

Read before Use

## Instruction Manual

### Product Name

Model: Type DNS Pressure Controls



## 1. Preface

Thank you for purchasing Type DNS Pressure Controls (hereinafter referred to as the "pressure switch" or "switch").

**Read this instruction manual thoroughly before use, and ensure that the product is used within its rated specifications according to the manual.**

This product is supplied with a document containing a QR code for downloading the instruction manual. **Be sure to keep it in an easily accessible place for future reference. Always check the latest version of the instruction manual available on our website via the QR code before each use, paying particular attention to the safety precautions.**

## 2. Safety Precautions

### ■ Warning and caution indications

Warnings and cautions in this instruction manual provide **important safety information**.

**To protect you and other people against danger or damage caused by improper use of the product, be sure to comply with these indications, as well as international standards (ISO/IEC), Japanese Industrial Standards (JIS)\*<sup>1</sup>, and other safety regulations\*<sup>2</sup>.**

\*1) ISO 4414: Pneumatic fluid power -General rules and safety requirements for system and their components.

ISO 4413: Hydraulic fluid power -General rules and safety requirements for system and their components.

IEC 60204-1: Safety of machinery -Electrical equipment of machines

IEC 60335-1: Household and similar electrical appliances -Safety-Part1 -General requirements

IEC 60335-2-24: Household and similar electrical appliances -Safety-Part2-24

IEC 60335-2-40: Household and similar electrical appliances -Safety-Part2-40

IEC 60335-2-89: Household and similar electrical appliances -Safety-Part2-89

ISO 5149: Refrigerating systems and heat pumps -Safety and environmental requirements Part 1 to 4, etc.

\*2) Industrial Safety and Health Act, High Pressure Gas Safety Act, EU Directives, Occupational Safety and Health Act, etc.



Indicates a hazardous situation that could result in serious injury<sup>(1)</sup> or death if the product is handled improperly.



Indicates a hazardous situation that could result in injury<sup>(2)</sup> or property damage<sup>(3)</sup> if the product is handled improperly.

(1) **Serious injury** refers to blindness, injury, burn (high-temperature, low-temperature), electric shock, bone fracture, or poisoning that leaves aftereffects and requires hospitalization and/or extended medical treatment.

(2) **Injury** refers to injury, burn, or electric shock that does not require hospitalization or extended medical treatment.

(3) **Property damage** refers to any damage affecting a house, household property, livestock, and/or pets.

## Explanations of symbols

| Symbol      |                                                                                   | Description                                                     | Example                                                                             |                                                                                     |
|-------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Prohibition |  | Indicates prohibited actions when handling the product.         |  |  |
|             |                                                                                   |                                                                 | General prohibition                                                                 | Prohibited: Disassembly                                                             |
| Warning     |  | Indicates the hazards and precautions for handling the product. |  |  |
|             |                                                                                   |                                                                 | General caution                                                                     | Caution: Electric shock                                                             |
| Instruction |  | Indicates the instructions for handling the product.            |  |                                                                                     |
|             |                                                                                   |                                                                 | General instruction                                                                 |                                                                                     |

|  <b>WARNING</b> |                                                                                                                                                                                                                                                                                                             |
|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                | Be sure to turn off all the power before installation, wiring, maintenance, or inspection. Performing the work with power on may cause accidental contact with the live part, resulting in serious injury or death due to electric shock.                                                                   |
|               | Properly ground the product before use. Failure to do so may cause electric shock or fire, resulting in serious injury or death. Make sure that the grounding wire is connected correctly as specified in the instruction manual to ensure a safe operating environment.                                    |
|               | Use the product only under the conditions described in the instruction manual. Perform periodic maintenance. Exposure to harsh conditions beyond the operating conditions or prolonged use may degrade the sealing integrity of the product. In addition, leaked refrigerant may cause fire or suffocation. |
|               | Wiring of the product must be performed by personnel with expertise and certification in electrical work. Otherwise, it may cause electric shock or fire due to miswiring or improper installation, resulting in death.                                                                                     |
|               | Before wiring, ensure that no water is present on the product, and perform the work in an environment where the product is not exposed to water, such as rain or condensation. Performing the work with the product wet may cause electric shock, resulting in serious injury or death.                     |
|               | After the work is completed, be sure to reinstall all the covers and protective parts. Failure to do so may cause electric shock or fire, resulting in serious injury or death. After the work, ensure that all the covers are securely in place.                                                           |



## CAUTION



Install and wire the product in accordance with the Technical Standards for Electrical Equipment and the Interior Wiring Code. Failure to observe these standards may result in fire.



Be sure to tighten the terminal screws with the specified torque. Failure to do so may cause fire or terminal overheating.



Do not disassemble the product. Doing so may cause electric shock, reduced pressure capacity, or failure.

## Description of terms

| Terms                       | Description                                                                                                                                                                 | Related page |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| A2L refrigerant             | Flammable refrigerant with a burning velocity of 10 cm/s or less (also referred to as a mildly flammable refrigerant)                                                       | p.8          |
| bar                         | Pressure unit                                                                                                                                                               | —            |
| cmHg                        | Pressure unit (used as a unit of negative pressure in kgf/cm <sup>2</sup> )                                                                                                 | —            |
| Diff.                       | Differential pressure                                                                                                                                                       | p.13         |
| IP                          | Protection level                                                                                                                                                            | p.15         |
| kgf/cm <sup>2</sup>         | Pressure unit                                                                                                                                                               | —            |
| MPa                         | Pressure unit                                                                                                                                                               | —            |
| N · m                       | Torque unit                                                                                                                                                                 | —            |
| psi                         | Pressure unit                                                                                                                                                               | —            |
| Range                       | Pressure rise setpoint (range)                                                                                                                                              | p.25         |
| Pressure settings           | Cut-in and cut-out pressure settings of the pressure switch                                                                                                                 | p.24-25      |
| Pressure adjustment range   | Cut-in and cut-out pressure setting range of the pressure switch                                                                                                            | p.24-25      |
| Differential pressure       | Difference in the cut-in and cut-out pressures of the pressure switch                                                                                                       | p.24-25      |
| Auto reset                  | Automatic cut-out or cut-in on pressure rise or pressure drop for the pressure switch                                                                                       | —            |
| Pollution degree            | Degree of pollution of the switch operating environment, such as dust                                                                                                       | p.8          |
| Mechanical endurance cycles | Maximum number of actuations without leakage                                                                                                                                | —            |
| Leak test pressure          | Maximum allowable pressure to ensure switch performance                                                                                                                     | —            |
| Cable gland                 | Device that secures and protects an electrical wire or cable                                                                                                                | p.23         |
| Conduit                     | Device that secures and protects an electrical wire or cable                                                                                                                | p.22         |
| High-pressure side          | For convenience, the right side of the pressure switch viewed from the front is referred to as the high-pressure side.                                                      | p.13         |
| Maximum operating pressure  | Maximum allowable operating pressure at which the switch operates properly under normal operating conditions                                                                | —            |
| Sliding                     | Frictional sliding between two contacting parts                                                                                                                             | —            |
| Connecting part             | Connecting part (joint) between the product and an external system                                                                                                          | p.9          |
| Setpoints                   | Actuation values for pressure rise and pressure drop, set with the pressure adjusting screw                                                                                 | —            |
| Endurance cycles            | Maximum allowable actuations with variations below tolerance                                                                                                                | —            |
| Type 1 actuation            | Automatic actuation for which no manufacturing variation or drift has been specified for the operating value, time, or sequence, and that is not tested under this standard | p.8          |

| Terms              | Description                                                                                                                                                                                                                                                                                                                                    | Related page |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| Type 2 actuation   | Automatic actuation for which manufacturing variation or drift has been specified for the operating value, time, or sequence, and tested under this standard                                                                                                                                                                                   | p.8          |
| Chattering         | Phenomenon in which the contact turns on and off repeatedly in a short period due to vibration                                                                                                                                                                                                                                                 | —            |
| Low-pressure side  | For convenience, the left side of the pressure switch viewed from the front is referred to as the low-pressure side.                                                                                                                                                                                                                           | p.13         |
| Trip-free          | Automatic actuation with a reset mechanism whose operation and position are structurally independent                                                                                                                                                                                                                                           | —            |
| Factory-set values | Settings of the pressure switch at the time of delivery to your company                                                                                                                                                                                                                                                                        | —            |
| Manual reset       | The pressure switch latches on or off when the inlet pressure rises to or above or drops to or below the set pressure (Whether the switch latches on or off varies depending on the connection terminal).<br>To reset the switch, the abnormal pressure condition must be resolved first, and then a manual reset by the operator is required. | p.13<br>p.25 |
| Pulsation          | Periodic pressure oscillation, different from normal actuations                                                                                                                                                                                                                                                                                | p. 22-23     |
| Reset button       | Button used for manual reset                                                                                                                                                                                                                                                                                                                   | p.13         |

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### 3. Product Overview

- This product integrates overpressure protection on the high-pressure side and control on the low-pressure side of the refrigeration system.
- This is a pressure-actuated switch using metal bellows.  
Applied pressure is transmitted to the internal mechanism via the bellows and actuates the switch.
- Internal components, including the bellows, cannot be replaced.

## 4. Specifications

### 4.1. General specifications

| Item                                                                         | Specification                                                    |
|------------------------------------------------------------------------------|------------------------------------------------------------------|
| Product name                                                                 | Type DNS Pressure Controls                                       |
| Model                                                                        | Indicated on the top of the product (See p.13 for the location.) |
| Purpose of the control device                                                | Operation control device , Protective control device *           |
| Structure of the control device                                              | Embedded                                                         |
| Pressure specifications                                                      | See the catalog.                                                 |
| Fluid temperature                                                            | -20 to +120 °C (no freezing)                                     |
| Operating ambient temperature                                                | -20 to +70 °C (no freezing, frosting, or condensation)           |
| Storage ambient temperature                                                  | -20 to +70 °C (no freezing, frosting, or condensation)           |
| Dimensions (H x W x D)                                                       | See p.10.                                                        |
| Weight                                                                       | See p.9.                                                         |
| Product installation method                                                  | See p.17.                                                        |
| Product grounding method                                                     | See p.22.                                                        |
| Operating time limitation                                                    | See the rate of pressure change on p.31.                         |
| Control device actuation type                                                | Type 1 or Type 2 *                                               |
| Cut-out reset characteristics                                                | Type 1 or Type 2 *                                               |
| Product contamination level                                                  | 3                                                                |
| Rated impulse voltage                                                        | 2,500 V                                                          |
| Installation environment                                                     | Pollution Degree 3, Overvoltage Category II                      |
| < For A2L-compatible models ><br>Supported A2L refrigerants (as of May 2025) | R1234yf, R1234ze(E), R454A, R454B, R454C, R455A                  |

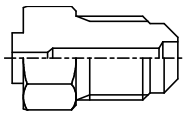
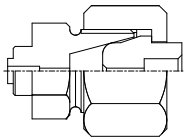
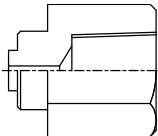
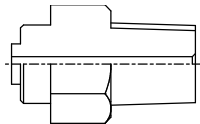
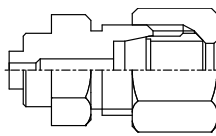
\*For details, please contact us

### 4.2. Wetted part materials

| Purpose and part         |         | Material        |
|--------------------------|---------|-----------------|
| Standard type            | Joint   | Brass           |
|                          | Bellows | Phosphor bronze |
|                          | Solder  | Pb-free         |
|                          | Braze   | —               |
| Corrosion-resistant type | Joint   | Stainless       |
|                          | Bellows |                 |

No oil-free treatment has been performed on the wetted parts. However, note that no oil was intentionally applied during manufacturing.

## 4.3. Joint shape details

| Joint type                       | Shape                                                                               | Code |     | Size  | Joint code | Mass [kg]* |
|----------------------------------|-------------------------------------------------------------------------------------|------|-----|-------|------------|------------|
|                                  |                                                                                     | Old  | New |       |            |            |
| Flare joint                      |    | —    | —   | 1/4   | —          | 0.51       |
|                                  |                                                                                     |      |     | φ8    | B1         | + 0.14     |
|                                  |                                                                                     |      |     | 3/8   | B2         | + 0.13     |
|                                  |                                                                                     |      |     | φ10   | B3         | + 0.13     |
|                                  |                                                                                     |      |     | φ12   | B4         | + 0.20     |
| Union joint<br>(for copper pipe) |    | —    | —   | φ6    | U1         | + 0.32     |
|                                  |                                                                                     |      |     | φ8    | U2         | + 0.32     |
|                                  |                                                                                     |      |     | φ10   | U          | + 0.31     |
|                                  |                                                                                     |      |     | φ10.5 | U3         | + 0.32     |
| Parallel pipe thread<br>(female) |  | PT   | Rc  | 1/4   | G          | + 0.05     |
|                                  |                                                                                     |      |     | 3/8   | G3         | + 0.06     |
|                                  |                                                                                     |      |     | 1/2   | G6         | + 0.12     |
|                                  |                                                                                     | PF   | G   | 1/4   | G1         | + 0.05     |
|                                  |                                                                                     |      |     | 3/8   | G4         | + 0.06     |
|                                  |                                                                                     |      |     | 1/2   | G7         | + 0.12     |
|                                  |                                                                                     | NPT  |     | 1/4   | G2         | + 0.05     |
|                                  |                                                                                     |      |     | 3/8   | G5         | + 0.06     |
|                                  |                                                                                     |      |     | 1/2   | G8         | + 0.11     |
| Parallel pipe thread<br>(male)   |  | PT   | R   | 1/4   | M02        | + 0.05     |
|                                  |                                                                                     |      |     | 3/8   | M01        | + 0.08     |
|                                  |                                                                                     |      |     | 1/2   | M07        | + 0.14     |
|                                  |                                                                                     | PF   | G   | 1/4   | M03        | + 0.05     |
|                                  |                                                                                     |      |     | 3/8   | M05        | + 0.08     |
|                                  |                                                                                     |      |     | 1/2   | M06        | + 0.08     |
|                                  |                                                                                     | NPT  |     | 1/4   | M04        | + 0.05     |
|                                  |                                                                                     |      |     | 3/8   | M06        | + 0.08     |
|                                  |                                                                                     |      |     | 1/2   | M09        | + 0.14     |
| Bite-type union                  |  | —    | —   | φ6    | K1         | + 0.03     |
|                                  |                                                                                     |      |     | φ8    | K2         | + 0.06     |
|                                  |                                                                                     |      |     | φ10   | K          | + 0.07     |

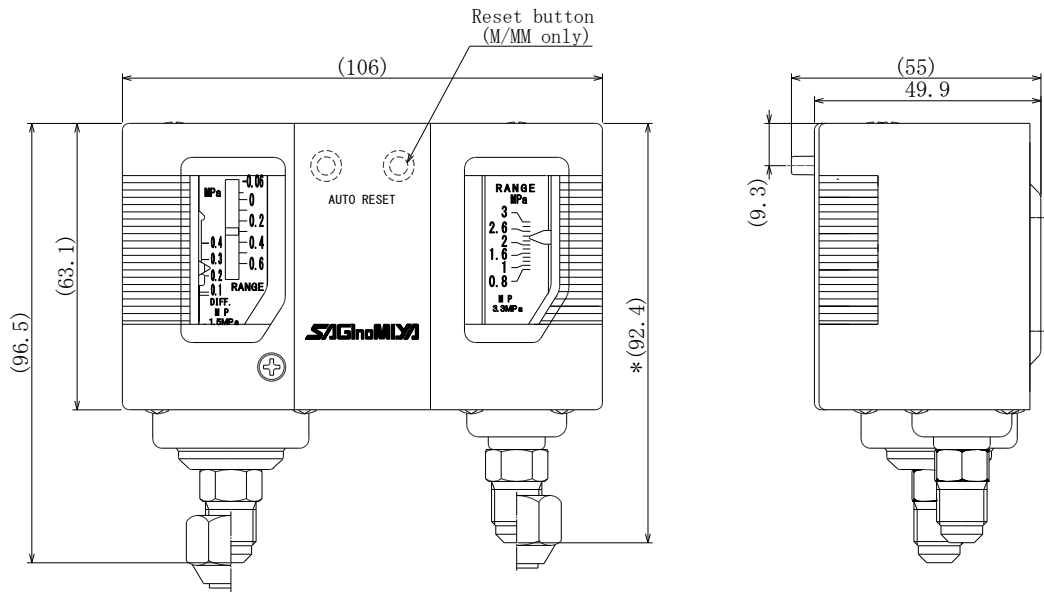
\* The mass is indicated as the difference from the 1/4" flare joint. Note that there is a margin of error of approximately 10%.  
Special items not included.

## 4. Specifications

### 4.4. Package contents

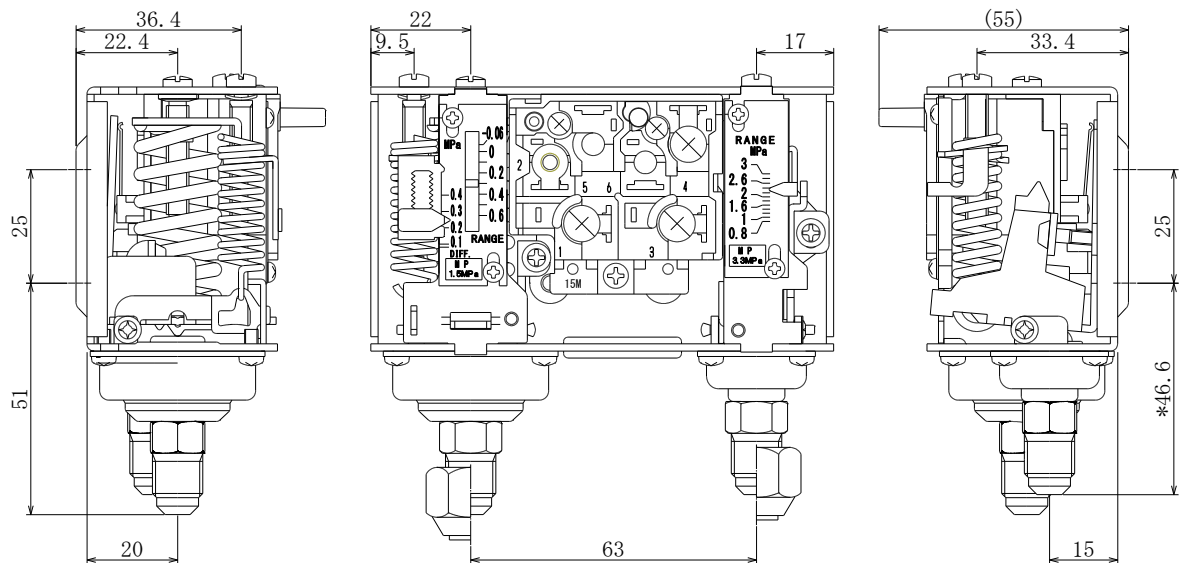
- Main unit
- Instruction manual
- Main unit mounting bracket
- Mounting screws

### 4.5. External dimensions



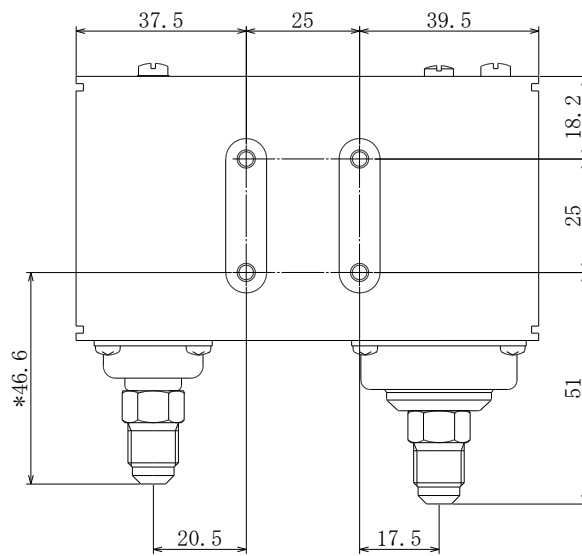
\* A2L-incompatible models: 91

### 4.6. Internal dimensions



\* A2L-incompatible models: 45.2

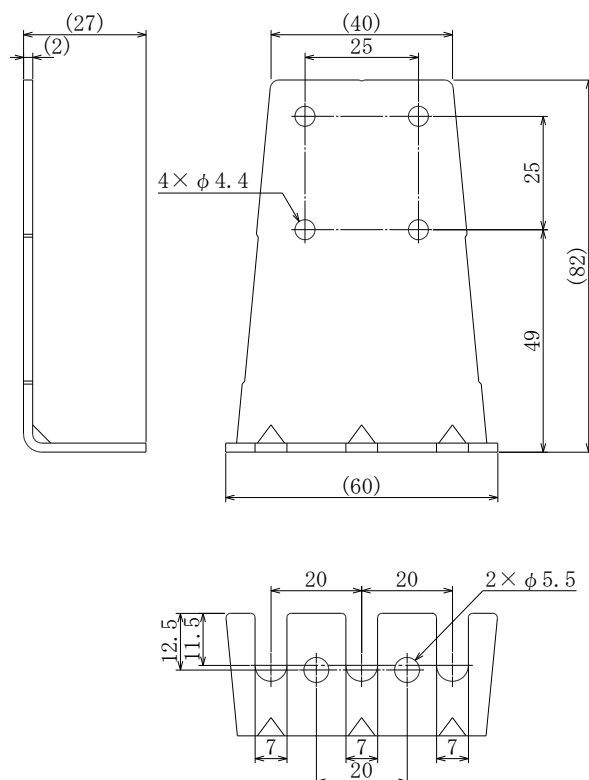
## 4. Specifications



\* A2L-incompatible models: 45.2

### 4.7. Accessories

#### SNS-AE01 (standard accessory)

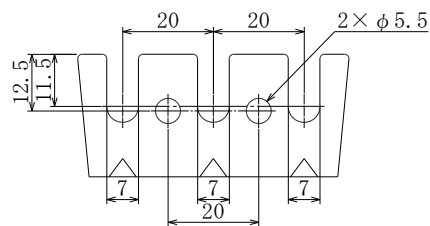
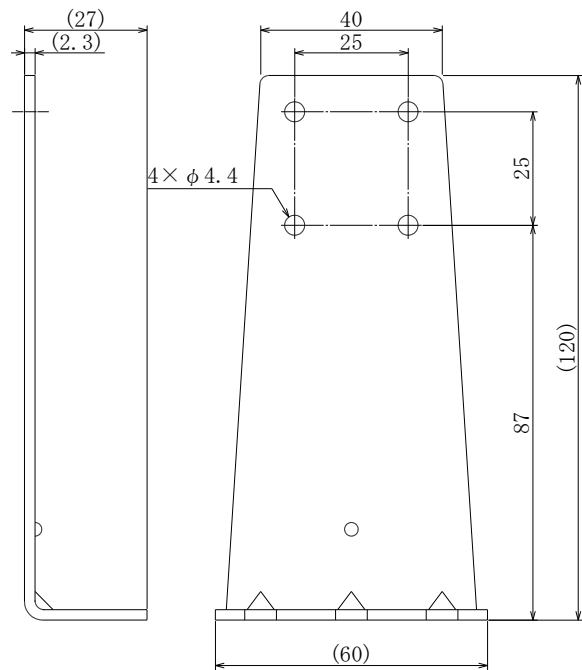


Unless otherwise specified, "SNS-AE01" is provided with the product.

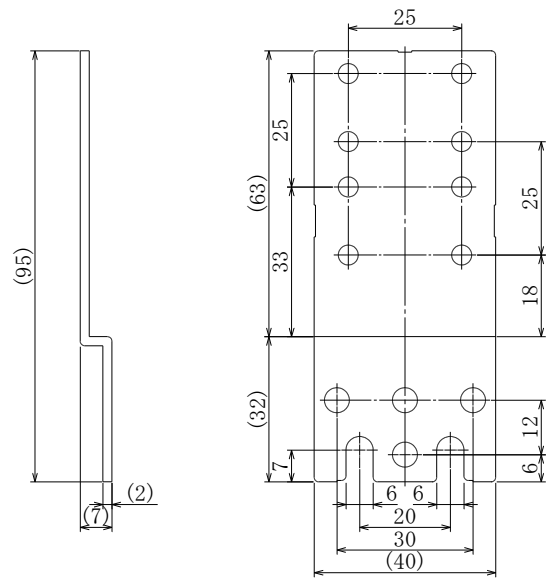
If you need "SNS-AE11" or "SNS-AE02", please contact us.

4. Specifications

SNS-AE11

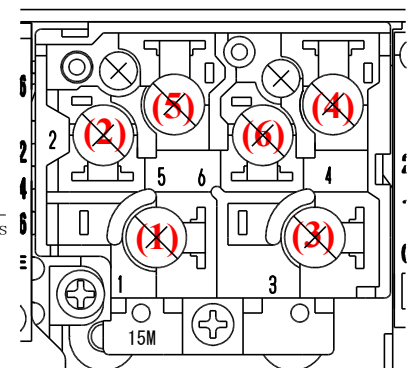
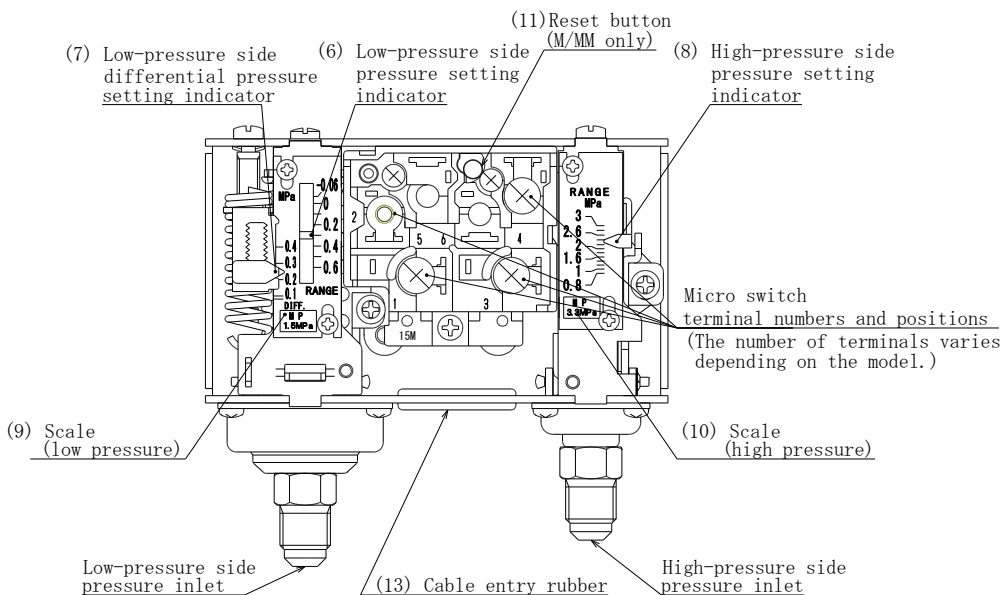
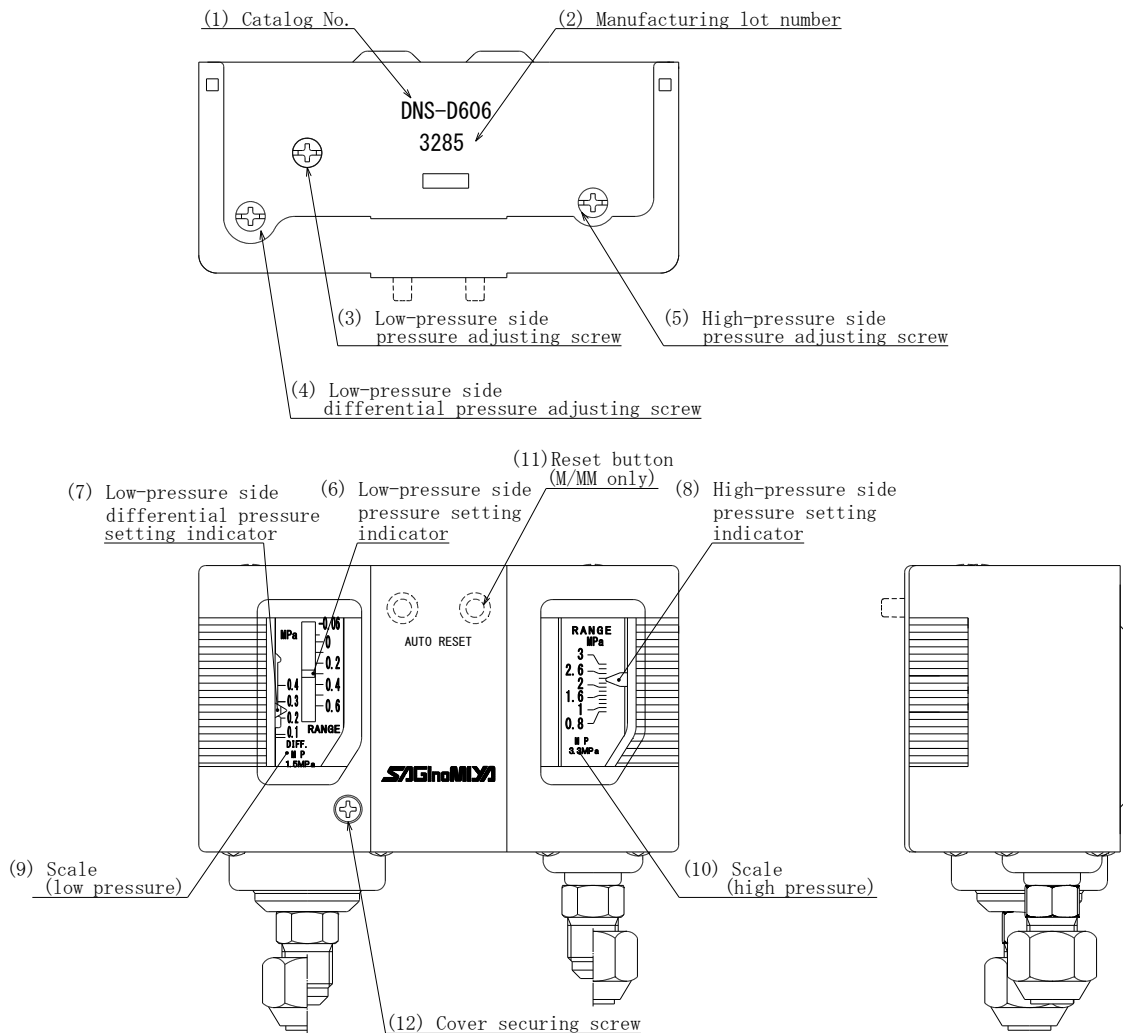


SNS-AE02



### 4.8. Part names

#### 4.8.1. Main unit



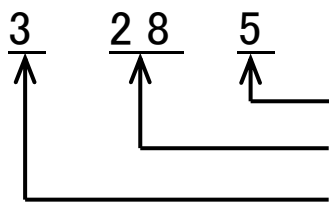
Micro switch terminal numbers and positions  
(The number of terminals varies depending on the model.)

## 4. Specifications

| No.  | Name                                                      | Description                                                                                                                                                                                          |
|------|-----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (1)  | Catalog No.                                               | Model number marked using permanent ink                                                                                                                                                              |
| (2)  | Manufacturing lot number                                  | Lot number (manufacturing date) marked using permanent ink                                                                                                                                           |
| (3)  | Low-pressure side pressure adjusting screw                | Used to set the actuation value for pressure rise on the low-pressure side.<br>Counterclockwise: Increases the pressure setting.<br>Clockwise: Decreases the pressure setting.                       |
| (4)  | Low-pressure side differential pressure adjusting screw   | Used to set the differential pressure (DIFF.) on the low-pressure side.<br>Clockwise: Increases the differential pressure setting.<br>Counterclockwise: Decreases the differential pressure setting. |
| (5)  | High-pressure side pressure adjusting screw               | Used to set the actuation value for pressure rise on the high-pressure side.<br>Clockwise: Increases the pressure setting.<br>Counterclockwise: Decreases the pressure setting.                      |
| (6)  | Low-pressure side pressure setting indicator              | Indicates the set pressure.*                                                                                                                                                                         |
| (7)  | Low-pressure side differential pressure setting indicator | Indicates the set pressure.*                                                                                                                                                                         |
| (8)  | High-pressure side pressure setting indicator             | Indicates the set pressure.*                                                                                                                                                                         |
| (9)  | Scale (low pressure)                                      | Indicates the set pressure.*                                                                                                                                                                         |
| (10) | Scale (high pressure)                                     | Indicates the set pressure.*                                                                                                                                                                         |
| (11) | Reset button                                              | Resets the protection function for Type M/MM.                                                                                                                                                        |
| (12) | Cover securing screw                                      | Used to install or remove the cover.                                                                                                                                                                 |
| (13) | Cable entry rubber                                        | Cable protection part<br>Make a slit in the center of the rubber before wiring.                                                                                                                      |

\* When changing the settings, adjust the values according to the pressure gauge reading. The scale should be used for reference only.

### 4.8.2. Manufacturing lot number



( M a r c h 2 8 , 2 0 2 5 )

**Last digit of the year**

**Day**

**Month (October, November, and December**

**are represented by X, Y, and Z, respectively.)**

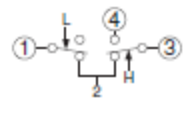
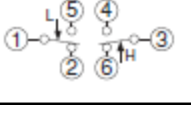
In the case of special products,  
the last two digits of the year may be shown.

## 4. Specifications

### 4.8.3. Model indication and numbering system

DNS   -   D6   06   X   M   W   G   Q   \*\*\*

Contact type Pressure range Shipping destination Sequential number Special specification Joint shape Water/splash-proof and element material Reset operation (No code: Automatic reset)

| Code | Description                                                                       |
|------|-----------------------------------------------------------------------------------|
| D3   |  |
| D6   |  |

| Code | Description |
|------|-------------|
| 04   | 0.4 MPa     |
| 06   | 0.6 MPa     |
| 30   | 3.0 MPa     |

| Code | Description |
|------|-------------|
| None | Japan       |
| X    | Overseas    |

| Description            | Code |
|------------------------|------|
| Flare joint            | B    |
| Union joint            | U    |
| Parallel pipe or taper |      |
| Femal                  | G    |
| Male                   | M    |
| Bite-type union        | K    |
| Capillary tube         | L    |

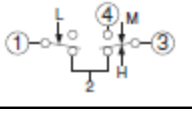
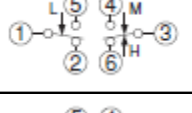
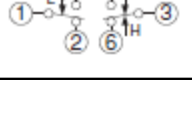
For details, see p.9.

| Code | Description  | Protection level |
|------|--------------|------------------|
| None | General      | IP20             |
| P    | Waterproof   | IP66             |
| W    | Splash-proof | IP62             |

| Code | Description         | Material                     |
|------|---------------------|------------------------------|
| None | General             | Brass, phosphor bronze, etc. |
| N    | Corrosion-resistant | Stainless                    |

#### Unit types and conversion

| MPa    | bar    | kgf/cm <sup>2</sup> | kPa     | psi<br>(lbf/in <sup>2</sup> ) |
|--------|--------|---------------------|---------|-------------------------------|
| 1      | 10     | 10.1972             | 1,000   | 145.0380                      |
| 0.1    | 1      | 1.0197              | 100     | 14.5038                       |
| 0.0981 | 0.9807 | 1                   | 98.0665 | 14.2233                       |
| 0.0010 | 0.0100 | 0.0102              | 1       | 0.1450                        |
| 0.0069 | 0.0689 | 0.0703              | 6.8948  | 1                             |

| Code  | Description                                                                           |
|-------|---------------------------------------------------------------------------------------|
| D3-M  |  |
| D6-M  |  |
| D6-MM |  |

Special specification: A2L-compatible models have sequential numbers starting with Q2. (Standard specification Q2000)  
(Example) DNS-D606MQ2000

### 5. Handling and Storage

|  <b>WARNING</b> |                                                                                                                                                                                                         |
|--------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | When transporting a heavy product, wear protective gear, such as safety shoes, to ensure safety. There is a risk of injury, such as a bone fracture, if the product falls or tips over.                 |
|                 | When unpacking or installing the product, wear appropriate protective gear (work gloves, etc.) to ensure safety. There is a risk of injury from the sharp edges of the packaging box, product, or tool. |

|  <b>CAUTION</b> |                                                                                                                                       |
|--------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
|                 | Do not paint the product.<br>If paint enters the pressure switch or adheres to the sliding part, it may cause failure or malfunction. |

★ Observe the following when handling the product:

- Do not drop the product.  
Doing so may cause failure, malfunction, or premature failure.
- Do not paint the product.  
If paint enters the pressure switch or adheres to the sliding part, it may cause failure or malfunction.
- Do not store the product in locations subject to vibration or impact.  
Doing so may cause failure, malfunction, or premature failure.
- Do not store the product with a load applied to the main unit or joint.  
Doing so may deform the main unit or joint, resulting in failure, malfunction, or premature failure.
- Avoid direct sunlight and store the product in a well-ventilated place.  
Failure to do so may oxidize conductive parts, resulting in pressure switch failure, malfunction, or premature failure.
- Do not turn any screws other than the adjusting screws.  
Doing so may cause failure, malfunction, or premature failure.
- Do not turn screws that have been pre-adjusted and locked (bonded) by our factory.  
Doing so may cause failure, malfunction, or premature failure.
- Use fluid that does not corrode copper alloys.  
Used fluid must not contain chemical- or organic-solvent-containing synthetic oils, salts, or corrosive gases.  
Presence of these substances may cause damage or malfunction.
- Use the product at the rated voltage.  
Failure to do so may cause failure or malfunction.
- Use the product at the rated operating pressure.  
Failure to do so may cause damage, resulting in inaccurate measurement.
- Do not apply voltage or current beyond the maximum load.  
Doing so may damage the product or shorten its service life.
- If the product has been stored for more than a year, verify that it actuates properly before use.  
After starting to use the product, periodic actuation verification is recommended.
- Secure a maintenance space.  
Allow a space for maintenance or inspection.

## 6. Assembly

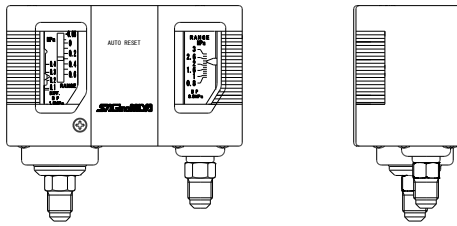
|  <b>WARNING</b> |                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | When transporting a heavy product, wear protective gear, such as safety shoes, to ensure safety. There is a risk of injury if the product falls or tips over.                                                                                                                                                                                        |
|                 | When unpacking or installing the product, wear appropriate protective gear (work gloves, protective goggles, etc.) to ensure safety. There is a risk of injury from the sharp edges of the packaging box, product, or tool.                                                                                                                          |
|                 | Installation of the product must be performed by personnel with expertise and certification in electrical work. Otherwise, it may cause electric shock or fire due to miswiring or improper installation, resulting in death.                                                                                                                        |
|                 | When securing the product with flare nuts, use two wrenches: one for fixing the hexagonal part of the main unit and the other (open-end wrench) for tightening the flare nut. Applying torque to the product without observing this instruction may damage the main unit, resulting in blindness or injury from scattered metal pieces or inner gas. |
|                | When performing brazing with nitrogen purging, wear appropriate protective gear (protective goggles, heat-resistant gloves, etc.) and provide a pressure relief zone to prevent an unintentional rise in inner pressure for your safety. Failure to do so may cause blindness, injury, or burn from scattered high-temperature parts, such as flux.  |
|               | Do not paint the product. Doing so may degrade insulation, resulting in fire or electric shock due to leakage current.                                                                                                                                                                                                                               |
|               | Use only the designed method when securing the product. Drilling or modifying the main unit may expose the internal live parts, resulting in death due to short circuit or electric shock.                                                                                                                                                           |
|               | When unpacking or installing the product, wear appropriate protective gear (work gloves, etc.) to ensure safety. There is a risk of injury from the sharp edges of the packaging box, product, or tool.                                                                                                                                              |
|               | Perform blazing in a well-ventilated location or using an exhaust system with adequate ventilation. Also, wear appropriate protective gear, such as a mask.<br>Failure to do so may cause inhalation of hazardous substances, such as fumes, resulting in respiratory disorders, or suffocation from leaked gas.                                     |

★ Observe the following when assembling the product:

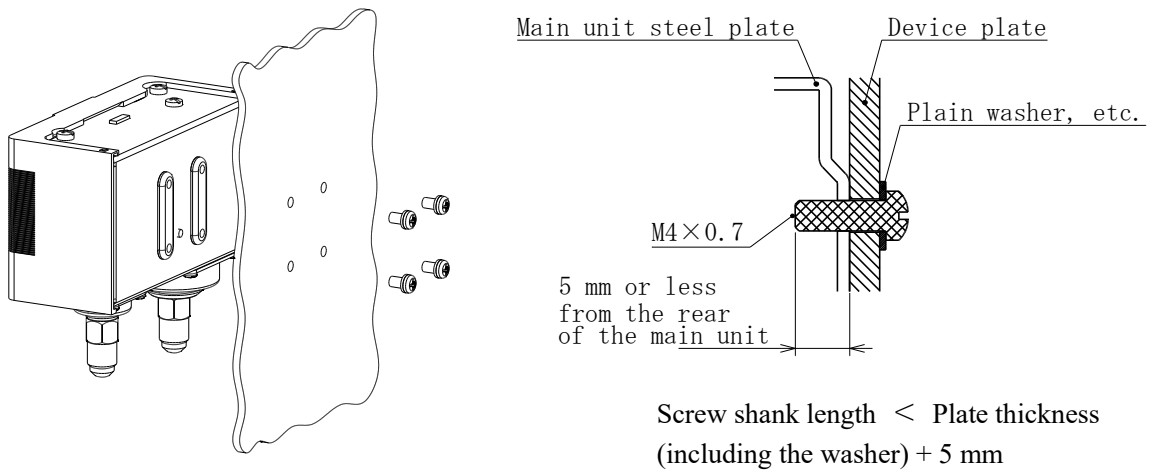
- Before unpacking, ensure that the packaging box is not deformed or damaged.
- During unpacking, ensure that the product is not deformed or damaged.
- After unpacking, ensure that the product meets your requested specifications.
- Do not apply shock to the product during unpacking.  
Doing so may cause failure or malfunction. It also results in inaccurate measurement.
- Be sure to remove the dust or foreign matter inside the pipe before installing the product on the piping line.  
If foreign matter may be present in the fluid, install or connect a filter to the piping line.  
Doing so may cause failure or malfunction. It also results in inaccurate measurement.
- Do not put a thin wire or similar objects into the pressure inlet.  
Doing so may damage the internal part, resulting in fluid leakage, failure, or malfunction.
- When using a flare joint, do not scratch the tapered surface of the flare end.  
Doing so may cause fluid leakage, failure, or malfunction.
- Do not install the product in a location that may be used as a scaffold.  
If excessive force is applied, such as by accidentally standing on or placing a foot on the product, it may cause damage.
- Do not use the product in atmospheres containing corrosive gases, chemical substances, seawater, water, or steam, or locations exposed to them.  
Doing so may cause failure or malfunction.
- Do not use the product in locations exposed to oils or chemical substances.  
Doing so may cause failure or malfunction.
- Install the product in a location not subject to vibration or impact.  
Doing so may cause failure or malfunction.
- Ensure that foreign matter, such as wire scraps, does not enter the product.  
Doing so may cause failure or malfunction.
- Do not use the product in an environment with temperature cycles.  
If temperature cycles other than normal temperature fluctuations are applied, it may adversely affect the inside of the product.
- Do not use the product under direct sunlight.  
If exposed to direct sunlight, block it. Doing so may cause failure or malfunction.
- Use the product within the operating fluid temperature and ambient temperature ranges.  
The operating fluid temperature range is -20 to 120 °C, while the ambient temperature range is -20 to 70 °C. If the product is used at low temperatures (5 °C or lower), moisture in the air may freeze, resulting in damage or malfunction.
- Take measures to prevent freezing. It is recommended to install an air dryer to drain or remove moisture.  
Also, avoid sudden temperature changes even within the specified temperature range.
- Do not use the product in locations exposed to radiant heat from surrounding heat sources.  
Doing so may cause malfunction.
- When installing piping for the product, do not tighten the pipe while holding the main unit, but use an open-end wrench.  
Otherwise, it may cause failure or malfunction.
- Do not apply additional machining, such as drilling a mounting hole in the main unit. Doing so may cause failure or malfunction.  
When installing the product on the wall or panel board, use the mounting holes (M4 x 0.7) at the rear of the main unit.
- The product can be installed in any orientation, but it is recommended that the product be used with the joint vertically facing downward to prevent dust or foreign matter inside the pipe from entering the product.

## 6. Assembly

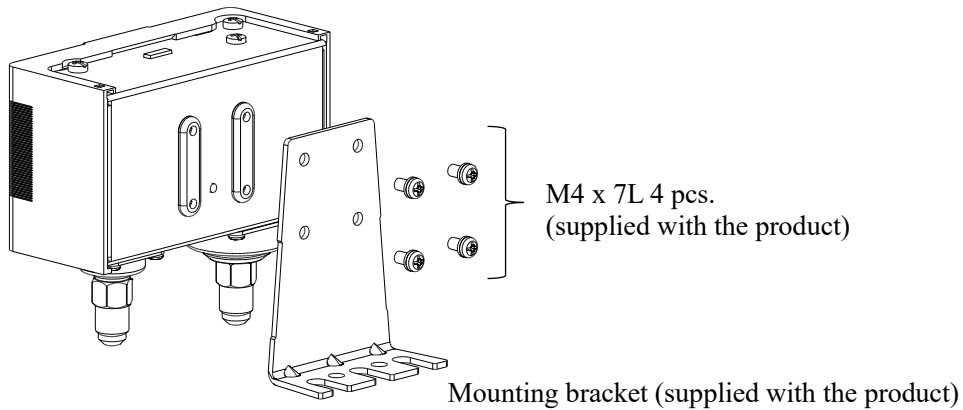
< Orientation that prevents foreign matter from entering the product >



- Use M4 x 0.7 mounting screws with an insertion depth of 5 mm or less from the rear of the main unit.  
If the insertion depth is more than 5 mm, it may cause electric shock or malfunction, resulting in damage.



- How to install the main unit mounting bracket  
Mount the bracket to the main unit with four mounting screws M4 x 7L.



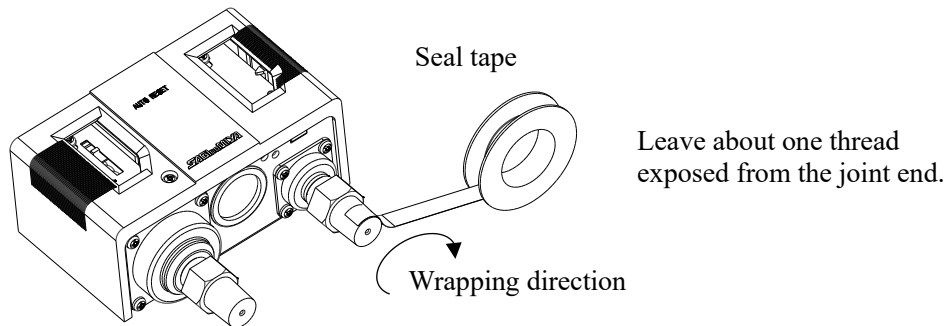
- Install the product on the piping line without mixing up the high-pressure side and the low-pressure side.

## 6. Assembly

- How to wrap the seal tape (Tapered pipe thread: joint code: M01, 02, 04, 06, 07, and 09)

When screwing a pipe or joint, ensure that the chips and sealant from the pipe thread do not enter the pipe.

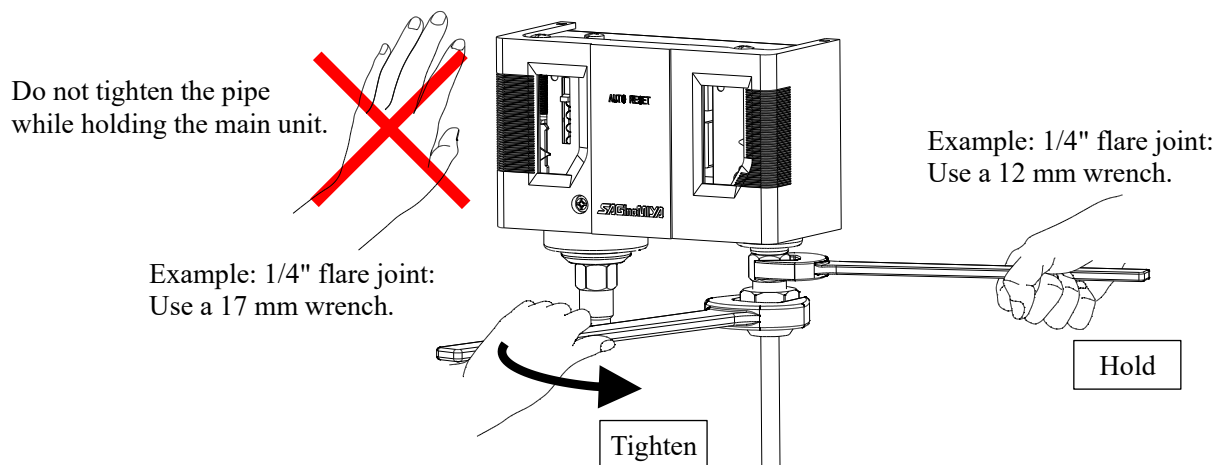
When wrapping the seal tape, be sure to leave about one thread exposed.



- When installing piping for the product, use an open-end wrench. (Example: For a 1/4" flare joint, the recommended tightening torque is 12 to 14 N · m.)

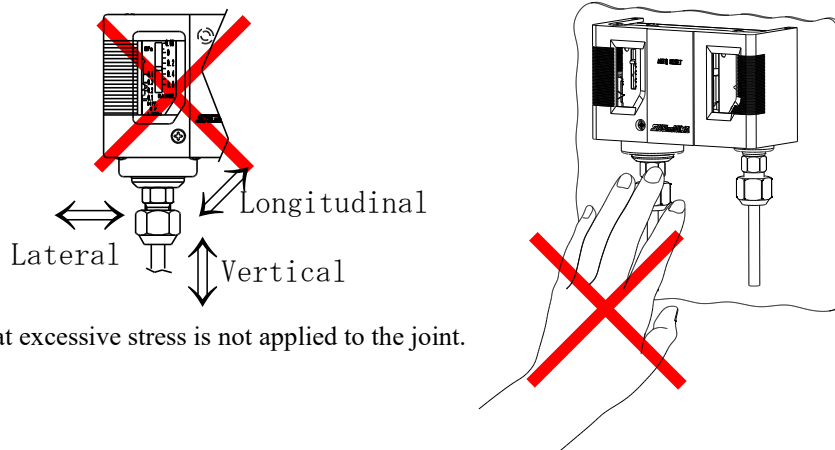
A tightening torque exceeding the above range may damage the mounting screws, mounting fixture, or pressure switch. If the tightening torque is below the above range, it may cause pressure switch misalignment or fluid leakage.

Use an appropriate tightening torque according to the industrial standards of each joint.



## 6. Assembly

- During piping installation, arrange the piping layout to prevent excessive stress from being applied to the joint in longitudinal, lateral, or vertical directions. Also, do not hold the pipe to adjust after it is connected.

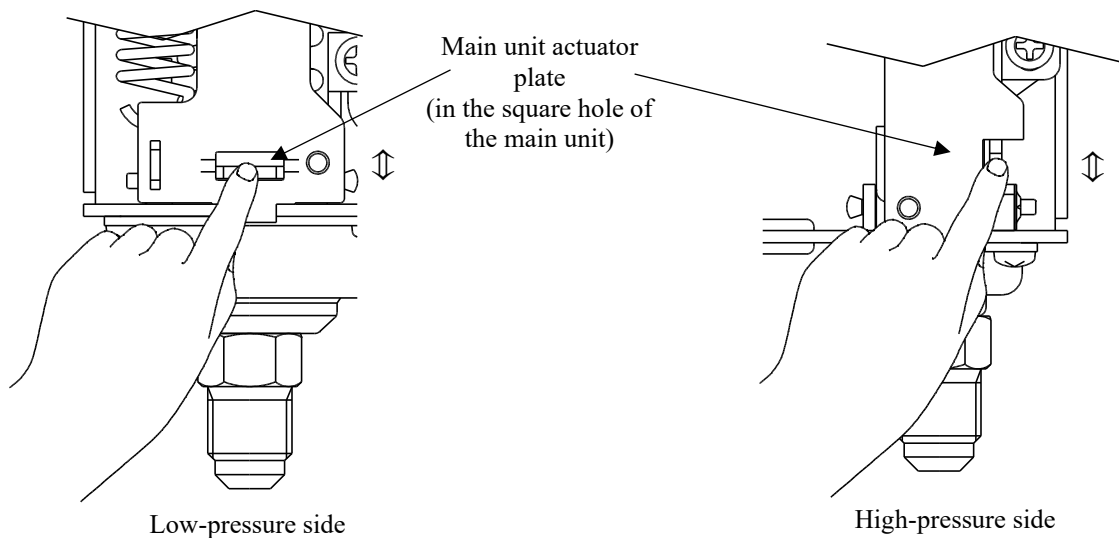


**!** Use the product under the following conditions. Failure to do so may lead to malfunction or performance degradation.

- Install in locations with vibration levels of  $9.8 \text{ m/s}^2$  or less.
- Use within an ambient temperature range of  $-20$  to  $70^\circ\text{C}$  and a fluid temperature range of  $-20$  to  $120^\circ\text{C}$ .
- Do not exceed the maximum operating pressure. (Example: DNS-D306 low-pressure side:  $1.5 \text{ MPa}$  or less, high-pressure side:  $3.3 \text{ MPa}$  or less)

Also, install in locations without impact pressure, excessive pressure changes, or pulsation.

To check pulsation, check the movement or vibration of the actuator plate in the square hole of the main unit visually or by touching the plate with your finger.



## 7. Wiring

|  <b>WARNING</b> |                                                                                                                                                                                                                                                                                         |
|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | Do not turn on the product with the protection cover for the live part removed. Doing so may cause accidental contact with the live part, resulting in serious injury or death due to electric shock.                                                                                   |
|                 | Be sure to turn off all the power before wiring. Performing the work with power on may cause accidental contact with the live part, resulting in serious injury or death due to electric shock.                                                                                         |
|                 | Before wiring, ensure that no water is present on the product, and perform the work in an environment where the product is not exposed to water, such as rain or condensation. Performing the work with the product wet may cause electric shock, resulting in serious injury or death. |
|                 | Wiring of the product must be performed by personnel with expertise and certification in electrical work. Otherwise, it may cause electric shock or fire due to miswiring or improper installation, resulting in death.                                                                 |
|                | When wiring the product, wear appropriate protective gear (work gloves, protective goggles, etc.) to ensure safety. There is a risk of injury from the sharp edges of the product or tool, or flying debris. If debris enters your eye, it may result in blindness.                     |
|               | Rubber grommets for cable entry must be attached during wiring. Also, use conduits if necessary. Failure to observe these instructions may damage cables, resulting in serious injury or death due to electric shock.                                                                   |
|               | Use only the supplied screws (M4 x 0.7 x 8 mm with washers). Failure to do so may cause the shank length to become excessive. This leads to short circuit due to insufficient insulation distance from the inner part, resulting in serious injury or death due to electric shock.      |
|               | Do not tighten the cover securing screw with a torque exceeding 0.3 N·m. If the cover is damaged or comes off due to an excessive tightening torque, the live part may be exposed, resulting in serious injury or death caused when the operator accidentally touches it.               |

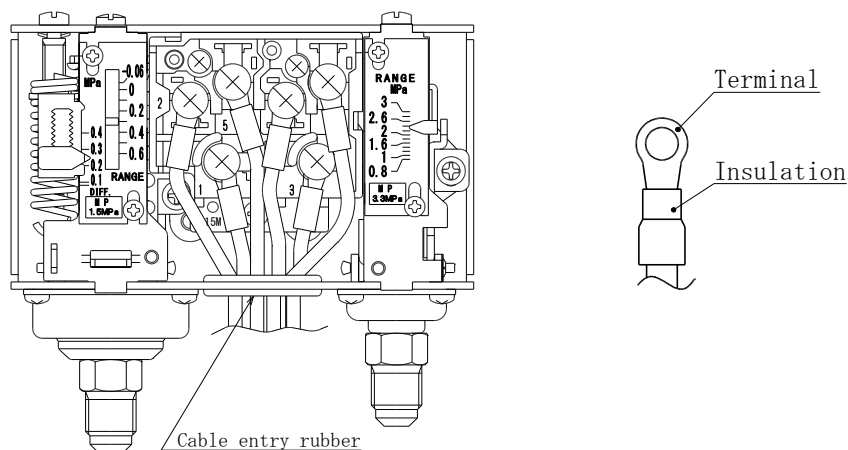
|  <b>CAUTION</b> |                                                                                                                                    |
|----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
|                 | Check safety in the surrounding environment before performing the work.                                                            |
|                 | Do not paint the product. If paint enters the pressure switch or adheres to the sliding part, it may cause failure or malfunction. |

## 7. Wiring

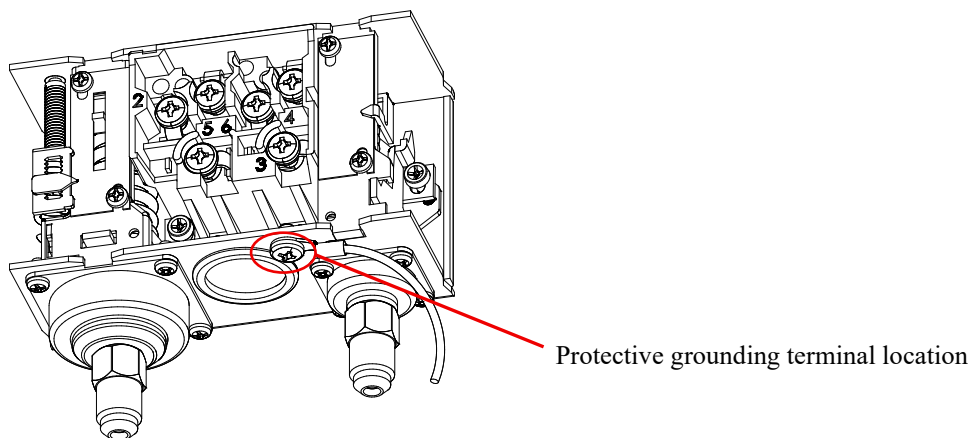
★ Observe the following when wiring the product:

★ The micro switch is equipped with terminal screws, so connect the electrical wires according to the wiring diagram for your intended purpose. Also, note the following:

- Do not turn any screws other than the terminal screws and the grounding screw.  
Doing so may cause failure, malfunction, or premature failure.
- Use the product within the electrical ratings. Doing so may damage the product or shorten its service life.
- Do not pull the connected electrical wire forcibly or lift the main unit by holding the wire.  
Doing so may damage the micro switch, resulting in failure or malfunction. If the lead wire is damaged, replace it.
- It is recommended to use a cable gland for wiring.  
If no cable gland is used, wire the cables with the cable entry rubber attached.  
Failure to do so may damage the cables, resulting in electric shock.  
Secure the wiring outside the main unit (near the main unit) to prevent its pulling force from being applied directly to the main unit.
- Do not paint the product. If paint enters the pressure switch or adheres to the sliding part, it may cause failure or malfunction.
- Use the installed M4 x 0.7 x 6 mm terminal screws.  
Using longer screws may damage the micro switch, resulting in failure or malfunction.
- Do not exceed a torque of 1.2 N · m when tightening the terminal screws.  
Doing so may damage the micro switch, resulting in failure or malfunction.
- Use round connectors (insulated) to connect to the terminals.



- Use the M4 x 0.7 screw to connect to the protective grounding terminal.



- Do not exceed a torque of 0.3 N · m when tightening the cover securing screw.  
Doing so may cause the cover to be damaged or come off, resulting in electric shock, failure, or malfunction.

### 8. Settings

|  <b>WARNING</b> |                                                                                                                                                                                                       |
|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | Be sure to turn off the power before wiring. Performing the work with power on may cause accidental contact with the live part, resulting in serious injury or death due to electric shock.           |
|                 | Do not turn on the product with the protection cover for the live part removed. Doing so may cause accidental contact with the live part, resulting in serious injury or death due to electric shock. |

#### 8.1. Settings

★ Observe the following when setting and adjusting the operating values:

- Do not pull the connected electrical wire forcibly or lift the main unit by holding the wire.  
Doing so may damage the micro switch, resulting in failure or malfunction. If the lead wire is damaged, replace it.
- Do not turn any screws other than the adjusting screws.  
Doing so may cause failure, malfunction, or premature failure.
- Do not turn screws that have been pre-adjusted and locked (bonded) by our factory.  
Doing so may cause failure, malfunction, or premature failure.

< Setting procedure >

Set the actuation value for pressure rise with the pressure adjusting screw first, and then set the actuation value for pressure drop with the differential pressure adjusting screw.

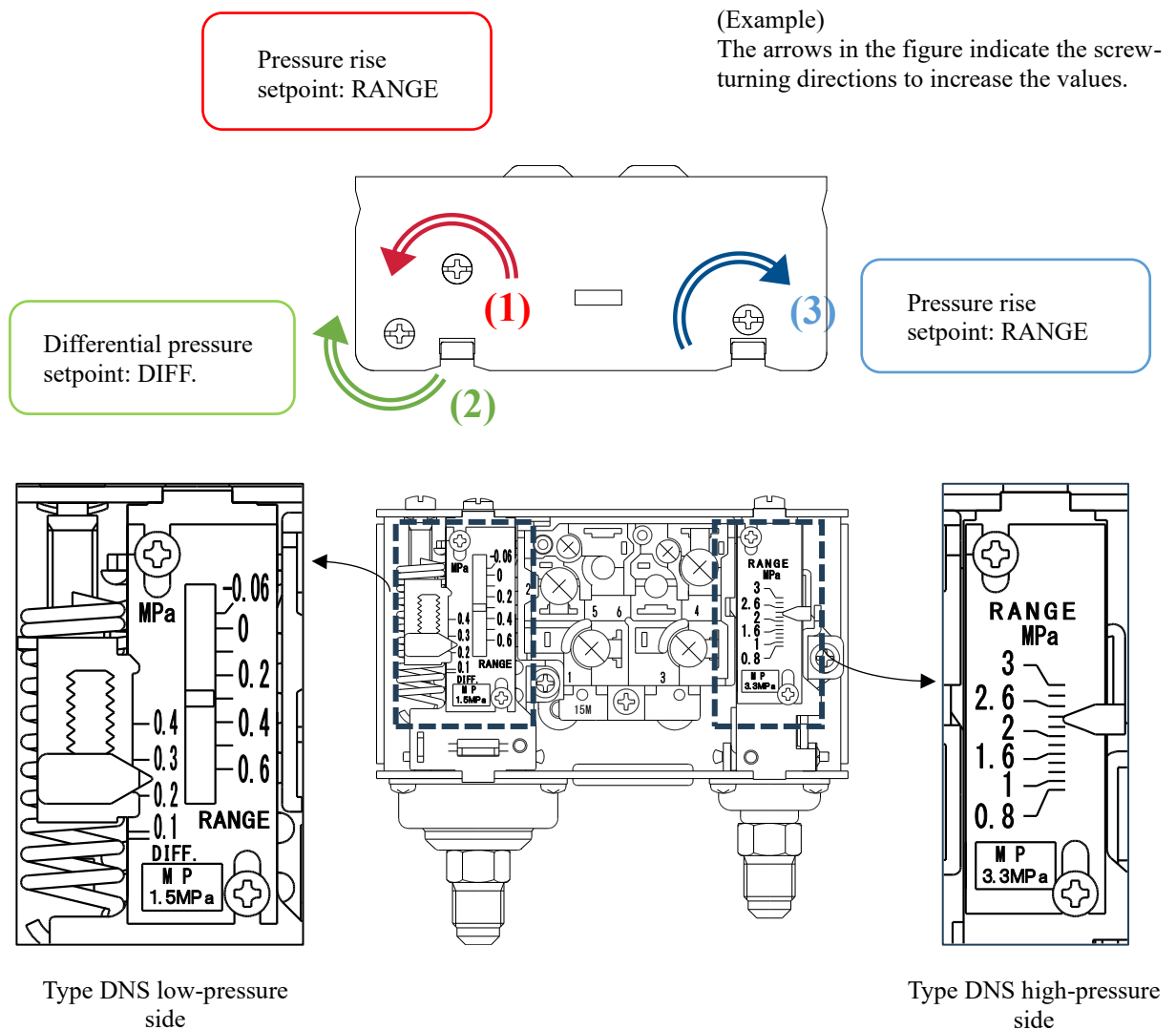
To increase the pressure setting, turn the pressure adjusting screw counterclockwise for Type DNS (low-pressure side) and turn it clockwise for Type DNS (high-pressure side).

To increase the differential pressure, turn the differential pressure adjusting screw clockwise. Use these two adjusting screws to adjust to your desired settings.

### 8.2. Setting examples

< Setting example >

- To increase the low-pressure side setting (actuation value for pressure rise): Turn Screw (1) **counterclockwise.**
  - To decrease the setting: Turn Screw (1) **clockwise.**
- To increase the differential pressure: Turn Screw (2) **clockwise.**
- To decrease the differential pressure: Turn Screw (2) **counterclockwise.**
- To increase the high-pressure side setting (actuation value for pressure rise): Turn Screw (3) **clockwise.**
  - To decrease the setting: Turn Screw (3) **counterclockwise.**



\* **(2) Differential pressure adjusting screw** is not provided with DNS-D606MM.

## 8. Settings

### < Setting change >

Adjust the values according to the pressure gauge reading. The scale should be used for reference only.

Note: For the Type DNS high-pressure side, the differential pressure cannot be adjusted, as it is fixed. (No differential pressure adjusting screw is provided.)

Note: For manual reset models, the differential pressure cannot be adjusted as well. To perform a manual reset, press the reset button after the specified pressure drops (or it rises for the Type MM low-pressure side).

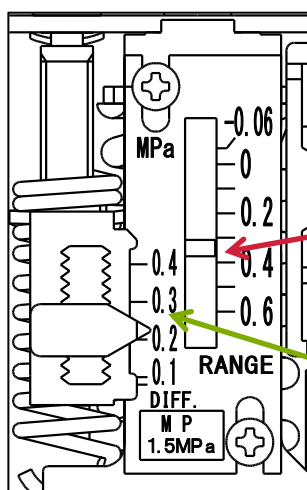
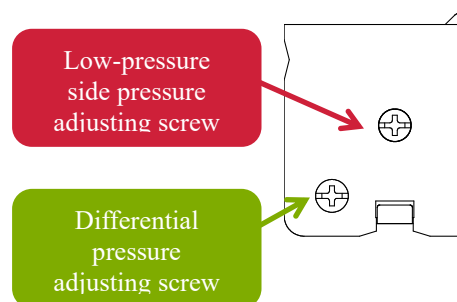
Pressing the reset button before the specified pressure drops (or it rises for the Type MM low-pressure side) may lead to malfunction.

### < Setting example >

Desired settings

Setpoint: 0.3 MPa / Differential pressure: 0.2 MPa

(Actuation value for pressure rise: 0.3 MPa / Actuation value for pressure drop: 0.1 MPa)



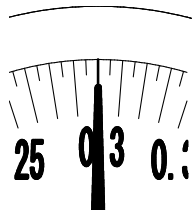
(1) Temporarily set the RANGE indicator to 0.3 MPa or more.

(2) Temporarily set the DIFF. indicator to 0.2 MPa or more.

Screw-turning direction

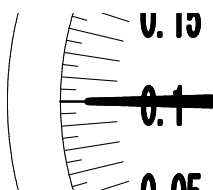
Counterclockwise

Clockwise



(3) Apply a pressure of 0.3 MPa to the product and turn the low-pressure side pressure adjusting screw back slowly until the switch actuates.

Clockwise



(4) Decrease the applied pressure to 0.1 MPa and turn the differential pressure adjusting screw back slowly until the switch actuates.

Counterclockwise

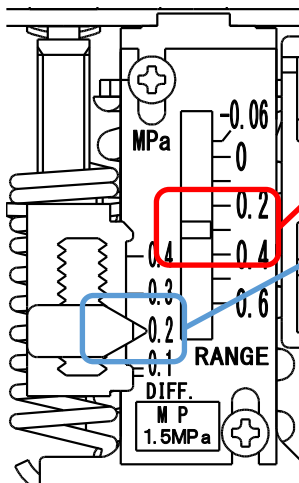
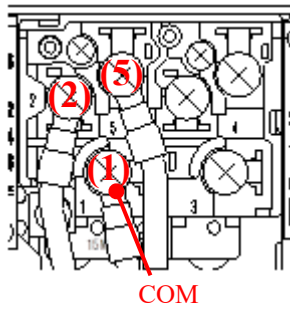
(5) After the adjustment, decrease the pressure to 0 MPa.

(6) Increase and decrease the pressure again to see if the desired settings have been obtained.

## 8. Settings

### • Output operation

< Type DNS-D6 low-pressure side >

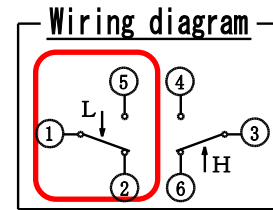


Pressure adjustment value **0.3MPa**

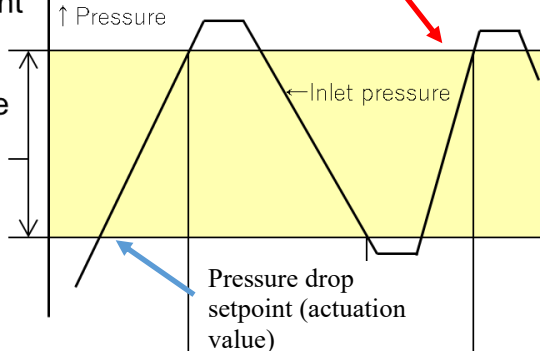
Differential pressure adjustment value **0.2MPa**

0.1MPa

Note: The ↑↓ arrows represent the behavior of the contacts during pressure rise.



Pressure rise setpoint (actuation value)



Between (1) and (2)

Between (1) and (5)

|     |     |     |     |
|-----|-----|-----|-----|
| Off | On  | Off | On  |
| On  | Off | On  | Off |

### • Settings

Low-pressure side setting scale: 0.3 MPa

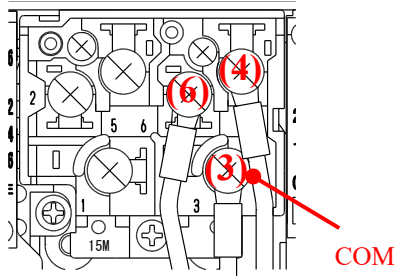
Differential pressure scale: 0.2 MPa\*

\* There is no differential pressure scale for Type DNS-D606MM, ANS, or FNS.

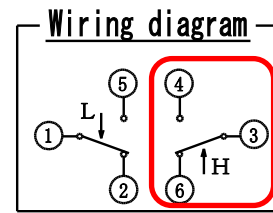
- ① When the pressure is increased from atmospheric pressure (0 MPa), the switch actuates at 0.3 MPa.  
Between Terminals (1) and (2): On / Between Terminals (1) and (5): Off
- ② When the pressure is decreased, the switch actuates at 0.1 MPa.  
Between Terminals (1) and (2): Off / Between Terminals (1) and (5): On

## 8. Settings

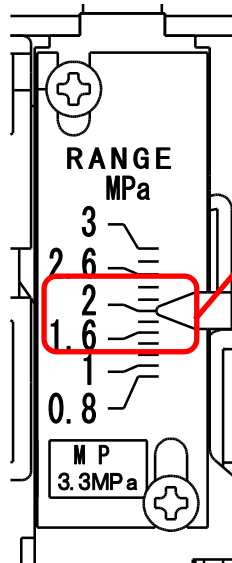
< Type DNS-D6 high-pressure side >



Note: The ↑↓ arrows represent the behavior of the contacts during pressure rise.

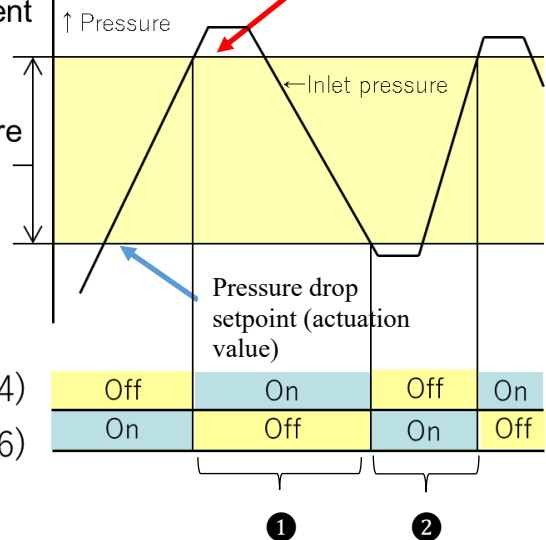


Pressure rise setpoint  
(actuation value)



Pressure adjustment  
value **2.0MPa**

Differential pressure  
adjustment value  
(Cannot be set)  
(1.6MPa)



### ● Settings

High-pressure side setting: 2.0 MPa

- ① When the pressure is increased from atmospheric pressure (0 MPa), the switch actuates at 2.0 MPa.  
Between Terminals (3) and (4): On / Between Terminals (3) and (6): Off
- ② When the pressure is decreased, the switch actuates at 1.6 MPa\*.  
Between Terminals (3) and (4): Off / Between Terminals (3) and (6): On

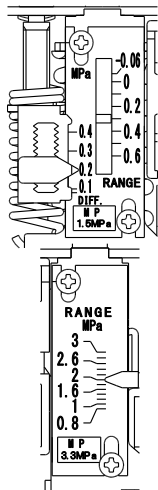
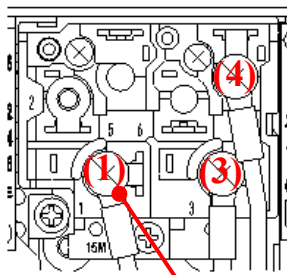
< Caution >

\* The high-pressure side differential pressure cannot be adjusted, as it is fixed by the product.

In addition, the differential pressure varies depending on the instrument error and the pressure rise setpoint. The switch actuates within the range of 0.3 to 0.5 MPa.

## 8. Settings

< Type DNS-D3 >



COM

Low-pressure side

High-pressure side

Pressure adjustment value  
**0.3MPa**

Differential pressure  
**0.2MPa**

Pressure adjustment value  
**2.0MPa**

Differential pressure adjustment value

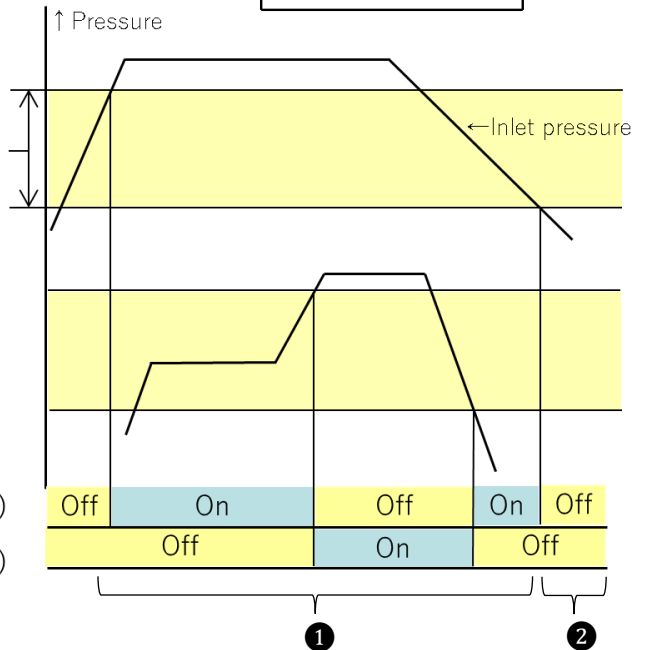
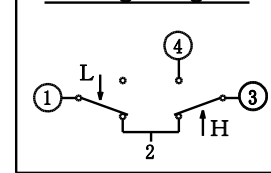
(Cannot be set)

Between (1) and (3)

Between (3) and (4)

Note: The ↑↓ arrows represent the behavior of the contacts during pressure rise.

Wiring diagram



### • Settings

Low-pressure side setting scale: 0.3 MPa

Differential pressure scale: 0.2 MPa

High-pressure side setting scale: 2.0 MPa

- ① Low-pressure side: When the pressure is increased from 0 MPa (atmospheric pressure) to 0.3 MPa or more  
 High-pressure side: Less than 2.0 MPa => Between Terminals (1) and (3): On  
 High-pressure side: 2.0 MPa or more => Between Terminals (1) and (3): Off / Between Terminal (3) and (4): On  
 High-pressure side: If the pressure rises to or above 2.0 MPa and then drops to or below 1.6 MPa\*  
 => Between Terminals (1) and (3): On / Between Terminal (3) and (4): Off
- ② Low-pressure side: When the pressure is decreased to less than 0.1 MPa  
 => Between Terminals (1) and (3): Off

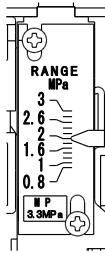
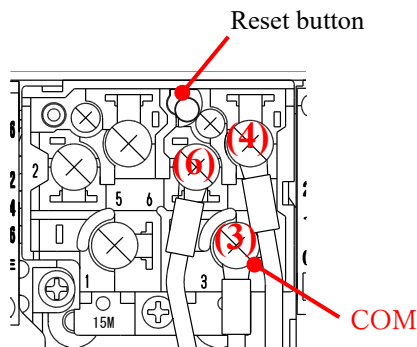
< Caution >

\* The high-pressure side differential pressure cannot be adjusted, as it is fixed by the product.

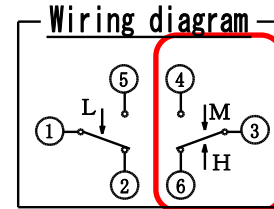
In addition, the differential pressure varies depending on the instrument error and the pressure rise setpoint. The switch actuates within the range of 0.3 to 0.5 MPa.

## 8. Settings

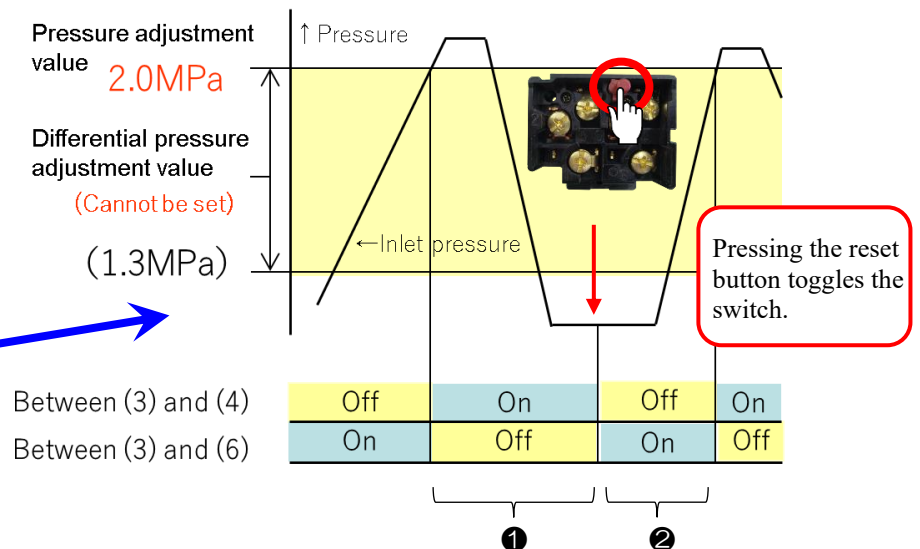
### < Actuation for Type DNS-D6M >



Note: The  $\uparrow\downarrow$  arrows represent the behavior of the contacts during pressure rise, and the  $M\downarrow$  arrow represents the behavior when the reset button is pressed.



When the pressure drops by **0.7 MPa or more** from the pressure adjustment value, press the reset button.



#### • Settings

High-pressure side setting scale: 2.0 MPa

- 1 When the pressure is increased from atmospheric pressure (0 MPa), the switch actuates at 2.0 MPa.  
Between Terminals (3) and (4): On / Between Terminals (3) and (6): Off

When the reset button is not pressed

Even if the pressure is decreased to 1.3 MPa or less, the switch does **not actuate.**  
Between Terminals (3) and (4): On / Between Terminal (3) and (6): Off

- 2 When the reset button is pressed after the pressure drops by 0.7 MPa or more from the pressure adjustment value  
Between Terminals (3) and (4): Off / Between Terminal (3) and (6): On

### < Caution >

When **the pressure drops by 0.7 MPa or more** from the pressure adjustment value, press the reset button.

If you press the reset button before the pressure fully drops, the switch may **not be reset.**  
In such cases, press the reset button again after the pressure drops sufficiently.

## 9. Operation

|  <b>WARNING</b> |                                                                                                                                                                                                                                                                                                             |
|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | Do not turn on the product with the protection cover for the live part removed. Doing so may cause accidental contact with the live part, resulting in serious injury or death due to electric shock.                                                                                                       |
|                 | Before wiring, ensure that no water is present on the product, and perform the work in an environment where the product is not exposed to water, such as rain or condensation. Performing the work with the product wet may cause electric shock, resulting in serious injury or death.                     |
|                 | Use the product only under the conditions described in the instruction manual. Perform periodic maintenance. Exposure to harsh conditions beyond the operating conditions or prolonged use may degrade the sealing integrity of the product. In addition, leaked refrigerant may cause fire or suffocation. |
|                 | Do not apply excessive external force, such as using the product or joint above the pipe as a climbing scaffolding. Doing so may damage the product or joint, resulting in suffocation or fire due to leaked refrigerant.                                                                                   |

### 9.1. Normal operation

★ Observe the following when operating the product:

- Do not expose the product to vibrations exceeding  $9.8 \text{ m/s}^2$ .
- Doing so may cause failure, malfunction, or premature failure.
- Use the product within the operating fluid temperature and ambient temperature ranges.  
The operating fluid temperature range is  $-20$  to  $120 \text{ }^\circ\text{C}$ , while the ambient temperature range is  $-20$  to  $70 \text{ }^\circ\text{C}$ . If the product is used at low temperatures ( $5 \text{ }^\circ\text{C}$  or lower), moisture in the air may freeze, resulting in damage or malfunction.
- Take measures to prevent freezing. Also, avoid sudden temperature changes even within the specified temperature range.
- Use the product in non-freezing and frost-free environments.  
Doing so may cause failure, malfunction, or premature failure.
- Do not use the product in locations exposed to radiant heat from surrounding heat sources.  
Doing so may cause malfunction.
- Do not use the product in an environment with temperature cycles.  
If temperature cycles other than normal temperature fluctuations are applied, it may adversely affect the inside of the product.
- Do not use the product under direct sunlight.  
If exposed to direct sunlight, block it. Doing so may cause failure or malfunction.
- Use the product in an atmosphere that does not corrode copper alloys.  
Doing so may cause failure, malfunction, or premature failure.
- Use fluid with a viscosity of  $400 \text{ mm}^2/\text{s}$  or less ( $400 \text{ cSt}$  or less).  
If the viscosity is high, the pressure may not be transmitted appropriately, resulting in malfunction.
- Be sure to comply with the table below for the rate of pressure change applied to the pressure switch.  
Failure to do so may result in the product not actuating as specified.

Rate of pressure change

| Catalyst | Time taken<br>(per $0.1 \text{ MPa}$ ) |
|----------|----------------------------------------|
| Gas      | At least 3 seconds                     |
| Liquid   | At least 10 seconds                    |

## 9. Operation

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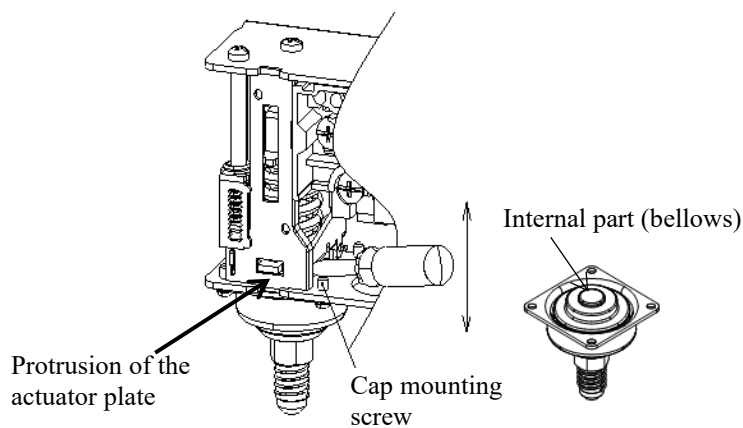
- Do not exceed the maximum operating pressure. Use in locations without impact pressure, excessive pressure changes, or pulsation. To check pulsation, check the movement or vibration of the actuator plate in the square hole of the main unit visually or by touching the plate with your finger or hand.
- Do not use the product in atmospheres containing corrosive gases, chemical substances, seawater, water, or steam, or locations exposed to them.  
Doing so may cause failure or malfunction.
- Do not use the product in locations exposed to oils or chemical substances.  
Doing so may cause failure or malfunction.
- Install the product in a location not subject to vibration or impact.  
Doing so may cause failure or malfunction.
- Ensure that foreign matter, such as wire scraps, does not enter the product.  
Doing so may cause failure or malfunction.
- After installing the product appropriately, be sure to perform a trial operation to ensure that all systems fully function before use.
- Configure appropriate settings according to your intended purpose.  
Failure to do so may cause malfunction.

### 9.2. Forced operation

To forcibly actuate the switch for some reasons, perform the following.  
However, **exercise extra caution, as it may damage the internal part.**

#### < Low-pressure side >

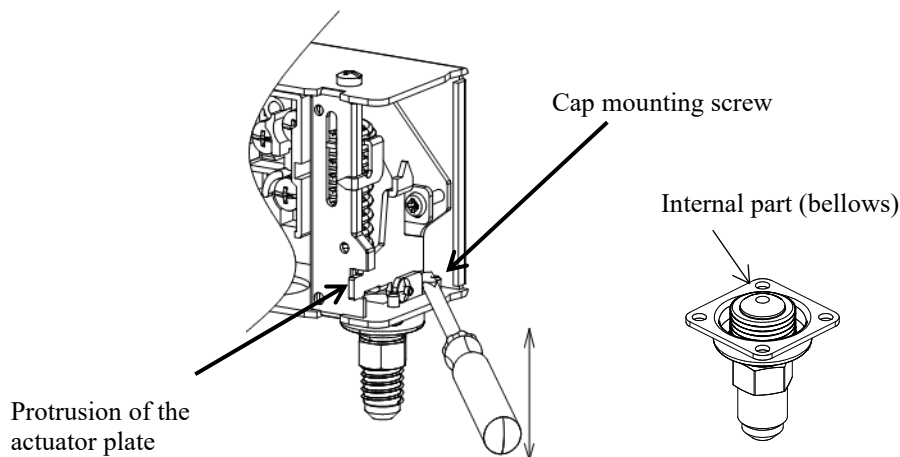
Insert a flathead screwdriver about 5 mm deep between the actuator plate and the main unit, and use the tip of the cap mounting screw as a fulcrum to actuate the switch. (Do not turn the screwdriver, as it damages the bellows.)  
Alternatively, place the screwdriver under the protrusion of the actuator plate on the front of the main unit and apply force in the direction of pushing the plate upward to actuate the switch. You can also actuate the switch in reverse by pushing the plate downward.



Pressure switch low-pressure side

#### < High-pressure side >

Insert a flathead screwdriver between the bending section of the actuator plate and the main unit, and use the tip of the cap mounting screw as a fulcrum to actuate the switch. (Do not turn the screwdriver, as it damages the bellows.)  
Alternatively, place the screwdriver above the protrusion of the actuator plate on the front of the main unit and apply force in the direction of pushing the plate downward to actuate the switch. You can also actuate the switch in reverse by pushing the plate upward.



Pressure switch high-pressure side

## 10. Maintenance and Inspection

|  <b>WARNING</b>   |                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   | Do not turn on the product with the protection cover for the live part removed. Doing so may cause accidental contact with the live part, resulting in serious injury or death due to electric shock.                                                                                                                                                                                   |
|                   | Be sure to turn off the power before maintenance or inspection. Performing the work with power on may cause accidental contact with the live part, resulting in serious injury or death due to electric shock.                                                                                                                                                                          |
|                   | Before maintenance, inspection, or replacement, be sure to recover the refrigerant inside the refrigeration system and ensure that no refrigerant remains inside the product. Failure to do so may cause fire or suffocation due to leakage. In addition, it may result in eye or physical injury, or blindness in the worst-case scenario, from escaping refrigerant or flying debris. |
|                   | Use the product only under the conditions described in the instruction manual. Perform periodic maintenance. Exposure to harsh conditions beyond the operating conditions or prolonged use may degrade the sealing integrity of the product. In addition, leaked refrigerant may cause fire or suffocation.                                                                             |
|                  | Before maintenance or inspection, ensure that no water is present on the product, and perform the work in an environment where the product is not exposed to water, such as rain or condensation. Performing the work with the product wet may cause electric shock, resulting in serious injury or death.                                                                              |
|  <b>CAUTION</b> |                                                                                                                                                                                                                                                                                                                                                                                         |
|                 | Before maintenance or inspection, be sure to turn off the power supply, stop the air supply, and release the compressed air inside the pipe to put the product in a vented state. Failure to do so may result in unintended component malfunction.                                                                                                                                      |

★ Observe the following when maintaining or inspecting the product:

- Do not turn any screws other than the adjusting screws.  
Doing so may cause failure, malfunction, or premature failure.
- Do not turn screws that have been pre-adjusted and locked (bonded) by our factory.  
Doing so may cause failure, malfunction, or premature failure.
- Periodic actuation verification is recommended.

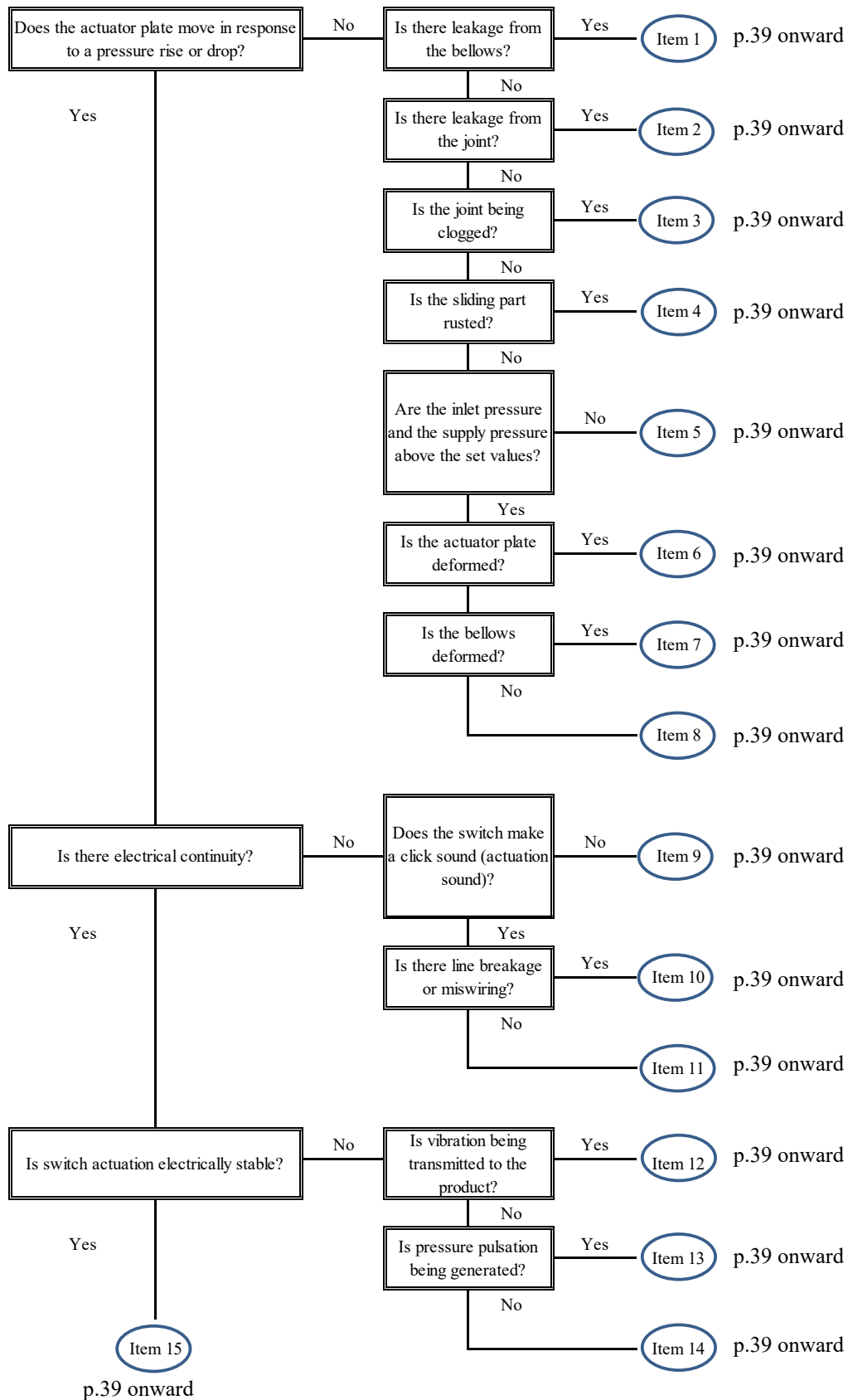
### 11. Replacement

|  <b>WARNING</b> |                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | Do not turn on the product with the protection cover for the live part removed. Doing so may cause accidental contact with the live part, resulting in serious injury or death due to electric shock.                                                                                                                                                                                   |
|                 | Before maintenance, inspection, or replacement, be sure to recover the refrigerant inside the refrigeration system and ensure that no refrigerant remains inside the product. Failure to do so may cause fire or suffocation due to leakage. In addition, it may result in eye or physical injury, or blindness in the worst-case scenario, from escaping refrigerant or flying debris. |
|                 | Before maintenance or inspection, ensure that no water is present on the product, and perform the work in an environment where the product is not exposed to water, such as rain or condensation. Performing the work with the product wet may cause electric shock, resulting in serious injury or death.                                                                              |

### 12. Disposal

When you no longer need the product, dispose of it properly in accordance with the laws, regulations, and ordinances of your local government.  
Also, do not reuse any part of the product.

## 13. Troubleshooting



## 14. Troubleshooting List

### 14. Troubleshooting List

#### 14.1. Frequently asked questions

| Phenomenon                                                                                                                                                                                                       | Check item                                                                                                                                                                                                                                                                                                                                             | Reference                                             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| <ul style="list-style-type: none"> <li>The switch does not actuate at the desired setpoint.</li> <li>There is a deviation in the actuation value.</li> <li>The value differs from the pressure gauge.</li> </ul> | Did you set the value based only on the scale?<br><ul style="list-style-type: none"> <li>The scale should be used for reference only. Use the pressure gauge to set the pressure.</li> </ul>                                                                                                                                                           | Common problems and solutions<br>Item 15              |
|                                                                                                                                                                                                                  | Are the switch and the pressure gauge located away from each other?<br><ul style="list-style-type: none"> <li>A pressure difference may occur due to piping resistance, so move the pressure outlet closer to the switch.</li> </ul>                                                                                                                   | —                                                     |
|                                                                                                                                                                                                                  | Is a high-viscosity fluid being used?<br>Ensure that the fluid viscosity is 400 mm <sup>2</sup> /s (cSt) or less.<br>(If the fluid viscosity is high, a response delay may occur, resulting in inaccurate pressure measurement.)                                                                                                                       | Common problems and solutions<br>Item 15              |
|                                                                                                                                                                                                                  | Is the rate of pressure change high?<br><ul style="list-style-type: none"> <li>If the rate of pressure change is high, a response delay may occur, resulting in inaccurate pressure measurement.</li> </ul>                                                                                                                                            | Common problems and solutions<br>Item 15              |
|                                                                                                                                                                                                                  | Is excessive pressure being applied to the switch?<br><ul style="list-style-type: none"> <li>If excessive pressure is applied, components such as the bellows and the actuator plate may be deformed, affecting the actuation value.</li> </ul>                                                                                                        | Common problems and solutions<br>Items 6, 7, and 15   |
| <ul style="list-style-type: none"> <li>There is a deviation in the settings.</li> <li>Actuation is unstable.</li> </ul>                                                                                          | Is the switch vibrating?<br><ul style="list-style-type: none"> <li>The transmitted vibration may cause the adjusting screws to rotate, affecting the settings.<br/>(Change the installation location or take measures to prevent vibration.)</li> </ul>                                                                                                | Common problems and solutions<br>Items 12 and 13      |
|                                                                                                                                                                                                                  | Is excessive pressure being applied to the switch?<br><ul style="list-style-type: none"> <li>If excessive pressure is applied, components such as the bellows and the actuator plate may be deformed, affecting the actuation value.</li> </ul>                                                                                                        | Common problems and solutions<br>Items 6, 7, and 15   |
|                                                                                                                                                                                                                  | Is pressure pulsation being generated?<br><ul style="list-style-type: none"> <li>Pulsation may cause the bellows or actuator plate to move, resulting in malfunction.</li> </ul>                                                                                                                                                                       | Common problems and solutions<br>Items 12 and 13      |
| <ul style="list-style-type: none"> <li>The setpoint cannot be adjusted to the desired one.</li> </ul>                                                                                                            | Adjust the pressure according to the instruction manual.<br><ul style="list-style-type: none"> <li>Adjust the actuation point for pressure rise with the pressure adjusting screw and the actuation point for pressure drop with the differential pressure adjusting screw.</li> <li>Adjust the pressure while checking the pressure gauge.</li> </ul> | Common problems and solutions<br>Items 12, 13, and 15 |
|                                                                                                                                                                                                                  | Is the electrical wiring to the micro switch correct?<br><ul style="list-style-type: none"> <li>The micro switch is a single-pole double-throw type, so it can be wired to cut in or cut out upon pressure rise.<br/>(Check the instruction manual and the wiring diagram on the back of the cover.)</li> </ul>                                        | Common problems and solutions<br>Item 10              |
| <ul style="list-style-type: none"> <li>The pressure is not controlled.</li> <li>The switch does not start.</li> </ul>                                                                                            | Are the pressure settings configured correctly?<br><ul style="list-style-type: none"> <li>Adjust the pressure according to the instruction manual.</li> </ul>                                                                                                                                                                                          | —                                                     |
|                                                                                                                                                                                                                  | Is pressure being transmitted to the switch?<br>Is the pipe or the switch joint clogged?<br><ul style="list-style-type: none"> <li>If the switch actuator plate moves in response to a pressure rise or drop, it means that pressure is being transmitted to the switch.</li> </ul>                                                                    | Common problems and solutions<br>Item 3               |
|                                                                                                                                                                                                                  | Is the electrical wiring to the micro switch correct?<br><ul style="list-style-type: none"> <li>The micro switch is a single-pole double-throw type, so it can be wired to cut in or cut out upon pressure rise.<br/>(Check the instruction manual and the wiring diagram on the back of the cover.)</li> </ul>                                        | Common problems and solutions<br>Item 10              |
|                                                                                                                                                                                                                  | Are the electrical ratings of the connected switch within the specified ratings?<br><ul style="list-style-type: none"> <li>If outside the specified ratings, the switch cannot be properly controlled.</li> </ul>                                                                                                                                      | Common problems and solutions<br>Item 14              |
|                                                                                                                                                                                                                  | Are the electrical ratings of the connected switch within the specified ratings?<br><ul style="list-style-type: none"> <li>If outside the specified ratings, the switch cannot be properly controlled.</li> </ul>                                                                                                                                      | Common problems and solutions<br>Item 11              |
| <ul style="list-style-type: none"> <li>The switch does not cut in or cut out even when forcibly actuated.</li> </ul>                                                                                             | Is excessive pressure being applied to the switch?<br><ul style="list-style-type: none"> <li>If excessive pressure is applied, components such as the bellows and the actuator plate may be deformed, failing to actuate.</li> </ul>                                                                                                                   | Common problems and solutions<br>Items 6, 7, and 15   |
|                                                                                                                                                                                                                  | Is the electrical wiring to the micro switch correct?<br><ul style="list-style-type: none"> <li>The micro switch is a single-pole double-throw type, so it can be wired to cut in or cut out upon pressure rise.<br/>(Check the instruction manual and the wiring diagram on the back of the cover.)</li> </ul>                                        | Common problems and solutions<br>Item 10              |
| <ul style="list-style-type: none"> <li>The switch cannot be manually reset.</li> </ul>                                                                                                                           | Has the pressure risen or dropped sufficiently?<br><ul style="list-style-type: none"> <li>Ensure that the pressure has fully restored.<br/>(Forced operation of the reset button may damage the micro switch.)</li> </ul>                                                                                                                              | —                                                     |
|                                                                                                                                                                                                                  | Is the electrical wiring to the micro switch correct?<br><ul style="list-style-type: none"> <li>The micro switch is a single-pole double-throw type, so it can be wired to cut in or cut out upon pressure rise.<br/>(Check the instruction manual and the wiring diagram on the back of the cover.)</li> </ul>                                        | Common problems and solutions<br>Item 10              |
| <ul style="list-style-type: none"> <li>The switch does not actuate.</li> </ul>                                                                                                                                   | Is pressure being transmitted to the switch?<br><ul style="list-style-type: none"> <li>If the switch actuator plate moves in response to a pressure rise or drop, it means that pressure is being transmitted to the switch.</li> </ul>                                                                                                                | Common problems and solutions<br>Item 3               |
|                                                                                                                                                                                                                  | Are the electrical ratings of the connected switch within the specified ratings?<br><ul style="list-style-type: none"> <li>If outside the specified ratings, the switch cannot be properly controlled.</li> </ul>                                                                                                                                      | Common problems and solutions<br>Item 14              |
|                                                                                                                                                                                                                  | Is there leakage from the bellows?<br><ul style="list-style-type: none"> <li>Replace the switch before the guaranteed number of endurance cycles is exceeded.</li> </ul>                                                                                                                                                                               | Common problems and solutions<br>Items 1 and 9        |

## 14. Troubleshooting List

| Phenomenon                                                                                                                                                                                                  | Check item                                                                                                                                                                                                                                                                                                             | Reference                                           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|
| <ul style="list-style-type: none"> <li>The switch remains actuated.</li> </ul>                                                                                                                              | Is the electrical wiring to the micro switch correct? <ul style="list-style-type: none"> <li>The micro switch is a single-pole double-throw type, so it can be wired to cut in or cut out upon pressure rise. (Check the instruction manual and the wiring diagram on the back of the cover.)</li> </ul>               | Common problems and solutions<br>Items 9 and 10     |
|                                                                                                                                                                                                             | Is excessive pressure being applied to the switch? <ul style="list-style-type: none"> <li>If excessive pressure is applied, components such as the bellows and the actuator plate may be deformed, failing to actuate.</li> </ul>                                                                                      | Common problems and solutions<br>Items 1, 6, and 7  |
| <ul style="list-style-type: none"> <li>The continuity to the micro switch (contacts) is unstable.</li> </ul>                                                                                                | Are the electrical ratings of the connected switch within the specified ratings? <ul style="list-style-type: none"> <li>If outside the specified ratings, the switch cannot be properly controlled.</li> </ul>                                                                                                         | Common problems and solutions<br>Item 11            |
| <ul style="list-style-type: none"> <li>There is no continuity to the micro switch (contacts).</li> </ul>                                                                                                    | Is the electrical wiring to the micro switch correct? <ul style="list-style-type: none"> <li>The micro switch is a single-pole double-throw type, so it can be wired to cut in or cut out upon pressure rise. (Check the instruction manual and the wiring diagram on the back of the cover.)</li> </ul>               | Common problems and solutions<br>Item 10            |
|                                                                                                                                                                                                             | Are the electrical ratings of the connected switch within the specified ratings? <ul style="list-style-type: none"> <li>If outside the specified ratings, the switch cannot be properly controlled.</li> </ul>                                                                                                         | Common problems and solutions<br>Item 14            |
| <ul style="list-style-type: none"> <li>The micro switch (contacts) does not cut out.</li> <li>The micro switch (contacts) does not cut in.</li> <li>The micro switch (contacts) does not toggle.</li> </ul> | Is the electrical wiring to the micro switch correct? <ul style="list-style-type: none"> <li>The micro switch is a single-pole double-throw type, so it can be wired to cut in or cut out upon pressure rise. (Check the instruction manual and the wiring diagram on the back of the cover.)</li> </ul>               | Common problems and solutions<br>Item 10            |
|                                                                                                                                                                                                             | Is excessive pressure being applied to the switch? <ul style="list-style-type: none"> <li>If excessive pressure is applied, components such as the bellows and the actuator plate may be deformed, failing to actuate.</li> </ul>                                                                                      | Common problems and solutions<br>Items 1, 6, and 7  |
|                                                                                                                                                                                                             | Are the electrical ratings of the connected switch within the specified ratings? <ul style="list-style-type: none"> <li>If the switch is outside the specified ratings, it cannot be properly operated.</li> </ul>                                                                                                     | Common problems and solutions<br>Electrical ratings |
|                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                        |                                                     |
| <ul style="list-style-type: none"> <li>External leakage</li> </ul>                                                                                                                                          | Is corrosive fluid being used? <ul style="list-style-type: none"> <li>Use an appropriate bellows according to the control fluid. (An SUS bellows is recommended for water, steam, or seawater.)</li> </ul>                                                                                                             | Common problems and solutions<br>Item 1             |
|                                                                                                                                                                                                             | Is the switch still being used after exceeding the guaranteed number of endurance cycles? <ul style="list-style-type: none"> <li>Replace before the guaranteed number of endurance cycles is exceeded.</li> </ul>                                                                                                      | Common problems and solutions<br>Item 1             |
|                                                                                                                                                                                                             | Is pressure pulsation being generated? <ul style="list-style-type: none"> <li>(Pulsation may cause premature failure of the bellows or micro switch.)</li> </ul>                                                                                                                                                       | Common problems and solutions<br>Item 1             |
| <ul style="list-style-type: none"> <li>The adjusting screw cannot be operated.</li> </ul>                                                                                                                   | Has the adjusting screw been turned beyond the switch's pressure adjustment range? <ul style="list-style-type: none"> <li>The micro switch is a single-pole double-throw type, so it can be wired to cut in or cut out upon pressure rise. (The adjusting screw cannot be turned, as it is cross-threaded.)</li> </ul> | —                                                   |
| <ul style="list-style-type: none"> <li>The joint cannot be firmly tightened.</li> </ul>                                                                                                                     | Tighten the joint using an open-end wrench. <ul style="list-style-type: none"> <li>If an open-end wrench is not used, the cap or main unit may deform, affecting the actuation value.</li> </ul>                                                                                                                       | —                                                   |

## 14. Troubleshooting List

### 14.2. Common problems and solutions

| Item                      | Phenomenon                        | Possible cause                                                                                        | Check item                            | Notes                                                                                                                                                                                                                                                                                                                  | Action                 |
|---------------------------|-----------------------------------|-------------------------------------------------------------------------------------------------------|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| 1                         | Crack in the bellows              | Overpressure                                                                                          | Deformation or dent of the bellows    | Ensure that the supply pressure is below the sealing pressure.                                                                                                                                                                                                                                                         | Replacement            |
|                           |                                   | Pressure pulsation                                                                                    | Presence of pressure pulsation        | Use in a location without pressure pulsation. Also, use a capillary tube or damper to reduce pulsation transmitted to the product.<br><br>Check the presence of pulsation by touching the actuator plate.<br>(If the actuator plate moves even slightly, it means that pulsation is being generated.)                  | Replacement            |
|                           |                                   | Corrosion                                                                                             | Discoloration of the bellows          | An SUS bellows is recommended if corrosive fluid, steam, water, or seawater is used.                                                                                                                                                                                                                                   | Replacement            |
|                           |                                   | Contact with the bellows due to a wrong part (such as a screw longer than the supplied cover securing | Deformation or scratch on the bellows | Use only the supplied cover screw.                                                                                                                                                                                                                                                                                     | Replacement            |
|                           |                                   | Contact with the bellows due to tool insertion                                                        | Deformation or scratch on the bellows | Do not perform forced actuation except at the specified location or by the specified method.<br>Check the Forced Actuation Guidelines for the forced actuation procedures.                                                                                                                                             | Replacement            |
|                           |                                   | Exceeded endurance cycles                                                                             | Endurance cycles                      | Replace before the guaranteed number of endurance cycles is reached.                                                                                                                                                                                                                                                   | Replacement            |
| 2                         | Leakage from the joint            | Breakage of the welded or brazed area due to piping stress                                            | Deformation of the joint or main unit | Tighten the joint with an appropriate torque using an open-end wrench.<br>Install the product and connect the piping without applying excessive force to the main unit.<br>Ensure that there is no misalignment between the joint and the pipe.                                                                        | Replacement            |
|                           |                                   | Breakage of the welded or brazed area due to vibration                                                | Presence of vibration                 | Install in locations with vibration levels of 9.8 m/s <sup>2</sup> or less.<br>Secure the main unit, joint, and pipe to prevent vibration transmission.                                                                                                                                                                | Replacement            |
|                           |                                   | Scratch on the sealing surface                                                                        | Sealing surface condition             | Tighten the joint with an appropriate torque using an open-end wrench.<br>(For flare joints, the recommended torque is 12 to 14 N·m)<br>Clean to remove any foreign matter. Check the sealing surface.                                                                                                                 | Replacement<br>Check   |
|                           |                                   | Foreign matter caught                                                                                 | Sealing surface condition             | Clean to remove any foreign matter. Check the sealing surface.                                                                                                                                                                                                                                                         | Check                  |
|                           |                                   | Misaligned gasket                                                                                     | Sealing surface condition             | Position the gasket appropriately. Check the sealing surface and the gasket.                                                                                                                                                                                                                                           | Check                  |
|                           |                                   | Low tightening torque                                                                                 | Tightening torque                     | Tighten the joint with an appropriate torque using an open-end wrench.<br>(For flare joints, the recommended torque is 12 to 14 N·m)                                                                                                                                                                                   | Check                  |
|                           |                                   | Corrosion                                                                                             | Discoloration of the joint            | An SUS bellows or joint is recommended if corrosive fluid, steam, water, or seawater is used.                                                                                                                                                                                                                          | Replacement            |
| 3                         | Clogging                          | Foreign matter                                                                                        | Presence of foreign matter            | Clean to remove any foreign matter. Install a filter.                                                                                                                                                                                                                                                                  | Check                  |
| 4                         | Rusted sliding part               | The product is operated in a corrosive atmosphere.                                                    | Environment                           | Review and take corrective action on the operating environment (corrosive atmosphere).<br>Consider introducing the waterproof or splash-proof type.                                                                                                                                                                    | Replacement            |
| 5                         | Insufficient pressure             | Insufficient inlet pressure                                                                           | Inlet pressure                        | Ensure that the inlet pressure and the supply pressure are above the set values.                                                                                                                                                                                                                                       | Check                  |
| 6                         | Deformation of the actuator plate | Overpressure                                                                                          | Supply pressure                       | Ensure that the supply pressure is below the sealing pressure.<br>Ensure that the refrigerant pressure during operation and stop is below the sealing pressure.                                                                                                                                                        | Replacement            |
|                           |                                   | Forced actuation                                                                                      | Deformation of the actuator plate     | Do not perform forced actuation except at the specified location or by the specified method.                                                                                                                                                                                                                           | Replacement            |
| 7                         | Deformation of the bellows        | Overpressure                                                                                          | Supply pressure                       | Ensure that the supply pressure is below the sealing pressure.<br>Ensure that the refrigerant pressure during operation and stop is below the sealing pressure.                                                                                                                                                        | Replacement            |
| 8                         | Others                            | Unknown                                                                                               | -----                                 | Investigate the operating conditions and environment in detail, and contact us.                                                                                                                                                                                                                                        | Investigation required |
| 9                         | No micro switch actuation sound   | The actuation position adjustment (distribution) screw has been moved.                                | Presence of bonded locking            | Do not turn screws that have been pre-adjusted and locked (bonded) by us.                                                                                                                                                                                                                                              | Replacement            |
|                           |                                   | The differential screw of the micro switch has been moved.                                            | —                                     | Do not turn screws that have been pre-adjusted and locked (bonded) by us.                                                                                                                                                                                                                                              | Replacement            |
|                           |                                   | Exceeded endurance cycles                                                                             | Endurance cycles                      | Replace before the guaranteed number of endurance cycles is exceeded.                                                                                                                                                                                                                                                  | Replacement            |
|                           |                                   | The micro switch came off due to piping stress.                                                       | —                                     | Install the product and connect the piping without applying excessive force to the main unit.<br>Ensure that there is no misalignment between the joint and the pipe.                                                                                                                                                  | Replacement            |
|                           |                                   | Disassembly (Micro switch misassembly)                                                                | Presence of disassembly               | Do not disassemble the product.                                                                                                                                                                                                                                                                                        | Replacement            |
|                           |                                   | Long screws other than the supplied terminal screws have been used.                                   | —                                     | Use the supplied micro switch screws or screws with a shank length of 8 mm or less.                                                                                                                                                                                                                                    | Replacement            |
|                           |                                   | (Micro switch internal damage)                                                                        | —                                     | —                                                                                                                                                                                                                                                                                                                      | —                      |
|                           |                                   | Welded contacts (Inside the micro switch)                                                             | —                                     | Check the rush current and ensure that it is below the rated value.<br>Replace before the guaranteed number of endurance cycles is exceeded.                                                                                                                                                                           | Replacement            |
|                           |                                   | Damage to the contact plate (Inside the micro switch)                                                 | —                                     | If pressure pulsation is present, use the product in a location without pulsation, or use a capillary tube or damper to reduce pulsation.<br><br>Review the operating environment and take corrective action if it is a corrosive atmosphere.<br>Replace before the guaranteed number of endurance cycles is exceeded. | Replacement            |
| Continue on the next page |                                   | Damage to the special spring (Inside the micro switch)                                                | —                                     | If pressure pulsation is present, use the product in a location without pulsation, or use a capillary tube or damper.<br><br>Review the operating environment and take corrective action if it is a corrosive atmosphere.<br>Replace before the guaranteed number of endurance cycles is exceeded.                     | Replacement            |
|                           |                                   |                                                                                                       |                                       |                                                                                                                                                                                                                                                                                                                        |                        |

## 14. Troubleshooting List

| Item | Phenomenon                      | Possible cause                                                                                                               | Check item                                                       | Notes                                                                                                                                                                                                                                       | Action      |
|------|---------------------------------|------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 9    | No micro switch actuation sound | Long screws other than the supplied main unit mounting screws have been used.<br>(Damage to the micro switch actuator plate) | —                                                                | Use the supplied screws.<br>If the supplied screws are not long enough, use screws with insertion depth into the main unit as shown below.<br><br>NS: 5 mm or less, YS: 4 mm or less                                                        | Replacement |
| 10   | Miswiring                       | —                                                                                                                            | Wiring status                                                    | Perform the wiring according to the instruction manual and the wiring diagram on the back of the cover.                                                                                                                                     | Check       |
| 11   | Others                          | Mismatched electrical ratings                                                                                                | Switch ratings                                                   | Use the product within the electrical ratings.                                                                                                                                                                                              | Check       |
|      |                                 | Foreign matter caught between the contacts                                                                                   | Operating environment                                            | Review and take corrective action on the operating environment (dust atmosphere).<br>Consider introducing the waterproof or splash-proof type.                                                                                              | Replacement |
|      |                                 | Corrosion of the contact surface                                                                                             | Operating environment                                            | Review and take corrective action on the operating environment (corrosive atmosphere, gas).<br>Consider changing the installation location.                                                                                                 | Replacement |
|      |                                 | Roughness of the contact surface                                                                                             | Switch load current<br>Endurance cycles<br>Operating environment | Check the load current and ensure that it is below the rated value.<br>Replace before the guaranteed number of endurance cycles is exceeded.<br>Review and take corrective action on the operating environment.                             | Replacement |
| 12   | Vibration transmitted           | Chattering/bouncing                                                                                                          | Pressure vibration                                               | Install in locations with vibration levels of $9.8 \text{ m/s}^2$ or less.<br>Secure the main unit, joint, and pipe to prevent vibration transmission.                                                                                      | Check       |
| 13   | Pulsation generated             | Chattering/bouncing                                                                                                          | Pressure pulsation                                               | Use the product in a location without pulsation, or use a capillary tube or damper to reduce pulsation.                                                                                                                                     | Check       |
| 14   | Others                          | Mismatched electrical ratings                                                                                                | Switch ratings                                                   | Use the product within the electrical ratings.                                                                                                                                                                                              | Check       |
|      |                                 | Foreign matter caught between the contacts                                                                                   | Operating environment                                            | Review and take corrective action on the operating environment (dust atmosphere).<br>Consider introducing the waterproof or splash-proof type.                                                                                              | Replacement |
|      |                                 | Corrosion of the contact surface                                                                                             | Operating environment                                            | Review and take corrective action on the operating environment (corrosive atmosphere, gas).<br>Consider changing the installation location.                                                                                                 | Replacement |
|      |                                 | Roughness of the contact surface                                                                                             | Switch load current<br>Endurance cycles<br>Operating environment | Check the load current and ensure that it is within the rated range.<br>Replace before the guaranteed number of endurance cycles is exceeded.<br>Review and take corrective action on the operating environment.                            | Replacement |
| 15   | Actuation value deviation       | Overpressure                                                                                                                 | Deformation of the bellows or actuator plate                     | Do not apply pressure exceeding the sealing pressure.                                                                                                                                                                                       | Replacement |
|      |                                 | Forced actuation                                                                                                             | Deformation of the bellows or actuator plate                     | Do not perform forced actuation except at the specified location or by the specified method.<br>Check the Forced Actuation Guidelines for the forced operation procedures.                                                                  | Replacement |
|      |                                 | The actuation position adjustment (distribution) screw has been moved.                                                       | Peeling of the bonded locking                                    | Do not turn screws that have been pre-adjusted and locked (bonded) by us.                                                                                                                                                                   | Replacement |
|      |                                 | The differential screw of the micro switch has been moved.                                                                   | —                                                                | Do not turn screws that have been pre-adjusted and locked (bonded) by us.                                                                                                                                                                   | Replacement |
|      |                                 | The actuation value has been adjusted according to the scale.                                                                | —                                                                | Adjust the pressure appropriately using the pressure gauge.<br>Use the gauge as a guide.                                                                                                                                                    | Check       |
|      |                                 | High rate of pressure change                                                                                                 | —                                                                | Set the rate as follows:<br>Liquid: At least 10 seconds per 0.1 MPa<br>Gas: At least 3 seconds per 0.1 MPa                                                                                                                                  | Check       |
|      |                                 | High fluid viscosity                                                                                                         | —                                                                | Ensure that the fluid viscosity is $400 \text{ mm}^2/\text{s}$ (cSt) or less.                                                                                                                                                               | Check       |
|      |                                 | High base pressure (Differential switch)                                                                                     | —                                                                | If the base pressure (normal pressure) is high, the actuation value may fluctuate. For this reason, adjust the actuation value with the base pressure being applied.<br><br>* If the base pressure is already known, contact us beforehand. | Check       |
|      | Others                          | Setting error                                                                                                                | Setpoints                                                        | Check if Range has been excessively adjusted (if the scale has been misread).<br>Ensure that Range is greater than DIFF.<br><br>Check if the Range and DIFF. settings are reversed.                                                         | Check       |

15. Revision History

| Revision date | Manual number | Revision details |
|---------------|---------------|------------------|
| October 2025  | A-NS-30113    | First version    |
|               |               |                  |
|               |               |                  |
|               |               |                  |



## CONSENT RELATED TO DISCLAIMERS

We, SAGINOMIYA SEISAKUSHO, INC., (hereinafter referred to as "Saginomiya"), truly appreciate your choosing Saginomiya's product. When using Saginomiya's own products and other products supplied by Saginomiya (hereinafter referred to as the "Product"), this document as provided below shall be applicable except to the extent that there is anything to the contrary in any applicable estimate, agreement, catalogue, specification, etc.

### ● CONFIRMATION OF OPERATION

All customers using the Product (hereinafter referred to as "Customers") are requested to, after properly installing the Product, test the operation of the Product to confirm that all the systems in connection with the Product fully function.

In order to prevent the occurrence of bodily injury, fire accidents, serious damage, etc., in connection with the Customers' machinery or equipment due to improper installation of the Product, Saginomiya kindly requests the Customers to take the necessary safety measures by preparing safe designs such as a fail-safe design (\*1) and a fire spread prevention design, as well as to make the proper adjustments for product reliability necessary for fault-tolerance (\*2).

(\*1) Fail-safe design: Design to ensure safety in the event of any mechanical failure

(\*2) Fault-tolerance: Utilization of redundancy technology

Periodic Inspection of the Product

Be sure to confirm the proper operation of the Product and keep records of such operation at least once a year.

Saginomiya shall be held harmless and be indemnified by the Customers from any damages incurred due to the Customers failing to conduct the above operational procedures, provided, however, that, this shall not apply if the damages which the Customers incurred due to the defect of the Product caused by Saginomiya.

### ● RESTRICTIONS OF USE

The Product is designed and manufactured for the purpose of using them for cooling and heating and refrigerating appliances and air conditioning equipment or various industrial equipment, but is not designed and manufactured for the purpose of using the Product for any instrument or system related to human life or health purposes.

Therefore, the use of the Product in fields related to items (1) through (3) below is not intended whatsoever.

Saginomiya shall be held harmless and be indemnified from any and all damages incurred by use of the Product under item (3).

- (1) In any field related to nuclear power and radiation;
- (2) In any field related to space or seafloor equipment;
- (3) In any equipment or device requiring a high degree of reliance on such equipment or device with respect to which it is reasonably foreseeable that failure or malfunction of the equipment or device would either directly or indirectly cause serious damage to human life, health or property;

Also, when using the Product under the fields related to items (1) through (10), (except for item (3), in relation to which the Product must never be used), please be sure to notify Saginomiya's contact desk in charge of sales and obtain Saginomiya's prior written approval for such use.

Saginomiya shall be held harmless and be indemnified from any and all damages incurred by use of the Product in relation to these fields if the Customers do not notify Saginomiya's contact desk and obtain Saginomiya's prior written approval.

- (4) Heating, cooling, and refrigeration/air conditioning equipment using flammable and/or toxic refrigerants, excluding A2L refrigerants as defined in ISO 817, or various industrial equipment using flammable and/or toxic fluids, excluding A2L refrigerants as defined in ISO 817;
- (5) Transportation device (railroad, aviation, ship or vessel, vehicle equipment, etc.);
- (6) Disaster prevention or crime prevention device;
- (7) Facility or application directly related to medical equipment, burning appliances, electro thermal equipment, amusement rides and devices, facilities/applications associated directly with billing;
- (8) Equipment requiring high reliance on supply systems such as electricity, gas, water, etc., in large-scale communication system, or in transportation or air traffic control system;
- (9) Facilities that are to comply with regulations of governmental / public agencies or specific industries or
- (10) Other machineries or equipment equivalent to those set forth in the above items (4) to (9) which require for high reliability and safety.
- (11) Machinery and equipment that are intended or expected to be used under conditions other than those specified in the catalogues and instruction manuals;

It is recommended to replace the Product within 5 to 10 years of delivery if no other duration of use is provided in the applicable specifications or instruction manual because the conditions and environment of use also have an impact on the Product.

### ● SCOPE OF WARRANTY

SAGINOMIYA WILL PROVIDE THE CUSTOMERS WITH REPLACEMENT OR REPAIRED THE PRODUCT DELIVERED, FREE OF COST, ONLY WITHIN ONE YEAR (NOTE 1) OF DELIVERY TO THE CUSTOMER, IF FAILURE OCCURS IN THE CUSTOMERS' EQUIPMENT USING THE PRODUCT DUE TO A DEFECT OF THE PRODUCT; PROVIDED, HOWEVER, THAT IN ANY EVENT THE AMOUNT THAT SAGINOMIYA BEARS FOR THE DAMAGES INCURRED BY THE FAILURE OF THE PRODUCT OR CUSTOMERS' EQUIPMENT SHALL NOT EXCEED THE PRICE OF THE PRODUCT WE DELIVERED. IN ADDITION, SAGINOMIYA SHALL BE HELD HARMLESS AND BE INDEMNIFIED FROM ANY AND ALL DAMAGES INCURRED WHEN THE FAILURE OF THE CUSTOMERS' EQUIPMENT OCCURRED DUE TO ANY CAUSE SET FORTH BELOW.

- (1) WHEN CAUSED BY INAPPROPRIATE HANDLING OR USE OF THE PRODUCT BY THE CUSTOMERS (SUCH AS NOT COMPLYING WITH THE CONDITIONS, ENVIRONMENTAL SPECIFICATIONS OR CAUTIONS INDICATED IN ANY APPLICABLE CATALOGUE, SPECIFICATIONS, INSTRUCTION MANUAL, ETC.);
- (2) WHEN FAILURE OCCURRED DUE TO ANY REASON OTHER THAN THE PRODUCT;
- (3) WHEN CAUSED BY MODIFICATION OR REPAIR OF THE PRODUCT MADE BY ANYONE OTHER THAN SAGINOMIYA OR DESIGNEE OF SAGINOMIYA;
- (4) WHEN CAUSED BY THE USE OF THE PRODUCT IN VIOLATION OF THE ABOVE "RESTRICTIONS OF USE" OR "CONFIRMATION OF OPERATION";
- (5) WHEN SUCH FAILURE WAS NOT REASONABLY FORESEEABLE AT THE TIME OF SAGINOMIYA'S SHIPMENT; OR
- (6) BY ANY OTHER CAUSE NOT ATTRIBUTABLE TO SAGINOMIYA, SUCH AS AN ACT OF GOD, DISASTER, OR ACT OF ANY THIRD PARTY.

PLEASE NOTE THAT THE CUSTOMERS WILL NOT BE ENTITLED TO ANY OF THE ABOVE WARRANTY IF THE CUSTOMERS PURCHASED THE PRODUCT FROM INTERNET AUCTION, ETC.

(NOTE 1): IN THE CASE OF DANFOSS PRODUCTS, WITHIN EIGHTEEN (18) MONTHS FROM THE DATE OF MANUFACTURE.

**SAGINOMIYA**  
**SEISAKUSHO, INC.**

This document shall apply to any catalogue and instruction manual issued by Saginomiya on or after December 2025.  
STF04001 Annex1a 2025.12

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The information in this instruction manual is current as of the date of publication and is subject to change without prior notice due to specification changes or improvements to the product.

We have made every effort to ensure its accuracy, but we shall not be responsible for any damages, direct or indirect, arising from errors, omissions, or use of the information.

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