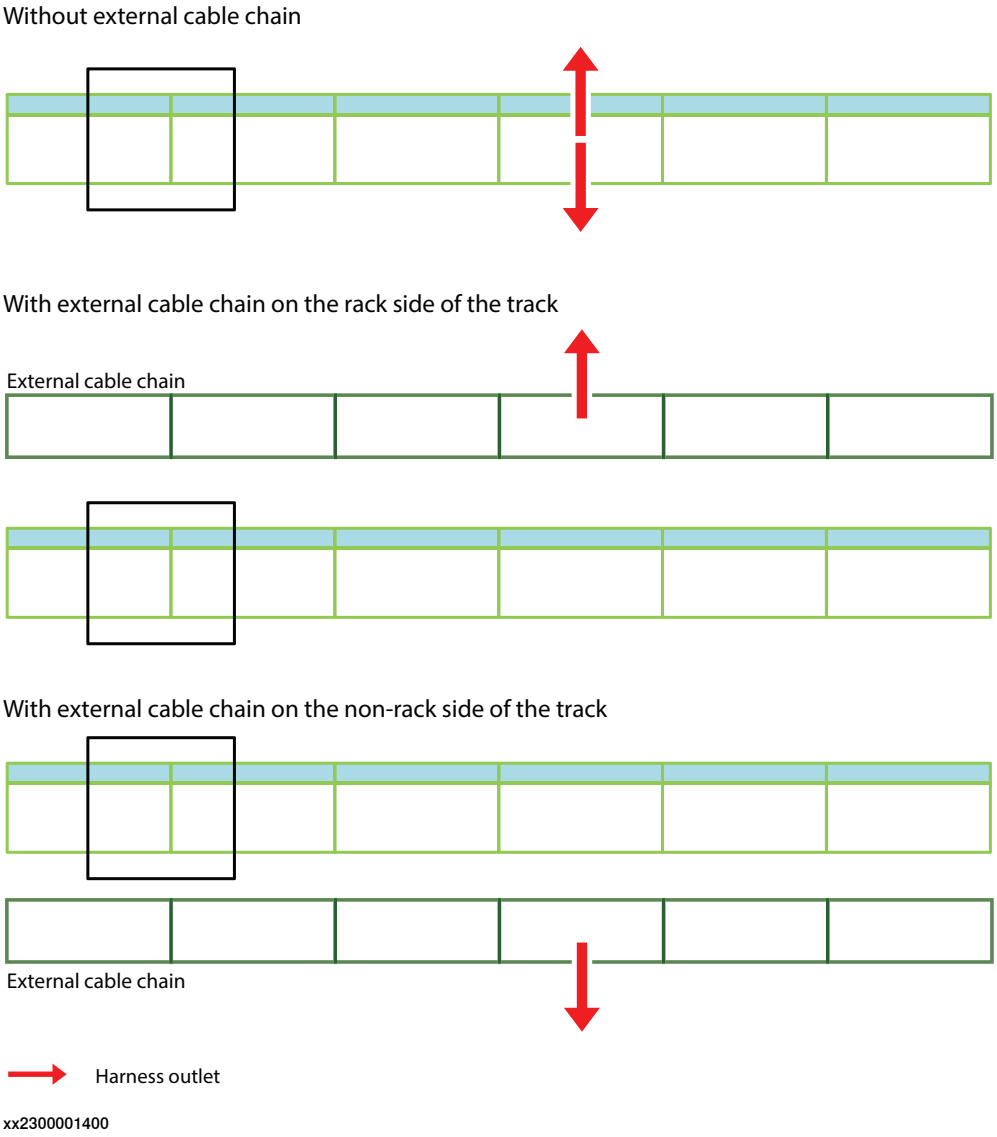
Harness outlet - One carriage with even sections

The harness should go out from the outlet on the (N/2 +1) section of the track.



Harness outlet - Two carriages with odd sections

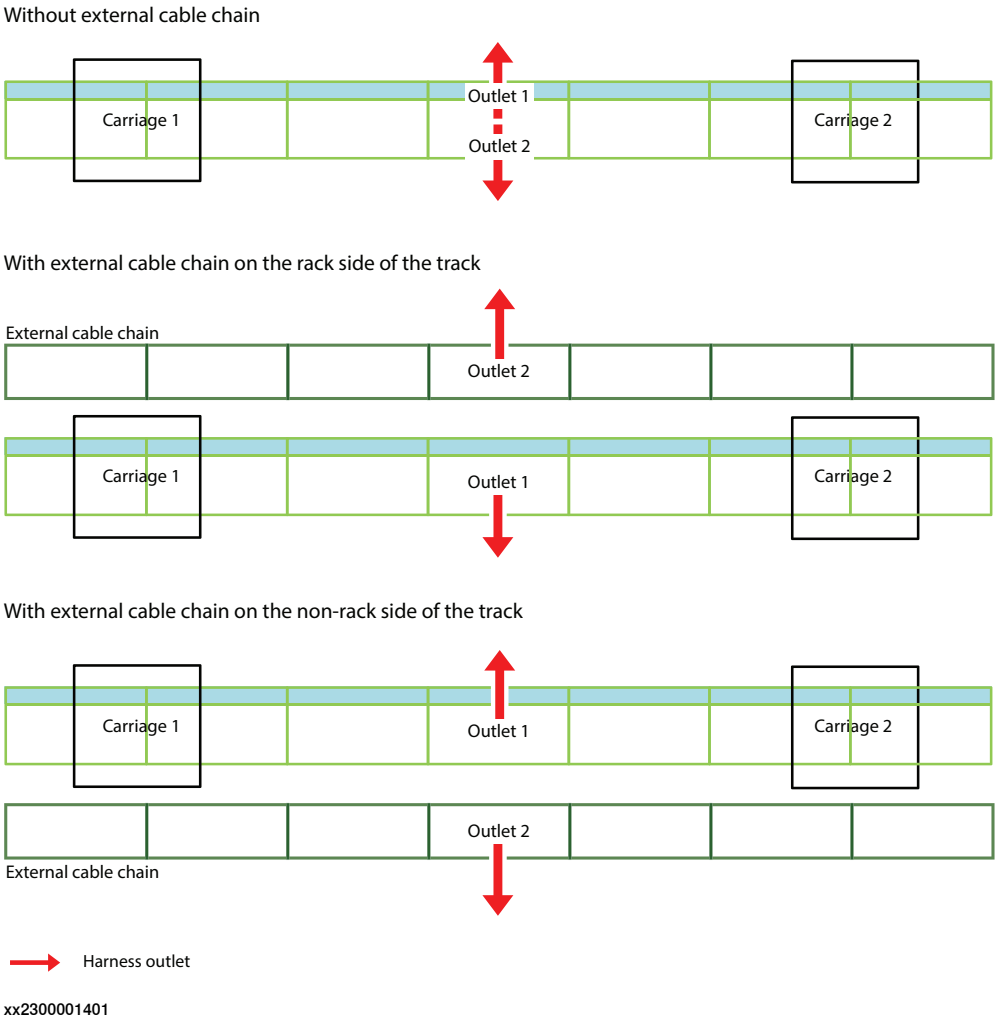
The harness of both carriages should go out from the outlet on the central section of the track.

> **Note**
>
> If the track is used for spot welding under this circumstance, it is recommended to thread the two carriages' cables from two different directions of the outlet.
>
> Otherwise the replacement of the harness will be very difficult due to the constriction of the space.

Continues on next page

3.5.9 Harness outlet

Continued



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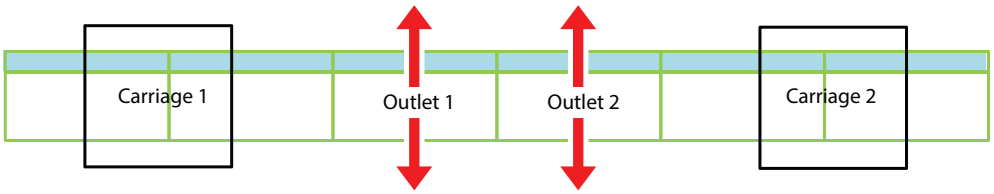
Harness outlet - Two carriages with even sections

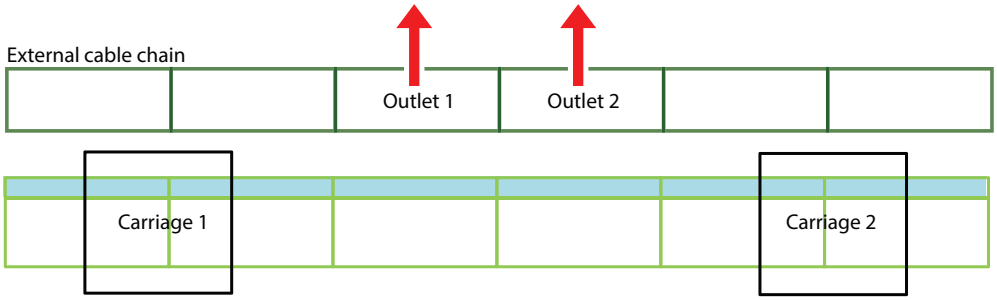
The harness of the carriage 1 should go out from the outlet on the (N/2) section of the track.

The harness of the carriage 2 should go out from the outlet on the (N/2 +1) section of the track.

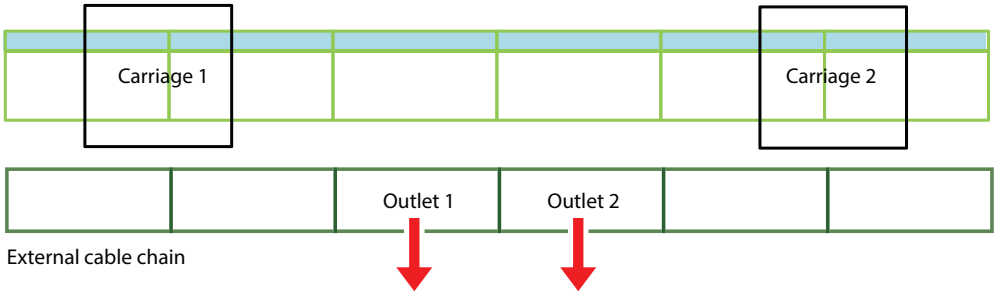
Without external cable chain



With external cable chain on the rack side of the track



With external cable chain on the non-rack side of the track



Harness outlet

xx2300001402

3.5.10 Inspection points of cable chain prior to start-up

Important inspection points prior to start-up of track

Please use the inspection sheet below to check that the installation of the cable chain is complete, before the track is commissioned.

Inspection sheet

Cable inspection

Inspection	Yes	No
All cables in the radius can be moved lengthways?		
Cable clearance in both end positions of the travel distance checked?		
Cable clearance in end positions after approximately 4 weeks of operation checked?		
Strain relief present at moving end?		
Strain relief present at fixed end?		

Cable chain inspection

Inspection	Yes	No
All covers closed?		
Internal separators in place?		
Moving end aligned with guide channel?		
Chain brackets tightened and secured using Nylock nuts on the moving end and Loctite on the fixed?		
Support and strapping plate on carriage correctly arranged and tight?		

Cable tray inspection

Inspection	Yes	No
Cable tray free of foreign objects?		
Tray internal width > 2 mm and < 4 mm than chain outside width?		
Transition of glide rail to chain lower run at same height?		
Tray joints arranged flush and unobstructed?		
Cable tray running parallel to the moving end guide?		
Glide bars don’t move. Screw holding glide bars at least one every two meters?		

3.6 Software installation

3.6.1 Creating and downloading a system

Introduction

The PC application RobotStudio is used for creating and downloading systems to the controller.

The procedure how to create and download a system is different depending on if the controller is installed with RobotWare 6.14 or later. RobotStudio 2022.3 or later supports both procedures.

> **Note**
>
> Use Installation Manager to create and modify systems with RobotWare 6.14 and later.

For more information, see *Operating manual - RobotStudio*.

Before modifying the system

Before modifying the system it is recommended to take a backup of the system and put all axes of the robot and any external axes are in their zero positions.

Creating a system for RobotWare 6

In RobotWare 6, the track motion is loaded as an Add-In. The track motion Add-In does not require a license.

Use this procedure to create and modify the system.

	Action
1	Create a new system based on the existing system using the Installation Manager in RobotStudio.
2	In the **Products** tab, click **Add** and select the *RobotWare* and *TrackMotion* product manifests.
3	In the **Licenses** tab, add the license for RobotWare. The track motion does not require a license.
4	In the **Options** tab, **Drive Modules** pane, add the additional drive unit (ADU) that controls your track motion.
5	If the system has SMB box, the measurement link for track should be revised to 2; the board position for track should be revised to 1; the measurement node for track should be revised to 7.
6	In the **Options** tab, **Drive Modules** pane, select and modify the options that suits your track motion. For example motion type, robot orientation, pedestal, length etc.
7	Complete the Installation Manager wizard.
8	Apply the changes to the system and restart the controller.

Continues on next page

3.6.1 Creating and downloading a system
Continued

	Action
9	Load the necessary system parameters, system modules, and program modules from the backup and restart the controller. **Note** Do not restore the old motor configuration file *moc.cfg*, this will remove the track motion settings. Instead, use **Load parameters and replace duplicates** from the **Configuration** window on the FlexPendant **Control Panel**.
10	Update the revolution counters, see *Updating the revolution counter on the track motion on page 191*.
11	Set the software limits for the track, see *Working range on page 62*. **Note** Note that the default length of the track is set very short, for safety reasons, and has to be updated to the correct length.
12	Verify that the selected robot orientation on the track motion matches the physical configuration, see *Direction of travel on page 81*.

For more detailed instructions on using the Installation Manager, see *Operating manual - RobotStudio*.

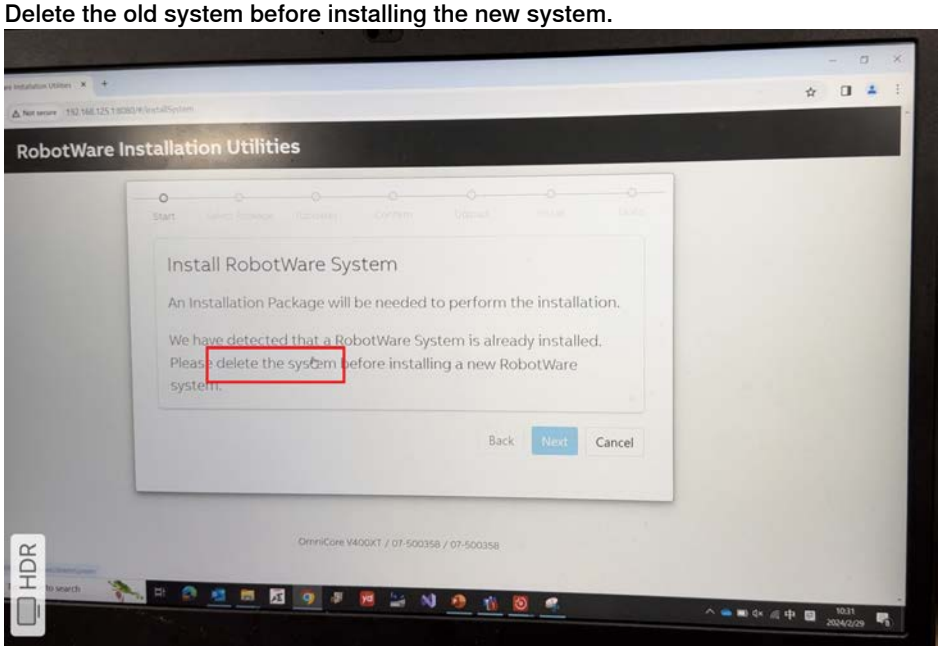
Creating a system for RobotWare 7

In RobotWare 7, the track motion is loaded as an Add-In. The track motion Add-In does not require a license.

Use this procedure to create and modify the system.

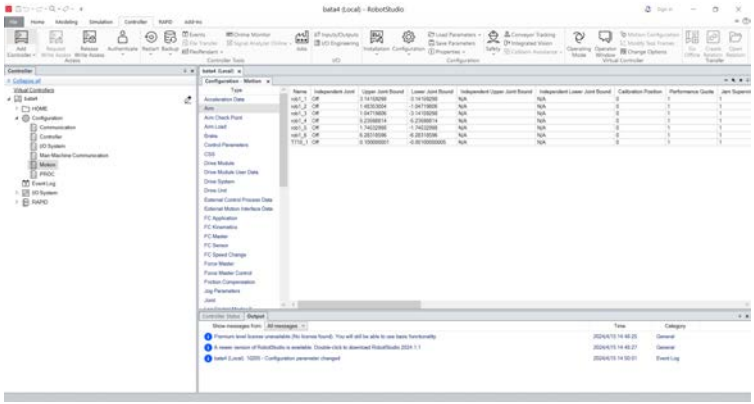
	Action
1	Create a new Station in RobotStudio.
2	In the **Home** tab, create a new virtual controller accordingly.
3	In the **Controller** tab, modify the new system based on the existing system using the Modify Installation.
4	In the **Software** tab, click **Include** to add the *RobotWare* and *TrackMotion* product software in **Available** list.
5	In the **Licenses** under **Options** tab, click **Edit** remove the virtual license and add the license for RobotWare. The track motion does not require a license.
6	In the **Options** tab, **Controller variant** pane, select the controller type and add the additional drive unit (ADU) that controls your track motion.
7	If the system has SMB board, the measurement link for track should be revised to 2; the board position for track should be revised to 1; the measurement node for track should be revised to 7.
8	In the **Options** tab, select and modify the options that suits your track motion. For example motion type, robot orientation, pedestal, length etc.
9	Click **Apply** to complete the Modify Installation wizard.
10	Click **Create Package...** to save the installation package to a destination folder.
11	Copy the installation package to a U-disk.
12	Insert the U-disk to the FlexPendant that connected to the controller.

Continues on next page

	Action
13	Click **Setting** -> **Backup & Recovery**-> **RobotWare Installation Utilities** -> **Start Installer** -> **Install RobotWare System** to start the installation of the new system on the controller.
14	Delete the old system before installing the new system.  xx2400000379
15	Select the new system installation package from the U-disk and start the installation.
16	Click **Done** to finish the installation of the new system.
17	Click **Start RobotWare System** -> **Start** to restart the controller.
18	Load the necessary system parameters, system modules, and program modules from the backup and restart the controller. **Note** Do not restore the old motor configuration file *moc.cfg*, this will remove the track motion settings. Instead, use **Load parameters and replace duplicates** from the **Configuration** window on the FlexPendant **Control Panel**.
19	Update the revolution counters, see *Updating the revolution counter on the track motion on page 191*.

Continues on next page

3.6.1 Creating and downloading a system
Continued

	Action
20	Set the software limits for the track, see *Working range on page 62*. **Note** For safety reasons, the default length of the track is set very short. Update the length of the track to the correct value. For more information about the correct value, see *Working range on page 62*.  xx2400000378
21	Verify that the selected robot orientation on the track motion matches the physical configuration, see *Direction of travel on page 81*.

For more detailed instructions on using the Modify Installation, see *Operating manual - RobotStudio*.

3.6.2 Updating the revolution counter on the track motion

General

For more details, see *Calibration on page 357*.

3.7 Lubrication

Overview

This section is based on the MEMOLUB® installation instructions. It details how to configure the grease pump MEMOLUB®.

	HPS	EPS
Power supply	4.5 V battery	External 24 V power
Control method	After setting the use period, install the time loop grease pump to work once, and then work independently according to the set use period until the grease bag is used up. The plastic ring white (Ø44 mm) is installed as default in HPS lubrication system.	The same as the HPS time setting, except that the battery power supply is changed to an external power supply; but the grease pump works once when it is powered on, and then works according to the previously set time period under the condition of uninterrupted power, so it can be synchronized with the equipment (in shutdown or the grease pump does not work during maintenance)

There are two types of automatic lubrication system can be used in IRT 710 OmniCore. One is HPS, and the other is EPS.

Configuration

The grease pump MEMOLUB® is set through combination of 3 plastic rings: black (Ø50 mm), white (Ø44 mm) and red (Ø38 mm).

The table shows the frequency of strokes and the duration of a 240 mm cartridge at different combinations. Change the rings accordingly to your requirements. The three rings are all delivered to the customer in the ABB product.

50 mm  xx1600001020	44 mm xx1600001021	38 mm  xx1600001022	Frequency hour(s)	Duration of a 240 mm cartridge month(s)
x			48	24
	x		24	12
x	x		16	8
		x	12	6
x		x	6	3
	x	x	2	1
x	x	x	1	1/2

Continues on next page

Set of rings

The figure shows the 3 rings disassembled from the grease pump MEMOLUB®.

xx1600001023

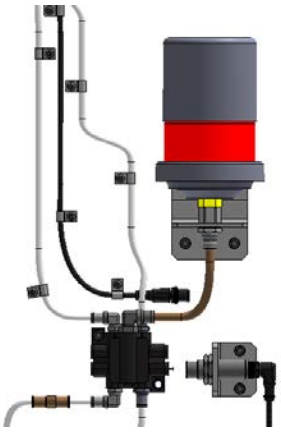
Continues on next page

3.7.1 HPS

Activating the automatic lubrication system

The HPS automatic lubrication system needs to be activated before using the IRT 710 OmniCore. Once the system has been activated, it delivers the exact quantity of grease to each port at required time interval (according to the configuration), during one year.

Follow the instructions below to activate the lubrication system:

	Action	Note/Illustration
1	Introduce the battery and the grease cartridge in the pump. The timer is activated once the battery is inserted. See *Memolub manual on page 230* for instructions about MEMOLUB.	 xx2200001275
2	The grease is pushed in the piping by the pump; a valve is sequencing the distribution to each port.	

3.7.2 EPS

Activating the automatic lubrication system

The EPS automatic lubrication system needs to be activated before using the IRT 710 OmniCore. Once the system has been activated, it delivers the exact quantity of grease to each port for six times in one lubrication. The system should be activated every six days.

Follow the instructions below to activate the lubrication system:

	Action	Note/Illustration
1	Introduce the external 24 V power and the grease cartridge in the pump. The timer is activated according to the program by the customers or integrators. See *Memolub manual on page 230* for instructions about MEMOLUB. **Tip** The 24 V power cable is black.	 xx2000002593
2	The grease is pushed in the piping by the pump; a valve is sequencing the distribution to each port.	

Lubrication feedback (optional)

To check if the lubrication system works well, it is viable to take use of lubrication feedback system with IRT 710 OmniCore.

The lubrication feedback function can be used with OmniCore controllers.

The principle of Switch detection of lubrication:

1. The interval time of the lubrication system is recommended as six days when the system is activated.
2. When the oil is pumped for the first time, the lubrication system scans the sensor and records the status value.

   The interval for each pumping is recommended as two minutes.
3. When the oil is pumped for the second time, the lubrication system scans the sensor and records the status value again.
4. If there is no change, the lubrication system continue scanning the sensor and recording the status value after the third time oil pumping.
5. If there is a change, the lubrication system stops scanning the sensor and recording the status value.
6. If no status value change is detected after the completion of six time pumping, it indicates that the lubrication system is abnormal. Please check the lubrication system and grease bag.

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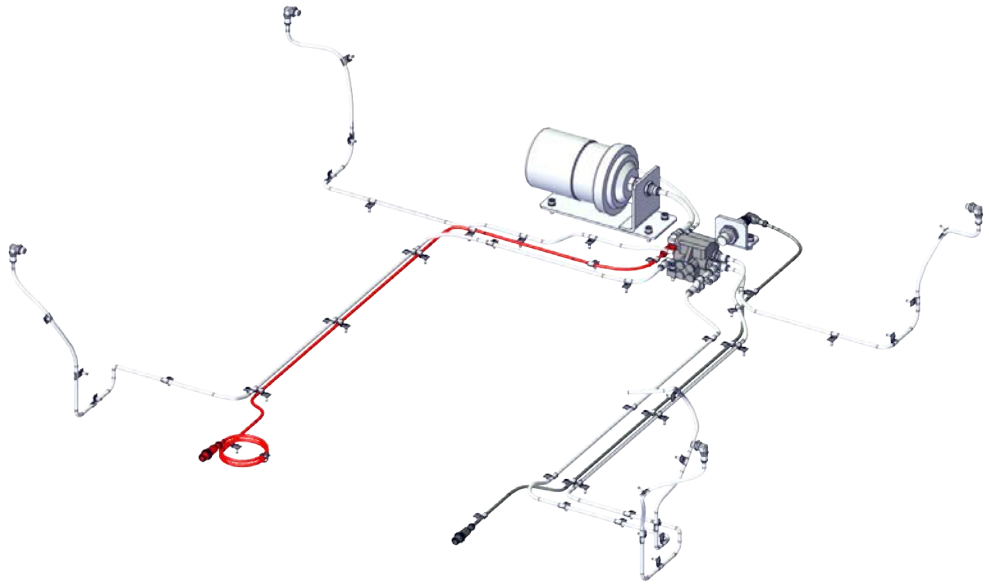
3.7.2 EPS
Continued



xx2200000795

A	M12 Cable, 1,000 mm (Silver white)
B	Sensor

3.8 Zone division

Division of the track

The purpose of the zone division is to divide the track into zones. Read about SafeMove in the controller manual. Document ID is specified in *References on page 10*.

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4 Maintenance

4.1 Introduction

Structure of this chapter

This chapter describes all the maintenance activities recommended for the IRT 710 OmniCore.

It is based on the maintenance schedule found at the beginning of the chapter. The schedule contains information about required maintenance activities including intervals, and refers to procedures for the activities.

Each procedure contains all the information required to perform the activity, including required tools and materials.

The procedures are gathered in different sections and divided according to the maintenance activity.

Safety information

Observe all safety information before conducting any service work.

There are general safety aspects that must be read through, as well as more specific safety information that describes the danger and safety risks when performing the procedures. Read the chapter *Safety on page 15* before performing any service work.

The maintenance must be done by qualified personnel in accordance with the safety requirements set forth in the applicable national and regional standards and regulations.

Note

If the IRT 710 OmniCore is connected to power, always make sure that the IRT 710 OmniCore is connected to protective earth and a residual current device (RCD) before starting any maintenance work.

For more information see:

- *Product manual - OmniCore V400XT*
- *Grounding point on page 177*.

4.2 Maintenance schedule and expected component life

4.2.1 Specification of maintenance intervals

Introduction

The intervals are specified in different ways depending on the type of maintenance activity to be carried out and the working conditions of the IRT 710 OmniCore:

- Calendar time: specified in months regardless of whether the system is running or not.
- Operating time: specified in operating hours. More frequent running means more frequent maintenance activities.

Robots with the functionality *Service Information System* activated can show active counters in the device browser in RobotStudio, or on the FlexPendant.

4.2.2 Maintenance schedule

Scheduled and non-predictable maintenance

The product must be maintained regularly to ensure proper function. The maintenance activities and intervals are specified in the table below.

Non-predictable situations also give rise to inspections of the product. Any damage must be attended to immediately.

Life of each component

The inspection intervals *do not* specify the life of each component. Values for these are specified in the section *Expected component life on page 203*

Maintenance schedule

Maintenance activities	Regularly	Every 1 months	Every 6 months	Every 12 months	Every 36 months	Every 100 km	Reference
Cleaning the whole system	x						*Cleaning the IRT 710 OmniCore on page 222*
Inspecting the information labels				x			*Inspecting the information labels on page 204*
Inspecting the lubrication system		x					*Inspecting the lubrication system on page 206*
Inspecting the cable chain			x				*Inspecting the cable chain on page 208*
Inspecting the levelling screw			x				*Inspecting the levelling screw on page 210*
Inspecting the rectangular rails			x				*Inspecting the rectangular rails on page 212*
Inspecting the cam roller			x				*Inspecting the cam roller units on page 214*
Inspecting the felt wiper		x					*Inspecting the felt wiper on page 216*
Inspecting the cables and connectors				x			*Inspecting the cables and connectors on page 218*
Inspecting the mechanical stops				x			*Inspecting the mechanical stops on page 219*
Inspecting the gearbox, back lash				x			*Inspecting the gearbox, back lash on page 220*
Cleaning and lubricating the gear racks				x			*Cleaning and lubricating the gear racks on page 224*

Continues on next page

4.2.2 Maintenance schedule
Continued

Maintenance activities	Regularly	Every 1 months	Every 6 months	Every 12 months	Every 36 months	Every 100 km	Reference
Cleaning the rectangular rails				x			*Cleaning and lubricating the rectangular rails on page 225*
Measuring the levelling				x			*Measuring the levelling on page 233*
Automatic lubrication system			x				*Automatic lubrication system on page 227*
Replacing the grease package and battery (HPS)			x [i]				*Replacing the grease package and battery on page 234*
Changing oil, cam roller unit			x				*Replenishing oil, cam roller unit on page 235*

[i] The battery is to be replaced at given maintenance interval or at battery low alert.

4.2.3 Expected component life

Expected life depends on usage

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

The Track has been designed and validated to perform at least 1000000 cycles at full payload and maximum duty cycle without the need for replacing any component. However, the lifetime of individual components may vary in case of extreme working conditions, or if the recommended maintenance is not observed.

Expected component life

Component	Expected life	Note
Cable harness	1,000,000 cycles	The expected life can also be affected by assemblage of cabling other than standard options.
Cable chain	10,000,000 m	1 Different working environment 2 the weight of the internal cables and tubes 3 the actual travel length 4 the speed and
Cam roller unit	1,000,000 cycles	The expected life is given for the cam roller units of a six-meter-longstroke track (12 meters per cycle) operating 1,000 maximum load cycles a day.
Gearboxes	Over 20,000 hours	
Rack	Over 10 years	
Rail	12 meters per cycle x 1,000,000 cycles	

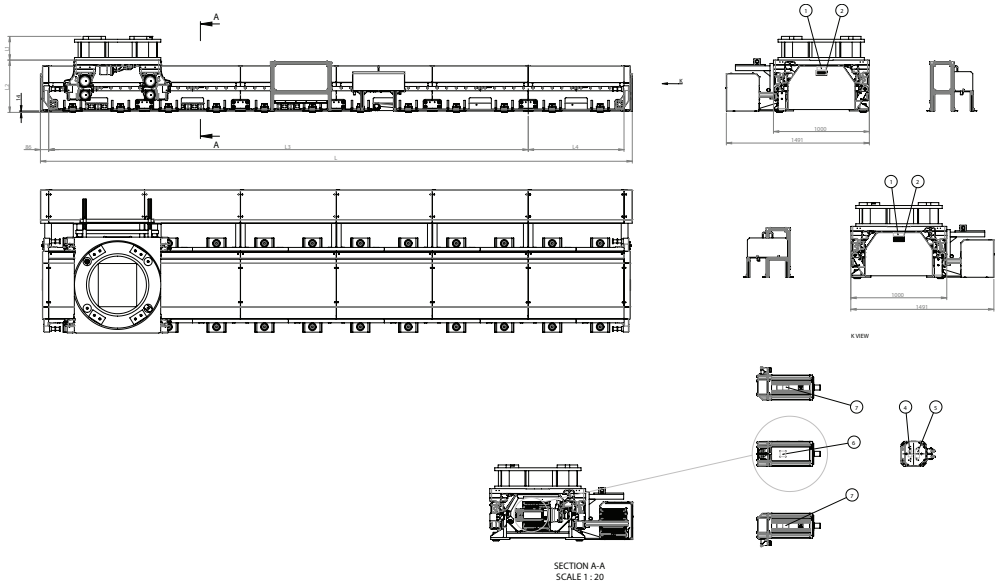
4.3 Inspection activities

4.3.1 Inspecting the information labels

Required spare parts

> **Note**
>
> The spare part numbers that are listed in the table can be out of date. See the latest spare parts of the IRT 710 OmniCore via myABB Business Portal, *www.abb.com/myABB*.

The figures show the location of the information labels to be inspected. The symbols are described in section *Safety symbols on product labels on page 39*.



xx2400000638

Item	Description
1	ABB Logo
2	Rating Label
3	Lifting Label
4	NO SHOCK Warning Label
5	Instruction Plate
6	Electric shock Warning Label
7	High Temperature Warning Label
8	WEEE label

Required tools and equipment

Visual inspection, no tools are required.

Continues on next page

Inspecting, labels

	Action	Note
1	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the system, before entering the safeguarded space.	
2	Inspect the labels, located as shown in the figures.	
3	Replace any missing or damaged labels.	Article numbers for the labels and plate set is specified in *Required spare parts on page 204*.

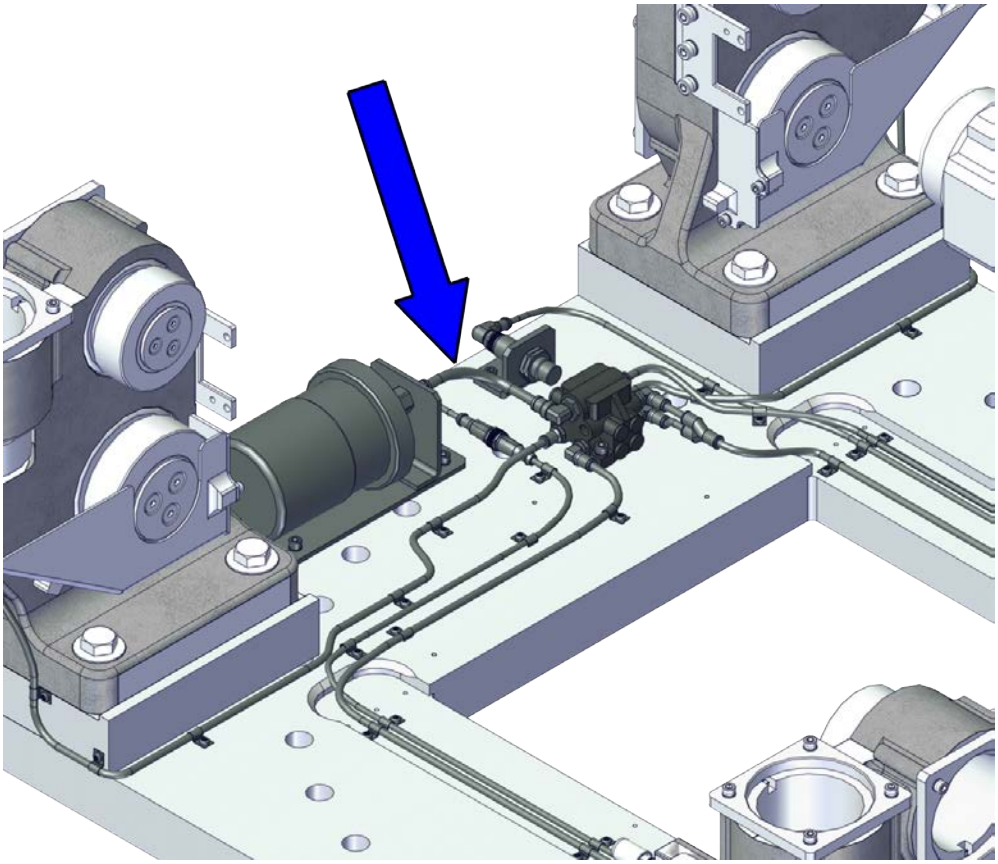
4.3.2 Inspecting the lubrication system

Overview

If the track motion is equipped with an automatic lubrication system the level of the lubricant should be checked according to the maintenance schedule (see *Maintenance schedule on page 201*), even if the system should apply the lubricant equally over a longer period. The timer is only active when the system is in Auto mode.

Location of lubrication system

The lubrication system is located as shown in the figure.



xx2200000633

Required equipment

Equipment, etc.	Art. no.	Note
Other tools and procedures may be required. See references to these procedures in the step-by-step instructions below.		These procedures include references to the tools required.

Continues on next page

Checking the lubrication system

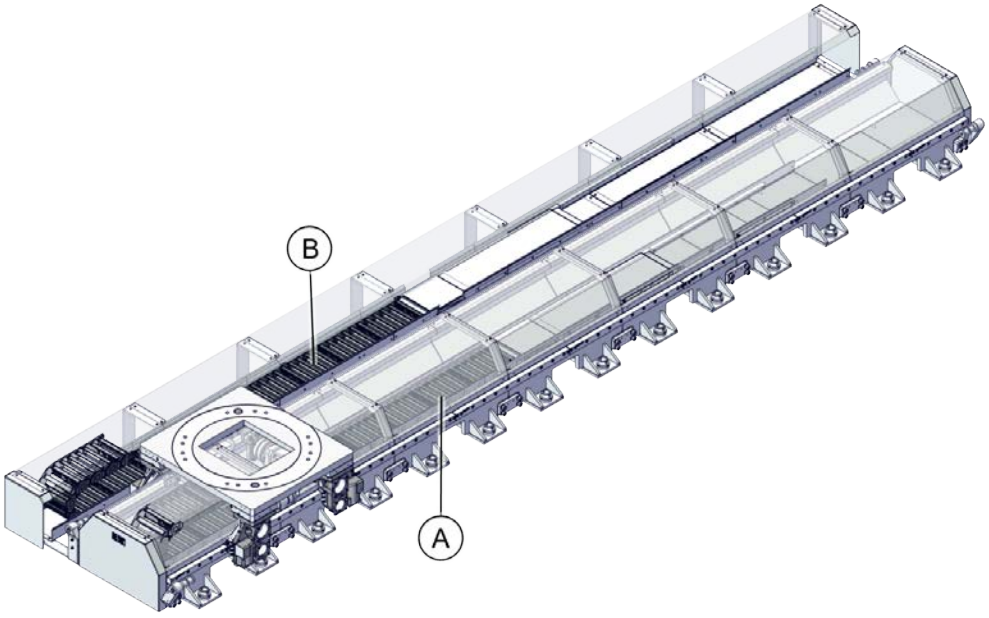
Use this procedure to check the grease level of the lubrication system.

	Action	Note
1	Check that there is no oil leakage in the lubrication system.	
2	Check that the oil pack in the pump is not used up.	
3	Check that the lubrication system is working normally.	

4.3.3 Inspecting the cable chain

Location of cable chain

The track motion cable chains are located as shown in figure.



xx2200001198

Item	Description
A	Internal cable chain unit
B	External cable chain unit

Required equipment

Equipment, etc.	Art. no.	Note
Visual inspection	-	
Cable ties	21662055-6	Needed if the cable strapping needs to be improved. Use heavy duty cable ties with minimum width: 7.6 mm.
Locking liquid	-	Loctite 243 Used if loose screws are detected.

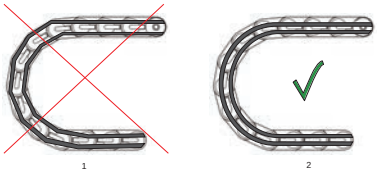
Checking the emergency stop

	Action	Note
1	Allow the track motion to stop.	
2	Press in the emergency stop.	
3	Try to start the track motion.	

Continues on next page

Inspecting the cable chain

Inspecting the cables

	Action	Note
1	Move the carriage to one end and open the covers on the outside bend.	
2	Check that the cables are in the neutral axis (center line of the link) of the chain as shown in the figure. If cables are found to be too loose or too tight then they need to be adjusted.	 xx1200000518
3	Repeat the check of the cables in the neutral axis with the carriage in the middle and at the other end.	
4	Make an overall inspection of the cables. If a cable is found to corkscrew it needs to be replaced immediately. If cables have worn through the outer cover they must be replaced. Some dust can be expected from the cables as they rub against the dividers in the chain.	

Inspecting the strapping

	Action	Note
1	Check that strapping is in place. Each cable is required to be individually strapped down, and not bunched together. If insufficient holes are available in the connection plates for individual strapping with cable ties, the cables should be secured in such a way that they cannot move. Only use heavy duty cable ties, specified in *Required equipment on page 208*. If strapping has been replaced ensure that a paint pen is used to mark both sides of the cable tie.	

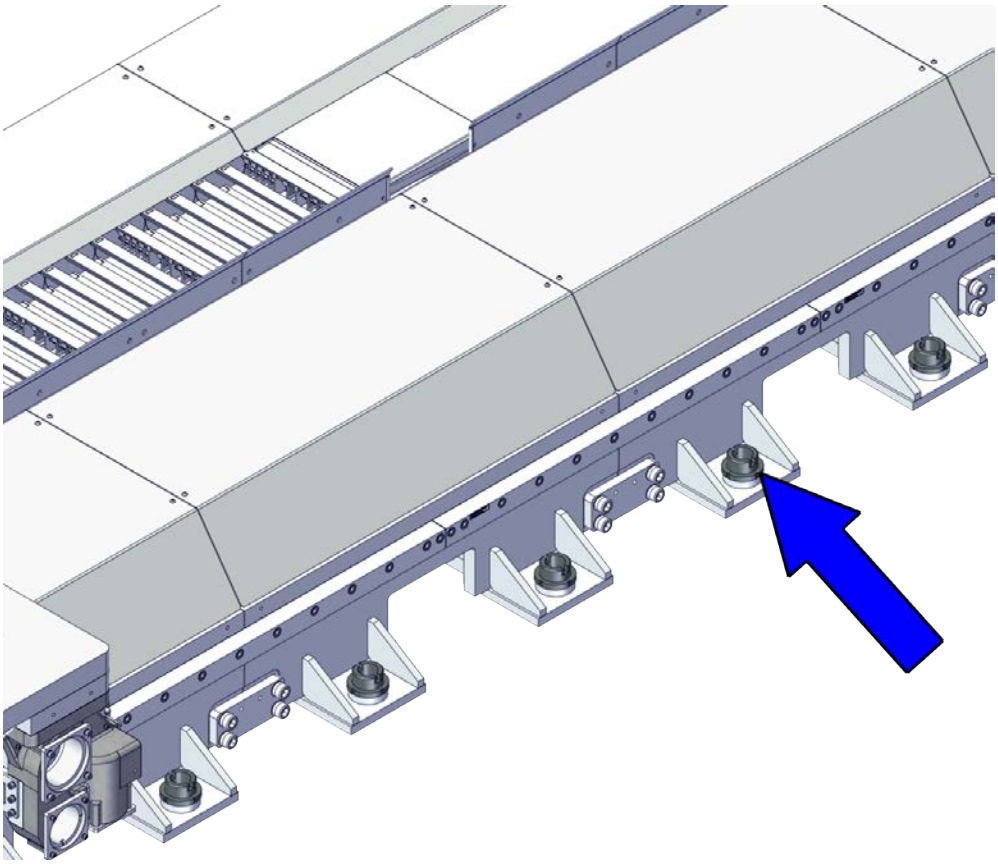
Inspecting the fasteners

	Action	Note
1	Check bolts and screws on the attaching plates and brackets. If found to be loose they need to be removed, have locking liquid applied to them and then be refitted and tightened.	Loctite 243.

4.3.4 Inspecting the levelling screw

Location of levelling screw

The levelling screw are located as shown in figure.



xx2200000628

Required equipment

Equipment, etc.	Article number	Note
Visual inspection	-	

Inspecting the levelling screw

Use this procedure to inspect the levelling screw.

	Action	Note
1	Check the M16 chemical anchor bolts for any loosen. • If any loosen is detected, retighten it.	Tighten torque: 80 Nm (Chemical anchor bolts directly connected to the foundation) 308 Nm (M16 bolts connected to the floor plate)

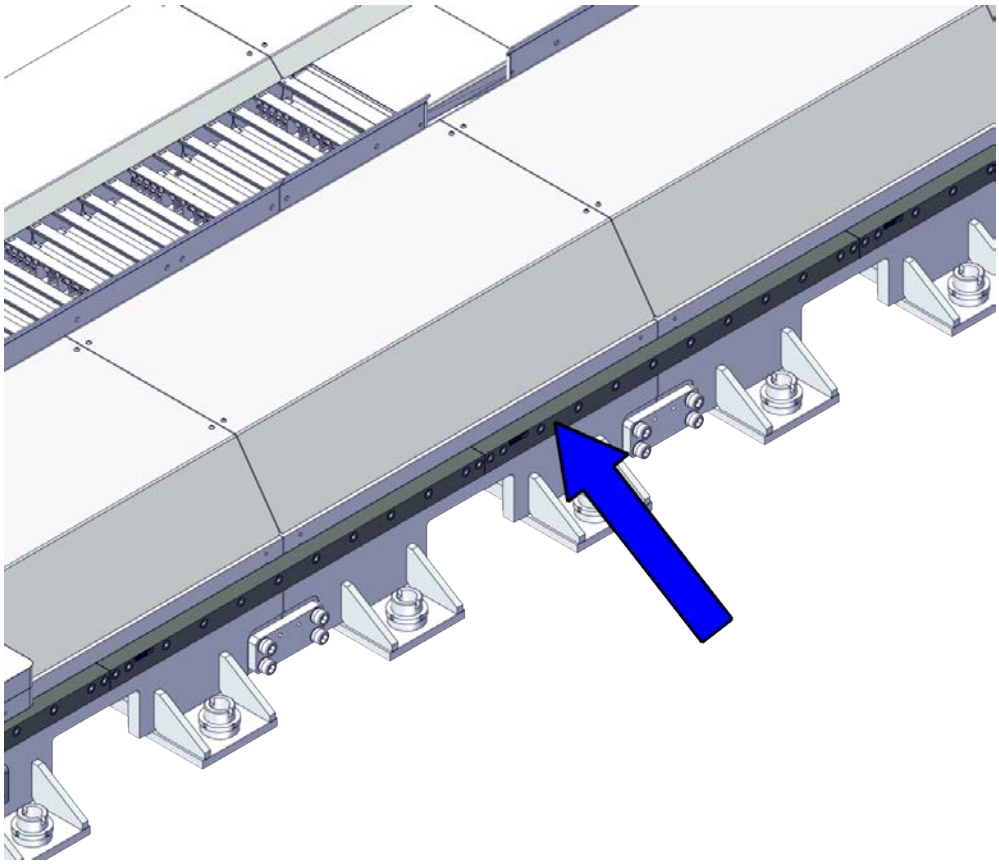
Continues on next page

	Action	Note
2	Check the levelling screw nut marker for any position shifted. • If marker position is shifted, check the level of the entire track in the height direction. - If there is any problem, adjust it. - If there is no problem, tighten the nut of the levelling screw.	*Geometric alignment of track motion IRT 710 OmniCore on page 144*
3	Check the levelling screw for damages or missing. • If visual wear is detected, replace with a new one. • If levelling screw is missing, install a new one and align the track motion.	

4.3.5 Inspecting the rectangular rails

Location of rectangular rails

The rectangular rails are located as shown in figure.



xx2200000629

Required equipment

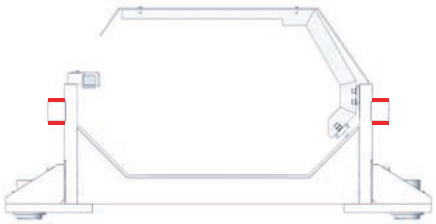
Equipment, etc.	Note
Lint free cloth	-
Lubricant[i]	CASTROL Tribol GR 100-0 PD
	Shell Gadus S2 V220 00
	TOTAL Multis EP 0
Lubrication gun (if no automatic lubrication system).	

i Use one of the three lubricants.

Continues on next page

Inspecting the rectangular rails

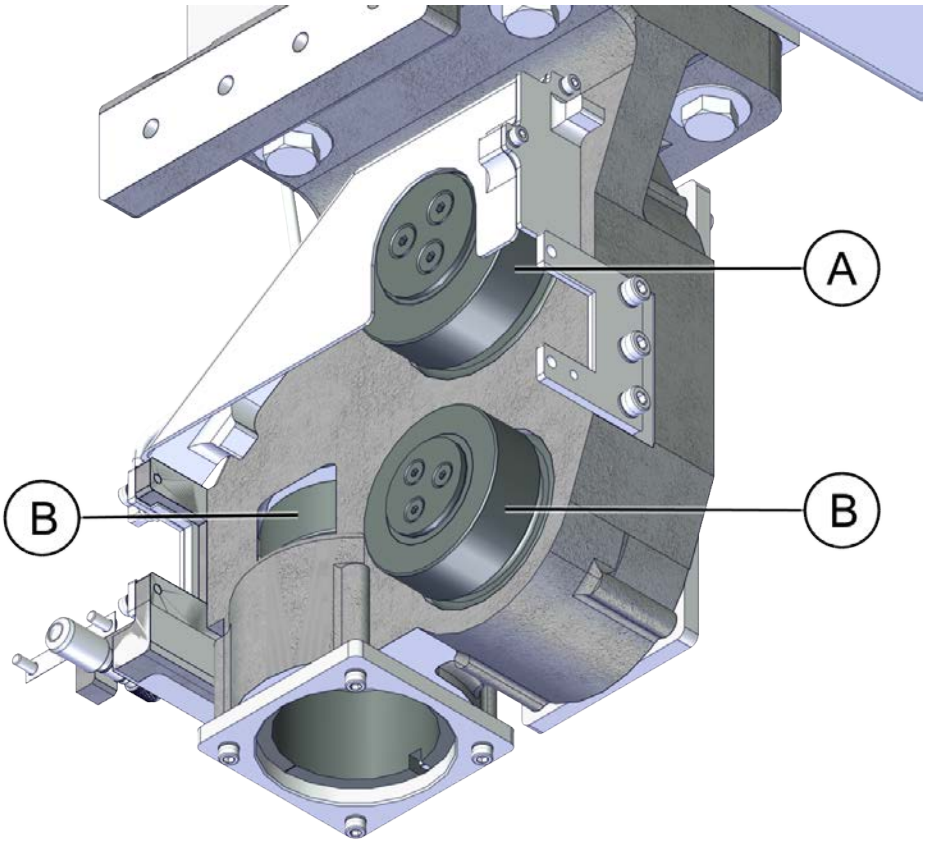
Use this procedure to inspect the rectangular rails.

	Action	Note
1	Inspect the rectangular rails for contamination and clean if necessary.	Use a lint free cloth. • Lubricate the rectangular rails after cleaning.  **WARNING** The grease used causes serious eye irritation and may cause an allergic skin reaction.
2	Check the guide surface of the rectangular rails for damages or wear. • If visual wear is detected, use a finger to feel the surface in the roller races. • If roughness or uneven surfaces in the roller races are found, the rectangular rails needs to be replaced. • Wear or uneven surfaces outside the roller races are not critical to achieve function. Worn out or damaged rails can be caused by the robot stopping occasionally with overload in the track axis.	If wear or damage is detected, replace all rectangular rails on the concerned side. Always lubricate new rectangular rails. See *Replacing the rectangular rails on page 285*.  xx2200000635

4.3.6 Inspecting the cam roller units

Location of cam roller units

The cam roller units are located as shown in figure.



xx2200000630

	Description
A	110MM Cam roller holder unit
B	90MM Cam roller holder unit

Required equipment

Equipment, etc.	Note
Lint free cloth	-
Lubricant	Shell Retinax LX2
Lubrication gun	

Continues on next page

Inspecting the cam roller units

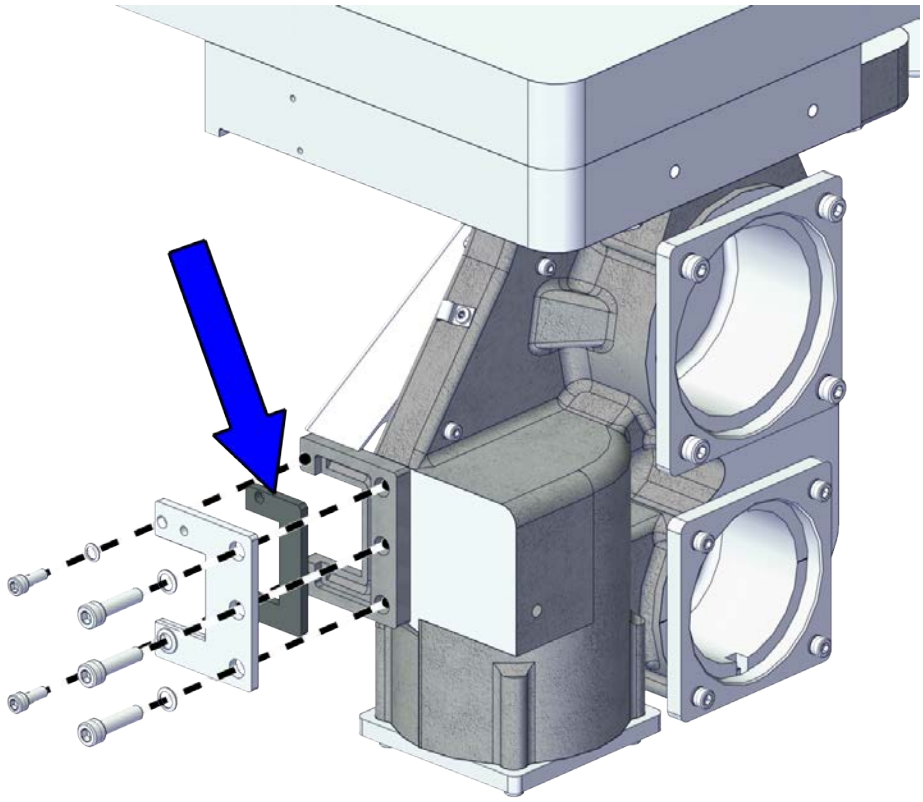
Use this procedure to inspect the cam roller units.

	Action	Note
1	Check that the oil flowing out of the cam roller unit: • is not turned black • contains any iron filings If any is detected, change the oil.	• Lubricate the cam rollers after cleaning. Use Shell Retinax LX2. *Replenishing oil, cam roller unit on page 235*
2	Check the 90mm cam roller unit for rotating with your fingers. • If it can be rotated, it is not tightly attached.	Make sure that the roller and the rail are tightly attached. For more information on how to adjust the 90 mm cam roller unit, see *Refitting the 90 cam roller unit on page 259*.
3	Check the cam roller unit for damages or wear. • If visual wear is detected, use a finger to feel the surface. • If roughness or uneven surfaces are found, the cam roller needs to be replaced. • any pitted part. • any worn glued part. Worn out or damaged roller can be caused by the robot stopping occasionally with overload in the track axis.	If wear or damage is detected, replace the cam roller unit. Always lubricate new cam roller. See *Replacing the rectangular rails on page 285*.

4.3.7 Inspecting the felt wiper

Location of felt wiper

The felt wiper is located as shown in figure.



xx2200000631

Required equipment

Equipment, etc.	Note
Lint free cloth	-
Lubricant	CASTROL Tribol GR 100-0 PD
Lubricant	Shell Gadus S2 V220 00
Lubricant	TOTAL Multis EP 0
Lubrication gun	

Continues on next page

Inspecting the felt wiper

Use this procedure to inspect the felt wiper.

	Action	Note
1	Check that there is any grease between the scraper and the rail. If not, check whether the lubrication system and the felt wiper are working properly or not. If not, replace the damaged parts.	Wipe the rails first, and then manually jog the carriage for a while (not exceeding the length of the carriage itself) to see if there is any grease on the rails.

4.3.8 Inspecting the cables and connectors

Required equipment

Equipment, etc.	Art. no.	Note
Visual inspection	-	

Inspecting the connectors

Use this procedure to check the connectors.

	Action	Note
1	Check that the connectors at the robot base, track motor and interchange to the floor cable are correctly fitted and that there is no risk of loose connections.	

Inspecting the cables

Use this procedure to check the cables.

	Action	Note
1	Check if any cables have been damaged through wear or pinching. If damaged then replace the cable.	
2	Check if any cables rub against sharp edges. If so, route the cable so that it runs freely.	See cable routing in *Replacing the cables in cable chain on page 336*.
3	Check strain relief of cables and hoses. Marking should be close to the corresponding strap. If not, pull the hose/cable to the correct position and strap it.	

Fault finding

The following information is provided to assist fault finding.

Cables that have failed due to incorrect installation typically show the following symptoms:

- Knotting of conductors underneath the cable jacket.
- Cables twist around one another within a cable carrier system.
- Cables are sticking out between the cable carrier crossbars and getting caught in the bend radius.
- Cables entangled with other cables and crossbars tearing them apart.
- Loss of conductivity through simple breaking of cable conductors.

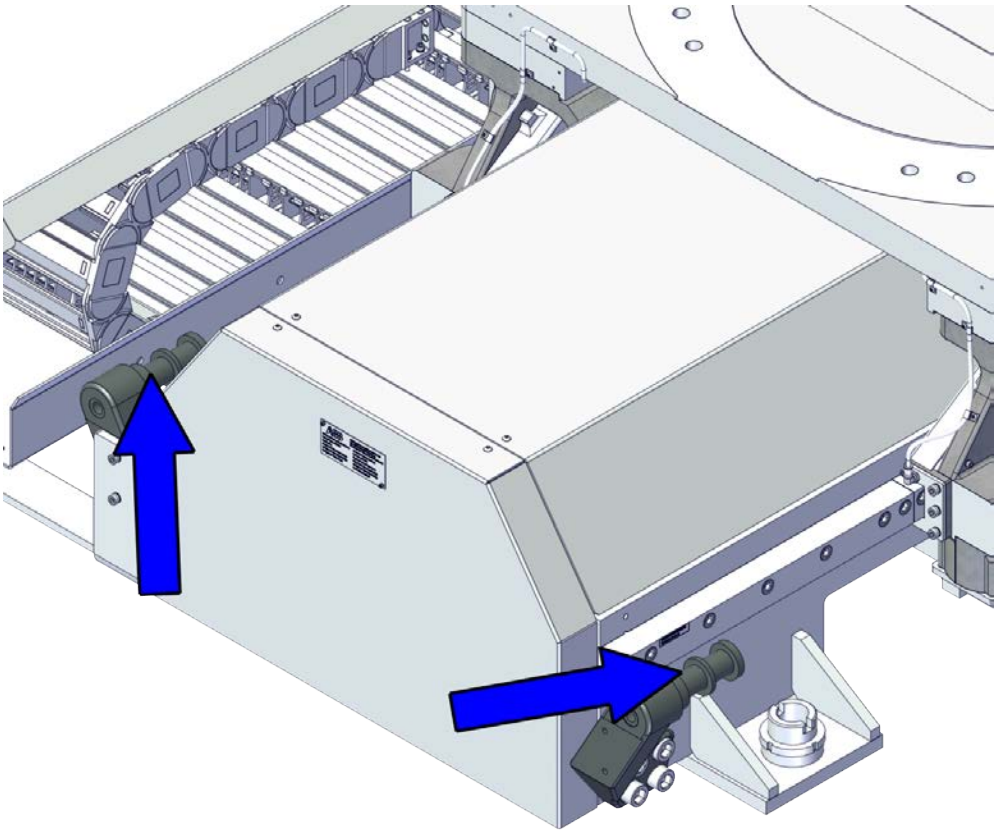
Common causes of cable failure when operating in a cable chain:

- Cables used are not designed for use in continuous flexing operation.
- Cables are packed too tight inside the carrier cavities.

4.3.9 Inspecting the mechanical stops

Location of mechanical stops

The mechanical stops are located as shown in figure.



xx2200000632

Required equipment

Equipment, etc.	Art. no.	Note
Visual inspection	-	

Inspecting the mechanical stops

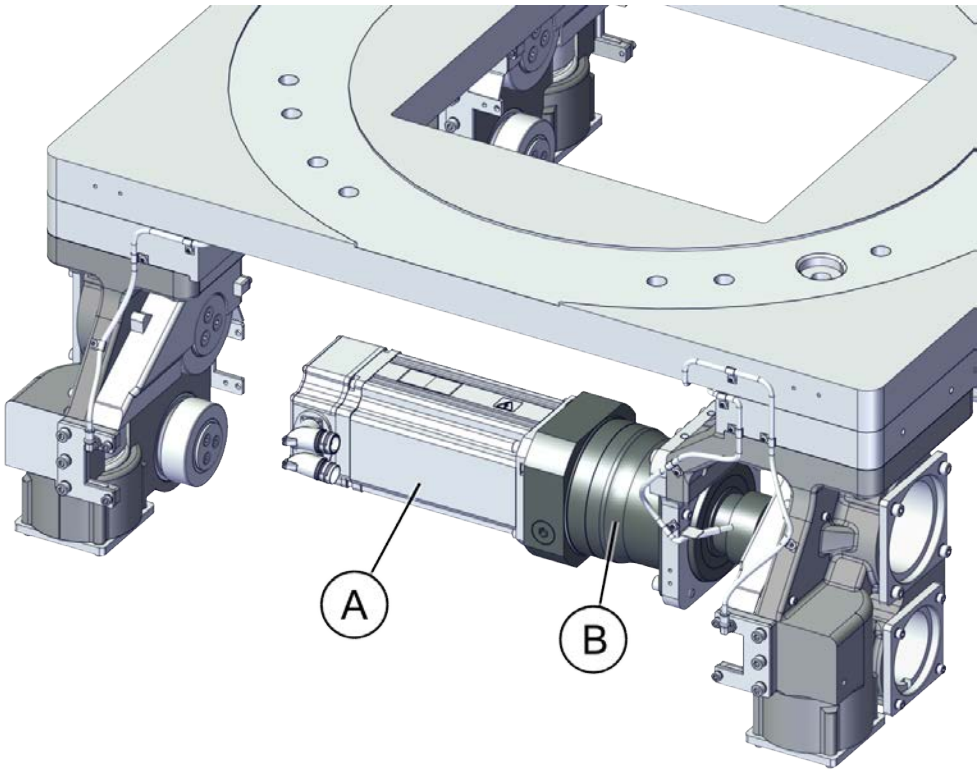
Use this procedure to inspect the mechanical stops.

	Action	Note
1	Visually inspect the mechanical stops for damage.	
2	If the mechanical stops are damaged, replace them.	

4.3.10 Inspecting the gearbox, back lash

Location of gearbox

The gearbox is located as shown in figure.



xx2400000725

A	Motor
B	Gearbox

Required equipment

Equipment, etc.	Art. no.	Note
Standard toolkit	-	Content is defined in section *Standard toolkit on page 393*.

Continues on next page

Inspecting the gearbox, back lash

Use this procedure to inspect the gearbox, back lash.

	Action	Note
1	The first step is to listen for abnormal noise when running. Then witness the appearance of the reducer, the appearance of the gear and the grease lubrication. There should be no cracks in the appearance, the gears are well lubricated, and the teeth are not severely worn. If there is wear, you need to check backlash in time. Contaminated grease requires cleaning and re-oiling Check that there is no abnormal noise when running.	See *Adjusting the gearbox and rack backlash on page 248*.
2	Check the gearbox for damages or wear. • If any visual wear is detected, replace with a new gearbox. • If any wear on the teeth is detect, check the backlash.	Choose two location per meter to measure the backlash and make sure that the backlash is within the required range.
3	Check the lubrication of the gearbox.	

4.4 Cleaning activities

4.4.1 Cleaning the IRT 710 OmniCore

General

To secure high uptime it is important that the IRT 710 OmniCore is cleaned regularly. The frequency of cleaning depends on the environment in which the track works.

Different cleaning methods are allowed depending on the type of protection of the IRT 710 OmniCore.

Note

Always verify the protection type of the product before cleaning.

WARNING

Turn off all electrical power supplies to the product before starting the cleaning.

Special cleaning considerations

This section specifies some special considerations when cleaning the product.

- Always use cleaning equipment as specified. Any other cleaning equipment may shorten the life of the product.
- Always check that all protective covers are fitted to the robot before cleaning.
- Do not point the water jet at connectors, joints, sealings or gaskets.
- Do not use compressed air to clean the product.
- Do not use solvents that are not approved by ABB to clean the product.
- Do not spray from a distance closer than 0.4 m.
- Do not remove any covers or other protective devices before cleaning the product.

Cleaning methods

This following table defines what cleaning methods are allowed for ABB manipulators depending on the protection type.

Protection type	Cleaning method			
	Vacuum cleaner	Wipe with cloth	Rinse with water	High pressure water or steam
Standard	Yes	Yes. With light cleaning detergent.	No	No

Cables

Movable cables need to be able to move freely:

- Remove waste material, such as sand, dust and chips, if it prevents cable movement.

Continues on next page

- Clean the cables if they have a crusty surface, for example from dry release agents.

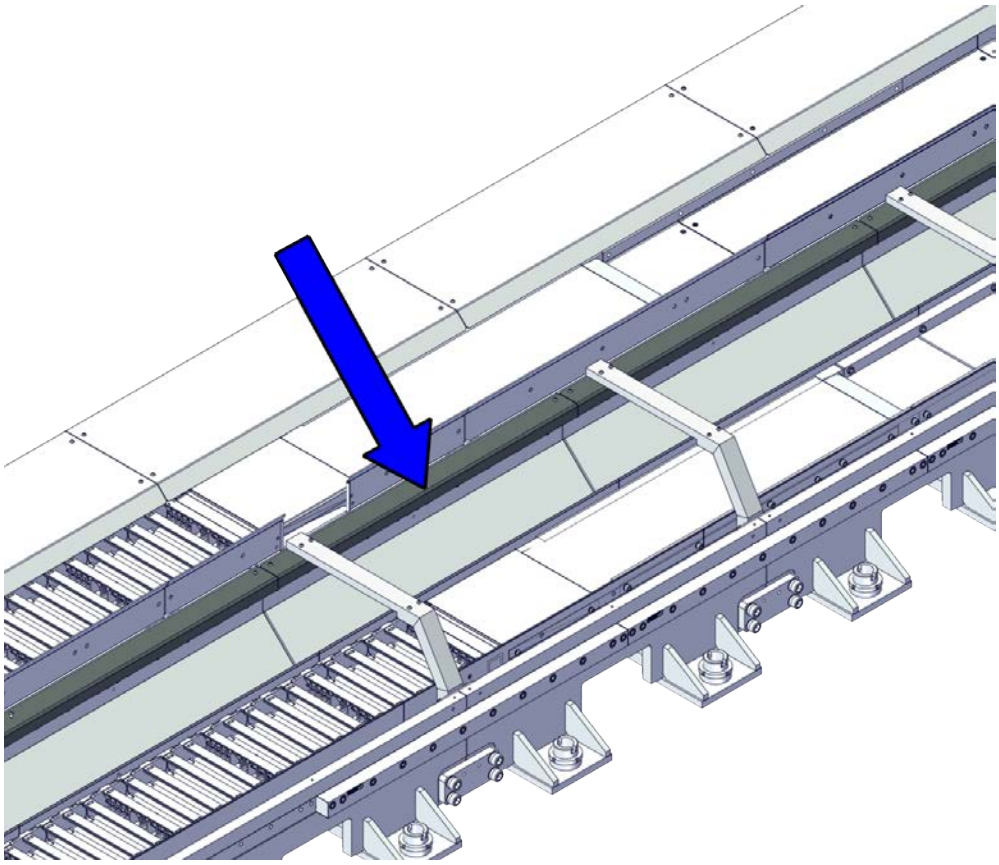
Mechanical stops

Regularly clean the contact surface of the mechanical stops.

4.4.2 Cleaning and lubricating the gear racks

Location of gear racks

The gear racks are located as shown in figure.



xx2200000634

Required equipment

Equipment, etc.	Note
Lint free cloth	-
Lubricant	CASTROL Tribol GR 100-0 PD
Lubricant	Shell Gadus S2 V220 00
Lubricant	TOTAL Multis EP 0
Lubrication gun	

Cleaning and lubricating the gear racks

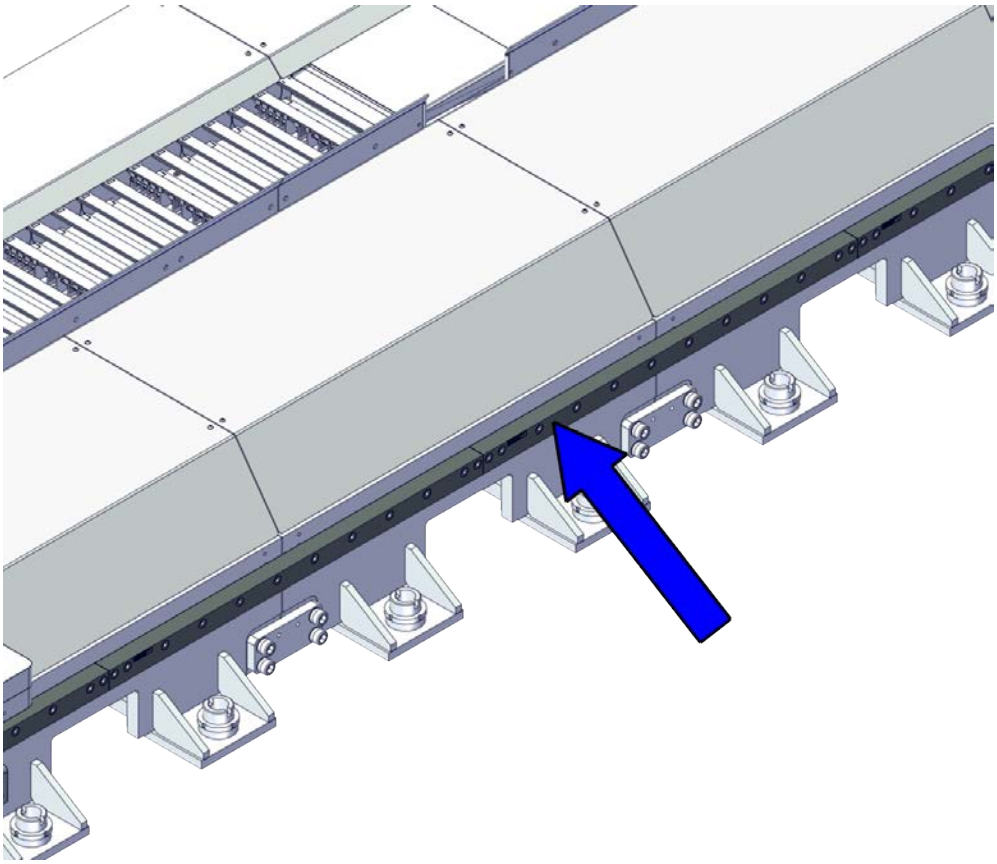
Use this procedure to clean and lubricate the gear racks.

	Action	Note
1	Remove the rack covers.	
2	Inspect the gear racks, clean if necessary.	Use lint free cloth
3	Use a brush to lubricate the gear rack.	

4.4.3 Cleaning and lubricating the rectangular rails

Location of rectangular rails

The rectangular rails are located as shown in figure.



xx2200000629

Required equipment

Equipment, etc.	Article number	Note
Lint free cloth	-	
Longtime lubricant	-	**WARNING** The grease used causes serious eye irritation and may cause an allergic skin reaction.

Cleaning and lubricating the rectangular rails

Use this procedure to clean the rectangular rails.

	Action	Note
1	Remove the rail covers.	
2	Clean the rectangular rails with a lint free cloth.	

Continues on next page

4.4.3 Cleaning and lubricating the rectangular rails

Continued

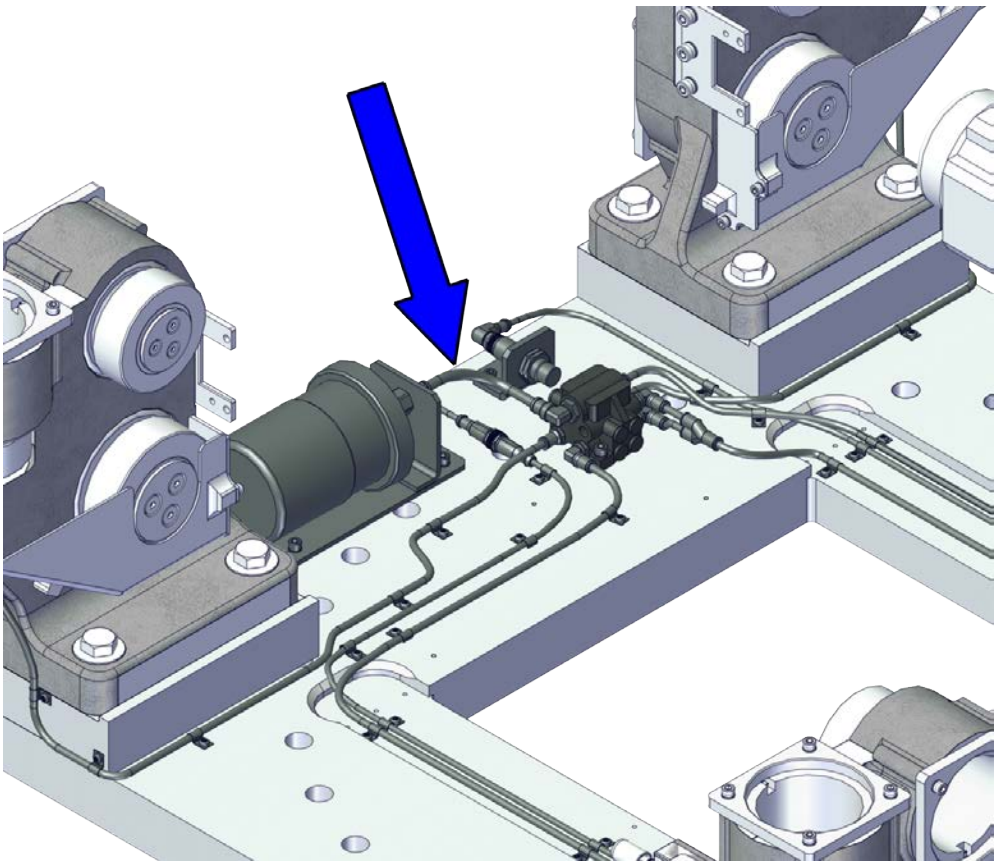
	Action	Note
3	Lubricate the rectangular rails after cleaning.  **WARNING** The grease used causes serious eye irritation and may cause an allergic skin reaction.	

4.5 Lubrication activities

4.5.1 Automatic lubrication system

Location

The figure below shows the location of the lubrication system.



xx2200000633

Required equipment

WARNING

Use lithium soap flowable grease, class NLGI 0, with a mineral oil base, doped with EP (extreme pressure) additives. The base oil viscosity must be ISO VG68 to ISO VG 100.

Grease doped with EP additives is absolutely necessary, due to high loads on blocks.

Customers must use the following lubrication suggested by ABB or malfunction of the lubrication system may occur.

Equipment	Note
Lubricant	CASTROL Tribol GR 100-0 PD

Continues on next page

4.5.1 Automatic lubrication system
Continued

Equipment	Note
Lubricant	Shell Gadus S2 V220 00
Lubricant	TOTAL Multis EP 0

WARNING

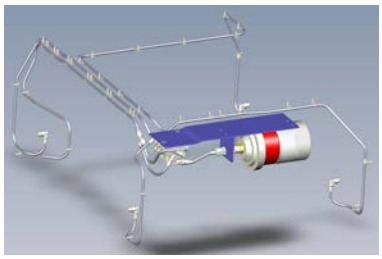
Battery packs should be changed every time the lubricant cartridge is replaced to assure proper voltage to the system, and each battery pack should only be used once only. A new battery pack should be supplied with each replacement cartridge purchased.

Checking grease level and inspect the pipes without lubrication feedback system

The procedure below details how to check the grease level and inspect the pipes when the IRT 710 OmniCore is installed without lubrication feedback system.

	Action	Note/Illustration
1	Locate the cartridge.	
2	Check the level of lubricant. If the lubricant is used up, change with a new one.	 xx1800001978 For cartridge replacement, see the *Memolub manual on page 230*.
3	Check if the lubrication pump is working normally. If not, check: • The battery is low or not. If yes, replace the battery. (Although the replacement battery should be delivered with the replacement cartridge, note that it is possible to use a set of 3 pcs standard AA batteries). • The EPS system is working normally or not. If no, replace the cartridge.	

Continues on next page

	Action	Note/Illustration
4	Check that no pipe has been damaged, and that the grease is distributed to each block and on the pinion.	 xx1800001979

Checking grease level and inspect the pipes with lubrication feedback system

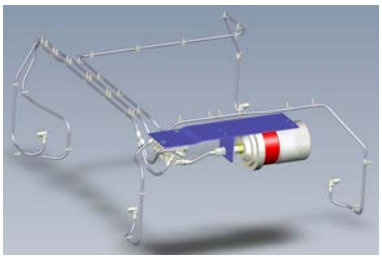
When lubrication feedback system is used, there will be an abnormal alarm on the FlexPendant if anything is not ok in the lubrication system.

The procedure below details how to troubleshoot the lubrication system when the lubrication feedback system has abnormal alarm happened.

	Action	Note/Illustration
1	Locate the cartridge.	
2	Check the level of lubricant. If the lubricant is used up, change with a new one.	 xx1800001978 For cartridge replacement, see the *Memolub manual on page 230*.
3	Check if the lubrication pump is working normally. If not, check: • The battery is low or not. If yes, replace the battery. (Although the replacement battery should be delivered with the replacement cartridge, note that it is possible to use a set of 3 pcs standard AA batteries). • The EPS system is working normally or not. If no, replace the cartridge.	

Continues on next page

4.5.1 Automatic lubrication system
Continued

	Action	Note/Illustration
4	Check that no pipe has been damaged, and that the grease is distributed to each block and on the pinion.	 xx1800001979
5	After installing the lubrication feedback system, check the lubrication status regularly (at least for three months) to avoid incorrect feedback.	

Memolub manual

The procedure below is based on the Memolub HPS user manual. It details how to replace the grease cartridge.

Opening and closing the Memolub

	Action	Note
1	Opening the Memolub. First place the Memolub on a flat and clean surface. Push firmly with one hand on top of the Memolub. With the other hand, hold the black base and turn counterclockwise. Pull the transparent bell to open.	 xx1800001980
2	Closing the Memolub. Use the same technique: hold the cranked black base, put the transparent bell and turn it clockwise. When the closed position is reached you should hear a "click".	 xx1800001981

Installing a new grease cartridge

Respect the following instructions to replace the grease cartridge:

	Action	Note
1	Open the Memolub® as described before.	

Continues on next page

	Action	Note
2	Pull-up the black rubber seal. Fill-in the Memolub® with a manual grease pump. This manual operation is required only if the Memolub has been used without a cartridge, if the previous cartridge has run out of grease. Place the pump nipple at the entry of the Memolub, and pump until you see grease coming out at the outlet. Two strokes of the manual pump are usually enough.	 xx1800001982
3	Pull-up the black strap to reveal the battery case. Insert a new Memolub battery: hold it by the black plastic strap & insert it in the Memolub respecting the instructions on the label. If the battery is correctly inserted the motor is activated during 1 sec. to check that the motor is working properly. Put the black rubber seal back in place.	 xx1800001983
4	Remove the paper disc from the replacement cartridge. Fill-in the required dates: "Started" and "Replace before". The "replace before" date is depending on the Memolub program. Put the paper disc back in place in order to see the instructions when the Memolub is closed.	 xx1800001984
5	Press softly on the cartridge until the grease comes out, to avoid injecting air into the pump.	 xx1800001985
6	Place the cartridge at the inlet of the pump. Check that the cartridge is correctly inserted in the inlet of the pump.	 xx1800001986

Continues on next page

4.5.1 Automatic lubrication system

Continued

	Action	Note
7	Place the spring and the compression disc inside the transparent bell. Put the bell back in place and check that the compression disc is correctly lying on the top of the cartridge surface.	 xx1800001987
8	Close the Memolub as described before.	

Test the Memolub® (Check Function)

	Action	Note
1	To check that the Memolub is working well after a maintenance operation, press one of the 3 connectors located on the base during a few seconds. The Memolub is starting a dispensing cycle. The completion of the cycle means that the battery & control board of the Memolub are working well. *It is important that you run this test cycle only if a cartridge is in place, otherwise you'll fill-in the pump with air.*	 xx1800001988

4.6 Adjusting activities

4.6.1 Measuring the levelling

Measuring the levelling

Measure the levelling every 12 months according to the *Track alignment in Z and Y on page 145*.

If needed, follow the procedure in *Geometric alignment of track motion IRT 710 OmniCore on page 144* to adjust the levelling on the track motion.

4.7 Replacement/changing activities

4.7.1 Replacing the grease package and battery

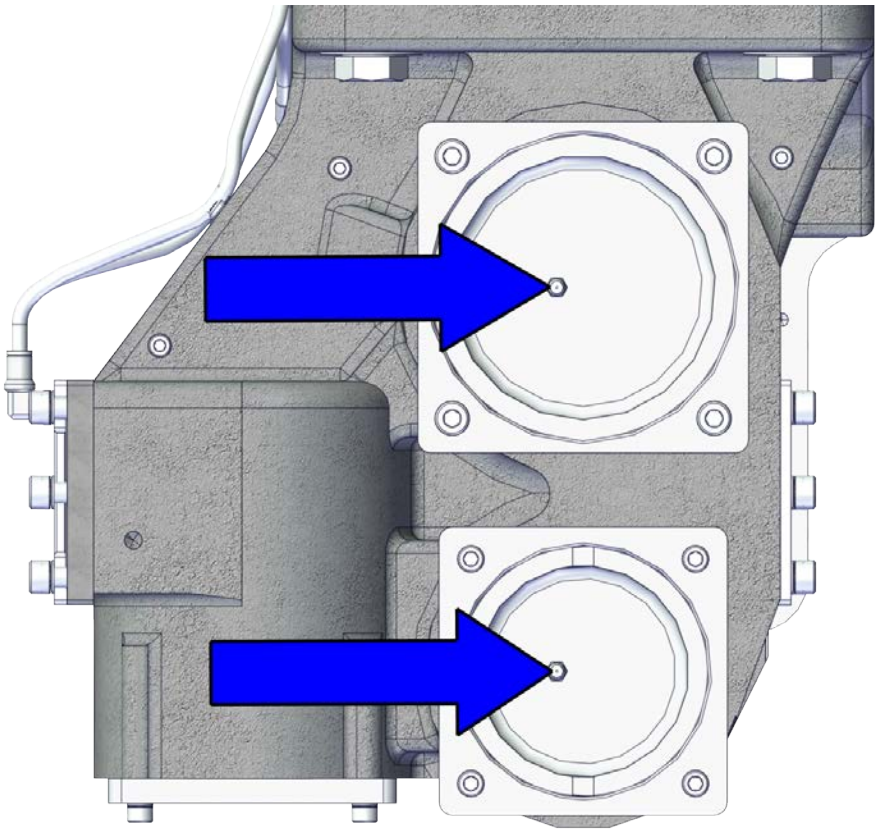
Replacing the grease package and battery

Follow the procedure in *Memolub manual on page 230* to replace the grease package and battery.

4.7.2 Replenishing oil, cam roller unit

Location of nipples

The M6 nipples of the cam roller units are located as shown in the figure.



xx2200000873

Equipment

Equipment	Note
Oil dispenser	Includes pump with outlet pipe. Use the suggested dispenser or a similar one: • TaJima THY-401 (Use the flexible pipe)

Consumable

Material	Note
Lubricant	Shell Retinax LX2

Continues on next page

4.7.2 Replenishing oil, cam roller unit
Continued

Replenishing oil into the cam roller unit

Use this procedure to replenish the cam roller unit with oil.

Replenishing oil to cam roller unit

	Action	Note
1	**WARNING** Overfilling of lubricant can lead to internal over-pressure which in turn may: • damage seals and gaskets • completely press out seals and gaskets • prevent the roller from moving freely.	
2	Replenish 10 ml oil to the cam roller unit.	
3	Clean the excess oil on the outside of the cam roller.	

Concluding procedure

	Action	Note
1	**DANGER** Make sure all safety requirements are met when performing the first test run. See *First test run may cause injury or damage on page 29*.	

5 Repair

5.1 Introduction

Structure of this chapter

This chapter describes repair activities for the IRT 710 OmniCore. Each procedure contains the information required to perform the activity, for example spare parts numbers, required special tools, and materials.

WARNING

Repair activities not described in this chapter must only be carried out by ABB.

Report replaced units

Note

When replacing a part on the IRT 710 OmniCore, report to your local ABB the serial number, the article number, and the revision of both the replaced unit and the replacement unit.

This is particularly important for safety equipment to maintain the safety integrity of the installation.

Safety information

Make sure to read through the chapter *Safety on page 15* before commencing any service work.

Note

If the IRT 710 OmniCore is connected to power, always make sure that the IRT 710 OmniCore is connected to protective earth and a residual current device (RCD) before starting any repair work.

For more information see:

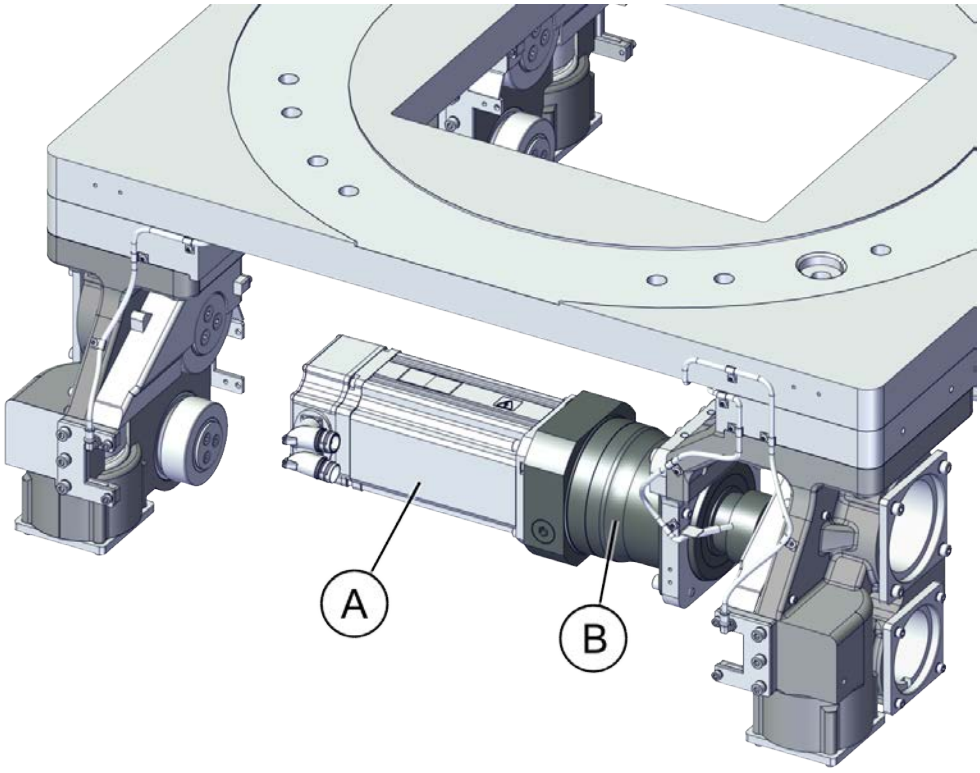
- *Product manual - OmniCore V400XT*
- *Grounding point on page 177*.

5.2 Replacing the carriage parts

5.2.1 Replacing the motor and gearbox

Location of motor and gearbox

The motor and gearbox are located as shown in the figure.



xx2400000725

A	Motor
B	Gearbox

Required spare parts

Note

The spare part numbers that are listed in the table can be out of date. See the latest spare parts of the IRT 710 OmniCore via myABB Business Portal, *www.abb.com/myABB*.

Spare part	Article number	Note
Motor	3HKA00000186481	
Reducer	3HKA00000186306	

Continues on next page

Required tools and equipment

Equipment	Article number	Note
Standard toolkit	-	Content is defined in section *Standard toolkit on page 393*.
24 V power supply		
Calibration toolbox, Axis Calibration	3HAC055412-001	Delivered as a set of calibration tools. Required if Axis Calibration is the valid calibration method for the robot.
Magnetic dial gauge	-	
Backlash adjustment tooling	3HKA00000189964	

Required consumables

Consumable	Article number	Note
Locking liquid	-	Loctite 2400 (or equivalent Loctite 243)
Cable straps	-	

Removing the motor and gearbox

Use this procedure to remove the gearbox.

Preparations before removing the motor and gearbox

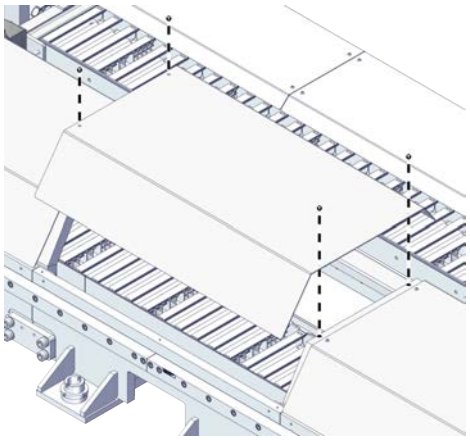
	Action	Note
1	Decide which calibration routine to use, and take actions accordingly prior to beginning the repair procedure.	
2	If there is no enough space for the maintenance work, clean the around to make enough space.	
3	If there is any robot on the track, jog it to the lifting/transportation position.	
4	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the product, before entering the safeguarded space.	

Continues on next page

5.2.1 Replacing the motor and gearbox

Continued

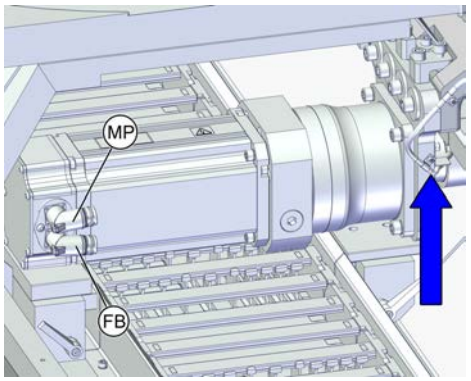
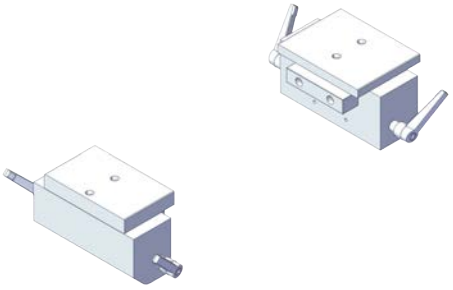
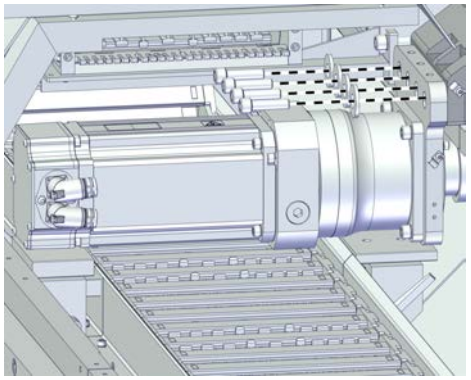
Removing the covers

	Action	Note
1	**CAUTION** Whenever parting/mating motor and gearbox, the gears may be damaged if excessive force is used!	
2	**DANGER** Turn off all electric power, hydraulic and pneumatic pressure supplies to the robot and for the track motion.	
3	Remove the covers.	 xx2200000616
4	Move the carriage to a proper position.	

Removing the drive unit

	Action	Note
1	**CAUTION** Whenever parting/mating motor and gearbox, the gears may be damaged if excessive force is used!	
2	**DANGER** Turn off all electric power, hydraulic and pneumatic pressure supplies to the robot and for the track motion.	

Continues on next page

	Action	Note
3	Disconnect the connectors on the motor: • MP (Power) • FB (Resolver)	 xx2400000791
4	Remove the locking screw to release the pipe on the drive unit.	
5	Place the reducer uninstall tool unit under the drive unit.	Reducer uninstall tool unit(3HKA00000192765)  xx2200001166
6	Remove the four screws that hold the drive unit.	 xx2400000797
7	Push the carriage manually to make enough space to remove the drive unit. **CAUTION** Be careful when moving the carriage manually. If the moving speed is too fast, it may cause unexpected injury. Please consider the weight of the robot and the carriage. For the weight of the robot, refer to the identification plate of the robot. For the weight of the carriage, refer to the identification plate of the track.	

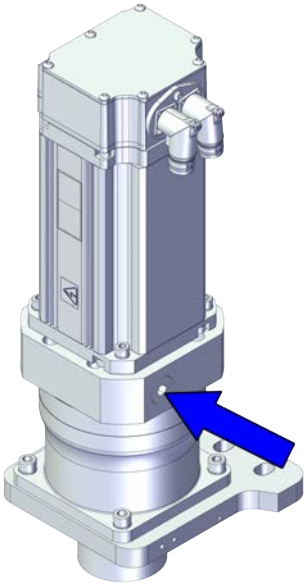
Continues on next page

5.2.1 Replacing the motor and gearbox

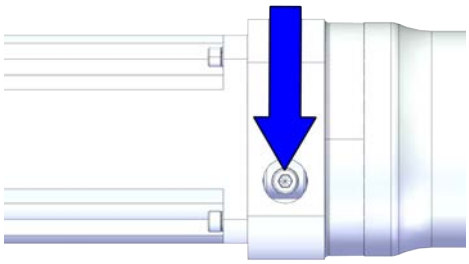
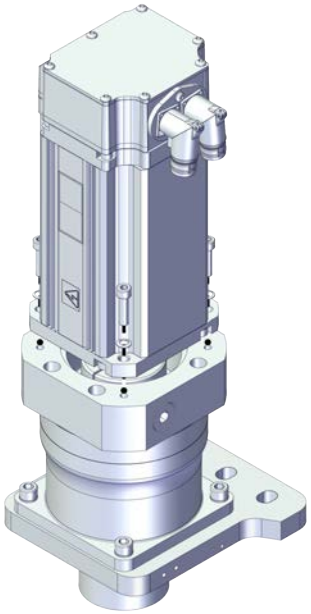
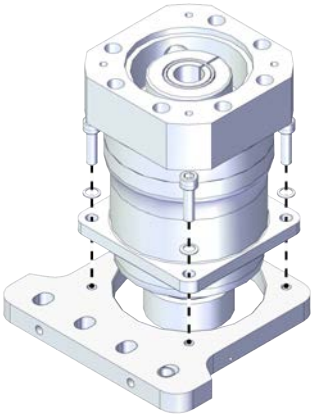
Continued

	Action	Note
8	Remove the drive unit with the bracket. **Note** The weight of the drive unit is almost 35 kg, be careful when lifting the drive unit. Use a lifting tool or at least two people to lift the drive unit.	

Disassembling the motor from the gearbox

	Action	Note
1	**CAUTION** Whenever parting/mating motor and gearbox, the gears may be damaged if excessive force is used!	
2	**DANGER** Turn off all electric power, hydraulic and pneumatic pressure supplies to the robot and for the track motion.	
3	Remove the stopper.	 xx2400000600

Continues on next page

	Action	Note
4	Check that the screw head is aligned with the disassembly hole. **Tip** If not, connect a 24 V power supply to the drive unit to release the brake. Connect to motor connector: • + : pin A • - : pin B	 xx2400000598
5	Unlock the motor from the gearbox by loosening the locking screw.	
6	Remove the four screws that hold the motor to the gearbox.	 xx2400000599
7	Remove the motor.	
8	Remove the four screws holding the gearbox to the bracket.	 xx2200000620
9	Remove the gearbox.	

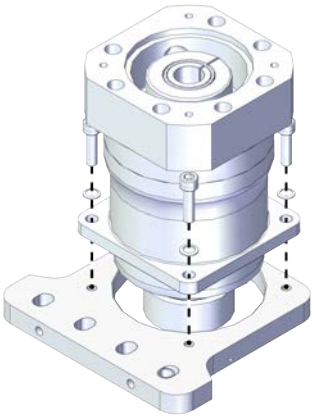
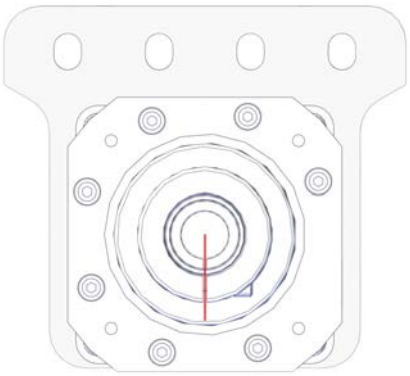
Continues on next page

5.2.1 Replacing the motor and gearbox
Continued

Refitting the motor and gearbox

Use this procedure to refit the motor and gearbox.

Assembling the motor to the gearbox

	Action	Note
1	Refit the bracket to the gearbox and secure with the screws.	 xx2200000620 Screws: ISO 4762 M10x35 Class 12.9 (4 pcs) Washers: BN 792 M10 Washer (4 pcs) Tightening torque: 83 Nm
2	Align the gaps on the gearbox as illustrated.	 xx2200000622

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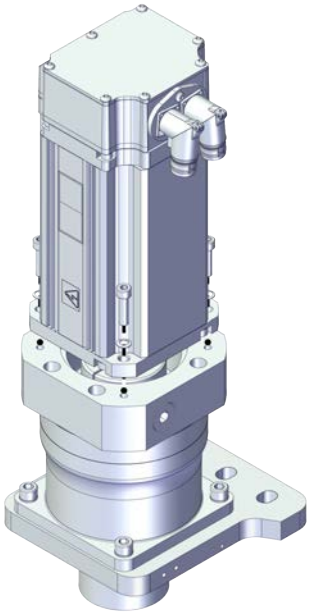
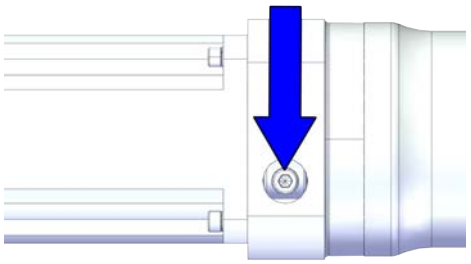
	Action	Note
3	Insert the motor to the gearbox carefully with a clearly "Ka-ta" sound.	 xx2400000599 Screws: ISO 4762 M8x30 Class 12.9 (4 pcs) Washers: BN 792 M8 Washer (4 pcs)
4	Refit the motor with four screws and washers without fully tightened. If required, use the extension 300 mm for bits 1/2". **Tip** The bracket should form a 90° angle with the motor connector in anti-clockwise direction from the motor side.	
5	Lock the motor and gearbox by tighten the locking screw.	 xx2400000598
6	Tighten the four screws from motor to gearbox.	Tightening torque: 43 Nm

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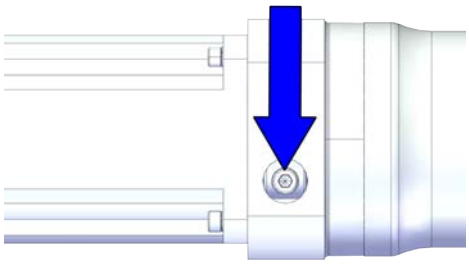
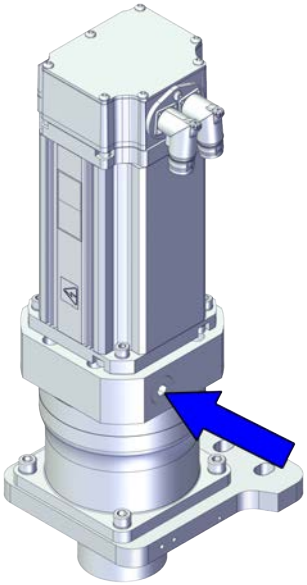
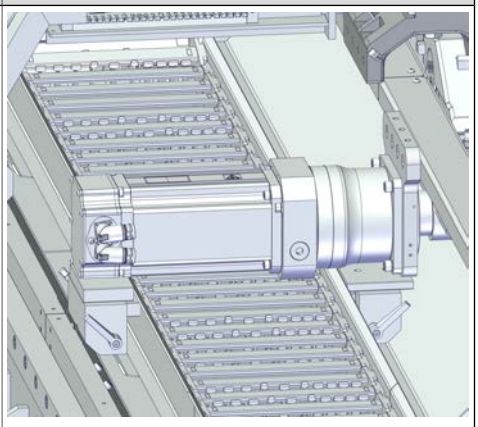
5.2.1 Replacing the motor and gearbox

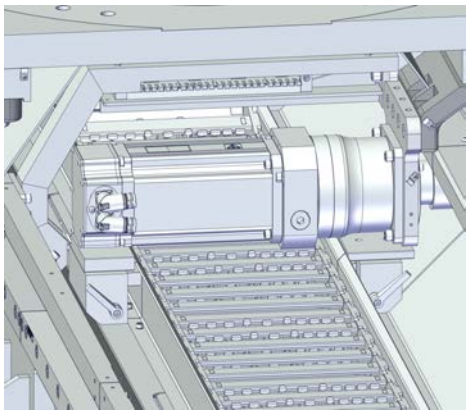
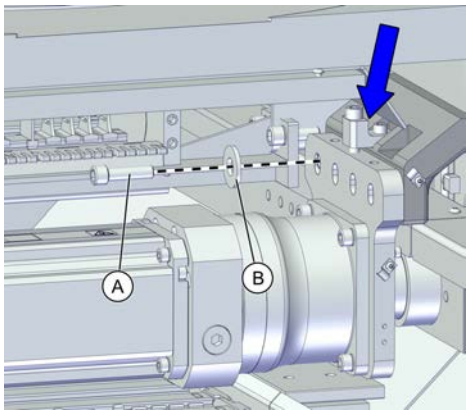
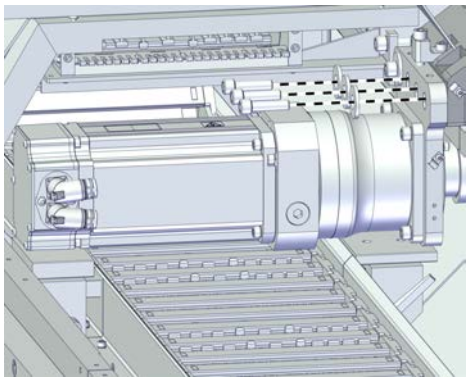
Continued

	Action	Note
7	Loose the locking screw and retighten it according to the tightening torque.	 xx2400000598 Tightening torque: 79 Nm.
8	Refit the stopper.	 xx2400000600

Refitting the drive unit

	Action	Note
1	Place the drive unit to the reducer uninstall tool unit. **Tip** The connector of the motor should face the external of the carriage. **Note** The weight of the drive unit is almost 35 kg, be careful when lifting the drive unit. Use a lifting tool or at least two people to lift the drive unit.	 xx2400000795

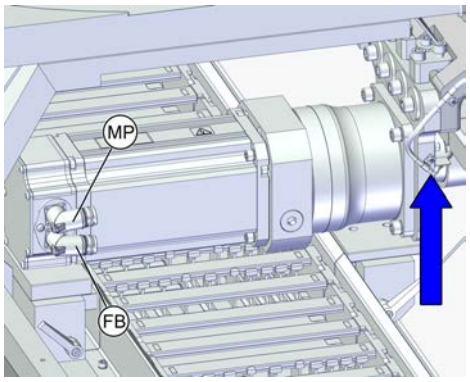
Continues on next page

	Action	Note
2	Push the carriage back to correct position. **CAUTION** Be careful when moving the carriage manually. If the moving speed is too fast, it may cause unexpected injury. Please consider the weight of the robot and the carriage. For the weight of the robot, refer to the identification plate of the robot. For the weight of the carriage, refer to the identification plate of the track.	 xx2400000794
3	Align the drive unit with the carriage.	
4	Install the adjustment tooling to installation location of the carriage.	 xx2400000793
5	Lift the drive unit with the tooling until the screw (A) and the bushing (B) can be insert to the carriage.	
6	Refit the other screws and washers.	 xx2400000792 Screws: ISO 4762 M12x45 (4 pcs) Washers: Spring washer DIN 6796 12 (4 pcs) Tightening torque: 20 Nm.

Continues on next page

5.2.1 Replacing the motor and gearbox

Continued

	Action	Note
7	Lock the pipe back to the drive unit with the screw.	 xx2400000791
8	Reconnect the connectors on the motor. • MP (Power) • FB (Resolver)	

Adjusting the gearbox and rack backlash

	Action	Note
1	Push the carriage to the location where the backlash value is minimum. **Tip** There is a label on the position where the backlash value is minimum.  xx2200000393 **CAUTION** Be careful when moving the carriage manually. If the moving speed is too fast, it may cause unexpected injury. Please consider the weight of the robot and the carriage. For the weight of the robot, refer to the identification plate of the robot. For the weight of the carriage, refer to the identification plate of the track.	

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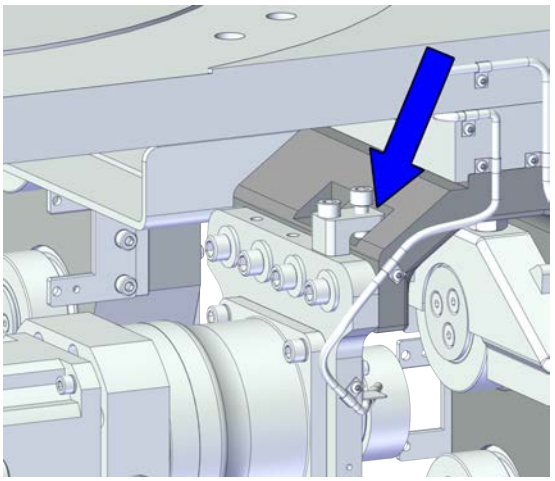
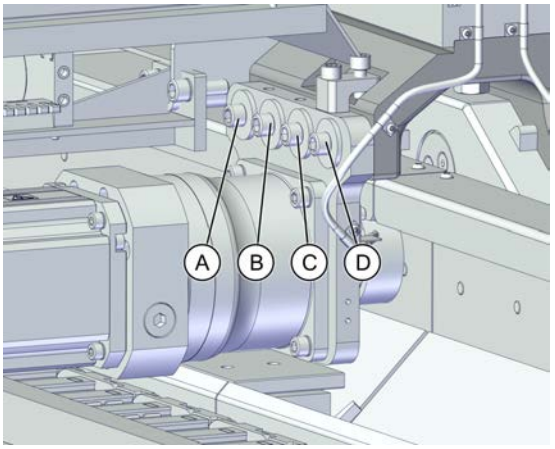
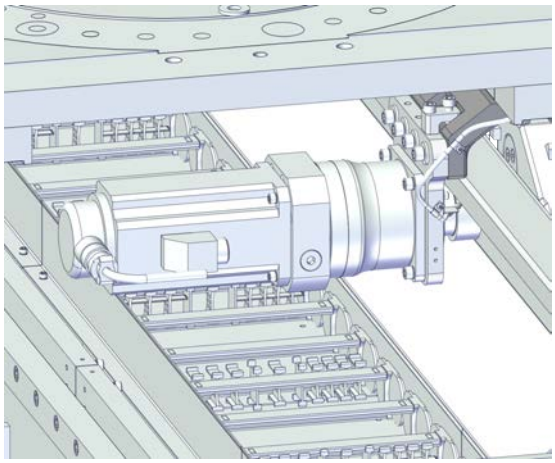
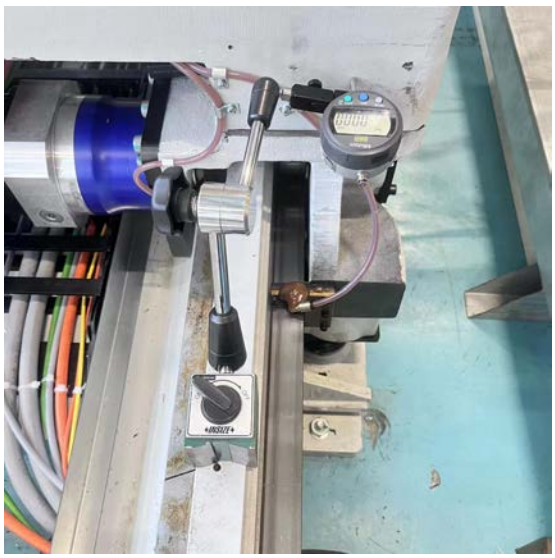
	Action	Note
2	Assemble the backlash adjustment tooling (3HKA00000189964) to the track.	 xx2200001167
3	Loose all socket head cap screws except screw (A).	 xx2400000796
4	Tighten the lock screws (A). Tightening torque: 10 Nm. (Socket head cap screws (A) is the joint screw).	
5	Fit the dial gauge to the track.	 xx2200001188
6	Reset the dial gauge.	

Continues on next page

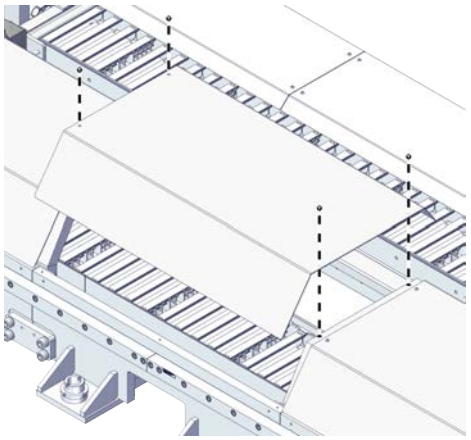
5.2.1 Replacing the motor and gearbox

Continued

	Action	Note
7	Adjust the drive unit against the gear rack with the backlash adjustment tooling.	 xx2200000625
8	Tighten the lock screw (A) and (D). Tightening torque: 40 Nm.	
9	Push the carriage by hand with 100 N along the track and record the value(N1) on the dial gauge.	 xx2200001188
10	Push the carriage by hand with 100 N from the opposite side of the carriage along the track and record the value(N2) on the dial gauge.	
11	Check the backlash value(|N1-N2|).	Recommended backlash value at synchronization position: 0.07-0.15 mm. At random positions the backlash value can deviate. Typical values: 0.03-0.20 mm.
12	If the value is OK, then tighten all the lock screws .	Tightening torque: 80 Nm.
13	If the value is not OK, then repeat *step 6* to *step 11*.	
14	Tighten the 4 screws in a spread sequence. **Tip** Check the class of the screws before tightening.	Tightening torque: 120 Nm for class 12.9 screws. 84 Nm for class 8.8 screws.

Continues on next page

Refitting the covers

	Action	Note
1	Refit the cover with its attachment screws on the bracket.	 xx2200000616 Screws: ISO 7380-2 M6x12 Class 10.9 (4 pcs) Tightening torque: 8 Nm

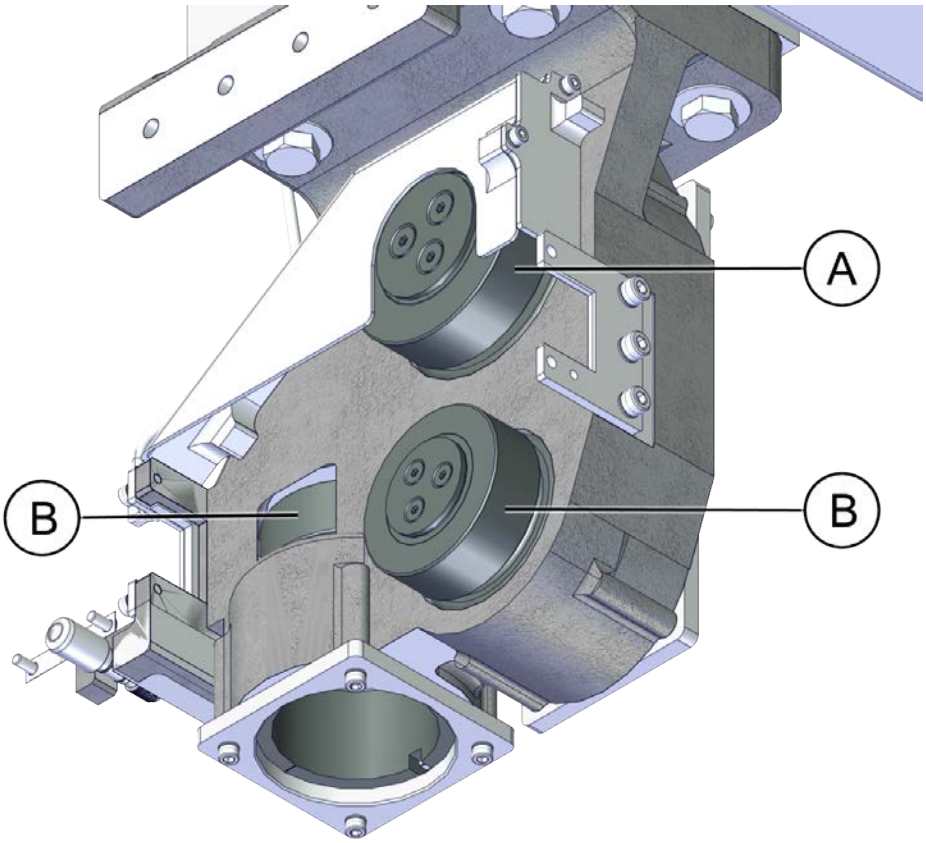
Concluding procedure

	Action	Note
1	Calibrate the track motion. Use previously measured reference values for the zero position.	Calibration is detailed in section *Calibration on page 357*.
2	**DANGER** Make sure all safety requirements are met when performing the first test run. See *First test run may cause injury or damage on page 29*.	

5.2.2 Replacing the cam roller units

Location of cam roller units

The cam roller units are located as shown in the figure.



xx2200000630

	Description
A	110MM Cam roller holder unit
B	90MM Cam roller holder unit

Required spare parts

Note

The spare part numbers that are listed in the table can be out of date. See the latest spare parts of the IRT 710 OmniCore via myABB Business Portal, *www.abb.com/myABB*.

Spare part	Article number	Note
110MM Cam roller holder unit	3HKA00000186268	
90MM Cam roller holder unit	3HKA00000186275	

Continues on next page

Required tools and equipment

Equipment	Article number	Note
Standard toolkit	-	Content is defined in section *Standard toolkit on page 393*.

Required consumables

Consumable	Article number	Note
Locking liquid	-	Loctite 2400 (or equivalent Loctite 243)
Flange sealant	-	Loctite 574 (or equivalent)

Replacing the 110 cam roller unit

Removing the 110 cam roller unit

Use this procedure to remove the cam roller unit.

Preparations before removing the cam roller unit

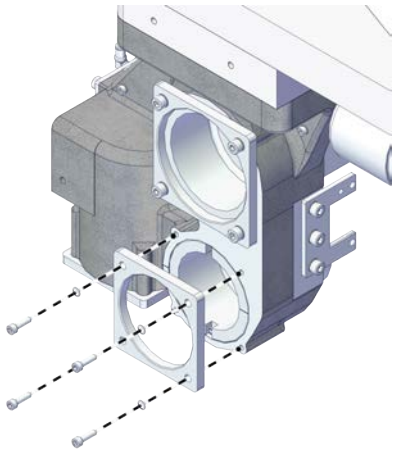
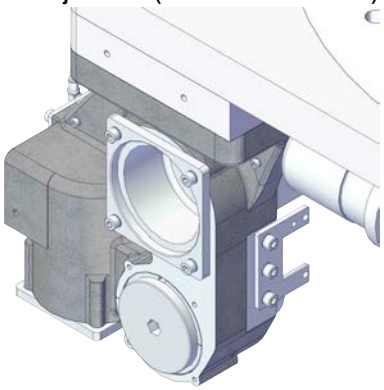
	Action	Note
1	If there is no enough space for the maintenance work, clean the surroundings.	
2	If there is any robot on the track, jog it to the lifting/transportation position.	
3	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the product, before entering the safeguarded space.	

Continues on next page

5.2.2 Replacing the cam roller units

Continued

Removing the 110 cam roller unit

	Action	Note
1	Remove the flange plate of the 90 mm cam roller unit below the 110 m cam roller unit which need to be replaced.	 xx2200000812
2	If there is no robot on the track, use a jack to support the carriage plate (don't rise it more than 1 mm) on the position which roller needs to be replaced. .	
3	If there is a robot on the track, jog the robot to the opposite direction.	
4	Rotate to release the 90 mm cam roller unit with the cam roller adjust tool. **Tip** When the 90 mm cam roller unit is released, it can be rotated with the finger.	Cam roller adjust tool (3HKA00000189966)  xx2200001177

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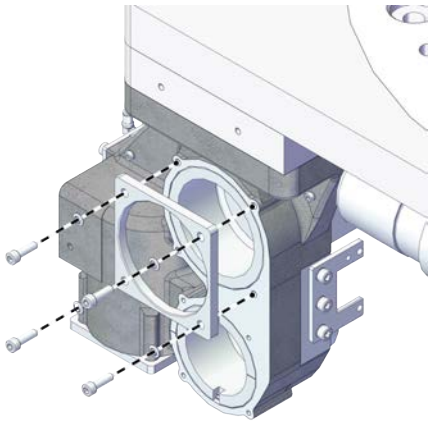
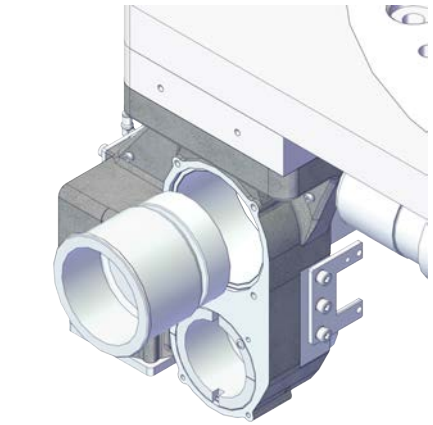
	Action	Note
5	Remove the flange plate with its screws.	 xx2200000810
6	Pull the cam roller unit out.	 xx2200000811

Refitting the 110 cam roller unit

Use this procedure to refit the cam roller unit.

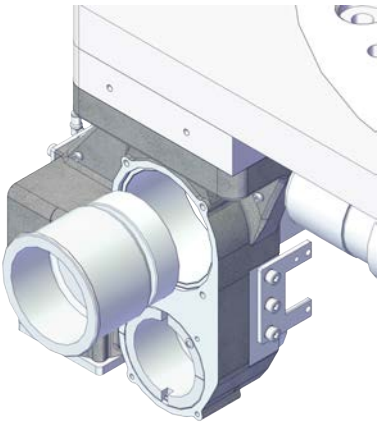
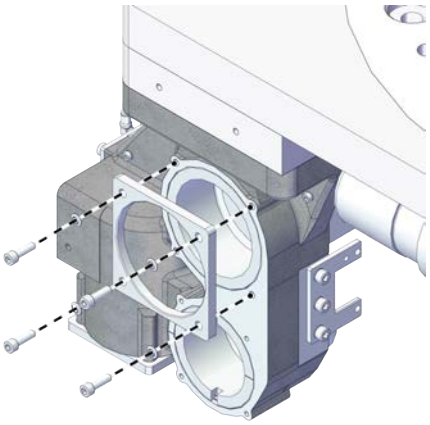
Refitting the 110 cam roller unit

	Action	Note
1	Fully lubricate and clean the cam roller unit before install it to the carriage. **Tip** During the operation, watch the seals at the ball bearing block: when you see the grease pouring out, you have applied enough grease.	Use Shell Retinax LX2.

Continues on next page

5.2.2 Replacing the cam roller units

Continued

	Action	Note
2	Insert the cam roller unit back to the carriage.	 xx2200000811
3	Refit the flange plate to locking the roller.	 xx2200000810 Screws: ISO 4762 M8x25 Class 8.8 (4 pcs) Washers: BN 792 M8 Washer (4 pcs) Tightening torque: 25 Nm
4	Secure the screws and washers.	
5	Remove the jack if installed.	
6	Refit the 90 mm cam roller unit if removed.	*Refitting the 90 cam roller unit on page 259*.

Concluding procedure

	Action	Note
1	**DANGER** Make sure all safety requirements are met when performing the first test run. See *First test run may cause injury or damage on page 29*.	

Continues on next page

Replacing the 90 cam roller unit

Removing the 90 cam roller unit

Use this procedure to remove the cam roller unit.

Preparations before removing the cam roller unit

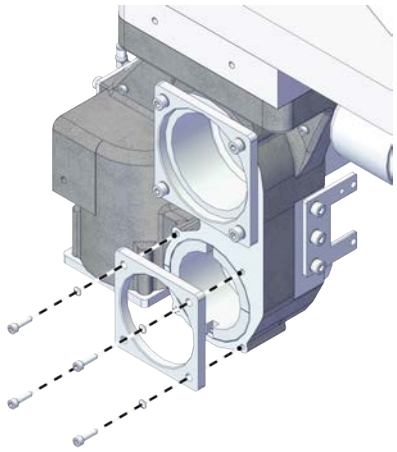
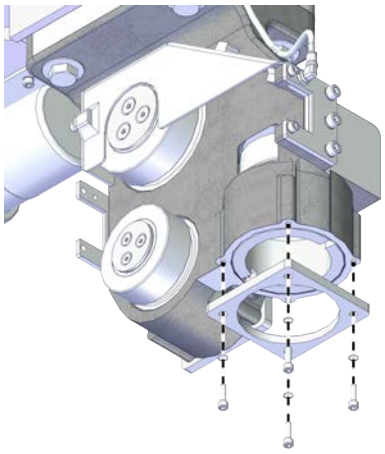
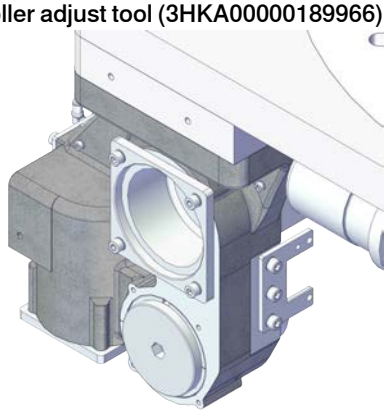
	Action	Note
1	If there is no enough space for the maintenance work, clean the surroundings.	
2	If there is any robot on the track, jog it to the lifting/transportation position.	
3	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the product, before entering the safeguarded space.	

Removing the 90 cam roller unit

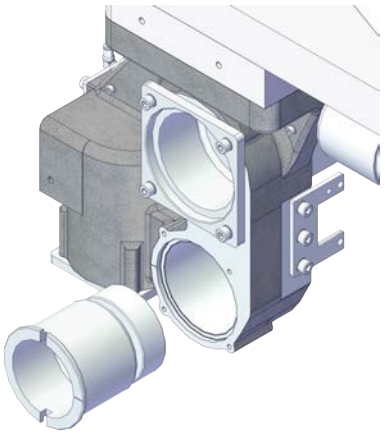
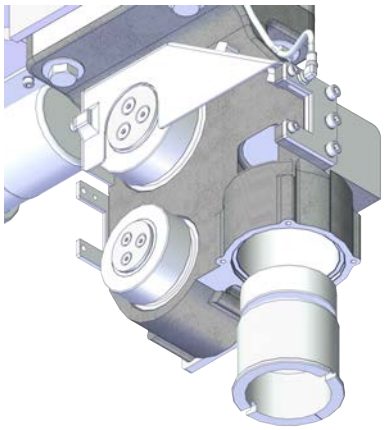
	Action	Note
1	If there is a robot on the track, jog the robot to the lifting position.	

Continues on next page

5.2.2 Replacing the cam roller units
Continued

	Action	Note
2	Remove the flange plate with its screws.	 xx2200000812  xx2200000814
3	Rotate the cam roller unit with the cam roller adjust tool. **Tip** Rotate the cam roller nipple away from the rectangular rail. **Tip** When the 90 mm cam roller unit is released, it can be rotated with the finger.	Cam roller adjust tool (3HKA00000189966)  xx2200001177

Continues on next page

	Action	Note
4	Pull the cam roller unit out.	 xx2200000813  xx2200000815

Refitting the 90 cam roller unit

Use this procedure to refit the cam roller unit.

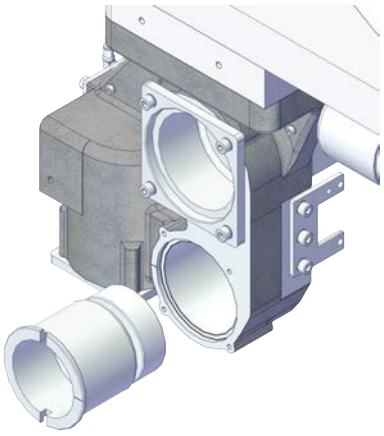
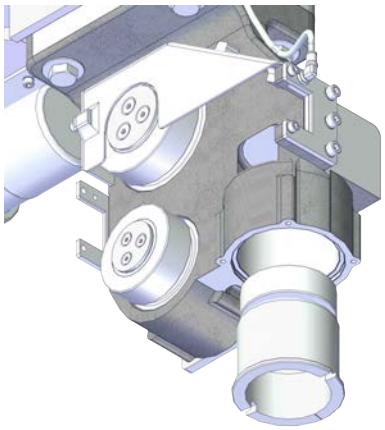
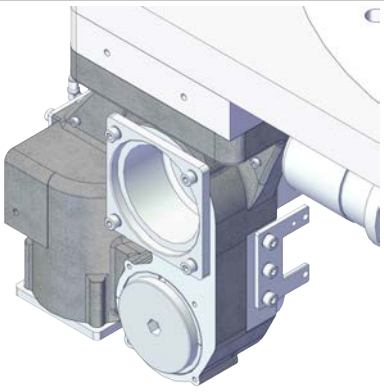
Refitting the 90 cam roller unit

	Action	Note
1	Fully lubricate and clean the cam roller unit before install it to the carriage. **Tip** During the operation, watch the seals at the ball bearing block: when you see the grease pouring out, you have applied enough grease.	Use Shell Retinax LX2.

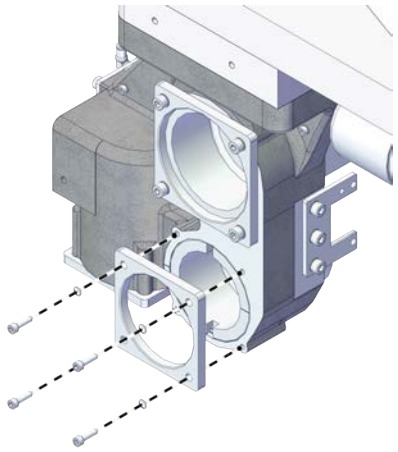
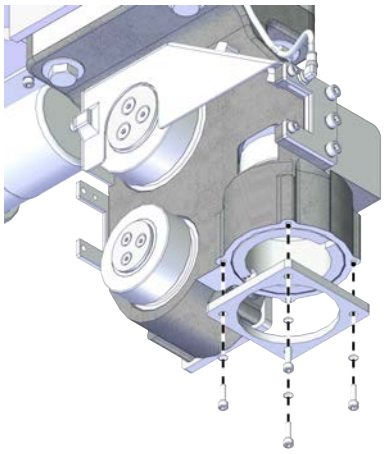
Continues on next page

5.2.2 Replacing the cam roller units

Continued

	Action	Note
2	Insert the cam roller unit back to the carriage.	 xx2200000813  xx2200000815
3	Tighten the cam roller unit with the holder tooling. **Tip** Rotate the cam roller nipple close to the rectangular rail.	 xx2200001177 Tightening torque:15 Nm

Continues on next page

	Action	Note
4	Refit the flange plate to locking the roller.	 xx2200000812  xx2200000814 Screws: ISO 4762 M6x20 Class 8.8 (4 pcs) Washers: BN 792 M8 Washer (4 pcs) Tightening torque: 10 Nm
5	Secure the screws and washers.	

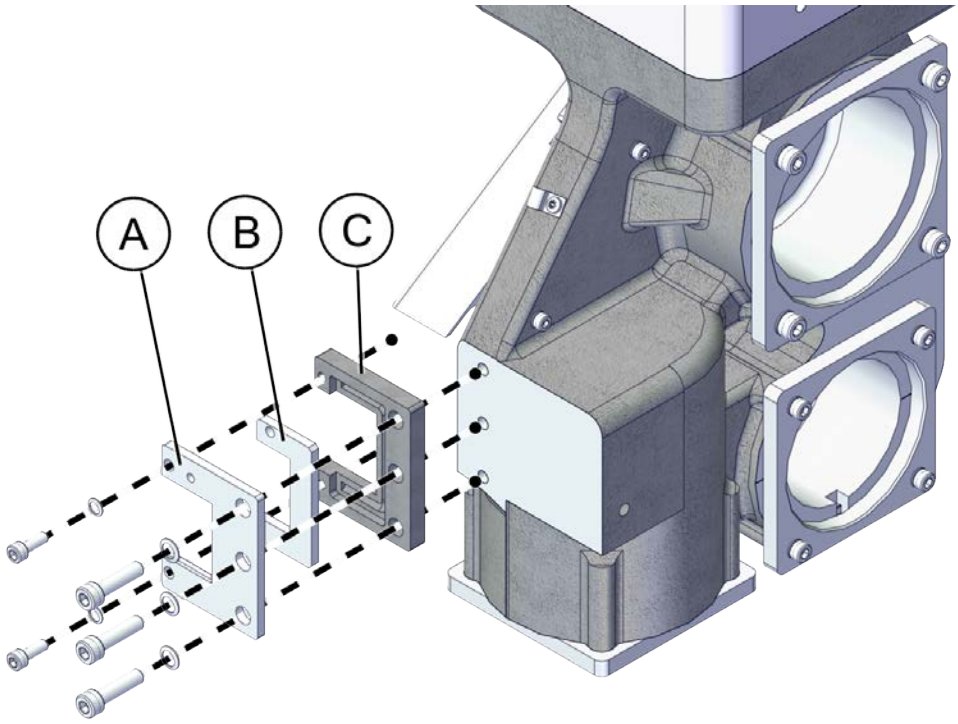
Concluding procedure

	Action	Note
1	**DANGER** Make sure all safety requirements are met when performing the first test run. See *First test run may cause injury or damage on page 29*.	

5.2.3 Replacing the scraper parts

Location of scrapers

The scrapers are located as shown in the figure.



xx2200000819

A	Scraper
B	Felt wiper
C	Scraper bracket

Required spare parts

Note

The spare part numbers that are listed in the table can be out of date. See the latest spare parts of the IRT 710 OmniCore via myABB Business Portal, *www.abb.com/myABB*.

Spare part	Article number	Note
Scraper	3HKA00000186288	
Scraper kit	3HKA00000189959	
Axial calibration kit	3HKA00000190635	
Mirrored axial calibration kit	3HKA00000190636	
Pin calibration kit	3HKA00000190637	
Mirrored pin calibration kit	3HKA00000190638	

Continues on next page

Required tools and equipment

Equipment	Article number	Note
Standard toolkit	-	Content is defined in section *Standard toolkit on page 393*.

Required consumables

Consumable	Article number	Note
Locking liquid	-	Loctite 2400 (or equivalent Loctite 243)
Flange sealant	-	Loctite 574 (or equivalent)

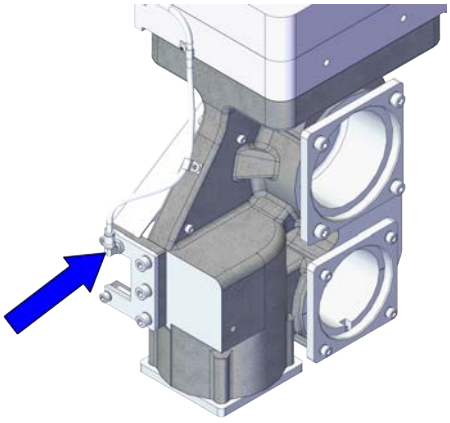
Removing the scrapers

Use this procedure to remove the scrapers.

Preparations before removing the scrapers

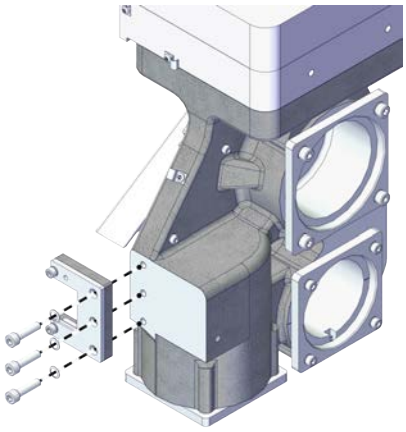
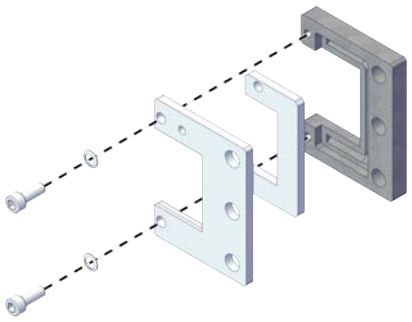
	Action	Note
1	If there is no enough space for the maintenance work, clean the surroundings.	
2	If there is any robot on the track, jog it to the lifting/transportation position.	
3	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the product, before entering the safeguarded space.	

Removing the scrapers

	Action	Note
1	Disconnect the lubrication tube from the scraper kit.	 xx2200000816

Continues on next page

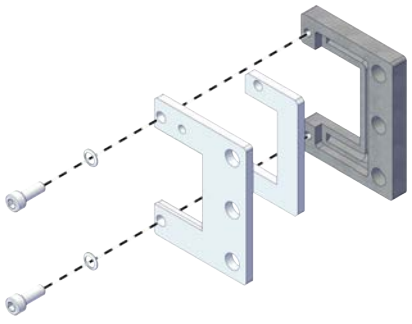
5.2.3 Replacing the scraper parts
Continued

	Action	Note
2	Remove the screws.	 xx2200000817
3	Remove the scraper kit from the carriage.	
4	Remove the screws.	 xx2200000818
5	Disassemble the scraper from the assembly.	

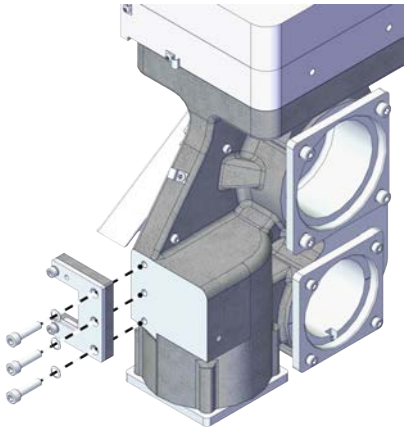
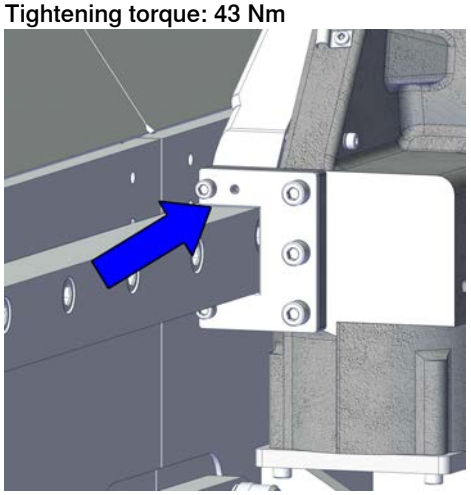
Refitting the scrapers

Use this procedure to refit the scrapers.

Refitting the scrapers

	Action	Note
1	Assemble the scraper kit.	 xx2200000818 Screws: ISO 4762 M6x16 Class 8.8 (2 pcs) Washers: BN 792 M6 Washer (2 pcs) Tightening torque: 10 Nm
2	Secure with the screws and washers.	

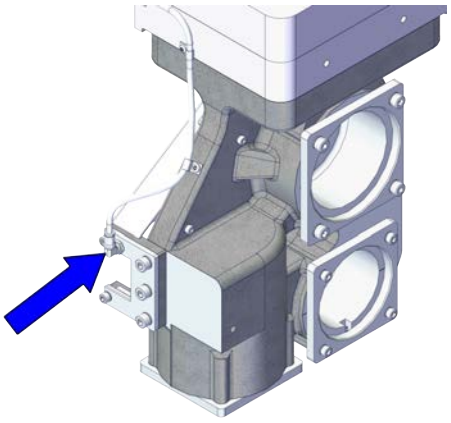
Continues on next page

	Action	Note
3	Lubricate the scraper kit with an oil gun before install it to the carriage. **Tip** During the operation, check the guide rail: when you see the grease, you have applied enough grease.	
4	Refit the scraper kit to the carriage.	 xx2200000817 Screws: ISO 4762 M8x30 Class 12.9 (3 pcs) Washers: BN 792 M8 Washer (3 pcs) Tightening torque: 43 Nm  xx2300001004
5	Refit the screws and washers without fully tighten.	
6	Check that the gap between the scraper and rectangular rail is 0.04 mm - 0.06 mm with a feeler gauge.	
7	Secure the screws with fully tighten.	

Continues on next page

5.2.3 Replacing the scraper parts

Continued

	Action	Note
8	Reconnect the lubrication tube to the scraper kit.	 xx2200000816

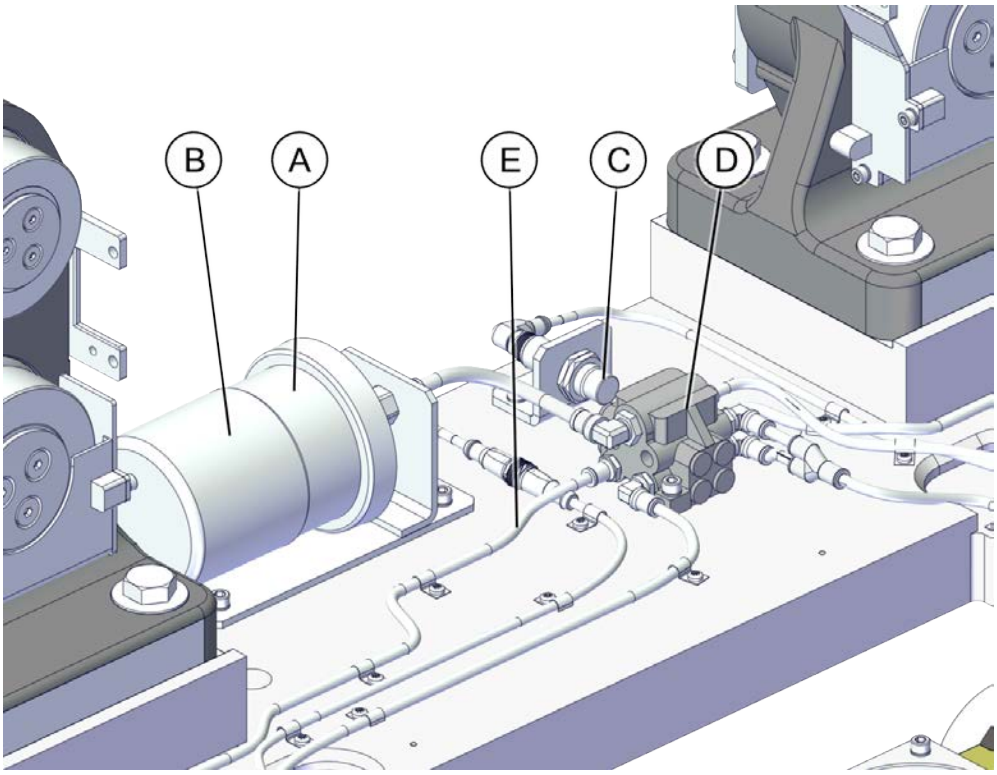
Concluding procedure

	Action	Note
1	**DANGER** Make sure all safety requirements are met when performing the first test run. See *First test run may cause injury or damage on page 29*.	

5.2.4 Replacing the lubrication parts

Location of lubrication parts

The lubrication parts are located as shown in the figure.



xx2200000820

	Spare part number	Description
A	3HAW060012002	Grease pump EPS 24V MEGA
	3HAWC114278	Grease pump HPS MEGA
B	3HKA00000191156	240cc grease cartridge PD0-240
	3HAWC116978	240cc grease cartridge and battery
C	3HAW050040467	Grease detection sensor
D	3HAWC116979	Distributor 6 ways
E	3HAWC116982	Polyamide tube 6x8 L=0.3M 1025 U08 R01
	3HAWC116981	Polyamide tube 4x6 L=8M 1025P06 00

Continues on next page

5.2.4 Replacing the lubrication parts
Continued

Required spare parts

Note

The spare part numbers that are listed in the table can be out of date. See the latest spare parts of the IRT 710 OmniCore via myABB Business Portal, *www.abb.com/myABB*.

Spare part	Article number	Note
Grease pump	3HAW060012002	EPS 24V MEGA
Grease pump	3HAWC114278	HPS MEGA
240cc grease cartridge	3HKA00000191156	PD0-240
240cc grease cartridge and battery	3HAWC116978	PD0-240
Grease detection sensor	3HAW050040467	IGS 213
Distributor 6 ways	3HAWC116979	84620
Polyamide tube 6x8 L=0.3M	3HAWC116982	1025 U08 R01
Polyamide tube 4x6 L=8M	3HAWC116981	1025P06 00

Required tools and equipment

Equipment	Article number	Note
Standard toolkit	-	Content is defined in section *Standard toolkit on page 393*.

Required consumables

Consumable	Article number	Note
Locking liquid	-	Loctite 2400 (or equivalent Loctite 243)
Flange sealant	-	Loctite 574 (or equivalent)

Replacing the grease pump

Removing the grease pump

Use this procedure to remove the grease pump.

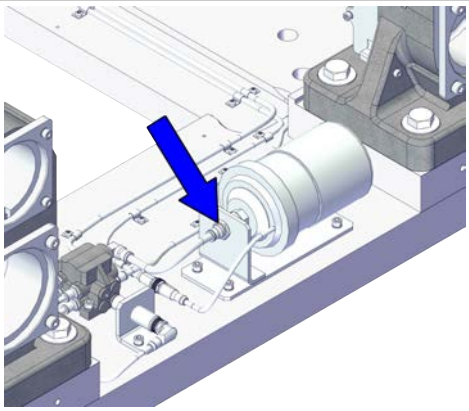
Preparations before removing the grease pump

	Action	Note
1	If there is no enough space for the maintenance work, clean the surroundings.	
2	If there is any robot on the track, jog it to the lifting/transportation position.	

Continues on next page

	Action	Note
3	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the product, before entering the safeguarded space.	

Removing the grease pump

	Action	Note
1	Disconnect the connector: • 24V	
2	Disconnect the tubes.	
3	Unscrew to remove the pump unit.	 xx2200000821
4	If need repair the Memolub parts, see *Memolub manual on page 230*.	

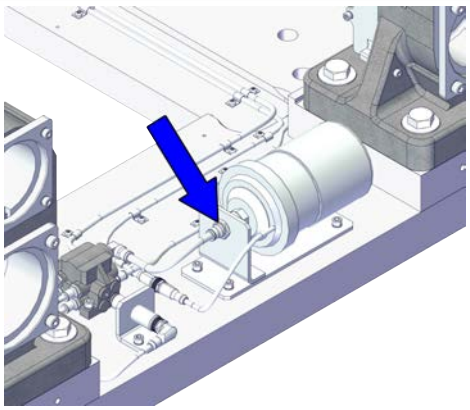
Continues on next page

5.2.4 Replacing the lubrication parts
Continued

Refitting the grease pump

Use this procedure to refit the grease pump.

Refitting the grease pump

	Action	Note
1	Refit the pump unit and tighten the screw.	 xx2200000821
2	Connect the tubes.	
3	Connect the connector: • 24V	
4	Check that the lubrication system can work normally.	

Concluding procedure

	Action	Note
1	**DANGER** Make sure all safety requirements are met when performing the first test run. See *First test run may cause injury or damage on page 29*.	

Replacing the grease detection sensor

Removing the grease detection sensor

Use this procedure to remove the grease detection sensor.

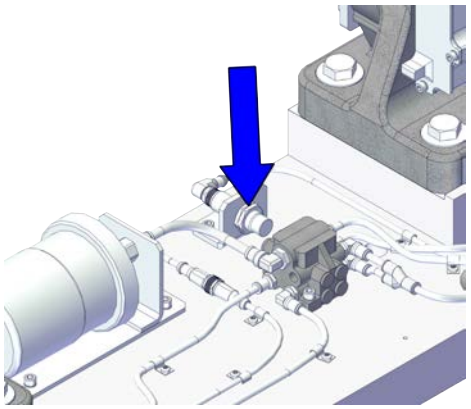
Preparations before removing the grease detection sensor

	Action	Note
1	If there is no enough space for the maintenance work, clean the surroundings.	
2	If there is any robot on the track, jog it to the lifting/transportation position.	

Continues on next page

	Action	Note
3	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the product, before entering the safeguarded space.	

Removing the grease detection sensor

	Action	Note
1	Disconnect the connector: • sensor	
2	Unscrew to remove the sensor.	 xx2200000822

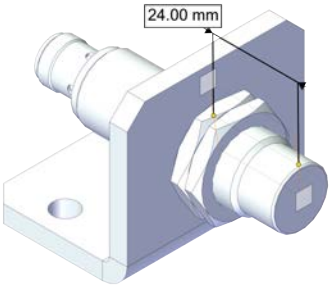
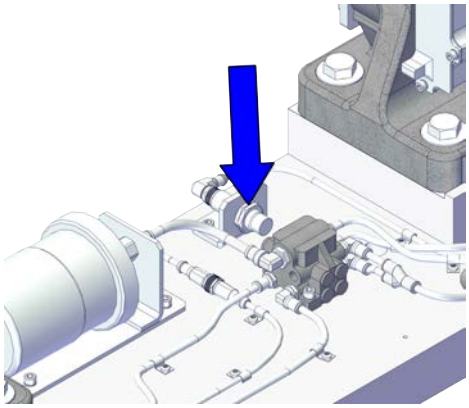
Continues on next page

5.2.4 Replacing the lubrication parts
Continued

Refitting the grease detection sensor

Use this procedure to refit the grease detection sensor.

Refitting the grease detection sensor

	Action	Note
1	Refit the sensor and tighten with the screw . **Note** Pay attention to the position of the sensor on the bracket.  xx2200000826	 xx2200000822
2	Connect the connector: • sensor	
3	Check that the lubrication system can work normally.	

Concluding procedure

	Action	Note
1	**DANGER** Make sure all safety requirements are met when performing the first test run. See *First test run may cause injury or damage on page 29*.	

Replacing the distributor

Removing the distributor

Use this procedure to remove the distributor.

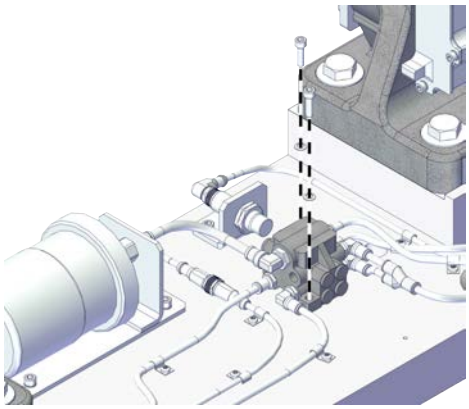
Preparations before removing the distributor

	Action	Note
1	If there is no enough space for the maintenance work, clean the surroundings.	
2	If there is any robot on the track, jog it to the lifting/transportation position.	

Continues on next page

	Action	Note
3	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the product, before entering the safeguarded space.	

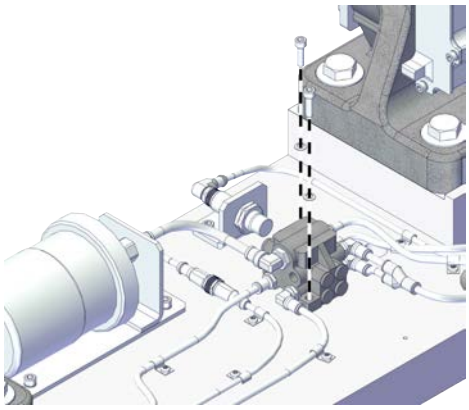
Removing the distributor

	Action	Note
1	Disconnect the tubes.	
2	Remove the screws locking the distributor.	 xx2200000824

Refitting the distributor

Use this procedure to refit the distributor.

Refitting the distributor

	Action	Note
1	Refit the distributor and secure with the screws.	 xx2200000824 Screws: ISO 4762 M6x20 Class 8.8 (2 pcs) Washers: BN 792 M6 Washer (2 pcs) Tightening torque: 10 Nm
2	Connect the tubes.	

Continues on next page

5.2.4 Replacing the lubrication parts
Continued

	Action	Note
3	Check that the lubrication system can work normally.	

Concluding procedure

	Action	Note
1	**DANGER** Make sure all safety requirements are met when performing the first test run. See *First test run may cause injury or damage on page 29*.	

Replacing the Y fitting

Removing the Y fitting

Use this procedure to remove the Y fitting.

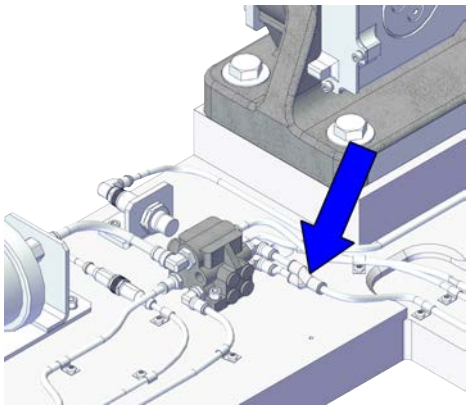
Preparations before removing the Y fitting

	Action	Note
1	If there is no enough space for the maintenance work, clean the surroundings.	
2	If there is any robot on the track, jog it to the lifting/transportation position.	
3	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the product, before entering the safeguarded space.	

Removing the Y fitting

	Action	Note
1	Disconnect the tubes.	

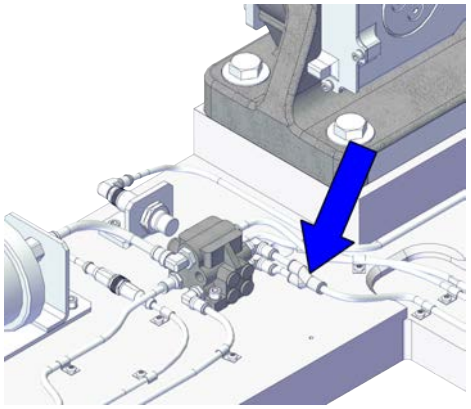
Continues on next page

	Action	Note
2	Remove the Y Fitting.	 xx2200000825

Refitting the Y fitting

Use this procedure to refit the Y fitting.

Refitting the Y fitting

	Action	Note
1	Connect the tubes.	
2	Refit the Y Fitting.	 xx2200000825
3	Check that the lubrication system can work normally.	

Concluding procedure

	Action	Note
1	**DANGER** Make sure all safety requirements are met when performing the first test run. See *First test run may cause injury or damage on page 29*.	

5.3 Replacing the track parts

Repair actions at breakdown

If a breakdown has occurred on a ball element or linear guide, use this procedure to take proper repair measures.

CAUTION

If not all parts are replaced during a breakdown, lifetime will be reduced.

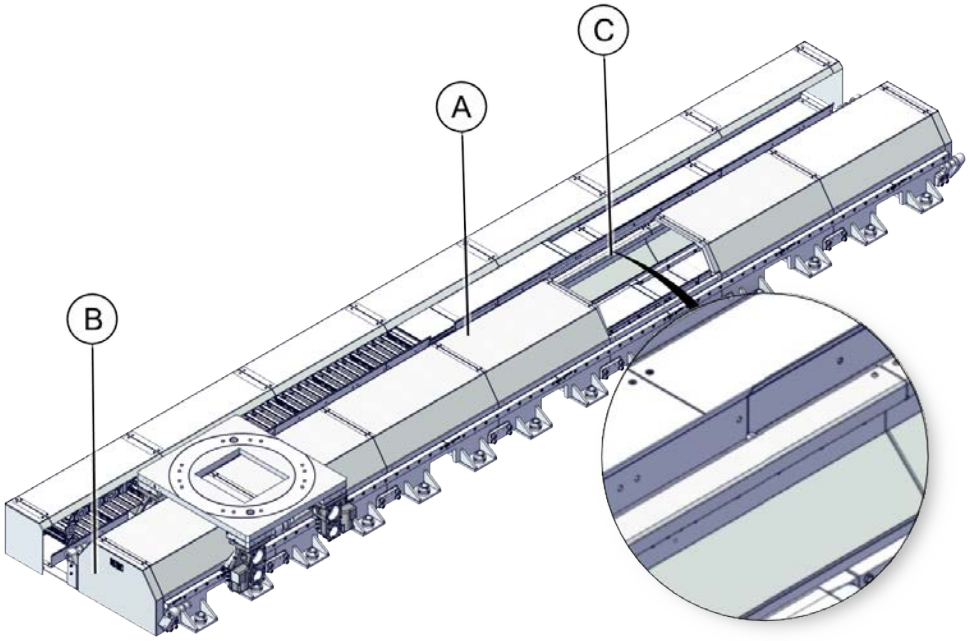
	Action	Note
1	Replace all rectangular rails on the same side of the track as where the damage has occurred. • Inspect the rectangular rails on the other side of the track.	
2	Inspect the cam roller units on the same side of the track as where the damaged guide is installed. Replace all cam roller units, if any of the ball elements are damaged.	See *Replacing the cam roller units on page 252*.

Continues on next page

5.3.1 Replacing the covers

Location of covers

The track covers are located as shown in the figure.



xx2200000827

	Spare part number	Description
A	3HKA00000186234A	Track cover L=1M (graphite white color)
	3HKA00000186234B	Track cover L=1M (orange color)
	3HKA00000186240A	Track cover L=1.5M (graphite white color)
	3HKA00000186240B	Track cover L=1.5M (orange color)
B	3HKA00000186231A	Terminal cover (graphite white color)
	3HKA00000186231B	Terminal cover (orange color)
C	3HKA00000186236A	Rack cover L=1M (graphite white color)
	3HKA00000186236B	Rack cover L=1M (orange color)
	3HKA00000186243A	Rack cover L=1.5M (graphite white color)
	3HKA00000186243B	Rack cover L=1.5M (orange color)

Required spare parts

Note

The spare part numbers that are listed in the table can be out of date. See the latest spare parts of the IRT 710 OmniCore via myABB Business Portal, *www.abb.com/myABB*.

Continues on next page

5.3.1 Replacing the covers
Continued

Spare part	Article number	Note
Track cover L=1M (graphite white color)	3HKA00000186234A	
Track cover L=1M (orange color)	3HKA00000186234B	
Track cover L=1.5M (graphite white color)	3HKA00000186240A	
Track cover L=1.5M (orange color)	3HKA00000186240B	
Terminal cover (graphite white color)	3HKA00000186231A	
Terminal cover (orange color)	3HKA00000186231B	
Rack cover L=1M (graphite white color)	3HKA00000186236A	
Rack cover L=1M (orange color)	3HKA00000186236B	
Rack cover L=1.5M (graphite white color)	3HKA00000186243A	
Rack cover L=1.5M (orange color)	3HKA00000186243B	

Required tools and equipment

Equipment	Article number	Note
Standard toolkit	-	Content is defined in section *Standard toolkit on page 393*.

Required consumables

Consumable	Article number	Note
Locking liquid	-	Loctite 2400 (or equivalent Loctite 243)
Flange sealant	-	Loctite 574 (or equivalent)

Continues on next page

5.3.1.1 Replacing the track covers

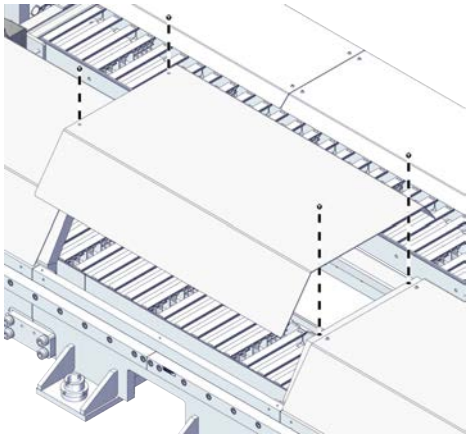
Removing the track covers

Use this procedure to remove the track cover.

Preparations before removing the track cover

	Action	Note
1	If there is no enough space for the maintenance work, clean the surroundings.	
2	If there is any robot on the track, jog it to the lifting/transportation position.	
3	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the product, before entering the safeguarded space.	

Removing the track cover

	Action	Note
1	Remove the screws and covers.	 xx2200000616

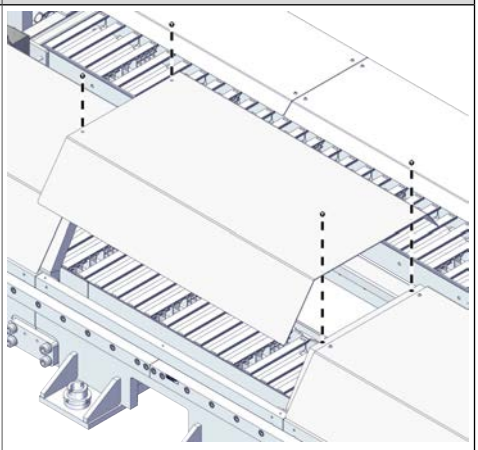
Continues on next page

5.3.1.1 Replacing the track covers
Continued

Refitting the track covers

Use this procedure to refit the track cover.

Refitting the track cover

	Action	Note
1	Refit the cover and secure with the screws.	 xx2200000616 Screws: ISO 7380-2 M6x12 Class 10.9 (4 pcs) Tightening torque: 8 Nm

Concluding procedure

	Action	Note
1	**DANGER** Make sure all safety requirements are met when performing the first test run. See *First test run may cause injury or damage on page 29*.	

5.3.1.2 Replacing the terminal covers

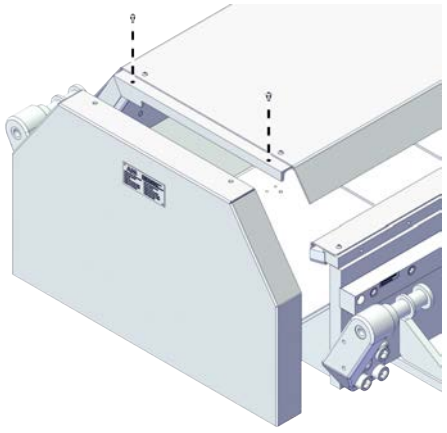
Removing the terminal covers

Use this procedure to remove the terminal covers.

Preparations before removing the terminal covers

	Action	Note
1	If there is no enough space for the maintenance work, clean the surroundings.	
2	If there is any robot on the track, jog it to the lifting/transportation position.	
3	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the product, before entering the safeguarded space.	

Removing the terminal cover

	Action	Note
1	**DANGER** Turn off all electric power, hydraulic and pneumatic pressure supplies to the robot and for the track motion.	
2	Remove the screws and covers.	 xx2200000829

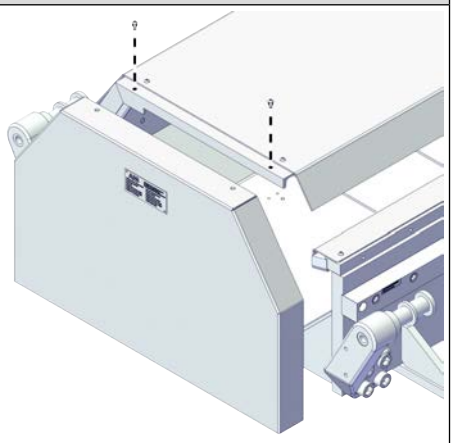
Continues on next page

5.3.1.2 Replacing the terminal covers
Continued

Refitting the terminal covers

Use this procedure to refit the terminal cover.

Refitting the terminal cover

	Action	Note
1	Refit the cover and secure with the screws.	 xx2200000829 Screws: ISO 7380-2 M6x12 Class 10.9 (2 pcs) Tightening torque: 8 Nm

Concluding procedure

	Action	Note
1	**DANGER** Make sure all safety requirements are met when performing the first test run. See *First test run may cause injury or damage on page 29*.	

5.3.1.3 Replacing the rack covers

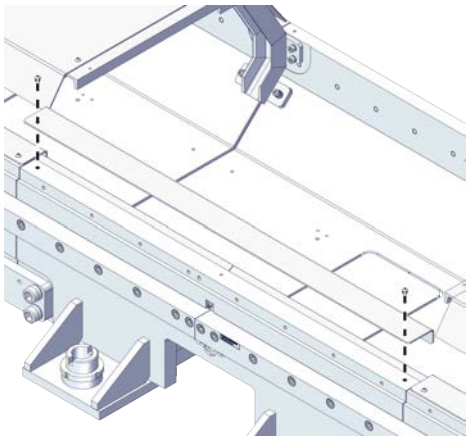
Removing the rack covers

Use this procedure to remove the rack covers.

Preparations before removing the rack covers

	Action	Note
1	If there is no enough space for the maintenance work, clean the surroundings.	
2	If there is any robot on the track, jog it to the lifting/transportation position.	
3	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the product, before entering the safeguarded space.	

Removing the rack cover

	Action	Note
1	**DANGER** Turn off all electric power, hydraulic and pneumatic pressure supplies to the robot and for the track motion.	
2	Remove the screws and covers.	 xx2200000830

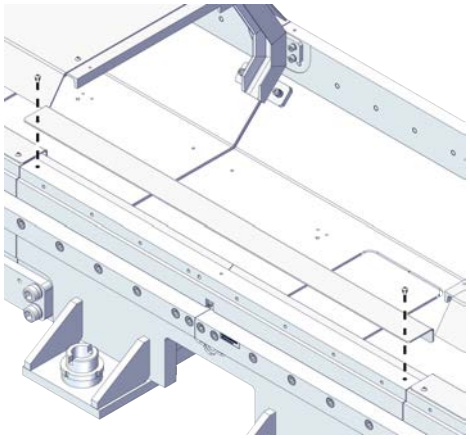
Continues on next page

5.3.1.3 Replacing the rack covers
Continued

Refitting the rack covers

Use this procedure to refit the rack cover.

Refitting the rack cover

	Action	Note
1	Refit the cover and secure with the screws.	 xx2200000830 Screws: ISO 7380-2 M6x12 Class 10.9 (2 pcs) Tightening torque: 8 Nm

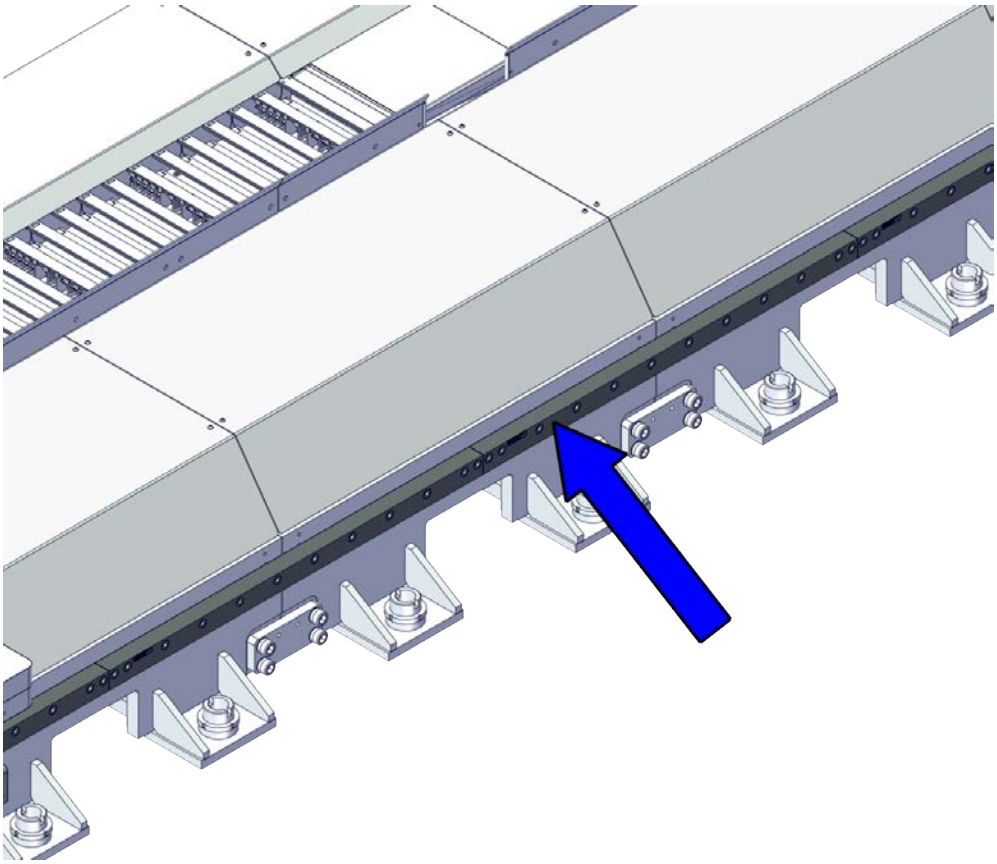
Concluding procedure

	Action	Note
1	**DANGER** Make sure all safety requirements are met when performing the first test run. See *First test run may cause injury or damage on page 29*.	

5.3.2 Replacing the rectangular rails

Location of rectangular rails

The rectangular rails are located as shown in the figure.



xx2200000629

Required spare parts

Note

The spare part numbers that are listed in the table can be out of date. See the latest spare parts of the IRT 710 OmniCore via myABB Business Portal, *www.abb.com/myABB*.

Spare part	Article number	Note
Retangular rail L=0.5M kit	3HKA00000190206	
Retangular rail L=1M kit	3HKA00000190201	

Required tools and equipment

Equipment	Article number	Note
Standard toolkit	-	Content is defined in section *Standard toolkit on page 393*.

Continues on next page

5.3.2 Replacing the rectangular rails
Continued

Required consumables

Consumable	Article number	Note
Locking liquid	-	Loctite 2400 (or equivalent Loctite 243)
Flange sealant	-	Loctite 574 (or equivalent)

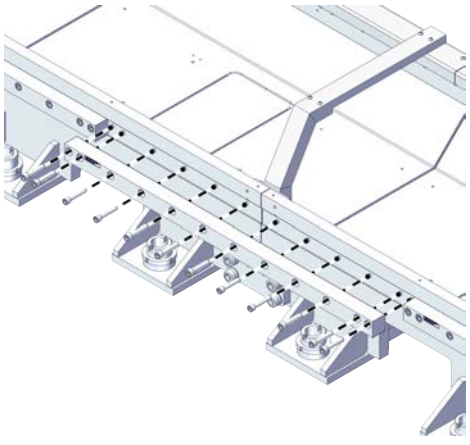
Removing the rectangular rails

Use this procedure to remove the rectangular rails.

Preparations before removing the rectangular rails

	Action	Note
1	If there is no enough space for the maintenance work, clean the surroundings.	
2	If there is any robot on the track, jog it to the lifting/transportation position.	
3	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the product, before entering the safeguarded space.	

Removing the rectangular rail

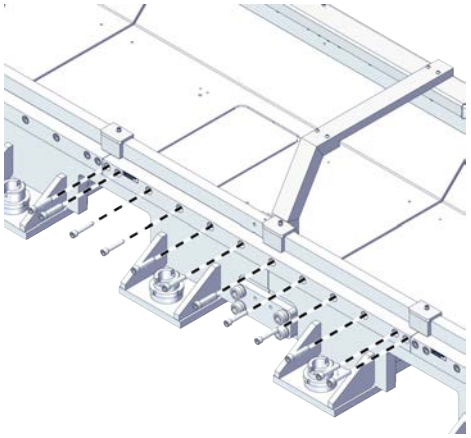
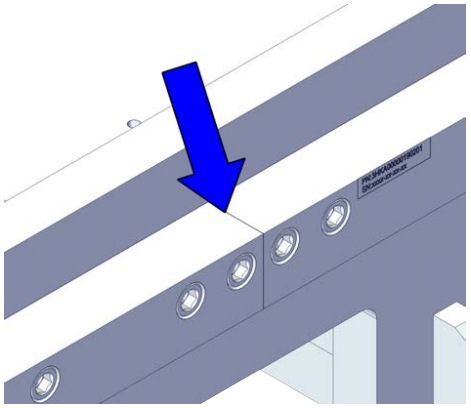
	Action	Note
1	Remove the covers over the rectangular rails to change.	
2	Remove the rectangular rail by removing all the screws.	 xx2200000831

Continues on next page

Refitting the rectangular rails

Use this procedure to refit the rectangular rails.

Refitting the rectangular rail

	Action	Note
1	Refit the rectangular rail with the rail pressing tool. **Note** Use the rail pressing tool to make sure that the rails are pushed against the side member mounting surface. **Note** There should be no gap between the rail mounting surface and the section mounting surface.	Rail pressing tool: • Rack side: 3HKA00000189983 • Non-rack side: 3HKA00000189982  xx2200001178
2	Fit with the screws, loose tightening.	
3	Visually check if the rails are seamlessly connected. **Note** If there is seam existed, push to adjust rail and ensure that the gap of seam is 0.2 mm on each side and totally no more than 0.4 mm. Otherwise, change with a new rail.	 xx2200001185
4	Press the rail with the rail pressing tool to ensure that there is no gap between the rail with the lower surface of the track step.	
5	Slightly tighten the rail screws and finalize the horizontal alignment of the IRT 710 OmniCore as described in *Geometric alignment of track motion IRT 710 OmniCore on page 144*.	Screws: For 0.5 m ISO 4762 M12x55 Class12.9 (7 pcs) For 1 m ISO 4762 M12x55 Class12.9 (12 pcs) For 1.5 m ISO 4762 M12x55 Class12.9 (15 pcs) Tightening torque: 128 Nm ±3%

Continues on next page

5.3.2 Replacing the rectangular rails

Continued

	Action	Note
6	Release the carriage brake and push the carriage manually to check the rails alignment. If the rails are correctly aligned, you should sense no “step” while passing the rails junction. If so then push downward the rail against the side member shoulder and verify the 0.02 mm gap between rails.  **Tip** For more information on moving carriage manually, see *Moving the carriage manually on page 119*.	
7	When the alignment is correct, tighten the rail screws one by one, after applying Loctite 243 on their thread.	Tightening torque: 128 Nm ±3%
8	Lubricate the rails.	Use Shell Gadus S2 V220 00.  **WARNING** The grease used causes serious eye irritation and may cause an allergic skin reaction.

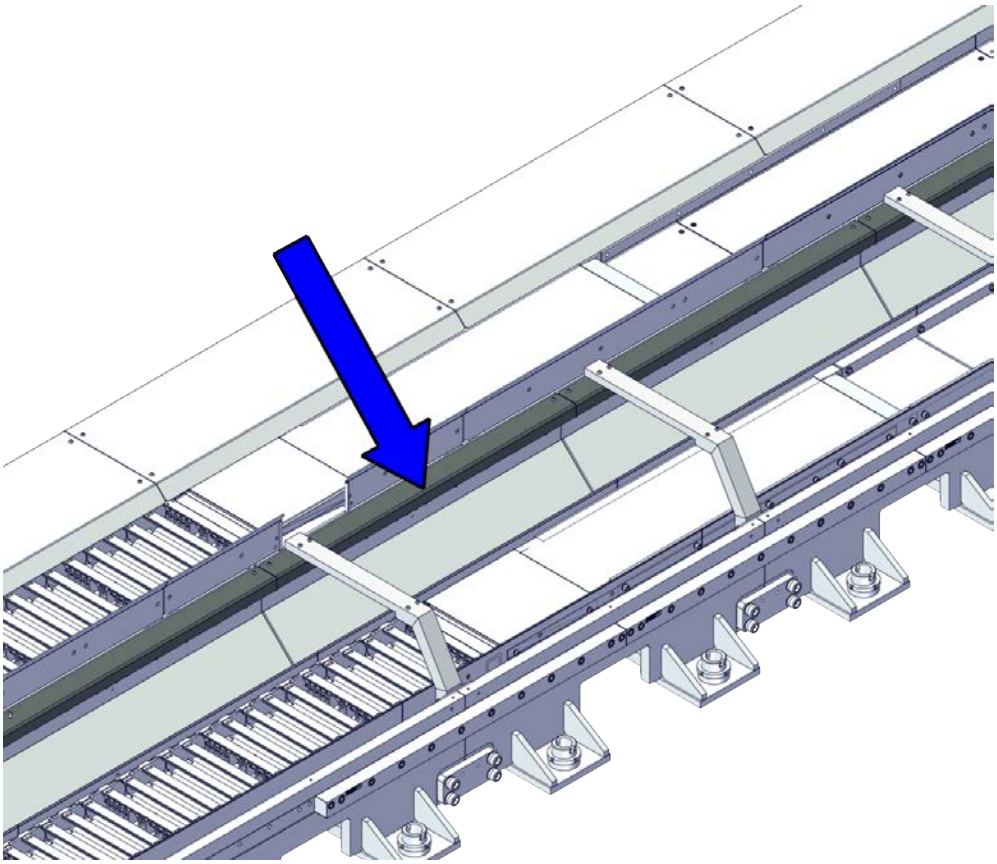
Concluding procedure

	Action	Note
1	 **DANGER** Make sure all safety requirements are met when performing the first test run. See *First test run may cause injury or damage on page 29*.	

5.3.3 Replacing the racks

Location of racks

The racks are located as shown in the figure.



xx2200000634

Required spare parts

Note

The spare part numbers that are listed in the table can be out of date. See the latest spare parts of the IRT 710 OmniCore via myABB Business Portal, *www.abb.com/myABB*.

Spare part	Article number	Note
Rack L=0.5M	3HKA00000186246	ZST 300-221-500-R1
Rack L=1M	3HKA00000186248	ZST 300-221-1000-R1

Required tools and equipment

Equipment	Article number	Note
Standard toolkit	-	Content is defined in section *Standard toolkit on page 393*.

Continues on next page

5.3.3 Replacing the racks
Continued

Required consumables

Consumable	Article number	Note
Locking liquid	-	Loctite 2400 (or equivalent Loctite 243)
Flange sealant	-	Loctite 574 (or equivalent)

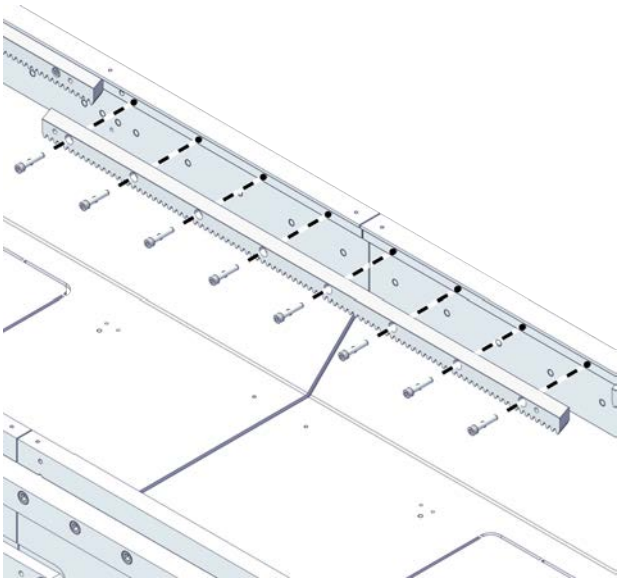
Removing the racks

Use this procedure to remove the racks.

Preparations before removing the racks

	Action	Note
1	If there is no enough space for the maintenance work, clean the surroundings.	
2	If there is any robot on the track, jog it to the lifting/transportation position.	
3	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the product, before entering the safeguarded space.	

Removing the rack

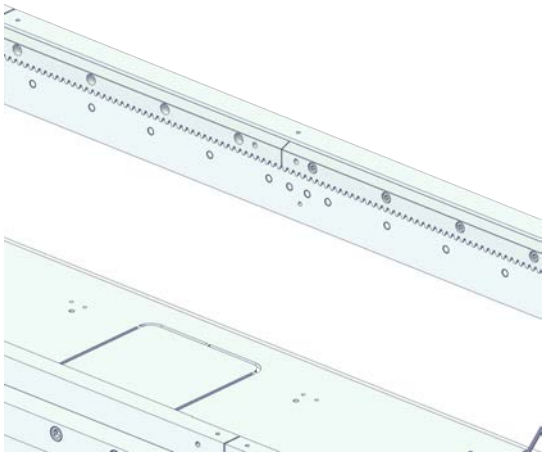
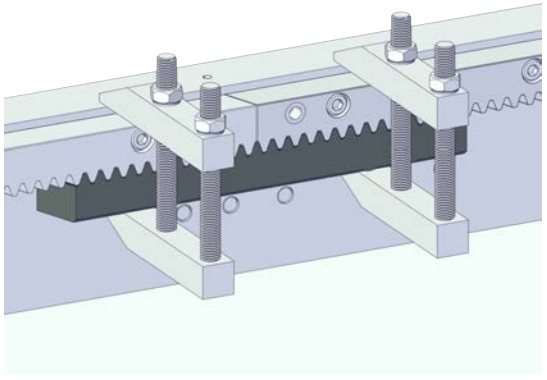
	Action	Note
1	Remove the covers over the racks to change.	
2	Remove the rack by removing all the screws.	 xx2200000832

Continues on next page

Refitting the racks

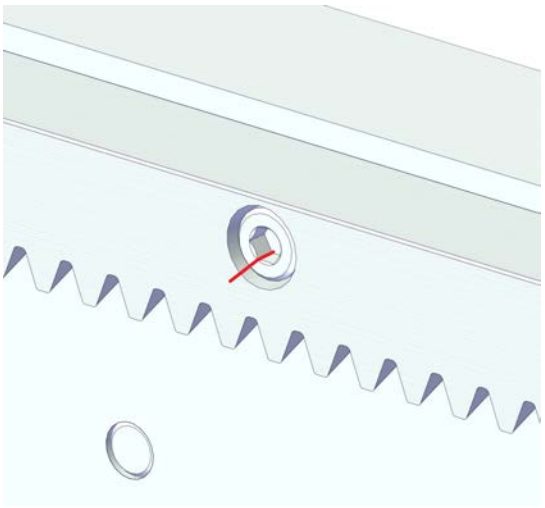
Use this procedure to refit the racks.

Refitting the rack

	Action	Note
1	Refit the rack to the track without fully tighten.	 xx2200000834 Screws: ISO 4762 M8x40 Class12.9 (12 pcs) Tightening torque: 43 Nm
2	Use the clamps and mounting block at the ends of the rack section to make sure that the racks are pushed against the mounting surface of the sections and perfectly aligned with each other.	Rack clamps: 3HAW107700357 Rack mounting block: 3HAWL000011  xx2200001170
3	When the alignment is correct, tighten the screws one by one, after applying Loctite 243 on their thread.	Tightening torque: 43 Nm

Continues on next page

5.3.3 Replacing the racks
Continued

	Action	Note
4	Once you have tightened a screw, mark it with a specific marker.	 xx2200000835
5	Lubricate the rack when all racks are installed.	

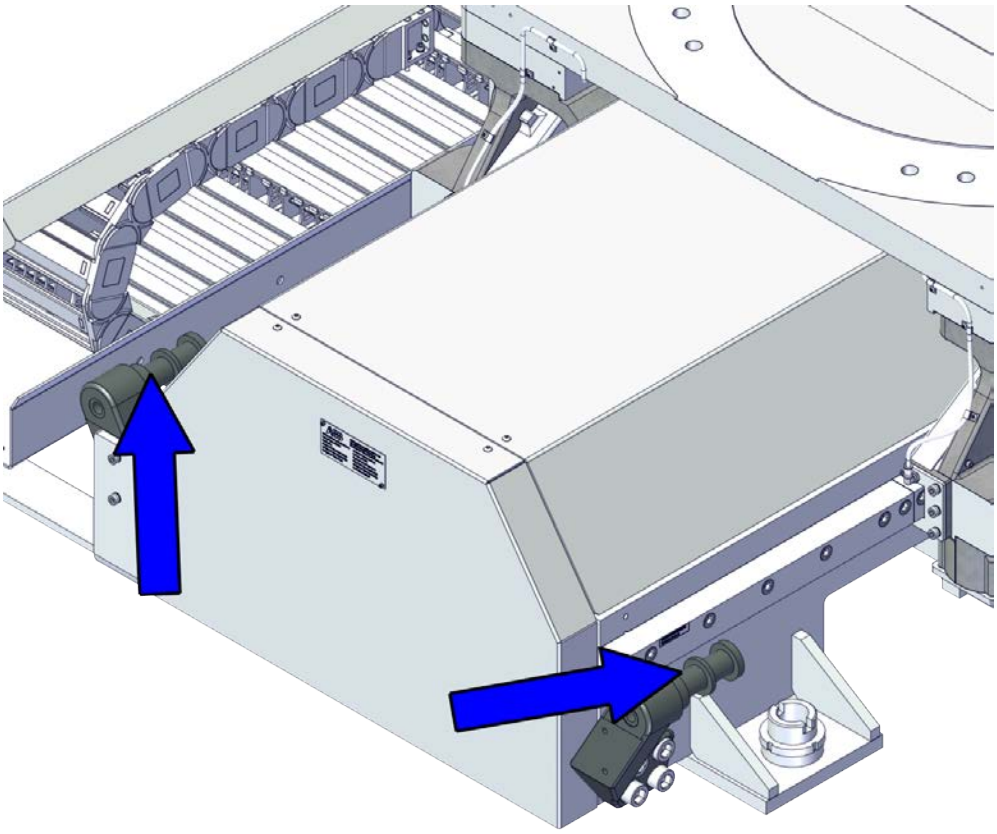
Concluding procedure

	Action	Note
1	**DANGER** Make sure all safety requirements are met when performing the first test run. See *First test run may cause injury or damage on page 29*.	

5.3.4 Replacing the mechanical stops

Location of mechanical stops

The mechanical stops are located as shown in the figure.



xx2200000632

Required spare parts

Note

The spare part numbers that are listed in the table can be out of date. See the latest spare parts of the IRT 710 OmniCore via myABB Business Portal, *www.abb.com/myABB*.

Spare part	Article number	Note
Bumper	3HKA00000186228	TI30-52-2-1
Bumper kit	3HKA00000190639	
Mirrored bumper kit	3HKA00000190648	

Required tools and equipment

Equipment	Article number	Note
Standard toolkit	-	Content is defined in section *Standard toolkit on page 393*.

Continues on next page

5.3.4 Replacing the mechanical stops
Continued

Required consumables

Consumable	Article number	Note
Locking liquid	-	Loctite 2400 (or equivalent Loctite 243)
Flange sealant	-	Loctite 574 (or equivalent)

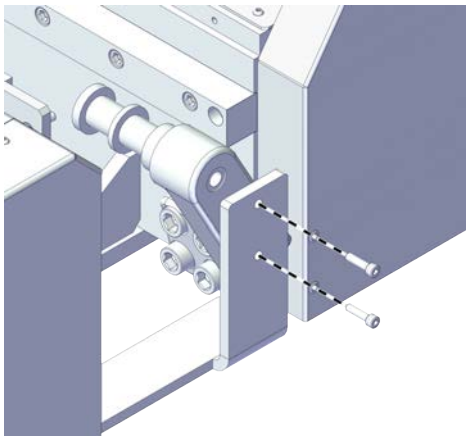
Removing the mechanical stops

Use this procedure to remove the mechanical stops.

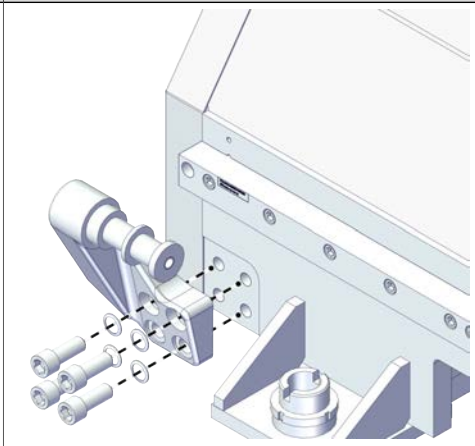
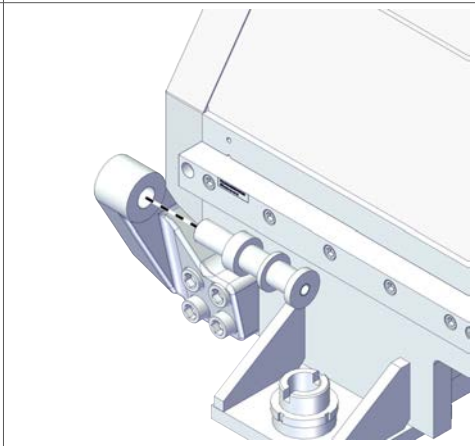
Preparations before removing the mechanical stops

	Action	Note
1	If there is no enough space for the maintenance work, clean the surroundings.	
2	If there is any robot on the track, jog it to the lifting/transportation position.	
3	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the product, before entering the safeguarded space.	

Removing the mechanical stop

	Action	Note
1	If there is external chain chain bracket connected to the bumper kit, remove the screws.	 xx2200000843

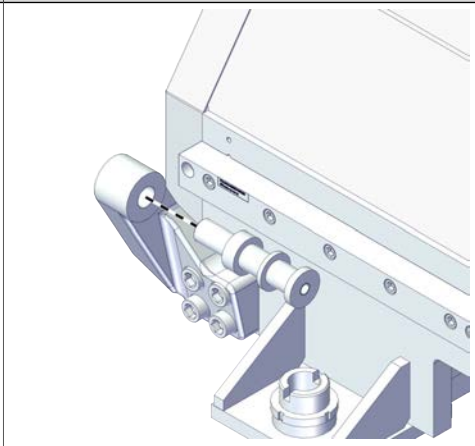
Continues on next page

	Action	Note
2	If the mechanical stops needs to be removed, remove bumper kit by removing the screws.	 xx2200000837
3	If only the bumper needs to be removed, unscrew to remove the bumper.	 xx2200000836

Refitting the mechanical stops

Use this procedure to refit the mechanical stops.

Refitting the mechanical stop

	Action	Note
1	Screw and tighten the bumper to the bracket.	 xx2200000836

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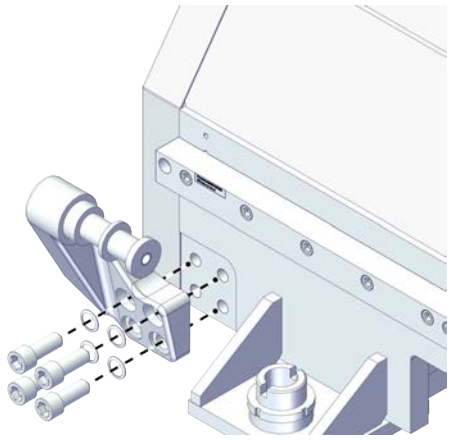
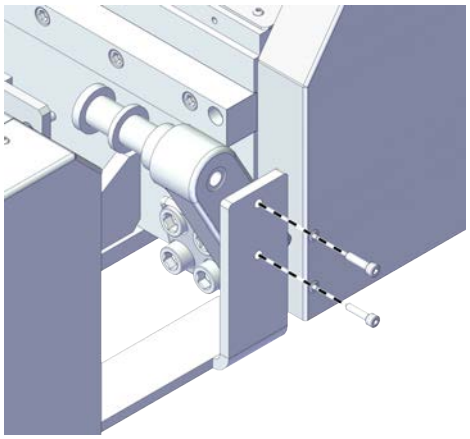
5.3.4 Replacing the mechanical stops

Continued

	Action	Note
2	Refit the mechanical stop and secure with the screws.	 xx2200000837 Screws: ISO 4762 M20x50 Class12.9 (4 pcs) Washers: BN 792 M20 Washer (4 pcs) Tightening torque: 305 Nm ±3%
3	If the external cable chain bracket is disconnected, secure the external cable chain bracket to the bumper kit with screws.	 xx2200000843 Screws: ISO 4762 M8x30 Class 12.9 (2 pcs) Washers: BN 792 M8 Washer (4 pcs) Tightening torque: 43 Nm

Concluding procedure

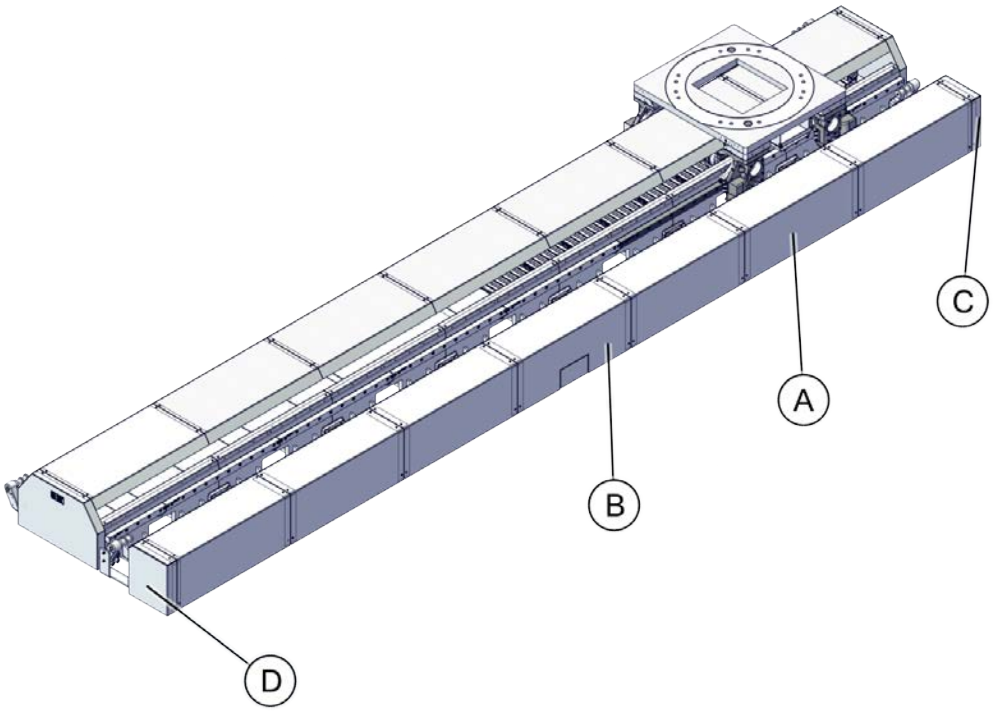
	Action	Note
1	**DANGER** Make sure all safety requirements are met when performing the first test run. See *First test run may cause injury or damage on page 29*.	

5.4 Replacing the cable chain parts

5.4.1 Replacing the cable chain covers

Location of cable chain covers

The cable chain covers are located as shown in the figure.



xx2200000828

	Spare part number	Description
A	3HKA00000189971A	External cable chain cover L=1M (graphite white color)
	3HKA00000189971B	External cable chain cover L=1M (orange color)
	3HKA00000189972A	External cable chain cover L=1.5M (graphite white color)
	3HKA00000189972B	External cable chain cover L=1.5M (orange color)
B	3HKA00000189973A	External cable chain terminal cover (graphite white color)
	3HKA00000189973B	External cable chain terminal cover (orange color)
-	3HKA00000189974A	Mirrored external cable chain terminal cover (graphite white color)
	3HKA00000189974B	Mirrored external cable chain terminal cover (orange color)

Continues on next page

5.4.1 Replacing the cable chain covers
Continued

Required spare parts

Note

The spare part numbers that are listed in the table can be out of date. See the latest spare parts of the IRT 710 OmniCore via myABB Business Portal, *www.abb.com/myABB*.

Spare part	Article number	Note
External cable chain cover L=1M (graphite white color)	3HKA00000189971A	
External cable chain cover L=1.5M (graphite white color)	3HKA00000189972A	
External cable chain cover L=1M (orange color)	3HKA00000189971B	
External cable chain cover L=1.5M (orange color)	3HKA00000189972B	
External cable chain terminal cover (graphite white color)	3HKA00000189973A	
External cable chain terminal cover (orange color)	3HKA00000189973B	
Mirrored external cable chain terminal cover (graphite white color)	3HKA00000189974A	
Mirrored external cable chain terminal cover (orange color)	3HKA00000189974B	

Required tools and equipment

Equipment	Article number	Note
Standard toolkit	-	Content is defined in section *Standard toolkit on page 393*.

Required consumables

Consumable	Article number	Note
Locking liquid	-	Loctite 2400 (or equivalent Loctite 243)
Flange sealant	-	Loctite 574 (or equivalent)

Continues on next page

5.4.1.1 Replacing the external cable chain covers

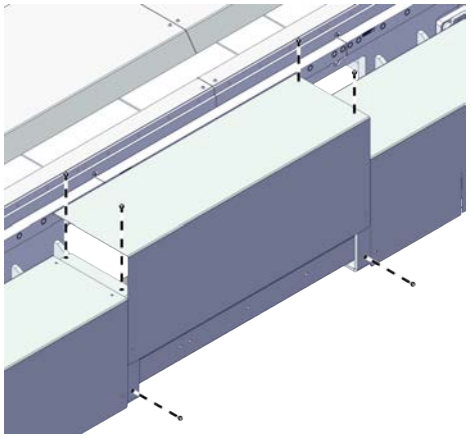
Removing the external cable chain covers

Use this procedure to remove the external cable chain cover.

Preparations before removing the external cable chain cover

	Action	Note
1	If there is no enough space for the maintenance work, clean the surroundings.	
2	If there is any robot on the track, jog it to the lifting/transportation position.	
3	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the product, before entering the safeguarded space.	

Removing the external cable chain cover

	Action	Note
1	Remove the screws and covers.	 xx2200000838

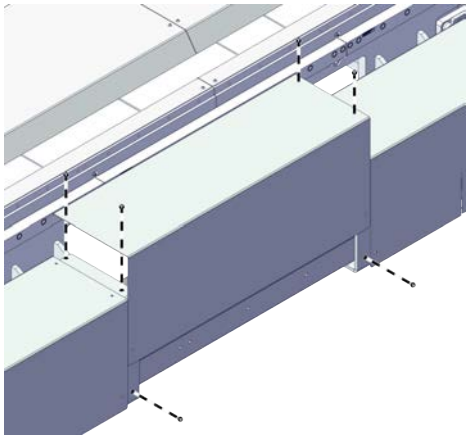
Continues on next page

5.4.1.1 Replacing the external cable chain covers
Continued

Refitting the external cable chain covers

Use this procedure to refit the external cable chain cover.

Refitting the external cable chain cover

	Action	Note
1	Refit the cover and secure with the screws.	 xx2200000838 Screws: ISO 7380-2 M6x12 Class 10.9 (6 pcs) Tightening torque: 8 Nm

Concluding procedure

	Action	Note
1	**DANGER** Make sure all safety requirements are met when performing the first test run. See *First test run may cause injury or damage on page 29*.	

5.4.1.2 Replacing the cable chain terminal covers

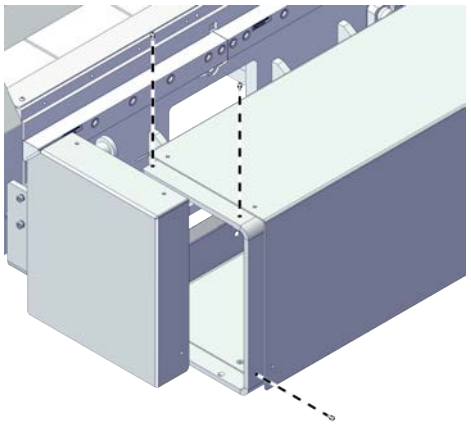
Removing the external cable chain terminal covers

Use this procedure to remove the external cable chain terminal covers.

Preparations before removing the external cable chain terminal covers

	Action	Note
1	If there is no enough space for the maintenance work, clean the surroundings.	
2	If there is any robot on the track, jog it to the lifting/transportation position.	
3	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the product, before entering the safeguarded space.	

Removing the external cable chain terminal cover

	Action	Note
1	**DANGER** Turn off all electric power, hydraulic and pneumatic pressure supplies to the robot and for the track motion.	
2	Remove the screws and covers.	 xx2200000839

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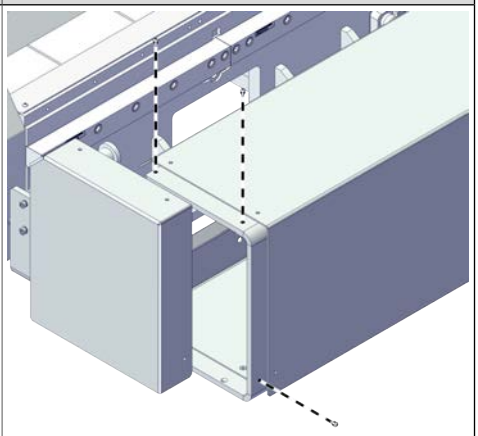
5.4.1.2 Replacing the cable chain terminal covers
Continued

Refitting the external cable chain terminal covers

Use this procedure to refit the external cable chain terminal cover.

Refitting the external cable chain terminal cover

	Action	Note
1	Refit the cover and secure with the screws.	 xx2200000839 Screws:9ADJ100086P0257 ISO 7380 M6x12 Class 10.9 (3 pcs) Screws: ISO 7380-2 M6x12 Class 10.9 (3 pcs) Tightening torque: 8 Nm

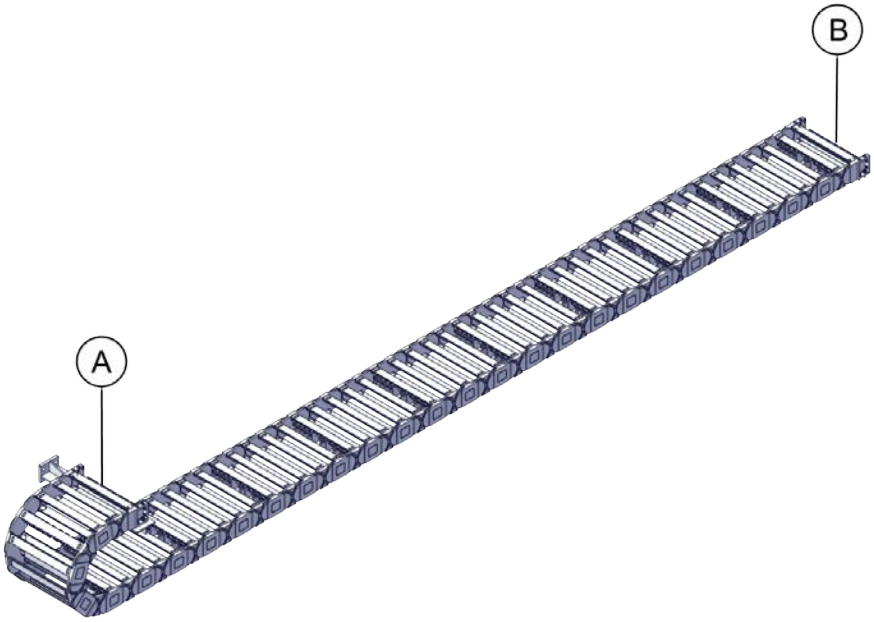
Concluding procedure

	Action	Note
1	**DANGER** Make sure all safety requirements are met when performing the first test run. See *First test run may cause injury or damage on page 29*.	

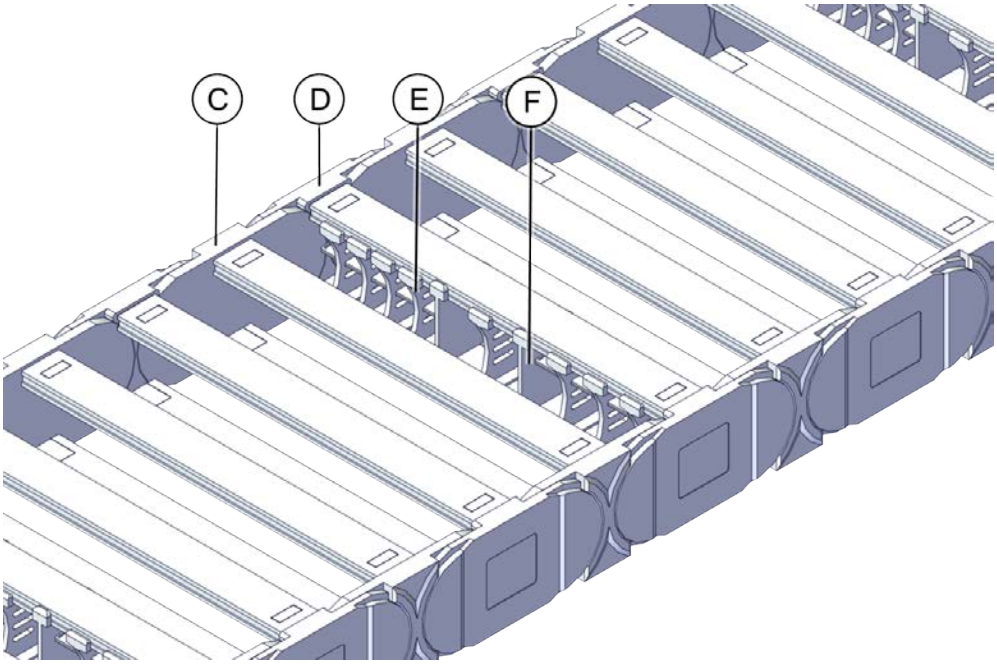
5.4.2 Replacing the cable chain parts

Location of cable chain parts

The cable chain parts are located as shown in the figure.



xx2200000840



xx2200000844

A	Movable chain end
B	Fixed chain end
C	Inner cable chain link

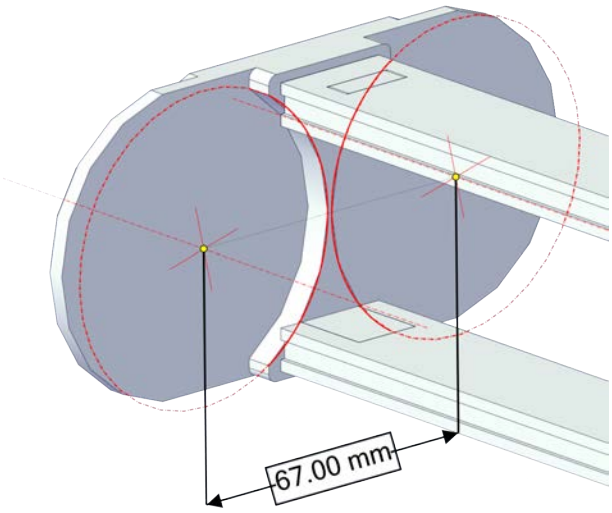
Continues on next page

5.4.2 Replacing the cable chain parts
Continued

D	Outer cable chain link
E	Small vertical separator
F	Big vertical separator

Tip

The pinch of each chain link is 67 mm. There are fifteen chain links for one meter cable chain.



xx2200001284

Required spare parts

Note

The spare part numbers that are listed in the table can be out of date. See the latest spare parts of the IRT 710 OmniCore via myABB Business Portal, *www.abb.com/myABB*.

Spare part	Article number	Note
Fixed chain end	3HKA00000191015	IGUS
Movable chain end	3HKA00000191016	IGUS
Inner cable chain link	3HKA00000191011	IGUS
Outer cable chain link	3HKA00000191012	IGUS
Small vertical separator	3HKA00000191013	IGUS
Big vertical separator	3HKA00000191014	IGUS

Continues on next page

Required tools and equipment

Equipment	Article number	Note
Standard toolkit	-	Content is defined in section *Standard toolkit on page 393*.

Required consumables

Consumable	Article number	Note
Locking liquid	-	Loctite 2400 (or equivalent Loctite 243)
Flange sealant	-	Loctite 574 (or equivalent)

Continues on next page

5.4.2.1 Replacing the outer cable chain link

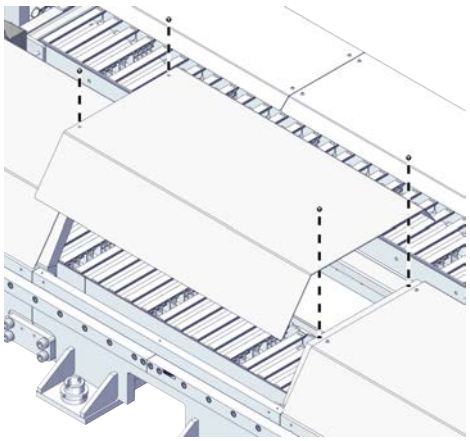
Removing the outer cable chain link

Use this procedure to remove the outer cable chain link.

Preparations before removing the outer cable chain link

	Action	Note
1	If there is no enough space for the maintenance work, clean the surroundings.	
2	If there is any robot on the track, jog it to the lifting/transportation position.	
3	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the product, before entering the safeguarded space.	

Removing the covers

	Action	Note
1	**CAUTION** Whenever parting/mating motor and gearbox, the gears may be damaged if excessive force is used!	
2	**DANGER** Turn off all electric power, hydraulic and pneumatic pressure supplies to the robot and for the track motion.	
3	Remove the covers.	 xx2200000616
4	Move the carriage to a proper position.	

Continues on next page

Removing the outer cable chain link

	Action	Note
1	**DANGER** Turn off all electric power, hydraulic and pneumatic pressure supplies to the robot and for the track motion.	
2	Insert the screwdriver into the slot to pry the plastic link bar. **Note** A 5 mm screwdriver is recommended. Or the plastic link bar may be broken. **Note** Be careful with the direction when prying. Or the plastic link bar cannot be pried off.	 xx2200000845
3	Remove the plastic link bars besides the cable chain link which need to replace.	 xx2200000846

Continues on next page

5.4.2.1 Replacing the outer cable chain link

Continued

	Action	Note
4	If any plastic link bar with separators need to be removed, use a screwdriver to pry it off.	 xx2200000847  xx2200000848
5	Insert the screwdriver into the outer cable chain link to pry it.	 xx2200000849

Continues on next page

	Action	Note
6	Remove the outer cable chain link.	 xx2200000850  xx2200000851

Refitting the outer cable chain link

Use this procedure to refit the outer cable chain link.

Refitting the outer cable chain link

	Action	Note
1	**Note** Be careful with the direction of the cable chain link when refitting it back to the track. The side with the article number should always be facing down when the cable chain lay down.	 xx2200000853

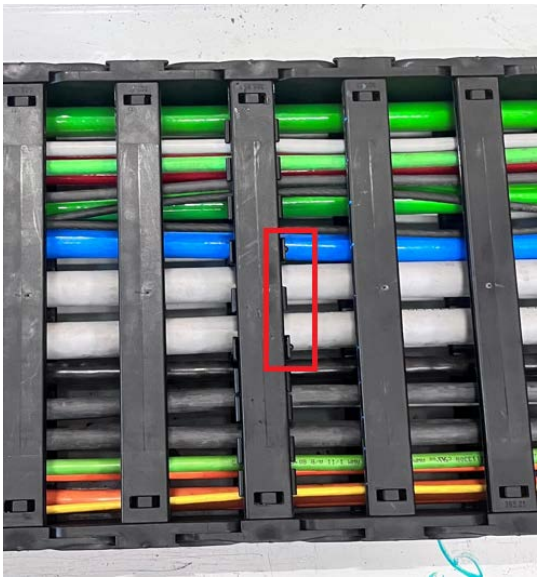
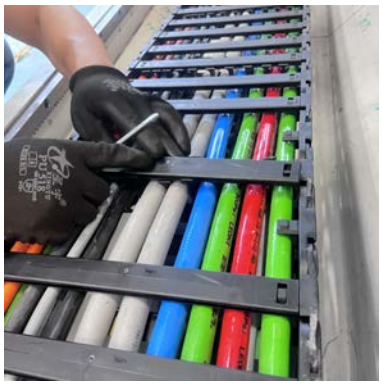
Continues on next page

5.4.2.1 Replacing the outer cable chain link

Continued

	Action	Note
2	Press one side of the outer cable chain link back.	 xx2200000852
3	Press the other side back.	 xx2200000854

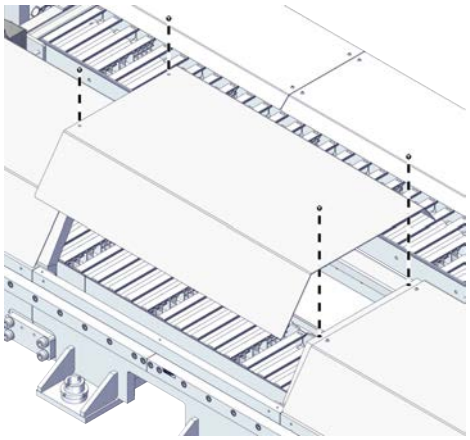
Continues on next page

	Action	Note
4	Press the plastic link bar back one by one. **Tip** First insert the plastic link bars on one side to the separators, then press the other side to the separators. Always insert on the side of the separator with bumps first.  xx2200000875 **Note** If any separator is removed during the disassembling procedure, insert it back to the correct position.	 xx2200000855  xx2200000856

Continues on next page

5.4.2.1 Replacing the outer cable chain link
Continued

Refitting the track cover

	Action	Note
1	Refit the cover and secure with the screws.	 xx2200000616 Screws: ISO 7380-2 M6x12 Class 10.9 (4 pcs) Tightening torque: 8 Nm

Concluding procedure

	Action	Note
1	**DANGER** Make sure all safety requirements are met when performing the first test run. See *First test run may cause injury or damage on page 29*.	

5.4.2.2 Replacing the inner cable chain link

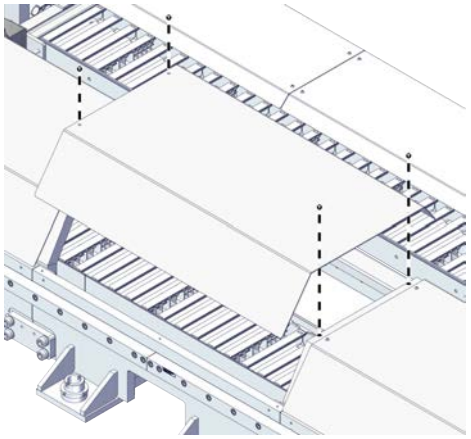
Removing the inner cable chain link

Use this procedure to remove the inner cable chain link.

Preparations before removing the inner cable chain link

	Action	Note
1	If there is no enough space for the maintenance work, clean the surroundings.	
2	If there is any robot on the track, jog it to the lifting/transportation position.	
3	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the product, before entering the safeguarded space.	

Removing the covers

	Action	Note
1	**CAUTION** Whenever parting/mating motor and gearbox, the gears may be damaged if excessive force is used!	
2	**DANGER** Turn off all electric power, hydraulic and pneumatic pressure supplies to the robot and for the track motion.	
3	Remove the covers.	 xx2200000616
4	Move the carriage to a proper position.	

Continues on next page

5.4.2.2 Replacing the inner cable chain link
Continued

Removing the inner cable chain link

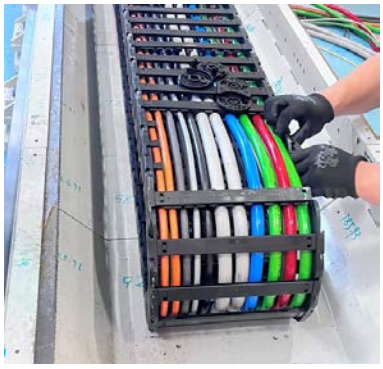
	Action	Note
1	**DANGER** Turn off all electric power, hydraulic and pneumatic pressure supplies to the robot and for the track motion.	
2	Insert the screwdriver into the slot to pry the plastic link bar. **Note** A 5 mm screwdriver is recommended. Or the plastic link bar may be broken. **Note** Be careful with the direction when prying. Or the plastic link bar cannot be pried off.	 xx2200000845
3	Remove the plastic link bars besides the cable chain link which need to replace.	 xx2200000846

Continues on next page

	Action	Note
4	If any plastic link bar with separators need to be removed, use a screwdriver to pry it off.	 xx2200000847  xx2200000848
5	Insert the screwdriver into the outer cable chain link to pry it.	 xx2200000849

Continues on next page

5.4.2.2 Replacing the inner cable chain link
Continued

	Action	Note
6	Remove the outer cable chain link.	 xx2200000850  xx2200000851
7	Repeat the steps to remove the other outer cable chain link connected to the inner cable chain link which need to be removed.	 xx2200000874
8	Remove the inner cable chain link.	

Continues on next page

Refitting the inner cable chain link

Use this procedure to refit the inner cable chain link.

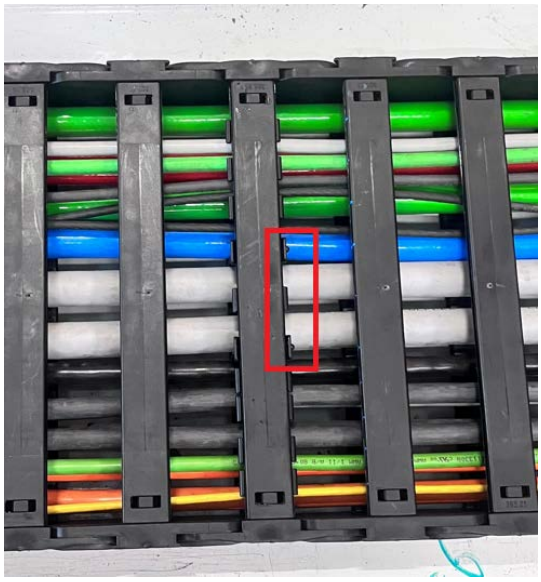
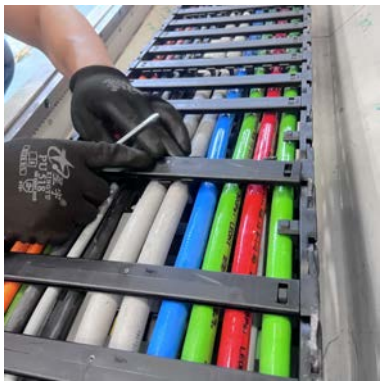
Refitting the inner cable chain link

	Action	Note
1	**Note** Be careful with the direction of the cable chain link when refitting it back to the track. The side with the article number should always be facing down when the cable chain lay down.	 xx2200000853
2	Press one side of the outer cable chain link back.	 xx2200000852
3	Refit the inner cable chain link and press the other side of the outer cable chain link to it.	 xx2200000854

Continues on next page

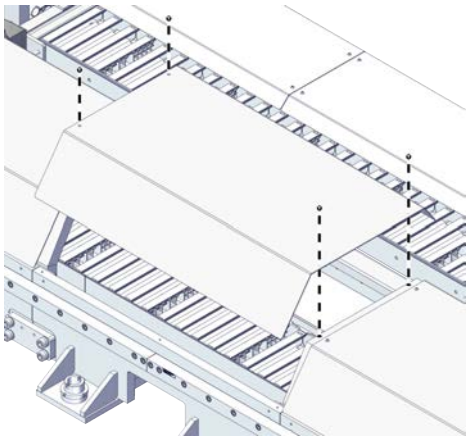
5.4.2.2 Replacing the inner cable chain link

Continued

	Action	Note
4	Press the plastic link bar back one by one. **Tip** First insert the plastic link bars on one side to the separators, then press the other side to the separators. Always insert on the side of the separator with bumps first.  xx2200000875 **Note** If any separator is removed during the disassembling procedure, insert it back to the correct position.	 xx2200000855  xx2200000856

Continues on next page

Refitting the track cover

	Action	Note
1	Refit the cover and secure with the screws.	 xx2200000616 Screws: ISO 7380-2 M6x12 Class 10.9 (4 pcs) Tightening torque: 8 Nm

Concluding procedure

	Action	Note
1	**DANGER** Make sure all safety requirements are met when performing the first test run. See *First test run may cause injury or damage on page 29*.	

5.4.2.3 Replacing the vertical separators

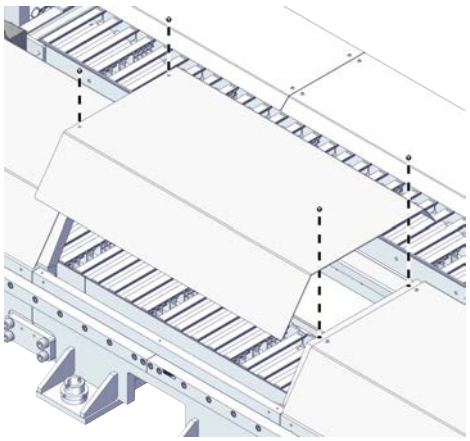
Removing the vertical separators

Use this procedure to remove the fixed chain end.

Preparations before removing the vertical separators

	Action	Note
1	If there is no enough space for the maintenance work, clean the surroundings.	
2	If there is any robot on the track, jog it to the lifting/transportation position.	
3	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the product, before entering the safeguarded space.	

Removing the covers

	Action	Note
1	**CAUTION** Whenever parting/mating motor and gearbox, the gears may be damaged if excessive force is used!	
2	**DANGER** Turn off all electric power, hydraulic and pneumatic pressure supplies to the robot and for the track motion.	
3	Remove the covers.	 xx2200000616
4	Move the carriage to a proper position.	

Continues on next page

Removing the vertical separators

	Action	Note
1	**DANGER** Turn off all electric power, hydraulic and pneumatic pressure supplies to the robot and for the track motion.	
2	Insert the screwdriver into the slot to pry the plastic link bar. **Note** A 5 mm screwdriver is recommended. Or the plastic link bar may be broken. **Note** Be careful with the direction when prying. Or the plastic link bar cannot be pried off.	 xx2200000845
3	Remove the plastic link bars besides the cable chain link which need to replace.	 xx2200000846

Continues on next page

5.4.2.3 Replacing the vertical separators
Continued

	Action	Note
4	If any plastic link bar with separators need to be removed, use a screwdriver to pry it off.	 xx2200000847  xx2200000848

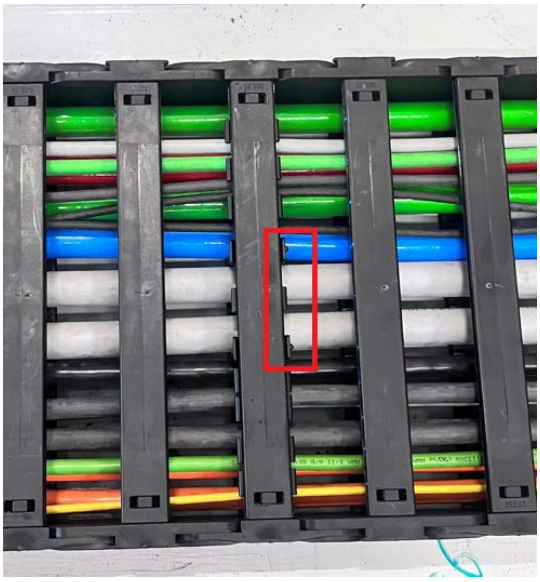
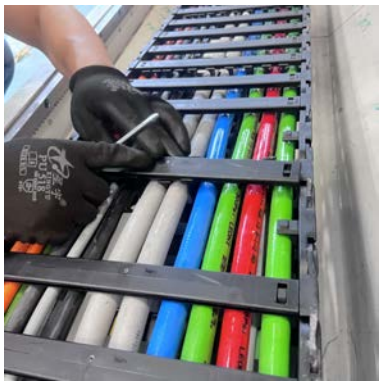
Refitting the vertical separators

Use this procedure to refit the vertical separators.

Refitting the vertical separators

	Action	Note
1	**Note** Be careful with the direction of the cable chain link when refitting it back to the track. The side with the article number should always be facing down when the cable chain lay down.	 xx2200000853
2	Insert the vertical separators back to the plastic link bar according to cable layout.	*Cable layout on page 336*

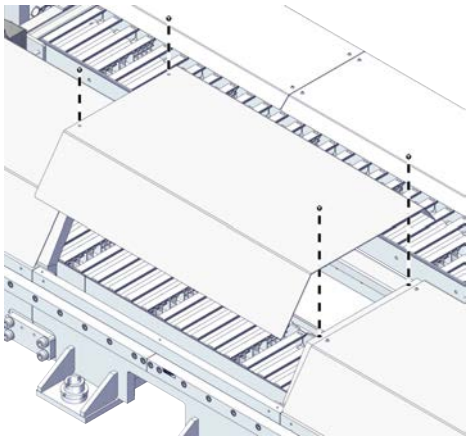
Continues on next page

	Action	Note
3	Press the plastic link bar back one by one. **Tip** First insert the plastic link bars on one side to the separators, then press the other side to the separators. Always insert on the side of the separator with bumps first.  xx2200000875 **Note** If any separator is removed during the disassembling procedure, insert it back to the correct position.	 xx2200000855  xx2200000856

Continues on next page

5.4.2.3 Replacing the vertical separators
Continued

Refitting the track cover

	Action	Note
1	Refit the cover and secure with the screws.	 xx2200000616 Screws: ISO 7380-2 M6x12 Class 10.9 (4 pcs) Tightening torque: 8 Nm

Concluding procedure

	Action	Note
1	**DANGER** Make sure all safety requirements are met when performing the first test run. See *First test run may cause injury or damage on page 29*.	

5.4.2.4 Replacing the movable chain end

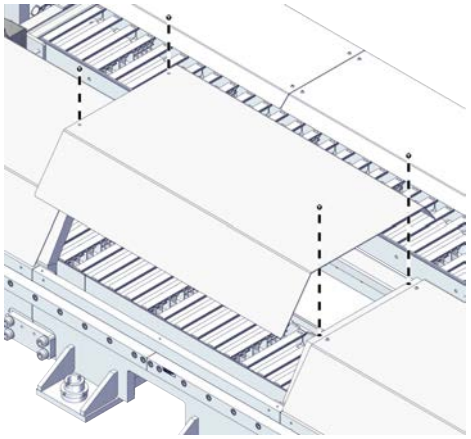
Removing the movable chain end

Use this procedure to remove the movable chain end.

Preparations before removing the movable chain end

	Action	Note
1	If there is no enough space for the maintenance work, clean the surroundings.	
2	If there is any robot on the track, jog it to the lifting/transportation position.	
3	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the product, before entering the safeguarded space.	

Removing the covers

	Action	Note
1	**CAUTION** Whenever parting/mating motor and gearbox, the gears may be damaged if excessive force is used!	
2	**DANGER** Turn off all electric power, hydraulic and pneumatic pressure supplies to the robot and for the track motion.	
3	Remove the covers.	 xx2200000616
4	Move the carriage to a proper position.	

Continues on next page

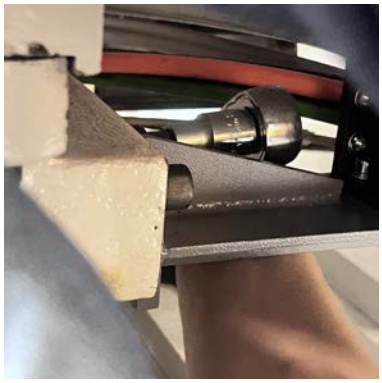
5.4.2.4 Replacing the movable chain end

Continued

Removing the movable chain end

	Action	Note
1	**DANGER** Turn off all electric power, hydraulic and pneumatic pressure supplies to the robot and for the track motion.	
2	Move the carriage to make enough space for removing the movable chain end.	
3	Make a marking on the moving chain end to show its location relative to the connecting plate. This will facilitate alignment during refitting.	
4	Take a photo of how the cabling is strapped on the carriage. Pay special attention to how the IRB power cable is routed.	 xx2200000877
5	Remove the strapping that ties the cabling to the cable chain.	
6	Disconnect the all connectors on the carriage to release all cables. **CAUTION** Cooling water may run out. Protect the connectors from getting wet.	
7	Remove the screws locking the cable drawer.	 xx2200000878

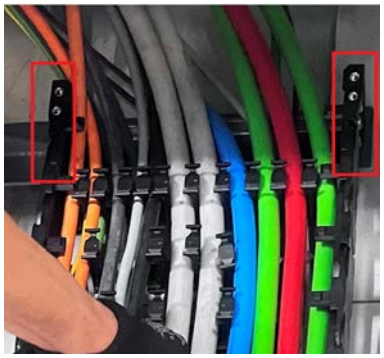
Continues on next page

	Action	Note
8	Pull out the cable drawer.	 xx2200000879  xx2200000880
9	Loosen the two screws locking the movable chain end bracket to the carriage.	 xx2200000881  xx2200000882

Continues on next page

5.4.2.4 Replacing the movable chain end

Continued

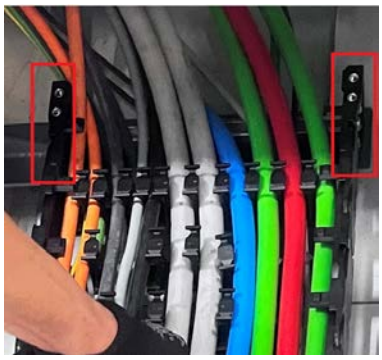
	Action	Note
10	Release the bracket to make enough space for removing the movable chain end.	 xx2200000883
11	Remove the plastic link bars.	 xx2200000884
12	Remove the screws locking the movable chain end to the bracket.	 xx2200000885
13	Remove the cable chain link besides the movable chain end.	*Replacing the inner cable chain link on page 313* *Replacing the outer cable chain link on page 306*
14	Remove the movable chain end.	

Continues on next page

Refitting the movable chain end

Use this procedure to refit the movable chain end.

Refitting the movable chain end

	Action	Note
1	**Note** If any part of the cable chain tray has been removed, use Loctite 243 when refitting parts. Also note that the NYLOC nuts can only be used once.	
2	Refit the movable chain end to the bracket and secure with screws.	 xx2200000885 Screws: ISO 4762 M6x20 Class 8.8 (4 pcs) Washers: BN 792 M6 Washer (4 pcs) Tightening torque: 10 Nm
3	Refit the movable chain end with bracket to the cable chain. **Note** Be careful with the cables routing.	
4	Refit the cable chain link besides the movable chain end.	*Replacing the inner cable chain link on page 313* *Replacing the outer cable chain link on page 306*
5	Refit the plastic link bars.	
6	Refit the movable chain end bracket with cables to the carriage and secure with screws.	 xx2200000882 Screws: ISO 4762 M12x35 Class 8.8 (2 pcs) Washers: BN 792 M12 Washer (2 pcs) Tightening torque: 83 Nm

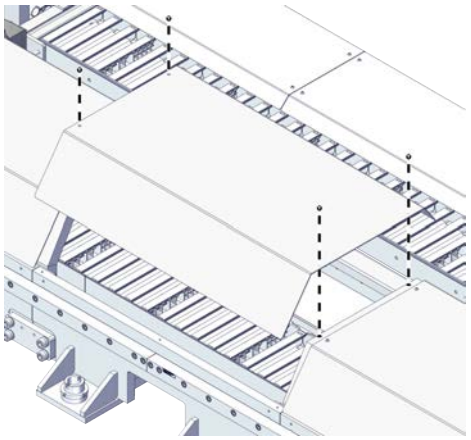
Continues on next page

5.4.2.4 Replacing the movable chain end
Continued

	Action	Note
7	Pull the cables out and route the cable in the movable chain end.	
8	Fix the cables with straps on the cable chain according to the photo taken before the replacement.	
9	Refit the cable drawer and secure with screws.	 xx2200000879  xx2200000878 Screws: ISO 4762 M8x20 Class 8.8 (4 pcs) Washers: BN 792 M8 Washer (4 pcs) Tightening torque: 25 Nm
10	Reconnect all connectors according to the diagram.	
11	Use a spirit level to check that the chain is level in the tray. If needed, adjust the levelling bolts or shim the brackets that hold the tray.	
12	Switch on the power and jog all axes to check that the cabling is correctly connected.	
13	Check that all process cabling and hoses are working properly.	
14	Run a few strokes in jogging mode and check that the chain is gliding properly upon itself and is correctly adjusted sideways.	

Continues on next page

Refitting the track cover

	Action	Note
1	Refit the cover and secure with the screws.	 xx2200000616 Screws: ISO 7380-2 M6x12 Class 10.9 (4 pcs) Tightening torque: 8 Nm

Concluding procedure

	Action	Note
1	**DANGER** Make sure all safety requirements are met when performing the first test run. See *First test run may cause injury or damage on page 29*.	

5.4.2.5 Replacing the fixed chain end

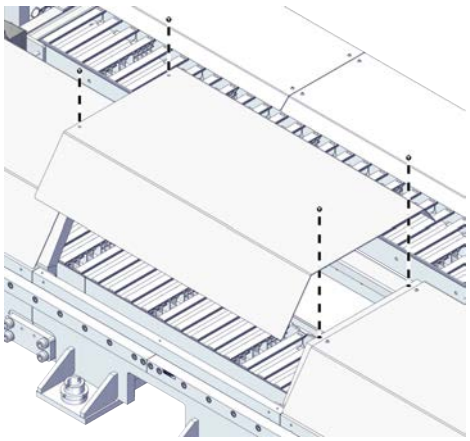
Removing the fixed chain end

Use this procedure to remove the fixed chain end.

Preparations before removing the fixed chain end

	Action	Note
1	If there is no enough space for the maintenance work, clean the surroundings.	
2	If there is any robot on the track, jog it to the lifting/transportation position.	
3	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the product, before entering the safeguarded space.	

Removing the covers

	Action	Note
1	**CAUTION** Whenever parting/mating motor and gearbox, the gears may be damaged if excessive force is used!	
2	**DANGER** Turn off all electric power, hydraulic and pneumatic pressure supplies to the robot and for the track motion.	
3	Remove the covers.	 xx2200000616
4	Move the carriage to a proper position.	

Continues on next page

Removing the fixed chain end

	Action	Note
1	**DANGER** Turn off all electric power, hydraulic and pneumatic pressure supplies to the robot and for the track motion.	
2	Move the carriage as far away as enough on the movement negative direction to make enough space for removing the fixed chain end.	 xx2200000887
3	Take a photo of how the cabling is strapped on the carriage. Pay special attention to how the IRB power cable is routed.	 xx2200000877
4	Remove the straps that ties the cabling to the cable chain.	
5	Loosen the screws locking the fixed chain end to the track.	 xx2200000888

Continues on next page

5.4.2.5 Replacing the fixed chain end
Continued

	Action	Note
6	Remove the plastic link bars.  **Tip** If needed, pull the cables out a little from inner side to make more space.	*Replacing the inner cable chain link on page 313* *Replacing the outer cable chain link on page 306*
7	Remove the cable chain link besides the fixed chain end.	
8	Remove the fixed chain end.	

Refitting the fixed chain end

Use this procedure to refit the fixed chain end.

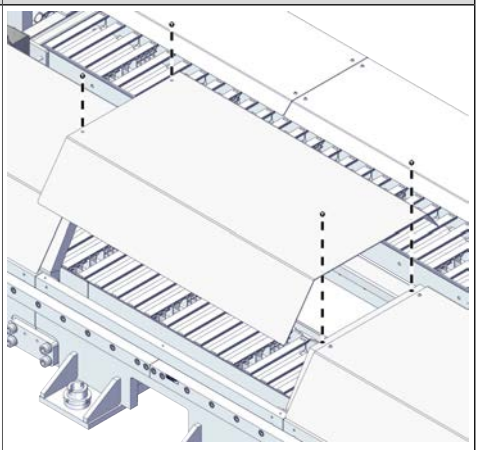
Refitting the fixed chain end

	Action	Note
1	 **Note** If any part of the cable chain tray has been removed, use Loctite 243 when refitting parts. Also note that the NYLOC nuts can only be used once.	
2	Refit the fixed chain end with bracket to the cable chain.  **Note** Be careful with the cables routing.	
3	Refit the cable chain link besides the fixed chain end.	*Replacing the inner cable chain link on page 313*
4	Refit the plastic link bars.	*Replacing the outer cable chain link on page 306*
5	Pull the cables from outer side and route the cable.	

Continues on next page

	Action	Note
6	Refit the fixed chain end with cables to the carriage and secure with screws.	 xx2200000888 Screws: ISO 4762 M6x20 Class 8.8 (4 pcs) Washers: BN 792 M6 Washer (4 pcs) Tightening torque: 10 Nm
7	Fix the cables with straps on the cable chain according to the photo taken before the replacement.	
8	Run a few strokes in jogging mode and check that the chain is gliding properly upon itself and is correctly adjusted sideways.	

Refitting the track cover

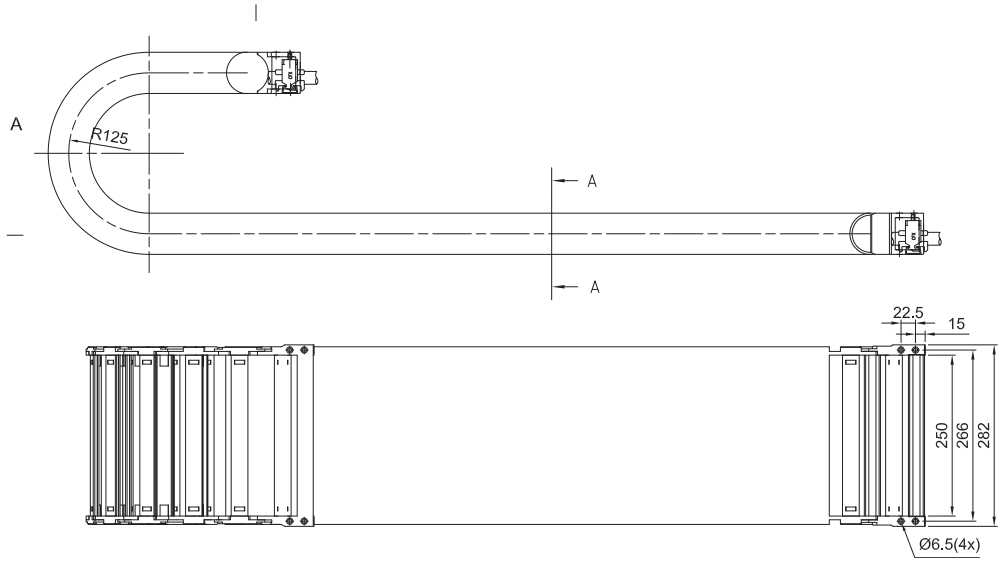
	Action	Note
1	Refit the cover and secure with the screws.	 xx2200000616 Screws: ISO 7380-2 M6x12 Class 10.9 (4 pcs) Tightening torque: 8 Nm

Concluding procedure

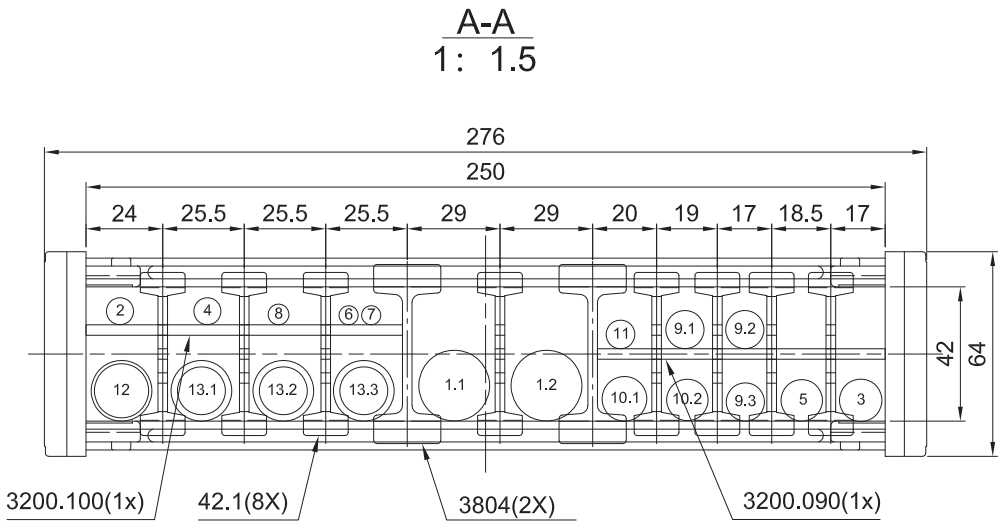
	Action	Note
1	**DANGER** Make sure all safety requirements are met when performing the first test run. See *First test run may cause injury or damage on page 29*.	

5.4.2.6 Replacing the cables in cable chain

Cable layout



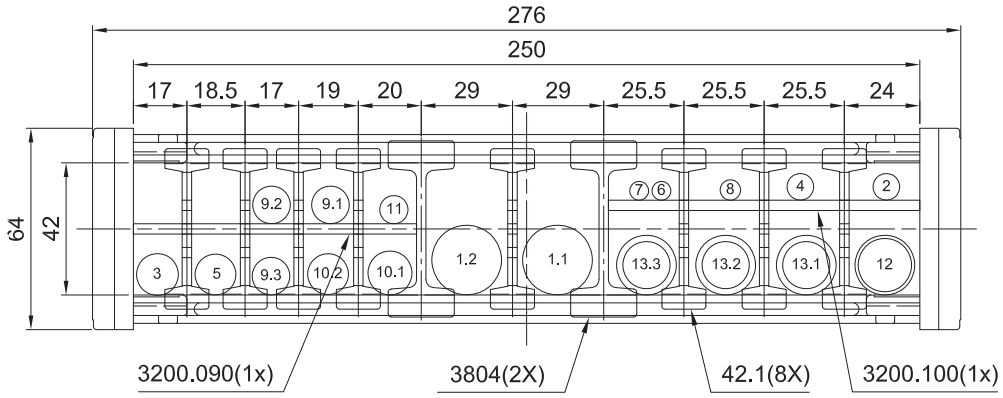
xx2200000861



xx2400001098

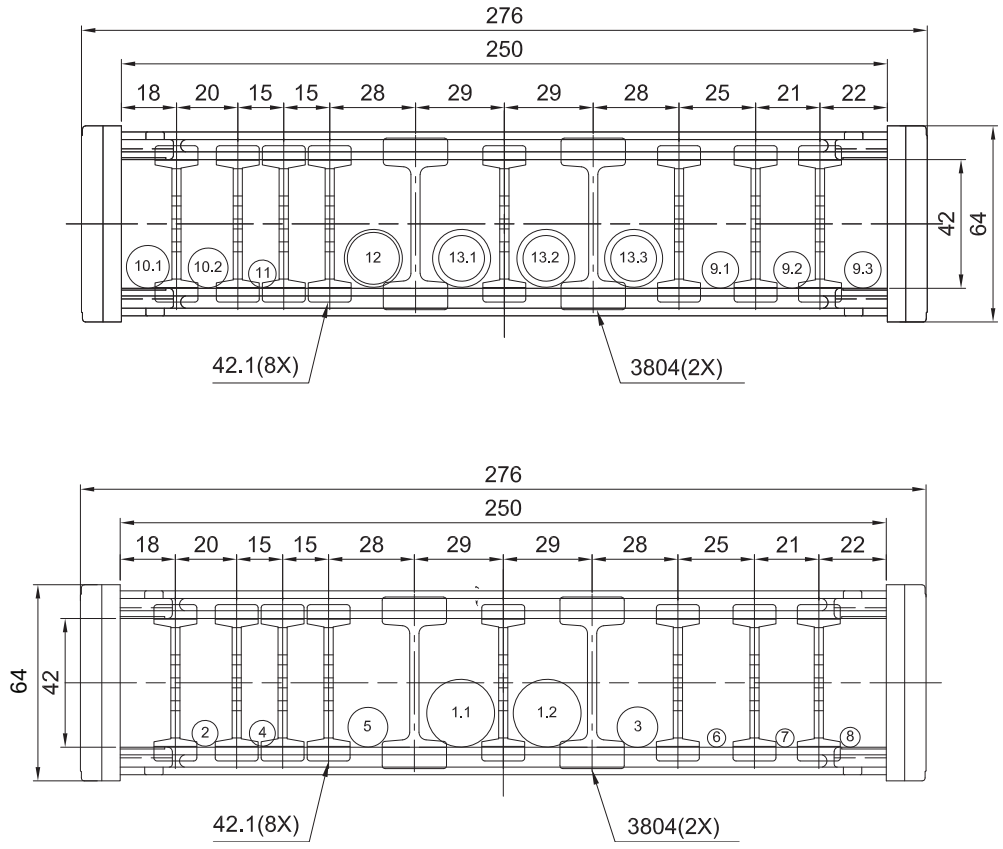
Figure 5.1: Cable layout, Carriage one

Continues on next page



xx2400001099

Figure 5.2: Cable layout, Carriage two



xx2400001100

Figure 5.3: Cable layout, Carriage one, external cable chain & internal cable chain

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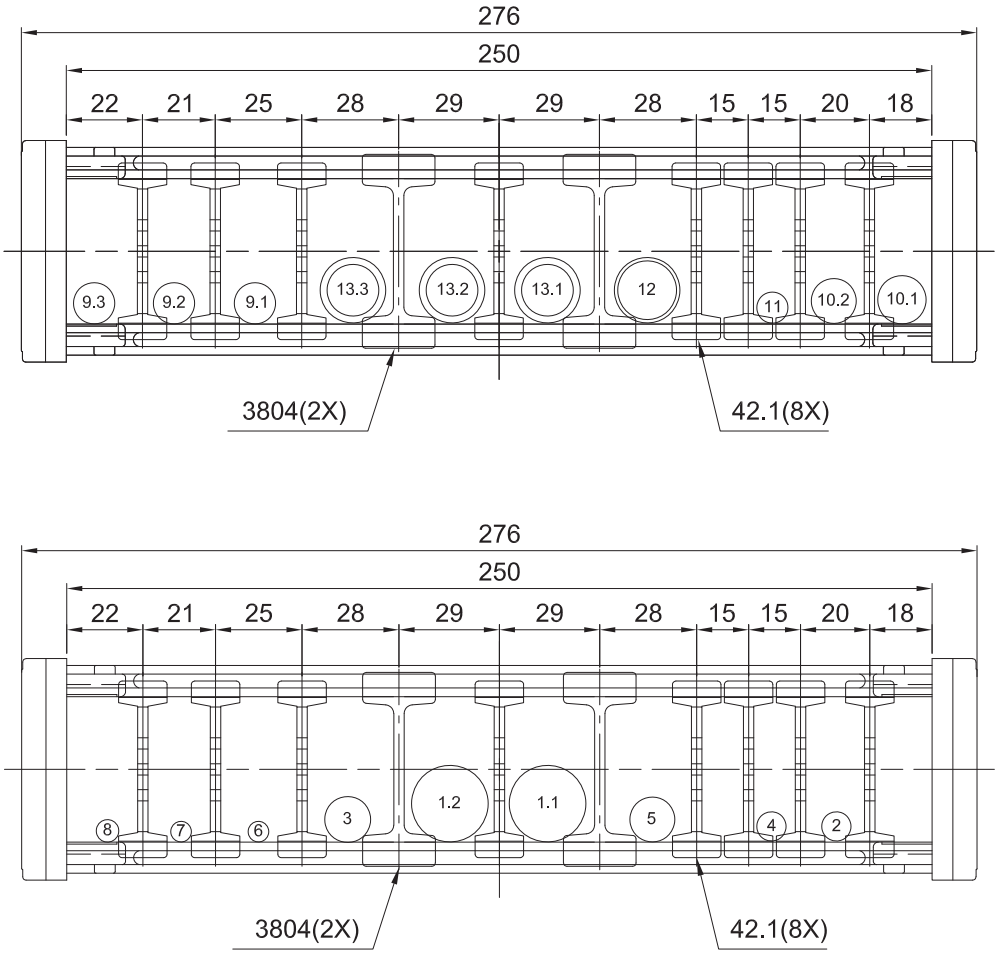
5.4.2.6 Replacing the cables in cable chain
Continued



xx2400001101

Figure 5.4: Cable layout, Carriage two, external cable chain & internal cable chain

Number	Description	Note
1	Robot power cable	
2	Robot resolver cable	
3	Track motor power cable	
4	Track motor resolver cable	
5	Servo gun motor cable	
6	Lubrication pump cable	
7	Lubrication feedback cable	
8	PE cable	
9	Welding power cable	
10	CP/CS cable	
11	EtherNet cabel	
12	Air pipe	
13	Water pipe	

Continues on next page

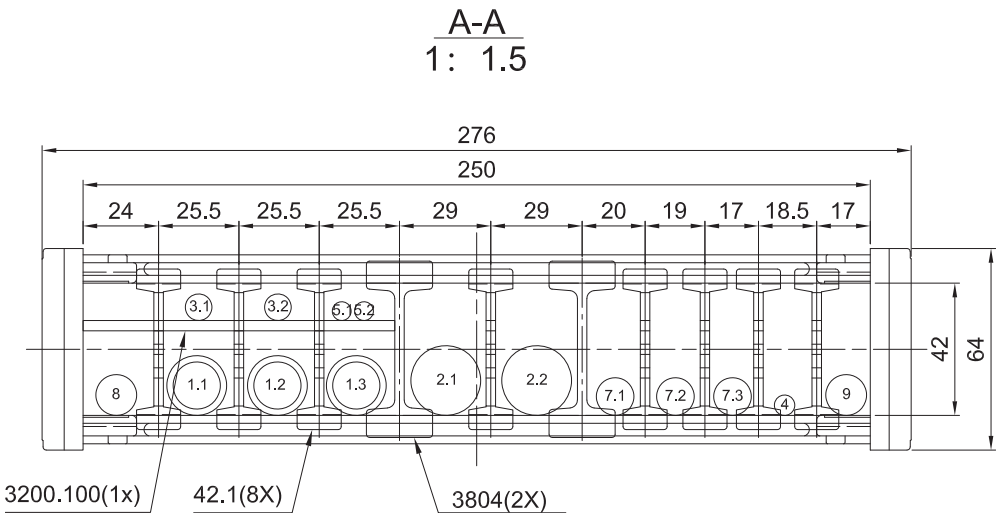


Figure 5.5: Cable layout, Carriage one, with Welding

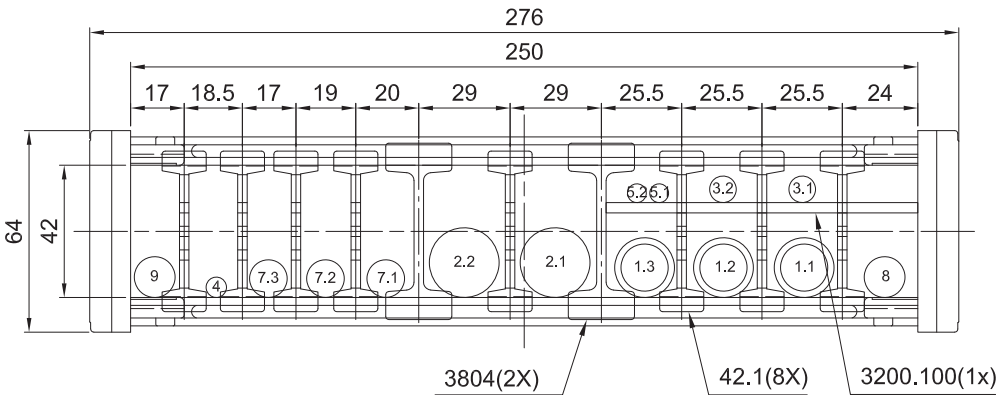


Figure 5.6: Cable layout, Carriage two, with Welding

Number	Description	Note
1	Water pipe and air pipe	
2	Robot cable - Power	
3	Robot cable - (Resolver and Track motor) - Resolver	
4	PE cable	
5	Lubrication pump and feedback cables	
7	Welding power cable	
8	Servo gun motor cable	
9	Track motor cable	

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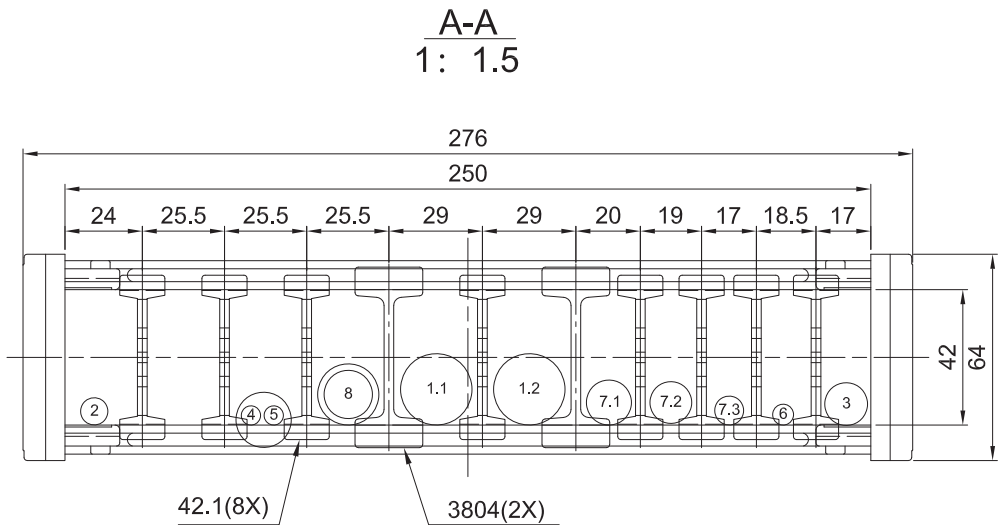
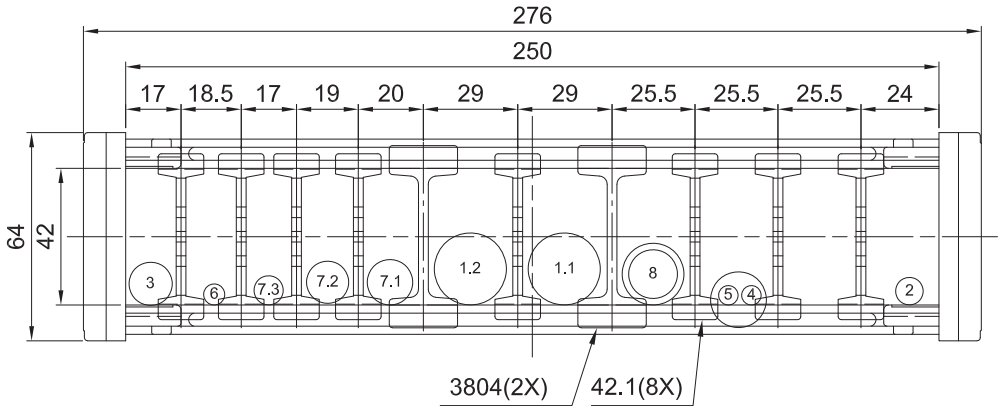
5.4.2.6 Replacing the cables in cable chain
Continued



xx2400001104

Figure 5.7: Cable layout, Carriage one, material handling



xx2400001105

Figure 5.8: Cable layout, Carriage two, material handling

Number	Description	Note
1	Robot power cable	
2	Robot resolver cable	
3	Track motor power cable	
4	Lubrication pump cable	
5	Lubrication feedback cable	
6	PE cable	
7	CP/CS cable (Device Net)	
8	CP/CS cable (Parallel) Ethernet cable	
9	Air pipe	

Continues on next page

Note

Take photos before any disassemble work on the cables.

Removing the cables in cable chain

Use this procedure to remove the cables in cable chain.

Preparations before removing the cables in cable chain

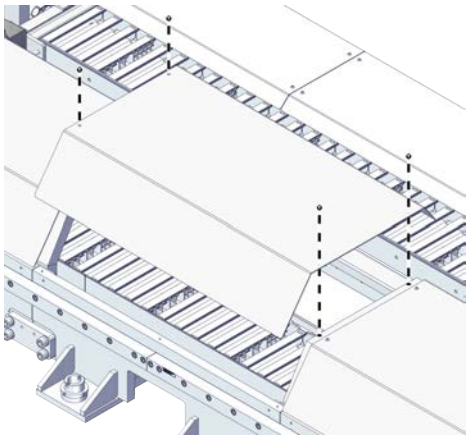
	Action	Note
1	If there is no enough space for the maintenance work, clean the surroundings.	
2	If there is any robot on the track, jog it to the lifting/transportation position.	
3	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the product, before entering the safeguarded space.	

Removing the covers

	Action	Note
1	**CAUTION** Whenever parting/mating motor and gearbox, the gears may be damaged if excessive force is used!	
2	**DANGER** Turn off all electric power, hydraulic and pneumatic pressure supplies to the robot and for the track motion.	

Continues on next page

5.4.2.6 Replacing the cables in cable chain
Continued

	Action	Note
3	Remove the covers.	 xx2200000616
4	Move the carriage to a proper position.	

Removing the fixed chain end

	Action	Note
1	**DANGER** Turn off all electric power, hydraulic and pneumatic pressure supplies to the robot and for the track motion.	
2	Move the carriage as far away as enough on the movement negative direction to make enough space for removing the fixed chain end.	 xx2200000887
3	Take a photo of how the cabling is strapped on the carriage. Pay special attention to how the IRB power cable is routed.	 xx2200000877

Continues on next page

	Action	Note
4	Remove the straps that ties the cabling to the cable chain.	
5	Loosen the screws locking the fixed chain end to the track.	 xx2200000888
6	Remove the plastic link bars. **Tip** If needed, pull the cables out a little from inner side to make more space.	*Replacing the inner cable chain link on page 313* *Replacing the outer cable chain link on page 306*
7	Remove the cable chain link besides the fixed chain end.	
8	Remove the fixed chain end.	

Removing the movable chain end

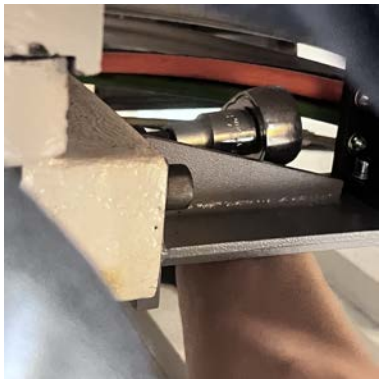
	Action	Note
1	**DANGER** Turn off all electric power, hydraulic and pneumatic pressure supplies to the robot and for the track motion.	
2	Move the carriage to make enough space for removing the movable chain end.	
3	Make a marking on the moving chain end to show its location relative to the connecting plate. This will facilitate alignment during refitting.	

Continues on next page

5.4.2.6 Replacing the cables in cable chain
Continued

	Action	Note
4	Take a photo of how the cabling is strapped on the carriage. Pay special attention to how the IRB power cable is routed.	 xx2200000877
5	Remove the strapping that ties the cabling to the cable chain.	
6	Disconnect the all connectors on the carriage to release all cables. **CAUTION** Cooling water may run out. Protect the connectors from getting wet.	
7	Remove the screws locking the cable drawer.	 xx2200000878

Continues on next page

	Action	Note
8	Pull out the cable drawer.	 xx2200000879  xx2200000880
9	Loosen the two screws locking the movable chain end bracket to the carriage.	 xx2200000881  xx2200000882

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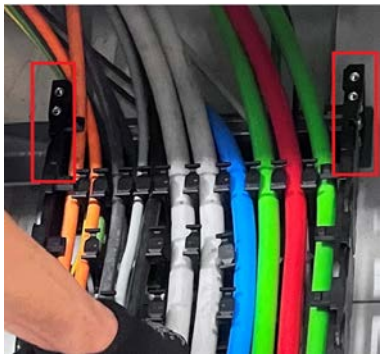
5.4.2.6 Replacing the cables in cable chain
Continued

	Action	Note
10	Release the bracket to make enough space for removing the movable chain end.	 xx2200000883
11	Remove the plastic link bars.	 xx2200000884
12	Remove the screws locking the movable chain end to the bracket.	 xx2200000885
13	Remove the cable chain link besides the movable chain end.	*Replacing the inner cable chain link on page 313* *Replacing the outer cable chain link on page 306*
14	Remove the movable chain end.	

Removing the cables in cable chain

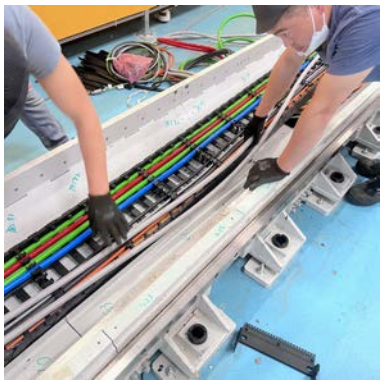
	Action	Note
1	Move the carriage as far away as enough on the movement position direction to make enough space.	

Continues on next page

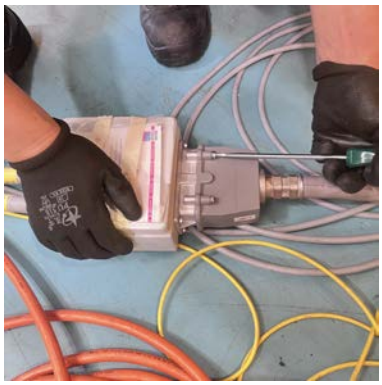
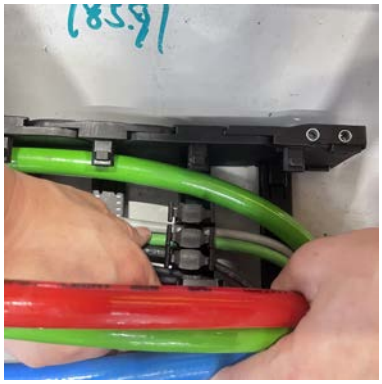
	Action	Note
2	Pull the cables from inner side on the fixed chain end opening to lay the cable chain flat.	 xx2200000896
3	Find the cable you need to replace.	
4	If needed, flip the cable chain over to make the cable that need to replace is on the upper side. **Tip** Pull out all cables from the cable drawer and take the movable chain end part of the cable chain to flip the cable chain over.	
5	Remove all the plastic link bars on the upper side.	 xx2200000890  xx2200000889

Continues on next page

5.4.2.6 Replacing the cables in cable chain
Continued

	Action	Note
6	Pull the connector out from the cable drawer.	 xx2200000891
7	Pull the cable out from the cable chain. **Note** Take a photo of the cable routing.	 xx2200000892  xx2200000893
8	Pull out the cable from the opening on the track carefully.	 xx2200000894

Continues on next page

	Action	Note
9	Disconnect the cable connector on the other side.	 xx2200000895
10	Remove the cable.	
11	If any very thick cable that cannot be removed directly, remove the cables besides it and then move the separators until the required cable can be removed.	 xx2200000900  xx2200001087

Refitting the cables in cable chain

Use this procedure to refit the cables in cable chain.

Refitting the cables in cable chain

	Action	Note
1	**Note** If any part of the cable chain tray has been removed, use Loctite 243 when refitting parts. Also note that the NYLOC nuts can only be used once.	

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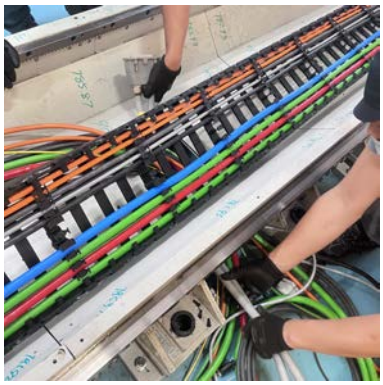
5.4.2.6 Replacing the cables in cable chain

Continued

	Action	Note
2	Insert the cable through the opening on the track.	 xx2200000897
3	Insert the cable into the cable chain. **Note** Route the cable according to the photo taken during disassembly.	 xx2200000898
4	Press the cable back to the cable chain.	 xx2200000899
5	If the cable chain has been flipped over, turn it back.	

Continues on next page

	Action	Note
6	Insert the cable connector back through the cable drawer.	 xx2200000891
7	Route the cable and ensure that the cable is made as flat as possible without cables piling up.	
8	Refit the plastic link bars.	 xx2200000890
9	Reconnect the connector on the outer side if removed.	

Refitting the movable chain end

	Action	Note
1	**Note** If any part of the cable chain tray has been removed, use Loctite 243 when refitting parts. Also note that the NYLOC nuts can only be used once.	

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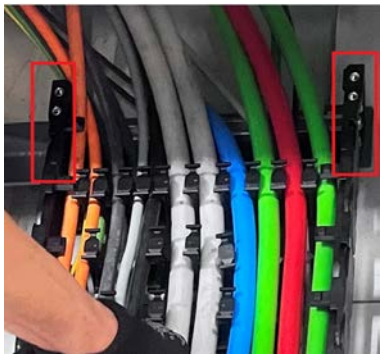
5.4.2.6 Replacing the cables in cable chain

Continued

	Action	Note
2	Refit the movable chain end to the bracket and secure with screws.	 xx2200000885 Screws: ISO 4762 M6x20 Class 8.8 (4 pcs) Washers: BN 792 M6 Washer (4 pcs) Tightening torque: 10 Nm
3	Refit the movable chain end with bracket to the cable chain. **Note** Be careful with the cables routing.	
4	Refit the cable chain link besides the movable chain end.	*Replacing the inner cable chain link on page 313* *Replacing the outer cable chain link on page 306*
5	Refit the plastic link bars.	
6	Refit the movable chain end bracket with cables to the carriage and secure with screws.	 xx2200000882 Screws: ISO 4762 M12x35 Class 8.8 (2 pcs) Washers: BN 792 M12 Washer (2 pcs) Tightening torque: 83 Nm
7	Pull the cables out and route the cable in the movable chain end.	
8	Fix the cables with straps on the cable chain according to the photo taken before the replacement.	

Continues on next page

	Action	Note
9	Refit the cable drawer and secure with screws.	 xx2200000879  xx2200000878 Screws: ISO 4762 M8x20 Class 8.8 (4 pcs) Washers: BN 792 M8 Washer (4 pcs) Tightening torque: 25 Nm
10	Reconnect all connectors according to the diagram.	
11	Use a spirit level to check that the chain is level in the tray. If needed, adjust the levelling bolts or shim the brackets that hold the tray.	
12	Switch on the power and jog all axes to check that the cabling is correctly connected.	
13	Check that all process cabling and hoses are working properly.	
14	Run a few strokes in jogging mode and check that the chain is gliding properly upon itself and is correctly adjusted sideways.	

Continues on next page

5.4.2.6 Replacing the cables in cable chain

Continued

Refitting the fixed chain end

	Action	Note
1	**Note** If any part of the cable chain tray has been removed, use Loctite 243 when refitting parts. Also note that the NYLOC nuts can only be used once.	
2	Refit the fixed chain end with bracket to the cable chain. **Note** Be careful with the cables routing.	
3	Refit the cable chain link besides the fixed chain end.	*Replacing the inner cable chain link on page 313*
4	Refit the plastic link bars.	*Replacing the outer cable chain link on page 306*
5	Pull the cables from outer side and route the cable.	
6	Refit the fixed chain end with cables to the carriage and secure with screws.	 xx2200000888 Screws: ISO 4762 M6x20 Class 8.8 (4 pcs) Washers: BN 792 M6 Washer (4 pcs) Tightening torque: 10 Nm
7	Fix the cables with straps on the cable chain according to the photo taken before the replacement.	
8	Run a few strokes in jogging mode and check that the chain is gliding properly upon itself and is correctly adjusted sideways.	

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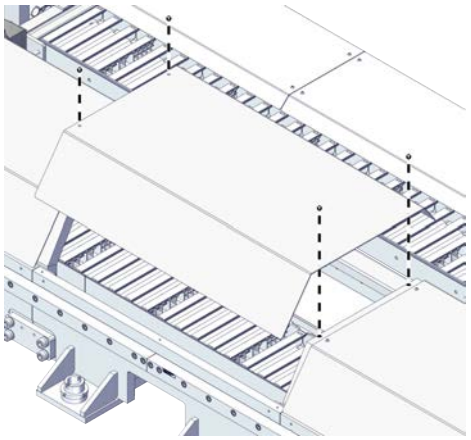
Refitting the track cover

	Action	Note
1	Refit the cover and secure with the screws.	 xx2200000616 Screws: ISO 7380-2 M6x12 Class 10.9 (4 pcs) Tightening torque: 8 Nm

Concluding procedure

	Action	Note
1	**DANGER** Make sure all safety requirements are met when performing the first test run. See *First test run may cause injury or damage on page 29*.	

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6 Calibration

6.1 Introduction to calibration

6.1.1 Introduction and calibration terminology

Calibration information

This chapter includes general information about the recommended calibration methods and also the detailed procedures for updating the revolution counters, checking the calibration position etc.

Detailed instructions of how to perform Axis Calibration are given on the FlexPendant during the calibration procedure. To prepare calibration with Axis Calibration method, see *Calibrating with Axis Calibration method on page 366*.

Calibration terminology

Term	Definition
Calibration method	A collective term for several methods that might be available for calibrating the ABB robot. Each method contains calibration routines.
Synchronization position	Known position of the complete robot where the angle of each axis can be checked against visual synchronization marks.
Calibration position	Known position of the complete robot that is used for calibration of the robot.
Standard calibration	A generic term for all calibration methods that aim to move the robot to calibration position.
Fine calibration	A calibration routine that generates a new zero position of the robot.
Reference calibration	A calibration routine that in the first step generates a reference to current zero position of the robot. The same calibration routine can later on be used to recalibrate the robot back to the same position as when the reference was stored. This routine is more flexible compared to fine calibration and is used when tools and process equipment are installed. Requires that a reference is created before being used for recalibrating the robot. Requires that the robot is dressed with the same tools and process equipment during calibration as during creation of the reference values.
Update revolution counter	A calibration routine to make a rough calibration of each manipulator axis.
Synchronization mark	Visual marks on the robot axes. When marks are aligned, the robot is in synchronization position.

6.1.2 Calibration methods

Overview

This section specifies the different types of calibration and the calibration methods that are supplied by ABB.

Types of calibration

Type of calibration	Description	Calibration method
Standard calibration	The calibrated robot is positioned at calibration position.	Axis Calibration Pin Calibration

Brief description of calibration methods

Axis Calibration method

Axis Calibration is a standard calibration method for calibration of IRT 710 OmniCore. It is the recommended method in order to achieve proper performance.

The following routines are available for the Axis Calibration method:

- Fine calibration
- Update revolution counters
- Reference calibration

The calibration equipment for Axis Calibration is delivered as a toolkit.

An introduction to the calibration method is given in this manual, see *Calibrating with Axis Calibration method on page 366*.

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

Pin calibration method

Pin calibration method is a method based on releasing the motor brakes of the product and manually moving the carriage into a calibration position. The manual calibration is using the manual methods for fine calibration and updating revolution counters.

With the manual calibration method, the product'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.

References

Article numbers for the calibration tools are listed in the section *Special tools on page 394*.

6.1.3 When to calibrate

When to calibrate

The system must be calibrated if any of the following situations occur.

The resolver values are changed

If resolver values are changed, the track motion must be recalibrated using the calibration methods supplied by ABB. Calibrate the track motion carefully with standard calibration.

The resolver values will change when parts affecting the calibration position are replaced on the track motion, for example motors or parts of the transmission.

This is detailed in *Pin calibration on page 378*.

The revolution counter memory is lost

If the revolution counter memory is lost, the counters must be updated. See *Updating revolution counters on page 363*. This will occur when:

- The battery is discharged
- A resolver error occurs
- The signal between a resolver and measurement board is interrupted
- A robot axis is moved with the control system disconnected

The revolution counters must also be updated after the robot and controller are connected at the first installation.

The track motion is rebuilt

If the track is rebuilt, for example after a crash or when the reach ability of the track is changed, it needs to be recalibrated for new resolver values.

This is detailed in *Pin calibration on page 378*.

6.2 Synchronization marks and track motion movement directions

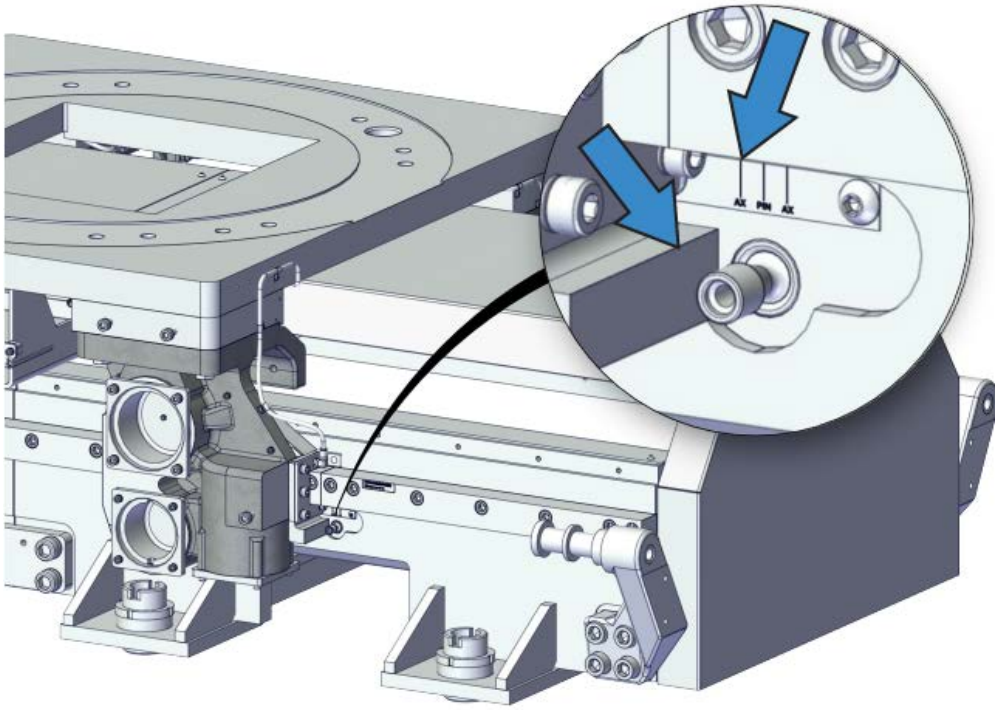
6.2.1 Synchronization marks and synchronization position for track motions

Introduction

This section shows the position of the synchronization marks and the synchronization position for each carriage.

synchronization marks - Axis calibration

The calibration bracket should touch the axis pin on the track and be aligned with the nearest axis synchronization mark at the same time.



xx2200001157

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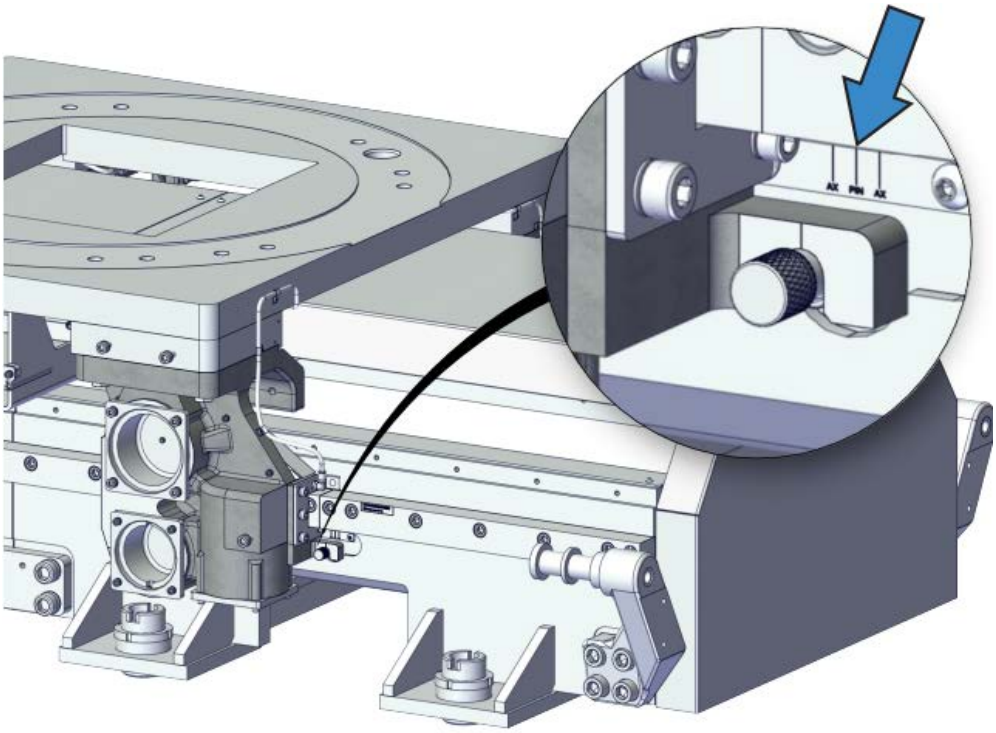
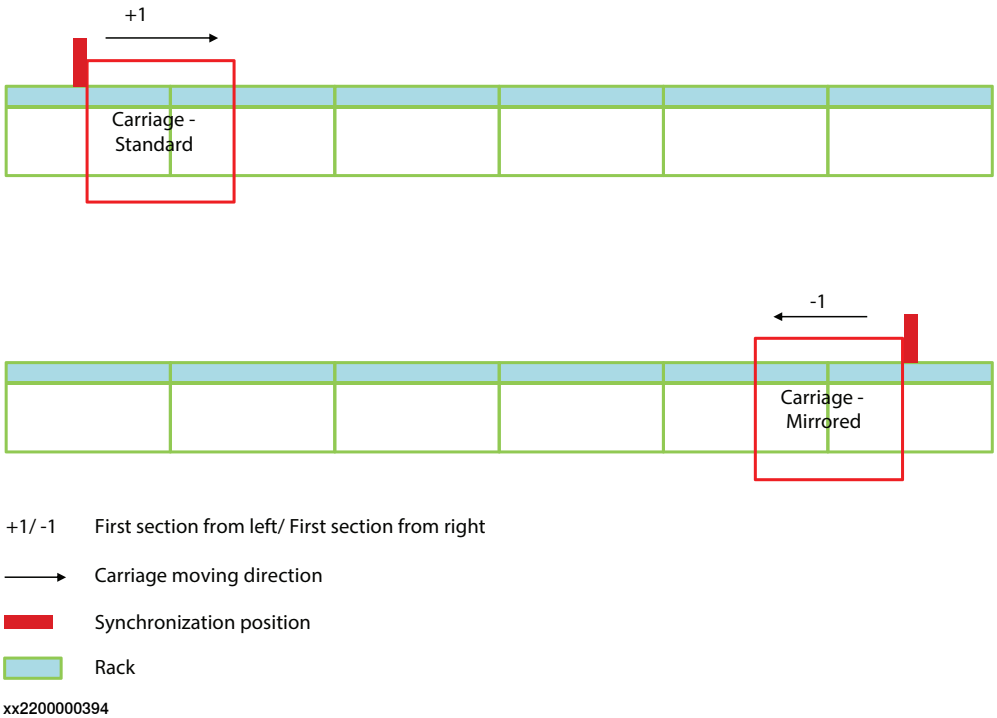
synchronization marks - Pin calibration



xx2200001158

Synchronization position and movement directions - One carriage



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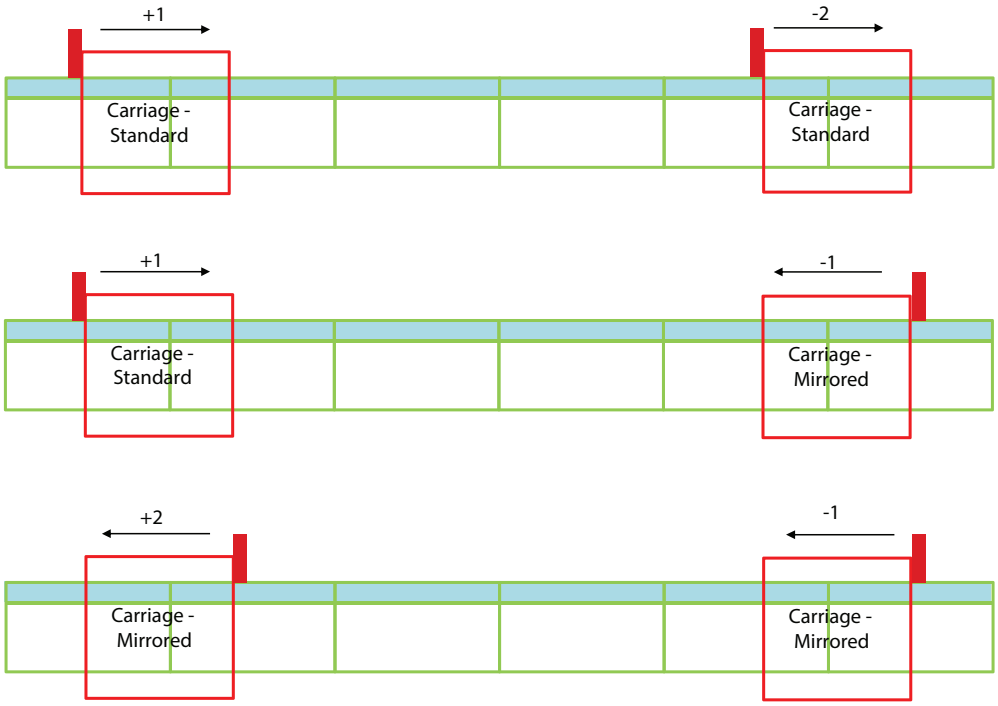
6.2.1 Synchronization marks and synchronization position for track motions

Continued

Synchronization position and movement directions - Two carriages



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Carriage moving direction

Synchronization position

Rack

xx2200000395

6.3 Updating revolution counters

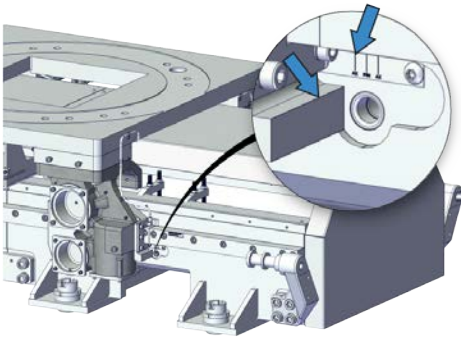
6.3.1 Updating revolution counters for axis calibration

Introduction

This section describes how to do a rough calibration of each track axis by updating the revolution counter for each axis, using the FlexPendant.

Step 1 - Manually running the manipulator to the synchronization position

Use this procedure to manually run the manipulator to the synchronization position.

	Action	Note
1	Select axis-by-axis motion mode.	
2	Jog the carriage to align the synchronization marks.	Use the nearest synchronization mark.  xx2300001326
3	When all axes are positioned, update the revolution counter.	

Step 2 - Updating the revolution counter with the FlexPendant

Use this procedure to update the revolution counter with the FlexPendant.

	Action
1	On the start screen, tap **Calibrate**.
2	Select **Calibration** from the menu. The **Mechanical Units** page displays a list of available mechanical units. **Note** This step is required only if you are not already in the **Mechanical Unit** page when you open **Calibrate**. **Note** The **Mechanical Unit** page is displayed only if there are more than one mechanical unit available. Otherwise, the calibration summary page for the available mechanical unit is displayed.
3	Select the mechanical unit for which revolution counter need to be updated.
4	The calibration summary page for the selected mechanical unit is displayed. Calibration method used at factory for each axis is shown, as well as calibration method used during last field calibration.

Continues on next page

6.3.1 Updating revolution counters for axis calibration

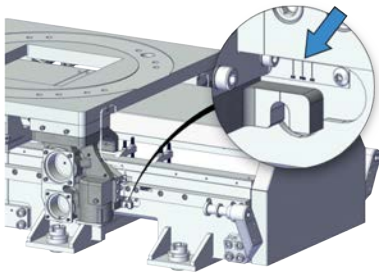
Continued

	Action
5	Tap **Calibration Methods** on the right pane. The calibration options are displayed.
6	Tap **Revolution Counters**.
7	In the **Selection** column select the axes for which revolution counters need to be updated.
8	Tap **Update**. A dialog box is displayed, warning that the updating operation cannot be undone: • Tap **Update** to proceed with updating the revolution counters. • Tap **Cancel** to cancel updating the revolution counters. Tapping **Update** and a confirmation window is displayed.
9	Tap **OK**. The revolution counter for the selected axes is updated.
10	**CAUTION** If a revolution counter is incorrectly updated, it will cause incorrect track positioning, which in turn may cause damage or injury! Check the synchronization position very carefully after each update. See *Checking the synchronization position on page 380*.

6.3.2 Updating revolution counters for pin calibration

Procedure

This procedure must be applied if revolution counter value is loss for the Track.

	Action	Note/Illustration
1	Align the sharp edge of the moving part of the calibration marker with the line of the fixed part calibration marker.	 xx2300001300
2	Tap **ABB** on the top left of the FlexPendant.	
3	Tap **Calibration**.	
4	Select the desired mechanical unit.	
5	Tap **Update revolution counters**.	
6	Select the desired axis.	
7	Tap **Update**.	

6.4 Calibrating with Axis Calibration method

Note

Make sure that the poses of the robots and work objects are always the same before calibration.

Continues on next page

6.4.1 Description of Axis Calibration

Instructions for Axis Calibration procedure given on the FlexPendant

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

This manual contains a brief description of the method, additional information to the information given on the FlexPendant, article number for the tools and images of where to fit the calibration tools on the robot.

Overview of the Axis Calibration procedure

The Axis Calibration procedure applies to all axes, and is performed on one carriage at the time. The carriages are both manually and automatically moved into position, as instructed on the FlexPendant.

Bushings are installed on each calibration position at delivery, for installation of the calibration tools.

The Axis Calibration procedure described roughly:

1 A removable calibration tool is inserted by the operator into a calibration bushing on the axis chosen for calibration, according to instructions on the FlexPendant.

> **WARNING**
>
> Calibrating the track with Axis Calibration requires special calibration tools from ABB. Using other pins in the calibration bushings may cause severe damage to the robot and/or personnel.

> **WARNING**
>
> The calibration tool must be fully inserted into the calibration bushing, until the steel spring ring snaps into place.

2 During the calibration procedure, RobotWare moves the carriage chosen for calibration so that the calibration tools get into contact. RobotWare records values of the calibration position and repeats the coming-in-contact procedure several times to get an exact value of the axis position.

> **WARNING**
>
> Risk of pinching! The contact force for large robots can be up to 150 kg. Keep a safe distance to the robot.

3 The axis position is stored in RobotWare with an active choice from the operator.

Continues on next page

6.4.1 Description of Axis Calibration
Continued

Routines in the calibration procedure

The following routines are available in the Axis Calibration procedure, given at the beginning of the procedure on the FlexPendant.

Fine calibration routine

Choose this routine to calibrate the track when there are no tools, process cabling or equipment fitted to the track.

Reference calibration routine

Choose this routine to create reference values and to calibrate the robot when the robot is dressed with tools, process cabling or other equipment.

> **Note**
>
> When calibrating the robot with the reference calibration routine, the robot must be dressed with the same tools, process cabling and any other equipment as when the reference values were created.

If calibrating the robot with reference calibration there must be reference values created before repair is made to the robot, if values are not already available. Creating new values requires possibility to move the robot. The reference values contain positions of all axes, torque of axes and technical data about the tool installed. A benefit with reference calibration is that the current state of the robot is stored and not the state when the robot left the ABB factory. The reference value will be named according to tool name, date etc.

Follow the instructions given in the reference calibration routine on the FlexPendant to create reference values.

When reference calibration is performed, the robot is restored to the status given by the reference values.

Update revolution counters

Choose this routine to make a rough calibration of each track carriage by updating the revolution counter for each carriage, using the FlexPendant.

Validation

In the mentioned routines, it is also possible to validate the calibration data.

6.4.2 Calibration tools for Axis Calibration

Calibration tool set

The calibration tools used for Axis Calibration are designed to meet requirements for calibration performance, durability and safety in case of accidental damage.

The calibration tool will eventually break from fatigue after longer period of use and then needs to be replaced. There is no risk for bad calibrations as long as the calibration tool is in one piece.

WARNING

Calibrating the track with Axis Calibration requires special calibration tools from ABB. Using other pins in the calibration bushings may cause severe damage to the robot and/or personnel.

Equipment, etc.	Article number	Note
Calibration toolbox, Axis Calibration	3HAC055412-001	Delivered as a set of calibration tools. Required if Axis Calibration is the valid calibration method for the robot.

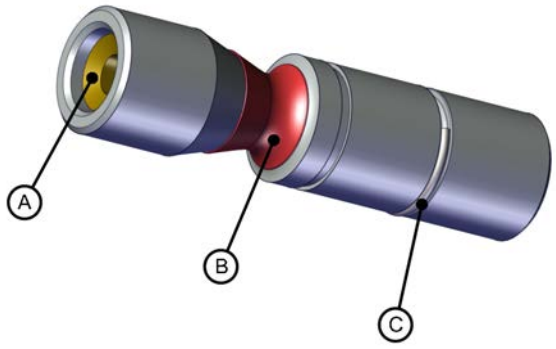
Examining the calibration tool

Check prior to usage

Before using the calibration tool, make sure that the tube insert, the plastic protection and the steel spring ring are present.

WARNING

If any part is missing or damaged, the tool must be replaced immediately.



xx1500001914

A	Tube insert
B	Plastic protection
C	Steel spring ring

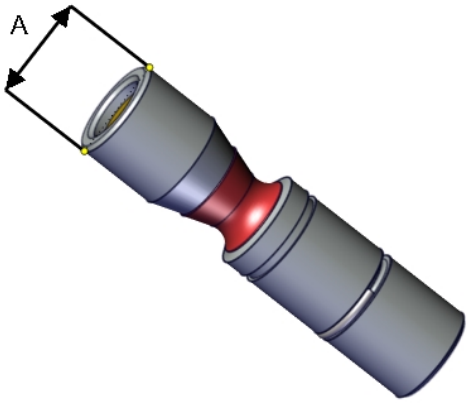
Continues on next page

6.4.2 Calibration tools for Axis Calibration
Continued

Periodic check of the calibration tool

If including the calibration tool in a local periodic check system, the following measures should be checked.

- Outer diameter within Ø12g4 mm, Ø8g4 mm or Ø6g5 mm (depending on calibration tool size).
- Straightness within 0.005 mm.



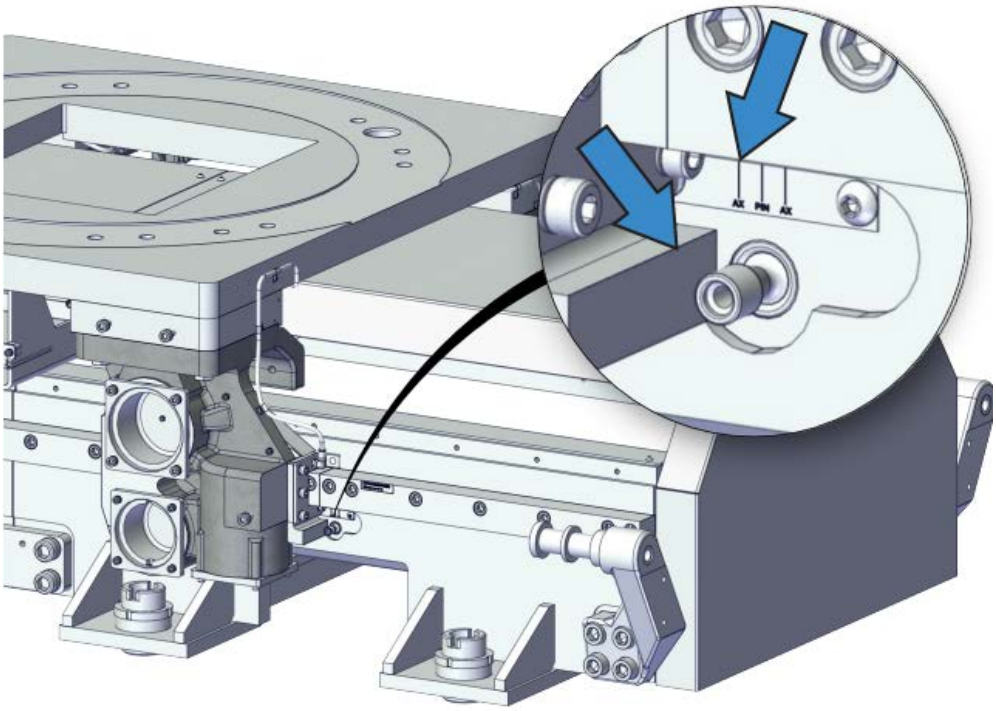
xx1500000951

A	Outer diameter

6.4.3 Installation locations for the calibration tools

Location of fixed calibration items

This section shows how the track is equipped with items for installation of calibration tools for Axis Calibration (fixed calibration pins and/or bushings). Installed calibration tools are not shown.



xx2200001157

6.4.4 Axis Calibration - Running the calibration procedure

Required tools

The calibration tools used for Axis Calibration are designed to meet requirements for calibration performance, durability and safety in case of accidental damage.

WARNING

Calibrating the track with Axis Calibration requires special calibration tools from ABB. Using other pins in the calibration holes may cause severe damage to the track and/or personnel.

Equipment, etc.	Article number	Note
Calibration toolbox, Axis Calibration	3HAC055412-001	Delivered as a set of calibration tools. Required if Axis Calibration is the valid calibration method for the robot.

Required consumables

Consumable	Article number	Note
Clean cloth	-	

Overview of the calibration procedure on the FlexPendant

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

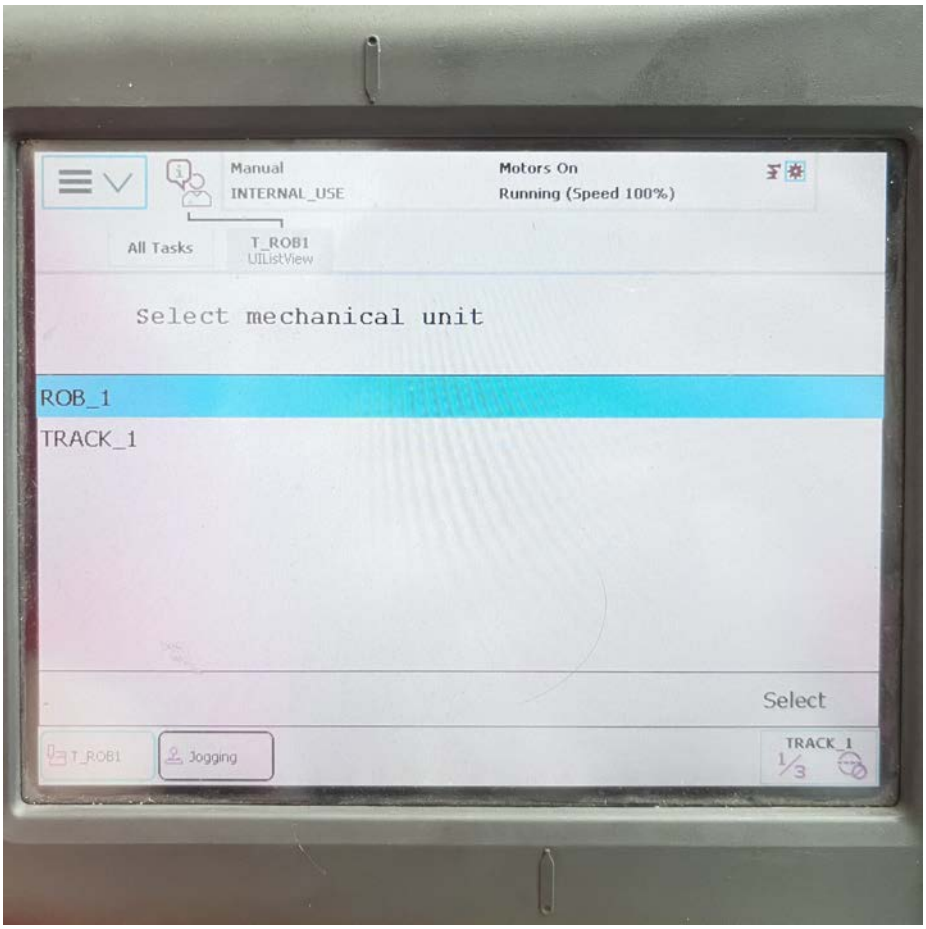
Use the following list to learn about the calibration procedure before running the RobotWare program on the FlexPendant. It gives you a brief overview of the calibration procedure.

After the calibration method has been started on the FlexPendant, the following sequence will be run.

1 Choose calibration routine. The routines are described in *Routines in the calibration procedure on page 368*.

Continues on next page

2 Choose which mechanical unit to calibrate.



xx2200001156

3 Choose which axis/axes to calibrate.
4 The carriage moves to synchronization position.
5 Validate the synchronization marks.
6 The carriage moves to preparation position.
7 The track performs a measurement sequence by moving the carriage back and forth.
8 Remove the calibration tool.
9 The robot moves to verify that the calibration tool is removed.
10 Choose whether to save the calibration data or not.

Calibration of the track is not finished until the calibration data is saved, as last step of the calibration procedure.

Continues on next page

6.4.4 Axis Calibration - Running the calibration procedure
Continued

Preparation prior to calibration

The calibration procedure is described in the FlexPendant while conducting it.

	Action	Note
1	**DANGER** While conducting the calibration, the track needs to be connected to power. Make sure that the track's working area is empty, as the robot can make unpredictable movements.	
2	Wipe the calibration tool clean. **Note** The calibration method is exact. Dust, dirt or color flakes will affect the calibration value.	Use a clean cloth.

Starting the calibration procedure

Use this procedure to start the Axis Calibration routine on the FlexPendant.

	Action	Note
1	Tap the calibration icon and enter the calibration main page.	
2	All mechanical units connected to the system are shown with their calibration status. Tap the mechanical unit in question.	
3	The calibration method used at ABB factory for each axis is shown, as well as calibration method used for the robot during last field calibration.	The FlexPendant will give all information needed to proceed with Axis Calibration.
4	**Valid for RobotWare 6** Tap **Call Calibration Method**. The software will automatically call for the procedure for the valid calibration method. If not, tap **Call Routine** and then tap **Axis calibration**.	
5	Follow the instructions given on the FlexPendant.	A brief overview of the sequence that will be run on the FlexPendant is given in *Overview of the calibration procedure on the FlexPendant on page 372*.

Restarting an interrupted calibration procedure

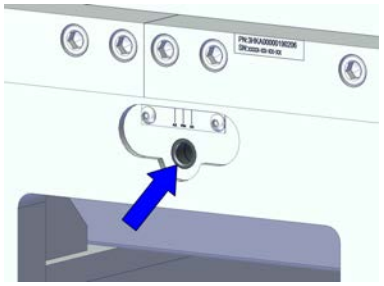
If the Axis Calibration procedure is interrupted before the calibration is finished, the RobotWare program needs to be started again. Use this procedure to take required action.

Situation	Action
The three-position enabling device on the FlexPendant has been released during robot movement.	Press and hold the three-position enabling device and press **Play**.

Continues on next page

Situation	Action
The RobotWare program is terminated with **PP to Main**.	Remove the calibration tool, if it is installed, and restart the calibration procedure from the beginning. See *Starting the calibration procedure*. If the calibration tool is in contact the robot axis needs to be jogged in order to release the calibration tool. Jogging the axis in wrong direction will cause the calibration tool to break. Directions of axis movement is shown in *Synchronization marks and track motion movement directions on page 360*.

After calibration

	Action	Note
1	Remove the calibration pin from the track.	
2	Check the o-ring on the calibration pin. Replace if damaged or missing.	
3	Check the bushing on the track. Replace if damaged or missing with a DIN 912 M10 bolt and a corresponding pin dismounting tool.	 xx2400000380

6.4.5 Reference calibration

Brief introduction to Reference Calibration

Reference calibration is a faster method compared to Fine calibration, as it refers to a previously made calibration.

1. Create a backup of the current robot system.
2. Check that the active calibration offset values corresponds to the values on the silver label (on the lower arm or the base).
3. Jog the manipulator so that all axes are in zero position (ex use `MoveAbsJ` instruction). Check that all axis scales are aligned with calibration marks.
4. If the scales differ from calibration marks it might depend on wrong turns of the revolution counters. Make a marker line on the corresponding axis to be able to validate the result of the calibration. If more than one motor revolutions are wrong, the calibration will fail.
5. Use a verification position. This is especially recommended if all axes were not aligned with the synchronization marks (step 3). Reuse an existing position that is suitable and accurate so it can be used to validate the repair. Use a position where a deviation in axis calibration gives a big deviation in positioning. Note! Check the position after each repair in one axis.
6. Use Reference calibration to save reference values for all axes that is to be replaced. Make sure that the values are saved in RobotStudio or FTP program. The files are located in "Active system folder name/HOME/RefCalibFiles".
7. Perform the repair.
8. Make sure that the tooling and process equipment are the same as when creating the reference. Use Reference calibration to update the system with new calibration offset value for the repaired axis.
9. Check the position against the verification position (step 5).
10. Proceed with the repair of the next axis, if necessary, and repeat (step 8-9) for every axis.
11. Perform test run.
12. Update the label for resolver values with new calibration values.

Manual tuning of calibration offset

Manual tuning of calibration offset is normally not needed, but can be useful in some situations. The requirement to do manual tuning is that there is a known accurate position, that worked accurately before the repair (step 5, see *Brief introduction to Reference Calibration on page 376*).

Example "Adjust axis 4":

1. Create a backup.
2. Run the manipulator to the verification position. (The manipulator position is now deviating from the verification position.)
3. Read and note current axis 4 value in degrees (example: 96.3 degrees).
4. Manually jog, only axis 4, so that the manipulator is correctly positioned to the verification position.

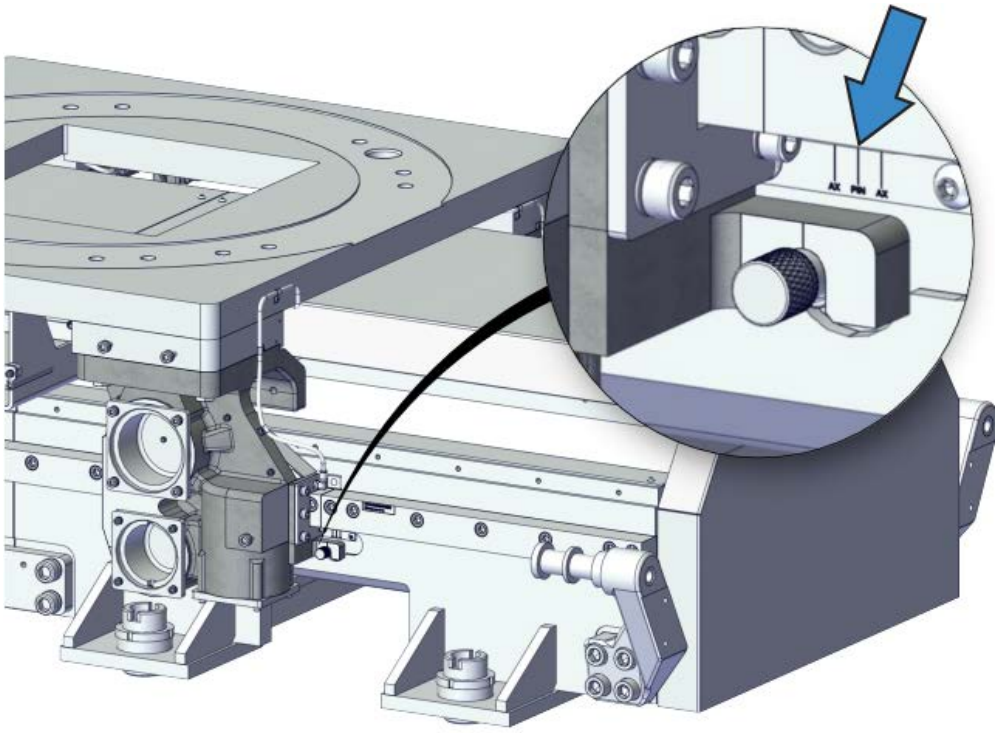
Continues on next page

5 Read and note current axis 4 value in degrees (example: 94.2 degrees).
6 Move the manipulator to its calibration position.
7 Calculate the angle difference (ie 96.3-94.2=2.1 degrees).
8 Manually jog axis 4 the calculated angle difference (-2.1). NOTE! The direction +/- shall be the same direction as the direction used when axis 4 was manually jogged to coincide with the verification process. In the example -2.1 degrees.
9 Make a new manual fine calibration of axis 4 with axis in -2.1 degrees position.
10 Check again against the verification position.
11 Repeat the manual tuning if needed.
12 Create a new reference if the intention is to use the reference in the future.

6.5 Pin calibration

Location of calibration tool

The calibration tool is mounted on the track motion as shown in the figure.



xx2200001158

Required equipment

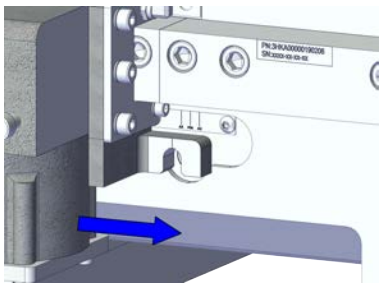
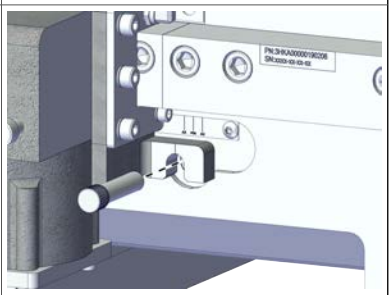
Equipment etc.	Article number	Note
Calibration tool	3HAC042466-001	Attachment screws 9DA183-52 (M10x35), 2 pcs, required. Not included with the calibration tool.
Calibration tool, mirrored	3HAC042467-001	Attachment screw 9DA183-52 (M10x35), 1 pc, required. Not included with the calibration tool.
Cleaning agent	-	Isopropanol

Calibrating

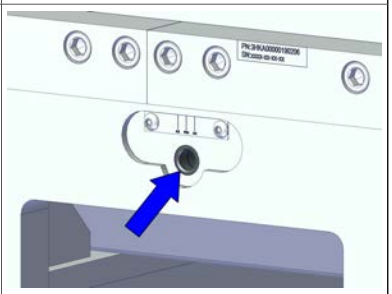
Use this procedure to perform fine calibration.

	Action	Note/Illustration
1	**WARNING** Make sure no persons are on the track motion when the carriage is in motion. Also make sure that the track motion's cover plates are free from loose objects, otherwise they can get trapped between the carriage and the plates.	

Continues on next page

	Action	Note/Illustration
2	**Note** The track motion does not need to be calibrated during restart. The resolvers only need to be calibrated when commissioning the system.	
3	Using the FlexPendant, jog the carriage close to the calibration gauge position.	
4	Jog the carriage to move it until the calibration holes line up.	 xx2200001160
5	Insert the calibration pin (3HAW107700354). A dowel pin diameter 8 mm can also be used.	 xx2200001161
6	Tap **ABB** on the top left of the FlexPendant	
7	Tap **Calibration**.	
8	Select the desired mechanical unit.	
9	Tap **Fine calibration**.	
10	Select the desired axis.	
11	Tap **Calibrate**.	

After calibration

	Action	Note
1	Remove the calibration pin from the track.	
2	Check the bushing on the track. Replace if damaged or missing with a DIN 912 M10 bolt and a corresponding pin dismounting tool.	 xx2400000380

6.6 Checking the synchronization position

Introduction

Check the synchronization position of the robot before beginning any programming of the robot system. This may be done:

- Using the **Jogging** window on the FlexPendant.

7 Decommissioning

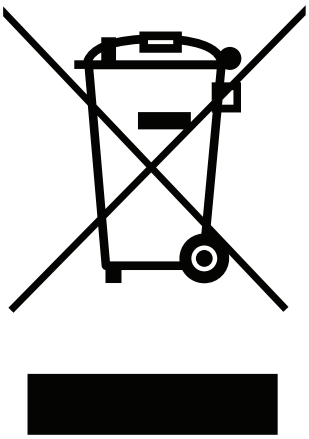
7.1 Environmental information

Introduction

ABB robots contain components in different materials. During decommissioning, all materials should be dismantled, recycled, or reused responsibly, according to the relevant laws and industrial standards. Robots or parts that can be reused or upcycled helps to reduce the usage of natural resources.

Symbol

The following symbol indicates that the product must not be disposed of as common garbage. Handle each product according to local regulations for the respective content (see table below).



xx1800000058

Materials used in the product

The table specifies some of the materials in the product and their respective use throughout the product.

Dispose components properly according to local regulations to prevent health or environmental hazards.

Material	Example application
Aluminium	Motor and gearbox housing
Batteries, Lithium	Serial measurement board
Cast iron/nodular iron	Crossmembers, linear carriage brackets
Copper	Cables, motors
Neodymium	Brakes, motors
Oil, grease	Lubrication system, gearbox
Plastic/rubber	Cables, connectors, hard stop bumper
Steel	Covers, sidemembers, carriage top plate, screws

Continues on next page

Oil and grease

Where possible, arrange for oil and grease to be recycled. Dispose of via an authorized person/contractor in accordance with local regulations. Do not dispose of oil and grease near lakes, ponds, ditches, down drains, or onto soil. Incineration must be carried out under controlled conditions in accordance with local regulations.

Also note that:

- Spills can form a film on water surfaces causing damage to organisms. Oxygen transfer could also be impaired.
- Spillage can penetrate the soil causing ground water contamination.

7.2 Scrapping of robot

Note

The decommissioning process shall be preceded by a risk assessment.

Important when scrapping the robot

DANGER

The risk assessment should consider hazards arising in the decommissioning, such as, but not limited to:

- Always remove all batteries. If a battery is exposed to heat, for example from a blow torch, it will explode.
- Always remove all oil/grease in gearboxes. If exposed to heat, for example from a blow torch, the oil/grease will catch fire.
- When motors are removed from the robot, the robot will collapse if it is not properly supported before the motor is removed.
- A used robot does not have the same performance as on delivery. Springs, brakes, bearings, and other parts might be worn or broken.

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8 Reference information

8.1 Introduction

General

This chapter includes general information, complementing the more specific information in the different procedures in the manual.

8.2 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 IRT 710 OmniCore

Deviations from the standard are motivated for IRT 710 OmniCore in the table below.

Requirement	Deviation for IRT 710 OmniCore	Motivation
§5.12.1 Limiting the range of motion by adjustable stops (§5.12.2) or by safety functions (§5.12.3).	IRT 710 OmniCore does not have adjustable mechanical stops.	The track motion is designed as segments, which can be reduced to limit the range of motion. The positioner is designed with fixed positions.

Other standards used in design

Standard	Description
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

Continues on next page

Standard	Description
IEC 60529:1989 + A2:2013	Degrees of protection provided by enclosures (IP code)

8.3 Unit conversion

Converter table

Use the following table to convert units used in this manual.

Quantity	Units		
Length	1 m	3.28 ft.	39.37 in
Weight	1 kg	2.21 lb.	
Weight	1 g	0.035 ounces	
Pressure	1 bar	100 kPa	14.5 psi
Force	1 N	0.225 lbf	
Moment	1 Nm	0.738 lbf-ft	
Volume	1 L	0.264 US gal	

8.4 Screw joints

General

This section describes how to tighten the various types of screw joints on ABB robots.

The instructions and torque values are valid for screw joints comprised of metallic materials and do *not* apply to soft or brittle materials.

UNBRAKO screws

UNBRAKO is a special type of screw recommended by ABB for certain screw joints. It features special surface treatment (Gleitmo as described below) and is extremely resistant to fatigue.

Whenever used, this is specified in the instructions, and in such cases, *no other type of replacement screw* is allowed. Using other types of screws will void any warranty and may potentially cause serious damage or injury.

Gleitmo treated screws

Gleitmo is a special surface treatment to reduce the friction when tightening the screw joint. It is recommended by ABB for M6-M20 screw joints. Screws treated with Gleitmo may be reused 3-4 times before the coating disappears. After this the screw must be discarded and replaced with a new one.

When handling screws treated with Gleitmo, protective gloves of **nitrile rubber** type should be used.

Generally, screws are lubricated with *Gleitmo 603* mixed with *Geomet 500* or *Geomet 702* in proportion 1:3. *Geomet* thickness varies according to screw dimensions, refer to the following.

Dimension	Lubricant	Geomet thickness
M6-M20 (any length except M20x60)	*Gleitmo 603* + *Geomet 500*	3-5 µm
M6-M20 (any length except M20x60)	*Gleitmo 603* + *Geomet 720*	3-5 µm
M20x60	*Gleitmo 603* + *Geomet 500*	8-12 µm
M20x60	*Gleitmo 603* + *Geomet 720*	6-10 µm

Screws lubricated in other ways

Screws lubricated with Molykote 1000 or Molykote P1900 should *only* be used when specified in the repair, maintenance or installation procedure descriptions.

In such cases, proceed as follows:

1. Apply lubricant to the screw thread.
2. Apply lubricant between the plain washer and screw head.
3. Screw dimensions of M8 or larger must be tightened with a torque wrench. Screw dimensions of M6 or smaller may be tightened without a torque wrench *if* this is done by trained and qualified personnel.

Continues on next page

Lubricant	Article number
Molykote 1000 (molybdenum disulphide grease)	3HAC042472-001
Molykote P1900 (molybdenum disulphide grease)	3HAC070875-001

Tightening torque

Before tightening any screw, note the following:

- Determine whether a **standard** tightening torque or **special** torque is to be applied. The **standard torques** are specified in the following tables. Any **special torques** are specified in the repair, maintenance or installation procedure descriptions. **Any special torque specified overrides the standard torque!**
- Use the *correct tightening torque* for each type of screw joint.
- Only use *correctly calibrated* torque keys.
- Always *tighten the joint by hand,* and never use pneumatic tools.
- Use the *correct tightening technique*, that is *do not* jerk. Tighten the screw in a slow, flowing motion.
- Maximum allowed total deviation from the specified value is **10%**!

Tightening torque for oil-lubricated screws with slotted or cross-recess head screws

The following table specifies the recommended standard tightening torque for *oil-lubricated screws* with *slotted or cross-recess head screws.*

Note

A special torque specified in the repair, maintenance or installation procedure overrides the standard torque.

Tightening torque for oil-lubricated screws with allen head screws

The following table specifies the recommended standard tightening torque for *oil-lubricated screws* with *allen head screws.*

Note

A special torque specified in the repair, maintenance or installation procedure overrides the standard torque.

Dimension	Tightening torque (Nm) Class 8.8, oil-lubricated	Tightening torque (Nm) Class 10.9, oil-lubricated	Tightening torque (Nm) Class 12.9, oil-lubricated
M5	6	-	-
M6	10	-	-
M8	24	34	40
M10	47	67	80
M12	82	115	140
M16	200	290	340
M20	400	560	670

Continues on next page

Dimension	Tightening torque (Nm) Class 8.8, oil-lubricated	Tightening torque (Nm) Class 10.9, oil-lubricated	Tightening torque (Nm) Class 12.9, oil-lubricated
M24	680	960	1150

Tightening torque for lubricated screws (Molykote, Gleitmo or equivalent) with allen head screws

The following table specifies the recommended standard tightening torque for *screws lubricated with Molycote 1000, Gleitmo 603 or equivalent* with *allen head screws.*

Note

A special torque specified in the repair, maintenance or installation procedure overrides the standard torque.

Dimension	Tightening torque (Nm) Class 10.9, lubricated [i]	Tightening torque (Nm) Class 12.9, lubricated [i]
M5		8
M6		14
M8	28	35
M10	55	70
M12	96	120
M16	235	300
M20	460	550
M24	790	950

[i] Lubricated with Molycote 1000, Gleitmo 603 or equivalent

8.5 Weight specifications

Definition

In installation, repair, and maintenance procedures, weights of the components handled are sometimes specified. All components exceeding 22 kg (50 lbs) are highlighted in this way.

To avoid injury, ABB recommends the use of a lifting accessory when handling components with a weight exceeding 22 kg. A wide range of lifting accessories and devices are available for each manipulator model.

Example

Following is an example of a weight specification in a procedure:

	Action	Note
	CAUTION The arm weighs 25 kg. All lifting accessories used must be sized accordingly.	

8.6 Standard toolkit

General

All service (repairs, maintenance, and installation) procedures contains lists of tools required to perform the specified activity.

All special tools required are listed directly in the procedures while all the tools that are considered standard are gathered in the standard toolkit and defined in the following table.

This way, the tools required are the sum of the standard toolkit and any tools listed in the instruction.

Contents, standard toolkit

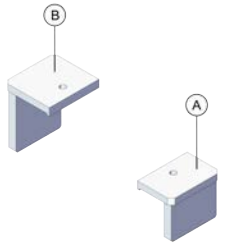
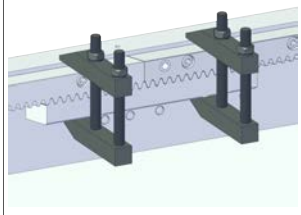
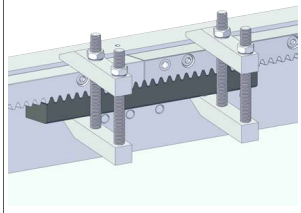
Qty	Tool	Rem.
1	Ring-open-end spanner 8-19 mm	
1	Socket head cap 2.5-17 mm	
1	Box spanner set	
1	Torque wrench 10-100 Nm	
1	Torque wrench 75-400 Nm	
1	Ratchet head for torque wrench 1/2	
1	Hex bit socket head cap no. 14 socket 40 mm L=100 mm	
1	Hex bit socket head cap no. 14 socket 40 mm L=20 mm	To be shortened to 12 mm
1	Hex bit socket head cap no. 6 socket 40 mm L=145 mm	
1	Hex bit socket head cap no. 6 socket 40mm bit L=220 mm	
1	Plastic mallet	
1	Copper mallet	
1	Filler gauge	

8.7 Special tools

General

All service instructions contain lists of tools required to perform the specified activity. The required tools are a sum of standard tools, defined in the section *Standard toolkit on page 393*, and of special tools, listed directly in the instructions and also gathered in this section.

Special tools

Qty	Tool	Article number	Picture
3	Rail Tool	A:Non-rack side 3HKA00000189982 B:Rack side 3HKA00000189983	 xx2200001179
3	Rack clamps	3HAW107700357	 xx2200001171
1	Rack Mounting block	3HAWL000011	 xx2200001170
1	Calibration pin	3HKA00000190563	 xx2200000667

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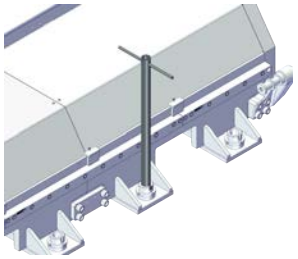
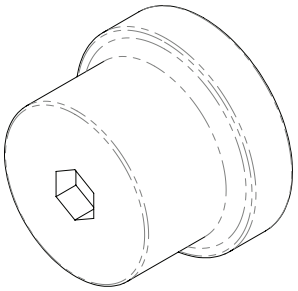
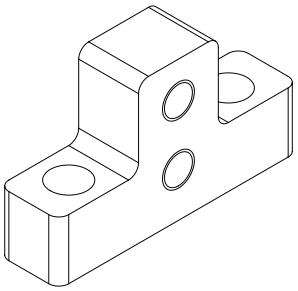
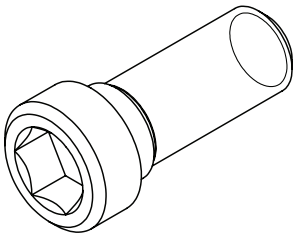
Qty	Tool	Article number	Picture
1	Calibration tool 12 mm	3HAC055412-001	 xx2200001173
1	Levelling tool	3HAW107700360	 xx2200001172
1	Tool for levelling screw nut tightening	3HKA00000216892	 xx2400000486
-	Axis Y adjusting tool For the drawing, see *Axis Y adjusting tool drawing on page 125*.	3HKA00000192738	 xx2400000487
-	Tooling bolt M16x35 For the drawing, see *Tooling bolt M16x35 drawing on page 125*.	3HKA00000216860	 xx2400000488

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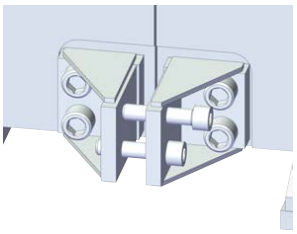
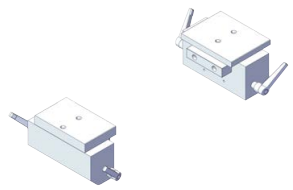
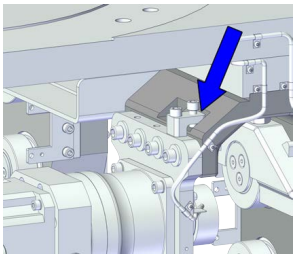
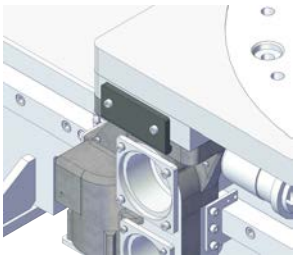
8.7 Special tools
Continued

Qty	Tool	Article number	Picture
-	Assisted tool set For the drawing, see *Assisted tool set drawing on page 126*.	3HKA00000216893 3HKA00000216894	 xx2400001324
1	Reducer uninstall tool unit	3HKA00000192850	 xx2200001166
1	Reducer backlash adjust tool	3HKA00000189964	 xx2200001167
1	Cam roller adjust tool	3HKA00000189966	 xx2200001169
1	Roller support block	3HKA00000186540	 xx2200001191

8.8 Lifting accessories and lifting instructions

General

Many repair and maintenance activities require different pieces of lifting accessories, which are specified in each procedure.

The use of each piece of lifting accessories is *not* detailed in the activity procedure, but in the instruction delivered with each piece of lifting accessories.

The instructions delivered with the lifting accessories should be stored for later reference.

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9 Spare parts

9.1 Spare part lists and illustrations

Location

Spare parts and exploded views are not included in the manual but delivered as a separate document for registered users on myABB Business Portal, *www.abb.com/myABB*.

Tip

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

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10 Circuit diagrams

Overview

The circuit diagrams are not included in this manual, but are available for registered users on myABB Business Portal, *www.abb.com/myABB*.

See the article numbers in the tables below.

Controllers

Product	Article numbers for circuit diagrams
Circuit diagram - OmniCore V250XT	*3HAC074000-008*
Circuit diagram - OmniCore V400XT	*3HAC082020-008*

Track

Product	Article numbers for circuit diagrams
IRT 710 OmniCore Circuit Diagram	3HAC091443-001

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