ROBOTICS

Product manual

Motor Units and Gear Units

Trace back information:
Workspace 25A version a15
Checked in 2025-03-07
Skribenta version 5.6.018

Product manual

MU 80, MU 100, MU 200, MU 250, MU 300, MU 400
MTD 250, MTD 500, MTD 750, MTD 2000, MTD 5000
MID 500, MID 1000

OmniCore

Document ID: 3HAC090254-001

Revision: B

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Keep for future reference.

Additional copies of this manual may be obtained from ABB.

Original instructions.

Table of contents

Overview of this manual

About this manual

This manual contains instructions for:

- Mechanical and electrical installation of the motor units and gear units.
- Maintenance of the motor units and gear units.
- Mechanical and electrical repair of the motor units and gear units.

Usage

This manual should be used during:

- Installation, from installation and connection, to making them ready for operation.
- Maintenance work.
- Repair work and calibration.

Who should read this manual?

This manual is intended for:

- Installation personnel.
- Maintenance personnel.
- Repair personnel.

Prerequisites

Maintenance/repair/installation personnel working with an ABB Robot must be trained by ABB and have the required knowledge of mechanical and electrical installation/repair/maintenance work.

Product manual scope

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

References

Reference	Document ID
Product manual, spare parts - Motor Units and Gear Units	*3HAC090256-001*
Circuit diagram - Motor Units and Gear Units	*3HAC092184-001*
Product specification - Motor units and gear units	*3HAC090259-001*
Safety manual for robot - Manipulator and IRC5 or OmniCore controller i	*3HAC031045-001*
Product manual - OmniCore V250XT Type B	*3HAC087112-001*
Product manual - OmniCore V400XT	*3HAC081697-001*
Operating manual - OmniCore	*3HAC065036-001*
Operating manual - RobotStudio	*3HAC032104-001*
Technical reference manual - System parameters	*3HAC065041-001*

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Continued

Reference	Document ID
Application manual - Additional axes	*3HAC082287-001*
Application manual - TuneMaster	*3HAC063590-001*

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

Tip

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

Revisions

Revision	Description
A	First edition.
B	Published in release 25A. The following updates are done in this revision: • Minor corrections.

1 Safety

1.1 Safety information

1.1.1 Limitation of liability

Limitation of liability

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

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

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

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

Spare parts and equipment

ABB supplies original spare parts and equipment which have been tested and approved for their intended use. The installation and/or use of non-original spare parts and equipment can negatively affect the safety, function, performance, and structural properties of the robot. ABB is not liable for damages caused by the use of non-original spare parts and equipment.

1.1.2 Requirements on personnel

General

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

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

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

Personal protective equipment

Use personal protective equipment, as stated in the instructions.

1.2 Safety signals and symbols

1.2.1 Safety signals in the manual

Introduction to safety signals

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

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

Hazard levels

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

Symbol	Designation	Significance
	DANGER	Signal word used to indicate an imminently hazardous situation which, if not avoided, will result in serious injury.
	WARNING	Signal word used to indicate a potentially hazardous situation which, if not avoided, could result in serious injury.
	ELECTRICAL SHOCK	Signal word used to indicate a potentially hazardous situation related to electrical hazards which, if not avoided, could result in serious injury.
	CAUTION	Signal word used to indicate a potentially hazardous situation which, if not avoided, could result in slight injury.
	ELECTROSTATIC DISCHARGE (ESD)	Signal word used to indicate a potentially hazardous situation which, if not avoided, could result in severe damage to the product.
	NOTE	Signal word used to indicate important facts and conditions.

Continues on next page

1.2.1 Safety signals in the manual
Continued

Symbol	Designation	Significance
	TIP	Signal word used to indicate where to find additional information or how to do an operation in an easier way.

1.2.2 Safety symbols on product labels

Introduction to symbols

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

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

> **Note**
>
> The symbols on the labels on the product must be observed. Additional symbols added by the integrator must also be observed.

Types of symbols

The product labels are marked with symbols, containing important information about the product. This is important for all personnel handling the product, for example during installation, service, or operation.

The safety labels are language independent, they only use graphics. See *Symbols on product labels on page 13*.

The information labels can contain information in text.

Symbols on product labels

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

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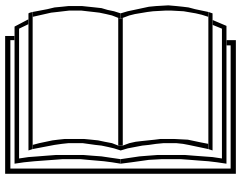
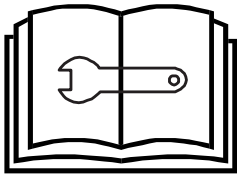
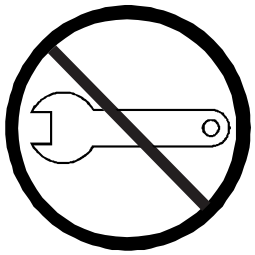
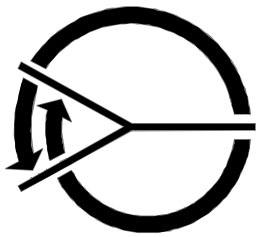
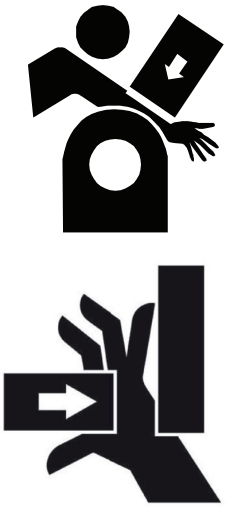
1.2.2 Safety symbols on product labels

Continued

Symbol	Description
 xx0900000813	**See user documentation** Read user documentation for details. Which manual to read is defined by the symbol: • No text: *Product manual*.
 xx0900000816	**Before disassembly, see product manual**
 xx0900000815	**Do not disassemble** Disassembling this part can cause injury.
 xx0900000814	**Extended rotation** This axis has extended rotation (working area) compared to standard.
 xx0900000817	**Crush** Risk of crush injuries.

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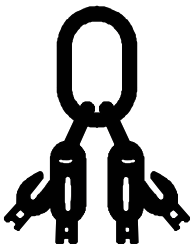
Symbol	Description
 xx0900000818  xx1300001087	**Heat** Risk of heat that can cause burns. (Both signs are used)
 xx0900000821	**Lifting bolt**
 xx1000001242	**Adjustable chain sling with shortener**
 xx0900000822	**Lifting**
 xx0900000823	**Oil** Can be used in combination with prohibition if oil is not allowed.

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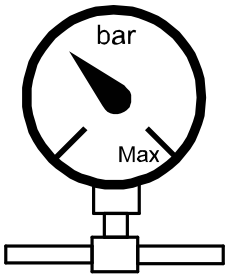
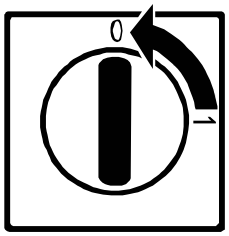
1.2.2 Safety symbols on product labels

Continued

Symbol	Description
 xx0900000825	**Stored energy** Warns that this part contains stored energy. Used in combination with *Do not disassemble* symbol.
 xx0900000826	**Pressure** Warns that this part is pressurized. Usually contains additional text with the pressure level.
 xx0900000827	**Shut off with handle** Use the power switch on the controller.
 xx1400002648	**Do not step** Warns that stepping on these parts can cause damage to the parts.

1.3 Stopping functions

Protective stop and emergency stop

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

For more information see:

- *Product manual - OmniCore V250XT Type B*
- *Product manual - OmniCore V400XT*

1.4 Installation and commissioning

National or regional regulations

The integrator of the robot system is responsible for the safety of the robot system. See ISO 10218-2.

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

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

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

Allergenic material

See *Environmental information on page 82* for specification of allergenic materials in the product, if any.

Using lifting accessories and other external equipment

Ensure that all equipment used during installation, service and all handling of the robot are in correct condition for the intended use.

Electrical safety

The installation must be done by authorized personnel and fulfill applicable national regulations and/or IEC 60204.

Note

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

Other hazards

Harnesses shall be fixed and protected to avoid tripping and wear.

Work shall be performed with all persons outside the safeguarded space.

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

- Water
- Compressed air
- Hydraulics
- Tripping
- Falling

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

Verify the safety functions

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

1.5 Safety during operation

Automatic operation

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

Unexpected movement

WARNING

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

A mechanical unit may perform unexpected limited movement.

WARNING

Movements by mechanical units can cause serious injuries on users and may damage equipment.

1.6 Safety during maintenance and repair

General

Corrective maintenance must only be carried out by trained personnel.

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

Make sure that there are no tools, loose screws, turnings, or other unexpected parts remaining after maintenance or repair work.

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

Hot surfaces

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

Gearbox lubricants (oil or grease)

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

Note

Take special care when handling hot lubricants.

Warning	Description	Elimination/Action
 **Hot oil or grease**	Changing and draining gearbox oil or grease may require handling hot lubricant heated up to 90 °C.	Make sure that protective gear like goggles and gloves are always worn during this activity.
 **Allergic reaction**	When working with lubricants there is a risk of an allergic reaction.	Make sure that protective gear like goggles and gloves are always worn.
 **Possible pressure build-up in gearbox**	When opening the oil or grease plug, there may be pressure present in the gearbox, causing hot lubricant to spray from the opening.	Open the plug carefully and keep away from the opening. Do not overfill the gearbox when filling. Put oil absorbent cloth, bags or paper at appropriate locations to catch any oil residues. Use appropriate protective gear such as heat-resistant gloves, goggles/protective visor, or a body suit if necessary.

Continues on next page

Warning	Description	Elimination/Action
 **Do not overfill**	Overfilling of gearbox lubricant can lead to internal over-pressure inside the gearbox which in turn may: • damage seals and gaskets • completely press out seals and gaskets • prevent the robot from moving freely.	Make sure not to overfill the gearbox when filling it with oil or grease. After filling, verify that the level is correct.
 **Specified amount depends on drained volume**	The specified amount of oil or grease is based on the total volume of the gearbox. When changing the lubricant, the amount refilled may differ from the specified amount, depending on how much has previously been drained from the gearbox.	After filling, verify that the level is correct.

Hazards related to batteries

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

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

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

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

Unexpected movement

WARNING

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

A mechanical unit may perform unexpected limited movement.

WARNING

Movements by mechanical units can cause serious injuries on users and may damage equipment.

When to test the brakes

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

Continues on next page

How to test the brakes

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

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

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

Note

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

For products with the option SafeMove, the *Cyclic Brake Check* routine is recommended. See the manual for SafeMove in *References on page 7*.

Related information

See also the safety information related to installation and operation.

1.7 Safety during troubleshooting

General

DANGER

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

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

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

CAUTION

Risk of hot surfaces that can cause burns.

A risk assessment must be done to identify and reduce hazards.

WARNING

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

A mechanical unit may perform unexpected limited movement.

WARNING

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

Related information

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

1.8 Safety during decommissioning

General

See section *Decommissioning on page 81*.

If the robot system is decommissioned, that is removing robot for example to be put in storage, ensure the safety devices are reset to delivery status.

Unexpected movement

WARNING

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

A mechanical unit may perform unexpected limited movement.

WARNING

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

2 Product overview

2.1 Introduction to motor units and gear units

Product overview

This manual provides the characteristics, installation, maintenance, and repair instructions for the Motor Units and Gear Units. The units are power-operated and function as external axes. They are powered from ABB drive units mounted in the robot controller. These drive units are controlled from robot control software.

These motor units and gear units are to be used as building blocks to realize customer specific solution / mechanism for rotation / translation of workpiece or manipulator (positioners, track motions, etc.).

Article number used on delivery documents

The products described in this document are delivered with an article number (3HAC090279-001) that is a collective number used on the delivery documents.

For traceability reason, each component has a label with an article number. For variants and options see the product specification.

Motor connection box (MCB)

The motor connection box can be ordered together with the industrial robot and allows connection of 1-6 Motor Units and/or Gear Units to the robot controller.

The motor connection box can be located 7, 15, or 22 meters from the cabinet.

The motor connection box can be equipped with brake release buttons (optional), one for each unit.

2.2 Motor units

Introduction

The motor units are specially designed for ABB's robots and can be used for peripherals requiring servo steered motors that are synchronized with the robot movements.

MU variants

The following motor unit variants are available:

- MU 80
- MU 100
- MU 200
- MU 250
- MU 300
- MU 400

MU stands for *motor unit*.

Product overview

The motor units consist of:

- Motor

Prerequisites

OmniCore V250XT with up to 3 additional drive units (ADUs) and 3axis Motor Connection Kit

or

OmniCore V400XT with up to 6 additional drive units (ADUs) and 6axis Motor Connection Kit

Mass

Motor unit	Weight [kg]
MU 80	1.37
MU 100	4.4
MU 200	9.3
MU 250	13.2
MU 300	15
MU 400	27

2.3 Gear units

Introduction

The gear units are divided in two categories, MTD and MID.

The number in the variant name describes the handling capacity.

MTD variants

The rotary unit MTD is a modular unit, developed specifically for robot applications and is intended for positioning the workpiece.

- MTD 250
- MTD 500
- MTD 750
- MTD 2000
- MTD 5000

MTD stands for *mechanical turning* unit (D is a generation label).

MID variants

The station interchange unit MID is a modular unit specifically developed for robot applications and is intended for indexed movement.

- MID 500
- MID 1000

MID stands for *mechanical interchange* unit (D is a generation label).

Product overview

The gear unit consists of:

- Gearbox
- Motor

Prerequisites

OmniCore V250XT with up to 3 additional drive units (ADUs) and 3axis Motor Connection Kit

or

OmniCore V400XT with up to 6 additional drive units (ADUs) and 6axis Motor Connection Kit

Mass

Gear unit	Weight [kg]
MTD 250	70
MTD 500	180
MTD 750	180
MTD 2000	340
MTD 5000	770

Continues on next page

2.3 Gear units
Continued

Gear unit	Weight [kg]
MID 500	170
MID 1000	395

2.4 Cables

Introduction

Options	Cable	Name	Note
Part of *Motor connection kit* 3069-x	Motor cable	OmniCore - MCB Cable harness power	From robot controller to MCB.
4114-1, 4114-2, 4114-3	Motor cable	OmniCore - MU Cable harness power	Flex cable from robot controller to motor or gear unit.
Part of *Motor connection kit* 3069-x	SMB cable	OmniCore - MCB Cable harness resolver, bus	From robot controller to MCB.
4118-1, 4119-1, 4120-1	Resolver cable	MCB - MU/GU Signal	Flex cable from MCB to motor unit/gear unit or from IRB to motor unit.
4115-1, 4116-1, 4117-1	Motor cable	MCB - MU/GU Cable harness power	Flex cable from MCB to motor or gear unit.

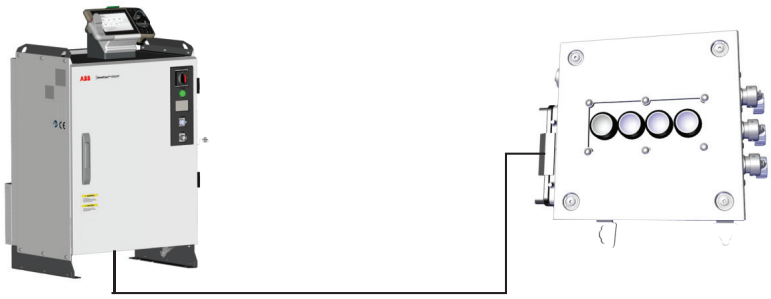
Illustrations below shows the routing of the cables.

For more details, see the circuit diagram.

OmniCore - MCB cable harness power

Part of *Motor connection kit* 3069-x.

Non-flexible cable.



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OmniCore - MU Cable harness power

Option 4114-1, 4114-2, 4114-3. (Flexible cable).

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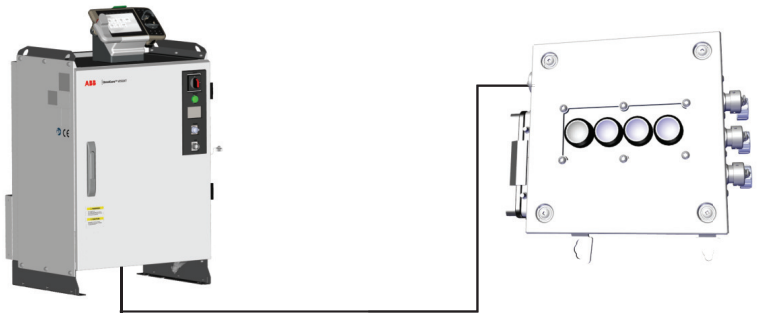
2.4 Cables
Continued

OmniCore - MCB Cable harness resolver, bus

Part of *Motor connection kit* 3069-x.

Non-flexible cable.



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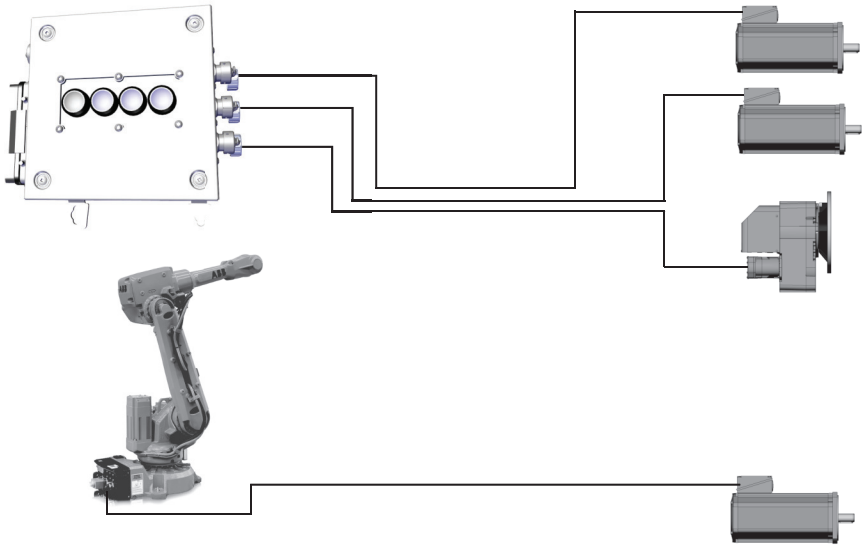
MCB - MU/GU Signal

Option 4118-1, 4119-1, 4120-1. (Flexible cable).



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MCB - MU/GU Cable harness power

Option 4115-1, 4116-1, 4117-1. (Flexible cable).

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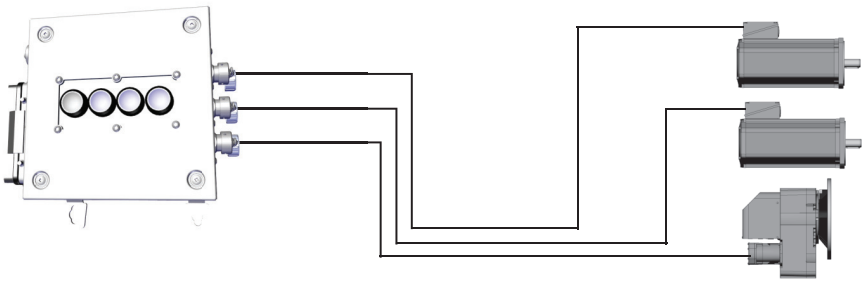

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2.5 Commissioning

Introduction to commissioning

Depending on the application, the setting up procedure for the motor unit or gear unit differs. This manual describes the commissioning and refers to other manuals for more information.

Setting up motor units and gear units

Use this procedure to set up motor units or gear units.

1. Mount the motor unit or gear unit. Connect cables according to selected scenarios. See *Scenarios on page 33*.

   For motor units, see *Installing motor units on page 37*.

   For gear units, see *Installing gear units on page 40*.
2. Load the configuration files, see *Loading configuration files on page 57*.
3. Calibrate, see *Calibration on page 65*.
4. Testrun with loads. If needed, tune the configuration data, see *Tuning on page 62*.
5. Tune the thermal supervision, see *Tuning the thermal supervision on page 67*.

Related information

Application manual - Additional axes.

Operating manual - OmniCore.

Operating manual - RobotStudio.

2.6 Scenarios

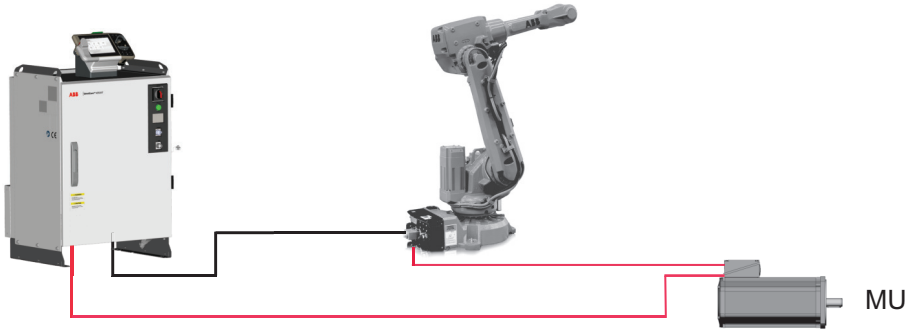
Introduction

Below are different scenarios described for installation of the units.

Concepts

Scenario A, Lean concept:

- One motor unit
- No motor connection box (MCB)
- Motor power connected to the robot controller and resolver connected to FB7 at manipulator.



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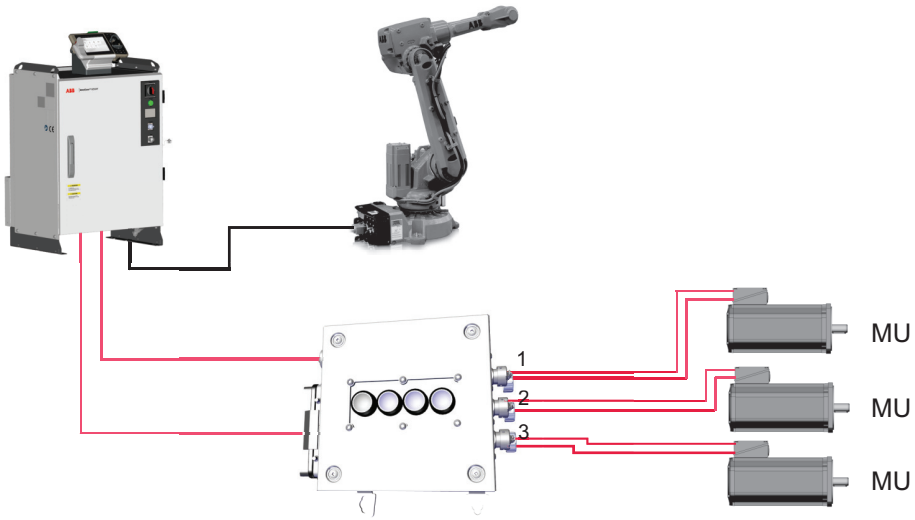
Scenario B:

- 3-axis motor connection box (MCB) connected to the robot controller
- Up to three motor units or gear units motor units connected to one motor connection box (MCB)



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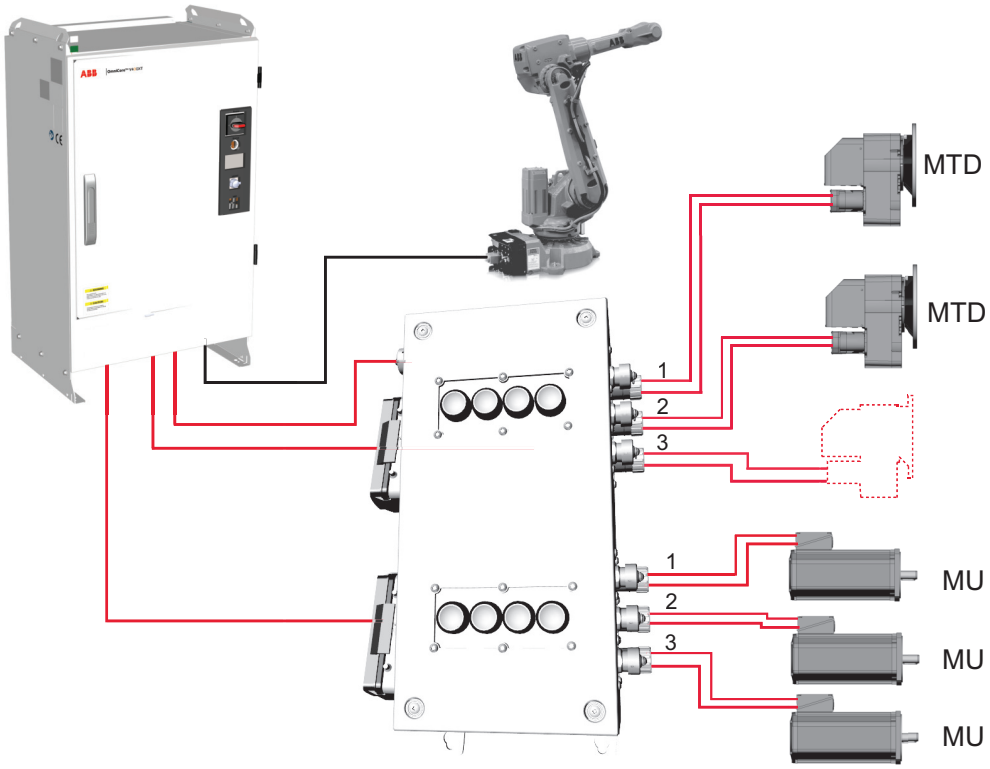
Scenario C:

- 6-axis Motor connection box (MCB) connected to the robot controller
- Up to six motor units or gear units connected to the robot controller, through the motor connection box (MCB)



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2.7 The unit is sensitive to ESD

Description

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

Safe handling

Use one of the following alternatives:

- Use a wrist strap.

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

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

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

3 Installation

3.1 Installing motor units

Attachment screws

The table shows tightening torques for the attachment screws of the motor units. The values are valid for non-lubricated screws. All screws should be of quality 8.8.

Motor unit	Screw	Tightening torque [Nm] ±10%
MU 80	M4	4
MU 100	M6	10
MU 200	M8	24
MU 250	M8	24
MU 300	M8	24
MU 400	M10	47

Use washers with minimum hardness 200HV (190HB).

Prerequisites

CAUTION

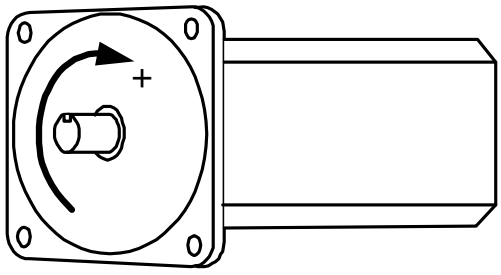
Never overheat the motor. The winding temperature must not exceed 140° C. Check that the temperature on the motor frame is lower than 100°C.

WARNING

If the motor unit is used in an arc welding station, the motor connection box (MCB) must always be insulated from the weld circuit. See *Insulation in arc welding stations on page 53*.

Motor connection

Positive electric rotation R ->S ->T -> (U, V, W) results in positive mechanical rotation defined as clockwise direction, seen from the drive shaft side. See illustration below.



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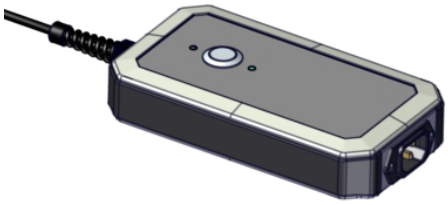
Releasing the brakes during installation

To release the motor brake during installation, use the brake release tool.

	Action	Note
1	**DANGER** Make sure that all supplies for electrical power, hydraulic pressure, and air pressure are turned off.	
2	Release the brakes of the motor with the brake release tool. 1 Turn off the brake release tool. 2 Connect the brake release tool connector to the motor. 3 Release the brakes by turning on the brake release tool and pressing the brake release button on the tool. **DANGER** Handling the tool incorrectly will cause serious injury. Read and follow enclosed user instructions for the tool. **WARNING** Electrical damage to the motor may occur if 24V is supplied to the motor connector for more than 30 seconds. Use the specified brake release tool to eliminate the risk.	Brake release tool: 3HAC081310-001 User instructions are enclosed with the tool.  xx2100000666

Installing motor units

Use this procedure to install motor units. For cable connections, see *Fastening cables on page 42*.

	Action	Information
1	Fit the motor in position and secure it with its attachments screws. **CAUTION** When fitting the motor pinion, make sure not to use high force or other methods that can damage the pinion, shaft, or resolver. See *Assembling motor axis and transmission element on page 46*.	**CAUTION** If using the motor unit in direct contact with oil or grease, make sure that the running conditions are suitable for the motor sealing.
2	If using an MCB box, fit and secure the box.	If there is a risk of return currents, then the box must be isolated, see *Insulation in arc welding stations on page 53*.

Continues on next page

	Action	Information
3	Connect the power cable from the controller or MCB box to the motor. **Note** Fasten the M23 connector fully. See *Fastening cables on page 42*. **Note** Turn the connectors to avoid breaking the cables. See *Fastening cables on page 42*.	
4	Connect the resolver cable from the robot or MCB box to the motor.	
5	If using an motor connection box (MCB), connect the MCB cable from the controller to the MCB box.	Part of Motor connection kit.
6	Mark the cables.	
7	Test the brake release buttons.	See *Testing the brake release buttons on page 51*.

CAUTION

Make sure that the thermal supervision is properly tuned, see *Tuning the thermal supervision on page 67*.

3.2 Installing gear units

Attachment screws

The tables show the attachment screws and tightening torques for the gear units. All screws should be of quality 12.9.

MTD

Gear unit	Screw	Tightening torque [Nm] ±10%	Minimum thread length in gearbox [mm]
MTD 250	M12	120	29
MTD 500	M20	550	47
MTD 750	M20	550	47
MTD 2000	M20	550	50
MTD 5000	M24	950	37

MID

The maximum floor loads in relation to the base coordination system for the MID units are described in *Product specification - Motor Units and Gear Units*.

Gear unit	Screw
MID 500	M16
MID 1000	M20

Prerequisites

CAUTION

Never overheat the motor. The winding temperature must not exceed 140°C. Check that the temperature on the motor frame is lower than 100°C.

WARNING

If the gear unit is used in an arc welding station, the motor connection box (MCB) must always be insulated from the weld circuit. The gearbox is isolated from the motor. See *Insulation in arc welding stations on page 53*.

Installing gear units

Use this procedure to install gear units. For cable connections, see *Fastening cables on page 42*.

	Action	Information
1	Fit the gear unit in position and secure it with its attachments screws.	**WARNING** The gear unit is heavy. Always use properly sized lifting accessories.

Continues on next page

	Action	Information
2	If using an MCB box, fit and secure the box.	If there is a risk of return currents, then the box must be isolated, see *Insulation in arc welding stations on page 53*.
3	Connect the power cable from the controller or MCB box to the gear unit.	**Note** Fasten the M23 connectors fully. See *Fastening cables on page 42*.
4	Connect the resolver cable from the robot or MCB box to the gear unit.	
5	If using an MCB box, connect the MCB cable from the controller to the MCB box.	**Note** Part of Motor connection kit.
6	Mark the cables.	
7	If needed, install a current collector.	
8	Test the brake release buttons.	See *Testing the brake release buttons on page 51*.
9	Fit and secure the flange to the equipment to be controlled by the gear unit.	

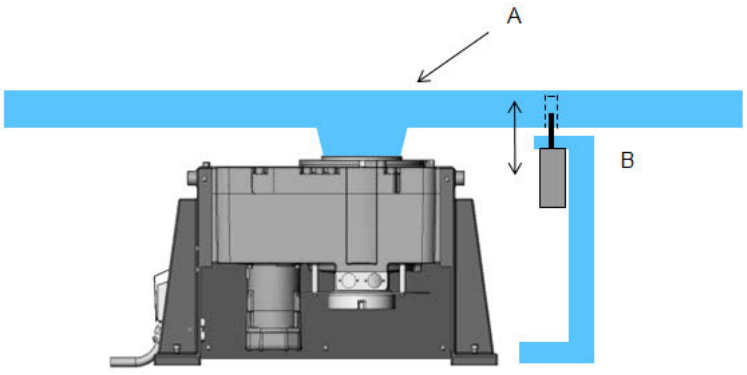
CAUTION

Make sure that the thermal supervision is properly tuned, see *Tuning the thermal supervision on page 67*.

Recommendations for MID units

The station interchange units have endless rotation and are delivered without a locking mechanism. ABB recommends using a pneumatic, externally operated locking pin for locking, to reduce the risk of collision with the end stop. This also relieves the pressure on the station interchange unit.

Example



xx1100000478

A	Swing frame (not provided by ABB)
B	Pneumatic locking pin (not provided by ABB)

3.3 Fastening cables

Protecting cables

Protect all flexible cables from weld spatter.

Place the cables so the risk of mechanical wear is minimized.

M23 connectors

Wobble the M23 connector body while tightening the connectors to make sure that they are fully fastened.

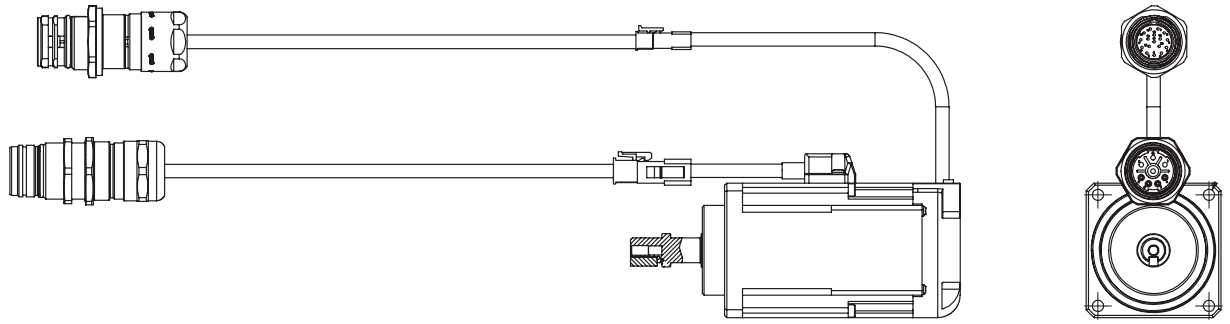
Cable markings

Cable connections are marked with default names on delivery. Add suitable labels or other markings during installation to simplify maintenance.

Cable connection	Marking
Motor power cables	MP
Resolver feedback cables	FB

Extended cables for MU 80

MU 80 provides extended power and resolver feedback cables.



xx1700001371

Cable lengths are allowed to be shorted by cutting off the connector MP/FB by customers. Always refer to the tables below to prepare new connectors.

Continues on next page

Extended power cable

xx1700001372

A	MP
B	MP (M23)

The following table lists the materials used for making new connector MP. The materials are delivered with the MU 80.

Item	Component article number	Qty.
1	3HAC026336-004	1
2	3HAC026345-002	2
3	3HAC026345-001	4

The following table shows the connection between connector MP and connector MP(M23).

Wire type	Description	Pin on Connect-or MP	Pin on Connect-or MP(M23)
1.5 mm^2 wire	U	1	3
1.5 mm^2 wire	V	3	1
1.5 mm^2 wire	W	5	4
1.5 mm^2 wire, GNYE	PE	2	PE
0.5 mm^2 wire	Brake +	4	A
0.5 mm^2 wire	Brake 0V	6	B

Continues on next page

3.3 Fastening cables
Continued

Extended resolver feedback cable

xx1700001373

A	FB
B	FB(M23)

The following table lists the materials used for making new connector FB. The materials are delivered with the MU 80.

Item	Component article number	Qty.
1	3HAC6996-8	1
2	3HAC6962-3	6

The following table shows the connection between connector FB and connector FB(M23).

Wire type	Description	Pin on Connector FB	Pin on Connector FB(M23)
Pair 1 BK, AWG24	X	5	1
Pair 1 WHBK, AWG24	X 0V	1	3
Pair 1 BN, AWG24	Y	6	4
Pair 1 WHBN, AWG24	Y 0V	2	2
Pair 1 RD, AWG24	EXC 0V	7	8
Pair 1 WHRD, AWG24	EXC	3	7

Cable routing for motor power cable GU MTD750

The motor cables for GU MTD750 are possible to turn approximately 45 degrees outwards, to avoid breaking the cables.

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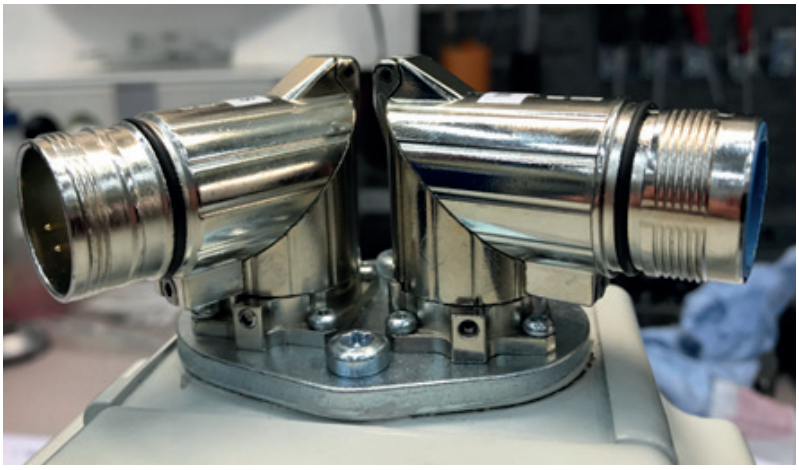


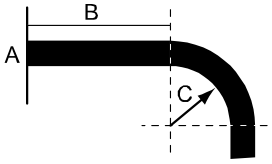
xx1800000601

Limitations

The following limitations apply when installing and fastening cables for the motor units or gear units to get best performance and durability.

Bending

Make sure that cables are not bent too close to the fastening points or too sharply.

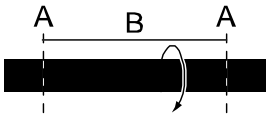


xx1000001397

A	Fastening point or connector
B	Minimum distance from fastening point to bend is 100mm
C	Minimum bending radius is 100mm

Twisting

The minimum length between the fastening points is 900mm if the cable will be twisted ±180°.



xx1000001398

A	Fastening points or connectors
B	Minimum length is 900mm

Fastening straps

Do not over-tighten cables when fastening them with straps.

3.4 Handling of motors

Assembling motor axis and transmission element

Couplings, pulley, and motor pinion (transmission elements) must be assembled using adequate tools. Otherwise the motor shaft can be distorted which damage the resolver. Never use a hammer, as this will damage the equipment.

CAUTION

When fitting the transmission element, make sure not to use high force or other methods that can damage the transmission element, shaft, resolver, or connection box.

The motor axis should be fitted using a press tool or a method with a dolly. Use heating if required.

The maximum allowed press force depends on the assembly method. See the following figures and tables.

Note

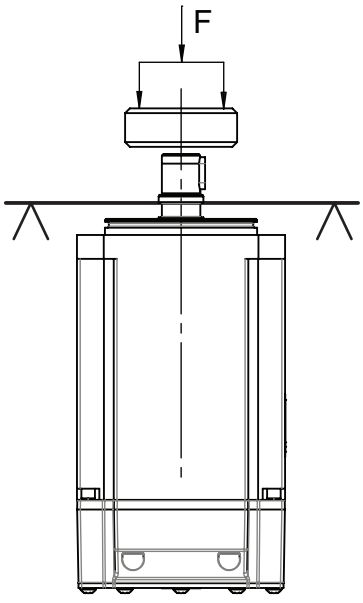
Grease the shaft after assembly to avoid oxidation.

Assembly with press tool

Assembly using a press tool with dolly is the best method. The tool can be fitted on the motor shaft as shown in the following figure.

Note

This method is not applicable for MU 100 since it does not have a flange on the motor shaft.



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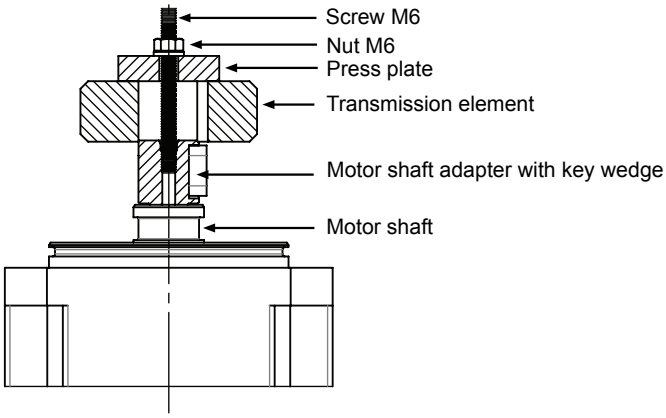
	Maximum allowed axial force (F)
MU 80	15 kN
MU 100	-
MU 200	40 kN
MU 250	40 kN
MU 300	40 kN
MU 400	60 kN

Assembly with nut and bolt

The motor and the transmission element can be assembled with a nut and bolt as shown in the following figure. The transmission element is driven onto the motor shaft by turning the nut. If needed, the transmission element can also be heated.



xx1300000314

Assembly by pressing on the pinion

The motor and the transmission element can be assembled by pressing, with or without heat.

Use the motor flange as a dolly, as shown in the following figure.

CAUTION

Make sure that the contact surfaces between the motor and the dolly distribute the press force evenly.

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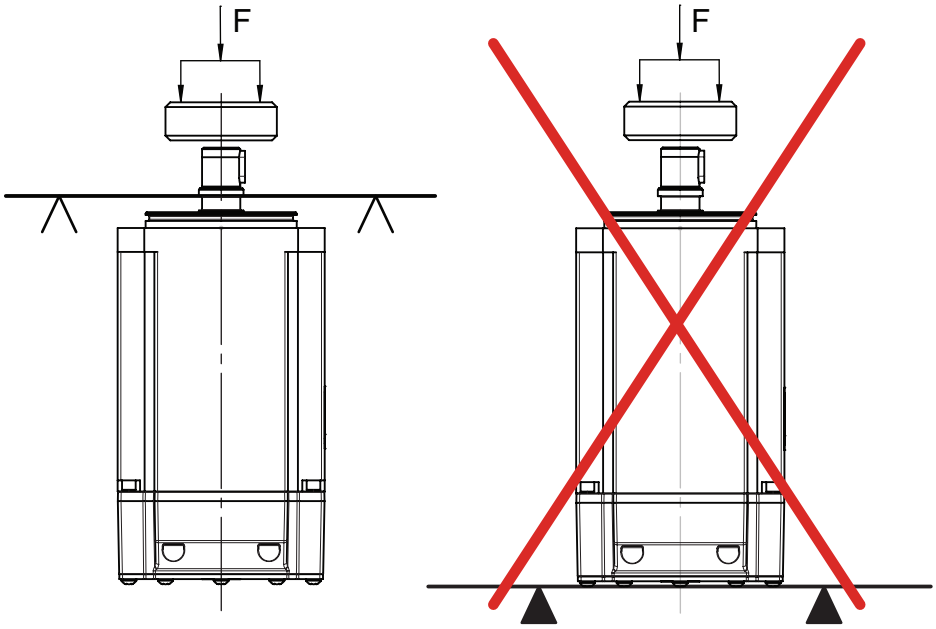
3.4 Handling of motors
Continued



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	Maximum allowed axial force (F)
MU 80	650 N
MU 100	125 N
MU 200	1,963 N
MU 250	1,963 N
MU 300	1,963 N
MU 400	2,825 N

Assembly with open back cover

If no press tool with dolly is available, the back cover of the motor can be opened so that some other flat and stable object can be used as dolly directly on the motor shaft. Make sure not to press on the resolver.

Note

This method is not applicable for MU 80 since it does not have a connection box and the back cover of the motor is not allowed to be opened.

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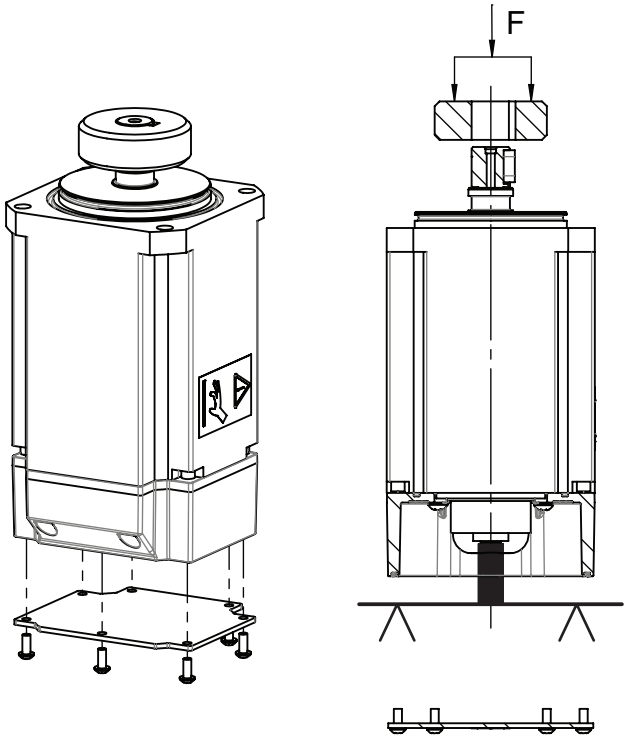

xx1300000316

	Maximum allowed axial force (F)
MU 100	10 kN
MU 200	20 kN
MU 250	20 kN
MU 300	20 kN
MU 400	30 kN

Disassembling the transmission element from the motor

Use a puller tool to disassemble the the transmission element from the motor axis.

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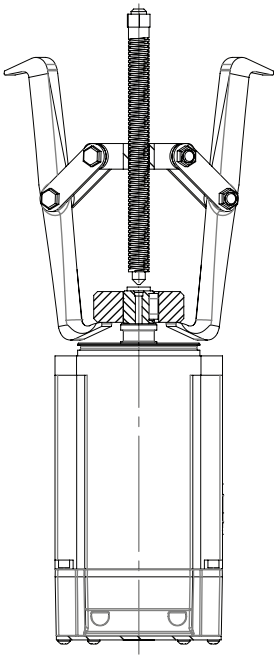
3.4 Handling of motors
Continued



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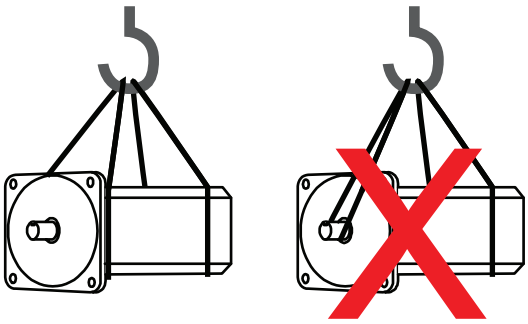
Note

Place a shim or washer on the shaft end for protection, so that the puller tool does not press directly on the shaft.

Lifting motors

Use lifting accessories that are accordingly sized for the motor.

When lifting the motor with roundslings, never place the sling around the motor shaft.



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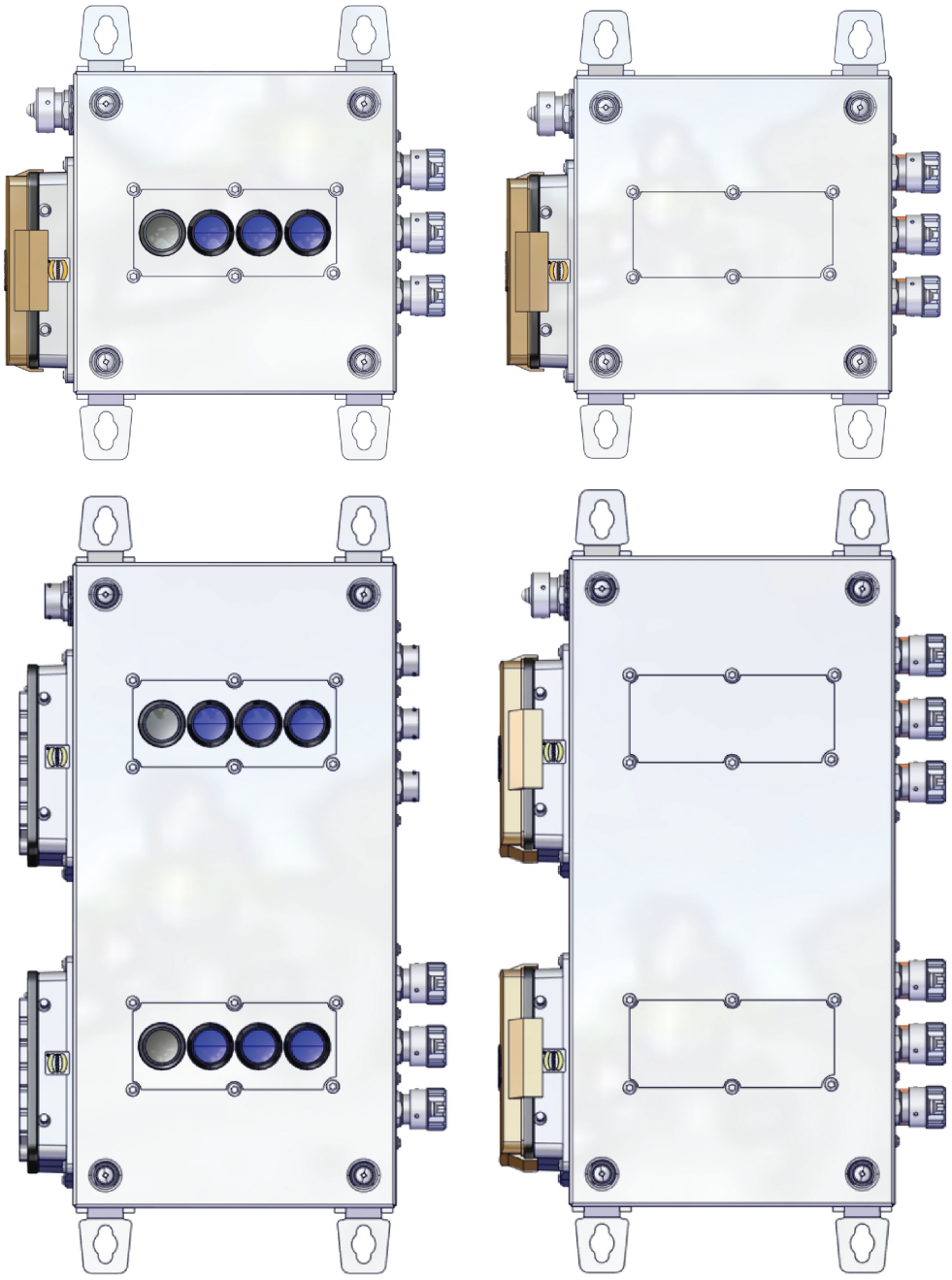
3.5 Testing the brake release buttons

Introduction to testing brake release buttons

The brake release buttons shall be tested before mounting loads or external equipment.

Note

The brake release buttons are part of MCB (optional).



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3.5 Testing the brake release buttons
Continued

Prerequisites

The brake release button must be installed as shown in the circuit diagram.

There must be power available to the controller.

Testing the brake release buttons

Use this procedure to test the brake release buttons.

	Action	Information
1	Turn on the power to the controller.	
2	**WARNING** When releasing the holding brakes, the axes can move very quickly and sometimes in unexpected ways! Make sure no personnel is near or beneath an axis!	
3	Press the brake release button.	When the brake is released, the axis should be possible to move.
4	Verify that the correct motor brake was released.	

3.6 Insulation in arc welding stations

The weld circuit

If using the motor unit or gear unit in an arc welding cell, the return current must be taken care of.

Gear units

The rotary units (MTD) and the station interchange units (MID) have the motor galvanically insulated from the weld circuit, that is, there is no connection between the weld circuit and protective earth.

MCB box

The MCB box is connected to protective earth and must always be mounted galvanically insulated from the weld circuit.

Motor units

The motor units are connected to protective earth when using cables supplied by ABB. When using the motor units in work piece positioners or other equipment connected to the weld circuit there will be a connection between the weld circuit and protective earth.

To avoid malfunction:

- Verify that good contact is established between the welding power source and work piece positioner.
- Verify that the current collector, if used, is working properly and has a low voltage drop.

Hazardous scenario

The following graphic shows a hazardous scenario with two faults causing the weld current to flow in protective earth.

- The weld return cable is disconnected from the work piece positioner.
- The weld return cable has contact with protective earth, in this case a cable channel made of metal.

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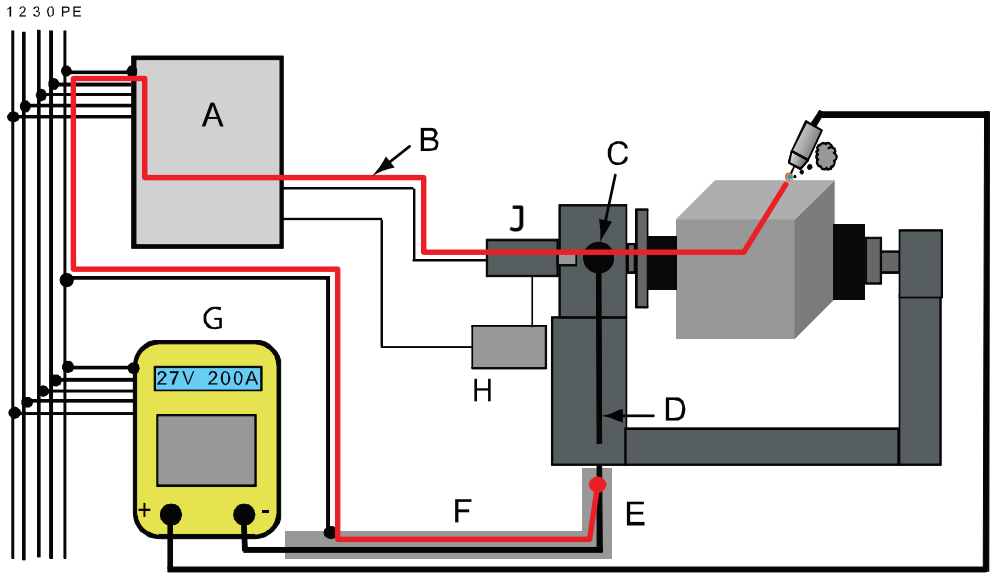
3.6 Insulation in arc welding stations

Continued



xx1100000103

A	Robot controller
B	Weld return current in protective earth
C	Current collector
D	The weld return cable is disconnected from the work piece positioner
E	The weld return cable has contact with protective earth
F	Cable channel made of metal
G	Power source
H	MCB box galvanically insulated from the weld circuit
J	Motor unit's protective earth connected to the weld circuit

3.7 Installing non ABB brake release buttons

Brake release buttons

The motor units are prepared for installing other brake release buttons than those supplied in the MCB box.

Installing non ABB brake release buttons

Use connection BRAKE PB. See the connections in the circuit diagram, *Circuit diagram - Motor Units and Gear Units*.

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4 Configuration

4.1 Loading configuration files

Introduction to configuration files

Template configuration files are available in the Add-In *Motor and Gear Units*, available in RobotStudio in the **Gallery** tab.

The configurations for motor units and gear units can be tuned before running in production to optimize performance.

Limitations

The values for acceleration and deceleration used in the template files might need to be verified. For gear units see *Dimensioning gear units on page 61*. For motor units, see *Application manual - Additional axes*.

For MID gear units, the working range must be carefully tested and if needed redefined. If the defined value is wrong, there is a risk that the MID crashes into the end stop.

Acceleration torque limit for motor units

The acceleration torque limit for the motor units is by default reduced to protect connected equipment. The acceleration torque limit can be increased, see the product specification (listed in *References on page 7*).

Redefine the system parameter *Torque Absolute Max* in the type *Stress Duty Cycle* (topic *Motion*) to increase the acceleration torque limit.

File name convention

The configuration files use a naming convention, based on the following data:

- Configuration topic
- Type of unit
- Drive unit and drive module (system parameters *Drive Unit* and *Drive Module*)
- Measurement link, board position, and measurement node (system parameters *Measurement Link*, *Board Position*, and *Measurement Node*)

For example, `MOC_MU100_M7DM1_L1B1N7.cfg`, defines:

- Topic *Motion*
- Motor unit MU 100
- Drive unit 7 and drive module 1
- Measurement link 1, board position 1, and measurement node 7

Loading configuration files

Use this procedure to load configuration files.

	Action	Information
1	In RobotStudio, load the configuration files for the motor units and the gear units. Open the file `readme.txt` to verify which files to use.	All files are included in the folder `...\utility\...` in the RobotWare installation.

Continues on next page

	Action	Information
2	Tune the motor.	See *Tuning on page 62*.

Configuration files and standard system parameters are described in *Technical reference manual - System parameters*.

4.2 Creating and downloading the RobotWare system

Introduction

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

For more information, see *Operating manual - Integrator's guide OmniCore*.

The robot is delivered with a RobotWare system installed and configured according to the order specification. The motor units and gear units must be added to the RobotWare system, as described in the following procedure.

Before modifying the system

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

Creating a system for RobotWare 7

In RobotWare 7, the motor units and gear units are loaded as an add-in. The add-in **Motor and Gear Units** is available in the RobotStudio **Gallery**.

Use this procedure to create the system in RobotStudio.

	Action
1	On the **Gallery** tab, install the add-in **Motor and Gear Units**.
2	On the **Home** tab, choose **Virtual Controller** > **New controller** to create a new virtual controller accordingly.
3	On the **Controller** tab, choose **Installation** > **Modify Installation** to modify the system.
4	In the **Software** tab, click **Available** and locate the add-in. Click **Include**. Add other software, if needed.
5	In the **Options** tab, scroll down to **Motor and Gear Units** and select **Unit**. Then select the unit per joint.
6	Select **Unit configuration** to modify measurement channel and drive unit for each joint.
7	If option 3068-4 *MU/GU* is selected, the unit connected to the first ADU should be configured as **Robot SMB node 7**.
8	Select other options, such as the ADU (in **Controller**).
9	Click **Apply** to accept the changes.  **Tip** If the PC is connected to the controller, then the system can be transferred using *Installation Utilities*, see *Operating manual - Integrator's guide OmniCore*, or create a package and transfer it with a USB memory.

For more detailed instructions on using the function Modify Installation, see *Operating manual - Integrator's guide OmniCore*.

Safety configuration

The required safety logic, for example, interchange positions, can be configured using an external safety PLC or using the safety logic in **Visual SafeMove**.

Continues on next page

Additional axes should be configured to use Safe Disable of Drive Unit in **Visual SafeMove**, see limitations for SafeMove in *Application manual - Functional safety and SafeMove*.

The interchange positions can be configured using Axis Position Supervision in **Visual SafeMove**.

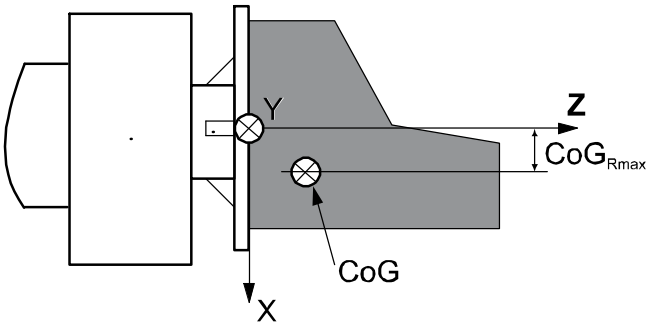
4.3 Dimensioning gear units

Acceleration and deceleration values

To secure that gear units will not run too hard and damage the gear box, the acceleration and deceleration of the axis on the arm side must be calculated.

This calculation will give a maximum value for the system parameters *Nominal Acceleration* and *Nominal Deceleration*. The value can be lowered if the acceleration is too fast, see *Application manual - Additional axes*. Do not use values higher than the recommended maximum acceleration, see *Maximum gearbox torques on page 61*.

$$(T_{maxgear} - m * g * CoG_{Rmax}) / (m * CoG_{Rmax}^2 + J_{0z})$$



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J_{0z} is the moment of inertia around the Z axis at the center of gravity (CoG).

CoG_{Rmax} is the radial distance in X and Y directions between the Z axis and the center of gravity (CoG).

Define the system parameters *Nominal Acceleration* and *Nominal Deceleration* in the type *Acceleration Data* in the topic *Motion*, based on the calculations.

Maximum gearbox torques

Use the $T_{maxgear}$ values from the table for the calculation.

Gear unit	$T_{maxgear}$ (max torque on arm side) (Nm)	Recommended maximum acceleration and deceleration (rad/s^2)
MTD 250	480	4
MTD 500	1100	3
MTD 750	1950	3
MTD 2000	5000	0.8
MTD 5000	11400	0.5
MID 500	1950	2.4
MID 1000	5000	1.1

Related information

Dimensioning of motors is described in *Application manual - Additional axes*.

4.4 Tuning

Introduction to tuning

The template configuration files can be tuned to optimize the performance under optimal reliability. The configuration data is preferably tuned using *TuneMaster*, or as described for additional axes, see *Application manual - Additional axes*.

TuneMaster

TuneMaster is an easy to use PC tool to optimize the motion performance. TuneMaster is included in the RobotWare distribution, in the folder *Tools*. How to use TuneMaster is described in the help file included in the installation.

Approach for tuning

Use the following procedure:

1 Testrun without loads to verify if tuning is needed.
2 Testrun with loads.
3 If needed, tune the configuration data and repeat steps 1-2.

4.5 Safe Disable of Drive Unit

Overview

Safe Disable of Drive Unit is a function to safely set the drive unit in a state with brake applied and servo control switched off.

Functionality

While the function is activated by safe input signal, the drive unit controlling the additional axis is set in a state with brake applied and servo control switched off. If the function is activated for an axis that is moving, a protective stop is triggered, which depending on configuration can be either stop category 0 or stop category 1.

Related information

More information about the safety function *Safe Disable of Drive Unit* is available in *Application manual - Functional safety and SafeMove*.

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5 Calibration

When to calibrate

Mechanical units must be calibrated after installation, if parts of the transmission are replaced, or if the resolver memory is lost.

Fine calibration defines the calibration zero position and updates the revolution counters.

Calibration position

Any position can be defined as the calibration zero position but it must be possible to move the axis to this position with good precision repeatedly. For example, this can be a mechanical stop or another indicator that clearly shows the position.

Related information

More information about how to calibrate mechanical units and update revolution counters is described in *Operating manual - OmniCore*.

The calibration procedure is described in *Operating manual - OmniCore*.

Commutation of motors is described in *Application manual - Additional axes*.

Coordinated positioners and user frames are described in *Application manual - Additional axes*.

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6 Tuning the thermal supervision

Thermal supervision

For protection against overheating of motor units (except MU 100 and MU 80) and gear units, there is a thermal supervision model that shall be configured and tuned. The supervision is a software configuration, that is, there is no physical PTC in motor units or gear units.

When properly tuned, there will be a warning close to maximum temperature and complete stop when maximum temperature is exceeded.

System parameters

The maximum ambient temperature and the thermal supervision sensitivity ratio are defined by the system parameters. The values can be changed using the *Control Panel* on the FlexPendant.

System parameter	Allowed values	Default value	Note
Maximum ambient temperature (*Max Temperature Robot*)	+5°C to +52°C	+45°C	The value should be set to the maximum expected ambient temperature for the MU, MTD, MID, and manipulator. Topic *Motion*, type *Motion System*.
Thermal supervision (*Thermal Supervision Sensitivity Ratio*)	0.5 to 2	1.0	Topic *Motion*, type *Supervision*.

Note

The system must be restarted after modifying the system parameters for the changes to take effect.

CAUTION

Validate in manual mode before running in automatic mode.

CAUTION

Never let the motor body temperature exceed 105°C. It may cause motor damages.

Tuning the thermal supervision

Use this procedure to tune the thermal supervision.

	Action	Information
1	Start the motor and run the toughest expected cycle.	

Continues on next page

Continued

	Action	Information
2	Monitor the motor body temperature and the thermal model temperature rise (test signal number 190), in TuneMaster.	T_{stator_rise}= Measured motor body temperature + 35 – actual ambient temperature 35 is the approximate difference between the motor body temperature and the stator temperature.
3	If T_{stator_rise} is larger than the thermal model temperature rise, then increase the thermal supervision sensitivity ratio. If T_{stator_rise} is smaller than the thermal model temperature rise, then decrease the thermal supervision sensitivity ratio.	 **Tip** You can use the ratio between T_{stator_rise} and the thermal model temperature rise, when estimating how much the Thermal supervision sensitivity ratio should be changed.
4	If T_{stator_rise} + *Max temperature robot* > 130 °C (max allowed is 140 °C, hot motor warnings will appear at 130 °C) consider actions to reduce the temperature, for example improving the cooling, reducing the average torque, or choosing a larger motor unit or gear unit.	

Related information

Technical reference manual - System parameters

Application manual - TuneMaster

7 Maintenance

7.1 Introduction

Structure of this chapter

This chapter describes all the maintenance activities recommended for the motor units and gear units.

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

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

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

Safety information

Observe all safety information before conducting any maintenance work.

There are general safety aspects that must be read through, as well as more specific safety information that describes the danger and safety risks when performing the procedures. Read the chapter *Safety on page 9* before performing any maintenance work.

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

Note

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

For more information see:

- *Product manual - OmniCore V250XT Type B*
- *Product manual - OmniCore V400XT*
- *Fastening cables on page 42*.

7.2 Maintenance schedule

Introduction

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

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

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

Activities and intervals

The table below specifies the required maintenance activities and intervals:

Maintenance activity	Equipment	Interval	Detailed in section
Cleaning	Motor units and gear units	Regularly	*Cleaning the motor units and gear units on page 74*
Inspection	Cables	Regularly	*Inspecting cables on page 71*
Inspection	MU250 drain holes **Note** Only MU250 has drain holes.	Regularly	*Inspecting MU250 drain holes on page 72*
Lubrication	Current collector	400 hours	*Lubricating the current collector on page 75*
Replacement	Battery pack, measurement system of type RMU101 or RMU102 (3-pole battery contact)	36 months or battery low alert [i]	*Replacing the motor connection box battery on page 73*
Replacement	Battery pack, measurement system with 2-pole battery contact, e.g. DSQC633A	Battery low alert [ii]	*Replacing the motor connection box battery on page 73*

i The battery low alert (38213 **Battery charge low**) is displayed when the battery needs to be replaced. The recommendation to avoid an unsynchronized robot is to keep the power to the controller turned on until the battery is to be replaced.

See the replacement instruction for more details.

ii The battery low alert (38213 **Battery charge low**) is displayed when remaining backup capacity (robot powered off) is less than 2 months. The 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 with a battery shutdown service routine. See *Operating manual - OmniCore* for instructions.

7.3 Inspecting cables

Inspecting cables

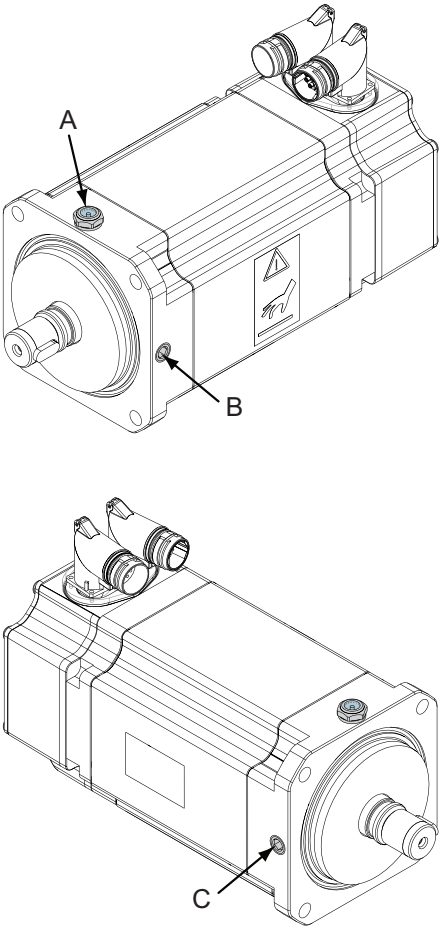
Use this procedure to inspect cables.

	Action	Information
1	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the robot, before entering the robot working area.	
2	Make an overall visual inspection of the cables to detect wear or damage.	
3	Check the connectors.	
4	Check that all brackets and straps are properly attached.	
5	Replace the cables if wear, cracks, or damage is detected.	

7.4 Inspecting MU250 drain holes

Inspecting MU250 drain holes

Use this procedure to inspect MU250 drain holes.

	Action	Information
1	**DANGER** Turn off all: • electric power supply • hydraulic pressure supply • air pressure supply to the robot, before entering the robot working area.	
2	Inspect the drain hole from the glass cover in the middle.	 xx1700000553 Parts: • A: Drain hole with glass cover • B: Drain hole with stop screw • C: Drain hole with stop screw
3	If any oil is visible on the sight glass or if any oil is spilled out from the drain hole, then replacement of the motor is recommended.	
4	Check that the stop screws for the other two drain holes are properly attached.	
5	Secure or reassemble the stop screws if any loose or missing.	

7.5 Replacing the motor connection box battery

Note

For replacement, see Product manual for V250XT or V400XT section *Replacing the motor connection box battery*.

WARNING

See *Hazards related to batteries on page 21*.

7.6 Cleaning the motor units and gear units

DANGER

Turn off all:

- electric power supply
- hydraulic pressure supply
- air pressure supply

before entering the safeguarded space.

General

To secure high uptime it is important that the motor units and gear units is cleaned regularly. The frequency of cleaning depends on the environment in which the product works.

Special cleaning considerations

This section specifies some special considerations when cleaning the equipment.

- Always use cleaning equipment as specified. Any other cleaning equipment may shorten the lifetime of the equipment.
- Always check that all protective covers are fitted before cleaning.
- Never point the water jet at connectors, joints, sealings, or gaskets.
- Do not use compressed air to clean the equipment.
- Never use solvents that are not approved by ABB to clean the equipment.
- Do not spray from a distance closer than 0.4 m.
- Do not remove any covers or other protective devices before cleaning the equipment.

Cleaning methods

The following table defines what cleaning methods are allowed.

Cleaning method	Note
Vacuum cleaner	Yes
Wipe with cloth	Yes. With mild cleaning detergent.
Rinse with water	Yes. It is highly recommended that water contains a rust prevention solution and that the equipment is dried afterwards.
High pressure water or steam	No

Cables

Movable cables need to be able to move freely:

- Remove waste material, such as sand, dust and chips, if it prevents cable movement.
- Clean the cables if they have a crusty surface, for example from dry release agents.

7.7 Lubricating the current collector

DANGER

Turn off all electrical power, hydraulic and pneumatic pressure supplies before entering the workspace of the manipulator.

See also the information in section *Safety on page 9*.

Current collector

The function of the current collector is to transfer the weld current through the rotary unit. This takes place through a spring-loaded contact bar against the shaft. The contact bar needs to be lubricated approximately after 400 hours of operation. This should be done using a special grease, P34 from Nies, article number: 0501869-001.

Required equipment

Equipment	Note
Grease	Grease type: P34 from Nies. Article number: 0501869-001.
Standard tools	
Grease gun	

Lubricating the current collector

	Action	Information
1	Lubricate the current collector using a grease gun.	**Note** Amount of grease: 12 ml.

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8 Repair

8.1 Cut the paint or surface before replacing parts

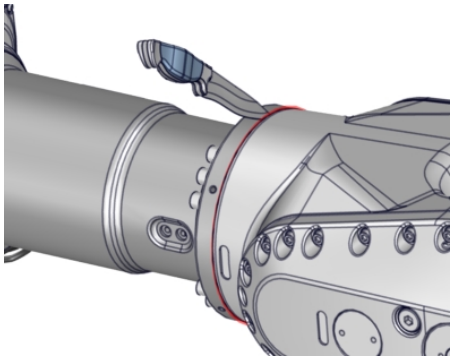
General

Follow the procedures in this section whenever breaking the paint during replacement of parts.

Required equipment

Equipment	Spare parts	Note
Cleaning agent		Ethanol
Knife		
Lint free cloth		
Touch up paint Standard/Foundry Plus	3HAC067974-001	Graphite White
Touch up paint Standard/Foundry Plus	3HAC037052-001	ABB Orange

Procedure

	Action	Description
1	Cut the paint with a knife in the joint between the part that will be removed and the structure, to avoid that the paint cracks.	 xx2300000950
2	Carefully grind the paint edge that is left on the structure to a smooth surface.	

8.2 Replacing the measurement unit

Note

For replacement, see Product manual for V250XT or V400XT section *Replacing the motor connection box battery*.

WARNING

See *Hazards related to batteries on page 21*.

8.3 Repair in the motor connection box

Motor connection box

The motor connection box can be opened to replace equipment.

Note

MU 80 does not have a connection box.

Note

When assembling the connection box to the motor or the top cover to the connection box, make sure that the o-ring is in the groove.

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9 Decommissioning

9.1 Introduction to decommissioning

Introduction

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

It deals with how to handle potentially dangerous components and potentially hazardous materials.

> **Note**
>
> The decommissioning process shall be preceded by a risk assessment.

Disposal of materials used in the product

All used materials **must** be disposed of in accordance with the current legislation of the country in which the equipment is installed.

If the material is partially or completely disposed of, the various parts **must** be grouped together according to their nature (which 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 equipment is installed.

See also *Environmental information on page 82*.

Transportation

Prepare the parts according to the risk assessment before transport, this to avoid hazards.

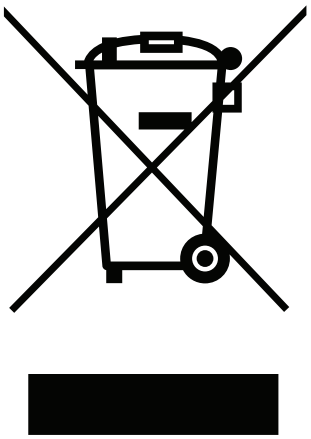
9.2 Environmental information

Introduction

ABB robots contain components in different materials. During decommissioning, all materials shall be dismantled, recycled, or reused responsibly, according to the relevant laws and industrial standards. Robots or parts that can be reused or upcycled helps to reduce the usage of natural resources.

Disposal symbol

The following symbol indicates that the product must not be disposed of as common garbage. Handle each product according to local regulations for the respective content (see table below).



xx1800000058

Materials used in the product

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

Dispose components properly according to local regulations to prevent health or environmental hazards.

Material	Example application
Aluminium	Motor housings
Batteries, Lithium	Serial measurement board
Cast iron/nodular iron	Gear housings
Copper	Cables, motors
Neodymium	Brakes, motors
Oil, grease	Gearboxes
Plastic/rubber	Cables, connectors, and so on.
Steel	Gears, screws, shafts, brackets, and so on.

Continues on next page

Oil and grease

Where possible, arrange for oil and grease to be recycled. Dispose of via an authorized person/contractor in accordance with local regulations. Do not dispose of oil and grease near lakes, ponds, ditches, down drains, or onto soil. Incineration must be carried out under controlled conditions in accordance with local regulations.

Also note that:

- Spills can form a film on water surfaces causing damage to organisms. Oxygen transfer could also be impaired.
- Spillage can penetrate the soil causing ground water contamination.

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10 Reference information

10.1 Applicable standards

General

Safety for mechanical parts based on motor units and gear units, designed by the integrator needs to address associated hazards. This needs to be done by the integrator through for example ISO 12100, ISO 10218-1, ISO 10218-2, ISO 13849, EN 60204, and other application specific standards.

Note

As this product is not delivered as a robot, it does not comply with ISO 10218-1.

Robot standards

Standard	Description
ISO 10218-1	Robots for industrial environments - Safety requirements - Part 1 Robots
ISO 10218-2	Robots and robotic devices - Safety requirements for industrial robots - Part 2: Robot systems and integration

Other standards to be considered

Standard	Description
ISO 12100	Safety of machinery – General principles for design - Risk assessment and risk reduction
IEC 60204-1	Safety of machinery – Electrical equipment of machines
ISO 13849	Safety of machinery - Safety related parts of control systems - Part 1: General principles for design
IEC 61000-6-2	Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity standard for industrial environments
IEC 61000-6-4	Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments

10.2 Unit conversion

Converter table

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

Quantity	Units		
Length	1 m	3.28 ft.	39.37 in
Weight	1 kg	2.21 lb.	
Weight	1 g	0.035 ounces	
Pressure	1 bar	100 kPa	14.5 psi
Force	1 N	0.225 lbf	
Moment	1 Nm	0.738 lbf-ft	
Volume	1 L	0.264 US gal	

10.3 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 instructions.

Contents, standard toolkit

Qty	Tool	Note
1	Ring-open-end spanner 8-19 mm	
1	Socket head cap 5-17 mm	
1	Torx socket no: 20-60	
1	Box spanner set	
1	Torque wrench 75-400 Nm	
1	Torque wrench 500-1500 Nm	
1	Ratchet head for torque wrench 1/2	
2	Hexagon-headed screw M10x100	
1	Socket head cap no: 14, socket 40 mm bit L 100 mm	
1	Socket head cap no: 14, socket 40 mm bit L 20 mm	To be shortened to 12 mm
1	Socket head cap no: 6, socket 40 mm bit L 145 mm	
1	Socket head cap no: 6, socket 40 mm bit L 220 mm	

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