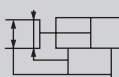




Linear Slide Hand with length measuring function, double acting

# LSHM-A Series

● Operating stroke length: 4, 6, 10, 14 mm



RoHS

## Specifications

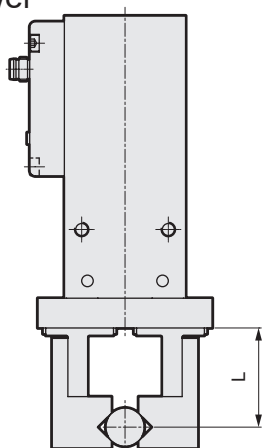
| Item                                              |    | LSHM-A                                                                                         |  |                                               |       |       |       |       |       |       |       |
|---------------------------------------------------|----|------------------------------------------------------------------------------------------------|--|-----------------------------------------------|-------|-------|-------|-------|-------|-------|-------|
| Bore size                                         |    | mm                                                                                             |  | ø10                                           |       | ø16   |       | ø20   |       | ø25   |       |
| Actuation                                         |    | Double acting                                                                                  |  |                                               |       |       |       |       |       |       |       |
| Working fluid                                     |    | Compressed air                                                                                 |  |                                               |       |       |       |       |       |       |       |
| Max. working pressure                             |    | MPa                                                                                            |  | 0.7                                           |       |       |       |       |       |       |       |
| Min. working pressure                             |    | MPa                                                                                            |  | 0.2                                           |       | 0.1   |       | 0.1   |       | 0.1   |       |
| Port size                                         |    |                                                                                                |  | M3                                            |       | M5    |       | M5    |       | M5    |       |
| Operating stroke length                           |    | mm                                                                                             |  | 4                                             |       | 6     |       | 10    |       | 14    |       |
| Power supply voltage                              |    | 24 VDC ±10%                                                                                    |  |                                               |       |       |       |       |       |       |       |
| Current consumption                               |    | 25 mA or less                                                                                  |  |                                               |       |       |       |       |       |       |       |
| Display lamp                                      |    | Green LED ON when power applied                                                                |  |                                               |       |       |       |       |       |       |       |
| Analog output                                     |    | When fingers are closed: 1 V; when opened: 5 V <sup>*1</sup> , connection load: 100 kΩ or more |  |                                               |       |       |       |       |       |       |       |
| Analog output linearity                           |    | Without correction adapter                                                                     |  | ±3% F.S. or less (ambient temperature 25°C)   |       |       |       |       |       |       |       |
|                                                   |    | With correction adapter                                                                        |  | ±0.5% F.S. or less (ambient temperature 25°C) |       |       |       |       |       |       |       |
| Repeatability of analog output                    |    | ±0.02 mm or less<br>(ambient temperature 25°C, no deformation or wear of actuator / jig)       |  |                                               |       |       |       |       |       |       |       |
| Valid measured range length                       |    | mm                                                                                             |  | 4.5                                           |       | 6.5   |       | 10    |       | 14    |       |
| Impact resistance (sensor / amplifier section)    |    | 294 m / s <sup>2</sup>                                                                         |  |                                               |       |       |       |       |       |       |       |
| Vibration resistance (sensor / amplifier section) |    | 10 to 55 Hz compound amplitude 1.5 mm, 2 hours per X, Y, Z direction                           |  |                                               |       |       |       |       |       |       |       |
| Degree of protection (sensor / amplifier section) |    | IEC standards IP65                                                                             |  |                                               |       |       |       |       |       |       |       |
| Ambient temperature, humidity                     |    | 10 to 60°C, 85% RH or less<br>(no freezing)                                                    |  |                                               |       |       |       |       |       |       |       |
| Amplifier mounting position                       |    |                                                                                                |  | Side                                          | Front | Side  | Front | Side  | Front | Side  | Front |
| Weight                                            | kg | Finger OP: 1, 2, 3                                                                             |  | 0.108                                         | 0.120 | 0.221 | 0.238 | 0.437 | 0.457 | 0.752 | 0.773 |
|                                                   |    | Finger OP: 4                                                                                   |  |                                               |       | 0.226 | 0.243 | 0.442 | 0.462 | 0.782 | 0.803 |
| Lubrication                                       |    | Not required                                                                                   |  |                                               |       |       |       |       |       |       |       |

Note: Refer to page 51 for the correction adapter.

\*1: There is output fluctuation of 1 mV / °C.

Unit: N

## Gripping power

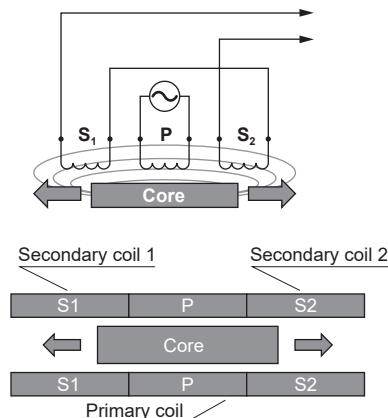


| Bore size (mm) | Double acting |             |
|----------------|---------------|-------------|
|                | Open side     | Closed side |
| ø10            | 17            | 11          |
| ø16            | 45            | 34          |
| ø20            | 66            | 42          |
| ø25            | 104           | 65          |

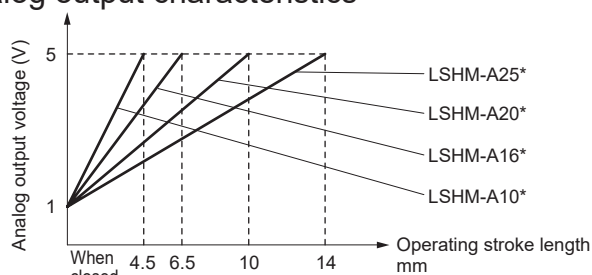
\*Supply pressure: 0.5 MPa, L = 20 mm, value at stroke center

## LVDT displacement sensor operation principle

When exciting the primary coil (P), induced voltage is generated in the two secondary coils (S1 / S2) by electromagnetic induction. When the Hand is driven, the core position changes and a difference in induced voltage occurs between S1 and S2. This difference is used to output the position of the core as electric signals.



## Analog output characteristics



\*The analog output voltage at shipment is 1 V on the closed side and 5 V on the open side, with the port closed and pressurized.

CKD

### How to order

**LSHM - A 10 D 2 A - N - HP2**

**A** Rubber cover

**B** Bore size

**C** Actuation

**D** Finger

**E** Amp mounting position / grip center reference, high precision positioning hole

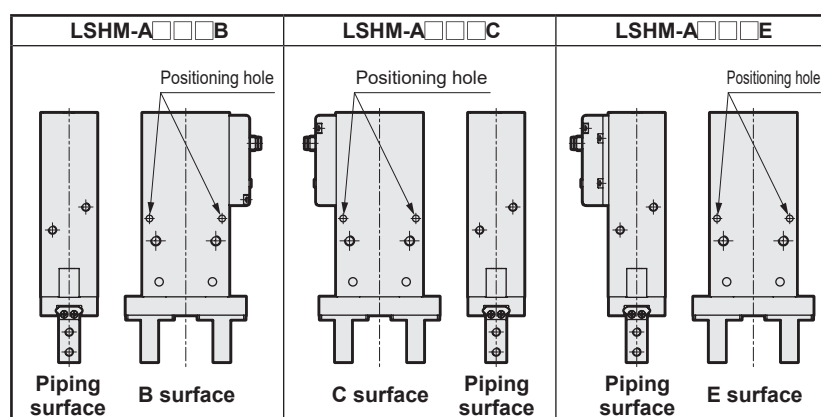
**F** Adapter option

| Code                                                                                       | Description                                         |
|--------------------------------------------------------------------------------------------|-----------------------------------------------------|
| <b>A Rubber cover</b>                                                                      |                                                     |
| A                                                                                          | Without rubber cover                                |
| <b>B Bore size (mm)</b>                                                                    |                                                     |
| 10                                                                                         | ø10                                                 |
| 16                                                                                         | ø16                                                 |
| 20                                                                                         | ø20                                                 |
| 25                                                                                         | ø25                                                 |
| <b>C Actuation</b>                                                                         |                                                     |
| D                                                                                          | Double acting                                       |
| <b>D Finger * Refer to the Dimensions for details.</b>                                     |                                                     |
| 1                                                                                          | Basic                                               |
| 2                                                                                          | Side tap                                            |
| 3                                                                                          | Through hole                                        |
| 4                                                                                          | Flat                                                |
| <b>E Amp mounting position / grip center reference, high precision positioning hole *1</b> |                                                     |
| A                                                                                          | Amp side / no positioning hole                      |
| B                                                                                          | Amp side / rear with finger below and piping right  |
| C                                                                                          | Amp side / rear with finger below and piping left   |
| D                                                                                          | Amp front / no positioning hole                     |
| E                                                                                          | Amp front / rear with finger below and piping right |
| <b>F Adapter option *2</b>                                                                 |                                                     |
| N                                                                                          | Without adapter                                     |
| A                                                                                          | Correction adapter                                  |
| B                                                                                          | Switch output adaptor (NPN)                         |
| C                                                                                          | Switch output adaptor (PNP)                         |
| D                                                                                          | IO-Link adapter                                     |

\*2: Shipped with the product.

\*1

Amp mounting position / grip center reference, high precision positioning hole position diagram



Refer to the Dimensions (pages 39 to 42) and page 60 for details.

[Example of model No.]

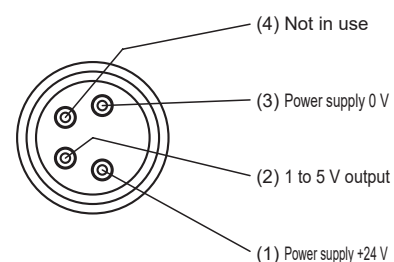
**LSHM-A10D2A-N-HP2**

Model: Linear Slide Hand

- A** Rubber cover : Without rubber cover
- B** Bore size : ø10
- C** Actuation : Double acting
- D** Finger : Side tap
- E** Amp mounting position / grip center reference, high precision positioning hole : Amp side / no positioning hole
- F** Adapter option : Without adapter

### Plug contact array diagram

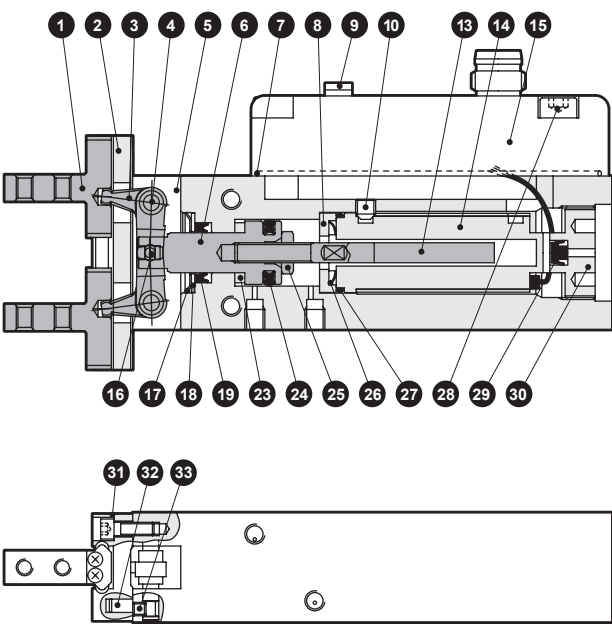
·Without correction adapter



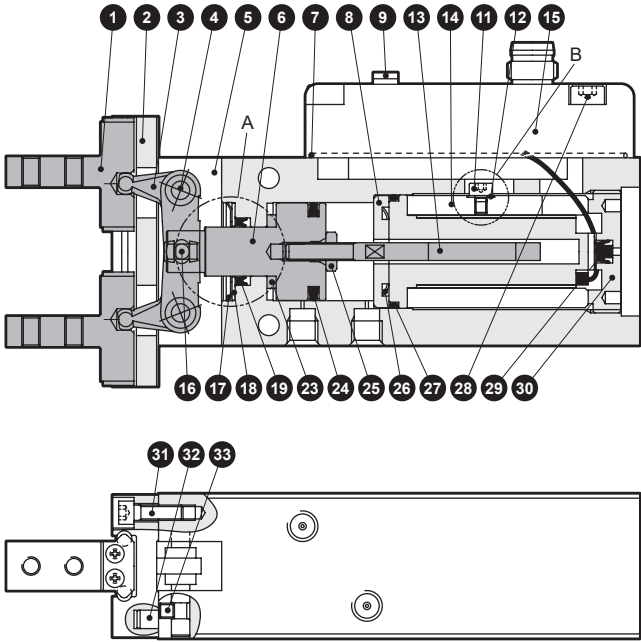
# LSHM-A Series

## Internal structure and parts list

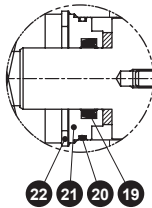
● Amplifier side mounting  
ø10



● Amplifier side mounting  
ø16 to 25



A part ø20, 25



B part ø20, 25



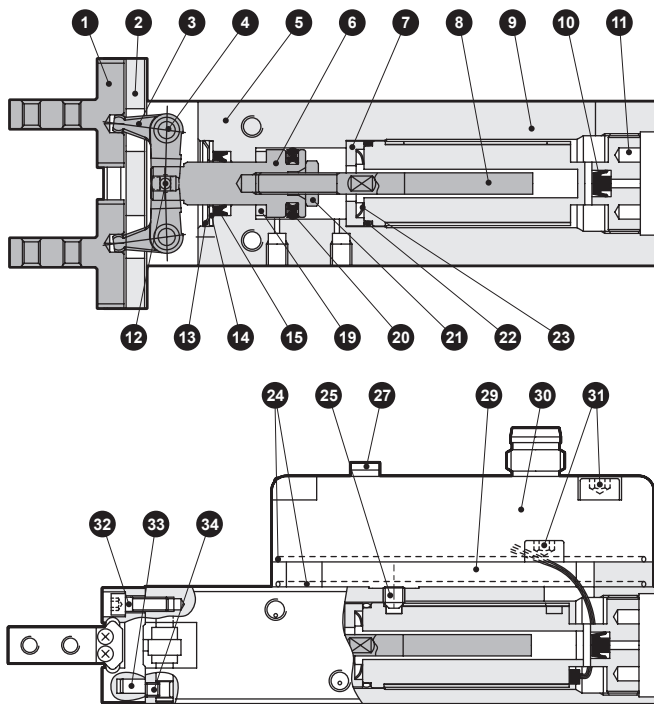
Cannot be disassembled

### Parts list

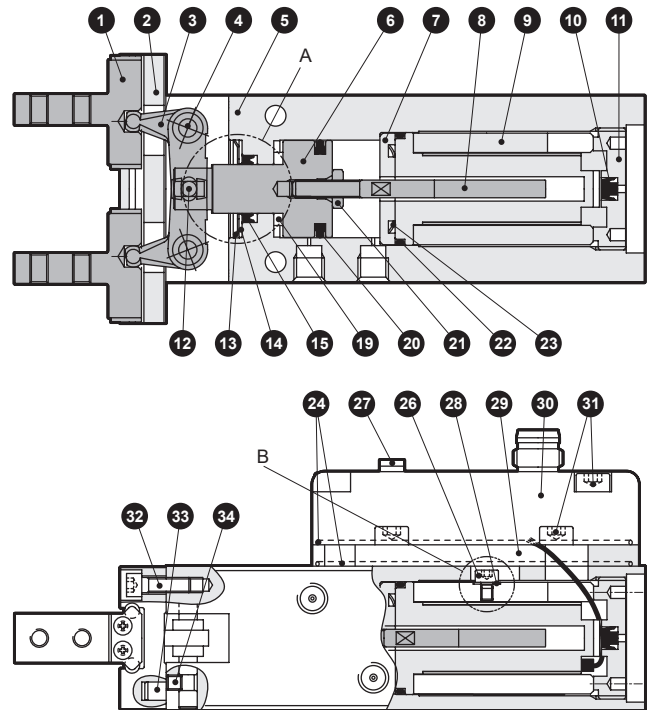
| No. | Part name                     | Material        | Remarks   | No. | Part name                     | Material        | Remarks |
|-----|-------------------------------|-----------------|-----------|-----|-------------------------------|-----------------|---------|
| 1   | Finger                        | Stainless steel |           | 18  | Cap                           | Stainless steel |         |
| 2   | Linear guide                  | Stainless steel |           | 19  | Rod packing                   | Nitrile rubber  |         |
| 3   | Lever                         | Stainless steel |           | 20  | O-ring                        | Nitrile rubber  |         |
| 4   | Fulcrum axis                  | Steel           |           | 21  | Rod metal                     | Aluminum alloy  |         |
| 5   | Body                          | Aluminum alloy  |           | 22  | C-snap ring                   | Steel           |         |
| 6   | Piston rod                    | Stainless steel |           | 23  | Cushion rubber                | Urethane rubber |         |
| 7   | Gasket                        | Nitrile rubber  |           | 24  | Piston packing                | Nitrile rubber  |         |
| 8   | Washer retainer               | Aluminum alloy  |           | 25  | Nut                           | Stainless steel |         |
| 9   | Plug                          | Nitrile rubber  |           | 26  | Wave washer                   | Stainless steel |         |
| 10  | Hexagon socket set screw      | Stainless steel | ø10       | 27  | O-ring                        | Nitrile rubber  |         |
| 11  | Hexagon socket head cap screw | Stainless steel | ø16 to 25 | 28  | Hexagon socket head cap screw | Stainless steel |         |
| 12  | Flat washer                   | Stainless steel | ø16       | 29  | Check valve                   | Nitrile rubber  |         |
| 13  | Core shaft                    | Steel           |           | 30  | Head cover                    | Aluminum alloy  |         |
| 14  | Sensor body                   | -               |           | 31  | Hexagon socket head cap screw | Stainless steel |         |
| 15  | Amplifier                     | -               |           | 32  | Pin                           | Steel           |         |
| 16  | Fulcrum axis                  | Steel           |           | 33  | Hexagon socket set screw      | Stainless steel |         |
| 17  | CR ring                       | Stainless steel |           |     |                               |                 |         |

## Internal structure and parts list

### ● Amplifier front mounting ø10

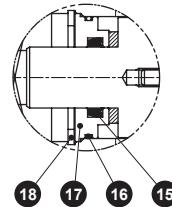


### ● Amplifier front mounting ø16 to 25



A part ø20, 25

B part ø20, 25



**Cannot be disassembled**

### Parts list

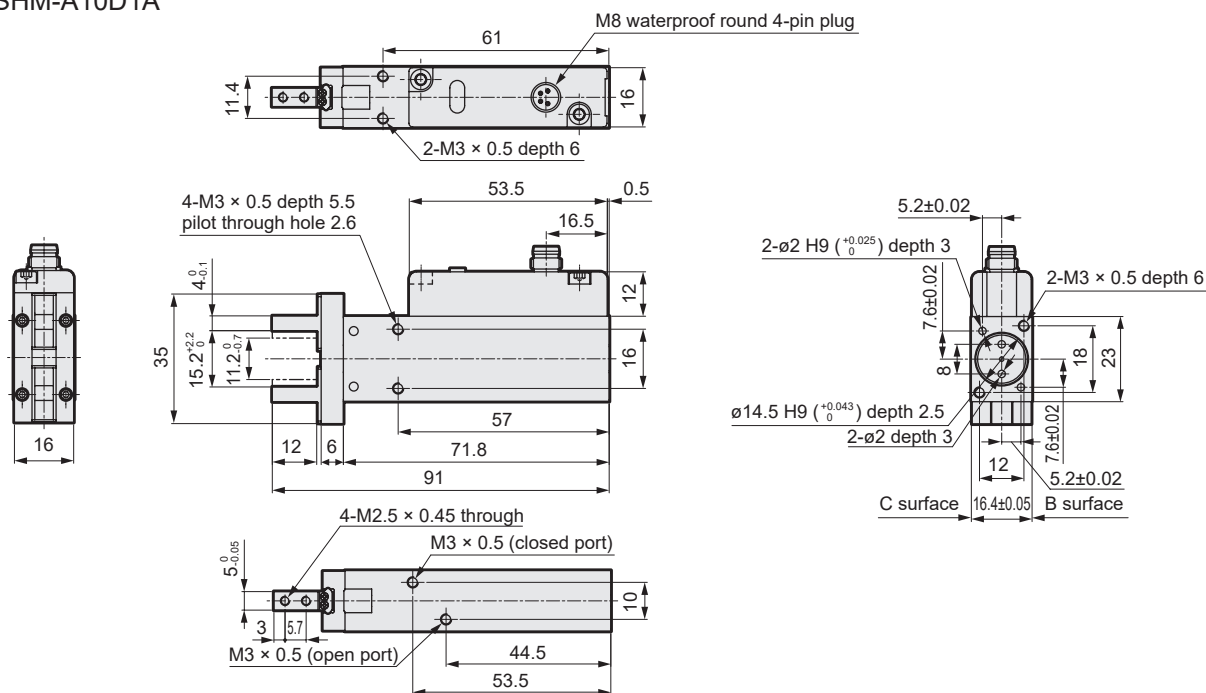
| No. | Part name       | Material        | Remarks | No. | Part name                     | Material        | Remarks   |
|-----|-----------------|-----------------|---------|-----|-------------------------------|-----------------|-----------|
| 1   | Finger          | Stainless steel |         | 18  | C-snap ring                   | Steel           |           |
| 2   | Linear guide    | Stainless steel |         | 19  | Cushion rubber                | Urethane rubber |           |
| 3   | Lever           | Stainless steel |         | 20  | Piston packing                | Nitrile rubber  |           |
| 4   | Fulcrum axis    | Steel           |         | 21  | Nut                           | Stainless steel |           |
| 5   | Body            | Aluminum alloy  |         | 22  | O-ring                        | Nitrile rubber  |           |
| 6   | Piston rod      | Stainless steel |         | 23  | Wave washer                   | Stainless steel |           |
| 7   | Washer retainer | Aluminum alloy  |         | 24  | Gasket                        | Nitrile rubber  |           |
| 8   | Core shaft      | Steel           |         | 25  | Hexagon socket set screw      | Stainless steel | ø10       |
| 9   | Sensor body     | -               |         | 26  | Hexagon socket head cap screw | Stainless steel | ø16 to 25 |
| 10  | Check valve     | Nitrile rubber  |         | 27  | Plug                          | Nitrile rubber  |           |
| 11  | Head cover      | Aluminum alloy  |         | 28  | Flat washer                   | Stainless steel | ø16       |
| 12  | Fulcrum axis    | Steel           |         | 29  | Amplifier adapter             | Aluminum alloy  |           |
| 13  | CR ring         | Stainless steel |         | 30  | Amplifier                     | -               |           |
| 14  | Cap             | Stainless steel |         | 31  | Hexagon socket head cap screw | Stainless steel |           |
| 15  | Rod packing     | Nitrile rubber  |         | 32  | Hexagon socket head cap screw | Stainless steel |           |
| 16  | O-ring          | Nitrile rubber  |         | 33  | Pin                           | Steel           |           |
| 17  | Rod metal       | Aluminum alloy  |         | 34  | Hexagon socket set screw      | Stainless steel |           |

|                             |       |       |        |        |        |            |        |        |
|-----------------------------|-------|-------|--------|--------|--------|------------|--------|--------|
| LSH-A                       | LSH-G | LSH-F | LSHL-A | LSHL-G | LSHL-F | LSHM-A     | LSHM-G | LSHM-F |
| HP1 Series                  |       |       |        |        |        | HP2 Series |        |        |
| Model selection             |       |       |        |        |        |            |        |        |
| Technical data              |       |       |        |        |        |            |        |        |
| Cylinder switch precautions |       |       |        |        |        |            |        |        |
| Safety precautions          |       |       |        |        |        |            |        |        |
| Related products            |       |       |        |        |        |            |        |        |

# LSHM-A Series

Dimensions (bore size:  $\varnothing 10$ )

## ● LSHM-A10D1A

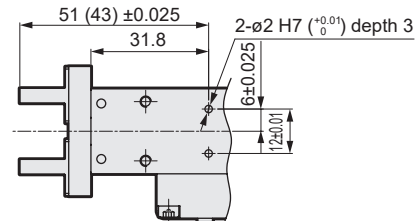
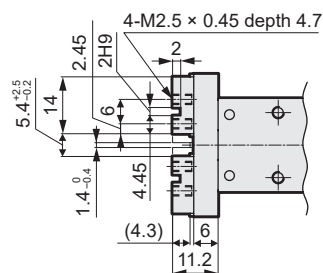
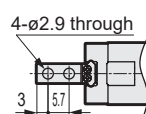
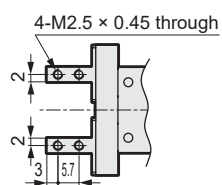


## ● LSHM-A10D2\*

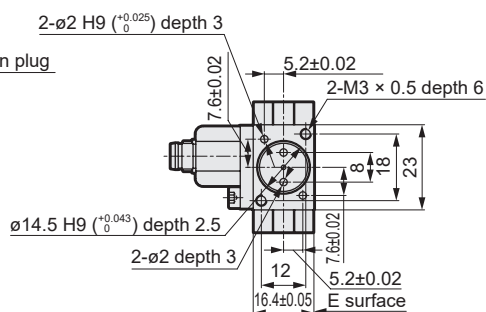
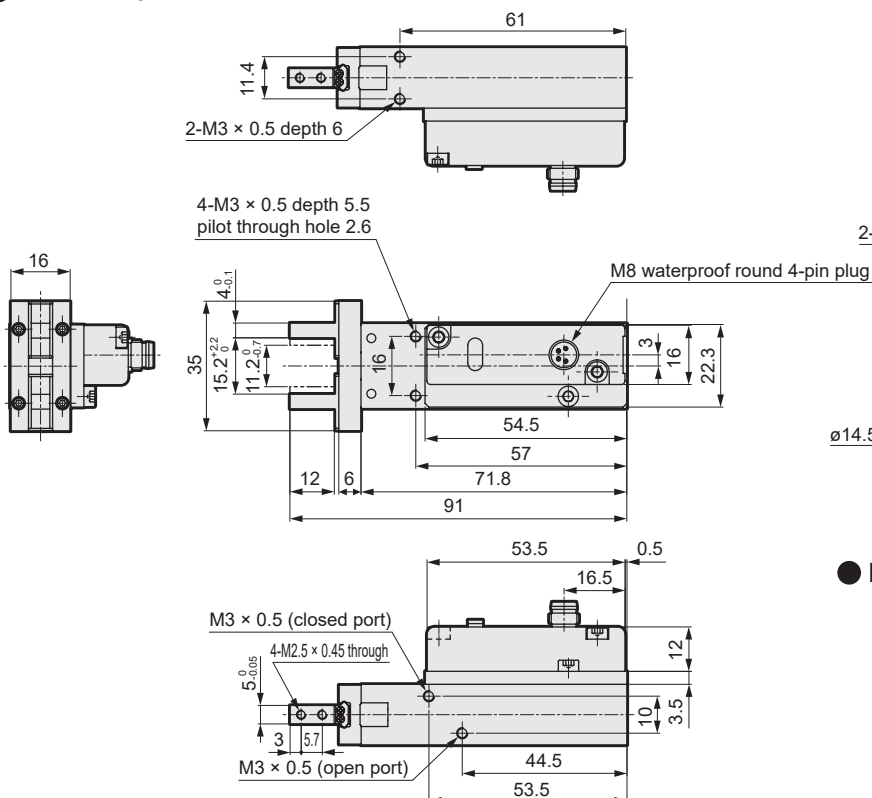
## ● LSHM-A10D3\*

## ● LSHM-A10D4\*

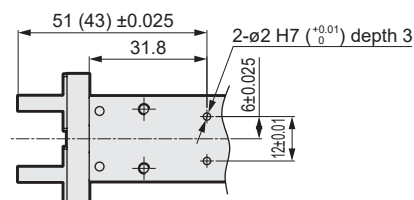
## ● LSHM-A10D\*B/C



## ● LSHM-A10D1D

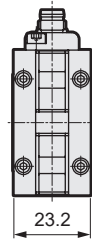


## ● LSHM-A10D\*E

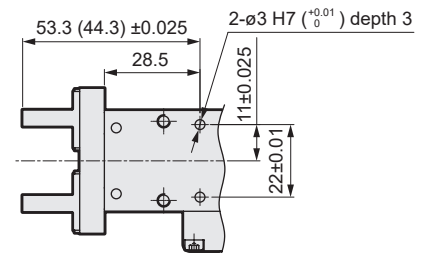
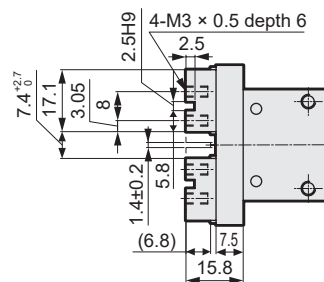
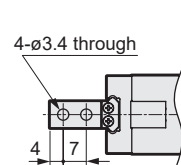


\*1: Positioning holes are machined on B surface for LSHM-A10D\*B and C surface for LSHM-A10D\*C  
\*2: The dimensions in parentheses are the dimensions for LSHM-A10D4.

● LSHM-A16D1A



● LSHM-A16D\*B / C



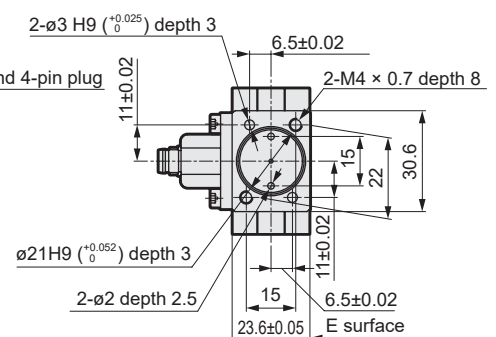
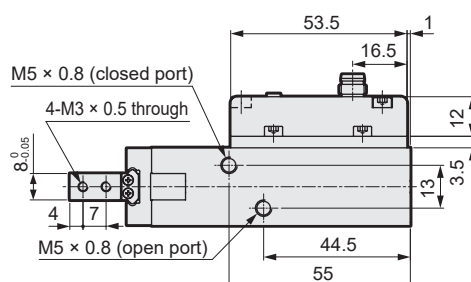
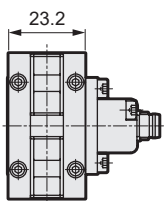
Technical drawing of a mechanical assembly, showing two views: a top view and a side view.

**Top View Dimensions:**

- Overall width: 66
- Overall height: 16
- Two M4 screws: 2-M4  $\times$  0.7 depth 4.5
- Four M4 screws: 4-M4  $\times$  0.7 depth 8 pilot through hole 3.4
- M8 water connection

**Side View Dimensions:**

- Overall height: 44
- Overall width: 103.3
- Distance from left edge to first hole center: 15
- Distance between first and second hole centers: 7.5
- Distance from second hole center to third hole center: 24
- Distance from third hole center to fourth hole center: 55
- Distance from fourth hole center to fifth hole center: 60.5
- Distance from fifth hole center to sixth hole center: 78.5
- Distance from sixth hole center to right edge: 16
- Distance from left edge to top hole center: 20.9 $\pm$ 3.2
- Distance from left edge to bottom hole center: 14.9 $\pm$ 0.7
- Distance from top hole center to bottom hole center: 5.0 $\pm$ 0.1



53.3 (44.3)  $\pm 0.025$

28.5

2-ø H7 ( $\begin{smallmatrix} +0.01 \\ 0 \end{smallmatrix}$ ) depth 3

11  $\pm 0.025$

22  $\pm 0.01$

\*1: Positioning holes are machined on B surface for LSHM-A16D\*B and C surface for LSHM-A16D\*C

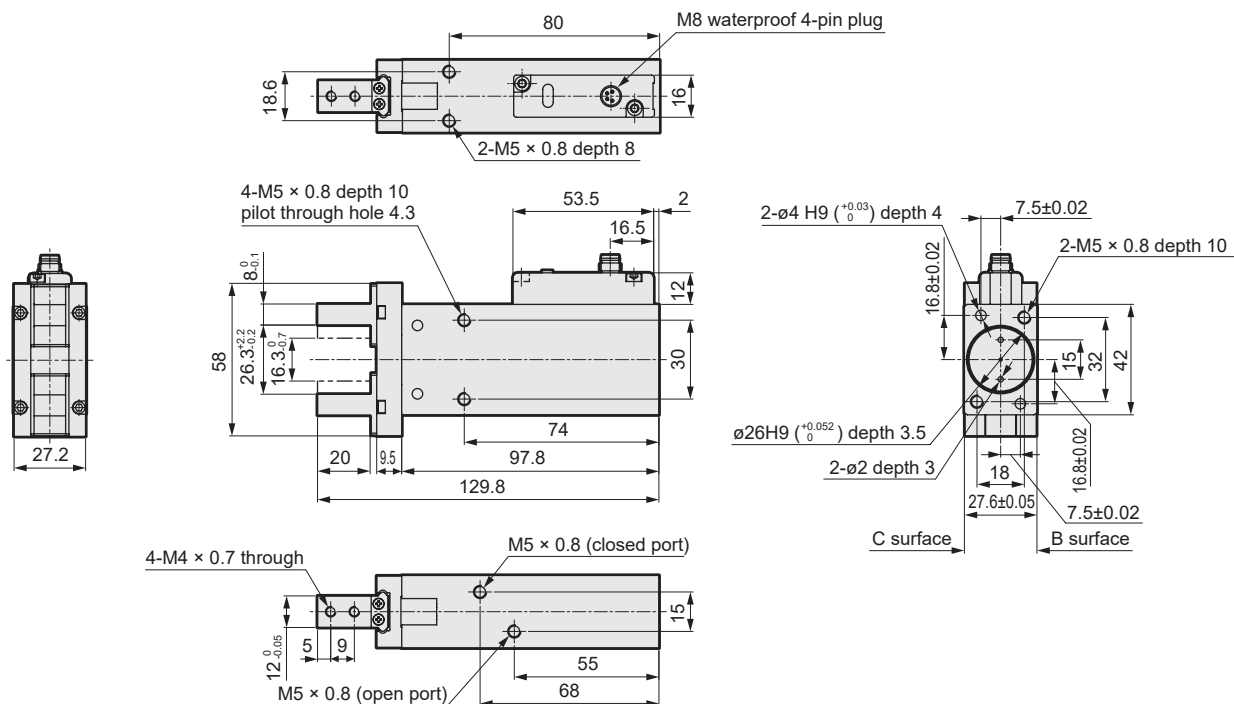
\*2: The dimensions in parentheses are the dimensions for LSHM-A16D4.

|      | HP1 Series     |        |                  |                | HP2 Series       |                 |                |                             |                    |                  |
|------|----------------|--------|------------------|----------------|------------------|-----------------|----------------|-----------------------------|--------------------|------------------|
| LSHA | LSH-G<br>LSH-F | LSHL-A | LSHL-G<br>LSHL-F | LSHMA<br>LSHMF | LSHM-G<br>LSHM-F | Model selection | Technical data | Cylinder switch precautions | Safety precautions | Related products |

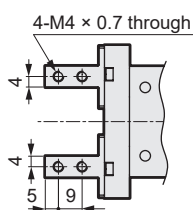
# LSHM-A Series

Dimensions (bore size:  $\varnothing 20$ )

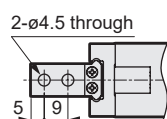
## ● LSHM-A20D1A



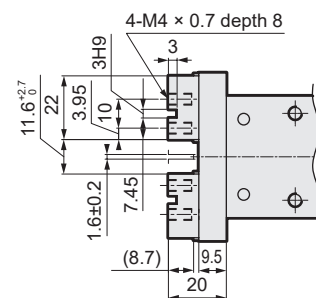
## ● LSHM-A20D2\*



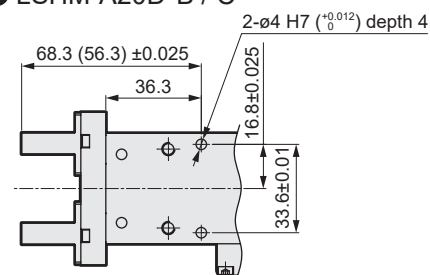
## ● LSHM-A20D3\*



## ● LSHM-A20D4\*

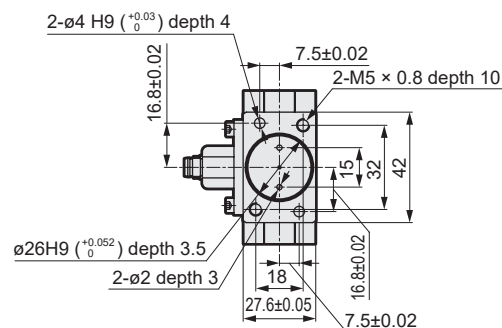
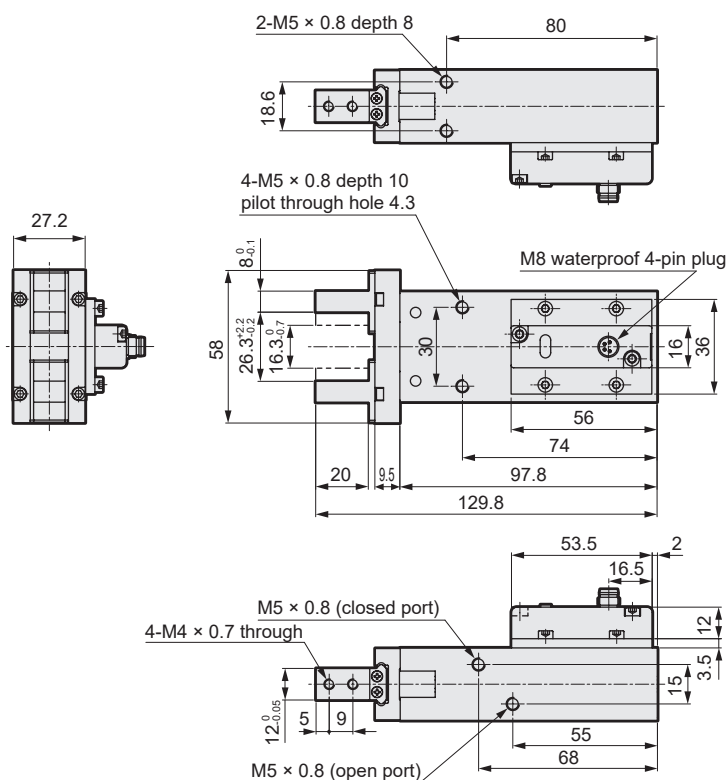


## ● LSHM-A20D\*B / C

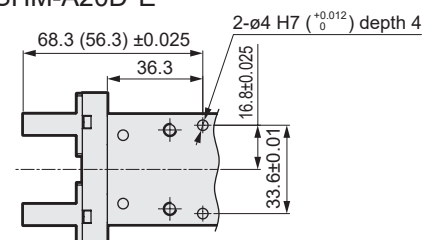


\*1: Positioning holes are machined on B surface for LSHM-A20D\*B and C surface for LSHM-A20D\*C  
\*2: The dimensions in parentheses are the dimensions for LSHM-A20D4.

## ● LSHM-A20D1D

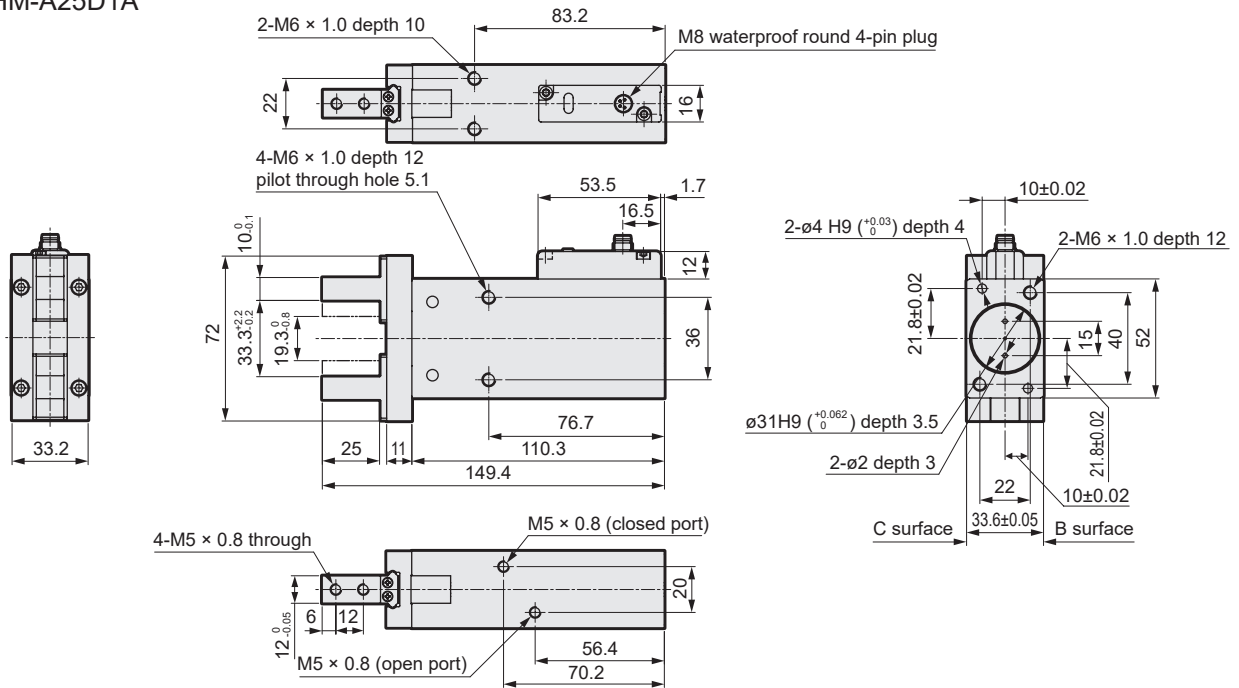


## ● LSHM-A20D\*E

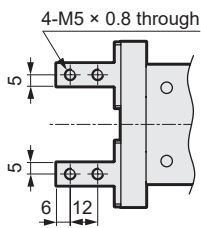


Dimensions (bore size: ø25)

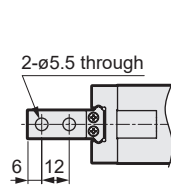
● LSHM-A25D1A



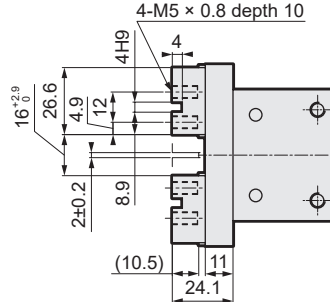
● LSHM-A25D2\*



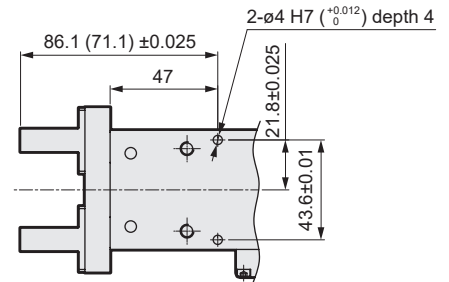
● LSHM-A20D3\*



● LSHM-A25D4\*

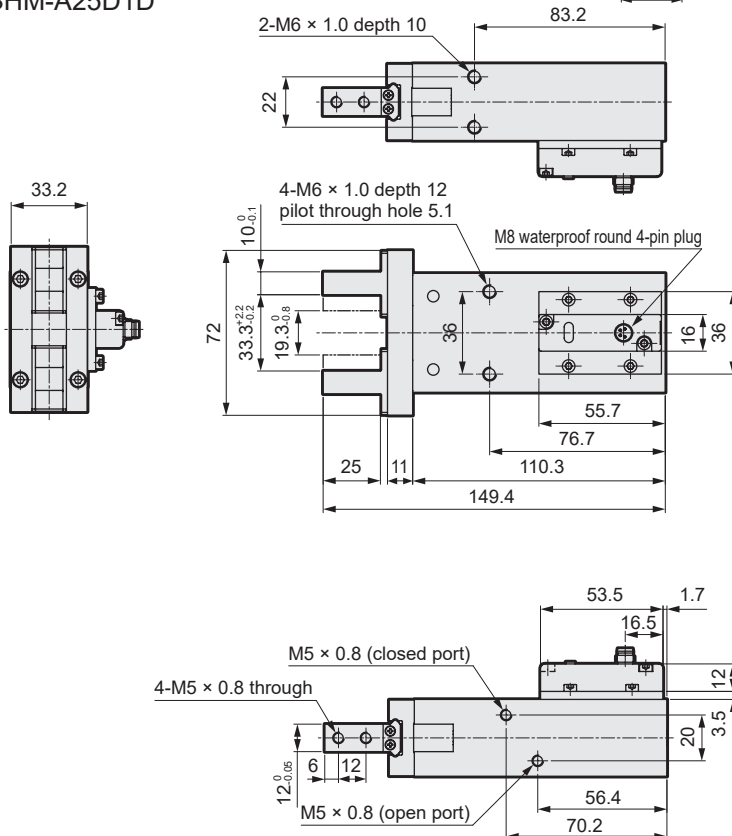


● LSHM-A25D\*B / C

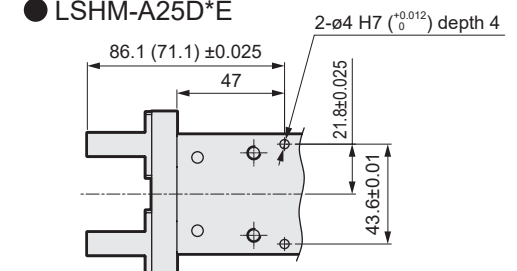


\*1: Positioning holes are machined on B surface for LSHM-A25D\*B and C surface for LSHM-A25D\*C  
\*2: The dimensions in parentheses are the dimensions for LSHM-A25D4.

● LSHM-A25D1D



● LSHM-A25D\*E



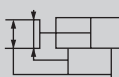
| HP1 Series |                |        |                  | HP2 Series |                  | Model selection | Technical data | Cylinder switch precautions | Safety precautions | Related products |
|------------|----------------|--------|------------------|------------|------------------|-----------------|----------------|-----------------------------|--------------------|------------------|
| LSH-A      | LSH-G<br>LSH-F | LSHL-A | LSHL-G<br>LSHL-F | LSHM-A     | LSHM-G<br>LSHM-F |                 |                |                             |                    |                  |
|            |                |        |                  |            |                  |                 |                |                             |                    |                  |



Linear Slide Hand with length measuring function, double acting with rubber cover

# LSHM-G / LSHM-F Series

● Operating stroke length: 4, 6, 10, 14 mm



RoHS

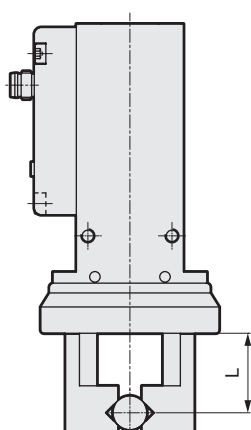
## Specifications

| Item                                              |                            | LSHM-G / LSHM-F                                                                                |  |       |       |       |       |       |       |       |       |
|---------------------------------------------------|----------------------------|------------------------------------------------------------------------------------------------|--|-------|-------|-------|-------|-------|-------|-------|-------|
| Bore size                                         |                            | mm                                                                                             |  | ø10   |       | ø16   |       | ø20   |       | ø25   |       |
| Actuation                                         |                            | Double acting                                                                                  |  |       |       |       |       |       |       |       |       |
| Working fluid                                     |                            | Compressed air                                                                                 |  |       |       |       |       |       |       |       |       |
| Max. working pressure                             |                            | MPa                                                                                            |  | 0.7   |       |       |       |       |       |       |       |
| Min. working pressure                             |                            | MPa                                                                                            |  | 0.2   |       | 0.1   |       | 0.1   |       | 0.1   |       |
| Port size                                         |                            |                                                                                                |  | M3    |       | M5    |       | M5    |       | M5    |       |
| Operating stroke length                           |                            | mm                                                                                             |  | 4     |       | 6     |       | 10    |       | 14    |       |
| Power supply voltage                              |                            | 24 VDC ±10%                                                                                    |  |       |       |       |       |       |       |       |       |
| Current consumption                               |                            | 25 mA or less                                                                                  |  |       |       |       |       |       |       |       |       |
| Display lamp                                      |                            | Green LED ON when power applied                                                                |  |       |       |       |       |       |       |       |       |
| Analog output                                     |                            | When fingers are closed: 1 V; when opened: 5 V <sup>*1</sup> , connection load: 100 kΩ or more |  |       |       |       |       |       |       |       |       |
| Analog output linearity                           | Without correction adapter | ±3% F.S. or less (ambient temperature 25°C)                                                    |  |       |       |       |       |       |       |       |       |
|                                                   | With correction adapter    | ±0.5% F.S. or less (ambient temperature 25°C)                                                  |  |       |       |       |       |       |       |       |       |
| Repeatability of analog output                    |                            | ±0.02 mm or less<br>(ambient temperature 25°C, no deformation or wear of actuator / jig)       |  |       |       |       |       |       |       |       |       |
| Valid measured range length                       |                            | mm                                                                                             |  | 4.5   |       | 6.5   |       | 10    |       | 14    |       |
| Impact resistance (sensor / amplifier section)    |                            | 294 m / s <sup>2</sup>                                                                         |  |       |       |       |       |       |       |       |       |
| Vibration resistance (sensor / amplifier section) |                            | 10 to 55 Hz compound amplitude 1.5 mm, 2 hours per X, Y, Z direction                           |  |       |       |       |       |       |       |       |       |
| Degree of protection (sensor / amplifier section) |                            | IEC standards IP65                                                                             |  |       |       |       |       |       |       |       |       |
| Ambient temperature, humidity                     |                            | 10 to 60°C, 85% RH or less<br>(no freezing)                                                    |  |       |       |       |       |       |       |       |       |
| Amplifier mounting position                       |                            |                                                                                                |  | Side  | Front | Side  | Front | Side  | Front | Side  | Front |
| Weight                                            |                            | kg                                                                                             |  | 0.113 | 0.125 | 0.236 | 0.253 | 0.462 | 0.482 | 0.792 | 0.813 |
| Lubrication                                       |                            | Not required                                                                                   |  |       |       |       |       |       |       |       |       |

Note: Refer to page 51 for the correction adapter.

\*1: There is output fluctuation of 1 mV / °C.

## Gripping power

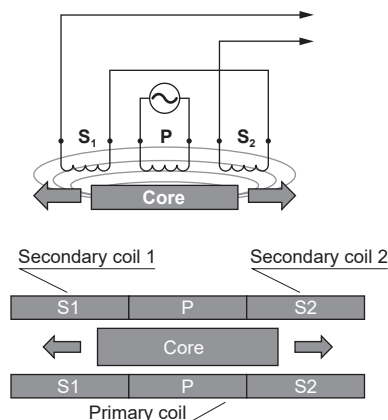


| Bore size (mm) | Double acting |             |
|----------------|---------------|-------------|
|                | Open side     | Closed side |
| ø10            | 17            | 11          |
| ø16            | 45            | 34          |
| ø20            | 66            | 42          |
| ø25            | 104           | 65          |

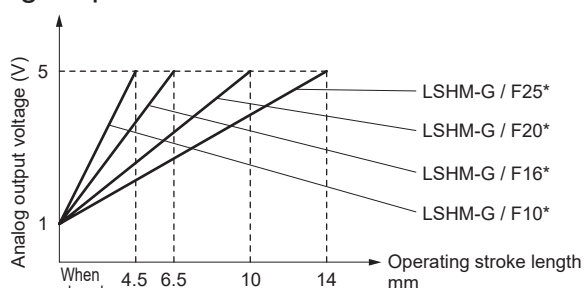
\*Supply pressure: 0.5 MPa, L = 20 mm, value at stroke center

## LVDT displacement sensor operation principle

When exciting the primary coil (P), induced voltage is generated in the two secondary coils (S1 / S2) by electromagnetic induction. When the Hand is driven, the core position changes and a difference in induced voltage occurs between S1 and S2. This difference is used to output the position of the core as electric signals.



## Analogue output characteristics



\*The analogue output voltage at shipment is 1 V on the closed side and 5 V on the open side, with the port closed and pressurized.

### How to order

**LSHM - G 10 D 1 A - N - HP2**

**A** Rubber cover

**B** Bore size

**C** Actuation

**D** Finger

**E** Amp mounting position / grip center reference, high precision positioning hole

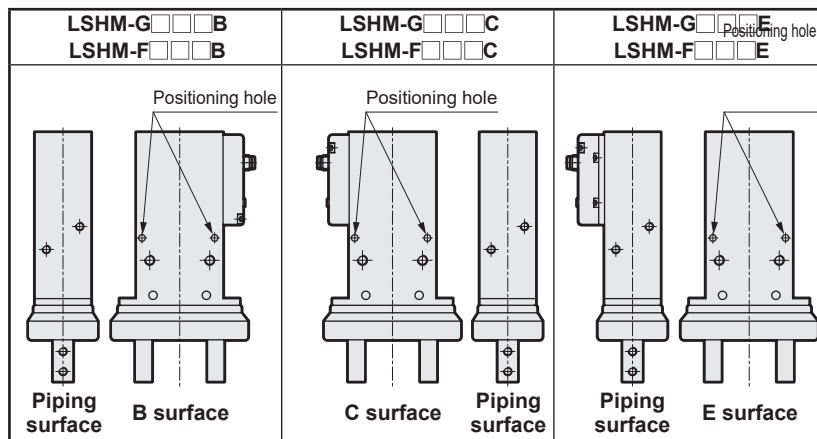
**F** Correction adapter option

| Code                                                                                                  | Description                                         |
|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------|
| <b>A Rubber cover</b>                                                                                 |                                                     |
| <b>G</b>                                                                                              | Chloroprene rubber                                  |
| <b>F</b>                                                                                              | Fluoro rubber                                       |
| <b>B Bore size (mm)</b>                                                                               |                                                     |
| <b>10</b>                                                                                             | ø10                                                 |
| <b>16</b>                                                                                             | ø16                                                 |
| <b>20</b>                                                                                             | ø20                                                 |
| <b>25</b>                                                                                             | ø25                                                 |
| <b>C Actuation</b>                                                                                    |                                                     |
| <b>D</b>                                                                                              | Double acting                                       |
| <b>D Finger</b>                                                                                       |                                                     |
| <b>1</b>                                                                                              | Basic                                               |
| <b>E Amp mounting position / grip center reference, high precision positioning hole <sup>*1</sup></b> |                                                     |
| <b>A</b>                                                                                              | Amp side / no positioning hole                      |
| <b>B</b>                                                                                              | Amp side / rear with finger below and piping right  |
| <b>C</b>                                                                                              | Amp side / rear with finger below and piping left   |
| <b>D</b>                                                                                              | Amp front / no positioning hole                     |
| <b>E</b>                                                                                              | Amp front / rear with finger below and piping right |
| <b>F Adapter option <sup>*2</sup></b>                                                                 |                                                     |
| <b>N</b>                                                                                              | Without correction adapter                          |
| <b>A</b>                                                                                              | Correction adapter attached                         |
| <b>B</b>                                                                                              | Switch output adaptor (NPN)                         |
| <b>C</b>                                                                                              | Switch output adaptor (PNP)                         |
| <b>D</b>                                                                                              | IO-Link adapter                                     |

<sup>\*2</sup> Shipped with the product.

<sup>\*1</sup>

Amp mounting position / grip center reference, high precision positioning hole position diagram



Refer to the Dimensions (pages 47 to 50) and page 60 for details.

[Example of model No.]

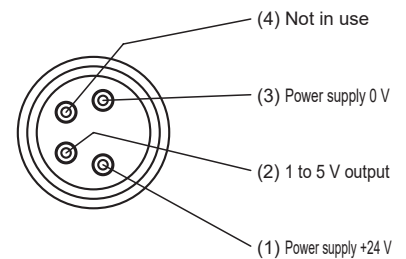
**LSHM-G10D1A-N-HP2**

Model: Linear Slide Hand

- A** Rubber cover : Chloroprene rubber
- B** Bore size : ø10
- C** Actuation : Double acting
- D** Finger : Basic
- E** Amp mounting position / grip center reference, high precision positioning hole : Amp side / no positioning hole
- F** Adapter option : Without adapter

### Plug contact array diagram

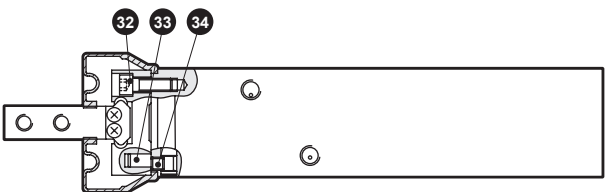
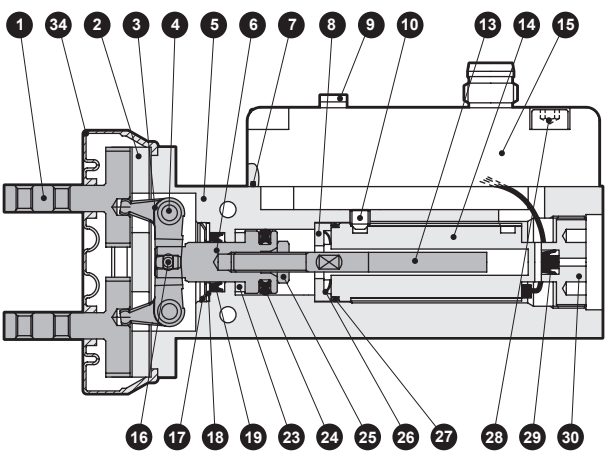
·Without correction adapter



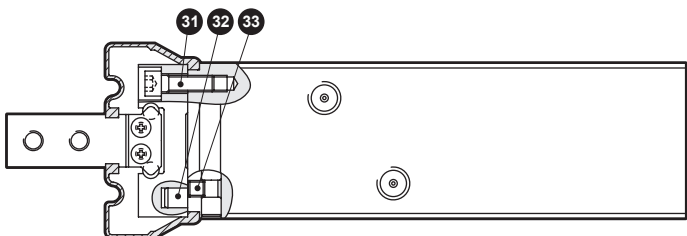
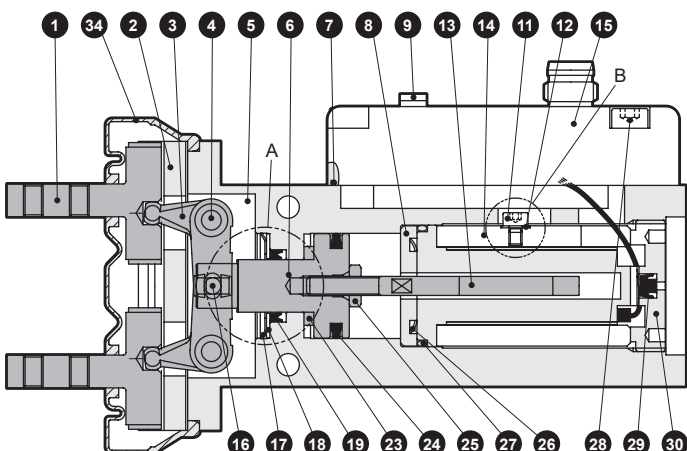
# LSHM-G / LSHM-F Series

## Internal structure and parts list

● Amplifier side mounting  
ø10



● Amplifier side mounting  
ø16 to 25



Cannot be disassembled

### Parts list

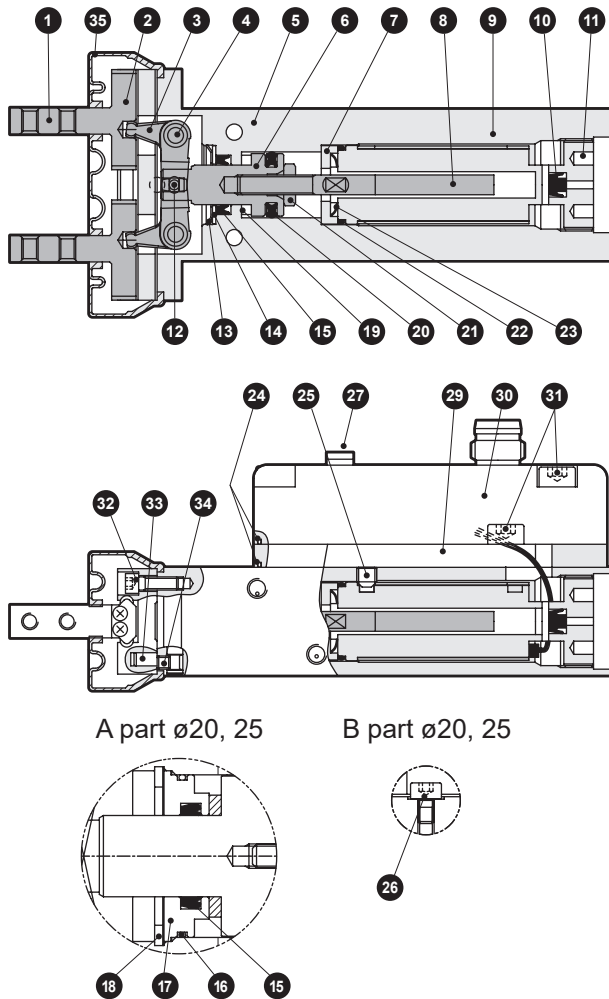
| No. | Part name                     | Material        | Remarks   | No. | Part name                     | Material           | Remarks |
|-----|-------------------------------|-----------------|-----------|-----|-------------------------------|--------------------|---------|
| 1   | Finger                        | Stainless steel |           | 19  | Rod packing                   | Nitrile rubber     |         |
| 2   | Linear guide                  | Stainless steel |           | 20  | O-ring                        | Nitrile rubber     |         |
| 3   | Lever                         | Stainless steel |           | 21  | Rod metal                     | Aluminum alloy     |         |
| 4   | Fulcrum axis                  | Steel           |           | 22  | C-snap ring                   | Steel              |         |
| 5   | Body                          | Aluminum alloy  |           | 23  | Cushion rubber                | Urethane rubber    |         |
| 6   | Piston rod                    | Stainless steel |           | 24  | Piston packing                | Nitrile rubber     |         |
| 7   | Gasket                        | Nitrile rubber  |           | 25  | Nut                           | Stainless steel    |         |
| 8   | Washer retainer               | Aluminum alloy  |           | 26  | Wave washer                   | Stainless steel    |         |
| 9   | Plug                          | Nitrile rubber  |           | 27  | O-ring                        | Nitrile rubber     |         |
| 10  | Hexagon socket set screw      | Stainless steel | ø10       | 28  | Hexagon socket head cap screw | Stainless steel    |         |
| 11  | Hexagon socket head cap screw | Stainless steel | ø16 to 25 | 29  | Check valve                   | Nitrile rubber     |         |
| 12  | Flat washer                   | Stainless steel | ø16       | 30  | Head cover                    | Aluminum alloy     |         |
| 13  | Core shaft                    | Steel           |           | 31  | Hexagon socket head cap screw | Stainless steel    |         |
| 14  | Sensor body                   | -               |           | 32  | Pin                           | Steel              |         |
| 15  | Amplifier                     | -               |           | 33  | Hexagon socket set screw      | Stainless steel    |         |
| 16  | Fulcrum axis                  | Steel           |           | 34  | Rubber cover                  | Chloroprene rubber | LSHM-G* |
| 17  | CR ring                       | Stainless steel |           |     |                               | Fluoro rubber      | LSHM-F* |
| 18  | Cap                           | Stainless steel |           |     |                               |                    |         |

### Repair parts list

| Bore size (mm) | Material           | Kit No.  | Repair part No. | Bore size (mm) | Material           | Kit No.  | Repair part No. |
|----------------|--------------------|----------|-----------------|----------------|--------------------|----------|-----------------|
| ø10            | Chloroprene rubber | LSH-G10K | 34              | ø20            | Chloroprene rubber | LSH-G20K | 34              |
|                | Fluoro rubber      | LSH-F10K |                 |                | Fluoro rubber      | LSH-F20K |                 |
| ø16            | Chloroprene rubber | LSH-G16K |                 | ø25            | Chloroprene rubber | LSH-G25K |                 |
|                | Fluoro rubber      | LSH-F16K |                 |                | Fluoro rubber      | LSH-F25K |                 |

### Internal structure and parts list

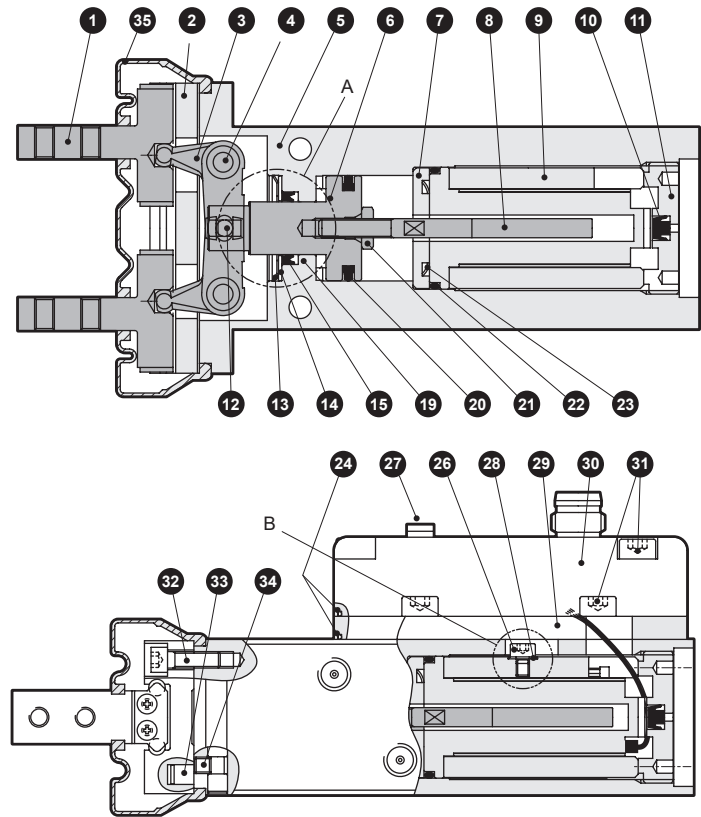
#### ● Amplifier front mounting ø10



A part ø20, 25

B part ø20, 25

#### ● Amplifier front mounting ø16 to 25



**Cannot be disassembled**

### Parts list

| No. | Part name       | Material        | Remarks | No. | Part name                     | Material           | Remarks   |
|-----|-----------------|-----------------|---------|-----|-------------------------------|--------------------|-----------|
| 1   | Finger          | Stainless steel |         | 19  | Cushion rubber                | Urethane rubber    |           |
| 2   | Linear guide    | Stainless steel |         | 20  | Piston packing                | Nitrile rubber     |           |
| 3   | Lever           | Stainless steel |         | 21  | Nut                           | Stainless steel    |           |
| 4   | Fulcrum axis    | Steel           |         | 22  | O-ring                        | Nitrile rubber     |           |
| 5   | Body            | Aluminum alloy  |         | 23  | Wave washer                   | Stainless steel    |           |
| 6   | Piston rod      | Stainless steel |         | 24  | Gasket                        | Nitrile rubber     |           |
| 7   | Washer retainer | Aluminum alloy  |         | 25  | Hexagon socket set screw      | Stainless steel    | ø10       |
| 8   | Core shaft      | Steel           |         | 26  | Hexagon socket head cap screw | Stainless steel    | ø16 to 25 |
| 9   | Sensor body     | -               |         | 27  | Plug                          | Nitrile rubber     |           |
| 10  | Check valve     | Nitrile rubber  |         | 28  | Flat washer                   | Stainless steel    | ø16       |
| 11  | Head cover      | Aluminum alloy  |         | 29  | Amplifier adapter             | Aluminum alloy     |           |
| 12  | Fulcrum axis    | Steel           |         | 30  | Amplifier                     | -                  |           |
| 13  | CR ring         | Stainless steel |         | 31  | Hexagon socket head cap screw | Stainless steel    |           |
| 14  | Cap             | Stainless steel |         | 32  | Hexagon socket head cap screw | Stainless steel    |           |
| 15  | Rod packing     | Nitrile rubber  |         | 33  | Pin                           | Steel              |           |
| 16  | O-ring          | Nitrile rubber  |         | 34  | Hexagon socket set screw      | Stainless steel    |           |
| 17  | Rod metal       | Aluminum alloy  |         | 35  | Rubber cover                  | Chloroprene rubber | LSHM-G*   |
| 18  | C-snap ring     | Steel           |         |     |                               | Fluoro rubber      | LSHM-F*   |

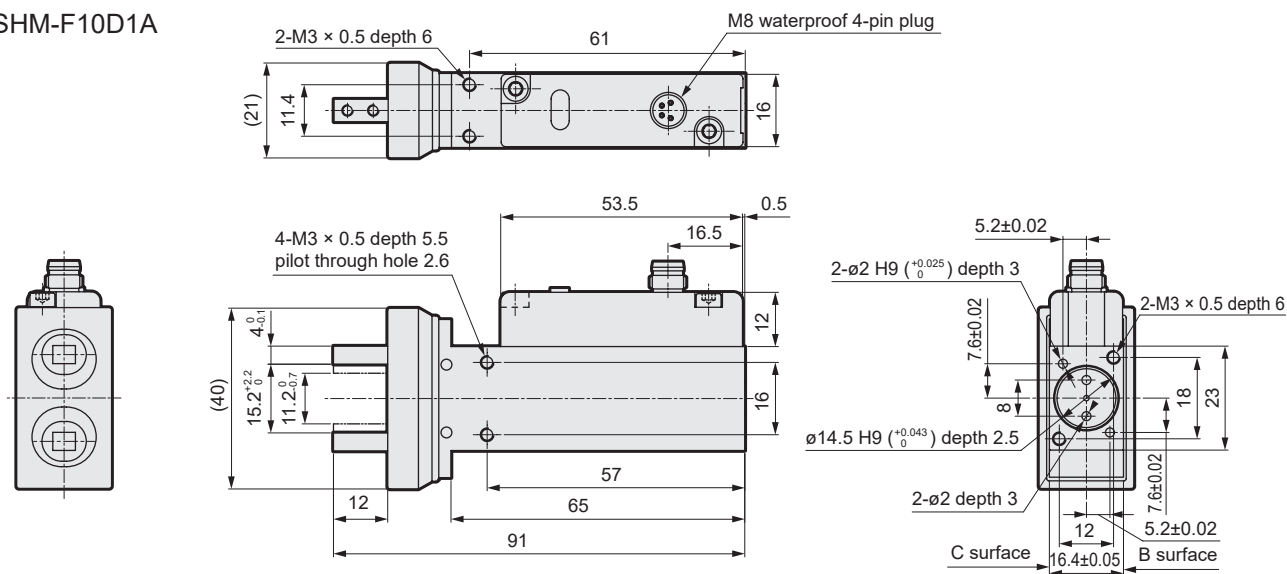
### Repair parts list

| Bore size (mm) | Material           | Kit No.  | Repair part No. | Bore size (mm) | Material           | Kit No.  | Repair part No. |
|----------------|--------------------|----------|-----------------|----------------|--------------------|----------|-----------------|
| ø10            | Chloroprene rubber | LSH-G10K | 35              | ø20            | Chloroprene rubber | LSH-G20K | 35              |
|                | Fluoro rubber      | LSH-F10K |                 |                | Fluoro rubber      | LSH-F20K |                 |
| ø16            | Chloroprene rubber | LSH-G16K |                 | ø25            | Chloroprene rubber | LSH-G25K |                 |
|                | Fluoro rubber      | LSH-F16K |                 |                | Fluoro rubber      | LSH-F25K |                 |

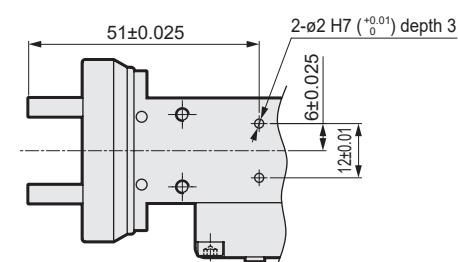
# LSHM-G / LSHM-F Series

Dimensions (bore size:  $\varnothing 10$ )

## ● LSHM-G10D1A LSHM-F10D1A

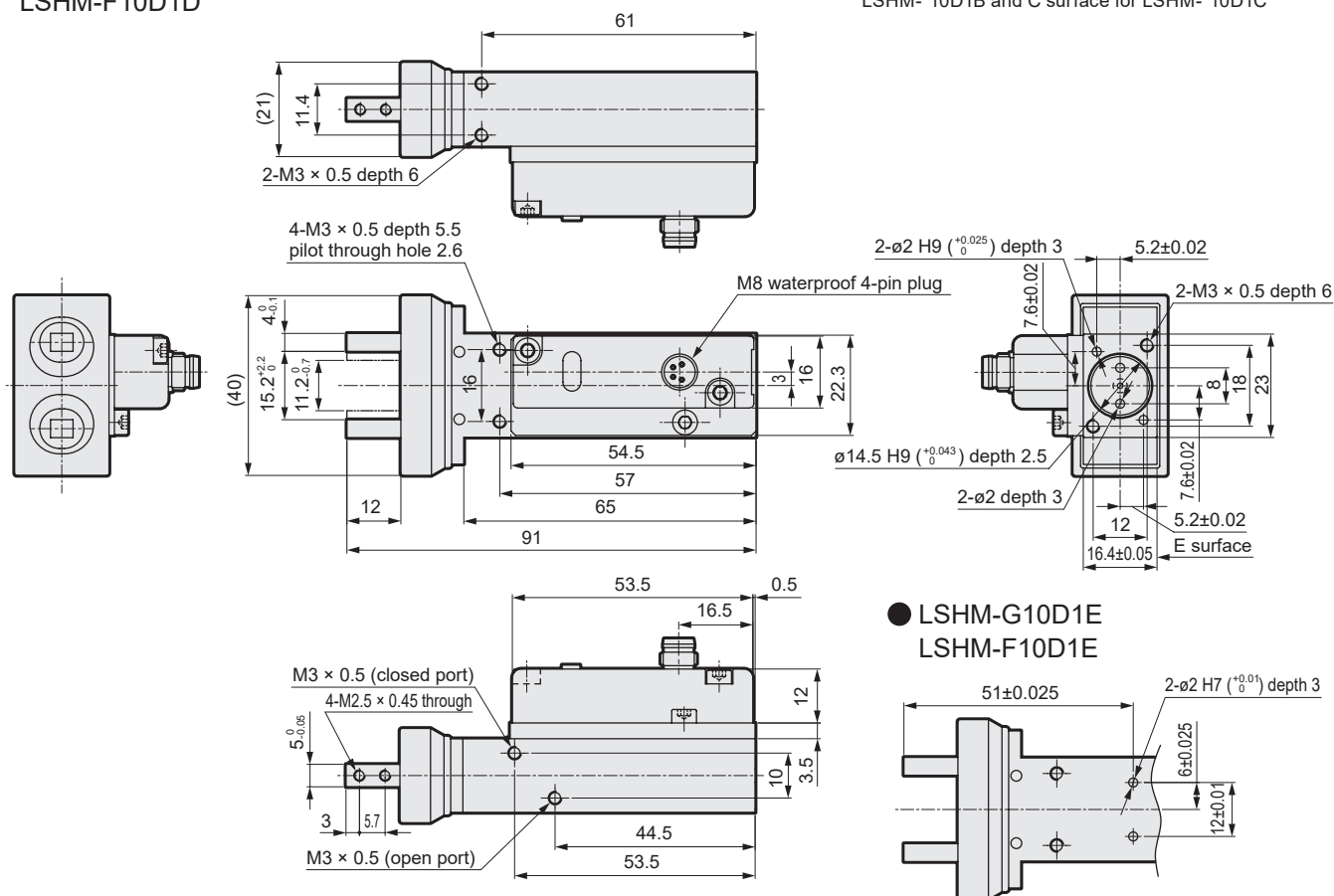


## ● LSHM-G10D1B / C LSHM-F10D1B / C

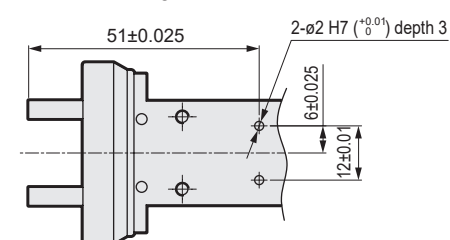


\*1: Positioning holes are machined on B surface for LSHM-\*10D1B and C surface for LSHM-\*10D1C

## ● LSHM-G10D1D LSHM-F10D1D

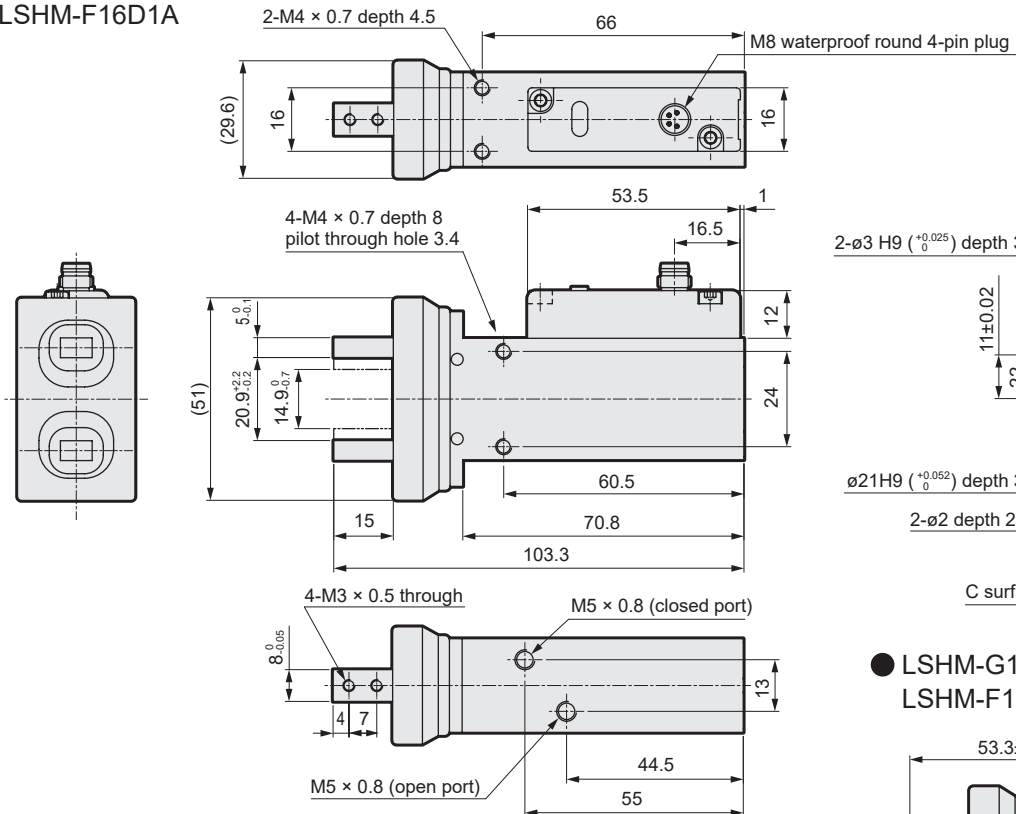


## ● LSHM-G10D1E LSHM-F10D1E

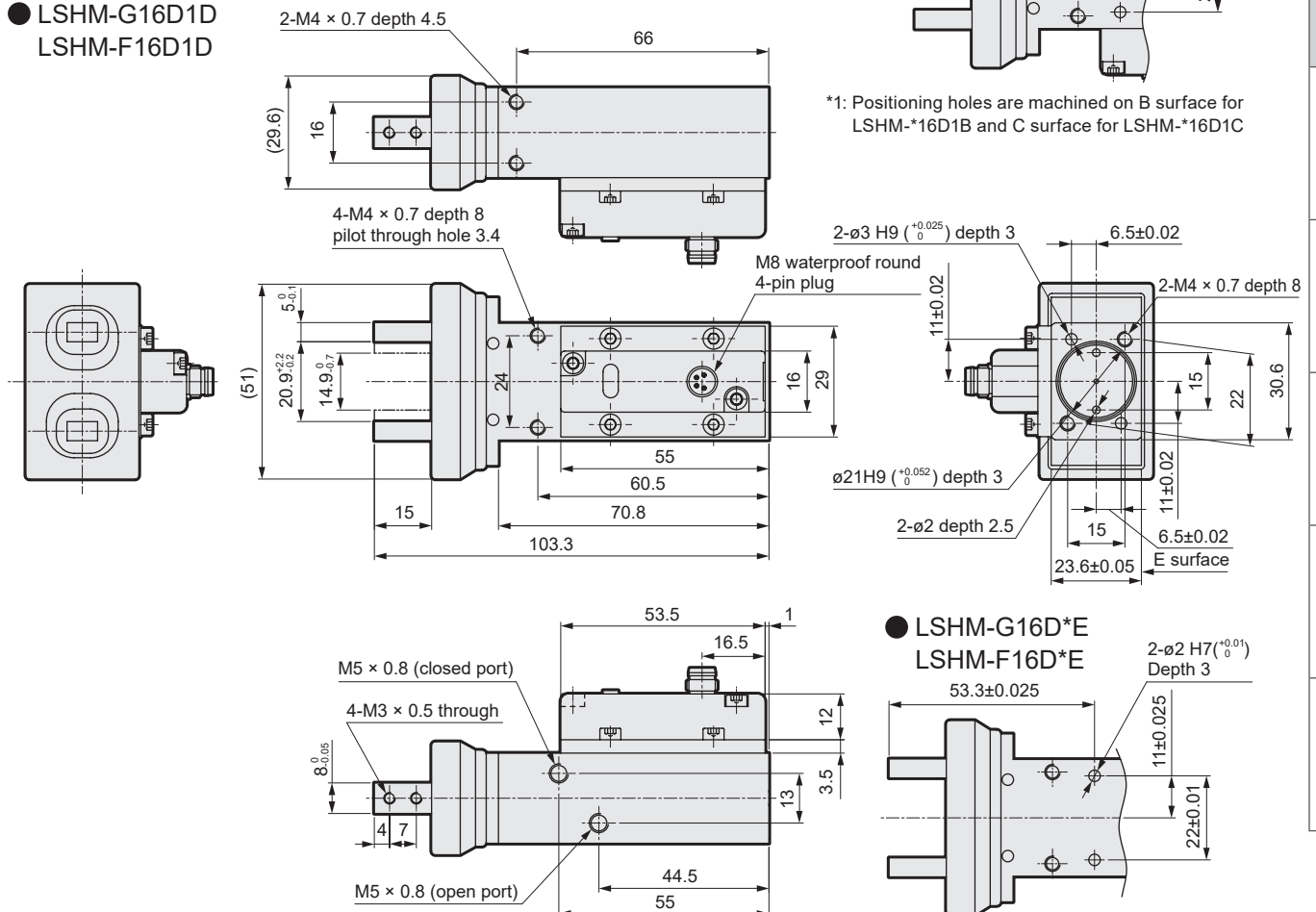


Dimensions (bore size:  $\varnothing 16$ )

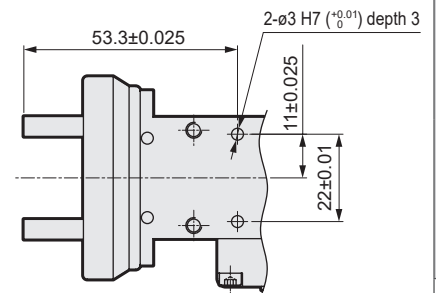
● LSHM-G16D1A  
LSHM-F16D1A



● LSHM-G16D1D  
LSHM-F16D1D

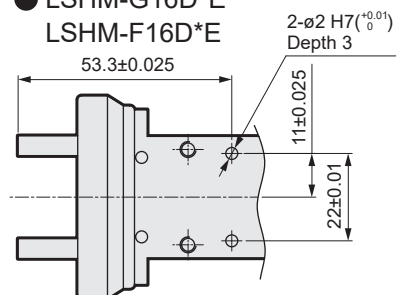


● LSHM-G16D1B / C  
LSHM-F16D1B / C



\*1: Positioning holes are machined on B surface for LSHM-\*16D1B and C surface for LSHM-\*16D1C

● LSHM-G16D\*E  
LSHM-F16D\*E

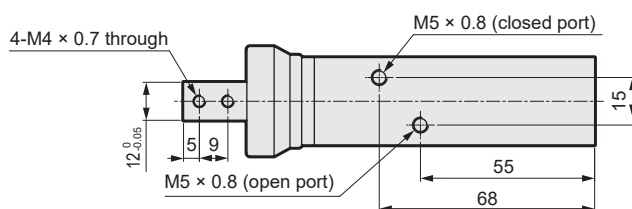
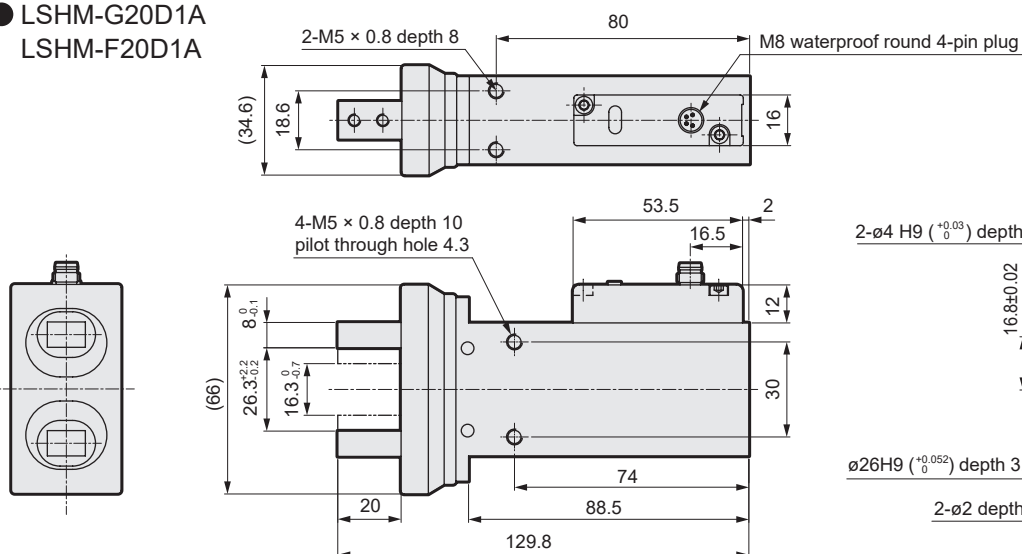


|            |                |        |                  |        |                  |                 |                |                                |                       |                     |
|------------|----------------|--------|------------------|--------|------------------|-----------------|----------------|--------------------------------|-----------------------|---------------------|
| LSH-A      | LSH-G<br>LSH-F | LSHL-A | LSHL-G<br>LSHL-F | LSHM-A | LSHM-G<br>LSHM-F | Model selection | Technical data | Cylinder switch<br>precautions | Safety<br>precautions | Related<br>products |
| HP1 Series |                |        |                  |        |                  |                 |                |                                |                       |                     |
| HP2 Series |                |        |                  |        |                  |                 |                |                                |                       |                     |

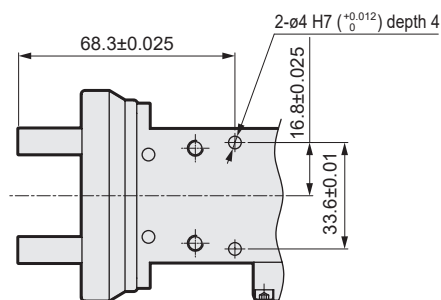
# LSHM-G / LSHM-F Series

Dimensions (bore size:  $\varnothing 20$ )

## ● LSHM-G20D1A LSHM-F20D1A

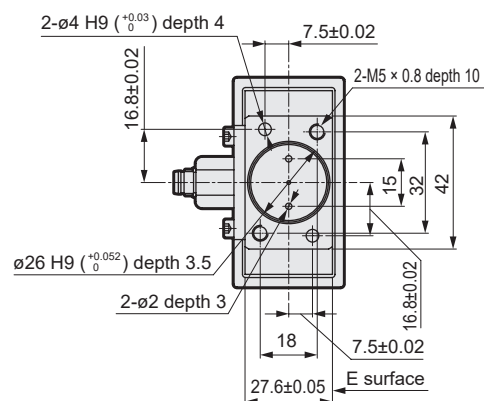
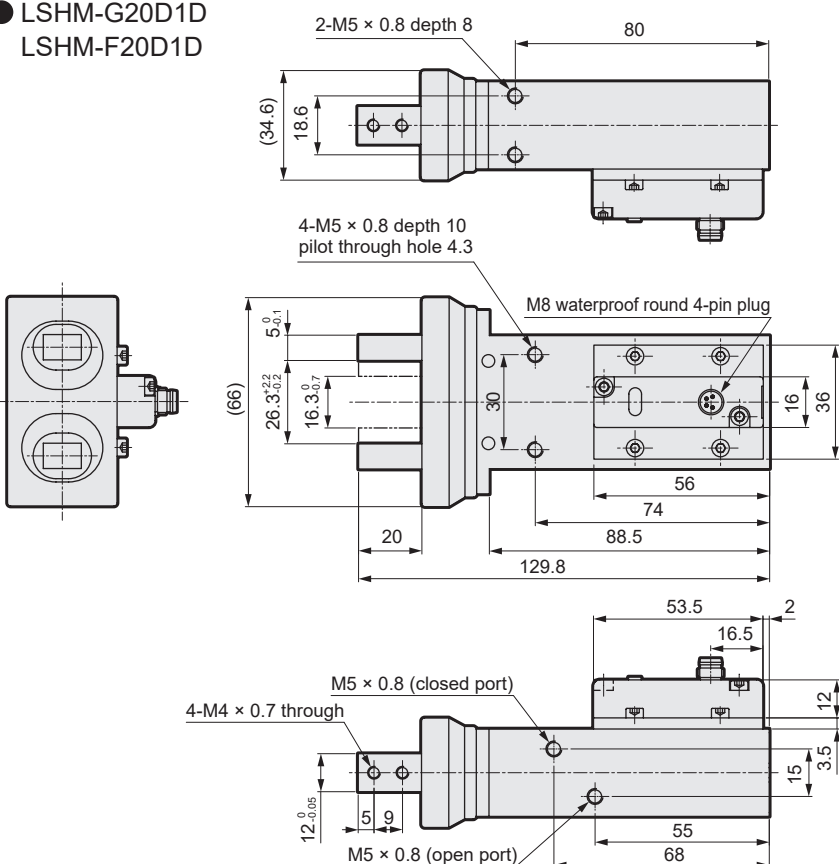


## ● LSHM-G20D1B / C LSHM-F20D1B / C

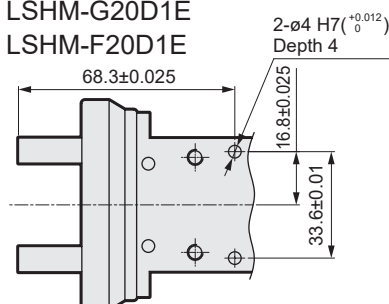


\*1: Positioning holes are machined on B surface for LSHM-\*20D1B and C surface for LSHM-\*20D1C

## ● LSHM-G20D1D LSHM-F20D1D

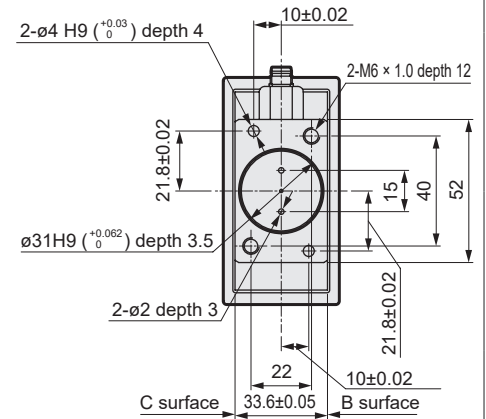
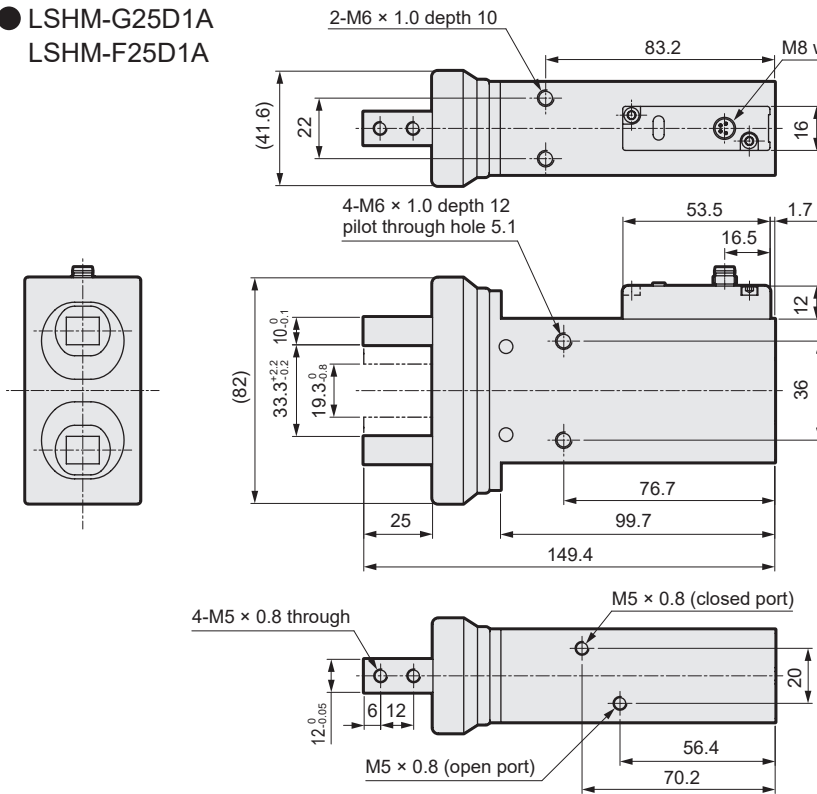


## ● LSHM-G20D1E LSHM-F20D1E

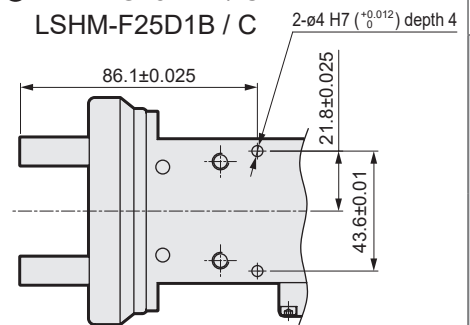


### Dimensions (bore size: $\phi 25$ )

#### ● LSHM-G25D1A LSHM-F25D1A

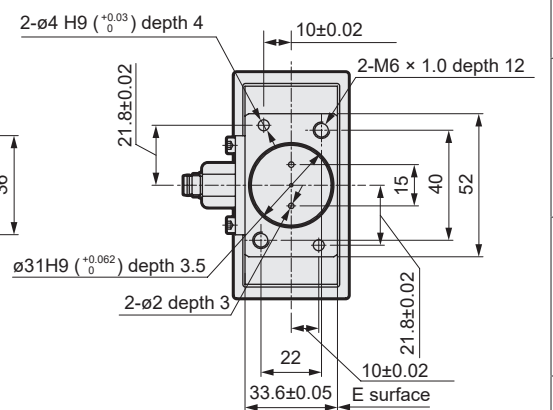
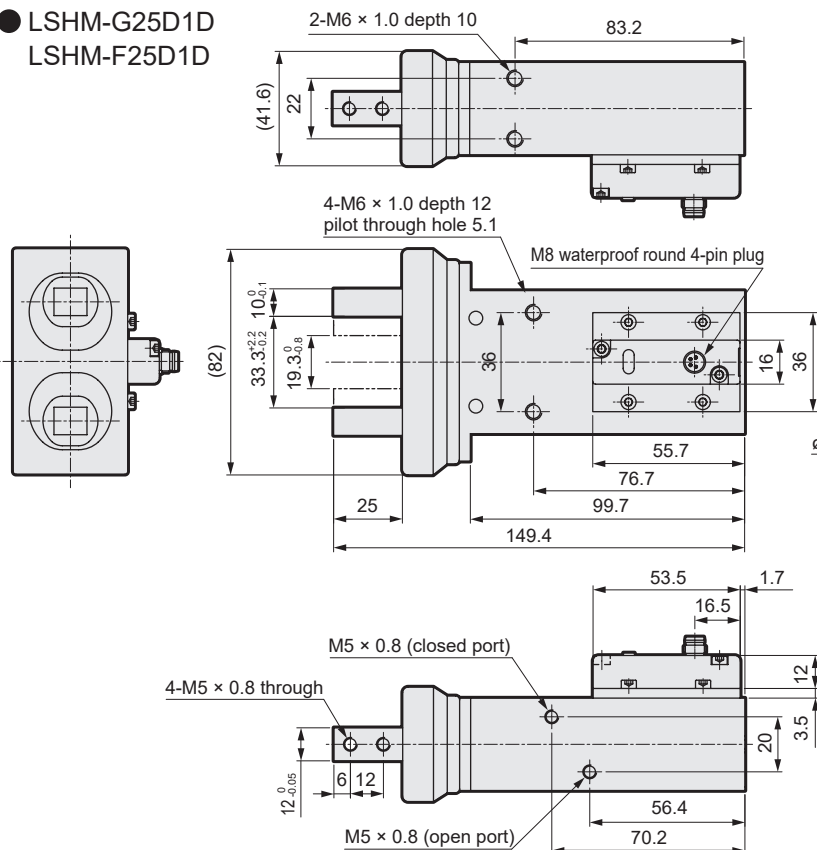


#### ● LSHM-G25D1B / C LSHM-F25D1B / C

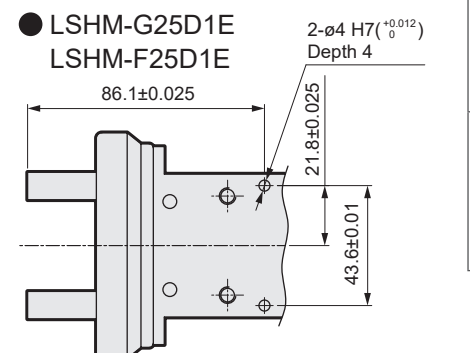


\*1: Positioning holes are machined on B surface for LSHM-\*25D1B and C surface for LSHM-\*25D1C

#### ● LSHM-G25D1D LSHM-F25D1D



#### ● LSHM-G25D1E LSHM-F25D1E



|            |                |        |                  |            |                  |                 |                |                                |                       |                     |
|------------|----------------|--------|------------------|------------|------------------|-----------------|----------------|--------------------------------|-----------------------|---------------------|
| LSH-A      | LSH-G<br>LSH-F | LSHL-A | LSHL-G<br>LSHL-F | LSHM-A     | LSHM-G<br>LSHM-F | Model selection | Technical data | Cylinder switch<br>precautions | Safety<br>precautions | Related<br>products |
| HP1 Series |                |        |                  | HP2 Series |                  |                 |                |                                |                       |                     |

Correction adapter

The analog output linearity will be corrected. Please use for applications where high-accuracy linearity is required.

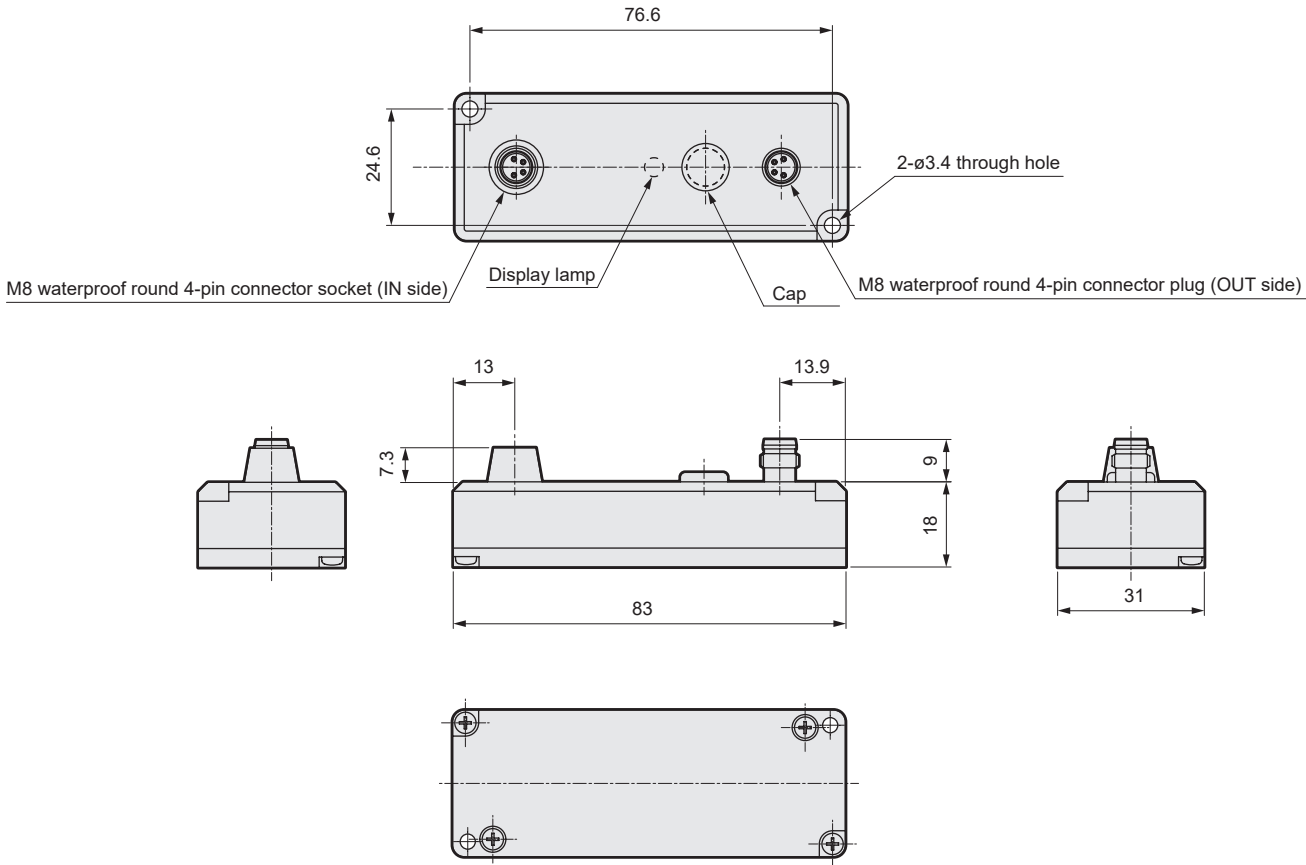
|       |            |                 |                |                             |                    |                  |
|-------|------------|-----------------|----------------|-----------------------------|--------------------|------------------|
| LSH-A | HP1 Series | Model selection | Technical data | Cylinder switch precautions | Safety precautions | Related products |
| LSH-G |            |                 |                |                             |                    |                  |
| LSH-F |            |                 |                |                             |                    |                  |
| LSH-A |            |                 |                |                             |                    |                  |
| LSH-L |            |                 |                |                             |                    |                  |
| LSH-F |            |                 |                |                             |                    |                  |
| LSH-A | HP2 Series | Model selection | Technical data | Cylinder switch precautions | Safety precautions | Related products |
| LSH-G |            |                 |                |                             |                    |                  |
| LSH-F |            |                 |                |                             |                    |                  |
| LSH-A |            |                 |                |                             |                    |                  |
| LSH-L |            |                 |                |                             |                    |                  |
| LSH-F |            |                 |                |                             |                    |                  |

Specifications

| Item                           | Description                                                                                         |
|--------------------------------|-----------------------------------------------------------------------------------------------------|
| Power supply voltage           | 24 VDC ±10%                                                                                         |
| Current consumption            | 35 mA or less                                                                                       |
| Display lamp                   | Red LED lit when power applied                                                                      |
| Analog input                   | 1 to 5 V (LSHM Series output voltage)                                                               |
| Analog output                  | 1 to 5 V, connection load 50 kΩ or more                                                             |
| Analog output linearity        | ±0.5%F.S. or less (ambient temperature 25°C, LSHM Series connection, CKD provided measuring method) |
| Repeatability of analog output | ±0.02mm or less (ambient temperature 25°C, no deformation or wear of actuator/jig)                  |
| Input connector                | M8 waterproof round 4-pin connector socket                                                          |
| Output connector               | M8 waterproof round 4-pin connector plug                                                            |
| Shock resistance               | 294m/s <sup>2</sup>                                                                                 |
| Degree of protection           | IEC Standard IP65                                                                                   |
| Ambient temperature, humidity  | 10 to 60°C, 85% RH or less                                                                          |
| Mounting method                | Direct mounting                                                                                     |
| Weight                         | 40g                                                                                                 |

\* Use the default combination of LSHM and correction adapter.

Dimensions



## Switch output adapter

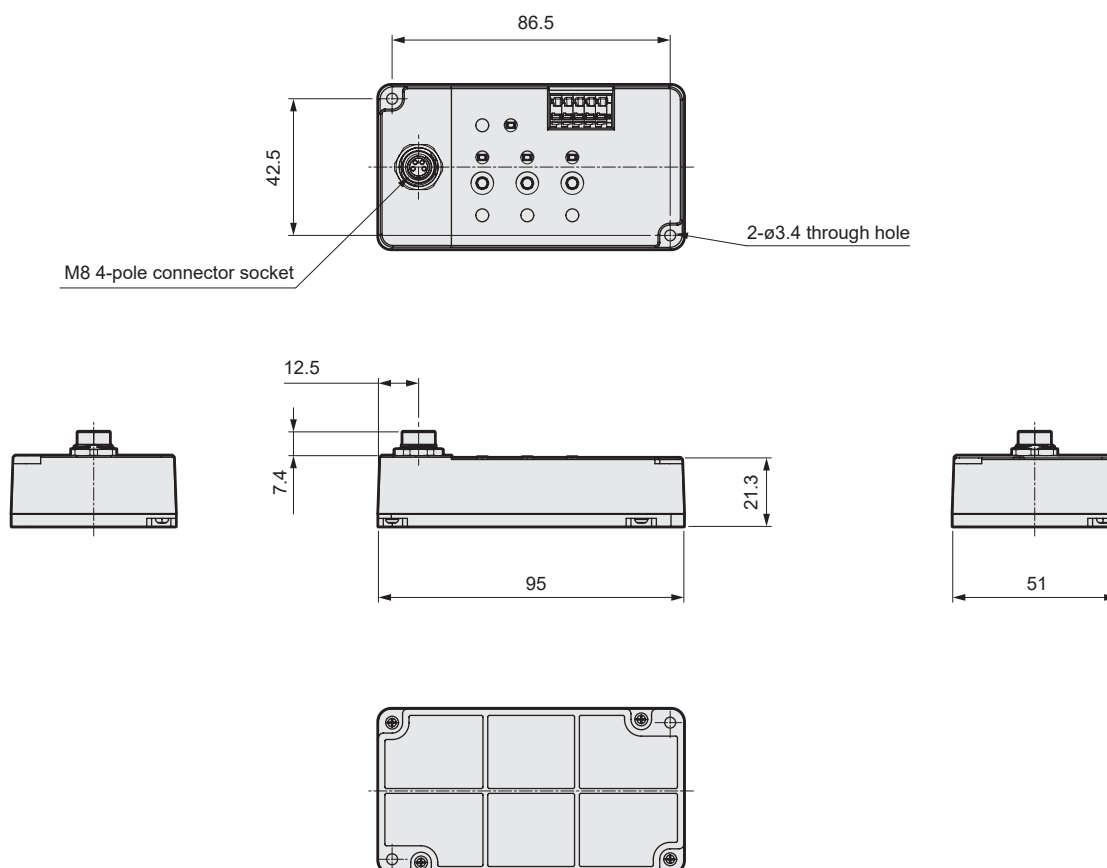
### Specifications

| Item                             | Switches output adaptor (NPN) option<br>code: B                                                                           | Switches output adaptor (PNP) option<br>code: C                                                                                |
|----------------------------------|---------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Power supply voltage             | 24 VDC ±10%                                                                                                               |                                                                                                                                |
| Current consumption              | 35 mA or less                                                                                                             |                                                                                                                                |
| Power indicator lamp             | Green LED ON when power applied                                                                                           |                                                                                                                                |
| Switch indicator lamp            | Red Lit when LED ON                                                                                                       |                                                                                                                                |
| Switch output point              | 3                                                                                                                         |                                                                                                                                |
| Switches output<br>(per channel) | NPN: Open collector<br>Max. power supply voltage: 24VDC<br>Max. load current: 50mA<br>Internal voltage drop: 1.2V or less | PNP: Open collector<br>Max. power supply voltage: 24VDC<br>Max. load current: 50mA (*1)<br>Internal voltage drop: 1.5V or less |
| Operating range                  | 0.2 / 0.5 / 1.0 mm *2                                                                                                     |                                                                                                                                |
| Analog input                     | 1 to 5 V (LSHM Series output voltage)                                                                                     |                                                                                                                                |
| Input connector                  | M8 connector 4-pin (socket)                                                                                               |                                                                                                                                |
| Shock resistance                 | 294m/s <sup>2</sup>                                                                                                       |                                                                                                                                |
| Degree of protection             | IEC Standards IP40                                                                                                        |                                                                                                                                |
| Ambient temperature,<br>humidity | 10 to 60°C, 85% RH or less                                                                                                |                                                                                                                                |
| Mounting method                  | Direct mounting                                                                                                           |                                                                                                                                |
| Insulation resistance            | 500 MΩ and over with 20 VDC megger                                                                                        |                                                                                                                                |
| Withstand voltage                | No failure after 1 minute of 1,000 VAC application                                                                        |                                                                                                                                |
| Vibration resistance             | 10Hz-55Hz compound amplitude 1.5mm, X, Y, Z, 2 hours each in two directions                                               |                                                                                                                                |
| Weight                           | 65g                                                                                                                       |                                                                                                                                |

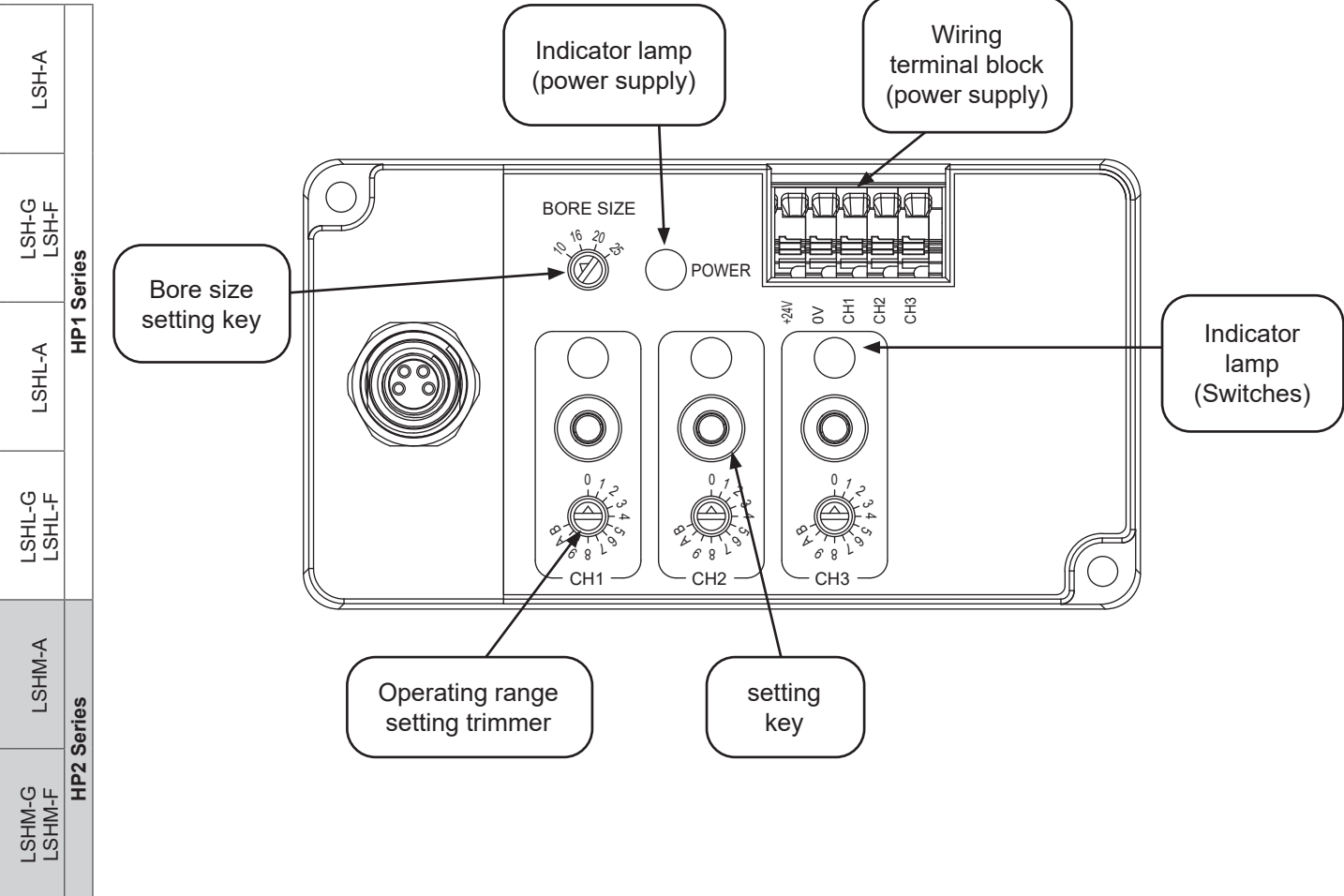
\*1: The total of all channels should be 100mA or less.

\*2: There is a hysteresis of 0.04 mm on one side.

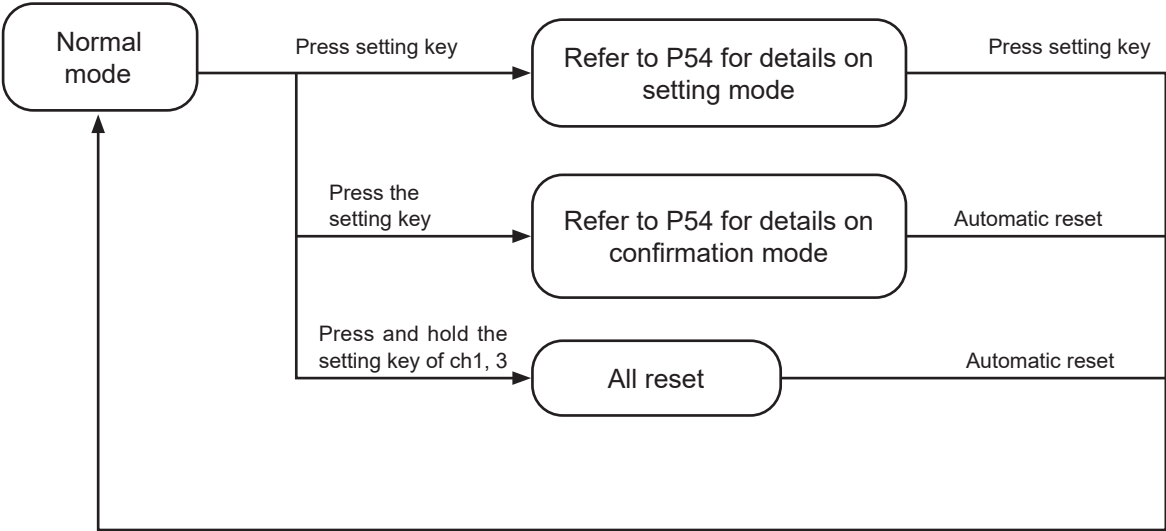
### Dimensions



Operating section and parts



Setting



## Setting mode

For the first time, each Switches channel must be configured.

| [Setting method] (Example) When setting ch1                                                                                                                                                                 | Status of the indicator lamp (ch1) |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|
| (1) ch1: Hold down the setting key for 3 seconds or longer to shift to the setting mode.                                                                                                                    | Blinking state (setting)           |
| (2) Move the LSHM to the operating position.                                                                                                                                                                | Blinking state (setting)           |
| (3) From the pattern table below, select the pattern that you want to output and shift the operation setting trimmer to the symbol position.                                                                | Blinking state (setting)           |
| (4) Ch1: Hold down the setting key for 3 seconds or longer to complete the setting.<br>Before deciding (by holding down), make sure that the bore size key is correct.<br>Automatically enters normal mode. | Setting completed when ON          |

When changing the settings and output patterns of other channels, perform the same operation for each channel.

Pattern table

| Output judgment pattern |  | Output range |        |        |             |       |
|-------------------------|--|--------------|--------|--------|-------------|-------|
|                         |  | 0.2 mm       | 0.5 mm | 1.0 mm | Normally ON | Reset |
| (1)                     |  | 1            | 4      | 7      | A           | -     |
| (2)                     |  | 2            | 5      | 8      | B           | -     |
| (3)                     |  | 3            | 6      | 9      | -           | -     |
| (4)                     |  | -            | -      | -      | -           | 0     |

## Confirmation mode

The setting Status of each ch can be confirmed.

(1) Press any setting key during normal mode.

(2) Automatically enters confirmation mode.

The indicator lamp turns ON for ch already set.

If not set, blinks when pattern 0 or when the current state and internal bore size keys do not match.

(3) In 3 seconds, the normal mode is automatically returned.

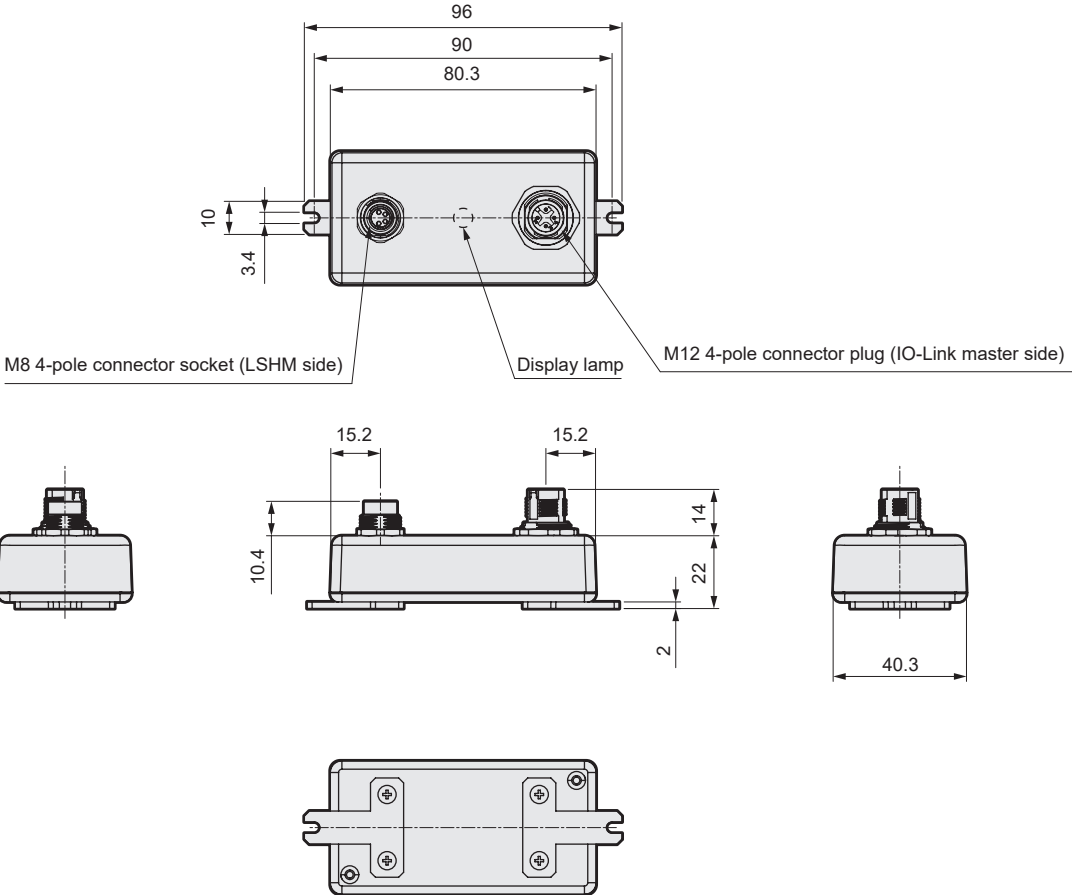
|       |       |       |       |                 |                |                             |                    |                  |
|-------|-------|-------|-------|-----------------|----------------|-----------------------------|--------------------|------------------|
| LSH-A | LSH-G | LSH-A | LSH-G | Model selection | Technical data | Cylinder switch precautions | Safety precautions | Related products |
| LSH-F | LSH-F | LSH-A | LSH-G | HP1 Series      |                |                             |                    |                  |
|       |       |       |       | HP2 Series      |                |                             |                    |                  |

IO-Link adapter

Specifications

| Item            |                               | Description                                                                                            |
|-----------------|-------------------------------|--------------------------------------------------------------------------------------------------------|
| LSH-A           | Power supply voltage          | 24 VDC ±10%                                                                                            |
|                 | Current consumption           | 35 mA or less                                                                                          |
|                 | Display lamp                  | Green LED ON when power applied                                                                        |
| LSH-G<br>LSH-F  | Analog input                  | 1 to 5 V (LSHM Series output voltage)                                                                  |
|                 | Input connector               | M8 connector 4-pin (socket)                                                                            |
|                 | Output connector              | M12 connector 4-pin (plug)                                                                             |
| LSH-A<br>LSHL-A | non-linearity                 | ±0.5%F.S. or less<br>(ambient temperature 25°C, LSHM Series connection, CKD provided measuring method) |
|                 | Insulation resistance         | 500 MΩ and over with 20 VDC megger                                                                     |
|                 | Withstand voltage             | No failure after 1 minute of 1,000 VAC application                                                     |
|                 | Shock resistance              | 294m/s <sup>2</sup>                                                                                    |
| LSH-G<br>LSHL-F | Degree of protection          | IEC Standards IP40                                                                                     |
|                 | Ambient temperature, humidity | 10 to 60°C, 85% RH or less                                                                             |
|                 | Mounting method               | Direct mounting                                                                                        |
| LSH-A<br>LSHM-A | Vibration resistance          | 10Hz-55Hz compound amplitude 1.5mm, X, Y, Z, 2 hours each in two directions                            |
|                 | Weight                        | 70g                                                                                                    |

Dimensions

| Model selection             |                    | Technical data | Dimensions                                                                           |  |  |  |
|-----------------------------|--------------------|----------------|--------------------------------------------------------------------------------------|--|--|--|
| Cylinder switch precautions | Safety precautions |                | HP2 Series                                                                           |  |  |  |
|                             |                    |                | LSHM-G LSHM-F                                                                        |  |  |  |
|                             |                    |                | LSHM-A                                                                               |  |  |  |
|                             |                    | Technical data |  |  |  |  |
|                             |                    |                |                                                                                      |  |  |  |
|                             |                    |                |                                                                                      |  |  |  |
|                             |                    |                |                                                                                      |  |  |  |

### IO-Link communication specifications

| Item                           | Details         |
|--------------------------------|-----------------|
| Communication protocol         | IO-Link         |
| Communication protocol version | V1.1            |
| Transmission bit rate          | COM3(230.4kbps) |
| Port                           | Class A         |
| Process data length (input)    | 4 byte          |
| Process data length (output)   | 0 byte          |
| Minimum cycle time             | 1ms             |
| Data storage                   | 1kbyte          |
| SIO mode support               | No              |

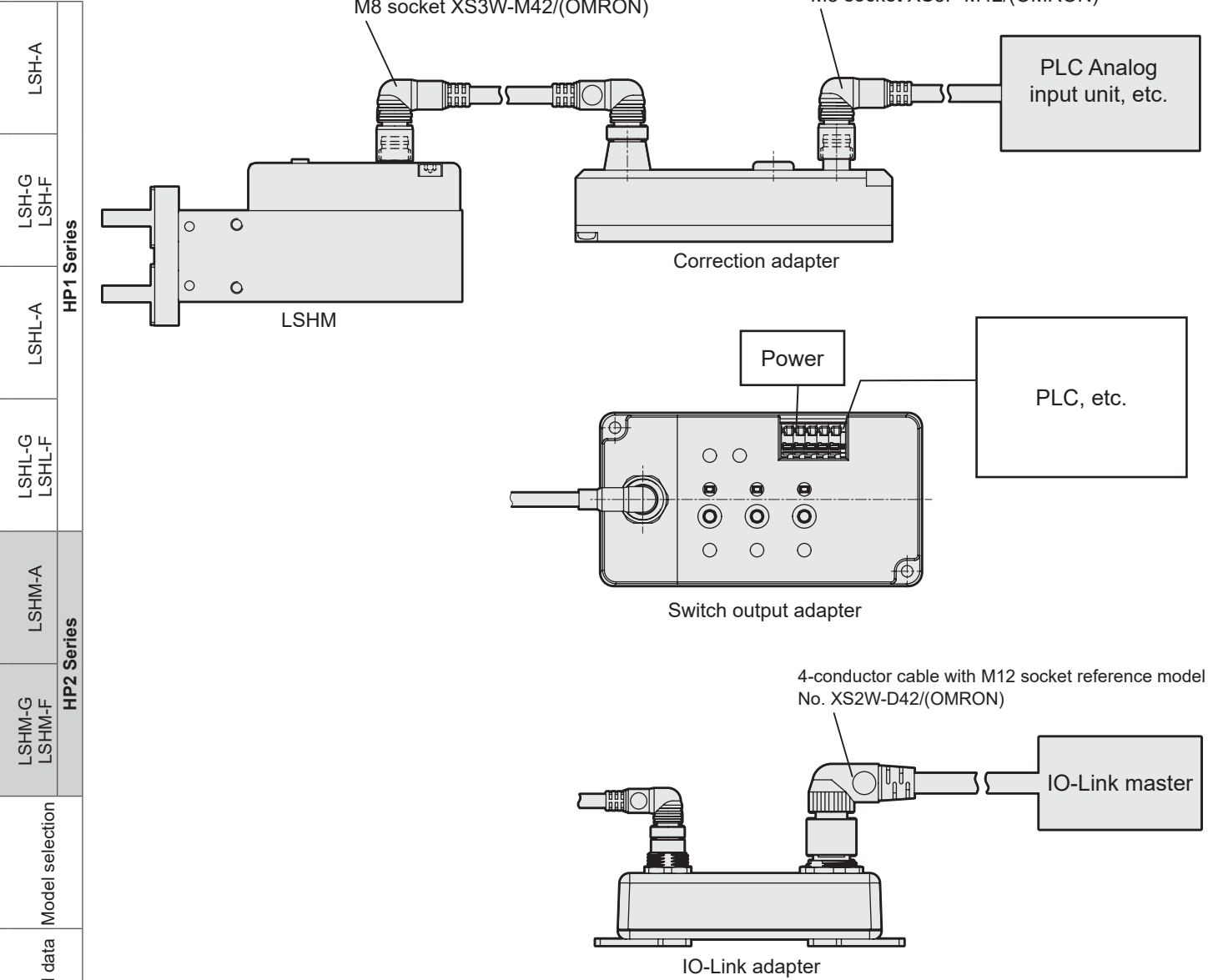
| Bit        | 31             | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16  |
|------------|----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|
|            | MSB            |    |    |    |    |    |    |    |    |    |    |    |    |    |    | LSB |
| Data name  | Output voltage |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |
| Data range | 2 byte         |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |
| Format     | UInteger16     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |

| Bit        | 15         | 14      | 13 | 12 | 11            | 10 | 9 | 8 | 7      | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|------------|------------|---------|----|----|---------------|----|---|---|--------|---|---|---|---|---|---|---|
| Data name  | Error      | WARNING | -  | -  | Switch output |    |   |   | Vacant |   |   |   |   |   |   |   |
|            |            |         |    |    | 4             | 3  | 2 | 1 |        |   |   |   |   |   |   |   |
| Data range | True/False |         |    |    |               |    |   |   |        |   |   |   |   |   |   |   |
| Format     | Boolean    |         |    |    |               |    |   |   |        |   |   |   |   |   |   |   |

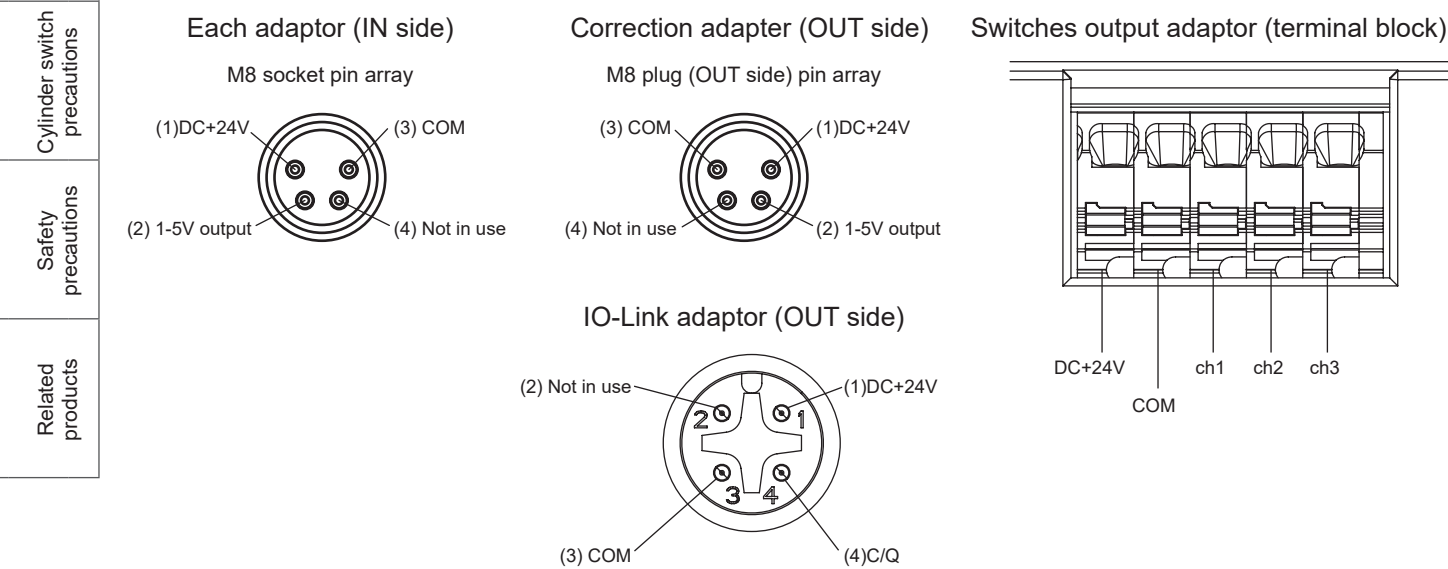
\* IODD file can be downloaded from the CKD website.

|            |                             |
|------------|-----------------------------|
| HP1 Series | LSH-A                       |
|            | LSH-G<br>LSH-F              |
|            | LSHL-A                      |
|            | LSHL-G<br>LSHL-F            |
| HP2 Series | LSHM-A                      |
|            | LSHM-G<br>LSHM-F            |
|            | Model selection             |
|            | Technical data              |
|            | Cylinder switch precautions |
|            | Safety precautions          |
|            | Related products            |

Each adapter system configuration



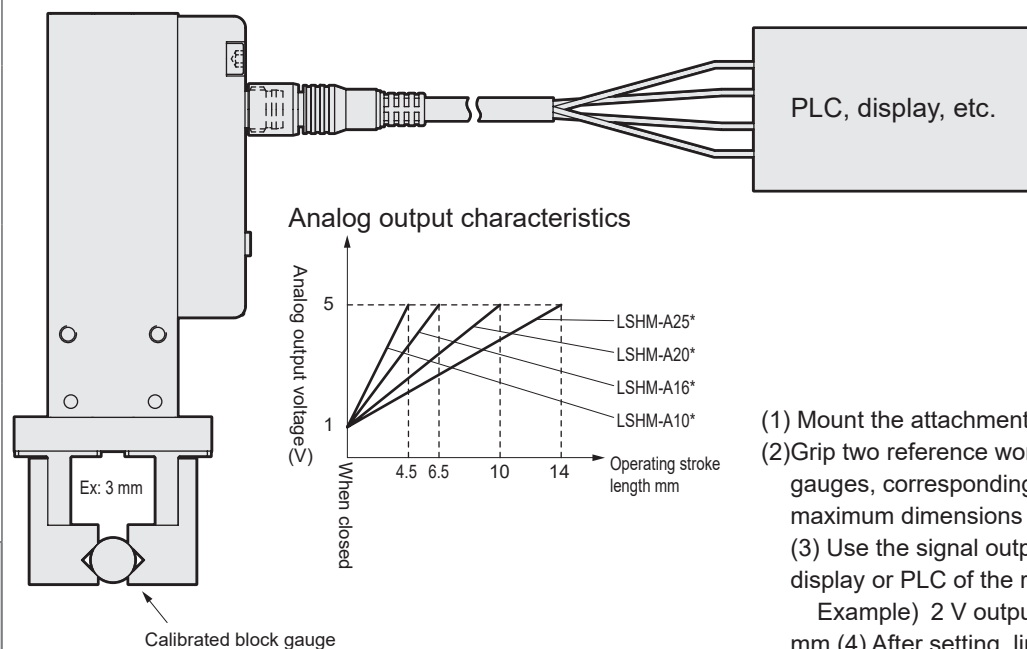
Plug contact array diagram



|            |                |        |                  |            |                  |                 |                |                                |                       |                     |
|------------|----------------|--------|------------------|------------|------------------|-----------------|----------------|--------------------------------|-----------------------|---------------------|
| LSH-A      | LSH-G<br>LSH-F | LSHL-A | LSHL-G<br>LSHL-F | LSHM-A     | LSHM-G<br>LSHM-F | Model selection | Technical data | Cylinder switch<br>precautions | Safety<br>precautions | Related<br>products |
| HP1 Series |                |        |                  | HP2 Series |                  |                 |                |                                |                       |                     |

### Workpiece measurement using the entire operating stroke length range

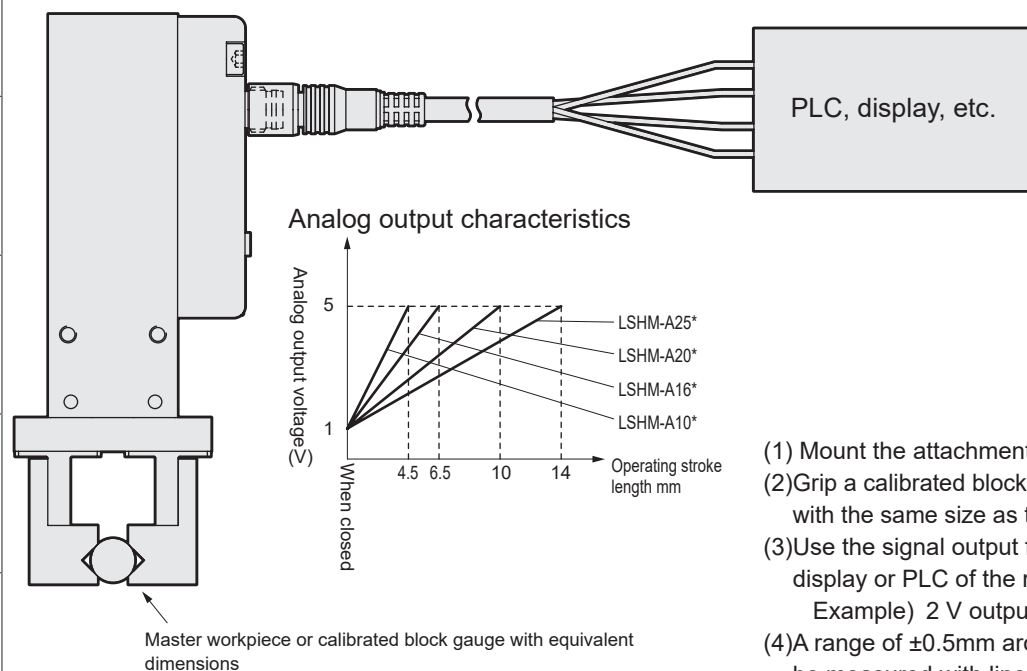
Example) Judgment of workpiece type in multi-model production equipment, etc.



- (1) Mount the attachment.
- (2) Grip two reference workpieces such as block gauges, corresponding to the minimum and maximum dimensions of the workpiece to be used.
- (3) Use the signal output from the sensor to set the display or PLC of the receiving side.  
Example) 2 V output → 3 mm, 4 V output → 8 mm
- (4) After setting, linearity of  $\pm 3\%$  F.S.  
( $\pm 0.5\%$  F.S. with correction adapter option) over the entire stroke

### Higher-precision measurement through limiting the measurement range

Example) Confirmation that the workpiece is dimensioned within the tolerance range, confirmation of wear and deformation of attachment and jig, etc.



- (1) Mount the attachment.
- (2) Grip a calibrated block gauge or master workpiece with the same size as the workpiece to be measured.
- (3) Use the signal output from the sensor to set the display or PLC of the receiving side.  
Example) 2 V output → 3 mm
- (4) A range of  $\pm 0.5$  mm around the set dimensions can be measured with linearity of  $\pm 0.5\%$  F.S. (reference value when without correction adapter).