

Robot Overhaul Maintenance Specification

The Robot Overhaul Maintenance Service is implemented later in the robot's operational life, after approximately 24,000 hours of the robot's operation. It is performed away from the operating location, in a workshop. Please refer to [Robot Overhaul Maintenance Actions Specific to Robot Type] table below for more information relating to robot types and associated actions.

The following evaluation and maintenance activities will be performed during the Robot Overhaul Maintenance Service.

These activities are in addition to the regular inspection actions / schedules which should be performed by the customer, and which are detailed in the [ROBOT ARM SETUP & MAINTENANCE] manual relating to each robot type.

Robot Operation Evaluation

Check Servo History, Error History¹ – RT Toolbox 3 / R56TB Teach Pendant

These checks can indicate possible problems with the operation of the robot, or the need for maintenance actions

Evaluation of Maintenance Forecast Data² – RT Toolbox 3 / R56TB Teach Pendant

This allows the user to reference consumable parts replacement timing (re-greasing, battery and belt replacement) from the operation data collected in the robot controller

Robot Mechanical Inspection & Maintenance³

Visually inspect all robot axis joints for grease leaks

As an example, some causes of grease leaks could be deterioration in the gear reducer oil seal, too much grease having been previously applied, grease that differs from the specification may have been used

Check lubrication status hours of all robot axis joints³

Depending on the robot type (see [Robot Overhaul Maintenance Service Actions Specific to Robot Type]):-

Lubricate robot axis joints (as required), or Re-lubricate robot axis joints

The requirement for lubrication of the gearing and spindle shafts (SCARA) reflects the usage of the robots. Generally grease is applied with a defined force using specific grease guns. Spindle shafts need to be cleaned and lubricated

Replace and tension robot timing belts

Regularly replacing belts ensures optimum robot performance. Belt tension will be adjusted to meet specified tension

Inspect each axis for backlash / free play / rough movement / noise

Manually move each axis to detect potential issues with the robot arm such as gearbox wear

Replace all robot arm and controller batteries (yearly)

An absolute encoder is used for the robot position detector, so whilst the power of the controller is turned off the position must be saved by the backup battery. The robot controller uses a backup battery to save the program, etc. These batteries are installed when the robot is shipped from the factory, but as these are consumable parts, they must be replaced periodically

*NOTE: Confirm prior to battery replacement that customer has completed robot backup⁴

- Programs, parameter files, system programs, origin parameters, event history, error record, error history – RT Toolbox 3 / Teach Pendant
- Backing up all settings allows quick resumption of operation in the event of battery failure or robot fault

Replace cooling fan filter on robot controller (yearly)

Replacing the robot controller air intake fan filter ensures optimum unit cooling.

Customer Responsibilities

Robot Overhaul Maintenance Service takes place either at the customer's workshop (if suitable) or at a Mitsubishi Electric workshop.

It is the customer's responsibility to remove the robot from its operating location and transport to the workshop location (either (1) customer site workshop or (2) nominated Mitsubishi Electric workshop) prior to Robot Overhaul Maintenance Service.

(1) Once the Robot Overhaul Maintenance Service has been performed at customer site workshop, it is the customer's responsibility to move the robot to its operating location, re-install and re-commission the robot

(2) Once the Robot Overhaul Maintenance Service has been performed at Mitsubishi Electric's workshop, the robot will be shipped back to the customer site. It is the customer's responsibility to move the robot to its operating location, re-install and re-commission

If the customer requires assistance in any of these actions, Mitsubishi Electric is able to provide costs for any additional work.

It is the customer's responsibility to complete a robot backup prior to the Robot Overhaul Maintenance Service.

[Programs, parameter files, system programs, origin parameters, event history, error record, error history] – using RT Toolbox 3 / Teach Pendant

Backing up all settings allows quick resumption of operation in the event of battery failure or robot fault.

Notes

The Robot Overhaul Maintenance Service is not a comprehensive robot check-up but limited to those tasks / actions listed in this specification.

Reactive / corrective maintenance services are not included in the Robot Overhaul Maintenance Service but can be offered separately.

Any other recommended corrective actions that our engineers observe whilst on site will be noted and a separate quotation will be provided.

Replacement robot arm and controller batteries are included in the Robot Overhaul Maintenance Service.

A replacement robot controller fan filter is included in the Robot Overhaul Maintenance service.

Any lubrication grease required is included in the Robot Overhaul Maintenance Service.

Replacement robot timing belts are included in the Robot Overhaul Maintenance Service.

Any other items are not included in the Robot Overhaul Maintenance Service.

1 Following procedures as specified in [Mitsubishi Electric RT ToolBox3 User's Manual Section 15.2] or [Mitsubishi Electric Teaching Pendant User's Manual Section 15.3]

2 Following procedures as specified in [Mitsubishi Electric RT ToolBox3 User's Manual Section 16.3] or [Mitsubishi Electric Teaching Pendant User's Manual Section 16.5]

3 Following procedures as specified in [Mitsubishi Electric Instruction Manual – Robot Arm Setup & Maintenance Section 5.3]

4 Following procedures as specified in [Mitsubishi Electric RT ToolBox3 User's Manual Section 18] or [Mitsubishi Electric Teaching Pendant User's Manual Section 14]

Robot Overhaul Maintenance Actions Specific to Robot Type

The Robot Overhaul Maintenance Service actions detailed in this specification will be carried out and the axis gearbox lubrication will be performed according to the robot types below.

Robot Type	Catalogue Number	Check Lubrication Status	Lubricate Axis Joints (If required)	Clean & Re-grease Axis Joints
RV-CRL Series	RV-8CRL	Y		Y
RV-F Series	RV-2F*	Y		Y
	RV-4F*	Y	Y	
	RV-7F*	Y	Y	
	RV-7FLL*	Y	Y	
	RV-13F*	Y	Y	
	RV-20F*	Y	Y	
RV-FR Series	RV-2FR*	Y		Y
	RV-4FR*	Y	Y	
	RV-7FR*	Y	Y	
	RV-7FRLL*	Y	Y (J4, J5, J6)	Y (J1, J2, J3)
	RV-13FR*	Y	Y (J4, J5, J6)	Y (J1, J2, J3)
	RV-20FR*	Y	Y (J4, J5, J6)	Y (J1, J2, J3)
Robot Type	Catalogue Number	Check Lubrication Status	Lubricate Axis Joints (If required)	Clean & Re-grease Axis Joints
RH-CH Series	RH-3CH*	Y		Y
	RH-6CH*	Y		Y
RH-CRH Series	RH-3CRH*	Y		Y
	RH-6CRH*	Y		Y
RH-F Series	RH-3FH*	Y	Y	
	RH-6FH*	Y	Y	
	RH-12FH*	Y	Y	
	RH-20FH*	Y	Y	
RH-FR Series	RH-3FRH*	Y	Y	
	RH-6FRH*	Y	Y	
	RH-12FRH*	Y	Y	
	RH-20FRH*	Y	Y	
RH-FHR series	RH-1FHR*	Y	Y	
	RH-3FHR*	Y		Y
RH-FRHR series	RH-1FRHR*	Y	Y	
	RH-3FRHR*	Y		Y

Note: For Horizontal (Scara) Robot types, the customer is responsible for applying a light coat of grease (such as Klubersynth UH1 14-222) to the spindle after approximately 600hr of movement.

The procedures in the [ROBOT ARM SETUP & MAINTENANCE] manual should be followed.