

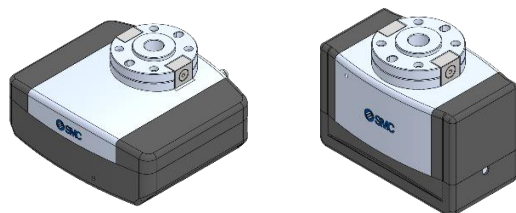


ORIGINAL INSTRUCTIONS

Instruction Manual

Electric Gripper for Collaborative Robots

Series LEHR



The intended use of the Electric Gripper is to convert an electrical input signal into mechanical motion in order to grip a work piece.

1 Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of "Caution," "Warning" or "Danger." They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)¹⁾, and other safety regulations.

¹⁾ ISO 4414: Pneumatic fluid power — General rules and safety requirements for systems and their components.

ISO 4413: Hydraulic fluid power — General rules and safety requirements for systems and their components

IEC 60204-1: Safety of machinery - Electrical equipment of machines. Part 1: General requirements

ISO 10218-1: Robots and robotic devices - Safety requirements for industrial robots - Part 1: Robots

• Refer to the product catalogue, Operation Manual and Handling Precautions for SMC Products for additional information.

• Keep this manual in a safe place for future reference.

	Danger	Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
	Warning	Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
	Caution	Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

Warning

- Always ensure compliance with relevant safety laws and standards.
- All work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations.
- Electromagnetic compatibility: This product is class A equipment that is intended for use in an industrial environment. There may be potential difficulties in ensuring electromagnetic compatibility in other environments due to conducted as well as radiated disturbances.
- Do not disassemble, modify or repair the product.
- Do not operate the product beyond the specification range.
- When using the product as part of an interlocking system, provide a double interlocking system, for example a mechanical system.
- For further safety instructions refer to the operation manual on the SMC website (URL: <https://www.smcworld.com>).

Warning

For special products which include a suffix of "-X#", "-D#", refer to the customer drawing of that specific product on the SMC website (URL: <https://www.smcworld.com>).

2 Specifications

2.1 Specifications - LEHR series

	Model	LEHR
Actuator	Opening and Closing stroke / both sides [mm]	50
	Gripping Force [N] * ¹⁾	60 to 140
	Opening and closing speed / Gripping speed [mm/s] * ²⁾	5 to 100 / 5 to 30
	Drive method	Slide screw and Belt
	Finger guide type	Sliding bearing
	Finger backlash / one side [mm] * ³⁾	0.5 max.
	Positioning repeatability / one side [mm]	± 0.1
	Lost motion / one side [mm] * ⁴⁾	0.5 max.
	Impact resistance / Vibration resistance [m/s ²] * ⁵⁾	150 / 5
	Operating temperature [°C]	5 to 40
Operating humidity [% RH]	90 or less (no condensation)	
Weight [kg]	1	
Electrical	Connector type	M8 8-pin (Plug)
	Motor type	Battery-less absolute (Step motor 24 VDC)
	Encoder (angular displacement sensor)	Battery-less absolute
	Power supply voltage	24 VDC ±10%
Power [W] * ⁶⁾	48 max.	

Notes

*1) The Gripping force accuracy should be ±20% (F.S.). Gripping with a heavy attachment and fast pushing speed may not meet the product specification. In this case decrease the weight and reduce the pushing speed.

*2) The Gripping speed should be set within the range during Gripping operations. Otherwise, it may cause a malfunction. The opening / closing speed and pushing speed are for both fingers. The speed for one finger is half this value.

*3) There will be no influence of backlash during gripping operations (Grip Command). Make the stroke longer for the amount of backlash when opening.

*4) Lost motion is a reference value for correcting an error in reciprocal operation which occurs during positioning operations.

*5) Impact resistance: No malfunction occurred when the gripper was tested with a drop tester in both an axial and a perpendicular direction to the lead screw. (The test was performed with the gripper in the initialized state).

Vibration resistance: No malfunction occurred in a test ranging between 45 to 2000 Hz. The test was performed in both an axial and a perpendicular direction to the lead screw. (The test was performed with the gripper in the initialized state).

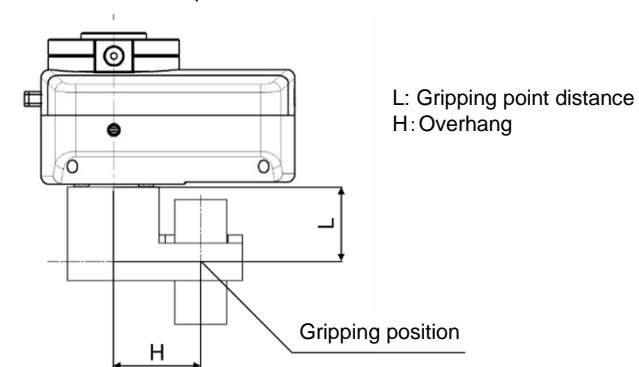
*6) Indicates the maximum power during operation.

3 Installation

3.1 Design and Selection

• Operate within the specified gripping range.

If the specified gripping range is exceeded, excessive moment is applied to the sliding part of the fingers, which may have an adverse effect on the life of the product.

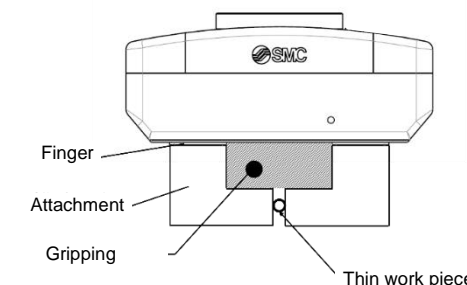


• Design the attachment to be lightweight and of minimum length.

A long heavy attachment will increase inertia force when the product is opened or closed, which causes play at the fingers. Even if the gripping point of the attachment is within the specified range, design it to be as short and lightweight as possible. For a long or large work piece, select a larger size gripper or use two or more grippers together.

• Reserve a gripping space for the attachment when the work piece is extremely thin.

Without this space the product cannot perform stable gripping and the displacement of the work piece or gripping failure can result.



- Use a gripping force with a margin with respect to the work piece weight. The gripping force should be within the range of 5 to 10 times the weight of the object to be conveyed. The accuracy of the gripping force is ±20% F.S.
- Select a model that allows for the correct opening and closing width relative to the width of the work piece. Selection of an incorrect model may cause gripping at unexpected positions due to the variable opening and closing width of the product and the width or diameter of the work piece that the product can handle. It may be necessary to select a larger stroke to overcome the backlash created when the gripper opens after gripping.
- Do not use the product in applications where excessive external forces, including vibration or impact force are applied to it.

3.2 Installation

Warning

- Do not install the product unless the safety instructions have been read and understood.
- Do not use the product outside of its allowable specification.
- Do not drop, dent, scratch, strike or cause other damage to the gripper body or the gripper fingers. This may lead to deterioration of accuracy or product failure.
- The electric gripper and its peripheral devices should be installed on a fire-proof material.

3.3 Operation

Warning

- Do not touch the motor while in operation. The surface temperature of the motor can increase to approx. 80°C due to operating conditions. Energizing alone may also cause this temperature increase.

3 Installation (continued)

- If abnormal heating, smoking or fire, etc. occurs in the product, immediately turn OFF the power supply.
- Immediately stop operation if abnormal operation noise or vibration occurs. If this occurs, the product may have been mounted incorrectly. Unless operation of the product is stopped for inspection, the product may be seriously damaged.
- Never touch the rotating part of the motor or the moving part of the actuator while in operation.

3.4 Environment

Warning

- Do not use in an environment where corrosive gases, chemicals, salt water or steam are present.
- Do not use in an explosive atmosphere.
- Do not expose to direct sunlight. Use a suitable protective cover.
- Do not install in a location subject to vibration or impact in excess of the product's specifications.
- Do not mount in a location exposed to radiant heat that would result in temperatures in excess of the product specifications.
- Prevent foreign particles from entering the product.
- Avoid using in the following environments:
 - a) Areas with large amounts of dust or cutting chips are airborne.
 - b) Areas where the ambient temperature exceeds the specified range.
 - c) Areas where the ambient humidity exceeds the specified range.
 - d) An environment which is subject to temperature cycles.
 - e) Areas where strong magnetic or electric fields are generated.
 - f) Environment at an altitude of 1,000 meters or higher.
- Do not use in an environment where the product is directly exposed to liquid, such as cutting oils. If cutting oil, coolant, or oil mist adheres to the product, failure or increased sliding resistance can result.

3.5 Mounting

Warning

- Observe the required tightening torque for screws. Tighten the screws to the recommended torque for the gripper and attachment mounting.

Tightening the screws with a torque higher than recommended may cause malfunction, whilst tightening with a lower torque can lead to the displacement of the mounting position or in extreme conditions the attachment could become detached from the gripper.

- Do not make any alterations to the product. Alterations made to this product may lead to a loss of durability and damage to the product, and other equipment and machinery.
- When attaching to the work piece, do not apply strong impact or a large moment. If an external force in excess of the allowable moment is applied, it may cause looseness in the guide unit, an increase in sliding resistance or other problems.
- Allow sufficient space for maintenance and inspection.

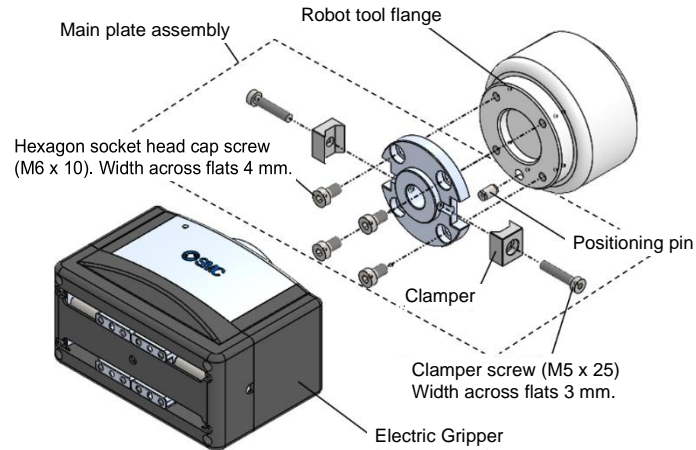
Caution

- When mounting attachments to the Gripper fingers avoid applying excessive torque and use screws with adequate length and tighten with adequate torque within the specified torque range. Applying excessive torque may lead to play in the fingers and deterioration of the gripper accuracy.
- The gripper finger mounting face has holes and slots for positioning. Make sure to use them if required.
- When the workpiece must be removed after the power has been switched off, it can be removed by using the manual override or by removing the finger attachments. If the manual override is used to remove the workpiece allow sufficient space to access the manual override screw. Do not apply excessive torque to the manual override that could lead to damage and malfunction of the product.
- When gripping the work piece leave space in the finger movement direction to prevent the load from being concentrated on one finger and to allow for work piece misalignment. For the same reason when aligning the work piece using the gripper finger movement, minimize the frictional resistance created by the movement of the workpiece. The finger can be displaced or play or damage can occur.

3 Installation (continued)

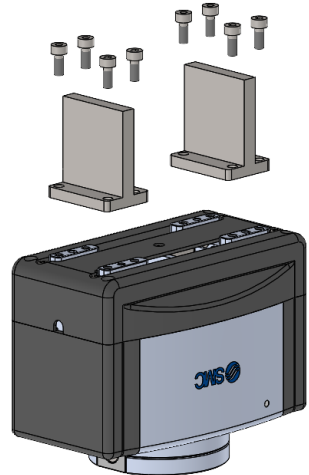
3.6 Mounting the Gripper

- Insert a parallel positioning pin into the pin hole in the robot tool flange.
- Insert the positioning pin by aligning it with the elongated hole in the main plate assembly and mount the main plate assembly onto the robot tool flange with the small head hexagon socket head cap screws supplied.
- Recommended tightening torque: 5.2 ±0.5 N·m.
- Confirm that the clamber screws on the main plate assembly are loosened, and align the clammers with the flange groove on the Electric Gripper for Collaborative Robot side.
- Tighten the clamber screws to mount the Electric Gripper for Collaborative Robot. Recommended tightening torque: 3.0 ±0.3 N·m.



3.7 Mounting the Attachment

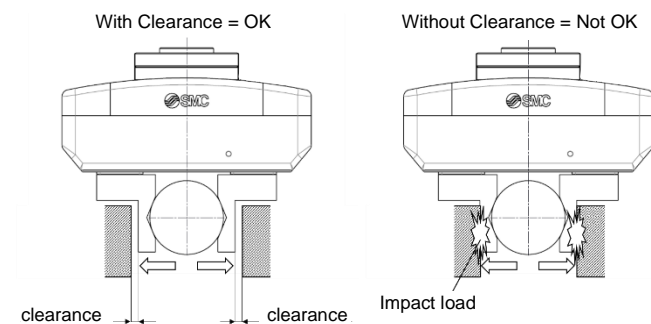
- When attaching or detaching the finger attachment, install them using M4 x 0.7 screws and tighten to the recommended tightening torque of 1.65 N·m.
- Set the tightening torques to the appropriate torque values based on the attachment used.



3.8 Gripper Adjustment

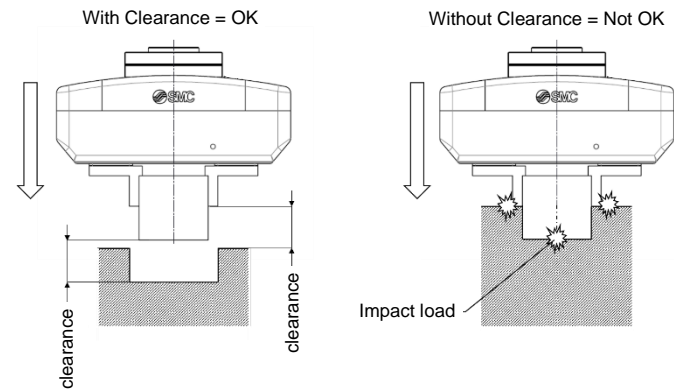
- Perform adjustment and confirmation to ensure there is no external force applied to the fingers.
- If the finger is subject to repetitive lateral load or impact load, it can cause play or damage and the lead screw can get stuck, which results in operation failure. Allow a clearance to prevent the work piece or the attachment from impacting the gripper at the end of the stroke.

- Stroke end when fingers are open

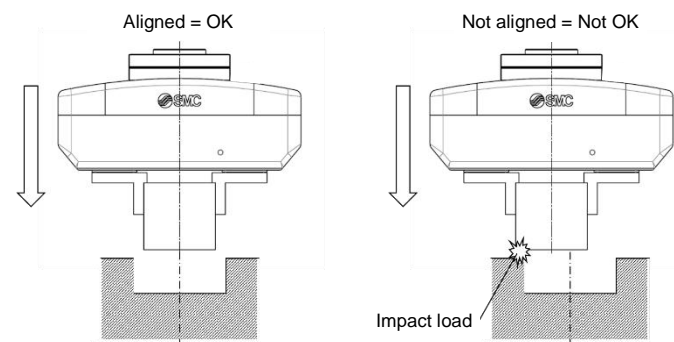


3 Installation (continued)

- Stroke end when gripper is moving



- When mounting a work piece, align it with the product carefully to prevent excessive force to the finger. In particular, during a trial run, operate the product manually or at a low speed and check that the safety is assured without impact.



3.9 Lubrication



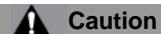
- SMC products have been lubricated for life at manufacture, and do not require lubrication in service.
- If a lubricant is used in the system, refer to the operation manual or catalogue on the SMC website (URL: <https://www.smcworld.com>).
- The recommended grease is lithium grade No.2.

4 Wiring

4.1 Wiring



- Adjustment, mounting or wiring changes should not be carried out before disconnecting the power supply to the product.
- Do not disassemble the cables.
- Use only specified cables.
- Do not connect or disconnect the wires, cables and connectors when the power is ON.

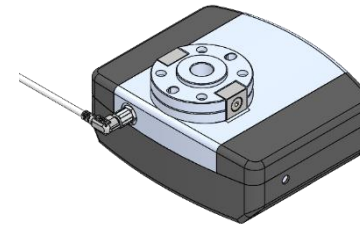


- Do not route wires and cables together with power or high-voltage cables.
- Check the insulation of wires and cables.
- Take appropriate measures against noise, such as noise filters, when the product is incorporated into other equipment or devices.
- Take care that actuator movement does not damage cables.
- Avoid twisting, folding, rotating, or applying external force to the cable. Electric shock, wire damage, contact failure, or a loss of product control may occur.
- When checking the conductivity of the cable, be careful not to deform the connector mating hole and terminals.
- Refrain from plugging in and unplugging the connector frequently. Doing so may result in contact failure or disconnection.

4 Wiring (continued)

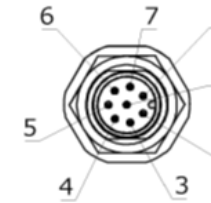
4.2 Cable connection

Connect a cable (part number RMH-A00-11-A) between the electric gripper connector and the connector on the robot tool flange. Secure the connector so that it does not become loose.



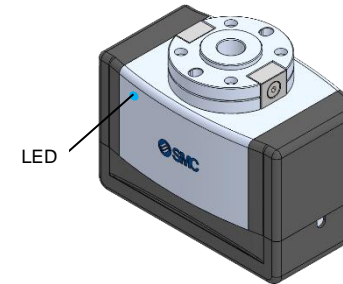
4.3 M8 Connector Pin layout

Pin No.	Description
1	RS485+
2	RS485-
3	N.C.
4	N.C.
5	24 V
6	0 V
7	24 V
8	0 V



5 LED indicator

The status of the Electric Gripper for Collaborative Robots can be checked via the LED lamp.



5.1 Normal operation

Status	LED	Red	Magenta	Green	Cyan	Blue	White	Yellow
Servo OFF	ON							
Servo ON	ON							
Operation in progress	ON							
Gripping operation in progress	Flashing							
Gripping completed	Flashing							

5.2 Alarm and Warning condition

Status	LED	Red	Magenta	Green	Cyan	Blue	White	Yellow
Overload	Alternating							
Overcurrent	Alternating							
Temperature abnormal	Alternating							
Over voltage	Alternating							
Low voltage	Alternating							
Location deviation overflow	Flashing							
Gripping warning	Flashing							
Load warning	Alternating							
Temperature warning	Alternating							

6 How to Order

- For standard products, refer to the catalogue on the SMC website (URL: <https://www.smcworld.com>) for the how to order information.

7 Outline Dimensions

- For standard products, refer to the catalogue on the SMC website (URL: <https://www.smcworld.com>) for outline dimensions.

8 Maintenance

8.1 General Maintenance



- Not following proper maintenance procedures could cause the product to malfunction and lead to equipment damage.
- If handled improperly electricity and compressed air can be dangerous.
- Maintenance of electromechanical and pneumatic systems should be performed only by qualified personnel.
- Before performing maintenance, turn OFF the power supply and be sure to cut off the supply pressure. Confirm that the power has been discharged and the air is released to atmosphere.
- After installation and maintenance, apply operating pressure and power to the equipment and perform appropriate functional and leakage tests to make sure the equipment is installed correctly.
- If any electrical or pneumatic connections are disturbed during maintenance, ensure they are reconnected correctly and safety checks are carried out as required to ensure continued compliance with applicable national regulations.
- Do not make any modification to the product.
- Incorrect handling can cause an injury, damage or malfunction of the equipment and machinery, so ensure that the procedure for the task is followed.
- Always allow sufficient space around the product to complete any maintenance and inspection.
- Do not disassemble or repair the product.
- Before modifying or checking the wiring, the voltage should be checked

with a tester 5 minutes after the power supply is turned OFF.

- When the product is to be removed, check that it is not gripping a work piece. There is a risk of dropping the work piece.



- Removal of product
When the equipment is serviced, first confirm that measures are in place to prevent dropping of work pieces and run-away of equipment, etc, and then turn off the power supply to the system.
When the machinery is restarted, check that the operation is normal with the gripper in a safe position.

9 Limitations of Use

9.1 Limited warranty and disclaimer/compliance requirements

- Refer to Handling Precautions for SMC Products.

10 Product disposal

This product should not be disposed of as municipal waste. Check your local regulations and guidelines to dispose of this product correctly, in order to reduce the impact on human health and the environment.

11 Contacts

Refer to www.smcworld.com or www.smc.eu for your local distributor / importer.

SMC Corporation

URL: <http://www.smcworld.com> (Global) <http://www.smc.eu> (Europe)
 SMC Corporation, 4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101-0021, Japan
 Specifications are subject to change without prior notice from the manufacturer.
 © 2021 SMC Corporation All Rights Reserved.
 Template DKP50047-F-085N