Instruction Manual

Original instructions

ELCT1-100-20-TMS

Electric parallel gripper for TM S Series

Be sure to read this instruction manual before using the product.

New-Era®

Contents

Safety Precautions －Electric actuator－

The safety precautions stated below are to be followed to use the product safely and correctly and to prevent the harm or damage to other persons and property. The precautions are classified into three categories, DANGER, WARNING and CAUTION, to indicate the degree of hazard, damage and imminence. Strictly observe these important safety precautions in addition to the safety requirements specified in applicable international or industry standards.

⚠ DANGER	Expresses situations that can be clearly predicted as dangerous. If the noted danger is not avoided, it could result in death or serious injury. It could also result in damage or destruction of assets.
⚠ WARNING	Expresses situations that, while not immediately dangerous, could become dangerous. If the noted danger is not avoided, it could result in death or serious injury. It could also result in damage or destruction of assets.
⚠ CAUTION	Expresses situations that, while not immediately dangerous, could become dangerous. If the noted danger is not avoided, it could result in light or semi-serious injury. It could also result in damage or destruction of assets.

⚠ DANGER

- Do not use the product in locations with or near dangerous substances such as flammable or ignitable substances. It could ignite or burst into flames.
- Do not use it in a place where the main body and controller may be splashed with water or oil. Doing so can cause malfunction, resulting in personal injury, electric shock or fire.
- When mounting the product and workpiece, always firmly support and secure them in place. Dropping or falling the product or improper operation could result in injury.
- Do not enter the machine's operating area while the product is in operation.
- Do not use the product for the purposes listed below:
  1. Medical equipment related to maintenance or management of human lives or bodies.
  2. Mechanical devices or equipment designed for moving or transporting people.
  3. Critical safety components in mechanical devices.

  This product has not been planned or designed for purposes that require advanced stages of safety. It could cause injury to human life.

⚠ DANGER

- Persons who use a pacemaker, etc., should keep a distance of at least 1 meter [3.28 ft.] away from the product. There is a possibility that the pacemaker will malfunction due to the strong magnet built in the product.
- Never attempt inappropriate disassembly, or assembly of the product relating to basic construction, its performance, or functions. It could result in injury, electric shock, fire, etc.
- Do not use the product in excess of its specification range. Such use could result in product breakdowns, function stop, or damage.
- Design safety circuits and equipment systems so as to avoid equipment damage or personal injury when the machine is shut down due to an emergency stop, power outages, or other system abnormalities.
- When wiring the product, see the wiring procedures stated in the instruction manual, and be careful not to wire it incorrectly. Connect the cables and connectors securely so that they will not be disconnected or loosened. Failure to do so may cause product malfunction or fire.
- When operating or adjusting the system after installing the actuator, strictly observe the safety precautions for the system. Failure to do so can cause serious personal injury.
- Before supplying power to the product and starting it, ensure the safety in the product operating range. If power is supplied to it carelessly, personal injury may be caused by electric shock or contact with moving parts.
- Do not touch any connector while the power is on the actuator. Doing so can cause electric shock and malfunction.
- When the actuator is installed in a system (machinery, equipment or robot), maintain the actuator in a safe and correct manner in accordance with the laws and standards relating to the system safety measures.

⚠ WARNING

- Use the compatibility of the product with your system based on the verification and judgement at your own risk.
- After reading the catalog and instruction manuals, keep them in a place accessible to the operators.
- The product was designed and manufactured as parts for use in General Industrial Machinery.
- In the selection and handling of the equipment, a system designer or other person with fully adequate knowledge and experience should always read the Safety Precautions, Catalog, Owner's Manual and other literature before commencing operation. Making mistakes in handling is dangerous.

⚠ WARNING

- Do not service or attempt to remove product and machinery equipment until safety is confirmed.
  1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
  2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
- Be sure to perform a safety check of the device's operating range before supplying power to the product. Inadvertently supplying power can cause electric shock or injury.
- Contact us beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.
  1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
  2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.
  3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
  4. Use in an interlock circuit, such as providing a mechanical protective function, and periodical checks to confirm proper operation.
- For inspection, maintenance, replacement, or other kinds of operations related to the product, always completely cut off the power supply before proceeding. Otherwise, it may cause damage, malfunction, or electric shock.
- Do not use the product in excess of its specification range. Such use could result in product breakdowns, function stop, and damage.
- There is a possibility of dangerous sudden action by the product if the sliding parts of the machinery are twisted due to external forces, etc.
  In such cases, human injury may occur, such as by hands or feet getting caught in the machinery, or damage to the machinery itself may occur. Design the machinery so as to avoid such dangers.
- Use a protective cover, etc. to ensure that the operating portions of mechanical devices, etc., are isolated and do not come into direct contact with human bodies.
- Consider the possibility of power source failure. Take measures to prevent bodily injury or machine damage even in the event of a power failure.

⚠ WARNING

- Design safety circuits and equipment systems so as to avoid equipment damage or personal injury when the machine is shut down due to an emergency stop, power outages, or other system abnormalities.
- Do not configure such a control that the work will drop upon occurrence of power interruption. Configure a control to prevent drop of work upon power interruption or emergency stop of the equipment.
- Consider the operation status when restarting after emergency or abnormal stops. Design the system so that bodily injury or machine damage even in the event of a power failure.
- Never disassemble the product or make any modifications, including additional machining. Doing so may cause human injury and/or an accident. It may also cause the deterioration of the product's performance.
- When an external guide is used, connect the moving parts of the actuator and the load in such a way that there is no interference at any point within the stroke.
- Do not scratch or dent the sliding parts of the product tube, piston-rod, etc., by striking or grasping them with other objects. The components are manufactured to precise tolerances. Even a slight deformation may cause a malfunction or seizure.
- Do not use the product until you confirm that the equipment can operate properly. After mounting or repair, connect the power supply to the product and perform appropriate functional inspections to check it is mounted properly.
- Do not apply strong impact or an excessive moment while mounting the product or a workpiece. If an external force over the allowable moment is applied, it may cause play in the guide or an increase in the sliding resistance.
- When mounting the product, secure adequate working space. Failure to ensure the enough working space will make it more difficult to conduct daily inspections or maintenance, which could eventually lead to system shutdown or damage to the product.
- Do not touch the motor during operation. The temperature may also increase due to energization. It may cause burns.
- If the product generates abnormal heat, smoke or odor, turn OFF the power immediately. Otherwise, product damage or fire may result.
- If abnormal noise occurs or vibrations are excessive, immediately cease operation. Continued use in this condition may result in abnormal operation or runaway that could lead to product damage or destruction.
- Always implement D-class grounding work (ground resistance 100 Ω or less).Grounding should be performed near the actuator to shorten the grounding distance. The cross-sectional area of this wire shall be a minimum of 2mm^2. Avoid common grounding with other devices.

⚠ WARNING

- Avoid use in the following environments.
  - Areas with large amounts of dust or cutting chips that could enter the product.
  - Areas where the ambient temperature exceeds the specified range (Refer to the specifications).
  - Areas where the ambient humidity exceeds the specified range (RH: less than 85% and no condensation).
  - Areas with corrosive gas, flammable gas, sea water, water, or steam that could adhere to the product
  - Areas where strong magnetic or electric fields are generated
  - Areas where direct vibration or impact shock is applied to the product
  - Areas where there are large amounts of dust or there is exposure to water/oil droplets
  - Areas that are exposed to direct sunlight (ultraviolet rays)
- 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 increase of sliding resistance can be caused.
- Install a protective cover when the product is used in an environment directly exposed to foreign matters, such as dust, cutting chips, and spatter.
- Shade the product from direct sunlight.
- In locations near heat sources, block them off. When there is a heat source surrounding the product, the radiated heat from the heat source can increase the temperature of the product beyond the operating temperature range. Protect it with a cover, etc.
- Levels of the base oil of grease may decrease due to the external environment and operating conditions, causing a decline in lubrication performance and a shortened lifetime of the product.
- Do not store the product in a place in direct contact with rain or water drops or where it is exposed to harmful gas or liquid.
- Store in an area that is shaded from direct sunlight and has a temperature and humidity within the specified range (5℃ to 50℃ and RH 35% to 85% no condensation or freezing).
- Do not apply vibration or impact to the product during storage.
- Do not disassemble or repair the product. Fire or electric shock can be caused. Contact New-Era if the disassembly of the product is required for maintenance.
- If power interruption occurs during operation, turn off the power. Otherwise, when the power is restored, the product may suddenly start moving, thereby damaging the equipment or causing personal injury.
- Before modifying or checking the wiring, the voltage should be checked with a tester 5 minutes after the power supply is turned off. Failure to do so may result in electrical shock.

⚠ WARNING

- Do not step onto the packing box of the product or do not place object on the box. Accidents such as falling and tripping over could result in injury. Dropping the product may result in injury, or also may damage or break the product resulting in abnormal or erratic operation, or runaway, etc.
- Wire the product securely while confirming with this catalog and the instruction manual and ensuring that there is no miswiring or loose connectors.
- Be sure to insulate unused wires. Failure to do so may cause malfunction, failure, or electric shock.
- Avoid scratching the cords of cables, etc. Letting the cords be subject to scratching, excessive bending, pulling, rolling up, or being placed under heavy objects or squeezed between two objects, may result in current leaks or defective continuity that lead to fire, electric shock, or abnormal operation.
- Mount the product before wiring. It may lead to electric shock.
- Do not throw the product into fire. It may rupture or generate toxic gas.
- Do not hold the moving parts or cable parts of the product during transportation. It may cause injury or disconnection.
- When the protective device (alarm) of the product works, immediately turn off the power. The product may malfunction, resulting in personal injury and property damage. After turning off the power, reveal the causes. Do not reapply the power until the causes are removed.

⚠ CAUTION

- Our products are offered for the manufacturing industry. It is provided mainly for peaceful use for the manufacturing industry. If you are considering using it in non-manufacturing industry, please consult with us and exchange specifications and make a contract as necessary.
- For export or provision of products or related technologies subject to EAR regulations, we request that the US Export Administration Regulations (EAR) be observed appropriately.
- Wiring should be done correctly. For each terminal, voltages other than those stipulated in the operation manual should not be applied.
- Connect the connector securely. Check for correct connector wiring and polarity.
- Do not connect power or high-voltage cables in the same wiring path as the unit. The product can malfunction due to noise and surge voltage interference in the signal line from power and high-voltage cables. Separate the wiring of the controller and its peripheral device from that of power and high-voltage cables.
- Be careful that cables are not caught by actuator movement.

⚠ CAUTION

- Fix the cable so as not to be moved easily. Avoid bending cables at sharp angles where they enter the product.
- Avoid twisting, folding, rotating, or applying external force to the cable. Electric shock, wire breakage, contact failure, or a loss of product control may occur.
- To fix the cable from actuator, make it larger than minimum fixing radius of 29.5mm. When moving it, make it lager than the minimum movable bending radius of 59mm. If it is smaller than the specified radius, there is a risk of electric shock, and problem such as cable disconnection, poor contact, and runaway may occur.
- Confirm wiring insulation. Insulation failure (interference with other circuits, poor insulation between terminals, etc.) could introduce excessive voltage or current to the controller or its peripheral devices, which may cause damage to them.
- When checking the conductivity of the cable, be careful not to deform the connector's mating hole and terminals. Inserting a non-compatible connector, tool, cylinder-shaped object, etc., into the connector's mating hole can cause the hole or terminals to become deformed, which may cause contact failure or disconnection.
- Operate within the limits of the maximum usable stoke. The product will be damaged if it is used with a stroke which exceeds the maximum stroke. Refer to the specifications of the product.
- When the product repeatedly cycles with partial strokes, operate it at a full stroke at least once a day or every 1000 strokes. Otherwise, lubrication may run out.
- Do not use the product in applications where excessive external force or impact force is applied to it, or the product can be damaged. The components, including the motor, are manufactured to precise tolerances. Even a slight deformation may cause a malfunction or seizure.
- Always use the robot designated for the product. Use of a non-designated robot could lead to product breakdown or runaway operation.
- Conduct the following inspection before operation.
  1. Confirm that the power supply line and each signal line is not damaged.
  2. Confirm that the power supply line and each signal line is not loosened.
  3. Confirm that the electric actuator/cylinder/controller/driver is not mounted loosely.
  4. Confirm that the electric actuator/cylinder/controller/driver is operating correctly.
  5. Confirm the function of the emergency stop of the whole system.
- If several persons are to be working conjointly, determine the procedure, signs, measures against abnormality, and restarting measures in advance. Then, have someone else to supervise the work.
- Do not remove the name plate.
- Operation tests should be done at a low speed. Start operation by predefined speed after confirming there are no problems.

⚠ CAUTION

- Do not apply forces of impact, collision, or resistance to the moving parts of an actuator in operation. Doing so will cause a decrease in product lifetime, damage to the product, etc.
- Check that the received product is as ordered. Installation of different product can result in injury or damage.
- Perform maintenance and inspection according to the procedures indicated in the operation manual. Improper handling can cause an injury, damage, or the malfunction of equipment and machinery.
- Do not manually move the actuator slider (lever, finger, attachment, etc.). The product may be damaged.
- The product has been lubricated for the lifespan by the manufacturer and does not require any further lubrication. Special grease must be used for lubrication. Please contact us when you apply it.
- Durability varies with transported load and environment. The transport load, etc., should be at a setting well within the margin.
- When disposing of the product, comply with laws pertaining to waste treatment and cleaning. Consign it to a specialized waste disposal company for processing.
- Frequently turning the power ON/OFF can cause damage to the elements inside the controller.
- The relationships between pressing force (gripping power) and pressing rate described in this catalog are merely guidelines. Fluctuation in motor torque, etc., may cause errors even at the same set values.
- Do not bring floppy disks or magnetic media, etc., within one meter [3.28ft.] of the product. There is the possibility that the data on the floppy disks will be destroyed due to the magnetism of the magnet.
- When handling the product, wear protective gloves, safety glasses, safety boots, etc. to keep safety.
- Perform daily inspections to make sure that the system meets the required functions to prevent accidents.

Warranty and Disclaimer

1) Warranty Period

A warranty period of our products are 12 months after our shipment.

2) Range of Warranty and Disclaimer

- If any malfunction or damage due to our responsibility becomes clear during the warranty period, we will repair or replace without charge. Although it is still within the warranty period, we set the lifespan of the product according to the number of operation. Please contact us to check that.

- Warranty of our products are applied only to our product itself. We will not bear responsibility at all against the damage caused by functional deterioration or mal function of our products, or the damage of other equipment caused by those.
  We will not bear responsibility at all against the cost to repair or replace our products at customer's side.

- We will not bear responsibility at all against the damage caused by remodeling, modifying or repairing by a customer.

- We will not bear responsibility at all against the usage, storage or mounting which is exceeding the limit of product specification indicated on a catalog and an instruction manual.

- We will not bear responsibility at all against the damage or malfunction occurred by fires, earthquakes, thunderbolts or other natural disasters.

- We will not bear responsibility at all against malfunction of product occurred by handling negligence.

1. Product Overview

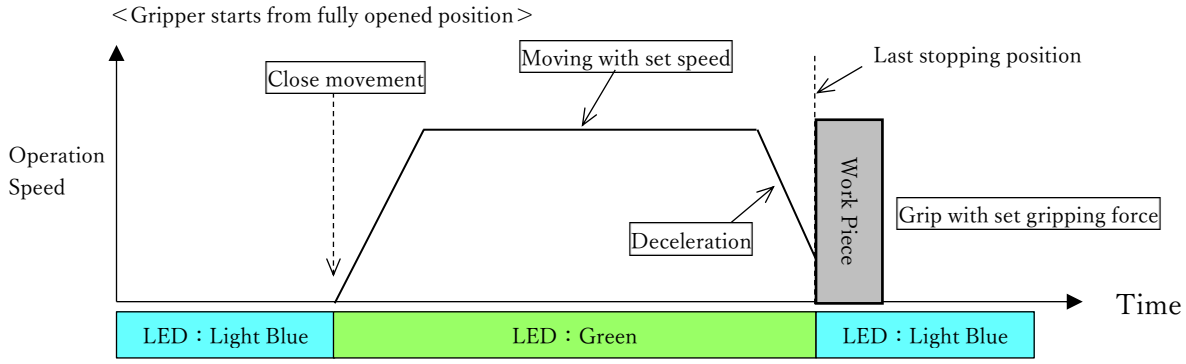
1.1. Feature

- This product is electric gripper installed with controller.
- It memorizes operation stroke every open/close, and decelerates right before the last stopping position.
- You can set the gripping force and open/close speed in 3 levels for each.

1.2. Operation Example

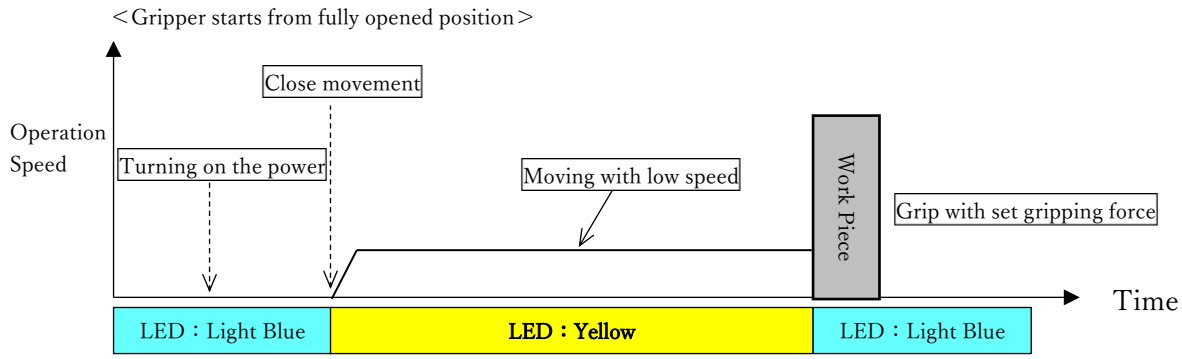
◆ Gripping and releasing operation of identical work piece.

It operates with set gripping force and operation speed. During operation, an LED lights up green, and it moves in set operation speed. It grips work piece with set gripping force and decelerates right before touching work piece.



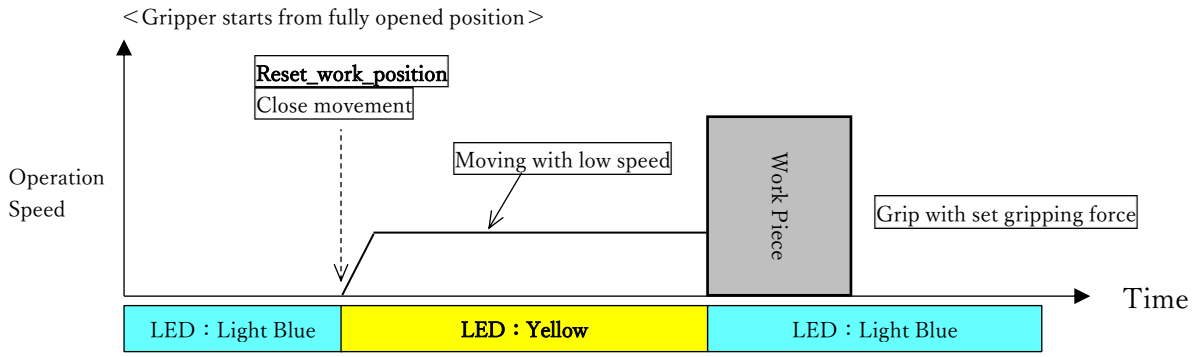
◆ Movement after turning on the power

It runs the memorizing operation of work piece position as first action after turning on the power. During operation, an LED lights up yellow and moving at low speed. After this, in case of gripping identical work piece, it decelerates right before touching work piece after moving at set operating speed.



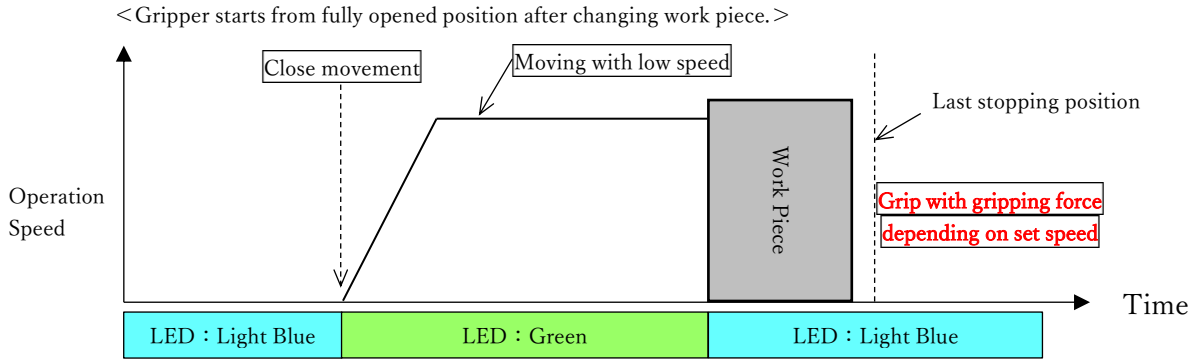
◆ The procedure at the time of work piece change.

In case operation stroke need to be changed due to work piece change, enable [Reset_work_position] when making gripping order of work piece.



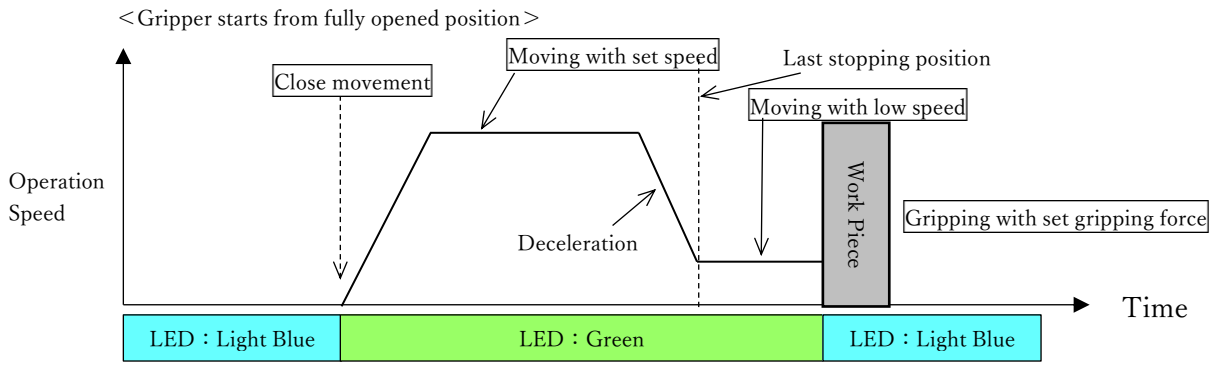
⚠ Caution

Please be careful if gripping bigger work piece than the last operation stroke without [Reset_work_position], there will be possibility about damaging the work piece due to excessive gripping force created by the last operation speed.



⚠ Caution

If gripping smaller work piece than the last operation stroke without [Reset_work_position], the operation time at low speed will be longer because it starts deceleration right before the last stopped position.



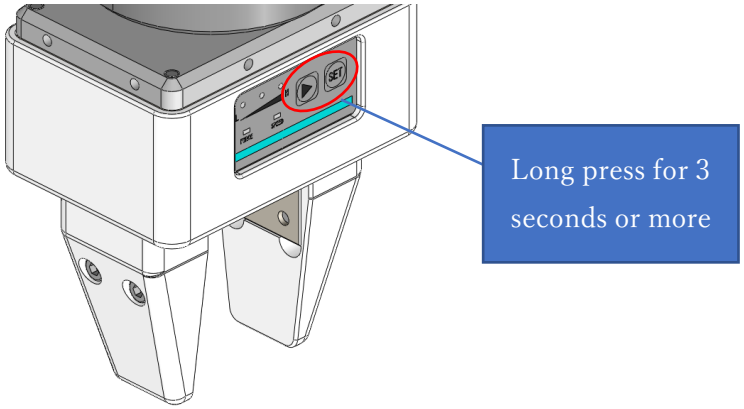
1.3. Release operation in case of emergency

If you need to release the fingers due to some trouble, please follow the steps below.

◆ When energized (when the LED band is lit in light blue)

Press and hold any button on the control panel for 3 seconds to move the fingers in the opposite direction of the previous action.

After operation, the LED band lights up in red and cannot accept commands from the robot. This state is canceled by restarting the gripper.

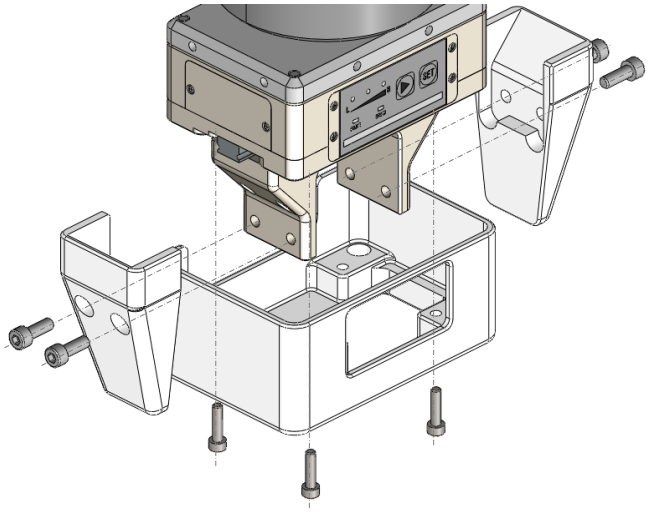


◆ When not energized (when the LED band is off)

Perform this operation after removing the main body cover.

- Loosen the two screws and remove the plate. (Figure 1)
- Fingers can be opened and closed manually by using a flathead screwdriver. (Figure 2)

Figure 1 plate removal



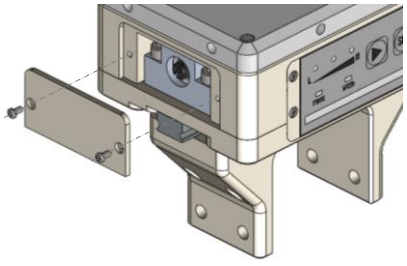
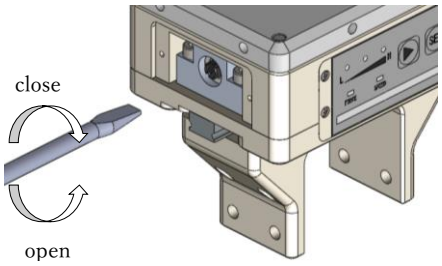
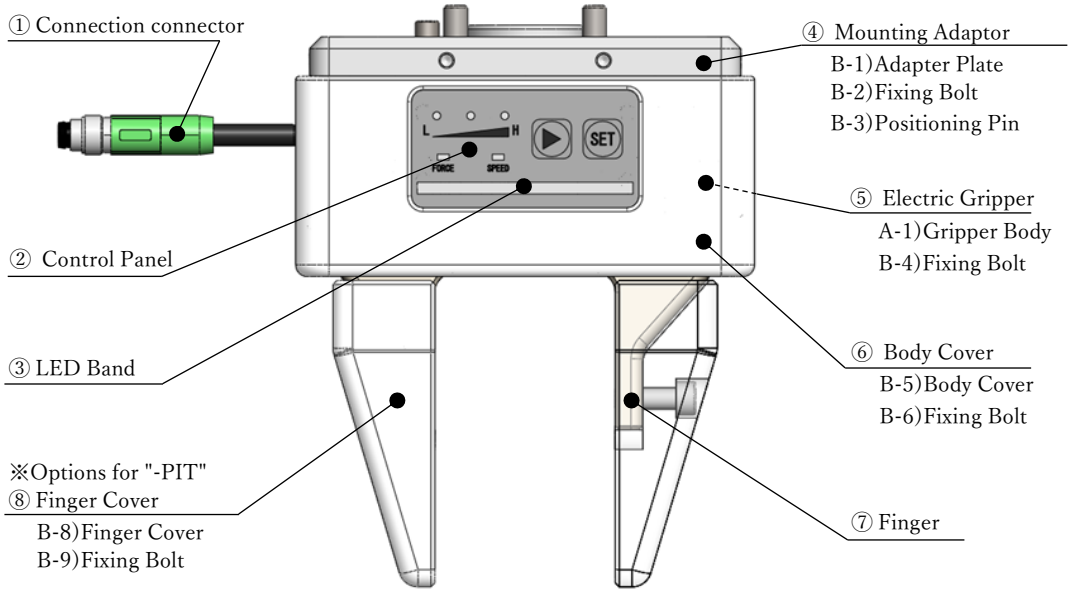


Figure 2 emergency release action



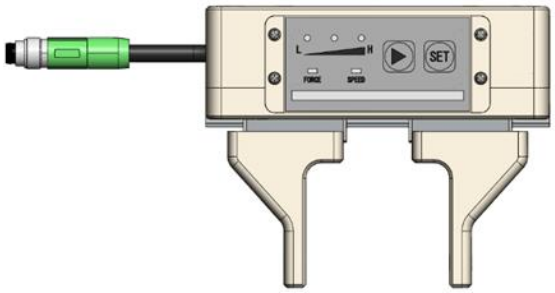
2. Product Structure



◆ The name of each part

① Connection Connector	To connect Tool End Connector Reference ☞P.28 "Installing Connectors"
② Control Panel	Gripping force and operation time of electric gripper can be set. (Not used as the settings from the Component is given priority.)
③ LED Band	The state of the electric gripper is indicated with the color of the LED band. Reference ☞P.31 "Instruction of LED Band"
④ Mounting Adapter	An adapter for installing to the Tool Flange. Reference ☞P.25 "Installation of an adapter plate"
⑤ Electric Gripper	ELCT1 Electric Gripper
⑥ Body Cover	Body cover made of resin Reference ☞P.26 "Installation of a body cover"
⑦ Finger	An aluminum open/close finger. Please use it for gripping work piece and installing an attachment. Reference ☞P.29 "Mounting Finger and Lever Attachments"
⑧ Finger Cover	A plastic finger cover. Reference ☞P.27 "Installation of a finger cover"

3. List of Bundled Items

<table>
<tr><td colspan="4">A-1)
 
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Gripper Body</td></tr>
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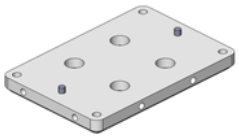
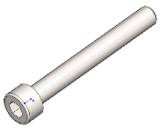
 
×1
Adapter plate</td><td>B-2)
 
×4
Mounting bolt for adapter plate (M6×12L)</td><td>B-3)
 
×1
Bearing pin for adapter plate（φ6×10L）</td><td>B-4)
 
×4
Mounting bolt for gripper body（M5×40L）</td></tr>
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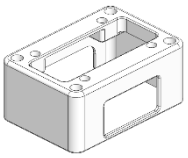
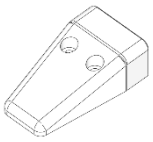
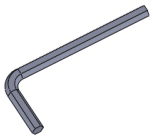
 
×1
Body cover</td><td>B-6)
 
×4
Mounting bolt for body cover (M4×16L)</td><td>B-7)
 
×1
Extension cable</td><td>B-8)
※Options for "-PIT"
 
×2
Finger cover</td></tr>
<tr><td>B-9)
※Options for "-PIT"
 
×4
Mounting bolt for finger cover（M5×14L）</td><td></td><td></td><td></td></tr>
</table>

◆ Please prepare a necessary tool for installation.

C-1)



Hexagonal wrench
Opposite side 2 mm (For M4) , Opposite side 2.5 mm (For M5), Opposite side 3 mm (For M6)

4. Product Specifications

4.1. Specifications

Model		ELCT1-100-20-TMS ELCT1-100-20-TMS-PIT(with finger cover)		
Connection cable/connector		300mm shield wire / M8 connector (S series for Tool End connector joint)		
Communication interface		RS-485 *Note 1		
Supply voltage		DC 24V ±10%		
Consumption current (at stand-by)		Max 35mA		
Instantaneous maximum current / motor		Max 1.8A		
Stroke *Note 2		20mm（one side 10mm）		
Gripping force*Note 3		3 stage setting	1：60N	2：80N	3：100N
Operating time*Note 4		3 stage setting	1：1.8s	2：1.2s	3：0.9s
Deceleration stroke (time)		1mm（About 0.2s）		
Repeated Gripping Accuracy *Note 5		±0.01mm		
Lever backlash amount*Note 6		One side 0.2mm		
Operating temperature range		5～50℃（No dew condensation）		
Sound noise		70dB(A)or less		
Maximum load mass		One side 150 g		
Static allowable moment		Mp：4.0N・m	My：5.0N・m	Mr：8.0N・m
Product mass		1.35kg（-PIT:1.49kg, Extension cable:+0.03kg）		
	Breakdown	Gripper body（without finger）	：0.86 kg	
		Finger（Including mounting part）	：0.14 kg（2 pcs）	
		Body cover	：0.11 kg	
		Adapter plate（Including mounting part）	：0.24 kg	
		Extension cable	：0.03 kg	
	(-PIT)	Finger cover（Including mounting part）	：0.14 kg（2 pcs）	

Note1) Control by TM Component(TMflowV2) is needed.

Note2) Please use a stroke by more than 3 mm. The usage for extremely short stroke leads to operation malfunction due to grease shortage.

Note3) Gripping force at the time of shipment: L=30mm. It fluctuates about ±20% due to the change of sliding friction etc by repeated swinging.

Note4) No load, rough indication of maximum stroke at the time of shipment. It fluctuates about ±20% due to the change of sliding friction etc by repeated swinging.

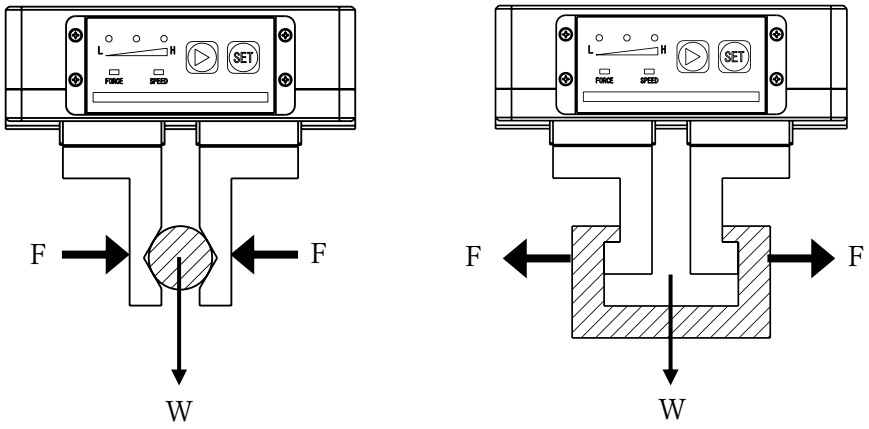
Note5) Variation of repeated 10 times operation at an identical operation condition with an identical work piece.

Note6) The backlash amount of opening/closing direction at the lever intermediate position.

4.2. About selection of gripping force and the work mass.

Force F acting while gripping a work piece is called gripping force as shown in the figure below. It's necessary to select proper gripping force to grip a work piece, to transport, and to assemble.

The standard of the selection is indicated on below, so please refer.



F： Gripping force [N]

W： Work mass [kg]

g： Gravitational acceleration [m/s^2]

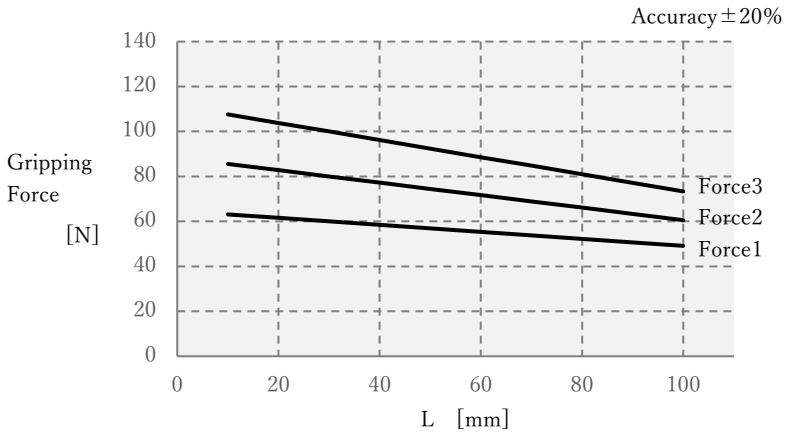
◆ Standard of selection

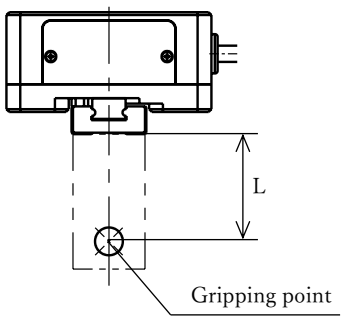
When a gripper just gripping	$F > 10 \times W \times g \sim 20 \times W \times g$
When a gripper involves usual movement	$F > 20 \times W \times g \sim 30 \times W \times g$
When a gripper involves urgent acceleration and deceleration movement	$F > 30 \times W \times g \sim 50 \times W \times g$

※When the friction coefficient of finger and the work piece is 0.1-0.2.

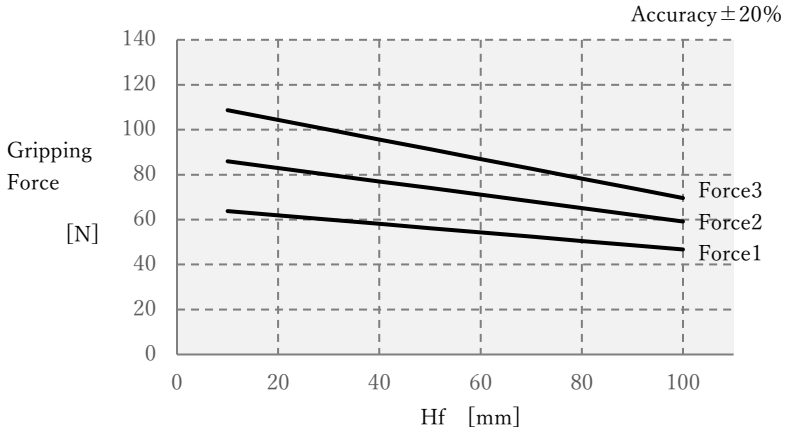
4.3. Effective Gripping Force

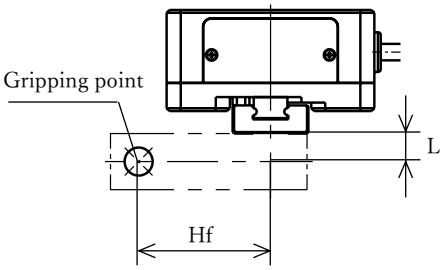
◆ Effective gripping force in the grip point L direction.



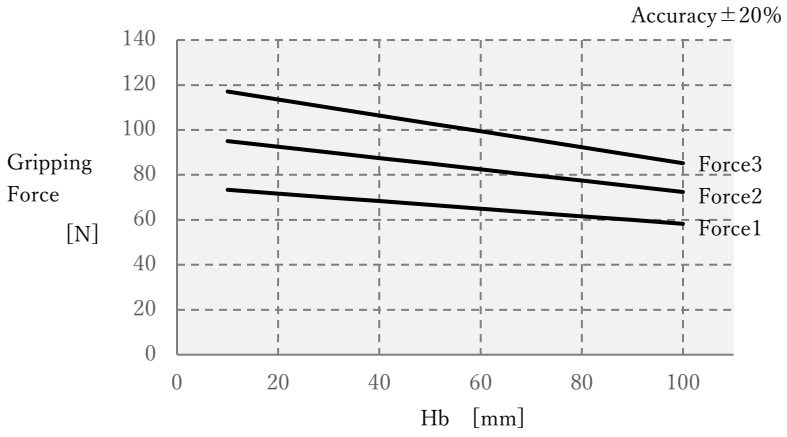


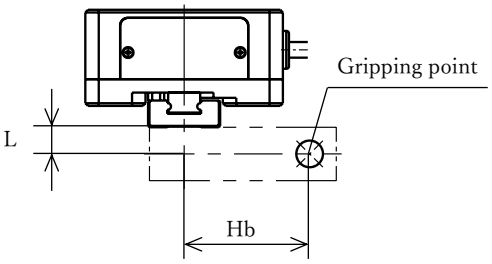
◆ Effective gripping force in the overhang Hf direction. (L=10)





◆ Effective gripping force in the overhang Hb direction. (L=10)

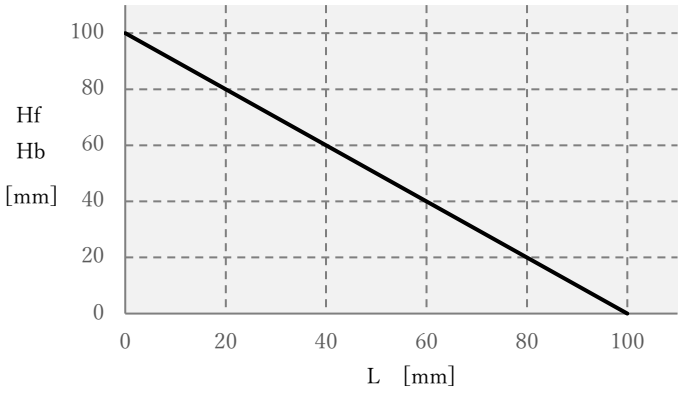


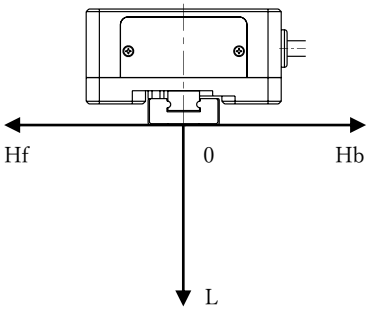


4.4. Grip Limit Range

Please use within the grip limit range. There is a possibility of damage because a moment which applies to a lever becomes bigger when a grip point (L direction) and an overhang (H direction) become bigger.

◆ Grip Limit Range

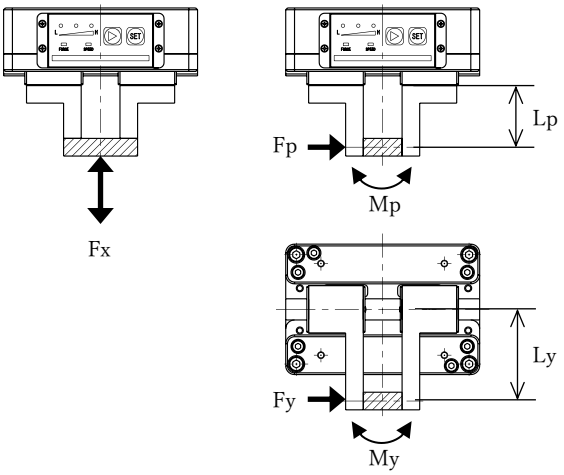


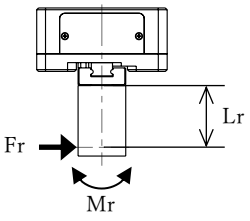


4.5. Allowable load and allowable moment

When adding external force to a lever, please make sure that it'll be within the range of allowable load and allowable moment.

Static allowable load				Static allowable moment		
Fx	Fp	Fy	Fr	Mp	My	Mr
210 N	50 N	50 N	100N	4.0 N・m	5.0 N・m	8.0 N・m





$Mp = Fp \times Lp$

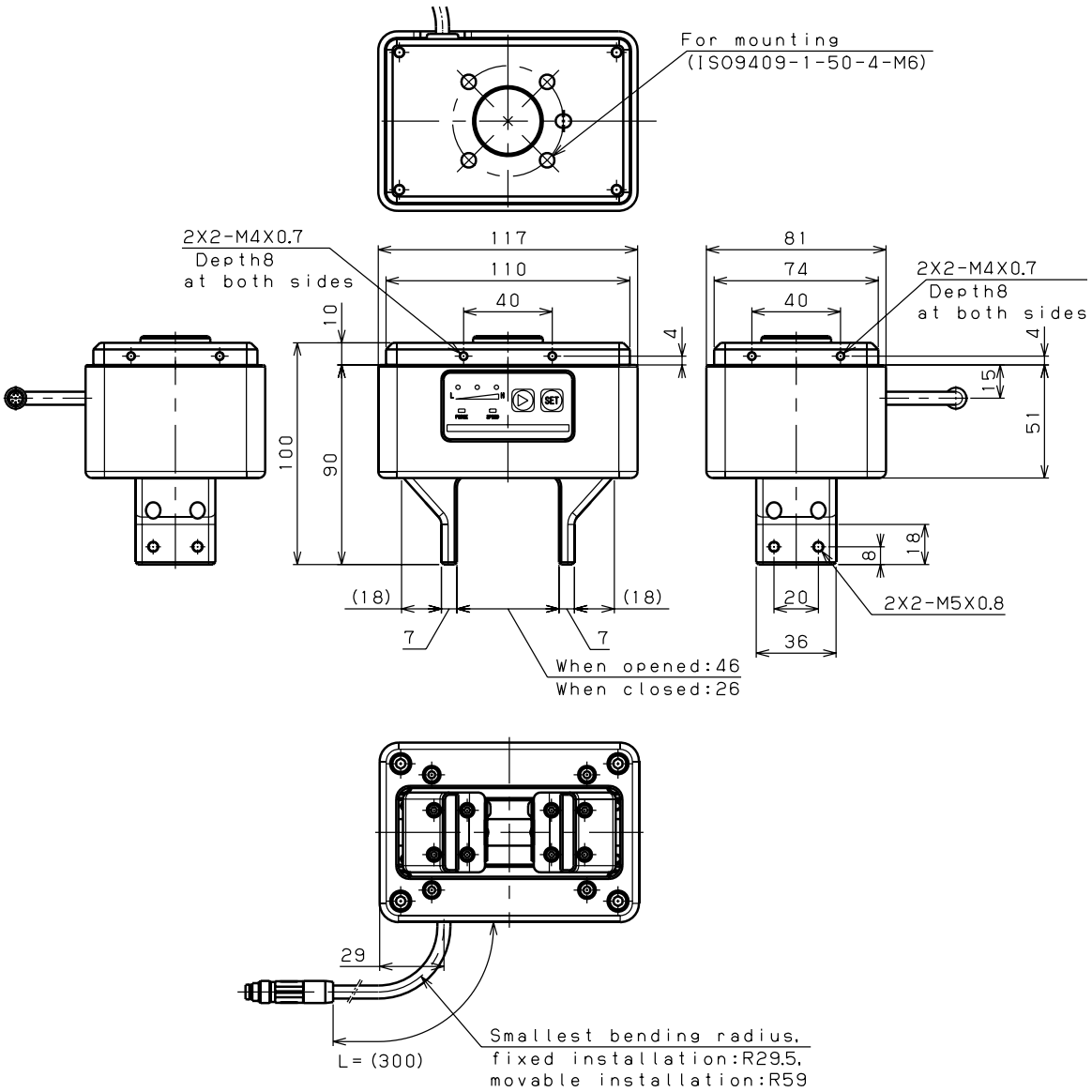
$My = Fy \times Ly$

$Mr = Fr \times Lr$

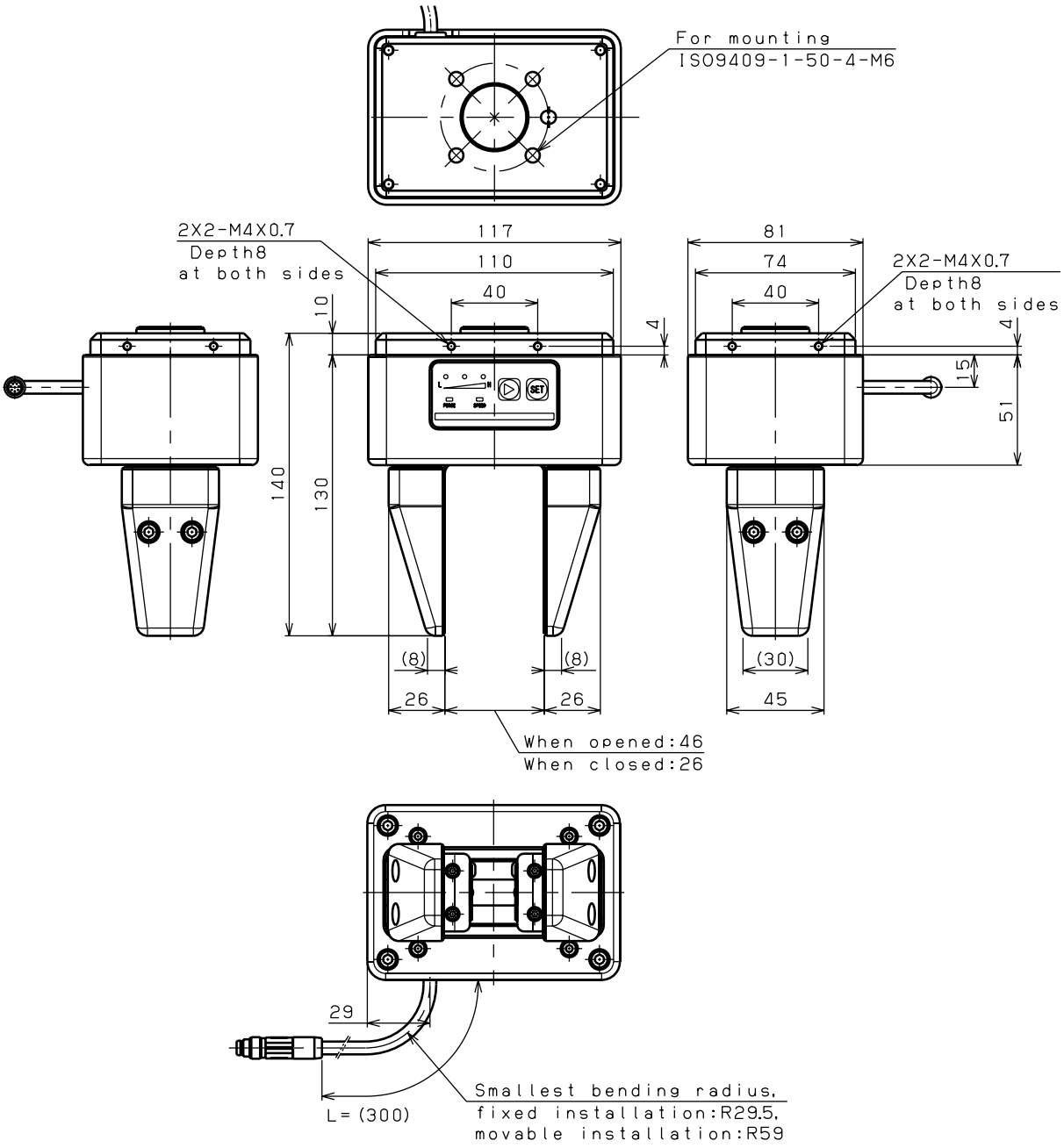
5. Outside dimension

5.1. Outside drawing

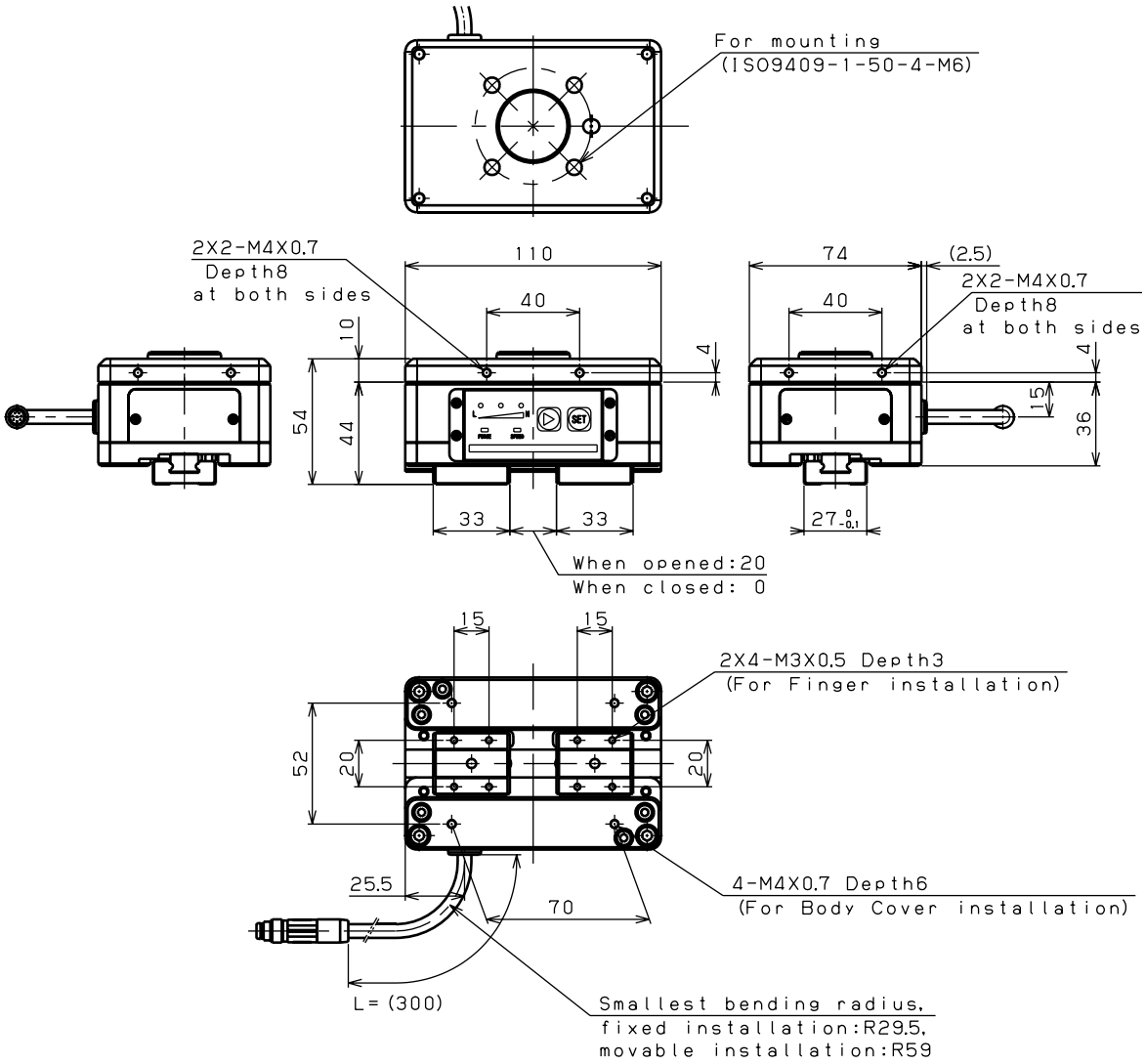
◆ Finger and body cover assembled (outside drawing)



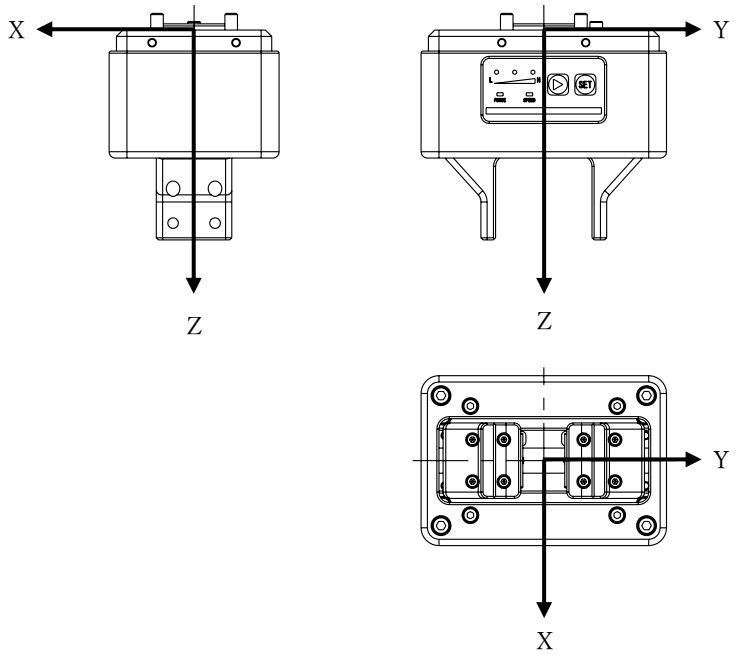
◆ Finger cover assembled (outside drawing)



◆ Accessories not assembled (outside drawing)



5.2. The position of center of gravity



Assembled condition of accessories		position of center of gravity [mm]			Product mass [kg]
		X	Y	Z	
Finger and body cover assembled		1.0	-1.5	31.0	1.35
	Finger cover assembled	1.0	-1.5	36.5	1.49
Accessories not assembled		1.0	-2.0	25.0	1.10

Extension Cable：+0.03 [kg]

6. Installation

6.1. Installing electric gripper on a robot

As to installation to a robot, make a robot arm move to the location where an electric gripper is easily installed, and install it after confirming the safety.

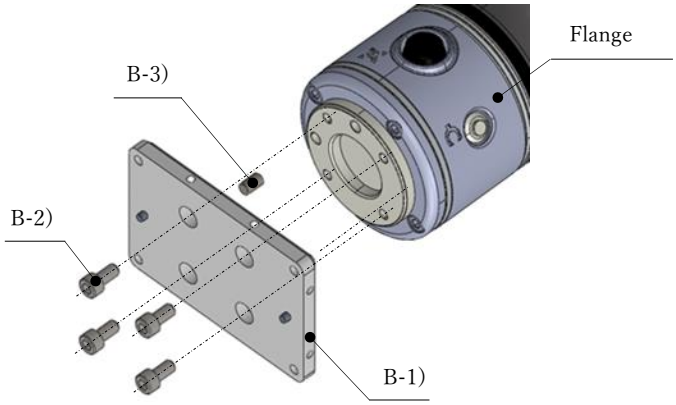
1) Installation of an adapter plate

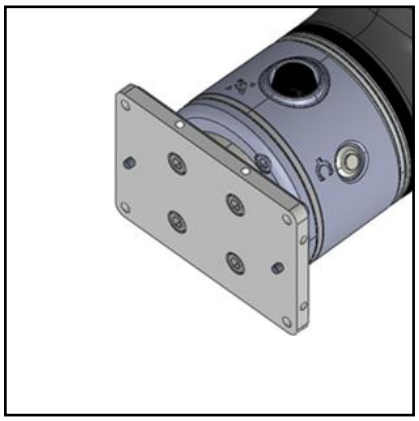
1-1) B-3. positioning pin is inserted flange pin hole at the tip of robot.

1-2) B-1. adapter plate is installed according to the location of the long hole.

1-3) Adapter plate is fixed by attached B-2. fixing bolts 4 pcs.

※Tightening torque：9.6 N・m



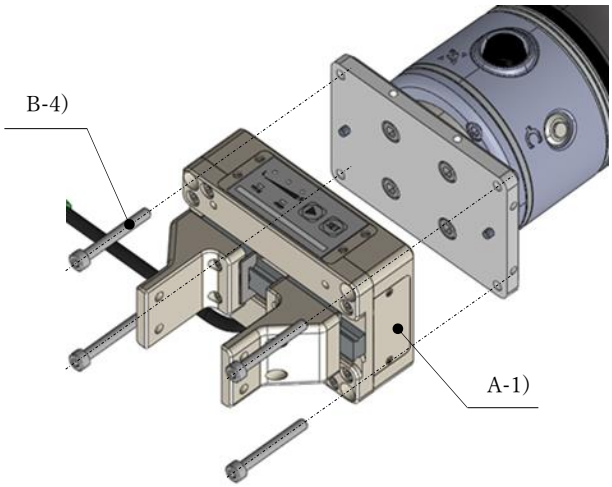


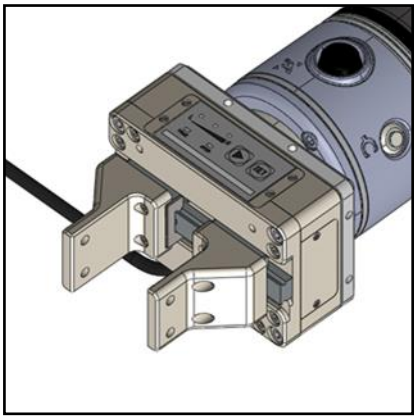
2) Installation of an electric gripper

2-1) A-1. gripper body is installed according to 2 positioning pin of an adapter plate.

2-2) Gripper body is fixed by attached B-4. fixing bolts 4pcs.

※Tightening torque：2.9 N・m



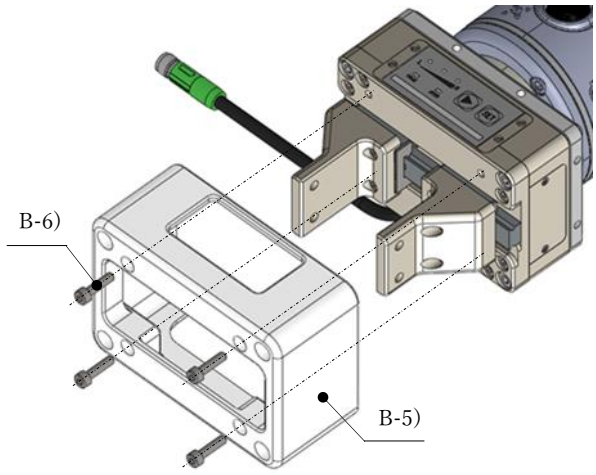


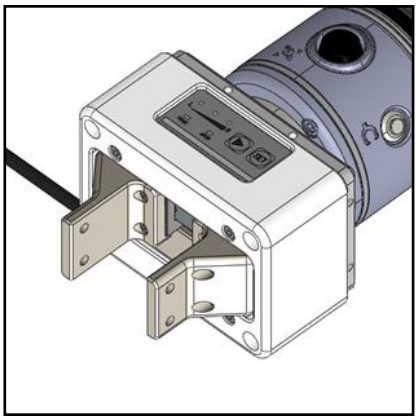
3) Installation of a body cover

3-1) B-5. body cover is installed on the gripper body.

3-2) Body cover is fixed by attached B-6. fixing bolts 4pcs.

※Tightening torque：1.4 N・m



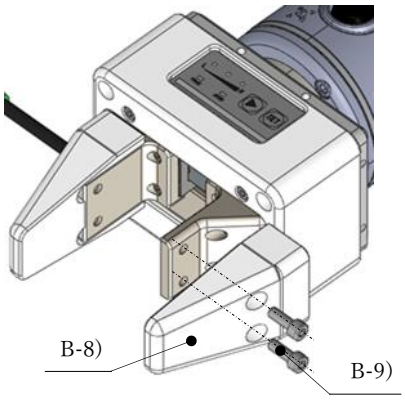


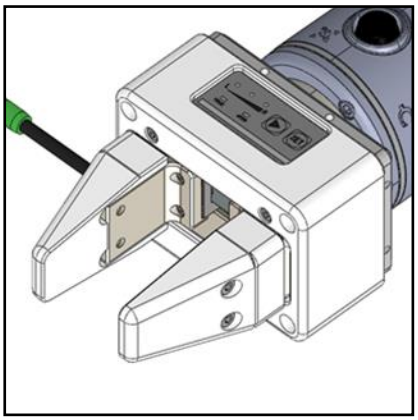
4) Installation of a finger cover (Options for "-PIT")

4-1) B-7. finger cover is installed on the finger.

4-2) Finger cover is fixed by attached B-8. fixing bolts 2pcs.

※Tightening torque：2.9 N・m

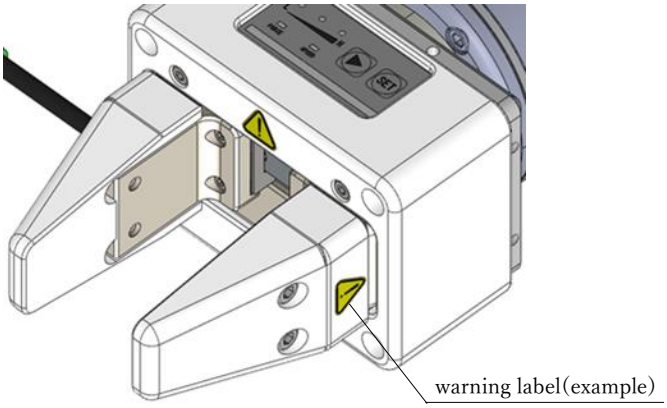




5) Attaching warning labels

Attach warning labels to locations where opening and closing operations of the gripper pose a danger.(Please prepare the warning label by yourself.)

・ attaching example



6.2. Installing Connectors

Connect the communication connector on the gripper body to the Tool Connector on the tip of the robot.

Use an extension cable if necessary.

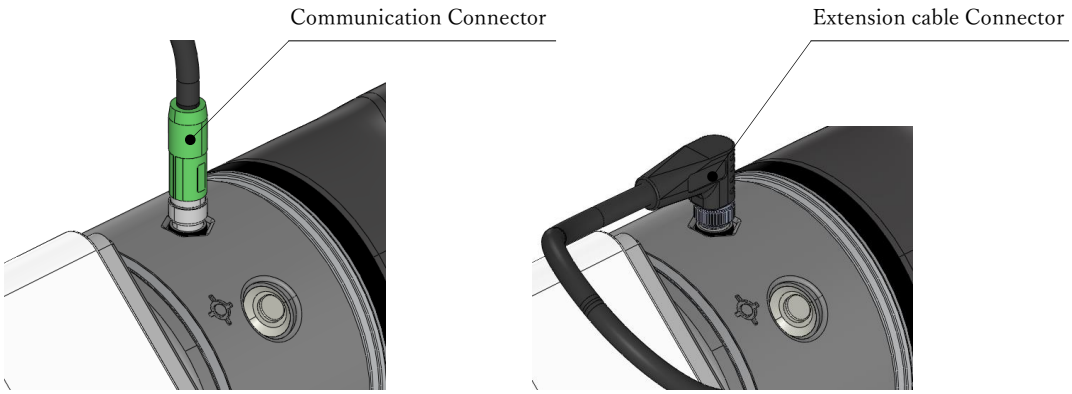
Tighten tightly so that there is no loosing.

Attach the cable not to be an acute angle more than the minimum bending radius (29.5mm when fixed).

※ Please connect the connector when not energized.

※Before installing the connector, install the TM Component and configure the robot.

Reference ☞P.32 "Installation of TM Component"



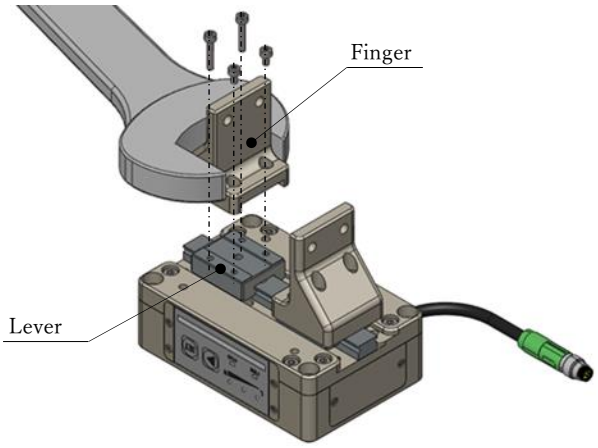
6.3. Mounting Finger and Lever Attachments

The assembled fingers are general-purpose products. Please use them depending on the application.

When mounting and removing finger and lever attachments, support with a spanner so that the lever will not be twisted.

When design lever attachment at your side, be careful not to exceed maximum load mass and make small and light-weight as much as possible.

Please refer to the table below for the tightening torque of mounting bolt.



◆ Tightening torque table

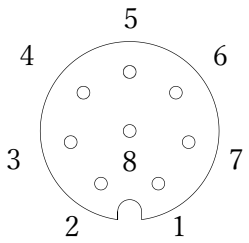
Mounting part	Bolt used	Tightening Torque
Lever	M3	1.14 N・m
Finger	M5	2.84 N・m

◆ Maximum load (attachment) mass

Maximum load mass
150 g（per lever）

7. Input / Output Interface

7.1. Connector Pin Arrangement



M8 8 pin connector（plug）

Pin No.	Type	Function
1	Power +24V	DC24V Power Supply
2		
3		
4		
5		
6	RS485 comm.(-)	RS485 comm.
7	RS485 comm.(+)	RS485 comm.
8	Power GND	DC0V Power Supply

7.2. Power Specifications

・ Power

Input Voltage：24V±10%

Input current：1.8A (Maximum instantaneous motor current 1sec or less)

⚠ CAUTION

For safe use, install an overcurrent protection such as a fuse or circuit protector on the power supply.　(Recommended rated current: 2A)

8. Instruction of LED Band

You can check the status of the gripper with the LED band on the control panel.

	State	Color	Function
1)	Standby	Light Blue (on)	Waiting for operation. Able to receive operation commands from the robot.
2)	Operating	Green (on)	Opening or closing. Unable to receive operation commands from the robot until the operation is completed.
3)	Memorizing Workpiece	Yellow (on)	Opening or closing at the minimum speed. This operation is performed when the power is turned on or when the gripper receives the command to open or close after [Reset_work_position]. Unable to receive operation commands from the robot until the operation is completed.
4)	Error	Red (blinking)	There is an error. Refer to ☞P.46 "Error Code and Remedy" for the details of the error and how to deal with and resolve.
5)	Emergency operation	Red (lighting)	Emergency operation in progress. It is not possible to receive motion commands from the robot until it is released. It is necessary to turn on the power again to cancel.

9. Installation of TM Component

IMPORTANT：For TMflowV2 only.

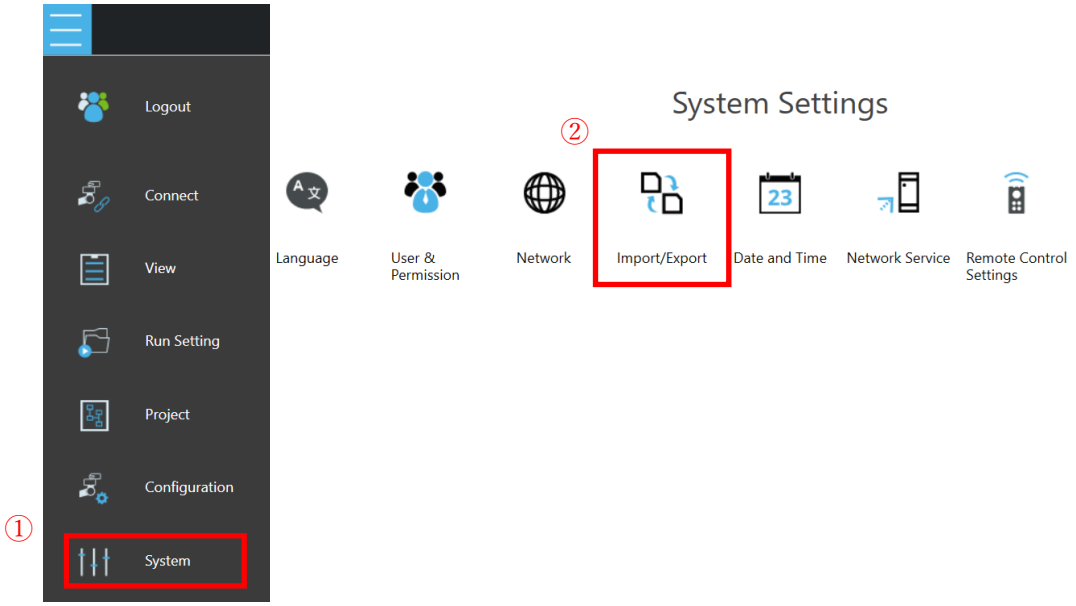
9.1. Preparation for TM Component Installation

1) Download the TM Component from our website (http://www.newera.co.jp/en/) and save “TM_Export” folder in the unzipped file to a USB drive that can be used with the TM S series.
2) Rename the USB drive to “TMROBOT”.

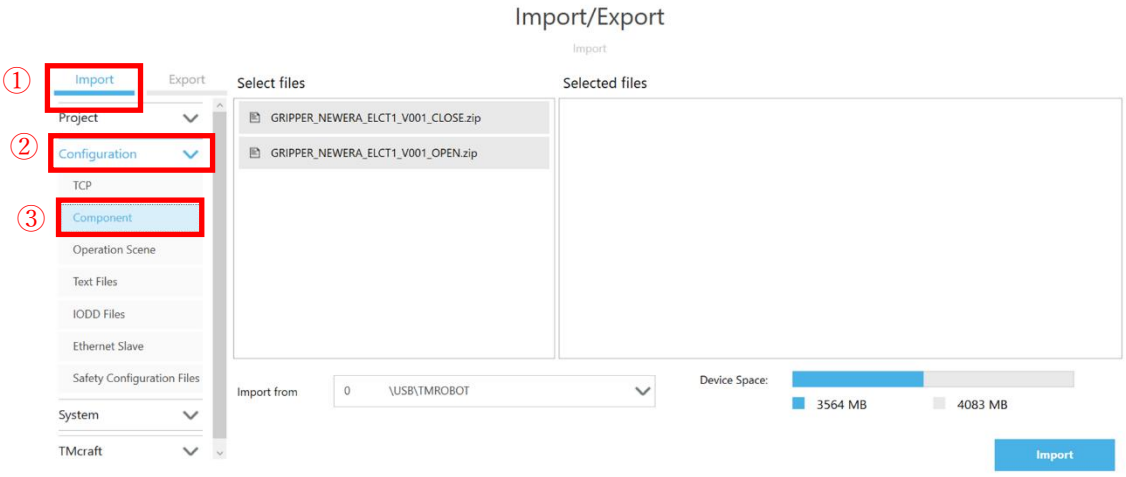
9.2. Installation of TM Component

Note) [Configuration]>[Tool Settings]:Ensure that the TCP settings are configured correctly.

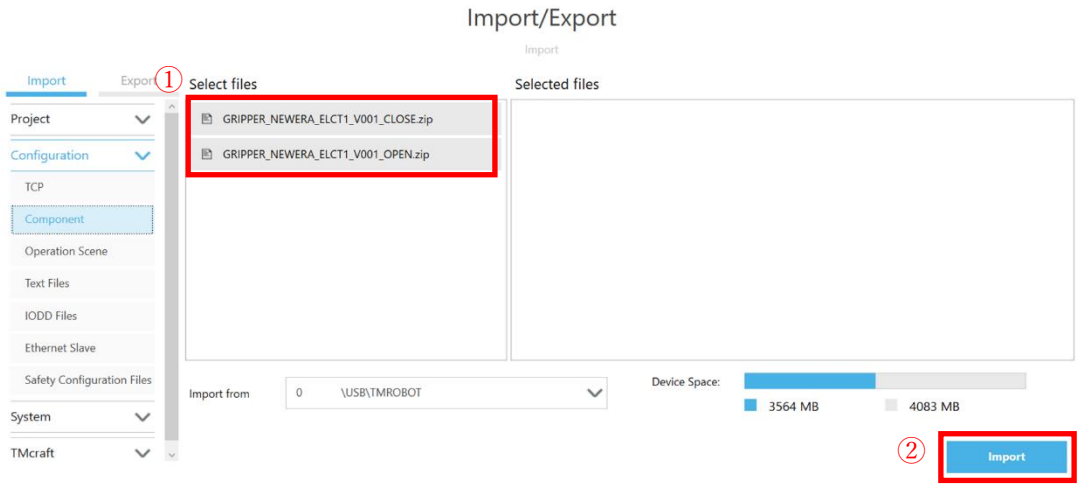
1) Connect the USB drive storing the TM Component to the Control Box.
2) Select [System]＞[Import/Export] from TMflow Menu.



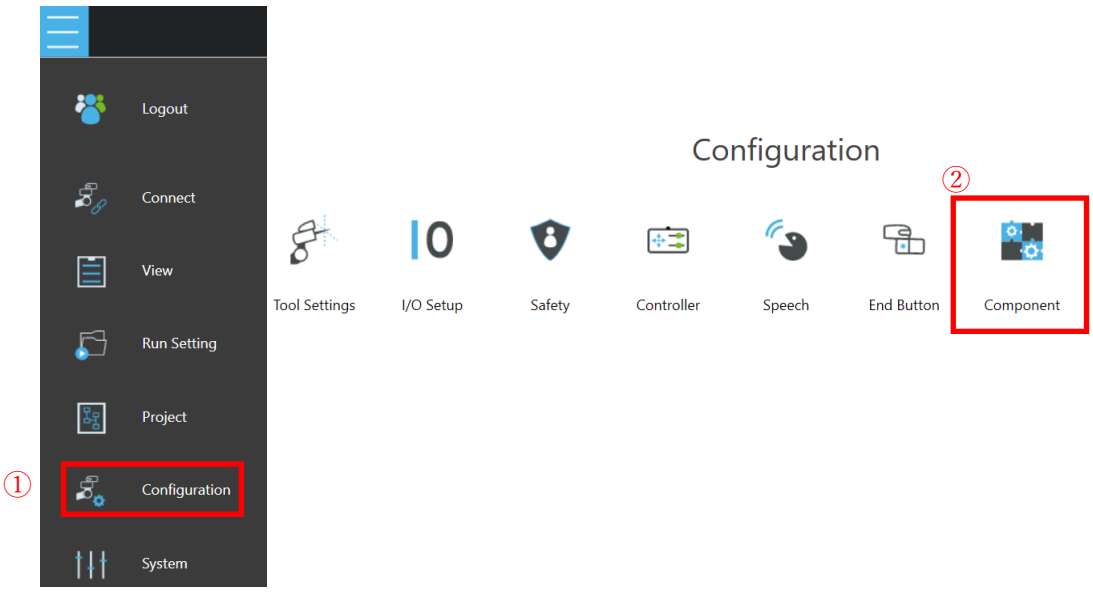
3) Select [Import]>[Configuration]>[Component].



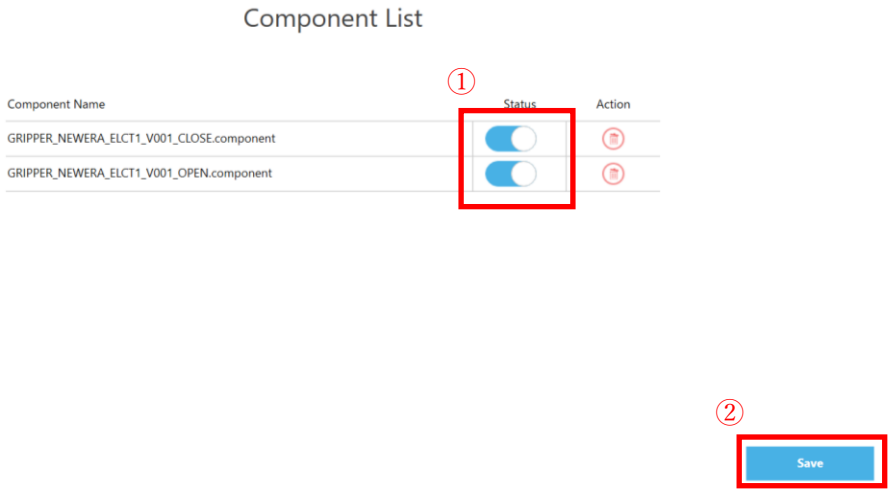
4) Select Components to add and press [Import] button.



5) Select [Configuration]>[Component] from TMflow Menu.

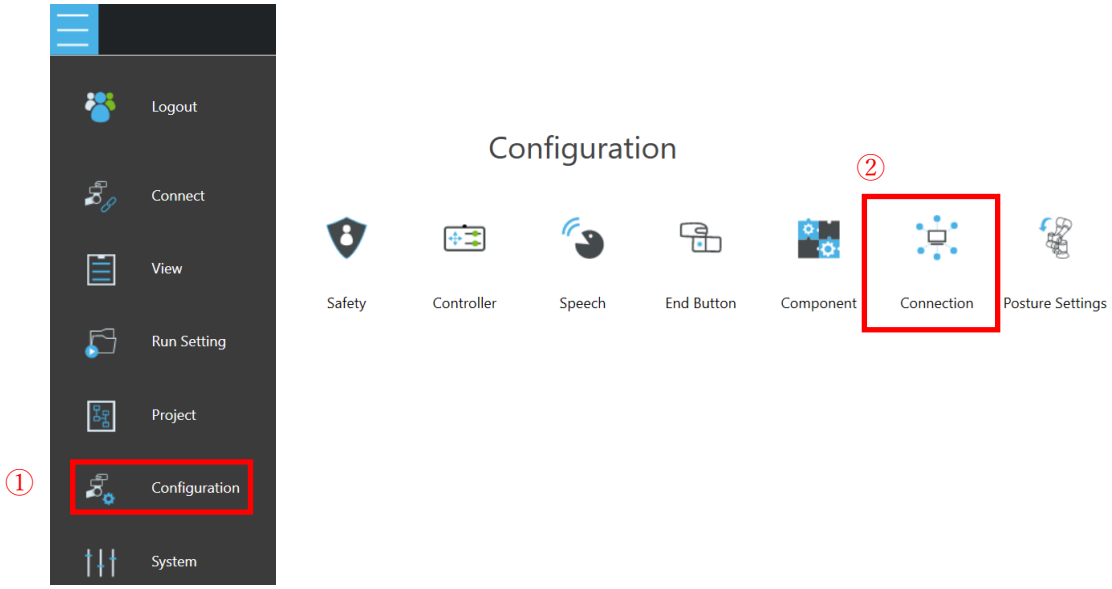


6) Enable the Components and press [Save] button.

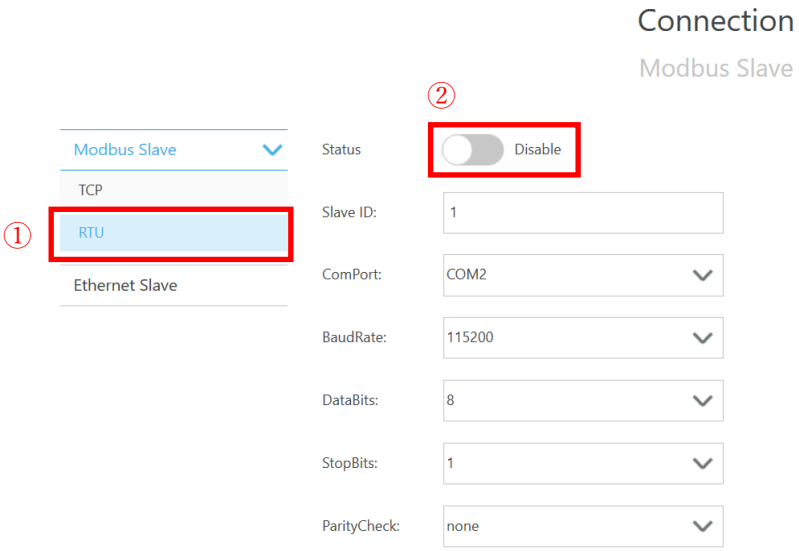


9.3. Robot Setting

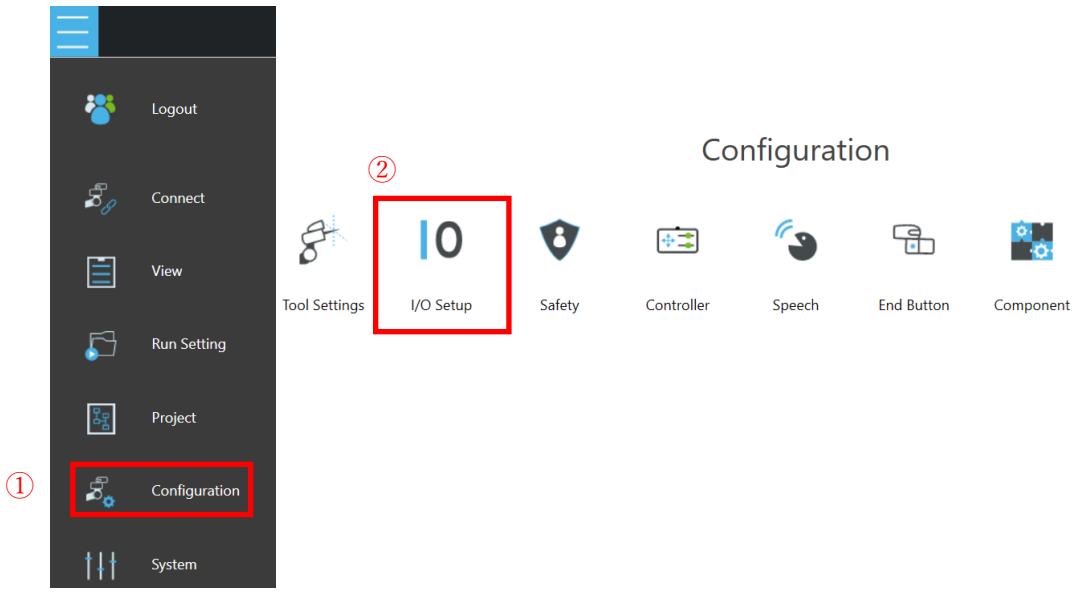
1) Select [Configuration] > [Connection] from TMflow Menu.



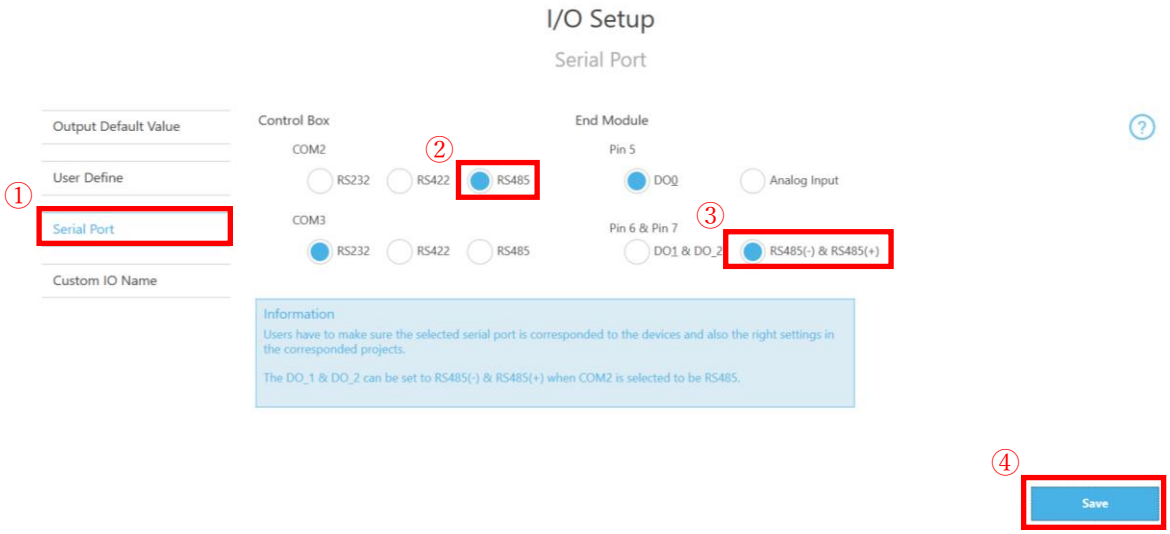
2) Select [Modbus Slave RTU], set to [Disable].



3) Select [Configuration] > [I/O Setup] from TMflow Menu.

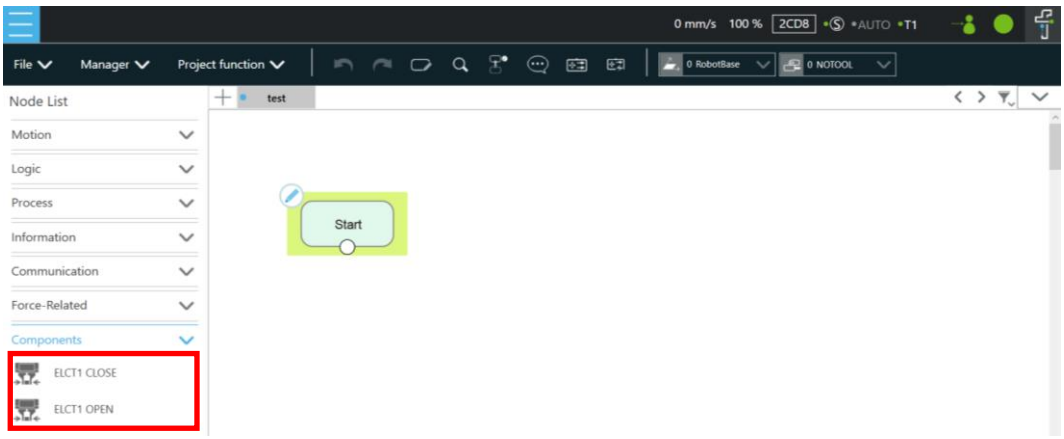


4) Select [Serial Port], set Control Box [COM2] to [RS485], set End Module [Pin6 & Pin7] to [RS485(-) & RS485(+)] and press [Save] button.

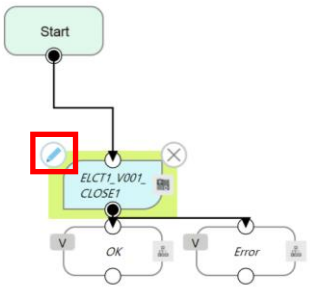


9.4. How to use TM Component

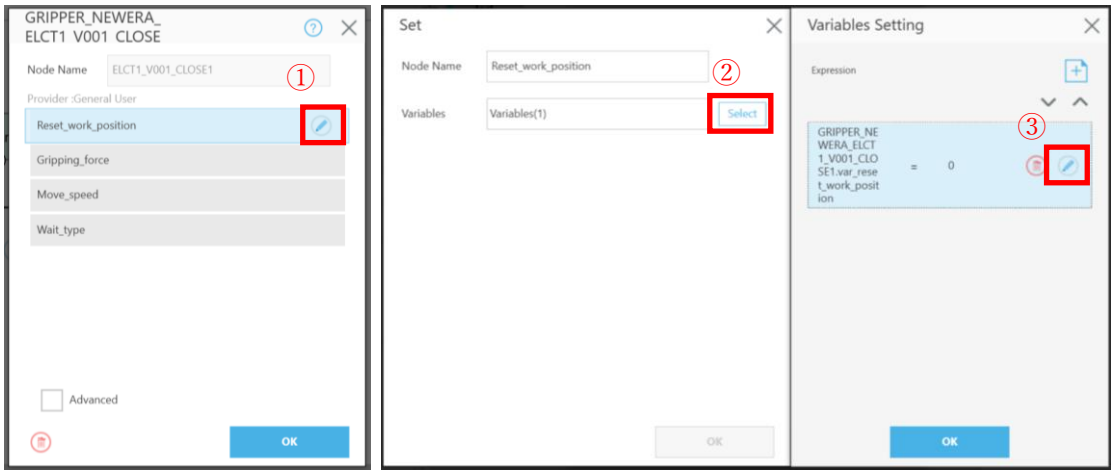
1) When open the project, the imported icons(TM Components) are displayed in the [Components] section.



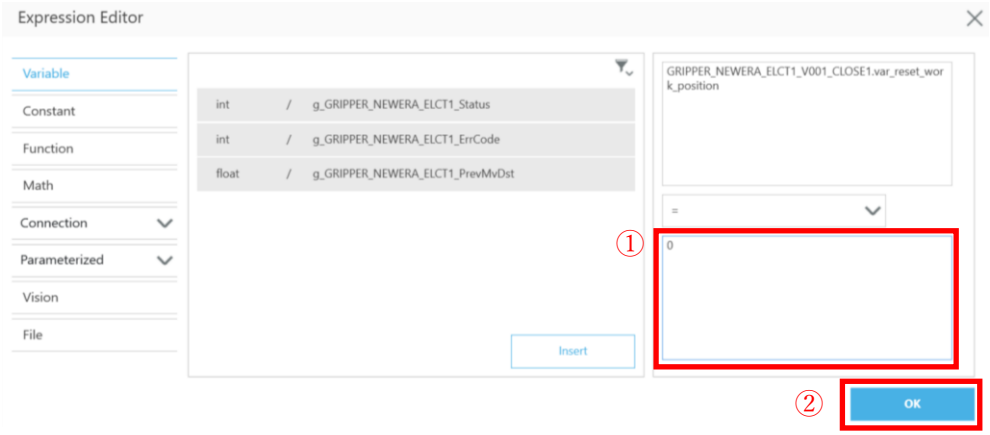
2) Drag & drop the icon onto the project. Press the [Pencil] button on the icon to display the Parameter Setting screen.



3) Press the [Pencil] button > [Select] > [Pencil] button to display the Parameter editing screen.



4) Edit the area at the bottom right of the screen and press [OK] button to set the gripper parameters. For details on parameters, reference the next section.



9.5. About TM Component

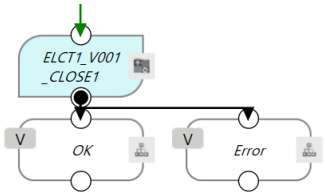
1) [ELCT1 CLOSE] component

The gripper fingers move to closing direction.

Note)

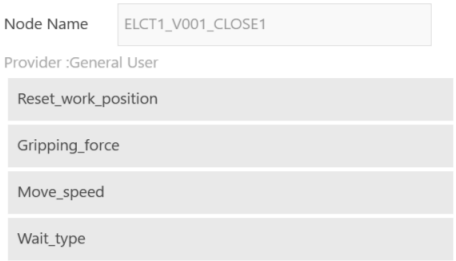
It memorizes operation stroke every open/close, and decelerates right before the previous stopping position. After decelerating and stopping, it operates with the set gripping force.

[Explanation]



Gateway	Explanation
OK	Successful.
Error	The gripper has an error.

[Parameter settings]



・ Reset_work_position

Reset the previous stop position.

Value	Explanation
0 (Default)	Disable
1	Enable

Note)

Set this when change the workpiece. If set to [Enable], this the operating speed becomes low as the workpiece memorizing movement(with LED band yellow). If this is [Disable] when the workpiece is changed, unintended gripping force may be applied to the workpiece. Be sure to select [Enable] when you change the workpiece.

* It runs [Enable] as first action after turning on the power.

・ Gripping_force

Set the gripping force level.

Value	Explanation
1 (Default)	approx. 60 [N]
2	approx. 80 [N]
3	approx. 100 [N]

・ Move_speed

Set the moving time(*1 level. This is disabled when [Reset_work_position] is [1].

Value	Explanation
1 (Default)	approx. 1.8 [sec]
2	approx. 1.2 [sec]
3	approx. 0.9 [sec]

*1) at moving full stroke.

・ Wait_type

Set how to proceed to the next node.

Value	Explanation
0 (Default)	Wait for the operation completion signal.
100～5000	Wait the set time[ms] and proceed to the next node.

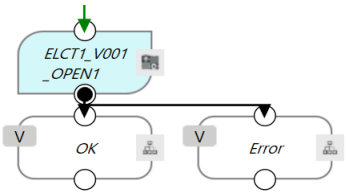
2) [ELCT1 OPEN] component

The gripper fingers move to opening direction.

Note)

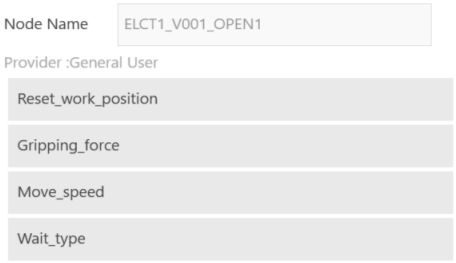
It memorizes operation stroke every open/close, and decelerates right before the previous stopping position. After decelerating and stopping, it operates with the set gripping force.

[Explanation]



Gateway	Explanation
OK	Successful.
Error	The gripper has an error.

[Parameter settings]



・ Reset_work_position

Reset the previous stop position.

Value	Explanation
0 (Default)	Disable
1	Enable

Note)

Set this when change the workpiece. If set to [Enable], this the operating speed becomes low as the workpiece memorizing movement(with LED band yellow). If this is [Disable] when the workpiece is changed, unintended gripping force may be applied to the workpiece. Be sure to select [Enable] when you change the workpiece.

* It runs [Enable] as first action after turning on the power.

・ Gripping_force

Set the gripping force level.

Value	Explanation
1 (Default)	approx. 60 [N]
2	approx. 80 [N]
3	approx. 100 [N]

・ Move_speed

Set the moving time(*1 level. This is disabled when [Reset_work_position] is [1].

Value	Explanation
1 (Default)	approx. 1.8 [sec]
2	approx. 1.2 [sec]
3	approx. 0.9 [sec]

*1) at moving full stroke.

・ Wait_type

Set how to proceed to the next node.

Value	Explanation
0 (Default)	Wait for the operation completion signal.
100～5000	Wait the set time[ms] and proceed to the next node.

9.6. About Global Variables

Type	Name	Value
int	g_GRIPPER_NEWERA_ELCT1_Status	0
int	g_GRIPPER_NEWERA_ELCT1_ErrCode	0

The value will be overwritten every time the component is executed.

Name		Explanation
Status		Gripper Status
	0	Normally
	3	The gripper has an error. Check the error code.
	999	Could not display the Gripper Status. It cannot be obtained in the following case: ・When [Wait_type] is other than [0].
ErrCode		Gripper Error Status
	101	Error Code : E101 [Overvoltage Error] The input voltage exceeds the rated voltage. Check if the power supply voltage is appropriate.
	102	Error Code : E102 [Low voltage Error] The input voltage below the rated voltage. Check if the power supply voltage is appropriate.
	201	Error Code : E201 [Operation Error] The gripper has not returned an operation completion signal. The gripper may be broken. Contact our distributor or New-Era office.
	301	Error Code : E301 [Communication Error] The communication between robot and gripper fails. Check that the robot and gripper are installed correctly.
	401	Error Code : E401 [Emergency operation Error] Displayed when an emergency operation is performed. Turn on the power again.

10. Failure Diagnosis and Troubleshooting

10.1. Phenomenon, Possible Cause, and the Remedy

If the product does not work as intended, or if the operation is unstable, refer to this section and take appropriate measures. If it still does not work properly, or if you have any other questions, please contact our distributor or New-Era office.

Phenomenon	Possible Cause	Remedy
LED band does not light when the power is turned on.	Unconnected connector	Check if the comm connector on the gripper is properly attached to the Tool End Connector on the robot.
	Disconnected cable	Check the cable for cracks, damage, or breaks
	Incorrect wiring	Check if the connected robot is TM S series Tool End Connector signal interface wiring.
	Broken/damaged product	Needs repairing. Contact our distributor or New-Era office.
When the power is turned on, LED band flashes red and the gripper does not work.	Low voltage protection is working error code: E101	Check if the power supply voltage is appropriate.
	Overvoltage protection is working error code :E102	Check if the power supply voltage is appropriate.
LED band flashes after the gripper moves, and then the gripper doesn't work.	Product is broken/damaged error code: E201	Needs repairing. Contact our distributor or New-Era office.
Not working even if the gripper is in standby (LED light blue) and the command is sent.	Communication error error code: E301	Check if the comm connector on the gripper is properly attached to the Tool End Connector on the robot.

Phenomenon	Possible Cause	Remedy
Not working even if the gripper is in standby (LED light blue) and the command is sent.	Disconnected cable	Check the cable for cracks, damage, or breaks
	Incorrect wiring	Check if the connected robot is TM S series Tool End Connector signal interface wiring.
	RS-485 is not valid in robot settings.	Check if the robot setting is appropriate.
	Broken/damaged product	Needs repairing. Contact our distributor or New-Era office.
Operating speed of the gripper is very slow.	The first operation after turning on the power.	For the first operation after turning on the power, the LED band lights yellow and the gripper operates at the minimum speed. This is not a malfunction
	[Reset_work_position] is enable.	Operating at the minimum speed when the power is turned on or after the [Reset_work_position] is enable. Check if the parameter is performed at the appropriate timing.
Operating speed of the gripper becomes very slow in the middle of the operation.	Trying to grip the smaller workpiece than that is gripped just before.	Memorizing the workpiece for each movement and decelerating just before gripping. This is not a malfunction. If the workpiece is changed, the gripper needs to grip the workpiece in advance at the minimum speed with enable [Reset_work_positon].
Sometimes the gripping force of the gripper is stronger than the setting.	Trying to grip the bigger workpiece than that is gripped just before.	Unable to grip the workpiece with the setting force without the deceleration operation just before its gripping. If the workpiece is changed, the gripper needs to grip the workpiece in advance at the minimum speed with enable [Reset_work_positon].

10.2. Error Code and Remedy

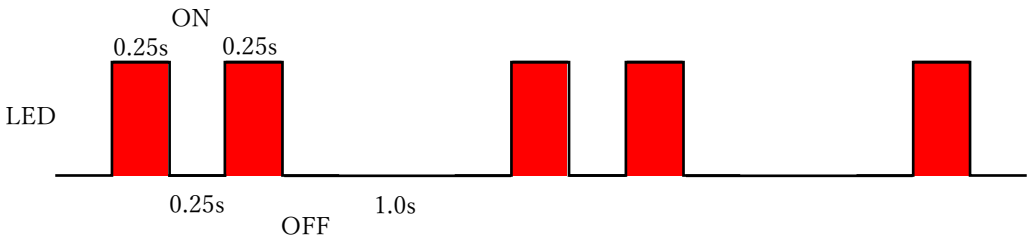
If the LED band is blinking red, there is an error. You can check the error code in the global variables on the TMflow project screen.

You need to turn off the power and then on again to cancel the error. After removing the causes of the problem, turn off the power of the robot, and then turn it on again.

Error Code	Error Details	Remedy
E101 <LED band> Blinking red twice	[Low Voltage Error] The input voltage is below the rated voltage	Check if the power supply voltage is appropriate.
E102 <LED band> Blinking red three times	[Overvoltage Error] The input voltage exceeds the rated voltage.	Check if the power supply voltage is appropriate.
E201 <LED band> Blinking red four times	[Operation Error] The operation completion signal is not returned for 5 seconds or more after the operation command.	Motor or opening-closing mechanism may be broken or damaged, and needs repairing. Contact our distributor or New-Era office.
E301 Can only be confirmed with TMflow	[Communication Error] The communication between robot and gripper fails.	Check if the comm connector on the gripper is properly attached to the Tool End Connector on the robot.
E401 <LED band> Red lighting	[Emergency operation error] Displayed when an emergency operation is performed.	Turn on the power again.

◆ Blinking LED when an error occurs

You can check the details of the error by counting the number of times the LED band blinks in red. It lights on for 0.25 seconds, blinks specific number times in 0.25 seconds, and repeats them at intervals of about 1 second.



11. Declarations and Certificates

11.1. Declaration of Incorporation

In terms of the EU Machinery Directive 2006/42/EC Annex II 1 B.

The manufacturer :	New-Era Co., Ltd. 1-7-21 Nakagawa-higashi, Ikuno-ku, Osaka, 544-0006 Japan
Product designation :	Electric parallel gripper
Type designation :	ELCT1-100-20-TMS
Serial number:	1000000-1999999

The product is partly completed machinery according to 2006/42/EC.
Do not use the product until the entire machine fully complies with all essential requirements of 2006/42/EC.

11.2. Declaration of Conformity

In terms of the EU Directive 2014/30/EU(EMC) , 2011/65/EU(RoHS).

The manufacturer	New-Era Co., Ltd. 1-7-21 Nakagawa-higashi, Ikuno-ku, Osaka, 544-0006 Japan
Product designation	Electric parallel gripper
Type designation	ELCT1-100-20-TMS
Serial number:	1000000-1999999

The product is in conformity with, and CE marked according to, the following directives:

2014/30/EU	Electromagnetic Compatibility Directive (EMC)
2011/65/EU	Restriction of the use of certain hazardous substances (RoHS)

Signature: see original declaration

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New-Era®

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