

## Electric actuator ESSD/ELCR Series

### ELECTRIC ACTUATOR ESSD/ELCR SERIES





# New electric actuator with the handiness of pneumatic components

The ESSD/ELCR series is an electric actuator series that directly incorporates the design concept of pneumatic components.  
This series is environmentally friendly and is also suitable for replacing pneumatic cylinder.

Electric actuator  
**ESSD Series**

Rod type

pneumatic



Electric actuator  
**ELCR Series**

Table type



Teaching pendant  
**ETP-2**

Five buttons  
for  
easy setting!



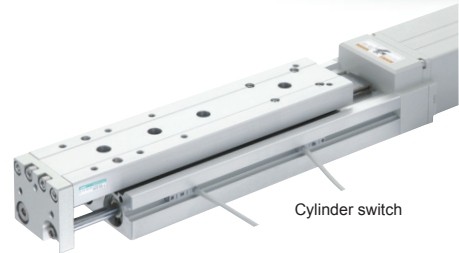
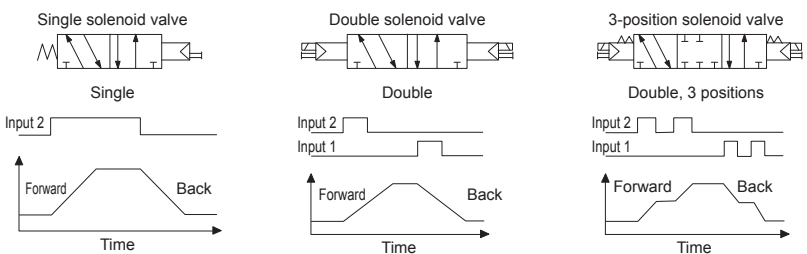
## Saving space with a built-in controller

No need for wiring and the installation space for a controller.  
The same height as a pneumatic cylinder.

## Design a system as if it is a pneumatic cylinder.

The design let the user directly imagine a pneumatic cylinder in the external shape, different controls, and the way of use.

- Operation signal same as a solenoid valve ...  
Works in the same sequence as a solenoid valve that controls a pneumatic cylinder.  
(Single solenoid valve, double solenoid valve, 3-position solenoid valve)
- Cylinder switch can be installed...  
A cylinder switch (T-type switch) for position detection can be installed.

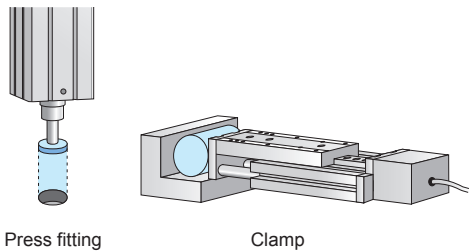


## Flexible operation control

- Three control modes available

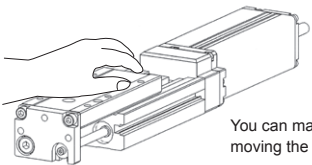
	Conveyance	Press fitting	Clamp
Solenoid valve mode	●	●	●
7-point positioning mode	●	●	●
Pitch transfer mode	●	—	—

- Speed and acceleration control
- In-position range can be changed by setting



## Easy teaching

- Five buttons for easy setting!
- Direct teaching



You can make adjustment manually by moving the rod and the table.

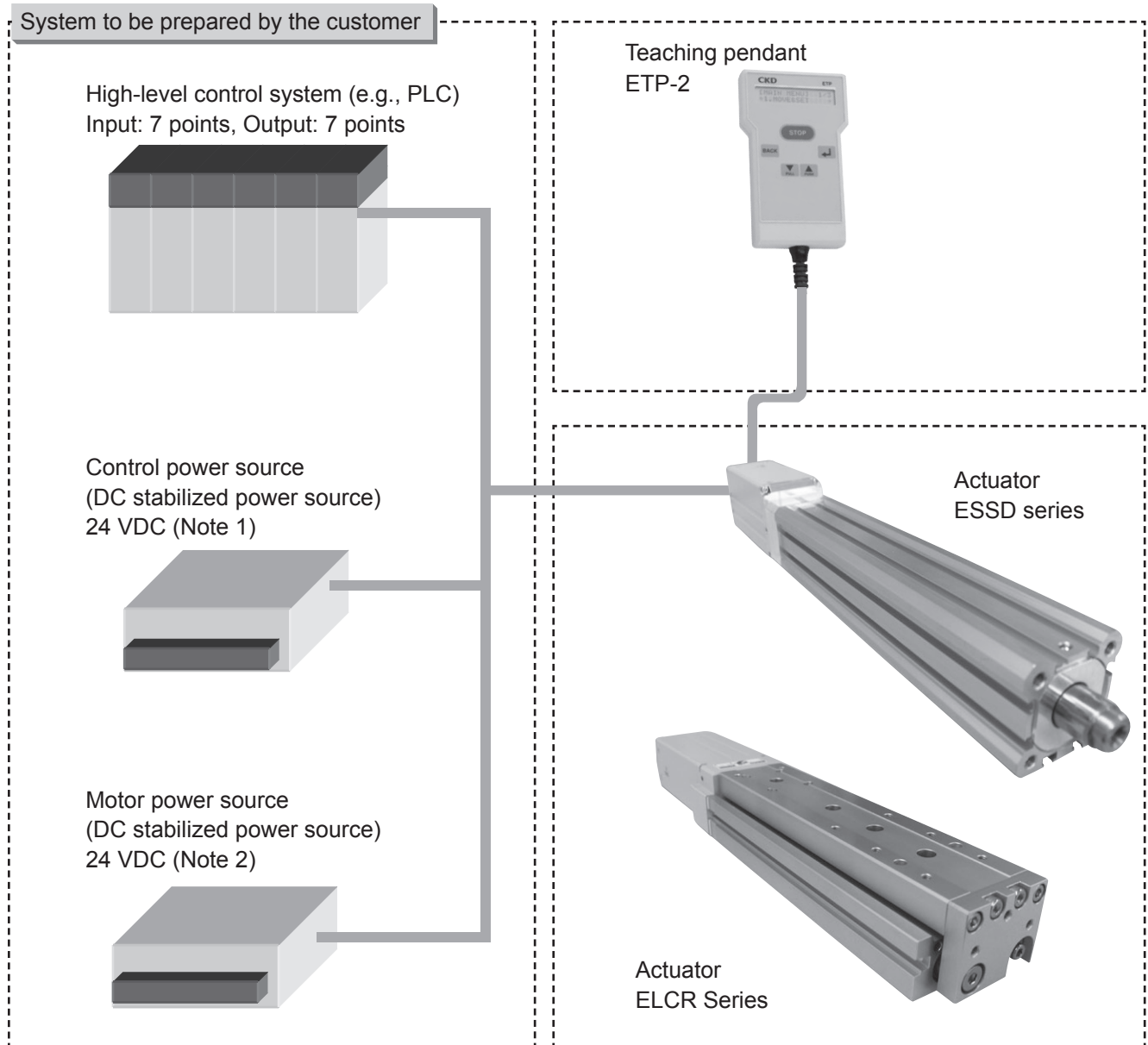
## Higher reliability

- Check the alarm by the teaching pendant.
- Save up to 10 alarm history.

### Product variations of ESSD/ELCR

	Model	Motor size	Lead	Stroke length
				50 100 150 200
Rod type	ESSD	□28	6	●
		□42	6 — 12 — 24	●
		□56	6 — 12	●
Table type	ELCR	□28	6	●
		□42	6 — 12 — 24	●

## System



### Note

In no event shall CKD be liable for merchantability or fitness for a particular purpose, notwithstanding any disclosure to CKD of the use to which the product is to be put.  
When you use multiple power sources, use the same OV.

Note 1: Each unit of this product requires 200 mA (including the teaching pendant). Prepare a DC stabilized power source that has a capacity well over the required capacity.

Note 2: Each unit of this product requires a maximum of 3 A for a motor of size □42, and a maximum of 4 A for a motor of size □28 or □56. Prepare a DC stabilized power source that has a capacity well over the required capacity.



## Safety information

Always read this section before use.

When designing equipment that employs an electric actuator, you are responsible for designing safe equipment by ensuring the safety of the system that operates with the mechanical mechanism of the equipment and the electrical controls.  
It is important to select, use, handle, and maintain the product appropriately to ensure that the CKD product is used safely.  
Observe warnings and precautions to ensure device safety.  
Check that device safety is ensured, and manufacture a safe device.



### WARNING

- 1** This product was designed and manufactured for use as parts for general industrial machinery. It must be handled by an operator having sufficient knowledge and experience.
  - 2** Use the product within the range of the product specification.  
This product must be used within its stated specifications. Do not attempt to modify or additionally machine the product.  
This product is intended for use as a general-purpose industrial device or part. It is not intended for use outdoors or for use under the following conditions or environment.  
(If you consult CKD upon adoption and consent to CKD product specification, it will be applicable; however, safeguards should be adopted that will circumvent dangers in the event of failure.)
    - ① Usage with or within components or applications that come into direct contact with nuclear energy, railroad, aviation, ships, vehicles, medical devices, beverage, and food. Usage in applications where safety is required such as amusement equipment, emergency operation (closing, opening, etc.) circuit, press machine, brake circuit, and safeguards.
    - ② Use for applications where life or assets could be adversely affected, and special safety measures are required.
  - 3** Observe corporate standards and regulations, etc., related to the safety of device design.
  - 4** Do not remove devices before confirming safety.
    - ① Inspect and service the machine and devices after confirming safety of the entire system related to this product.
    - ② Note that there may be hot or charged sections even after operation is stopped.
    - ③ When inspecting or servicing the device, turn off the power of the device and related equipment, and be careful not to have electric shock.
  - 5** Observe the warnings and the operation description of the product to prevent accidents.
    - ① During teaching and test operation, do not touch moving sections because they may show an unexpected behavior. If you cannot see a moving section from the position at which you operate the product, be sure to check that the movement of the moving section is not dangerous.
  - 6** Observe the cautions to prevent electric shock.
    - ① Do not touch the heatsink, the cement resistor, or the motor within the controller.  
They become hot enough to cause a burn. Leave it for some time before you handle them for inspection or other purposes.  
The internal capacitor retains high voltage after power-off until it discharges electricity. So do not touch it for about three minutes.
    - ② Turn off the power supply to the controller before maintenance or inspection. You may be electrified with high voltage if you fail to do so.
    - ③ Do not insert or remove cables to/from connectors while power is on. Doing so may cause a malfunction, a fault, or an electric shock.
  - 7** Install an overcurrent protection device.  
In accordance with JIS B 9960-1:2008, Safety of machinery - Electrical equipment of machines - Part 1: "General requirements", install overcurrent protection devices (circuit breakers for wiring, circuit protectors, etc.) to the primary sides of the power supply for dynamic force (wire color: red, black) and for control (wire color: red (with white lines), black (with white lines)).  
(Excerpt from JIS B 9960-17.2.1 "General requirements")  
When the circuit current of a machine (electric device) can be larger than the rated current of a component or the tolerable current of a conductor, you must use an overcurrent protection device. The rated values and setting values to be selected are listed in 7.2.10.
  - 8** Observe the cautions below to prevent accidents.
- The safety cautions are ranked as "DANGER", "WARNING" and "CAUTION" in this section.



**DANGER:** When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries, or when there is a high degree of emergency to a warning.



**WARNING:** When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries.



**CAUTION:** When a dangerous situation may occur if handling is mistaken leading to minor injuries or physical damage.

Items listed under "caution" can also possibly lead to serious results depending on the situation.  
Important details are listed for each; please make sure to follow them.

### Precautions when ordering

- 1** Warranty period  
"Warranty Period" is one (1) year from the first delivery to the customer.
- 2** Scope of warranty  
In case any defect attributable to CKD is found during the term of warranty, CKD provides a free-of-charge replacement of the product or the part that need to be replaced, or repairs the faulty product at a CKD factory without charge.  
Note that the following faults are excluded from the warranty term:
  - ① Failure caused by not adhering to the limitations and environment conditions described in the product specification
  - ② Failure caused by careless use or improper management
  - ③ Failure caused by other than the delivered product
  - ④ Use other than original design purposes
  - ⑤ Failure caused by a modification of the structure, the performance, or the specification made after delivery by a third party, or by a repair not specified by CKD
  - ⑥ Damage cause by installing this product in a machine or a device of the customer, which would not have happened if the machine or the device had had a function or a structure that is ordinarily expected in the industry
  - ⑦ Failure caused by reason that is unforeseeable with technology put into practical use at the time of delivery
  - ⑧ Failure caused by a natural hazard such as fire, earthquake, flooding, and lightning, or failure caused by an external cause such as natural calamity, environmental pollution, salt damage, gas damage, and abnormal voltage.
 The warranty mentioned here covers the discrete delivered product. Only the scope of warranty shall not cover losses induced by the failure of the delivered product.
- 3** Warranty on exported units
  - (1) CKD repairs any unit returned to a CKD factory, or a company or a factory specified by CKD. The warranty does not cover the construction or the cost that arises with returning.
  - (2) A repaired unit is delivered to a specified domestic location with the domestic packaging specification.  
These warranty terms define basic matters. If a warranty description in a specification diagram or a specification description does not agree with these warranty terms, the specification diagram and the specification description take precedence.
- 4** Compatibility confirmation  
In no event shall CKD be liable for merchantability or fitness for a particular purpose, notwithstanding any disclosure to CKD of the use to which the product is to be put.
- 5** Scope of service  
The product price does not cover engineer dispatching services. A separate payment will be asked in the following cases:
  - (1) Instructions on installation and adjustment, and attendance on test operation
  - (2) Maintenance, inspection, adjustment, and repair
  - (3) Technical instruction and training (operation, programming, wiring, and safety)





## Safety information

Be sure to read the instructions before use.

Specific precautions: Electric actuator ESSD/ELCR series and teaching pendant ETP-2

### Design and selection

#### 1. Common

##### DANGER

- Do not use the product near a dangerous object such as an ignitable, inflammable, or exploding object.  
Doing so may cause ignition, fire, or explosion.
- Make sure that water drops or oil drops do not spill over the product. They cause fire or malfunction.
- When you install the product, attach and fix it firmly (including works). Failure to do so may result in falling, dropping, or malfunction of the product causing injury.
- Be sure to use a DC stabilized power source (24 VDC  $\pm$  10%) for power sources for the motor, control, and input/output circuits.  
Connecting the product directly to an AC power source may cause fire, explosion, or damage.

##### WARNING

- Design the safety circuit or your equipment in a way that the equipment does not break and does not cause injury when the machine stops in case of system abnormality such as an emergency stop or power failure.
- Install a guard fence to keep people out from the moving range of the electric actuator.  
In preparation for emergencies, install an emergency stop button of the equipment at a convenient position.  
Design the structure and the wiring of the emergency stop button in a way that it does not return automatically and people cannot return it inadvertently.
- Install the product in an indoor location with low humidity.  
In a place not shielded from rain or humid (humidity of 85% or higher, or a place having condensation), the product may have earth leakage or may cause fire. Oil drops and oil mist must also be strictly avoided.
- Use and store the product in a place having the specified temperature and not having condensation.  
Not storing the product in such a place may cause a sudden stop or a shorter lifetime of the product. Ventilate the room if the room tend to retain heat.
- Do not install the product near direct sunlight, dust, or an object producing heat. Do not install the product in a place with corrosive gas, explosive gas, inflammable gas, or a burnable object. This product is not designed to be chemical proof.  
Chemicals may cause failure of the product, explosion, or fire.

- Use and store the product in a place without strong electromagnetic wave, ultraviolet light, or radioactivity.  
These elements may cause malfunction or failure of the product.

##### Caution

- When you make wiring, do not lay wires near a strong electric current or a strong magnetic field to avoid induction noise. Also do not lay wires in the same pipe of or in parallel with (using a multi-conductor cable) a power line of a large motor other than the motor of this product. Also pay attention to any inverter power source used for robots and wiring sections. (Avoid parallel wiring and wiring in the same pipe.) Make the frame grounding of such a power source, and be sure to insert a filter at the output section.
- If the same power source is shared by the output section of this product and an inductive load that makes surges such as a solenoid valve and a relay, the surge current may damage the output section. Use separate power sources for any output system with inductive load and for the output section of this product. If you cannot use separate power sources, connect a surge absorbing element directly to each inductive load in parallel.
- For motors, select a power source with an adequate capacity for the number of units of this product installed. If the capacity has no allowance, the product may malfunction. (Guideline: □28: 4 A/unit, □42: 3 A/unit, □56: 4 A/unit)
- Do not disassemble the product.
- The cable cannot be used in a manner having repeated bends. Use a robot cable for a use having repeated bends.
- Fix cables so that they do not move easily. Make sure that fixing points do not have sharp bends (with bending radius of 50 mm or less).
- Provide a space of 70 mm or wider behind the motor so that you can connect and disconnect the teaching pendant to/from the connector.
- When the product tries to find the origin position at the time of power-on, it may determine a wrong position as the origin if there is an external stopper or a holding mechanism (such as a brake). Be careful of the position of any external stopper so that the product can find the origin correctly at the time of power-on.
- In no event shall CKD be liable for merchantability or fitness for a particular purpose, notwithstanding

any disclosure to CKD of the use to which the product is to be put.

## 2. Teaching pendant

### WARNING

- If you cannot see an actuator from the position at which you operate the product, be sure to check that the movement of the actuator is not dangerous.

## Installation and adjustment

### 1. Common

#### DANGER

- Do not enter the product movement range when the product is ready to operate. The product may abruptly operate causing injury.
- When using ELCR (table type), you may have your finger pinched between the motor case and the table when the machine returns to the origin point. Be careful of such cases.

#### WARNING

- Because this product contains precision components, overturning, shaking, and jolts must be avoided during transportation. Such transportation may damage the product.
- When you put the product somewhere for temporary storage, put it horizontally.
- Do not step on or put an object on the package.
- Keep the ambient temperature within -20 to 60°C and the ambient humidity within 35 to 85% during transportation and conveyance, and make sure that there is no condensation and freezing. Transportation not in this condition may cause a failure of the product.
- Attach the product to a fireproof object. Attaching this product to or near a burnable object may cause fire.
- Be sure to make class D grounding (grounding resistance of 100 Ω or less) for the product. Earth leakage may cause electrical shock or malfunction.
- When you make wiring, do it carefully according to this catalog so that there will be no wiring error or loose connector connection. Make sure that wires are insulated each other. Contact to an external circuit, grounding fault, or bad insulation between pins may result in over-current into this product causing damage. It may also cause malfunction or fire.
- Before electrifying the product, make sure that the area of its moving range is safe. If the product LED does not blink after power-on, power it off immediately. Careless electrification of the product may cause an electric shock or injury.
- Do not contact your hand or body to the product during or just after operation. You may have a burn if you do so.
- Do not step on the product, use it as a footing, or put an object on it. Doing so may cause a turnover accident, turnover of the product, injury from falling, or malfunction from breakage or damage of the product.

- Implement adequate countermeasures to protect the workers and the equipment in case of disconnection of power supply (including the case of failure).  
Installing the product vertically may result in an unexpected accident from the rod falling on the table.
- Do not blemish a cable, put too much stress on it, put a heavy object on it, or pinch it. Doing so may cause an electrical shock.
- When you position the moving section of the product with your hand (direct teaching), first confirm that the servo is off using the teaching pendant.

#### Caution

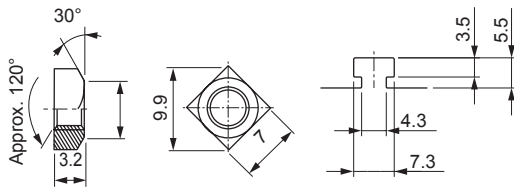
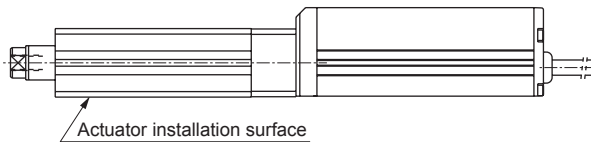
- Do not hold a moving section or a cable of the product when you carry or install the product. Doing so may cause injury or disconnection of the cable.
- Do not install the product at a place that receives intensive vibration or jolt. Doing so may cause malfunction.
- When you use a cylinder switch, be sure to read the CKD general catalog (Air Pressure Cylinder General I) for installation, wiring, and precautions.
- Do not allow external force to actuate or sharply decelerate the moving section of the product. Regenerative current may cause the product to malfunction or break.
- When the product returns to the origin position, do not have it knock against an object such as mechanical stopper, except in pressing operation. The feed screw may break causing malfunction.
- When the product returns to the origin position, make sure that no external force is put on the actuator. The product may determine the origin position incorrectly.
- Do not put a dent or a scratch on the moving section. It may cause malfunction.
- For press fitting and pressing operation, set the starting point of the operation 0.5 mm or more earlier than the actual pressing position. An alarm is issued when you press a work at a position where the pressing operation has not started.
- Durability of the product varies depending on the conveyance load and the environment. Configure the system with an capacity adequate for the conveyance load and other parameters. Use the product in a manner that does not put jolts on the moving section.



## 2. ESSD series

### ⚠ Caution

- Connect the product in a way that the orientation of the rod axis aligns with the movement direction of the conveyed load.  
Not doing so may cause the attrition or breakage of the feed screw.
- When you use an external guide, ensure smooth movement at all positions within the stroke of the product before installing the guide.
- At the tip of the rod, do not put a load in the direction of the rotation.  
The product may break if you do so.
- When you install the product, fix it firmly using, for example, a hexagon socket head cap bolt.  
If you install the product on the actuator installation surface, insert four or more M4 square nuts (JIS B 1163 (2001)) along the two grooves on the actuator installation surface, and fix the product firmly.



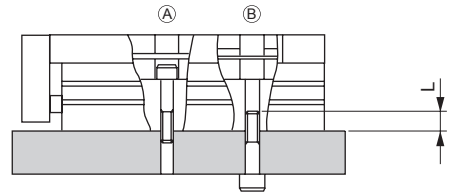
Recommended square nut:  
Conformance to JIS B 1163 (2001)  
[Attachment on actuator installation surface]

## 3. ELCR Series

### ⚠ Caution

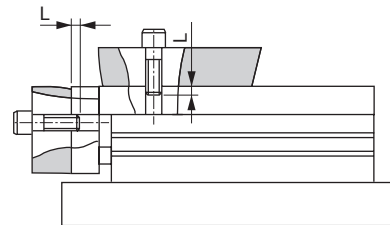
- For the table type, make sure that an excessive moment is not placed.  
An excessive moment may cause the product to break or malfunction.
- For the table type, keep the flatness of the installation surface 0.02 mm or less, and do not put screwing or bending force on the product.
- For the table type, keep the flatness of the work attached to the table or the end plate 0.02 mm or less, and do not put screwing or bending force on the product.  
An excessive moment may cause the product to break or malfunction.

- When fixing the product, use a screw of the length indicated in the table below and tighten the screw with an appropriate torque.



	A		B		Maximum screwing depth (mm)
	Bolt	Screwing torque (N·m)	Bolt	Screwing torque (N·m)	
ELCR-28/42	M5 × 0.8	2.9 to 5.1	M6 × 1.0	4.8 to 8.6	9

- Use the bolt screwing depths and the tightening torques indicated below when you attach a jig to the slide table or the end plate.



### Attachment to slide table surface

	Bolt	Screwing torque (N·m)	Maximum screwing depth (mm)
ELCR-28/42	M5 × 0.8	2.9	5

### Attachment to end plate surface

	Bolt	Screwing torque (N·m)	Maximum screwing depth (mm)
ELCR-28	M5 × 0.8	2.9	9
ELCR-42			11

- Consider the moment load when you attach the product on the table or on the end plate surface.  
See the guideline for the selection of models (page 12 to 14).

## 4. Teaching pendant

### ⚠ Caution

- Connect the teaching pendant to the actuator only when you use it.
- Do not put intensive pressure or jolt on the product.  
Doing so may cause failure of the product.
- Do not put unnatural force to cables and connectors.
- Do not press the LCD display or operation keys strongly.

## During use and maintenance

### 1. Common

#### DANGER

- Leave the wiring and inspection work to specialized technicians.
- Make wiring after the product is installed.  
Doing so may cause an electrical shock.
- Do not handle the product with a wet hand.  
Doing so may cause an electrical shock.
- When you make wiring or inspection, do it after five minutes of power-off and after checking the voltage by a tester or other instrument.  
Doing so may cause an electrical shock.
- Do not insert or remove cables and connectors while power is on.  
Doing so may cause a malfunction, a fault, or an electric shock.
- To extend the cable, use a lead wire with a diameter allowing electric current up to 4 A.  
Otherwise, not enough voltage may cause malfunction, low thrust force, heat, or a shorter lifetime.
- Do not connect the communication connector of the product to other devices.  
Doing so breaks the product.

#### WARNING

- The recommended storage environment is the same as the recommended working environment. We recommend that you keep the storage period shorter than one month. Especially, be sure to prevent condensation.

#### Caution

- Conduct regular inspections two or three times a year to confirm normal operation.
- When the product has a failure (abnormal heat, smoke, abnormal odor, abnormal sound, vibration, or other abnormalities), turn off the power immediately. Leaving the product in such a condition cause damage on the product. Also electric current in such a condition may cause a fire.
- When having gravity or inertia force, the product does not stop immediately after the servo is turned off (with emergency stop, an alarm, or other causes). Before making such an operation, make sure that the product is in the neutral condition without gravity or inertia force, or confirm that the product is in the safe condition.
- Be sure to stop the power supply to the product before conducting maintenance, inspection, or repair. Make sure that people around do not power on or operate the product carelessly.
- When you dispose of the product, conform to Wastes Disposal and Public Cleansing Act and always outsource the work to a waste disposal business.
- Between the internal control circuit substrate of this product and the metal frame, a varistor (voltage limit: approx. 40 V) is connected for prevention of damage from static electricity. So do not make a withstand voltage test or an insulation resistance test on any equipment that has this product installed. Making such a test will break this product. If such a test is necessary for the equipment, remove the product from the equipment before making the test.
- When you make electric welding on equipment having this product installed, remove the F.G. (Frame Ground) connection before doing the welding. Electric welding may break the product by an excessively high voltage or a surge voltage.



## ESSD Series

● Motor size: □28, □42, □56

### Specifications

Descriptions		ESSD					
Actuator type		Rod type					
Motor		Stepping motor					
Encoder type		Incremental type					
Drive system		Slip screw					
Motor size	mm	□28	□42			□56	
Screw lead	mm	6	6	12	24	6	12
Stroke length	mm	50, 100, 150, 200					
Range of operation speed	mm/s	15 to 100	15 to 100	30 to 200	60 to 400	15 to 100	30 to 200
Speed of origin returning	mm/s	15	15	30	60	15	30
Accuracy of repeated positioning	mm	±0.05	±0.05	±0.1	±0.2	±0.05	±0.1
Lost motion	mm	0.4 or less	0.4 or less	0.5 or less	0.6 or less	0.4 or less	0.5 or less
Max. load capacity*1	Vertical kg	1.5	11	5	1	25	15
Maximum press fitting force	N	30 or over	150 or over	70 or over	30 or over	450 or over	250 or over
Setting method		Setting by the teaching pendant					
Control mode	*4	Solenoid valve mode (single type, double 2-position type, double 3-position type)					
		7-point positioning mode					
		Pitch transfer mode					
Indicator light (LED)		Green: Operation (Blinking: Operation in preparation), Red: Alarm					
Number of input points		7 points (photo-coupler insulation)					
Number of output points		7 points (photo-coupler insulation)					
Motor power supply voltage		24 VDC ± 10%					
Instantaneous maximum current on the motor	*3	4 A	3 A			4 A	
Average current on the motor	*2	0.8 A	1.1 A			1.2 A	
Control power supply voltage		24 VDC ± 10%					
Current consumption by controller		200 mA or less (including the case when the teaching pendant is connected)					
Insulation resistance		50 MΩ or higher in 500-VDC megger					
Withstand voltage		No abnormality for 1 minute with 1000 VAC					
Operating ambient temperature		0 to 50 (no condensation or freezing)					
Operating ambient humidity		35 to 85 (no condensation or freezing)					
Storage ambient temperature		-20 to 60 (no condensation or freezing)					
Storage ambient humidity		35 to 85 (no condensation or freezing)					
Atmosphere		No corrosive gas					
Degree of protection		Equivalent to IP40 of IEC standard (with protection covers on LAN ports)					

\*1: The maximum load capacity becomes lower for higher speeds. For details, see the table (page 15) and the graph of technical document ②  
Vertical Load Capacity and Horizontal Load Capacity.

\*2: The average current is the current (reference value) at the maximum speed with the maximum load capacity.

\*3: Use a power supply having an enough allowance for the instantaneous maximum current.

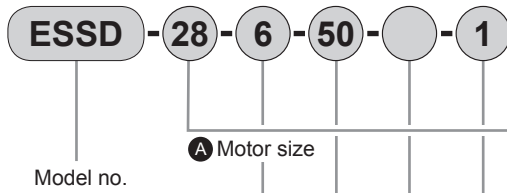
\*4: The factory setting is the solenoid valve mode (double 2-position type).

### Weight

(kg)

Descriptions	50st	100st	150st	200st
□28	0.8	1.0	1.1	1.2
□42	1.4	1.6	1.8	2.0
□56	2.9	3.3	3.6	3.9

### How to order



Symbol	Description			
A Motor size				
28	□28			
42	□42			
56	□56			
B Lead				
Motor size		28	42	56
6	6 mm	●	●	●
12	12 mm		●	●
24	24 mm		●	
C Stroke length				
50	50 mm			
100	100 mm			
150	150 mm			
200	200 mm			
D Option				
Blank	Female screw			
N	Male screw			
E Cable length				
1	1 m			
3	3 m			

### ● Teaching pendant

ETP - 2

### ● Available cylinder switches

SW - T2H

Lead wire axial	Lead wire radial	Contact	Indicator	Lead wire quantity
T2H*	T2V*	Proximity	1 color indicator	2 wire
T3H*	T3V*			3 wire
T2WH*	T2WV*		2 color indicator	2 wire
T3WH*	T3WV*			3 wire
T2YH*	T2YV*			2 wire
T3YH*	T3YV*			3 wire
T2YD*	-			2 wire

\* indicates the lead wire length.

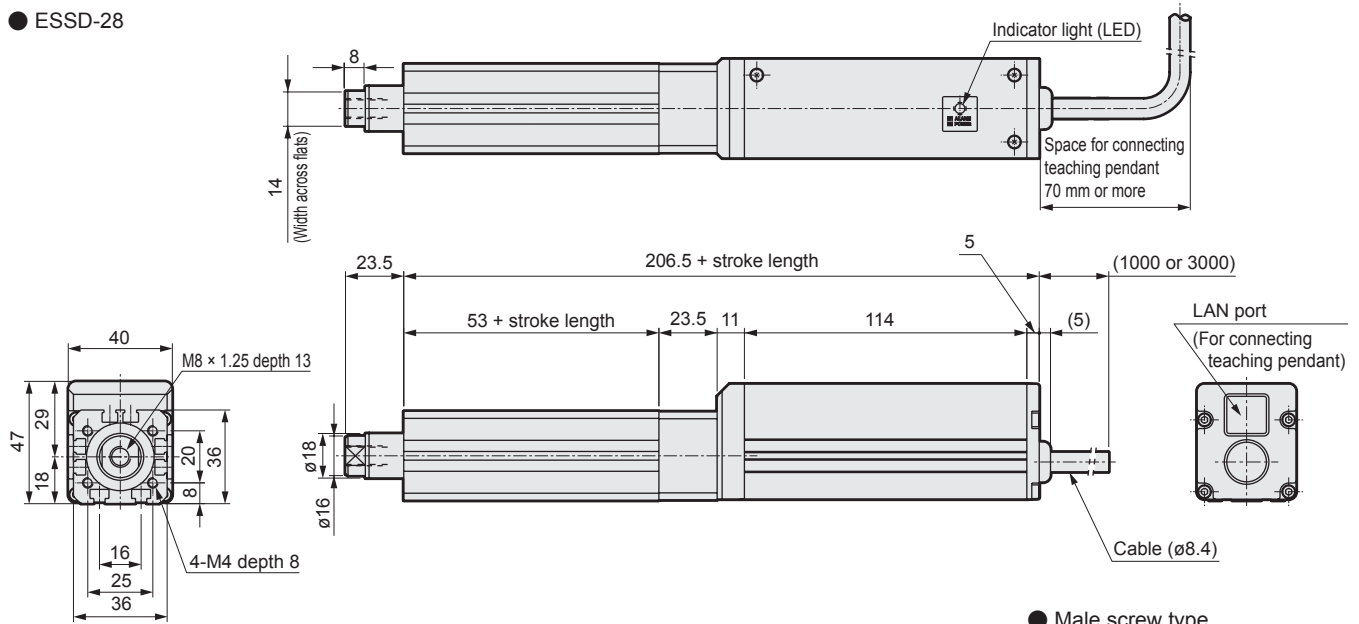
* Lead wire length	
Blank	1 m (standard)
3	3 m (option)
5	5 m (option)

\*For details of cylinder switches, see Pneumatic Cylinder I (catalog No. CB-029S).



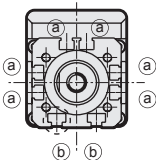
### Dimensions

#### ● ESSD-28

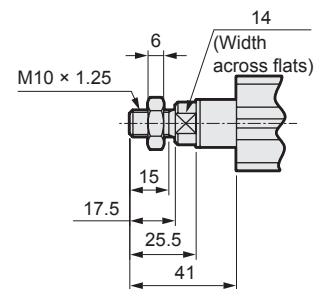
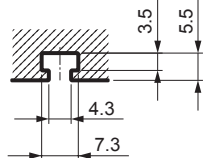


#### ● Male screw type

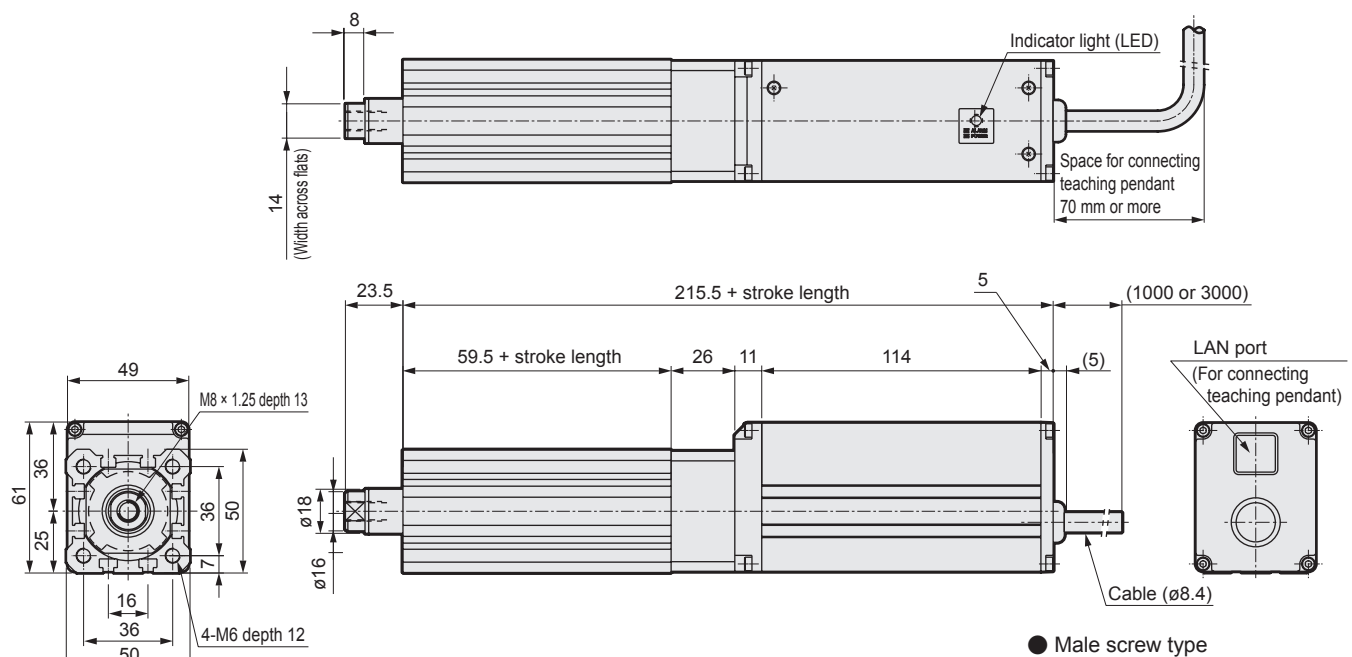
Groove on main unit



- a) Groove: For T-type cylinder switch
- b) Groove: For M4 square nut (See the figure below.)

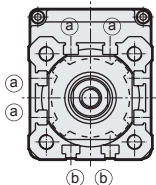


#### ● ESSD-42

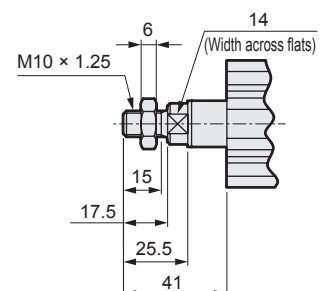
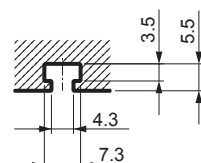


#### ● Male screw type

Groove on main unit

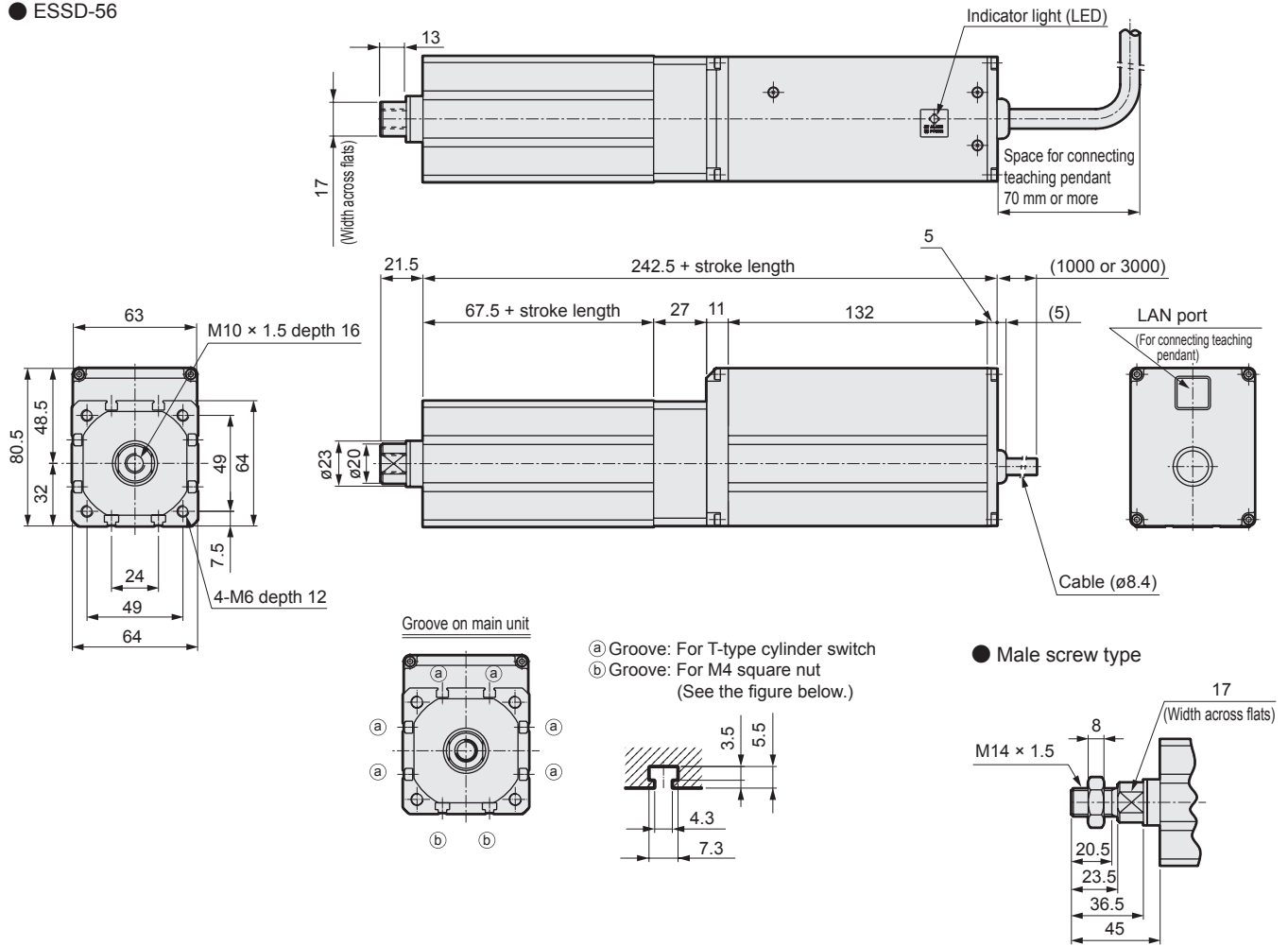


- a) Groove: For T-type cylinder switch
- b) Groove: For M4 square nut (See the figure below.)



## Dimensions

## ● ESSD-56





## ELCR Series

● Motor size: □28, □42

### Specifications

Descriptions		ELCR Series			
Actuator type		Table type			
Motor		Stepping motor			
Encoder type		Incremental type			
Drive system		Slip screw + belt			
Motor size	mm	□28	□42		
Screw lead	mm	6	6	12	24
Stroke length	mm	50, 100	50, 100, 150		
Range of operation speed	mm/s	15 to 100	15 to 100	30 to 200	60 to 400
Speed of origin returning	mm/s	15	15	30	60
Accuracy of repeated positioning	mm	±0.05	±0.05	±0.1	±0.2
Lost motion	mm	0.4 or less	0.4 or less	0.5 or less	0.6 or less
Max. load	Horizontal kg	4.5	7	7	7
capacity *1	Vertical kg	1	7	4	1
Maximum press fitting force	N	10 or over	120 or over	60 or over	30 or over
Setting method		Setting by the teaching pendant			
Control mode	*4	Solenoid valve mode (single type, double 2-position type, double 3-position type)			
		7-point positioning mode			
		Pitch transfer mode			
Indicator light (LED)		Green: Operation (Blinking: Operation in preparation), Red: Alarm			
Number of input points		7 points (photo-coupler insulation)			
Number of output points		7 points (photo-coupler insulation)			
Motor power supply voltage		24 VDC ± 10%			
Instantaneous maximum current on the motor	*3	4 A	3 A		
Average current on the motor	*2	0.8 A	1.1 A		
Control power supply voltage		24 VDC ± 10%			
Current consumption by controller		200 mA or less (including the case when the teaching pendant is connected)			
Insulation resistance		50 MΩ or higher in 500-VDC megger			
Withstand voltage		No abnormality for 1 minute with 1000 VAC			
Operating ambient temperature °C		0 to 50 (no condensation or freezing)			
Operating ambient humidity %		35 to 85 (no condensation or freezing)			
Storage ambient temperature °C		-20 to 60 (no condensation or freezing)			
Storage ambient humidity %		35 to 85 (no condensation or freezing)			
Atmosphere		No corrosive gas			
Degree of protection		Equivalent to IP40 of IEC standard (with protection covers on LAN ports)			

\*1: The maximum load capacity becomes lower for higher speeds. For details, see the table (page 15) and the graph of technical document ②  
Vertical Load Capacity and Horizontal Load Capacity.

\*2: The average current is the current (reference value) at the maximum speed with the maximum load capacity.

\*3: Use a power supply having an enough allowance for the instantaneous maximum current.

\*4: The factory setting is the solenoid valve mode (double 2-position type).

### Weight

Descriptions	50st	100st	150st
□28	1.3	1.6	-
□42	2.1	2.5	2.9

## How to order

**ELCR - 28 - 6 - 50 - 1**

Model no.

A Motor size

B Lead

C Stroke length

D Cable length

Symbol	Description		
A Motor size			
28	□28		
42	□42		
B Lead			
Motor size		28	42
6	6 mm	●	●
12	12 mm		●
24	24 mm		●
C Stroke length			
Motor size		28	42
50	50 mm	●	●
100	100 mm	●	●
150	150 mm		●
D Cable length			
1	1 m		
3	3 m		

## ● Teaching pendant

**ETP - 2**

## ● Available cylinder switches

**SW - T2H**

Lead wire axial	Lead wire radial	Contact	Indicator	Lead wire quantity
<b>T2H*</b>	<b>T2V*</b>	Proximity	1 color indicator	2 wire
<b>T3H*</b>	<b>T3V*</b>			3 wire
<b>T2WH*</b>	<b>T2WV*</b>			2 wire
<b>T2WH*</b>	<b>T3WV*</b>		2 color indicator	3 wire
<b>T2YH*</b>	<b>T2YV*</b>			2 wire
<b>T3YH*</b>	<b>T3YV*</b>			3 wire
<b>T2YD*</b>	-			2 wire

\* indicates the lead wire length.

<b>* Lead wire length</b>	
<b>Blank</b>	1 m (standard)
<b>3</b>	3 m (option)
<b>5</b>	5 m (option)

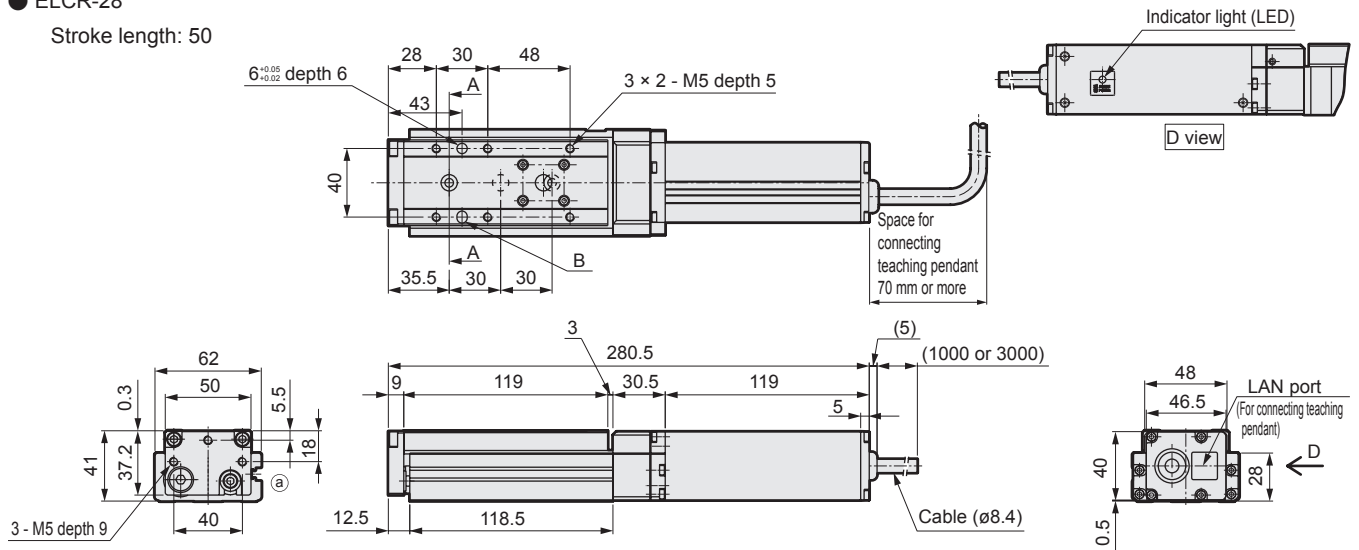
\*For details of cylinder switches, see Pneumatic Cylinder I (catalog No. CB-029S).

## ELCR Series

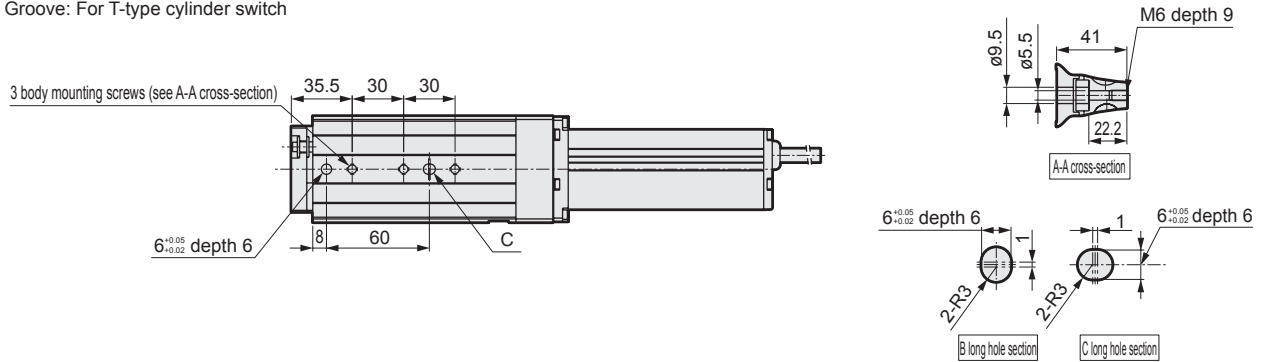
### Dimensions

#### ● ELCR-28

Stroke length: 50

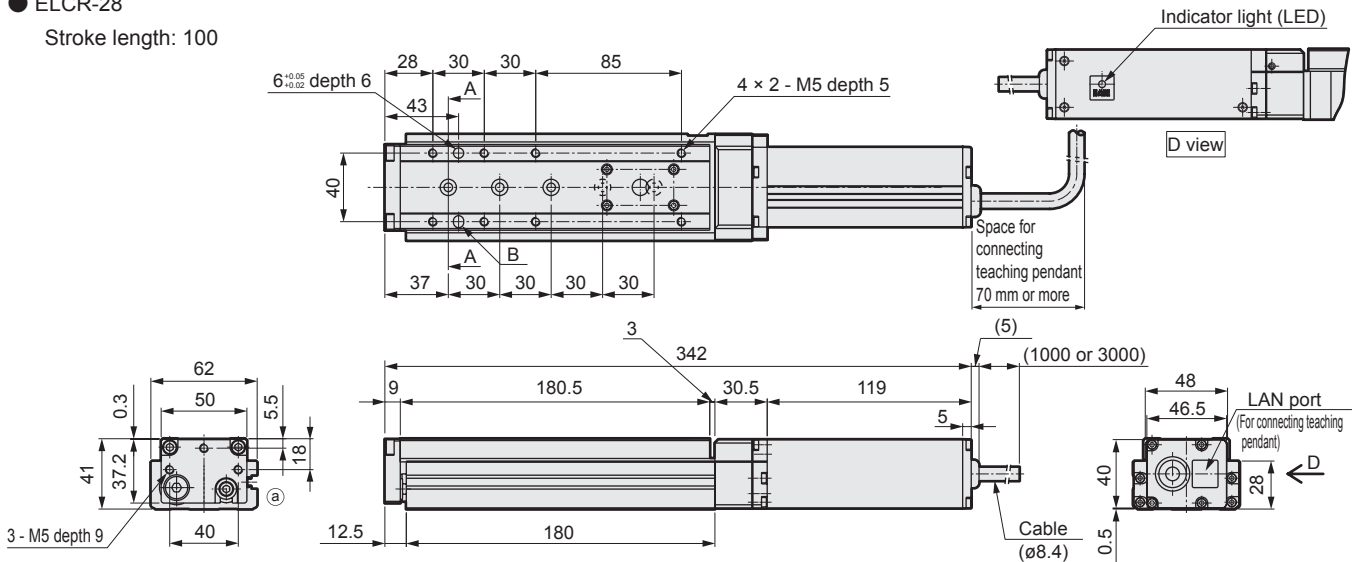


(a) Groove: For T-type cylinder switch

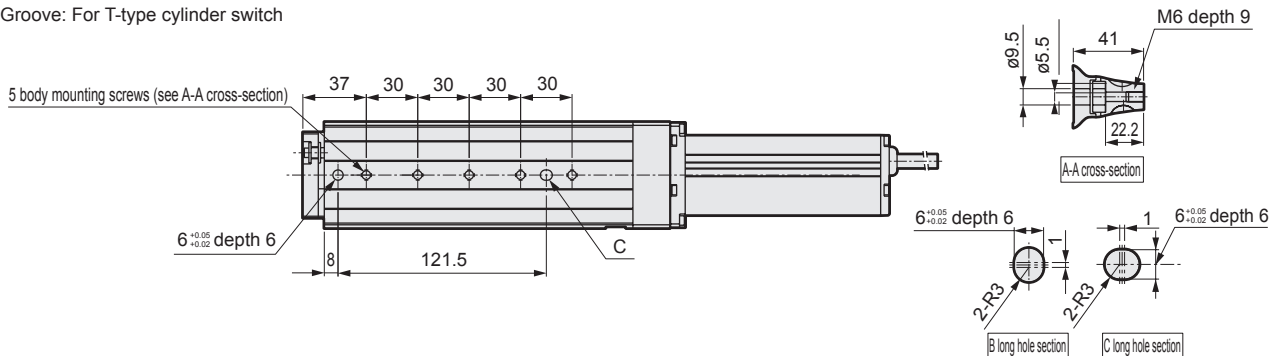


#### ● ELCR-28

Stroke length: 100



(a) Groove: For T-type cylinder switch

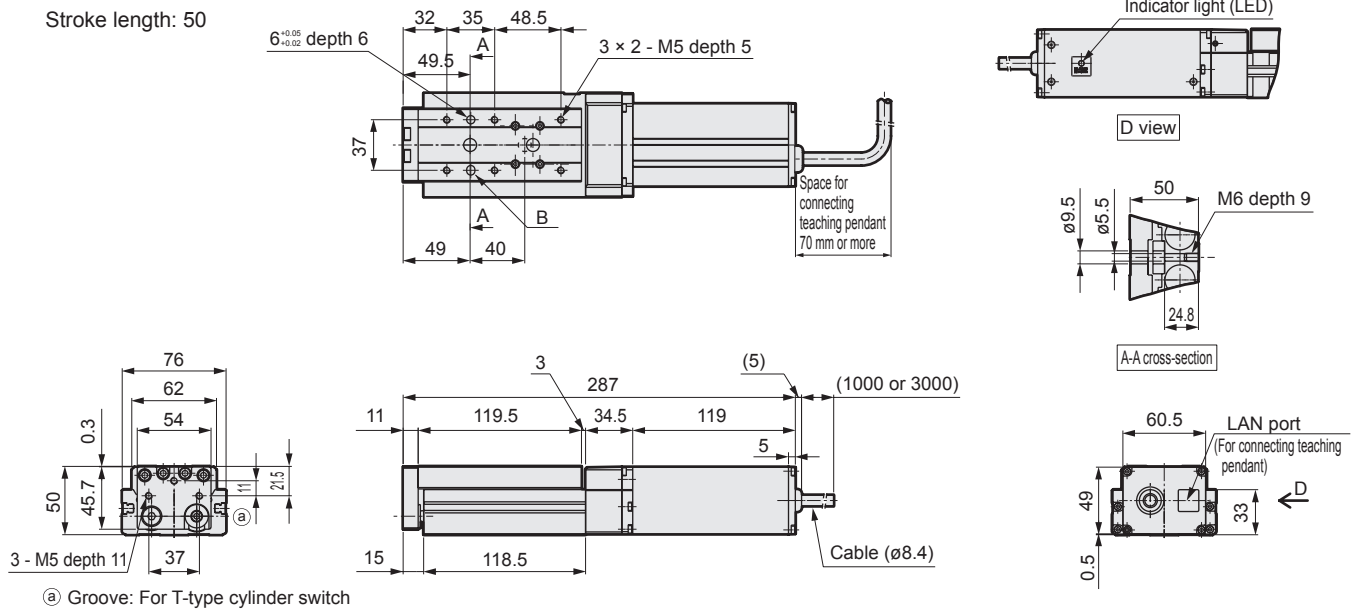




### Dimensions

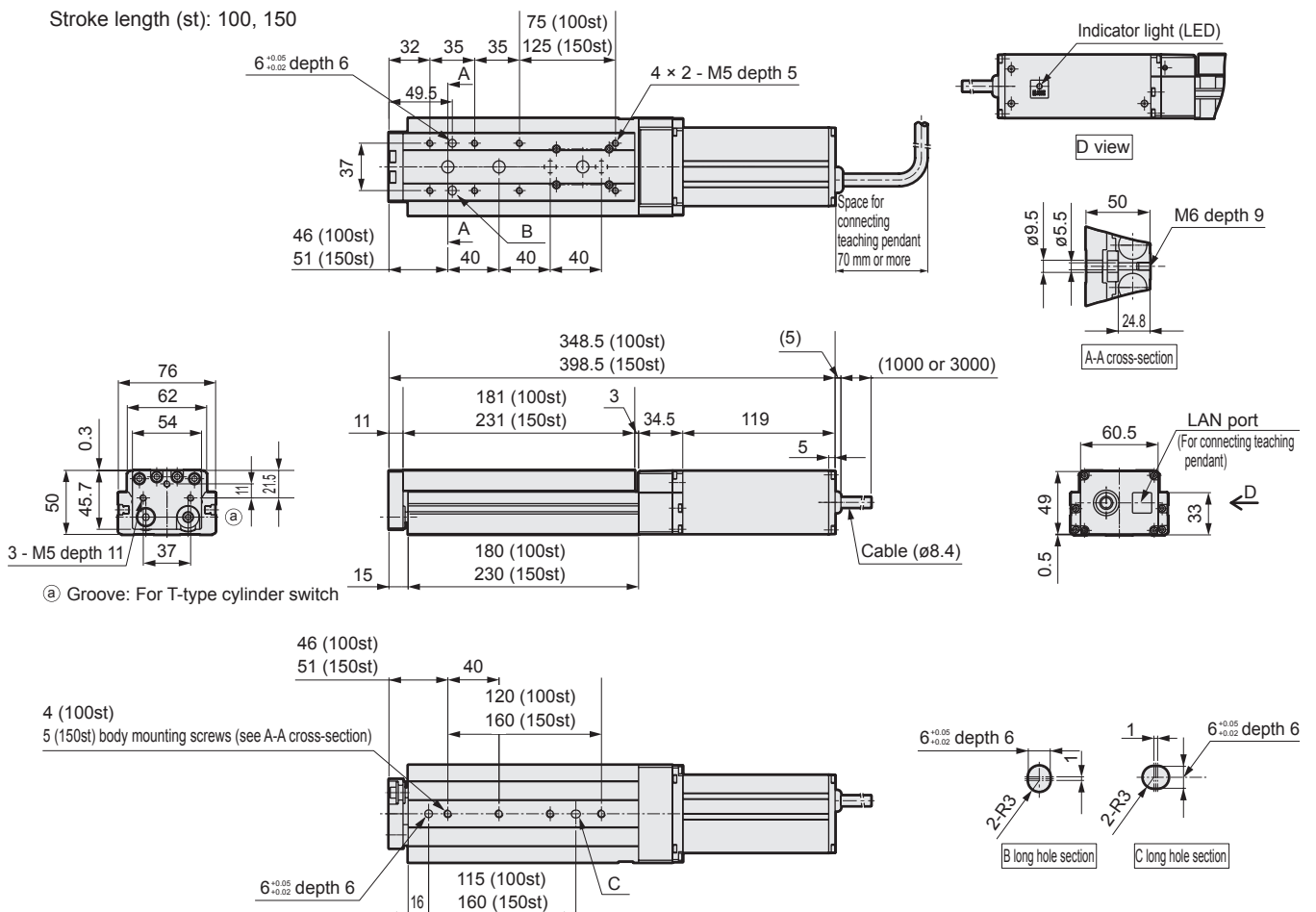
#### ● ELCR-42

Stroke length: 50



#### ● ELCR-42

Stroke length (st): 100, 150



### Specifications

Descriptions	ETP-2
Display	16 characters × 2 lines (LCD)
Input key	5 keys (stop key: 1, operation keys: 4)
Power supply	24 VDC, 100 mA or less (provided from the actuator)
Cable length	2 m
Weight	140 (body only)
Operating ambient temperature °C	0 to 40 (no condensation or freezing)
Operating ambient humidity %	35 to 85 (no condensation or freezing)
Storage ambient temperature °C	-20 to 60 (no condensation or freezing)
Storage ambient humidity %	35 to 85 (no condensation or freezing)
Degree of protection	Equivalent to IP50 of IEC standard
Connected actuators	ESSD series and ELCR series

### Dimensions and names/functions of components

No	Name	Function
①	LCD display	16 characters × 2 lines
②	STOP	Stop key Use this key to stop the actuator operation. If you make a long press when the actuator is stopped, the actuator leaves the stopping state (and enters the standby mode).
③	[PUSH] key	Use this key to select a menu item or to select a digit when changing a value. For the jog operation and inching operation in the direction of push.
	[PULL] key	Use this key to select a menu item or to select a digit when changing a value. For the jog operation and inching operation in the direction of pull.
	[BACK] key	Use this key to cancel the operation and to return to the previous screen.
	[ENTER] key	Use this key to enter the selected menu and defined data.
④	Connector	Connector for actuator

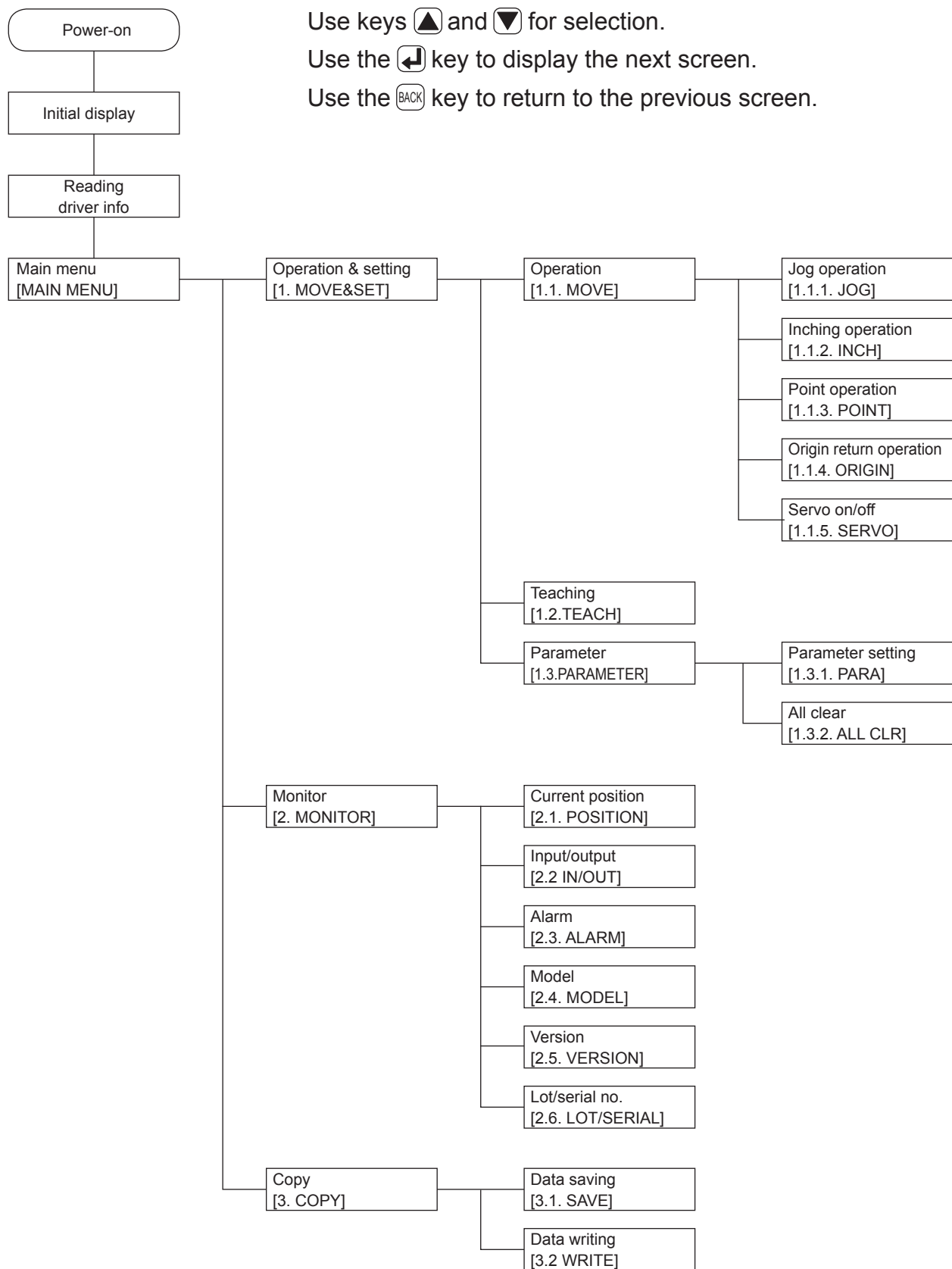
### List of functions

Main	Sub 1	Sub 2	Descriptions
Operation [MOVE] / Setting [SET] (*1)	Operation [MOVE]	Jog operation [JOG]	This item specifies the speed and performs the jog operation (push/pull).
		Inching operation [INCH]	This item specifies the speed and the pitch, and performs the inching operation (push/pull).
		Point operation [POINT]	According to the data configured by teaching, this item makes movement to the positions of the selected points (maximum of 7 points).
		Origin returning [ORIGIN]	This item finds the origin and returns to the origin.
		Servo on/off [SERVO]	This item turns the servo on or off.
	Teaching [TEACH]		This item specifies the position, speed, force, and acceleration of each point (maximum of 7 points).
Monitor [MONITOR]	Parameter [PARAMETER]	Parameter setting [PARA]	This item changes the parameter values.
		All clear [ALL CLR]	Resets the parameters to the factory default setting.
	Current position [POSITION]		Use this item to find the current position.
	Input/output [IN/OUT]		Use this item to check the condition of the input/output signals of the actuator.
	Alarm [ALARM]		Use this item to view the current alarm and the past records.
	Model [MODEL]		Use this item to find the model code of the actuator.
Copy [COPY]	Version [VERSION]		Use this item to find the version of the driver software in the actuator.
	Lot/serial no. [LOT/SERIAL]		Use this item to find the lot number and the serial number.
Copy [COPY]	Data saving [SAVE]		Use this item to save the actuator data in the teaching pendant.
	Data writing (*1) [WRITE]		Use this item to write the data saved in the teaching pendant into the actuator.

\*1: PLC operation is disabled for "operation/setting" and "data writing of copy."

### Operation flow

The figure below shows the flow of the operation of the teaching pendant.  
(Basic operation)



For details, see the operation manual.

### STEP-1 Checking the load capacity

The load capacity varies depending on the mounting orientation and the conveyance speed.  
Select a size and a lead with reference to technical information ② and ③.

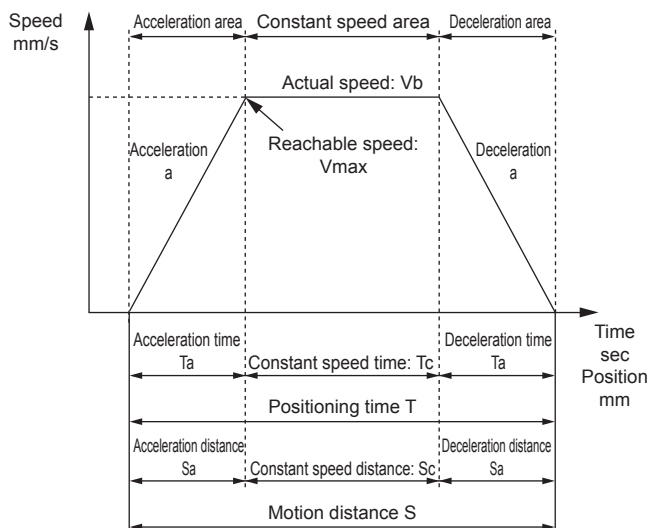
### STEP-2 Checking the takt time

Calculate the takt time for the selected product according to the example shown below, and confirm that the obtained takt time satisfies the requirement.

Setting ranges of speed and acceleration

Motor size	Lead (mm)	Speed (mm/s)	Acceleration (m/s <sup>2</sup> )
* Acceleration and deceleration cannot be set separately.			
□28	6	15, 20, 30, 40, 50, 60, 70, 80, 90, 100	0.4, 0.5, 0.6, 0.8, 1.0
	6	15, 20, 30, 40, 50, 60, 70, 80, 90, 100	0.4, 0.5, 0.6, 0.8, 1.0
□42	12	30, 40, 60, 80, 100, 120, 140, 160, 180, 200	0.4, 0.5, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0
	24	60, 80, 120, 160, 200, 240, 280, 320, 360, 400	0.4, 0.5, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0
□56	6	15, 20, 50, 60, 70, 80, 90, 100	0.4, 0.5, 0.6, 0.8, 1.0
	12	30, 40, 60, 80, 100, 120, 140, 160, 180, 200	0.4, 0.5, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0

#### Takt setting of general conveyance operation



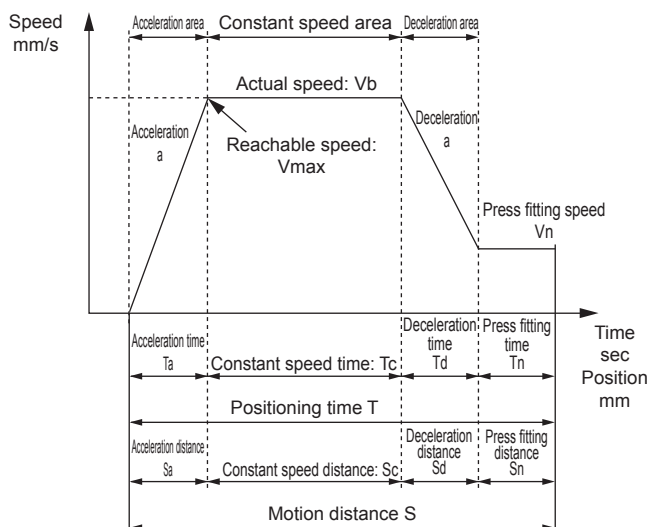
	Descriptions	Symbol	Unit	Remarks
Setting value	Setting speed	V	mm/s	
	Setting acceleration/deceleration	a	mm/s <sup>2</sup>	
	Motion distance	S	mm	
Calculated value	Reachable speed	Vmax	mm/s	$= (S \times a)^{1/2}$
	Actual speed	Vb	mm/s	Smaller value from V and Vmax
	Acceleration/deceleration time	Ta	s	$= Vb/a$
	Time of constant speed	Tc	s	$= Sc/Vb$
	Acceleration/deceleration distance	Sa	mm	$= (a \times Ta^2) / 2$
	Constant speed distance	Sc	mm	$= S - 2 \times Sa$
	Position determination time	T	s	$= 2 \times Ta + Tc$

-The acceleration and the deceleration are set to the same value.

-Acceleration/deceleration setting by the teaching pendant is made in units of m/s<sup>2</sup>. Remember this when you make setting.

-The setting stroke and acceleration may not actually be achieved. Compare Vmax and the setting speed.

#### Takt setting of press fitting



	Descriptions	Symbol	Unit	Remarks
Setting value	Setting speed	V	mm/s	
	Setting acceleration/deceleration	a	mm/s <sup>2</sup>	
	Motion distance	S	mm	
	Press fitting speed	Vn	mm/s	
Calculated value	Press fitting distance	Sn	mm	
	Reachable speed	Vmax	mm/s	$= (a \times (S - Sn + Vn^2 / (2 \times a)))^{1/2}$
	Actual speed	Vb	mm/s	Smaller value from V and Vmax
	Acceleration time	Ta	s	$= Vb/a$
	Deceleration time	Td	s	$= (Vb - Vn) / a$
	Time of constant speed	Tc	s	$= Sc/Vb$
	Press fitting time	Tn	s	$= Sn/Vn$
	Acceleration distance	Sa	mm	$= (a \times Ta^2) / 2$
	Deceleration distance	Sd	mm	$= ((Vb - Vn) \times Td) / 2$
	Constant speed distance	Sc	mm	$= S - (Sa + Sd + Sn)$
	Position determination time	T	s	$= Ta + Td + Tc + Tn$

-The acceleration and the deceleration are set to the same value.

-Acceleration/deceleration setting by the teaching pendant is made in units of m/s<sup>2</sup>. Remember this when you make setting.

-The setting stroke and acceleration may not actually be achieved. Compare Vmax and the setting speed.

Use a duty ratio of 50% or less.

Duty ratio = operating time / (operating time + stopping time)



### STEP-3

Checking the tolerable moment (for ELCR only) \* For the ESSD type, determine the value in accordance with the guide installed together.

Confirm that the moment produced by the acceleration to be set is within the tolerable limit.

#### 3-1. Checking the tolerable moment in the motionless condition

$$M^T = \frac{M1' \times G}{M1' \max} + \frac{M2'}{M2' \max} + \frac{M3' \times G}{M3' \max} + \frac{W'}{W' \max} < 1$$

$M^T$  : Compound moment (must be less than 1)

$G$  : Acceleration configured in STEP2 (m/s<sup>2</sup>)

$W' \max$  : Maximum tolerance of  $W'$  (from the table below)

$M1' \max$  : Maximum tolerance of  $M1'$  (from the table below)

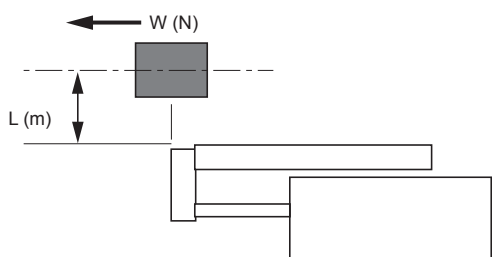
$M2' \max$  : Maximum tolerance of  $M2'$  (from the table below)

$M3' \max$  : Maximum tolerance of  $M3'$  (from the table below)

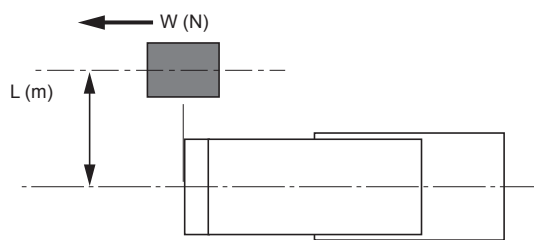
Load tolerance in stillness

Motor size	Stroke length (mm)	Vertical load $W' \max$ (N)	Bending moment $M1' \max$ (N·m)	Side bending moment $M2' \max$ (N·m)	Twist moment $M3' \max$ (N·m)
□28	50	380.8	17.8	19.2	17.8
	100		37.3		37.3
□42	50	548.8	31.1	37.6	31.1
	100, 150		56.2		56.2

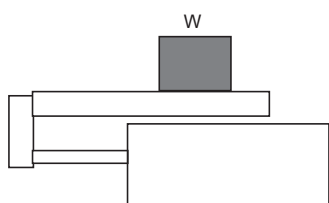
Note: If you put the load on the end plate, apply the tolerance for stroke = 50 mm.



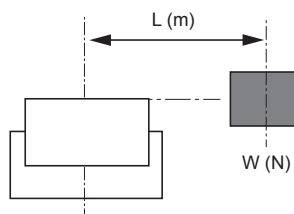
$$M1' = L \times W$$



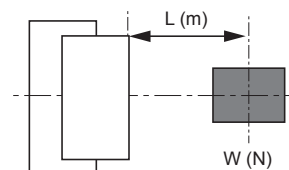
$$M3' = L \times W$$



$$W' = W$$



$$M2' = L \times W$$



### 3-2. Checking the tolerable moment in the operating condition

$$M'_T = \frac{M_1}{M_{1\max}} + \frac{M_2}{M_{2\max}} + \frac{M_3}{M_{3\max}} + \frac{W}{W_{\max}} < 1$$

$M_T$  : Compound moment

$W_{\max}$  : Maximum tolerance of  $W$  (from the table below)

$M_{1\max}$  : Maximum tolerance of  $M_1$  (from the table below)

$M_{2\max}$  : Maximum tolerance of  $M_2$  (from the table below)

$M_{3\max}$  : Maximum tolerance of  $M_3$  (from the table below)

Load tolerance in operation

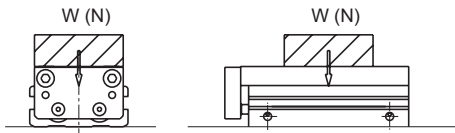
Motor size	Stroke length (mm)	Vertical load $W_{\max}$ (N)	Bending moment $M_{1\max}$ (N·m)	Side bending moment $M_{2\max}$ (N·m)	Twist moment $M_{3\max}$ (N·m)
□28	50	47.6	1.9	2.4	1.9
	100		4.6		4.6
□42	50	68.6	3.4	4.7	3.4
	100, 150		7.0		7.0

Note: If you put the load on the end plate, apply the tolerance for stroke = 50 mm.

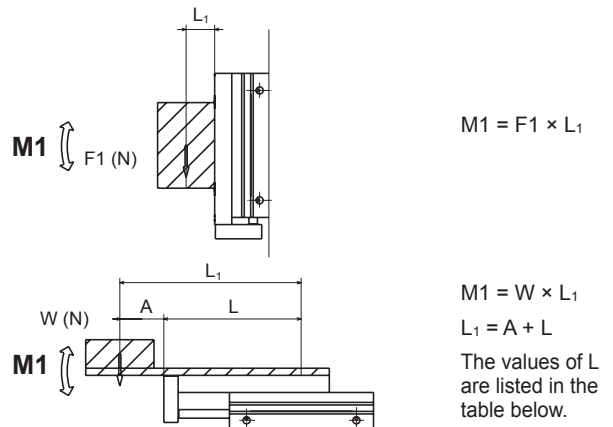
From the value calculated in 3-1 and 3-2,

confirm that  $M_T \leq 1$  and  $M'_T \leq 1$ .

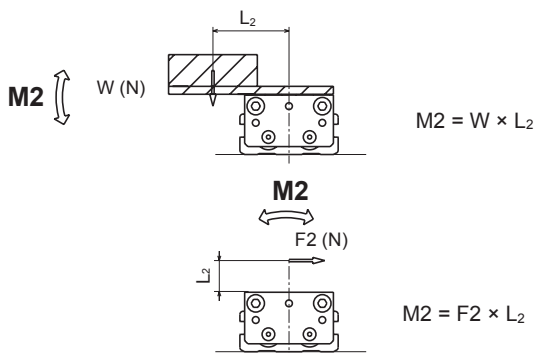
● Vertical load:  $W$  (N)



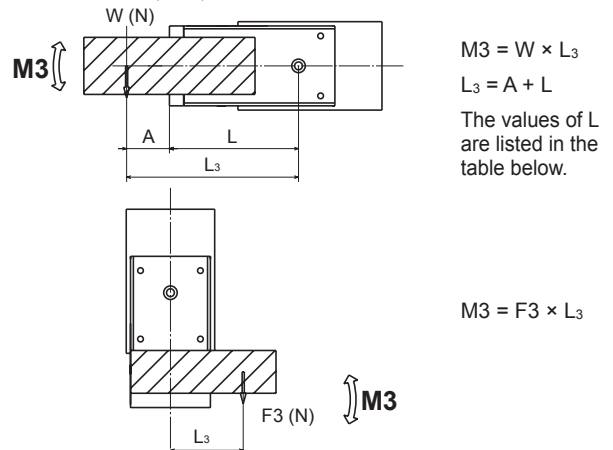
● Bending moment:  $M_1$  (N·m)



● Side bending moment:  $M_2$  (N·m)



● Twist moment:  $M_3$  (N·m)



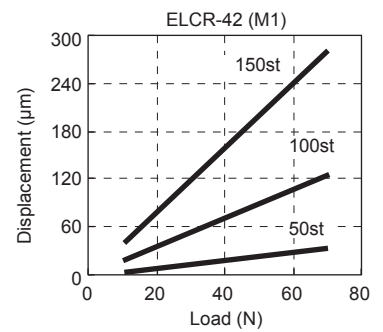
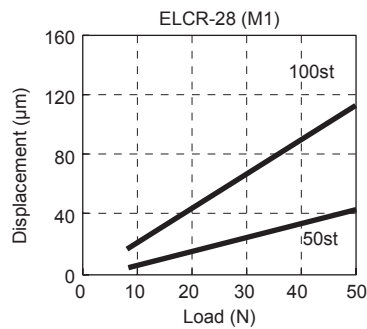
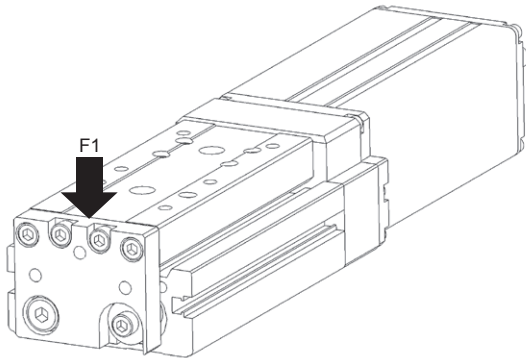
L value

Unit (m)

Size	Stroke length		
	50	100	150
□28	0.09	0.15	0.21
□42	0.11	0.16	

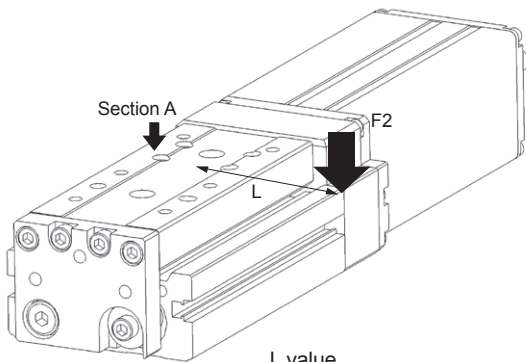
#### Table displacement by moment M1

Displacement at the tip of the table when a load ( $F_1$ ) is put on the table tip



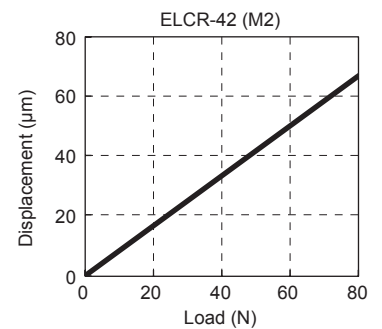
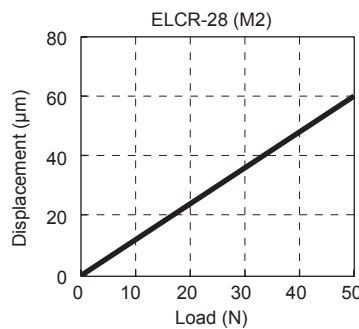
#### Table displacement by moment M2

Displacement of the table tip (section A) when a load ( $F_2$ ) is put on the position that is L mm away from the table center



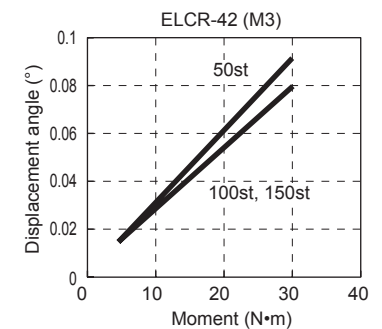
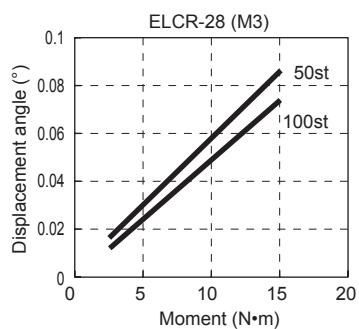
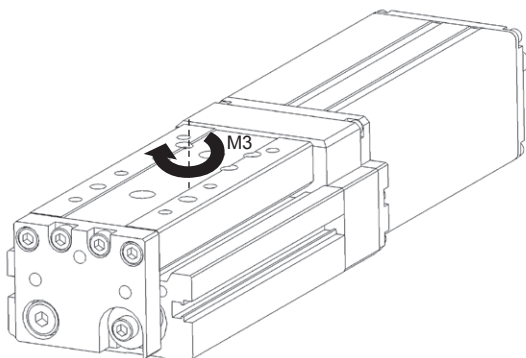
L value

	L
ELCR-28	100
ELCR-42	100



#### Angle of table displacement caused by moment M3

Angle of table displacement when a rotation moment ( $M_3$ ) is put on the table



## ESSD/ELCR Series

Technical information ② :Vertical and horizontal load capacities

### Vertical and horizontal load capacities

Values for ESSD series are values when using both a free joint and a linear guide. These values vary depending on the manner of connection and the frictional resistance. (with ambient temperature of 20°C)

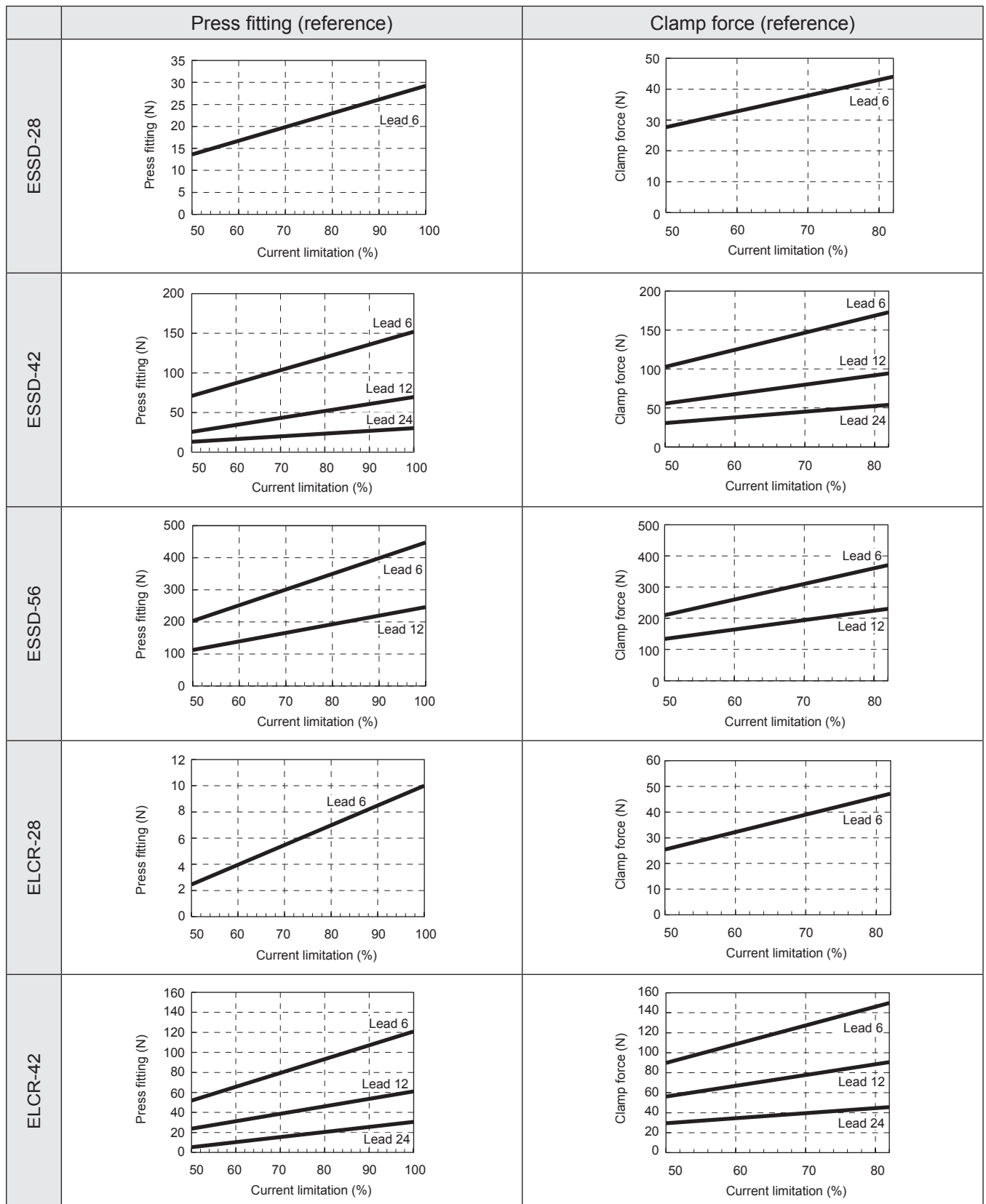
	Vertical load capacity	Horizontal load capacity (Values for ESSD are values when a guide is used together. These values vary depending on the manner of connection and the frictional resistance of the guide.)
ESSD-28		
ESSD-42		
ESSD-56		
ELCR-28		
ELCR-42		

\* For settable speeds, see the table below.

Motor size	Lead	Settable speed (mm/s)
□28, 42	6	15, 20, 30, 40, 50, 60, 70, 80, 90, 100
	12	30, 40, 60, 80, 100, 120, 140, 160, 180, 200
	24	60, 80, 120, 160, 200, 240, 280, 320, 360, 400
□56	6	15, 20, 50, 60, 70, 80, 90, 100
	12	30, 40, 60, 80, 100, 120, 140, 160, 180, 200



## Press fitting, clamp force



\*The speeds of press fitting and clamping are: Lead 6: 1, 2, 3 mm/s; lead 12: 2, 4, 6 mm/s; lead 24: 4, 8, 12 mm/s. The graphs above are just for reference, which provide information on the relationship between the press fitting and the current limitation and the relationship between the clamp force and the current limitation. For settable current limitation values, see the table below.

Press fitting	50(%), 61(%), 75(%), 82(%), 100(%)
Clamp	50(%), 61(%), 75(%), 82(%)

# ESSD/ELCR Series

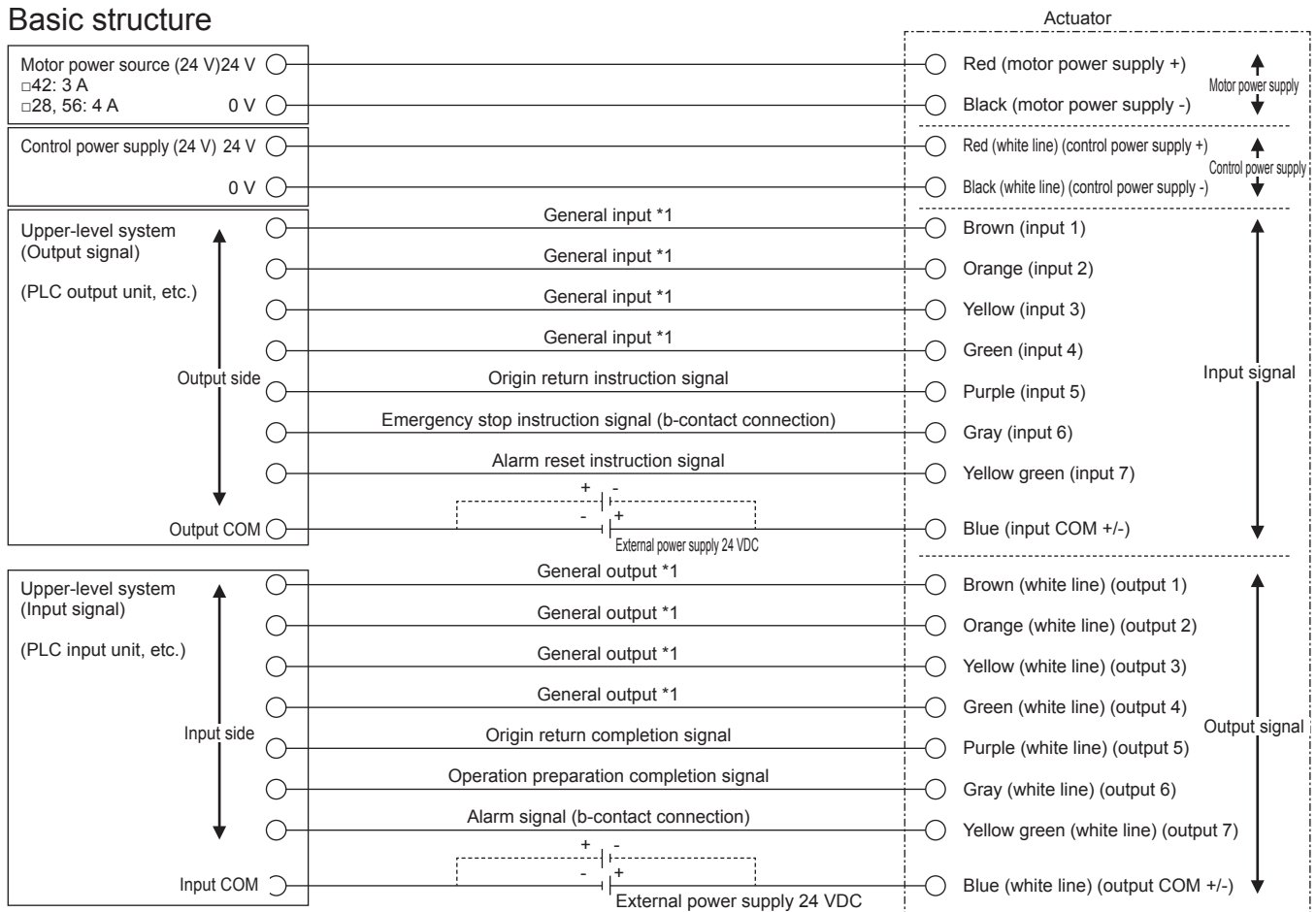
## Wiring

### Wiring

#### Cable specification

Descriptions	Specifications
Type	20-core type cabtyre cord (UL94V-0)
Sheath material	Chloroethene
Sheath diameter	ø8.4
Sheath color	Gray
Cable core	0.2 mm <sup>2</sup> (AWG24) annealed copper wire
Lead wire peeling length (reference)	7 mm from the tip of the lead wire

#### Basic structure



Note:

Check the wiring before electrification to prevent mistakes.

See the table below for general inputs and general outputs marked by \*1.

#### Allocation of general inputs/outputs

-: Not used

		Control mode		
		Solenoid valve mode	7-point positioning mode	Pitch transfer mode
General input	Input 1	Operation instruction input	Start signal	Start signal
	Input 2	Operation instruction input	Positioning 1 input *1	Positioning 1 input *1
	Input 3	-	Positioning 2 input *1	Positioning 2 input *1
	Input 4	-	Positioning 3 input *1	-
General output	Output 1	Positioning completion 1 output	Positioning completion output	Positioning completion output
	Output 2	Positioning completion 2 output	Position information 1 output *2	-
	Output 3	-	Position information 2 output *2	-
	Output 4	-	Position information 3 output *2	-

\*1: In 7-point positioning mode and pitch transfer mode, the position is determined by turning each of input 2, 3, and 4 on or off.

\*2: In 7-point positioning mode, the destination position is indicated by turning output 2, 3, and 4 on or off.

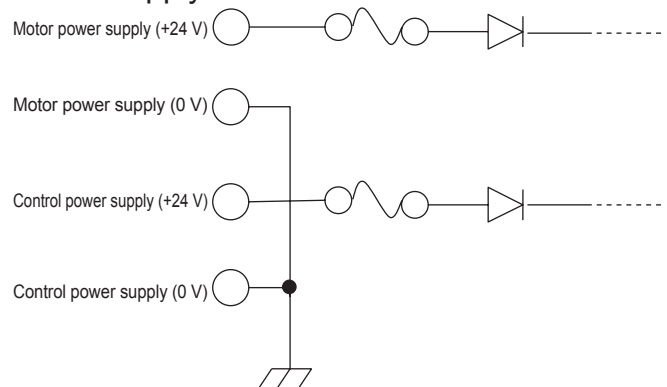
#### Power supply circuit

##### Power supply specification

Descriptions		Specifications
Motor power supply	Power supply voltage	24 VDC $\pm$ 10%
	Instantaneous maximum current	ESSD/ELCR-28: 4 A ESSD/ELCR-42: 3 A ESSD-56: 4 A
Control power supply	Power supply voltage	24 VDC $\pm$ 10%
	Current consumption	200 mA or less *1

\*1: This includes the case when the teaching pendant is mounted.

##### Power supply circuit



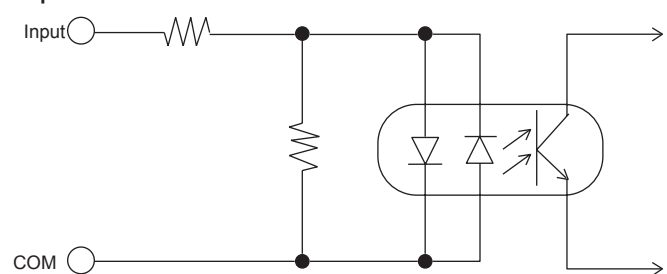
#### Input/output circuits

##### Input specification

Descriptions	Specifications
Number of input points (circuit)	7 points
Input voltage (V)	24 VDC $\pm$ 10%
Input current (mA)	3 mA/point
Maximum input current (mA)	21 mA
Maximum current consumption (mA) *	91 mA
Input current during ON	2 mA (min)
Input current during OFF	0.5 mA (max)

\* The maximum current consumption value includes the current consumption of the output circuit.

##### Input circuit



The input has no polarity.  
(COM can be used for both + and -.)

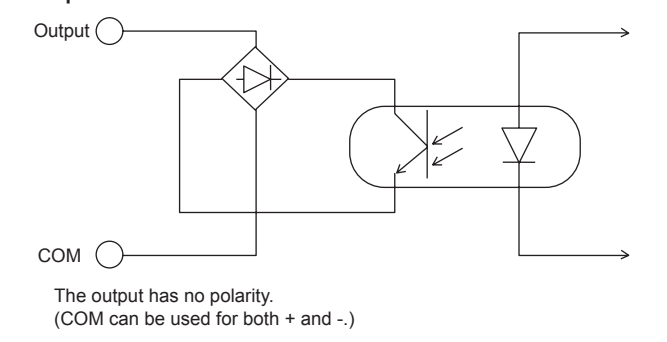
##### Output specification

Descriptions	Specifications
Number of Output points (circuit)	7 points
Load voltage (V)	24 VDC $\pm$ 10%
Load current (mA)	10 mA or less per point
Maximum current (mA)	70 mA
Maximum current consumption (mA) *1	91 mA
Internal voltage drop	6 V or lower (25°C or lower) *2
Leakage current	10 $\mu$ A
Output short-circuit protection circuit	Provided
Connected load	PLC

\*1: The maximum current consumption value includes the current consumption of the input circuit.

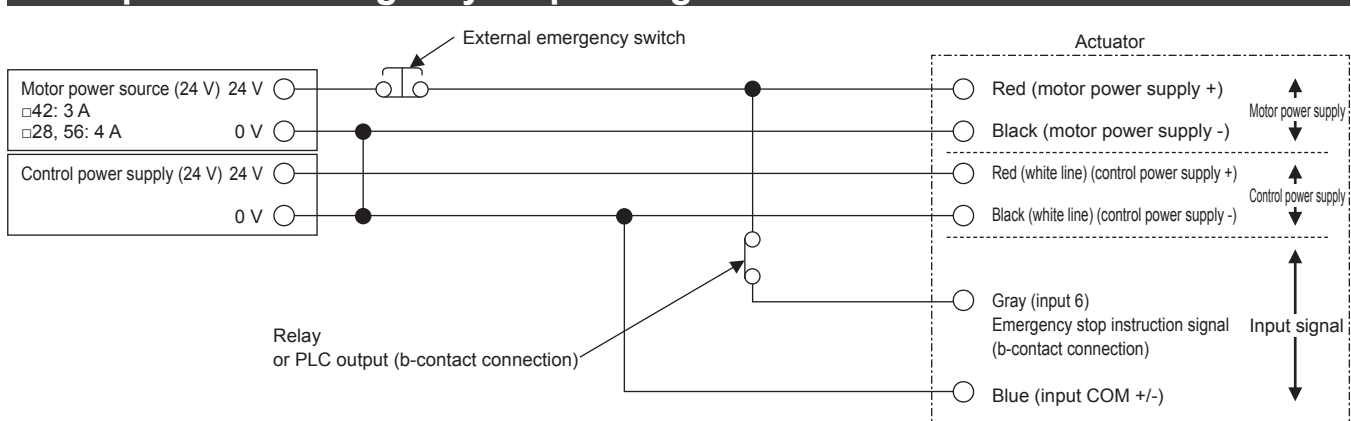
\*2: At 40°C, the value becomes 6 V or lower when the load current is 9 mA.

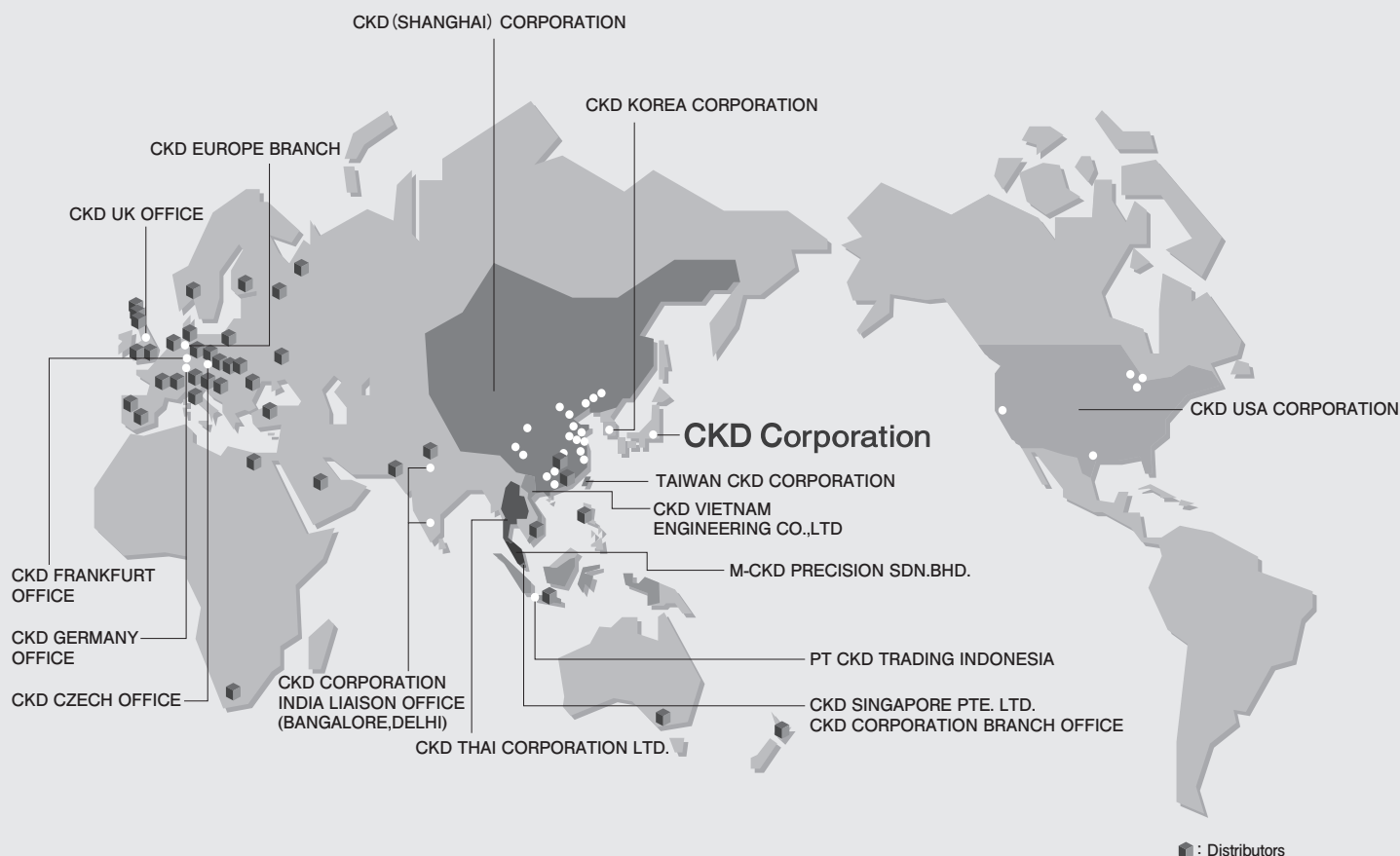
##### Output circuit



The output has no polarity.  
(COM can be used for both + and -.)

#### Example of an emergency stop wiring





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