

Product manual

FlexTrack IRT 501-66/66R/90/90R

Product manual

FlexTrack

IRT 501-66

IRT 501-66R

IRT 501-90

IRT 501-90R

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Overview

About this manual

This manual contains instructions for:

- mechanical and electrical installation instructions for the FlexTrack
- maintenance instructions for the FlexTrack
- spare parts

Usage

This manual should be used when working during;

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

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	Content
1. Safety	Safety information that must be read through before performing any installation or service work on the FlexTrack. Contains general safety aspects as well as more specific information about how to avoid personal injuries and damage to the product.
2. Installation and commissioning	Required information about lifting and installation of the FlexTrack.
3. Maintenance	Step-by-step procedures that describe how to perform maintenance of the FlexTrack. Based on a maintenance schedule that may be used in the work of planning periodical maintenance.
4. Calibration information	Procedures that does not require specific calibration equipment.

References

Reference	Document Id
Product specification - IRT 501 - 66/66R/90/90R	3HAW050008591
Product manual - IRC5 Robot Controller	3HAC021313-001
Operating manual - IRC5 with FlexPendant	3HAC16590-1
Operating manual - Calibration Pendulum	3HAC16578-1
Service Information System - IRC5	3HAC025709-001
Application manual - Additional axes and stand alone controller	3HAC021395-001
System Parameters	3HAC17076-1

Revisions

Revision	Description
–	First edition
A	Changes made in: <ul style="list-style-type: none">Clarity improved and pictures added in <i>Disassemble the bracket from the carriage on page 146</i>Instructions for the coupling of the motor and the gearbox updated, see <i>Motor and gear assembly on page 154</i>Clarity improved and pictures added in <i>Disassemble the bracket from the carriage on page 146</i>Instructions for the coupling of the motor and the gearbox updated, see <i>Motor and gear assembly on page 154</i>Names of spare cables updated, see <i>Electrical spare parts and cables on page 181</i>
B	Changes made in: <ul style="list-style-type: none">Standard top plate drawings are updated in <i>Standard top plate on page 48</i>.Robot capacities updated in <i>Static loads on page 52</i>.FlexTrack on site installation procedures updated in <i>Procedure of assembly on page 58</i>.Add more detailed information about 1, 2 and 4 position switch in <i>Zone Division on page 102</i>.Change the verification step of the tightening torque in <i>Verification of the tightening torque on page 130</i>.Procedures about how to change a cable in the cable chain is added in <i>Replace cables on page 161</i>.Spare parts updated in <i>Spare parts on page 175</i>.Electrical diagrams added in <i>Appendix on page 185</i>.

Product documentation, M2004

Categories for manipulator documentation

The manipulator documentation 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 M2004 manipulator systems.

Product manuals

All hardware, manipulators and controllers will be delivered with a **Product manual** that contains:

- Safety information.
- Installation and commissioning (descriptions of mechanical installation, electrical connections).
- Maintenance (descriptions of all required preventive maintenance procedures including intervals).
- Repair (descriptions of all recommended repair procedures including spare parts).
- Additional procedures, if any (calibration, decommissioning).
- Reference information (article numbers for documentation referred to in Product manual, procedures, lists of tools, safety standards).
- Parts list.
- Foldouts or exploded views.
- Circuit diagrams (or references to circuit diagrams).

Technical reference manuals

The technical reference manuals describe the manipulator software in general and contain relevant reference information.

- **RAPID Overview:** An overview of the RAPID programming language.
- **RAPID Instructions, Functions and Data types:** Description and syntax for all RAPID instructions, functions, and data types.
- **RAPID Kernel:** A formal description of the RAPID programming language.
- **System parameters:** Description of system parameters and configuration workflows.

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, CD with PC software).
- How to use the application.
- Examples of how to use the application.

Continues on next page

Continued

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:

- **Emergency safety information**
- **General safety information**
- **Getting started, IRC5 and RobotStudio**
- **IRC5 with FlexPendant**
- **RobotStudio**
- **Introduction to RAPID**
- **Trouble shooting**, for the controller and manipulator.

How to read the product manual

Reading the procedures

The procedures contain references to figures, tools, material etc. The references are read as described below.

References to figures

The procedures often include references to components or attachment points located on the robot/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 <i>Location of gearbox on page xx</i> .

Reference 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, i.e. article number, dimension.

The denomination in the procedure for the component or attachment point corresponds to the denomination 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 <i>Required equipment on page xx</i> .

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 [Safety on page 13](#).

1 Safety

1.1. Introduction

Overview

The safety information in this manual is divided in two 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 14.*](#)
- specific safety information, pointed out in the procedure at the moment of the danger. How to avoid and eliminate the danger is either detailed directly in the procedure, or further detailed in separate instructions, found in [*Safety related instructions on page 29.*](#)

1 Safety

1.2.1. Safety in the robot system

1.2 General safety information

1.2.1. 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, which can influence the safety of the total 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 robots must be familiar with the operation and handling of the industrial robot, described in the applicable documents, e.g. User's Guide and Product Manual.

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. Via this interface, an external safety function can interact with other machines and peripheral equipment. 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 robot modes	Operators manual (RobotWare 5.0)	Operating modes
Restricting the working space	Product manual for the robot	Installation and commissioning

1.3.1. Safety risks during installation and service work on robot

1.3 Safety risks

1.3.1. Safety risks during installation and service work on robot

Overview

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

General risks during installation and service

- The instructions in the Product Manual - Installation and Commissioning 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 the robot must have the appropriate training for the robot system in question and in any safety matters associated with it.

Nation/region specific regulations

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

Non-voltage related risks

- Safety zones, which have to 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.
- 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, you run the risk of being crushed by the parallel arm.
- 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, i.e. do not climb on the robot motors or other part during service work. There is a serious risk of slipping because of the high temperature of the motors or oil spills that can occur on the robot.

To be observed by the supplier of the complete system

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

Continues on next page

1 Safety

1.3.1. Safety risks during installation and service work on robot

Continued

Complete robot

Safety risk	Description
Hot components! Removed parts may result in collapse of robot!	 Caution signal Caution! Motors and gears are HOT after running the robot! Touching the motors and gears may result in burns!  Warning signal Warning! Take any necessary measures to ensure that the robot does not collapse as parts are removed, e.g. secure the lower arm with fixtures if removing motor, axis 2.

Cabling

Safety risk	Description
Cable packs are sensitive to mechanical damage!	 Caution signal Caution! The cable packs are sensitive to mechanical damage! They must be handled with care, especially the connectors, in order to avoid damaging them!

Gearboxes and motors

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

1.3.2. Safety risks related to tools/workpieces

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 workpieces in the event of a power failure or a disturbance of the controller.



CAUTION!

Ensure that a gripper is prevented from dropping a workpiece, if such is used.

1 Safety

1.3.3. Safety risks related to pneumatic/hydraulic systems

General

Special safety regulations apply to pneumatic and hydraulic systems.

Residual energy

- Residual energy may be present in these systems. After shutdown, particular care must be taken.
 - The pressure in pneumatic and hydraulic systems must be released before starting to repair them.
-

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.

1.3.4. Safety risks during operational disturbances

General

- The industrial robot is a flexible tool which 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 Safety

1.3.5. Risks associated with live electric parts

1.3.5. Risks associated with live electric parts

Voltage related risks, general

- Although troubleshooting may, on occasion, have to be carried out while the power supply is turned on, the robot must be turned off (by setting the mains switch to OFF) when repairing faults, disconnecting electric leads and disconnecting or connecting units.
- The mains supply to the robot must be connected in such a way that it can be turned off outside the robot's working space.

Voltage related risks, controller IRC5

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

- Be aware of stored electrical energy (DC link, Ultra Cap unit) in the controller.
- Units inside the controller, e.g. I/O modules, can be supplied with power from an external source.
- The mains supply/mains switch
- The transformers
- The power unit
- The control power supply (230 VAC)
- The rectifier unit (400-480 VAC and 700 VDC. Note: Capacitors!)
- The drive unit (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 tools, or special power supply units for the machining process.
- The external voltage connected to the control cabinet remains live even when the robot is disconnected from the mains.
- Additional connections.

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, see chapter Installation and commissioning in the Product manual).

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.

1.4 Safety actions

1.4.1. Safety fence dimensions

General

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

Dimensioning

Dimension the fence or enclosure to enable it 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 *Product Specification - Description, Robot Motion*).

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

1 Safety

1.4.2. Fire extinguishing

NOTE!

Use a CARBON DIOXIDE (CO₂) extinguisher in the event of a fire in the robot (manipulator or controller)!

1.4.3. Emergency release of the robots/manipulators axes

Description

In an emergency situation, any of the robot's/manipulators axes may be released manually by pushing the brake release buttons on the robot.

How to release the brakes is detailed in section:

- *Moving the carriage manually on page 50.* The robot arm may be moved manually on smaller robot models, but larger models may require using an overhead crane or similar.

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 Safety

1.4.4. Brake testing

1.4.4. Brake testing

When to test

During operation the holding brakes of each axis motor wear normally. A test may be performed to determine whether the brake can still perform its function.

How to test

The function of each axis' motor holding brakes may be checked as detailed below:

1. Run each manipulator axis to a position where the combined weight of the manipulator arm and any load is maximized (max. static load).
2. Switch the motor to the MOTORS OFF position with the Operating mode selector on the controller.
3. Check that the axis maintains its position.

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

1.4.5. Risk of disabling function "Reduced speed 250 mm/s"

1.4.5. Risk of disabling function "Reduced speed 250 mm/s"**NOTE!**

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

1 Safety

1.4.6. Safe use of the Teach Pendant Unit

NOTE!



The enabling device is a push button located on the side of the Teach Pendant Unit (TPU) which, when pressed halfway in, takes the system to MOTORS ON. When the enabling device is released or pushed all the way in, the robot is taken to the MOTORS OFF state. To ensure safe use of the Teach Pendant Unit, the following must be implemented:

- The enabling device must never be rendered inoperative 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.
- The programmer must always bring the Teach Pendant Unit with him/her, when entering the robot's working space. This is to prevent anyone else taking control of the robot without the programmer knowing.

1.4.7. Work inside the manipulator's working range

WARNING!



If work must be carried out within the robot's work envelope, the following points must be observed:

- The operating mode selector on the controller must be in the manual mode position to render the enabling device operative and to block operation from a computer link or remote control panel.
- The robot's speed is limited to max. 250 mm/s when the operating mode selector is in position < 250 mm/s. This should be the normal position when entering the working space. The position 100% "full speed" may only be used by trained personnel who are aware of the risks that this entails.
- Pay attention to the rotating axes of the manipulator! Keep a distance to the axes in order not to 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 manipulator or inside the cell.

1 Safety

1.4.8. Translate the information on safety and information labels

1.4.8. Translate the information on safety and information labels

Labels on the product

Both the manipulator 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, e.g. during installation, service or operation.

Translation possibilities

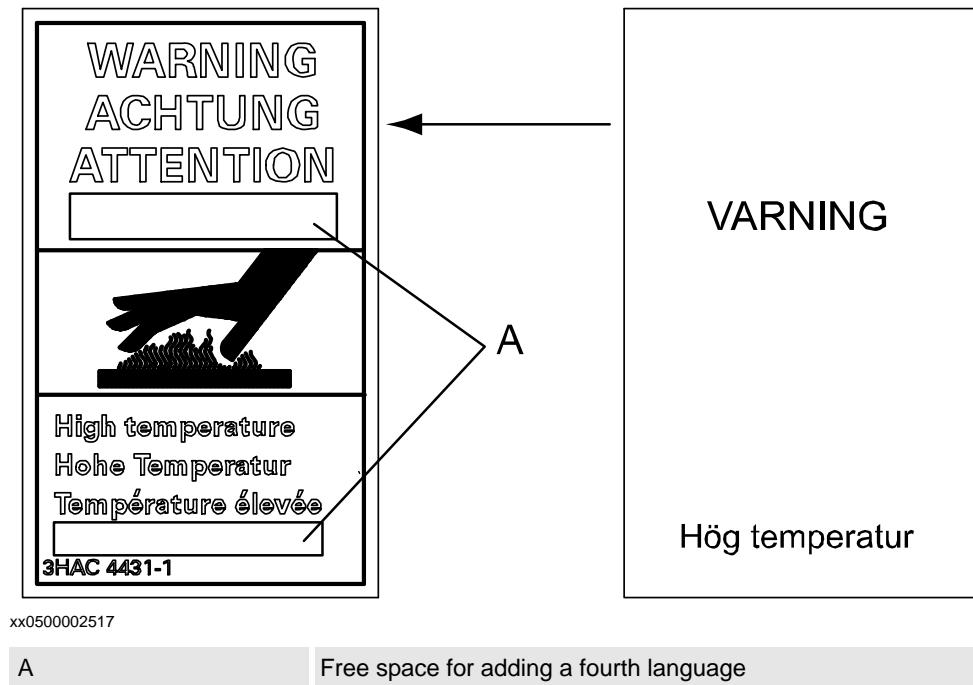
The labels fitted to the product contain space for adding a fourth language underneath the three standard languages (English, German and French).

Add a local language to the label by:

- using a transparent sticker over the standard label with text added in a fourth language. Drawings detailing the design (text, figure, dimensions) of the standard labels can be ordered from ABB. Notice that each label is identified according to the article number located in the lower corner of the label.

Example of transparent sticker

The figure below shows the location of the free space on one of the labels on the robot, where the fourth language can be added. The figure also shows a transparent sticker, containing the text in Swedish.



1.5 Safety related instructions

1.5.1. Safety signals, general

General

This section specifies all dangers that may arise from performing the work detailed in the manual. Each danger is detailed in its own section consisting 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.
- An instruction of how to eliminate the danger to facilitate performing the activity at hand.

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

Symbol	Designation	Signification
 danger	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 etc.
 warning	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.
 Electrical shock	ELECTRICAL SHOCK	The electrocution or electrical shock symbol indicates electrical hazards which could result in severe personal injury or death.
 caution	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.

1 Safety

1.5.1. Safety signals, general

Continued

Symbol	Designation	Signification
 Electrostatic discharge (ESD)	ELECTROSTATIC DISCHARGE (ESD)	The electrostatic discharge (ESD) symbol indicates electrostatic hazards which could result in severe damage to the product.
	NOTE	Note symbols alert you to important facts and conditions.
	TIP	Tip symbols direct you to specific instructions, where to find additional information or how to perform a certain operation in an easier way.

1.5.2. DANGER - Moving manipulators are potentially lethal!

1.5.2. DANGER - Moving manipulators are potentially lethal!**Description**

Any moving manipulator is a potentially lethal machine.

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

Elimination

	Action	Note/Illustration
1.	Before attempting to run the manipulator, make sure all emergency stop equipment is correctly installed and connected.	Emergency stop equipment such as gates, tread mats, light curtains, etc.
2.	If possible, use the hold-to-run button whenever possible. The hold-to-run button is used in manual mode, not in automatic mode.	How to use the hold-to-run control in RobotWare 5.0 is detailed in section <i>How to use the hold-to-run function in the Operating manual - IRC5 with FlexPendant</i> .
3.	Make sure no personnel are present within the manipulator working range before pressing the start button.	

1 Safety

1.5.3. DANGER - First test run may cause injury or damage!

1.5.3. 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 (repair, installation or maintenance):

	Action
1.	Remove all service tools and foreign objects from the robot and its working area!
2.	Install all safety equipment properly!
3.	Make sure all personnel are standing at a safe distance from the robot, i.e. out of its reach behind safety fences, etc.!
4.	Pay special attention to the function of the part previously serviced!

1.5.4. WARNING - The unit is sensitive to ESD!

1.5.4. WARNING - The unit is sensitive to ESD!**Description**

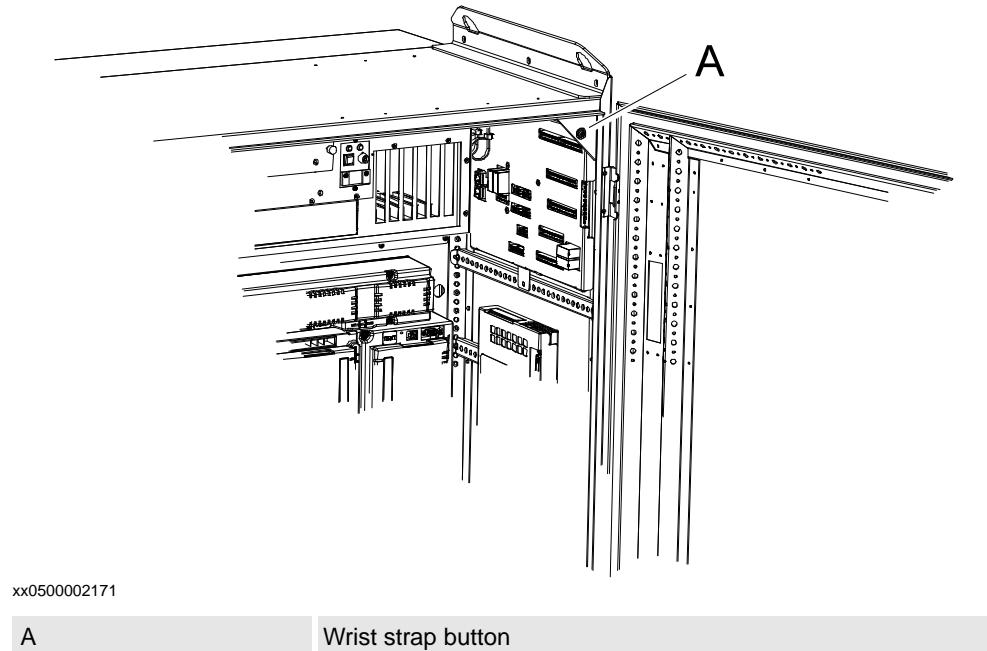
ESD (electro static discharge) is the transfer of electrical static charge between two bodies at different potentials, either through direct contact or through an induced electrical field. When handling parts or their containers, personnel not grounded may potentially transfer high static charges. This 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 wrist strap button is located in the top right corner as shown in the illustration below.



1 Safety

1.5.5. WARNING - Safety risks during work with gearbox oil

Description

When handling the gearbox oil, there are several dangers to both personal injuries and product damages! Following safety information must be regarded before performing any work with the oil in the gearboxes!

Warning and elimination

Warning	Description	Elimination/Action
 warning Hot oil!	Changing and draining gearbox oil may require handling hot oil of up to 90 °C!	Make sure that protective gear like goggles and gloves are always worn during this activity.
 warning Possible pressure build in gear box	When opening the oil plug, there may be pressure present in the gearbox, causing oil to spray from the opening!	Open oil plug carefully and keep away from the opening. Do not overfill the gearbox when filling.
 warning Don not overfill!	Overfilling of gearbox oil 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 manipulator from moving freely.	Make sure not to overfill the gearbox when filling with oil! After filling, check the correct oil level.
 warning 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 instruction. Always use the type of oil specified by the manufacturer!

1.5.5. WARNING - Safety risks during work with gearbox oil

Continued

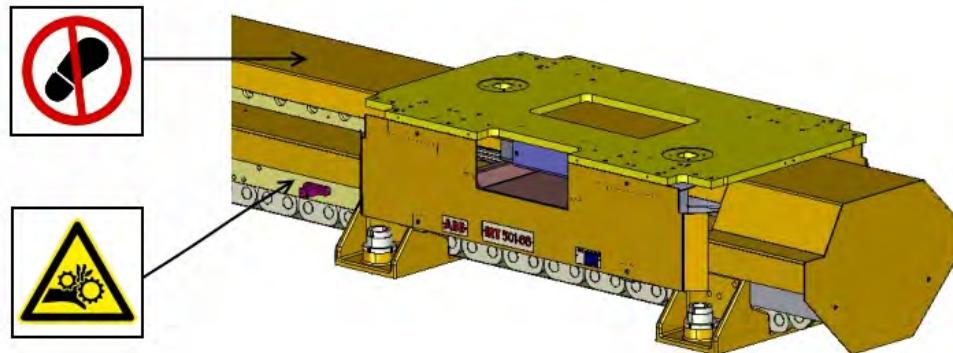
Warning	Description	Elimination/Action
 Tip Heat up the oil!	Warm oil drains quicker than cold oil.	When changing gearbox oil, first run the robot for a time to heat up the oil.
 Note Specified amount depends on drained volume!	The specified amount of oil is based on the total volume of the gearbox. When changing the oil, the amount of refilled oil may differ from the specified amount, depending on how much oil has previously been drained from the gearbox.	After refilling, check the oil level.

1 Safety

1.5.6. Location of safety pictograms

1.5.6. Location of safety pictograms

Location of safety pictograms



en1004070182

Symbol	Description	Position
	DANGER! Risk of severe injury to hands! This pictogram must be positioned close to the timing mark. en1004070183	 en1004070184
	DO NOT WALK! The pictogram is located on the track covers. en1004070185	 en1004070186

2 Installation and commissioning

2.1. Introduction

General

The FlexTrack IRT 501-66 /66R /90 /90R includes one or more carriages moving on a modular track made of crossmembers, sidemembers, rack, and covers. This unit can be either installed on a concrete floor, or on a FlexiCell platform.

For detailed information regarding mechanical installation requirement for concrete floor and FlexiCell platform, see [Preparation for setup on page 85](#).

Protection standards

Standard FlexTrack IP54.

Explosive environments

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

Terminology

Designation	Definition
Robotic system	The robot and the FlexTrack.
Robot	The manipulator and the controller.
Manipulator	The 6 axis mechanical unit of the robot.
Controller	The motion system used to control the manipulator & FlexTrack (i.e. ABB IRC5).
Translation unit	The complete carriage assembly including all moving parts (cable track, lubrication system, sensors, and so on).
Carriage	The moving part of the FlexTrack. The top plate receives the tooling / robot.
Track	The static part of the FlexTrack. The track is delivered as modules to be assembled by the customer, as described in Assembly of the track on page 58 .
Travel length	Maximum stroke of the carriage.
SMB Box	The Serial Measurement Board Box, a control box which includes the SMB card for the FlexTrack axis as well as the resolver position backup battery.
SMB	The Serial Measurement Board is a integrated circuit board used to measure and store the position of each robot axes.
Recirculating ball bearing linear guide system	Is the system of both the linear guideway and the ball bearing blocks which achieve high precision linear motion.
Linear guideway	Is the lubricated rail (steel beam) on which the ball bearing block slides.
Ball bearing block	Is the sliding block which translates on the linear guideway. Also known as linear block or linear guide block. The ball bearing block contains the recirculating balls which roll on the linear guideway.

2 Installation and commissioning

2.1. Introduction

Continued

Ambient temperature

Description	Standard/Option	Temperature
FlexTrack during operation	Standard	+ 5°C (41°F) to + 50°C (122°F)
For the controller	Standard	+ 5°C (41°F) to + 45°C (113°F)
For the controller	Option	+ 5°C (41°F) to + 52°C (126°F)
For short periods (not exceeding 24 hours)	Standard	up to + 70°C (158°F)

Relative humidity

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

Preparations

The following steps should be carried out before starting the FlexTrack IRT 501.

	Action	Note
1.	Unpacking and acceptance.	Compare the delivery check to the identification plate and verify for acceptance according to Acceptance inspection on page 40 .
2.	Lifting.	Lifting FlexTrack IRT 501 using lifting slings, see Lifting FlexTrack IRT 501 on page 41 .
3.	Preparation for assembly.	
4.	Assemble the track.	
5.	Assemble the manipulator.	
6.	Electrical installation.	
7.	Software installation.	

2.2 Unpacking and acceptance

2.2.1. Unpacking

Inspection

The FlexTrack IRT 501 is wrapped in plastic. Unpack the track and check for any visible transport damage. If the FlexTrack IRT 501 is damaged, contact ABB.

Contents

If the complete track contains more than 5 modules, it would be separated to more than 1 sections for packing's convenience. As standard the FlexTrack IRT 501 includes the following on delivery (not including options):

- One or more preassembled track sections, depending on the complete track length.
The carriage is mounted on one track section no less than 2m long.
- Cable chain. The cable chain has been preassembled on the track when delivered.
- Memolub auto lubrication system. The Memolub auto lubrication system has been installed on the carriage and preset when delivered, but it is not yet activated.

Cleaning

Before transport the FlexTrack IRT 501 has been protected against rust by a thin film of oil that has been applied before packing. This film of oil must be wiped off before installation, at the exception of the pre-lubricated parts such as the rack and the linear guideways.

NOTE!



Wipe off any surplus oil using a lint-free cloth.

2 Installation and commissioning

2.2.2. Acceptance inspection

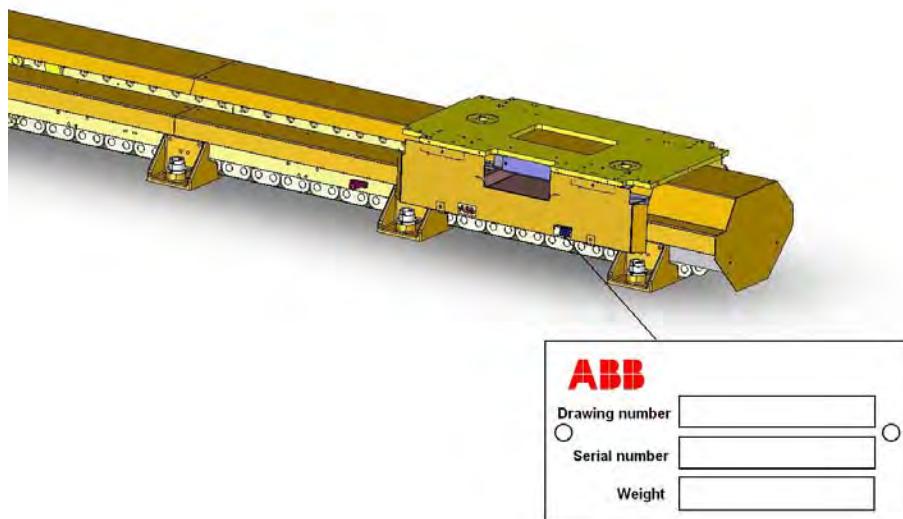
TIP!



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

Identification plate

To identify the delivery, check the identification plate and compare it to the delivery note. The identification plate is located on the carriage side (see figure below) and indicates the FlexTrack type, the serial number and the weight of the complete track.



en1004070001

2.3 Handling

2.3.1. Lifting FlexTrack IRT 501

Action before lifting

CAUTION!



Read through the safety instructions carefully, before the FlexTrack IRT 501 is installed.

WARNING!



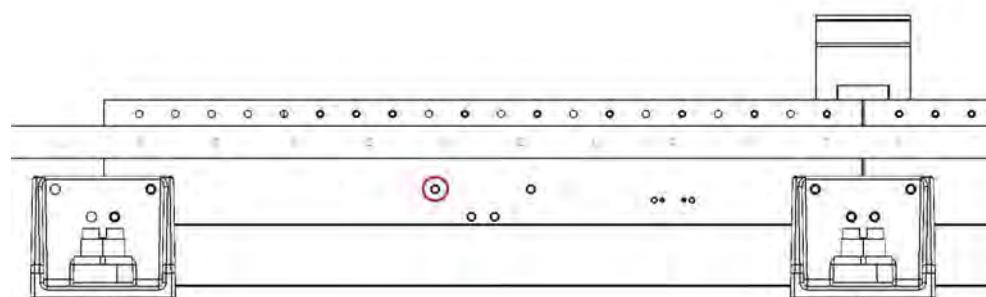
After assembly, the FlexTrack IRT 501 must not be handled using a forklift truck or a crane.

Handling equipment for FlexTrack modules without a mounted carriage

Type	Recommended equipment
IRT 501 - 66 and 90	4 U-shackles (shackle has to fit into the bail)  <small>en1004070187</small>
	4 Lifting I-bolts with a M12 thread  <small>en1004070188</small>
	2 lifting straps (min. 5 meters) with a load capacity of 1 tonne each
IRT 501 - 66R and 90R	2 lifting straps (min. 5 meters) with a load capacity of 1 tonne each

Lifting FlexTrack IRT 501 - 66 and 90 without a mounted carriage

Unmount all covers and screw the I-bolt in the outer holes located between the crossmembers and connect the shackle with the I-bolts.



en1004070189

Continues on next page

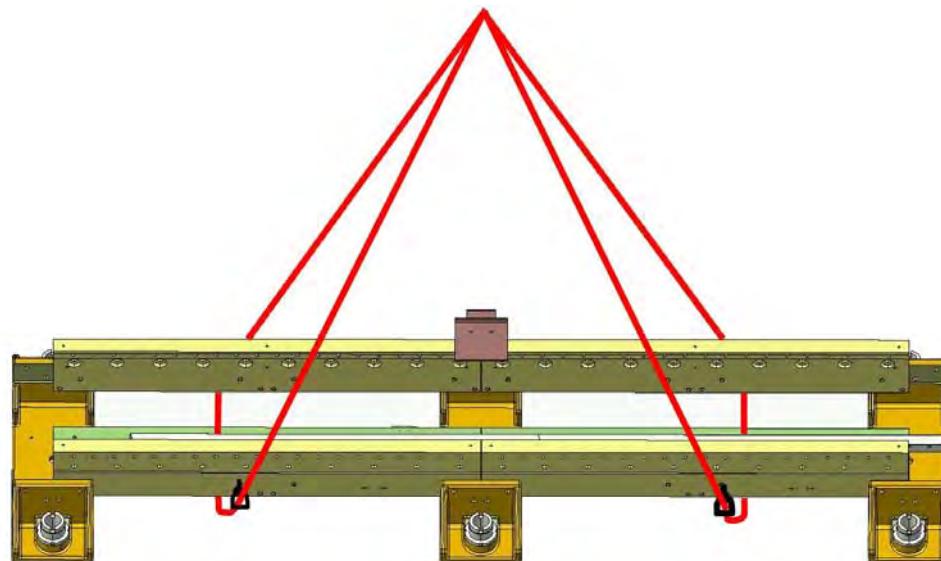
2 Installation and commissioning

2.3.1. Lifting FlexTrack IRT 501

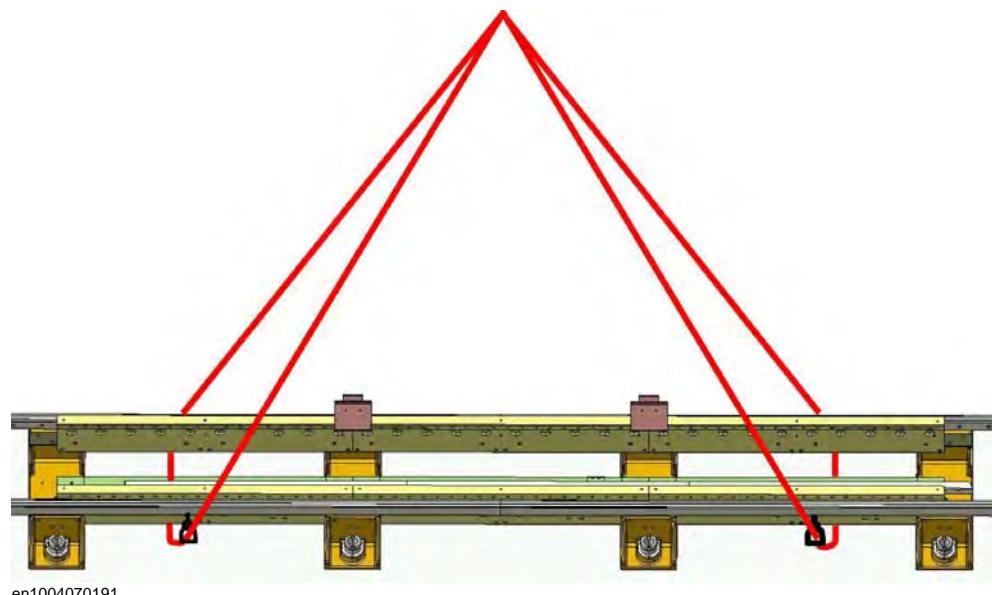
Continued

In the following step one end of a lifting strap should be guided through the shackle, below the sidemembers at both sides and through the second shackle. The second strap should be used for the other side.

The shackle should act as a guidance only to prevent the straps from slipping. The weight of the FlexTrack should be carried by the sidemembers.



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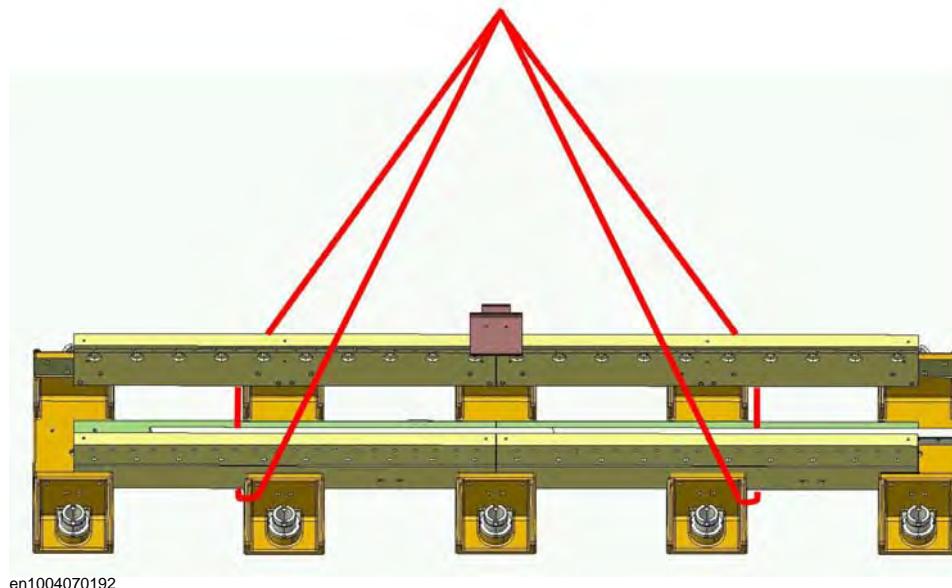


en1004070191

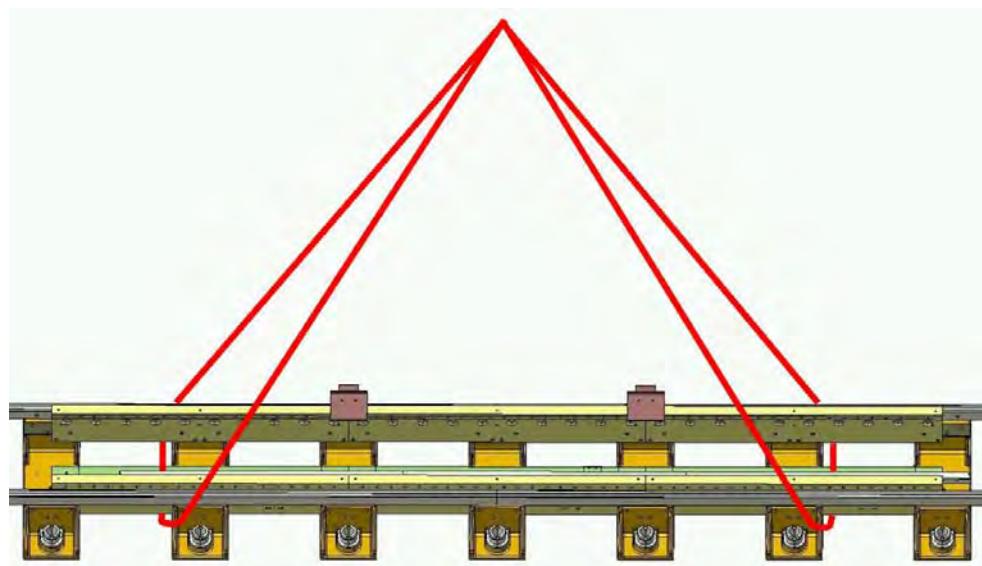
Continued

Lifting FlexTrack IRT 501 - 66R and 90R without a mounted carriage

The lifting strap should be guided behind the second to last crossmembers below the sidemembers at both sides and through the second shackle. The second strap should be used for the other side.



en1004070192



en1004070193

WARNING!

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

Never lift a track longer than 3m at once. If the track is longer, the track has to be disassembled into smaller sections.



2 Installation and commissioning

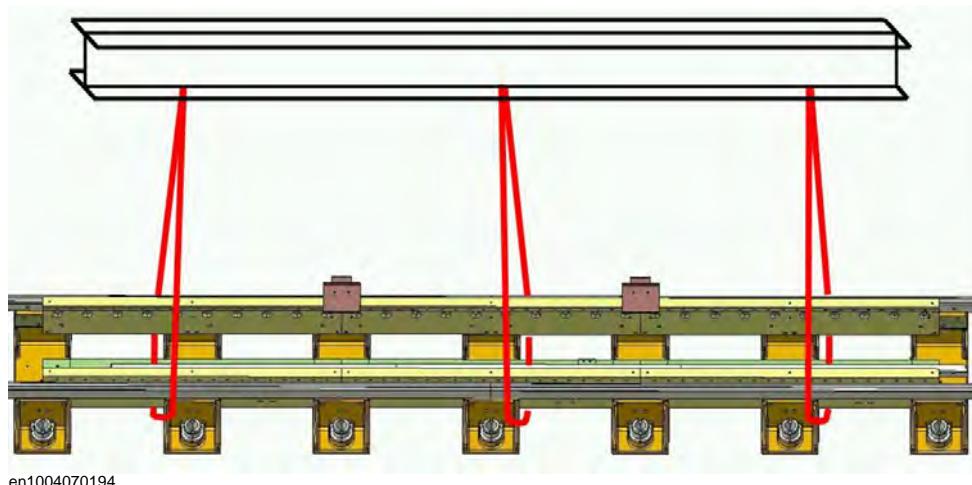
2.3.1. Lifting FlexTrack IRT 501

Continued

Lifting FlexTrack with a lifting beam

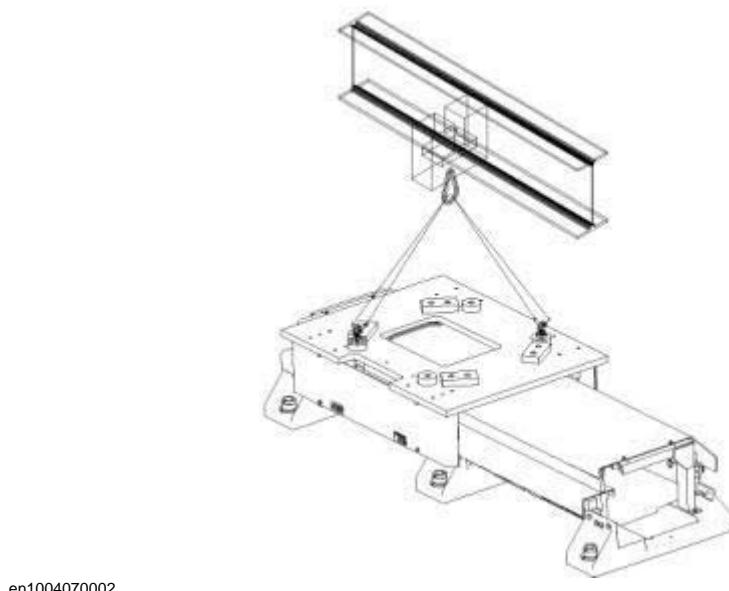
If there is a lifting beam available, the strap should always be located at the middle of the sidemembers.

The picture shows 66R / 90R with a length of 3 meters.



Lifting 2m FlexTrack with carriage

The carriage comes assembled on a 2m track section which can be handled using appropriate straps and M24 handling I-bolts.



2.3.2. Lifting weight

Continued

2.3.2. Lifting weight

FlexTrack IRT 501 weight

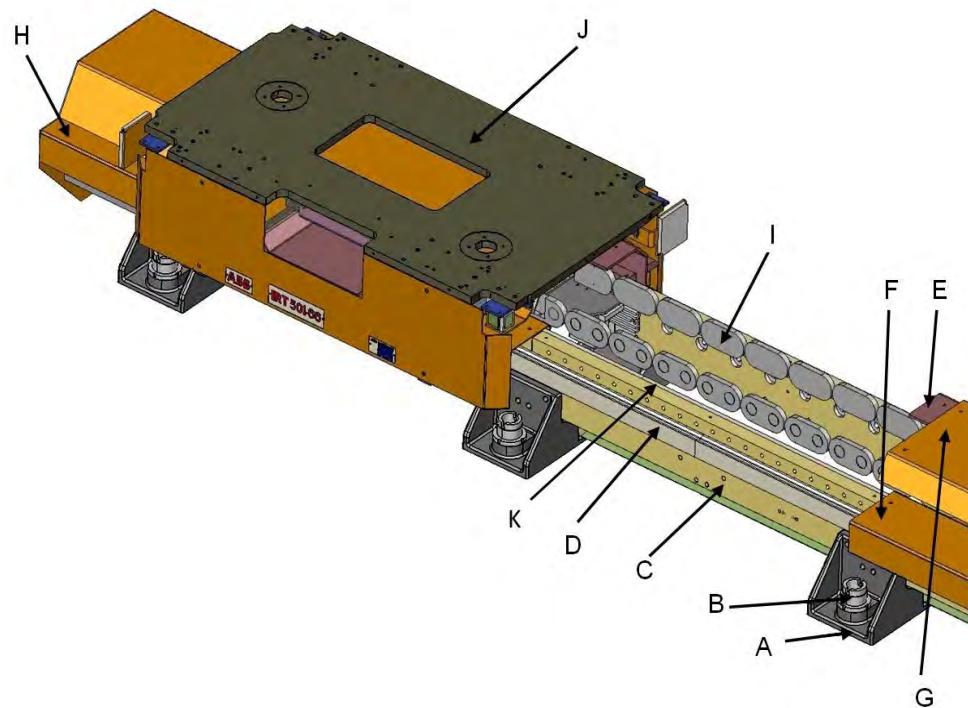
For accurate weight of the whole track, read the identification plates on the FlexTrack IRT 501. The position of the identification plates are described in [Identification plate on page 40](#).

	IRT 501-66	IRT 501-66R	IRT 501-90	IRT 501-90R
1 meter Section without carriage	275 kg	325 kg	326 kg	390 kg
2 meter section without carriage	436 kg	516 kg	510 kg	618 kg
3 meter section without carriage	591 kg	712 kg	686 kg	848 kg
2 meter section with carriage	772 kg	853 kg	909 kg	1020 kg

2 Installation and commissioning

2.3.3. FlexTrack IRT 501 size and dimensions

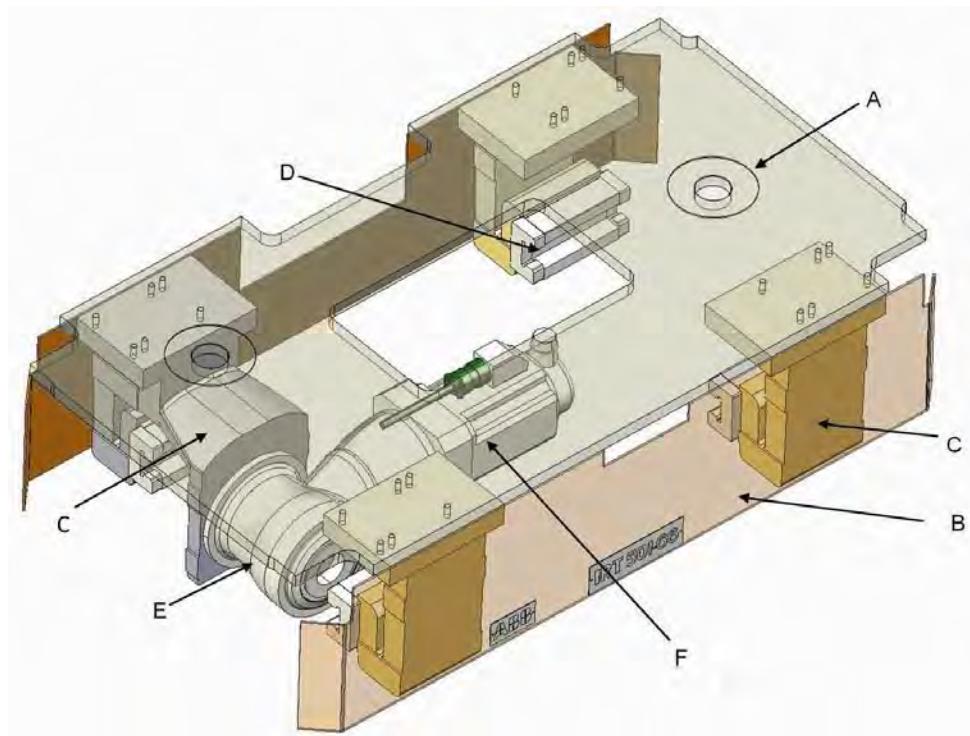
FlexTrack overview



en1004070004

Label	Description
A	Cross member
B	Levelling screw
C	Side member
D	Linear guideway
E	Cover bracket
F	Rack cover
G	Cover
H	End cover
I	Cable chain
J	Carriage
K	Rack

FlexTrack Carriage Overview



en1004070005

Label	Description
A	Top plate
B	Side cover
C	3 carriage bracket
	1 carriage bracket with gear motor support
D	Ball bearing block
E	Gearbox
F	Motor

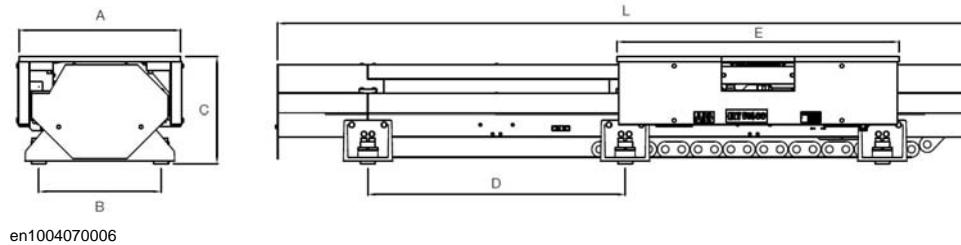
2 Installation and commissioning

2.3.3. FlexTrack IRT 501 size and dimensions

Continued

Dimensions of the FlexTrack

Data	IRT 501 66	IRT 501 66R	IRT 501 90	IRT 501 90R
A	660	660	900	900
B	500	500	680	680
C	435	435	495	495
D	1050	525	1050	525
E	1150	1150	900	900
L	738+Nx1050			



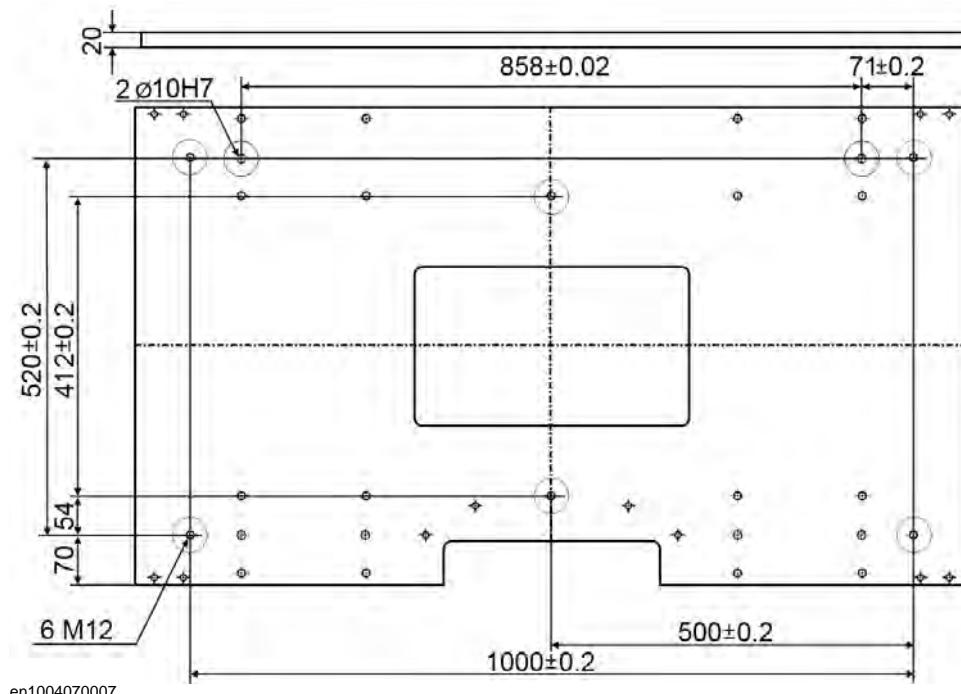
en1004070006

Standard top plate

For material handling applications with FlexTrack, six M12 holes are prepared for fastening of the fixture on top, two Ø10 dowels for the locating.

The opening in the middle of the plate is for easy access to the motor connection box.

Dimensions for IRT501-66 / IRT501-66R

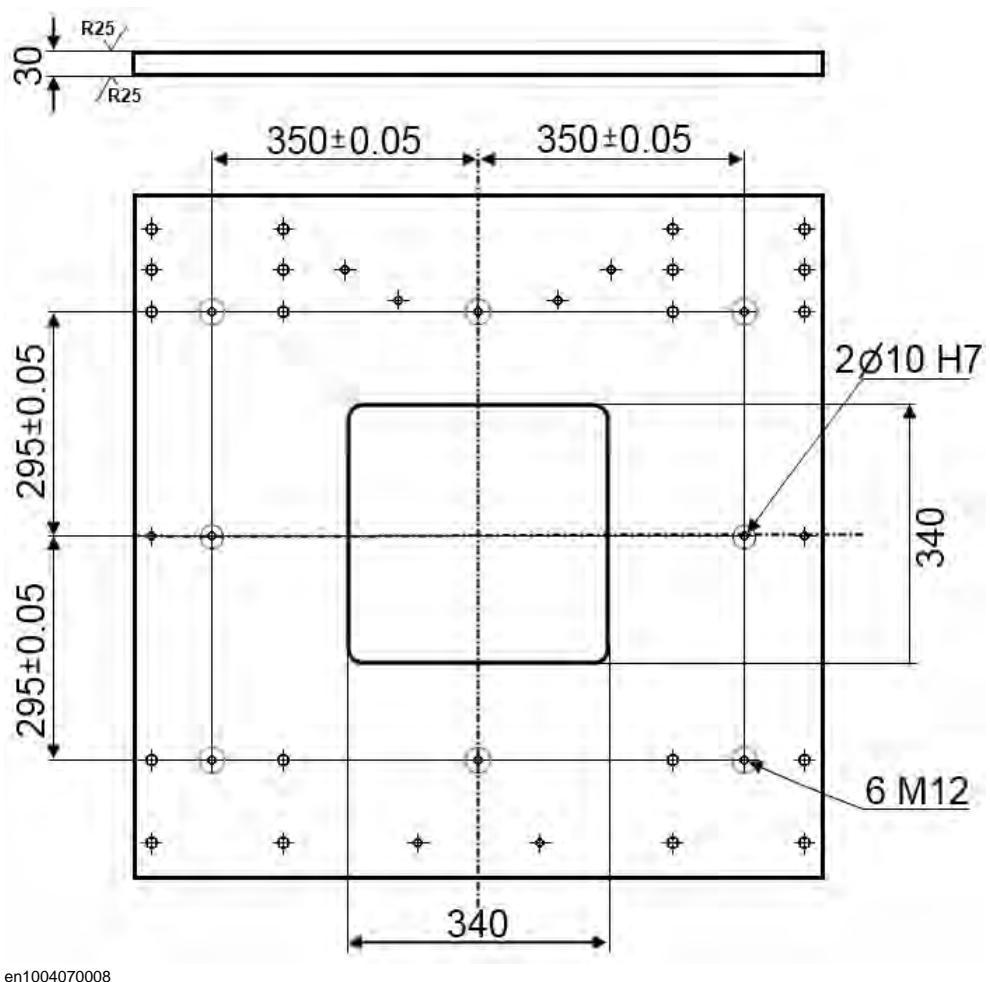


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Continues on next page

Continued

Dimensions for IRT501-90 / IRT501-90R



en1004070008

Robot Plate

Robot plates exist for various robot models and their bolting patterns match that of the robot.

2 Installation and commissioning

2.3.4. Moving the carriage manually

Continued

2.3.4. Moving the carriage manually

Release the brake

The carriage can be pushed manually to another position on the track.

It is recommended that the carriage is manually pushed along its complete stroke after being installed and before running the track using the IRC5. This is to ensure that there is no risk of collision other equipment in the vicinity of the track.

Action	Note/Illustration
1. Connect all cables to the controller as described in Cables connections on page 80 .	
2. Start up the controller as described in Connectors on IRC5 controller on page 81 .	
3. Press in the brake release button (A) shows in the figure.	 <ul style="list-style-type: none">Release the brake
4. Push the carriage by hand to the desired location.	

NOTE!



Care should be taken when moving the track manually. There is a risk of severe injury to hands near the calibration pin, as well as at the location where the rack and pinion mesh. Users should remain clear of these locations when moving the track.



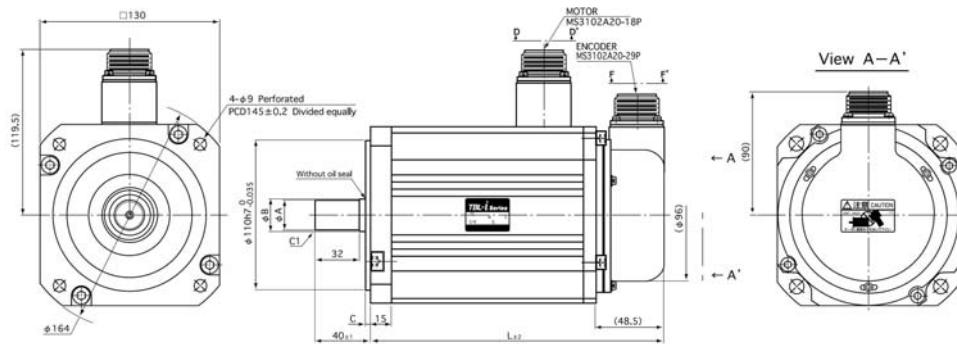
en1004070010

2.3.4. Moving the carriage manually

Release the brake (external 24V DC)

If there is no voltage to the motor, 24V DC can be connected direct to the SMB Box.

Action
1. Unplug the Motor power cable from the SMB box that runs to the FlexTrack Motor
2. Using pins, connect the +24VCC to the G pin (see fig.)
3. Connect the 0VCC to the H pin



en1004070011

Motor Connection

PIN	FUNCTION
A	—
B	W-phase
C	—
D	—
E	Frame GND
F	U-phase
G	(brake)
H	(brake)
I	V-phase

Encoder Connection

PIN No.	FUNCTION	PIN No.	FUNCTION
A	NC	K	NC
B	NC	L	NC
C	NC	M	NC
D	NC	N	NC
E	SD	P	NC
F	SD	R	NC
G	GND	S	GND
H	VDC	T	VB
J	CASE GND		

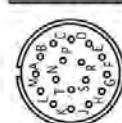
(In case of 17/32bit abs encoder)

MOTOR



View D-D'

ENCODER



View F-F'

en1004070012

WARNING!

The motor breaks on the FlexTrack IRT 501 are phase dependent. Fault connection can cause damage to vital parts.



2 Installation and commissioning

2.4.1. Foundation

2.4 Preparations for assembly

2.4.1. Foundation

Robustness

The foundation must withstand the static loads caused by the weight of the equipment and the dynamic loads generated by the movement of the carriage and the manipulator. The minimum thickness of the concrete floor is 175mm.

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

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

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

Inclination and flatness

The levelling of the track is done by screwing / unscrewing the M60 screws. However, in order to insure a good levelling, the concrete floor inclination must not exceed 1mm / meter in the translation direction, and 0,5mm / meter cross section. The levelling screws can also compensate a poor flatness of the slab and small bumps up to 10mm. However, the surface under the levelling screw must be flat. A concrete surfacing grinder should be used to correct the flatness locally if necessary.

Static loads

The following table shows the maximum payload of all FlexTrack carriage variants, and the corresponding load distributed to each levelling screw.

Load	IRT 501 66	IRT 501 66R	IRT 501 90	IRT 501 90R
Max. Load	900 kg	2000 kg	2000 kg	2950 kg
Load on each levelling screw	320 kg	450 kg	800 kg	1050 kg

NOTE!

The payloads listed above are estimated for a wide range of FlexTrack applications. For ModulFlex payload, please refer to ModulFlex specifications.



Continued

Robot capabilities

The following table shows the robot capabilities of the FlexTrack.

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

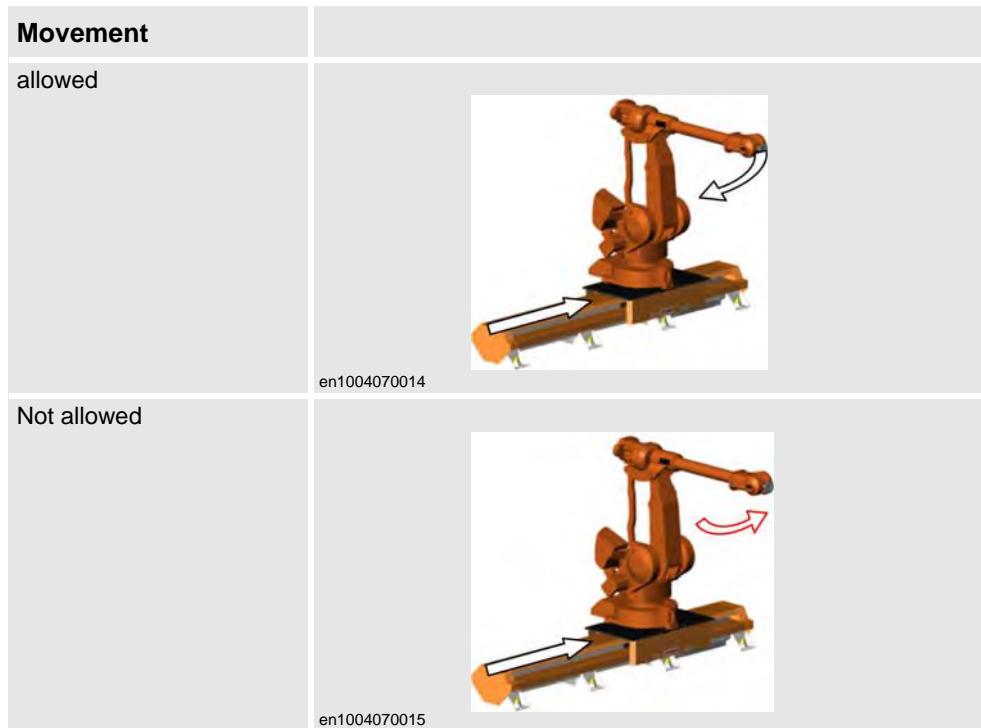
Robot	IRT 501-66	IRT 501-66R	IRT 501-90	IRT 501-90R
IRB 1410	√ Riser 2000mm max	√ Riser 2000mm max	X	X
IRB 1600	√ Riser 1500mm max	√ Riser 1500mm max	X	X
IRB 52	√ Riser 1500mm max	√ Riser 1500mm max	X	X
IRB 2400/ 2600	√ Riser 1500mm max	√ Riser 1500mm max	X	X
IRB 260	√ Riser 1500mm max	√ Riser 1500mm max	X	X
IRB 4400	X	X	√ Riser 1000mm max	√ Riser 1500mm max
IRB 4600	√ Riser 500mm max	√ Riser 1000mm max	√ Riser 1500mm max	√ Riser 1500mm max
IRB 460	X	√ Riser 500mm max	√ Riser 500mm max	√ Riser 1500mm max
IRB 6400R/ 6400RF	X	X	X	√ No riser allowed
IRB 6600	X	X	√ No riser allowed	√ Riser 500mm max
IRB 6620/ 6640	X	X	√ No riser allowed	√ Riser 500mm max
IRB 6700	X	X	√ No riser allowed	√ Riser 500mm max
IRB 660	X	X	√ No riser allowed	√ Riser 1500mm max
IRB 6650/ 6650S/6660	X	X	X	√ No riser allowed
RB 7600	X	X	X	√ No riser allowed
IRB 760	X	X	√ No riser allowed	√ Riser 1000mm max

2 Installation and commissioning

2.4.1. Foundation

Dynamic loads

The FlexTrack and the manipulator generate independent dynamic loads. It is important to limit the forces that the anchors are subjected to: the dynamic loads generated by the FlexTrack and the robot should never accumulate. To avoid this, when the carriage is moving the robot should stand still, or only move in the opposite direction.



WARNING!



The dynamic forces generated by the FlexTrack & the manipulator in motion should never occur in the same direction. For instance, if the carriage is moving at full speed in one direction, the manipulator should not move, or move only in the opposite direction.

The table below shows the dynamic performances of the FlexTrack.

For the dynamic forces generated by the manipulator, please check the robot operation manual.

FlexTrack	Cycle time for 6 m stroke	Gear ratio	Max speed (m/s)	Acceleration / Deceleration (m/s ²)	Acceleration/Deceleration Time(s)
IRT 501-66	4.4 sec.	10	2.0	2.0/2.0	1.0/1.0
IRT 501-66R	5.4 sec.	16	1.5	1.2/1.8	1.25/0.83
IRT 501-90	5.4 sec.	16	1.5	1.2/1.8	1.25/0.83
IRT 501-90R	6.5 sec.	20	1.2	1.0/1.2	1.20/1.00

WARNING!



In the event that any of the static or dynamic loading rules are not followed, the tracks warranty will be void and no warranty claims of any sort will be valid.

Continued

2.4.2. Recommendation for anchors

Recommended anchor

The recommended anchor bolts are SPIT MAXIMA M16 as shown below:

SPIT MAXIMA

Zinc coated steel



ETA Option 7
n° 03/0007

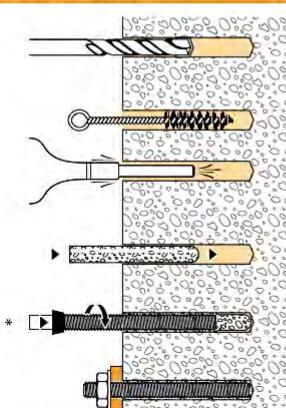
APPLICATION

- ▶ Fixing steel framed structures
- ▶ Fixing machinery (resistant to vibration)
- ▶ Fixing of storage silos, refinery pipework supports
- ▶ Fixing motorway signs
- ▶ Fixing safety barriers

MATERIAL

- ▶ Threaded rod M8-M16: cold formed steel NF A35-053
- ▶ Threaded rod M20-M30: 11 SMnPb37 - NFA 35-561
- ▶ Nut: Steel, EN 20898-2 grade 6 or 8
- ▶ Washer: Steel DIN 513
- ▶ Zinc coating 5 μm min. NF E25-009

INSTALLATION



* Using the installation tool available in each box of studs.

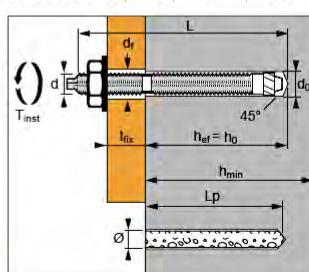


1/4

Bonded anchor in glass capsule

Technical data

SPIT MAXIMA	Max. anchor depth (mm)	Max. thick of part to be fixed (mm)	Min thick of base material (mm)	Ø thread (mm)	Drilling depth (mm)	Ø drill bit (mm)	Ø clearance (mm)	Total rod length (mm)	Total capsule length (mm)	Max. tighten torque (Nm)	Code rod	Code capsule
	h_{ef}	t_{fix}	h_{min}	d	h_0	d_0	d_f	L	L_p	T_{inst}		
MAXIMA M16	125	35	175	16	125	18	18	190	107	60	050980	051530



Anchor mechanical properties

M16

Threaded part

f_{uk} (N/mm ²)	Min. tensile strength	600
f_{yk} (N/mm ²)	Yield strength	420
A_s (mm ²)	Stressed cross-section	157
W_{el} (mm ³)	Elastic section modulus	277,5
$M_{Rk,s}^0$ (Nm)	Characteristic bending moment	200
M (Nm)	Recommended bending moment	81,6

Setting time before tightening torque and applying a load

Ambient temperature (°C)

	SPIT MAXIMA resin	
	Dry concrete	Wet concrete
$T \geq 20^\circ\text{C}$	20 min.	40 min.
$10^\circ\text{C} < T < 20^\circ\text{C}$	30 min.	60 min.
$0^\circ\text{C} < T \leq 10^\circ\text{C}$	1 hour	2 hours
$-5^\circ\text{C} < T \leq 0^\circ\text{C}$	5 hours	10 hours

Chemical resistance of the SPIT MAXIMA anchor

Chemical substances	Concentration (%)	Resistance	Chemical substances	Concentration (%)	Resistance
Nitric acid	< 20	(+)	Ethylene glycol	100	(+)
Nitric acid	20 - 70	(o)	Heptane	100	(o)
Phosphoric acid	< 10	(+)	Hexane	100	(o)
Sulphurous acid	100	(o)	Methanol	≤ 15	(o)
Sulphuric acid	≤ 30	(+)	Carbon monoxide	100	(+)
Ethyl alcohol	≤ 15	(+)	Washing powder	100	(+)
Beer	100	(+)	Perchloroethylene	100	(o)
Carbon dioxide	100	(+)	Hydrogen peroxide	≤ 40	(o)
Engine petrol without benzene	100	(o)	Caustic potash	100	(+)
Hydrogen fluoride	≤ 20	(+)	Cement in suspension	saturated solution	(+)
Ammonia	100	(+)			

Resistant (+): the samples in contact with the substances did not show any visible damage such as cracks, attacked surfaces, burst corners nor large swelling.

Sensitive (o): use with care regarding exposure of the field of usage, precautions to be taken. The samples in contact with the substance slightly attacked the material.

* Using the installation tool available in each box of studs.

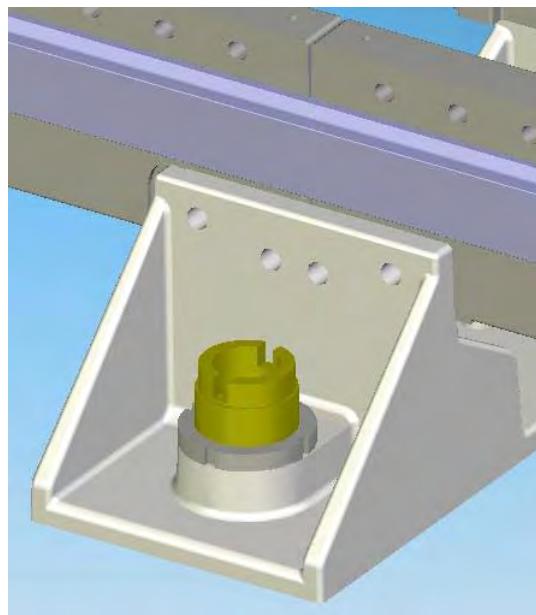
2 Installation and commissioning

2.4.2. Recommendation for anchors

Continued

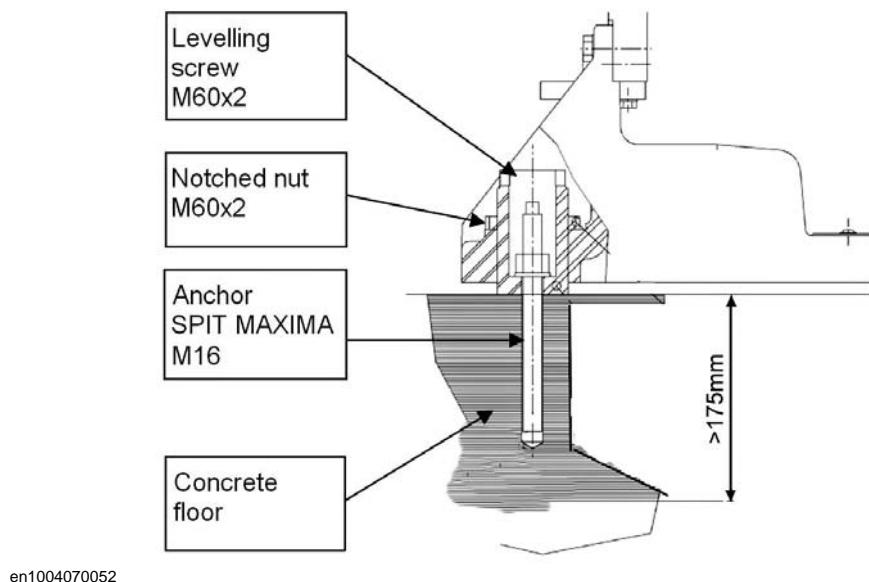
NOTE!

It is recommended to use chemical anchors with M16 threaded rods to secure the unit to the floor. See [Recommendations for floor mounting on page 66](#).



en1004070051

Section view of the FLEXTRACK anchor



en1004070052

2.4.3. Screw joints

General

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

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

Screw class

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

Loctite 243

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

Tightening torque

Before tightening any screw, note the following:

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

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

- Maximum allowed total deviation from the specified value is 10%!

The table below specifies the recommended standard tightening torque for class 12.9 screws.

Dimension	Tightening torque (Nm) Class 12.9
M6	16.4
M8	40
M10	79
M12	136

2 Installation and commissioning

2.5.1. Procedure of assembly

Continued

2.5 Assembly of the track

2.5.1. Procedure of assembly

General

The FlexTrack IRT 501 should be assembled as set out in the procedure below. Detailed descriptions of each stage can be found in the following sections.

Required equipment

Qty	Tool
1	Ring-open-end spanner 8 - 22 mm
1	Socket head cap 2.5, 4, 5, 6, 8 and 10 mm
1	Small flat tip screwdriver
1	Plastic mallet
1	Torque wrench 10 -140 Nm
1	Ratchet head for torque wrench 1/2
2	Socket head cap 5mm, 8mm, 10mm socket 1/2" bit L 20 MM
2	Hex head cap 13mm, 19mm socket 1/2" bit L 20 MM

Qty	Specific FlexTrack tools	Picture
3	Rail Pressing Tool IRT501-66 & 66R: 3HAW107700358 IRT501-90 & 90R: 3HAW107700456	 en1004070026
3	Rack clamps (3HAW107700357)	 en1004070027

2 Installation and commissioning

2.5.1. Procedure of assembly

Qty	Specific FlexTrack tools	Picture
1	Rack Mounting block (3HAWL000011)	 en1004070028
1	Leveling Tool (3HAW107700360)	 en1004070029
1	Calibration pin (3HAW107700354)	 en1004070030
1	Tool for levelling screw nut tightening (3HAW107700361)	

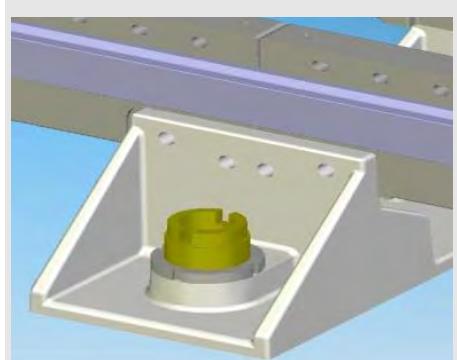
2 Installation and commissioning

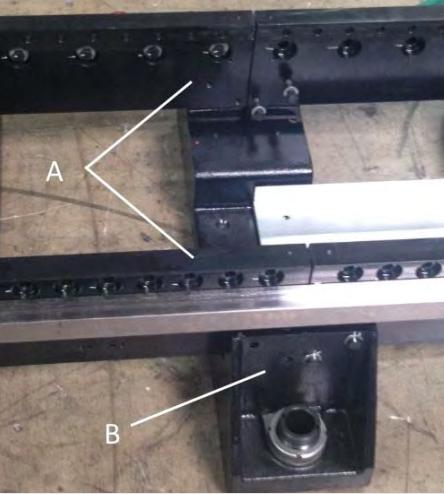
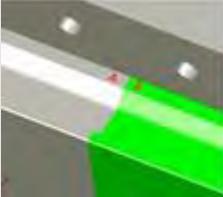
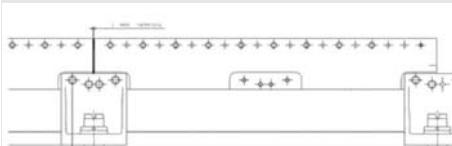
2.5.1. Procedure of assembly

Continued

Procedure of assembly

The following table describes all necessary steps to achieve a correct assembly of the IRT501 track:

Action	Note/Illustration
1. Markup on a clean floor the FlexTrack axis. Markup also the position of each cross member, with the following intervals: IRT 501-66/90: 1050 mm steps IRT 501-66R/90R: 525 mm steps	
2. Position the preassembled carriage & track section on the floor at the predetermined position.	
3. Linearly position the other preassembled section beside the section above.	
4. Connect the preassembled sections with screws not mounted.	
5. Level the track module with the M60 screws. See Geometric alignment of FlexTrack IRT 501 on page 70.	 NOTE! Ensure the geometric alignment of the Flextrack with an optical level or a laser tracker. Note that, at this stage, you can only check the horizontal alignment based on the sidemember upper surface. The final alignment will be given by the measurements done based on the linear guideways position. en1004070032
6. Adjust the leveling screws until all leveling screws touch the ground.	

Action	Note/Illustration
7. Slightly tighten screws connecting the sidemember and the crossmember.	 <p>A: Sidemember B: Crossmember</p>
8. Visually check if the guideways are seamlessly connected. If there is seam existed, push to adjust track sections and ensure the seamless. The distance between the two track sections should be approximately 2 mm.	 <p>en1004070037</p> 
9. When the levelling is satisfying, tighten all the screws connecting the sidemember and the crossmember after applying Loctite 243 on their thread. Tightening torque: 136 Nm.	

2 Installation and commissioning

2.5.1. Procedure of assembly

Continued

Action	Note/Illustration
<p>10. Slightly tighten the guideway screws and finalize the horizontal alignment of the FlexTrack as described in Geometric alignment of FlexTrack IRT 501 on page 70.</p> <p> All linear guideways are preassembled on track sections.</p> <p></p> <p>NOTE!</p> <p>Use the rail pressing tool to make sure that the rails are pushed against the side member mounting surface.</p>	 en1004070038
<p>11. Unscrew one block from the carriage and use it to check the rails alignment: if the rails are correctly aligned, you should sense no "step" while passing the rails junction. If so then push the rail against the side member step and check that there's no clearance between the rails.</p>	 en1004070039
<p>12. When the alignment is correct, tighten the guideway screws one by one, after applying Loctite 243 on their thread. (Tightening torque: 132 Nm.) If necessary, re-assemble the block in the carriage bracket and tighten its 4 hexagon socket head cap M10x30 class 12.9 screws and narrow contact-lock washers M10-16. (Tightening torque: 77 Nm)</p>	
<p>13. Use a brush to lubricate the linear guideways.</p>	

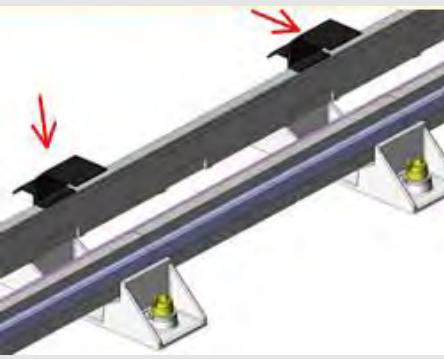
Continued

	Action	Note/Illustration
14.	<p>Assemble the rack by slightly tighten hexagon head bolt M8x55 screws class 12.9 with contact-lock washers M8-18 and plain washers 8x25x3.</p> <p></p> <p>NOTE!</p> <p>Clean the sidemember mounting before install the rack.</p> <p>Check that the chamfer is located in front of the side member step (check on preassembled section if you are not sure).</p> <p></p> <p>NOTE!</p> <p>Use the clamping and mounting racks at the ends of the rack section to make sure that the racks are pushed against the side member mounting surface and perfectly aligned with each other.</p>	 en1004070040
15.	<p>When the alignment is correct, tighten the screws one by one, after applying Loctite 243 on their thread.</p> <p>(Tightening torque: 40 Nm)</p> <p>Use a brush to lubricate the racks.</p>	 en1004070043
16.	<p>Install the cable tray.</p>	 en1004070042

2 Installation and commissioning

2.5.1. Procedure of assembly

Continued

	Action	Note/Illustration
17.	Install the cover brackets.	 en1004070045
18.	 CAUTION! Release the carriage brake and push the carriage manually along the length of its stroke. Check that the cable chain lies in the centre of the track and does not collide with any other fixed parts. See section Release the brake on page 50 for instructions on how to release the motor brake.	
19.	Fix the small covers on top of the side members. Fix the large cover's brackets on the opposite side members.	 en1004070048

2 Installation and commissioning

2.5.1. Procedure of assembly

Continued

	Action	Note/Illustration
20.	Fix the large covers on top of the cover brackets.	 en1004070049
21.	 CAUTION! Once again, release the carriage brake and push the carriage manually along the length of its stroke. Check that no covers come into contact with the moving carriage.	

2 Installation and commissioning

2.5.2. Recommendations for floor mounting

Continued

2.5.2. Recommendations for floor mounting

Mounting bolts

Choose mounting bolts so that they:

- Are suitable for the foundation.
- Can bear the dynamic loads.
- The bolts must be able to bear the combined dynamic loads that can occur when the manipulator and carriage move.

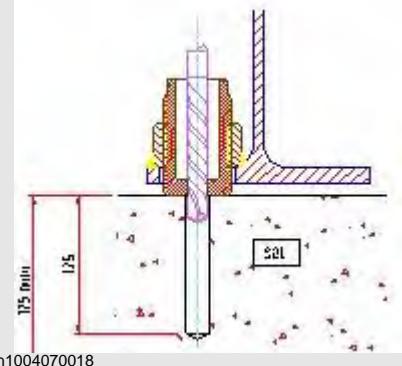
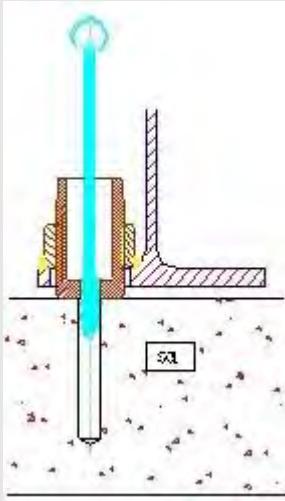
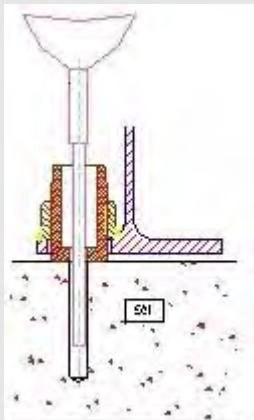
Securing the assembled track to the floor

Action	
1.	After assembly, all the levelling screws should touch the floor. Adjust if necessary and tighten the blocking nut.
2.	Move the carriage all along the track way, and check the levelling with a levelling device or a laser tracker. The horizontality of the top plate must be satisfying in the translation direction, but also cross section. If you have moved the carriage manually, you probably need to initialize the resolver position, see Update revolution counters on page 167 .
3.	Drill the holes in the floor through the levelling screws opening, see the following section.
4.	Install the anchors and secure the cross members to the floor. If the recommended anchors are not used, you should check that the floor resistance and the selected anchors are compatible with the dynamic forces generated by the FlexTrack and the manipulator, see Recommendation for anchors on page 55 .

Securing a crossmember

Action	Note/Illustration
1. Position the crossmembers on the floor.	 en1004070017
2. Adjust the horizontality of the FlexTrack with the M60 levelling screw.	
3. Check that all the levelling screws are touching the floor.	
4. Tighten the M60 nuts.	

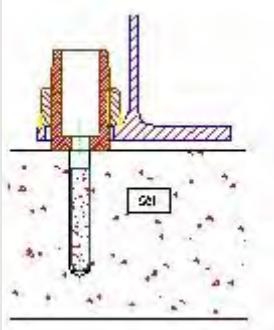
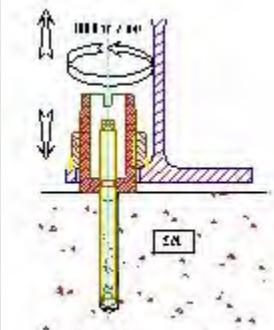
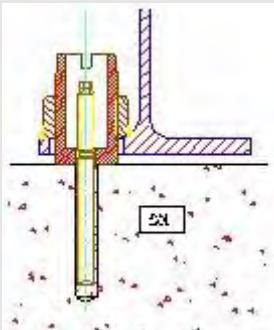
Continued

	Action	Note/Illustration
	5. Drill a hole in the floor through the levelling screw: Ø18 mm, 125 mm deep.	 en1004070018
	6. Remove the dust in the hole with a vacuum cleaner.	
	7. Brush the inside of the hole.	 en1004070019
	8. Remove the dust after brushing the hole with a vacuum cleaner.	 en1004070020

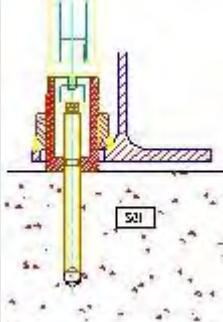
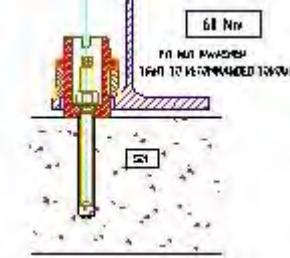
2 Installation and commissioning

2.5.2. Recommendations for floor mounting

Continued

Action	Note/Illustration
9. Introduce a glass capsule in the hole, after you've checked that the liquid inside the capsule is fluid.	 en1004070021
10. Insert the SPIT tool supplied with the anchor kit in a handheld electric punch drill's chuck. Insert the triangular extremity of the threaded rod in the SPIT tool.	
11. Insert the rod in the hole and start the rotation + punching at 1000 rpm. The capsule brakes and the rotating rod is mixing the melange.	 en1004070022
12. Hardening time before tightening depending on the ambient temperature: 2 hours < 10 °C ambient 1 hour < 20 °C ambient 40 minutes > 20 °C ambient.	 en1004070023

2.5.2. Recommendations for floor mounting

Action	Note/Illustration
13. If necessary, refine the adjustment of the track levelling using the M60 screws, and then tighten the M16 notched nuts. See Geometric alignment of FlexTrack IRT 501 on page 70	 en1004070024
14. Use the supplied washers, then the nuts and tighten to 60 Nm.	 en1004070025

WARNING!

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

2 Installation and commissioning

2.5.3. Geometric alignment of FlexTrack IRT 501

Continued

2.5.3. Geometric alignment of FlexTrack IRT 501

Instruction

The geometric alignment of the FlexTrack can be done by two different methods. The instructions for the method 1 are detailed below. In any case, the geometric alignment of the FlexTrack should be done based on the position of the linear guideways.

Method	Description
Method 1	Adjustment of the FlexTrack using an optical level.
Method 2	Adjustment of the FlexTrack using a laser tracker.

Method 1: list of tools

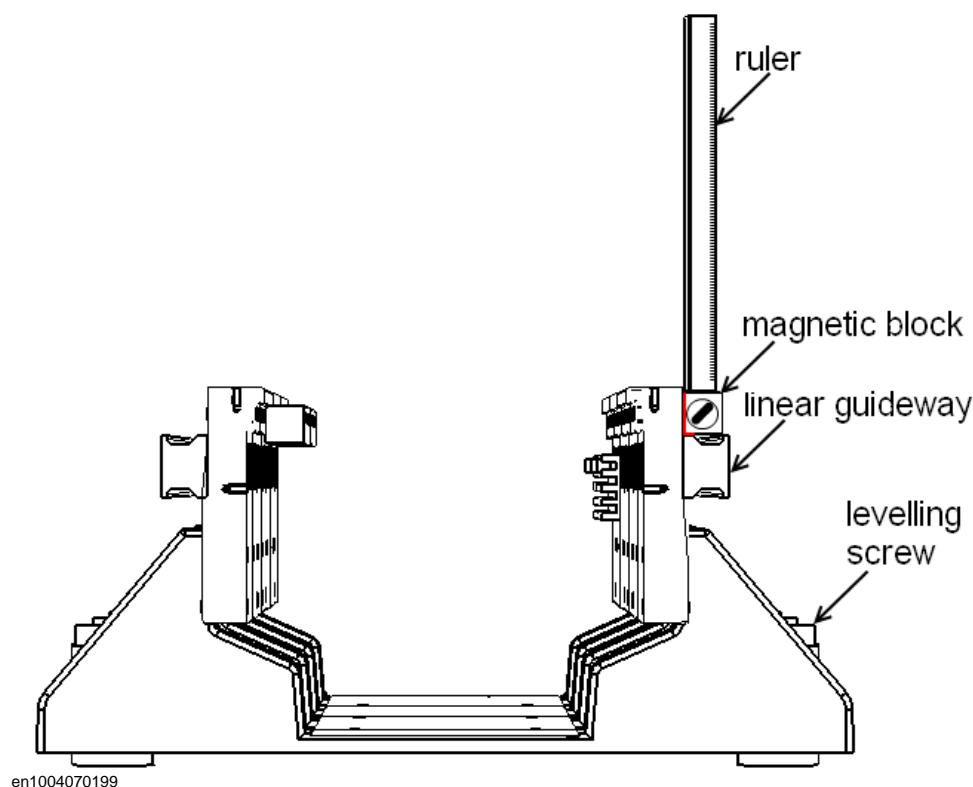
Tool	Illustration
Optical level with parallel-plate micrometer and tripod. Reading must allow estimating 0.1mm. Example: Leica NA2 + parallel plate micrometer GPM6 or GPM3	 en1004070196
Ruler minimal length 90cm, with M8 or M10 threaded shaft at the end. Example: Leica Geosystems - GWL92N Industrial Rod.	 en1004070197
Magnetic base with at least 2 perpendicular magnetic faces, and M8 or M10 threaded hole on the upper face.	 en1004070198
ABB levelling tool (3HAW107700360)	

Method 1: Instructions

	Action	Note/Illustration
1.	If the Flextrack is already assembled, remove the covers, the cover supports, and slightly loosen all the screws of the linear guideways.	
2.	Position the optical level such as you will be able to measure the ruler position from any location of the ruler on the linear guideways.	

Continued

	Action	Note/Illustration
3.	Make sure that the optical level is parallel to the sea level.	
4.	Measure the level of the Flextrack linear guideways at different locations of the Flextrack. Measurements should be made on both sides of each crossmembers.	The magnetic base attached to the ruler must be in contact with the guideway upper surface and the sidemember surface. See the contact surfaces in red on the picture below:



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	Action	Note/Illustration
5.	If the measurements reveal big level differences, you can slightly loosen the hexagon head bolts M12 x 40 screws that attach the sidemembers to the crossmembers to facilitate the levelling.	
6.	Use the ABB levelling tool 3HAW107700360 to adjust the levelling screws until all the measured points, on both sides of the FlexTrack, are at the same level. The planarity tolerance is 0.1mm/m, in lateral and transverse.	It is recommended to use one of the highest points of the Flextrack as reference: It is easier to bring the crossmember to a higher level rather than to bring it to a lower level.

Continues on next page

2 Installation and commissioning

2.5.3. Geometric alignment of FlexTrack IRT 501

Continued

	Action	Note/Illustration
7.	Once the alignment is correct, tighten all the locknuts of the levelling screws. If you have loosened them, tighten the hexagon head bolts M12 x 40 screws that attach the sidemembers to the crossmembers. (Tightening torque: 136 Nm.)	
8.	Unscrew one block from the carriage and use it to check the rails alignment: if the rails are correctly aligned, you should sense no "step" while passing the rails junction. If so then push the rail against the side member step and check that there is no clearance between the rails.	 en1004070200
9.	When the alignment is correct, tighten the screws one by one, after applying Loctite 243 on their thread. (Tightening torque: 132 Nm) If necessary, re-assemble the block in the carriage bracket and tighten its 4 hexagon socket head cap M10x30 class 12.9 screws and narrow contact-lock washers M10-16. (Tightening torque: 77 Nm)	
10.	Use a brush to lubricate the linear guideways.	

2.6. Assembly of the manipulator

Overview

When the FlexTrack is associated with an IRB robot it behaves like an integrated 7th axis. The robot should be ordered with an additional drive unit (907-1) for the FlexTrack motor, and optionally a resolver connection for 7th axis on the robot base (864-1). The FlexTrack unit has been designed for ABB IRC5 controller, for compatibility with other control systems please contact ABB.

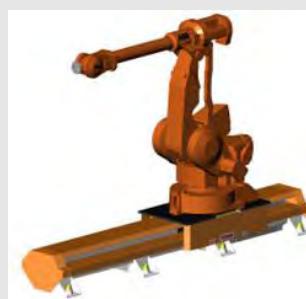
WARNING!



The robot should stand still while the carriage is moving, in order to avoid any additional dynamic forces on the FlexTrack.

Robot position on the carriage - 4 possibilities:

In line with the track, 0° (left) or 180° (right)



en1004070056



en1004070057

90° (left) or 270° (right)



en1004070058



en1004070059

See [Robot orientation on the Track on page 91](#) for details on how to link the robot to the track.

2 Installation and commissioning

2.7.1. Cabling of the FlexTrack

Continued

2.7 Cables, SMB box and cable chain

2.7.1. Cabling of the FlexTrack

Description

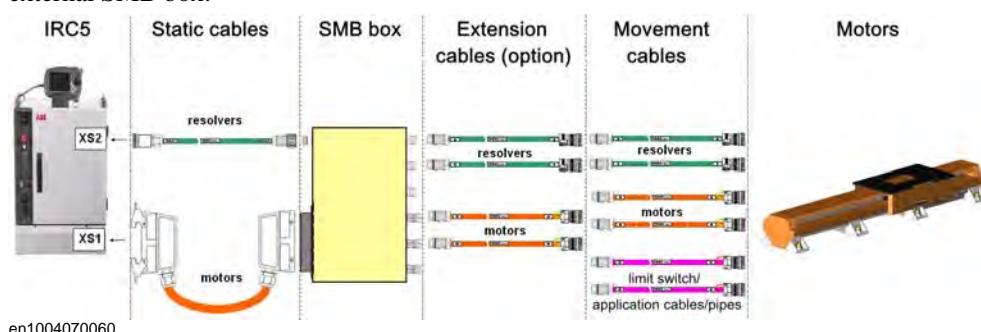
The FlexTrack has an internal cable chain which carries flexible movement cables.

The FlexTrack motor can be controlled through an external SMB box, or through the integrated SMB card of a manipulator.

Static cables connect to the IRC5 controller.

Schema

The schema below shows the typical control architecture of a FlexTrack controlled through external SMB box:



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

FlexTrack cables lengths

The FlexTrack flexible and static cables (power & resolver) are available in standard lengths of 5, 10 and 15 meters lengths.

Robot cables

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

TIP!

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



Continued

2.7.2. Specifications of the movement cables

Movement cables diameter and weight

The internal cable chain usually contains the FlexTrack motor power and resolver cables.

When additional cables are used, it is important to ensure that they can all fit in. In particular, if a number n of cables are used, you must make sure that:

- The total width of all the cables added together, as well as the width of n-1 separators (5mm each), does not exceed the internal width of the cable chain (175mm).
- The total weight of all cables does not exceed 10 kg/m.

Cable reference number	Cable type	Cable diameter in mm	Cable weight in kg/m
3HAW050008608- ¹⁾	FlexTrack motor power	13.3 mm	0.3 kg/m
3HAW050008609- ¹⁾	FlexTrack resolver	8.5 mm	0.2 kg/m
3HAW050008637- ¹⁾	FlexTrack resolver (no SMB)	8.5 mm	0.2 kg/m
3HAW050008610- ¹⁾	Position switch cable 1 sensor	6.6 mm	0.1 kg/m
3HAW050008654- ¹⁾	Position switch cable 2 sensors	6.6 mm + 6.6 mm	0.4 kg/m
3HAW050008611- ¹⁾	Position switch cable 4 sensors	11.2 mm	0.1 kg/m
3HEA802409- ¹⁾	IRB2400/4400/6600/7600 movement resolver cable	8.5 mm	0.2 kg/m
3HAC029834- ¹⁾	IRB1410/1600/2600/4600 movement resolver cable	7.8 mm	0.2 kg/m
3HAW050008617- ¹⁾	IRB1410/2400 movement power cable	21.5 mm	1.2 kg/m
3HAW050008622- ¹⁾	IRB4400 movement power cable	22.2 mm + 22.2 mm	1.7 kg/m
3HAW050008620- ¹⁾	IRB2600/4600/6600/7600 movement power cable	22.2 mm + 22.2 mm	1.7 kg/m
3HEA801277- ¹⁾	CP/CS Parallel	13.9 mm + 9.5 mm	0.7 kg/m
3HEA801279- ¹⁾	CP/CS DeviceNet	14 mm + 13 mm + 9 mm	1 kg/m
3HEA801278- ¹⁾	CP/CS INTERBUS	14 mm + 13 mm + 9 mm	0.7 kg/m
3HAW050008631- ¹⁾	Spot welding servo motor	13 mm + 5.2 mm	0.4 kg/m
3HAW050008628- ¹⁾	Spot welding power	12 mm + 12 mm + 12 mm	1.3 kg/m
3HAW050008644- ¹⁾	Tooling Protective Earth	6.5 mm	0.2 kg/m
3HAW050008633- ¹⁾	Power supply 24V	12.5 mm	0.4 kg/m
(Depends on hoses quantity)	Water and Air pipe DN12	19 mm	0.2 kg/m
	Water and Air pipe DN16	23.5 mm	0.4 kg/m

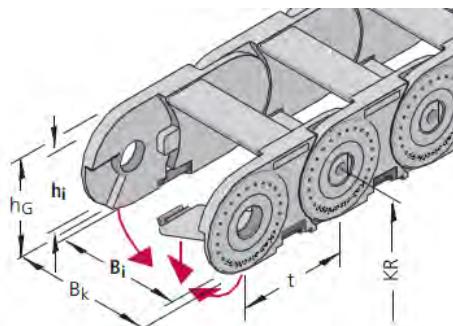
¹⁾The exact reference depends on the length of the cable. See *Product Manual - FlexTrack*.

2 Installation and commissioning

2.7.3. Specifications of the internal cable chain

Cable chain specifications

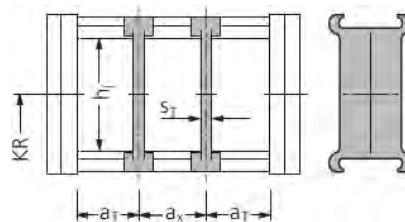
The internal cable chain is chosen to allow the customer to fit in additional flexible cables. However their specifications (size, weight, and bend radius) must be checked and compared with the cable chain specifications below.



Cable chain dimensions

Max. total cables weight	KR: Bend radius	h_i	h_G	B_i	B_k	t: Pitch	Intrinsic chain weight
10 kg/m	120mm	44mm	60mm	175mm	202mm	90.5mm	2.85 kg/m

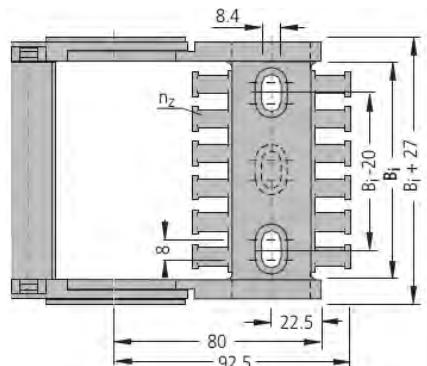
Between each cable, a cable chain divider must be used every 8 links:



Divider dimensions

h_i	s_T	a_x	$a_T \text{ min}$
44mm	5mm	25mm	25mm

A strain relief comb is used at the carriage attachment point to fix the cables position:



Comb dimensions

B_i	B_k	n_z
175mm	202mm	14mm

Continued

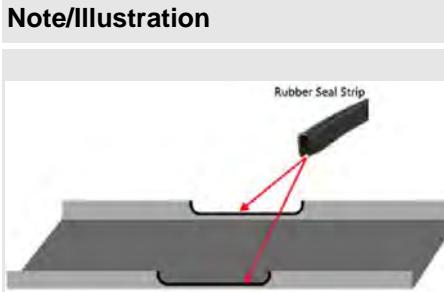
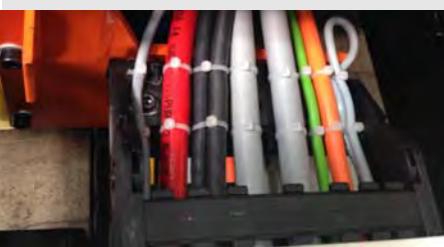
2.7.4. Installation of the cable chain

WARNING!



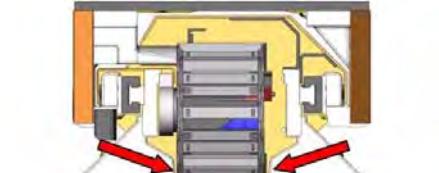
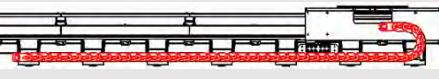
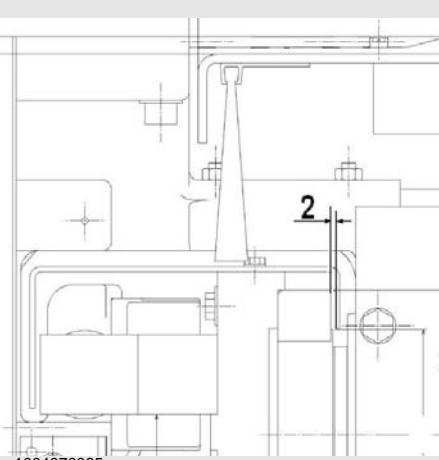
The FlexTrack cable chain is delivered assembled in the FlexTrack. If the cable chain and/or its content must be modified upon installation, make sure that the following recommendations are strictly followed. Improper installation of the cable chain will result in premature wear or damages of the chain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

Checklist

	Action	Note/Illustration
1.	A hole should be made in the cable tray to let all the cables exit the FlexTrack. All cables should exit the FlexTrack immediately at the end of the chain. If necessary, the edges of the cut tray area should be covered with rubber edge guard.	
2.	The cable tray should be absolutely free of any object (cable, screw, etc.). The bottom of the cable tray must be perfectly flat, without bump.	
3.	In the cable chain, the cables should be separated by the "separators", at least every 8 links. That the mass of the cables and pipes inside the chain should be balanced. Having all heavy cables on the same side of the chain could cause premature wear.	
4.	The cables should be firmly attached on the tiewrap plate at the end of the cable chain on the carriage side.	

2 Installation and commissioning

2.7.4. Installation of the cable chain

Action	Note/Illustration
5. The cable chain should be perfectly aligned with the FlexTrack chain tray. In order to achieve a correct alignment, it is recommended to fix both ends of the chain when the carriage is at the end of its stroke, and the chain is entirely unrolled in the duct.	 
6. For very long chains, a ramp should be used to prevent the chain from running on the cables exiting the cable chain. If the cable chain appears to be rubbing the cables and no ramp is installed, please order 1pc 3HAW107700646 and 1pc 3HAW107700647 from ABB.	
7. Verify that there is a clearance of approximately 2 mm between the rack covers and the pinion (see figure). If not, unscrew the cover screws and push the cover away from the pinion. Tighten the cover screws.	 en1004070065
8. Move the carriage to both ends in manual mode at low speed. Verify that the cable track is not rubbing on the covers during the carriage movement, and that no moving part shows abnormal wear. Check also that the stationary cables are not interfering with moving elements.	 en1004070066
9. Check that the cable chain is long enough to reach the ends of the stroke without damage. At least 1 chain link should remain horizontal to avoid unnecessary pulling on the chain fixing element. Verify again that the chain is parallel with the cable tray when unwind. If not, adjust the orientation of the fixed point of the chain as described in step 5.	

2.7.5. SMB box

Description

The FlexTrack motor must be controlled through an ABB Serial Measurement Board. For FlexTrack used to move a manipulator, it is possible to connect the motor resolver to the manipulator's integrated SMB board (robot option). If there is no robot, or if the robot is not equipped with a resolver socket for external axis on its base, it is necessary to use an external SMB box:



NOTE!



Check that there is enough space to install the SMB box at layout time.

2 Installation and commissioning

2.7.6. Cables connections

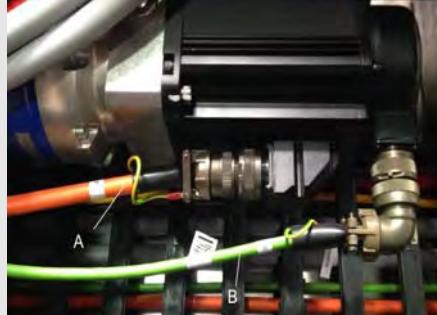
Continued

2.7.6. Cables connections

Instruction

If the FlexTrack motor is controlled through a robot integrated SMB card, the FlexTrack resolver cable should be connected to the robot base, the FlexTrack movement power cable should be connected to the FlexTrack static power cable and the FlexTrack static power cable should be connected to the XS7 socket on the IRC5 controller.

If the system is controlled through an external SMB box, the connections should be made as shown below:

Description	Note/Illustration
Connect the static resolver and power cables from the IRC5 to the SMB box.	
Connect the movement resolver and power cables from the carriage to the SMB Box.	
For all signal sockets on the SMB box that are unused, a PTC plug is required. This plug bridges pin 7 and 8.	
Ensure that the movement cables are properly connected to the motor.	 <p>A: Power cable B: signal cable</p>

2.7.7. Connectors on IRC5 controller

General

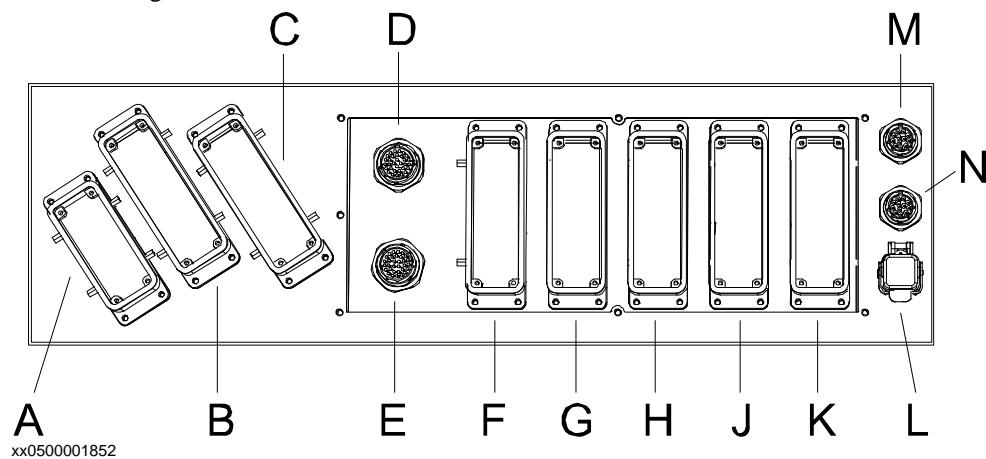
The following section describes the connectors on the respective front panels of the IRC5 controller. These are described below, and detailed in section, Connectors on controller IRC5 in Product Manual IRC5.

Single Cabinet Controller

The following details the connection interface on the Single Cabinet Controller.

Small robots

The following details the connection interface for small robots.



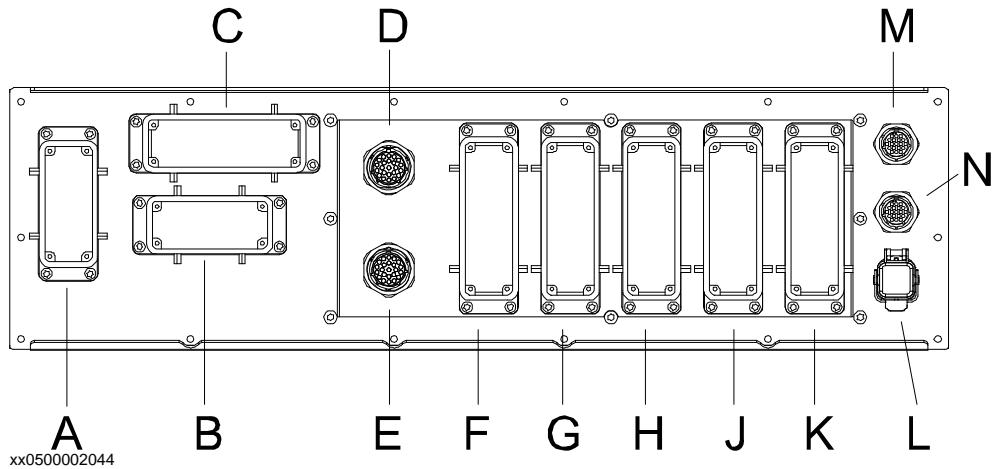
	Description
A	XP.0 Mains connection
B	XS.1 Robot power connection
C	XS.7 Additional axes power connection
D	XS.58 Position switches
E	XS.8 Position switches
F	XS.13/XS.5 Customer power/signals external connection
G	XS.10 Customer options
H	XS.11 Customer options
J	XS.12 Customer options
K	X3 Customer safety signals
L	XS.28 Network connection
M	XS.41 Additional axes SMB connection
N	XS.2 Robot SMB connection

2 Installation and commissioning

2.7.7. Connectors on IRC5 controller

Large robots

The following details the connection interface for large robots.



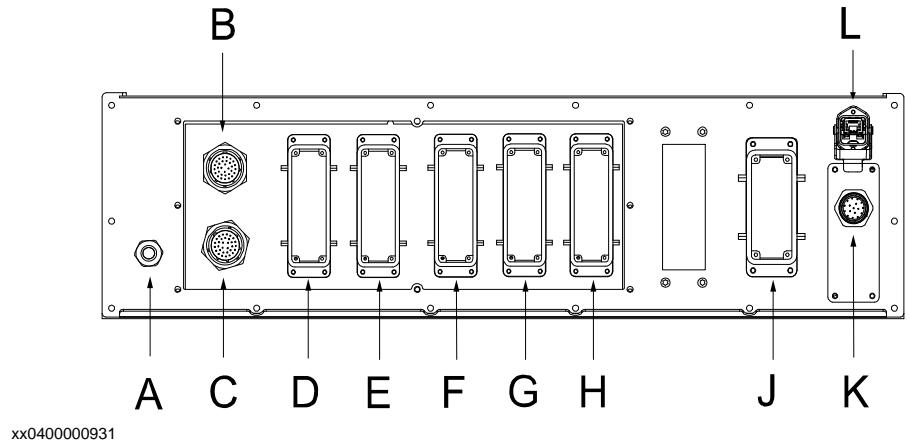
	Description
A	XP.0 Mains connection
B	XS.1 Robot power connection
C	XS.7 Additional axes power connection
D	XS.58 Position switches
E	XS.8 Position switches
F	XS.13/XS.5 Customer power/signals external connection
G	XS.10 Customer options
H	XS.11 Customer options
J	XS.12 Customer options
K	X3 Customer safety signals
L	XS.28 Network connection
M	XS.41 Additional axes SMB connection
N	XS.2 Robot SMB connection

Dual cabinet controller

The following details the connectors on the frontpanel of the Dual Cabinet Controller, that is the Control Module and the Drive Module.

Control Module

The following details the connectors on the frontpanel of the Control Module.



	Description
A	Power connection
B	A5.X8: Position switches
C	A5.X58: Position switches
D	A5.X5: Customer power/signals external connection
E	A5.X11: Customer options
F	A5.X12: Customer options
G	A5.X13: Customer options
H	A5.X14: Customer options
J	A5.X3: Customer safety signals
K	A22.X1: FlexPendant connection
L	A5.X28: Network connection

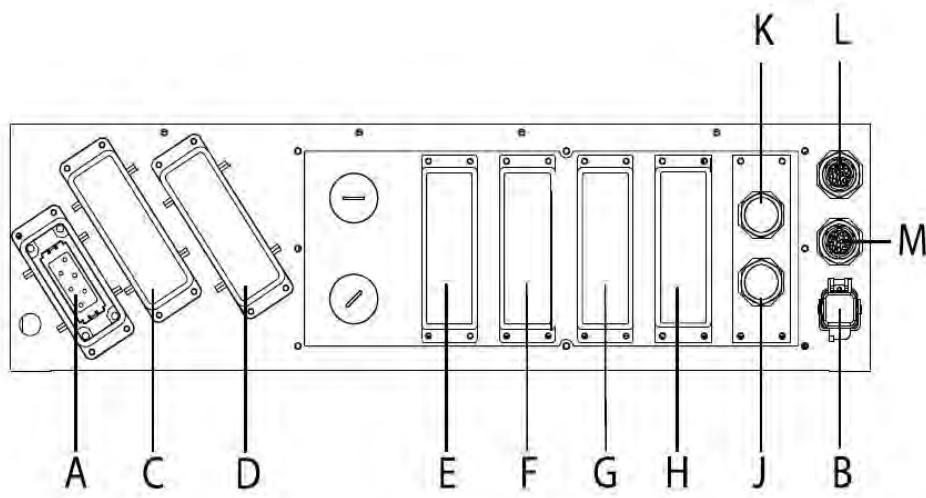
2 Installation and commissioning

2.7.7. Connectors on IRC5 controller

Drive Module

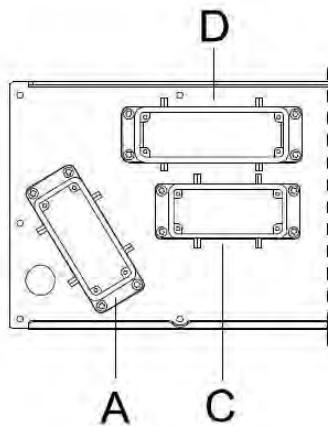
The following details the connectors on the frontpanel of the Drive Module.

Small robots:



xx0600002931

Large robots:



xx0700000424

	Description
A	A4.X0: Mains connection to transformer
B	A4.XS25: Power to Control Module
C	A4.X1: Robot power connection
D	A4.X7: External axes power connection
E	A4.XX: Customer options
F	A4.XX: Customer options
G	A4.XX: Customer options
H	A4.XX: Customer options
J	Communication cabling between Control/Drive Module
K	Communication cabling between Control/Drive Module
L	A4.XS41: Additional axes SMB connection
M	A4.XS2: Robot SMB connection

Continued

2.8 Software installation

2.8.1. Preparation for setup

General

How to get the system running is described in Getting started, IRC5 and in Robot Studio. This chapter contains instructions for starting up the IRC5 robot controller for the very first time after the physical installation has been completed.

Procedure

Hereunder are listed the required operations before starting up the FlexTrack setup:

	Action	Note/Illustration
1.	Configure the controller.	Load the FlexTrack parameters and configure the controller as described in the section below.
2.	Installation of the FlexTrack.	Check that the FlexTrack is installed and leveled as described in Assembly of the track on page 58 .
3.	Lubrication system.	If the Flextrack is equipped with an automatic lubrication system, it must be activated as described in Lubrication on page 101 .
4.	Manual lubrication.	If the Flextrack is not equipped with an automatic lubrication system, you need to manually lubricate the blocks and the rack, see Racks and pinion on page 113 .
5.	Revolution counter update.	Like any other robot axis, the FlexTrack revolution counter must be updated using the FlexPendant, see Update revolution counters on page 167 .

Loading the FlexTrack parameters

It is necessary to load the FlexTrack parameters in the controller. These can be found on the CD supplied in the delivery package. This procedure is described in details in the robot controller operation manual. Hereunder are listed the actions related to the FlexTrack specifics:

	Action
1.	Select the menu option: Add new parameters .
2.	Load the file <i>MOC.cfg</i> .

2 Installation and commissioning

2.8.2. Load configuration files

Continued

2.8.2. Load configuration files

Procedure

When the track is delivered, it will be delivered with the configuration files for the track. These files include the information for the IRC5 to recognise the track, as well as required parameters for the track motor. The files are specific to the system layout and configuration. If these files were not received, contact ABB.

To load the files, there are two methods, load the MOC files onto a USB stick and load them directly on the IRC5 or use Robot Studio Online. Below described only the USB method.

Action	Note/Illustration
1. Make a System Backup before beginning.	
2. Start the IRC5 and tap ABB .	 en1004070072
3. From the ABB menu, tap Control Panel .	 en1004070073
4. Tap Configuration .	 en1004070075

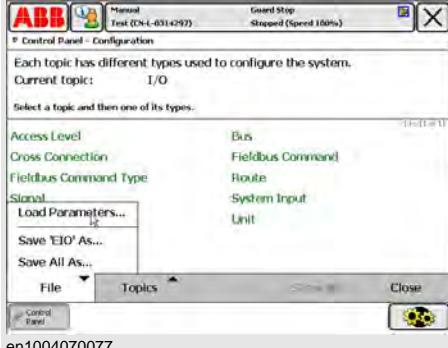
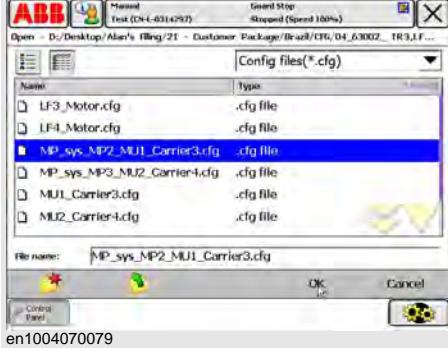
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Continues on next page

2 Installation and commissioning

2.8.2. Load configuration files

Continued

	Action	Note/Illustration
5.	Tap File.	
6.	From the File menu, tap Load Parameters.	
7.	Tap to select the Load parameters and replace duplicates option.	
8.	Browse for the appropriate *.CFG files to add, and tap OK. Do not restart the controller yet.	
9.	Repeat the steps for all *.CFG files that need to be loaded, and then warm restart the controller.	

2 Installation and commissioning

2.8.2. Load configuration files



TIP!

- If the IRC5 reboots without error, then the *.CFG files have been loaded correctly. If an error occurs, record the error message and error number and send the backup of the original system, system layout and error information to the *After-Sales support* to get help.
- If the system enters **System failure state** it is necessary to perform a cold start. This will restore the system to a default settings with no mechanical units or programs. Then restore the original backup taken before loading the CFG files. Then retry loading the CFG files.

2.8.3. Modification of the Travel Direction of the track

Continued

2.8.3. Modification of the Travel Direction of the track

Instruction

To change the travel direction, do the following:

The travel direction is in MOC.CFG, under the theme TRANSMISSION.

The travel direction and the transmission ratio are in transm_joint.

Never change the value of the transmission ratio. This is a function of the mechanical gear ratio.

If you want the track to move in the negative, add the "-" sign before the transmission ratio (-179,519).

TRANSMISSION: -name "TR2" -transm_joint 179.519

NOTE!



There are different track transmission ratios, depending on the type of track and the gear for each different model.

2 Installation and commissioning

2.8.4. Link Robot and Track

NOTE!

If no robot is mounted on the track, this set can be skipped.

Instruction

If a robot is mounted in the track, it is necessary to link the robot to the track. This effectively increases the work frame of the robot, allowing the robot to reach desired targets along the length of the track, by moving the robot on the track.

The declaration is in the MOC under the theme ROBOT in base_frame_coordinated.

In the example below, we declare that the robot ROB1 is mounted on the Track TR1.

ROBOT: -base_frame_coordinated "TR1"

Continued

2.8.5. Robot orientation on the Track

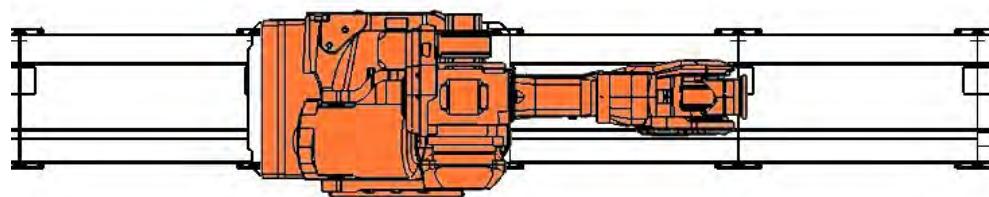
Introduction

To ensure that the robot works properly in linear on its track, it is necessary to declare the robots orientation relative to the track.

The declaration of the orientation is in the MOC under the theme ROBOT in:

- `base_frame_orient_u0` which corresponds to the quaternion Q1
- `base_frame_orient_u1` which corresponds to the quaternion Q2
- `base_frame_orient_u2` which corresponds to the quaternion Q3
- `base_frame_orient_u3` which corresponds to the quaternion Q4

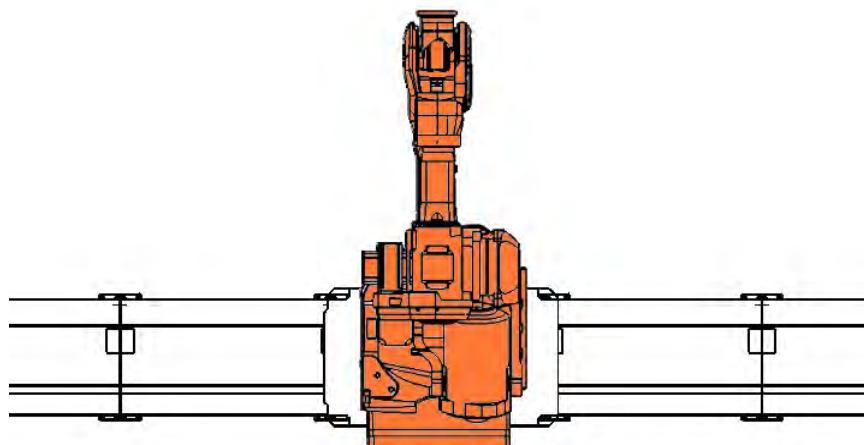
Robot aligned with the Track



en1004070080

`base_frame_orient_u0 = 1`
`base_frame_orient_u1 = 0`
`base_frame_orient_u2 = 0`
`base_frame_orient_u3 = 0`

Robot with a 90° rotation around Z on the Track



en1004070081

`base_frame_orient_u0 = 0.70710678`
`base_frame_orient_u1 = 0`
`base_frame_orient_u2 = 0`
`base_frame_orient_u3 = 0.70710678`

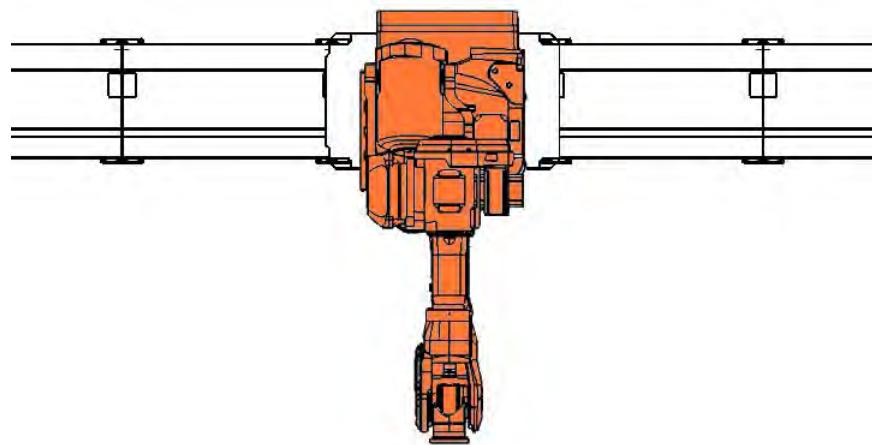
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2 Installation and commissioning

2.8.5. Robot orientation on the Track

Continued

Robot with a 270° rotation around Z on the Track



en1004070082

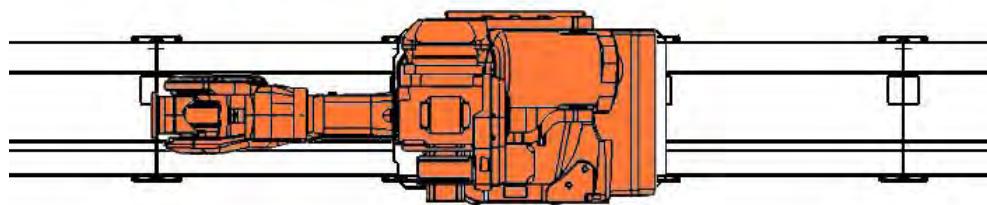
base_frame_orient_u0 = 0.70710678

base_frame_orient_u1 = 0

base_frame_orient_u2 = 0

base_frame_orient_u3 = -0.70710678

Robot with a 180° rotation around Z on the Track



en1004070083

base_frame_orient_u0 = 0

base_frame_orient_u1 = 0

base_frame_orient_u2 = 0

base_frame_orient_u3 = 1

2.8.6. Set Upper and Lower Limits Software Limits for track

Introduction

The Upper and Lower software limit of the track are software limits that prevent the track from being jogged beyond the mechanical limit of the track.

WARNING!



This is an important safety feature to prevent damage to the track. Ensure that the track direction has first been set and the track has been calibrated before performing this step.

Example

An example of the error message that is generated when the track is jogged beyond its software limit is shown below:



The Upper and Lower Limit of the track is the physical displacement distance from the zero position to the limit position in meters. This depends on the length of the track, and the location of the calibration pin (Also referred to as the Zero position of the track).

The limits are in `MOC.CFG`, under the theme `ARM`.

The upper limit is called `upper_joint_bound`, and the lower limit is called `lower_joint_bound`. Both are expressed in meters.

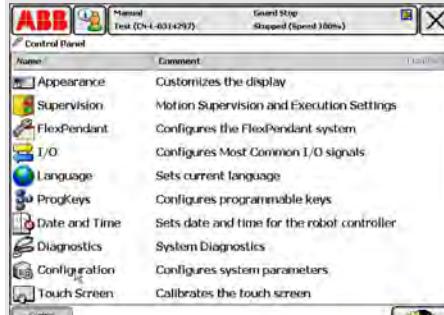
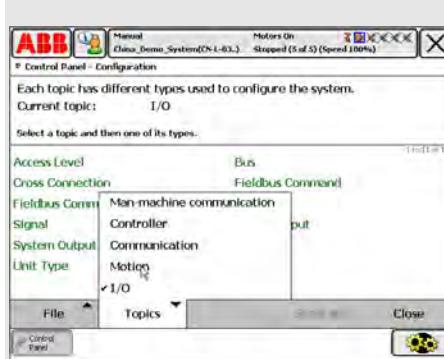
In the example below the upper limit is set to 6 m and the lower limit is set to -0.005 m.

`ARM : -upper_joint_bound 6 -lower_joint_bound -0.005`

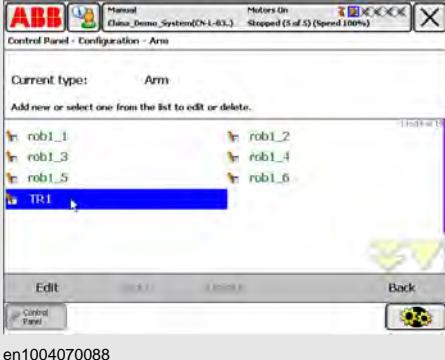
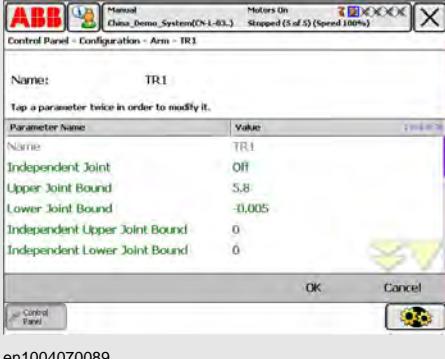
2 Installation and commissioning

2.8.6. Set Upper and Lower Limits Software Limits for track

To change the limits using the teach pendent, do the following:

	Action	Note/Illustration
1.	From the ABB menu, tap Control Panel .	 en1004070085
2.	Tap Configuration .	 en1004070075
3.	Under Topics , tap Motion .	 en1004070086
4.	Select Arm .	 en1004070087

2.8.6. Set Upper and Lower Limits Software Limits for track

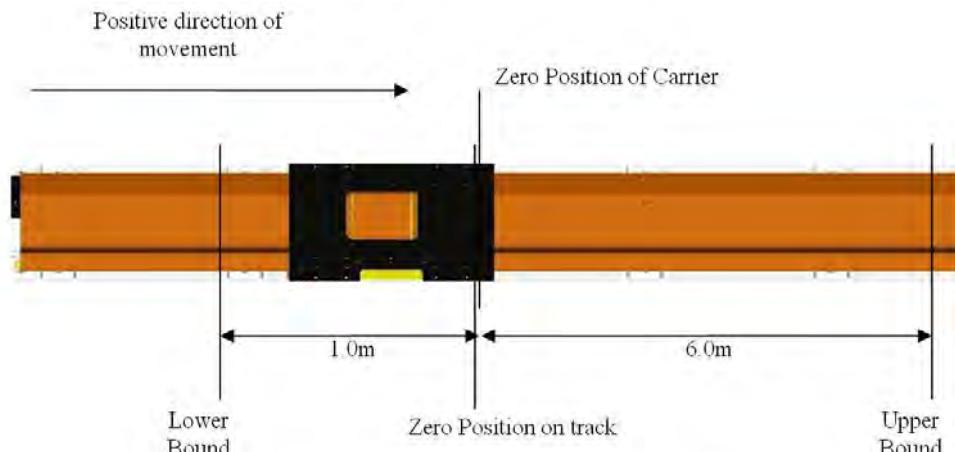
	Action	Note/Illustration
5.	Select the appropriate Mechanical unit.	 en1004070088
6.	Change the Upper joint bound and Lower Joint bound limits.	 en1004070089
7.	Tap OK to save the change and perform a warm start.	

Example of correct Upper and Lower Limit value

The following system is shown below as an example. The physical length of the track is 8 meters. The carriage is 0.8 meters long. The zero position of the track is in the middle of the track.

The MOC file would be as follows:

ARM: -upper_joint_bound 6 -lower_joint_bound -1



Track between limits (Carrier Position = 0.0m)

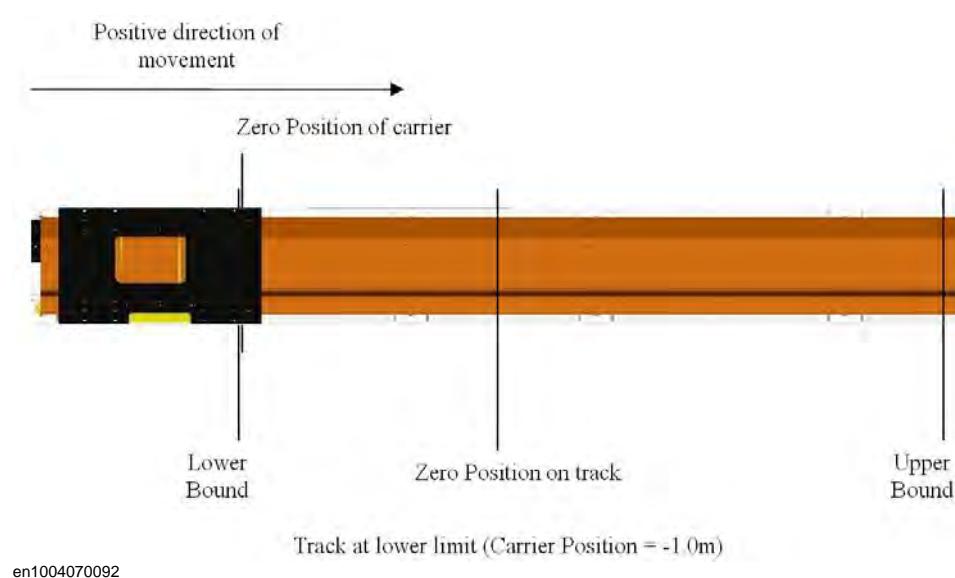
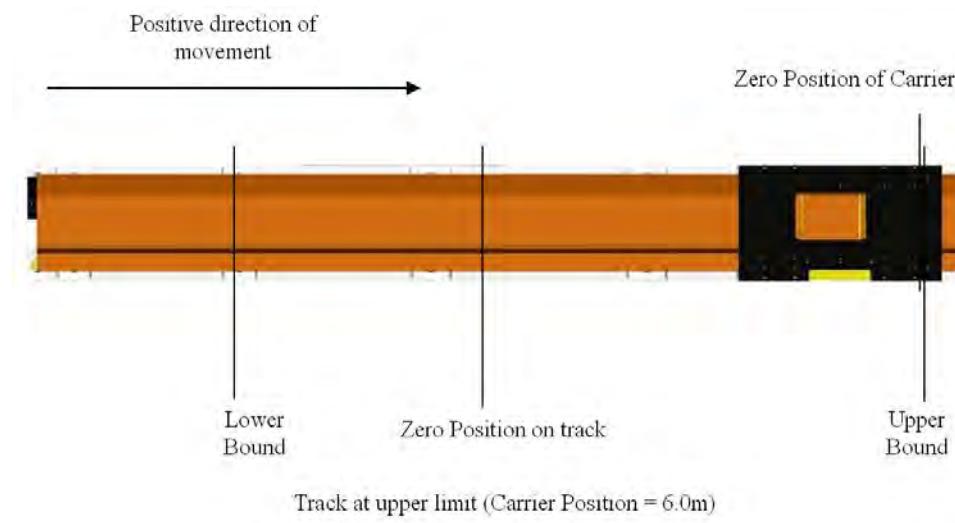
en1004070090

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2 Installation and commissioning

2.8.6. Set Upper and Lower Limits Software Limits for track

Continued

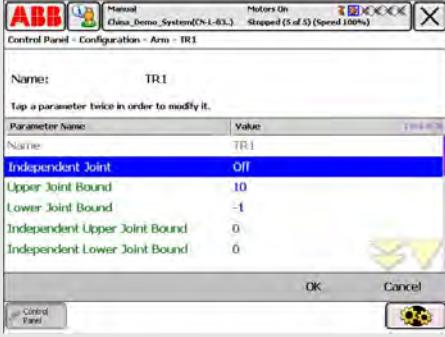


2.8.6. Set Upper and Lower Limits Software Limits for track

Identifying the upper and lower limits by experiment

If the actual value of the limit is not known, it is possible to jog the track to the desired limit position, and then read the limit value off of the teach pendant.

Below is the process to identify the limits by experiment:

	Action	Note/Illustration
	<p>1. Before beginning, ensure that the FlexTrack's revolution counter is calibrated.</p> <p>2. The Upper and Lower Limit monitoring is active when in manual mode, thus it is first necessary increase the current limit to beyond the mechanical stop. This will then allow the track to be jogging without error up to the desired limit position.</p> <p>ARM : -upper_joint_bound 11 -lower_joint_bound -1</p>	 <p>en1004070093</p> <p>WARNING!</p> <p>If the actual track length is 10 meters in the positive direction of movement, and -0.060 meter in the negative direction, then first set the Set the upper bound to 11 meters and the lower bound to -1 meters.</p>
	3. Perform a warm restart.	

2 Installation and commissioning

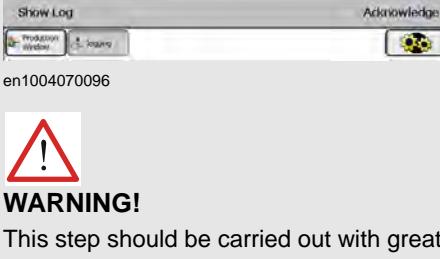
2.8.6. Set Upper and Lower Limits Software Limits for track

Continued

Action	Note/Illustration
<p>4. Jog the mechanical unit to the limit position as shown in the figure. A minimum distance of 50 mm should be used between where the software limit is set and the actual mechanical stop. In the jogging window, read off the tracks current position. Note that the distance is shown in millimeters, and not meters. In this example it is 9950.1 mm. Update the limit in the MOC file ARM: -upper_joint_bound 9.950 -lower_joint_bound -1</p>	 <p>en1004070094</p>  <p>en1004070095</p> <p>WARNING! This step should be carried out with great care. If the software limit has not been set correctly the mechanical unit may hit the mechanical hard stop.</p>
5. Perform a warm restart.	

2.8.6. Set Upper and Lower Limits Software Limits for track

Continued

Action	Note/Illustration
<p>6. Set the Jogging speed to 20% and test the software limit. If the software limit has been set correctly, the following error should be generated, see the figure.</p>	 <p>Event Log - Event Message</p> <p>Event Message 50028 2009-04-22 10:36:56</p> <p>Jog in wrong direction Description: Position for TR1 joint TR1 is out of working range. Actions: Use the joystick to move the joint in opposite direction.</p>  <p>Show Log Acknowledge</p> <p>en1004070096</p> <p>WARNING!</p> <p>This step should be carried out with great care. If the software limit has not been set correctly the mechanical unit may hit the mechanical hard stop.</p>
<p>7. Repeat the previous steps for the other limit.</p>	

2 Installation and commissioning

2.8.6. Set Upper and Lower Limits Software Limits for track

Continued

Offset parameters

The offset parameters for the FlexTrack IRT 501 are manufacturer parameters, and must not be modified on site.

Travel length

The travel length of each carriage are defined starting from the zero indicator (see figure).

In the parameter file, the travel length value is set to the maximum stroke.

Use a Ø8mm pin or the calibration tool to accurately setup the FLEXTRACK zero position, then follow the instruction in [Fine calibration on page 166](#).



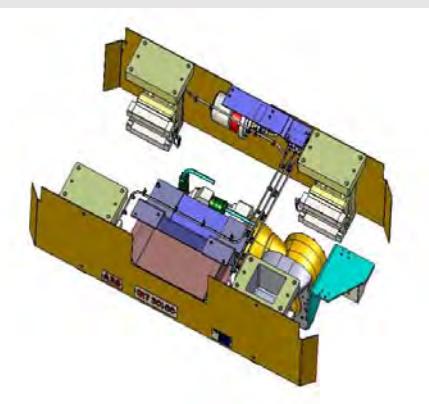
Continued

2.9. Lubrication

Activating the automatic lubrication system

The automatic lubrication system needs to be activated before using the FlexTrack. Once the system has been activated, it delivers the exact quantity of grease to each port at required time interval, during one year.

Follow the instructions below to activate the cartridge:

	Action	Note/Illustration
1.	Introduce the battery and the cartridge LONGTIME PD 0 in the port. The timer is activated once the battery is inserted. See <i>Memolub manual on page 122</i> for instructions about MEMOLUB.	 en1004070098
2.	The grease is pushed in the piping by the pump; a valve is sequencing the distribution to each port.	 en1004070099

2 Installation and commissioning

2.10. Zone Division

Continued

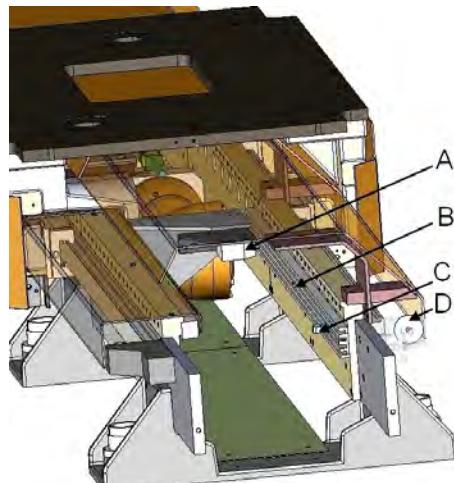
2.10. Zone Division

Description

The purpose of the zone division is to divide the track into zones. It consists of switches that sense when the carriage comes into respective zones using moveable cams. One set of switches is used for two zones, and two sets of switches for four zones. If zone division is chosen the option EPS (Electronic Position Switches) is not necessary, for more detailed information regarding EPS, see *Product specification - Controller IRC5 with FlexPendant* and *Application Manual Electronic Position Switches* (Document ID: 3HAC027709-001).

The wiring of the zone division is subject to the system layout. Hence, the design of the circuit is left to the system integrator. Refer to the wiring diagram developed by the system integrator for details on how the zone division sensors are used.

The figure below shows the location of the position switch:



Item	
A	1, 2 or 4 position switch
B	Cam rail
C	Moveable zone division cam
D	Hard stop bumper

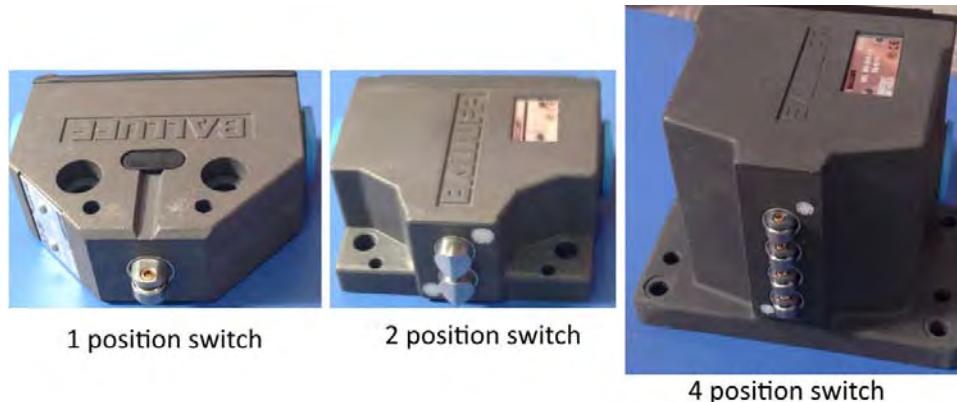
Continued

TIP!



The 1,2,4 position switch can be useful to verify if the carriage is at a particular desired position. Usually 1 position switch is used at the end of the track to detect if the track reaches the limit position. 2 position and 4 position switch can be used when 2 particular positions and 4 particular positions are needed to be detected in the track stroke.

The position switch can be connected to the IRC5 or a PLC depending on the system layout.



TIP!



If two carriages are used on the same track, setup the cam positions on rails in order to secure the working range. Two types of cam would be used.



2 Installation and commissioning

2.11. Setting up the FlexTrack limit switch for additional safety

2.11. Setting up the FlexTrack limit switch for additional safety

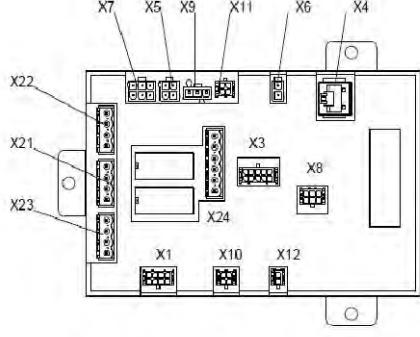
Option 1 - Wiring the limit switch into the safety link of the IRC5

NOTE!

This option should be used in simple systems where there is no safety PLC however additional safety is required to guarantee that the carriage does not go beyond the software limits set in the controller.

Operating principle

When the limit switch is triggered, it will open a circuit that is constantly monitored by the robot controller. As soon as this open circuit is detected, the IRC safety chain is opened and the drive module turns off the motors immediately stopping all motion. At the same time **Error 20209 - External Contactor Open** is generated on the Flex Pendant.

	Action	Note/Illustration
1.	<p>Connect the signal cable from the limit switch to the IRC5 cabinets "Contactor Board" to A43:X24. This connection is described below.</p> <p>The board is located as shown:</p>	 en1004070203
2.		<p>A43 Contactor unit</p>  en1004070202

2.11. Setting up the FlexTrack limit switch for additional safety

	Action	Note/Illustration
3.	Remove the terminal connector A43:X24. There should normally be a jumper between Pins 1 & 2 (Jumper between Pins 3 & 4 or Pin 5 & 6 can be used for each limit switch)	 en1004070201
4.	Remove the jumper between Pin 1 & 2 and place one cable from the limit switch into pin 1 and the other into pin 2.	
5.	Start the IRC5 controller. If the "Error 20209 - External Contactor Open" is generated, check the cable connection between A43:X22 and the limit switch. Ensure that the limit switch is normally closed.	
6.	Repeat the above step for the limit switch at the other end of the FlexTrack.	If all the pairs of Pins in A43:X24 are used, then place the limit switch 1 and limit switch 2 in series to an existing chain

NOTE!



The limit switch has 1 normally open contact and 1 normally closed contact. The normally closed circuit should be connected to the A43:X24 terminal.



TIP!

- If the limit switch is triggered by the carriage, it will not be possible to jog the carriage away from the limit switch. In this case, release the brake and manually push the carriage away from the sensor. Then update the revolution counters before attempting to run the track when necessary.
- For more information, please review IRC5 product manual, Chapter 2. Connect a remote switch. 3HAC021313-001

Option 2 - Wiring the limit switch into the safety PLC

NOTE!



This option should be used for more complex systems where a safety PLC is controlling the complete station and additional safety to guarantee that the carriage does not go beyond the software limits set in the controller.

Operating Principle

When the limit switch is triggered, it will open a circuit that is constantly monitored by the safety PLC. Additional logic should be programmed in the PLC react appropriately, such as shutting off the power to the motors.

2 Installation and commissioning

2.11. Setting up the FlexTrack limit switch for additional safety



TIP!

For details on how to connect to the safety PLC, please review the PLC specific manual.

Continued

3 Maintenance

3.1. Introduction

Structure of this chapter

This chapter details all maintenance activities recommended for the FlexTrack IRT 501-66/66R/90/90R.

It is based on the maintenance schedule, located in 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 information required to perform the activity, e.g. required tools and materials. The procedures are gathered in different sections, divided according to the maintenance activity.

Safety information

Before any service work is commenced, it is extremely important that all safety information is observed! There are general safety aspects that must be read through, as well as more specific safety information that describe danger and safety risks when performing the procedures. Read [Safety on page 13](#) before performing any service work.

3 Maintenance

3.2. Standard toolkit

Continued

3.2. Standard toolkit

General

All service (repairs, maintenance and installation) procedures contain lists of tools required to perform the specified activity. All special tools required are listed directly in the procedures while all the tools that are considered standard are gathered in the standard toolkit and defined in the table below. This way, the tools required are the sum of the standard toolkit and any tools listed in the instruction.

Contents, standard toolkit

Qty	Tool
1	Ring-open-end spanner 8-22 mm
1	Socket head cap 2.5, 4, 5, 6, 8 and 10 mm
1	Small flat tip screwdriver
1	Plastic mallet
1	Torque wrench 10-140 Nm
1	Ratchet head for torque wrench 1/2
2	Socket head cap 5mm, 8mm, 10mm socket 1/2" bit L 20 MM
2	Hex head cap 13mm, 19mm socket 1/2" bit L 20 MM

3.3 Maintenance schedule and expected component life

3.3.1. Specification of maintenance intervals

Description

The intervals may be specified in different ways depending on the type of maintenance activity to be carried out and the working conditions of the FlexTrack IRT 501-66/66R/90/90R:

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

3 Maintenance

3.3.2. Expected component life

General

The expected life of a component can vary greatly depending on how intensely the FlexTrack IRT 501 is run.

Expected life

Component	Expected life	Note
Cables	3,000,000 cycles	The expected life can also be affected by assemblage of cabling other than standard options.
Cable chain	10,000,000 m	For example, the given life for the cable chain of a six-meter-long-stroke FlexTrack (12 meters per cycle) operating 260 test cycles a day is 9 years.
Ball bearing blocks • IRT 501-66 • IRT 501-66R • IRT 501-90 • IRT 501-90R	• Over 27 years • Over 20 years • Over 20 years • Over 10 years	The expected life is given for the ball bearings of a six-meter-long-stroke FlexTrack (12 meters per cycle) operating 1,000 maximum load cycles a day.
Gear and pinion	Over 10 years	

3.3.3. Maintenance schedule

General

The FlexTrack IRT 501-66/66R/90/90R must be maintained regularly to ensure proper function. The maintenance activities and intervals are specified in the table below.

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

The inspection intervals do not specify the life of each component.

Values for these are specified in the previous chapter.

Activities and interval, standard equipment

The table below specifies the required maintenance activities and intervals:

Maintenance activity	Equipment	Interval	More information
Inspection and cleaning if necessary	Racks and pinion	Every 100 km or every week	See Racks and pinion on page 113 .
Lubricate (If no automatic lubrication)	Racks and pinion	Every 100 km or every week	See Racks and pinion on page 113 .
Inspection and cleaning if necessary	linear guideways	1 month	See Racks and pinion on page 113 for cleaning linear guides.
Lubricate (If no automatic lubrication)	Ball bearing blocks	1 month	See Ball bearing blocks on page 117 .
Inspect and re-fill if necessary (If automatic lubrication)	Automatic lubrication system	1 month	See Automatic lubrication system on page 119 .
Inspection	Emergency stop and stroke limit system	1 month	See Emergency stop and stroke limit system on page 125 .
Inspection	Zone division system	1 month	See Zone division system on page 126 .
Inspection	Cables, connectors and electrical cabinets	1 month	See Cables and connectors on page 128 .
Inspection	Cable chain	1 month	See Cables and connectors on page 128 .
Inspection (visual)	Gear	3 months	See Gear on page 129 .
Inspection (tightening)	Gear	1 year	See Gear on page 129 .
Replacement	SMB Battery pack	Battery low alert (1)	See Replacement, SMB Battery pack on page 131 .

3 Maintenance

3.3.3. Maintenance schedule

NOTE!

 SMB Battery low alert (38213 Battery charge low) is displayed when remaining backup capacity (robot powered off) is less than two months. Typical lifetime of a new battery is 36 months if the robot is powered off 2 days/week or 18 months if the robot is powered off 16 h/day. The lifetime can be extended (approx. 3 times) for longer production breaks by a battery shutdown service routine. See *Operating manual - IRC5 with FlexPendant* for instructions.

3.4 Activities 100 Km or one week

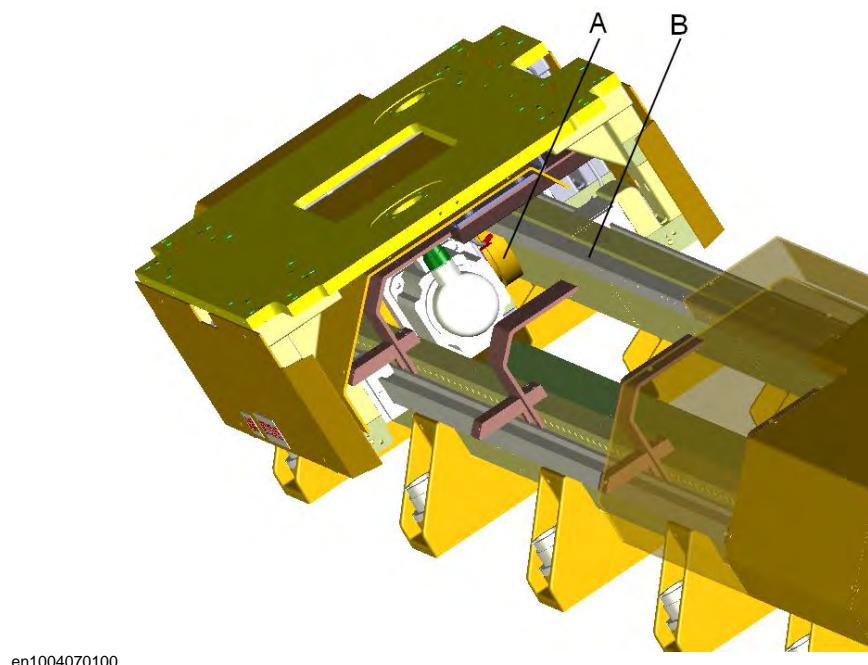
3.4.1. Racks and pinion

General

It is recommended to inspect and, if necessary, clean the racks and the pinion every 100 km or every week. If the FlexTrack IRT 501-66/66R/90/90R is not equipped with an automatic lubrication system, it is necessary to lubricate the racks and the pinion manually every 100 km or every week.

Location

The figure below shows the location of the gear racks and pinion:



	Name
A	Pinion
B	Rack

Required equipment

When you clean the racks and the pinion, or if the FlexTrack IRT 501-66/66R/90/90R is not equipped with an automatic lubrication system, it is necessary to lubricate the racks and pinion manually. Use one of the recommended lubricants:

Equipment	Note
Lubricant	CASTROL Longtime PD0
Lubricant	KLÜBER Microlube GB0
Lubricant	TOTAL Multis EP 0

3 Maintenance

3.4.1. Racks and pinion

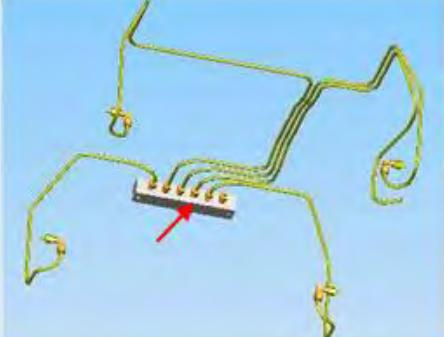
Equipment	Note
Lint free cloth	
Lubrication gun (if no automatic lubrication system).	

Lubrication of the racks and pinion

The procedure below details how to perform manual cleaning and lubrication of the racks and pinion of FlexTracks that are not equipped with an automatic lubrication system.

NOTE!

Use lint free cloth.

Action	Note/Illustration
1. Remove the FlexTrack upper covers and rack covers.	
2. Inspect the racks and the pinion, clean them if necessary.	
3. If you have cleaned them, use a brush to lubricate the racks and the pinion.	
4. Move the carriage back and forth and repeat step 3.	
5. Re-attach the covers.	
6. Every week or 100 km, if the FlexTrack is not equipped with an automatic lubrication system, connect the pump to the rack & pinion grease port on the manifold. Check that no pipe has been damaged.	 en1004070101
7. Pump to inject the grease in the piping. Inject 3 grams of lubricant for rack & pinion per week or 100 km.	

Continued

3.5 Activities 1 Month

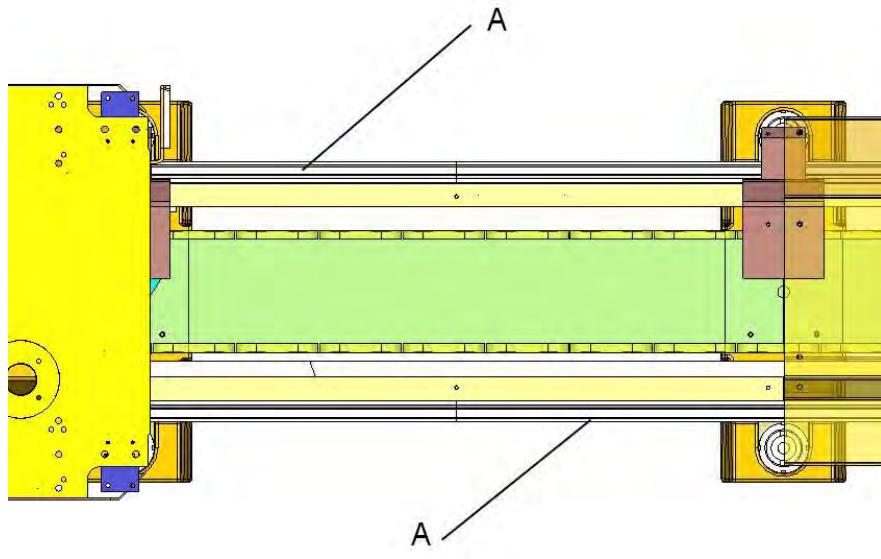
3.5.1. Linear guideways

General

It is recommended to inspect and, if necessary, clean the linear guideways every month.

Location

The figure below shows the location of the linear guideways:



	Name
A	Linear guideways

Required equipment

When you clean the linear guideways, it is necessary to lubricate them manually. Use one of the recommended lubricants:

Equipment	Note
Lubricant	CASTROL Longtime PD0
Lubricant	KLÜBER Microlube GB0
Lubricant	TOTAL Multis EP 0
Lint free cloth	

3 Maintenance

3.5.1. Linear guideways

Lubrication of the linear guideways

The procedure below details how to perform cleaning and, if necessary, lubrication of the linear guideways.

NOTE!

Use lint free cloth.

Action	Note/Illustration
1. Remove the FlexTrack upper covers and rack covers.	
2. Inspect the linear guideways, clean them if necessary.	
3. If you have cleaned them, use a brush to lubricate the linear guideways.	
4. Move the carriage back and forth and repeat step 3.	
5. Re-attach the covers.	

Continued

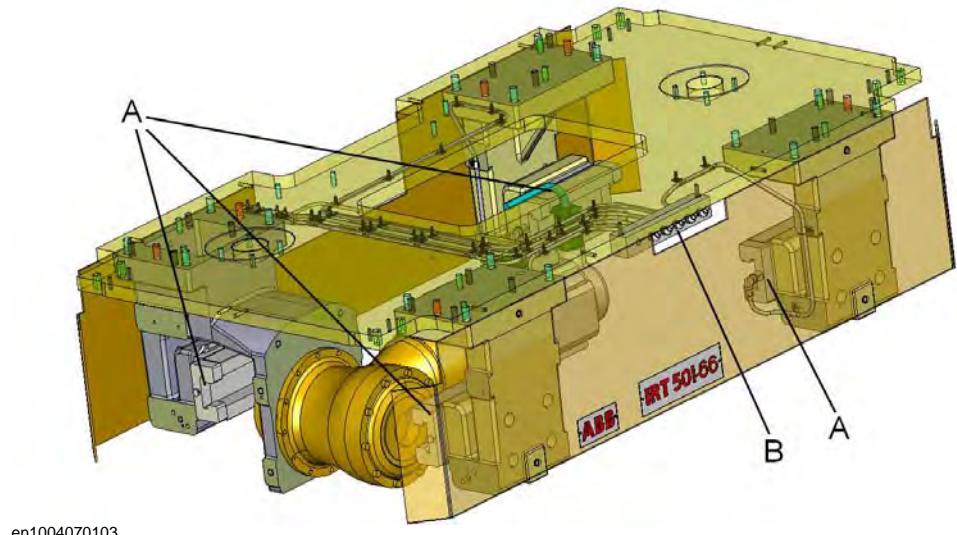
3.5.2. Ball bearing blocks

General

If the FlexTrack IRT 501-66/66R/90/90R is not equipped with an automatic lubrication system, it is necessary to lubricate the ball bearing blocks manually every month.

Location

The figure below shows the location of the ball bearing blocks:



	Name
A	Ball bearing blocks
B	Grease manifold

Required equipment

Use one of the recommended lubricants:

Equipment	Note
Lubricant	CASTROL Longtime PD0
Lubricant	KLÜBER Microlube GB0
Lubricant	TOTAL Multis EP 0
Lubrication gun	

3 Maintenance

3.5.2. Ball bearing blocks

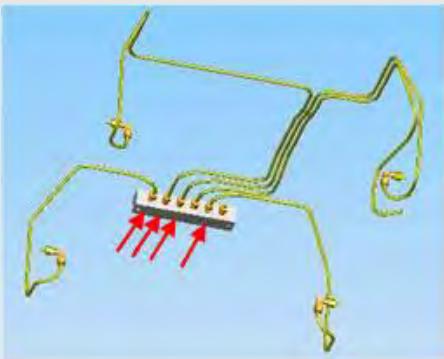
Lubricate the ball bearing blocks

The procedure below details how to lubricate the ball bearing blocks.

NOTE!

Use lint free cloth.



Action	Note/Illustration
1. Connect the pump to a block grease port on the manifold. Check that no pipe has been damaged.	 en1004070104
2. Pump to inject the grease in the piping. During the operation, watch the seals at the ball bearing block: when you see the grease pouring out, you have applied enough grease. In average, one should inject 1 gram of lubricant per block and per month.	
3. Repeat the steps 1 and 2 for each block port on the manifold.	

Continued

3.5.3. Automatic lubrication system

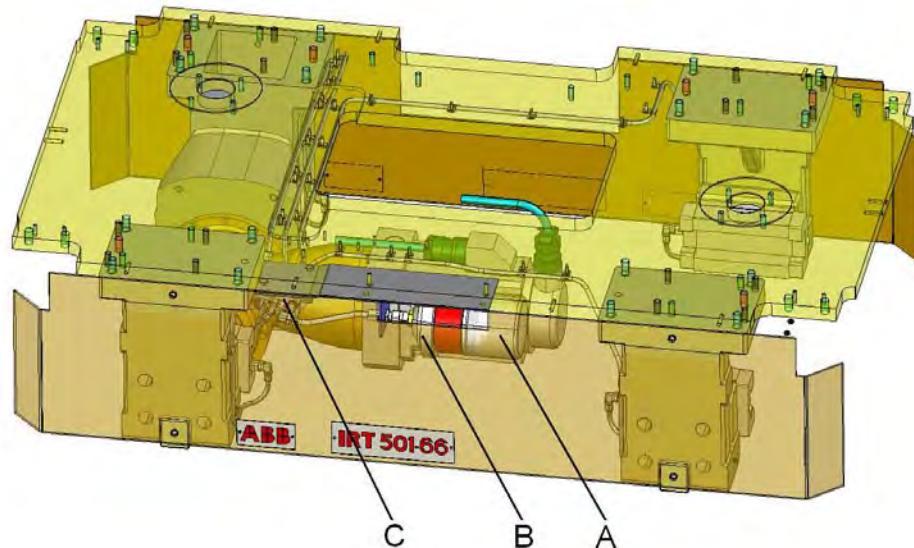
General

If the FlexTrack is equipped with an automatic lubrication system, an electric pump will deliver the correct quantity of grease from a cartridge to the ball bearing blocks and to the pinion at required time intervals (one cycle per day). The grease is pushed in the piping by the pump; a valve is sequencing the distribution to each port.

The level of the lubricant should be checked once a month, even though the system should apply the lubricant equally over a longer period.

Location

The figure below shows the location of the lubrication system.



en1004070105

	Name
A	Grease cartridge
B	Control unit grease pump
C	Oil dispatcher

3 Maintenance

3.5.3. Automatic lubrication system

Required equipment

WARNING!



Use lithium soap flowable grease, class NLGI 0, with a mineral oil base, doped with EP (extreme pressure) additives. The base oil viscosity must be ISO VG68 to ISO VG 100. Grease doped with EP additives is absolutely necessary, due to high loads on blocks. Customers must use the following lubrication suggested by ABB or malfunction of the lubrication system may occur.

Equipment	Note
Lubricant	CASTROL Longtime PD0
Lubricant	KLÜBER Microlube GB0
Lubricant	TOTAL Multis EP 0

WARNING!



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

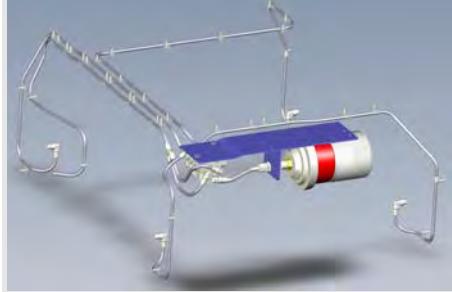
Checking grease level and inspect the pipes

The procedure below details how to check the grease level and inspect the pipes.

	Action	Note/Illustration
1.	Locate the cartridge.	

3.5.3. Automatic lubrication system

Continued

Action	Note/Illustration
2. Check the level of lubricant, if necessary replace the cartridge and the battery (although the replacement battery should be delivered with the replacement cartridge, note that it is possible to use a set of 3pc standard AA batteries).	 en1004070106 <p>For cartridge replacement, see the memolub manual on the next page.</p>
3. Check that no pipe has been damaged, and that the grease is distributed to each block and on the pinion.	 en1004070107

3 Maintenance

3.5.3. Automatic lubrication system

Continued

Memolub manual

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

Opening and closing the Memolub

Action	Note/Illustration
1. Opening the Memolub. First place the Memolub on a flat and clean surface. Push firmly with one hand on top of the Memolub. With the other hand, hold the black base and turn counterclockwise. Pull the transparent bell to open.	 en1004070108
2. Closing the Memolub. Use the same technique: hold the cranked black base, put the transparent bell and turn it clockwise. When the closed position is reached you should hear a "click".	 en1004070109

Installing a new grease cartridge

Respect the following instructions to replace the grease cartridge:

Action	Note/Illustration
1. Open the Memolub® as described before. 2. Pull-up the black rubber seal. Fill-in the Memolub® with a manual grease pump. This manual operation is required only if the Memolub has been used without a cartridge, if the previous cartridge has run out of grease. Place the pump nipple at the entry of the Memolub, and pump until you see grease coming out at the outlet. Two strokes of the manual pump are usually enough.	 en1004070110

Continued

	Action	Note/Illustration
3.	Pull-up the black strap to reveal the battery case. Insert a new Memolub battery: hold it by the black plastic strap & insert it in the Memolub respecting the instructions on the label. If the battery is correctly inserted the motor is activated during 1 sec. to check that the motor is working properly. Put the black rubber seal back in place.	 en1004070111
4.	Remove the paper disc from the replacement cartridge. Fill-in the required dates: "Started" and "Replace before". The "replace before" date is depending on the Memolub program. Put the paper disc back in place in order to see the instructions when the Memolub is closed.	 en1004070112
5.	Press softly on the cartridge until the grease comes out, to avoid injecting air into the pump.	 en1004070113
6.	Place the cartridge at the inlet of the pump. Check that the cartridge is correctly inserted in the inlet of the pump.	 en1004070114

3 Maintenance

3.5.3. Automatic lubrication system

Continued

Action	Note/Illustration
7. Place the spring and the compression disc inside the transparent bell. Put the bell back in place and check that the compression disc is correctly lying on the top of the cartridge surface.	 en1004070115
8. Close the Memolub as described before.	

Test the Memolub® (Check Function)

Action	Note/Illustration
1. To check that the Memolub is working well after a maintenance operation, press one of the 3 connectors located on the base during a few seconds. The Memolub is starting a dispensing cycle. The completion of the cycle means that the battery & control board of the Memolub are working well. <i>It is important that you run this test cycle only if a cartridge is in place, otherwise you'll fill-in the pump with air.</i>	 en1004070116

3.5.4. Emergency stop and stroke limit system

General

It is recommended to ensure the emergency stop and stroke limit system effectiveness every month.

Motor brake

The procedure below details how to ensure the effectiveness of the motor brake in case of emergency stop.

Action	Note/Illustration
1. The FlexTrack is powered, but not moving.	
2. Press the emergency stop button.	
3. The brake is applied; you should hear the noise in the motor area.	
4. Try to push the carriage manually	
5. If the brake is correctly applied, it is not possible to move the carriage manually.	
6. Proceed with the required validations in the control system to switch back to auto mode.	

Verification of the effectiveness of the stroke limit system

A software limit prevents the carriage from moving beyond its acceptable upper and lower stroke limits.

The procedure below details how to ensure the software stroke limit is working correctly:

Action	Note/Illustration
1. Switch the IRC5 to manual mode.	
2. With the teach pendant, try to jog the carriage to both ends.	
3. If the software limits are functional, it should not be possible to go beyond the defined upper or lower end position, and it should not be possible to reach the hard stops.	

3 Maintenance

3.5. Zone division system

Continued

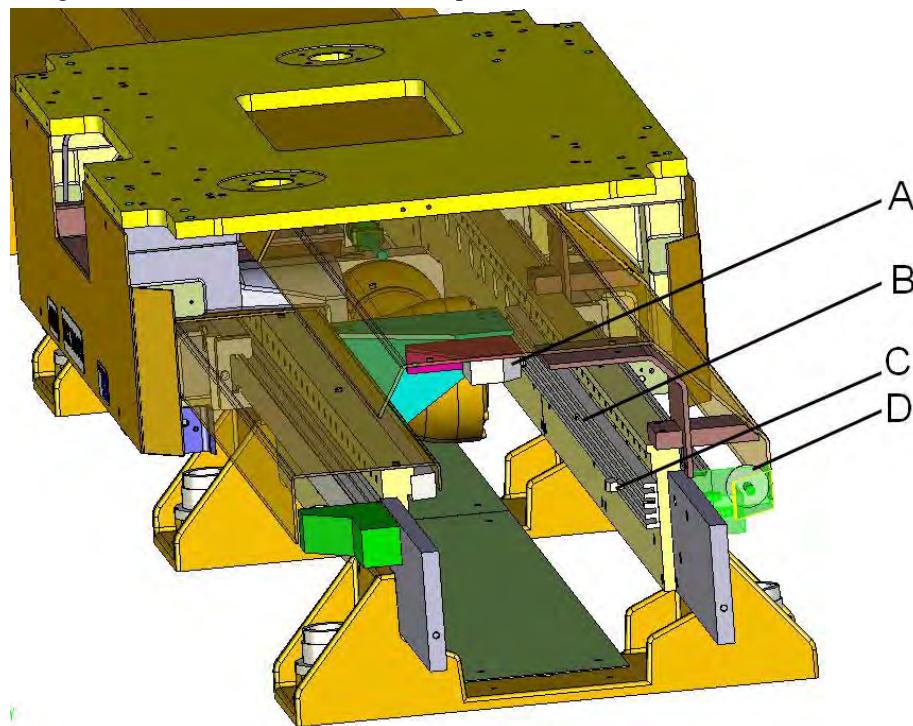
3.5.5. Zone division system

General

It is recommended to ensure the zone division is working properly every month.

Zone division system

The figure below shows the location of the position switch:



Inspect monthly the following parts:

	Name
A	Limit switch
B	Cam guide (on both ends of the FlexTrack)
C	Cam (on both ends of the FlexTrack)
D	Hard stop (bumper) (on both ends of the FlexTrack)

Verification of the effectiveness of the zone division sensor

If a 1 position, 2 position or 4 position limit switch is used to divide the track into zones, then the following procedure should be followed to ensure it is functioning correctly:

Action	Note/Illustration
1. Power off the IRC5 and activate the E-Stop.	
2. Activate the limit switch sensor using an adhesive tape.	
3. Reset the E-Stop button and power on the IRC5 in manual mode.	
4. Check if the reaction / error from the IRC5 or PLC are as expected while the limit switch is triggered.	This depends on how the limits switch has been wired and the function it is being used for. For example, if the limit switch is wired to a lamp, then the lamp should be illuminated.
5. Power off the IRC5 and activate the E-Stop.	
6. Remove the adhesive tape and reset the E-Stop button and power on the IRC5.	

3 Maintenance

3.5.6. Cables and connectors

3.5.6. Cables and connectors

Inspection of electrical operations

WARNING!



Turn off all electric power, hydraulic and pneumatic pressure supplies to the robot and for the FlexTrack IRT 501-66/66R/90/90R.

Check the cabling

Check monthly:

If any cables ...	then ...
have been damaged through wear or pinching	replace the cable
run against sharp edges	Replace the cable, remove the cause of the wear, or route the cable in a different way.

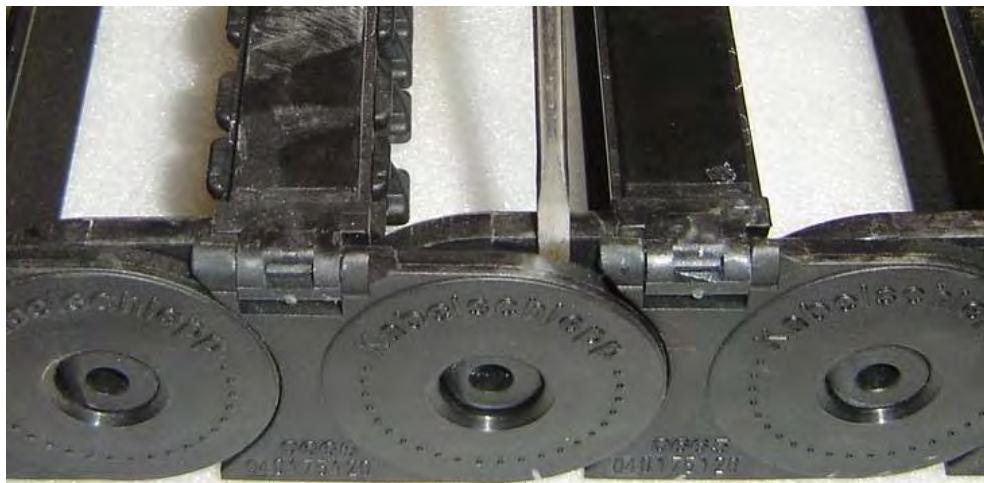
Check the connector

Check monthly:

- All the connectors on the controller, the SMB box and the motor are firmly tightened, and that there's no damage to the cable outlet.

Inspection of the cable chain

Once a month check that the cable track shows no trace of excessive wear due to rub on a fixed part. If one element is damaged, it is possible to replace it without removing the whole chain from the FlexTrack.



en1004070118

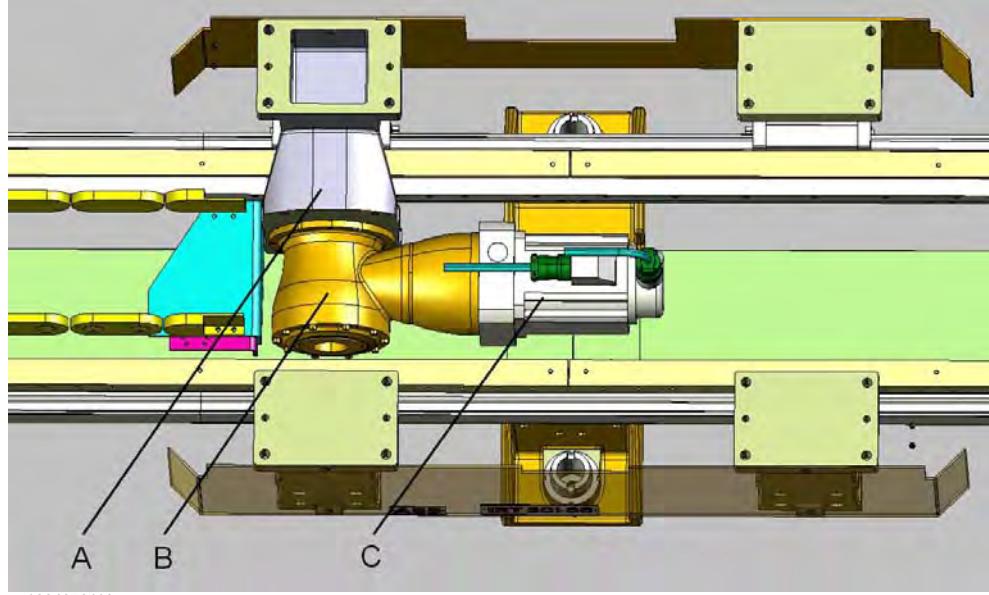
Continued

3.6 Activity 3 and 12 months

3.6.1. Gear

Location

The figure below shows the location of the gear:



	Name
A	Bracket
B	Gear
C	Motor

Oil

The FlexTrack IRT 501 gear is filled with synthetic oil for the internal lubrication. The quantity of oil in the gear is planned for the gear's lifetime. However, if you need to refill the gear with oil for any reason, you must use one of the recommended oil below (ISO VG 220):

Supplier	Reference
MOBIL	SHC 630
SHELL	Omala HD 220
TOTAL	Carter SH 220

NOTE!

The oil in the gear does not need to be changed during life of the gear.



3 Maintenance

3.6.1. Gear

Maintenance schedule

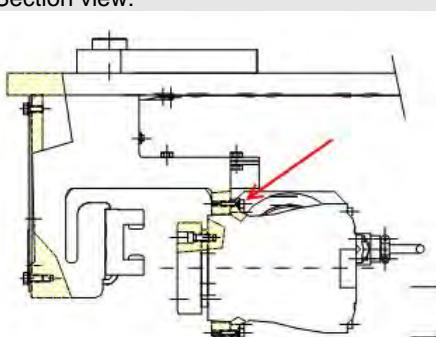
Interval	Maintenance activity
1st use	Visual inspection Verification of the tightening torque
After the first 500 hours / 3 months	Visual inspection Verification of the tightening torque
Every 3 months	Visual inspection
Every year	Verification of the tightening torque

Visual Inspection

Every 3 months, remove the necessary FlexTrack and carriage side covers and inspect the gear. Make sure that there is no mark of wear or damages to the gear, and that there is no oil leak.

Verification of the tightening torque

Every year, make sure that the tightening torque of the hexagon socket head cap M6x25 class 12.9 screws that secure the gear to the bracket is 16.5 Nm:

Action	Note/Illustration
1. Separate the carriage bracket holding the gearbox and motor from the carriage, and move the carriage away. For the procedure about how to move the carriage away, see 4.5.2 <i>Disassemble the bracket from the carriage</i> on page 146.	
2. The tightening torque of the hexagon socket head cap M6x25 class 12.9 screws that secure the gear to the bracket is 16.5 Nm .	Section view: 

Continued

3.7 Activities 36 Months

3.7.1. Replacement, SMB Battery pack

General

The SMB box contains a main board and a battery for the memory backup in order to maintain position data.

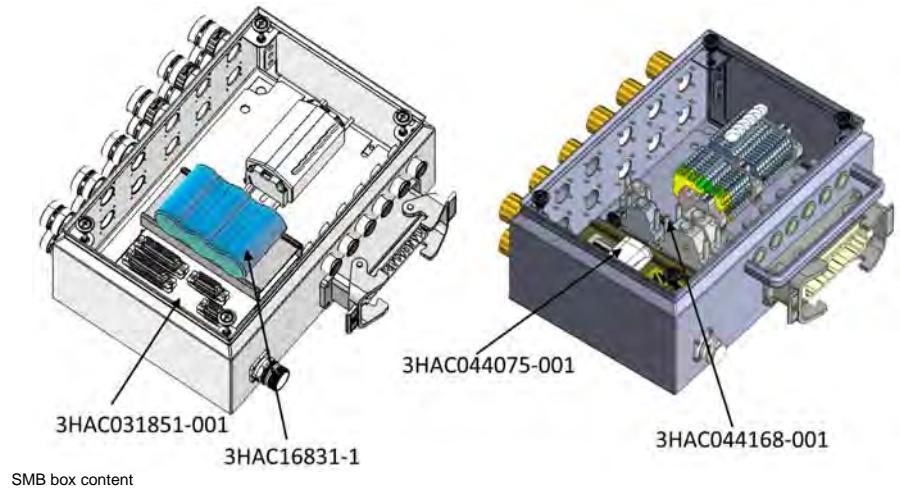
SMB boxes manufactured before 2015 are equipped with a SMB board DSQC633 (Ref. 3HAC031851-001) and a SMB battery (Ref. 3HAC16831-1).

SMB boxes manufactured after 2015 are equipped with a SMB board RMU101 (Ref. 3HAC044168-001) and a Battery pack RMU (Ref. 3HAC044075-001).

The battery should be replaced every three years or when the battery is going flat. This is generally shown by an error code on the FlexPendant screen (38213). Information about error codes can be found in the FlexPendant documentation.

NOTE!

In a new system the batteries are charged to full capacity after a few hours in STANDBY mode.



3 Maintenance

3.7.1. Replacement, SMB Battery pack

Instructions

Replace the SMB battery as follows:

	Action	Note/illustration
1.	Position first the carriage in the calibration position (align the synchronization gauges).	 en1004070122
2.	Switch off the power on the SMB box.	 WARNING! Turn off all electric power, hydraulic and pneumatic pressure supplies to the robot and for the FlexTrack IRT 501.
3.	Open the SMB box and locate the battery.	
4.	Cut the plastic straps.	
5.	Unplug the 2 wires cable from the board and remove the battery pack.	
6.	Place the new battery pack, plug the connector on the board, and secure the pack with straps.	
7.	Close the SMB box, switch on the power.	
8.	Update the revolution counters of the axis.	

4 Repair

4.1. Instruction

Structure of the this chapter

This chapter details all repair activities recommended for the FlexTrack IRT 501-66/66R/90/90R and any external unit. Each procedure contains all information required to perform the activity, e.g. required tools and materials.

Safety information

Before any service work is commenced, it is extremely important that all safety information is observed! There are general safety aspects that must be read through, as well as more specific safety information that describe danger and safety risks when performing the procedures. Read [Safety on page 13](#) before performing any service work.

4 Repair

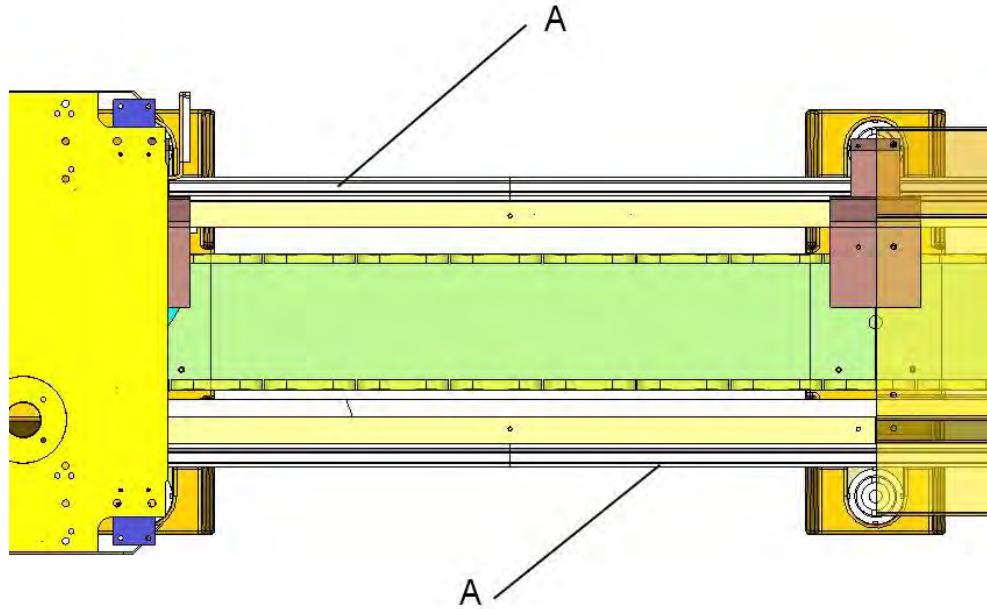
4.2. Replace the linear guideways

4.2. Replace the linear guideways

Location

There are 3 different lengths of linear guideway sections, depending on its position on the FlexTrack. If you need to replace one or more sections of linear guideway, make sure that you order the right parts. See [Spare parts on page 175](#) at the end of this manual to find the correct part number.

The figure below shows the location of the linear guideways:



en1004070124

Name	
A	Linear guideways

Required equipment

Equipment	Note
Standard toolkit	The content is defined in Standard toolkit on page 108 .
Rail pressing tool IRT501-66/66R: 3HAW107700358 IRT501-90/90R: 3HAW107700456	The rail pressing tool is part of the kit of tools necessary to assemble the FlexTrack. See Procedure of assembly on page 58 .
Ball bearings block	It is recommended to use one spare ball bearing block to verify the alignment of the rails.
Loctite 243	Apply Loctite 243 on the screws that hold the linear guideways.

4.2. Replace the linear guideways

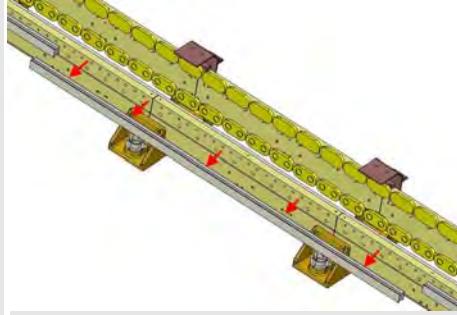
Continued

When you install new linear guideways, it is necessary to lubricate them manually. Use one of the recommended lubricants:

Equipment	Note
Lubricant	CASTROL Longtime PD0
Lubricant	KLÜBER Microlube GB0
Lubricant	TOTAL Multis EP 0
Lint free cloth	

Disassemble

Follow the directions below to disassemble the linear guideway:

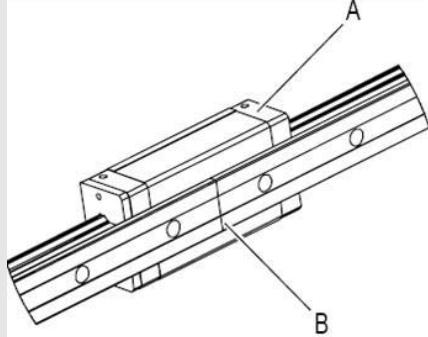
	Action	Note/Illustration
1.	Remove all necessary FlexTrack covers and disassemble all hexagon head bolt M12x35 class 12.9 screws with contact-lock washers M12-27 and plain washers 12x32x4 which hold the linear guideway to the sidemember.	As the linear guideway screws should have been tightened with Loctite 243, you may have to apply high force on the wrench.
2.	Remove the linear guideway.	 en1004070125

4 Repair

4.2. Replace the linear guideways

Continued

Assemble

Action	Note/Illustration
<p>1. Assemble linear guideways using all the hexagon head bolt M12x35 class 12.9 screws with contact-lock washers M12-27 and plain washers 12x32x4. Use the rail pressing tool to make sure that the rails are pushed against the sidemember mounting surface. Use standard tools, slightly tighten.</p>	 en1004070126
<p>2. Check the rails alignment: Use a ball bearing block; if you do not have a spare block, disassemble one from the carriage (remove the 4 hexagon head bolt M10X30 class 12.9 screws). If the linear guideways are correctly aligned, you should sense no "step" while passing the rails junctions. If you do, then push the rail against the sidemember step, using the rail pressing tool, and check that there's no clearance between the rails. When the alignment is correct, tighten the screws one by one, after applying Loctite 243 on its thread.</p> <p>Tightening torque: 132 Nm. If necessary, re-assemble the block in the carriage bracket and tighten its 4 screws (Tightening torque: 77 Nm)</p>	 en1004070127



en1004070128



CAUTION!

If you need to remove the block out of the rails, make sure you use the bearing protection to prevent the balls from falling out.

4.2. Replace the linear guideways*Continued*

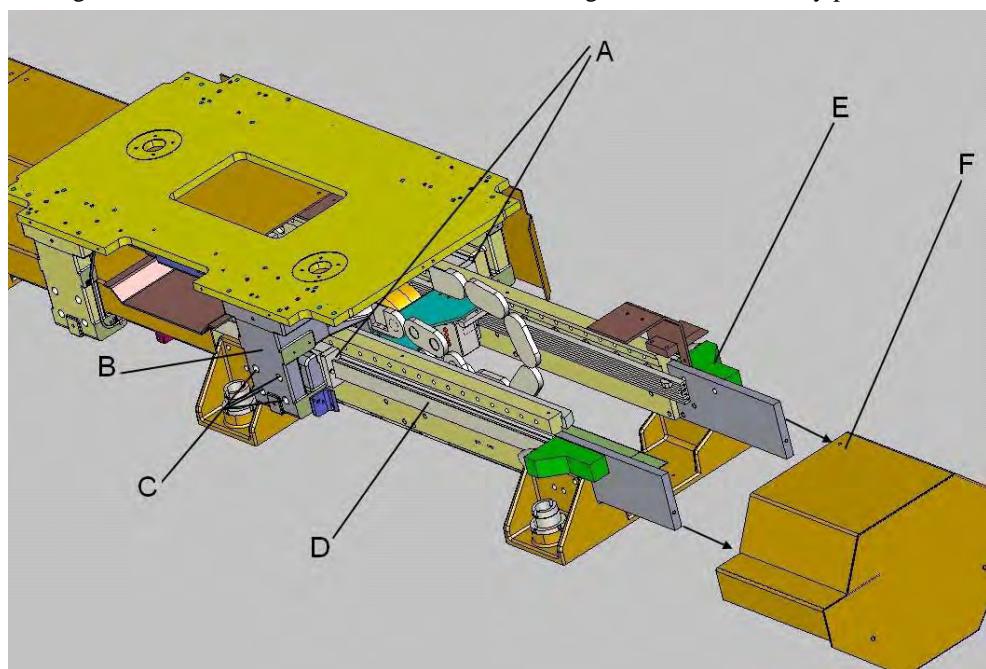
Action	Note/Illustration
3. Once you have tightened a screw, mark it with a white marker.	 en1004070129
4. Use a brush to lubricate the linear guideways.	
5. Re-assemble the FlexTrack covers.	

4 Repair

4.3. Replace the ball bearing blocks

Location

The figure below shows the location of the ball bearing blocks and other key parts:



en1004070130

Name	
A	Ball bearing blocks
B	Carriage bracket
C	4 hexagon head bolt M10x30 class 12.9 screws and 4x M10-16 narrow contact-lock washers
D	Linear guideway
E	Mechanical stop (supports + rubber hard stop)
F	End cover

Required equipment

Equipment	Note
Standard toolkit	The content is defined in Standard toolkit on page 108 .
Lubrication gun	
Jack >2t	

Use one of the recommended lubricants:

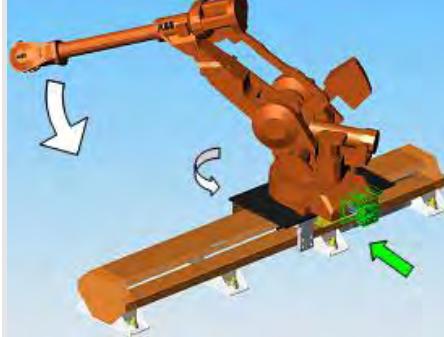
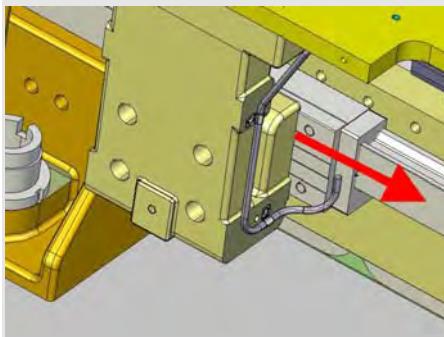
Equipment	Note
Lubricant	CASTROL Longtime PD0
Lubricant	KLÜBER Microlube GB0
Lubricant	TOTAL Multis EP 0
Lubrication gun	

Continues on next page

4.3. Replace the ball bearing blocks

*Continued***Disassemble**

Follow the directions below to disassemble the linear guideway:

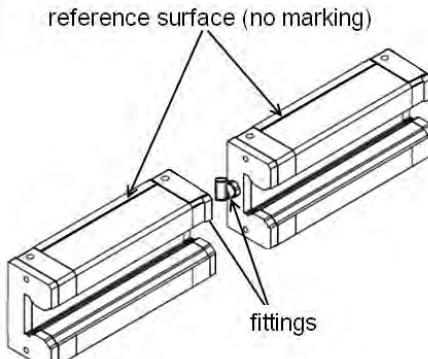
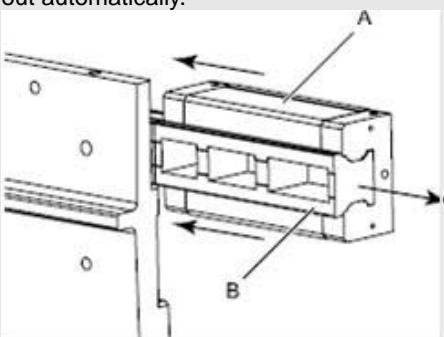
	<ol style="list-style-type: none"> 1. Disassemble the necessary carriage side cover, the FlexTrack end cover (if present) and the mechanical stop. 2. Move the robot on the opposite direction from the bracket in order to unload it. 	 en1004070131
	<ol style="list-style-type: none"> 3. Unplug the lubrication pipe from the block. 4. Remove the 4 hexagon head bolt M10X30 class 12.9 screws and 4 M10-16 narrow contact-lock washers. 	<p>Use a jack to secure the height of the carriage plate (don't rise it more than 1 mm)</p> <p></p> <p>WARNING!</p> <p>Rising the carriage more than 1 mm can seriously damage the remaining three ball bearing blocks.</p>
	<ol style="list-style-type: none"> 5. Let the block slide out of the bracket and linear guideway. 	 en1004070132

4 Repair

4.3. Replace the ball bearing blocks

Continued

Assemble

Action	Note/Illustration
1. Remove the standard screws delivered with the blocks and replace them with the grease pipe fittings taken from the previous blocks. The fittings must be on the inside of the carriage, and the reference surface (with no marking) on the upper face of the block.	 <p>reference surface (no marking)</p> <p>fitting</p> <p>en1004070133</p>
2. Insert it onto the rail. Pay attention to the position of the fittings which must be on the inside of the carriage.	 <p>en1004070134</p> <p>ATTENTION: Do not remove the black plastic protection of the bearings until you slide the block onto the rail. They will come out automatically.</p>  <p>A</p> <p>B</p> <p>en1004070135</p> <ul style="list-style-type: none"> • A: Ball bearing block • B: Plastic bearing protection
3. Inject grease in the block. During the operation, watch the seals at the ball bearing block: when you see the grease pouring out, you have applied enough grease.	
4. Let the bearings block slide into the bracket and tighten the 4 hexagon head bolt M10X30 class 12.9 screws s and 4x M10-16 narrow contact-lock washers. (Tightening torque: 77 Nm)	
5. Remove the jack.	

Continues on next page

4.3. Replace the ball bearing blocks*Continued*

	Action	Note/Illustration
6.	Re-connect the lubrication pipe.	
7.	Re-assemble the mechanical stop and the covers.	

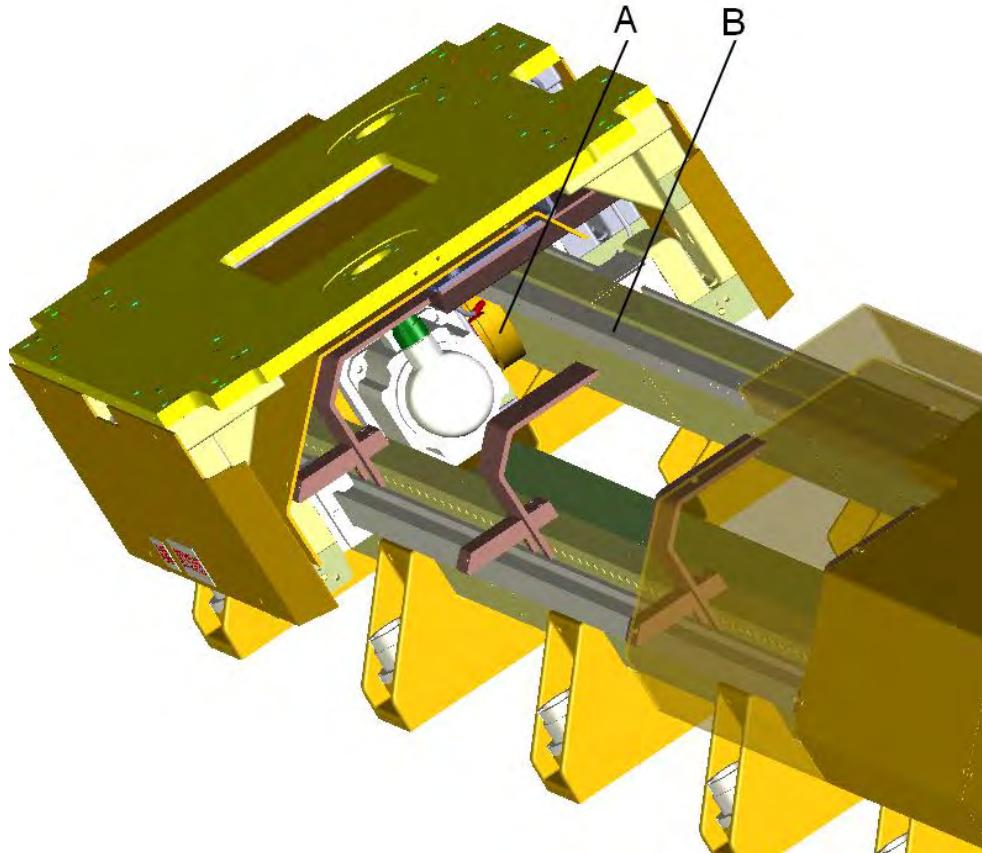
4 Repair

4.4. Replace the racks

4.4. Replace the racks

Location

The figure below shows the location of the gear racks and pinion:



en1004070136

	Name
A	Pinion
B	Rack

Required equipment

Equipment	Note
Standard toolkit	The content is defined in Standard toolkit on page 108 .
Rack clamps 3HAW107700357	The rack clamps are part of the kit of tools necessary to assemble the FlexTrack. See Procedure of assembly on page 58 .
Mounting rack 3HAWL000011	The mounting rack is part of the kit of tools necessary to assemble the FlexTrack. See Procedure of assembly on page 58 .
Loctite 243	Apply Loctite 243 on the screws that hold the racks.

4.4. Replace the racks

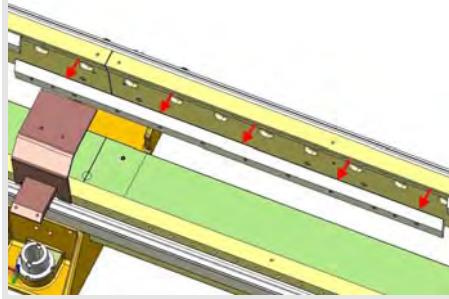
Continued

When you install new racks, it is necessary to lubricate them manually. Use one of the recommended lubricants:

Equipment	Note
Lubricant	CASTROL Longtime PD0
Lubricant	KLÜBER Microlube GB0
Lubricant	TOTAL Multis EP 0
Lint free cloth	

Disassemble

Follow the directions below to disassemble the racks:

Action	Note/Illustration
1. Remove all necessary FlexTrack covers and disassemble all hexagon head bolt M8x55 screws class 12.9 with contact-lock washers M8-18 and plain washers 8x25x3 that hold the rack to the sidemember.	As the rack screws should have been tightened with Loctite 243, you may have to apply high force on the wrench.
2. Remove the rack.	 en1004070137

4 Repair

4.4. Replace the racks

Continued

Assemble

Follow the directions below to assemble the racks:

Action	Note/Illustration
<ol style="list-style-type: none">1. Assemble the racks using the hexagon head bolt M8x55 screws class 12.9 with contact-lock washers M8-18 and plain washers 8x25x3. Use the clamping and mounting racks at the ends of the rack section to make sure that the racks are pushed against the sidemember mounting surface and perfectly aligned with each other. Use standard tools, slightly tighten.	 en1004070138
<ol style="list-style-type: none">2.	 en1004070139
<ol style="list-style-type: none">2. When you are confident that the alignment is correct, tighten the screws one by one, after applying Loctite 243 on their thread. Tightening torque: 40 Nm.	
<ol style="list-style-type: none">3. Once you have tightened a screw, mark it with a white marker.	 en1004070140
<ol style="list-style-type: none">4. Use a brush to lubricate the racks.	
<ol style="list-style-type: none">5. Re-assemble the FlexTrack covers.	

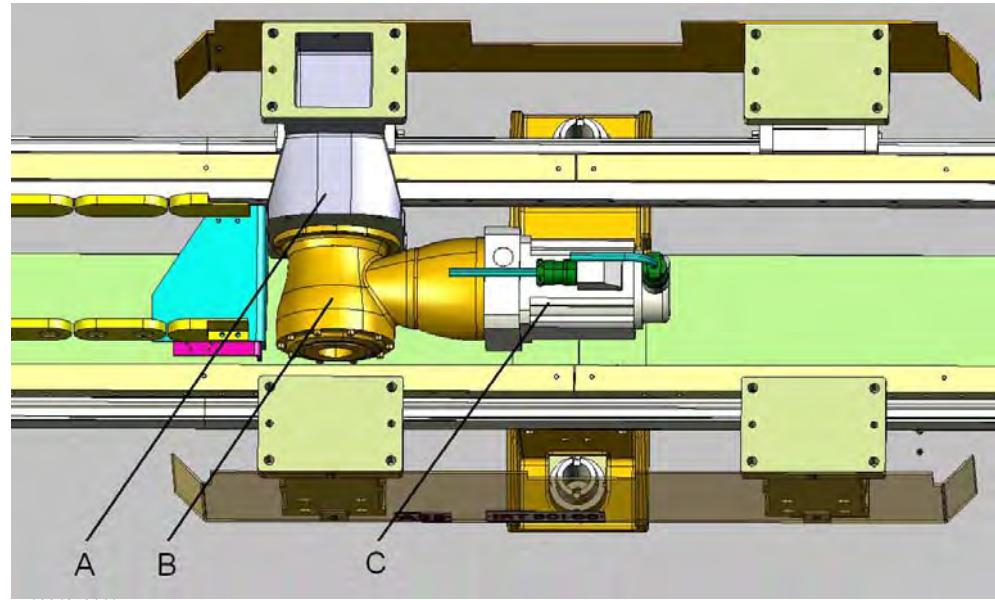
4.5 Motor and gear

4.5.1. Overview

It is possible to remove the motor and /or the gear whatever the position of the carriage or the tooling/robot on top. It is recommended to have 2 technicians to work together.

Location

The figure below shows the location of the motor and the gear:



	Name
A	Bracket
B	Gear
C	Motor

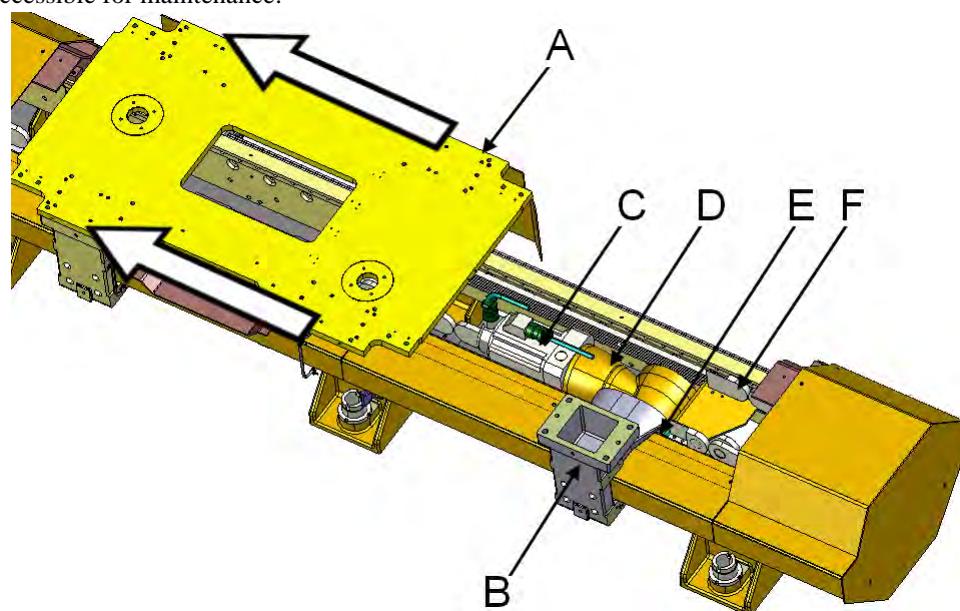
4 Repair

4.5.2. Disassemble the bracket from the carriage

Overview

To replace the motor and/or the gear, it is possible to disassemble the motor bracket from the top plate and then push the carriage away. It is recommended to have 2 technicians to work together.

The figure below shows how pushing the carriage away from the motor bracket exposes the motor, gearbox and cable chain connection point. This makes the following components accessible for maintenance:



	Name
A	Carriage - pushed away
B	Motor bracket - remains stationary
C	Motor - remains stationary
D	Gear - remains stationary
E	Pinion - remains stationary
F	Cable chain - remains stationary

Required equipment

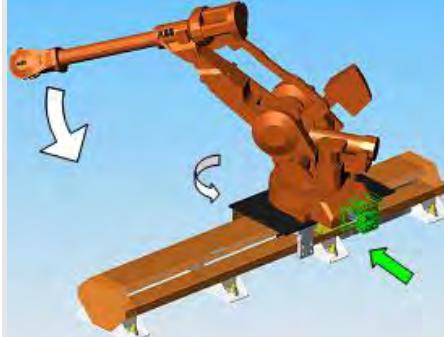
Equipment	Note
Standard toolkit	The content is defined in Standard toolkit on page 108 .

4.5.2. Disassemble the bracket from the carriage

Continued

Equipment	Note
Torque wrench	The tightening torque of the hexagon socket head cap M6x25 class 12.9 screws that secure the gear to the bracket is 16.5 Nm. There are also specific tightening torques for the motor shaft and gear assembly. See the details in maintenance instructions.
For the dowel pin extraction, you will need: M6 screws of different lengths. For example: M6x10, M6x15, M6x35 1 thick washer inside diameter 6mm 1 spacer 30mm long, inside diameter no smaller than the dowel pin diameter (10mm), and outside diameter no bigger than the thick washer outside diameter.	

Instructions

Action	Note/Illustration
1. If a robot is mounted on the carriage, move its arm to the opposite side of the motor bracket in order to unload it.	 <p>en1004070142</p>
2. Loosen the 4 M12x55 class 12.9 screws. Use a ratchet wrench.	<p>WARNING!</p> <p>Turn off all electric power, hydraulic and pneumatic pressure supplies to the robot and for the FlexTrack IRT 501.</p>  <p>en1004070146</p>

4 Repair

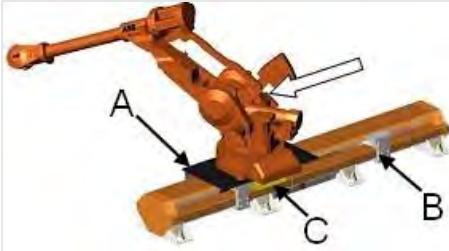
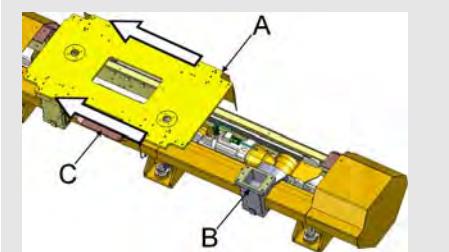
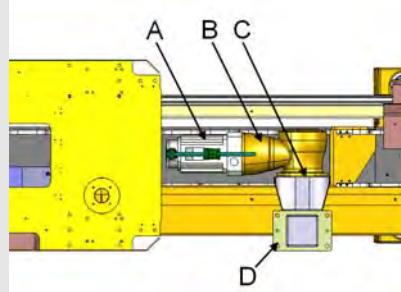
4.5.2. Disassemble the bracket from the carriage

Continued

Action	Note/Illustration
3. Extraction of the dowel: Place the spacer on the dowel pin, insert the longest screw with the thick washer and screw it to start extracting the dowel. Use shorter screws when necessary.	 en1004070144
4. Stop when the dowel pin is extracted from the top plate. It is not necessary to extract it from the bracket.	 en1004070145
5. Remove the 4 M12x55 class 12.9 screws and contact-lock washers M12-24. Use a ratchet wrench.	 en1004070146
6. Disconnect the 2 lubrication tubes from the fitting of the ball bearing block and from the support located near the pinion. Loosen all the flanges (circled in red on the picture) to release the tubes from the bracket (the tubes will be pushed away along with the carriage).	 en1004070147

4.5.2. Disassemble the bracket from the carriage

Continued

	Action	Note/Illustration
7.	<p>If present, disconnect the cables from the tooling or robot mounted on the carriage. Remove the upper part of the cable tray so that the connectors can pass through.</p>	 en1004070148
8.	<p>Push the carriage away from the bracket. The bracket, gear and pinion, motor, cable chain support and cable chain, stay stationery.</p> <p>If present, pay attention to the cables and their connectors: You must guide them through the cable tray while you push the carriage away.</p> <p>A: Carriage B: Motor bracket C: Cable tray</p>	 en1004070149  en1004071149
9.	<p>Remove the covers. The drive unit is now accessible.</p> <p>A: Motor B: Gear C: Pinion D: Motor bracket</p>	 en1004070150

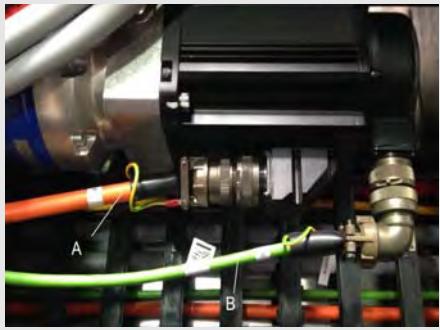
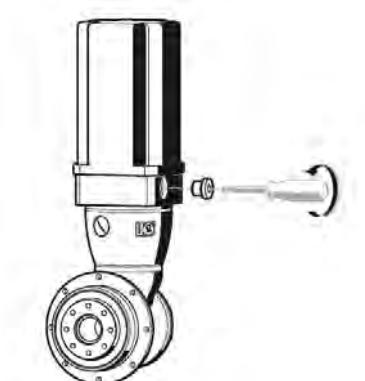
4 Repair

4.5.3. Replace motor

4.5.3. Replace motor

Instructions

Follow the directions below to disassemble the motor:

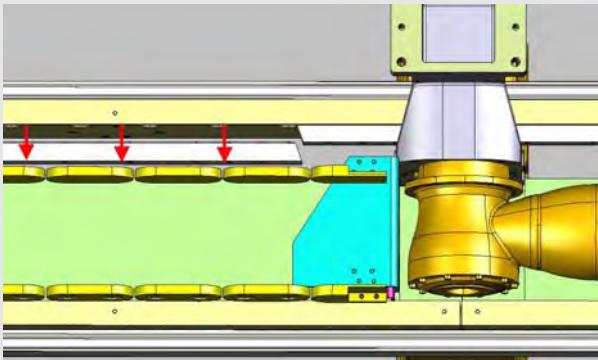
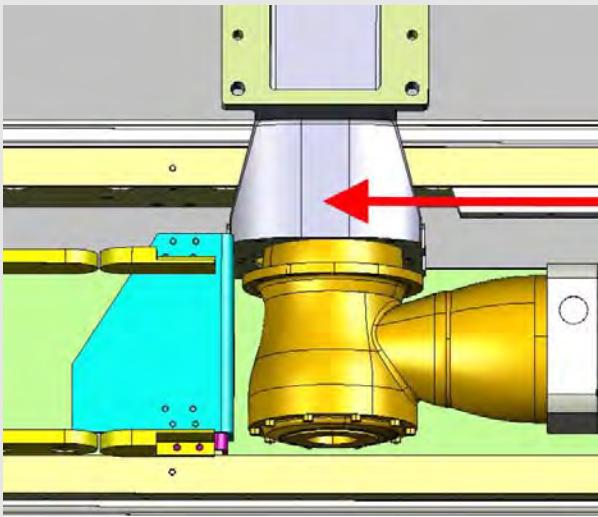
Action	Note/Illustration
1. Unplug the power and resolver plugs from the motor. Guide the cables in the tray area.	 A: Power cable B: signal cable
2. Remove the threaded cover plug to access the motor coupling screw. If you do not see the coupling screw, remove the 4 screws that attach the motor to the gear, and rotate the motor until you can see the coupling screw. Untight it (without removing it) and separate the motor from the gear:	 en1004070152
3. Replace the motor. For instructions about how to re-assemble the motor to the gear and issues that need attention, see Motor and gear assembly on page 154	
4. Re-assemble the bracket with the carriage. (Tightening torque: 132Nm) Re-connect the lubrication pipe to the block and secure it to the bracket with the flanges.	Use hexagon socket head cap M12x55 class 12.9 screws and contact-lock washers M12-24 tightened at 132 Nm to secure the bracket.
5. Turn the power on and perform a fine calibration.	

4.5.4. Replace gear

Instructions

If you need to replace the gear, you must first remove the motor such as described in [Replace motor on page 150](#), steps 1 and 2 of the disassembly instructions.

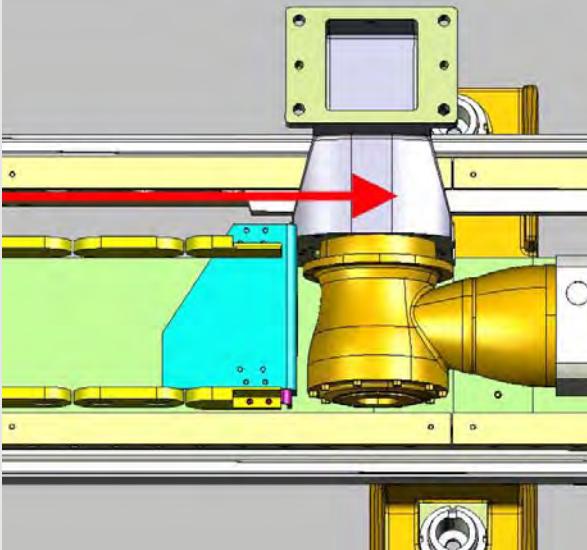
Follow the directions below to disassemble the gear:

	Action	Note/Illustration
1.	Remove the section of rack that is next to the section of rack with which the gear pinion is meshing.	<p>Unscrew all the hexagon head bolt M8x55 screws with contact-lock washers M8-18 and plain washers 8x25x3 to remove the rack from the sidemember.</p>  <p>en1004070153</p>
2.	Push the bracket and gear out of the rack section.	 <p>en1004070154</p>
3.	Remove the hexagon socket head cap M6x25 class 12.9 screws that secure the gear to the bracket and remove the gear.	<p></p> <p>CAUTION!</p> <p>The complete gear weighs about 30 kg! All lifting equipment used must be sized accordingly!</p>

4 Repair

4.5.4. Replace gear

Continued

Action	Note/Illustration
<p>4. Replace the gear and tighten the hexagon socket head cap M6x25 class 12.9 screws and contact-lock washers M6-12 with a torque wrench.</p> <p>Tightening torque: 16.5 Nm</p>	
<p>5. Push the bracket and gear back to the rack section.</p>	 en1004070155

4.5.4. Replace gear

Continued

	Action	Note/Illustration
6.	<p>Re-assemble the rack with the sidemember. (Tightening torque: 40 Nm)</p>	<p>Before tightening all the hexagon head bolt M8x55 class 12.9 screws with contact-lock washers M8-18 and plain washers 8x25x3, ensure that the rack section is completely pushed again its mounting surface, using on both of its ends the mounting rack section 3HAWL000011:</p>  <p>en1004070156</p> <p>and the clamps 3HAW107700357:</p>  <p>en1004070157</p>
7.	Follow the instructions in the section 6.2.4 to re-assemble the motor to the gear.	
8.	<p>Re-assemble the bracket with the carriage. (Tightening torque: 132Nm) Re-connect the lubrication pipe to the block and secure it to the bracket with the flanges.</p>	<p>Use hexagon socket head cap M12x55 class 12.9 screws and contact-lock washers M12-24 tightened at 132 Nm to secure the bracket.</p>
9.	Turn the power on and perform a fine calibration.	See Fine calibration on page 166 .

4.5.5. Motor and gear assembly

4.5.5. Motor and gear assembly

FlexTrack IRT 501- 66, gear ratio i=10

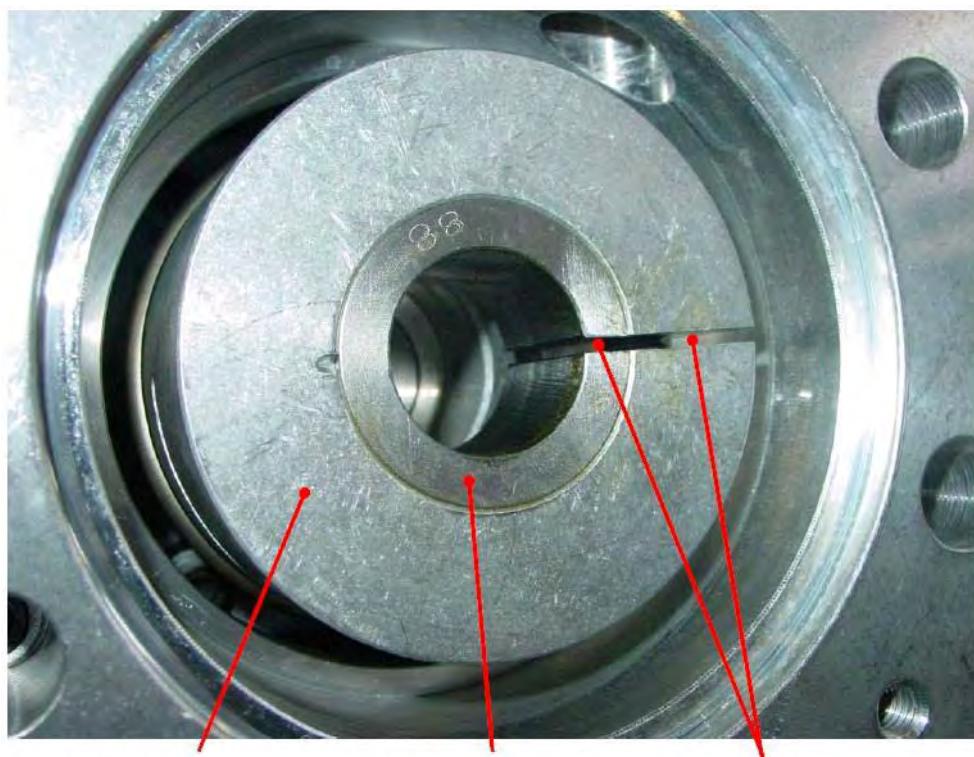
The motor for the IRT 501-66 has a shaft diameter = Ø26.

The gear for the IRT 501-66 has a slotted coupling diameter = Ø38.

A slotted ring Ø26/Ø38 is mounted into the coupling to tighten the motor shaft.

NOTE!

Slots of both parts must be in line for a maximum tightening force:



Slotted coupling Ø38

Slotted ring Ø26/Ø38

2 slots in line

en1004070158

The tightening screw of slotted coupling, SW1 = 8mm, must be tightened to **TA1 = 69 Nm**.

The plug, SW2 = 10 mm, must be tightened to **TA2 = 50 Nm**.

(SW: width across flats. See motor mounting instructions below for details)

*Continued***FlexTrack IRT 501- 66R, 90 90R, gear ratio i=16 or i=20**

The motor for the IRT 501-66R, 90 and 90R has a shaft diameter = Ø22.

Gears for the IRT 501-66R, 90 and 90R have a slotted coupling diameter = Ø28.

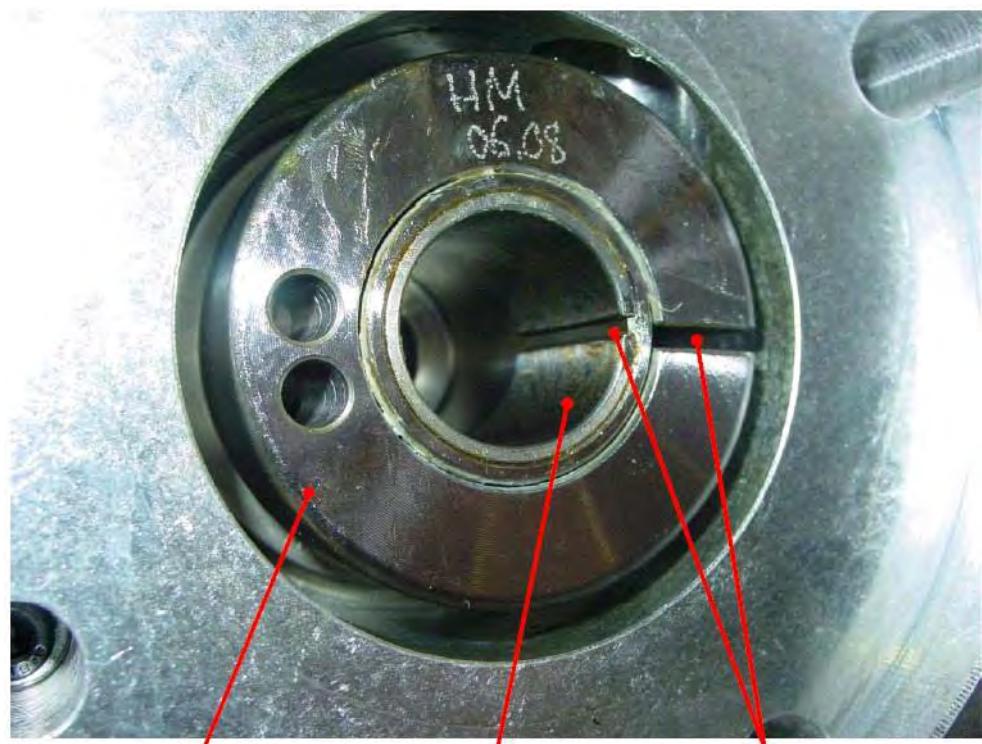
A malleable ring Ø24/Ø28 is mounted into the coupling.



A slotted ring Ø22/Ø24 is mounted into the malleable ring to tighten the motor shaft.

en1004070159

Slots of both parts must be in line for a maximum tightening force:



Slotted coupling Ø28

Slotted ring Ø22/Ø24

2 slots in line

en1004070160

The tightening screw of slotted coupling, SW1 = 6mm, must be tightened to **TA1 = 35 Nm**.

The plug, SW2 = 10 mm, must be tightened to **TA2 = 50 Nm**.

(SW: width across flats. See motor mounting instructions below for details)

Continues on next page

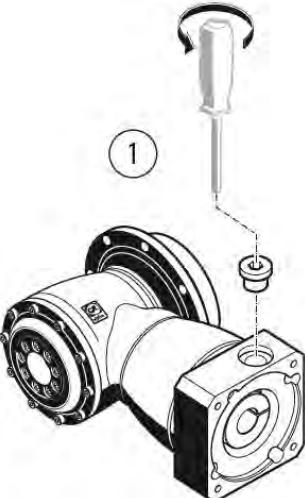
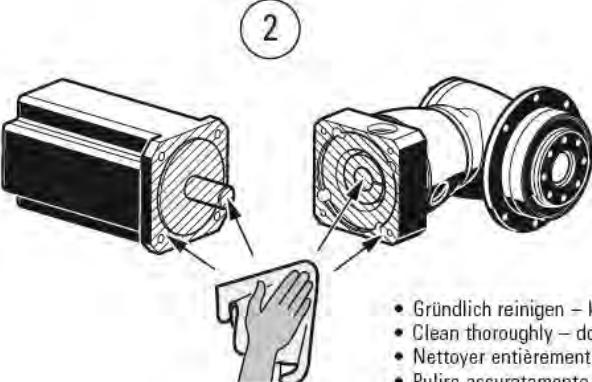
4 Repair

4.5.5. Motor and gear assembly

Continued

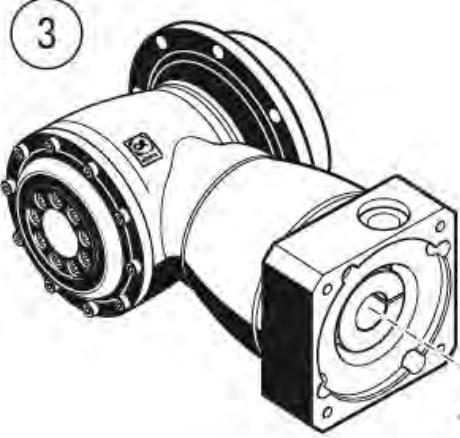
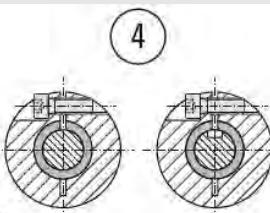
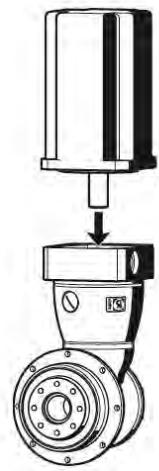
Motor assembly

The following instructions are based on the Alpha gear and motor assembly manual:

Action/Note/Illustration	
1.	 <ul style="list-style-type: none">• Verschlusschraube lösen und aufbewahren• Release plug and reserve• Desserrer le bouchon obturateur et le conserver• Allentare e riporre il tappo a vite• Soltar el tornillo de cierre y conservarlo• Soltar parafuso de fechamento e guardá-lo <p>en1004070161</p>
2.	 <ul style="list-style-type: none">• Gründlich reinigen – keine Pressluft verwenden• Clean thoroughly – do not use compressed air• Nettoyer entièrement – ne pas utiliser d'air comprimé• Pulire accuratamente. Non usare aria compressa• Limpiar a fondo – No usar aire comprimido• Limpar criteriosamente – não usar ar comprimido <p>en1004070162</p>

4.5.5. Motor and gear assembly

Continued

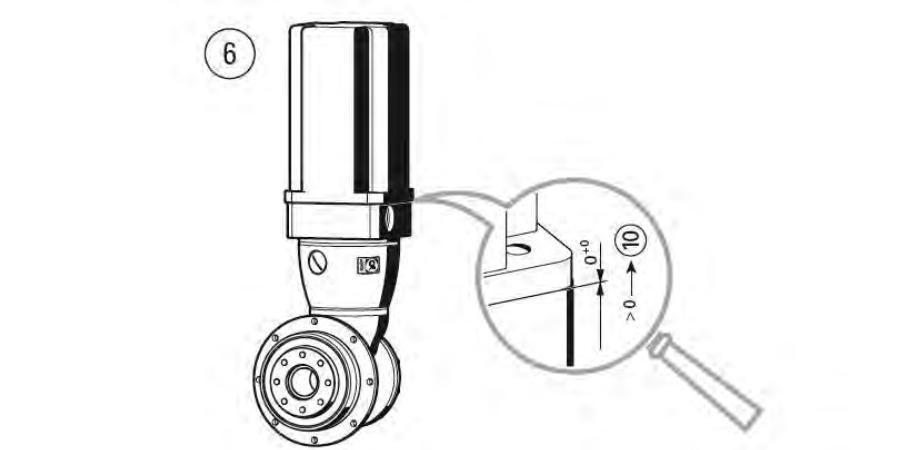
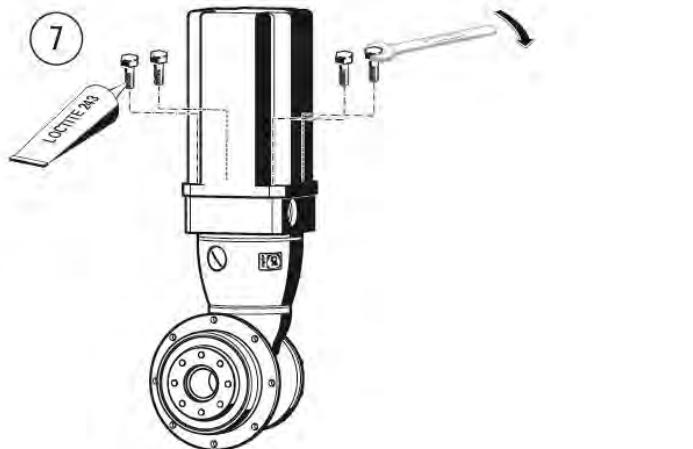
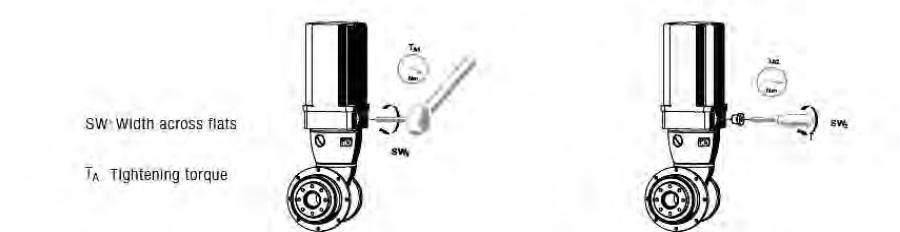
Action/Note/Illustration	
3.	 <ul style="list-style-type: none"> • Lagerrichtig drehen • Turn into correct position • Tourner dans la bonne position • Girare in posizione corretta • Girarlo a la posición prescrita • Girar para a posição correta <p>en1004070163</p>
4.	 <ul style="list-style-type: none"> • Bei genuteter Motorwelle: Passfeder entfernen. Schlitz, Distanzhülse und Passfedernut lagerichtig montieren. • With grooved shaft: remove feather key. Mount slot, spacer sleeve and feather key groove in the correct position. • Pour les arbres de moteur cannelés: retirer la clavette. Monter la fente, la bague et la rainure pour clavette de manière à ce qu'elles se trouvent dans la bonne position. • Per alberi motore con chiavetta: rimuovere la chiavetta. Montare una mezza chiavetta, la bussola distanziante e posizionare la mezza chiavetta nella posizione corretta. • Si se trata de un eje de motor ranurado: saque la chaveta. Montar de acuerdo a la posición prescrita la entalladura, el casquillo y la ranura de la chaveta. • No caso de eixo do motor com ranhura: Remover chaveta. Montar fenda, manga distanciadora e chaveta na posição correta. <p>en1004070164</p>
5.	 <ul style="list-style-type: none"> • ACHTUNG! Wenn Sie den Motor nicht leicht aufschieben können: Die Schraube in Bild 4 um eine Umdrehung lösen • CAUTION! If the motor does not move into position easily: Loosen the screw in fig. 4 by one rotation • ATTENTION !! Si le moteur ne peut pas être légèrement poussé: desserrer d'un tour la vis illustrée sur la figure 4 • ATENCIÓN! Se resultasse difíciltooso portare il motore in posizione: allentare di un giro la vite in figura 4 • ¡ATENCIÓN! Si al montar el motor no puede deslizarlo con facilidad: suelte una vuelta el tornillo de la figura 4 • ATENÇÃO! Caso não consiga colocar o motor facilmente: Soltar o parafuso da figura 4 por um giro <p>en1004070165</p>

Continues on next page

4 Repair

4.5.5. Motor and gear assembly

Continued

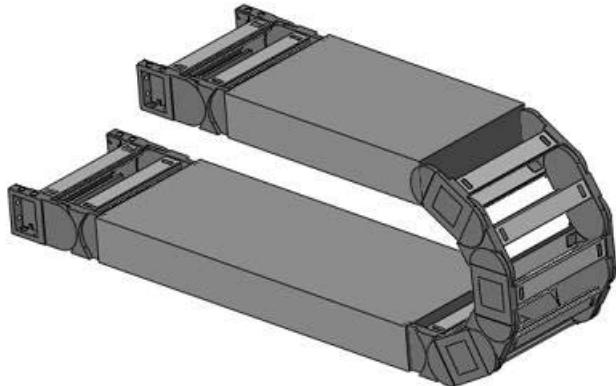
Action/Note/Illustration																
6.	 en1004070166															
7.	 en1004070167															
8.	 <table border="1"><tr><th></th><th>SW₁ [mm]</th><th>T_{A1} [Nm]</th></tr><tr><td>FlexTrack IRT 501- 66, Ratio i=10</td><td>8</td><td>69</td></tr><tr><td>FlexTrack IRT 501-66R / 90 / 90R, Ratio i=16 or 20</td><td>6</td><td>35</td></tr></table> <table border="1"><tr><th></th><th>SW₂ [mm]</th><th>T_{A2} [Nm]</th></tr><tr><td></td><td>10</td><td>50</td></tr></table> en1004070168		SW ₁ [mm]	T _{A1} [Nm]	FlexTrack IRT 501- 66, Ratio i=10	8	69	FlexTrack IRT 501-66R / 90 / 90R, Ratio i=16 or 20	6	35		SW ₂ [mm]	T _{A2} [Nm]		10	50
	SW ₁ [mm]	T _{A1} [Nm]														
FlexTrack IRT 501- 66, Ratio i=10	8	69														
FlexTrack IRT 501-66R / 90 / 90R, Ratio i=16 or 20	6	35														
	SW ₂ [mm]	T _{A2} [Nm]														
	10	50														

4.6. Replace the cable chain or the cable

4.6. Replace the cable chain or the cable

Overview

It is possible to remove the complete cable chain in order to replace it. It is recommended to have 2 technicians to work together.



en1004070169

Required equipment

Equipment	Note
Standard toolkit	The content is defined in section 5.2, standard toolkit.
Cables	
Cable chain parts	

4 Repair

4.6. Replace the cable chain or the cable

Continued

Replace cable chain



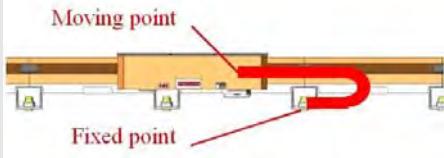
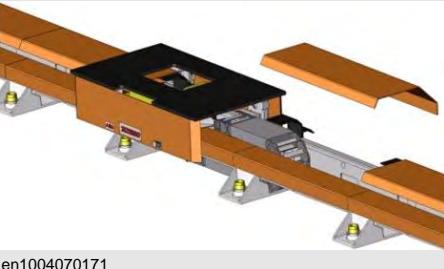
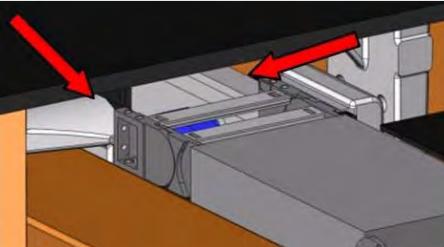
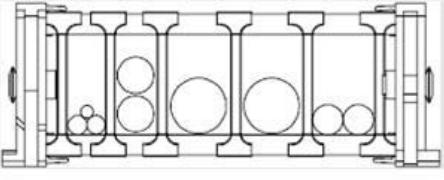
TIP!

Remove all cover plates before turning off all electric power. Without 24V DC the carriage can not be moved.



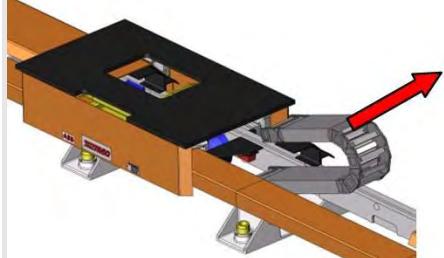
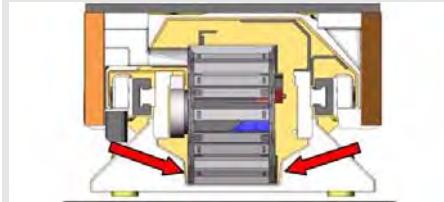
WARNING!

Turn off all electric power, hydraulic and pneumatic pressure supplies to the robot and FlexTrack IRT 501.

Action	Note/Illustration
1. Move the track carriage in order to have it positioned just above the fixed point of the cable chain. Doing so you just have to remove two covers in the same zone to access both fixed & moving points of the cable chain.	 en1004070170
2. Remove two covers.	 en1004070171
3. Remove screws at fixed point, pull-out cable chain, help the cables through the carriage opening.	 en1004070172
4.  TIP! To facilitate assembly, take a picture of the placement in the cable chain before removing cables.	 en1004070173

4.6. Replace the cable chain or the cable

Continued

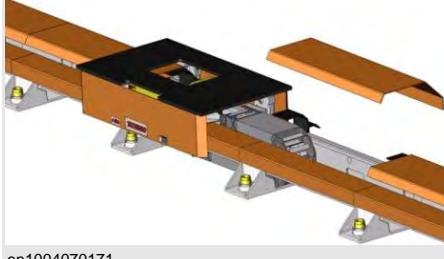
Action	Note/Illustration
5. Remove screws at fixed point, pull the complete chain out.	 en1004070174
6. Install the new cable chain, and ensure the correct installation as described in <i>Installation of the cable chain on page 77</i>	 en1004070175

Replace cables**TIP!**

Remove all cover plates before turning off all electric power. Without 24V DC the carriage can not be moved.

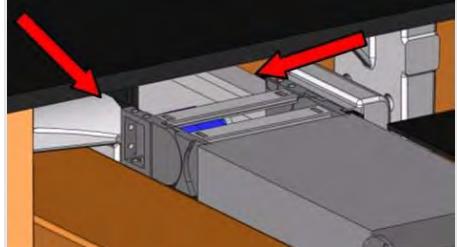
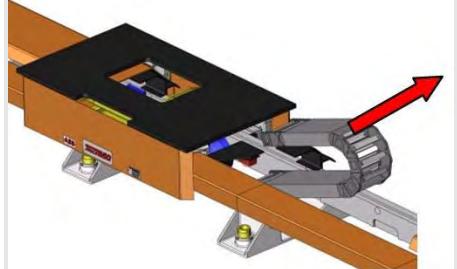
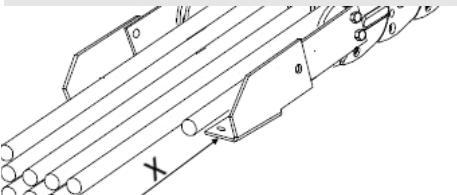
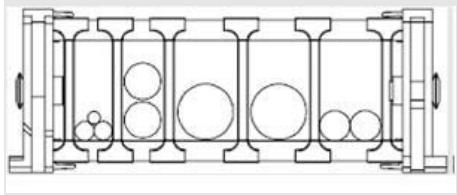
**WARNING!**

Turn off all electric power, hydraulic and pneumatic pressure supplies to the robot and FlexTrack IRT 501.

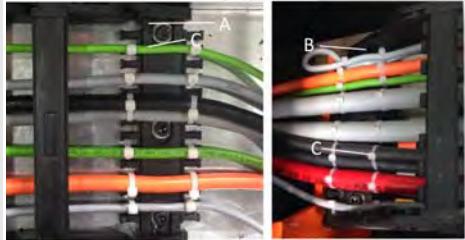
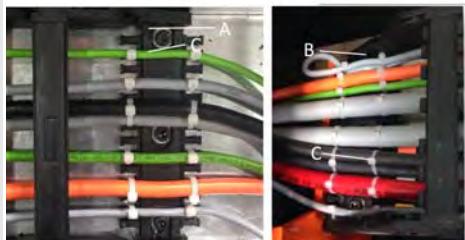
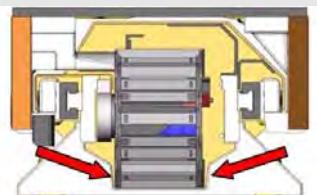
Action	Note/Illustration
1. Move the track carriage in order to have it positioned just above the fixed point of the cable chain. Doing so you just have to remove two covers in the same zone to access both fixed & moving points of the cable chain.	 en1004070170
2. Remove two covers.	 en1004070171

4 Repair

4.6. Replace the cable chain or the cable

	Action	Note/Illustration
	3. Remove screws at fixed point, pull-out cable chain, help the cables through the carriage opening.	 en1004070172
	4. Remove screws at fixed point, pull the complete chain out.	 en1004070174
5.	 TIP! Before removing damaged cables, take a picture of the placement of the cables on the connect plate. This will facilitate re-assembly.	
6.	 TIP! Before removing cables, measure the length of the cable projecting from the end of the cable chain. This will facilitate re-assembly.	 X: Cable length projecting from the cable chain
7.	 TIP! To facilitate assembly, take a picture of the placement in the cable chain before removing damage cables.	 en1004070173

4.6. Replace the cable chain or the cable

Action	Note/Illustration
8. Cut off the ties that fix the cables to the tiewrap plate and cable chain end unit at the fix end and moving end of the cable chain.	 <p>A: Tiewrap plate of the fix end cable chain B: End unit of the move end cable chain C: Ties fixing cables</p>
9. Open the cover strips of the cable chain.	
10. Remove the cables.	
11. Install the new cables. Make sure the replacement cable is at the same position and is projecting the same length with the old one.	
12. Close the cover of the cable chain.	
13. Fix the cable on the tiewrap plate and the cable chain end unit with ties.	 <p>A: Tiewrap plate of the fix end cable chain B: End unit of the move end cable chain C: Ties fixing cables</p>
14. Re-install the cable chain, and ensure the correct installation as described in Installation of the cable chain on page 77	 <p>en1004070175</p>

4 Repair

4.6. Replace the cable chain or the cable

5 Calibration information

5.1. Overview

General

This chapter includes general information about different calibration methods and also details procedures that do not require specific calibration equipment.

When the robot system must be recalibrated, it is done according to the documentation enclosed with the calibration tools.

WARNING!



Make sure no persons are on the FlexTrack when the carriage is in motion. Also make sure that the FlexTrack's cover plates are free from loose objects, otherwise they can get trapped between the carriage and the plates.

NOTE!



The FlexTrack does not need to be calibrated during restart. The resolvers only need to be calibrated when commissioning the system.

When to calibrate

The system must be calibrated if any of the below occurs.

The resolver values are changed

If resolver values are changed, the robot must be recalibrated using the calibration methods supplied from ABB. Calibrate the FlexTrack IRT 501 carefully with standard calibration. The resolver values will change when parts affecting the calibration position are replaced on the FlexTrack IRT 501, e.g. motor, or part of transmission. This is detailed in [Fine calibration on page 166](#).

Contents of the revolution counter memory are lost

If the contents of the revolution counter memory are lost, the counters must be updated as detailed in [Update revolution counters on page 167](#). This will occur when:

- the battery is discharged
- a resolver error occurs
- the signal between a resolver and measurement board is interrupted
- a robot axis is moved with the control system disconnected

The revolution counters must also be updated after the robot and controller are connected at the first installation.

The FlexTrack IRT 501 is rebuilt

If the track has been rebuilt, e.g. after a crash or when the track has been changed for other reachability, it needs to be recalibrated for new resolver values. This is detailed in [Fine calibration on page 166](#).

5 Calibration information

5.2. Fine calibration

5.2. Fine calibration

General

This procedure must be applied at the first start or after mechanical intervention (motor change, gearbox).

Action	Note/Illustration
1. Using the FlexPendant, jog the carriage close to the calibration gauge position.	
2. Move the track until the calibration holes line up.	 en1004070176
3. Insert the calibration pin (3HAW107700354). A dowel pin diameter 8mm can also be used.	 en1004070177
4. Tap ABB on the top left of the FlexPendant	
5. Tap Calibration .	
6. Select the desired mechanical unit.	
7. Tap Fine calibration .	
8. Select the desired axis.	
9. Tap Calibrate .	

5.3. Update revolution counters

Procedure

This procedure must be applied if revolution counter value is loss for the Track.

Action	Note/Illustration
1. Align the sharp edge of the moving part of the calibration marker with the line of the fixed part calibration marker.	 en1004070178
2. Tap ABB on the top left of the FlexPen-dant.	
3. Tap Calibration .	
4. Select the desired mechanical unit.	
5. Tap Update revolution counters .	
6. Select the desired axis.	
7. Tap Update .	

5 Calibration information

5.3. Update revolution counters

6 Decommissioning

6.1. Introduction

Introduction

This chapter contains information to consider when taking a product, robot or controller, out of operation.

It details with how to handle potentially dangerous components and potentially hazardous material.

General

All used grease/oils and dead batteries must be disposed of in accordance with the current legislation of the country in which the robot and the control unit are installed.

If the robot or the control unit is partially or completely disposed of, the various parts must be grouped together according to their nature (that is, all iron together and all plastic together), and disposed of accordingly. These parts must also be disposed of in accordance with the current legislation of the country in which the robot and control unit are installed.

6 Decommissioning

6.2. Environmental information

6.2. Environmental information

Hazardous material

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

Dispose of the 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	Crossmembers, linear carriage brackets
Steel	Covers, sidemembers, carriage top plate, screws
Neodymium	Brakes, motors
Plastic/rubber (PVC)	Cables, connectors, hard stop bumper
Oil, grease	Lubrication system, gearbox
Aluminium	Motor and gearbox housing

Oil and grease

Where possible, arrange for the 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 may form a film on water surfaces causing damage to organisms. Oxygen transfer could also be impaired.
- Spillage may penetrate the soil causing ground water contamination.

7 Reference information

7.1. Introduction

General

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

7 Reference information

7.2. Applicable safety standards

7.2. Applicable safety standards

Safety standards

The robot conforms to the following standards:

- EN ISO 12100-1 Safety of machinery - Basic terminology
- EN ISO 12100-2 Safety of machinery - Technical principles/specifications - Emergency stop
- EN ISO 13850:2006 Safety of machinery - Emergency stop - Principles for design
- EN ISO 13732:2006 Ergonomics of the thermal environment - Part 1
- EN 614-1 Safety of machinery, ergonomic design principles
- EN ISO 10218-1:2006 Robots for industrial environments - Safety requirements - Part 1 Robot
- EN ISO 60204-1:2005 Safety of machinery - Electrical equipment of machines - Part 1 General requirement
- EN 574 Safety of machinery, two hand control device
- EN 953 Safety of machinery, fixed/movable guards
- EN ISO 13849-1:2006 Safety of machinery, safety related parts of the control system
- EN 61000-6-4:2007 EMC, Part 6-4: Generic standards - Emission standard for industrial environments
- EN 55011 Class A Radiated emission enclosure
- EN 55011 Class A Conducted emission AC Mains
- EN 61000-6-2:2005 EMC, Part 6-2: Generic standards - Immunity for industrial environments
- EN 61000-4-2 Electrostatic discharge immunity test
- EN 61000-4-3 Radiated, radio-frequency, electromagnetic field immunity test
- EN 61000-4-4 Electrical fast transient/burst immunity test
- EN 61000-4-5 Surge immunity test
- EN 61000-4-6 Immunity to conducted disturbances, induced by radio-frequency fields
- EN 61000-4-8 Power frequency magnetic field immunity test
- EN 61000-4-11 Voltage dips, short interruptions and voltage variations immunity test

7.3. Unit conversion

Converter table

Use the table below to convert units used in this manual.

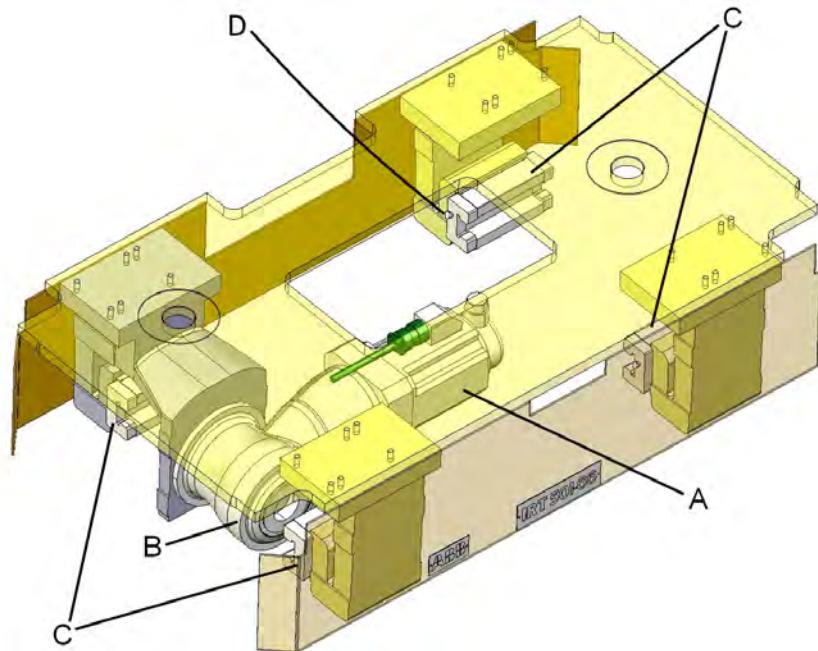
Quantity	Units		
Length	1m	3.28 ft	39.37 in
Weight	1 kg	2.21 lb	
Pressure	1 bar	100 kPa	14.5 psi
Force	1 N	0.738 lbf	
Moment	1 Nm	0.738 lbf·in	
Volume	1 L	0.264 US gal	

7 Reference information

7.3. Unit conversion

8 Spare parts

8.1. Carriage IRT501



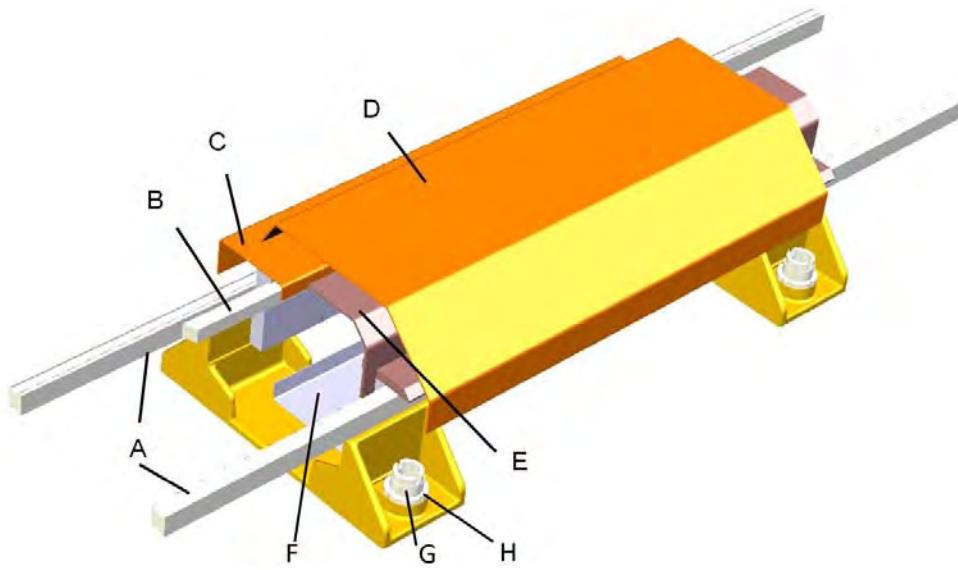
en1004070179

Item	Quantity	ABB part reference no.	Description
A	1	3HAWC116592	Motor for IRT501-66
		3HAWC116593	Motor for IRT501-66R / 90 / 90R
B	1	3HAWC116589	Gear + pinion for IRT501-66
		3HAWC116590	Gear + pinion for IRT501-66R/90
		3HAWC116596	Gear + pinion for IRT501-90R
C	4	3HAWL000021	Ball bearing block (Rexroth)
		3HAWC116594	Ball bearing block (INA)
D	4	3HAWL000049	D6-M6 lubrication elbow fitting

8 Spare parts

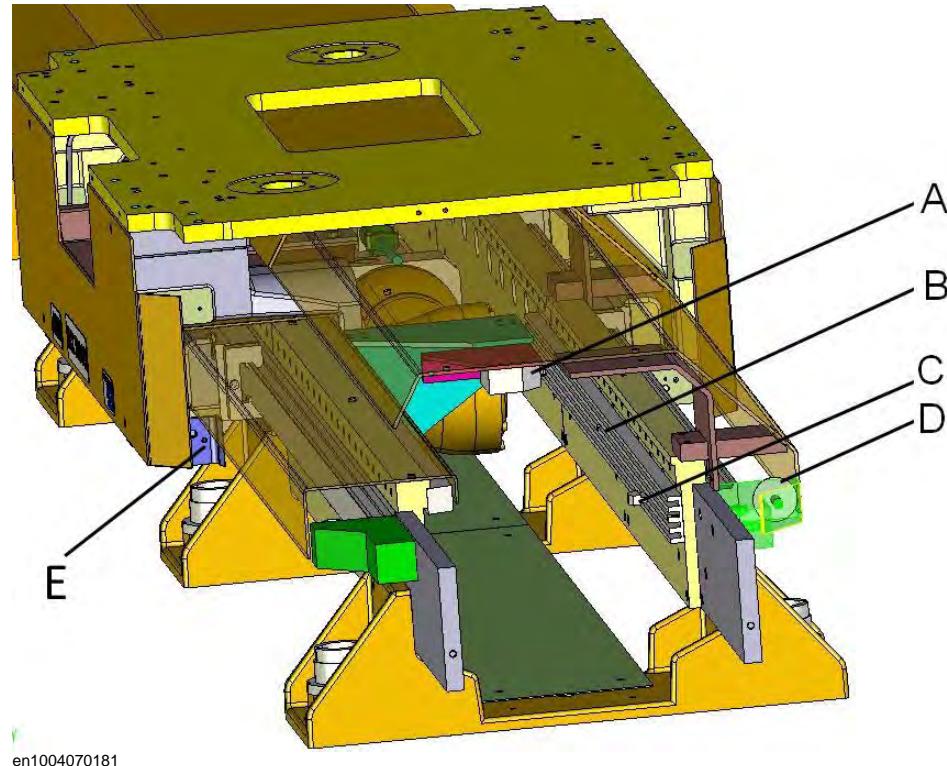
8.2. Track

8.2. Track



Item	ABB part reference no.	Description
A	3HAWL000016	Linear guideway 2625mm (Rexroth)
	3HAWL000015	Linear guideway 2100mm (Rexroth)
	3HAWL000014	Linear guideway 1575mm (Rexroth)
	3HAWC116829	Linear guideway 2625mm (INA)
	3HAWC116827	Linear guideway 2100mm (INA)
	3HAWC116828	Linear guideway 1575mm (INA)
B	3HAW107700347	Toothed rack 1000mm
C	3HAW107700342	Rack cover - orange
	3HAW107700342-735	Rack cover - graphite white
D	3HAW107700343	Upper cover for FlexTrack IRT 501-66 and 66R
	3HAW107700431	Upper cover for FlexTrack IRT 501-90 and 90R
E	3HAW107700337	Bracket for cover for FlexTrack IRT 501-66 and 66R
	3HAW107700430	Bracket for cover for FlexTrack IRT 501-90 and 90R
F	3HAW107700359	Cable chain guide L=1050mm
G	3HAW108201422	Levelling screw M60x2
H	3HAWC100857	Slotted round nut KM 12

8.3. Limit switch and calibration

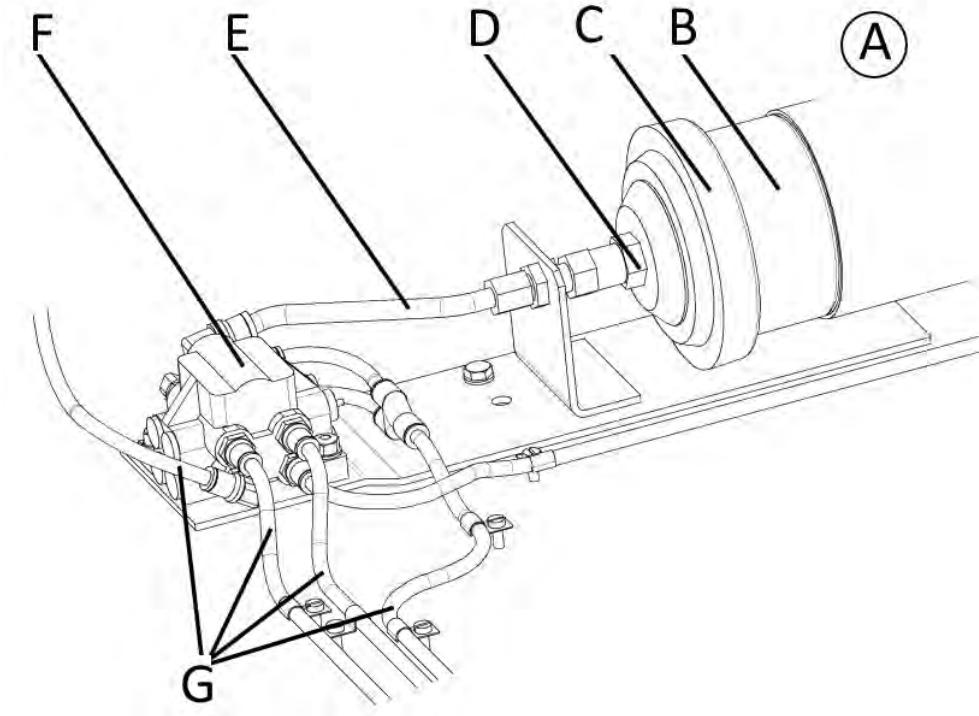


Item	Quantity	ABB part reference no.	Description
A	1	3HAWC116586	Limit switch 1 sensor
	1	3HAWC117028	Limit switch 2 sensors
	1	3HAWL000022	Limit switch 4 sensors
B	1	3HAWC116599	Limit switch cam tray L=1000
		3HAW107700657	Limit switch cam tray L=1200
C	2 (min.)	3HAWC116600	Cam (on both ends of the FlexTrack)
D	4	3HAWC106195	Hard stop bumper (a pair on both ends of the FlexTrack)
E	1	3HAW107700344	Calibration gauge (fixed, on FlexTrack)
	1	3HAW107700540	Calibration gauge (mobile, on carriage)

8 Spare parts

8.4. Automatic lubrication system

8.4. Automatic lubrication system



en1004070204

Item	Quantity	ABB part reference no.	Description
A	1	3HAW107700590-004	Automatic lubrication, complete kit for 1 carriage. Contain all items below.
B	1	3HAWC116978	240cc HPS Mega grease cartridge + battery
C	1	3HAWC114278	Automatic grease dispenser
D	1	3HAWL000050	Set of washers for automatic oil dispenser output volume setting
E	0.2m	3HAWC116980	Tube D8x6 (from dispenser to splitter only)
F	1	3HAWC116979	Grease splitter 6 outputs
G	25m	3HAWL000032	Tube D6x4. 5m are required in one carriage.

8.5. Cable chains

Formula

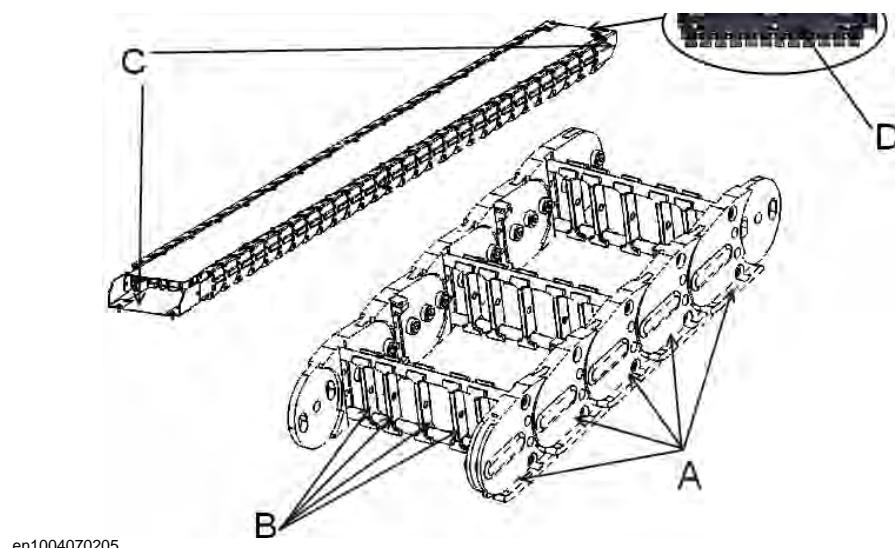
If you need to replace elements of the cable chain, please calculate your needs: The cable chain is made of modular elements which quantity depends on the stroke of your FlexTrack.

S is the Stroke of the FlexTrack in mm (from hard stop to hard stop)

L is the length of the cable chain in mm

$$L = S/2 + 510$$

Internal chain spare parts



Item	Quantity	ABB part reference no.	Description
A	1m chain requires 15 pieces	3HAWL000017	Cable chain link unit
B	1m chain requires 12 pieces	3HAWL000018	Cable separator
C	1	3HAWL000019	Cable chain end units (1 mobile + 1 fixed)
D	1	3HAWL000020	Tiewrap plate (1 per cable chain)

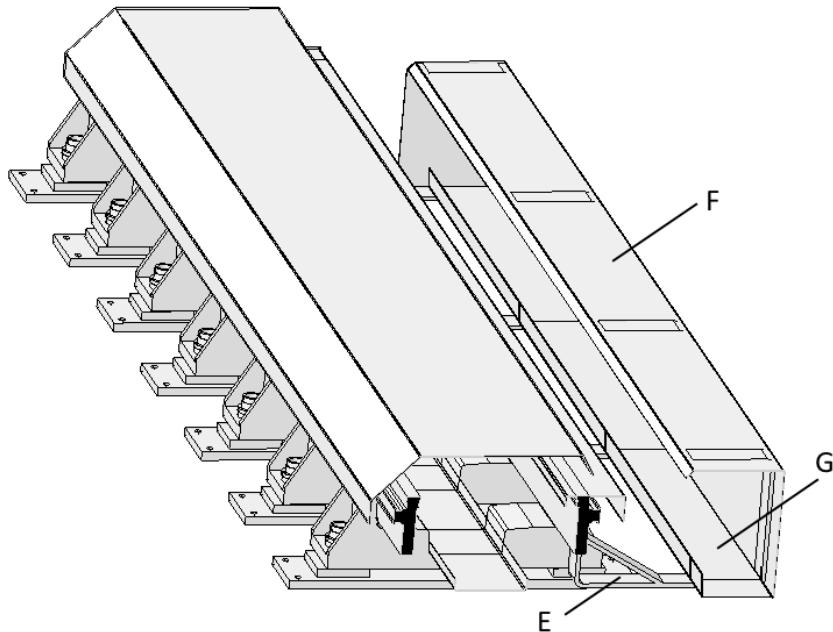
8 Spare parts

8.5. Cable chains

External chain spare parts

If the internal cable chain is not wide enough to fit all the required cables, a wider external cable chain, assembled in a complete housing for optimal protection, may be used.

This option is used only on FlexTrack types IRT 501-90 and IRT 501-90R.



Item	Quantity	ABB part reference no.	Description
A	1m of chain requires 15 pieces	3HAWL000042	External cable chain link unit
B	1m chain requires 12 pieces	3HAWL000018	Cable separator
C	1 mobile + 1 fixed	3HAWL000043	External cable chain end units
D	1 plate per cable chain	3HAWL000041	External cable chain end tiewrap plate
E	1m chain requires 1 piece	3HAW107700442 3HAW107700442-735	External cable chain bow - orange External cable chain bow - graphite white
F	1m chain requires 1 piece	3HAW107700443 3HAW107700443-735	External cable chain cover module - orange External cable chain cover module - graphite white
G	1m chain requires 1 piece	3HAW107700449	External cable chain floor guide

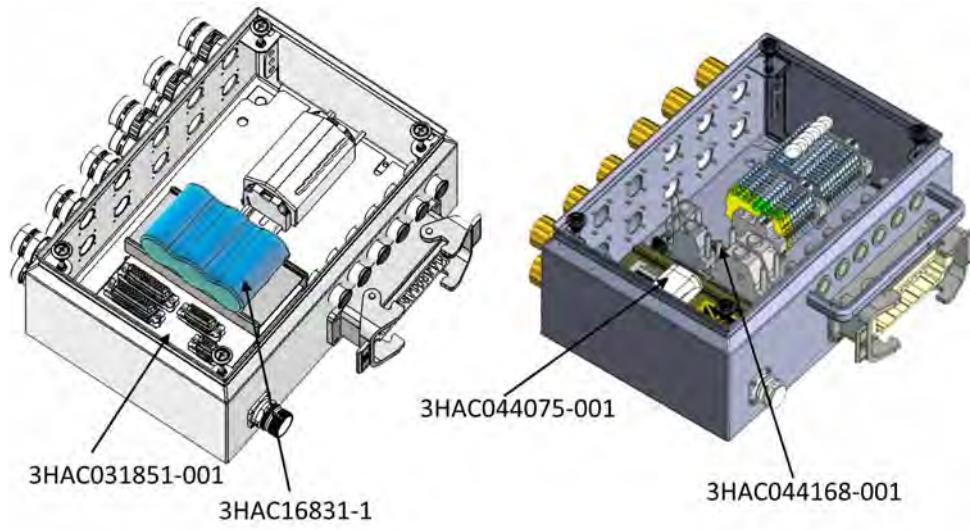
8.6. Electrical spare parts and cables

SMB box and battery

NOTE: The SMB box contains a main board and a battery for the memory backup in order to maintain position data.

SMB boxes manufactured before 2015 are equipped with a SMB board DSQC633 Ref. 3HAC031851-001 and a SMB battery Ref. 3HAC16831-1.

SMB boxes manufactured after 2015 are equipped with a SMB board RMU101 Ref. 3HAC044168-001 and a Battery pack RMU Ref. 3HAC044075-001.



SMB box content

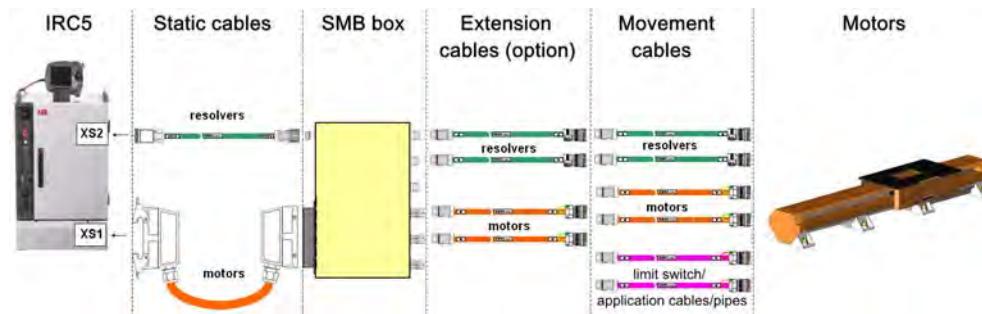
ABB part reference no.	Description
3HAW050008604	SMB box 1 axis M2008
3HAW050008605	SMB box 3 axis M2008
3HAW050008651	SMB box 6 axis M2011
3HAC031851-001	SMB Main board DSQC633. Phased out! Order instead the set 3HAC046686-001 (board RMU101 + battery pack RMU)
3HAC16831-1	Battery pack for SMB board DSQC633. For SMB boxes manufactured before 2015 only.
3HAC044168-001	SMB Main board RMU101
3HAC044075-001	Battery pack for SMB board RMU101
3HAW050008607	PTC shunt M2008

8 Spare parts

8.6. Electrical spare parts and cables

Motor cables and resolver cables

Following is a typical cabling layout of FlexTrack. Please refer to the layout to confirm what kind of motor cables and resolver cables are needed.



Type	ABB part reference no.	Description
Static cable - motor	3HAW050008613-005	1 axis motor static cable 5m
	3HAW050008613-010	1 axis motor static cable 10m
	3HAW050008613-015	1 axis motor static cable 15m
	3HAW050008614-005	3 axis motor static cable 5m
	3HAW050008614-010	3 axis motor static cable 10m
	3HAW050008614-015	3 axis motor static cable 15m
	3HAW050008614-025	3 axis motor static cable 25m
	3HAW050008615-005	6 axis motor static cable 5m
	3HAW050008615-010	6 axis motor static cable 10m
	3HAW050008615-015	6 axis motor static cable 15m
	3HAW050008615-025	6 axis motor static cable 25m
	3HAW050008635-005	1 Motor Static XP7 M2008 5m, for FlexTrack controlled without external SMB box
	3HAW050008635-010	1 Motor Static XP7 M2008 10m, for FlexTrack controlled without external SMB box
	3HAW050008635-015	1 Motor Static XP7 M2008 15m, for FlexTrack controlled without external SMB box
Static cable - resolver	3HAW050008612-005	6 axis resolver static cable 5m
	3HAW050008612-010	6 axis resolver static cable 10m
	3HAW050008612-015	6 axis resolver static cable 15m
	3HAW050008612-025	6 axis resolver static cable 25m
Static/Extension cable - motor	3HAW050008624-005	1 Motor Static or Extension M2008 5m
	3HAW050008624-010	1 Motor Static or Extension M2008 10m
	3HAW050008624-015	1 Motor Static or Extension M2008 15m
Static/Extension cable- resolver	3HAW050008625-005	1 Resolver M2008 5m
	3HAW050008625-010	1 Resolver M2008 10m
	3HAW050008625-015	1 Resolver M2008 15m
Movement cable - motor	3HAW050008608-005	1 axis motor movement cable 5m
	3HAW050008608-007	1 axis motor movement cable 7.5m
	3HAW050008608-010	1 axis motor movement cable 10m
	3HAW050008608-015	1 axis motor movement cable 15m

Type	ABB part reference no.	Description
Movement cable - resolver	3HAW050008609-005	1 axis resolver movement cable 5m
	3HAW050008609-007	1 axis resolver movement cable 7.5m
	3HAW050008609-010	1 axis resolver movement cable 10m
	3HAW050008609-015	1 axis resolver movement cable 15m
	3HAW050008637-001	1 Resolver Track M2008 1.2m, connects to robot base
	3HAW050008637-005	1 Resolver Track M2008 5m, connects to robot base
	3HAW050008637-010	1 Resolver Track M2008 10m, connects to robot base
	3HAW050008637-015	1 Resolver Track M2008 15m, connects to robot base
Limit switch cable	3HAW050008610-005	Limit switch cable 1 position 5m
	3HAW050008610-010	Limit switch cable 1 position 10m
	3HAW050008610-015	Limit switch cable 1 position 15m
	3HAW050008654-005	Limit switch cable 2 positions 5m
	3HAW050008654-010	Limit switch cable 2 positions 10m
	3HAW050008654-015	Limit switch cable 2 positions 15m
	3HAW050008611-005	Limit switch cable 4 position 5m
	3HAW050008611-010	Limit switch cable 4 position 10m
	3HAW050008611-015	Limit switch cable 4 position 15m

Robot cable & pipe

Type	ABB part reference no.	Description
Application cable	3HAW050008628-005	Welding Power cable of robot 5m
	3HAW050008628-010	Welding Power cable of robot 10m
	3HAW050008628-015	Welding Power cable of robot 15m
Air pipe	3HAW050008638-005	Air pipe DN12 5m
	3HAW050008638-010	Air pipe DN12 10m
	3HAW050008638-015	Air pipe DN12 15m

8 Spare parts

8.7. Anti collision

8.7. Anti collision

Anti collision spare parts

ABB part reference no.	Description
3HAWC116985	Laser reflector
3HAW107700584	Laser reflector bracket
3HAW107710201	Laser scanner
3HAW107700582	Laser bracket (1/2)
3HAW107700583	Laser bracket (2/2)

9 Appendix

9.1. Wiring diagrams

List

This chapter contains the following wiring diagrams:

- 3HAW050008604: SMB box for 1 axis M2008
- 3HAW050008605: SMB box for 3 axis M2008
- 3HAW050008651: SMB box for 6 axis M2011
- 3HAW050008607: PTC Shunt M2008
- 3HAW050008612: 6 axis resolver static cable XS41-2, XP2 to SMB
- 3HAW050008613: 1 axis motor static cable XP7 400-600V
- 3HAW050008614: 3 axis motor static cable XP7 400-600V
- 3HAW050008615: 6 axis motor static cable high voltage XP1 to SMB 600V
- 3HAW050008624: 1 Motor static extension M2008
- 3HAW050008625: 1 Resolver static extension M2008
- 3HAW050008635: 1 Motor Static XP7 M2008 (No SMB box)
- 3HAW050008636: 1 Resolver Static M2008 (No SMB box)
- 3HAW050008628: Extension welding power cable
- 3HAW050008631: 1 Motor power flex cable- Electrical Spot Gun, from SMB.MP&SMB.MR to R1.SP
- 3HAW050008608: 1 axis motor movement cable
- 3HAW050008609: 1 axis resolver movement cable
- 3HAW050008610: Limit switch cable 1 position
- 3HAW050008654: Limit switch cable 2 positions
- 3HAW050008611: Limit switch cable 4 positions
- 3HAW050008633: Power supply 24V DC output & communication flexible cable
- 3HAW050008637: 1 Resolver, Robot Axis 7 Feedback- motor resolver, Track M2008 No SMB

9 Appendix

9.1. Wiring diagrams



Project Description

SMB Box For 1 Axis M2008

Document Number

3HAW050008604

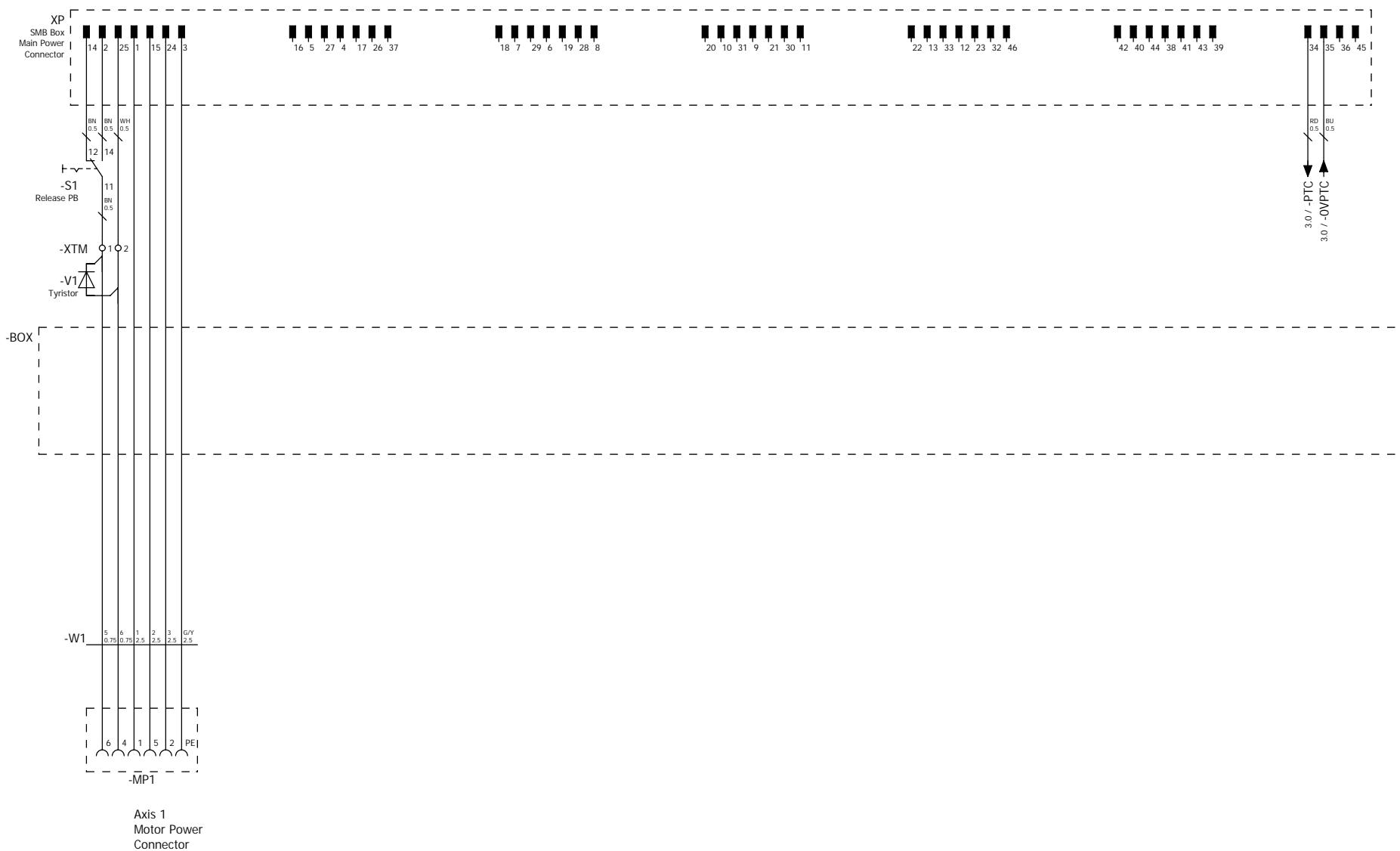
Revision

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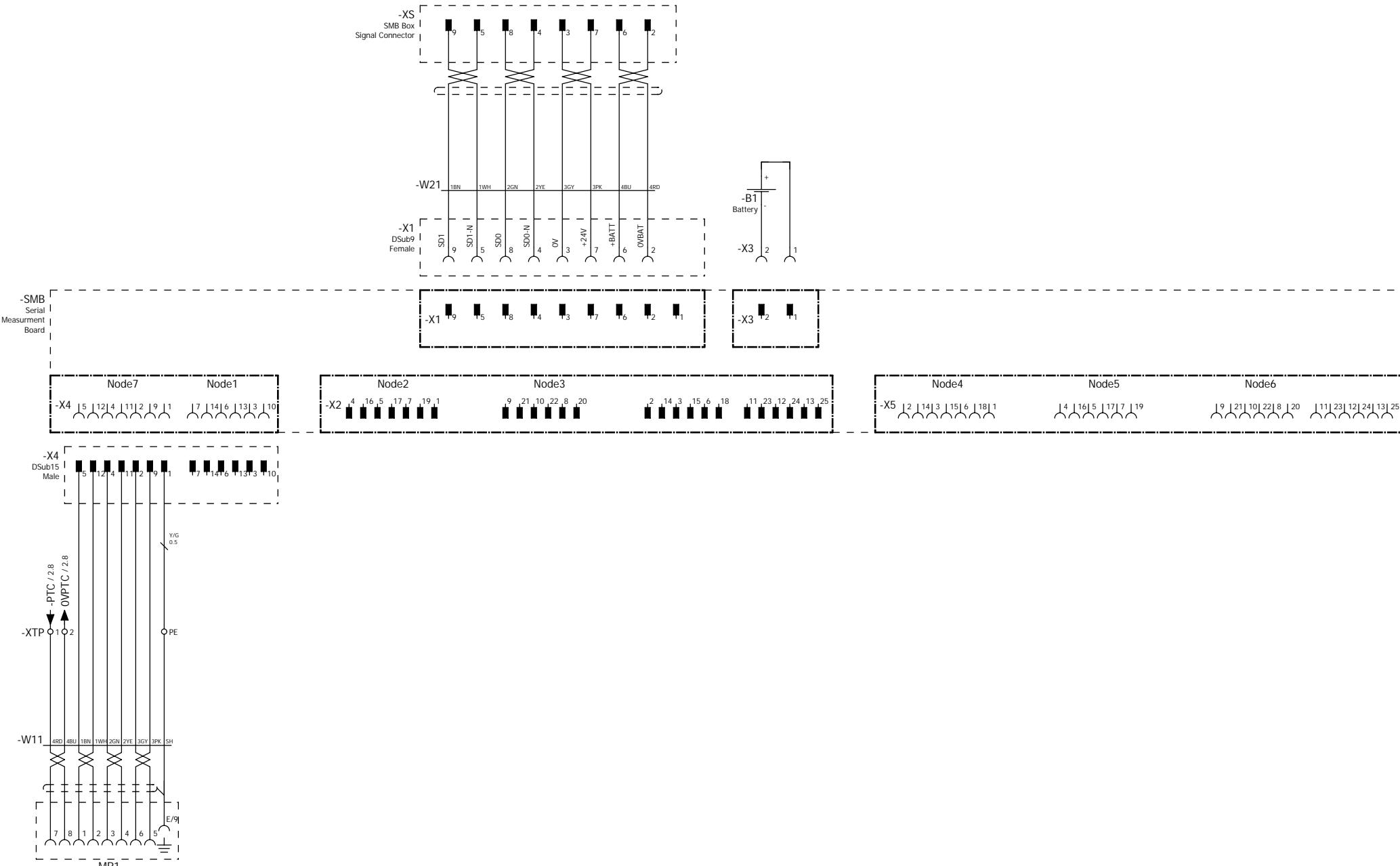
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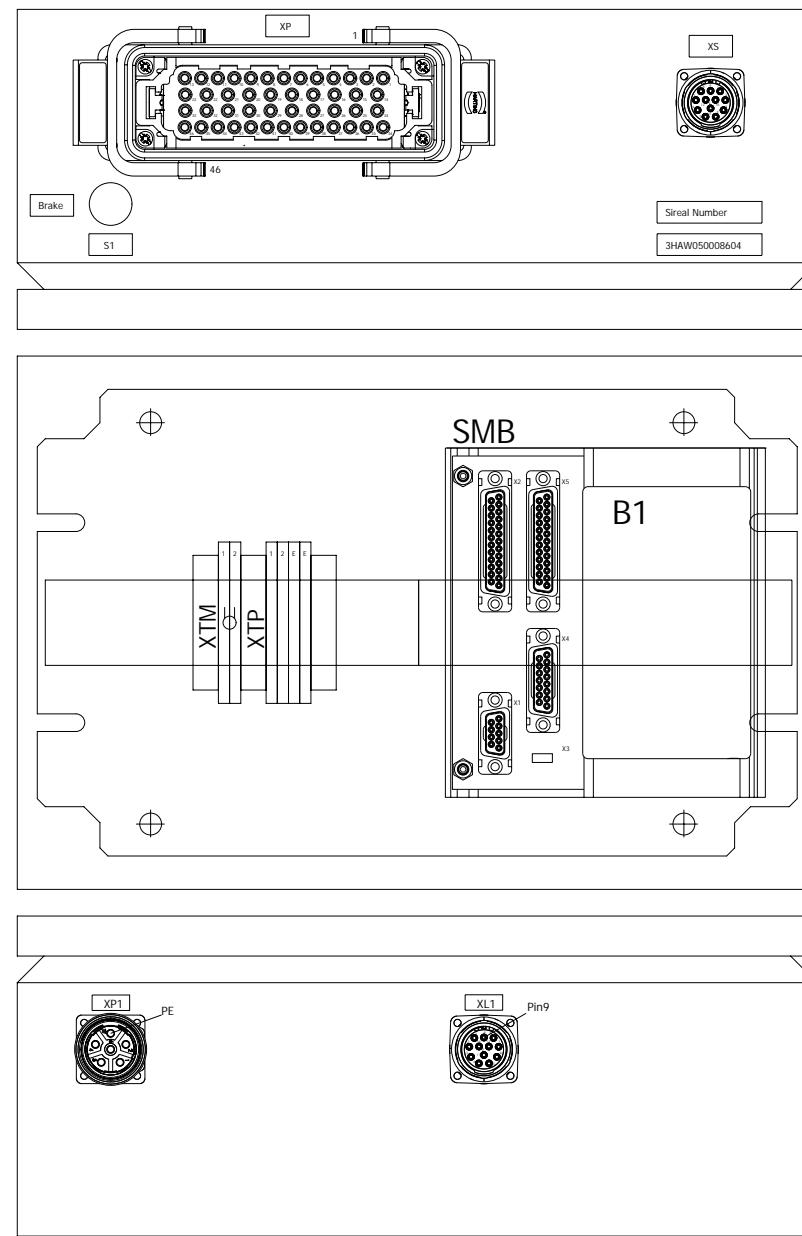
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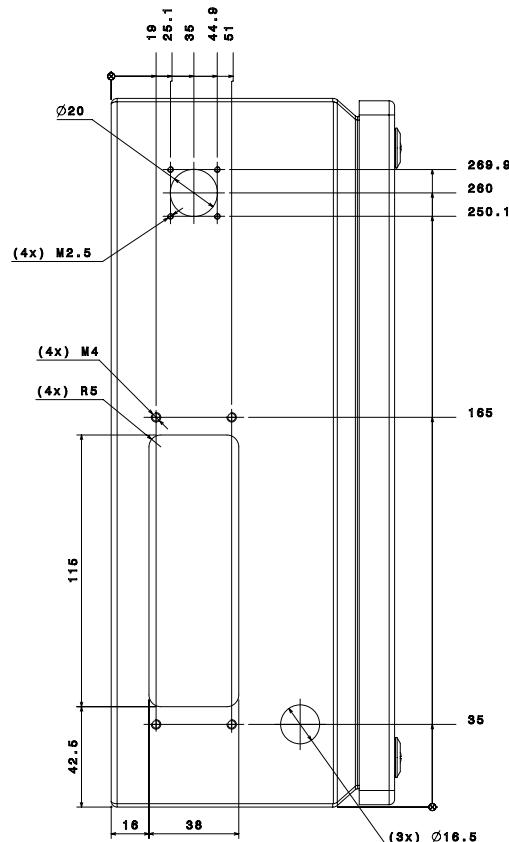
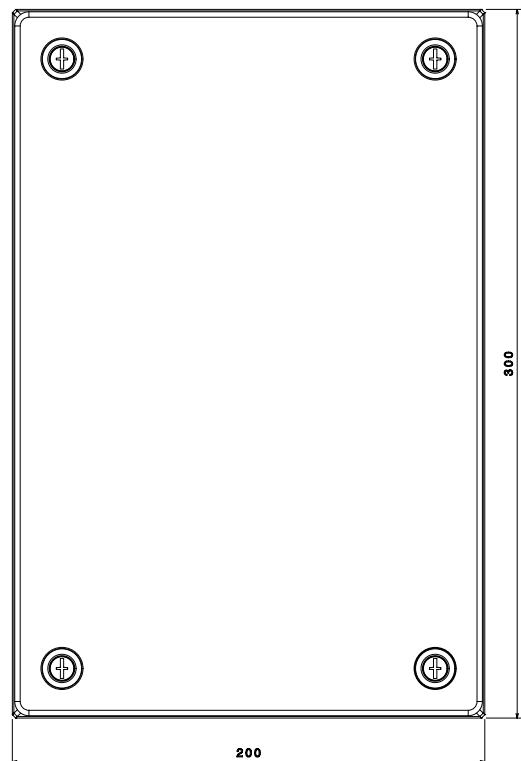
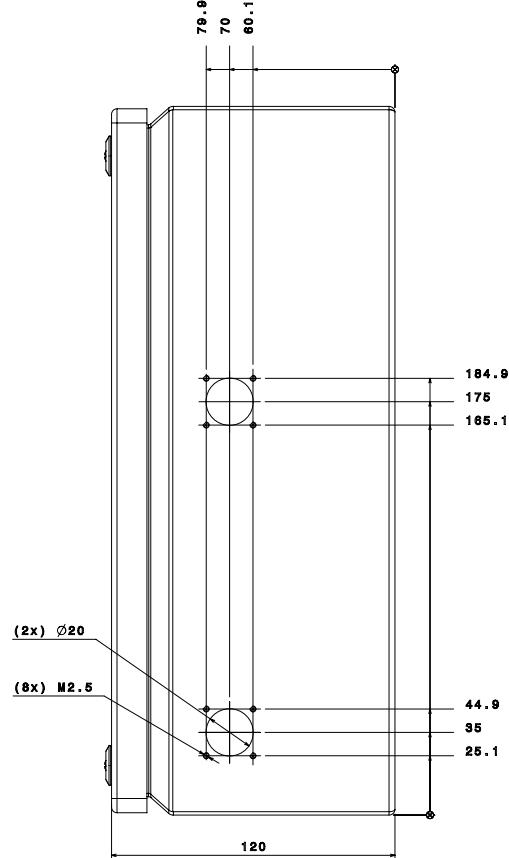
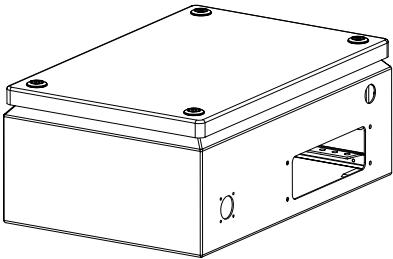
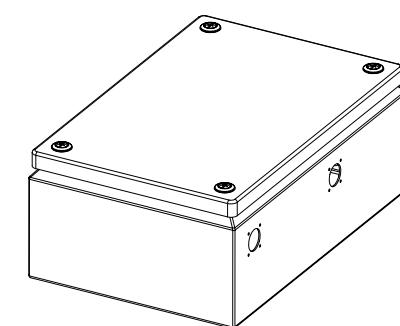
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Responsible Department: RS/BIW	Prepare by, Date N.Cao 2013-2-25	Approve by, Date A.Stapelberg 2012-6-1	Replacement of	Replaced by	Document no. 3HAW050008604	Rev. Ind 008	Page 0	



Responsible Department: RS/BIW	Approve by Date: A.Stapelberg 2012-6-1	SMB Box For 1 Axis M2008	ABB	Power	Status: Approved Document no. 3HAW050008604	2012-6-1 Rev. Ind 008	= + Page 2 Total Page 16
Prepare by Date: N.Cao 2013-2-25	Replace by Date: A.Stapelberg 2012-6-1	Replacement of _____	Replaced by _____				







TOLERANCES GENERALES GENERAL TOLERANCES Sauf indication contraire Unless otherwise indicated				
	BRUT STOCK MATERIAL	R25	R12.5	R6.3
0 -> 180	± 1	± 0.85	± 0.80	± 0.15
180 -> 400	± 1.85	± 0.85	± 0.80	± 0.20
> 400	± 1.80	± 0.80	± 0.40	± 0.80

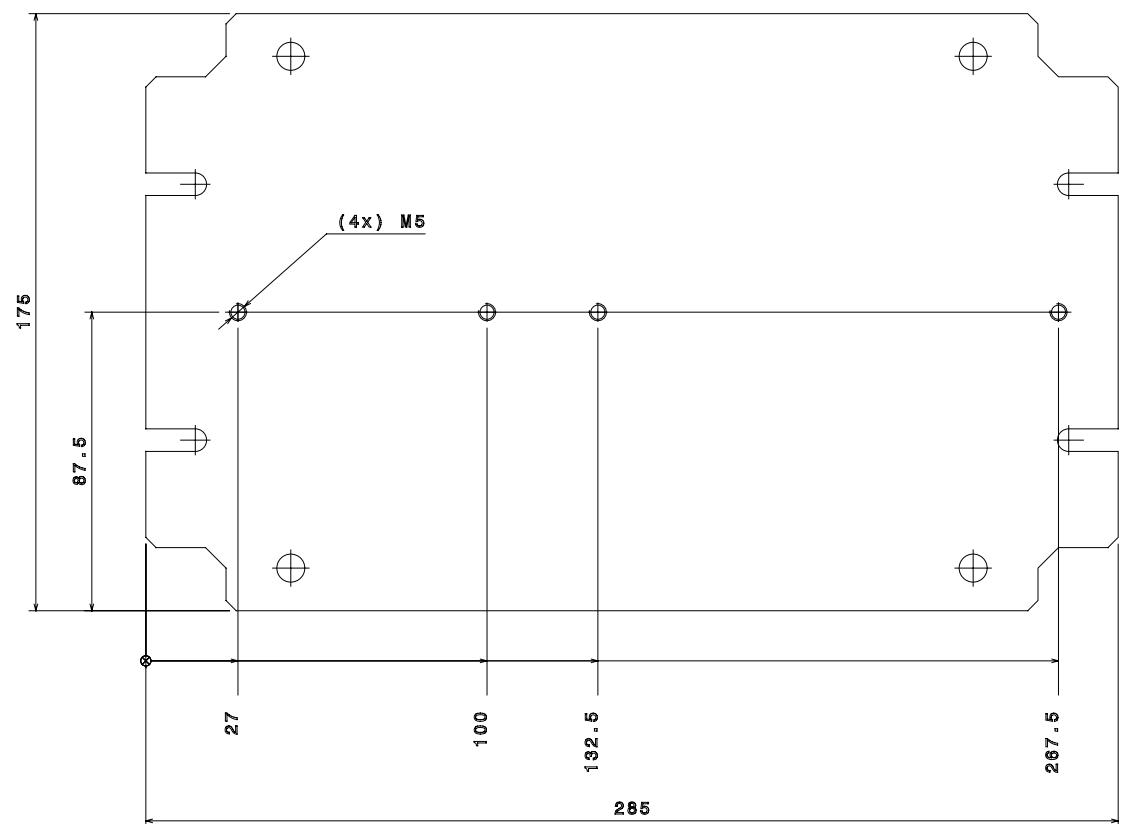
Exhibit 1/1	Designation: piece, sous ensemble ou ensemble . Description: part, sub assembly or assembly.	Material KL1603.510
Form	-	Treatment -
Format	-	Part Mark
A1	-	1-Axis SMB Box
	-	800 X 200 X 120
	-	ABB INC. Rockford, IL, Chicago Road, Rockford, IL, 61108 Tel: +1 815 6562270
Date:	26/03/2011	Plastic Sheet
Design by:	Zhang Hulyun	1/1
Vise:	Approved: -	Revision date: CATIA V5
	KL1603.510-SMB-Box-1	



Box Drill Hole

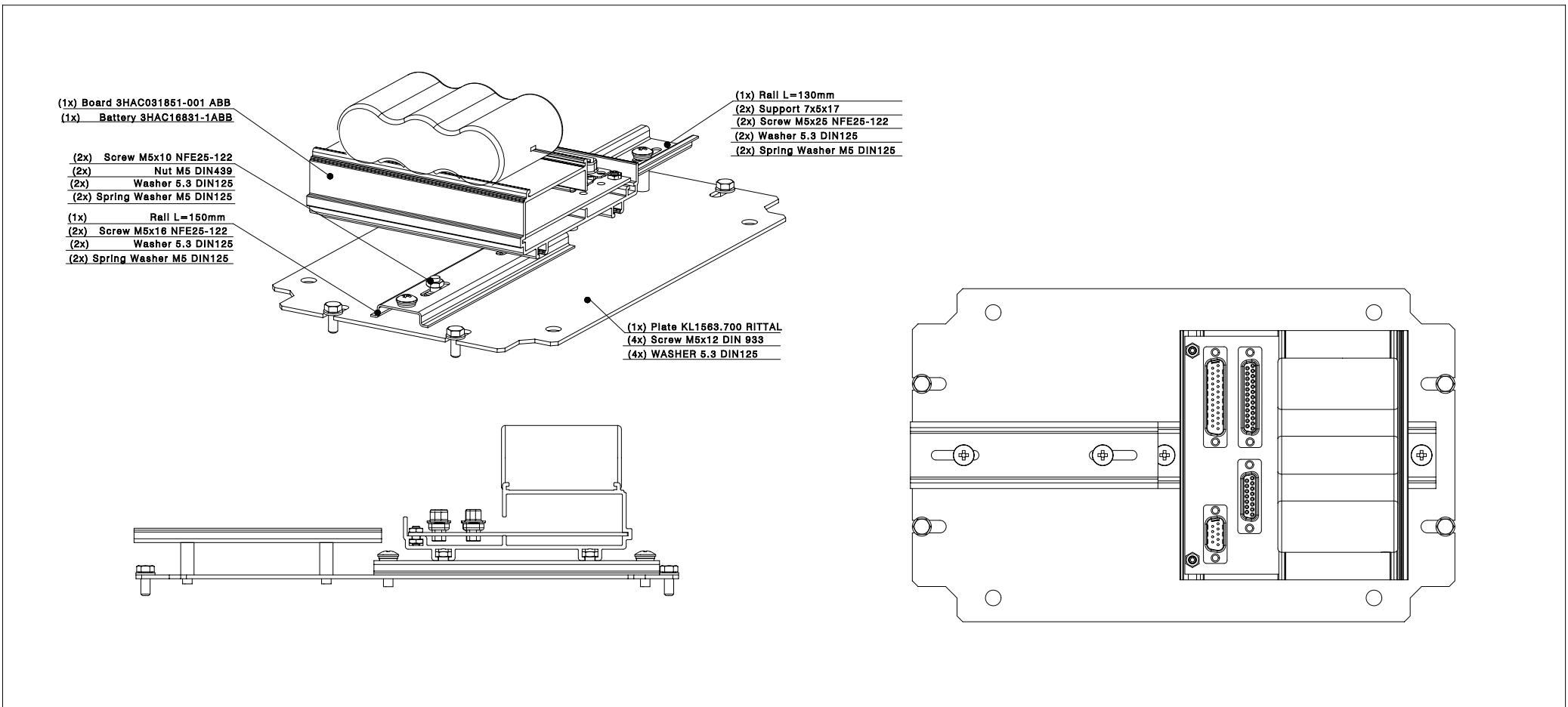
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3HAW050008604

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Rev. Ind
008
Page
4.a
Total Page
16

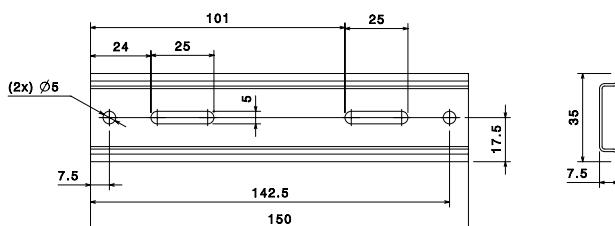


TOLERANCES GENERALES GENERAL TOLERANCES					
Sauf indication contraire Unless otherwise indicated					
	BRUT STOCK MATERIAL	R25	R12.5	R8.3	
0 --> 150	± 1	± 0.25	± 0.20	± 0.15	
150 --> 400	± 1.25	± 0.85	± 0.50	± 0.20	
> 400	± 1.50	± 0.50	± 0.40	± 0.30	
		⊥	//	□	
USINE MACHINED	0.2/1000	0.2/1000	0.3/1000		
BRUT STOCK MATERIAL	2/1000	2/1000	2.5/1000		

Echelle Scale 1/1 1 mm	Designation: pièce, sous ensemble ou ensemble . Description: part, sub assembly or assembly.	Matière Material KL1563.700
		Traitement Treatment -
		Brut Stock -
Format A2	Holes drilled after SMB Box	ABB MO No.5 Lane 568, Changye Road, Kangqiao Town, Shanghai, P.R.China Tel:+86 21 51509878
	ABB Engineer Ltd. Shanghai	System CAD/CAM CATIA V5
Chemin CAO: Dwg file identify:	-	Planche Sheet 1/1
Date: 28/03/2011	-	
Designe par: Drawn by: Zhang Hulyun	-	
Vise: Approved: -	KL1563.700	

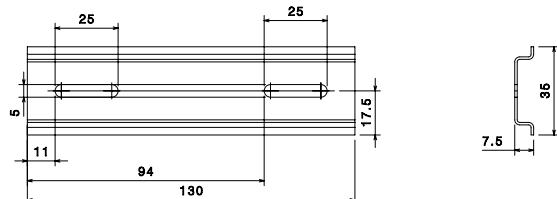


Rail L=150mm

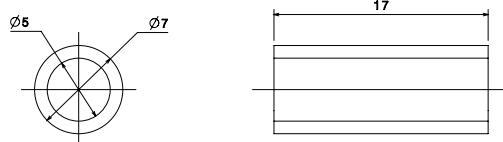


4.b

Rail L=130mm



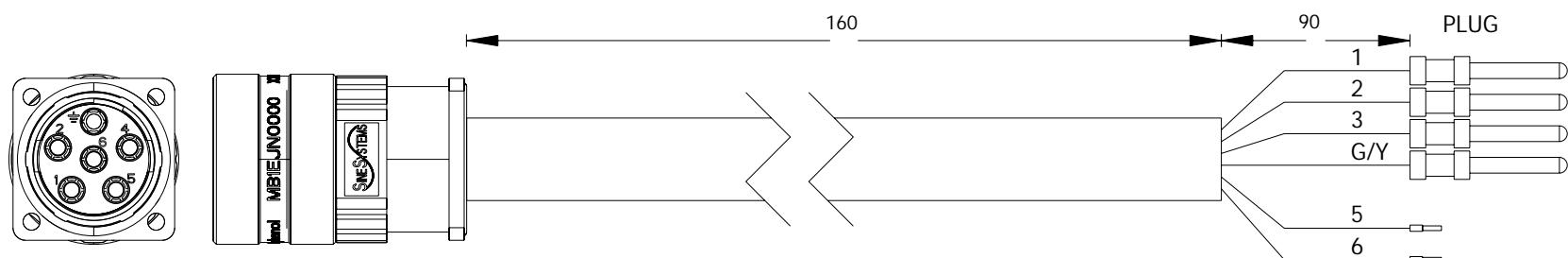
Support 7x5x17



10

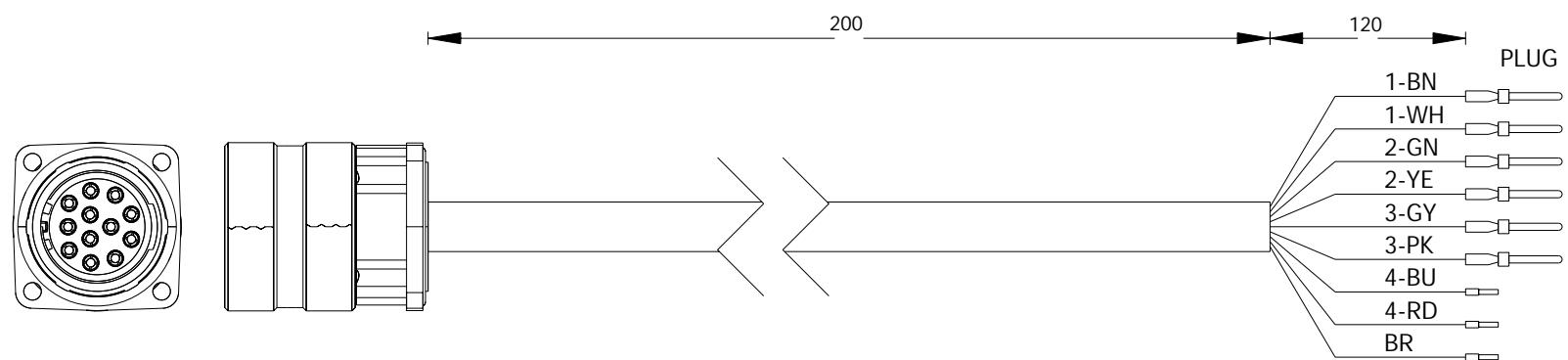
Cable diagram

Cable name =+-W1			cable type Lappkabel:0036026					
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function text	Page / column	Target designation from	Connection point	conductor	Target designation to	Connection point	Page / column	function text
U	/2.1	-MP1	1	1	-XP	1	/2.1	
V	/2.1	-MP1	5	2	-XP	15	/2.1	
W	/2.1	-MP1	2	3	-XP	24	/2.1	
BK+	/2.1	-MP1	6	5	-XTM	1	/2.1	
BK-	/2.1	-MP1	4	6	-XTM	2	/2.1	
PE	/2.1	-MP1	PE	G/Y	-XP	3	/2.1	



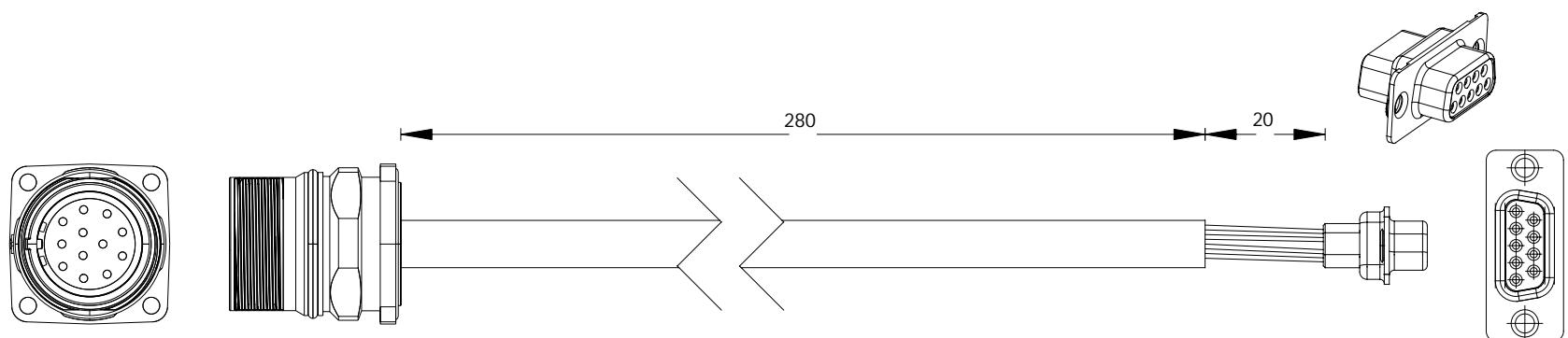
Cable diagram

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function text	Page / column	Target designation from	Connection point	conductor	Target designation to	Connection point	Page / column	function text
S1	/3.0	-MR1	1	1BN	-X4	5	/3.0	X7
S3	/3.1	-MR1	2	1WH	-X4	12	/3.1	0V X7
S4	/3.1	-MR1	3	2GN	-X4	4	/3.1	Y7
S2	/3.1	-MR1	4	2YE	-X4	11	/3.1	0V Y7
R2	/3.1	-MR1	6	3GY	-X4	2	/3.1	0V EXC2
R1	/3.1	-MR1	5	3PK	-X4	9	/3.1	EXC2
OVPTC	/3.0	-MR1	8	4BU	-XTP	2	/3.2	
PTC	/3.0	-MR1	7	4RD	-XTP	1	/3.0	
PE	/3.1	-MR1	E/9	SH	-XTP	PE	/3.1	



Cable diagram

Cable name =+-W21			cable type Lappkabel:0035802					
function text			no. of conductors 4x2			cross-section 0.25mm		Length 0.3
function text	Page / column	Target designation from	Connection point	conductor	Target designation to	Connection point	Page / column	function text
SD1	/3.3	-XS	9	1BN	-X1	9	/3.3	SD1
SD1-N	/3.3	-XS	5	1WH	-X1	5	/3.3	SD1-N
SD0	/3.3	-XS	8	2GN	-X1	8	/3.3	SD0
SD0-N	/3.4	-XS	4	2YE	-X1	4	/3.4	SD0-N
0V	/3.4	-XS	3	3GY	-X1	3	/3.4	0V
24V	/3.4	-XS	7	3PK	-X1	7	/3.4	+24V
BAT+	/3.4	-XS	6	4BU	-X1	6	/3.4	+BATT
0V BAT	/3.4	-XS	2	4RD	-X1	2	/3.4	0VBAT





Project Description

SMB Box For 3 Axis M2008

Document Number

3HAW050008605

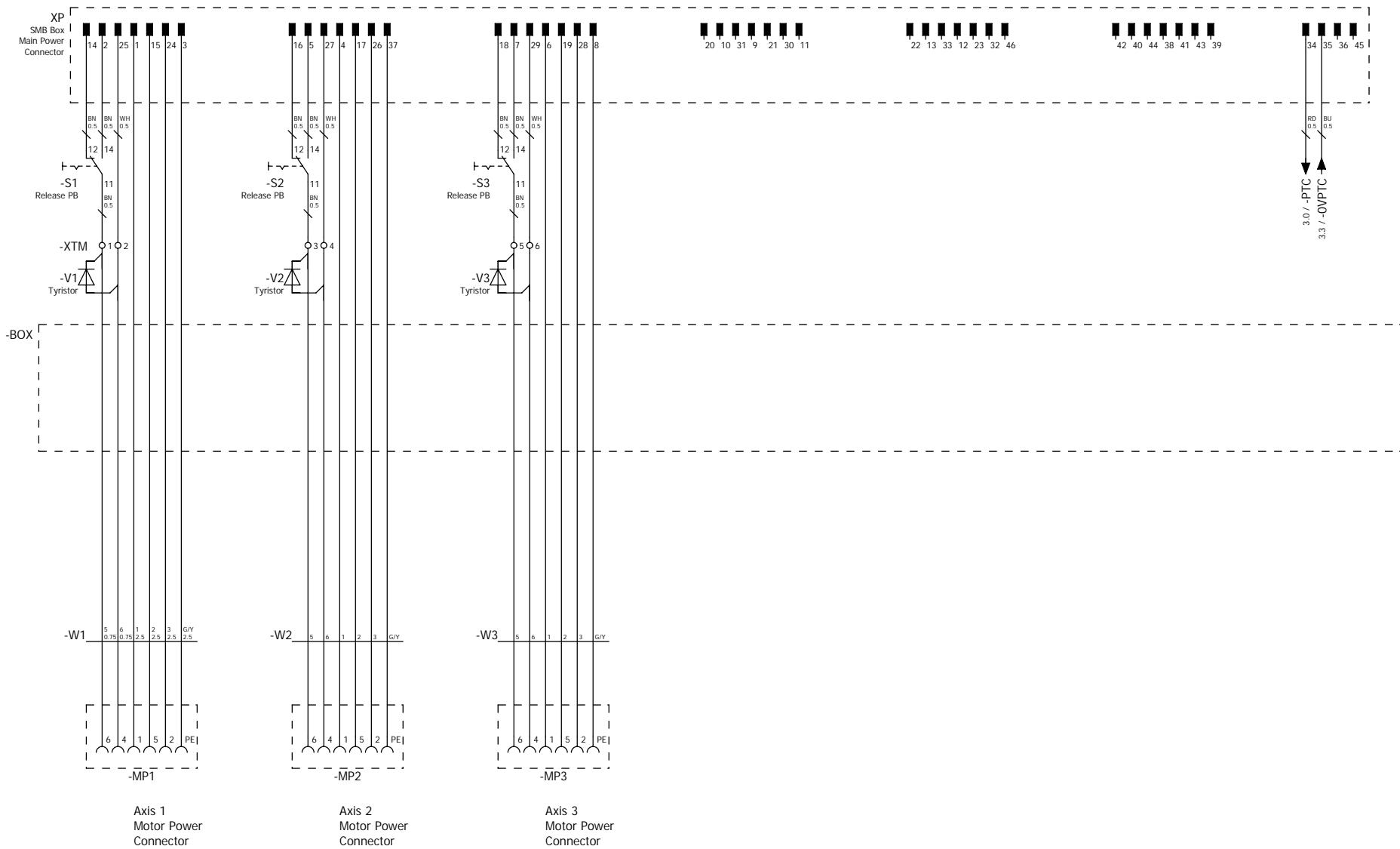
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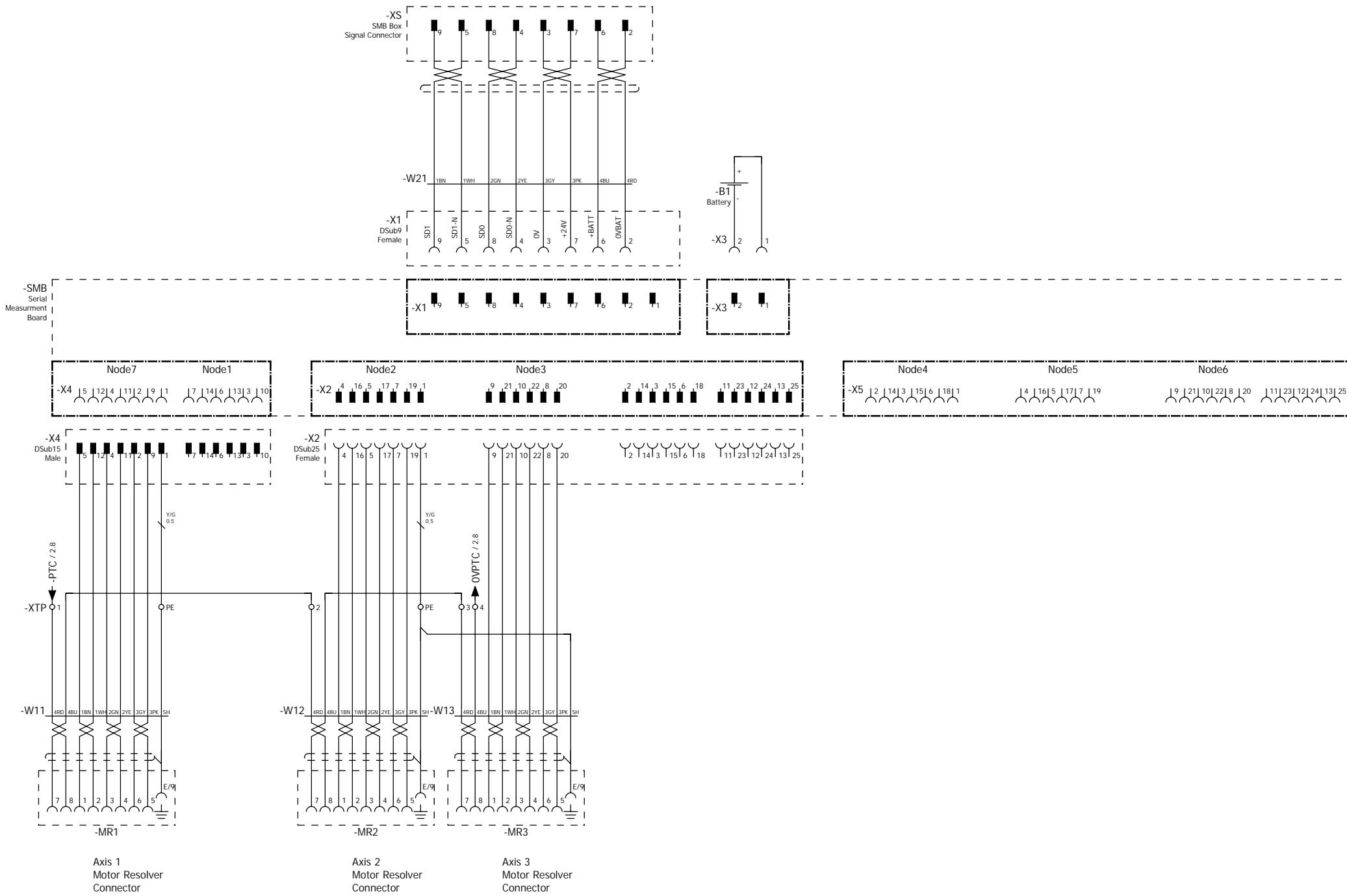
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Number of pages

21

		SMB Box For 3 Axis M2008		Title page / cover sheet	Status: Approved	2012-6-1	=	
Responsible Department: RS/BIW	Prepare by, Date N.Cao 2013-2-25	Approve by, Date A.Stapelberg 2012-6-1	Replacement of	Replaced by	Document no. 3HAW050008605	Rev. Ind 008	Page 0	

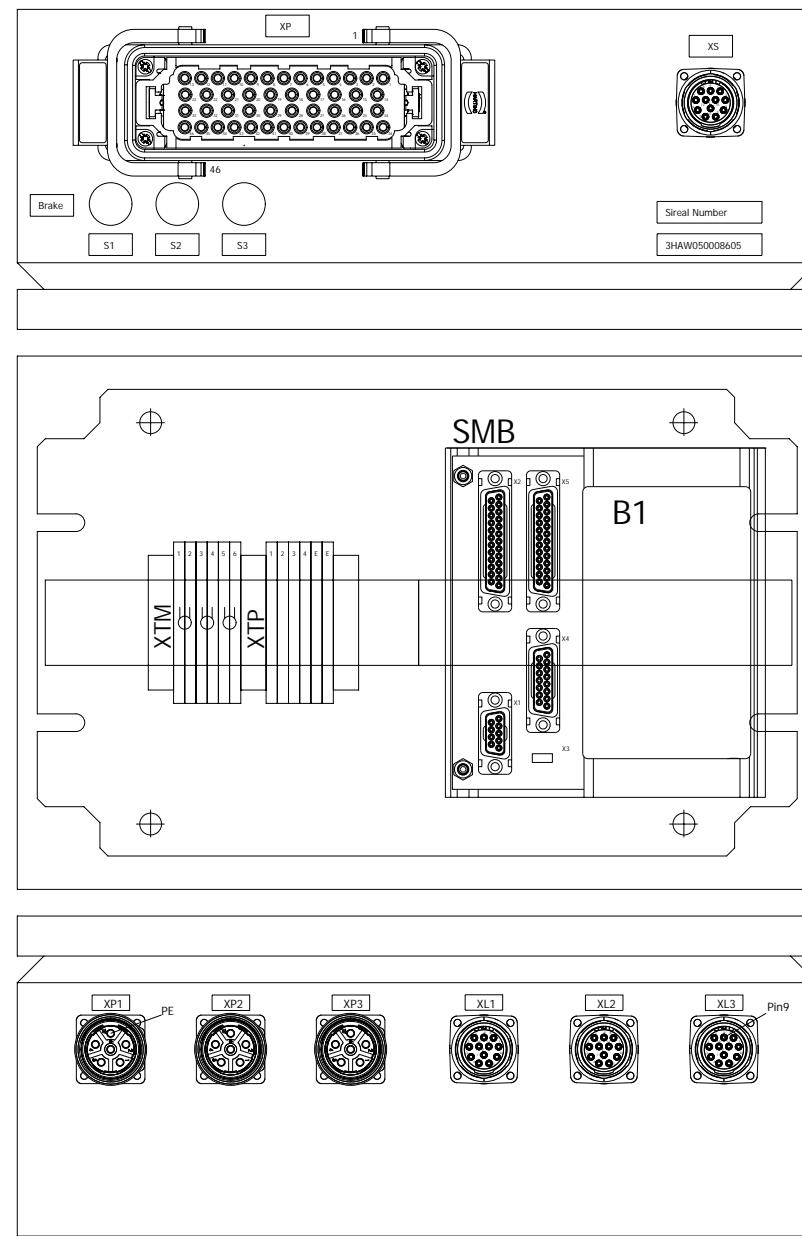




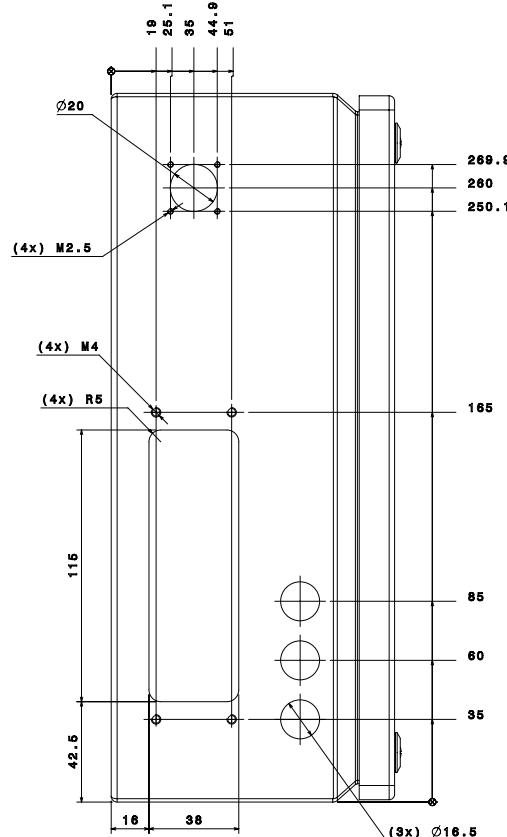
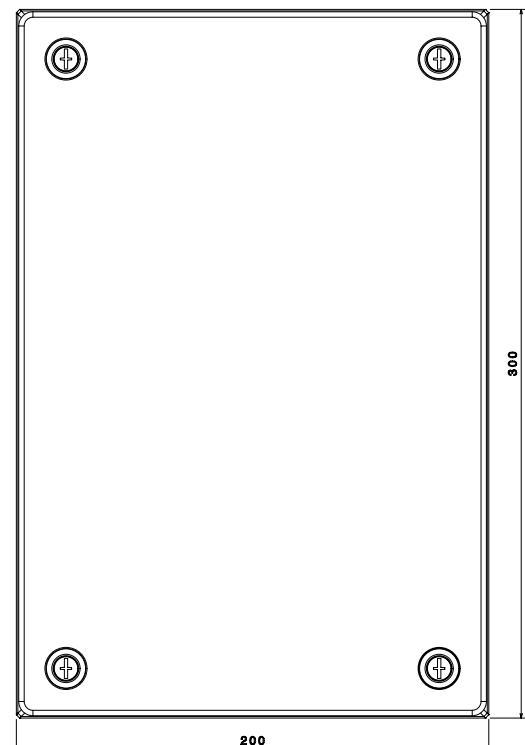
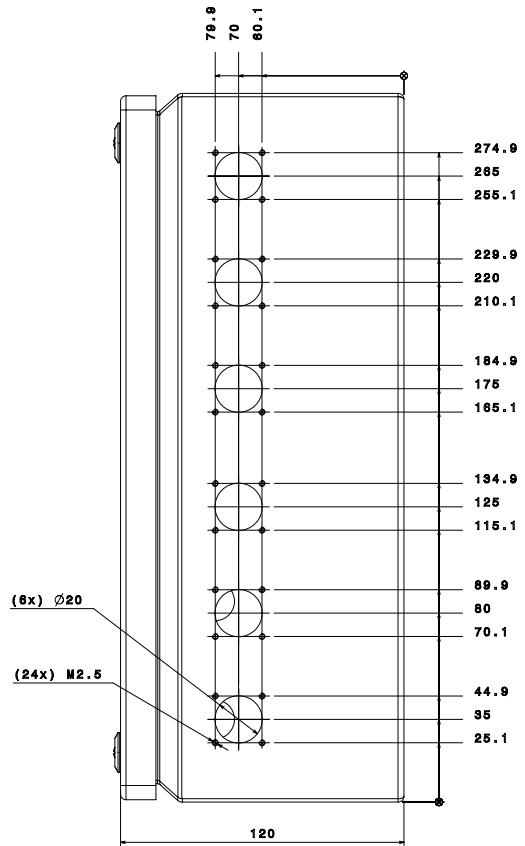
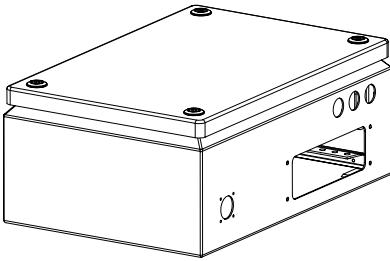
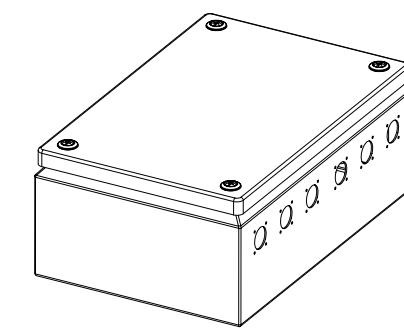
Axis 1
Motor Resolver
Connector

Axis 2
Motor Resolver
Connector

Axis 3
Motor Resolver
Connector



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TOLERANCES GENERALES GENERAL TOLERANCES				
Sauf indication contraire Unless otherwise indicated				
	BROF <small>(Sous forme matérielle)</small>	R25	R12.5	R6.3
0 → 100	± 1	± 0.55	± 0.30	± 0.15
150 → 400	± 1.25	± 0.85	± 0.50	± 0.30
> 400	± 1.60	± 0.90	± 0.60	± 0.50
		//		□
URINE MACHINED	0.2/1000	0.2/1000	0.2/1000	
STOCK MATERIAL	2/1000	2/1000	2/1000	

2012-6-1 =

Responsible Department: RS/RIW

Prepared by Date N.Cao 2013-2

Responsible Department: RG/BW

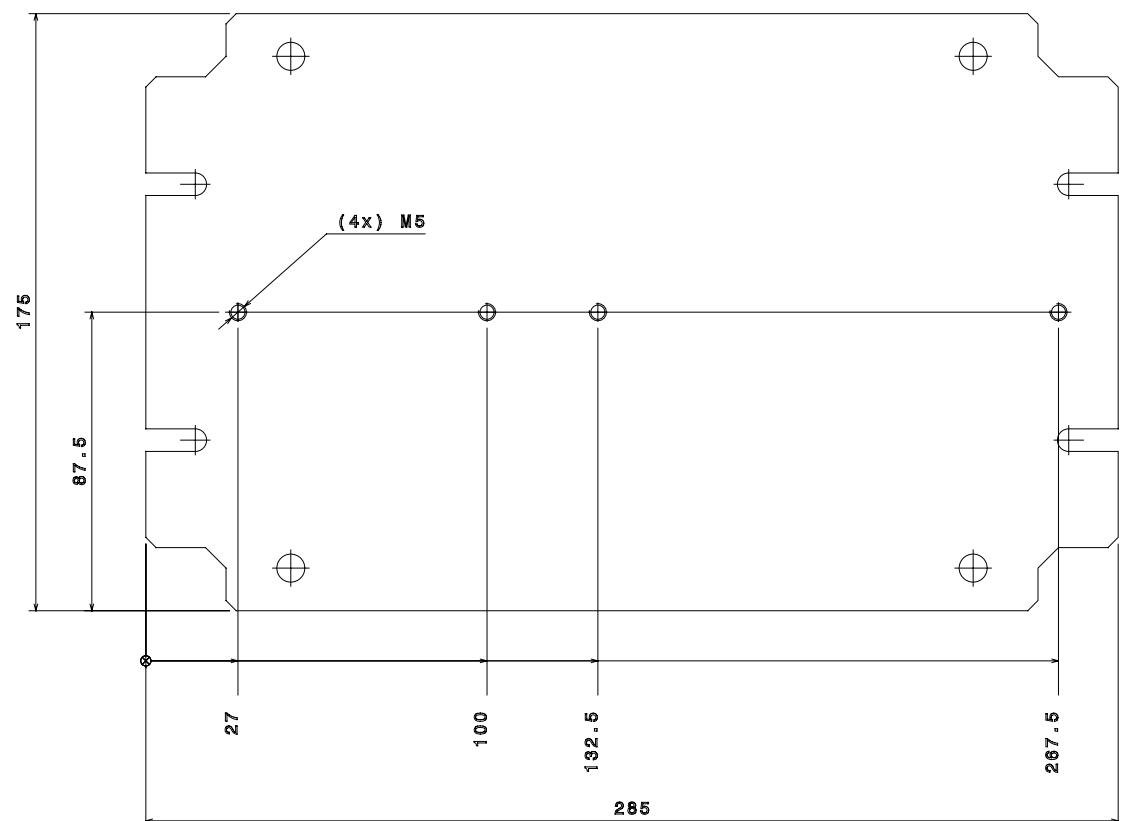
SMB Box For 3 Axis M2008



Box Drill Hole

Status:
Approved
Document no.
3HAW050008605

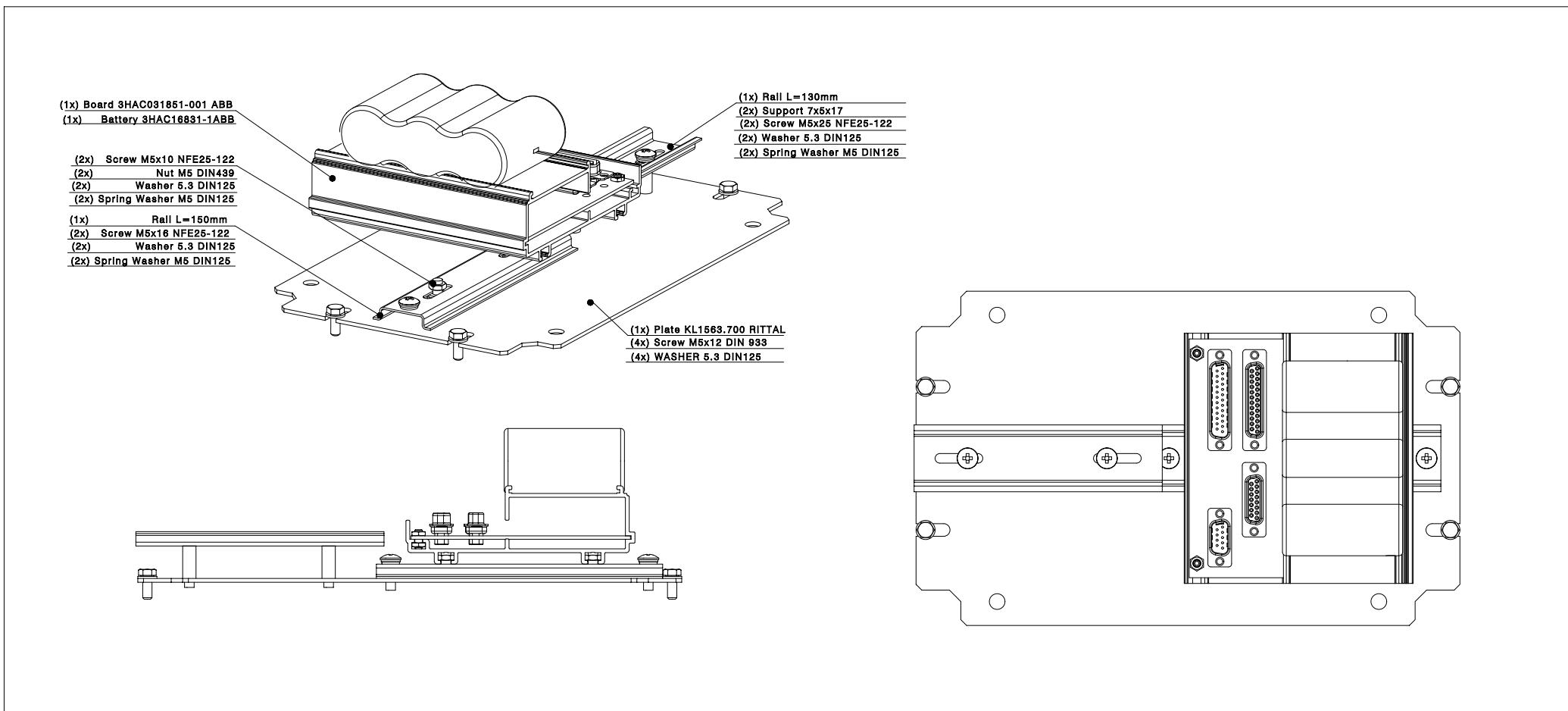
Rev.Ind
008 Page 4.a
Total Page 21



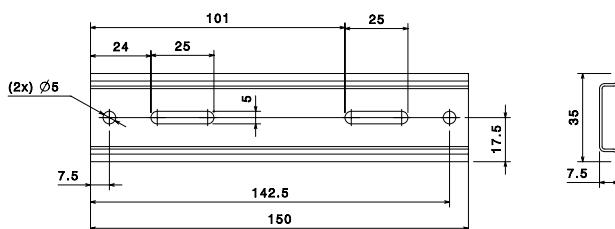
TOLERANCES GENERALES GENERAL TOLERANCES					
Sauf indication contraire Unless otherwise indicated					
	BRUT STOCK MATERIAL	R25	R12.5	R8.3	
0 --> 150	± 1	± 0.25	± 0.20	± 0.16	
150 --> 400	± 1.25	± 0.85	± 0.50	± 0.20	
> 400	± 1.50	± 0.50	± 0.40	± 0.30	
		⊥	//	□	
USINE MACHINED	0.2/1000	0.2/1000	0.3/1000		
BRUT STOCK MATERIAL	2/1000	2/1000	2.5/1000		

Echelle Scale 1/1 1 mm	Designation: pièce, sous ensemble ou ensemble . Description: part, sub assembly or assembly.	Matière Material KL1563.700
Format A2	Holes drilled after SMB Box	Traitement Treatment -
ABB	ABB Engineer Ltd. Shanghai	Brut Stock -
On document est la propriété de ABB MO et son propriété réservée reproduit ou communiquée à un tiers sans autorisation écrite préalable.		ABB MO No.5 Lane 568, Changye Road, Kangqiao Town, Shanghai, P.R.China Tel:+86 21 61609878
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Date: 28/03/2011	-	Planche Sheet 1/1
Designe par: Drawn by: Zhang Hulyun	-	KL1563.700
Vise: Approved: -	-	



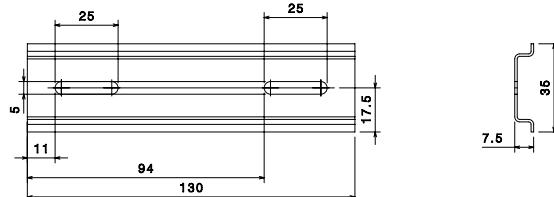


Rail L=150mm

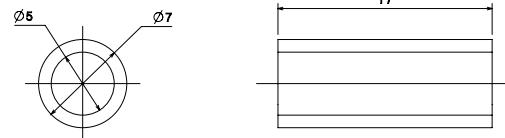


4.b

Rail L=130mm

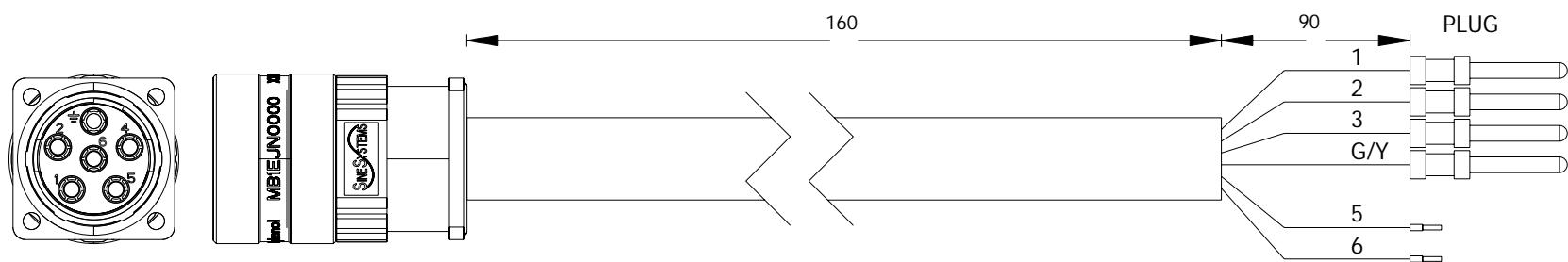


Support 7x5x17



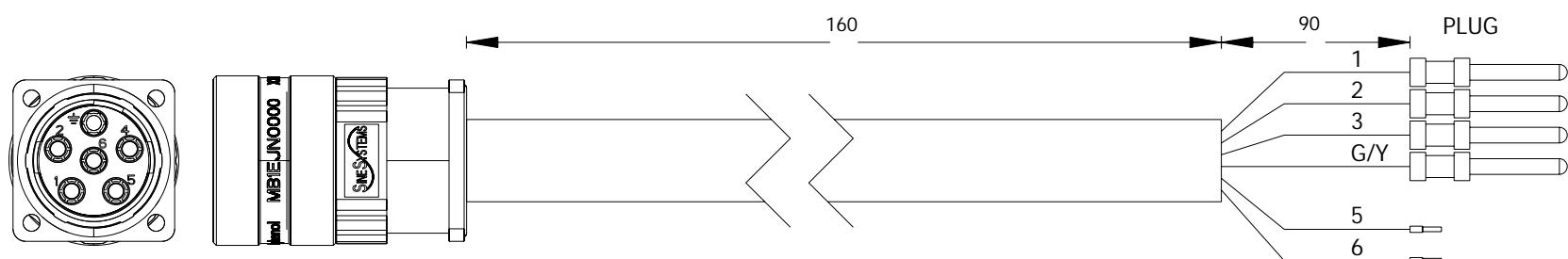
Cable diagram

Cable name =+-W1			cable type Lappkabel:0036026					
function text			no. of conductors 4G2.5+2x0.75mm			cross-section		Length 0.3
function text	Page / column	Target designation from	Connection point	conductor	Target designation to	Connection point	Page / column	function text
U	/2.1	-MP1	1	1	-XP	1	/2.1	
V	/2.1	-MP1	5	2	-XP	15	/2.1	
W	/2.1	-MP1	2	3	-XP	24	/2.1	
BK+	/2.1	-MP1	6	5	-XTM	1	/2.1	
BK-	/2.1	-MP1	4	6	-XTM	2	/2.1	
PE	/2.1	-MP1	PE	G/Y	-XP	3	/2.1	



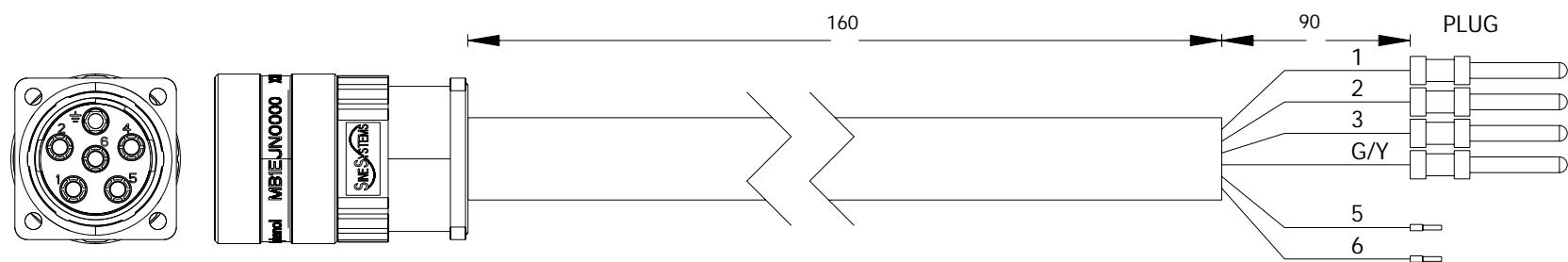
Cable diagram

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function text	Page / column	Target designation from	Connection point	conductor	Target designation to	Connection point	Page / column	function text
U	/2.2	-MP2	1	1	-XP	4	/2.2	
V	/2.2	-MP2	5	2	-XP	17	/2.2	
W	/2.2	-MP2	2	3	-XP	26	/2.2	
BK+	/2.2	-MP2	6	5	-XTM	3	/2.2	
BK-	/2.2	-MP2	4	6	-XTM	4	/2.2	
PE	/2.3	-MP2	PE	G/Y	-XP	37	/2.3	



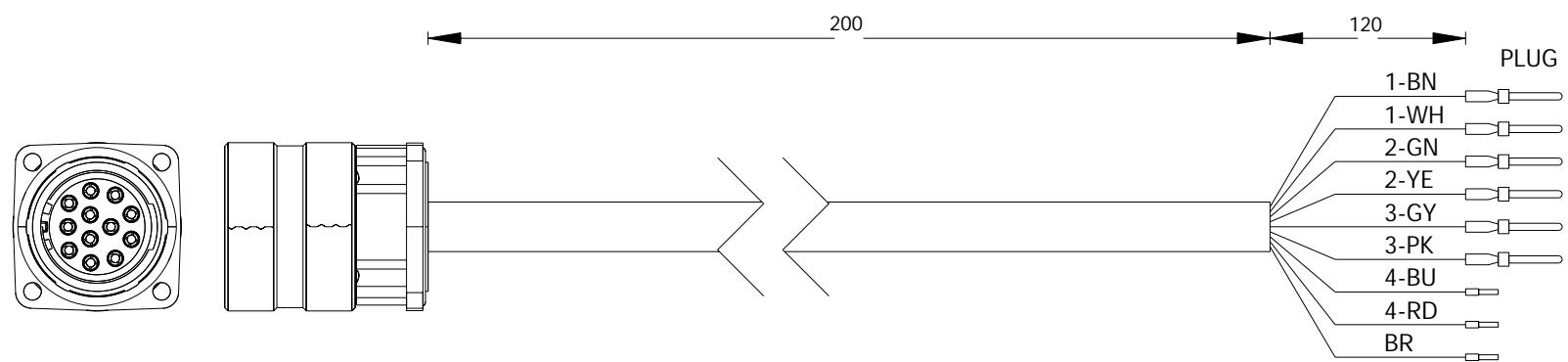
Cable diagram

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function text	Page / column	Target designation from	Connection point	conductor	Target designation to	Connection point	Page / column	function text
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V	/2.4	-MP3	5	2	-XP	19	/2.4	
W	/2.4	-MP3	2	3	-XP	28	/2.4	
BK+	/2.3	-MP3	6	5	-XTM	5	/2.3	
BK-	/2.3	-MP3	4	6	-XTM	6	/2.3	
PE	/2.4	-MP3	PE	G/Y	-XP	8	/2.4	



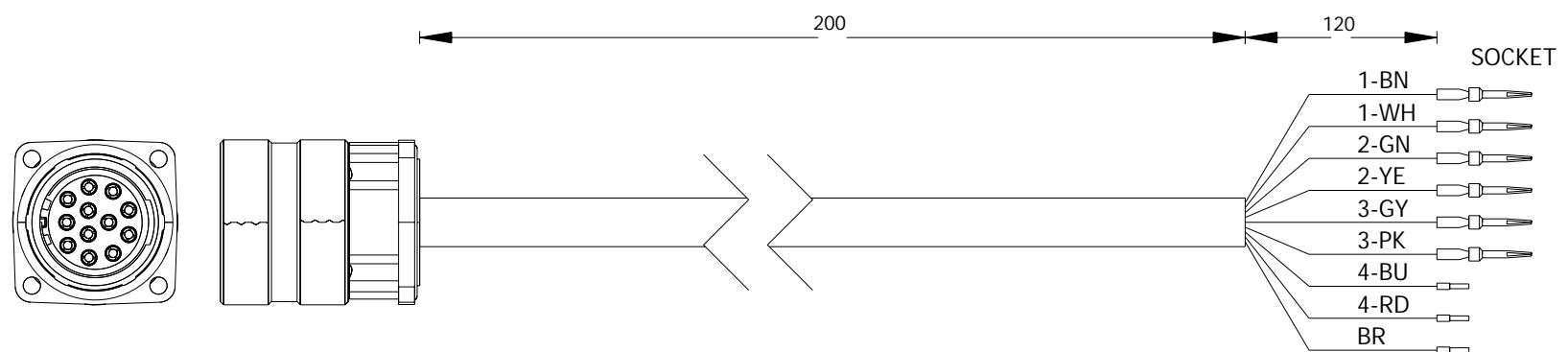
Cable diagram

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S1	/3.0	-MR1	1	1BN	-X4	5	/3.0	X7
S3	/3.1	-MR1	2	1WH	-X4	12	/3.1	0V X7
S4	/3.1	-MR1	3	2GN	-X4	4	/3.1	Y7
S2	/3.1	-MR1	4	2YE	-X4	11	/3.1	0V Y7
R2	/3.1	-MR1	6	3GY	-X4	2	/3.1	0V EXC2
R1	/3.1	-MR1	5	3PK	-X4	9	/3.1	EXC2
OVPTC	/3.0	-MR1	8	4BU	-XTP	2	/3.2	
PTC	/3.0	-MR1	7	4RD	-XTP	1	/3.0	
PE	/3.1	-MR1	E/9	SH	-XTP	PE	/3.1	



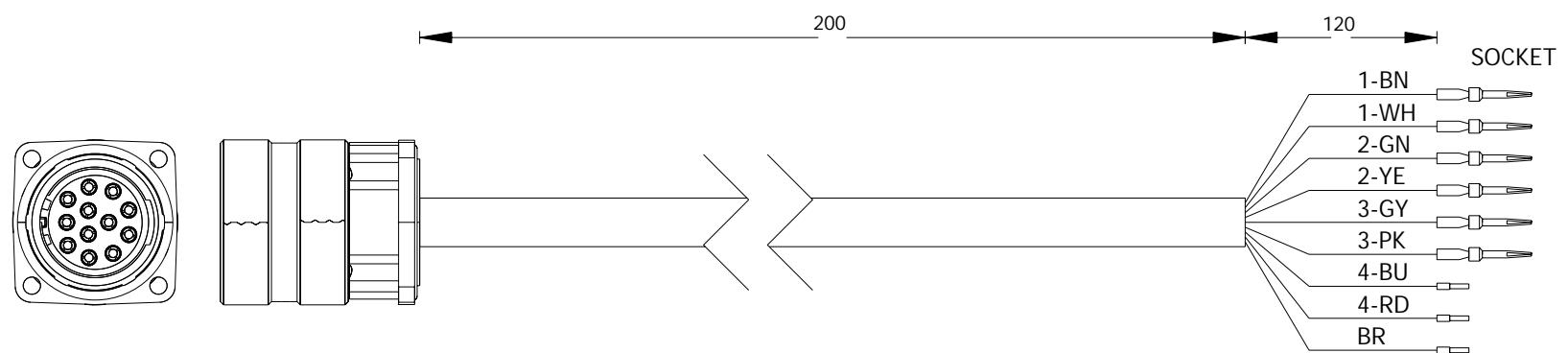
Cable diagram

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S1	/3.2	-MR2	1	1BN	-X2	4	/3.2	X2
S3	/3.2	-MR2	2	1WH	-X2	16	/3.2	0V X2
S4	/3.2	-MR2	3	2GN	-X2	5	/3.2	Y2
S2	/3.3	-MR2	4	2YE	-X2	17	/3.3	0V Y2
R2	/3.3	-MR2	6	3GY	-X2	7	/3.3	0V EXC1
R1	/3.3	-MR2	5	3PK	-X2	19	/3.3	EXC1
OVPTC	/3.2	-MR2	8	4BU	-XTP	3	/3.3	
PTC	/3.2	-MR2	7	4RD	-XTP	2	/3.2	
PE	/3.3	-MR2	E/9	SH	-XTP	PE	/3.3	



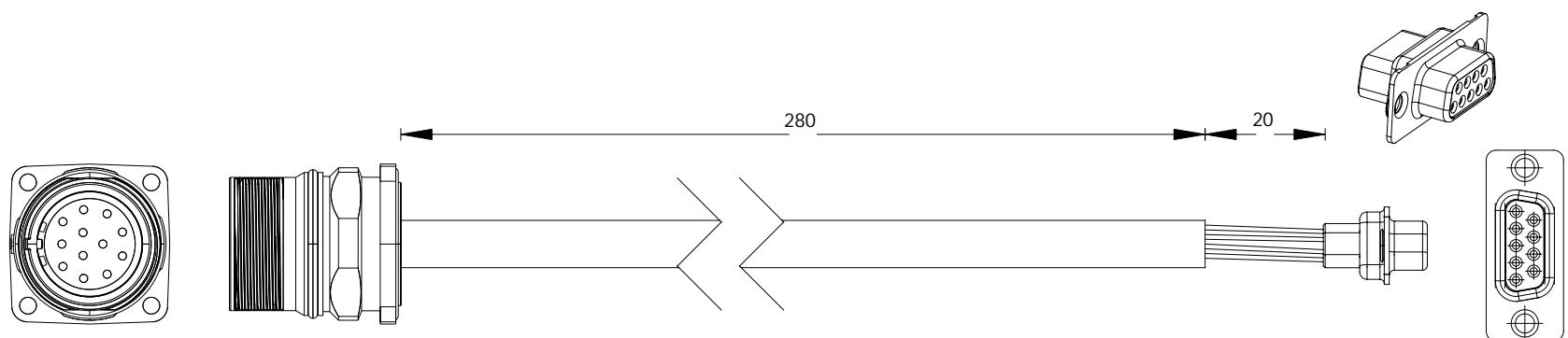
Cable diagram

Cable name =+-W13			cable type Lappkabel:0035802					
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function text	Page / column	Target designation from	Connection point	conductor	Target designation to	Connection point	Page / column	function text
S1	/3.3	-MR3	1	1BN	-X2	9	/3.3	X3
S3	/3.3	-MR3	2	1WH	-X2	21	/3.3	0V X3
S4	/3.4	-MR3	3	2GN	-X2	10	/3.4	Y3
S2	/3.4	-MR3	4	2YE	-X2	22	/3.4	0V Y3
R2	/3.4	-MR3	6	3GY	-X2	8	/3.4	0V EXC1
R1	/3.4	-MR3	5	3PK	-X2	20	/3.4	EXC1
OVPTC	/3.3	-MR3	8	4BU	-XTP	4	/3.6	
PTC	/3.3	-MR3	7	4RD	-XTP	3	/3.3	
PE	/3.4	-MR3	E/9	SH	-XTP	PE	/3.3	



Cable diagram

Cable name =+-W21			cable type Lappkabel:0035802					
function text			no. of conductors 4x2			cross-section 0.25mm		Length 0.3
function text	Page / column	Target designation from	Connection point	conductor	Target designation to	Connection point	Page / column	function text
SD1	/3.3	-XS	9	1BN	-X1	9	/3.3	SD1
SD1-N	/3.3	-XS	5	1WH	-X1	5	/3.3	SD1-N
SD0	/3.3	-XS	8	2GN	-X1	8	/3.3	SD0
SD0-N	/3.4	-XS	4	2YE	-X1	4	/3.4	SD0-N
0V	/3.4	-XS	3	3GY	-X1	3	/3.4	0V
24V	/3.4	-XS	7	3PK	-X1	7	/3.4	+24V
BAT+	/3.4	-XS	6	4BU	-X1	6	/3.4	+BATT
0V BAT	/3.4	-XS	2	4RD	-X1	2	/3.4	0VBAT





Project Description

SMB Box For 6 Axis M2011

Document Number

3HAW050008651

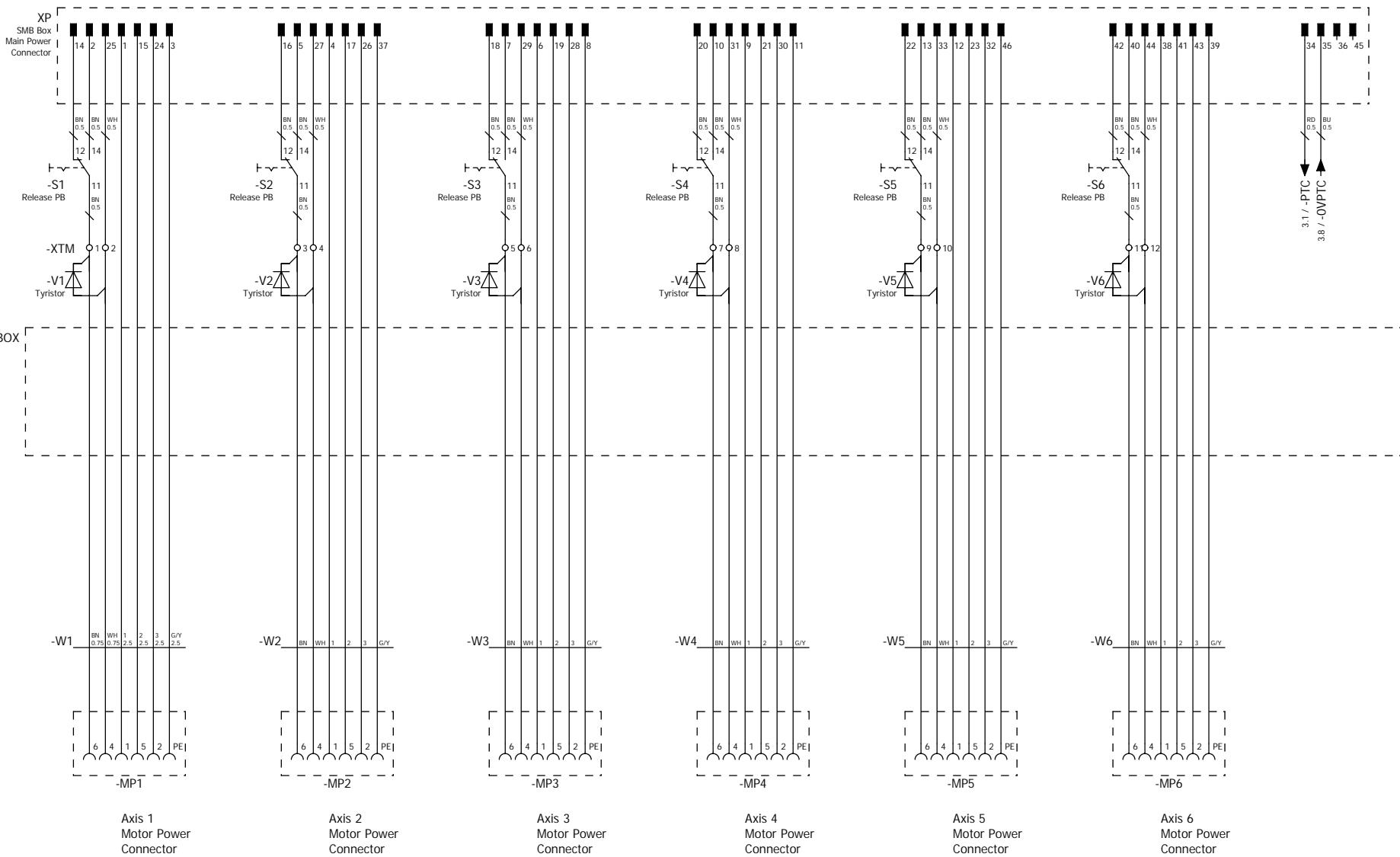
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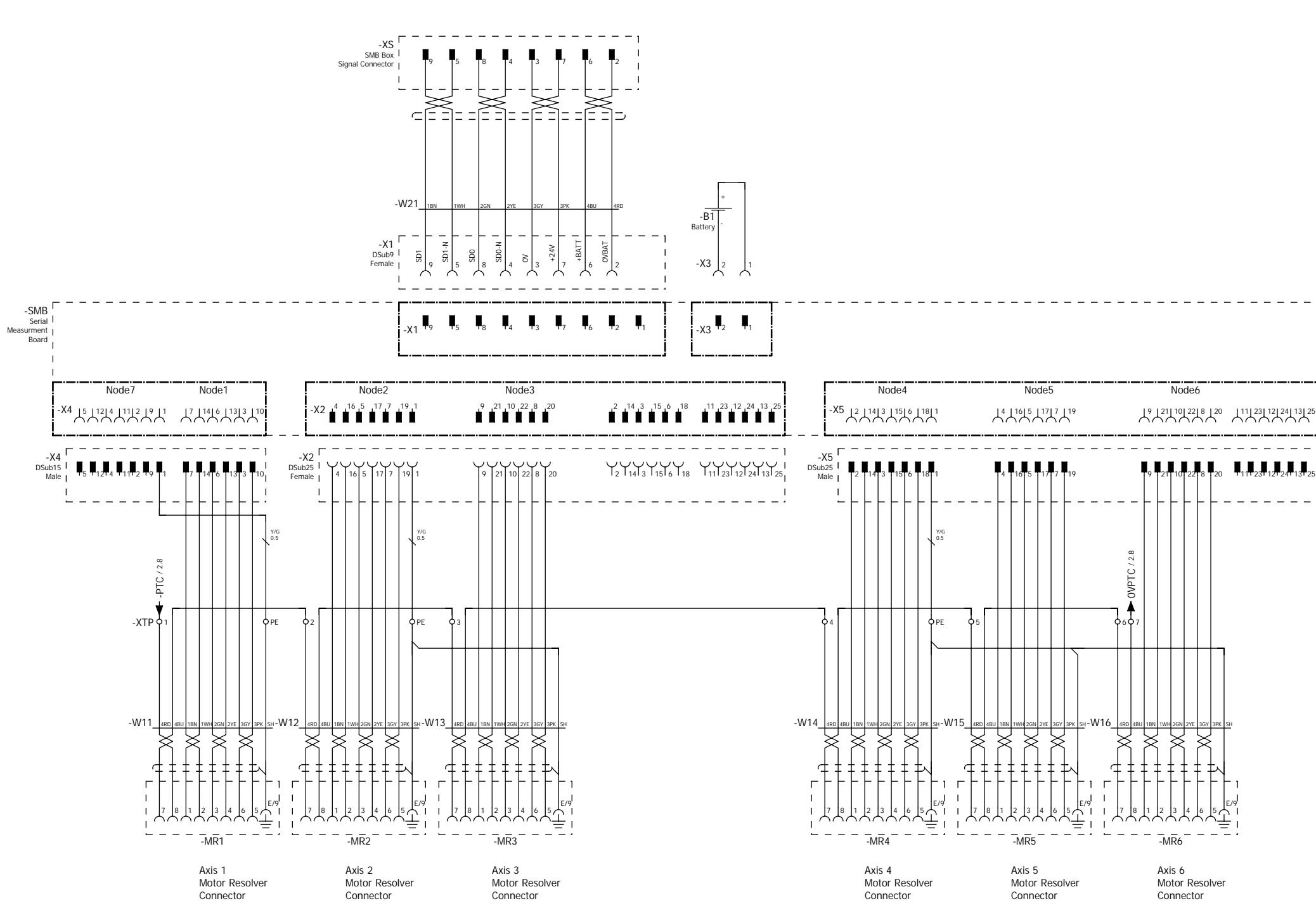
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Number of pages

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		SMB Box For 6 Axis M2011		Title page / cover sheet	Status: Approved	2012-9-15	=	
Responsible Department: RS/BIW	Prepare by, Date N.Cao 2013-2-25	Approve by, Date A.Stapelberg 2012-9-15	Replacement of	Replaced by	Document no. 3HAW050008651	Rev. Ind 002	Page 0	





Axis 1
Motor Resolver
Connector

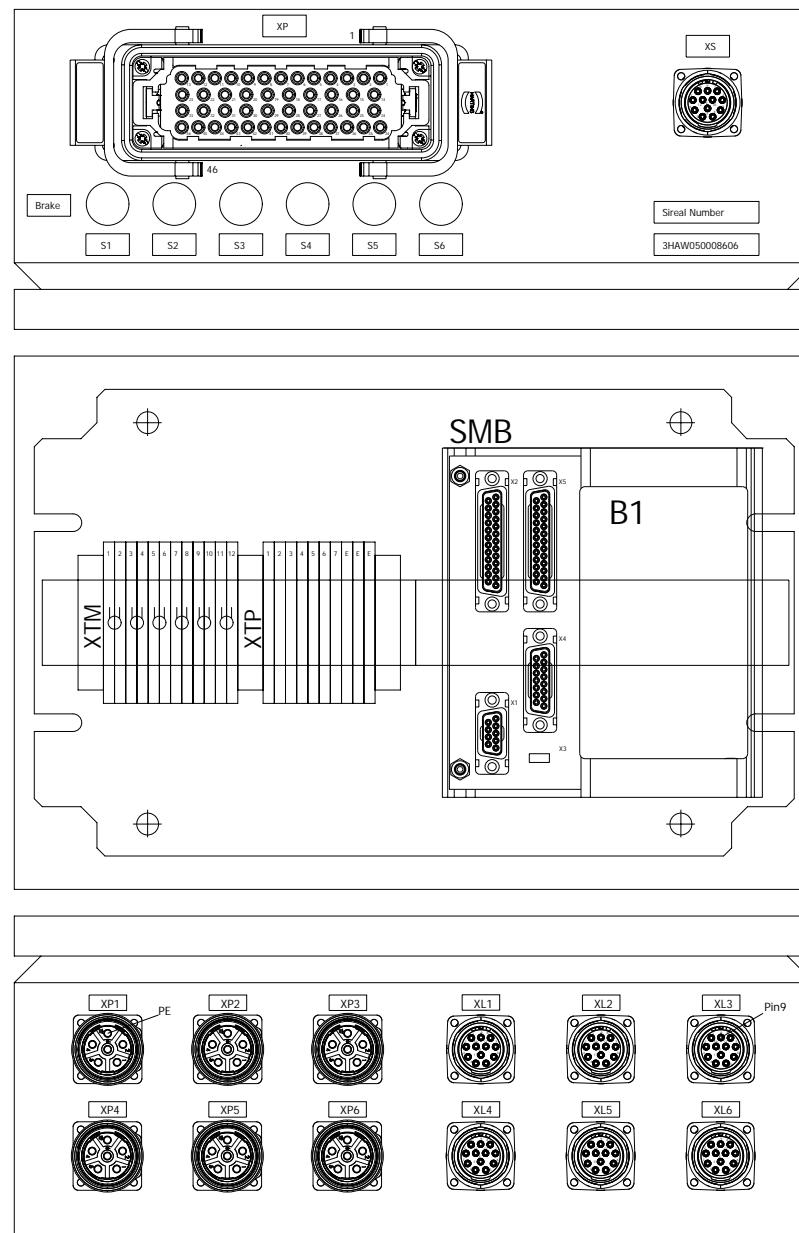
Axis 2
Motor Resolver
Connector

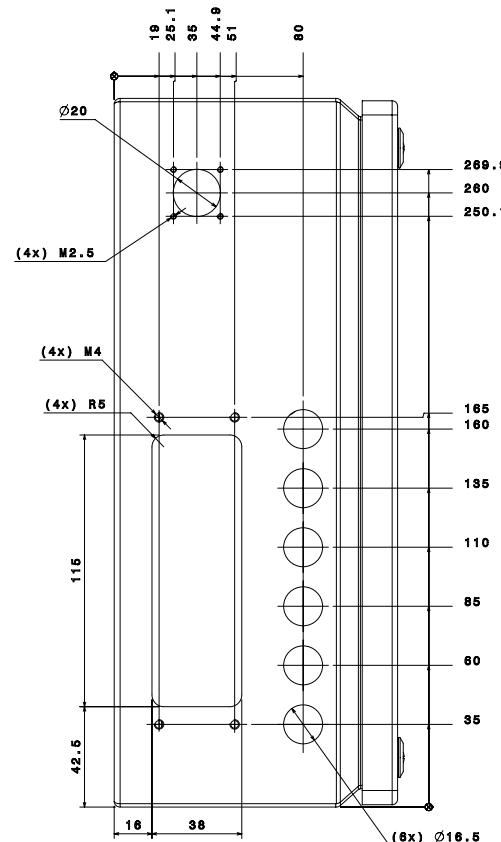
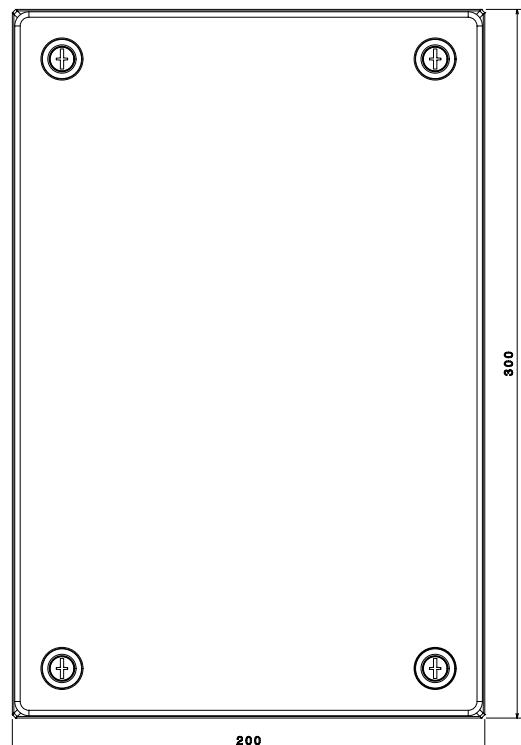
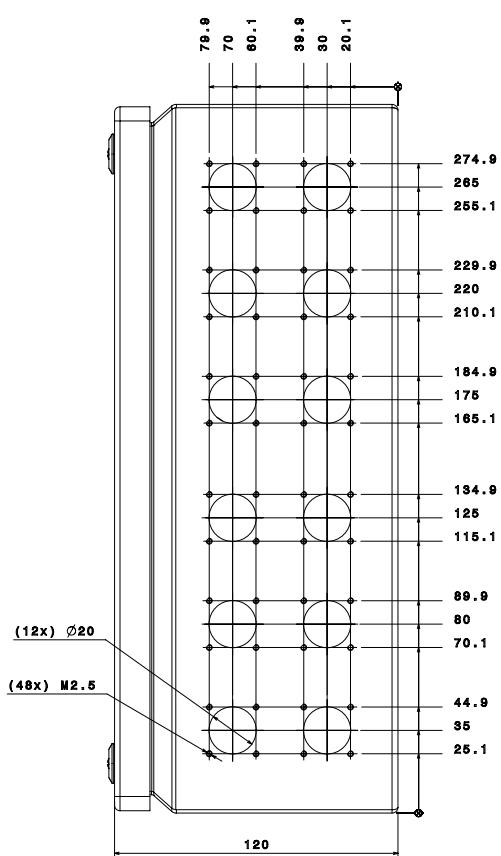
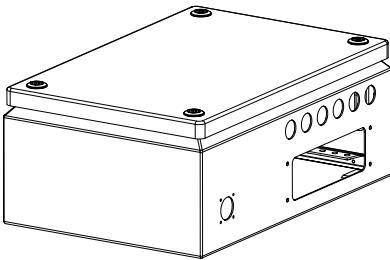
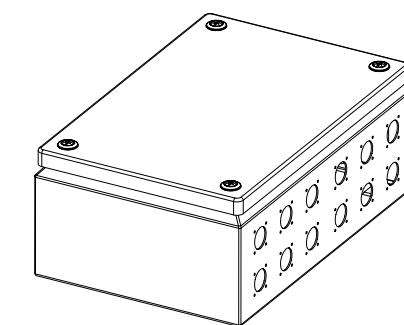
Axis 3
Motor Resolver
Connector

Axis 4
Motor Resolver
Connector

Axis 5
Motor Resolver
Connector

Axis 6
Motor Resolver
Connector



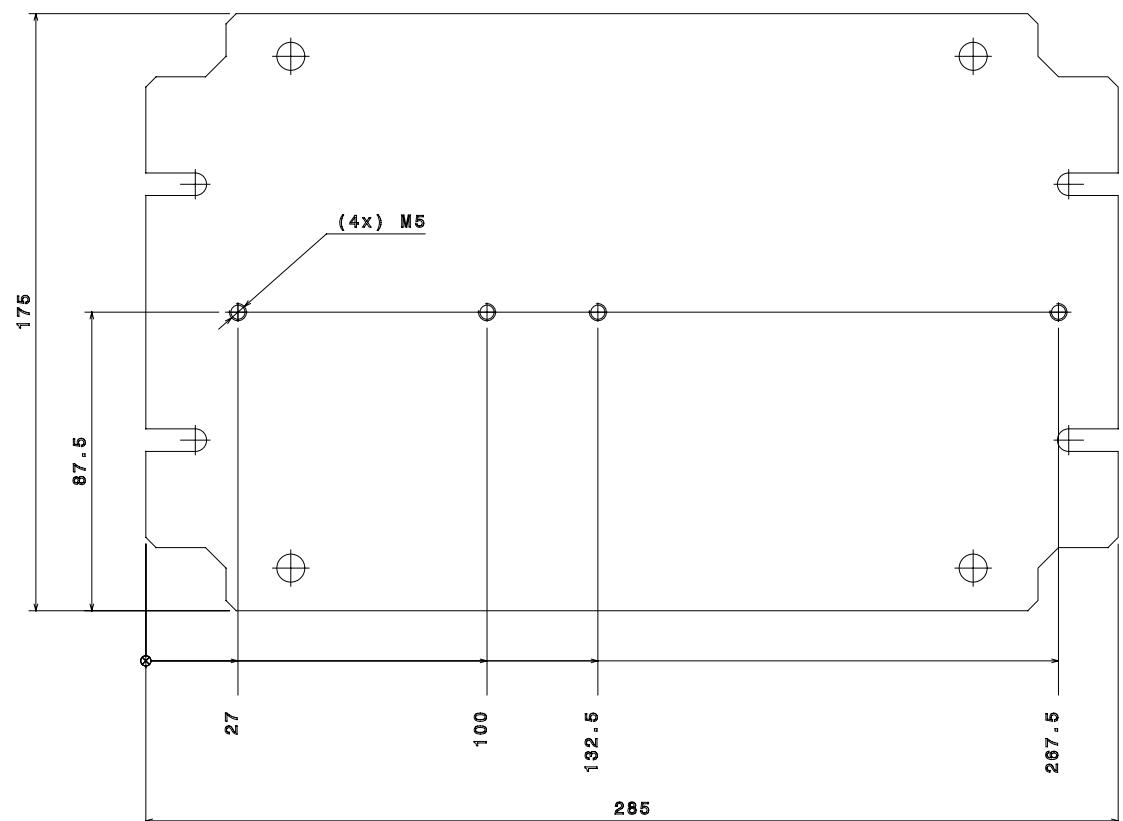


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180 -> 400	± 1.85	± 0.85	± 0.80	± 0.20
> 400	± 1.80	± 0.80	± 0.40	± 0.80

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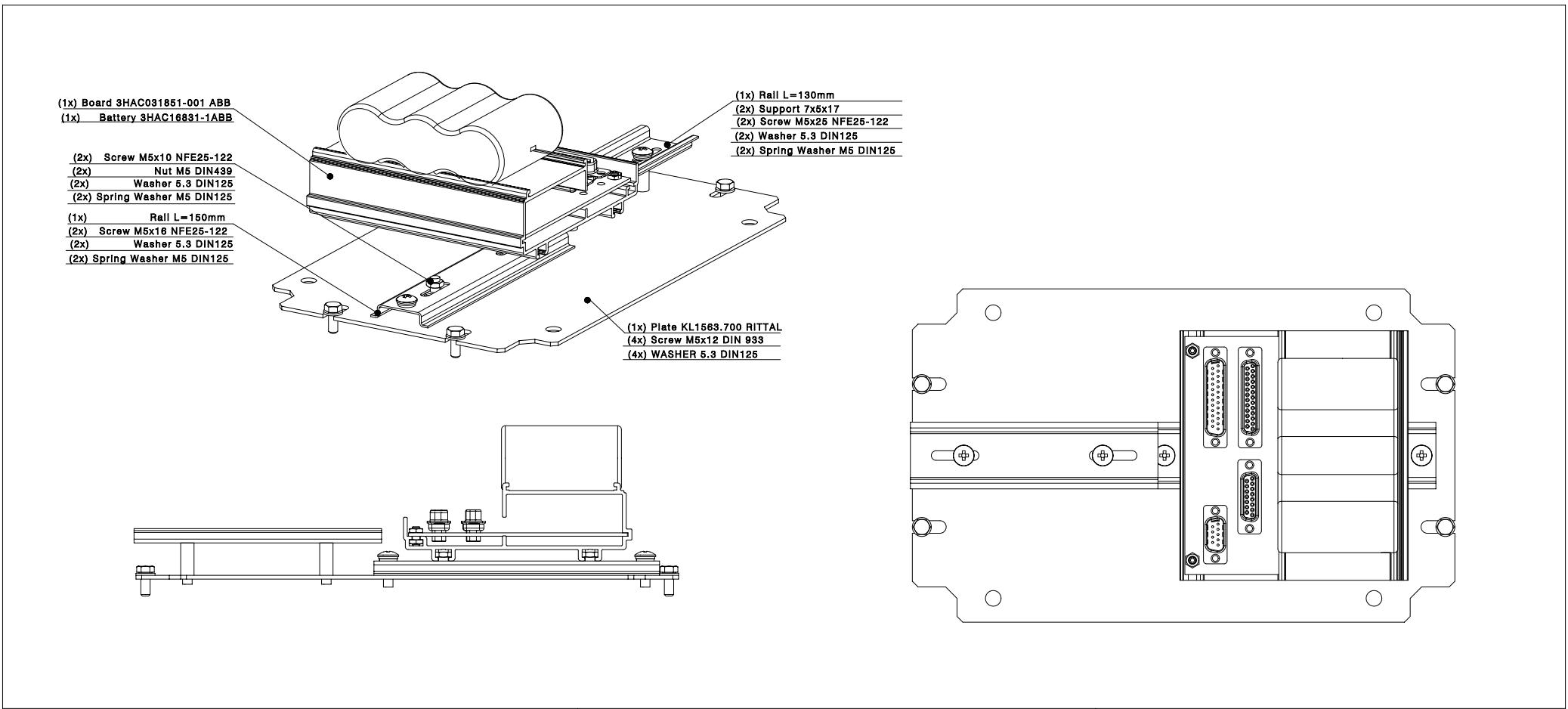
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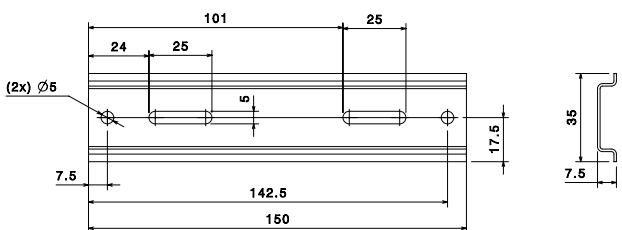
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> 400	± 1.50	± 0.50	± 0.40	± 0.30	
		⊥	//	□	
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BRUT STOCK MATERIAL	2/1000	2/1000	2.5/1000		

Echelle Scale 1/1 1 mm	Designation: pièce, sous ensemble ou ensemble . Description: part, sub assembly or assembly.	Matière Material KL1563.700
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Format A2	Holes drilled after SMB Box	
ABB	ABB Engineer Ltd. Shanghai	ABB MO No.5 Lane 568, Changye Road, Kangqiao Town, Shanghai, P.R.China Tel:+86 21 61609878
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Vise: Approved: -	KL1563.700	

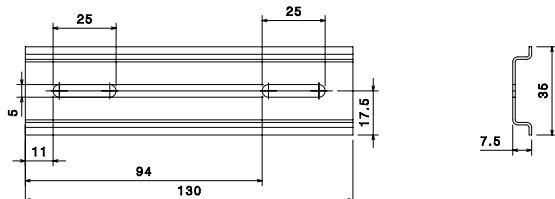




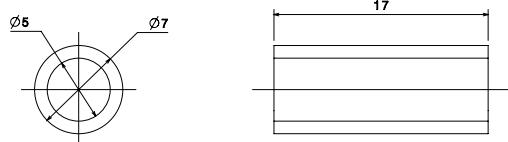
Rail L=150mm



Rail L=130mm



Support 7x5x17



4.b

SMB Box For 6 Axis M2011



Rail Installation On Plate

Status:
Approved

2012-9-15

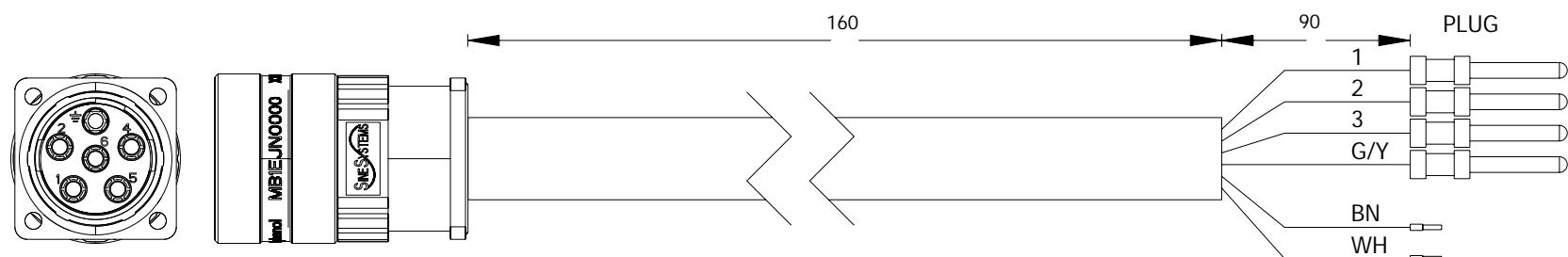
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Document no.
3HAW050008651Rev. Ind
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4.cTotal Page
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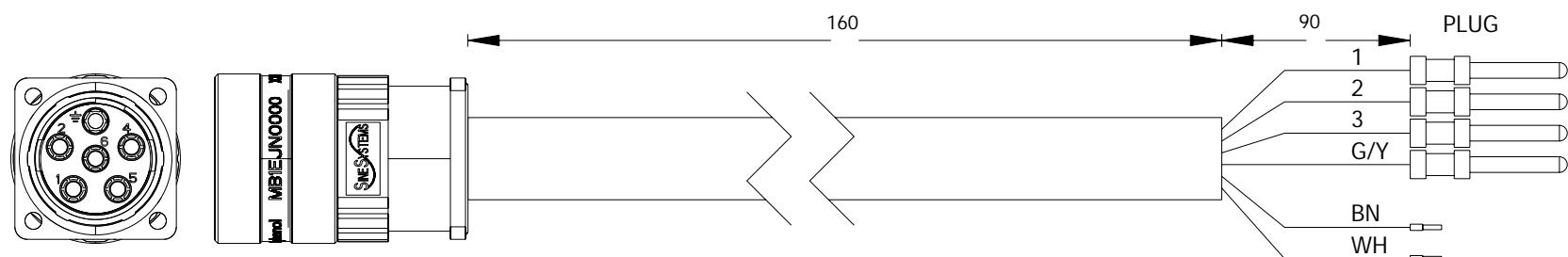
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U	/2.1	-MP1	1	1	-XP	1	/2.1	
V	/2.1	-MP1	5	2	-XP	15	/2.1	
W	/2.1	-MP1	2	3	-XP	24	/2.1	
BK+	/2.1	-MP1	6	BN	-XTM	1	/2.1	
PE	/2.1	-MP1	PE	G/Y	-XP	3	/2.1	
BK-	/2.1	-MP1	4	WH	-XTM	2	/2.1	



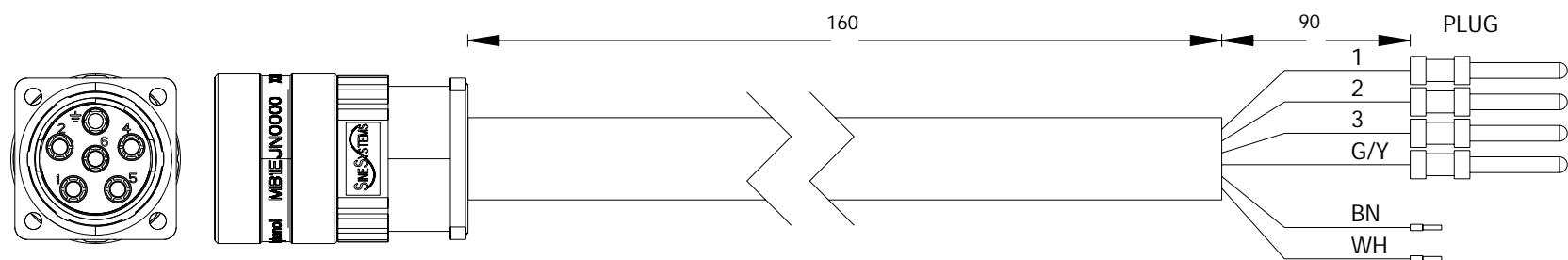
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U	/2.2	-MP2	1	1	-XP	4	/2.2	
V	/2.2	-MP2	5	2	-XP	17	/2.2	
W	/2.2	-MP2	2	3	-XP	26	/2.2	
BK+	/2.2	-MP2	6	BN	-XTM	3	/2.2	
PE	/2.3	-MP2	PE	G/Y	-XP	37	/2.3	
BK-	/2.2	-MP2	4	WH	-XTM	4	/2.2	



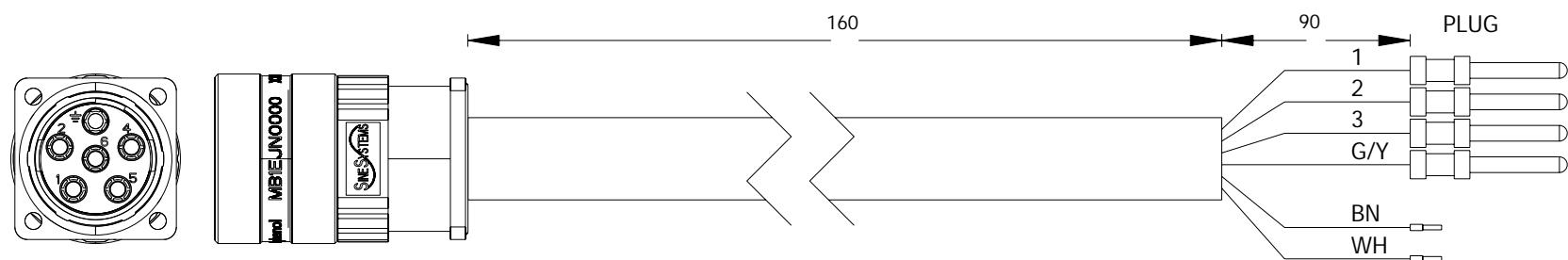
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function text	Page / column	Target designation from	Connection point	conductor	Target designation to	Connection point	Page / column	function text
U	/2.4	-MP3	1	1	-XP	6	/2.4	
V	/2.4	-MP3	5	2	-XP	19	/2.4	
W	/2.4	-MP3	2	3	-XP	28	/2.4	
BK+	/2.3	-MP3	6	BN	-XTM	5	/2.3	
PE	/2.4	-MP3	PE	G/Y	-XP	8	/2.4	
BK-	/2.3	-MP3	4	WH	-XTM	6	/2.3	



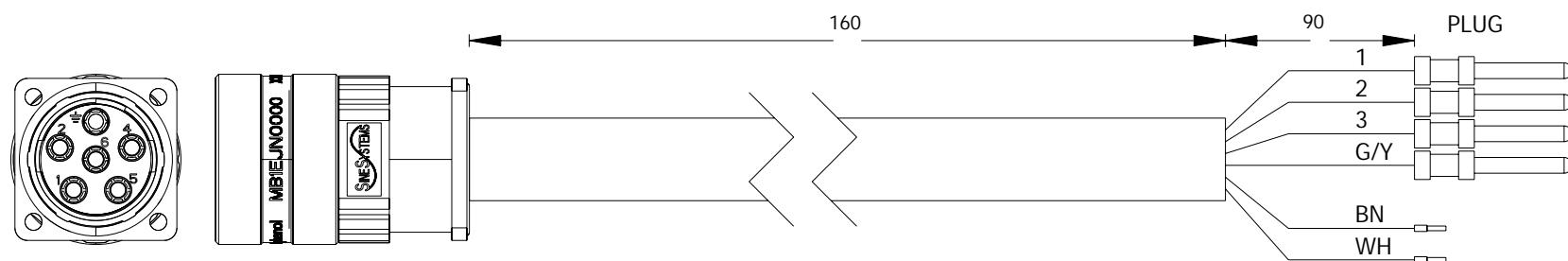
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U	/2.5	-MP4	1	1	-XP	9	/2.5	
V	/2.5	-MP4	5	2	-XP	21	/2.5	
W	/2.5	-MP4	2	3	-XP	30	/2.5	
BK+	/2.5	-MP4	6	BN	-XTM	7	/2.5	
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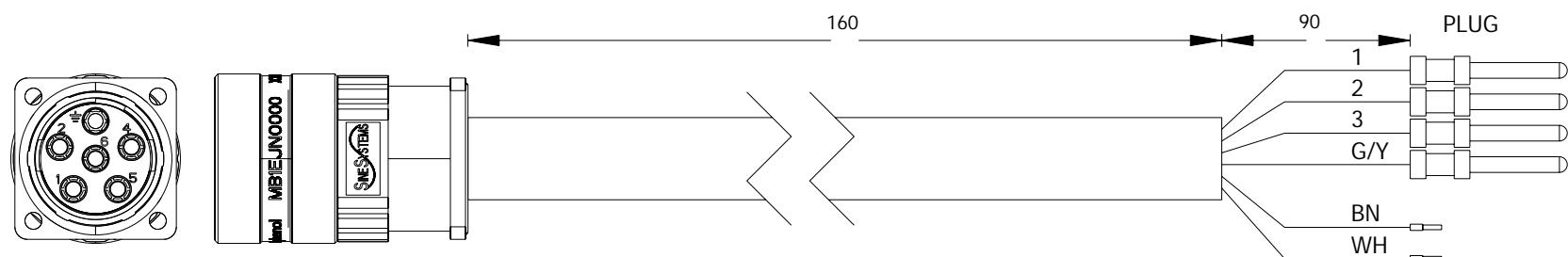
Cable diagram

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U	/2.6	-MP5	1	1	-XP	12	/2.6	
V	/2.6	-MP5	5	2	-XP	23	/2.6	
W	/2.6	-MP5	2	3	-XP	32	/2.6	
BK+	/2.6	-MP5	6	BN	-XTM	9	/2.6	
PE	/2.6	-MP5	PE	G/Y	-XP	46	/2.6	
BK-	/2.6	-MP5	4	WH	-XTM	10	/2.6	



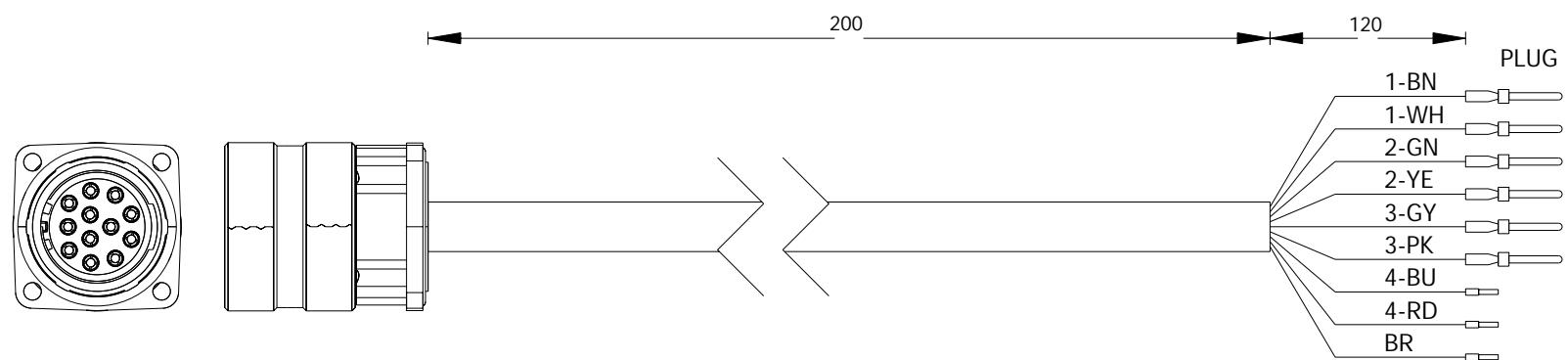
Cable diagram

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U	/2.7	-MP6	1	1	-XP	38	/2.7	
V	/2.7	-MP6	5	2	-XP	41	/2.7	
W	/2.7	-MP6	2	3	-XP	43	/2.7	
BK+	/2.7	-MP6	6	BN	-XTM	11	/2.7	
PE	/2.8	-MP6	PE	G/Y	-XP	39	/2.8	
BK-	/2.7	-MP6	4	WH	-XTM	12	/2.7	



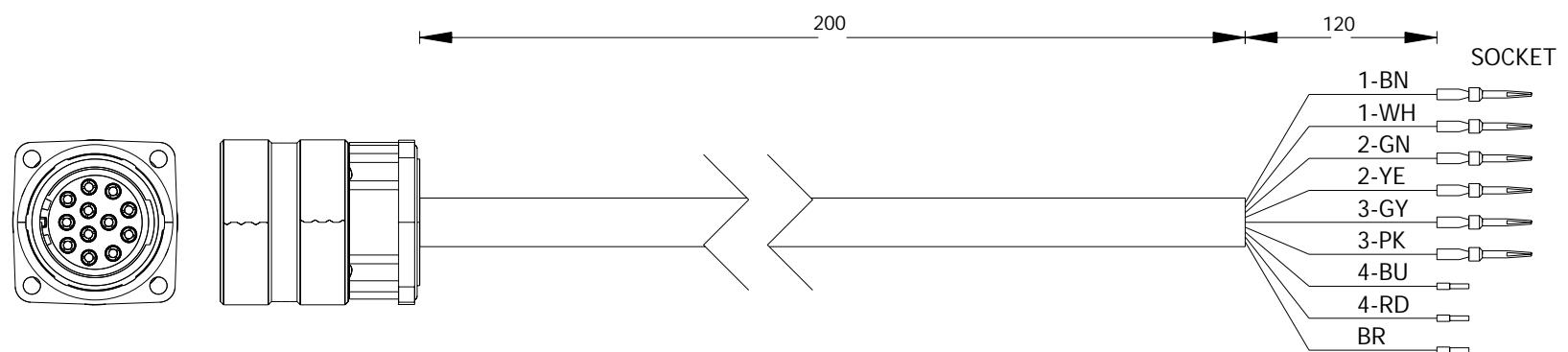
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S1	/3.1	-MR1	1	1BN	-X4	7	/3.1	X1
S3	/3.1	-MR1	2	1WH	-X4	14	/3.1	0V X1
S4	/3.1	-MR1	3	2GN	-X4	6	/3.1	Y1
S2	/3.2	-MR1	4	2YE	-X4	13	/3.2	0V Y1
R2	/3.2	-MR1	6	3GY	-X4	3	/3.2	0V EXC1
R1	/3.2	-MR1	5	3PK	-X4	10	/3.2	EXC1
OVPTC	/3.1	-MR1	8	4BU	-XTP	2	/3.2	
PTC	/3.1	-MR1	7	4RD	-XTP	1	/3.1	
PE	/3.2	-MR1	E/9	SH	-XTP	PE	/3.2	



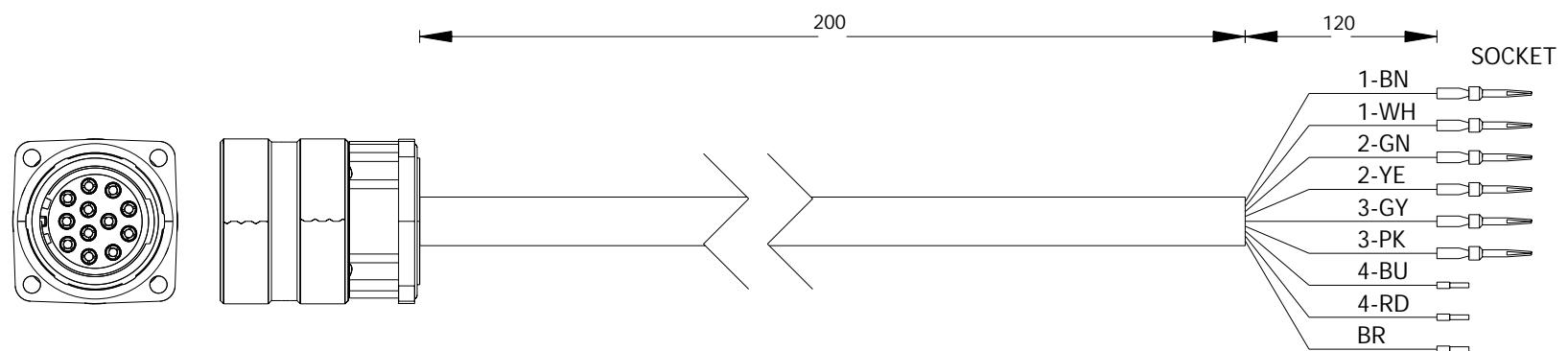
Cable diagram

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S1	/3.2	-MR2	1	1BN	-X2	4	/3.2	X2
S3	/3.2	-MR2	2	1WH	-X2	16	/3.2	0V X2
S4	/3.2	-MR2	3	2GN	-X2	5	/3.2	Y2
S2	/3.3	-MR2	4	2YE	-X2	17	/3.3	0V Y2
R2	/3.3	-MR2	6	3GY	-X2	7	/3.3	0V EXC1
R1	/3.3	-MR2	5	3PK	-X2	19	/3.3	EXC1
OVPTC	/3.2	-MR2	8	4BU	-XTP	3	/3.3	
PTC	/3.2	-MR2	7	4RD	-XTP	2	/3.2	
PE	/3.3	-MR2	E/9	SH	-XTP	PE	/3.3	



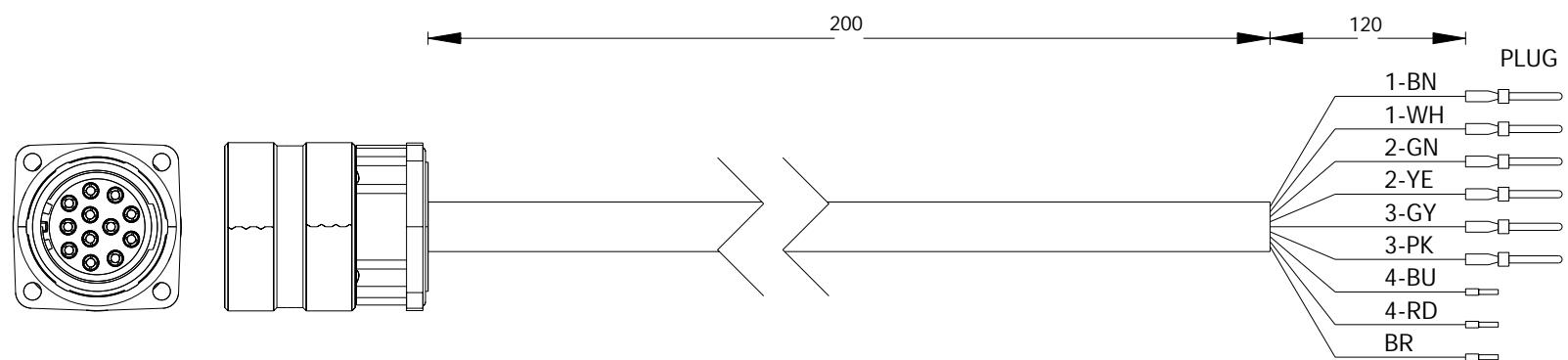
Cable diagram

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S1	/3.3	-MR3	1	1BN	-X2	9	/3.3	X3
S3	/3.3	-MR3	2	1WH	-X2	21	/3.3	0V X3
S4	/3.4	-MR3	3	2GN	-X2	10	/3.4	Y3
S2	/3.4	-MR3	4	2YE	-X2	22	/3.4	0V Y3
R2	/3.4	-MR3	6	3GY	-X2	8	/3.4	0V EXC1
R1	/3.4	-MR3	5	3PK	-X2	20	/3.4	EXC1
OVPTC	/3.3	-MR3	8	4BU	-XTP	4	/3.6	
PTC	/3.3	-MR3	7	4RD	-XTP	3	/3.3	
PE	/3.4	-MR3	E/9	SH	-XTP	PE	/3.3	



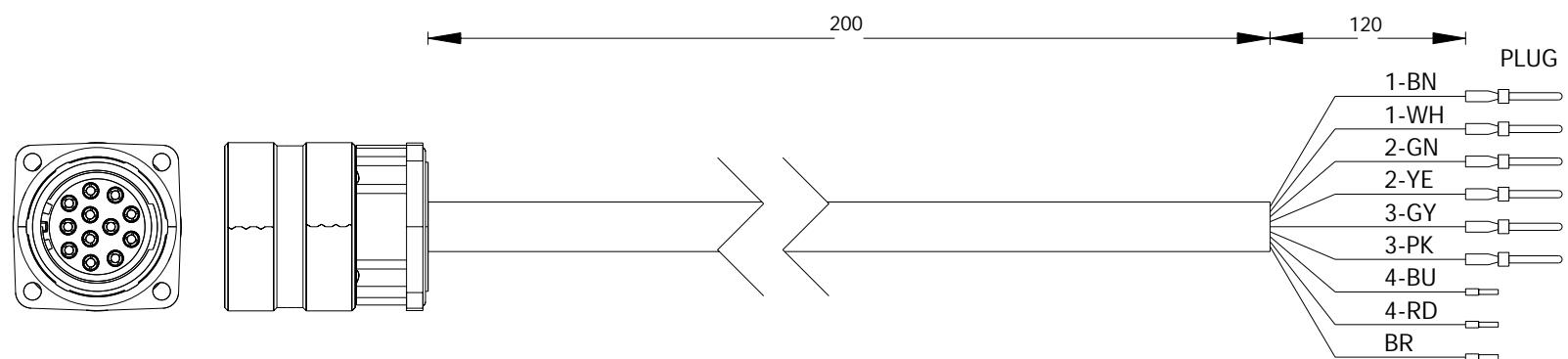
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S1	/3.6	-MR4	1	1BN	-X5	2	/3.6	X4
S3	/3.6	-MR4	2	1WH	-X5	14	/3.6	0V X4
S4	/3.6	-MR4	3	2GN	-X5	3	/3.6	Y4
S2	/3.6	-MR4	4	2YE	-X5	15	/3.6	0V Y4
R2	/3.6	-MR4	6	3GY	-X5	6	/3.6	0VEXC2
R1	/3.6	-MR4	5	3PK	-X5	18	/3.6	EXC2
OVPTC	/3.6	-MR4	8	4BU	-XTP	5	/3.7	
PTC	/3.6	-MR4	7	4RD	-XTP	4	/3.6	
PE	/3.7	-MR4	E/9	SH	-XTP	PE	/3.7	



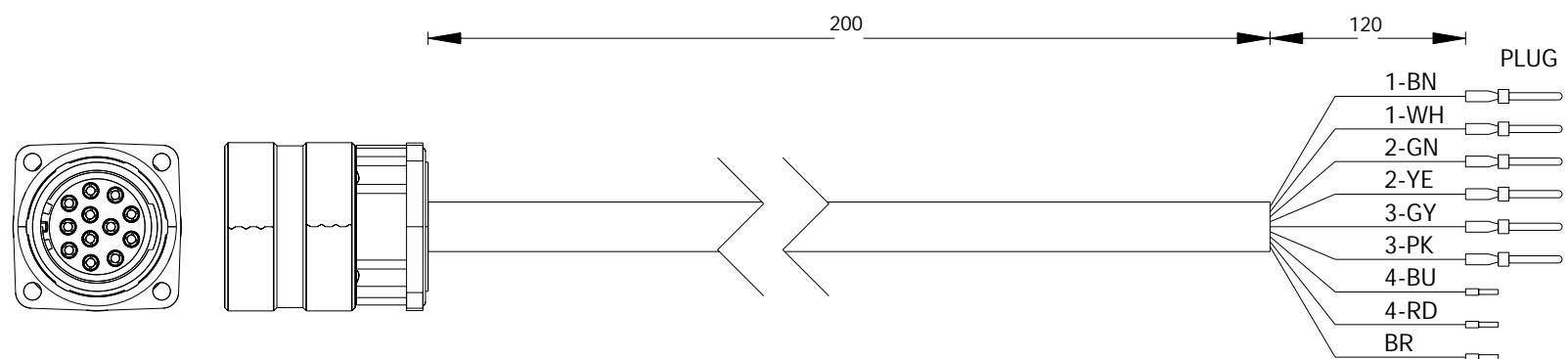
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S1	/3.7	-MR5	1	1BN	-X5	4	/3.7	X5
S3	/3.7	-MR5	2	1WH	-X5	16	/3.7	0V X5
S4	/3.7	-MR5	3	2GN	-X5	5	/3.7	Y5
S2	/3.7	-MR5	4	2YE	-X5	17	/3.7	0V Y5
R2	/3.7	-MR5	6	3GY	-X5	7	/3.7	0V EXC2
R1	/3.8	-MR5	5	3PK	-X5	19	/3.8	EXC2
OVPTC	/3.7	-MR5	8	4BU	-XTP	6	/3.8	
PTC	/3.7	-MR5	7	4RD	-XTP	5	/3.7	
PE	/3.8	-MR5	E/9	SH	-XTP	PE	/3.7	



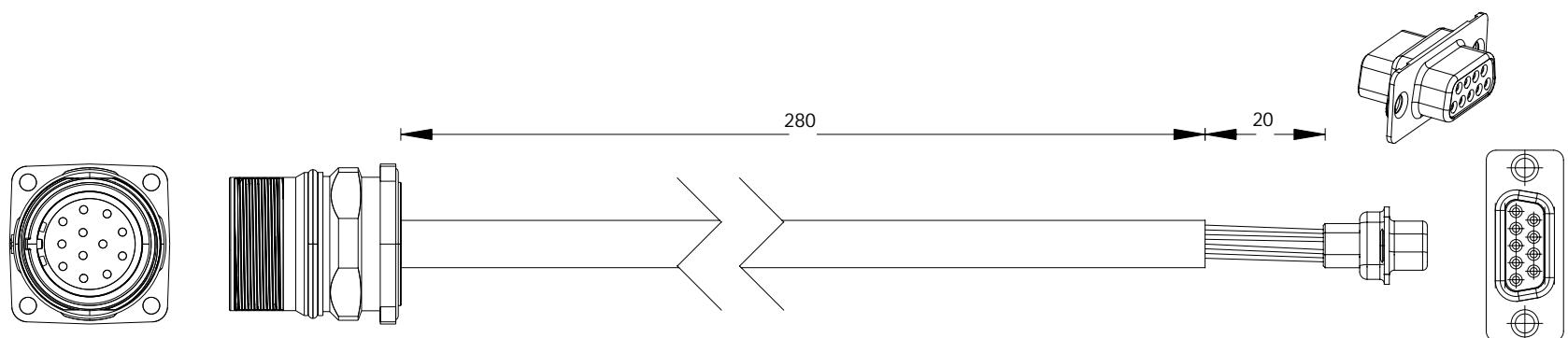
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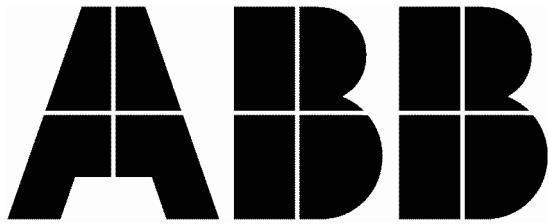
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S1	/3.8	-MR6	1	1BN	-X5	9	/3.8	X6
S3	/3.8	-MR6	2	1WH	-X5	21	/3.8	0V X6
S4	/3.8	-MR6	3	2GN	-X5	10	/3.8	Y6
S2	/3.8	-MR6	4	2YE	-X5	22	/3.8	0V Y6
R2	/3.8	-MR6	6	3GY	-X5	8	/3.8	0V EXC2
R1	/3.9	-MR6	5	3PK	-X5	20	/3.9	EXC2
OVPTC	/3.8	-MR6	8	4BU	-XTP	7	/3.8	
PTC	/3.8	-MR6	7	4RD	-XTP	6	/3.8	
PE	/3.9	-MR6	E/9	SH	-XTP	PE	/3.7	



Cable diagram

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SD1	/3.3	-XS	9	1BN	-X1	9	/3.3	SD1
SD1-N	/3.3	-XS	5	1WH	-X1	5	/3.3	SD1-N
SD0	/3.3	-XS	8	2GN	-X1	8	/3.3	SD0
SD0-N	/3.4	-XS	4	2YE	-X1	4	/3.4	SD0-N
0V	/3.4	-XS	3	3GY	-X1	3	/3.4	0V
24V	/3.4	-XS	7	3PK	-X1	7	/3.4	+24V
BAT+	/3.4	-XS	6	4BU	-X1	6	/3.4	+BATT
0V BAT	/3.4	-XS	2	4RD	-X1	2	/3.4	0VBAT





Project Description

PTC Shunt

Document Number

3HAW050008607

Revision

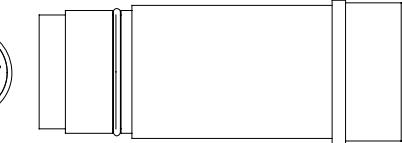
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Number of pages

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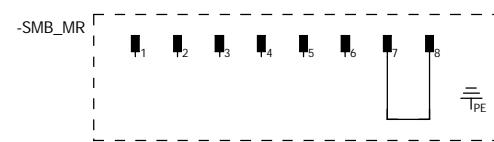
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Prepare by, Date	N.Cao 2011-10-24	Approve by, Date	A.Stapelberg 2011-10-10	Replacement of	Replaced by	Document no. 3HAW050008607	Rev.Ind 003 Page 2 Total Page 6

0	1	2	3	4	5	6	7	8	9		
Supplementary Document	Doc Type	Document	Description	Technical Provisions	TP	3HAB8053-1	Barcodes	Technical Provisions	TP	3HAB8053-1	Manufact Moving Cable



3HAW050008607

SMB Box
Motor
Resolver



		PTC Shunt		ABB	Connection	Status: Approved	2011-10-10	=
Responsible Department:	RS / BIW	Replace by	Document no.					
Prepare by, Date	N.Cao 2011-10-24	Approve by, Date	A.Stapelberg 2011-10-10	Replacement of	Replaced by	3HAW050008607	Rev.Ind 003	Page 3



Project Description

6 Resolver FlexCable
IRC5.XP2 - SMB.XS

Document Number

3HAW050008612-XXX

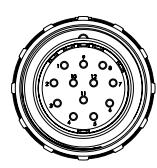
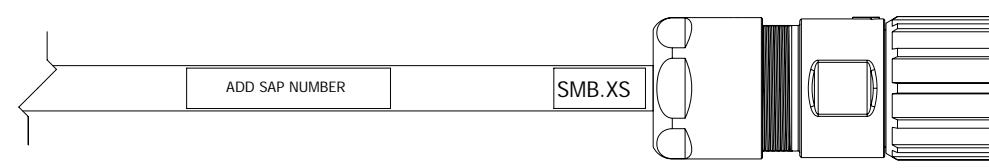
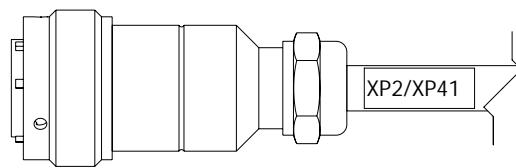
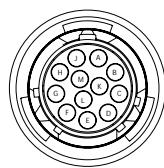
Revision

003

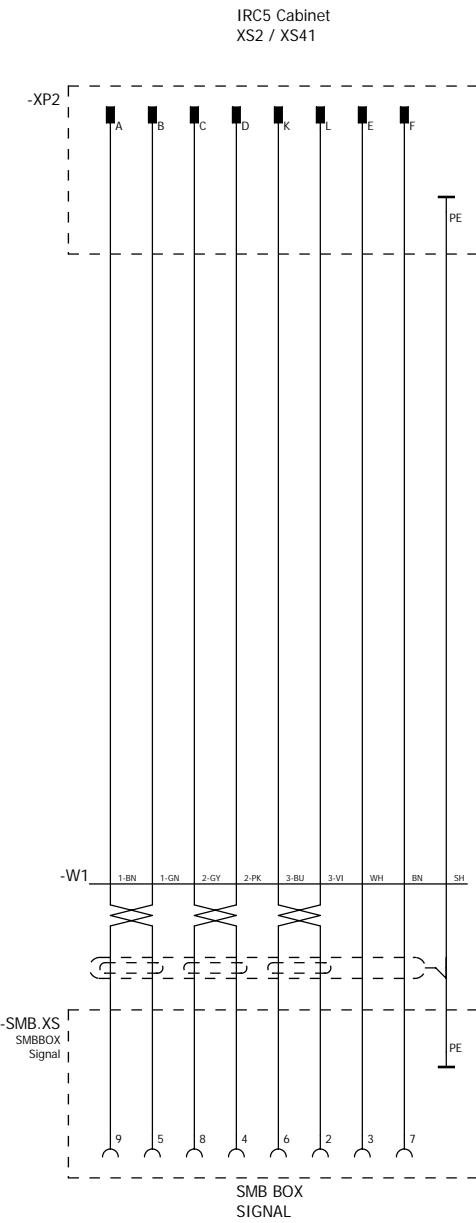
Number of pages

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		6 Resolver FlexCable IRC5.XP2 - SMB.XS			Title page / cover sheet	Status: Approved	=	
Responsible Department:	RS / BIW	Replace by	Document no.				+	
Prepare by, Date	N.Cao 2014/8/25	Approve by, Date	3HAW050008612-XXX	Rev. Ind	Page	0	003	8



SAP NUMBER	Length
3HAW050008612-005	5M
3HAW050008612-010	10M
3HAW050008612-015	15M
3HAW050008612-020	20M
3HAW050008612-025	25M



6 Resolver FlexCable
IRC5.XP2 - SMB.XS



Connection

Status:
Approved
Document no.
3HAW050008612-XXX

=
+
Rev. Ind
003
Page
3
Total Page
8

Cable diagram

F09_002_ABB

Cable name = +-W1			cable type INTERCOND:13MYI 21Z 10P					
function text			no. of conductors 4x2x0.25mm+2x0.5mm			cross-section		Length
function text	Page / column	Target designation from	Connection point	conductor	Target designation to	Connection point	Page / column	function text
SDI	/3.1	-SMB.XS	9	1-BN	-XP2	A	/3.1	SDI
SDI-N	/3.1	-SMB.XS	5	1-GN	-XP2	B	/3.1	SDI-N
SDO	/3.1	-SMB.XS	8	2-GY	-XP2	C	/3.1	SDO
SDO-N	/3.1	-SMB.XS	4	2-PK	-XP2	D	/3.1	SDO-N
BATSUP	/3.2	-SMB.XS	6	3-BU	-XP2	K	/3.2	BATSUP
BATLD	/3.2	-SMB.XS	2	3-VI	-XP2	L	/3.2	BATLD
24V	/3.2	-SMB.XS	7	BN	-XP2	F	/3.2	24V
	/3.2	-SMB.XS	PE	SH	-XP2	PE	/3.2	
OV	/3.2	-SMB.XS	3	WH	-XP2	E	/3.2	OV



Project Description

1Motor Power StaticCable
IRC5.XP7 to SMB.XP

Document Number

3HAW050008613-XXX

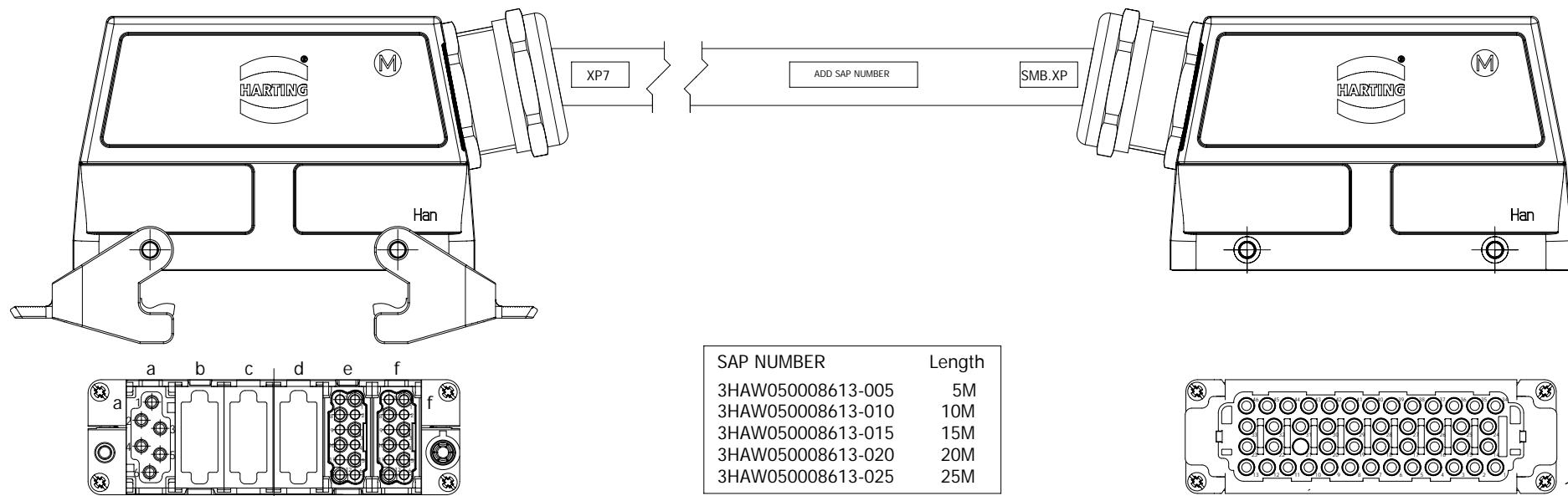
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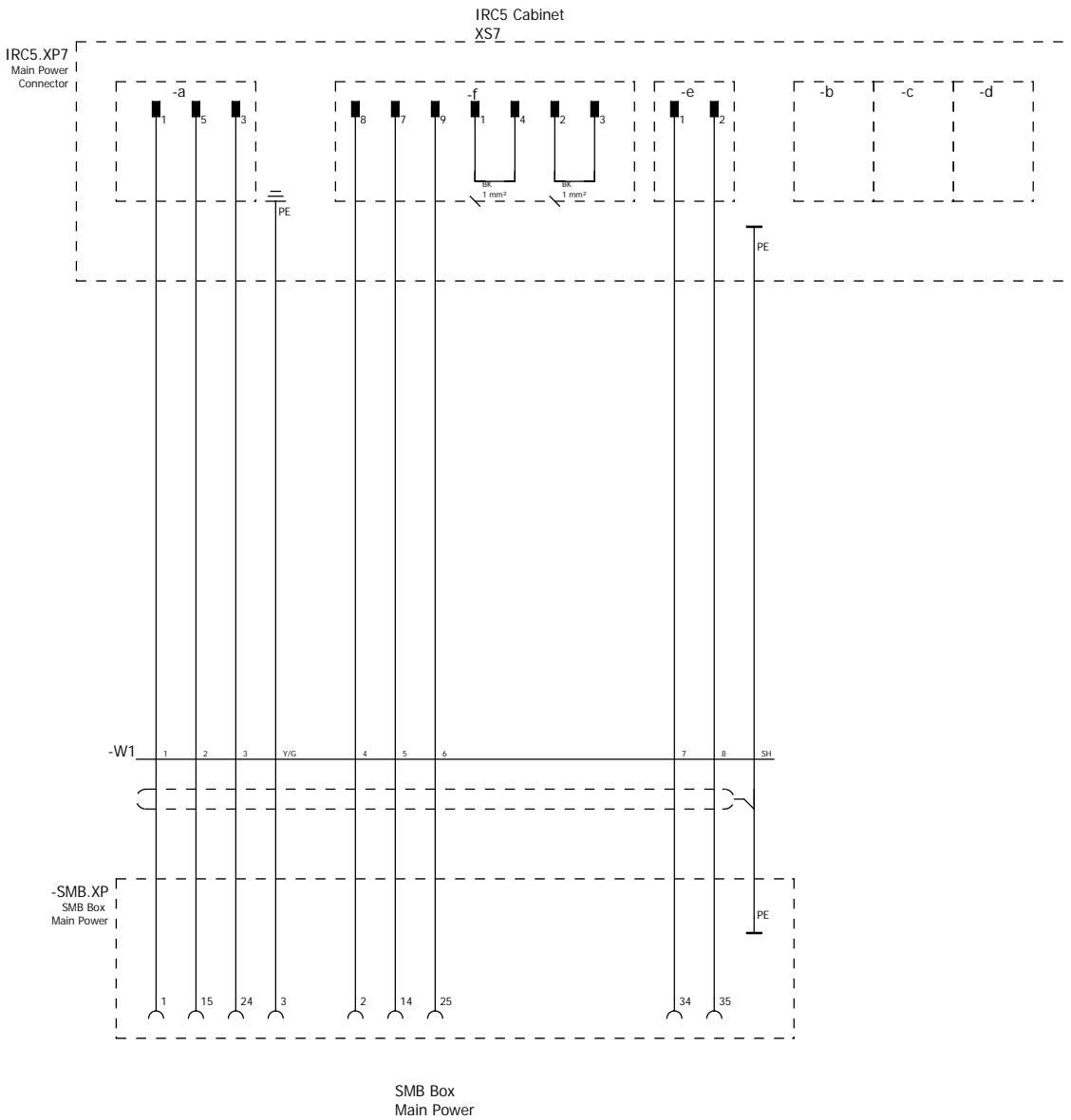
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Number of pages

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Responsible Department:	RS / BIW				Document no.		
Prepare by, Date	N.Cao	2014/8/25	Approve by, Date	Replacement of	3HAW050008613-XXX	Rev. Ind	Page
				Replaced by		003	0
					Total Page		8





Cable diagram

F09_002_ABB

Cable name = +-W1			cable type Helukabel:83757					
function text			no. of conductors 12G			cross-section 1.5mm		Length
function text	Page / column	Target designation from	Connection point	conductor	Target designation to	Connection point	Page / column	function text
U7	/3.1	-IRC5.XP7-a	1	1	-SMB.XP	1	/3.1	U7
V7	/3.1	-IRC5.XP7-a	5	2	-SMB.XP	15	/3.1	V7
W7	/3.1	-IRC5.XP7-a	3	3	-SMB.XP	24	/3.1	W7
24V PB	/3.2	-IRC5.XP7-f	8	4	-SMB.XP	2	/3.2	24V PB
24V REL	/3.2	-IRC5.XP7-f	7	5	-SMB.XP	14	/3.2	24V REL
0V BK	/3.2	-IRC5.XP7-f	9	6	-SMB.XP	25	/3.2	0V BK
PTC	/3.3	-IRC5.XP7-e	1	7	-SMB.XP	34	/3.3	PTC
0V PTC	/3.4	-IRC5.XP7-e	2	8	-SMB.XP	35	/3.4	0V PTC
	/3.4	-IRC5.XP7	PE	SH	-SMB.XP	PE	/3.4	
	/3.1	-IRC5.XP7	PE	Y/G	-SMB.XP	3	/3.1	PE



Project Description

3Motor Power StaticCable IRC5 XP7 to SMB.XP

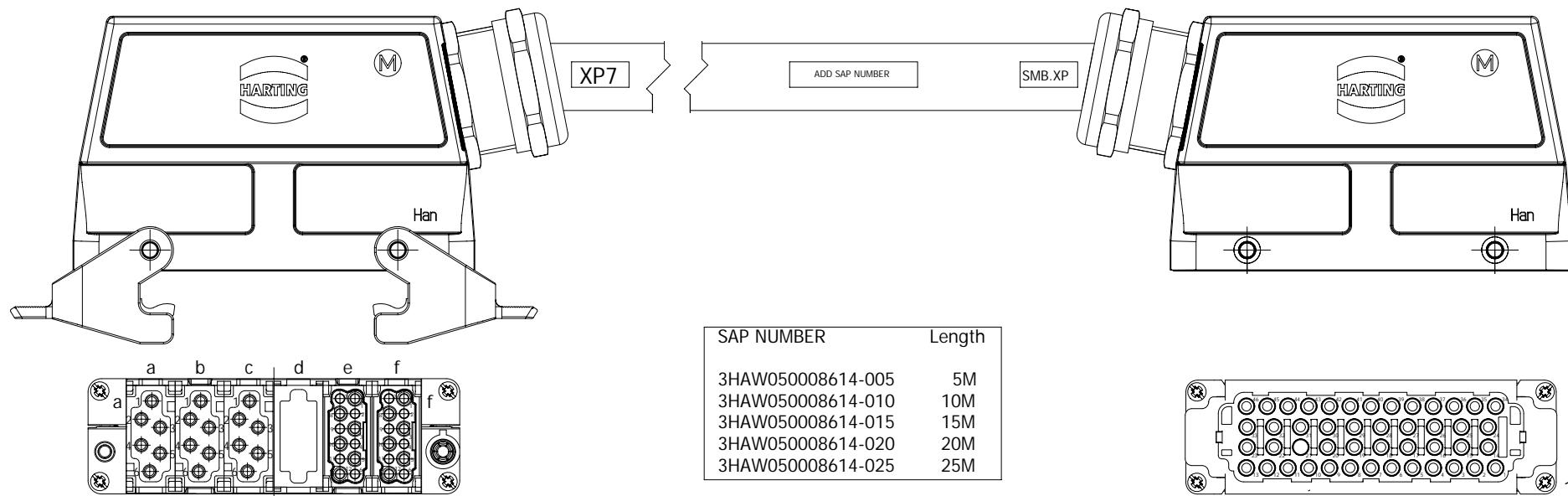
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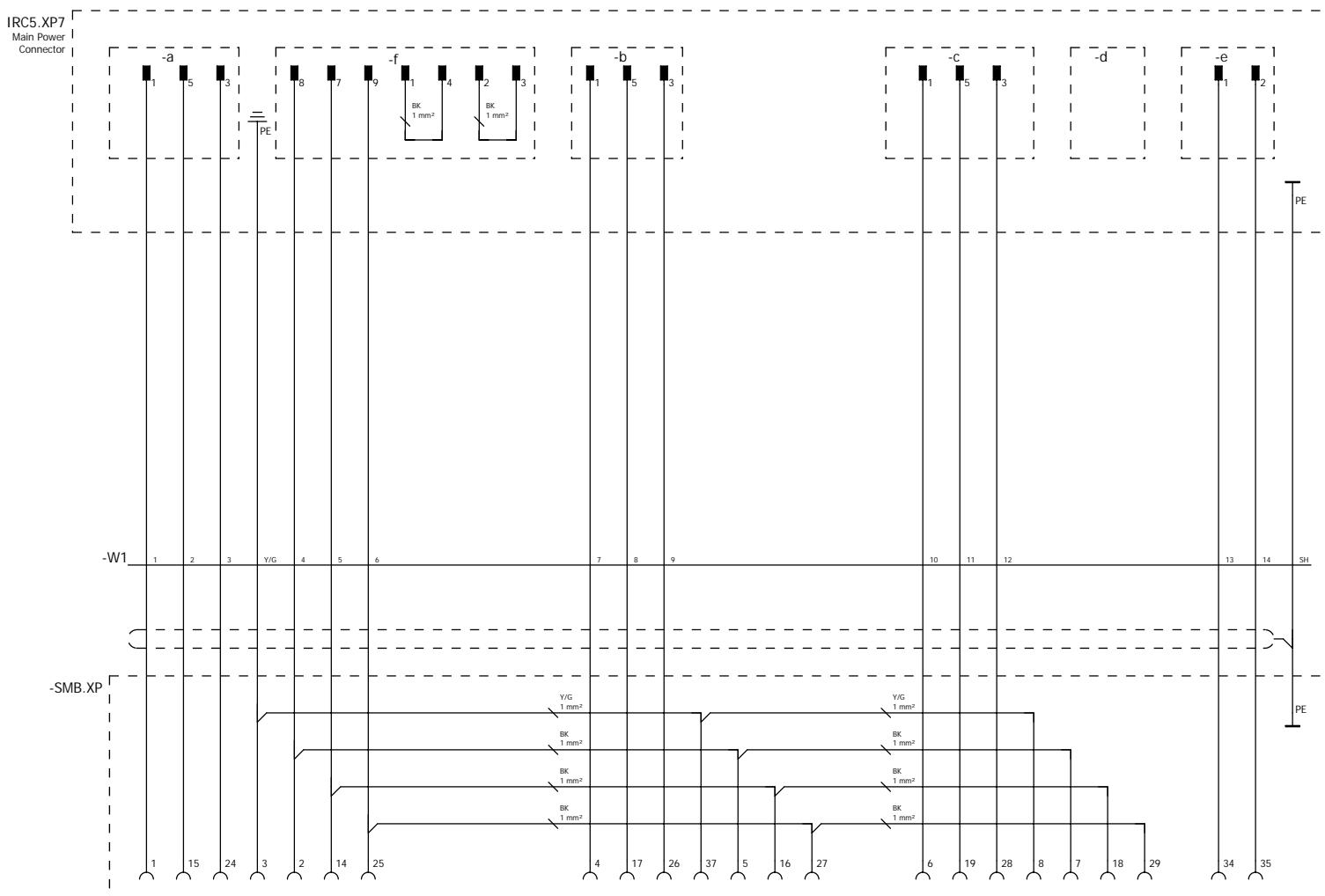
Revision 004

Number of pages

8



IRC5 Cabinet
XP/XS7



SMB BOX
Main Power

Cable diagram

F09_002_ABB

Cable name = +-W1			cable type Helukabel.83758					
function text			no. of conductors 18G			cross-section 1.5mm		Length
function text	Page / column	Target designation from	Connection point	conductor	Target designation to	Connection point	Page / column	function text
U7	/3.1	-IRC5.XP7-a	1	1	-SMB.XP	1	/3.1	U7
V7	/3.1	-IRC5.XP7-a	5	2	-SMB.XP	15	/3.1	V7
W7	/3.1	-IRC5.XP7-a	3	3	-SMB.XP	24	/3.1	W7
24V PB	/3.2	-IRC5.XP7-f	8	4	-SMB.XP	2	/3.2	24V PB7
24V Rel	/3.2	-IRC5.XP7-f	7	5	-SMB.XP	14	/3.2	24V REL7
0V BK	/3.2	-IRC5.XP7-f	9	6	-SMB.XP	25	/3.2	0V BK7
U8	/3.3	-IRC5.XP7-b	1	7	-SMB.XP	4	/3.3	U8
V8	/3.3	-IRC5.XP7-b	5	8	-SMB.XP	17	/3.3	V8
W8	/3.4	-IRC5.XP7-b	3	9	-SMB.XP	26	/3.4	W8
U9	/3.5	-IRC5.XP7-c	1	10	-SMB.XP	6	/3.5	U9
V9	/3.5	-IRC5.XP7-c	5	11	-SMB.XP	19	/3.5	V9
W9	/3.5	-IRC5.XP7-c	3	12	-SMB.XP	28	/3.5	W9
PTC	/3.6	-IRC5.XP7-e	1	13	-SMB.XP	34	/3.6	PTC
0V PTC	/3.7	-IRC5.XP7-e	2	14	-SMB.XP	35	/3.7	0V PTC
	/3.7	-IRC5.XP7	PE	SH	-SMB.XP	PE	/3.7	
	/3.1	-IRC5.XP7	PE	Y/G	-SMB.XP	3	/3.1	PE



Project Description

6MotorPower StaticCable
HighVoltage IRC5.XP1 to SMB.XP
32EE-16B to 46EE-24B

Document Number

3HAW050008615-XXX

Revision

003

Number of pages

8



Title page / cover sheet

Status:
Approved

Document no.
3HAW050008615-XXX

Rev. Ind
003

Page
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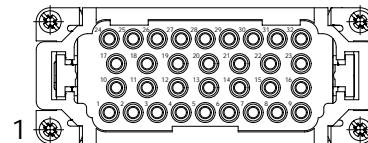
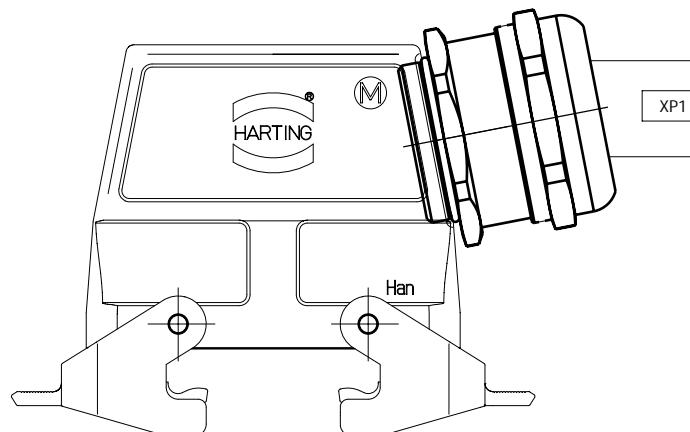
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Responsible Department:	RS / BIW	Approve by Date	2014/8/25
Prepare by Date	N.Cao	Replace by Date	2014/8/25

6MotorPower StaticCable
HighVoltage IRC5.XP1 to SMB.XP
32EE-16B to 46EE-24B

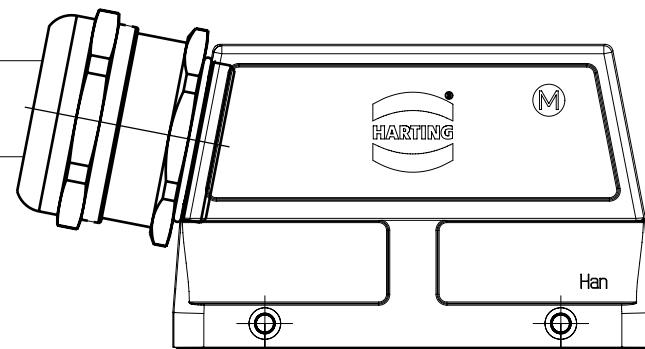
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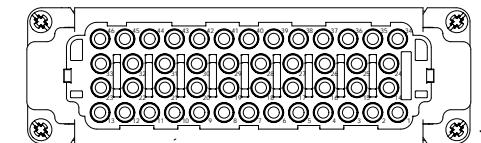
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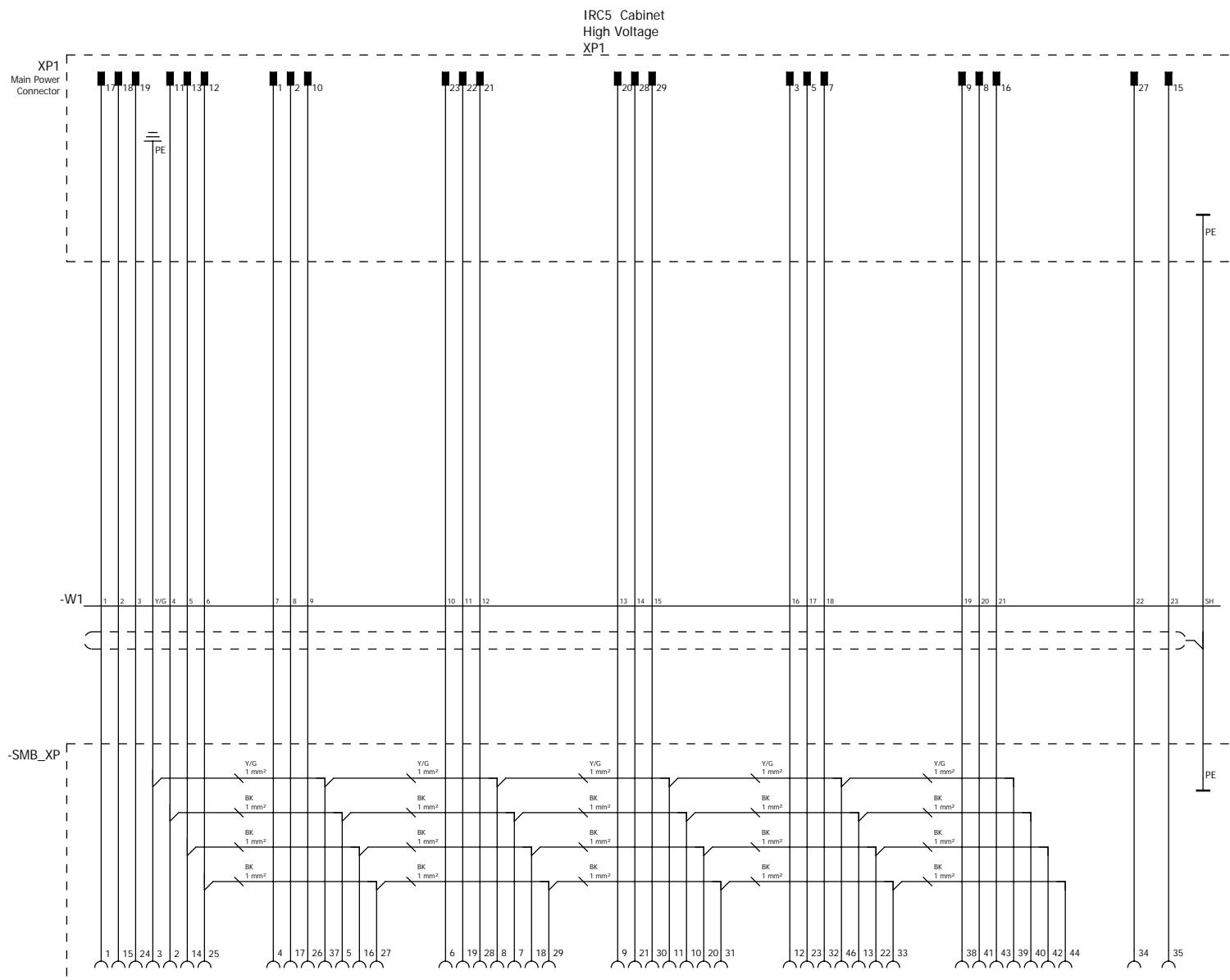
SMB.XP



SAP NUMBER Length

3HAW050008615-005	5M
3HAW050008615-010	10M
3HAW050008615-015	15M
3HAW050008615-020	20M
3HAW050008615-025	25M



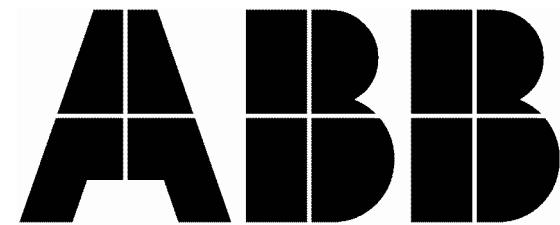


SMB BOX
Main Power

Cable diagram

F09_002_ABB

Cable name	= + -W1		cable type Helukabel.83759						
function text			no. of conductors 25G			cross-section 1.5mm			Length
function text	Page / column	Target designation from	Connection point	conductor	Target designation to	Connection point	Page / column	function text	
U1	/3.1	-SMB_XP	1	1	-XP1	17	/3.1	U1	
V1	/3.1	-SMB_XP	15	2	-XP1	18	/3.1	V1	
W1	/3.1	-SMB_XP	24	3	-XP1	19	/3.1	W1	
24V PB1	/3.1	-SMB_XP	2	4	-XP1	11	/3.1	24V PB	
24V REL1	/3.1	-SMB_XP	14	5	-XP1	13	/3.1	24V Rel	
OV BK1	/3.1	-SMB_XP	25	6	-XP1	12	/3.1	OV BK	
U2	/3.2	-SMB_XP	4	7	-XP1	1	/3.2	U2	
V2	/3.2	-SMB_XP	17	8	-XP1	2	/3.2	V2	
W2	/3.2	-SMB_XP	26	9	-XP1	10	/3.2	W2	
U3	/3.3	-SMB_XP	6	10	-XP1	23	/3.3	U3	
V3	/3.3	-SMB_XP	19	11	-XP1	22	/3.3	V3	
W3	/3.3	-SMB_XP	28	12	-XP1	21	/3.3	W3	
U4	/3.4	-SMB_XP	9	13	-XP1	20	/3.4	U4	
V4	/3.4	-SMB_XP	21	14	-XP1	28	/3.4	V4	
W4	/3.4	-SMB_XP	30	15	-XP1	29	/3.4	W4	
U5	/3.5	-SMB_XP	12	16	-XP1	3	/3.5	U5	
V5	/3.5	-SMB_XP	23	17	-XP1	5	/3.5	V5	
W5	/3.5	-SMB_XP	32	18	-XP1	7	/3.5	W5	
U6	/3.6	-SMB_XP	38	19	-XP1	9	/3.6	U6	
V6	/3.6	-SMB_XP	41	20	-XP1	8	/3.6	V6	
W6	/3.6	-SMB_XP	43	21	-XP1	16	/3.6	W6	
PTC	/3.7	-SMB_XP	34	22	-XP1	27	/3.7	PTC	
OV PTC	/3.7	-SMB_XP	35	23	-XP1	15	/3.7	OV PTC	
	/3.7	-SMB_XP	PE	SH	-XP1	PE	/3.7		
PE1	/3.1	-SMB_XP	3	Y/G	-XP1	PE	/3.1		



Project Discription

Extension 1 Motor Power FlexCable Track M2008
J1.SMB.MP to SMB.MP

Document Number

3HAW050008624-xxx

Revision

002

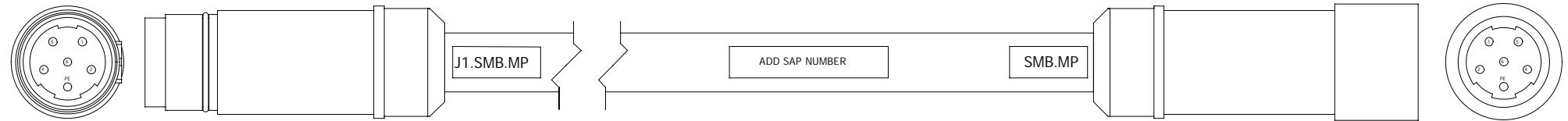
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Responsible Department:	RS / BIW	Replace by	Replaced by			Document no.	3HAW050008624-xxx	+ Rev. Ind 002
Prepare by, Date	N.Cao 2011-10-18	Approve by, Date	A.Stapelberg 2011-10-10	Replacement of	Replaced by			Page 0 Total Page 8

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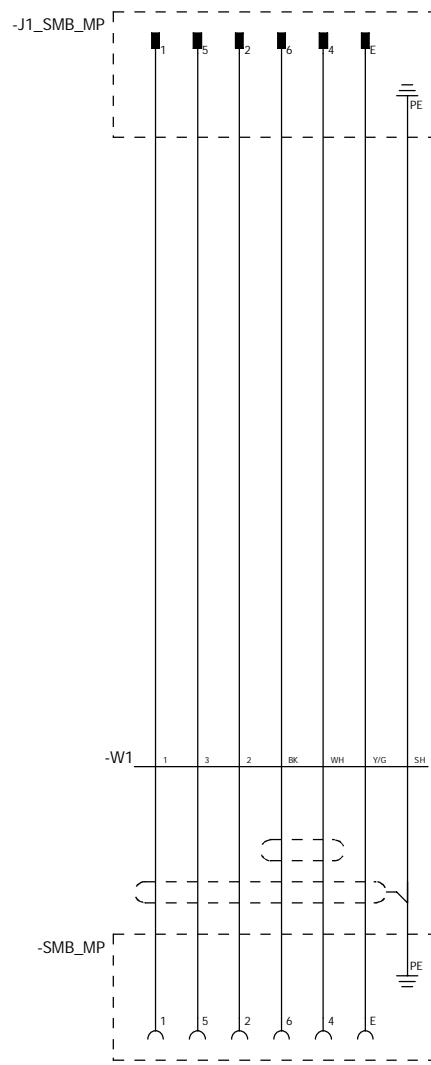
Supplementary Document	Doc Type	Document	Description
Technical Provisions Technical Provisions	TP TP	3HAB8053-1 3HAB8053-1	Barcodes Manufact Moving Cable



SAP NUMBER	Length
3HAW050008624-005	5M
3HAW050008624-010	10M
3HAW050008624-015	15M

1	Extension 1 Motor Power FlexCable Track M2008 J1.SMB.MP to SMB.MP	ABB	Layout	Status: Approved Document no. 3HAW050008624-xxx	2011-10-10 = + Rev.Ind 002 Page 2 Total Page 8
Responsible Department: RS / BIW	Approve by, Date N.Cao 2011-10-18	Replace by, Date A.Stapelberg 2011-10-10	Replacement of	Replaced by	

SMB Box
Motor Power



Extension
Motor Power

Cable diagram

F09_002_ABB

Cable name			cable type INTERCOND:13EBU 15Z 06P					
function text			no. of conductors 3x1.5mm+2x1mm			cross-section		Length
function text	Page / column	Target designation from	Connection point	conductor	Target designation to	Connection point	Page / column	function text
U	/3.1	-J1_SMB_MP	1	1	-SMB_MP	1	/3.1	U
W	/3.1	-J1_SMB_MP	2	2	-SMB_MP	2	/3.1	W
V	/3.1	-J1_SMB_MP	5	3	-SMB_MP	5	/3.1	V
BK+	/3.1	-J1_SMB_MP	6	BK	-SMB_MP	6	/3.1	BK+
	/3.2	-J1_SMB_MP	PE	SH	-SMB_MP	PE	/3.2	
BK-	/3.2	-J1_SMB_MP	4	WH	-SMB_MP	4	/3.2	BK-
PE	/3.2	-J1_SMB_MP	E	Y/G	-SMB_MP	E	/3.2	PE



Project Discription

Extension 1Resolver FlexCable Track M2008

Document Number

3HAW050008625-XXX

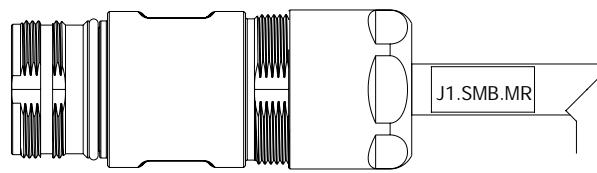
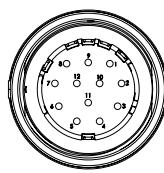
Revision

004

Number of pages

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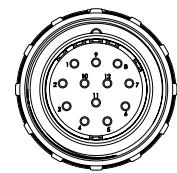
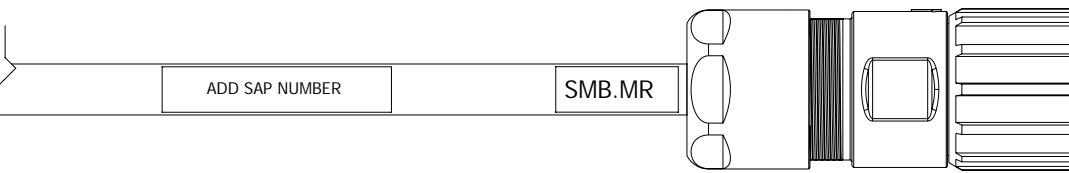
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Prepare by	N.Cao	2015/3/30	Approve by	Date	Replacement of	3HAW050008625-XXX	Rev. Ind	Page
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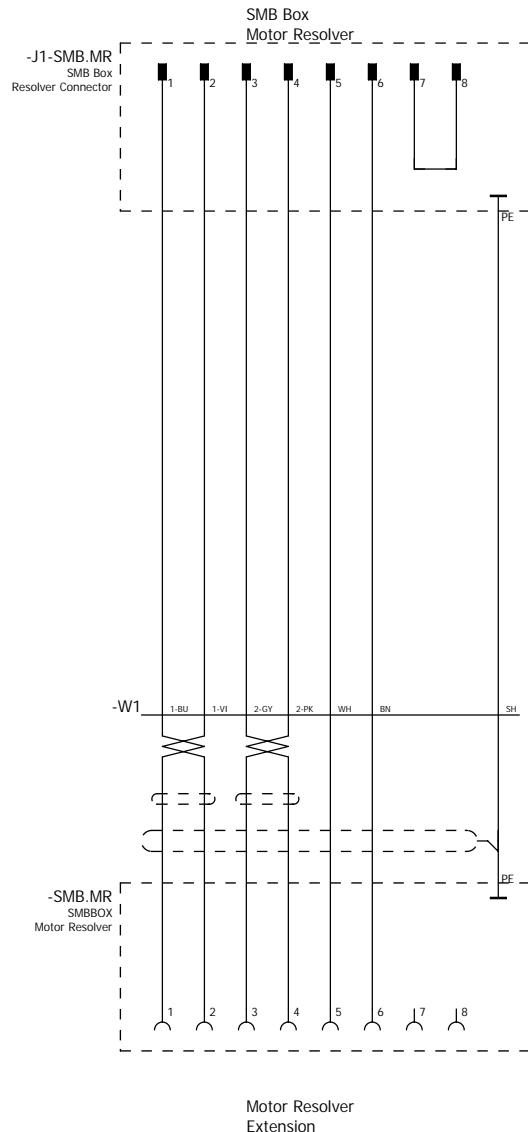
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ADD SAP NUMBER

SMB.MR



SAP NUMBER	Length
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3HAW050008625-010	10M
3HAW050008625-015	15M



Cable diagram

F09_002_ABB

Cable name			cable type					
function text			no. of conductors 4x2x0.25mm+2x0.5mm			cross-section		Length
function text	Page / column	Target designation from	Connection point	conductor	Target designation to	Connection point	Page / column	function text
X (S1,Cos+)	/3.1	-J1-SMB.MR	1	1-BU	-SMB.MR	1	/3.1	X (S1,Cos+)
0V-X(S3,Cos-)	/3.1	-J1-SMB.MR	2	1-VI	-SMB.MR	2	/3.1	0V-X(S3,Cos-)
Y(S4,Sin+)	/3.1	-J1-SMB.MR	3	2-GY	-SMB.MR	3	/3.1	Y(S4,Sin+)
0V-Y(S2,Sin-)	/3.1	-J1-SMB.MR	4	2-PK	-SMB.MR	4	/3.1	0V-Y(S2,Sin-)
0V-EXC(R2,0V)	/3.2	-J1-SMB.MR	6	BN	-SMB.MR	6	/3.2	0V-EXC(R2,0V)
	/3.2	-J1-SMB.MR	PE	SH	-SMB.MR	PE	/3.2	
EXC(R1,24V)	/3.2	-J1-SMB.MR	5	WH	-SMB.MR	5	/3.2	EXC(R1,24V)



Project Description

1 Motors Power Static Harness - No SMB
IRC5.XP7 to J1.MPx

Document Number

3HAW050008635-XXX

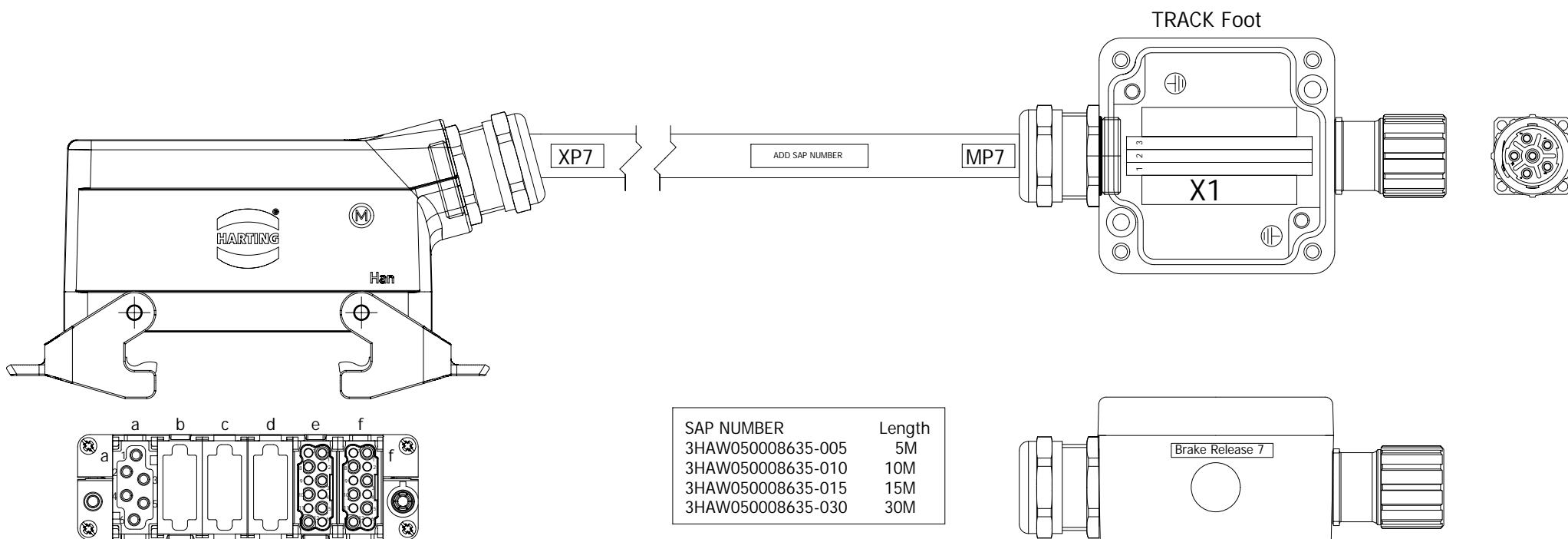
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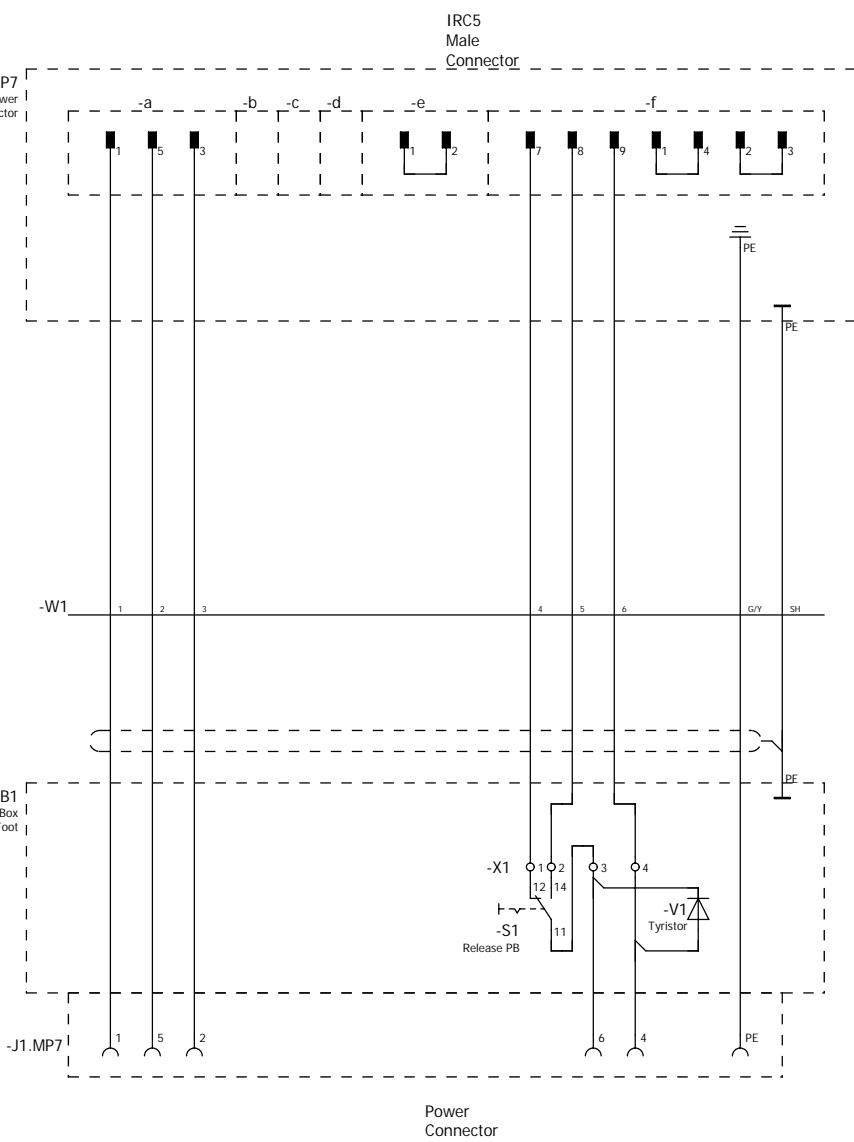
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Number of pages

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Responsible Department:	RS / BIW				Document no.		
Prepare by, Date	N.Cao	2015/5/6	Approve by, Date	Replacement of	3HAW050008635-XXX	Rev. Ind	Page
				Replaced by		006	0
					Total Page		8





Responsible Department: RS / BIW	1 Motors Power Static Harness - No SMB IRC5.XP7 to J1.MPx	ABB	Connection	Status: Approved	=
Prepare by, Date N.Cao 2015/5/6	Approve by, Date	Replacement of	Replaced by	Document no. 3HAW050008635-XXX	Rev. Ind + 006 Page 3
				Total Page 8	

Cable diagram

F09_002_ABB

Cable name = +-W1			cable type Helukabel:83756					
function text			no. of conductors 7G			cross-section 1.5mm		Length
function text	Page / column	Target designation from	Connection point	conductor	Target designation to	Connection point	Page / column	function text
U	/3.1	-J1.MP7	1	1	-XP7-a	1	/3.1	U
V	/3.1	-J1.MP7	5	2	-XP7-a	5	/3.1	V
W	/3.1	-J1.MP7	2	3	-XP7-a	3	/3.1	W
	/3.3	-B1-X1	1	4	-XP7-f	7	/3.3	24V Rel
	/3.3	-B1-X1	2	5	-XP7-f	8	/3.3	24V PB
	/3.3	-B1-X1	4	6	-XP7-f	9	/3.3	0V BK
PE	/3.4	-J1.MP7	PE	G/Y	-XP7	PE	/3.4	
	/3.4	-B1	PE	SH	-XP7	PE	/3.4	



Project Description

1Resolver FlexCable No SMB
 Robot Axis7 feedback -Motor Resolver M23
 Tooling On Track IRB66XX,76XX

Document Number

3HAW050008636-xxx

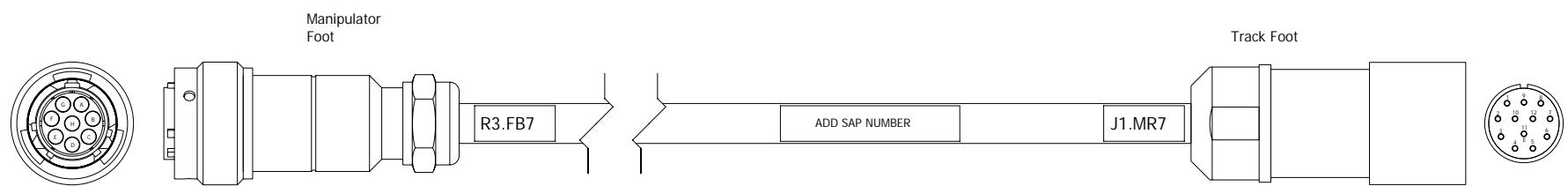
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Number of pages

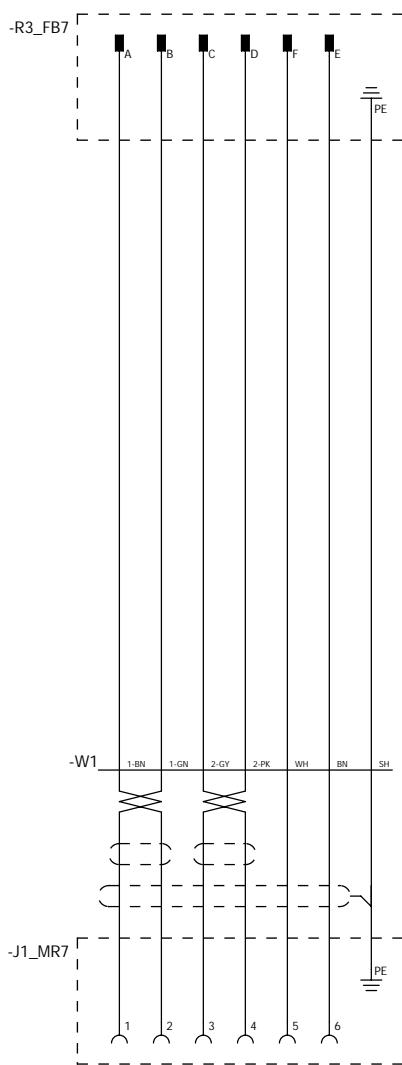
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Responsible Department: RS/BIW	Prepare by, Date N.Cao 2013-2-25	Approve by, Date A.Stapelberg 2011-10-10	Replacement of	Replaced by	Document no.	3HAW050008636-XXX	Rev. Ind 003 Page 0 Total Page 8



SAP NUMBER	Length
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3HAW050008636-010	10M
3HAW050008636-015	15M

**Manipulator
7Axis Feedback**



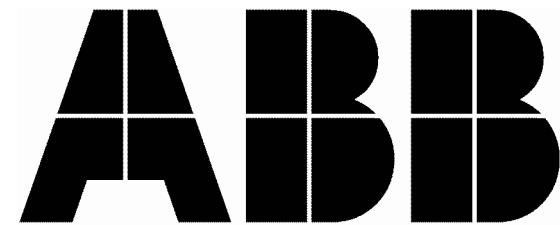
**Track Foot
Motor Resolver**



Cable diagram

F09_002_ABB

Cable name =+-W1			cable type INTERCOND:13MYI 21Z 10P					
function text			no. of conductors 4x2x0.25mm+2x0.5mm			cross-section		Length
function text	Page / column	Target designation from	Connection point	conductor	Target designation to	Connection point	Page / column	function text
X	/3.1	-J1_MR7	1	1-BN	-R3_FB7	A	/3.1	X
OV X	/3.1	-J1_MR7	2	1-GN	-R3_FB7	B	/3.1	OV X
Y	/3.1	-J1_MR7	3	2-GY	-R3_FB7	C	/3.1	Y
OV Y	/3.1	-J1_MR7	4	2-PK	-R3_FB7	D	/3.1	OV Y
OV EXC	/3.2	-J1_MR7	6	BN	-R3_FB7	E	/3.2	OV EXC
	/3.2	-J1_MR7	PE	SH	-R3_FB7	PE	/3.2	
EXC	/3.2	-J1_MR7	5	WH	-R3_FB7	F	/3.2	EXC



Project Discription

Extension Welding Cable
J1.WELD - R1.WELD

Document Number

3HAW050008628-xxx

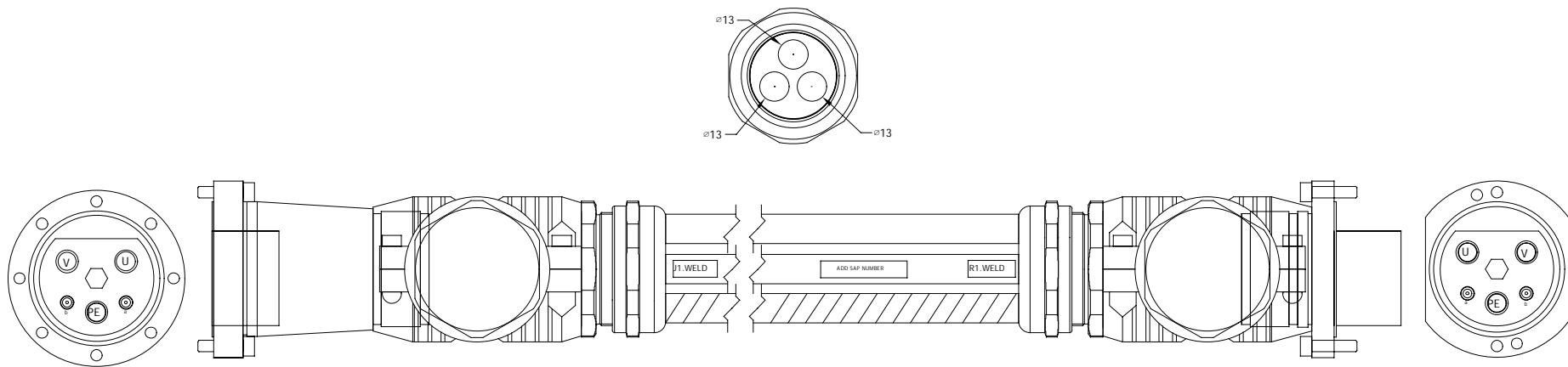
Revision

002

Number of pages

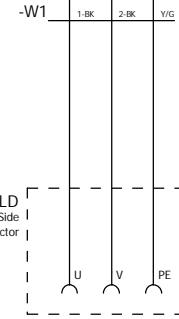
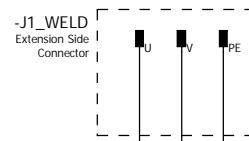
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Responsible Department:	RS / BIW	Replace of	Replaced by		Document no.	3HAW050008628-xxx	+ Rev. Ind 002 Page 0
Prepare by, Date	N.Cao 2011-10-18	Approve by, Date	A.Stapelberg 2011-10-10				Total Page 8



SAP NUMBER	Length
3HAW050008628-005	5M
3HAW050008628-010	10M
3HAW050008628-015	15M

TrackFoot
Welding Connector



Manipulator
Welding Connector

Cable diagram

F09_002_ABB

Cable name	= + -W1	cable type							
function text			no. of conductors 3Gx			cross-section 35mm			Length
function text	Page / column	Target designation from	Connection point	conductor	Target designation to	Connection point	Page / column	function text	
U	/3.1	-J1_WELD	U	1-BK	-R1_WELD	U	/3.1	U	
V	/3.1	-J1_WELD	V	2-BK	-R1_WELD	V	/3.1	V	
PE	/3.1	-J1_WELD	PE	Y/G	-R1_WELD	PE	/3.1	PE	





Project Description

Electrical Spot Gun - Motor Power FlexCable
From SMB.MP & SMB.MR to R1.SP

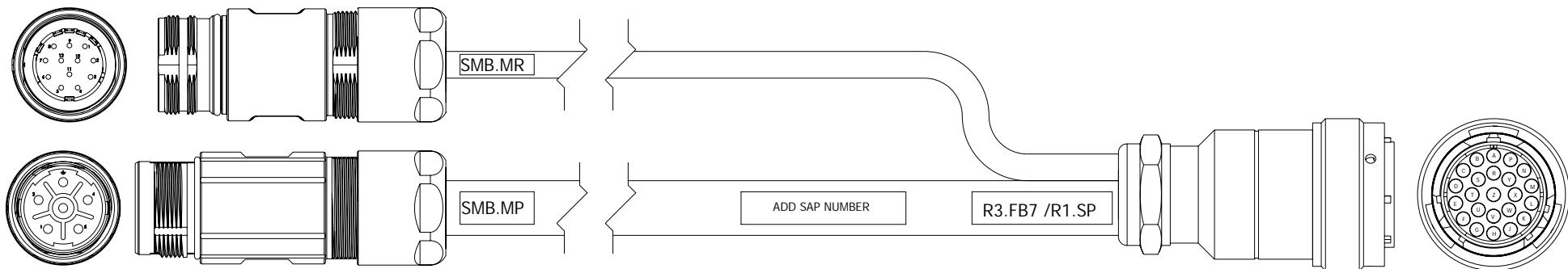
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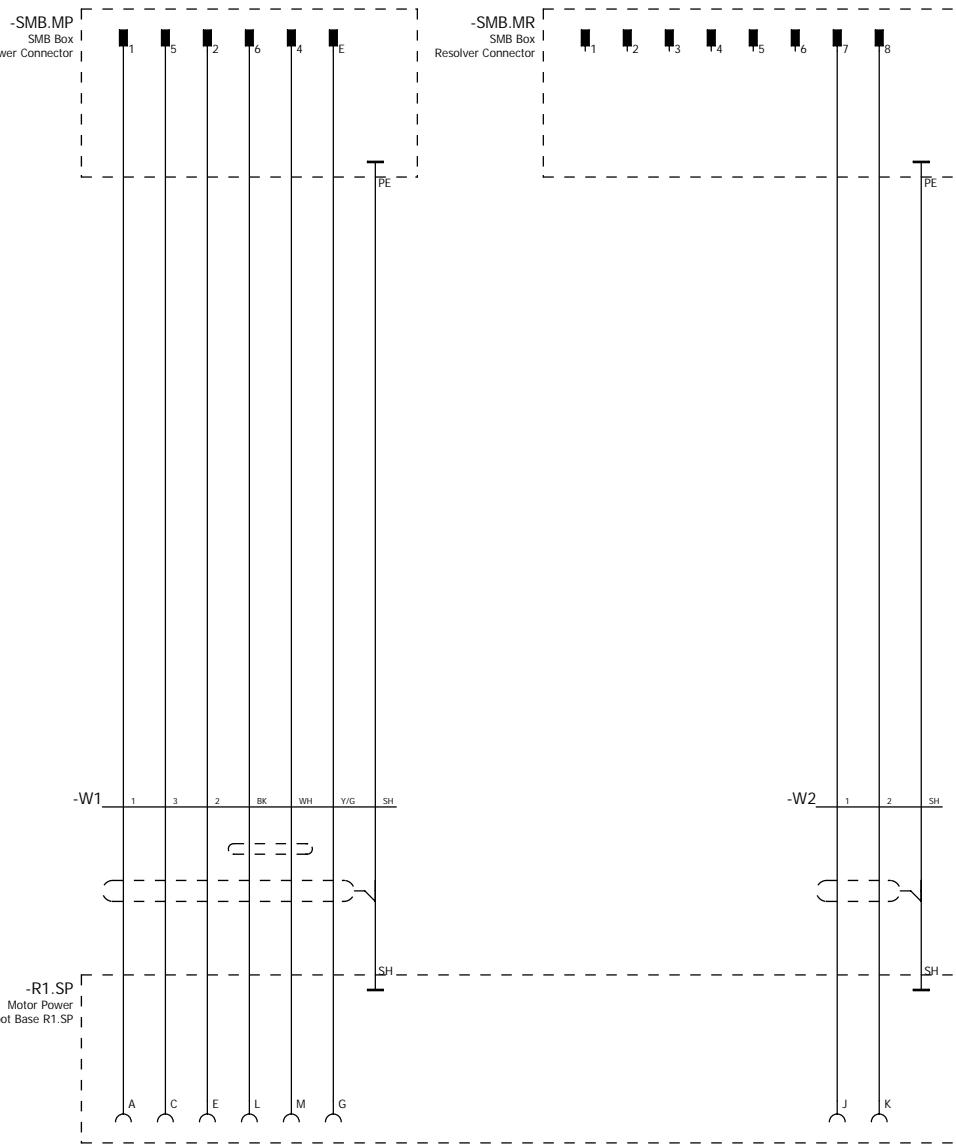
Revision 003

Number of pages

9



SAP NUMBER	Length
3HAW050008631-005	5M
3HAW050008631-010	10M
3HAW050008631-015	15M



Electrical Spot Gun - Motor Power FlexCable
From SMB.MP & SMB.MR to R1.SP



Connection

Status:
Approved

Document no.
3HAW050008631-XXX

=
+
Rev. Ind
003
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Cable diagram

F09_002_ABB

Cable name = +-W1			cable type INTERCOND.13EYS 15Z 06R-A1					
function text			no. of conductors 4Gx1.5mm+2x1.5mm			cross-section		Length
function text	Page / column	Target designation from	Connection point	conductor	Target designation to	Connection point	Page / column	function text
U	/3.1	-R1.SP	A	1	-SMB.MP	1	/3.1	U
W	/3.1	-R1.SP	E	2	-SMB.MP	2	/3.1	W
V	/3.1	-R1.SP	C	3	-SMB.MP	5	/3.1	V
BK+	/3.1	-R1.SP	L	BK	-SMB.MP	6	/3.1	BK+
	/3.2	-R1.SP	SH	SH	-SMB.MP	PE	/3.2	
BK-	/3.2	-R1.SP	M	WH	-SMB.MP	4	/3.2	BK-
PE	/3.2	-R1.SP	G	Y/G	-SMB.MP	E	/3.2	PE

Cable diagram

F09_002_ABB

Cable name =+-W2			cable type INTERCOND.13IBZ 21X 02P					
function text			no. of conductors 2			cross-section 0.5mm		Length
function text	Page / column	Target designation from	Connection point	conductor	Target designation to	Connection point	Page / column	function text
PTC	/3.4	-R1.SP	J	1	-SMB.MR	7	/3.4	PTC
OV PTC	/3.4	-R1.SP	K	2	-SMB.MR	8	/3.4	OV PTC
	/3.4	-R1.SP	SH	SH	-SMB.MR	PE	/3.4	



Project Description

Track Motor Power FlexCable
SMB.MP-MP

Document Number

3HAW050008608-xxx

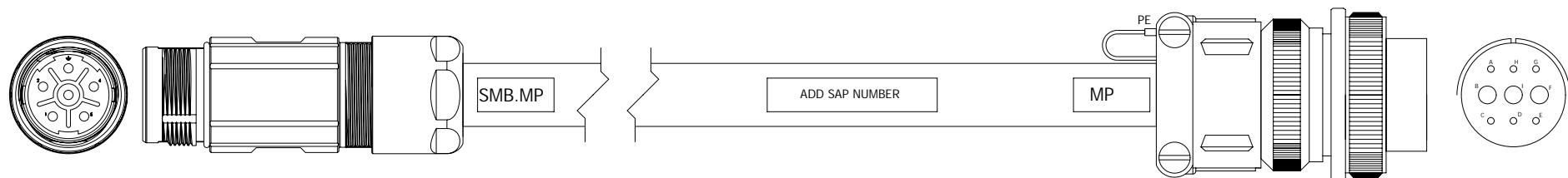
Revision

003

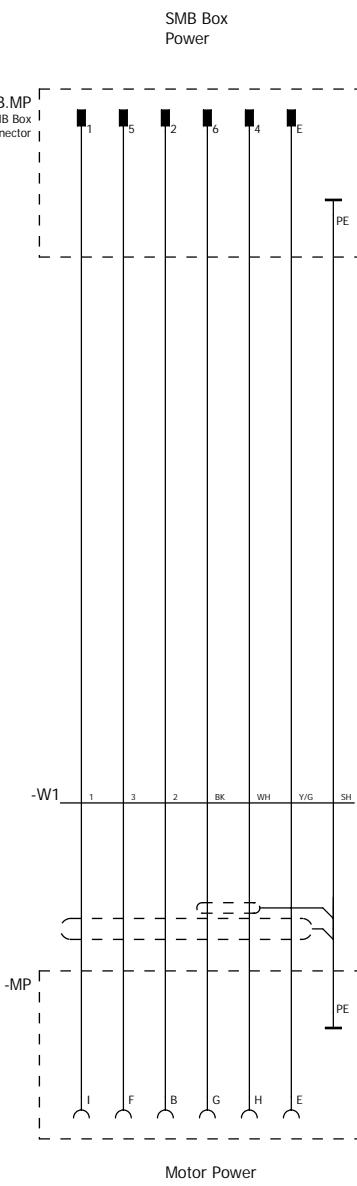
Number of pages

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SAP NUMBER	Length
3HAW050008608-005	5M
3HAW050008608-007	7.5M
3HAW050008608-010	10M
3HAW050008608-015	15M



Responsible Department:	RS / BIW	Approve by Date	A.Stapelberg	2011/10/10
Prepare by Date	N.Cao	2014/7/10	Replacement of	Replaced by

Track Motor Power FlexCable
 SMB.MP-MP



Connection

Status:
Approved
 Document no.
 3HAW050008608-xxx

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Cable diagram

F09_002_ABB

Cable name = +-W1			cable type INTERCOND:13EBU 15Z 06P					
function text			no. of conductors 4Gx1.5mm+2x1.5mm			cross-section		Length
function text	Page / column	Target designation from	Connection point	conductor	Target designation to	Connection point	Page / column	function text
U	/3.1	-MP	I	1	-SMB.MP	1	/3.1	U
W	/3.1	-MP	B	2	-SMB.MP	2	/3.1	W
V	/3.1	-MP	F	3	-SMB.MP	5	/3.1	V
BK+	/3.1	-MP	G	BK	-SMB.MP	6	/3.1	BK+
	/3.2	-MP	PE	SH	-SMB.MP	PE	/3.2	
BK-	/3.2	-MP	H	WH	-SMB.MP	4	/3.2	BK-
PE	/3.2	-MP	E	Y/G	-SMB.MP	E	/3.2	PE



Project Description

Track Motor Resolver FlexCable
SMB.MR-MR

Document Number

3HAW050008609-xxx

Revision

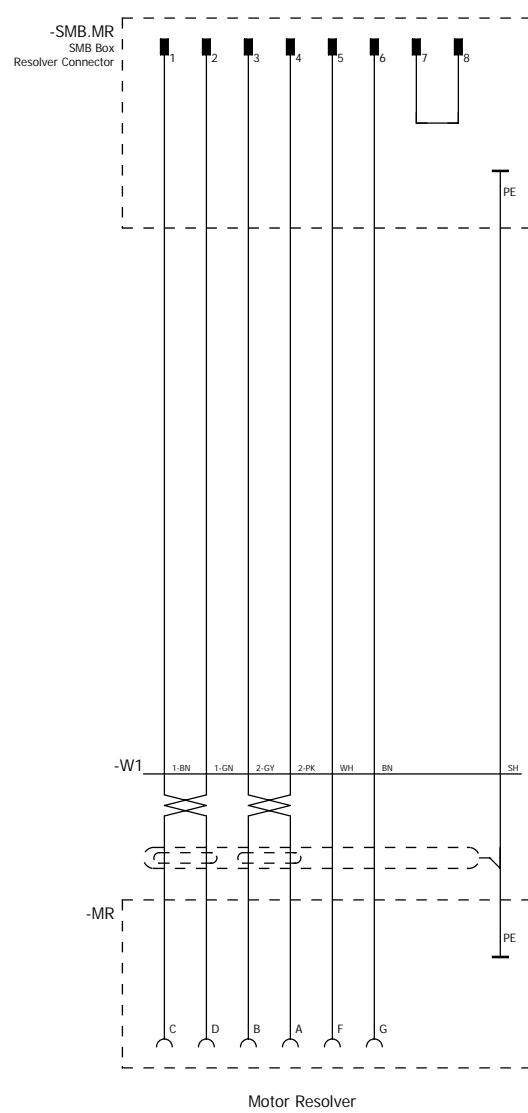
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Number of pages

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Prepare by, Date	N.Cao 2014/7/10	Approve by, Date	A.Stapelberg 2011/10/10	Replacement of			003	0

SMB Box
Motor
Resolver



Motor Resolver

Responsible Department:	RS / BIW	Approve by Date	A.Stapelberg	2011/10/10
Prepare by Date	N.Cao	2014/7/10	Replacement of	Replaced by

Track Motor Resolver FlexCable
SMB.MR-MR



Connection

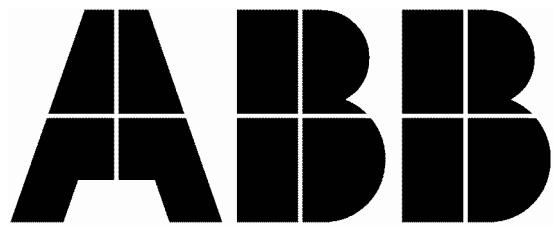
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3HAW050008609-xxx

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Cable diagram

F09_002_ABB

Cable name = +-W1			cable type INTERCOND:13MYI 21Z 10P					
function text			no. of conductors 4x2x0.25mm+2x0.5mm			cross-section		Length
function text	Page / column	Target designation from	Connection point	conductor	Target designation to	Connection point	Page / column	function text
X (S1)	/3.1	-MR	C	1-BN	-SMB.MR	1	/3.1	X (S1,Cos+)
0V X (S3)	/3.1	-MR	D	1-GN	-SMB.MR	2	/3.1	0V-X(S3,Cos-)
Y (S4)	/3.1	-MR	B	2-GY	-SMB.MR	3	/3.1	Y(S4,Sin+)
0V Y (S2)	/3.1	-MR	A	2-PK	-SMB.MR	4	/3.1	0V-Y(S2,Sin-)
0V EXC (R2)	/3.2	-MR	G	BN	-SMB.MR	6	/3.2	0V-EXC(R2,0V)
	/3.2	-MR	PE	SH	-SMB.MR	PE	/3.2	
EXC (R1)	/3.2	-MR	F	WH	-SMB.MR	5	/3.2	EXC(R1,24V)



Project Discription

LimitSwitch 1Positon

Document Number

3HAW050008610-xxx

Revision

003

Number of pages

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		LimitSwitch 1Positon			Title page / cover sheet	Status: Approved	2011-10-10	=
Responsible Department:	RS / BIW	Replace by	Replaced by			Document no.	3HAW050008610-xxx	+
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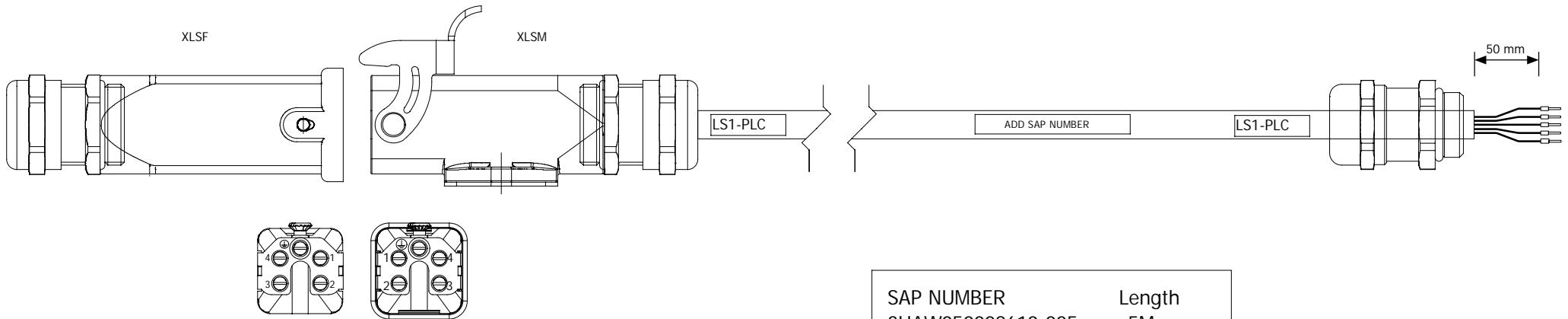
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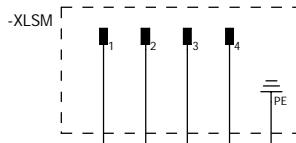
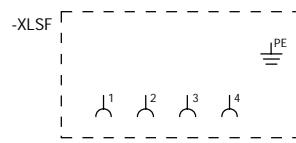
Technical Provisions
Technical Provisions

TP
TP

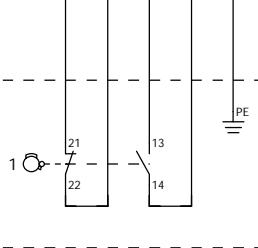
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Barcodes
Manufact Moving Cable





-W1



LimitSwitch
(Supply By ABB)

LimitSwitch 1Positon



Connection

Status:
Approved

2011-10-10

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3HAW050008610-xxx

Rev.Ind
003

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8

Responsible Department: RS / BIW

Prepare by, Date N.Cao 2011-11-28

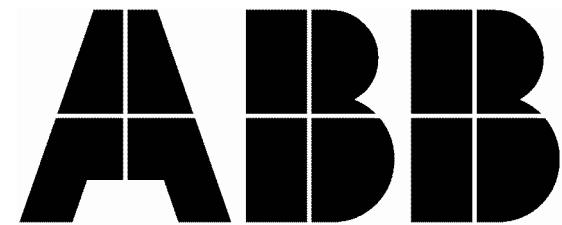
Approve by, Date A.Stapelberg 2011-10-10

Replacement of Replaced by

Cable diagram

F09_002_ABB

Cable name = +-W1			cable type IGUS:CF130.05.05.UL					
function text			no. of conductors 5G			cross-section 0.5mm		Length
function text	Page / column	Target designation from	Connection point	conductor	Target designation to	Connection point	Page / column	function text
	/3.1	-XLSM	1	1	-LS-1	21	/3.1	
	/3.1	-XLSM	2	2	-LS-1	22	/3.1	
	/3.1	-XLSM	3	3	-LS-1	13	/3.1	
	/3.1	-XLSM	4	4	-LS-1	14	/3.1	
	/3.2	-XLSM	PE	Y/G	-LS	PE	/3.2	



Project Discription

LimitSwitch 2 Positon

Document Number

3HAW050008654-xxx

Revision

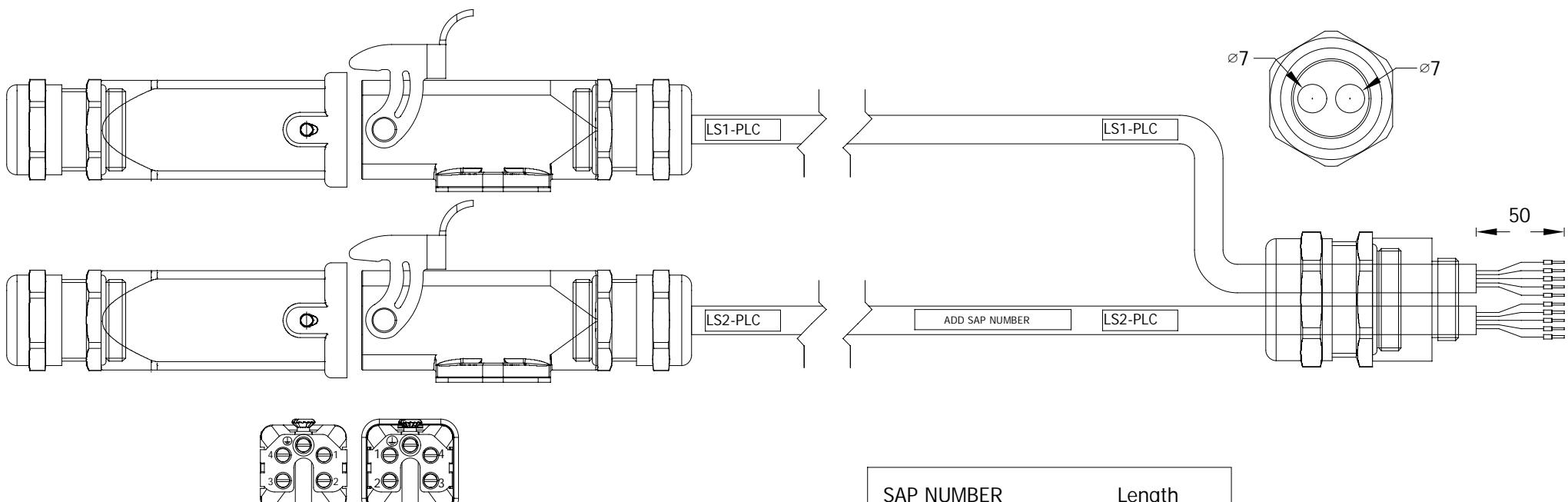
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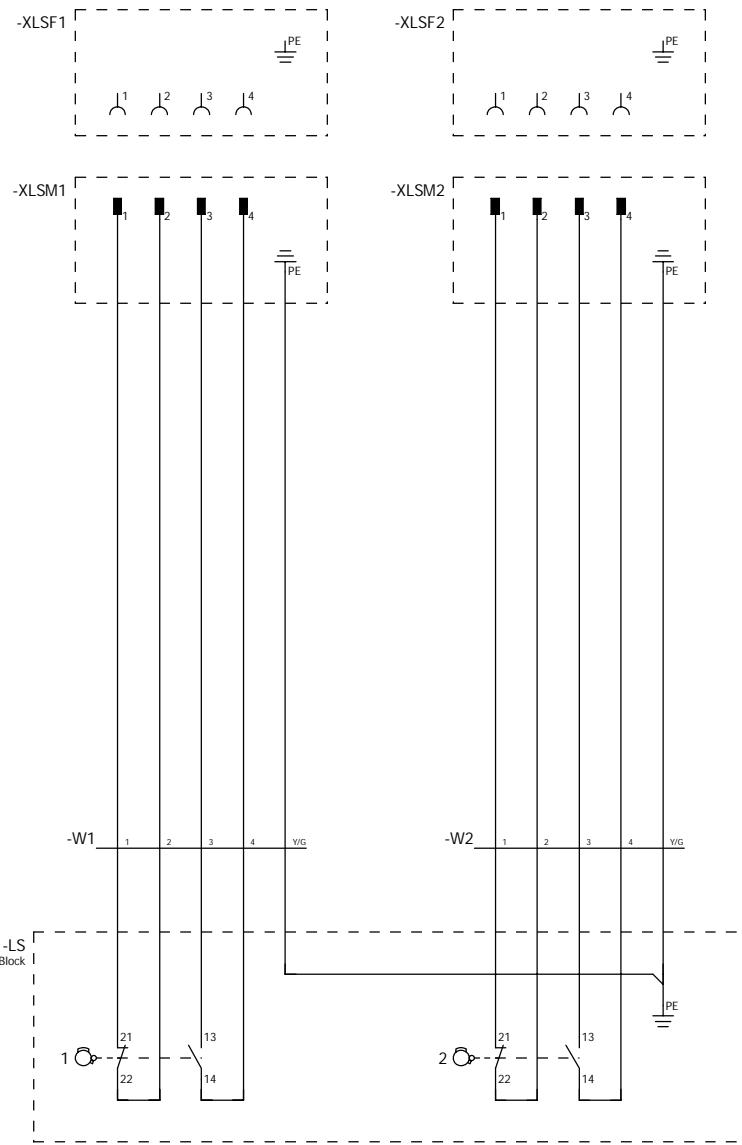
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Prepare by, Date	N.Cao 2011-11-28	Approve by, Date	A.Stapelberg 2011-12-3			Rev.Ind	000	Page 0
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SAP NUMBER	Length
3HAW050008654-005	5M
3HAW050008654-010	10M
3HAW050008654-015	15M



Limit Switch Block
 (Supply By ABB)

Cable diagram

F09_002_ABB

Cable name = +-W1			cable type IGUS:CF130.05.05.UL					
function text			no. of conductors 5G			cross-section 0.5mm		Length
function text	Page / column	Target designation from	Connection point	conductor	Target designation to	Connection point	Page / column	function text
	/3.1	-XLSM1	1	1	-LS-1	21	/3.1	
	/3.1	-XLSM1	2	2	-LS-1	22	/3.1	
	/3.1	-XLSM1	3	3	-LS-1	13	/3.1	
	/3.1	-XLSM1	4	4	-LS-1	14	/3.1	
	/3.2	-XLSM1	PE	Y/G	-LS	PE	/3.3	

Cable diagram

F09_002_ABB

Cable name = +-W2			cable type IGUS:CF130.05.05.UL					
function text			no. of conductors 5G			cross-section 0.5mm		Length
function text	Page / column	Target designation from	Connection point	conductor	Target designation to	Connection point	Page / column	function text
	/3.3	-XLSM2	1	1	-LS-2	21	/3.3	
	/3.3	-XLSM2	2	2	-LS-2	22	/3.3	
	/3.3	-XLSM2	3	3	-LS-2	13	/3.3	
	/3.3	-XLSM2	4	4	-LS-2	14	/3.3	
	/3.3	-XLSM2	PE	Y/G	-LS	PE	/3.3	



Project Discription

LimitSwitch 4Positon

Document Number

3HAW050008611-xxx

Revision

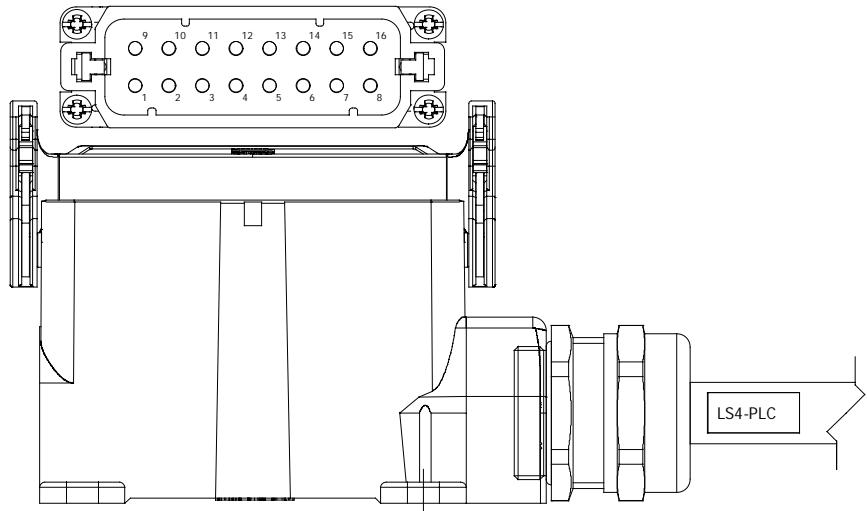
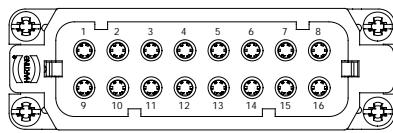
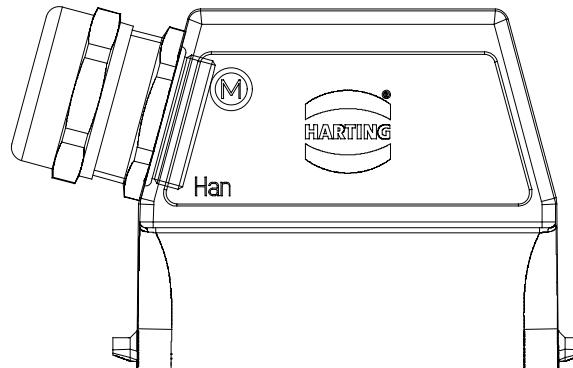
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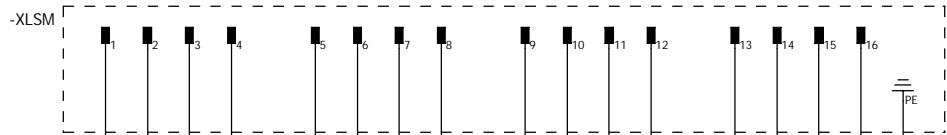
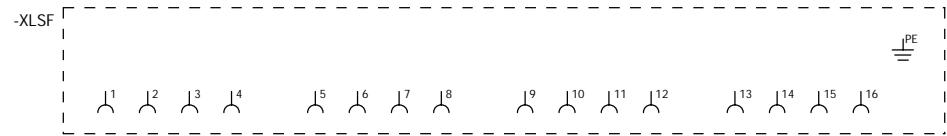
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Prepare by, Date	N.Cao 2011-11-28	Approve by, Date	A.Stapelberg 2011-10-10			Rev. Ind	003	Page 0
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Supplementary Document	Doc Type	Document	Description
Technical Provisions Technical Provisions	TP TP	3HAB8053-1 3HAB8053-1	Barcodes Manufact Moving Cable

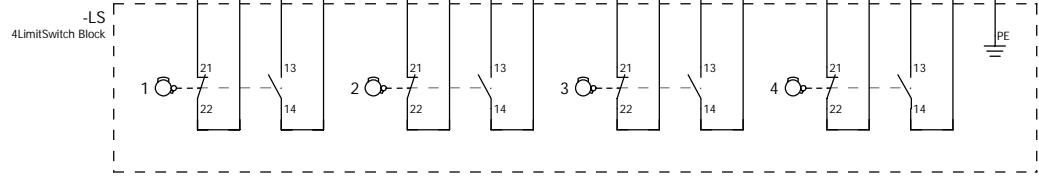


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3HAW050008611-005	5M
3HAW050008611-010	10M
3HAW050008611-015	15M



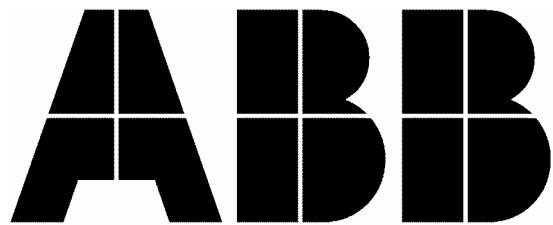
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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Y/G
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Limit Switch Block
 (Supply By ABB)

Revision	Date	Page Range	Comment
Rev0	13/04/2010	ALL	Create a new drawing number with 3HAW for SAP
Rev1	12/01/2011	LS	1.Add the strip length of cable cores 2. Update the wrong Harting hood and housing part number
Rev2	24/02/2011	ALL	Create an approver for the drawing release
Rev3	10/10/2011	ALL	Create a new drawing by EPLAN



Project Discription

24VDC PowerSupply and Communication FlexCable

Document Number

3HAW050008633-xxx

Revision

002

Number of pages

8



Title page / cover sheet

Status:	2011-10-10	=
Approved		+
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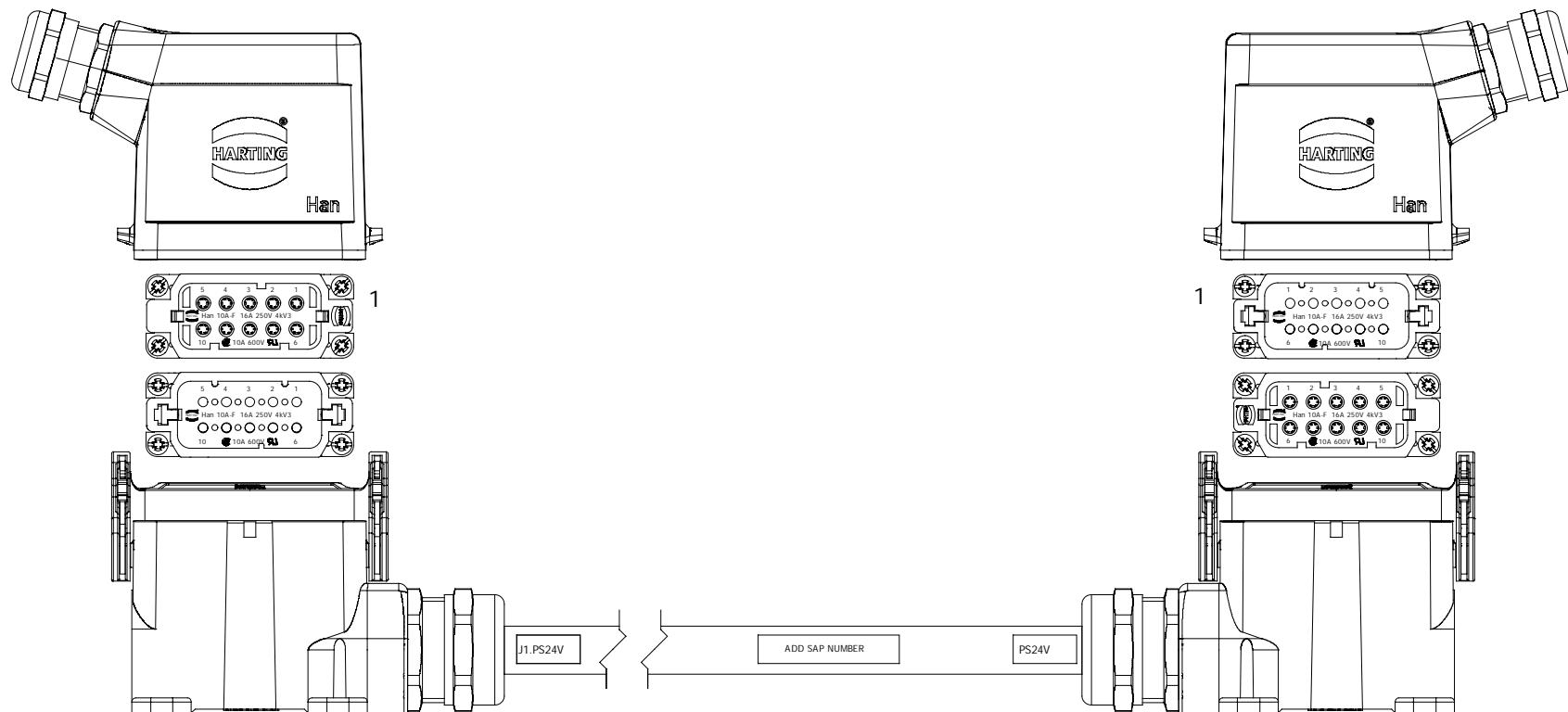
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Approve by, Date A.Stapelberg 2011-10-10

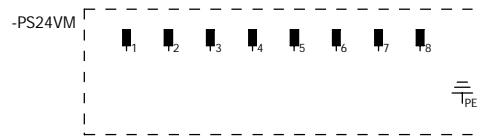
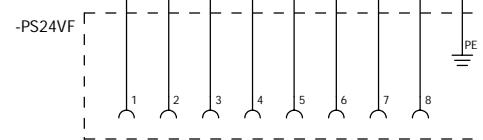
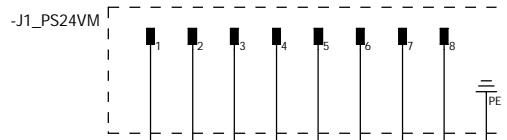
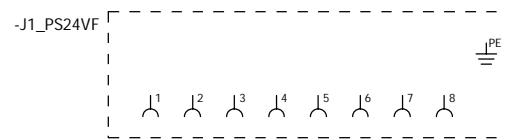
24VDC PowerSupply and Communication FlexCable

Replacement of Replaced by



SAP NUMBER	Length
3HAW050008633-005	5M
3HAW050008633-010	10M
3HAW050008633-015	15M

Track Foot



Track Move Part



Cable diagram

F09_002_ABB

Cable name = + -W1			cable type IGUS:CF130.15.12.UL					
function text			no. of conductors 12G			cross-section 1.5mm		Length
function text	Page / column	Target designation from	Connection point	conductor	Target designation to	Connection point	Page / column	function text
	/3.1	-J1_PS24VM	1	1	-PS24VF	1	/3.1	
	/3.1	-J1_PS24VM	2	2	-PS24VF	2	/3.1	
	/3.1	-J1_PS24VM	3	3	-PS24VF	3	/3.1	
	/3.1	-J1_PS24VM	4	4	-PS24VF	4	/3.1	
	/3.2	-J1_PS24VM	5	5	-PS24VF	5	/3.2	
	/3.2	-J1_PS24VM	6	6	-PS24VF	6	/3.2	
	/3.2	-J1_PS24VM	7	7	-PS24VF	7	/3.2	
	/3.2	-J1_PS24VM	8	8	-PS24VF	8	/3.2	
	/3.2	-J1_PS24VM	PE	Y/G	-PS24VF	PE	/3.2	



Project Description

1Resolver FlexCable No SMB Track
Robot Axis7 Feedback -Motor Resolver
For Robot IRB26XX 66XX 76XX

Document Number

3HAW050008637-XXX

Revision

006

Number of pages

8



Title page / cover sheet

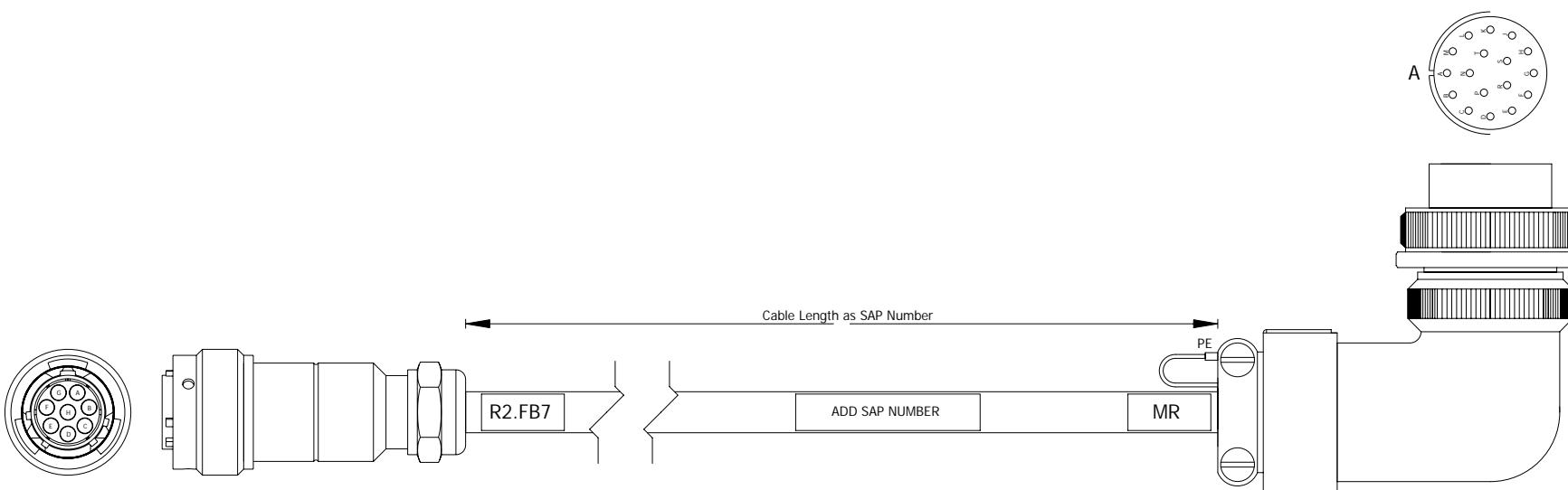
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Prepare by Date	N.Cao	Replace by Date	2015/2/10

1Resolver FlexCable No SMB Track
Robot Axis7 Feedback -Motor Resolver
For Robot IRB26XX 66XX 76XX

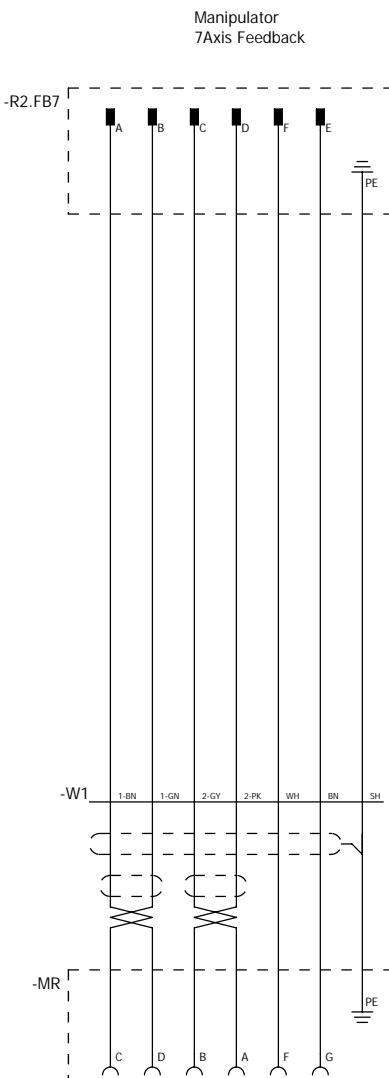
Replacement of

Replaced by



ATTENTION:
The Connector Installation Orientation
MUST PLACED AS Drawing

SAP NUMBER	Length
3HAW050008637-001	1.2M
3HAW050008637-002	2M
3HAW050008637-003	3M
3HAW050008637-005	5M
3HAW050008637-010	10M
3HAW050008637-015	15M



Motor Resolver

1Resolver FlexCable No SMB Track
Robot Axis7 Feedback -Motor Resolver
For Robot IRB26XX 66XX 76XX

Responsible Department: RS / BIW

Prepare by, Date N.Cao 2015/2/2

Approve by, Date 2015/2/10

Replacement of

Replaced by



Connection

Status: Approved
2015/2/10
Document no. 3HAW050008637-XXX

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Cable diagram

F09_002_ABB

Cable name			cable type INTERCOND:13MYI 21Z 10P					
function text			no. of conductors 4x2x0.25mm+2x0.5mm			cross-section		Length
function text	Page / column	Target designation from	Connection point	conductor	Target designation to	Connection point	Page / column	function text
X	/3.1	-MR	C	1-BN	-R2.FB7	A	/3.1	X
0V X	/3.1	-MR	D	1-GN	-R2.FB7	B	/3.1	0V X
Y	/3.1	-MR	B	2-GY	-R2.FB7	C	/3.1	Y
0V Y	/3.1	-MR	A	2-PK	-R2.FB7	D	/3.1	0V Y
0V EXC	/3.2	-MR	G	BN	-R2.FB7	E	/3.2	0V EXC
	/3.2	-MR	PE	SH	-R2.FB7	PE	/3.2	
EXC	/3.2	-MR	F	WH	-R2.FB7	F	/3.2	EXC

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