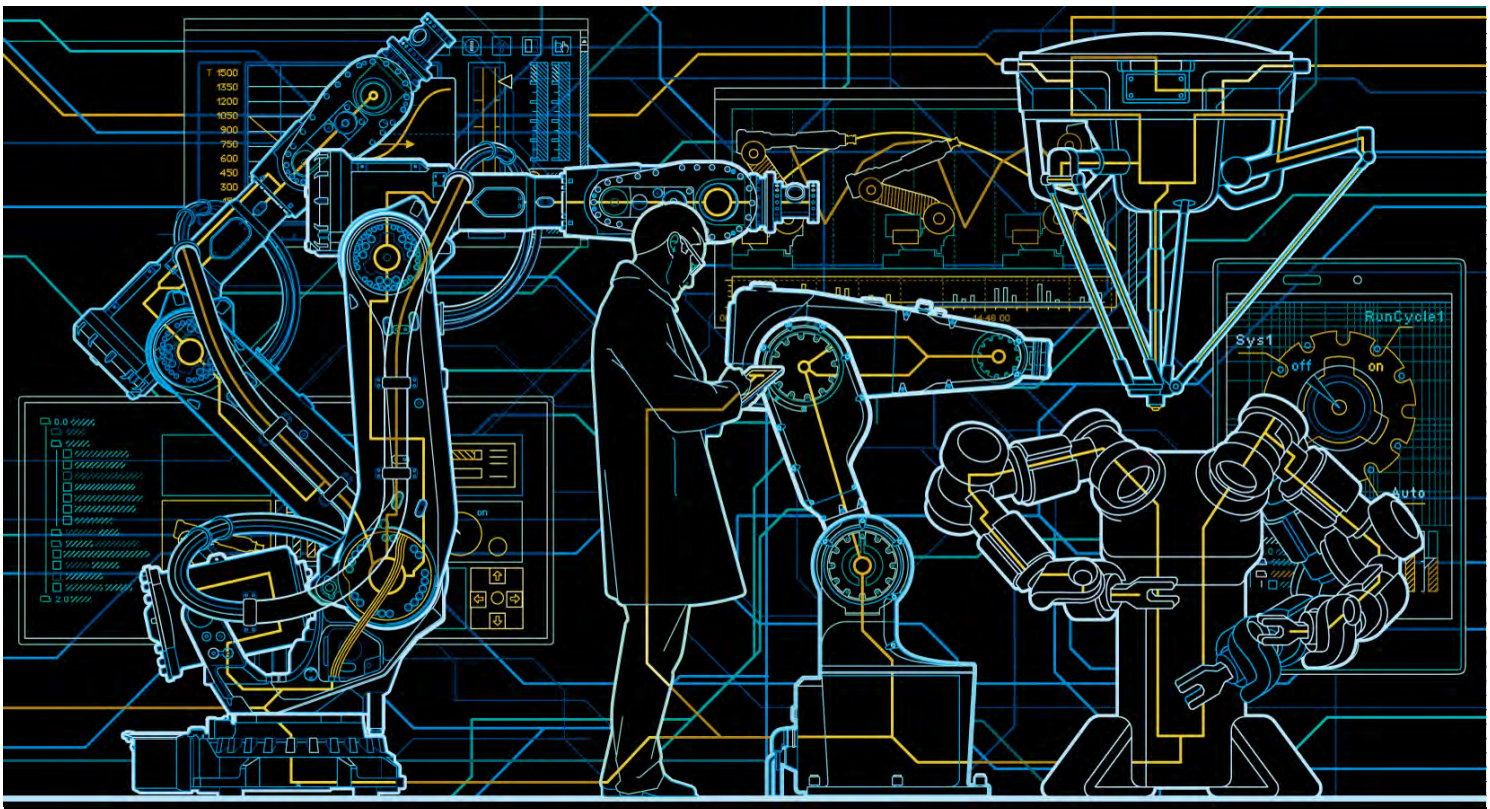

Product manual
DressPack/SpotPack IRB 8700

Power and productivity
for a better world™

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Product manual

DressPack/SpotPack IRB 8700

IRC5

Document ID: 3HAC055802-001

Revision: A

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Table of contents

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Overview of this manual

About this manual

This manual contains instructions for:

- mechanical and electrical work for DressPack/SpotPack systems
- maintenance of the DressPack/SpotPack systems
- mechanical and electrical repair of the DressPack/SpotPack systems.

The manual also contains reference information for all procedures detailed in the manual.

Usage

This manual should be used during:

- installation of the DressPack/SpotPack system
- maintenance of the DressPack/SpotPack system
- repair work of the DressPack/SpotPack system.

Who should read this manual?

This manual is intended for:

- installation personnel
- maintenance personnel
- repair personnel.

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.

Organization of chapters

The manual is organized in the following chapters:

Chapter	Contents
Safety	Safety information that must be read through before performing any installation or service work on the robot. Contains general safety aspects as well as more specific information on how to avoid personal injuries and damage to the product.
Installation	Descriptions of mechanical installation and electrical connections.
Maintenance	Descriptions of all required preventive maintenance procedures including intervals.
Repair	Descriptions of all recommended repair procedures.
Reference information	Useful information when performing installation, maintenance or repair work. Includes lists of necessary tools, additional documents, safety standards etc.
Spare parts	Complete spare part list and list of robot components, shown in exploded views.
Circuit diagram	References to the circuit diagrams.

Continues on next page

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References

Reference	Document ID
Operating manual - General safety information [i]	*3HAC031045-001*
Product manual IRB 8700 - lägg in en länk	
Reservdelsmanual IRB 8700 - lägg in en länk	
Product manual - IRC5 IRC5 with main computer DSQC 639.	*3HAC021313-001*
Product manual - IRC5 IRC5 with main computer DSQC1000.	*3HAC047136-001*
Operating manual - IRC5 with FlexPendant	*3HAC050941-001*
Technical reference manual - System parameters	*3HAC050948-001*

[i] This manual contains all safety instructions from the product manuals for the manipulators and the controllers.

Revisions

Revision	Description
-	First edition.
A	Published in release R16.2. The following updates are done in this revision: • Updated spare parts numbers for MH6 harnesses (upper arm). • Updated spare parts numbers for MH3 harnesses (upper arm). • Information about Spot welding cabinet removed. *Product manual - Spot welding cabinet* (*3HAC058524-001*) describes the Spot welding cabinet.

Product documentation, IRC5

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.

All documents listed can be ordered from ABB on a DVD. The documents listed are valid for IRC5 robot systems.

Product manuals

Manipulators, controllers, DressPack/SpotPack, 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.
- Decommissioning.
- Reference information (safety standards, unit conversions, screw joints, lists of tools).
- Spare parts list with exploded views (or references to separate spare parts lists).
- Circuit diagrams (or references to circuit diagrams).

Technical reference manuals

The technical reference manuals describe reference information for robotics products.

- *Technical reference manual - Lubrication in gearboxes*: Description of types and volumes of lubrication for the manipulator gearboxes.
- *Technical reference manual - RAPID overview*: An overview of the RAPID programming language.
- *Technical reference manual - RAPID Instructions, Functions and Data types*: Description and syntax for all RAPID instructions, functions, and data types.
- *Technical reference manual - RAPID kernel*: A formal description of the RAPID programming language.
- *Technical reference manual - System parameters*: Description of system parameters and configuration workflows.

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Continued

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, DVD with PC software).
- How to install included or required hardware.
- How to use the application.
- 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 trouble shooters.

The group of manuals includes (among others):

- *Operating manual - Emergency safety information*
- *Operating manual - General safety information*
- *Operating manual - Getting started, IRC5 and RobotStudio*
- *Operating manual - IRC5 Integrator's guide*
- *Operating manual - IRC5 with FlexPendant*
- *Operating manual - RobotStudio*
- *Operating manual - Trouble shooting IRC5*

How to read the product manual

Reading the procedures

The procedures contain references to figures, tools, material, and so on. The references are read as described below.

References to figures

The procedures often include references to components or attachment points located on the manipulator/controller. The components or attachment points are marked with *italic text* in the procedures and completed with a reference to the figure where the current component or attachment point is shown.

The denomination in the procedure for the component or attachment point corresponds to the denomination in the referenced figure.

The table below shows an example of a reference to a figure from a step in a procedure.

	Action	Note/Illustration
8.	Remove the *rear attachment screws, gearbox*.	Shown in the figure *Location of gearbox on page xx*.

References to required equipment

The procedures often include references to equipment (spare parts, tools, etc.) required for the different actions in the procedure. The equipment is marked with *italic text* in the procedures and completed with a reference to the section where the equipment is listed with further information, that is article number and dimensions.

The designation in the procedure for the component or attachment point corresponds to the designation in the referenced list.

The table below shows an example of a reference to a list of required equipment from a step in a procedure.

	Action	Note/Illustration
3.	Fit a new *sealing, axis 2* to the gearbox.	Art. no. is specified in *Required equipment on page xx*.

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 17*.

Illustrations

The robot 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 robot models, can be illustrated with illustrations that show a different robot model than the one that is described in the current manual.

Product name principles

General

The different robots have a wide range of options. In many cases the option name gives a good explanation of its content. In some cases there is a need to add more information in the product name in order to clearly show a certain variant and to avoid misunderstandings. Hence a complementary naming standard is used.

The family name of the options is DressPack (that is customer cables and hoses from the controller to the robot's axis 6, divided in different sections).

DressPack parts

DressPack parts that are assembled on the robot are called:

- **IRBDP** (IRB DressPack)

Main application

The DressPack has been prepared for two main applications:

Product name	Application
MH	Material handling
SW	Spot welding

Generations

The different generations of a DressPack is indicated with a generation number. The number indicates the different design of each generation. (Some generations might not be available since it has been phased out).

- **1**, **2**, **3** etc

Sections

The DressPack on the robot is supplied in different sections:

Product name	Section
L	Lower DressPack section
U	Upper DressPack section
C	Continuous DressPack (DressPack without an intermediate connection point)

Routing

The DressPack can be routed in different ways:

Product name	Routing
I	Integrated DressPack The main parts are integrated within the robot structure.
E	External DressPack The main parts are routed outside, on the robot structure.

Continues on next page

Examples

- **IRBDP MH 3 UE** = IRB DressPack / Material handling application / Generation 3 / Upper arm DressPack section / External routing
- **IRBDP SW 4 UI** = IRB DressPack / Spot welding application / Generation 4 / Upper arm DressPack section / Internal routing
- **IRBDP SW 2 LE** = IRB DressPack / Spot welding application / Generation 2 / Lower arm DressPack section / External routing
- **IRBDP SW 2 CE** = IRB DressPack / Spot welding application / Generation 2 / Continuos DressPack section / External routing

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1 Safety

1.1 Introduction to safety information

Overview

The safety information in this manual is divided into the following categories:

- General safety aspects, important to attend to before performing any service work on the robot. These are applicable for all service work and are found in *General safety information on page 18*.
- Safety signals and symbols shown in the manual and on the robot, warning for different types of dangers, are found in *Safety signals and symbols on page 42*.
- Specific safety information, pointed out in the procedures. How to avoid and eliminate the danger is either described directly in the procedure, or in specific instructions in the section *Safety related instructions on page 50*.

1.2 General safety information

1.2.1 Introduction to general safety information

Definitions

This section details general safety information for personnel performing installation, repair and maintenance work.

Sections

The general safety information is divided into the following sections.

Contents	Examples of content
General information	• safety, service • limitation of liability • related information
Safety risks lists dangers relevant when working with the product. The dangers are split into different categories.	• safety risks during installation or service • risks associated with live electrical parts
Safety actions describes actions which may be taken to remedy or avoid dangers.	• fire extinguishing • safe use of the teach pendant or jogging device
Safety stops describes different types of stops.	• stopping functions • description of emergency stop • description of safety stop

1.2.2 Safety in the robot system

Validity and responsibility

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. 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 robot is installed.

The users of ABB industrial robots are responsible for ensuring that the applicable safety laws and regulations in the country concerned are observed and that the safety devices necessary to protect people working with the robot system are designed and installed correctly. Personnel working with robot must be familiar with the operation and handling of the industrial robot as described in the applicable documents, for example:

- *Operating manual - IRC5 with FlexPendant*
- *Operating manual - General safety information* [I]
- *Product manual*

[I] This manual contains all safety instructions from the product manuals for the robots and the controllers.

The robot system shall be designed and constructed in such a way as 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.

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

Connection of external safety devices

Apart from the built-in safety functions, the robot 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 robot.

Limitation of liability

Any information given in this manual regarding safety must not be construed as a warranty by ABB that the industrial robot will not cause injury or damage even if all safety instructions are complied with.

Related information

Type of information	Detailed in document	Section
Installation of safety devices	*Product manual for the robot*	Installation and commissioning
Changing operating modes	*Operating manual - IRC5 with FlexPendant* *Operator's Manual - IRC5P*	Operating modes

Continues on next page

1.2.2 Safety in the robot system
Continued

Type of information	Detailed in document	Section
Restricting the working space	*Product manual for the robot*	Installation and commissioning

1.2.3 Safety risks

1.2.3.1 Safety risks during installation and service work on robots

Overview

This section includes information on general safety risks to be considered when performing installation and service work on the robot.

These safety instructions have to be read and followed by any person who deals with the installation and maintenance of the robot. Only persons who know the robot and are trained in the operation and handling of the robot are allowed to maintain the robot. Persons who are under the influence of alcohol, drugs or any other intoxicating substances are not allowed to maintain, repair, or use the robot.

General risks during installation and service

- The instructions in the product manual in the chapters *Installation and commissioning*, and *Repair* must always be followed.
- Emergency stop buttons must be positioned in easily accessible places so that the robot can be stopped quickly.
- 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 robot must have the appropriate training for the equipment in question and in any safety matters associated with it.

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 products could negatively affect the structural properties of the robot 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 robot system.

Personal protective equipment

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

Nation/region specific regulations

To prevent injuries and damages during the installation of the robot, the regulations applicable in the country concerned and the instructions of ABB Robotics must be complied with.

Non-voltage related risks

- Make sure that no one else can turn on the power to the controller and robot 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.

Continues on next page

1.2.3.1 Safety risks during installation and service work on robots
Continued

- Safety zones, which must be crossed before admittance, must be set up in front of the robot'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 robot's working space.
- If the robot is installed at a height, hanging, or other than standing directly on the floor, there may be additional risks than those for a robot standing directly on the floor.
- The axes are affected by the force of gravity when the brakes are released. In addition to the risk of being hit by moving robot parts, there is a risk of being crushed by the parallel arm (if there is one).
- Energy stored in the robot for the purpose of counterbalancing certain axes may be released if the robot, or parts thereof, are dismantled.
- When dismantling/assembling mechanical units, watch out for falling objects.
- Be aware of stored heat energy in the controller.
- Never use the robot as a ladder, which means, do not climb on the robot motors or other parts during service work. There is a serious risk of slipping because of the high temperature of the motors and oil spills that can occur on the robot.
- Never use the robot as a ladder, which means, do not climb on the manipulator motors or other parts during service work. There is a risk of the robot being damaged.

To be observed by the supplier of the complete system

When integrating the robot 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.

Complete robot

Safety risk	Description
Hot components!	**CAUTION** Motors and gearboxes are HOT after running the robot! Touching motors and gearboxes may result in burns! With a higher environment temperature, more surfaces on the manipulator will get HOT and may also result in burns.

Continues on next page

Safety risk	Description
Removed parts may result in collapse of the robot!	**WARNING** Take any necessary measures to ensure that the robot does not collapse as parts are removed. For example, secure the lower arm according to the repair instruction if removing the axis-2 motor.
Removed cables to the measurement system	**WARNING** If the internal cables for the measurement system have been disconnected during repair or maintenance, then the revolution counters must be updated.

Cabling

Safety risk	Description
Cable packages are sensitive to mechanical damage!	**CAUTION** The cable packages are sensitive to mechanical damage. Handle the cable packages and the connectors with care in order to avoid damage.

Gearboxes and motors

Safety risk	Description
Gears may be damaged if excessive force is used!	**CAUTION** Whenever parting/mating motor and gearbox, the gears may be damaged if excessive force is used!

Balancing device

Safety risk	Description
Dangerous balancing device!	**WARNING** *Do not,* under any circumstances, deal with the balancing device in any other way than that described in the product documentation! For example, attempting to open the balancing device is potentially lethal!

1.2.3.2 CAUTION - Hot parts may cause burns!

Description

During normal operation, many robot parts become hot, especially the drive motors and gearboxes. Sometimes areas around these parts also become hot. Touching these may cause burns of various severity.

Because of a higher environment temperature, more surfaces on the robot get hot and may result in burns.

Elimination

The following instructions describe how to avoid the dangers specified above:

	Action	Information
1	Always use your hand, at some distance, to feel if heat is radiating from the potentially hot component before actually touching it.	
2	Wait until the potentially hot component has cooled if it is to be removed or handled in any other way.	

1.2.3.3 Safety risks related to tools/work pieces

Safe handling

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

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 robot 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.

1.2.3.4 Safety risks related to pneumatic/hydraulic systems

General

Special safety regulations apply to pneumatic and hydraulic systems.

Note

All components that remain pressurized after separating the machine from the power supply must be provided with clearly visible drain facilities and a warning sign that indicates the need for pressure relief before adjustments or performing any maintenance on the robot system.

Residual energy

- Residual energy can be present in these systems. After shutdown, particular care must be taken.
- The pressure must be released in the complete pneumatic or hydraulic systems before starting to repair them.
- Work on hydraulic equipment may only be performed by persons with special knowledge and experience of hydraulics.
- All pipes, hoses, and connections have to be inspected regularly for leaks and damage. Damage must be repaired immediately.
- Splashed oil may cause injury or fire.

Safe design

- Gravity may cause any parts or objects held by these systems to drop.
- Dump valves should be used in case of emergency.
- Shot bolts should be used to prevent tools, etc., from falling due to gravity.

1.2.3.5 Safety risks during operational disturbances

General

- The industrial robot is a flexible tool that can be used in many different industrial applications.
- All work must be carried out professionally and in accordance with the applicable safety regulations.
- Care must be taken at all times.

Qualified personnel

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.

Extraordinary risks

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.

1.2.3.6 Risks associated with live electric parts

Voltage related risks, general

Work on the electrical equipment of the robot 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 robot 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 robot must be connected in such a way that it can be turned off from outside the working space of the robot.
- Make sure that no one else can turn on the power to the controller and robot 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 robot system during construction, commissioning, and maintenance is guaranteed if the valid regulations are followed.

All work must be performed:

- by qualified personnel
- on machine/robot system in deadlock
- in an isolated state, disconnected from power supply, and protected against reconnection.

Voltage related risks, IRC5 controller

A danger of high voltage is associated with, for example, the following parts:

- Be aware of stored electrical energy (DC link, Ultracapacitor bank unit) in the controller.
- Units such as I/O modules, can be supplied with power from an external source.
- The main supply/main switch
- The transformers
- The power unit
- The control power supply (230 VAC)
- The rectifier unit (262/400-480 VAC and 400/700 VDC. Note: capacitors!)
- The drive unit (400/700 VDC)
- The drive system power supply (230 VAC)
- The service outlets (115/230 VAC)
- The customer power supply (230 VAC)
- The power supply unit for additional tools, or special power supply units for the machining process.
- The external voltage connected to the controller remains live even when the robot is disconnected from the mains.
- Additional connections.

Continues on next page

Voltage related risks, robot

A danger of high voltage is associated with the robot in:

- The power supply for the motors (up to 800 VDC).
- The user connections for tools or other parts of the installation (max. 230 VAC).

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

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

1.2.4 Safety actions

1.2.4.1 Safety fence dimensions

General

Install a safety cell around the robot to ensure safe robot installation and operation.

Dimensioning

The fence or enclosure must be dimensioned to withstand the force created if the load being handled by the robot is dropped or released at maximum speed. Determine the maximum speed from the maximum velocities of the robot axes and from the position at which the robot is working in the work cell (see the section *Robot motion* in the *Product specification*).

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

1.2.4.2 Fire extinguishing

Note

Use a CARBON DIOXIDE (CO_2) extinguisher in the event of a fire in the robot system (robot or controller)!

1.2.4.3 Emergency release of the robot arm

Description

In an emergency situation, the brakes on the robot axes can be released manually by pushing the brake release buttons.

How to release the brakes is detailed in the section:

- *Manually releasing the brakes* in the product manual for the robot.

The robot arm may be moved manually on smaller robot models, but larger models may require using an overhead crane or similar equipment.

Increased injury

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

1.2.4.4 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 robot axis to a position where the combined weight of the robot arm and any load is maximized (maximum static load).
2. Switch the motor to the MOTORS OFF.
3. Inspect and verify that the axis maintains its position.

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

1.2.4.5 Risk of disabling function "Reduced speed 250 mm/s"

Note

Do not change *Transm gear ratio* or other kinematic system parameters from the FlexPendant or a PC. This will affect the safety function "Reduced speed 250 mm/s".

1.2.4.6 Safe use of the jogging device

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 robot is impossible.

Note

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

To ensure safe use of the jogging device, 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 robot to move.
- Anyone entering the working space of the robot must always bring the jogging device with him/her. This is to prevent anyone else from taking control of the robot 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 for IRC5 is described in *Operating manual - IRC5 with FlexPendant*.

1.2.4.7 Work inside the working range of the robot

WARNING

If work must be carried out within the work area of the robot, 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.
- The maximum speed of the robot is limited to 250 mm/s when the operating mode selector is in the position *Manual mode with reduced speed*. This should be the normal position when entering the working space.

  The position *Manual mode with full speed (100%)* may only be used by trained personnel who are aware of the risks that this entails. *Manual mode with full speed (100%)* is not available in USA or Canada.
- Pay attention to the rotating axes of the robot. Keep away from axes to not get entangled with hair or clothing. Also, be aware of any danger that may be caused by rotating tools or other devices mounted on the robot or inside the cell.
- Test the motor brake on each axis, according to the section *Brake testing on page 33*.
- To prevent anyone else from taking control of the robot, 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 of the robot's axes! There is always a risk that the robot will move unexpectedly when robot axes are moved using the three-position enabling device or during other work inside the working range of the robot.

1.2.4.8 Signal lamp (optional)

Description

A signal lamp with a yellow fixed light can be mounted on the robot, as a safety device.

Function

The lamp is active in MOTORS ON mode.

Further information

Further information about the MOTORS ON/MOTORS OFF mode may be found in the product manual for the controller.

1.2.5 Safety stops

1.2.5.1 What is an emergency stop?

Definition of emergency stop

An emergency stop is a state that takes precedence over all other robot controls, causes all controlled hazards to stop, removes drive power from the robot actuators, remains active until it is reset, and can only be reset by manual action.

An emergency stop state means that all power is disconnected from the robot except for the manual brake release circuits. You must perform a recovery procedure, that is, resetting the emergency stop button and pressing the Motors On button, to return to normal operation.

The robot system can be configured so that the emergency stop results in either:

- A category 0 stop, immediately stopping the robot actions by disconnecting power from the motors.
- A category 1 stop, stopping the robot actions with power available to the motors so that the robot path can be maintained. When completed, power is disconnected from the motors.

The default setting is a category 0 stop. However, category 1 stops are preferred since they minimize unnecessary wear on the robot and the actions needed to return the system back to production. Consult your plant or cell documentation to see how your robot system is configured.

Note

The emergency stop function may only be used for the purpose and under the conditions for which it is intended.

Note

The emergency stop function is intended for immediately stopping equipment in the event of an emergency.

Note

Emergency stop should not be used for normal program stops as this causes extra, unnecessary wear on the robot.

For how to perform normal program stops, see section *Stopping programs* in *Operating manual - IRC5 with FlexPendant*.

Classification of stops

The safety standards that regulate automation and robot equipment define categories in which each type of stop applies:

If the stop is...	... then it is classified as...
category 0 (zero)	uncontrolled

Continues on next page

If the stop is...	... then it is classified as...
category 1	controlled

Emergency stop buttons

In a robot system there are several emergency stop buttons that can be operated in order to achieve an emergency stop. There are emergency stop buttons available on the FlexPendant and on the controller cabinet. There can also be other types of emergency stops on your robot. Consult your plant or cell documentation to see how your robot system is configured.

1.2.5.2 What is a safety stop or protective stop?

Definition of safety stops

A safety stop is a state that stops all robot motion and removes power to the robot drive actuators. There is no recovery procedure. You need only to restore motor power to recover from a safety stop. Safety stop is also called protective stop.

The robot system can be configured so that the safety stop results in either:

- A category 0 stop, immediately stopping the manipulator actions by disconnecting power from the motors.
- A category 1 stop, stopping the manipulator actions with power available to the motors so that the manipulator path can be maintained. When completed, power is disconnected from the motors.

The default setting is a category 1 stop.

Category 1 stops are preferred since they minimize unnecessary wear on the manipulator and the actions needed to return the system back to production. Consult your plant or cell documentation to see how your robot system is configured.

Note

The safety stop function may only be used for the purpose and under the conditions for which it is intended.

Note

Safety stop should not be used for normal program stops as this causes extra, unnecessary wear on the manipulator.

For how to perform normal program stops, see section *Stopping programs* in *Operating manual - IRC5 with FlexPendant*.

Classification of stops

The safety standards that regulate automation and robot equipment define categories in which each type of stop applies:

If the stop is...	... then it is classified as...
category 0 (zero)	uncontrolled
category 1	controlled

Continues on next page

Type of safety stops

Safety stops are activated through special signal inputs to the controller, see *Product manual - IRC5*.

The inputs are intended for safety devices such as cell doors, light curtains, or light beams.

Safety stop:	Description:
Automatic mode stop (AS)	Disconnects drive power in automatic mode. In manual mode this input is inactive.
General stop (GS)	Disconnects drive power in all operating modes.
Superior stop (SS)	Disconnects drive power in all operating modes. Intended for external equipment.

Note

Use normal program stop for all other types of stop.

1.3 Safety signals and symbols

1.3.1 Safety signals in the manual

Introduction to safety signals

This section specifies all dangers that can arise when doing the work described in the user manuals. Each danger consists of:

- A caption specifying the danger level (DANGER, WARNING, or CAUTION) and the type of danger.
- A brief description of what will happen if the operator/service personnel **do not** eliminate the danger.
- Instruction about how to eliminate danger to simplify doing the work.

Danger levels

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

Symbol	Designation	Significance
 xx0200000022	DANGER	Warns that an accident *will* occur if the instructions are not followed, resulting in a serious or fatal injury and/or severe 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, and so on.
 xx0100000002	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.
 xx0200000024	ELECTRICAL SHOCK	Warns for electrical hazards which could result in severe personal injury or death.
 xx0100000003	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.
 xx0200000023	ELECTROSTATIC DISCHARGE (ESD)	Warns for electrostatic hazards which could result in severe damage to the product.

Continues on next page

Symbol	Designation	Significance
 xx0100000004	NOTE	Describes important facts and conditions.
 xx0100000098	TIP	Describes where to find additional information or how to do an operation in an easier way.

1.3.2 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 robot 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 robot system, for example during installation, service, or operation.

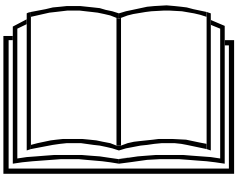
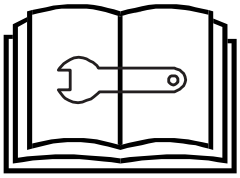
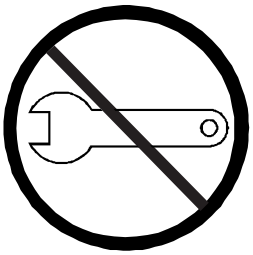
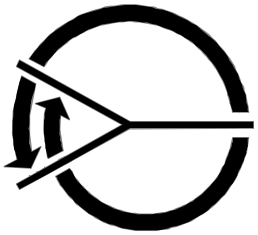
The safety labels are language independent, they only use graphics. See *Symbols on safety labels on page 44*.

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

Symbols on safety labels

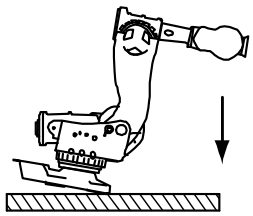
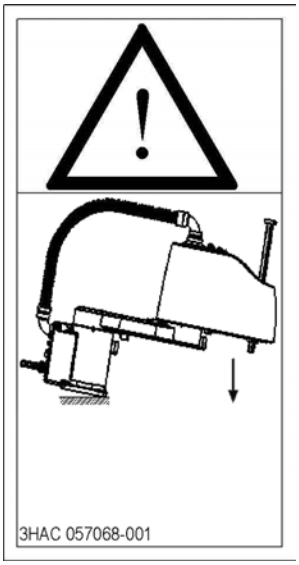
Symbol	Description
 xx0900000812	**Warning!** Warns that an accident *may* occur if the instructions are not followed that can lead to serious injury, possibly fatal, and/or great damage to the product. It applies to warnings that apply to danger with, for example, contact with high voltage electrical 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

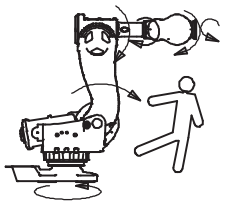
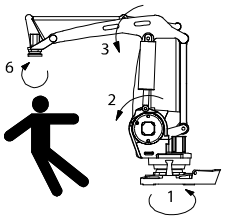
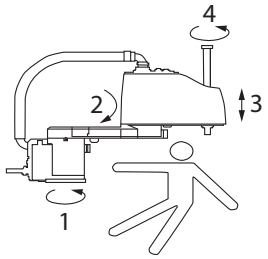
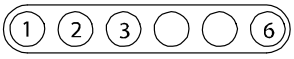
Symbol	Description
 xx0900000813	**See user documentation** Read user documentation for details. Which manual to read is defined by the symbol: • No text: *Product manual*. • EPS: *Application manual - Electronic Position Switches*.
 xx0900000816	**Before disassemble, see product manual**
 xx0900000815	**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 robot arm can fall down.

Continues on next page

1.3.2 Safety symbols on product labels
Continued

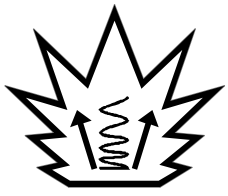
Symbol	Description
 xx0900000810  xx1500002402	**Tip risk when loosening bolts** The robot can tip over if the bolts are not securely fastened.
 xx0900000817	**Crush** Risk of crush injuries.
 xx0900000818	**Heat** Risk of heat that can cause burns.

Continues on next page

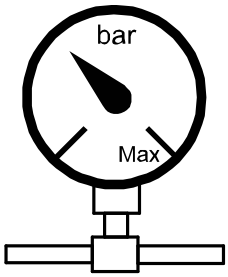
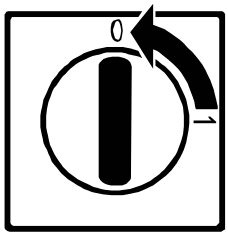
Symbol	Description
 xx0900000819  xx1000001141  xx1500002616	**Moving robot** The robot can move unexpectedly.
 xx0900000820  xx1000001140	**Brake release buttons**
 xx0900000821	**Lifting bolt**

Continues on next page

1.3.2 Safety symbols on product labels
Continued

Symbol	Description
 xx1000001242	**Chain sling with shortener**
 xx0900000822	**Lifting of robot**
 xx0900000823	**Oil** Can be used in combination with prohibition if oil is not allowed.
 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.

Continues on next page

Symbol	Description
 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.

1.4 Safety related instructions

1.4.1 DANGER - Moving robots are potentially lethal!

Description

Any moving robot is a potentially lethal machine.

When running, the robot 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 robot.

Elimination

	Action	Note
1	Before attempting to run the robot, 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 - IRC5 with FlexPendant*.
3	Make sure no personnel are present within the working range of the robot before pressing the start button.	

1.4.2 DANGER - First test run may cause injury or damage!

Description

Since performing a service activity often requires disassembly of the robot, there are several safety risks to take into consideration before the first test run.

Elimination

Follow the procedure below when performing the first test run after a service activity, such as repair, installation, or maintenance.

	Action
1	Remove all service tools and foreign objects from the robot and its working area.
2	Verify that the robot is secured to its position, see installation section in the product manual for the robot.
3	Verify that the fixture and work piece are well secured, if applicable.
4	Install all safety equipment properly.
5	Make sure all personnel are standing at a safe distance from the robot, that is out of its reach behind safety fences, and so on.
6	Pay special attention to the function of the part that previously was serviced.

Collision risks

CAUTION

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

1.4.3 WARNING - The brake release buttons may be jammed after service work

Description

The brake release unit has push-buttons for the brake release of each axis motor. When service work is performed inside the SMB recess that includes removal and refitting of the brake release unit, the brake release buttons may be jammed after refitting.

DANGER

If the power is turned on while a brake release button is jammed in depressed position, the affected motor brake is released! This may cause serious personal injuries and damage to the robot.

Elimination

To eliminate the danger after service work has been performed inside the SMB recess, follow the procedure below.

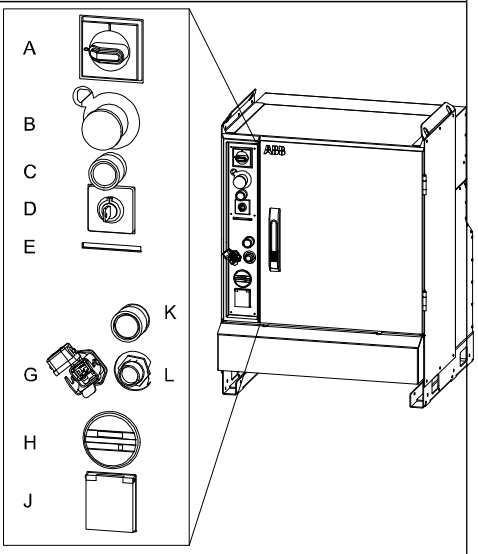
	Action
1	Make sure the power is turned off.
2	Remove the push-button guard, if necessary.
3	Verify that the push-buttons of the brake release unit are working by pressing them down, one by one. Make sure none of the buttons are jammed in the tube.
4	If a button gets jammed in the depressed position, the alignment of the brake release unit must be adjusted so that the buttons can move freely in their tubes!

1.4.4 DANGER - Make sure that the main power has been switched off!

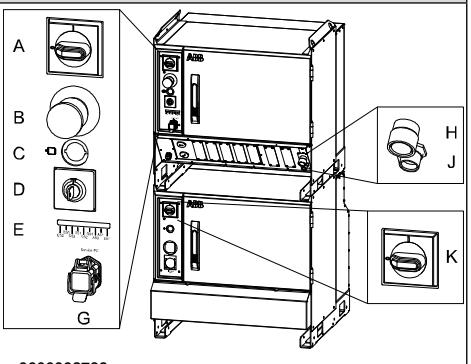
Description

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 dangers, do not proceed working before eliminating the danger as detailed below.

Elimination, Single Cabinet Controller

	Action	Note/illustration
1	Switch off the main switch on the controller cabinet.	 xx0600002782 A: Main switch

Elimination, Dual Cabinet Controller

	Action	Note/illustration
1	Switch off the main switch on the Drive Module.	 xx0600002783 K: Main switch, Drive Module
2	Switch off the main switch on the Control Module.	A: Main switch, Control Module

1.4.5 WARNING - The unit is sensitive to ESD!

Description

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

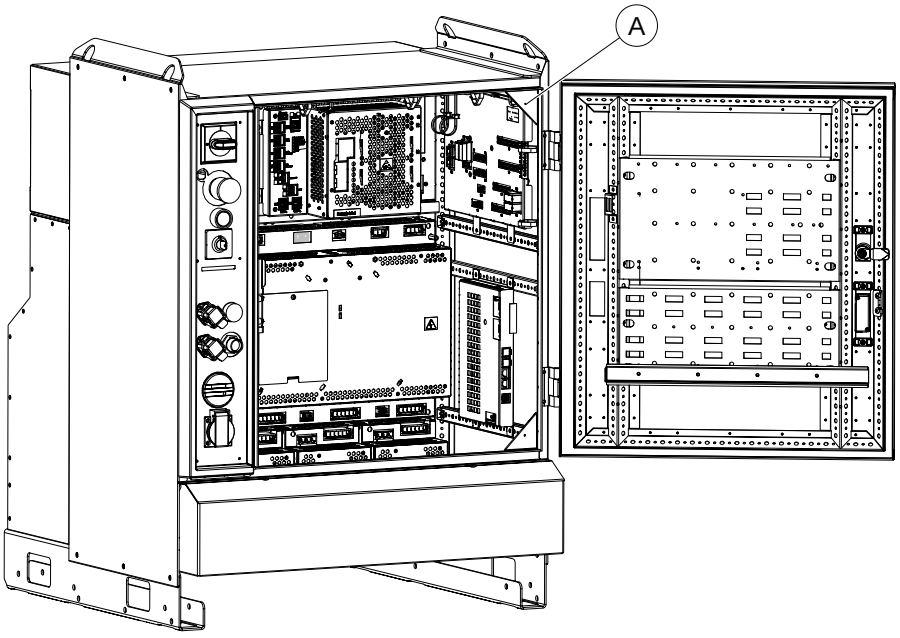
Elimination

	Action	Note
1	Use a wrist strap.	Wrist straps must be tested frequently to ensure that they are not damaged and are operating correctly.
2	Use an ESD protective floor mat.	The mat must be grounded through a current-limiting resistor.
3	Use a dissipative table mat.	The mat should provide a controlled discharge of static voltages and must be grounded.

Location of wrist strap button

The location of the wrist strap button is shown in the following illustration.

IRC5



xx1300000856

A	Wrist strap button

1.4.6 WARNING - 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.

Elimination

	Action	Note
1	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.	
2	Use safety glasses when handling the batteries.	
3	In the event of leakage, wear gloves and chemical apron.	
4	In the event of fire, use self-contained breathing apparatus.	

1.4.7 WARNING - 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.

Warnings and elimination

Warning	Description	Elimination/Action
 xx0100000002 **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.
 xx0100000002 **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.
 xx0100000002 **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

1.4.7 WARNING - Safety risks during work with gearbox lubricants (oil or grease)
Continued

Warning	Description	Elimination/Action
 xx0100000002 **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.
 xx0100000002 **Do not mix types of oil**	Mixing types of oil may cause severe damage to the gearbox.	When filling gearbox oil, do not mix different types of oil unless specified in the instructions. Always use the type of oil specified by the manufacturer!
 xx0100000098 **Heat up the oil**	Warm oil drains quicker than cold oil.	When changing gearbox oil, first run the robot for a time to heat up the oil.
 xx0100000004 **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.
 xx0100000003 **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.	

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2 Installation

2.1 Introduction

General

This chapter presents general information, complementing the more specific information in the following chapters.

Sections

The installation chapter is divided in the following sections:

- Fitting DressPack cable package attachments
- Fitting DressPack cable packages
- DressPack floor cable
- Water and air unit

2.2 Overview

General

Installing, programming and operating the ABB DressPack/SpotPack product program may be a complex task as each application instance is very specific. The product is designed to fit a wide variety of applications, and must be adapted to each in order to maximize life and function.

The generic installation procedure is described below.

Limitations of robot movements

When using DressPack options on the upper arm, the robot movements will be limited.

- In bending backwards positions there are limitations due to interference with the robot itself or with the Water and Air unit (if such is mounted).

Effects on armload and performance

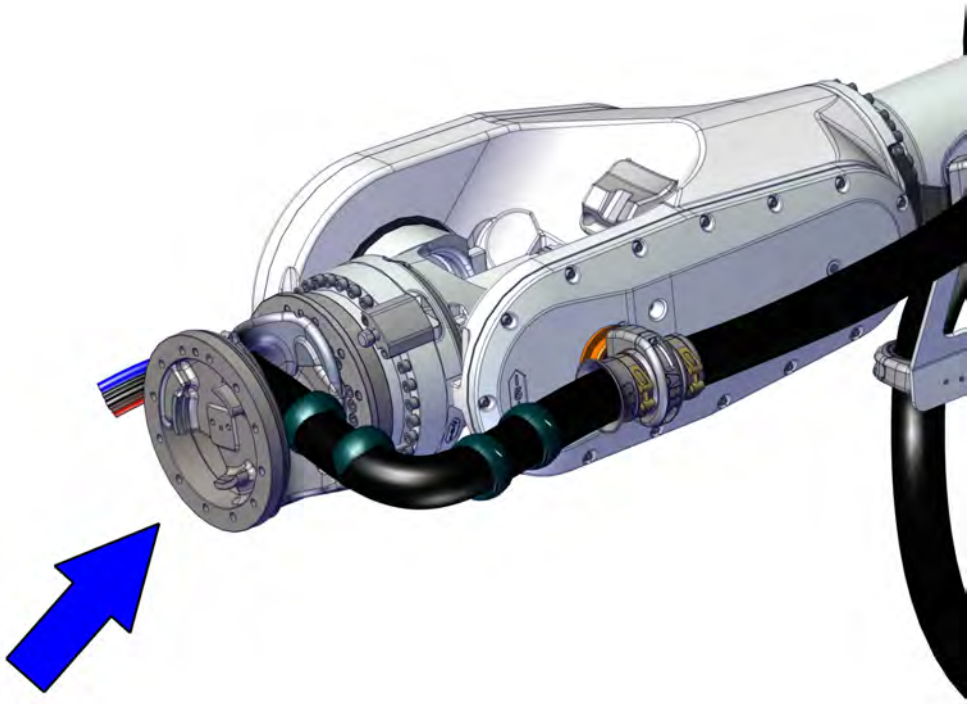
Note

The extra weight of the DressPack/SpotPack products will affect the armload data and the performance of the robot. The effect differs depending on which type of DressPack/SpotPack product. See DressPack - arm load parameters and LoadId.

2.3 Fitting the process turning disc

Location of the process turning disc

The process turning disc is located in the front of the wrist housing as shown in the figure.



xx1500003047

Required tools and equipment

Equipment, etc.	Article number	Note
Standard toolkit	-	Content is defined in section *Standard toolkit on page 235*.
Roundsling 1 m	-	Lifting capacity: 1,000 kg

Fitting the process turning disc

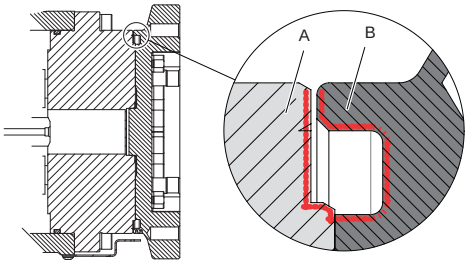
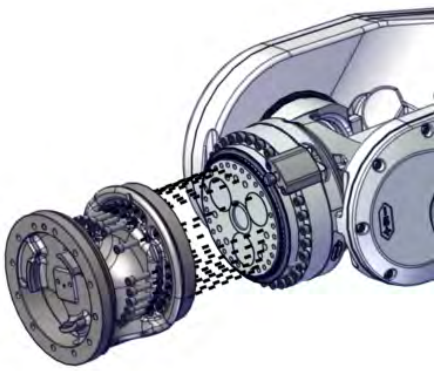
Screw joints for fitting the process turning disc

Variant	Screw dimension	Number of screws	Number of washers	Tightening torque
3HAC051003-005	M12x40	22 pcs	22 pcs	120 Nm

Continues on next page

2.3 Fitting the process turning disc
Continued

Fitting the process turning disc

	Action	Note
1	**DANGER** Make sure that all supplies for electrical power, hydraulic pressure and air pressure are turned off.	
2	**CAUTION** The process turning disc weight is 50 kg. All lifting equipment must be sized accordingly.	
3	Attach the roundsling to the process turning disc and to an overhead crane or similar.	Roundsling 1 m, Lifting capacity: 1,000 kg
4	Stretch the roundsling to take the weight of the process turning disc.	
5	Wipe clean the contacts surfaces.	
6	*Foundry Plus*: Apply Mercasol on the surfaces on the process turning disc and axis-6 gearbox as shown in the figure.	 xx1400000385
7	Secure the process turning disc with its attachment screws and washers.	Tightening torque: 120  xx1500003048 M12x40 12.9 Gleitmo 603 (22 pcs)

Continues on next page

Removing the process turning disc

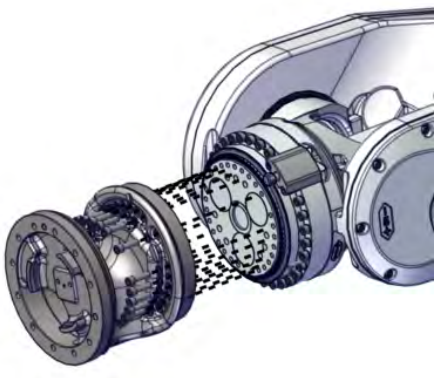
Screw joints for fitting the process turning disc

Variant	Screw dimension	Number of screws	Number of washers	Tightening torque
3HAC051003-005	M12x40	22 pcs	22 pcs	120 Nm

Preparations

	Action	Note
1	Run the robot to a suitable position for removal of the process turning disc.	
2	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the robot, before entering the robot working area.	
3	Remove any equipment fitted to the process turning disc.	

Removing the process turning disc

	Action	Note
1	**CAUTION** The process turning disc weight is 50 kg. All lifting equipment must be sized accordingly.	
2	Attach the roundsling to the process turning disc and to an overhead crane or similar.	Roundsling 1 m, Lifting capacity: 1,000 kg
3	Stretch the roundsling to take the weight of the process turning disc.	
	Remove the 22 screws and washers that secure the process turning disc.	 xx1500003048

Continues on next page

2.3 Fitting the process turning disc
Continued

	Action	Note
4	Remove the process turning disc.	

2.4 DressPack cable package

2.4.1 Overview

General

Installing, programming and operating the ABB DressPack/SpotPack product program may be a complex task as each application instance is very specific. The product is designed to fit a wide variety of applications, and must be adapted to each in order to maximize life and function.

The generic installation procedure is described below.

Limitations of robot movements

When using DressPack options on the upper arm, the robot movements will be limited.

- In bending backwards positions there are limitations due to interference with the robot itself or with the Water and Air unit (if such is mounted).

Effects on armload and performance

Note

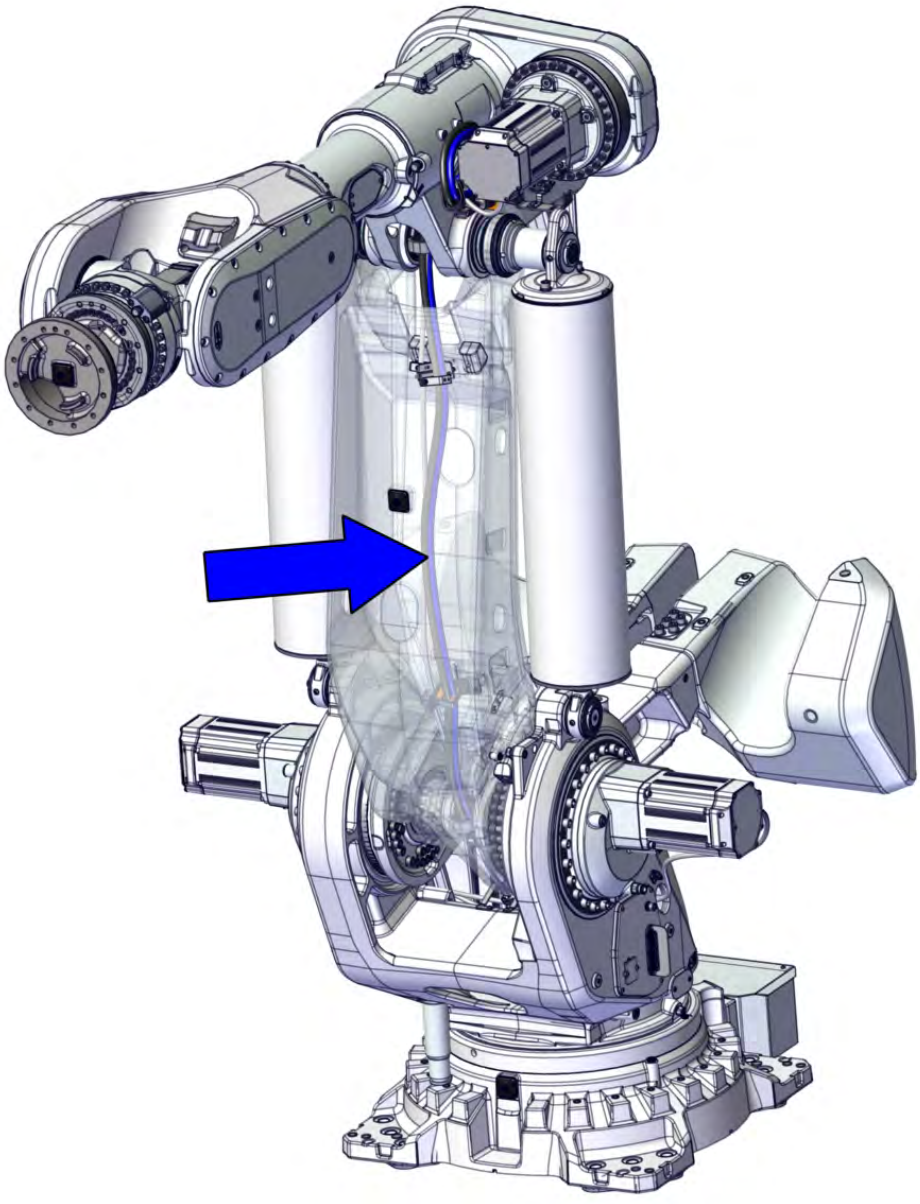
The extra weight of the DressPack/SpotPack products will affect the armload data and the performance of the robot. The effect differs depending on which type of DressPack/SpotPack product. See DressPack - arm load parameters and LoadId.

2.4.2 Installation of IRBDP MH LI

2.4.2.1 Fitting the cable package IRBDP MH LI

Location of the cable package

The cable package is located inside the lower arm.



xx1500002962

Spare parts

Equipment, etc.	Article number	Note
Cable package IRBDP MH LI	See DressPack cable package IRBDP MH LI	

Continues on next page

Equipment, etc.	Article number	Note
Material set IRBDP MH LI	3HAC053920-001	

Required tools and equipment

Equipment, etc.	Article number	Note
Standard toolkit	-	Content is defined in section *Standard toolkit on page 235*.

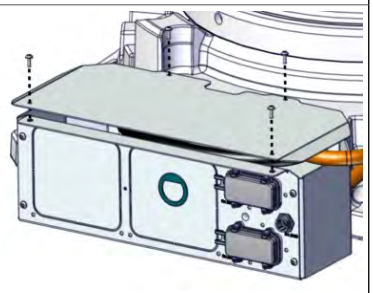
Consumables

Equipment, etc.	Article number	Note
Locking liquid	3HAB7116-1	Loctite 243

Fitting the cable package IRBDP MH LI

Use this procedure to fit the cable package IRBDP MH LI.

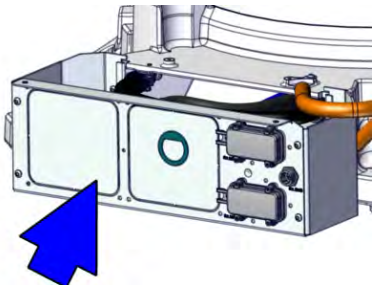
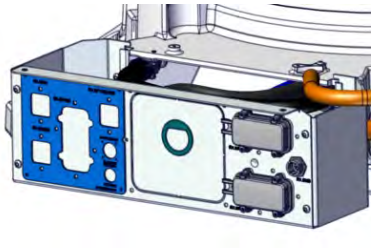
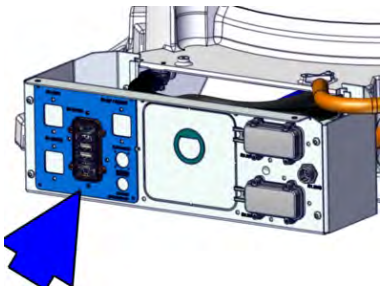
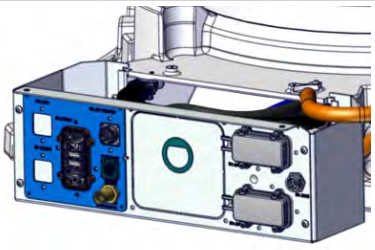
Connect the cable package at the base

	Action	Note
1	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the robot, before entering the robot working area.	
2	**CAUTION** The cable package is sensitive to mechanical damage. Handle it with care in order to avoid damaging the cabling or the connectors.	
3	Remove the rear cover plate.	 xx1500002963

Continues on next page

2.4.2.1 Fitting the cable package IRBDP MH LI

Continued

	Action	Note
4	Remove the part of the backplate where the customer plate is to be fitted. Hit the removable part carefully with a plastic mallet. **Note** Only needed when the DressPack cable package is fitted for the first time.	 xx1500002964
5	Fit the customer plate.	 xx1500002965 M6x25 A2-70 (4 pcs)
6	Fit the adapter complete.	 xx1500002966 M6x16 A2-70 (2 pcs)
7	Fit the Profinet bracket.	 xx1500002967 M3x8 A2-70 (4 pcs)

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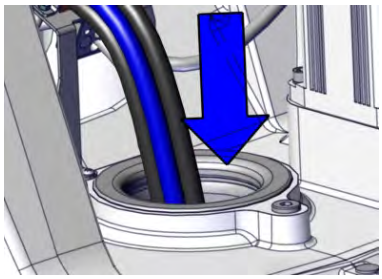
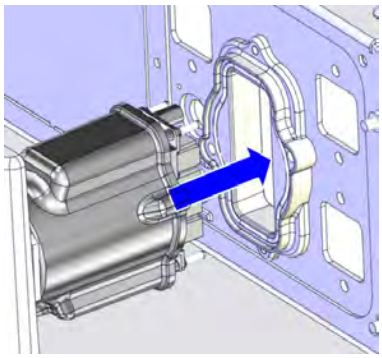
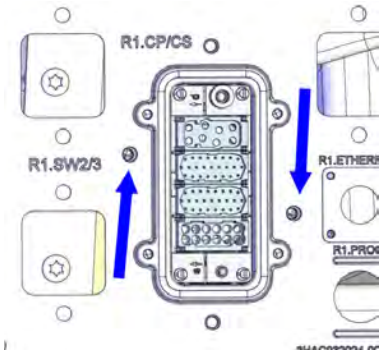
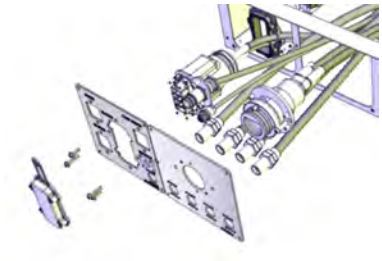
	Action	Note
8	Run the cables down through the center hole of axis 1. • Make a check that the cables and hoses do not cross each other.	 xx1500002968
9	Fit the R1.CP/CS cable to the customer plate.	 xx1400001142
10	Secure the R1.CP/CS connector.	 xx1400001143 M6x25 A2-70 (2 pcs)
11	Connect the rest of the cable and hose connectors to the customer plate. **CAUTION** Do not tighten the brass couplings for water and air with excessive force. **CAUTION** Make sure that no cables or hoses are twisted or strained. Reroute if necessary.	Tightening torque, brass couplings 1/2": 31 Tightening torque, brass couplings 3/8": 17  xx1200000088

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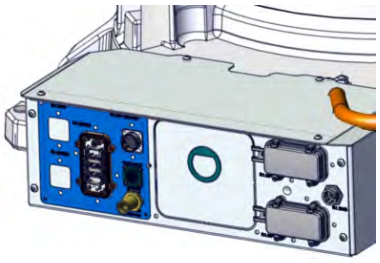
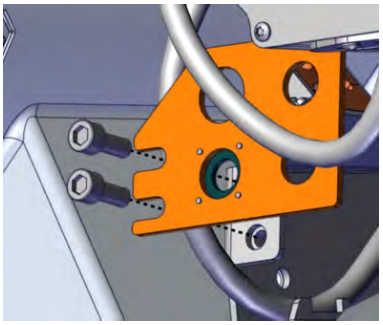
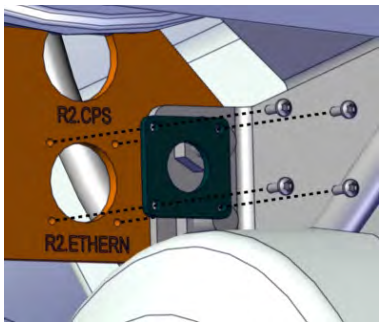
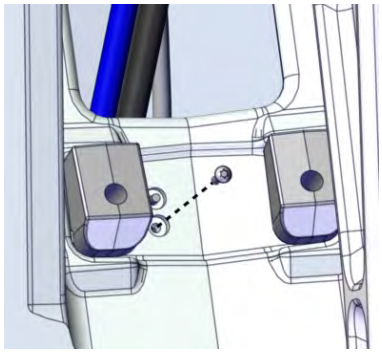
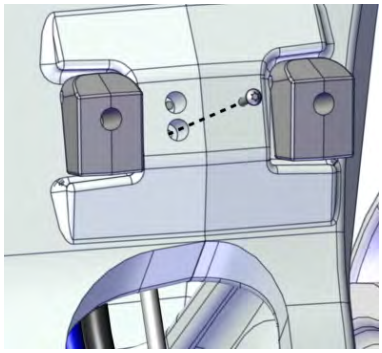
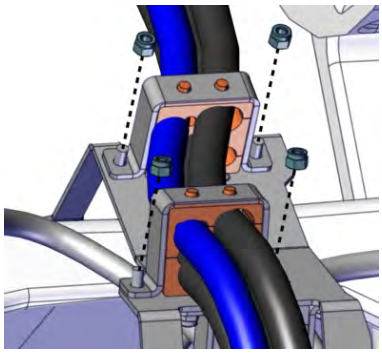
2.4.2.1 Fitting the cable package IRBDP MH LI
Continued

	Action	Note
12	Refit the rear cover plate.	 xx1500002969

Refitting the cable package

	Action	Note
1	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the robot, before entering the robot working area.	
2	**CAUTION** The cable package is sensitive to mechanical damage. Handle it with care in order to avoid damaging the cabling or the connectors.	
3	Fit the connection plate. Lock screws with locking liquid (Loctite 243)	 xx1500002970 M10x25 A2-7 0 (2 pcs)

Continues on next page

	Action	Note
4	Fasten the Profinet bracket.	 xx1500002971 M3x8 A2-70 (4 pcs)
5	Remove screws for motor cabling brackets inside the lower arm.	 xx1500003019  xx1500003020
6	Gently push the dresspack cables up into the lower arm.	
7	Fit the metal clamps on the motor cabling bracket.	 xx1500003022 M6 Steel 8-A2F (2x 2 pcs)

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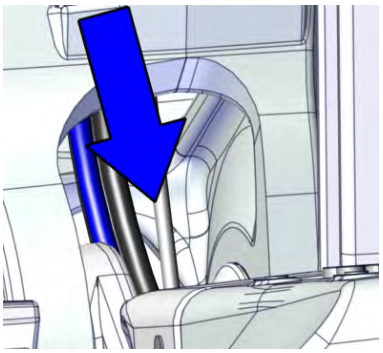
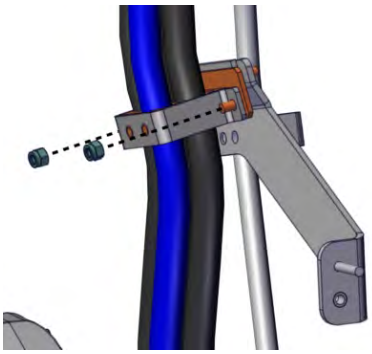
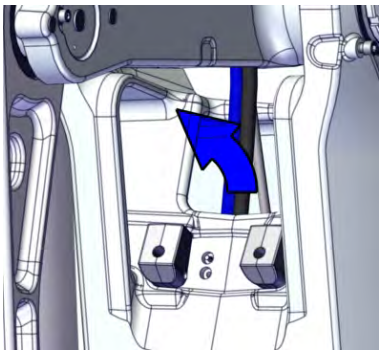
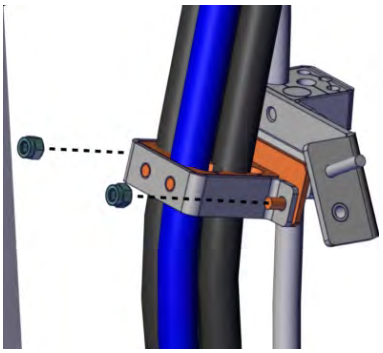
2.4.2.1 Fitting the cable package IRBDP MH LI

Continued

	Action	Note
8	Gently pull out the motor cabling downwards to be able to fit the dresspack cables on the cabling bracket inside lower arm.	 xx1500003021
9	Fit the metal clamp.	 xx1500003023 M6 Steel 8-A2F (2 pcs)
10	Pull the motor cabling gently upwards until the motor cabling bracket is reachable.	 xx1500003024
11	Fit the metal clamp.	 xx1500003025 M6 Steel 8-A2F (2 pcs)

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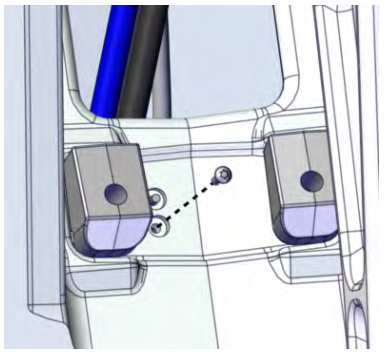
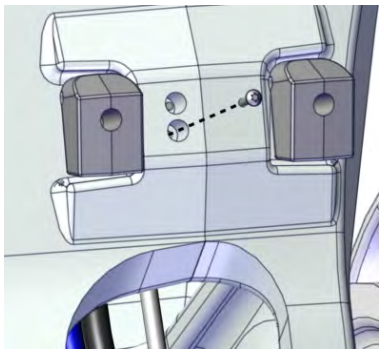
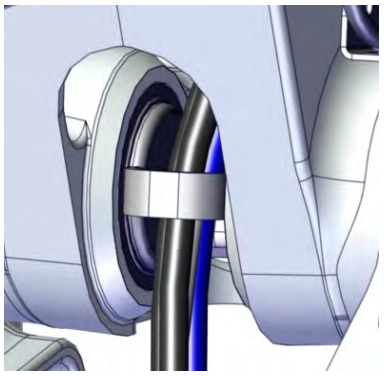
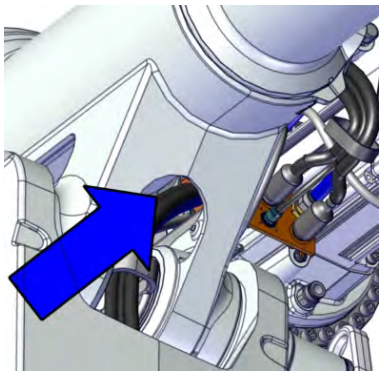
	Action	Note
12	Fit the motor cabling brackets inside lower arm.	 xx1500003019  xx1500003020
13	Place the cables in the cable guide.	 xx1500003027
14	Push the cables out of axis 3-4 beside the motor.	 xx1500003032

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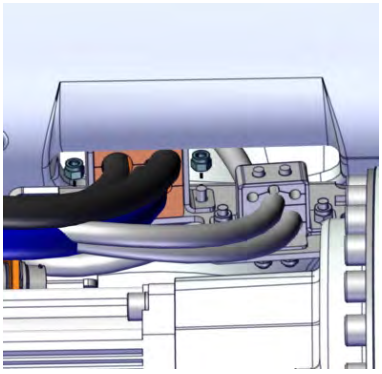
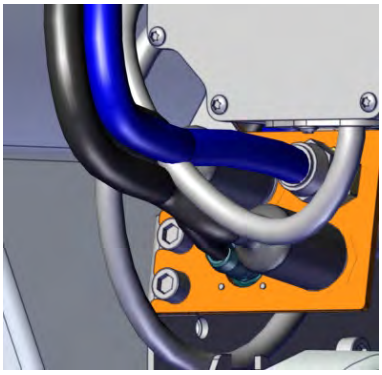
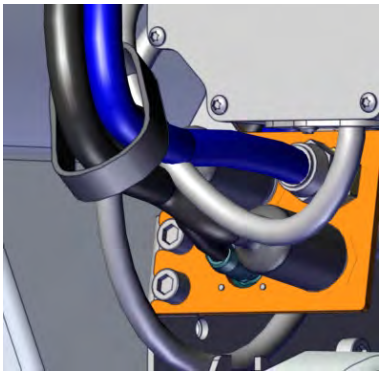
2.4.2.1 Fitting the cable package IRBDP MH LI

Continued

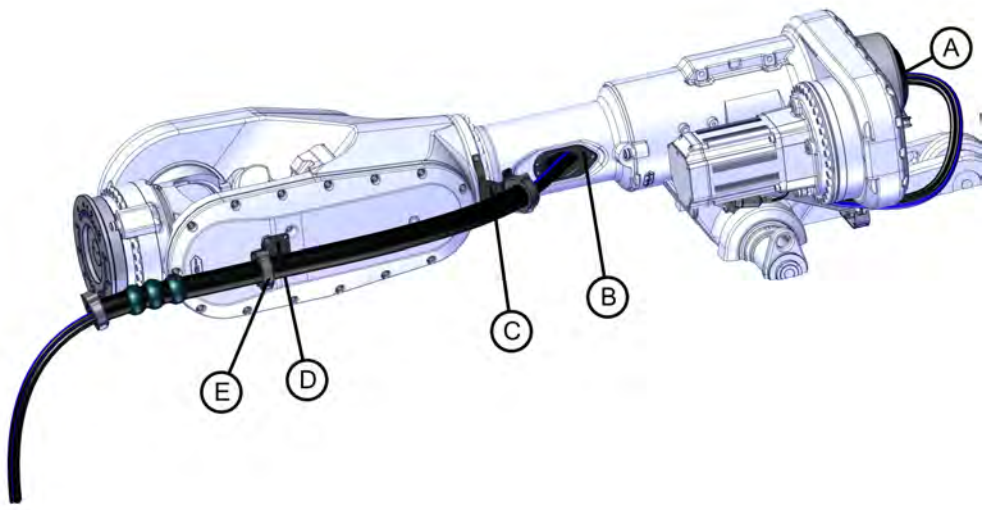
	Action	Note
15	Fit the metal clamp.	 xx1500003033
16	Carefully bend the cabling and attach it to the connection plate. **Tip** Start connecting top connectors, and continue downwards.	 xx1500003034
17	Put a strap around the cabling.	 xx1500003035

2.4.3 Installation of IRBDP MH3 UI

2.4.3.1 Fitting attachments of the IRBDP MH3 UI

Location of the attachments

The location of the attachments of the cable package are shown in the figure.



xx1500003001

A	Cover
B	Insert and tube (inside upper arm)
C	Upper arm bracket
D	Wrist bracket
E	Gripping clamp

Required parts

Spare part	Article number	Note
Material set IRBDP MH3 UI	3HAC053947-001	

Required tools and equipment

Equipment, etc.	Article number	Note
Standard toolkit	-	Content is defined in section *Standard toolkit on page 235*.

Consumables

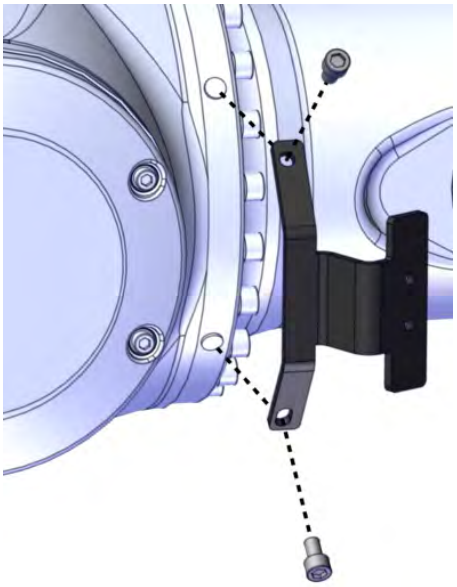
Equipment	Article number	Note
Locking liquid	3HAB7116-1	Loctite 243

Continues on next page

2.4.3.1 Fitting attachments of the IRBDP MH3 UI
Continued

Fitting the cable package attachments - IRBDP MH3 UI

Use this procedure to fit the cable attachments of the cable package IRBDP MH3 UI.

	Action	Note
1	Move the robot to a suitable position for fitting the cable attachments on the upper arm.	
2	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the robot, before entering the robot working area.	
3	Fasten the upper arm bracket. Lock screws with Loctite 243 (Locking liquid).	 xx1500003002 M8x16 A2-7 0 (2 pcs)

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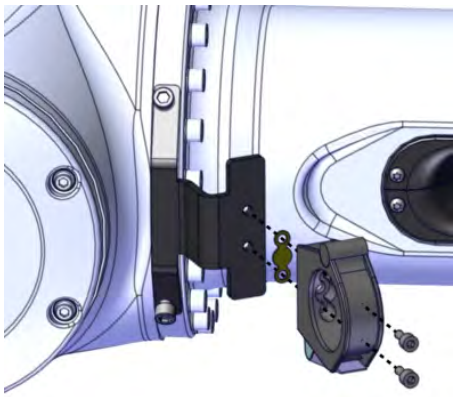
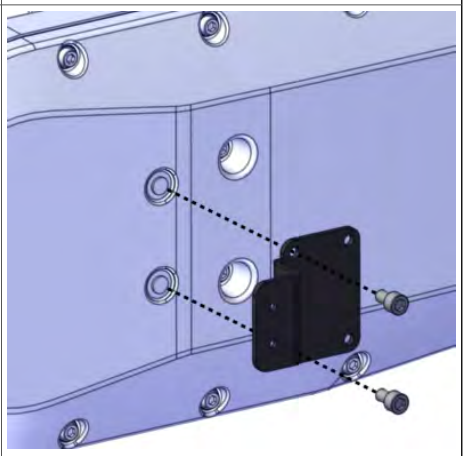
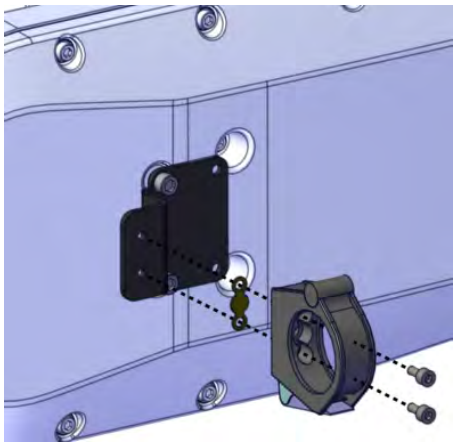
	Action	Note
4	Fasten gripping clamp. Lock screws with Loctite 243 (Locking liquid).	 xx1500003016 M8x16 A2-7 0 (2 pcs)
5	Fasten the wrist bracket. Lock screws with Loctite 243 (Locking liquid).	 xx1500003013 M8x16 A2-7 0 (2 pcs)
6	Fasten gripping clamp. Lock screws with Loctite 243 (Locking liquid).	 xx1500003017 M8x16 A2-7 0 (2 pcs)

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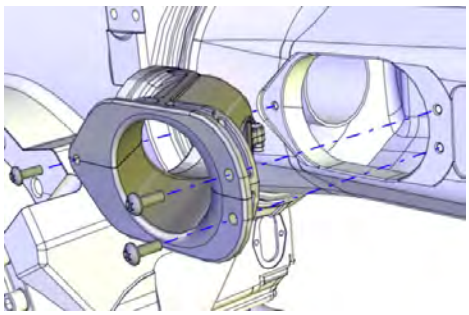
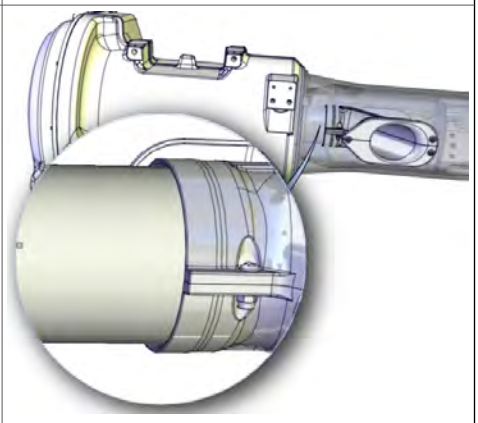
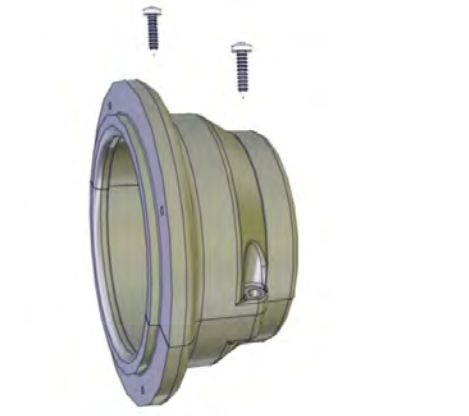
2.4.3.1 Fitting attachments of the IRBDP MH3 UI
Continued

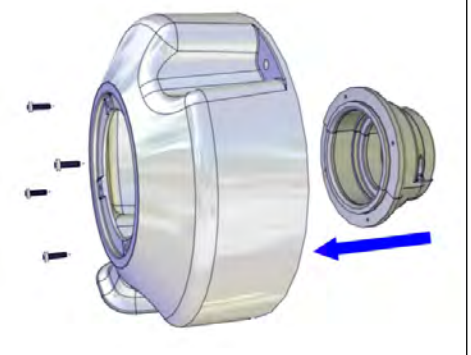
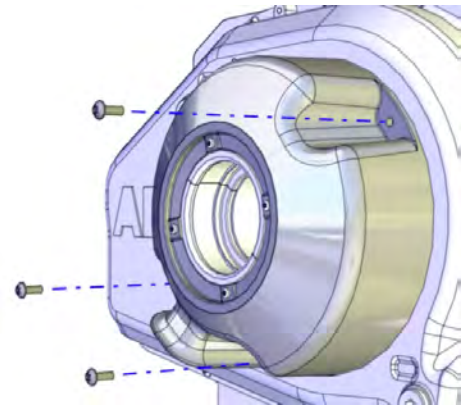
Fitting insert, tube and cover

Fitting insert, tube and cover

Use this procedure to fit the insert, the tube and the cover.

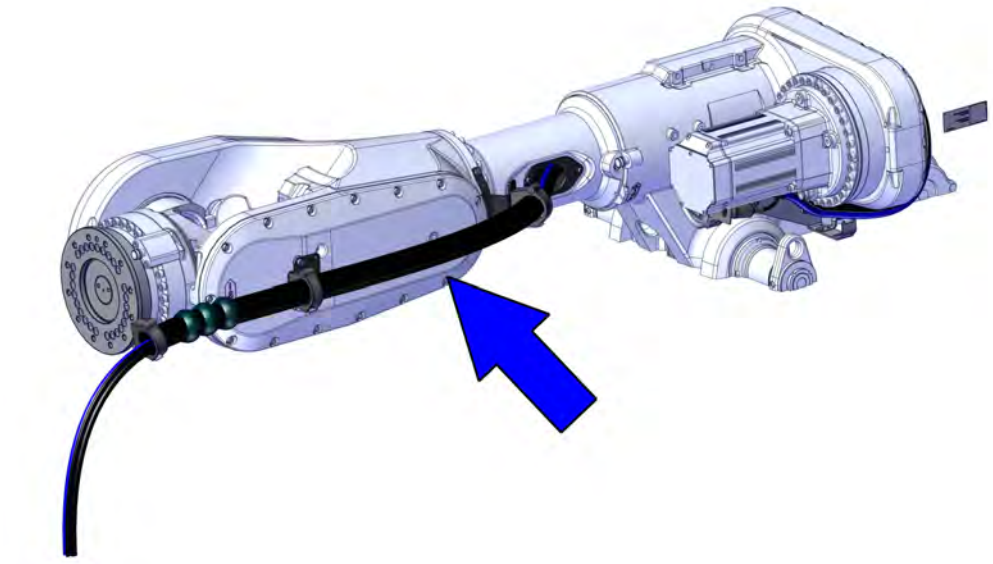
	Action	Note
1	Fit the insert. Lock screws with locking liquid (Loctite 243).	 xx1200000042 Screw, M6x16 8.8-A2F (3 pcs)
2	Insert the tube into the arm tube and fit it into the insert.	 xx1200000043
3	Mount the two parts of the tube guiding ring.	 xx1200000162 Pan head screw ST3.9x16 (2 pcs).

Continues on next page

	Action	Note
4	Fit the tube guiding ring in the cover.	 xx1200000044 Screw, Pan head screw ST3.9x16 (4 pcs).
5	Fit the cover, with the tube guiding ring, on the tube and secure it to the armhouse cover. Lock screws with locking liquid (Loctite 243). **Note** Check that the tube is fitted correctly in both ends, when fitting the cover.	 xx1200000045 Screws, M6x16 quality 8.8-A2F (3 pcs)

2.4.3.2 Fitting the cable package IRBDP MH3 UI

Location of the cable package



xx1500003018

Required parts

Spare part	Article number	Note
Cable package IRBDP MH3 UI	See *DressPack cable package IRBDP MH3 UI on page 242*	

Required tools and equipment

Equipment	Article number	Note
Standard toolkit		Content is defined in section *Standard toolkit on page 235*.

Consumables

Equipment	Article number	Note
Locking liquid	3HAB7116-1	Loctite 243
Cable grease	3HAC14807-1	Optitemp RB2

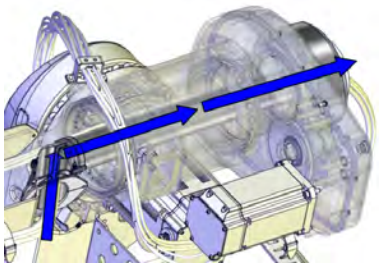
Fitting the cable package IRBDP MH3 UI

Use this procedure to fit the cable package IRBDP MH3 UI.

Route the cable package

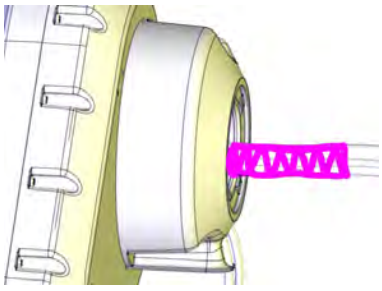
	Action	Note
1	Move the robot to a comfortable working position.	

Continues on next page

	Action	Note
2	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the robot, before entering the robot working area.	
3	**CAUTION** The cable package is sensitive to mechanical damage. Handle it with care in order to avoid damaging the cabling or the connectors.	
4	**Tip** This procedure is best done by two persons working together - one pushing cabling and hoses into the tube and the other pulling them out at the wrist.	
5	Carefully push the cable package into the insert, through the tube and out in the back of the arm housing. **Tip** The following order is preferable: 1 Cables 2 Hoses 3 Weld cables (where applicable) If there is a problem, remove the nut inside the tube.	 xx1400000095

Apply cable grease

It is necessary to apply cable grease on the cable package inside the tube.

	Action	Note
1	Carefully pull the cable package out 10 to 15 centimeters longer than the final assembly position.	
2	Apply grease on the highlighted area.	 xx1400001389

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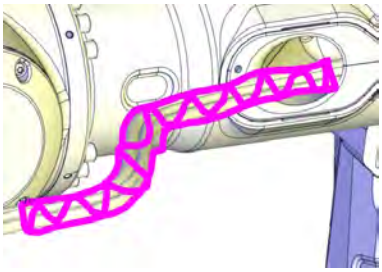
2.4.3.2 Fitting the cable package IRBDP MH3 UI

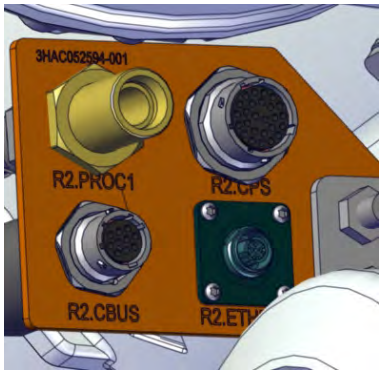
Continued

	Action	Note
3	Carefully push the cable package back into the tube and out through the insert until the area where grease was applied, is visible and able to reach.	
4	Apply grease on the highlighted area so that the cable package inside the tube is covered with cable grease all the way through.	 xx1400001390
5	Carefully push the cable package back in through the insert and into its mounting position in the tube.	
6	**Note** Make sure the cables and hoses are not twisted through the upper arm.	

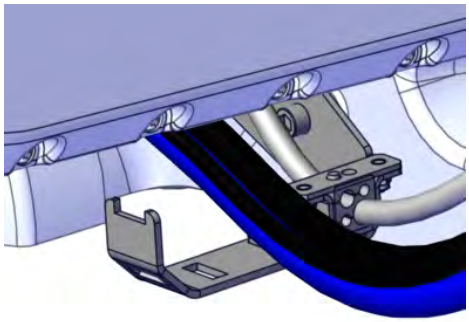
Connect the cable package

	Action	Note
1	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the robot, before entering the robot working area.	
2	**CAUTION** The cable package is sensitive to mechanical damage. Handle it with care in order to avoid damaging the cabling or the connectors.	

Continues on next page

	Action	Note
3	Connect the hose and cable connectors on the connection plate. **CAUTION** Do not tighten the brass couplings for water and air with excessive force. **Tip** Start connecting top connectors, and continue downwards.	Tightening torque, brass couplings 1/2": 31 Nm Tightening torque, brass couplings 3/8": 17 Nm  xx1500003038

Fitting cable package on the upper arm

	Action	Note
1	Secure the cable package to the mounting plate with a strap.	 xx1500003039

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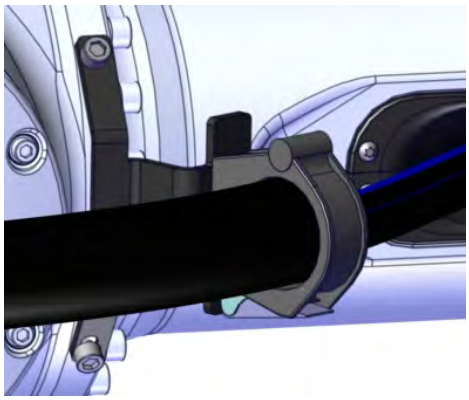
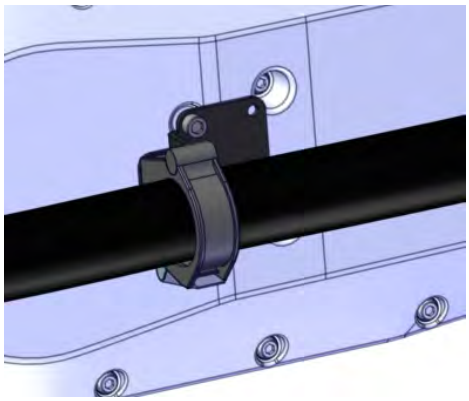
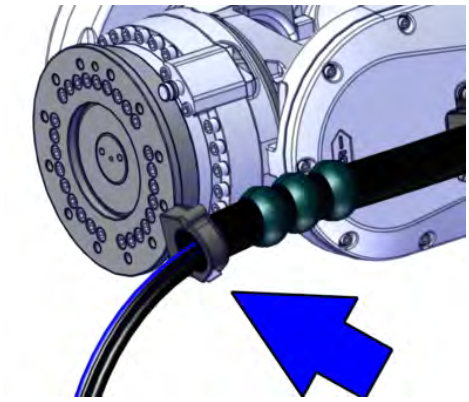
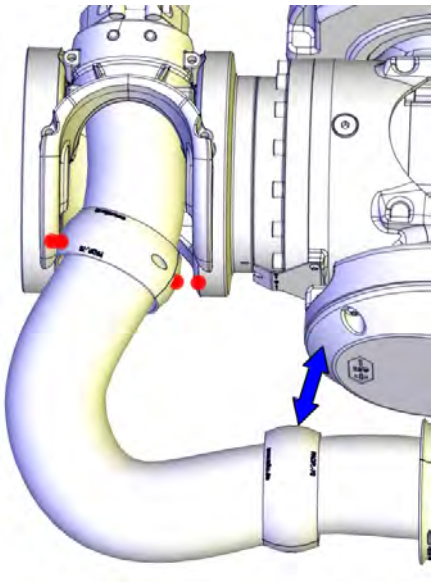
2.4.3.2 Fitting the cable package IRBDP MH3 UI
Continued

	Action	Note
2	Fasten the cable package in the gripping clamps on the upper arm.	 xx1500003040  xx1500003041
3	The gripping clamp at the front shall be fitted on equipment used by the customer.	 xx1500003042

Continues on next page

Check of protective sleeve

The protective hose is protected against wear in exposed areas with a protective sleeve.

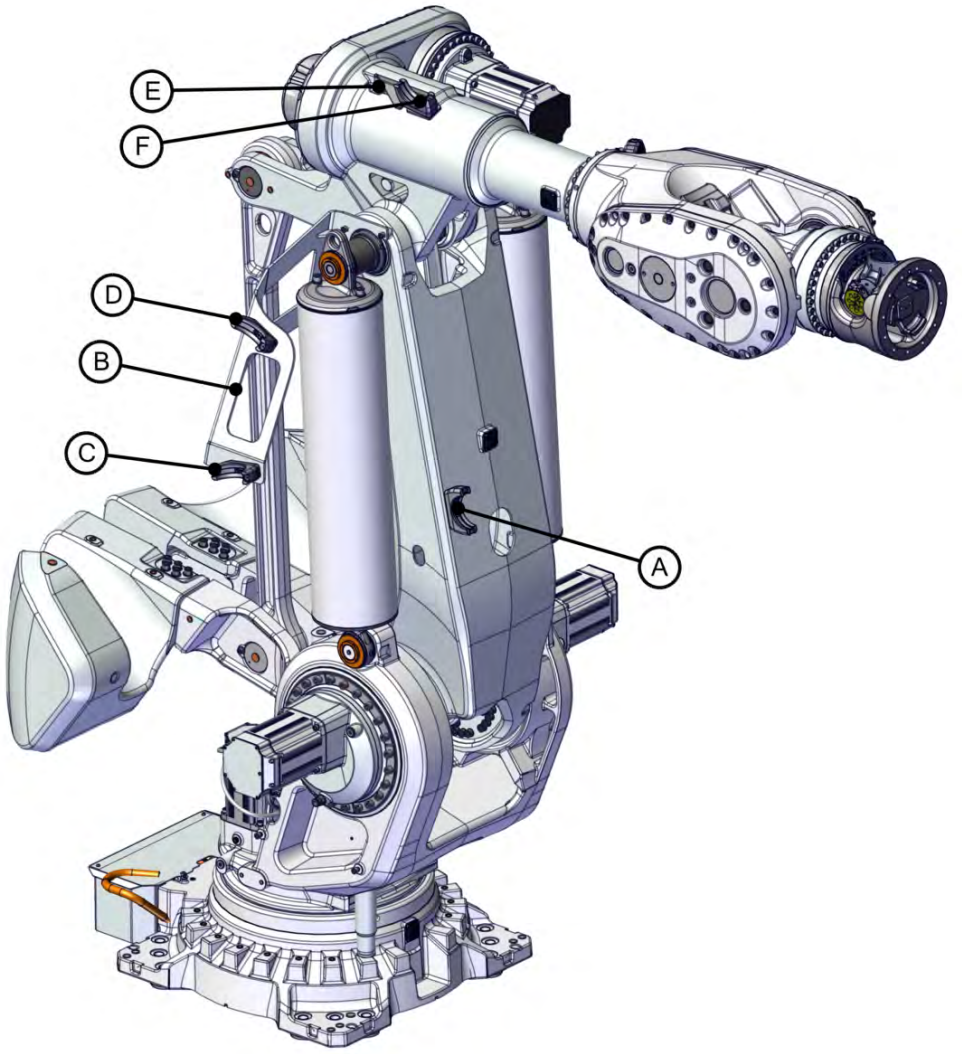
	Action	Note
1	In order to be sure that the protective sleeve is in the correct position, check the position after some hours running.	 xx1400000224
2	If the protective hose is worn somewhere, adjust the position of the protective sleeve.	

2.4.4 Installation of IRBDP SW6 LI, LeanID

2.4.4.1 Fitting attachments of the IRBDP SW6 LI, Lean ID

Location of the attachments

The attachments of the cable package are located as shown in the figure.



xx1500002597

A	Lower ball joint housing
B	Bracket
C	Lower ball joint housing
D	Lower ball joint housing
E	Bracket
F	Lower ball joint housing

Continues on next page

Required parts

Article	Article number	Note
Material set IRBDP SW6 LI	3HAC055251-001	

Required tools and equipment

Equipment, etc.	Article number	Note
Standard toolkit	-	Content is defined in section *Standard toolkit on page 235*.

Consumables

Equipment, etc.	Article number	Note
Locking liquid	3HAB7116-1	Loctite 243 For locking attachment screws.

Fitting the cable attachments - IRBDP SW6 LI

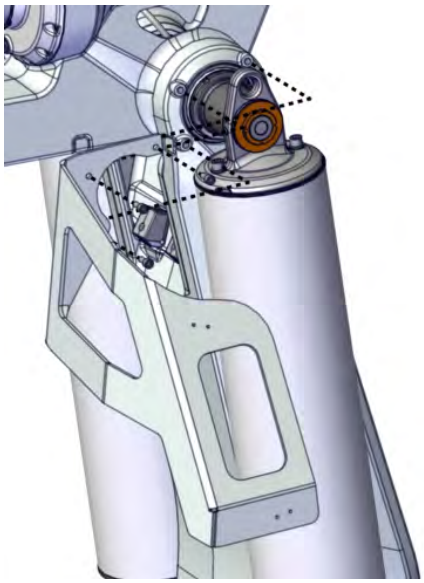
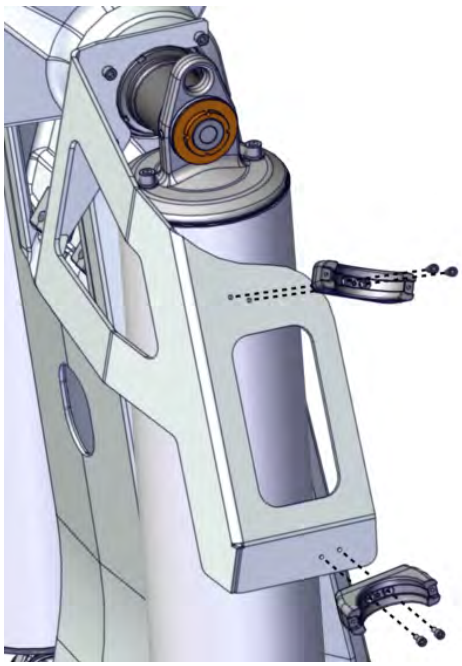
Use this procedure to fit the cable attachments.

	Action	Note
1	Move the robot to a suitable position for fitting the cable attachments on the lower arm.	
2	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the robot, before entering the robot working area.	

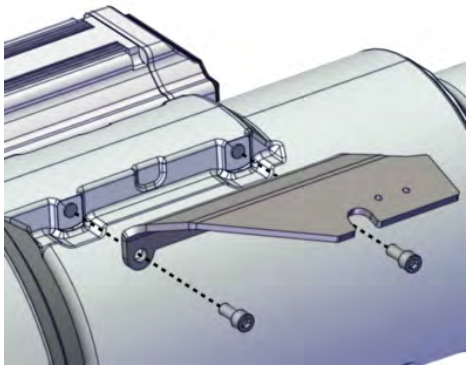
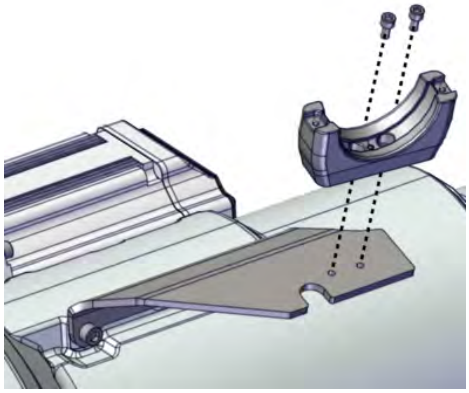
Continues on next page

2.4.4.1 Fitting attachments of the IRBDP SW6 LI, Lean ID

Continued

	Action	Note
3	Fasten the bracket on the lower arm. Lock screws with Locking liquid Loctite 243.	 xx1500002608 M12x25 8.8-A3F (3 pcs)
4	Fasten lower ball joint housings (2 pcs) on the bracket. Lock screws with Locking liquid Loctite 243.	 xx1500002609 M8x16 8.8-A2F (4 pcs)

Continues on next page

	Action	Note
5	Fasten bracket on axis 4. Lock screws with Locking liquid Loctite 243.	 xx1500002610 M12x25 8.8-A3F (2 pcs)
6	Fasten lower ball joint housing. Lock screws with Locking liquid Loctite 243.	 xx1500002611 M8x16 8.8-A2F (2 pcs)

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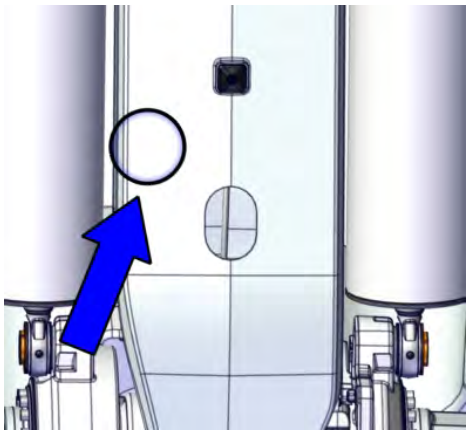
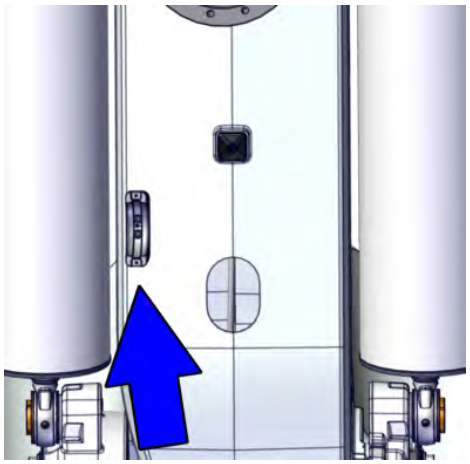
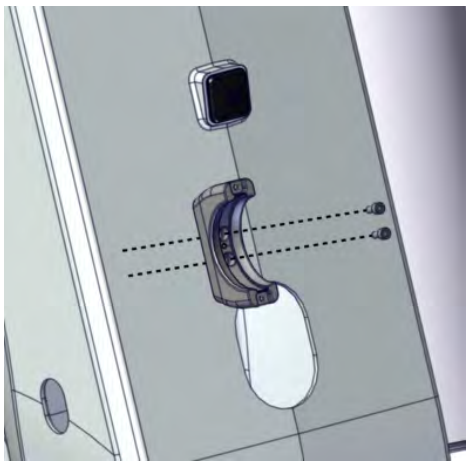
2.4.4.1 Fitting attachments of the IRBDP SW6 LI, Lean ID

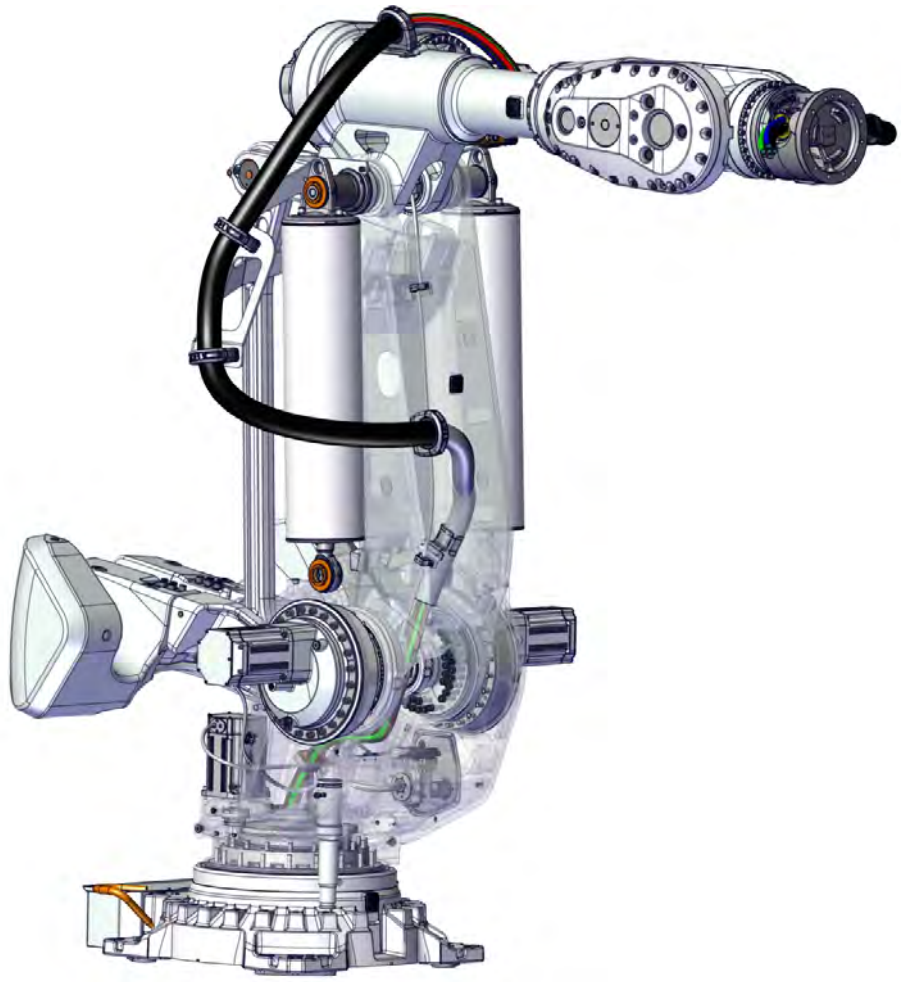
Continued

	Action	Note
7	Mark a position on the lower arm where to fasten the lower ball joint housing. • Use the ball joint housing as a reference template and mark the hole placement (vertical). • Drill and thread the holes for M6 screws.	 xx1500002632  xx1500002633
8	Fasten lower ball joint housing. Lock screws with Locking liquid Loctite 243.	 xx1500002635 M8x16 8.8-A2F (2 pcs)

2.4.4.2 Fitting the cable package IRBDP SW6 LI, Lean ID

Location of the cable package IRBDP SW6 LI

The DressPack cable package IRBDP SW6 LI, is located as shown in the figure.



xx1500002651

Spare parts

Spare part	Article number	Note
Cable package IRBDP SW6 LI	See *DressPack cable package IRBDP SW6 LI on page 240*	

Required tools and equipment

Equipment, etc.	Article number	Note
Standard toolkit	-	Content is defined in section *Standard toolkit on page 235*.

Continues on next page

2.4.4.2 Fitting the cable package IRBDP SW6 LI, Lean ID
Continued

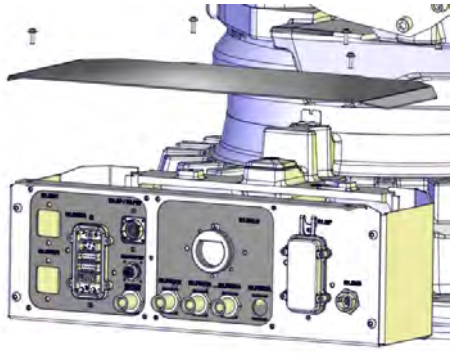
Required consumable

Equipment, etc.	Art. no.	Note
Locking liquid	3HAB7116-1	Loctite 243, for locking screws.
Cable grease	3HAC14807-1	Optitemp RB2

Fitting the cable package

Use this procedure to fit the cable package.

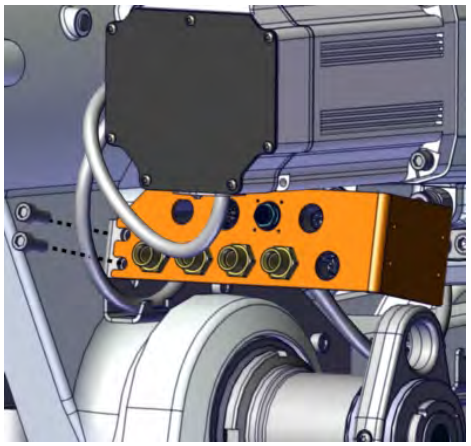
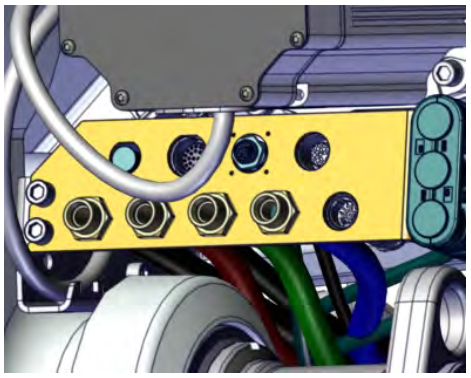
Preparations

	Action	Note
1	Move the robot to a comfortable working position.	
2	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the robot, before entering the robot working area.	
3	Remove the rear cover plate (if not already removed).	 xx1400000197

Fasten the cable package

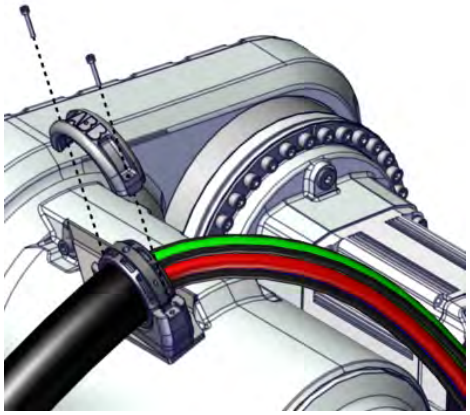
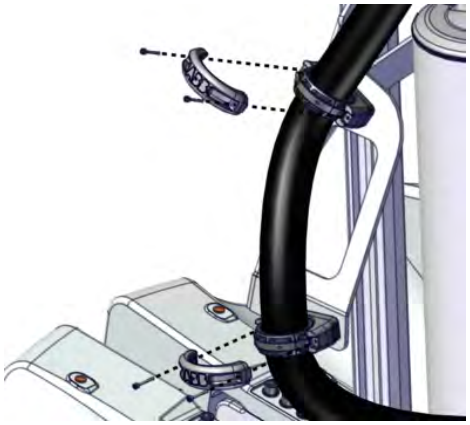
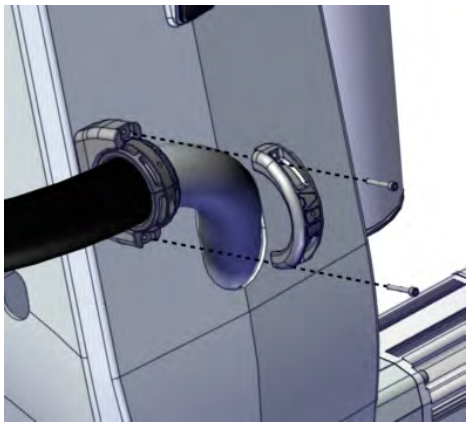
	Action	Note
1	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the robot, before entering the robot working area.	

Continues on next page

	Action	Note
2	**CAUTION** The cable package is sensitive to mechanical damage. Handle it with care in order to avoid damaging the cabling or the connectors.	
3	Start the assembly of the cabling at the connector plate in axis 3-4. Let the cabling rest over the robots axis 3-4.	
4	Fasten the connector plate.	 xx1500002652 M10x25 8.8-A3F (2 pcs)
5	Connect the connectors.	 xx1500003049
6	**CAUTION** Do not change the position of the clamp inserts on the protection hose, being fitted in the ball joint housings. If the position is changed it will alter the bending movement of the protection hose, when the arms are moved. A change of position of the clamp inserts may result in serious damage to the cable package.	

Continues on next page

2.4.4.2 Fitting the cable package IRBDP SW6 LI, Lean ID
Continued

	Action	Note
7	Fasten the cabling in the axis-3 ball joint housing. **Note** Be careful not to loose the small o-ring! The purpose of the o-ring is to keep the screws in place in the housing, upper part.	 xx1500002653 M8x16 8.8-A2F (2 pcs)
8	Fasten the cabling in the ball joint housings on the lower arm bracket. **Note** Be careful not to loose the small o-ring! The purpose of the o-ring is to keep the screws in place in the housing, upper part.	 xx1500002654 M8x16 8.8-A2F (2x 2 pcs)
9	Fasten the cabling in the ball joint housings on the lower arm. **Note** Be careful not to loose the small o-ring! The purpose of the o-ring is to keep the screws in place in the housing, upper part.	 xx1500002658 M8x16 8.8-A2F (2 pcs)

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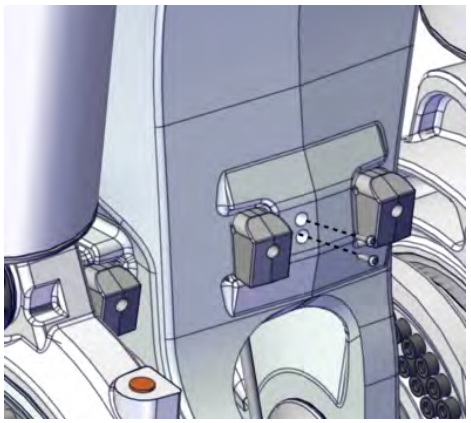
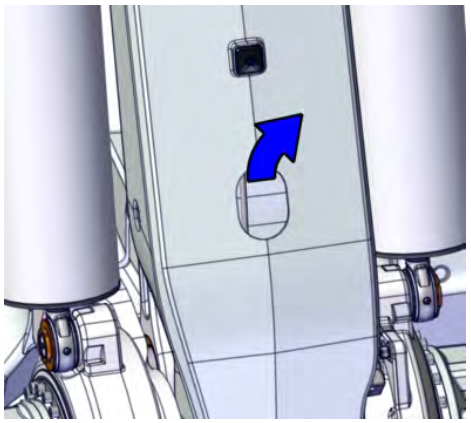
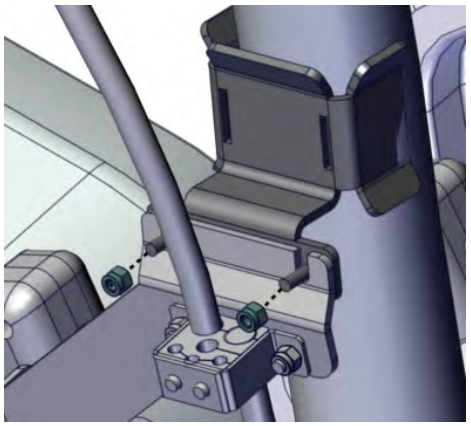
	Action	Note
10	Loosen the screws on the back lower arm. Save the screws for re-assembly.	 xx1500002606
11	Carefully pull out the motor cabling with the bracket through the front hole on the lower arm.	 xx1500002607
12	Fasten the IRBDP SW6 LE cabling bracket on the motor cabling bracket.	 xx1500002655 Prev. torque nut M6 (2 pcs)

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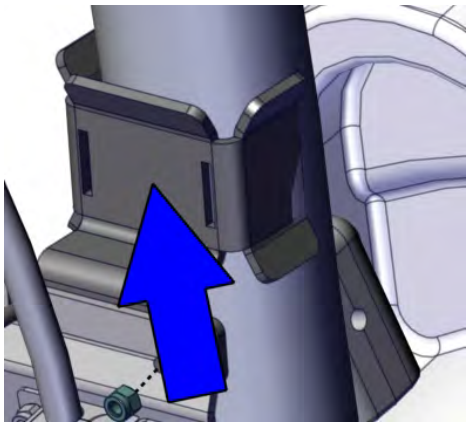
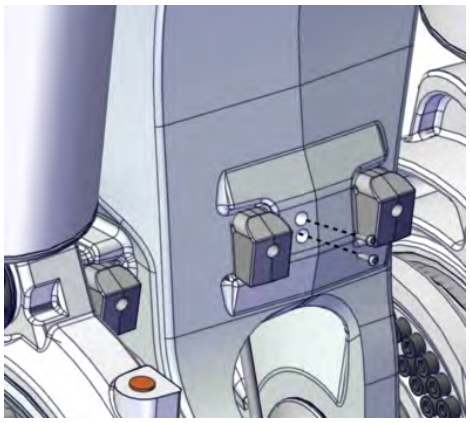
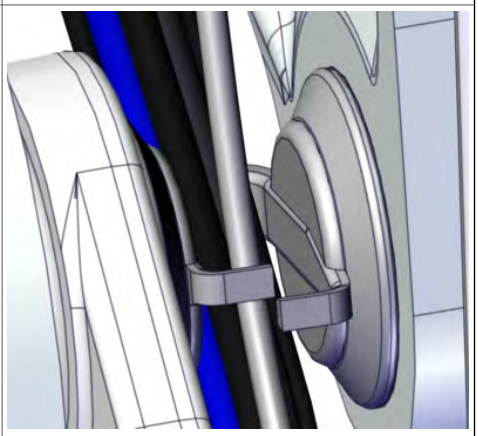
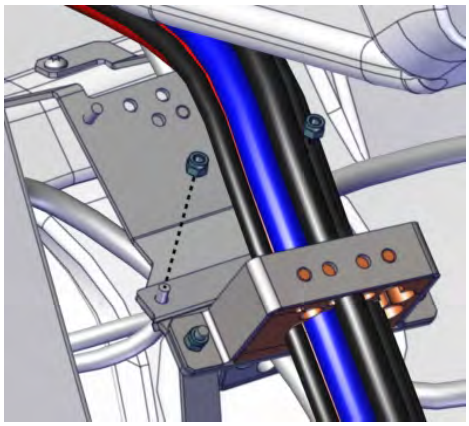
2.4.4.2 Fitting the cable package IRBDP SW6 LI, Lean ID

Continued

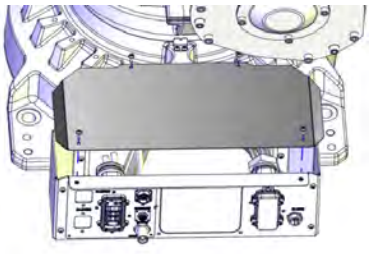
	Action	Note
13	Fasten a velcro strap around the bracket and the cabling.	 xx1500002657
14	Carefully push the cabling down through the lower arm.	
15	Fasten the bracket in the back lower arm. Use previously removed screws.	 xx1500002606
16	Put the cabling through the cable guide in axis 2.	 xx1500002656

Continues on next page

	Action	Note
17	Fasten the IRBDP cabling on the cabling bracket in the frame.	 xx1500002659 Prev. torque nut M6 (2 pcs)
18	Run the cables down through the center hole of axis 1, in the following order: • Signal cables (Spot welding) • Hoses • Make a check that cables and hoses do not cross each other.	

Connect the lower cable package at the base

Connect the lower cable package at the base

	Action	Note
1	**DANGER** Turn off all: • electric power supply • air pressure supply to the robot, before starting the repair work on the robot.	
2	**CAUTION** The cable package is sensitive to mechanical damage. Handle it with care in order to avoid damaging the cabling or the connectors.	
3	Remove the rear cover plate.	 xx1400000080

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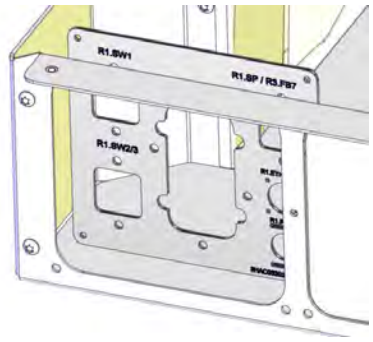
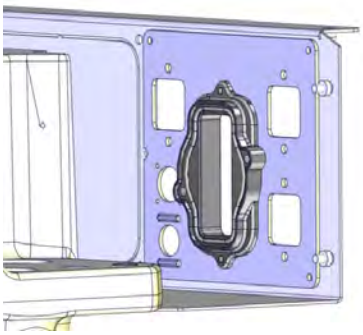
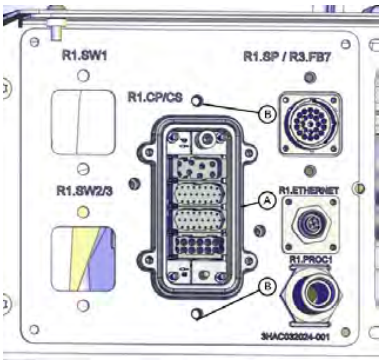
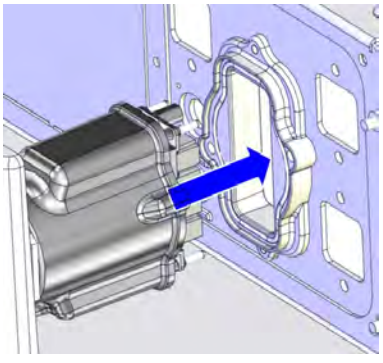
2.4.4.2 Fitting the cable package IRBDP SW6 LI, Lean ID

Continued

	Action	Note
4	Fit the customer plate.	 xx1400001146 M6x16 8.8-A2F (4 pcs)
5	Fit the adapter complete to the customer plate.	 xx1400001140
6	Fasten the adapter complete to the customer plate.	 xx1400001141 M6x16 8.8-A2F (2 pcs)
7	Fit the R1.CP/CS cable to the customer plate.	 xx1400001142

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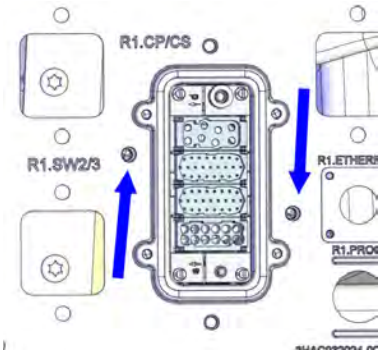
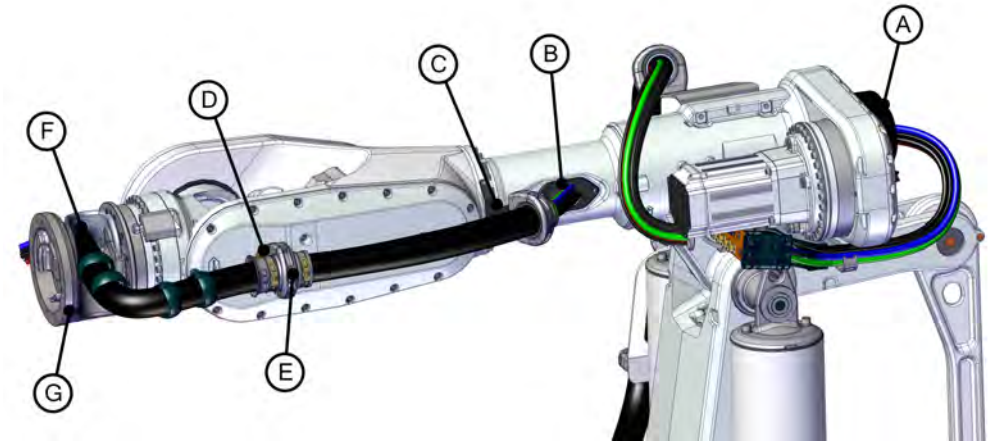
	Action	Note
8	Secure the R1.CP/CS connector.	 xx1400001143 M6x25 8.8-A2F (2 pcs)
9	Connect the rest of the cable and hose connectors to the customer plate. **CAUTION** Do not tighten the brass couplings for water and air with excessive force. **CAUTION** Make sure that no cables or hoses are twisted or strained. Reroute if necessary.	Tightening torque, brass couplings 1/2": 31 Nm Tightening torque, brass couplings 3/8": 17 Nm

2.4.5 Installation of IRBDP MH6 UI and IRBDP SW6 UI, LeanID

2.4.5.1 Fitting attachments of the IRBDP MH6 UI and IRBDP SW6 UI, Lean ID

Location of the attachments

The cable package attachemnts are located as shown in the figure.



xx1500002766

A	Cover
B	Insert
C	Upper arm bracket
D	Bearing housing
E	Ball joint housing
F	Cable guide
G	Process turning disc

Required parts

Equipment, etc.	Article number	Note
Material set IRBDP SW6 UI and IRBDP MH6 UI	3HAC053942-001	

Required tools and equipment

Equipment, etc.	Article number	Note
Standard toolkit	-	Content is defined in section *Standard toolkit on page 235*.

Consumables

Equipment, etc.	Article number	Note
Locking liquid	3HAB7116-1	Loctite 243

Continues on next page

Fitting the cable attachments

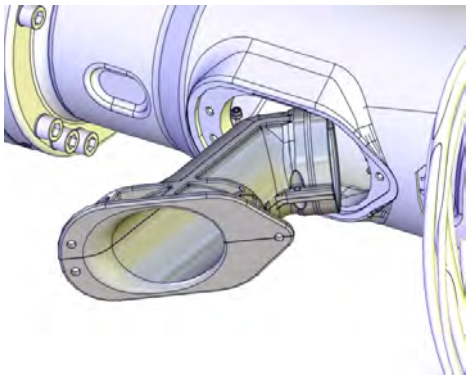
Use these procedures to fit the cable attachments.

Preparations

	Action	Note
1	Move the robot to a suitable position for fitting the cable attachments on the upper arm.	
2	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the robot, before entering the robot working area.	

Fitting insert, tube and cover

Use this procedure to fit the insert, the tube and the cover.

	Action	Note
1	Fit the insert. Lock screws with Locking liquid Loctite 243.	 xx1400000091 M6x16 A2-70 (3 pcs)

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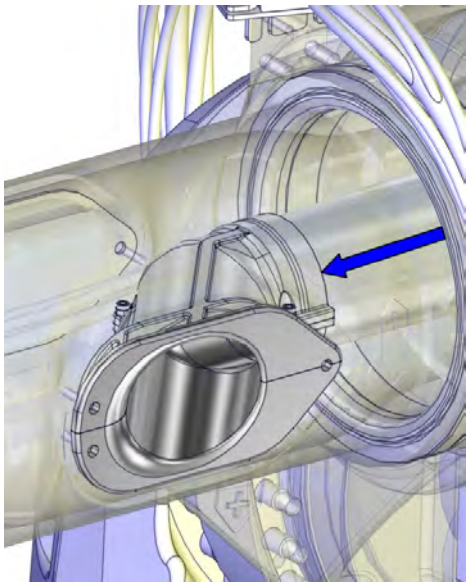
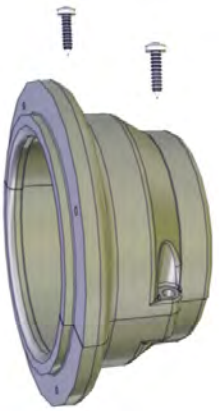
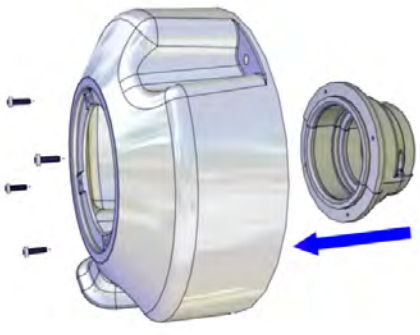
2.4.5.1 Fitting attachments of the IRBDP MH6 UI and IRBDP SW6 UI, Lean ID

Continued

	Action	Note
2	Insert the tube into the arm tube and fit it into the insert.	 xx1400000092
3	Mount the two parts of the tube guiding ring.	 xx1200000162 ST3.5x16 (2 pcs)
4	Fit the tube guiding ring in the cover.	 xx1200000044 ST3.5x16 (4 pcs)

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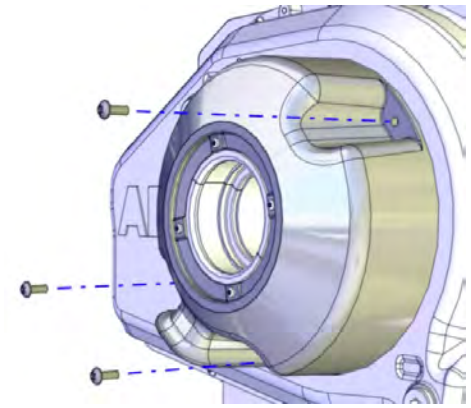
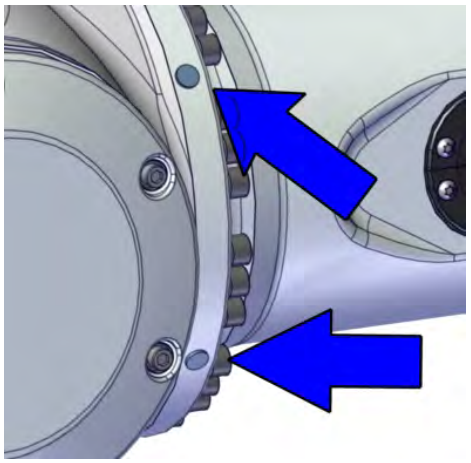
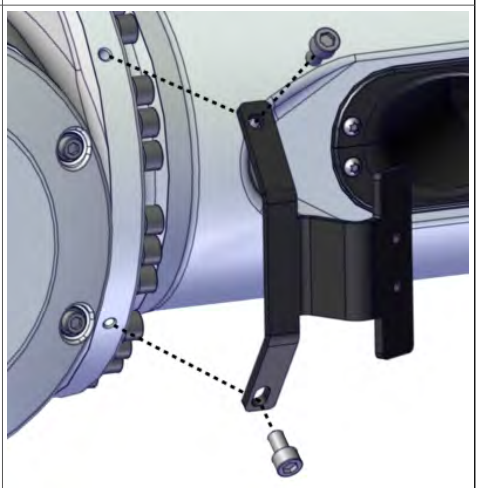
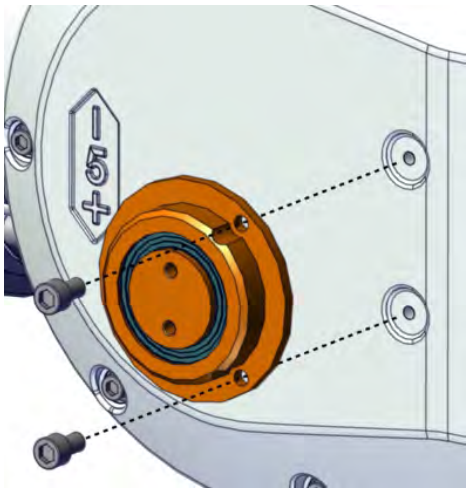
	Action	Note
5	Fit the cover with the tube guiding ring fitted, on the tube and secure it to the arm-house cover. Lock screws with Locking liquid Loctite 243. **Note** Make sure that the tube is fitted correctly in both ends, when fitting the cover.	 xx1200000045 M6x16 A2-70 (3 pcs)

Fitting the cable attachments

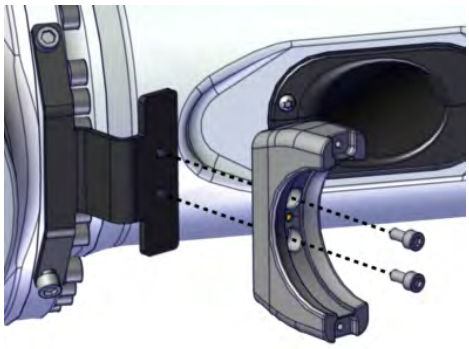
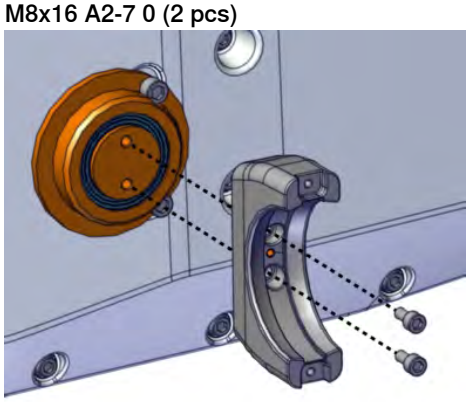
	Action	Note
1	Remove plastic plugs if fitted.	 xx1500002767
2	Fasten the upper arm bracket. Lock screws with Locking liquid Loctite 243.	 xx1500002768 M8x16 A2-7 0 (2 pcs)

Continues on next page

2.4.5.1 Fitting attachments of the IRBDP MH6 UI and IRBDP SW6 UI, Lean ID
Continued

	Action	Note
3	Remove plastic plugs if fitted.	 xx1500002769
4	Fasten bearing with housing. Lock screws with Locking liquid Loctite 243.	 xx1500002770 M8x16 A2-7 0 (2 pcs)

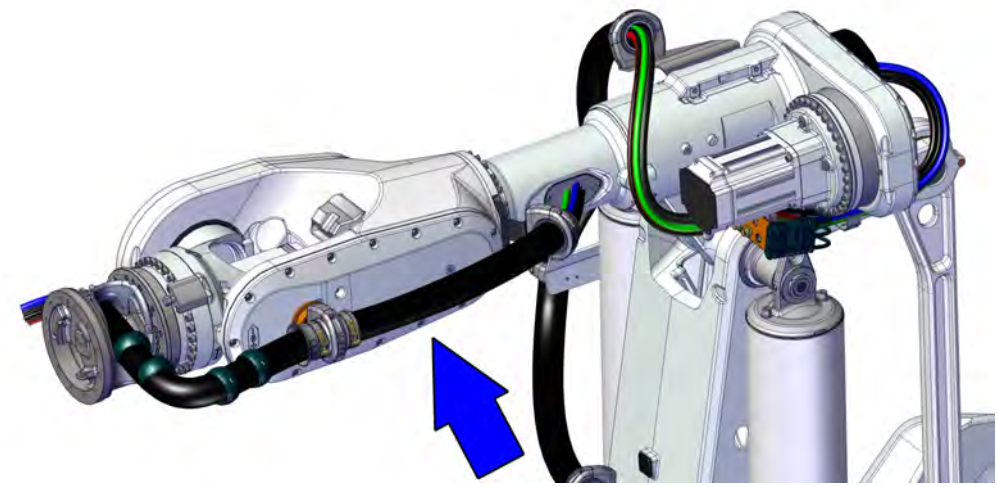
Continues on next page

	Action	Note
5	Fasten the two lower ball joint housing parts. Lock screws with Locking liquid Loctite 243.	 xx1500002775 M8x16 A2-7 0 (2 pcs)  xx1500002776 M8x16 A2-7 0 (2 pcs)

2.4.5.2 Fitting the cable packages IRBDP MH6 UI and IRBDP SW6 UI, Lean ID

Location of the cable package IRBDP SW6 UI and IRBDP MH6 UI

The cable packages IRBDP SW6 UI and IRBDP MH6 UI, are located as shown in the figure. The figure shows cable package IRBDP SW6 UI. The principle of IRBDP MH6 UI is the same as IRBDP SW6 UI.



xx1500002777

Required parts

Equipment, etc.	Article number	Note
Cable package IRBDP SW6 UI	See *DressPack cable package IRBDP SW6 UI on page 241*	
Cable package IRBDP MH6 UI	See *DressPack cable package IRBDP SW6 LI on page 240*	

Required tools and equipment

Equipment, etc.	Article number	Note
Standard toolkit	-	Content is defined in section *Standard toolkit on page 235*.

Consumables

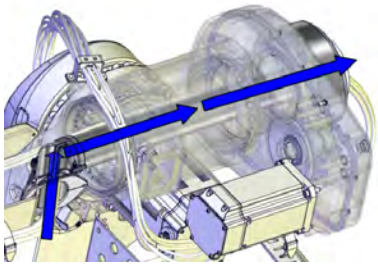
Equipment, etc.	Article number	Note
Locking liquid	3HAB7116-1	Loctite 243
Cable grease	3HAC14807-1	Optitemp RB2

Continues on next page

Fitting the cable package - IRBDP SW6 UI and IRBDP MH6 UI

Use these procedures to fit the cable packages.

Route the cable package

	Action	Note
1	Move the robot to a comfortable working position.	
2	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the robot, before entering the robot working area.	
3	**CAUTION** The cable package is sensitive to mechanical damage. Handle it with care in order to avoid damaging the cabling or the connectors.	
4	**Tip** This procedure is best done by two persons working together - one pushing cabling and hoses into the tube and the other pulling them out at the wrist.	
5	Carefully push the cable package into the insert, through the tube and out in the back of the arm housing. **Tip** The following order is preferable: 1 Cables 2 Hoses 3 Weld cables (where applicable) If there is a problem, remove the nut inside the tube.	 xx1400000095

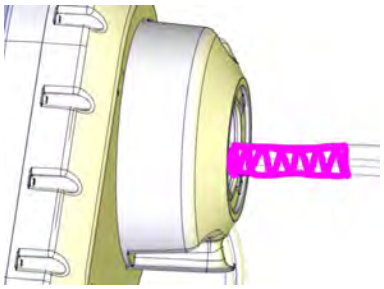
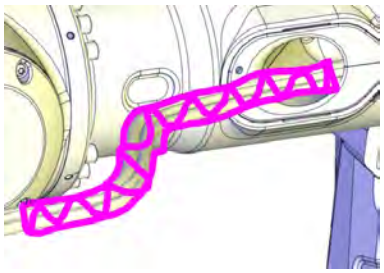
Apply cable grease

It is necessary to apply cable grease on the cable package inside the tube.

	Action	Note
1	Carefully pull the cable package out 10 to 15 centimeters longer than the final assembly position.	

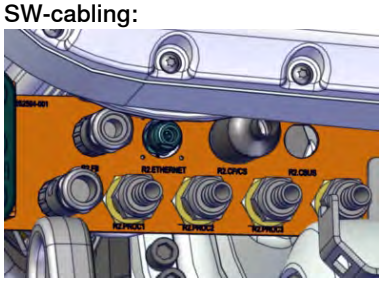
Continues on next page

2.4.5.2 Fitting the cable packages IRBDP MH6 UI and IRBDP SW6 UI, Lean ID
Continued

	Action	Note
2	Apply grease on the highlighted area.	 xx1400001389
3	Carefully push the cable package back into the tube and out through the insert until the area where grease was applied, is visible and able to reach.	
4	Apply grease on the highlighted area so that the cable package inside the tube is covered with cable grease all the way through.	 xx1400001390
5	Carefully push the cable package back in through the insert and into its mounting position in the tube.	
6	**Note** Make sure the cables and hoses are not twisted through the upper arm.	

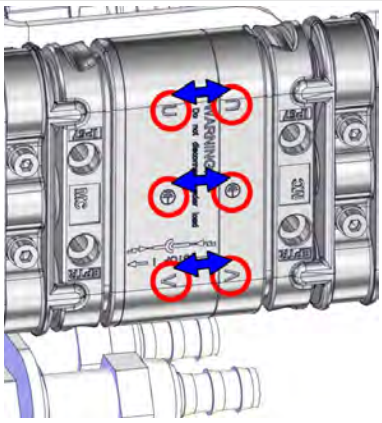
Continues on next page

Connect the cable package

	Action	Note
1	Connect the hose and cable connectors on the connection plate. **CAUTION** Do not tighten the brass couplings for water and air with excessive force. **Tip** Start connecting top connectors, and continue downwards.	Tightening torque, brass couplings 1/2": 31 Nm Tightening torque, brass couplings 3/8": 17 Nm SW-cabling:  xx1500002812 MH-cabling:  xx1500003038

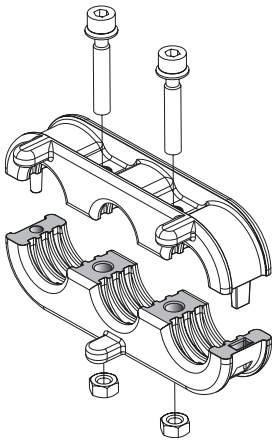
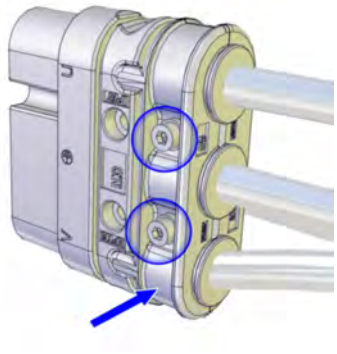
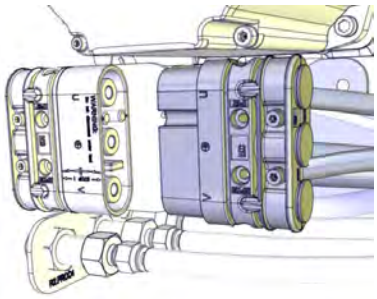
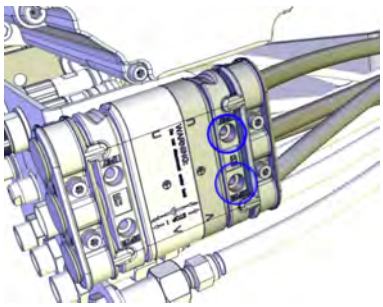
Weld connector

Only valid for IRBDP SW6 UI.

	Action	Note
1	Press (manually) the cables with the crimped-on contact part into the insulation from the back until it perceptibly engages into place to the detent. **Note** Make sure the pins are pushed all the way into the connector.	 xx1400000216

Continues on next page

2.4.5.2 Fitting the cable packages IRBDP MH6 UI and IRBDP SW6 UI, Lean ID
Continued

	Action	Note
2	Fit the cable strain relief.  xx1300000836	 xx1200000058 M5x25 8.8-A2F (2 pcs)
3	Connect the weld cable.	 xx1200000075
4	Fasten the weld connector to the connection plate.	 xx1200000089 M5x40 8.8-A2F (2 pcs)

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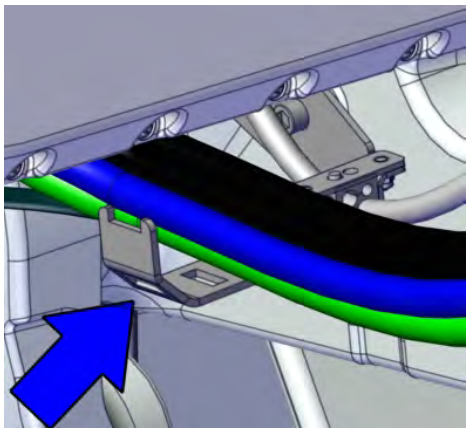
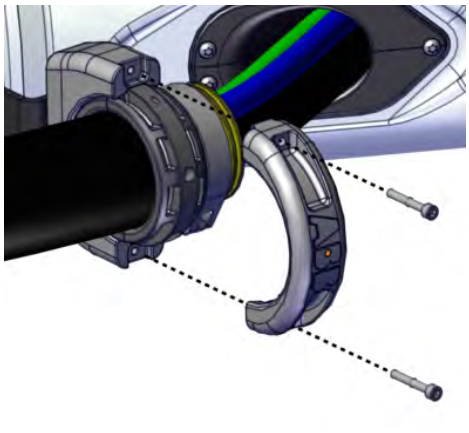
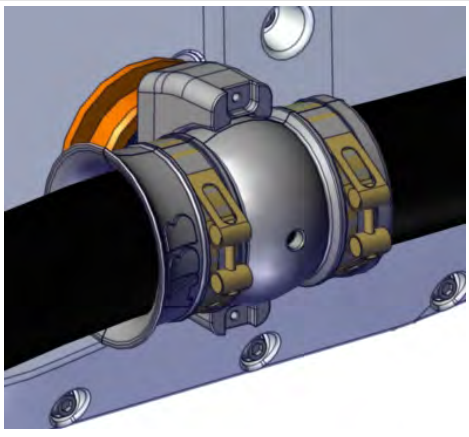
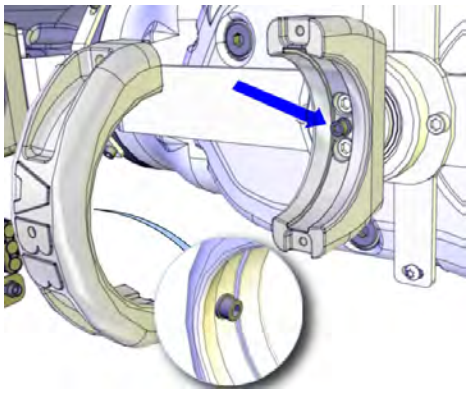
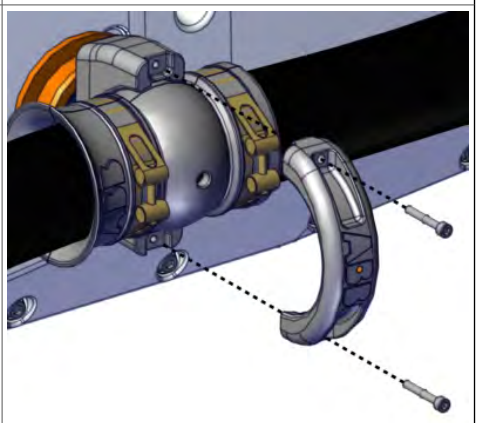
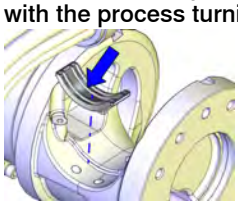
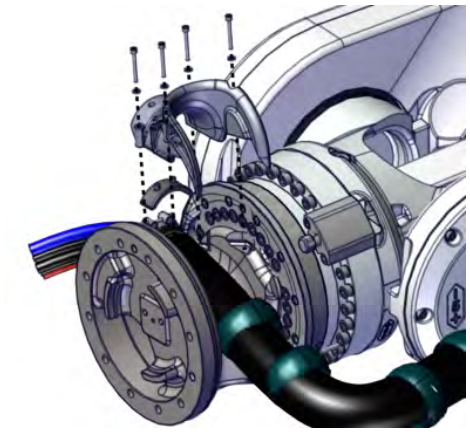
Fasten the cable package IRBDP SW6 UI and IRBDP MH6 UI

	Action	Note
1	Fasten the cable package to the bracket with a strap.	 xx1500002818
2	Fasten the cable package in the ball joint housing.	 xx1500002819 M8x16 A2-7 0 (2 pcs)
3	Make sure that the hose reinforcement funnel is fitted correctly, in the direction shown in the figure.	 xx1500002821

Continues on next page

2.4.5.2 Fitting the cable packages IRBDP MH6 UI and IRBDP SW6 UI, Lean ID
Continued

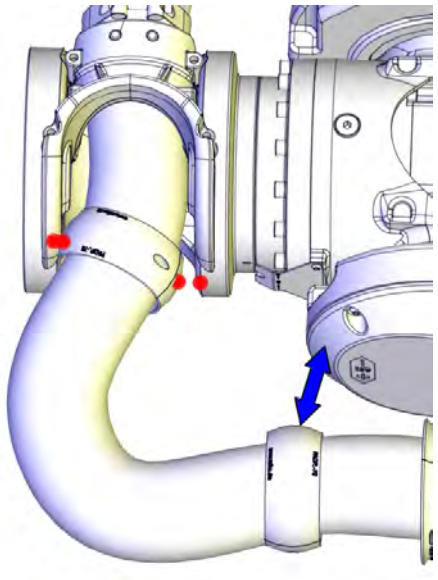
	Action	Note
4	Make sure that the screws (M6x12) fits into the guiding holes of the hose reinforcement funnel when it is fitted in the ball joint housing. **CAUTION** The hose reinforcement funnel must not be able to rotate inside the ball joint housing when fitted.	 xx1200000153 M6x12 8.8-A2F (1 pc)
5	Fasten the cable package in the ball joint housing.	 xx1500002820 M8x16 A2-7 0 (2 pcs)
6	**Only valid for IRBDP SW6 UI:** Put cable grease on the process turning disc and the cable guide.	Cable grease 3HAC14807-1
7	**Only valid for IRBDP SW6 UI:** Fasten the cable package in the clamp jaw with the process turning disc cable guide.  xx1400000223	 xx1500002822

Continues on next page

	Action	Note
8	**CAUTION** Check potential collision risks between the cable package and the wrist, as well as between the cable package and any equipment fitted on the wrist, before restarting the normal production.	
9	Turn on the power and run the present programming at a very slow speed, while checking all movements for collision risk between cable package and wrist.	
10	**DANGER** Make sure all safety requirements are met when performing the first test run. These are further detailed in the section *DANGER - First test run may cause injury or damage! on page 51*.	

Check of protective sleeve

The protective hose is protected against wear in exposed areas with a protective sleeve.

	Action	Note
1	In order to be sure that the protective sleeve is in the correct position, check the position after some hours running.	 xx1400000224
2	If the protective hose is worn somewhere, adjust the position of the protective sleeve.	

2.5 Inspection, DressPack lower arm

General

In order to ensure adequate life of the equipment, it is vital that the cables and hoses are properly installed and operated correctly, with their movement patterns well within the acceptable limits.

This procedure describes how to inspect the DressPack lower arm installation in this regard.

Procedure, process cable package

	Action	Note
1	*Do not bend* any cable or hose excessively!  **Note** Make sure no cables or hoses are twisted.	Minimum bending radius is approximately 10x the cable or hose diameter.
2	Make sure all cables straps are tight enough to prevent the cable package from moving in any undesired way.	
3	Make sure the cable package is properly connected at the connection plate as well as at the robot base.	
4	Make sure no hoses or cables, or parts thereof, touch any part of the robot structure in a way that may cause wear.	
5	Make sure all cables and hoses move smoothly together during operation and that no part of the cable package moves in a different pattern.	
6	Make sure that cables, hoses or packages do not rub against *any sharp corner of something* (not just the robot itself)!	
7	Make sure all connection points are well tightened and sealed in order to avoid leaks.	

Procedure, attachments and brackets

	Action	Note
1	Make sure that all cable clamps securing the process cable package and protective hose are tightened correctly.	Tightening torques are specified: • For *standard tightening torques* - See tightening torque table in chapter References. • For *non standard tightening torques* see chapter *Installation*.

2.6 Inspection, DressPack upper arm

Introduction

In order to ensure adequate life of the equipment, it is vital that the cables and hoses are properly installed and operated correctly, with their movement patterns well within the acceptable limits.

This section describes how to inspect the DressPack upper arm installation in this regard.

Procedure, general

	Action	Note
1	Inspect all attachments, brackets and any other hardware securing or guiding the protective hose.	
2	Inspect the process cable package.	Described in the following section.
3	Inspect and make sure all cables and hoses are securely fixed and connected.	Described in the following section.

Cables and hoses

Use this procedure to inspect cables and hoses, not necessarily in any particular order unless stated.

	Action	Note
1	Do not bend any cable or hose excessively.	Minimum bending radius is approximately 10x the cable or hose diameter.
2	Make sure no cables or hoses are twisted.	
3	Make sure that all hoses and cables to gun or gripper are long enough to avoid stretching.	
4	Make sure that the protection hose is rotating correctly in the hose reinforcement funnel.	
5	Make sure that the hose reinforcement funnel is tilting correctly in the ball joint housing.	
6	Make sure that cables are clamped with straps in a way that there is no movement at connectors.	Use only wide straps or velcro straps in order not to damage the cables or hoses.
7	Make sure that no hoses or cables, or parts thereof, touch any part of the robot structure in a way that may cause wear.	
8	Make sure that no hoses or cables, or parts there of, touch any part of the surrounding equipment in a way that may cause wear.	
9	Make sure all cables and hoses move smoothly together during operation.	

Continues on next page

Securing and connecting

Use this procedure inspect the securing and connecting of the cable harness, not necessarily in any particular order unless stated.

	Action	Note
1	Make sure that all cable clamps securing the process cable package and protective hose are tightened correctly.	Tightening torques are specified: • For *standard tightening torques* - See tightening torque table in chapter References. • For *non standard tightening torques* - See Installation chapter.
2	Make sure all cable straps are tight enough to prevent the cable package from moving in any undesired way.  **Note** The cable ties should not be too narrow. This may damage the cables/hoses.	
3	When securing cables and hoses with cable ties: *never* overtighten the ties. It may damage the equipment.	
4	Make sure that the cable package have been properly connected at the connection plate, axis 3 on the rear of the upper arm as well as at the tool on the robot turning disc.	
5	Make sure all connection points are well tightened and sealed in order to avoid leaks.	
6	Make sure the weight of the cable package is secured to the tool in order to avoid straining the connectors.	

2.7 DressPack adjustments

2.7.1 Inspection during programming and test-running

General

In order to ensure adequate life of the equipment, it is vital that the cables and hoses are properly installed and operated correctly, with their movement patterns well within the acceptable limits.

Checking the cable package at the upper arm

This procedure describes how to inspect the DressPack upper arm installation during programming and test-running the complete installation the very first times.

IRBDP MH3 UI, IRBDP MH6 UI and IRBDP SW6 UI

This instruction describes how to inspect the DressPack installation during programming and test-running the complete installation the very first times.

	Action	Note
1	Inspect the DressPack upper arm installation before programming and test-running.	See *Inspection, DressPack upper arm on page 115*.
2	Check the operating cycle of the robot, to make sure the movement pattern of the wrist does not cause extensive wear or strain of the cable package.	If required, re-program the robot movement pattern!
3	Make sure the upper arm protective hose *does not get flattened* during rotating upper arm movements.	Flattening indicates an overstressed hose and *increases* the risk of damaging the DressPack upper arm.
4	Make sure the process cable package does not rub against the sides of the wrist more than absolutely necessary.	The rubbing may result in the cable getting stuck. When the package is released, the retracting unit may snap back, potentially causing damage to the equipment.
5	If any of the actions recommended above, causes a change of the DressPack installation, it must be reinspected.	See section *Inspection, DressPack upper arm on page 115*.
6	Make sure that the velcro straps are not too tight. The cables should be able to twist individually. The cable ties shall be tight.	
7	Make sure that no parts of the DressPack are in contact with the surroundings.	

Checking the DressPack at the lower arm

This instruction describes how to inspect the DressPack lower arm installation during programming and test-running the complete installation the very first times.

	Action	Note
1	Inspect the DressPack lower arm installation before programming and test-running.	See section *Inspection, DressPack lower arm on page 114*

Continues on next page

2.7.1 Inspection during programming and test-running

Continued

	Action	Note
2	Check the operating cycle of the robot, to make sure the movement pattern of the robot does not cause extensive wear or straining on the cable package.	If required, re-program the robot movement pattern!
3	If any of the actions recommended above, causes changes of the DressPack installation, it must be reinspected.	See section *Inspection, DressPack lower arm on page 114*

2.8 DressPack arm load parameters

2.8.1 DressPack - arm load parameters and LoadId

General

A DressPack is adding load to the robot. If the arm and tool loads are not stated correctly, this will affect the behavior and the wear of the robot.

Note

The extra weight of the DressPack products will affect the arm load data and the performance of the robot. The effect differs depending on which type of DressPack product being used.

Note

The "Add to tool data" shall only be used when stating the effect of the DressPack on tool load manually.

Coordinate system definitions

Coordinate system definitions when defining arm loads.

Arm load parameters for Spot welding

Note

These values reflect the standard mounting of the Process bracket, pointing straight upwards in the robot calibration position. If the mounting is changed, the X, Y and Z values must be changed correspondingly.

Arm load parameters for Material handling

Note

These values reflect the standard mounting of the Process bracket, pointing straigh upwards in the robot calibration position. If the mounting is changed, the X, Y and Z values must be changed correspondingly.

Procedures Step 1 - Arm load data

How to define the *Arm load* data is described in *Operating manual - IRC5 with FlexPendant* section *Configuring system parameters*.

All system parameters are described in *Technical reference manual - System parameters*.

Define the arm loads, typically:

- load:_1
- load:_2

Continues on next page

- load:_3

The used arm load is defined for each arm, irb_1, irb_2, and irb_3.

Procedures Step 2 - Load Identification

It is recommended to use the service routine *Load Identification* (LoadID) to define the load data for an individual robot, as this method not only measures the mass but also the inertia of the tool.

Detailed in *Operating manual - IRC5 with FlexPendant*.

	Action	Note
1	Check if the cable package prevents movements.	If the cable package prevent the motions.
2	If not: Run *Load Identification*.	The DressPack forces on the wrist will "increase" the load parameters, but this is anyhow a good approximation of the actual load case to be considered by the motion planning functions of the robot.
3	If the cable package prevent the motions: Remove the cable package.	
4	Make the Load Identification.	
5	Refit the cable package.	
6	Add the DressPack load manually.	See *Procedures Step 1 - Arm load data on page 119*.

2.9 DressPack floor

2.9.1 Installation of DressPack floor

Configuration and connections of DressPack floor

The DressPack floor is made up of several components. Some of these components are specific to DressPack / SpotPack application, while others are used also in other applications.

The configuration of the components differs between different application types.

The connection of the water and air unit also differs whether option 782-13 Bosch MFDC Profinet is chosen or not.

Types of application

Some typical applications are specified below:

Type of application	Description	Example of included components
H		Robot, single cabinet controller
S	Pneumatic gun	Robot, single cabinet controller, water and air unit
HS	Material handling and pneumatic gun	Robot, single cabinet controller, spot welding cabinet, water and air unit, pedestal gun
Se	Servo gun	Robot, single cabinet controller, spot welding cabinet, water and air unit
HSe	Material handling and servo gun	Robot, single cabinet controller, spot welding cabinet, water and air unit, pedestal gun

Connection points

The cables and connections points between the components are all detailed and illustrated in the circuit diagram for the current application. See references to the circuit diagrams in *Reference documents on page 121*.

Required equipment

Equipment, etc.	Article number	Note
DressPack floor	For spare part number see chapter: • *Spare parts on page 239*.	A number of versions are available.
Standard Toolkit, DressPack/SpotPack	3HAC17290-7	The contents are defined in section *Toolkits, DressPack/SpotPack on page 235*.

Reference documents

Document	Document number	Note
Circuit diagram - SpotPack SWC IRC5 M2004	*3HAC026208-001*	Valid for all robots without PROFINET.
Circuit diagram - SpotPack SWC IRC5 Design 2014 PROFINET	*3HAC044736-001*	Valid for all robots with option 782-13 Bosch MFDC PROFINET.

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2.9.1 Installation of DressPack floor
Continued

Installation

The procedure below details how to install the DressPack floor. Also refer to the current circuit diagram according to *Reference documents on page 121* and the *Spare parts on page 239* chapter.

	Action	Note
1	 **DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the robot, before entering the robot working area.	
2	 **CAUTION** The cable package is sensitive to mechanical damage. Handle it with care in order to avoid damaging the cabling or the connectors.	
3	Determine which type of installation is to be done. Study the circuit diagram to decide which cables to connect.	The different types are shown in section *Configuration and connections of DressPack floor on page 121*.
4	Whenever possible, run all cables/hoses in cable ducts or trenches. Make sure these meet the required standards.	Make sure: • no floor weld cable is routed along signal cabling to minimize the risk of interference. • the duct/trench floor is free from sand and other contamination. This is to reduce the risk of damaging the cable insulation. • no cables or hoses rub against any sharp corners which might damage them.
5	Do not bend or twist any cable or hose excessively.	Minimum bending radius is approximately 10x the cable or hose diameter.
6	Make sure all cable straps are tight enough to prevent the cable package from moving in any undesired way.	
7	Remember that switching the weld power as well as the water ON and OFF may cause the cables/hoses to move slightly. They may require additional clamping to avoid damage caused by these movements.	

Continues on next page

	Action	Note
8	Connect the shop power supply to the spot welding cabinet.	The supply needs to be configured in such a way that the requirements of the spot welding cabinet are met: • Voltage: 400-600 VAC, 50-60 Hz • Fuse: 110 A • Earth fault protection, see *Product manual - Spot welding cabinet* (*3HAC058524-001*). • Contactor, see *Product manual - Spot welding cabinet* (*3HAC058524-001*).
9		See circuit diagram and the *Spare parts on page 239* chapter.
10	Select which CP/CS cabling (customer power/customer signals) to be used.	Some versions include industrial buses. See circuit diagram and the *Spare parts on page 239* chapter.
11	Connect the CP/CS cable to the manipulator and controller cabinet connectors.	See circuit diagram and the *Spare parts on page 239* chapter.
12	If used, connect the split box cable to the water and air unit on the robot and to the spot welding cabinet (if no PROFINET is available) or to the single cabinet controller (if PROFINET is available) *connectors*.	See circuit diagram and the *Spare parts on page 239* chapter.
13	If used, connect the stationary/pedestal gun process cable to the stationary/pedestal gun connectors and to the spot welding cabinet (if no PROFINET is available) or to the single cabinet controller (if PROFINET is available).	A stationary/pedestal gun is optional. See circuit diagram and the *Spare parts on page 239* chapter.
14	If used, connect the weld power cable to the spot welding cabinet and to the robot or the stationary/pedestal gun (depending on if it is variant *Se* or *HSe*).	See circuit diagram and the *Spare parts on page 239* chapter.
15	If used, connect the resolver cable to the robot base and to the stationary/pedestal gun.	See circuit diagram and the *Spare parts on page 239* chapter.

2.9.2 Inspection, DressPack floor

General

In order to ensure adequate life of the equipment, it is vital that the cables and hoses are properly installed and operated correctly, with their movement patterns well within the acceptable limits.

This instruction details how to inspect the DressPack floor installation in this regard.

Procedure, process cable package

This section details each inspection to be carried out, not necessarily in any particular order unless stated.

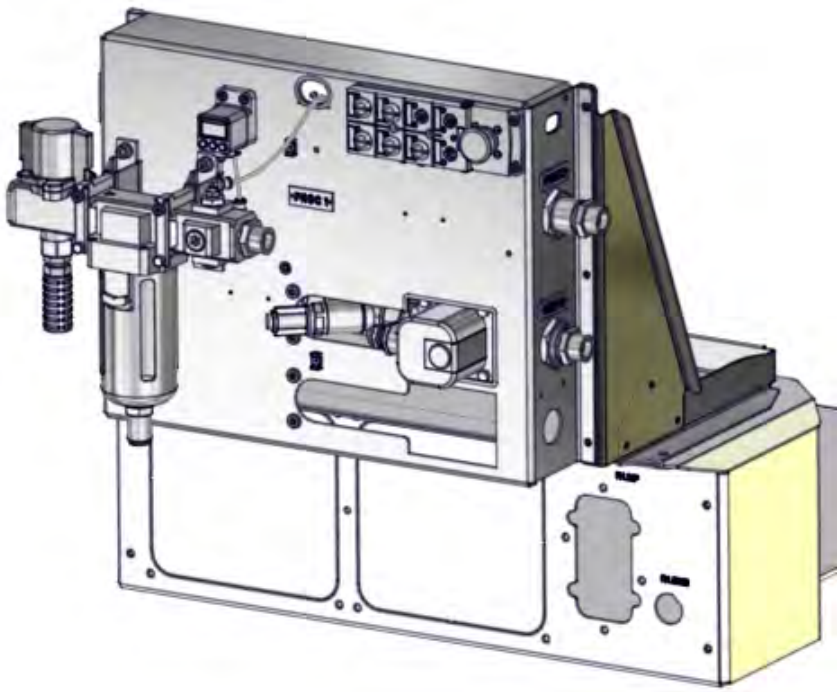
	Action	Note
1	Make sure that the cable package is properly connected at the robot base as well as at the other end.	
2	Make sure that no hoses or cables, or parts thereof, are routed in such a way that they are subjected to wear, for example hoses being run over by fork lifts etc.	
3	Make sure that no cables or hoses rub against any sharp corners which might damage them.	
4	Make sure all connection points are well tightened and sealed in order to avoid leaks.	

2.10 Water & Air unit

2.10.1 Installation of Water and air unit

Location of the Water and Air unit

The Water and Air unit is located on top of the robot base, as shown in the figure.



xx1300002321

General technical data

The table below shows technical data of the water and air pressure:

Parameter	Value
Water operating pressure	Max. 0.6 MPa / 87 PSI
Air operating pressure	Max. 1.0 MPa / 145 PSI

The table below shows technical data for water and air quality:

Parameter	Value
Water quality	Normal filtered industrial water quality, 80 to 100 mesh.

Continues on next page

2.10.1 Installation of Water and air unit
Continued

Parameter	Value
Air quality	Use clean air. When there is excessive condensate, install a device that will eliminate water, such as a dryer or water separator (Drain Catch) on the inlet side of the air filter.

Required equipment

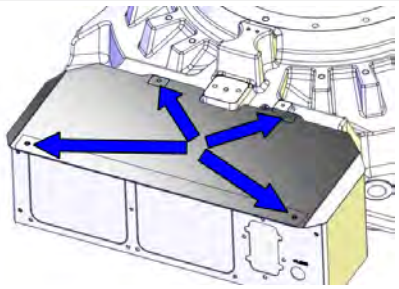
Equipment, etc	Art. no.	Note
Water and Air unit	For spare part number see chapter: • *Spare parts on page 239*.	
Standard toolkit, DressPack/SpotPack	3HAC17290-7	The contents are defined in section *Toolkits, DressPack/SpotPack on page 235*.

Reference documents

Document	Document number	Note
Circuit diagram - SpotPack SWC IRC5 M2004	*3HAC026208-001*	Valid for all robots without PROFINET.
Circuit diagram - SpotPack SWC IRC5 Design 2014 PROFINET	*3HAC044736-001*	Valid for all robots with option 782-13 Bosch MFDC PROFINET.

Installation of Water and air unit

The procedure below details how to install the Water and Air unit on the robot base.

	Action	Note
1	**DANGER** Turn off all: • electric power supply • water pressure supply • air pressure supply to the robot, before entering the robot working area.	
2	Remove the attachment screws securing the top cover at the base of the robot. Do not remove the top cover! **Note** Keep the screws! They will be reused when fitting the water and air unit on the top cover.	 xx1300002322

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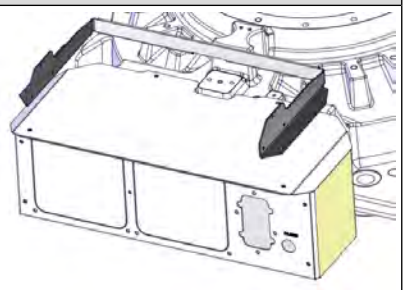
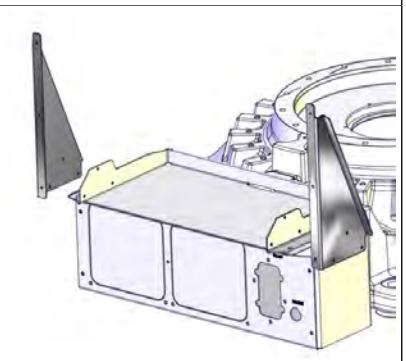
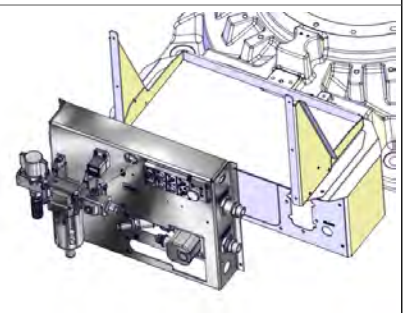
	Action	Note
3	Fit the bracket connection box using the attachment screws removed earlier.	 xx1300002323
4	Fit brackets right and left to the bracket connection box with its attachment screws.	 xx1300002324
5	Fit the water and air unit to the brackets with its attachment screws (Fastite).	 xx1300002325

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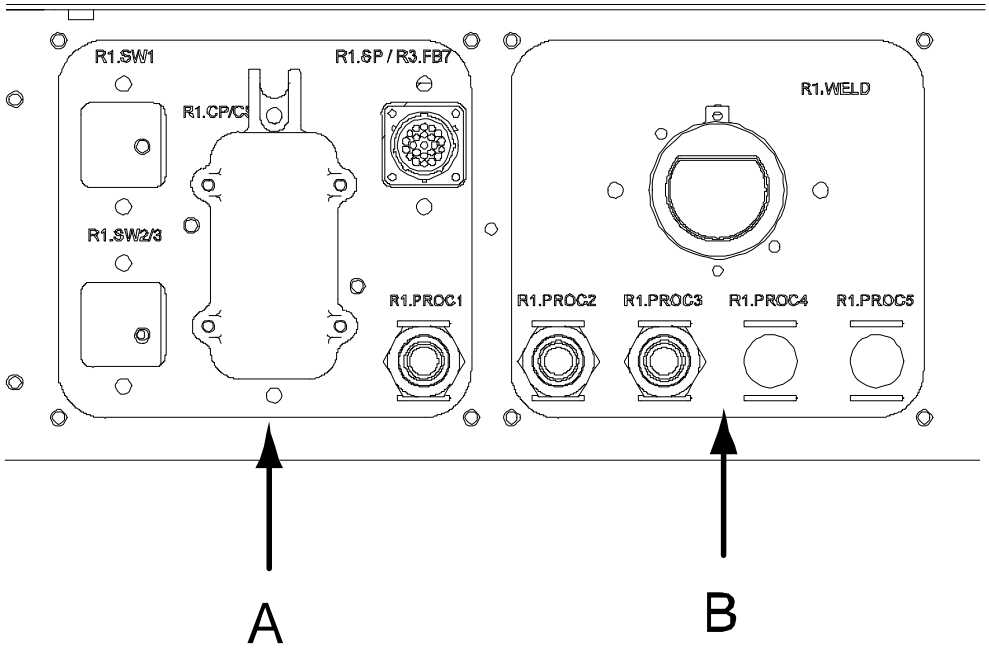
2.10.1 Installation of Water and air unit
Continued

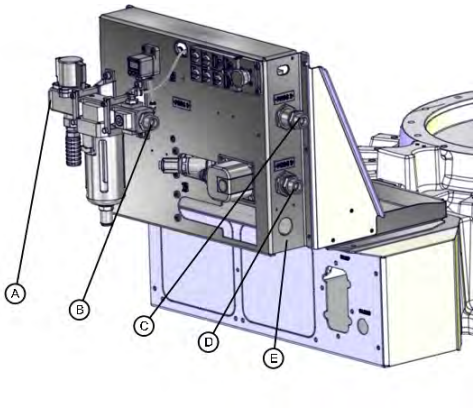
Connections to Water and Air unit

The figure shows the connections at the robot base.



xx0600003178

A	Customer plate
B	Process plate

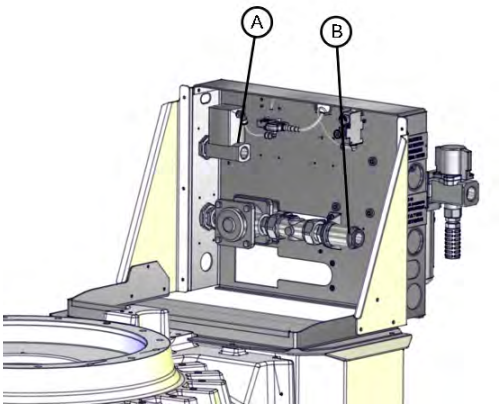


xx1300002326

Item in figure	Connect to:	Function:
A	Shop compressed air supply	
B	PROC1 on robot base	Compressed air supply to robot
C	PROC2 on robot base	Water in circuit
D	PROC3 on robot base	Water return circuit
E	PROC4 on robot base **Note!** Only the position of this connection is shown in the figure!	Depending on option selected: • Second water return • Regulated air

Continues on next page

CAUTION Do not tighten the brass couplings for water and air with excessive force.	Tightening torque, brass couplings 1/2": 31Nm Tightening torque, brass couplings 3/8": 17Nm



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Item in figure	Connect to:	Function:
A	Shop water supply	
B	Shop water drain **Note!** In case of a second water return, the water drain connection is moved to the outside of the mounting plate!	

Shop water supply

Use this procedure to connect the Water and Air unit to the shop water supply.

	Action	Note
1	Route the water supply hose through the upper hole in the mounting plate.	
2	Connect the hose to the fitting with a G½" thread on the solenoid valve (A). **CAUTION** Do not tighten the brass couplings for water and air with excessive force.	Tightening torque, brass couplings 1/2": 31 Nm Tightening torque, brass couplings 3/8": 17 Nm

Continues on next page

2.10.1 Installation of Water and air unit
Continued

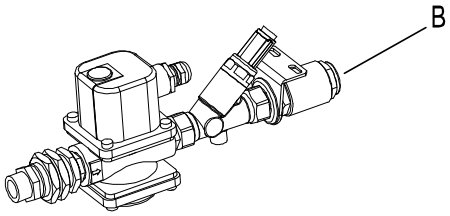
Shop compressed air supply

Use this procedure to connect the Water and Air unit to the shop compressed air supply.

	Action	Note
1	Connect the air hose to the fitting with a G½" thread on the air shut off valve (C). **CAUTION** Do not tighten the brass couplings for water and air with excessive force.	Tightening torque, brass couplings 1/2": 31 Nm Tightening torque, brass couplings 3/8": 17 Nm

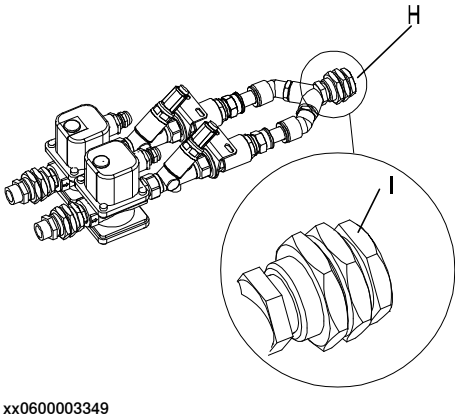
Water drain connection, One water return

Use this procedure to connect the water drain connection with one water return, to the Water and Air unit.

	Action	Note
1	Route the water drain hose through the lower hole in the mounting plate.	
2	Connect the hose to the fitting with a G½" thread on the check-valve. **CAUTION** Do not tighten the brass couplings for water and air with excessive force.	 xx0600003348 • B: Water drain connection, one water return

Water drain connection, Two water return

Use this procedure to connect the water drain connection with two water return, to the Water and Air unit.

	Action	Note
1	Connect the hose to the *bulkhead fitting* with a G½" thread. **CAUTION** Do not tighten the brass couplings for water and air with excessive force. **Note** Any rotation of the bulkhead fitting must be avoided when mounting. Hold the *outer part of the bulkhead fitting* with a suitable tool, in order to prevent rotation.	 xx0600003349 Parts: • H: Bulkhead fitting • I: Outer part of bulkhead fitting

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Hoses connecting Robot and Water and Air unit

Use this procedure to connect hoses between manipulator and Water and Air unit.

	Action	Note
1	**CAUTION** Do not tighten the brass couplings for water and air with excessive force.	Tightening torque, brass couplings 1/2": 31Nm Tightening torque, brass couplings 3/8": 17Nm
2	Connect Proc 1 on the Water and Air unit with Proc 1 on the robot.	
3	Connect Proc 2 on the Water and Air unit with Proc 2 on the robot.	
4	Connect Proc 3 on the Water and Air unit with Proc 3 on the robot.	
5	Connect Proc 4 on the Water and Air unit with Proc 4 on the robot.	If second water return or regulated air is used.
6	Secure all connectors.	See *Tightening torques* in section *Screw joints on page 231*.

2.10.2 Return water flow control

Overview

The mechanical flow control valve is pre-set at delivery at 8 liter/min (maximum flow).

Settings

The procedure below details how to set the mechanical flow control valve.

	Action	Note
1	Open the solenoid valve on the water inlet.	
2	Water flow is indicated on the scale of the Flow control valve.	
3	Adjust water flow by using the red adjusting knob on the scale of the Flow control valve to the required set flow.	The red adjusting knob is placed on the back of the Water and Air unit.

2.10.3 Return water flow switch setting

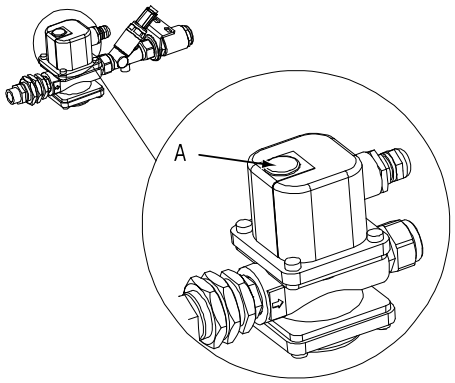
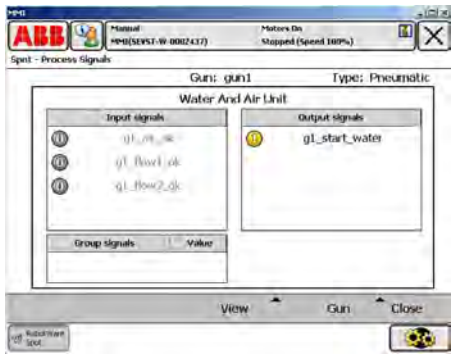
Introduction

The mechanical flow switch is pre-set at delivery to 8 liters/min at 0.2 MPa water pressure.

If the water pressure exceeds 0.2 MPa, the setting cannot be done with the graduation on the window name plate, as the pressure affects the measured flow. Please perform the setting as described in the following procedure.

Settings

The procedure below details how to set the mechanical flow switch.

	Action	Note
1	Open the solenoid valve on the water inlet.	
2	Water flow is indicated on the scale of the flow control valve.	
3	Adjust the water flow to the level where the Flow switch shall give alarm. Use the red adjusting knob on the scale of the flow control valve.	See section *Return water flow control on page 132*.
4	To adjust the set flow on the mechanical Flow switch, remove the grommet on the upper cover and rotate the flow adjusting gear by using a flat screwdriver. Turning clockwise will increase the set flow and turning counterclockwise will decrease the set flow.	 xx0600003346 Parts: • A: Flow switch
5	Depending on initial value, increase or decrease the set value until the **g_flow_ok** changes, by observing the *Process Signals window* on the FlexPendant. **Note** The indicated flow level may differ from real flow as the flow switch is affected by the water pressure.	 xx0600003355 • Process Signals window
6	Refit the grommet on the flow switch.	

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2.10.3 Return water flow switch setting
Continued

	Action	Note
7	Increase water flow to desired level by adjusting the flow control valve. Put back the red adjusting knob on the back of the Water and Air unit.	**Note** This level shall be higher than the alarm level.

2.10.4 Setting of air pressure switch (only applicable to type S)

General

The digital pressure switch monitors the shop floor air pressure.

Settings

The procedure below details how to set the digital pressure switch. The example shows how to set according to the pre-set values. The sensor will set **g1_air_ok** in the robot controller when pressure reaches 0.5 MPa and reset **g1_air_ok** if pressure goes lower than 0.45 MPa.

	Mode	Action	Note
1	Preparation	Make sure that the pressure switch is connected to 12-24 VDC power.	
2	Initialize	In measurement mode, press SET button for two seconds or more.	**0**
3	Selection of Unit	Press UP or DOWN button until the display matches the figure on the right, then press the SET button.	**PA** PA indicates MPa.
4	OUT1 Output type Setting	Press UP or DOWN button until display matches the figure on the right, then press the SET button.	**1no** ("**1no**" = Output 1 normally open)
5	OUT2 Output type Setting	Ignore and press the SET button.	**2n***
6	Response Time Setting	Press UP or DOWN button until display matches the value on the right, then press the SET button.	**24**
7	Auto/Manual Setting	Press UP or DOWN button until display matches the value on the right, then press the SET button.	**ñAn** (**ñAn** indicates manual setting)
8	Value Setting	In measurement mode, press the SET button.	
9	Set Point Value for OUT1(1) **Pressure OK goes high**	When the display blinks, press UP or DOWN button without pressing the SET button. Press UP or DOWN button until the display matches the value on the right, then press the SET button.	**P_1** 0.500
10	Set Point Value for OUT1(2) **Pressure OK goes low**	When the display blinks, press UP or DOWN button without pressing the SET button. Press UP or DOWN button until the display matches the value on the right, then press the SET button.	**P_2** 0.450
11	Set Point Value for OUT2(1)	Ignore and press the SET button.	**P/n3**
12	Set Point Value for OUT2(2)	Ignore and press the SET button.	**P/n4**
13		The pressure switch changes to measurement mode. All settings are completed.	**0**
14	Zero Clear Function	Press UP and DOWN buttons simultaneously for about 2 seconds, under atmospheric pressure.	**0**

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2.10.4 Setting of air pressure switch (only applicable to type S)
Continued

Pre-set values

Parameter	Pre-set value
Unit specification	MPa
Hysteresis mode	Normally open
Response time	24 ms
High pressure P_1	0.5 MPa
Low pressure P_2	0.05 MPa

2.10.5 Setting of electrical proportional valve (option)

Introduction

The electrical proportional valve is available as an option.

The output pressure from the proportional valve is set by a voltage input signal, 0 - 10 VDC.

The output pressure range is 0.005 - 0.9 MPa.

I/O configuration

The following has to be done in order to configure the system to automatically feed the electrical proportional valve with 24 V only, when there is a sufficient air pressure indicated by the air pressure switch. If there is not enough pressure, the electrical proportional valve works continuously and the lifetime may be shortened.

The related input and output is **gx_air_ok** and **gx_epvalve_on**, where x represents the actual gun. The example below shows the setting for gun 1.

	Action	Note
1	Create a digital output signal named **g1_epvalve_on** on unit **SWBOARD1** and unit mapping **14**.	
2	Create a cross connection between **g1_air_ok** and **g1_epvalve_on**.	

Setting

Normally the pre-set values are used. But if other settings are desired, do as described below.

The procedure below details how to set the proportional valve.

Mode		Action	Note
Preparation	1	Make sure that the 12-24 VDC power is connected.	
Release key locking	2	The indication *Loc* flashes on LED by pushing the DOWN key for two seconds or more. The key locking function is released by pushing the SET key here.	The keys are locked after the power is turned on and cannot be operated. *Loc* is indicated on LED when the keys are pushed.
Min. pressure setting	3	Press the SET key.	*F_1* is indicated on LED.
	4	Set the required min. pressure by using the UP and DOWN keys.	The min. pressure is equal to 0 VDC input signal.
	5	When finished, press the SET key.	*F_2* is indicated on LED.
Max. pressure setting	6	Set the required max. pressure by using the UP and DOWN keys.	The max. pressure is equal to 10 VDC input signal.
	7	When finished press the SET key.	*P_1* is indicated on LED.

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2.10.5 Setting of electrical proportional valve (option)
Continued

Mode		Action	Note
Setting switch output, P1	8	Set the value 0 (zero) by using the UP and DOWN keys.	There are three kinds of modes of the switch function: • Window Comparator Mode • Hysteresis Mode • Out of range Mode The choice of the different modes is determined by setting the two values P1 and P2 and the relation between value P1 and value P2. P1=P2=0 Out of range mode
	9	When finished, press the SET key.	*P_2* is indicated on LED.
Setting switch output, P2	10	Set the value 0 (zero) by using the UP and DOWN keys.	
	11	When finished, press the SET key.	LED returns to the present pressure indication. Setting is completed.
Active key locking	12	The indication *unL* flashes on LED when the DOWN key is pressed for two seconds or more. Key locking function is released by pressing SET key here.	

Pre-set values

Parameter	Pre-set value
Min. pressure F1	0.0 MPa
Max. pressure F2	0.9 MPa
Switch output	Out of range mode (P1=P2=0)

Insufficient air pressure (Only applicable to type S)

If the Air pressure switch indicates too low pressure, the 24 V supply of the Electrical proportional valve is disconnected and the valve stops from operating.

If the Air pressure switch is to be set without having sufficient air pressure, the corresponding digital output *gx_epvalve_on* supplying the valve with 24 V, has to be set manually. This is most easily done by simulating input *gx_air_ok*.

3 Maintenance

3.1 Introduction

Structure of this chapter

This chapter describes all the maintenance activities recommended for the DressPack/SpotPack IRB 8700.

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 17* before performing any service work!

3.2 Maintenance schedule and component life

3.2.1 Maintenance schedule

General

The DressPack must be maintained regularly to ensure its function. The lifetime of a process cable package can be extended with the correct preventive maintenance activities. A daily visual check of the DressPack is highly recommended, which is normally performed by robot production personnel. It is essential that the person performing the visual check have basic training in ABB DressPack.

Wear parts

Wear parts should be replaced before considerable damage occurs to the process cable package. Replace wear parts before the part is completely damaged.

The following parts are considered as wear parts:

- Protection sleeves
- Protective hose
- Hose reinforcement

Activities and intervals, standard equipment

The sections referred to in the table can be found in the different chapters for each maintenance activity.

The table below specifies the required maintenance activities and intervals:

Maintenance activity	Equipment	Interval	Detailed in section:
Inspection	Water & Air unit	1 month	
Inspection	All cables	Regularly [i]	*Preventive inspection of all cables, DressPack on page 142*
Inspection	DressPack upper arm	Regularly i	*Preventive inspection, DressPack on page 144*
Cleaning	DressPack upper arm	Regularly i	*Cleaning, DressPack upper arm on page 150*
Cleaning	Water & Air unit	Regularly i	

i "Regularly" implies that the activity is to be performed regularly, but the actual interval may not be specified by the robot manufacturer. The interval depends on the operation cycle of the robot, its working environment and movement pattern.

Generally, the more contaminated the environment, the closer the maintenance intervals. Also, the more demanding the movement pattern (sharper bending cable harness), the closer the intervals.

DressPack upper arm cable package

Based on experience, some parts are more exposed to wear. Therefore the DressPack upper arm cable package should be inspected according to the following schedule.

Interval	Action
Weekly	None

Continues on next page

Interval	Action
Every two weeks	Inspection wear
Every third month	Inspection
After changing movement pattern	Inspection

3.3 Inspection activities SpotPack

3.3.1 Preventive inspection of all cables, DressPack

Cables in the DressPack system

There are many different cables used in the DressPack system. The different cables used are listed in Spare parts section.

The inspection activities described below are a general description, and does not refer to any specific cable.

Required equipment

Equipment	Art. no.	Note
Standard Toolkit, DressPack/SpotPack	3HAC17290-7	The contents are defined in section *Toolkits, DressPack/SpotPack on page 235*.

Inspection

The procedure below details how to inspect all cables included in the SpotPack system.

This instruction applies to:

- DressPack upper arm and cables and hoses contained within
- DressPack lower arm and cables and hoses contained within
- DressPack floor and cables and hoses contained within.

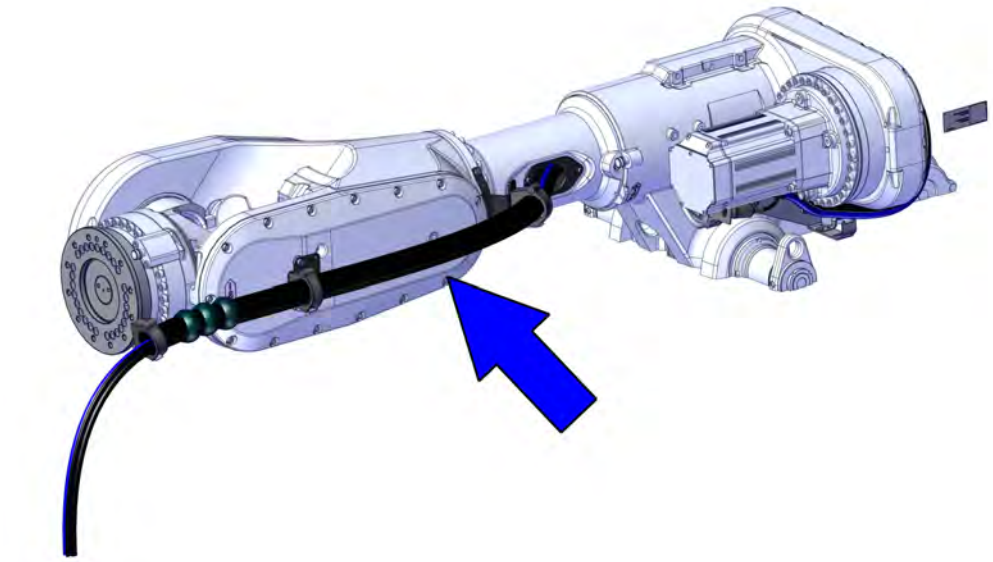
	Action	Note
1	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the robot, before entering the robot working area.	
2	Make sure that the unit is clean and not overly contaminated.	Clean if required as detailed in section *Cleaning, DressPack upper arm on page 150*.
3	Make sure that all bolts are fastened.	Recommended tightening torques are specified in section *Screw joints on page 231*.
4	Make sure that all connections are fastened.	Re-tighten if necessary.
5	Make sure that all hose connections are fastened and that there are no leaks.	Re-tighten if necessary.
6	Check for mechanical wear, especially in areas where the cable/hose package rub against, or move close to, the robot or any other structure. Especially check any cable/hose package at the robot wrist.	Replace any worn items as detailed in the chapter *Repair on page 157*. Re-adjust the assembly after installation.

Continues on next page

	Action	Note
7	If any of the protective sleeves are worn, rotate it or replace it.	
8	Check the attachments of the cable/hose package, to make sure they are properly secured.	
9	Check all cable retainers, to make sure the cables/hoses are securely locked in the cable retainers.	

3.3.2 Preventive inspection, DressPack

Location of DressPack upper arm



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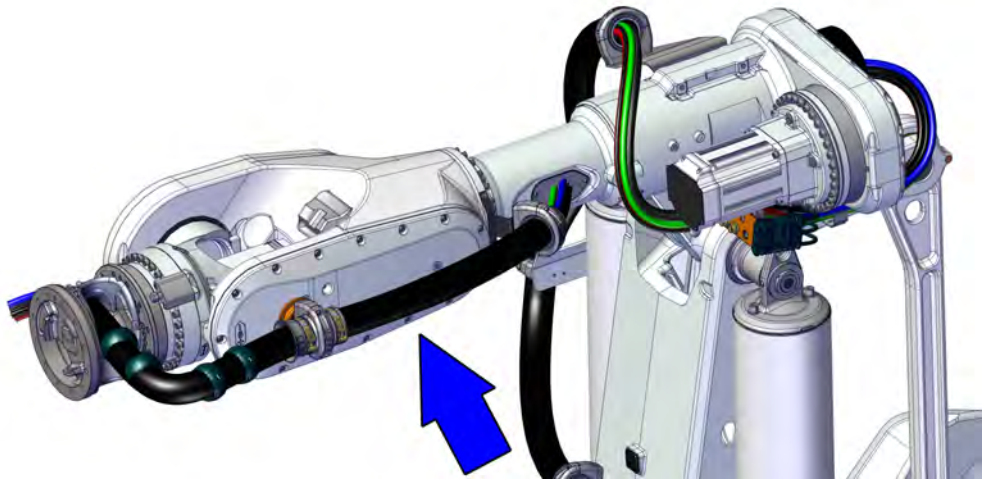
The figure shows the cable package IRBDP MH3 UI.



xx1500002777

The figure shows the cable package IRBDP MH6/SW6 UI.

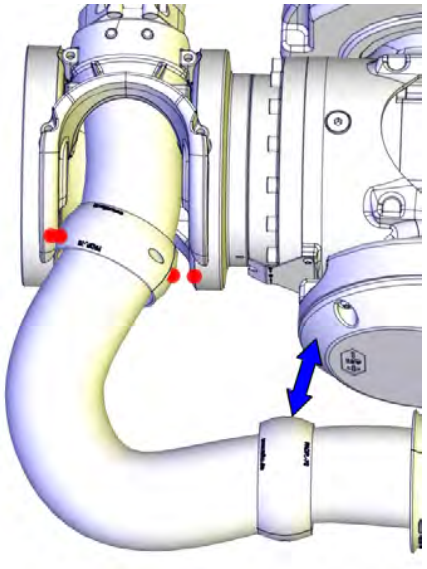
Required equipment

Equipment	Article number	Note
Standard Toolkit, DressPack/SpotPack	3HAC17290-7	The contents are defined in section *Toolkits, DressPack/SpotPack on page 235*.

Continues on next page

Inspection - Robot standing still

Use this procedure to inspect the DressPack when the robot is not in motion.

	Action	Note
1	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the robot, before entering the robot working area.	
2	Make sure that the DressPack is not contaminated.	If required, clean as detailed in section *Cleaning, DressPack upper arm on page 150*.
3	Make sure that all bolts are fastened.	Recommended standard tightening torques are specified in section *Screw joints on page 231*.
4	**Only applicable to cable packages IRBDP SW6 UI & IRBDP MH6 UI:** Check the position and state of the *protective sleeves*. Correct fitting of the protective sleeve at the wrist cover: • align the center of the radius on the front end of the wrist cover, with the center of the radius on the corresponding protective sleeve. See figure! Correct fitting of the protective sleeve at the axis-6 cable support: • align the center of the radius (right side) of the axis-6 cable support, with the center of the radius of the corresponding protective sleeve. See figure! Replace protective sleeves if needed. For correct fitting of the new protective sleeve, see instructions above for a correct fitting. The number of protective sleeves must remain the same (2 pcs).	 xx1400000224
5	Make sure all cable straps are tight enough to prevent the cable package from moving in an undesired way.	
6	Make sure that the velcro strap are not too tight. The cables should be able to twist.	
7	Make sure that the cable package is properly connected at: • the connection plate • the robot base • the lower arm • the tool on the turning disc of the robot.	
8	Make sure that all connections are fastened and that there are no leaks.	Re-tighten if necessary.

Continues on next page

3.3.2 Preventive inspection, DressPack
Continued

	Action	Note
9	Make sure that the cable package is not cracked or damaged in any other way.	
10	Check all cable clamps securing the process cable package and protective hose for tightness.	Tightening torques are specified either in: • Installation chapter (non-standard tightening torques) or • standard tightening torque table (standard tightening torques).

Inspection - Reduced speed

The following procedure details how to inspect the DressPack upper arm when the robot is moving in reduced speed.

WARNING

A robot in motion is dangerous and may cause severe personal injuries, if safety procedures are not followed. Hence, all work must be performed outside the robots working range and outside the robots safety area.

Secure the following before work starts:

- Check that all emergency stops are fully functional.
- Close and activate all safety equipment (safety gates and/or safety curtains etc.).

	Action
1	Make sure that no hoses or cables, or parts thereof, touch any part of the robot structure in a way that may cause wear.
2	Make sure all cables and hoses move smoothly together during operation and that no part of the cable package moves in a different pattern.

Inspection - Full speed

The following procedure details how to inspect the DressPack upper arm, when the robot is moving in full speed.

WARNING

A robot in motion is dangerous and may cause severe personal injuries, if safety procedures are not followed. Hence, all work must be performed outside the robots working range and outside the robots safety area.

Secure the following before work starts:

- Check that all emergency stops are fully functional.
- Close and activate all safety equipment (safety gates and/or safety curtains etc.).

	Action	Note
1	Make sure that no hoses or cables, or parts thereof, touch any part of the robot structure (or something in the vicinity of it) in a way that may cause wear.	

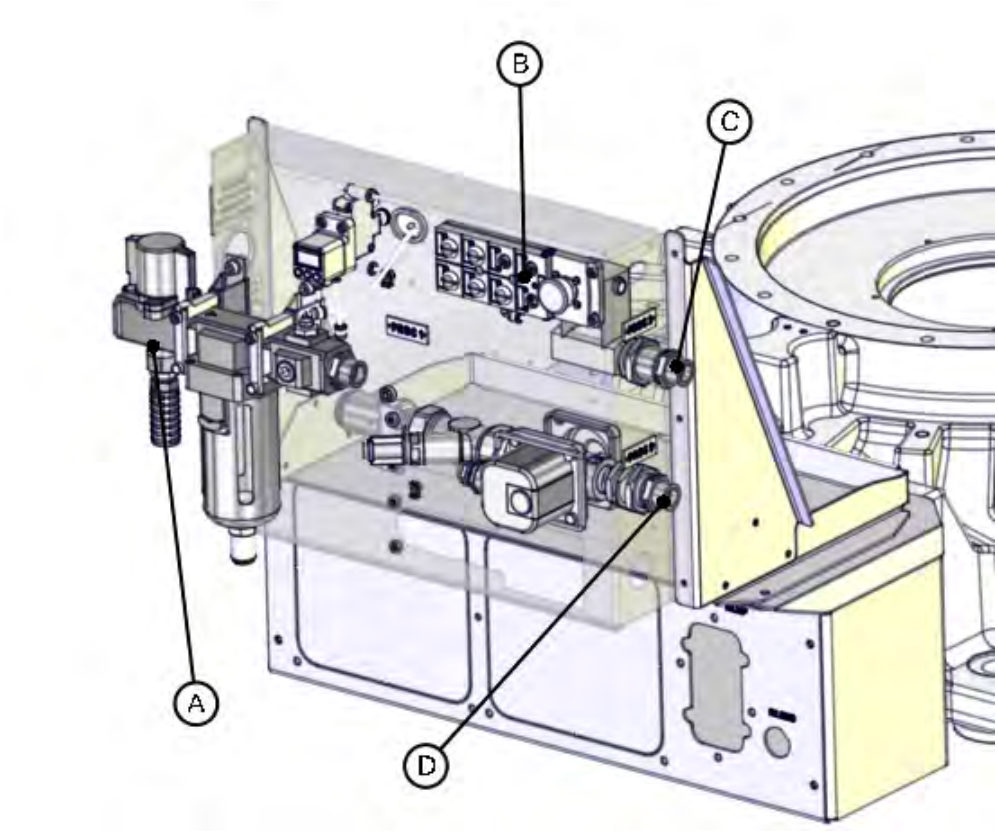
Continues on next page

	Action	Note
2	Make sure all cables and hoses move smoothly together during operation and that no part of the cable package moves in a different pattern.	

3.3.3 Preventive inspection of Water and air unit

Location of Water and air unit

The Water and air unit is located as shown in the figure.



xx1300002328

A	Air supply circuit
B	Split box
C	Water in circuit
D	Water return circuit

Required equipment

Equipment	Article number	Note
Standard Toolkit, DressPack/SpotPack	3HAC17290-7	The contents are defined in section *Toolkits, DressPack/SpotPack on page 235*.

General inspection

The procedure below describes how to perform a general inspection of the Water and air unit.

	Action	Note
1	Check that the Water and air unit is not contaminated.	Clean if required as detailed in section *Cleaning, Water and air unit on page 151*.

Continues on next page

	Action	Note
2	Check that the bolts are fastened.	Recommended tightening torques are specified in section *Tightening torque on page 231*.
3	Check that all connections are correctly made and that there are no leaks. **CAUTION** Do not tighten the brass couplings for water and air with excessive force.	Retighten if necessary. Tightening torque, brass couplings 1/2": 31 Nm Tightening torque, brass couplings 3/8": 17 Nm

Inspection, air supply circuit

The procedure below describes how to inspect the air supply circuit.

	Action	Note
1	Check if there is water in the filter receptacle. Normally the filter receptacle is drained automatically in case of a fall of air pressure. If there is no fall of pressure in the air system, there is an automatic draining of the system, when the water level reaches a certain level.	If there is a lot of water in the filter receptacle, this is a sign that the supplied air consist of too much water. If this is the case, steps must be taken to correct this problem!
2	Drain the air filter receptacle manually by pressing a small pin at the bottom of the air filter unit.	
3	Make a check that there is no leakage.	Retighten if necessary!
4	Make a check of the condition of the air filter.	If needed replace the air filter. Normally the filter should be replaced after one year of use.

Inspection, water in and water return circuits

The procedure below describes how to inspect the water in and water return circuits.

	Action	Note
1	Open the hand operated ball valve for water inlet.	
2	Open the water return valve on the water in circuit.	
3	Close the hand operated ball valve for water outlet.	
4	While the system is under pressure, check if there are any leaks.	Retighten if necessary!
5	Reset the system.	

3.4 Cleaning activities

3.4.1 Cleaning, DressPack upper arm

Required equipment

Equipment	Art. no.	Note
Standard Toolkit, DressPack/SpotPack	3HAC17290-7	The contents are defined in section *Toolkits, DressPack/SpotPack on page 235*.
Dry rag and medium soft brush		For cleaning the protective hose ribs.

Cleaning

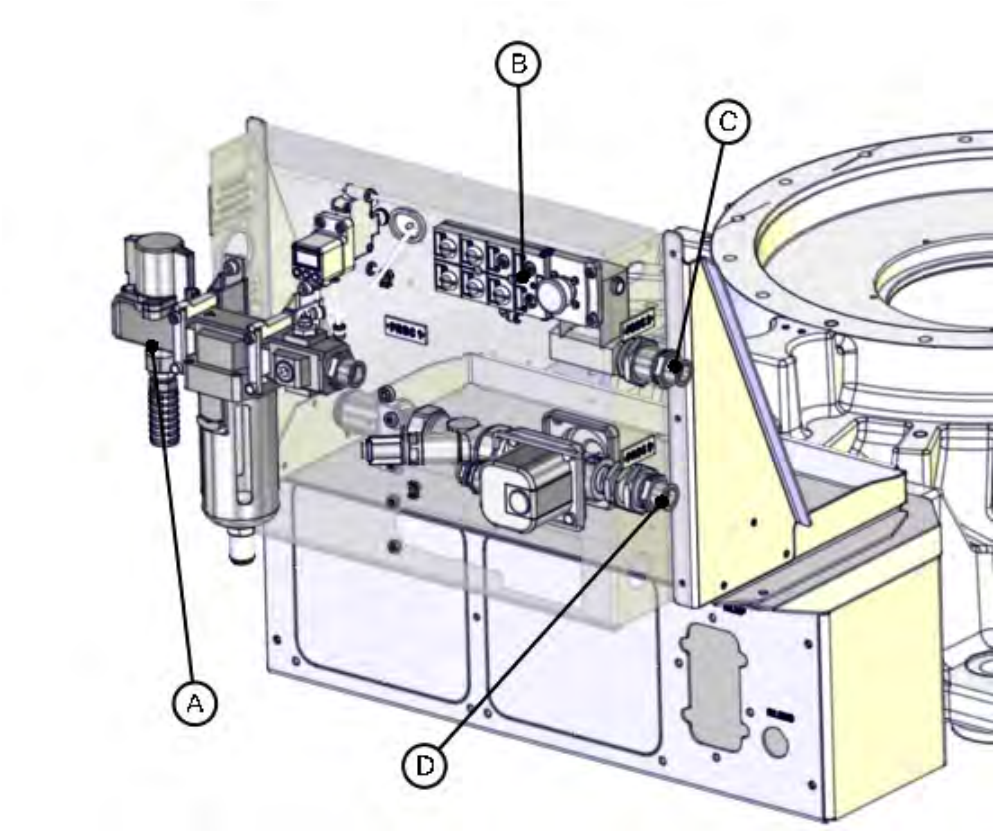
The procedure below details how to clean the DressPack upper arm.

	Action	Note
1	Clean the DressPack upper arm exterior, in order to avoid filling up the spaces between the ribs with debris. Make sure to clean any areas where any hoses bend or rub against the robot. If the harness is not cleaned sufficiently, breakage of the protective hose may result.	Only use equipment and cleaning agents as specified in section *Required equipment on page 142*.
2	Clean the slide sleeves of any sort of contamination.	

3.4.2 Cleaning, Water and air unit

Location of Water and air unit

The Water and air unit is located as shown in the figure.



xx1300002328

A	Air supply circuit
B	Split box
C	Water in circuit
D	Water return circuit

Required equipment

Equipment	Note
Dry rag	When cleaning the Water and air unit, only use household neutral detergent.

Maintenance of Air filter

	Action	Note
1	Peridically inspect the resin bowl for cracks or other deterioration.	If found, replace the bowl with a new one.

Continues on next page

3.4.2 Cleaning, Water and air unit
Continued

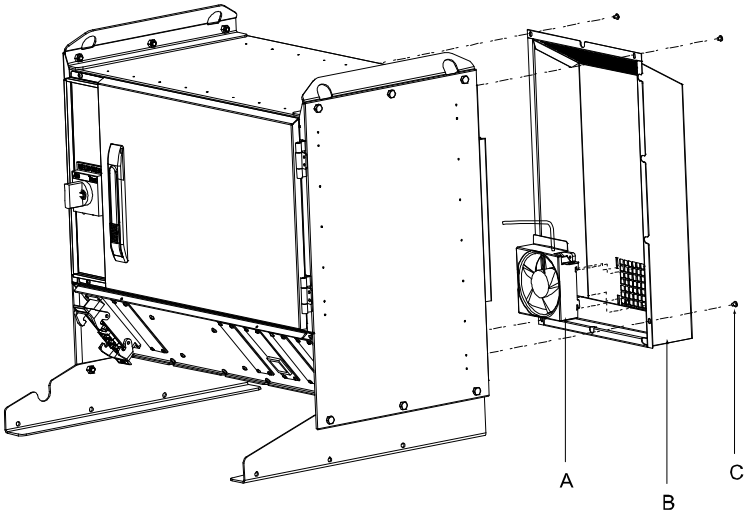
	Action	Note
2	Periodically inspect the cleanliness of the resin bowl.	If the resin bowl is dirty, replace it with a new one or clean it. Use a household (neutral) detergent when cleaning, other detergent may break the bowl.
3	Replace the filter element within two years since first use.	Replacement of the air filter is detailed in section *Replacement of Air filter element on page 224*.
4	Replace the filter after pressure drop from initial outlet reaches 0.1 MPa.	Replacement of the air filter is detailed in section *Replacement of Air filter element on page 224*.
5	Replace if the filter element is broken.	Replacement of the air filter is detailed in section *Replacement of Air filter element on page 224*.

3.4.3 Cleaning the Fan unit

Overview

Use this section to clean the fan unit.

Location



en0500001924

A	Fan holder with fan
B	Fan casing
C	Attachment screws M5x9, Fastite screw (4 pcs)

Required equipment

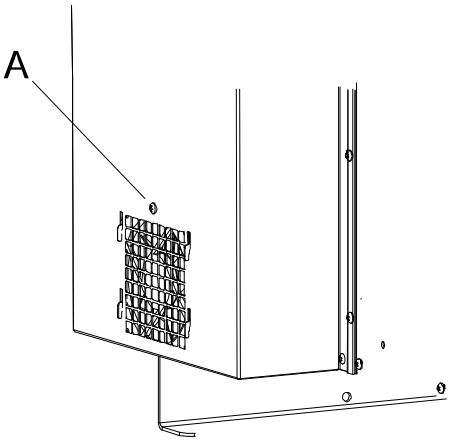
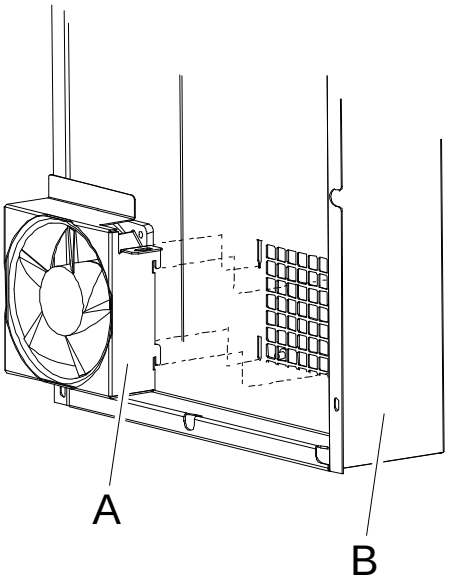
Equipment	Article number	Note
Standard toolkit DressPack/SpotPack	3HAC17290-7	The contents are defined in section *Toolkits, DressPack/SpotPack on page 235*.
Vacuum cleaner	-	

Maintenance procedure

	Action	Note
1	**DANGER** Before any work inside the cabinet, please observe the safety information in the section *DANGER - Make sure that the main power has been switched off* in the product manual for the IRC5 controller.	
2	Remove the attachment screws holding the fan casing.	Shown in the section *Location on page 153* Screw M5x9 Fastite (4 pcs)
3	Disconnect the fan connector.	

Continues on next page

3.4.3 Cleaning the Fan unit
Continued

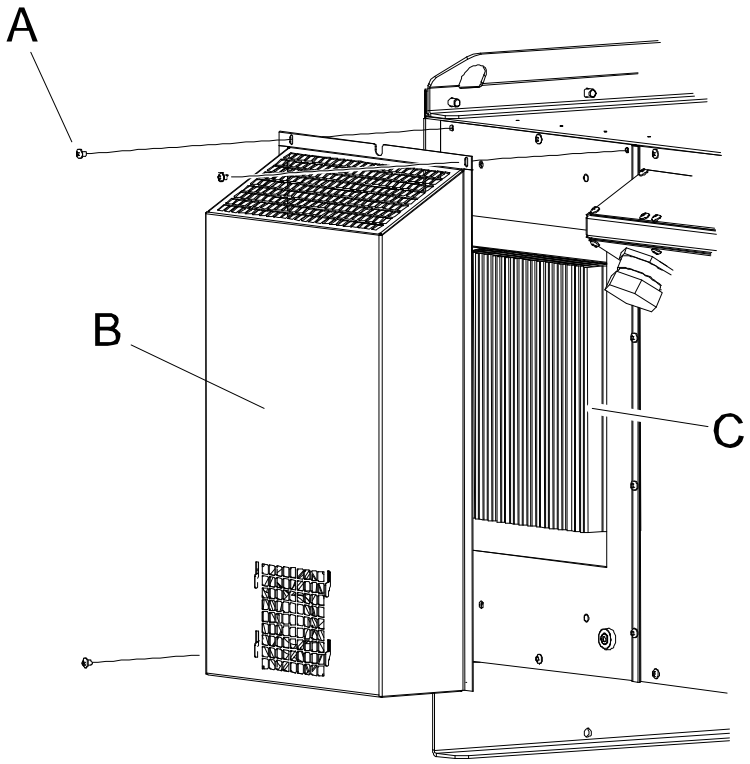
	Action	Note
4	Remove the stop screw.	 xx0500002232 • A: Stop screw
5	Lift out the fan holder with fan.	 xx0500002234 • A: Fan holder with fan • B: Fan casing
6	Clean the fan.	
7	Refit according to the steps above, in reverse order.	

3.4.4 Cleaning the Weld timer cooling fins

Overview

Use this procedure to clean the weld timer cooling fins.

Location



xx0500002240

A	Attachment screws M5x9 Fastite screw (3 pcs)
B	Fan casing
C	Cooling fins

Required equipment

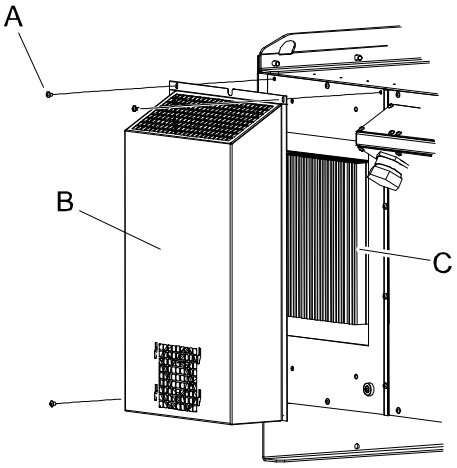
Equipment	Art.no.	Note
Standard toolkit DressPack/SpotPack	3HAC17290-7	The contents are defined in section *Toolkits, DressPack/SpotPack on page 235*.
Vacuum cleaner		

Continues on next page

3.4.4 Cleaning the Weld timer cooling fins

Continued

Maintenance procedure

	Action	Note
1	**DANGER** Before any work inside the cabinet, please observe the safety information in the section *DANGER - Make sure that the main power has been switched off* in the product manual for the IRC5 controller.	
2	Remove the attachment screws.	 xx0500002240 • A: Attachment screw M5x9 Fastite (3 pcs) • B: Fan casing • C: Cooling fins
3	Disconnect the fan connector.	
4	Remove the fan casing.	
5	Clean the cooling fins with a vacuum cleaner.	
6	Refit the fan connector and fan casing.	

4 Repair

4.1 Introduction

Structure of this chapter

This chapter describes all repair activities recommended for the DressPack/SpotPack IRB 8700 and any external unit.

It is made up of separate procedures, each describing a specific repair activity. Each procedure contains all the information required to perform the activity, for example spare parts numbers, required special tools, and materials.

The procedures are gathered in sections, divided according to the component location on the DressPack/SpotPack IRB 8700.

Required equipment

The details of the equipment required to perform a specific repair activity are listed in the respective procedures.

The details of equipment are also available in different lists in the chapter *Reference information on page 229*.

Safety information

There are general safety information and specific safety information. The specific safety information describes the danger and safety risks while performing specific steps in a procedure. Make sure to read through the chapter *Safety on page 17* before commencing any service work.

Note

If the DressPack/SpotPack IRB 8700 is connected to power, always make sure that the DressPack/SpotPack IRB 8700 is connected to earth before starting any repair work.

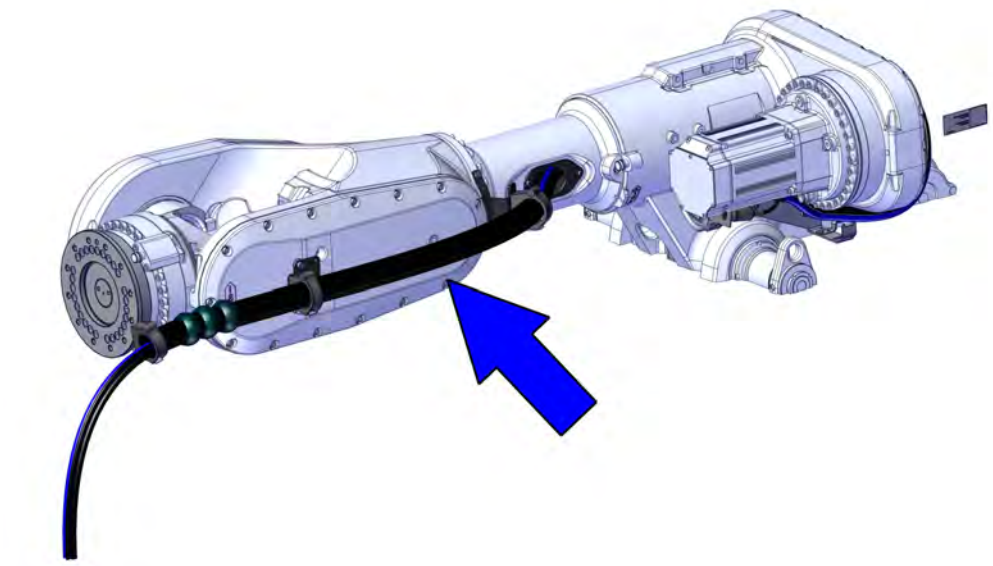
For more information see:

- *Product manual - IRC5*

4.2 DressPack cable package

4.2.1 Replacing the cable package IRBDP MH3 UI

Location of the cable package



xx1500003018

Spare parts

Spare part	Spare part number	Note
Cable package IRBDP MH3 UI	See *Spare parts on page 239*.	

Required tools and equipment

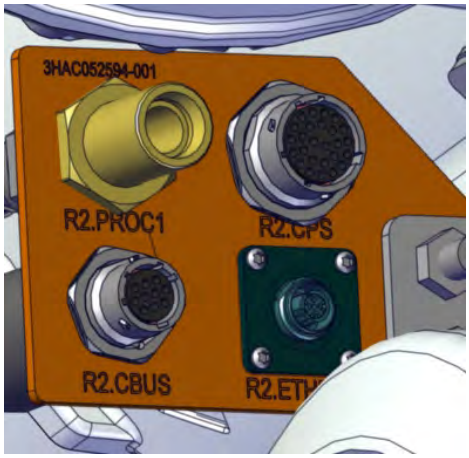
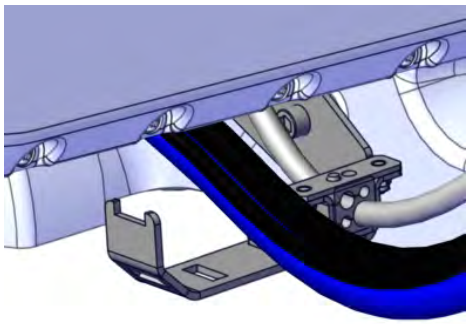
Equipment, etc.	Article number	Note
Standard toolkit	-	Content is defined in section *Standard toolkit on page 235*.

Removing the cable package IRBDP MH3 UI

Use this procedure to remove the cable package.

	Action	Note
1	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the robot, before entering the robot working area.	

Continues on next page

	Action	Note
2	**CAUTION** The cable package is sensitive to mechanical damage. Handle it with care in order to avoid damaging the cabling or the connectors.	
3	Disconnect the hose and cable connectors on the connection plate.	 xx1500003038
4	Open the velcro strap on the mounting plate.	 xx1500003039

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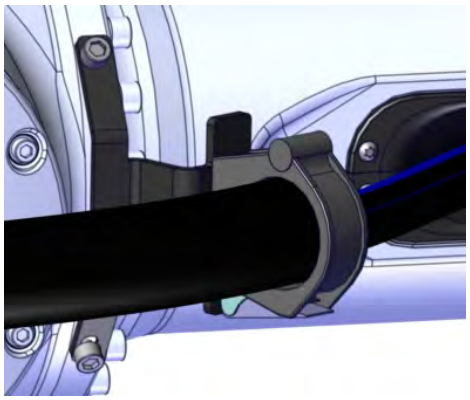
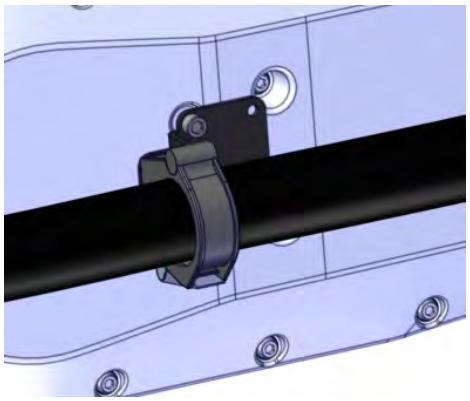
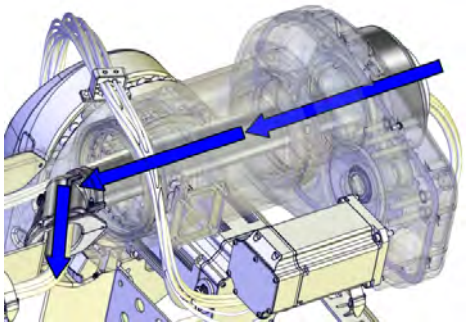
4.2.1 Replacing the cable package IRBDP MH3 UI
Continued

	Action	Note
5	Open the gripping clamps holding the cable package on the upper arm.	 xx1500003040  xx1500003041
6	Carefully pull the cable package out of the tube and insert. **Note** There are cable grease on the cables.	 xx1400000188

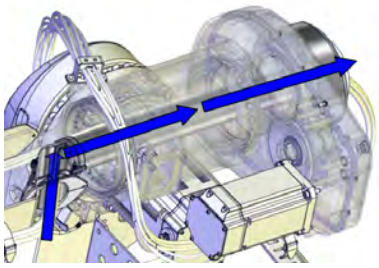
Refitting the cable package

Use this procedure to refit the cable package IRBDP MH3 UI.

Route the cable package

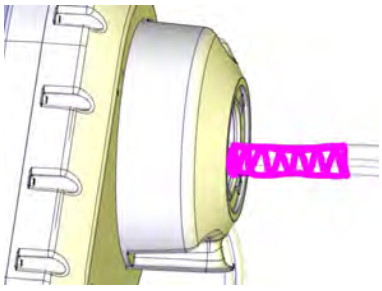
	Action	Note
1	Move the robot to a comfortable working position.	

Continues on next page

	Action	Note
2	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the robot, before entering the robot working area.	
3	**CAUTION** The cable package is sensitive to mechanical damage. Handle it with care in order to avoid damaging the cabling or the connectors.	
4	**Tip** This procedure is best done by two persons working together - one pushing cabling and hoses into the tube and the other pulling them out at the wrist.	
5	Carefully push the cable package into the insert, through the tube and out in the back of the arm housing. **Tip** The following order is preferable: 1 Cables 2 Hoses 3 Weld cables (where applicable) If there is a problem, remove the nut inside the tube.	 xx1400000095

Apply cable grease

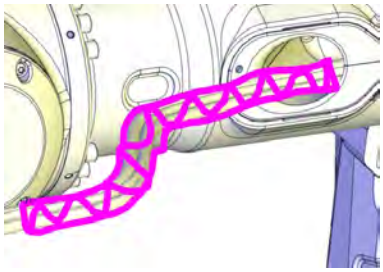
It is necessary to apply cable grease on the cable package inside the tube.

	Action	Note
1	Carefully pull the cable package out 10 to 15 centimeters longer than the final assembly position.	
2	Apply grease on the highlighted area.	 xx1400001389

Continues on next page

4.2.1 Replacing the cable package IRBDP MH3 UI

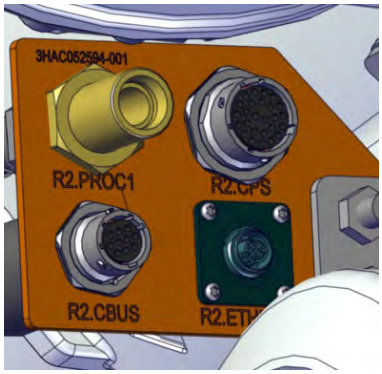
Continued

	Action	Note
3	Carefully push the cable package back into the tube and out through the insert until the area where grease was applied, is visible and able to reach.	
4	Apply grease on the highlighted area so that the cable package inside the tube is covered with cable grease all the way through.	 xx1400001390
5	Carefully push the cable package back in through the insert and into its mounting position in the tube.	
6	**Note** Make sure the cables and hoses are not twisted through the upper arm.	

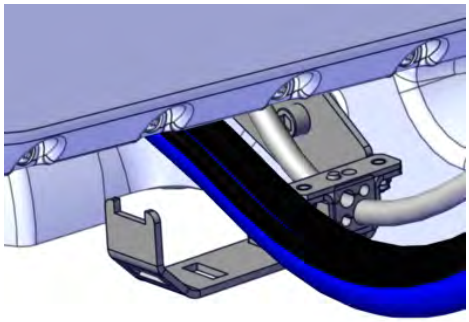
Connect the cable package

	Action	Note
1	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the robot, before entering the robot working area.	
2	**CAUTION** The cable package is sensitive to mechanical damage. Handle it with care in order to avoid damaging the cabling or the connectors.	

Continues on next page

	Action	Note
3	Connect the hose and cable connectors on the connection plate. **CAUTION** Do not tighten the brass couplings for water and air with excessive force. **Tip** Start connecting top connectors, and continue downwards.	Tightening torque, brass couplings 1/2": 31 Nm Tightening torque, brass couplings 3/8": 17 Nm  xx1500003038

Fitting cable package on the upper arm

	Action	Note
1	Secure the cable package to the mounting plate with a strap.	 xx1500003039

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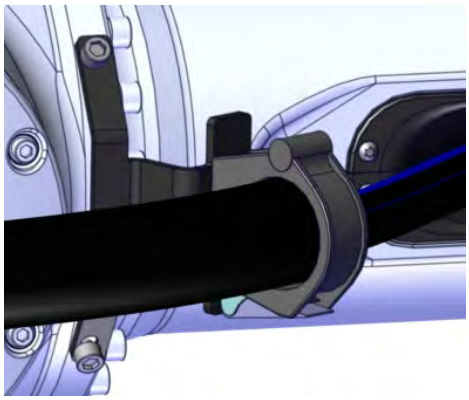
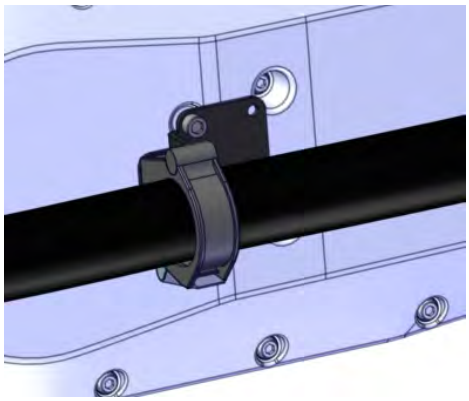
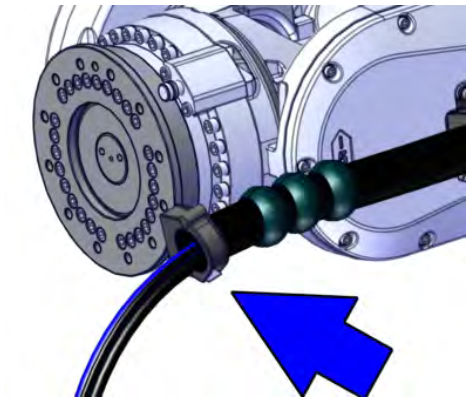
4.2.1 Replacing the cable package IRBDP MH3 UI

Continued

	Action	Note
2	Fasten the cable package in the gripping clamps on the upper arm.	 xx1500003040  xx1500003041
3	The gripping clamp at the front shall be fitted on equipment used by the customer.	 xx1500003042

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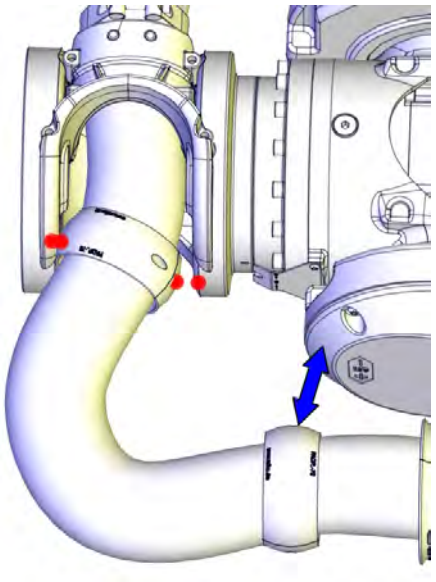
Check of protective sleeve

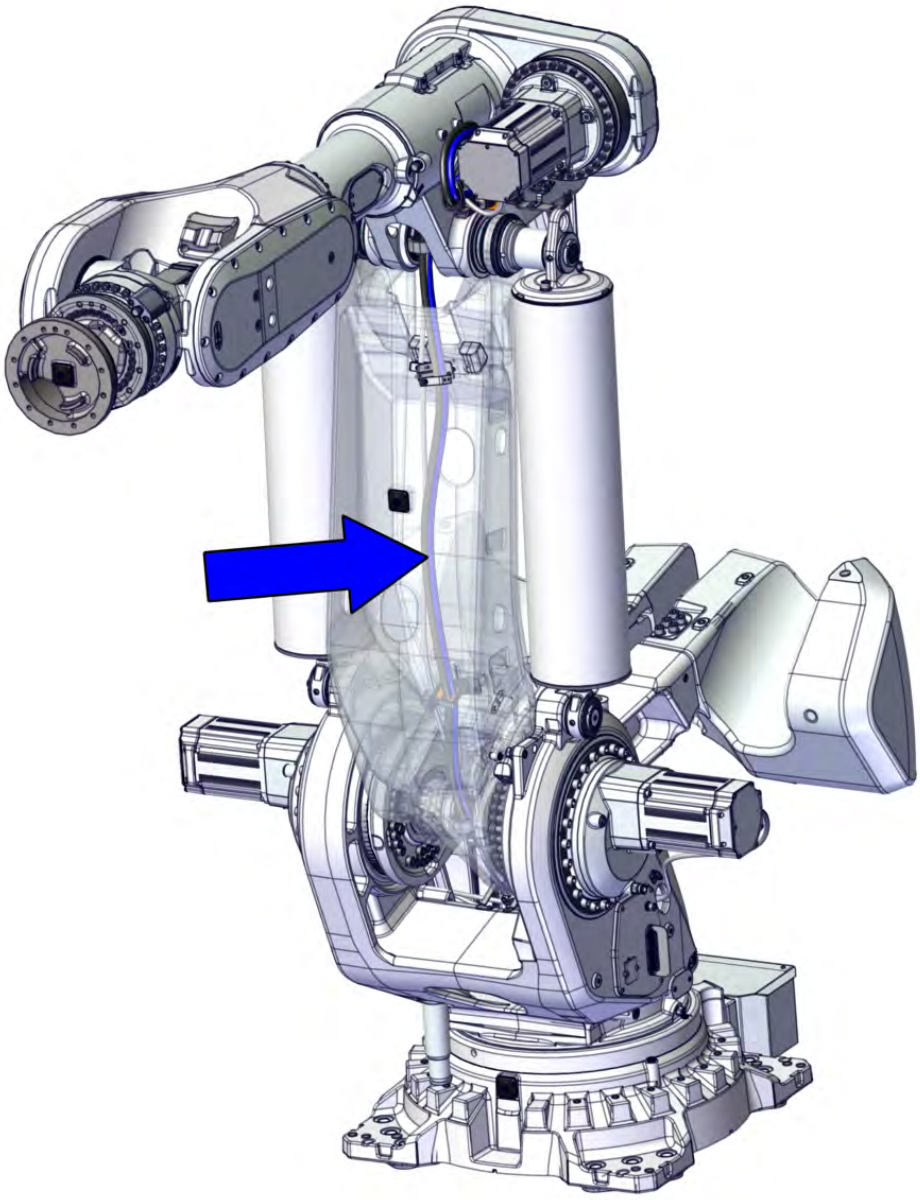
The protective hose is protected against wear in exposed areas with a protective sleeve.

	Action	Note
1	In order to be sure that the protective sleeve is in the correct position, check the position after some hours running.	 xx1400000224
2	If the protective hose is worn somewhere, adjust the position of the protective sleeve.	

4.2.2 Replacing the cable package IRBDP MH LI

Location of the cable package

The cable package is located inside the lower arm.



xx1500002962

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Spare parts

The following equipment is required for the replacement of the lower arm cable package IRBDP MH LI.

Spare part	Spare part number	Note
Cable package IRBDP MH LI	See *Spare parts on page 239*.	

Required tools and equipment

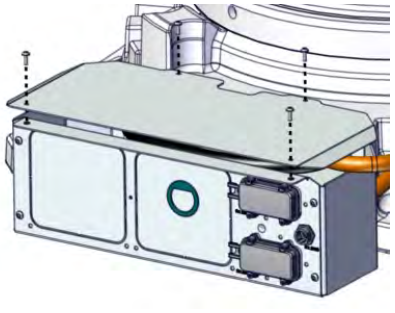
The following equipment is required for the replacement of the cable package IRBDP MH LI.

Equipment	Article number	Note
Standard toolkit, DressPack/SpotPack	3HAC17290-7	The contents are defined in section *Toolkits, DressPack/SpotPack on page 235*.

Removing the cable package

Use this procedure to remove the cable package IRBDP MH LI.

Disconnecting the cable package

	Action	Note
1	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the robot, before entering the robot working area.	
2	**CAUTION** The cable package is sensitive to mechanical damage. Handle it with care in order to avoid damaging the cabling or the connectors.	
3	Remove the rear cover plate.	 xx1500002963

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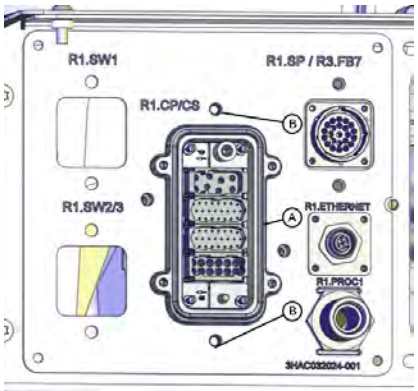
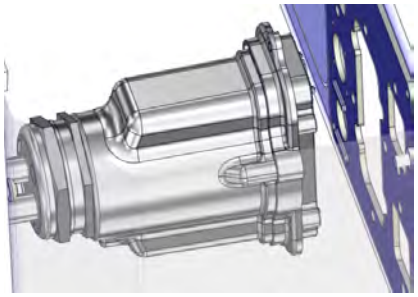
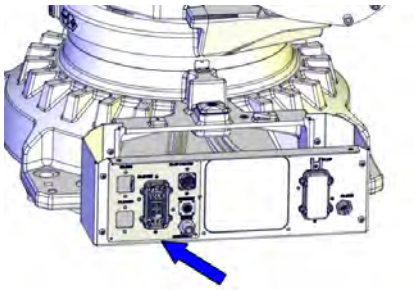
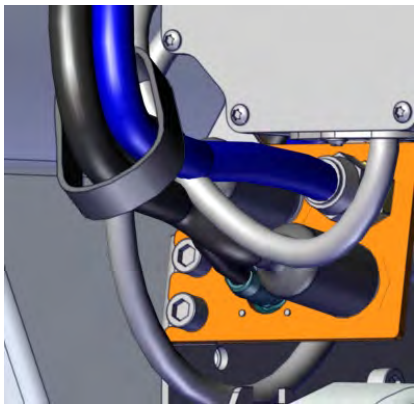
4.2.2 Replacing the cable package IRBDP MH LI

Continued

	Action	Note
4	Unscrew the screws that secure the R1.CP/CS connector.	 xx1400001141 A Screw M6x16 8.8-A2F (2 pcs) B R1.CP/CS connector
5	Remove the R1.CP/CS connector.	 xx1400001149
6	Disconnect the connectors from the customer plate.	 xx1400000081
7	Disconnect the connectors at the connection plate.	 xx1500003035

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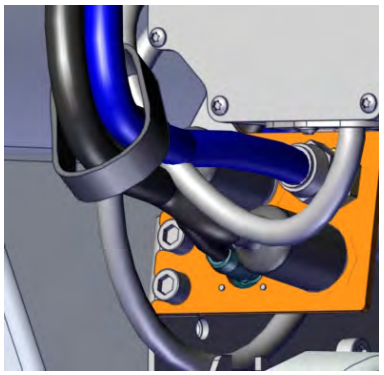
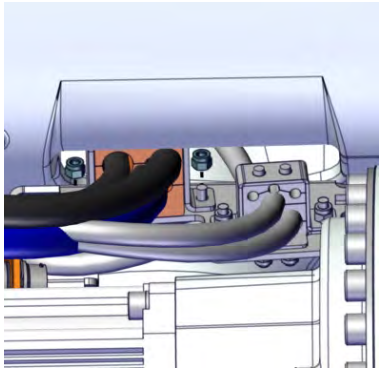
Removing the cable package

	Action	Note
1	Remove the strap.	 xx1500003035
2	Remove nuts holding the metal clamp.	 xx1500003033
3	Gently push the cabling into the lower arm.	

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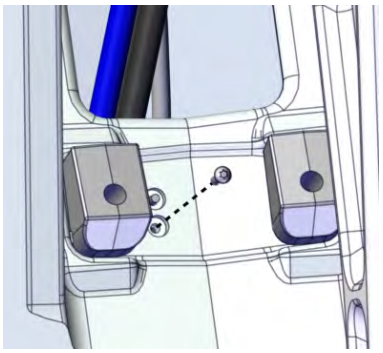
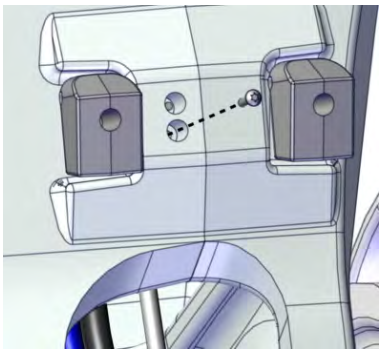
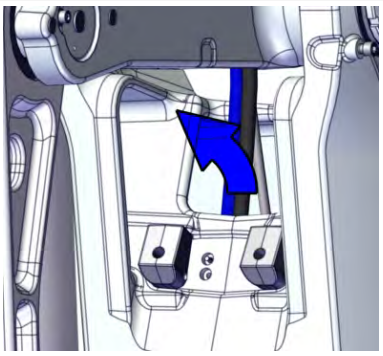
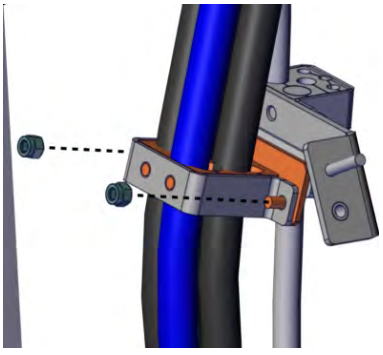
4.2.2 Replacing the cable package IRBDP MH LI

Continued

	Action	Note
4	Remove the screws holding the motor cabling brackets inside lower arm.	 xx1500003019  xx1500003020 *Figure 4.1:*
5	Gently pull the motor cabling upwards until the motor cabling bracket is reachable.	 xx1500003024
6	Remove nuts.	 xx1500003025

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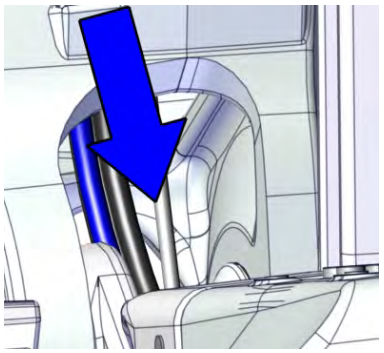
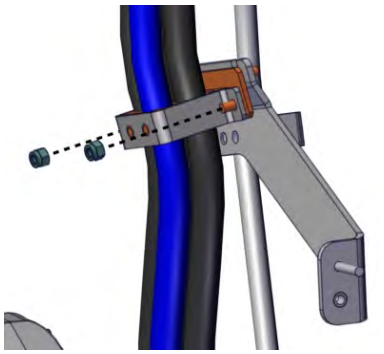
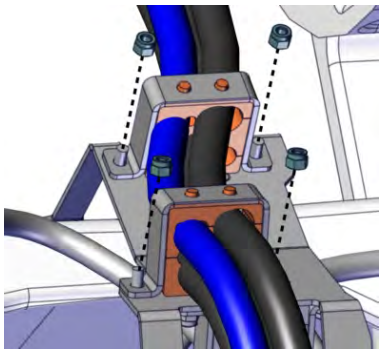
	Action	Note
7	Gently pull out the motor cabling downwards to be able to remove the dresspack cabling from the motor cabling bracket inside lower arm.	 xx1500003021
8	Remove nuts.	 xx1500003023
9	Remove the nuts on the motor cabling bracket.	 xx1500003022
10	Carefully pull out the cable package.	

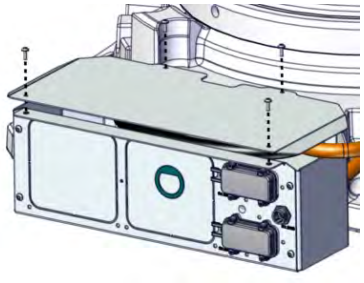
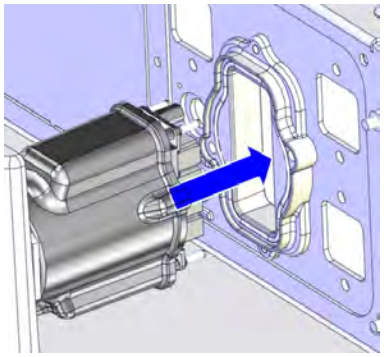
Continues on next page

4.2.2 Replacing the cable package IRBDP MH LI
Continued

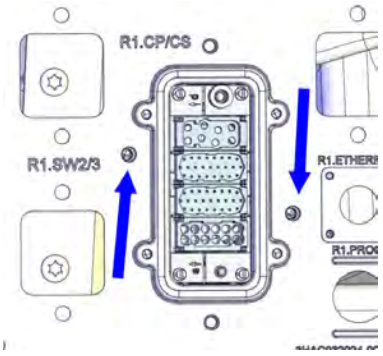
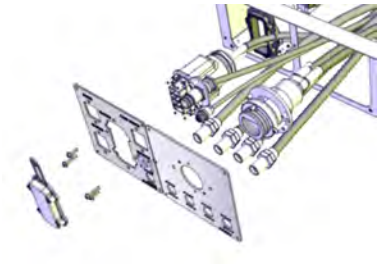
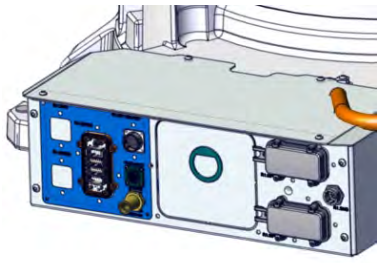
Refitting the cable package

Use this procedure to refit the cable package IRBDP MH LI.

Connecting the cable package

	Action	Note
1	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the robot, before entering the robot working area.	
2	**CAUTION** The cable package is sensitive to mechanical damage. Handle it with care in order to avoid damaging the cabling or the connectors.	
3	Remove the rear cover plate.	 xx1500002963
4	Fit the R1.CP/CS cable to the customer plate.	 xx1400001142

Continues on next page

	Action	Note
5	Secure the R1.CP/CS connector.	 xx1400001143 M6x25 A2-70 (2 pcs)
6	Connect the rest of the cable and hose connectors to the customer plate. **CAUTION** Do not tighten the brass couplings for water and air with excessive force. **CAUTION** Make sure that no cables or hoses are twisted or strained. Reroute if necessary.	Tightening torque, brass couplings 1/2": 31 Tightening torque, brass couplings 3/8": 17  xx1200000088
7	Refit the rear cover plate.	 xx1500002969

Refitting the cable package

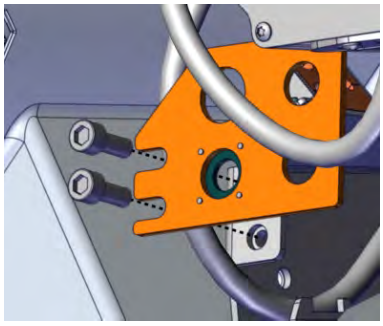
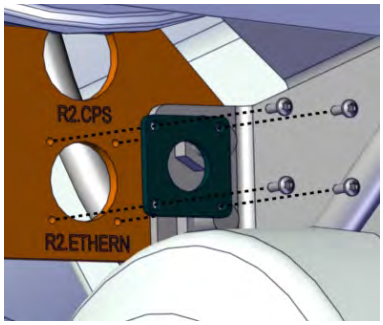
Refitting the cable package

	Action	Note
1	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the robot, before entering the robot working area.	

Continues on next page

4.2.2 Replacing the cable package IRBDP MH LI

Continued

	Action	Note
2	**CAUTION** The cable package is sensitive to mechanical damage. Handle it with care in order to avoid damaging the cabling or the connectors.	
3	Fit the connection plate. Lock screws with locking liquid (Loctite 243)	 xx1500002970 M10x25 A2-7 0 (2 pcs)
4	Fasten the Profinet bracket.	 xx1500002971 M3x8 A2-70 (4 pcs)

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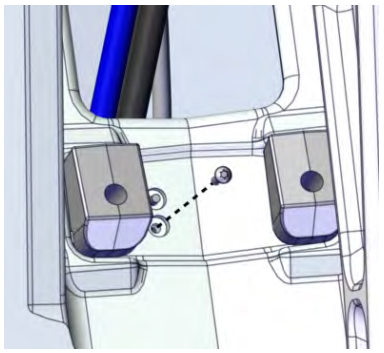
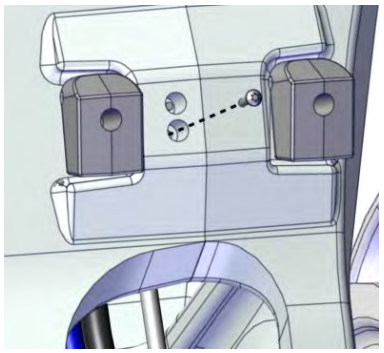
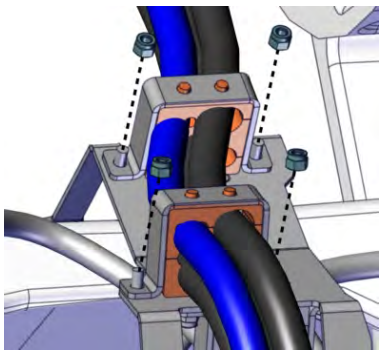
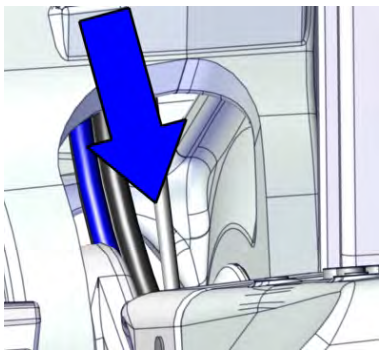
	Action	Note
5	Remove screws for motor cabling brackets inside the lower arm.	 xx1500003019  xx1500003020
6	Gently push the dresspack cables up into the lower arm.	
7	Fit the metal clamps on the motor cabling bracket.	 xx1500003022 M6 Steel 8-A2F (2x 2 pcs)
8	Gently pull out the motor cabling downwards to be able to fit the dresspack cables on the cabling bracket inside lower arm.	 xx1500003021

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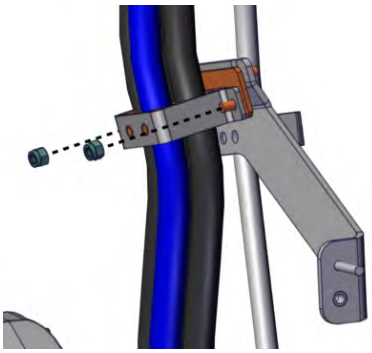
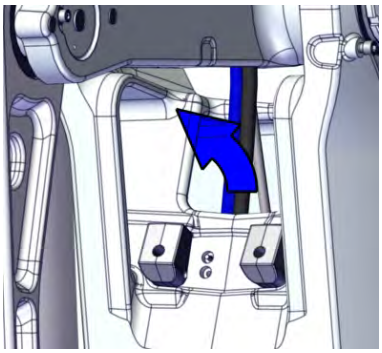
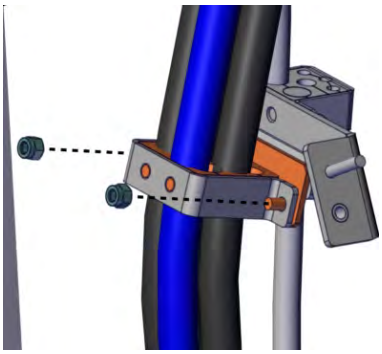
4.2.2 Replacing the cable package IRBDP MH LI

Continued

	Action	Note
9	Fit the metal clamp.	 xx1500003023 M6 Steel 8-A2F (2 pcs)
10	Pull the motor cabling gently upwards until the motor cabling bracket is reachable.	 xx1500003024
11	Fit the metal clamp.	 xx1500003025 M6 Steel 8-A2F (2 pcs)

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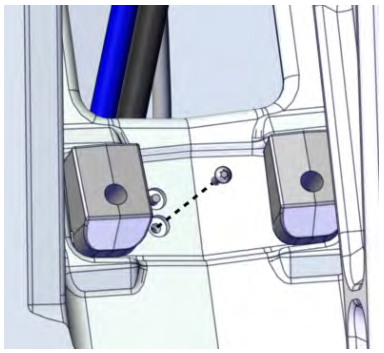
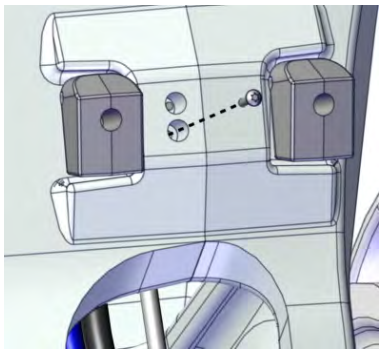
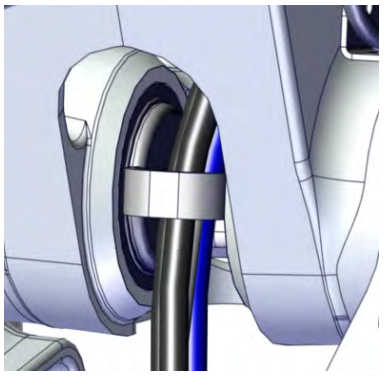
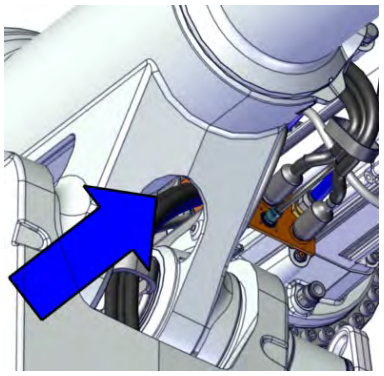
	Action	Note
12	Fit the motor cabling brackets inside lower arm.	 xx1500003019  xx1500003020
13	Place the cables in the cable guide.	 xx1500003027
14	Push the cables out of axis 3-4 beside the motor.	 xx1500003032

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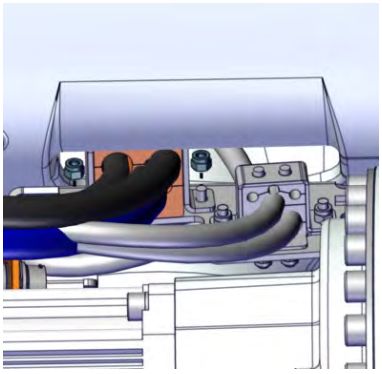
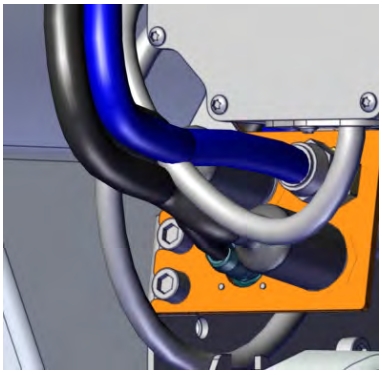
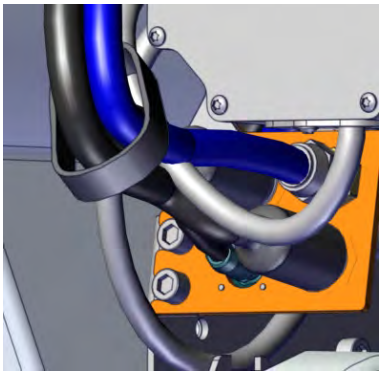
4.2.2 Replacing the cable package IRBDP MH LI

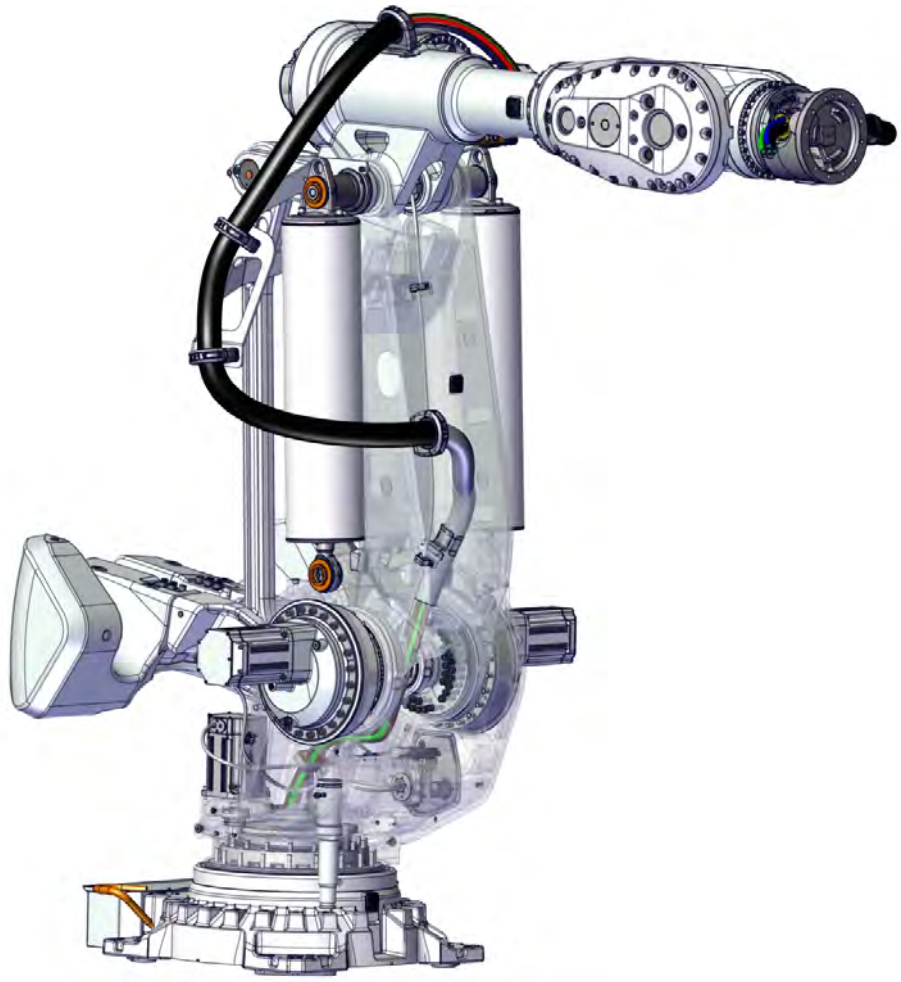
Continued

	Action	Note
15	Fit the metal clamp.	 xx1500003033
16	Carefully bend the cabling and attach it to the connection plate. **Tip** Start connecting top connectors, and continue downwards.	 xx1500003034
17	Put a strap around the cabling.	 xx1500003035

4.2.3 Replacing the cable package IRBDP SW6 LI LeanID

Location

The DressPack cable package IRBDP SW6 LI, is located as shown in the figure.



xx1500002651

Spare parts

Spare part	Article number	Note
Cable package IRBDP SW6 LI	See *DressPack cable package IRBDP SW6 LI on page 240*	

Required tools and equipment

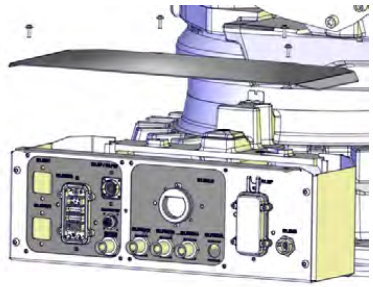
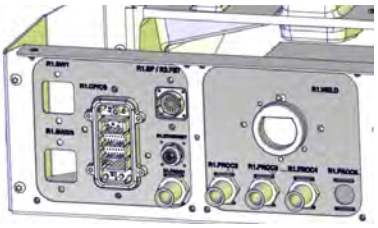
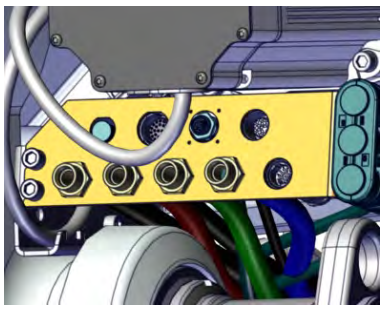
Equipment, etc.	Article number	Note
Standard toolkit	-	Content is defined in section *Standard toolkit on page 235*.

Continues on next page

4.2.3 Replacing the cable package IRBDP SW6 LI LeanID
Continued

Removing the cable package -IRBDP SW6 LI

Disconnecting the cable package

	Action	Note
1	Move the robot to a comfortable working position.	
2	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the robot, before entering the robot working area.	
3	**CAUTION** The cable package is sensitive to mechanical damage. Handle it with care in order to avoid damaging the cabling or the connectors.	
4	Remove the rear cover.	 xx1400000197
5	Disconnect connectors at the base.	 xx1400000212
6	Disconnect connectors at the connection plate. **Note** Do not disconnect the connectors of the cable package IRBDP SW6 LI. The connection plate is part of IRBDP SW6 LI.	 xx1500003049

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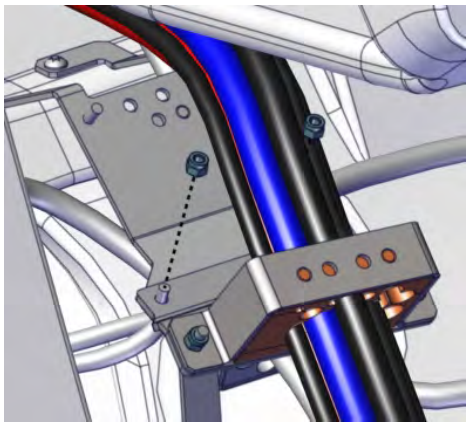
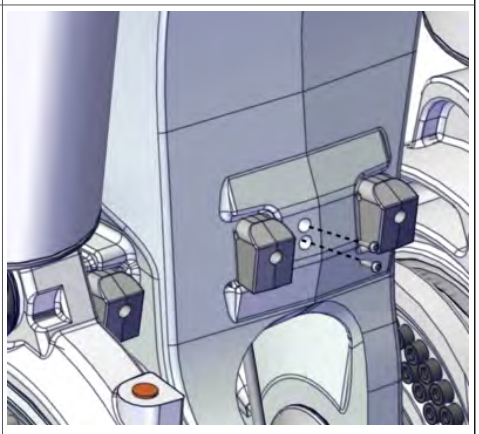
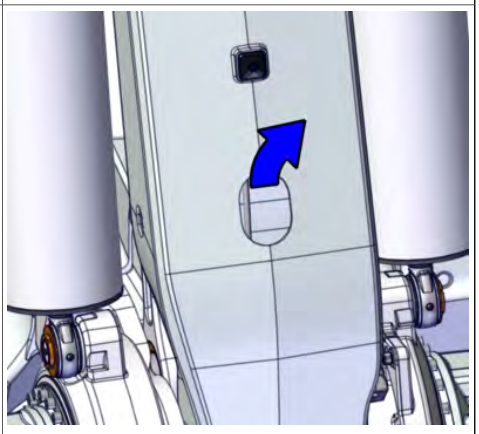
Removing the cable package

	Action	Note
1	Remove nuts inside frame.	 xx1500002659
2	Loosen screws int the back lower arm.	 xx1500002606
3	Carefully pull out the motor cabling with the bracket through the front hole on the lower arm.	 xx1500002607

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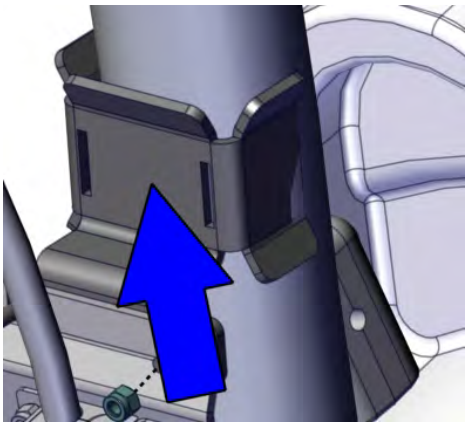
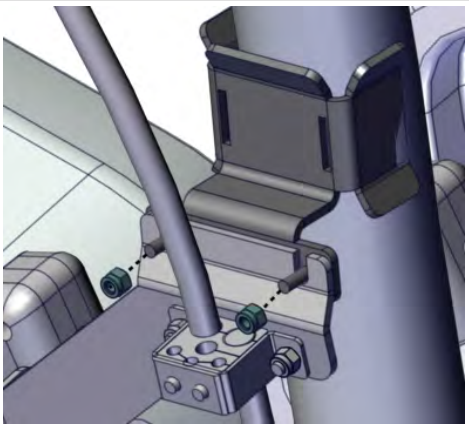
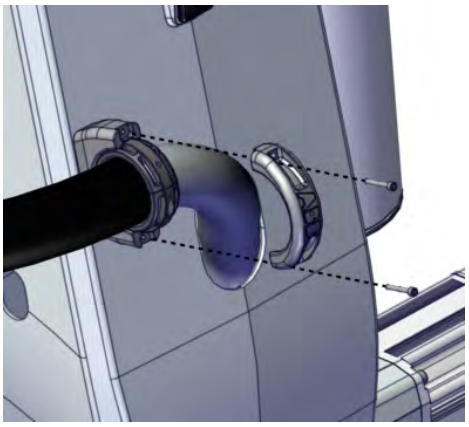
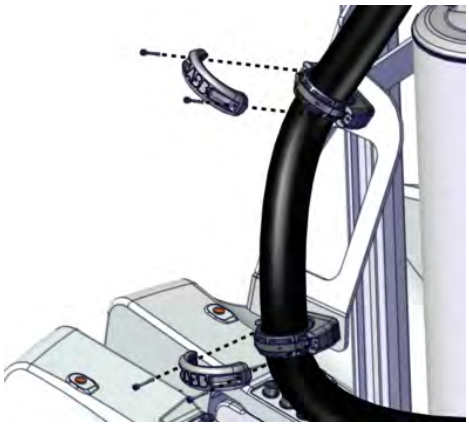
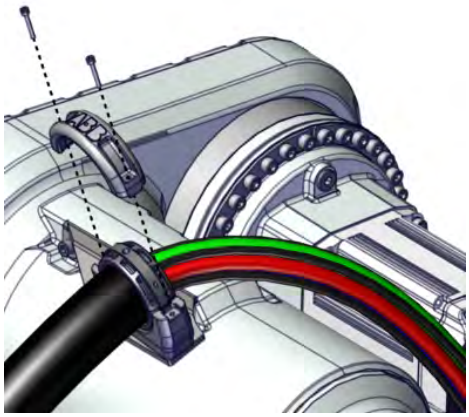
4.2.3 Replacing the cable package IRBDP SW6 LI LeanID

Continued

	Action	Note
4	Remove the velcro strap.	 xx1500002657
5	Remove nuts.	 xx1500002655
6	Remove upper part of ball joint housing. **Note** Be careful not to loose the small o-ring! The purpose of the o-ring is to keep the screws in place in the housing, upper part.	 xx1500002658

Continues on next page

	Action	Note
7	Remove upper part of ball joint housings. **Note** Be careful not to loose the small o-ring! The purpose of the o-ring is to keep the screws in place in the housing, upper part.	 xx1500002654
8	Remove upper part of ball joint housing. **Note** Be careful not to loose the small o-ring! The purpose of the o-ring is to keep the screws in place in the housing, upper part.	 xx1500002653
9	Carefully pull out the cable package. **Tip** This is best done following this order: • Hoses • Weld cables • Motor cables	

Refitting the cable package - IRBDP SW6 LI

Use this procedure to refit the cable package.

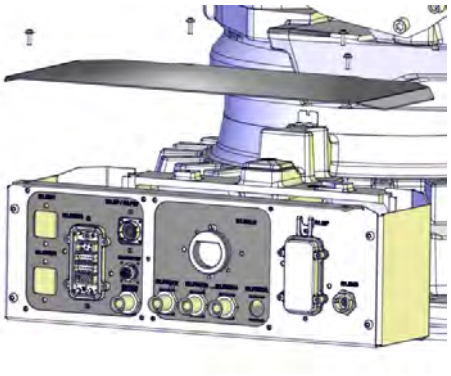
Preparations

	Action	Note
1	Move the robot to a comfortable working position.	

Continues on next page

4.2.3 Replacing the cable package IRBDP SW6 LI LeanID

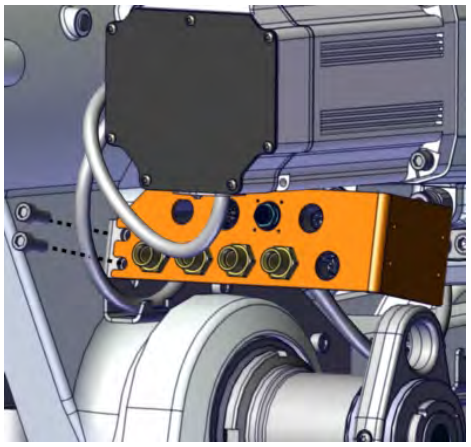
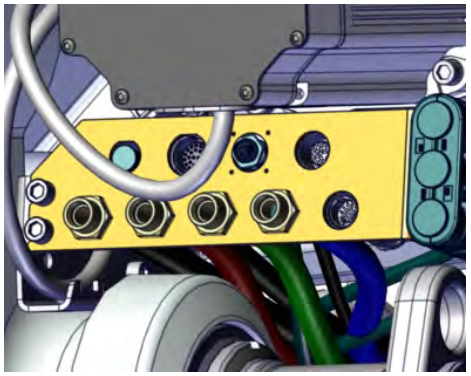
Continued

	Action	Note
2	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the robot, before entering the robot working area.	
3	Remove the rear cover plate (if not already removed).	 xx1400000197

Fasten the cable package

	Action	Note
1	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the robot, before entering the robot working area.	
2	**CAUTION** The cable package is sensitive to mechanical damage. Handle it with care in order to avoid damaging the cabling or the connectors.	
3	Start the assembly of the cabling at the connector plate in axis 3-4. Let the cabling rest over the robots axis 3-4.	

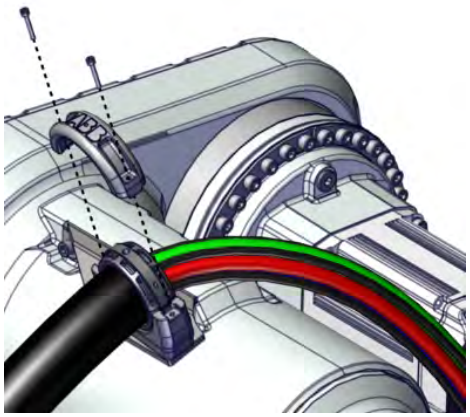
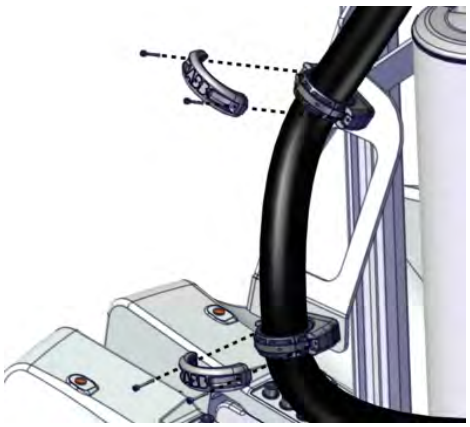
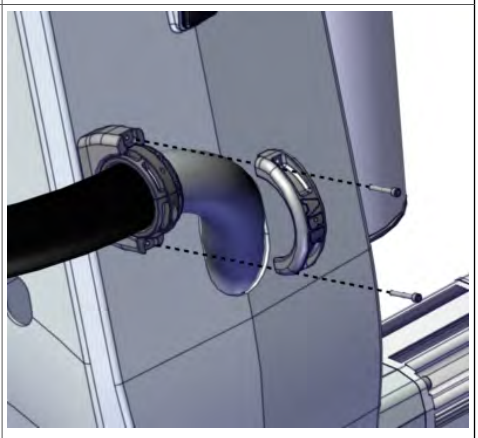
Continues on next page

	Action	Note
4	Fasten the connector plate.	 xx1500002652 M10x25 8.8-A3F (2 pcs)
5	Connect the connectors.	 xx1500003049
6	**CAUTION** Do not change the position of the clamp inserts on the protection hose, being fitted in the ball joint housings. If the position is changed it will alter the bending movement of the protection hose, when the arms are moved. A change of position of the clamp inserts may result in serious damage to the cable package.	

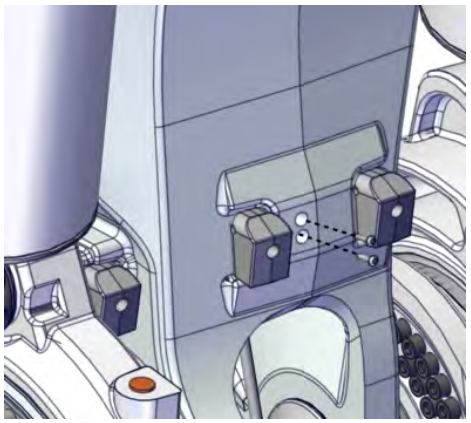
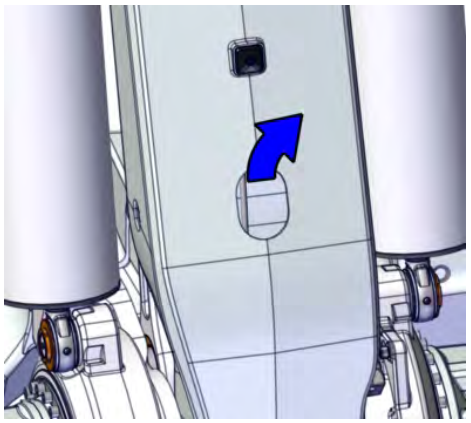
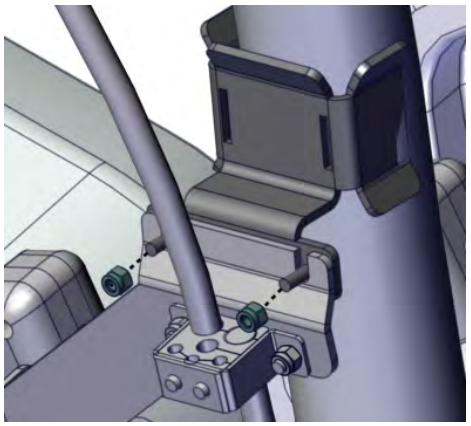
Continues on next page

4.2.3 Replacing the cable package IRBDP SW6 LI LeanID

Continued

	Action	Note
7	Fasten the cabling in the axis-3 ball joint housing. **Note** Be careful not to loose the small o-ring! The purpose of the o-ring is to keep the screws in place in the housing, upper part.	 xx1500002653 M8x16 8.8-A2F (2 pcs)
8	Fasten the cabling in the ball joint housings on the lower arm bracket. **Note** Be careful not to loose the small o-ring! The purpose of the o-ring is to keep the screws in place in the housing, upper part.	 xx1500002654 M8x16 8.8-A2F (2x 2 pcs)
9	Fasten the cabling in the ball joint housings on the lower arm. **Note** Be careful not to loose the small o-ring! The purpose of the o-ring is to keep the screws in place in the housing, upper part.	 xx1500002658 M8x16 8.8-A2F (2 pcs)

Continues on next page

	Action	Note
10	Loosen the screws on the back lower arm. Save the screws for re-assembly.	 xx1500002606
11	Carefully pull out the motor cabling with the bracket through the front hole on the lower arm.	 xx1500002607
12	Fasten the IRBDP SW6 LE cabling bracket on the motor cabling bracket.	 xx1500002655 Prev. torque nut M6 (2 pcs)

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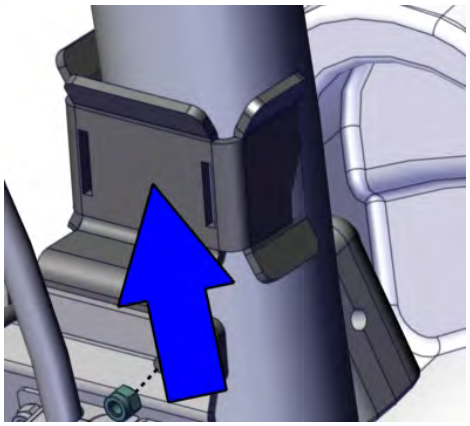
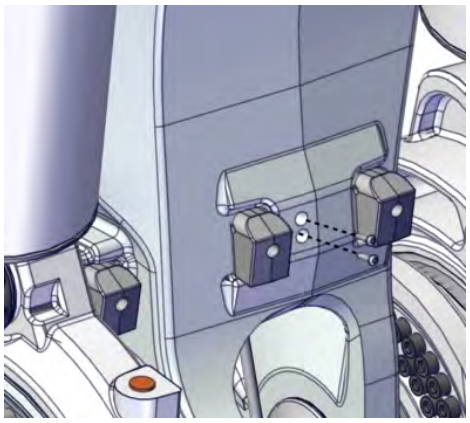
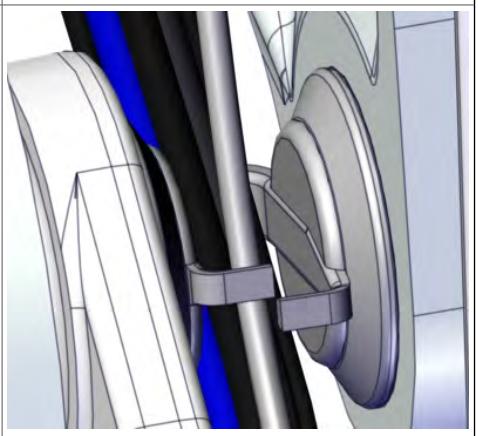
4.2.3 Replacing the cable package IRBDP SW6 LI LeanID

Continued

	Action	Note
13	Fasten a velcro strap around the bracket and the cabling.	 xx1500002657
14	Carefully push the cabling down through the lower arm.	
15	Fasten the bracket in the back lower arm. Use previously removed screws.	 xx1500002606
16	Put the cabling through the cable guide in axis 2.	 xx1500002656

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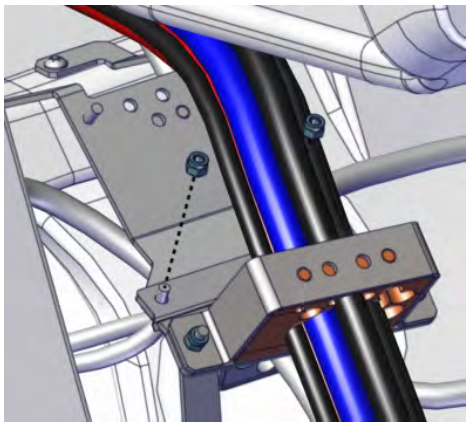
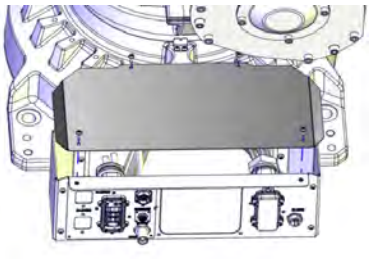
	Action	Note
17	Fasten the IRBDP cabling on the cabling bracket in the frame.	 xx1500002659 Prev. torque nut M6 (2 pcs)
18	Run the cables down through the center hole of axis 1, in the following order: • Signal cables (Spot welding) • Hoses • Make a check that cables and hoses do not cross each other.	

Connect the lower cable package at the base

	Action	Note
1	**DANGER** Turn off all: • electric power supply • air pressure supply to the robot, before starting the repair work on the robot.	
2	**CAUTION** The cable package is sensitive to mechanical damage. Handle it with care in order to avoid damaging the cabling or the connectors.	
3	Remove the rear cover plate.	 xx1400000080

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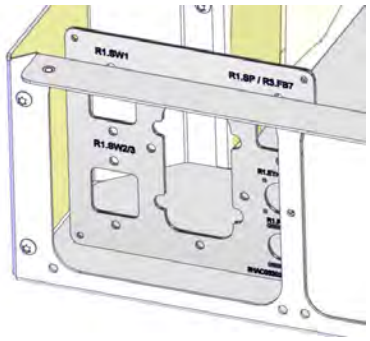
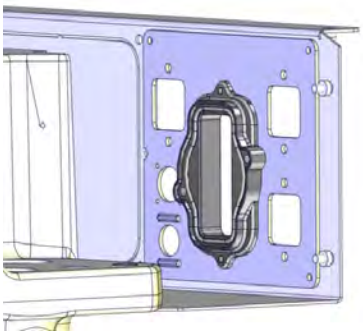
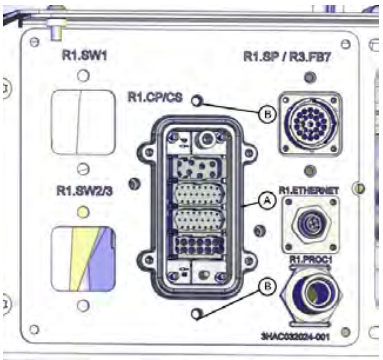
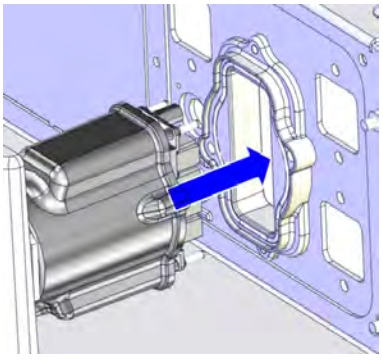
4.2.3 Replacing the cable package IRBDP SW6 LI LeanID

Continued

	Action	Note
4	Fit the customer plate.	 xx1400001146 M6x16 8.8-A2F (4 pcs)
5	Fit the adapter complete to the customer plate.	 xx1400001140
6	Fasten the adapter complete to the customer plate.	 xx1400001141 M6x16 8.8-A2F (2 pcs)
7	Fit the R1.CP/CS cable to the customer plate.	 xx1400001142

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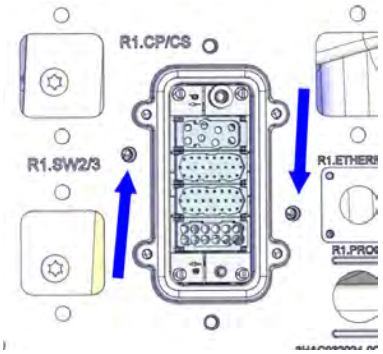
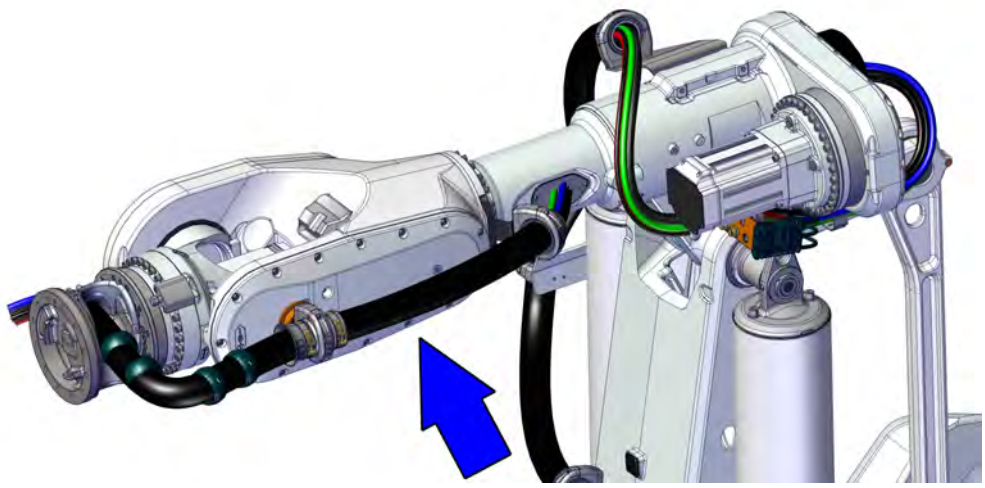
	Action	Note
8	Secure the R1.CP/CS connector.	 xx1400001143 M6x25 8.8-A2F (2 pcs)
9	Connect the rest of the cable and hose connectors to the customer plate. **CAUTION** Do not tighten the brass couplings for water and air with excessive force. **CAUTION** Make sure that no cables or hoses are twisted or strained. Reroute if necessary.	Tightening torque, brass couplings 1/2": 31 Nm Tightening torque, brass couplings 3/8": 17 Nm

4.2.4 Replacing the cable packages IRBDP SW6 UI and IRBDP MH6 UI LeanID

Location of the cable package IRBDP SW6 UI and IRBDP MH6 UI

The cable packages IRBDP SW6 UI and IRBDP MH6 UI, are located as shown in the figure. The figure shows cable package IRBDP SW6 UI. The principle of IRBDP MH6 UI is the same as IRBDP SW6 UI.



xx1500002777

Spare parts

Equipment, etc.	Article number	Note
Cable package IRBDP SW6 UI	See *DressPack cable package IRBDP SW6 UI on page 241*	
Cable package IRBDP MH6 UI	See *DressPack cable package IRBDP SW6 LI on page 240*	

Required tools and equipment

Equipment, etc.	Article number	Note
Standard toolkit	-	Content is defined in section *Standard toolkit on page 235*.

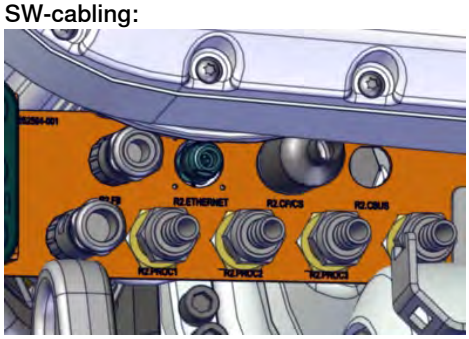
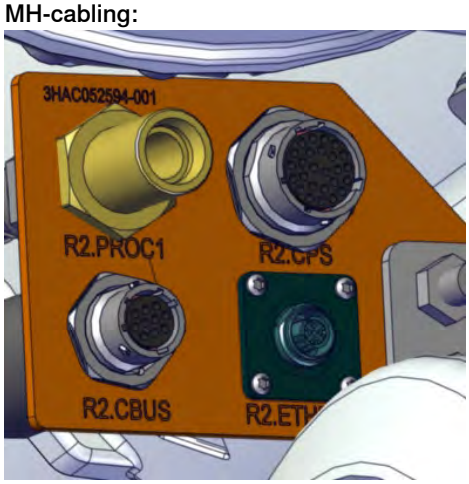
Removing cable packages IRBDP SW6 UI and IRBDP MH6 UI

Use this procedure to remove the cable packages IRBDP SW6 UI and IRBDP MH6 UI.

Disconnecting the cable package

	Action	Note
1	Move the robot to a comfortable working position.	

Continues on next page

	Action	Note
2	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the robot, before entering the robot working area.	
3	**CAUTION** The cable package is sensitive to mechanical damage. Handle it with care in order to avoid damaging the cabling or the connectors.	
4	Disconnect hose and cable connectors on the connection plate.	SW-cabling:  xx1500002812 MH-cabling:  xx1500003038

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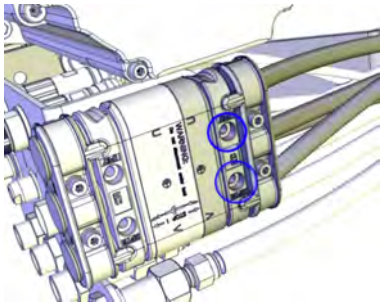
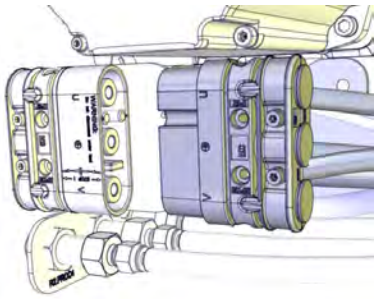
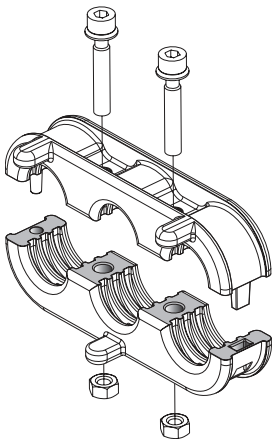
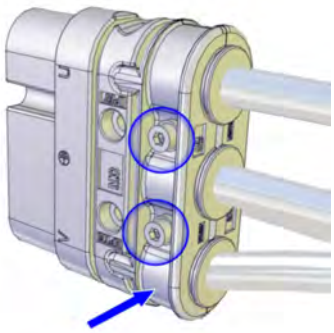
4.2.4 Replacing the cable packages IRBDP SW6 UI and IRBDP MH6 UI LeanID

Continued

Disconnecting the weld connector

Only valid for IRBDP SW6 UI.

	Action	Note
1	Remove the screws securing the weld connector to the connection plate.	 xx1200000089 Screw, M5x40 8.8-A2F (2 pcs)
2	Disconnect the weld connector.	 xx1200000075
3	Remove the cable strain relief.  xx1300000836 *Figure 4.2:*	 xx1200000058 Screw, M5x25 8.8-A2F (2 pcs)

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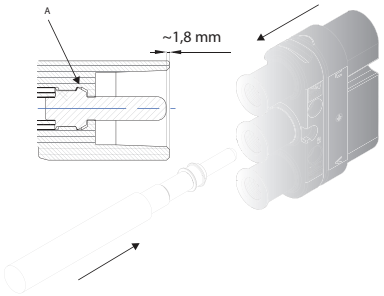
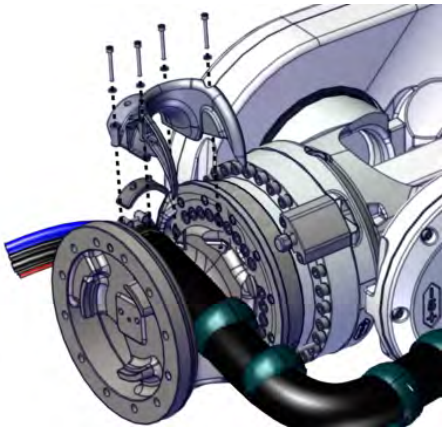
	Action	Note
4	Unplug the connectors in the weld connector. Manually pull the cables with the crimped-on contact part out of the insulation. **Note** The unplugging will facilitate the removal of the cable package through the tube in the upper arm.	 xx1300000835

Removing the cable package

	Action	Note
1	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the robot, before entering the robot working area.	
2	**CAUTION** The cable package is sensitive to mechanical damage. Handle it with care in order to avoid damaging the cabling or the connectors.	
3	Only valid for IRBDP SW6 UI: Remove the cable package from the process turning disc cable guide. **Note** There is cable grease in the turning disc cable guide.	 xx1500002822

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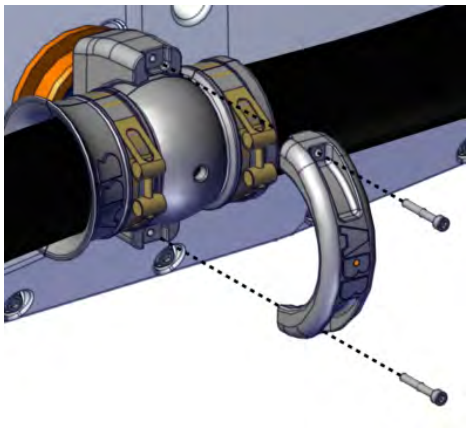
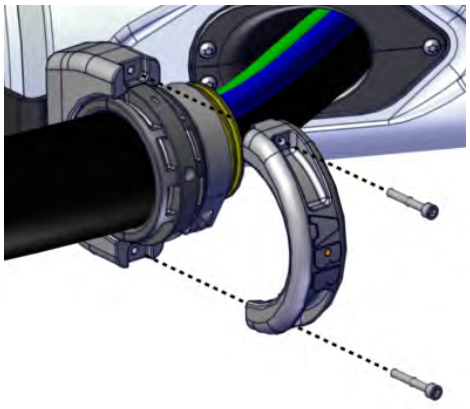
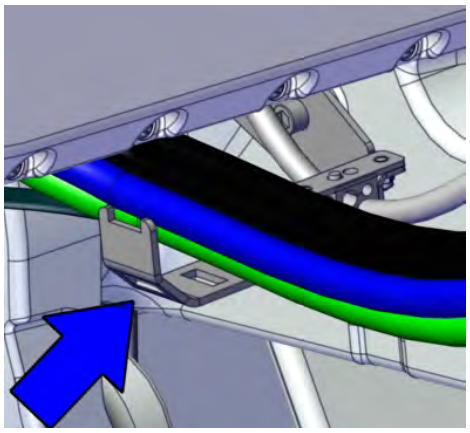
4.2.4 Replacing the cable packages IRBDP SW6 UI and IRBDP MH6 UI LeanID

Continued

	Action	Note
4	Remove upper part of ball joint housing. **Note** Be careful not to loose the small o-ring! The purpose of the o-ring is to keep the screws in place in the housing, upper part.	 xx1500002820  xx1500002819
5	Remove the velcro strap.	 xx1500002818

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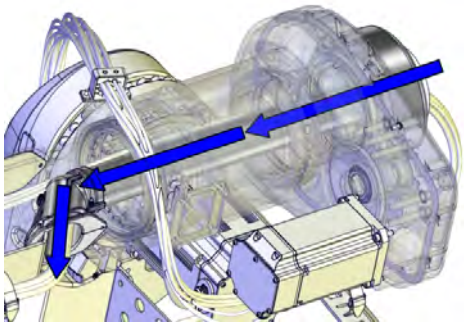
	Action	Note
6	Carefully pull the cable package out of the tube and insert. **Note** There is cable grease on the cables. **Tip** This operation is best performed by two persons working together.	 xx1400000188

Refitting cable packages IRBDP SW6 UI and IRBDP MH6 UI

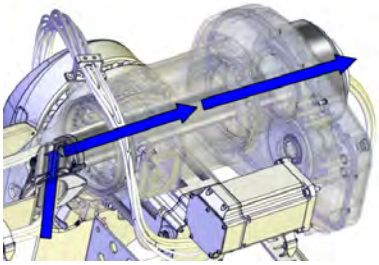
Use this procedure to refit the cable packages IRBDP SW6 UI and IRBDP MH6 UI.

Route the cable package

	Action	Note
1	Move the robot to a comfortable working position.	
2	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the robot, before entering the robot working area.	
3	**CAUTION** The cable package is sensitive to mechanical damage. Handle it with care in order to avoid damaging the cabling or the connectors.	
4	**Tip** This procedure is best done by two persons working together - one pushing cabling and hoses into the tube and the other pulling them out at the wrist.	

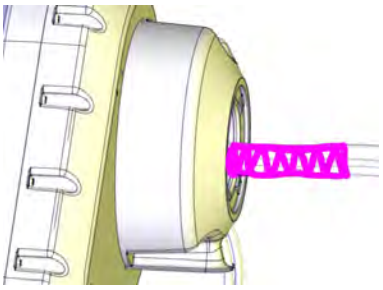
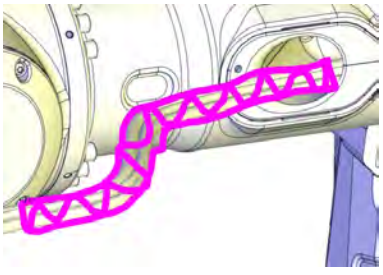
Continues on next page

4.2.4 Replacing the cable packages IRBDP SW6 UI and IRBDP MH6 UI LeanID
Continued

	Action	Note
5	Carefully push the cable package into the insert, through the tube and out in the back of the arm housing. **Tip** The following order is preferable: 1 Cables 2 Hoses 3 Weld cables (where applicable) If there is a problem, remove the nut inside the tube.	 xx1400000095

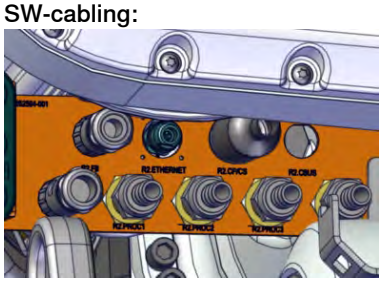
Apply cable grease

It is necessary to apply cable grease on the cable package inside the tube.

	Action	Note
1	Carefully pull the cable package out 10 to 15 centimeters longer than the final assembly position.	
2	Apply grease on the highlighted area.	 xx1400001389
3	Carefully push the cable package back into the tube and out through the insert until the area where grease was applied, is visible and able to reach.	
4	Apply grease on the highlighted area so that the cable package inside the tube is covered with cable grease all the way through.	 xx1400001390
5	Carefully push the cable package back in through the insert and into its mounting position in the tube.	
6	**Note** Make sure the cables and hoses are not twisted through the upper arm.	

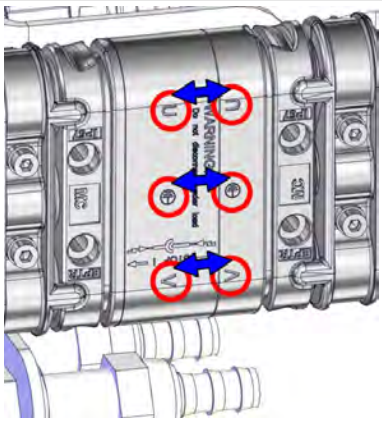
Continues on next page

Connect the cable package

	Action	Note
1	Connect the hose and cable connectors on the connection plate. **CAUTION** Do not tighten the brass couplings for water and air with excessive force. **Tip** Start connecting top connectors, and continue downwards.	Tightening torque, brass couplings 1/2": 31 Nm Tightening torque, brass couplings 3/8": 17 Nm SW-cabling:  xx1500002812 MH-cabling:  xx1500003038

Weld connector

Only valid for IRBDP SW6 UI.

	Action	Note
1	Press (manually) the cables with the crimped-on contact part into the insulation from the back until it perceptibly engages into place to the detent. **Note** Make sure the pins are pushed all the way into the connector.	 xx1400000216

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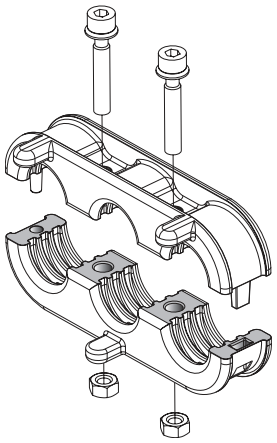
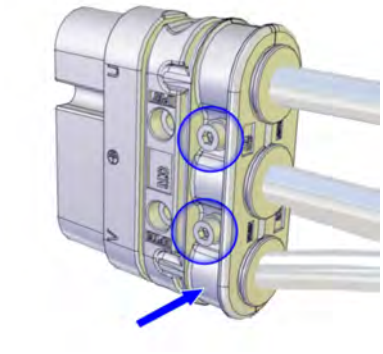
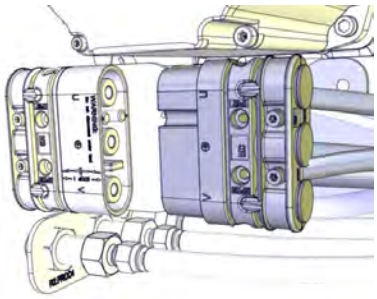
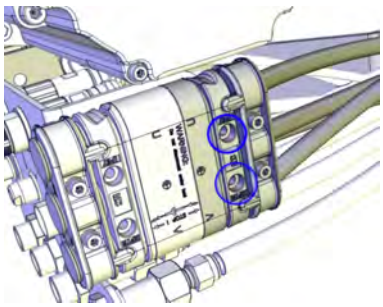
4.2.4 Replacing the cable packages IRBDP SW6 UI and IRBDP MH6 UI LeanID
Continued

	Action	Note
2	Fit the cable strain relief.  xx1300000836	 xx1200000058 M5x25 8.8-A2F (2 pcs)
3	Connect the weld cable.	 xx1200000075
4	Fasten the weld connector to the connection plate.	 xx1200000089 M5x40 8.8-A2F (2 pcs)

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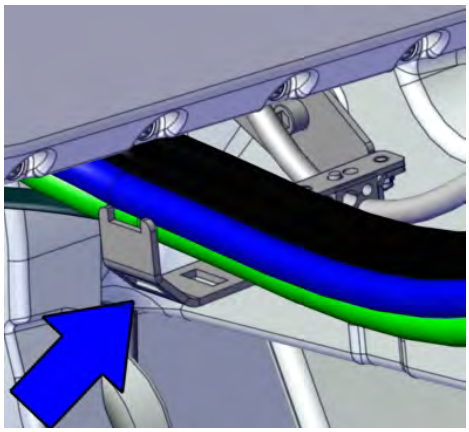
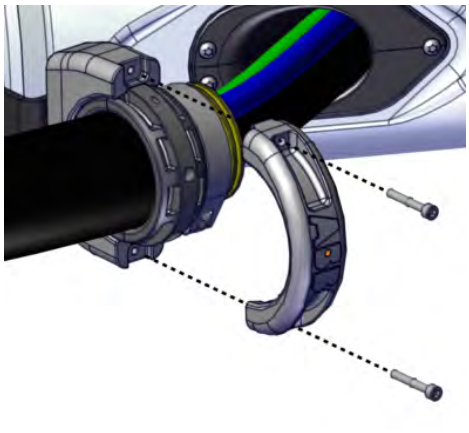
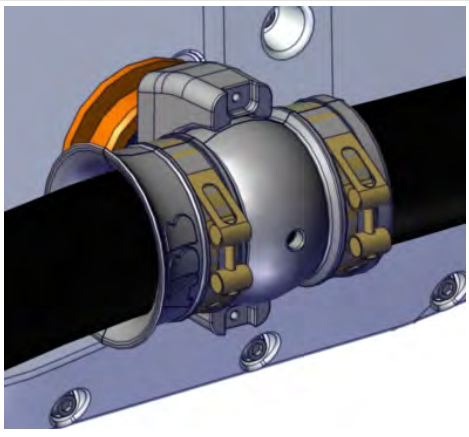
Fasten the cable package IRBDP SW6 UI and IRBDP MH6 UI

	Action	Note
1	Fasten the cable package to the bracket with a strap.	 xx1500002818
2	Fasten the cable package in the ball joint housing.	 xx1500002819 M8x16 A2-7 0 (2 pcs)
3	Make sure that the hose reinforcement funnel is fitted correctly, in the direction shown in the figure.	 xx1500002821

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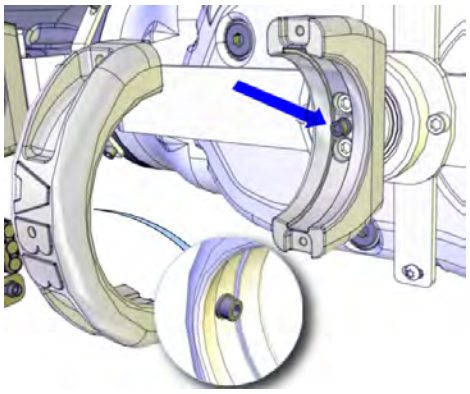
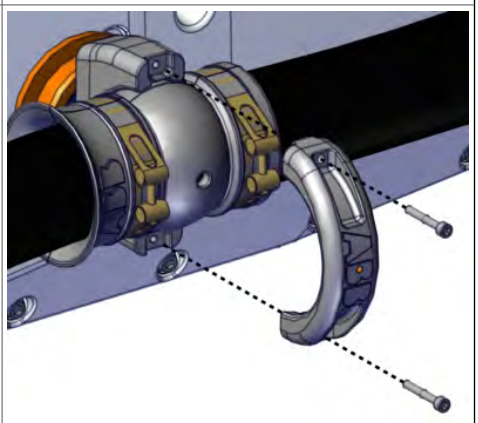
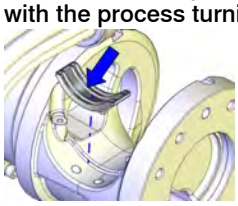
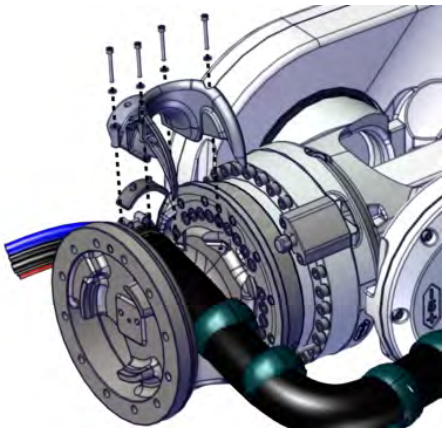
4.2.4 Replacing the cable packages IRBDP SW6 UI and IRBDP MH6 UI LeanID

Continued

	Action	Note
4	Make sure that the screws (M6x12) fits into the guiding holes of the hose reinforcement funnel when it is fitted in the ball joint housing. **CAUTION** The hose reinforcement funnel must not be able to rotate inside the ball joint housing when fitted.	 xx1200000153 M6x12 8.8-A2F (1 pc)
5	Fasten the cable package in the ball joint housing.	 xx1500002820 M8x16 A2-7 0 (2 pcs)
6	**Only valid for IRBDP SW6 UI:** Put cable grease on the process turning disc and the cable guide.	Cable grease 3HAC14807-1
7	**Only valid for IRBDP SW6 UI:** Fasten the cable package in the clamp jaw with the process turning disc cable guide.  xx1400000223	 xx1500002822

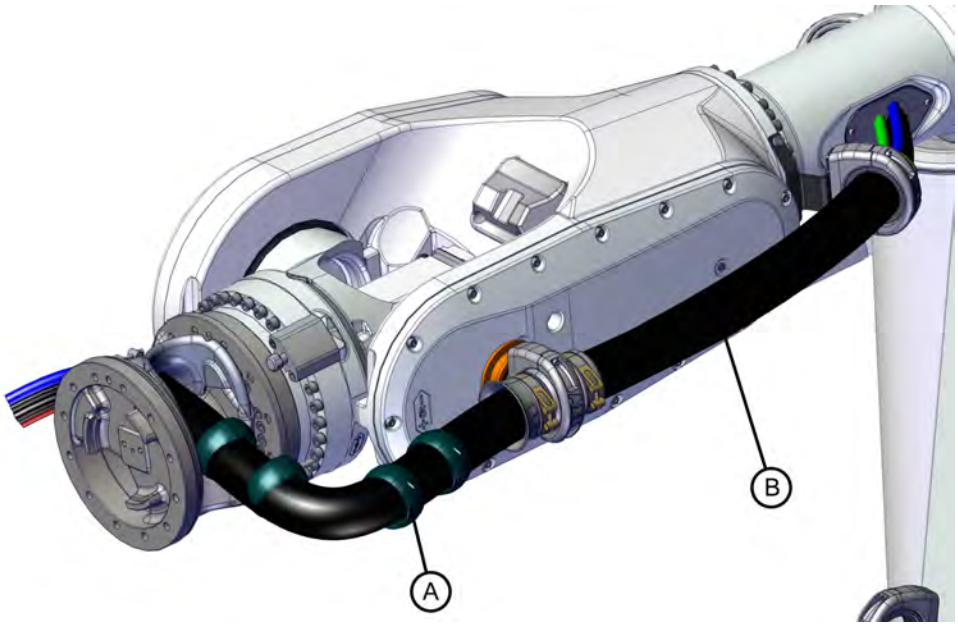
Continues on next page

	Action	Note
8	 **CAUTION** Check potential collision risks between the cable package and the wrist, as well as between the cable package and any equipment fitted on the wrist, before restarting the normal production.	
9	Turn on the power and run the present programming at a very slow speed, while checking all movements for collision risk between cable package and wrist.	
10	 **DANGER** Make sure all safety requirements are met when performing the first test run. These are further detailed in the section *DANGER - First test run may cause injury or damage! on page 51*.	

4.2.5 Replacing the protection hose IRBDP SW6 UI and IRBDP MH6 UI LeanID

Location of protection hose, upper arm

The protection hose upper arm is located as shown in the figure.



xx1500003061

A	Protection hose, front part
B	Protection hose, back part

Spare parts

Wear parts	Article number	Note
Protection hose, upper arm, front part (1,150 mm) Protection hose, upper arm, back part (745 mm)	See *Wear parts on page 246*	

Required equipment

Equipment, etc.	Article number	Note
Standard toolkit	-	Content is defined in section *Standard toolkit on page 235*.

Consumables

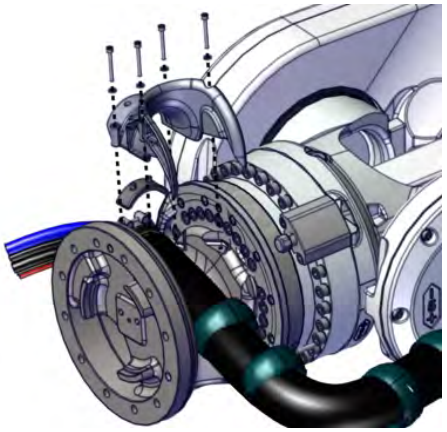
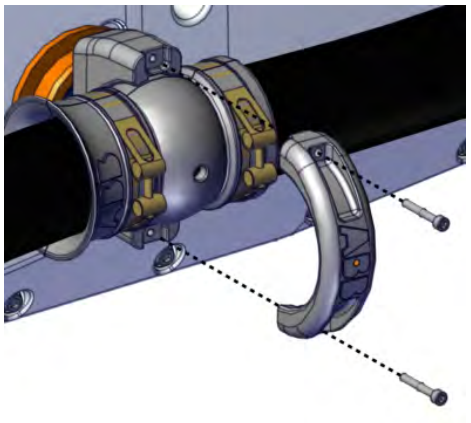
Equipment	Article number	Note
Cable grease	3HAC14807-1	Optitemp RB2

Continues on next page

Removing the protection hose

Use these procedures to remove the protection hose

Remove cable guide

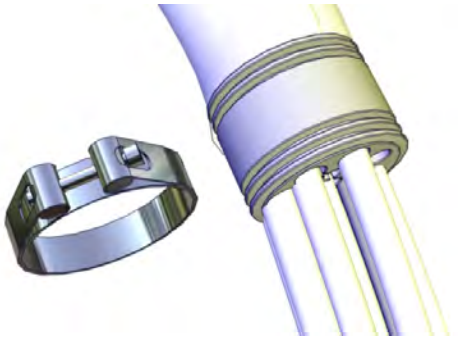
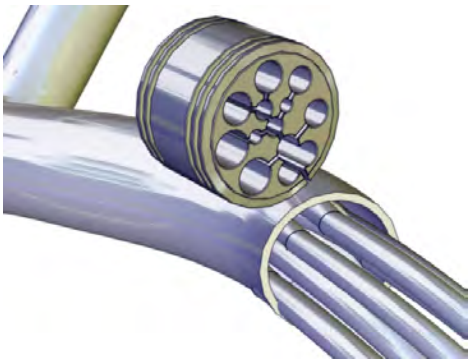
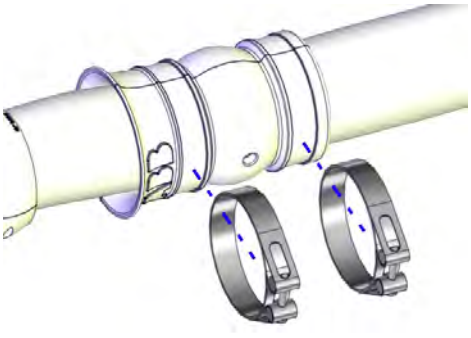
	Action	Note
1	Move the robot to a comfortable working position.	
2	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the robot, before entering the robot working area.	
3	**CAUTION** The cable package is sensitive to mechanical damage. Handle it with care in order to avoid damaging the cabling or the connectors.	
4	Only valid for IRBDP SW6: Remove screws and washers to remove the cable guide. **Note** There is cable grease in the turning disc cable guide.	 xx1500002822
5	Open the ball joint housing.	 xx1500002820

Continues on next page

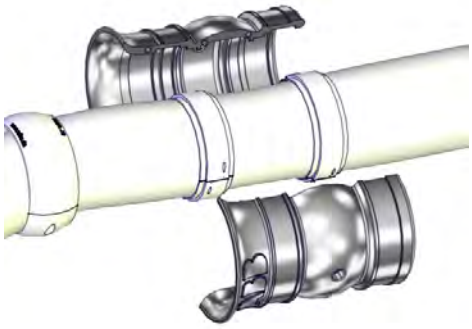
4.2.5 Replacing the protection hose IRBDP SW6 UI and IRBDP MH6 UI LeanID
Continued

	Action	Note
6	**Note** Let the cable package stay fitted in the second ball joint housing during the procedure.	

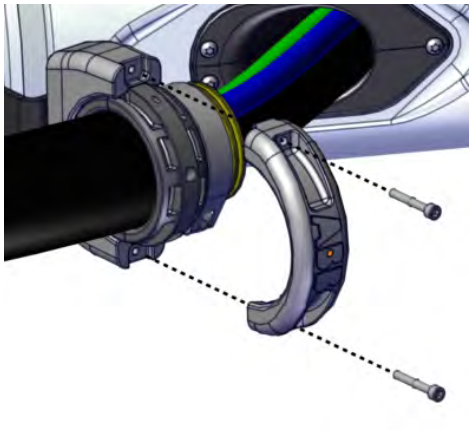
Remove the front part of the protection hose

	Action	Note
1	Remove the hose clamp securing the cable and hose retainer.	 xx1200000159
2	Remove the cable and hose retainer.	 xx1200000103
3	Remove the hose clamps (2 pcs) securing the hose reinforcement funnel.	 xx1400000209

Continues on next page

	Action	Note
4	Remove the hose reinforcement funnel (two parts).	 xx1400000210
5	Carefully pull the cables and hoses out and remove the front part of the protection hose. **Tip** The following order is preferred: 1 Cables with small connectors 2 Hoses 3 Cables with large connectors	Best performed in this order: 1 Cables with the smallets connectors 2 Hoses 3 Cables with the biggest connectors.

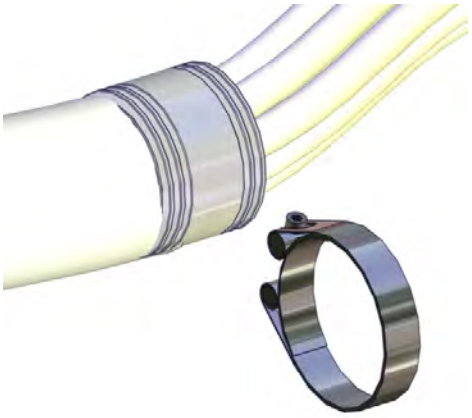
Remove the back part protection hose

	Action	Note
1	Open the ball joint housing at the upper arm tube.	 xx1500002819

Continues on next page

4.2.5 Replacing the protection hose IRBDP SW6 UI and IRBDP MH6 UI LeanID

Continued

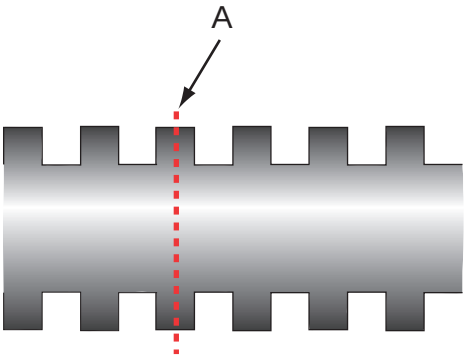
	Action	Note
2	Remove the clamp jaw.	 xx1400000347
3	Open the hose clamps securing the cable and hose retainer.	 xx1400000348
4	Remove the cable and hose retainer.	 xx1400000349
5	Carefully pull the cables and hoses out and remove the back part of the protection hose. **Tip** The following order is preferred: 1 Cables with small connectors 2 Hoses 3 Cables with large connectors	Best performed in this order: 1 Cables with the smallets connectors 2 Hoses 3 Cables with the biggest connectors.

Continues on next page

Refitting the protection hose

Use these procedures to refit the protection hose

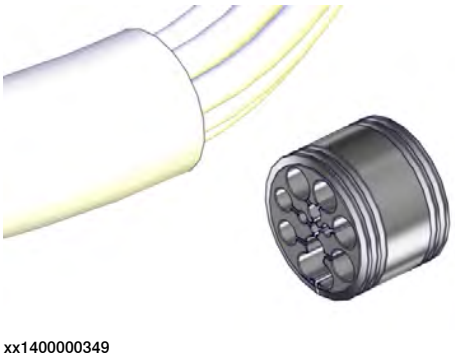
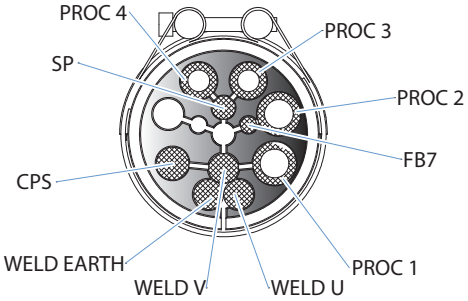
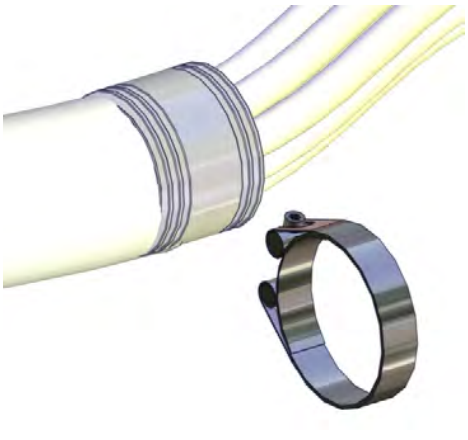
Refitting the back part protection hose

	Action	Note
1	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the robot, before entering the robot working area.	
2	Cut the new protection hose, back part to the length required. **Note** Place the cut on top of a ridge.	 xx0300000061 Length: 745 mm
3	Put some cable grease on cables and hoses on the area where they run through the protection hose and hose reinforcement funnel.	
4	Carefully push cables and hoses into the protection hose. **Tip** 1 Cables with large connectors 2 Hoses 3 Cables with small connectors	
5	Make sure that cables and hoses are not twisted.	

Continues on next page

4.2.5 Replacing the protection hose IRBDP SW6 UI and IRBDP MH6 UI LeanID

Continued

	Action	Note
6	Fit the cable and hose retainer.	 xx1400000349
7	Arrange the cables and hoses and put them in their position in the cable and hose retainer. **Note** This is an example showing the Paracom cable harness. If in doubt check the positions on a cable and hose retainer that still is fitted.	 xx1200000106
8	Secure the cable and hose retainer with the hose clamp.	 xx1400000348
9	Fit the clamp jaw.	 xx1400000347

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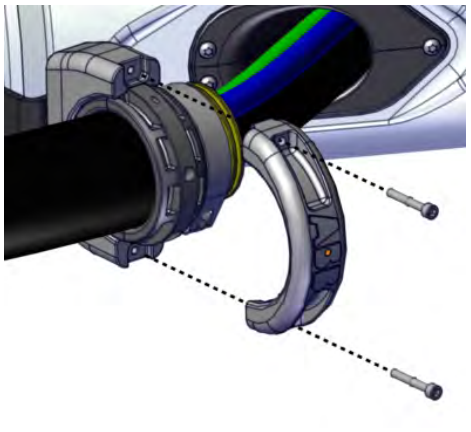
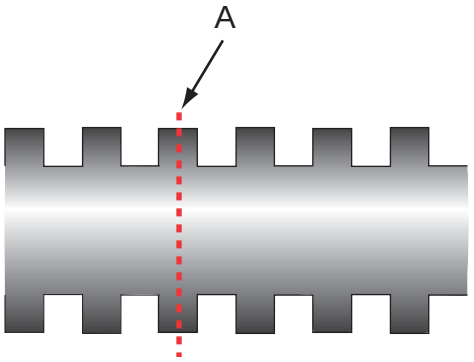
	Action	Note
10	Put the clamp jaw in the ball joint housing.	 xx1500002819

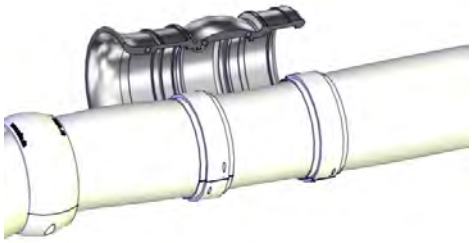
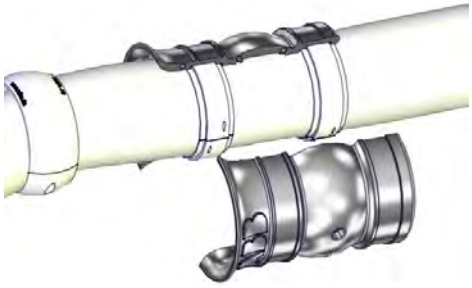
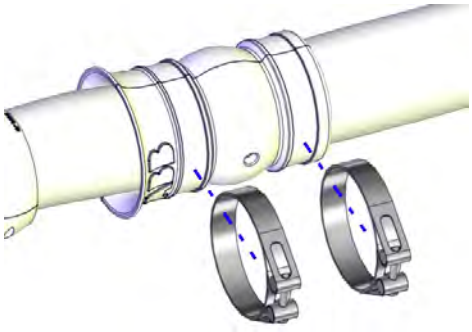
Refit the front part protection hose

	Action	Note
1	Cut the protection hose, front part, to the length required. **Note** Place the cut on top of a ridge.	 xx0300000061 Front end: 1,150 mm
2	Carefully push cables and hoses into the protection hose. **Tip** 1 Cables with large connectors 2 Hoses 3 Cables with small connectors	
3	Make sure that cables and hoses are not twisted.	

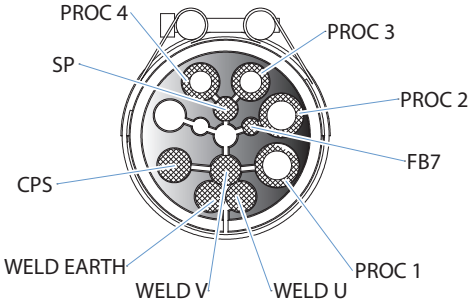
Continues on next page

4.2.5 Replacing the protection hose IRBDP SW6 UI and IRBDP MH6 UI LeanID

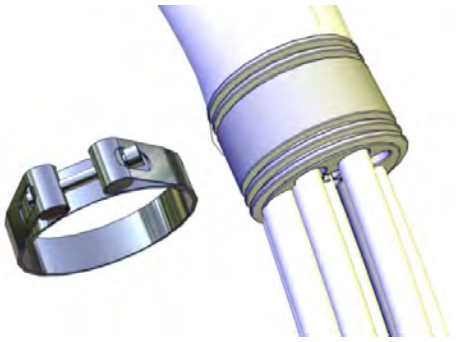
Continued

	Action	Note
4	Fit the middle jaws in one of the hose reinforcement funnel halves. **Note** The side of the hose reinforcement funnel which has the bigger outer diameter shall be turned towards the wrist.	 xx1400000350
5	Fit the other half of the funnel.	 xx1400000351
6	Fasten the hose reinforcement funnel with the hose clamps.	 xx1400000209

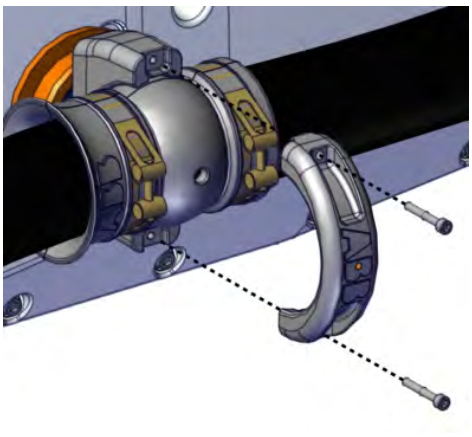
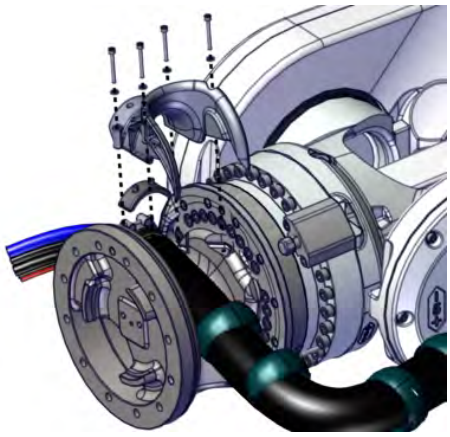
Cable and hose retainer wrist

	Action	Note
1	Arrange cable and hoses according to their position in the cable and hose retainer. **Note** This is an example showing the Paracom cable harness. If in doubt check the positions on a cable and hose retainer that still is fitted.	 xx1200000106

Continues on next page

	Action	Note
2	Secure the cable and hose retainer with the hose clamp.	 xx1200000159

Refitting cable package

	Action	Note
1	Fasten the cable package in the ball joint housing.	 xx1500002820
2	Only valid for IRBDP SW6: Put some cable grease on the cable guide and the process turning disc.	
3	Only valid for IRBDP SW6: Fasten cable package with the cable guide.	 xx1500002822

Continues on next page

4.2.5 Replacing the protection hose IRBDP SW6 UI and IRBDP MH6 UI LeanID

Continued

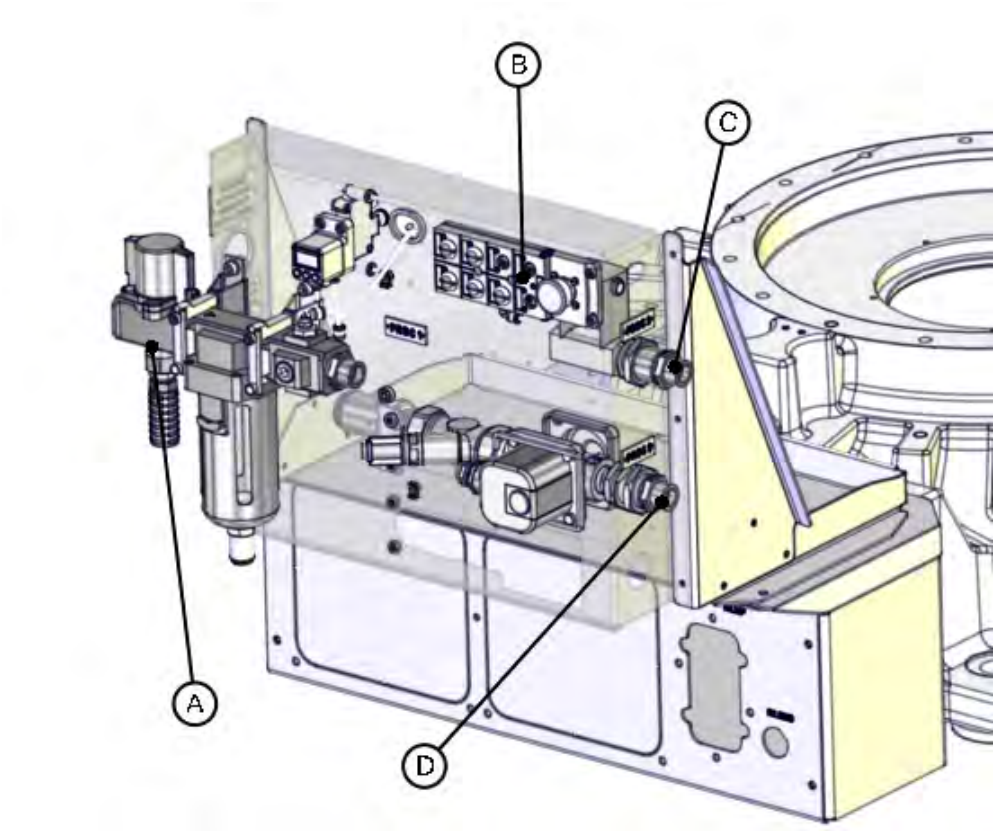
	Action	Note
4	 **DANGER** Make sure all safety requirements are met when performing the first test run. These are further detailed in the section *DANGER - First test run may cause injury or damage! on page 51*.	

4.3 Water & Air unit

4.3.1 Replacement of Air supply circuit

Location of Water and air unit

The Water and air unit is located as shown in the figure.



xx1300002328

A	Air supply circuit
B	Split box
C	Water in circuit
D	Water return circuit

Required equipment

Equipment	Art. no.	Note
Water and air unit	See *Spare parts*.	A number of versions are available. The Water and Air unit assembly contains all required hardware for fitting and connecting.
Standard toolkit, DressPack/SpotPack	3HAC17290-7	The contents are defined in section *Toolkits, DressPack/SpotPack on page 235*.
Circuit diagram	3HAC026208-001	SpotPack

Continues on next page

4.3.1 Replacement of Air supply circuit
Continued

Removal

The procedure below details how to remove the Air supply circuit. It does not deal with details specific to each version, such as article numbers, connector types etc. For details see the *Spare parts* section.

	Action	Note
1	**CAUTION** The system contains compressed air! Observe the safety information in section *Safety risks related to pneumatic/hydraulic systems on page 26*.	
2	Turn off the hand operated air valve on the air supply circuit.	The air hoses on the robot will be decompressed.
3	Turn off the shop floor air supply to the Water and Air unit.	
4	Remove the hose of the compressed air supply of the workshop.	
5	Remove the Proc 1 hose from the air supply unit.	
6	Remove the Proc 4 hose from the air supply unit.	Only if the option Proportional valve has been selected.
7	Disconnect the pressure switch tube from the Air circuit Cross interface.	
8	Disconnect the pressure switch connector on the split box, according to the circuit diagram.	
9	Disconnect the pressure switch from the mounting plate.	
10	If the option proportional valve is selected, disconnect the proportional valve connectors on the split box according to the circuit diagram.	
11	Unscrew the four attachment screws holding the air supply circuit and remove it.	

Refitting

The procedure below details how to refit the air supply circuit. It does not deal with details specific to each version, such as article numbers, connector types etc. For details see the *Spare parts* section.

	Action	Note
1	Fit the air supply circuit with its four attachment screws.	
2	Connect the proportional valve connectors on the split box according to the circuit diagram.	Only if the option Proportional valve has been selected.
3	Connect the pressure switch to the mounting plate.	
4	Connect the pressure switch connector on the split box according to the circuit diagram.	
5	Connect the pressure switch tube from the Air circuit Cross interface.	

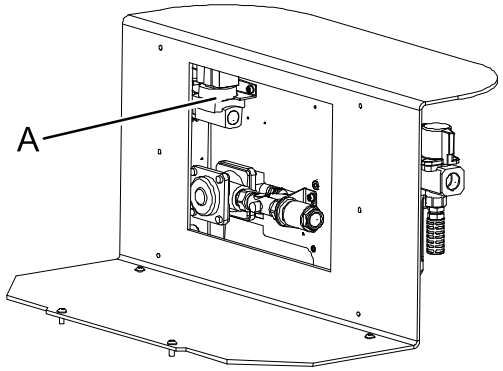
Continues on next page

	Action	Note
6	Connect the Proc 4 hose from the Air supply unit. **CAUTION** Do not tighten the brass couplings for water and air with excessive force.	Only if the option Proportional valve has been selected. Tightening torque, brass couplings 1/2": 31 Nm
7	Connect the Proc 1 hose from the Air supply unit. **CAUTION** Do not tighten the brass couplings for water and air with excessive force.	Tightening torque, brass couplings 1/2": 31 Nm
8	Connect the hose of the compressed air supply of the workshop.	
9	Turn on the air supply to the Water and Air unit.	
10	Turn on the hand operated air valve on the air supply circuit.	The hoses at the robot will be compressed.
11	See if there are any leakages.	Tighten if there is leakage.

4.3.2 Replacement of Water-in circuit

Location of Water-in circuit, type S

The water in circuit is located on the rear side of the Water and air unit as shown in the figure.

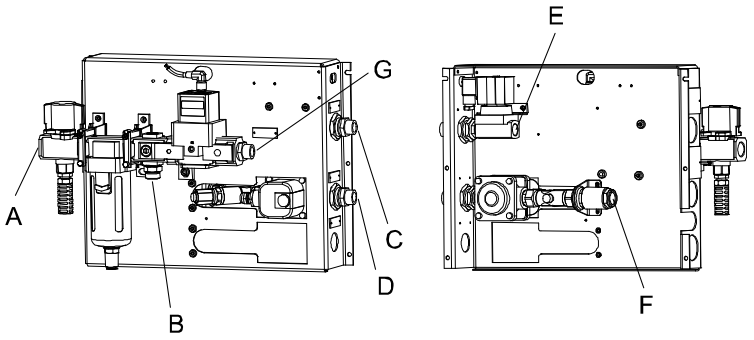


xx0600003462

A	Water-in circuit

Location of Water-in circuit, type Sb

The water in circuit is located on the rear side of the Water and air unit as shown in the figure.



xx0800000122

A	Air supply circuit
B	PROC 1 on robot base
C	PROC 2 on robot base
D	PROC 3 on robot base
E	Water-in circuit
F	Water drain
G	PROC 4 on robot base (option)

Continues on next page

Required equipment

Equipment	Art. no.	Note
Water and Air unit	See *Spare parts* section!	A number of versions are available. The Water and Air unit assembly contains all required hardware for fitting and connecting.
Standard toolkit, DressPack/SpotPack	3HAC17290-7	The contents are defined in section *Toolkits, DressPack/SpotPack on page 235*.
Circuit diagram	3HAC026208-001	SpotPack

Removal

The procedure below details how to remove the water-in circuit. It does not deal with details specific to each version, such as article numbers, connector types etc. For details see the *Spare parts* section.

	Action	Note
1	Turn off the water supply to the Water and Air unit.	
2	Remove the hose of the water supply of the workshop to the Water-in circuit.	
3	Remove the Proc 2 hose from the Water and Air unit.	
4	Remove the Pushlok nipple.	
5	Loosen the locking nut.	
6	Unscrew the two attachment screws holding the water-in circuit.	
7	Remove the Water-in circuit from the mounting plate.	
8	Remove the DIN-connector from the electrical water valve.	

Refitting

The procedure below details how to refit the water-in circuit. It does not deal with details specific to each version, such as article numbers, connector types etc. For details see the *Spare parts* section.

	Action	Note
1	Attach the DIN-connector to the electrical water valve.	
2	Fit the water-in circuit with its two attachment screws on the mounting plate.	
3	Tighten the locking nut.	
4	Fit the Pushlok nipple.	
5	Connect the Proc 2 hose on the Water and Air unit. **CAUTION** Do not tighten the brass couplings for water and air with excessive force.	Tightening torque, brass couplings 1/2": 31 Nm

Continues on next page

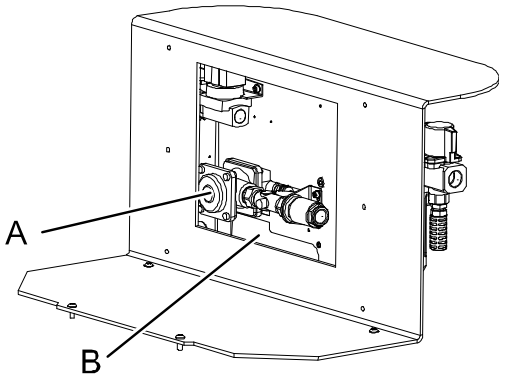
4.3.2 Replacement of Water-in circuit
Continued

	Action	Note
6	Connect the hose of the workshop water supply to the Water-in circuit.	
7	Turn on the water supply to the Water and Air unit.	
8	Check for leakages.	Tighten if there are any leaks.

4.3.3 Replacement of Water-return circuit

Location of Water-return circuit, type S

The Water-return circuit (or circuits) is located on the rear side of the Water and air unit as shown in the figure.

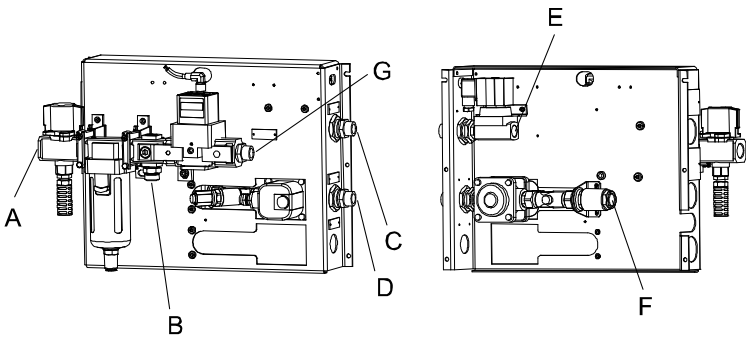


xx0600003464

A	Water-return circuit
B	Position for second Water-return circuit

Location of Water-return circuit, type Sb

The Water-return circuit (or circuits) is located on the rear side of the Water and air unit as shown in the figure.



xx0800000122

A	Air supply circuit
B	PROC 1 on robot base
C	PROC 2 on robot base
D	PROC 3 on robot base
E	Water-in circuit
F	Water-return circuit
G	PROC 4 on robot base (option)

Continues on next page

4.3.3 Replacement of Water-return circuit
Continued

Required equipment

Equipment	Art. no	Note
Water and Air unit	See Spare Parts section.	A number of versions are available. The Water and Air unit assembly contains all required hardware for fitting and connecting.
Standard toolkit, DressPack/SpotPack	3HAC17290-7	The contents are defined in section *Toolkits, DressPack/SpotPack on page 235*.
Circuit diagram	3HAC026208-001	SpotPack

Removal

The procedure below details how to remove the water-return circuit. It does not deal with details specific to each version, such as article numbers, connector types etc. For details see *Spare parts* section.

	Action	Note
1	Turn off the water supply to the Water and Air unit.	
2	Turn off the shop water drain from the Water and Air unit.	
3	Remove the hose of the shop floor water drain from the Water-return circuit.	One water-return: • Disconnect the hose from the check valve Second water-return: • Disconnect the hose from the bulkhead connector.
4	Loosen the locking nut.	Only if the option *Second water return* has been selected.
5	Remove the Proc 3 hose from the Water and Air unit.	
6	Remove the Proc 4 hose from the Water and Air unit.	Only if the option *Second water return* has been selected.
7	Remove the Pushlok nipple (or nipples) for return water.	
8	Loosen and remove the locking nut (or nuts).	
9	Unscrew the two attachment screws securing the mounting bracket (or brackets).	
10	Remove the Water-return circuit (or circuits) from the mounting plate.	

Refitting

The procedure below details how to refit the water-return circuit. It does not deal with details specific to each version, such as article numbers, connector types etc. For details see *Spare parts* section.

	Action	Note
1	Place the Water-return circuit (or circuits) on the mounting plate.	

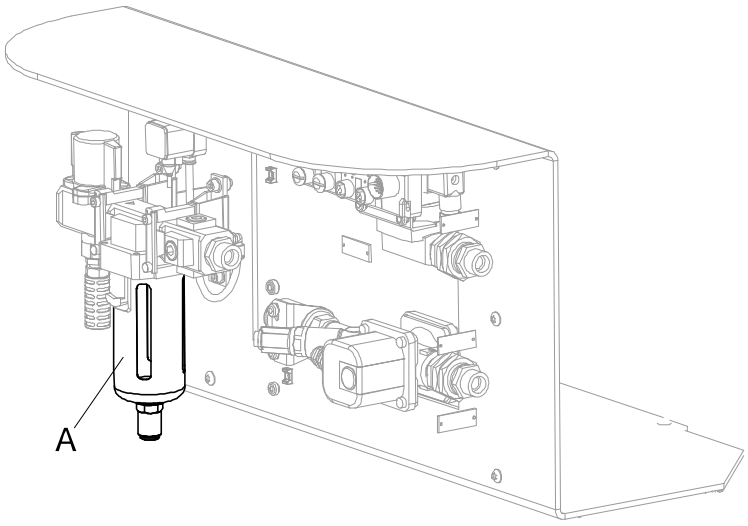
Continues on next page

	Action	Note
2	Fit the two attachment screws securing the mounting bracket (or brackets).	
3	Fit and tighten the locking nut (or nuts).	
4	Fit the Pushlok nipple (or nipples).	
5	Connect the Proc 3 hose from the Water and Air unit. **CAUTION** Do not tighten the brass couplings for water and air with excessive force.	Tightening torque, brass couplings 1/2": 31 Nm
6	Connect the Proc 4 hose from the Water and Air unit. **CAUTION** Do not tighten the brass couplings for water and air with excessive force.	Tightening torque, brass couplings 1/2": 31 Nm Only if the option *Second water return* has been selected.
7	Tighten the locking nut, at the shop floor side.	Only if the option *Second water return* has been selected.
8	Connect the hose of the shop water drain to the water-return circuit.	
9	Turn on the water supply to the Water and Air unit.	
10	Activate the electrical valve.	
11	First turn on and then turn off the shop water drain.	This is done in order to evacuate all air in the circuit.
12	Wait a couple of minutes and check for leakage.	Tighten if there is any leakage.
13	Turn on the shop water drain.	

4.3.4 Replacement of Air filter element

Replacement of air filter

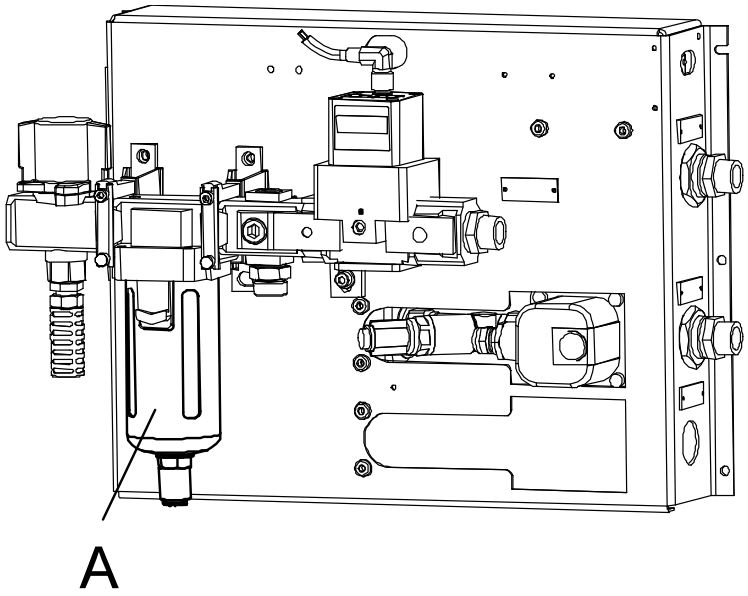
Type S



xx0700000400

A	Air filter

Type Sb



xx0800000125

A	Air filter

Continues on next page

The procedure below details how to replace the air filter element on the Water and Air unit.

	Action	Note
1	Turn off the hand operated air valve and make sure that the air filter is not pressurized.	
2	Remove the bowl assembly, by following these steps: • Push the bowl assembly lock button. • Lift the bowl assembly. • Rotate the bowl assembly 45° (right or left). • Pull out the assembly.	
3	Remove the baffle, filter element and deflector by rotating the baffle counterclockwise by hand.	
4	Fit the deflector to the body assembly. Mind the fitting direction of the deflector (concave in which the element goes into).	Deflector direction: Concave, facing the filter element.
5	Fit the new filter element by inserting it to the deflector concave.	
6	Fit the baffle by inserting it to the filter element. Mind the fitting direction of the baffle (convex to which the element goes).	Baffle direction: Convex, facing the filter element.
7	Tighten the baffle to settle the baffle, filter element and deflector by rotating the baffle counterclockwise until it contacts the element and deflector lightly. Rotate approximately one half revolution counterclockwise further in order to tighten them.	Tightening torque: 0.9 Nm
8	Fit the bowl assembly. Match the mating mark of the body and the bowl assembly to insert the assembly to the body. Rotate the assembly 45° (right or left) until the lock button is tossed up to fit the bowl assembly.	**Note** Check that the lock button has tossed up!

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5 Decommissioning

5.1 Environmental information

Hazardous material

The table specifies some of the materials in the product and their respective use throughout the product.

Dispose components properly to prevent health or environmental hazards.

Material	Example application
Batteries, NiCad or Lithium	Serial measurement board
Copper	Cables, motors
Cast iron/nodular iron	Base, lower arm, upper arm
Steel	Gears, screws, base frame, and so on.
Neodymium	Brakes, motors
Plastic/rubber	Cables, connectors, drive belts, and so on.
Aluminium	Covers, synchronization brackets

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.

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6 Reference information

6.1 Introduction

General

This chapter includes general information, complementing the more specific information in the different procedures in the manual.

6.2 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	

6.3 Screw joints

General

This section describes how to tighten the various types of screw joints on the DressPack/SpotPack IRB 8700.

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. 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.

Screws lubricated in other ways

Screws lubricated with Molycote 1000 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.

Lubricant	Article number
Molycote 1000 (molybdenum disulphide grease)	11712016-618

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.

Continues on next page

- 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%**!

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.* Any special torque specified in the repair, maintenance or installation procedure overrides the standard torque!

Oil-lubricated screws with allen head screws

The following table specifies the recommended standard tightening torque for *oil-lubricated screws* with *allen head screws.* Any 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
M24	680	960	1150

Lubricated screws (Molycote, 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.* Any 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]
M8	28	35
M10	55	70
M12	96	120
M16	235	280
M20	460	550
M24	790	950

[i] Lubricated with Molycote 1000, Gleitmo 603 or equivalent

Continues on next page

Water and air connectors

The following table specifies the recommended standard tightening torque for *water and air connectors* when *one* or *both* connectors are made of *brass*. Any special torque specified in the repair, maintenance or installation procedure overrides the standard torque!

Dimension	Tightening torque Nm - Nominal	Tightening torque Nm - Min.	Tightening torque Nm - Max.
1/8	12	8	15
1/4	15	10	20
3/8	20	15	25
1/2	40	30	50
3/4	70	55	90

6.4 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 robot weighs 4,750 kg. All lifting accessories used must be sized accordingly!	

6.5 Toolkits, DressPack/SpotPack

General

All service (repair, maintenance and installation) instructions contain lists of tools required to perform the specified activity. All special tools, that is all tools that are not considered standard as defined below, are listed in their instructions respectively.

This way, the tools required are the sum of the Standard Toolkit and any tools listed in the instruction.

Standard toolkit

This standard toolkit contains a set of standard tools used for DressPack/SpotPack, 3HAC17290-7.

Qty	Article number	Tool	Note
1	-	Socket head cap, 5-17mm	-
1	-	Torx socket no: 20-60	-
1	-	Phillips screwdriver, small	For Harting connectors
1	-	Flat screwdriver, medium	For Harting connectors
2	-	Ring-open-end spanner 8-19 mm	For water connectors on water and air unit
1	-	Open end wrench, 27 mm.	For Tension arm unit and water connectors on DressPack
1	-	Open end wrench, 36 mm	For water connectors on DressPack

Toolkit, water panel

This toolkit contains tools needed for water panel:

Qty	Article number	Tool	Note
1	-	Socket head cap 4 mm	For water panel
2	-	Ring-open-end spanner, 36 mm	For water panel

Toolkit, cables

This toolkit contains tools needed for work with cables:

Qty	Article number	Tool	Note
1	0999 000 0171 (D-sub)	Removal and Insertion tool for pins and sockets	Art. no. from Harting
1	0999 000 0012 (HAN DD)	Removal tool for pins and sockets	Art. no. from Harting
1	0999 000 0319 (HAN EE)	Removal tool for pins and sockets	Art. no. from Harting
1	0999 000 0059 (HAN DD and HAN EE)	Insertion tool for pins and sockets	Art. no. from Harting
1	-	Stripping pliers	

Continues on next page

6.5 Toolkits, DressPack/SpotPack
Continued

Qty	Article number	Tool	Note
1	09 99 000 0021	Crimping tool HARTING with locator	Art. no. from Harting
1	09 99 000 0001	Crimping tool BUCHANAN, HARTING	Art. no. from Harting
1	09 99 000 0175 09 99 000 0169	Crimping tool HARTING	Art. no. from Harting

6.6 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.

This implies that the instructions delivered with the lifting accessories should be stored for later reference.

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7 Spare parts

7.1 Introduction

General

This chapter contains more specific article information. It is to be regarded as a complement to the slightly generic procedure information found in the Installation, Maintenance and Repair chapters.

The robot system itself, consisting of robot and controller cabinet, is described in its own technical documents.

7.2 DressPack cable package IRBDP SW6 LI

General

This chapter contains more specific article information. It is to be regarded as a complement to the slightly generic procedure information found in the Installation, Maintenance and Repair chapters.

The robot system itself, consisting of robot and controller cabinet, is detailed in its own technical documents.

IRBDP SW6 LI

This section describes the spare parts for DressPack cable package IRBDP SW6 LI.

Spare part number	800/3.50	550/4.20
3HAC055113-001 Paracom	X	X
3HAC055113-002 Paracom Servo Gun	X	X
3HAC055114-001 Parabus Com	X	X
3HAC055114-002 Parabus Com Servo Gun	X	X
3HAC055115-001 Paramulti	X	X
3HAC055115-002 Paramulti Servo Gun	X	X

7.3 DressPack cable package IRBDP SW6 UI

General

This chapter contains more specific article information. It is to be regarded as a complement to the slightly generic procedure information found in the Installation, Maintenance and Repair chapters.

The robot system itself, consisting of robot and controller cabinet, is detailed in its own technical documents.

IRBDP SW6 UI

This section describes the spare parts for DressPack cable package IRBDP SW6 UI.

Spare part number	800/3.50	550/4.20
3HAC055584-001 Paracom	X	
3HAC055584-002 Paracom Long		X
3HAC055584-004 Paracom Servo Gun	X	
3HAC055584-006 Paracom Servo Gun Long		X
3HAC055585-001 Parabus com	X	
3HAC055585-002 Parabus com Long		X
3HAC055585-003 Parabus com Servo Gun	X	
3HAC055585-004 Parabus Com Servo Gun Long		X
3HAC055586-001 Paramulti	X	
3HAC055586-002 Paramulti Long		X
3HAC055586-003 Paramulti Servo Gun	X	
3HAC055586-004 Paramulti Servo Gun Long		X

7.4 DressPack cable package IRBDP MH3 UI

General

This chapter contains more specific article information. It is to be regarded as a complement to the slightly generic procedure information found in the Installation, Maintenance and Repair chapters.

The robot system itself, consisting of robot and controller cabinet, is detailed in its own technical documents.

IRBDP MH3 UI

This section describes the spare parts for DressPack cable package IRBDP MH3 UI.

Spare part number	800/3.50	550/4.20
3HAC055588-001 Paracom	X	
3HAC055588-002 Paracom Long		X
3HAC055589-001 Parabus Com	X	
3HAC055589-002 Parabus Com Long		X
3HAC055590-001 Paramulti	X	
3HAC055590-002 Paramulti Long		X

7.5 DressPack cable package IRBDP MH LI

General

This chapter contains more specific article information. It is to be regarded as a complement to the slightly generic procedure information found in the Installation, Maintenance and Repair chapters.

The robot system itself, consisting of robot and controller cabinet, is detailed in its own technical documents.

IRBDP MH LI

This section describes the spare parts for DressPack cable package IRBDP MH6 LI.

Spare part number	800/3.50	550/4.20
3HAC052425-001 Paracom	X	X
3HAC052426-001 Parabus com	X	X
3HAC052427-001 Paramulti	X	X

7.6 DressPack cable package IRBDP MH6 UI

General

This chapter contains more specific article information. It is to be regarded as a complement to the slightly generic procedure information found in the Installation, Maintenance and Repair chapters.

The robot system itself, consisting of robot and controller cabinet, is detailed in its own technical documents.

IRBDP MH6 UI

This section describes the spare parts for DressPack cable package IRBDP MH6 UI.

Spare part number	800/3.50	550/4.20
3HAC054634-001 Paracom	X	
3HAC054634-003 Paracom Long		X
3HAC054635-001 Parabus Com	X	
3HAC054635-002 Parabus Com Long		X
3HAC054636-001 Paramulti	X	
3HAC054636-002 Paramulti Long		X

7.7 Sub cables

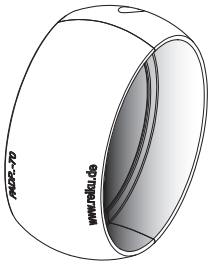
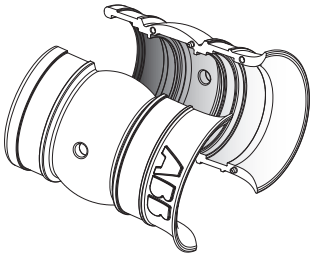
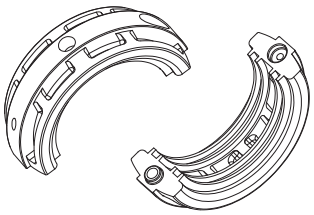
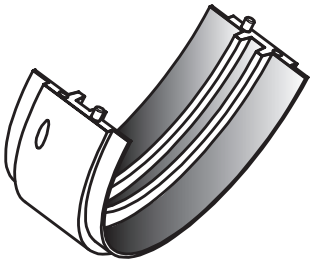
Spare parts

This section describes the spare parts for DressPack Sub cables.

Spare part number	800/3.50	550/4.20
3HAC054648-001 CPS axes 3-6	X	
3HAC054801-001 CPS axes 3-6 Long		X
3HAC055620-001 SP axes 3-6	X	
3HAC055621-001 SP axes 3-6 Long		X
3HAC055618-001 FB axes 3-6	X	
3HAC055619-001 FB axes 3-6 Long		X
3HAC054650-001 CBUS axes 3-6	X	
3HAC054802-001 CBUS axes 3-6 Long		X
3HAC054654-001 Ethernet Upper arm	X	
3HAC054803-001 Ethernet Upper arm, long		X

7.8 Wear parts

Wear parts

Spare part number	Illustration	Note
3HAC5320-2 Protection hose Lower arm		Only delivered in full meters.
3HAC042173-004 Protection hose Upper arm, back part (745 mm)		This length is ready to use.
3HAC042173-005 Protection hose Upper arm, front part (1,150 mm)		This length is ready to use.
3HAC032660-001 Protective sleeve, rotary	 xx1400001981	Delivered complete (both parts).
3HAC032916-001 Hose reinforcement funnel	 xx1400001982	Delivered complete (both parts).
3HAC042483-001 Clamp insert	 xx1400001400	Delivered complete (both parts).
3HAC14290-1 Middle jaw	 xx1400001399	Delivered complete (both parts).

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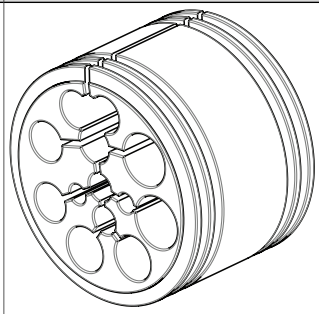
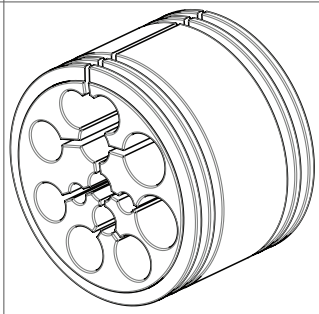
Spare part number	Illustration	Note
3HAC035251-001 Cable & hose retainer 60	 xx1400001398	
3HAC035251-002 Cable & hose retainer 40	 xx1400001398	

7.9 Connection kits

General

This chapter contains more specific article information. It is to be regarded as a complement to the slightly generic procedure information found in the Installation, Maintenance and Repair chapters.

The robot system itself, consisting of robot and controller cabinet, is detailed in its own technical documents.

Spare parts

Spare part	Spare part number	Note
CP/CS Proc 1 on base	3HAC16667-1	
Weld, Proc axis 6	3HAC043502-001	
CP/CS/CBUS Ethernet, Proc axis 3	3HAC048464-001	
CP/CS/CBUS Ethernet, Proc axis 6	3HAC043503-001	
7th axis on base	3HAC023441-001	

7.10 7th axis to base

General

This chapter contains more specific article information. It is to be regarded as a complement to the slightly generic procedure information found in the Installation, Maintenance and Repair chapters.

The robot system itself, consisting of robot and controller cabinet, is detailed in its own technical documents.

Spare parts

Spare part	Spare part number	Note
7th axis, serial cable	3HAC023278-001	

7.11 DressPack floor

Spare parts

Spare part	Spare part number	Note
Floor weld cable	3HAC16847-1	7 m 3x35 mm^2 MC connector
Floor weld cable	3HAC16847-2	15 m 3x35 mm^2 MC connector
Floor weld cable	3HAC16847-4	22 m 3x35 mm^2 MC connector
Cable to split box	3HAC16844-1	7 m Used with Water and air unit
Cable to split box	3HAC16844-2	15 m Used with Water and air unit
Cable to split box	3HAC16844-13	22 m Used with Water and air unit
Cable to split box	3HAC16844-3	30 m Used with Water and air unit
Process cable to stat gun	3HAC025117-001	7 m
Process cable to stat gun	3HAC025117-002	15 m
Process cable to stat gun	3HAC025117-003	22 m
Process cable to stat gun	3HAC025117-006	30 m

7.12 Customer signal/power

General

This chapter contains more specific article information. It is to be regarded as a complement to the slightly generic procedure information found in the Installation, Maintenance and Repair chapters.

The robot system itself, consisting of robot and controller cabinet, is detailed in its own technical documents.

Spare parts

Spare part	Spare part number	Note
Harness - CP/CS/DeviceNet	3HAC022978-001	7 m Parallel DeviceNet
Harness - CP/CS/DeviceNet	3HAC022978-002	15 m Parallel DeviceNet
Harness - CP/CS/DeviceNet	3HAC022978-006	22 m Parallel DeviceNet
Harness - CP/CS/DeviceNet	3HAC022978-003	30 m Parallel DeviceNet
Harness - CP/CS/ProfiBus	3HAC022988-001	7 m ProfiBus
Harness - CP/CS/ProfiBus	3HAC022988-002	15 m ProfiBus
Harness - CP/CS/ProfiBus	3HAC022988-006	22 m ProfiBus
Harness - CP/CS/ProfiBus	3HAC022988-003	30 m ProfiBus
Harness - CP/CS	3HAC022957-001	7 m Parallel
Harness - CP/CS	3HAC022957-002	15 m Parallel
Harness - CP/CS	3HAC022957-006	22 m Parallel
Harness - CP/CS	3HAC022957-003	30 m Parallel
Harness - Profinet	3HAC031924-001	7 m
Harness - Profinet	3HAC031924-002	15 m
Harness - Profinet	3HAC031924-003	22 m
Harness - Profinet	3HAC031924-004	30 m

7.13 Water and air unit

Spare parts

This section details spare parts for the water and air unit.

Spare part	Spare part number	Note
Water and air unit	3HAC027294-001	Basic Type S
Water and air unit	3HAC027294-002	2:nd water return
Water and air unit	3HAC027294-003	E/P valve Type S

Continues on next page

7.13.1 DressPack - Water and air unit

Overview

The following section details spare parts for DressPack Water and air unit.

Water and air unit

Parts	Article no.	Note
Water and air unit	3HAC048636-001	Basic
Water and air unit	3HAC048636-002	2:nd water return
Water and air unit	3HAC048636-003	E/P valve

Hoses for Water and air unit

Parts	Article number	Note
Air hose if E/P valve	3HAC16845-2	Orange
Air hose if E/P valve	3HAC16845-4	Black
Hose water and air unit (3 pcs)	3HAC16845-1	Orange
Hose water and air unit (3 pcs)	3HAC16845-5	Black

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8 Circuit diagrams

8.1 Circuit diagrams

Overview

The circuit diagrams are not included in this manual, but delivered as separate documents on the documentation DVD. See the article numbers in the tables below.

Controllers

Product	Article numbers for circuit diagrams
Circuit diagram - IRC5	*3HAC024480-011*
Circuit diagram - IRC5 Compact	*3HAC049406-003*
Circuit diagram - IRC5 Panel Mounted Controller	*3HAC026871-020*
Circuit diagram - Euromap	*3HAC024120-004*
Circuit diagram - Spot welding cabinet	*3HAC057185-001*

DressPack/SpotPack

Product	Article numbers for circuit diagrams
Circuit diagram - DressPack 6650S/7600	*3HAC022327-002*
Circuit diagram - DressPack 8700	*3HAC053524-002*
Circuit diagram - DressPack 6650S/7600	*3HAC026209-001*
Circuit diagram - DressPack 6620	*3HAC026136-001*
Circuit diagram - DressPack IRB 6640, IRB 6650S, IRB 7600	*3HAC026209-001*
Circuit diagram - DressPack 6660	*3HAC029940-001*
Circuit diagram - DressPack 6700	*3HAC044246-002*
Circuit diagram - SpotPack SWC IRC5 M2004	*3HAC026208-001*
Circuit diagram - SpotPack SWC IRC5 Design 2014 PROFINET	*3HAC044736-001*

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