Air-blow Module

**LLB1 Series** (Produced upon receipt of order)

Reduced piping man-hours/space-saving Integration of devices in compact space
Parts in contact with fluid: Grease-free

Outlet pressure can be controlled by the pressure switch (option).

Nominal filtration rating 0.01 µm (Filtration efficiency 99.99%)

Built-in clean air filter

Acrylic name plate

Short-pitch mounting is possible. Centralized pressure control is achieved with compact design.

Available in 3 patterns.

<table>
<thead>
<tr>
<th>Variations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulator + (Digital pressure switch)</td>
</tr>
</tbody>
</table>

Applications

- **Air-blow**
  - N2 blow to prevent lead frame oxidation.
  - N2 blow to prevent detection camera blur.

- **Ionizer**
  - Supplies main pressure to the ionizer.
  - Prevents traces of water droplets. Air-knife
**Air-blow Module**

**LLB1 Series**

(Produced upon receipt of order)

---

**How to Order**

**LLB1**  
- C4  
-  
- F - X1

**Fitting size**
- C4 ø4 One-touch fitting  
- C6 ø6 One-touch fitting

**Fitting type**
- Nil  
- Straight  
- L  
- Elbow

**Regulator**
- Nil  
- Without regulator  
- R  
- Without pressure gauge  
- RN  
- Digital pressure switch, NPN open collector  
- RP  
- Digital pressure switch, PNP open collector  
- RG  
- With pressure gauge

**Restrictor + Filter**
- F  
- Without pressure switch  
- F1  
- With pressure switch  
  - Used to check the differential pressure of the clean filter, etc.

**ON/OFF valve**
- Nil  
- Without 2 port solenoid valve  
- V5  
- 24 VDC/2.9 W  
- V5E  
- 24 VDC/1.8 W  
- V6  
- 12 VDC/2.9 W

**Set pressure range**  
**Note 1**
- Nil  
- 0.05 to 0.6 MPa specification (standard)  
- 5  
- 0.05 to 0.35 MPa specification  
**Note 2**

**Variations**

<table>
<thead>
<tr>
<th>Regulator + (Digital pressure switch)</th>
<th>ON/OFF valve</th>
<th>Restrictor + Filter + Pressure switch</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>-</td>
<td>-</td>
<td>254</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>-</td>
<td>356</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>-</td>
<td>565</td>
</tr>
</tbody>
</table>

**Weight (g)**
- Without pressure gauge  
- With pressure gauge

---

**Acrylic name plate**  
**Digital pressure switch**  
**Regulator**  
**ON/OFF valve**  
**Restrictor + Filter**  
**Pressure switch**

---

**Notes**

1) There is no need to enter the symbol when “without regulator” is selected.
2) A pressure gauge with a full span of 0.4 MPa is provided.
## Specifications

### Air-blow Module Common Specifications

<table>
<thead>
<tr>
<th>Fluid</th>
<th>Air, N₂ gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum operating pressure</td>
<td>0.7 MPa</td>
</tr>
<tr>
<td>Set pressure range</td>
<td>0.05 to 0.6 MPa (0.05 to 0.35 MPa) Note 3</td>
</tr>
<tr>
<td>Withstand pressure</td>
<td>1.0 MPa</td>
</tr>
<tr>
<td>Fluid temperature</td>
<td>5 to 45°C (No freezing)</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td></td>
</tr>
<tr>
<td>Flow range Note 1</td>
<td>Up to 100 L/min (ANR)</td>
</tr>
<tr>
<td>Nominal filtration rating Note 2</td>
<td>0.01 µm (Filtration efficiency 99.99%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fluid contact space material</th>
<th>Body</th>
<th>AL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bushing</td>
<td>AL</td>
</tr>
<tr>
<td></td>
<td>Seal</td>
<td>HNBR</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fitting material</th>
<th>Straight ø4</th>
<th>POM, Stainless steel, PBT, NBR (Fluorine coated)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Straight ø6</td>
<td>POM, Stainless steel, Brass (Electroless nickel plated), NBR (Fluorine coated)</td>
</tr>
<tr>
<td></td>
<td>Elbow</td>
<td>POM, Stainless steel, Brass (Electroless nickel plated), PBT, NBR (Fluorine coated)</td>
</tr>
</tbody>
</table>

| Applicable tubing material | PFA, Polyolefin, Soft polyolefin, Polyurethane Note 4 |

Note 1) The maximum flow rate varies depending on set pressure. Refer to "Flow Rate Characteristics" for detail.
Note 2) According to SMC measurement conditions.
Note 3) The upper limit value of the set pressure range of each product number can be changed.
Note 4) Due to the softness of polyurethane tubing, it may fold when being inserted.
Hold the end of the tubing and insert it all the way in.

### Regulator Unit Specifications

<table>
<thead>
<tr>
<th>Regulator type</th>
<th>Direct acting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relief mechanism</td>
<td>Relief type</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pressure gauge specifications</th>
<th>Display accuracy</th>
<th>±3% F.S. (Full Span)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calibration angle</td>
<td>230°</td>
<td></td>
</tr>
<tr>
<td>Limit indicator</td>
<td>With limit indicator</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fluid contact space material</th>
<th>Body, Port plug</th>
<th>PBT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Valve seat, Stem</td>
<td>POM</td>
</tr>
<tr>
<td>Diaphragm</td>
<td>Weatherproof NBR</td>
<td></td>
</tr>
<tr>
<td>Valve</td>
<td>Aluminum alloy (chromate), HNBR</td>
<td></td>
</tr>
<tr>
<td>Valve spring</td>
<td>Stainless steel</td>
<td></td>
</tr>
<tr>
<td>O-ring</td>
<td>HNBR</td>
<td></td>
</tr>
<tr>
<td>Without pressure display</td>
<td>POM, HNBR</td>
<td></td>
</tr>
<tr>
<td>With pressure gauge</td>
<td>Brass, HNBR</td>
<td></td>
</tr>
<tr>
<td>Digital pressure switch</td>
<td>PPS, Silicone, HNBR</td>
<td></td>
</tr>
</tbody>
</table>

Note: See page 353 for more details.
## Specifications

### ON/OFF Valve Unit Specifications

<table>
<thead>
<tr>
<th></th>
<th>2 port poppet pilot operated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve type</td>
<td></td>
</tr>
<tr>
<td>Ambient and fluid temperature</td>
<td>–10 to 50°C</td>
</tr>
<tr>
<td>Impact resistance/Vibration resistance</td>
<td>150/30 m/s²</td>
</tr>
<tr>
<td>Internal leakage cm³/min</td>
<td>15 or less</td>
</tr>
<tr>
<td>Exterior leakage cm³/min</td>
<td>15 or less</td>
</tr>
<tr>
<td>Mounting orientation</td>
<td>Free</td>
</tr>
<tr>
<td>Coil rated voltage</td>
<td>12 VDC, 24 VDC</td>
</tr>
<tr>
<td>Allowable voltage fluctuation</td>
<td>±10% rated voltage</td>
</tr>
<tr>
<td>Type of coil insulation</td>
<td>Equivalent to B type</td>
</tr>
<tr>
<td>Power consumption V5, V6</td>
<td>Inrush: 2.9 W  Holding: 0.6 W</td>
</tr>
<tr>
<td></td>
<td>V5E: 1.8 W</td>
</tr>
<tr>
<td>Flow rate characteristics</td>
<td></td>
</tr>
<tr>
<td>CV [dm³/(s·bar)]</td>
<td></td>
</tr>
<tr>
<td>b</td>
<td></td>
</tr>
<tr>
<td>Cv</td>
<td></td>
</tr>
<tr>
<td>Minimum operating pressure differential</td>
<td>0.01 MPa</td>
</tr>
<tr>
<td>Maximum operating pressure</td>
<td>0.6 MPa</td>
</tr>
<tr>
<td>Response time Note 4)</td>
<td></td>
</tr>
<tr>
<td>ON</td>
<td>10 ms or less (with power-saving circuit)</td>
</tr>
<tr>
<td>OFF</td>
<td>15 ms or less (with power-saving circuit)</td>
</tr>
</tbody>
</table>

| Fluid contact space material |                             |
| Body                        | PBT                         |
| Diaphragm                   | HNBR                        |
| Armature/Fixed armature     | Stainless steel             |

Note 1) Use dry air to prevent condensation when operating at low temperatures.

Note 2) Vibration resistance: No malfunction occurred in a one-sweep test between 8.3 and 2000 Hz. Test was performed at both energized and de-energized states to the axis and right angle directions of the main valve and armature (value at the initial state).

Impact resistance: No malfunction resulted from the impact test using a drop impact tester. The test was performed on the axis and right angle directions of the main valve and armature for both energized and de-energized states (value at the initial state).

Note 3) If a restrictor (nozzle, etc.) is mounted on the outlet side piping, the pressure differential when ON is smaller. Be sure that the pressure differential does not drop below 0.01 MPa.

Note 4) JIS 8375 (At supply pressure 0.5 MPa) (Value of high response time is subject to change upon pressure, quality of air.)

### Restrictor Unit Specifications

| Cv factor                  | 0.28                        |
| Number of needle rotations | 8 rotations                 |
| Fluid contact space material | Stainless steel          |

### Filter Unit Specifications

| Nominal filtration rating Note 1) | 0.01 μm (Filtration efficiency 99.99%) |
| Element withstand differential pressure Note 2) | 0.5 MPa |
| Flow capacity                 | Up to 100 L/min (ANR) |

| Fluid contact space material |                             |
| Filter case                 | PC, ABS                     |
| Hollow fiber                | PP, PET                     |
| Potting                     | PU                          |
| O-ring                      | FKM                         |

Note 1) According to SMC measurement conditions.

Note 2) This means that the element does not break at 0.5 MPa. Refer to “Specific Product Precautions”.

---

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Flow Rate Characteristics

Note) The flow rate characteristics are representative values.

Relationship between number of needle rotations and flow rate

Conditions:
- ø6 pipe length
- In side = 600 mm
- Out side = 100 mm
- Measured under the conditions shown above.
- Measured in the regulator full open status.

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Individual part no.</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regulator assembly</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Without pressure gauge</td>
<td>LV1B1-1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Digital pressure switch NPN open collector</td>
<td>LV1B1-2-1</td>
<td>For set pressure range 0 to 0.35 MPa LV1B1-2-2</td>
</tr>
<tr>
<td></td>
<td>Digital pressure switch PNP open collector</td>
<td>LV1B1-3-1</td>
<td>For set pressure range 0 to 0.35 MPa LV1B1-3-2</td>
</tr>
<tr>
<td></td>
<td>With pressure gauge</td>
<td>LV1B1-4-1</td>
<td>For set pressure range 0 to 0.35 MPa LV1B1-4-2</td>
</tr>
<tr>
<td></td>
<td>Acrylic name plate</td>
<td>136163-2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>ON/OFF valve</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>12 VDC</td>
<td>LV1B1-5-1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>24 VDC (2.9 W)</td>
<td>LV1B1-5-2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>24 VDC (1.8 W)</td>
<td>LV1B1-5-3</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Regulator clean air filter assembly</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Replacement element</td>
<td>SFD-EL101</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>In side One-touch fitting assembly</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Straight</td>
<td>VVQ1000-50A-C4-X17</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Elbow</td>
<td>VVQ1000-50A-C6-X17</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Out side One-touch fitting assembly</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Straight</td>
<td>KPH04-01</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Elbow</td>
<td>KPL04-01</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Pressure switch</td>
<td>PSE510-R06</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Fitting for pressure switch</td>
<td>KPGL06-M5-X193</td>
<td></td>
</tr>
</tbody>
</table>
**LLB1 Series**

**Dimensions**

**LLB1-C6□-F(1)-X1**

For straight fitting, IN side

One-touch fitting ø4, ø6 IN side

One-touch fitting ø4, ø6 OUT side

---

**LLB1-C6□-V5F(1)-X1**

For straight fitting, IN side

One-touch fitting ø4, ø6 IN side

One-touch fitting ø4, ø6 OUT side

---

<table>
<thead>
<tr>
<th>Fitting size</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>ø4</td>
<td>13</td>
<td>12.2</td>
<td>20.5</td>
</tr>
<tr>
<td>ø6</td>
<td>13.5</td>
<td>14.3</td>
<td>21</td>
</tr>
</tbody>
</table>

---

**LLB1 Series**

**Dimensions**

**LLB1-C6□-F(1)-X1**

For straight fitting, IN side

One-touch fitting ø4, ø6 IN side

One-touch fitting ø4, ø6 OUT side

---

**LLB1-C6□-V5F(1)-X1**

For straight fitting, IN side

One-touch fitting ø4, ø6 IN side

One-touch fitting ø4, ø6 OUT side

---

<table>
<thead>
<tr>
<th>Fitting size</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>ø4</td>
<td>13</td>
<td>12.2</td>
<td>20.5</td>
</tr>
<tr>
<td>ø6</td>
<td>13.5</td>
<td>14.3</td>
<td>21</td>
</tr>
</tbody>
</table>
Dimensions

LLB1-C4□-R□G□V□S□F(1)-X1

Mounting hole for 2 x M4

Digital pressure switch

Pressure switch

Acrylic name plate

+Included
(but not assembled)

Regulator

ON/OFF valve

Restrictor

Filter

One-touch fitting ø4, ø6 IN side

One-touch fitting ø4, ø6 OUT side

For straight fitting, IN side

For straight fitting, OUT side

<table>
<thead>
<tr>
<th>Fitting size</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>ø4</td>
<td>9.5</td>
<td>12.2</td>
<td>20.5</td>
</tr>
<tr>
<td>ø6</td>
<td>9</td>
<td>14.3</td>
<td>21</td>
</tr>
</tbody>
</table>
Digital pressure switch

Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated pressure range</td>
<td>0 to 1 MPa</td>
</tr>
<tr>
<td>Set pressure range</td>
<td>– 0.1 to 1 MPa</td>
</tr>
<tr>
<td>Withstand pressure</td>
<td>1.5 MPa</td>
</tr>
<tr>
<td>Set pressure resolution</td>
<td>0.01 MPa</td>
</tr>
<tr>
<td>Power supply voltage</td>
<td>12 to 24 VDC</td>
</tr>
<tr>
<td>(with power supply polarity protection)</td>
<td></td>
</tr>
<tr>
<td>Current consumption</td>
<td>55 mA or less (at no load)</td>
</tr>
<tr>
<td>Switch output</td>
<td>NPN or PNP open collector 1 output</td>
</tr>
<tr>
<td>Maximum load current</td>
<td>80 mA</td>
</tr>
<tr>
<td>Maximum applied voltage</td>
<td>30 V (at NPN output)</td>
</tr>
<tr>
<td>Residual voltage</td>
<td>1 V or less (with load current of 80 mA)</td>
</tr>
<tr>
<td>Response time</td>
<td>1s</td>
</tr>
<tr>
<td>Anti-chattering function</td>
<td>(0.25, 0.5, 2, 3)</td>
</tr>
<tr>
<td>Short circuit protection</td>
<td>With short-circuit protection</td>
</tr>
<tr>
<td>Repeatability</td>
<td>±1%F.S. or less</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>Variable (0 or above)</td>
</tr>
<tr>
<td>Hysteresis mode</td>
<td></td>
</tr>
<tr>
<td>Window comparator mode</td>
<td></td>
</tr>
<tr>
<td>Display</td>
<td>3-digit, 7-segment indicator, 2-color display (Red/Green) can be interlocked with the switch output</td>
</tr>
<tr>
<td>Display accuracy</td>
<td>±2%F.S.±1digit (at 25°C ±3°C)</td>
</tr>
<tr>
<td>Indicator light</td>
<td>OUT: Lights up when output is turned ON (Green)</td>
</tr>
<tr>
<td>Environmental resistance</td>
<td>Enclosure IP40</td>
</tr>
<tr>
<td>Lead wire with connector</td>
<td>ø3.4 3 cores 25AWG 2 m</td>
</tr>
</tbody>
</table>

Output specifications

NPN open collector output
Max. 30 V, 80 mA
Residual voltage: 1 V or less

PNP open collector
Max. 80 mA
Residual voltage: 1 V or less

Model

ISE35 – N – 25 – M – x501

Electrical entry specifications

N: Wiring bottom entry
R: Wiring top entry

Output specifications

Symbol | Contents
---|---
25 | NPN output
65 | PNP output

Unit specifications

Symbol | Contents
---|---
M | Fixed SI unit

For details about setting and operating procedures, refer to pages 359 to 363.
**Pressure Setting**

**Operation**
When the pressure level exceeds the set value, the switch turns ON. When the pressure level decreases only the hysteresis from the set value, the switch turns OFF.

With the factory default settings, when the pressure level exceeds 0.35 MPa, the switch turns ON. When the pressure level becomes 0.34 MPa or less, the switch turns OFF.

When the operation shown in the Fig. below has no problem, use the product with the factory default settings.

![Pressure Setting Diagram]

**<Operating procedure>**

1. Press the button in the measurement mode to display the set value.

2. Press the or button to change the set value. Pressing the or button will increase the set value while pressing the button will decrease the set value.

3. Press the button once to increase the numeric value. Keep the button pressed to continuously increase the numeric value.

4. Press the button once to decrease the numeric value. Keep the button pressed to continuously decrease the numeric value.

5. Press the button to complete the setting.

For details about how to set the pressure in window comparator mode, refer to “Pressure Setting (Window comparator mode)” on page 361.

---

**Function Settings**

**Factory default settings**
The factory default settings are as follows. When there is no problem with the factory default settings, use the product as it is. To change any setting, make the setting properly while referring to relevant page.

<table>
<thead>
<tr>
<th>Setting Item</th>
<th>Factory default settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switch output</td>
<td>ON</td>
</tr>
<tr>
<td>Display color</td>
<td>ON: Green OFF: Red</td>
</tr>
<tr>
<td>Response time</td>
<td>1s</td>
</tr>
<tr>
<td>Operation mode</td>
<td>Hysteresis mode</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>0.01 MPa (1psi)</td>
</tr>
</tbody>
</table>

The numeric value in ( ) shows the value when the unit specifications are P.

- **Special function settings**

- **Handling precautions**

  - When changing the factory default settings, the setting item is changed with the button. Be sure to check that the item you want to change is displayed, and then make the setting without fail.

  - **About measurement mode**

    In this measurement mode, the pressure is detected and displayed or the switch is operated after the power has been turned ON. The measurement mode is a basic mode that allows you to change the setting or set other functions according to the purpose.

    - **Turn ON the power.**
    - **The display shows the unit specifications is lit for approx. 1 second.**
    - **Unit specifications:**
      - M
      - P
      - Nil
    - **The operation enters the measurement mode and the current pressure value is displayed.**
Function Settings

1. Switch output (Su)
Whether or not the switch output is used can be selected.
When it is selected that the switch output is not used, the product can be used as a pressure gauge without using the switch output.
In this case, only the display color changes as it interlocks with changes in pressure setting. The indicator light does not light up.

<Operating procedure>
1. Keep the button pressed for 2 seconds or longer in the measurement mode.
   “Su” and current set value are displayed alternately.

2. Press the or button to select whether or not the switch output is used.
   - Switch output is used
   - Switch output is not used.

3. After selected, keep the button pressed for 2 seconds or longer. The setting is then completed to return to the measurement mode.

2. Display color (CoL)
Four kinds of display can be selected.

<table>
<thead>
<tr>
<th>Switch</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>Red</td>
<td>Green</td>
</tr>
<tr>
<td>Green</td>
<td>Red</td>
</tr>
<tr>
<td>Red</td>
<td>rEd</td>
</tr>
<tr>
<td>Green</td>
<td>Grn</td>
</tr>
</tbody>
</table>

<Operating procedure>
1. Keep the button pressed for 2 seconds or longer in the measurement mode.
   “CoL” and current set value are displayed alternately.

2. Press the or button to select a display color you want to use.

3. After selected, keep the button pressed for 2 seconds or longer. The setting is then completed to return to the measurement mode.

3. Response time (rES)
The switch output response time can be set to a desired level. As the response time is changed, the display update time is also changed accordingly. If the switch output or display chatters, make the response time longer.

<Operating procedure>
1. Keep the button pressed for 2 seconds or longer in the measurement mode.
   When “Su” is displayed, press the button twice. “rES” and current set value are displayed alternately.

2. Press the or button to select a response time you want to use.

3. After selected, keep the button pressed for 2 seconds or longer. The setting is then completed to return to the measurement mode.

4. Operation mode (oPE)
The switch operation mode can be selected.

<Operating procedure>
1. Keep the button pressed for 2 seconds or longer in the measurement mode.
   When “Su” is displayed, press the button three times. “oPE” and current set value are displayed alternately.

2. Press the or button to select an operation mode you want to use.
   - Hysteresis mode
   - Window comparator

3. After selected, keep the button pressed for 2 seconds or longer. The setting is then completed to return to the measurement mode.
Function Settings

Pressure Setting (Window comparator mode)

**<Operating procedure>**

1. Press the button in the measurement mode to display the set value.

2. Press the or button to change the set value. Pressing the button will increase the set value while pressing the button will decrease the set value.

3. Press the button to display the set value at the 2nd location.

4. Press the or button to change the set value.

5. Press the button to complete the setting.

6. Output mode (oU)
A desired switch output mode can be set.

**<Operating procedure>**

1. Keep the button pressed for 2 seconds or longer in the measurement mode.

2. Press the or button to select an output mode you want to use.

3. After selected, keep the button pressed for 2 seconds or longer. The setting is then completed to return to the measurement mode.

7. Power-saving mode (Po)
When the power-saving mode is selected, the numeric value display disappears to reduce the current consumption.

**<Operating procedure>**

1. Keep the button pressed for 2 seconds or longer in the measurement mode.

2. Press the or button to select whether or not the power-saving mode is used.

3. After selected, keep the button pressed for 2 seconds or longer. The setting is then completed to return to the measurement mode.

5. Hysteresis (H)
A hysteresis can be set.

**<Operating procedure>**

1. Keep the button pressed for 2 seconds or longer in the measurement mode. When “S □” is displayed, press the button four times. “H” and current set value are displayed alternately.

2. Press the or button to set a hysteresis you want to use.

3. After selected, keep the button pressed for 2 seconds or longer. The setting is then completed to return to the measurement mode.
**Function Settings**

### 8. Security code setting (P_{in})

It can be set whether code number input is required or not in the key lock mode.

---

#### <Operating procedure>

1. Keep the button pressed for 2 seconds or longer in the measurement mode. When “S □” is displayed, press the button seven times. “P_{n}” and current set value are displayed alternately.

2. Press the or button to select whether or not the security code entry is used.

3. After selected, keep the button pressed for 2 seconds or longer. The setting is then completed to return to the measurement mode.

When you select to use the security code entry, you need to enter the security code so as to unlock the key. A desired security code can be set by the user. With the factory default settings, the security code is set at “000”.

When you select to use the security code entry, please also refer to page 363.

---

#### ● List of output modes

<table>
<thead>
<tr>
<th>Switch output</th>
<th>Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>( P_{L} )</td>
</tr>
<tr>
<td>OFF</td>
<td>( P_{H} )</td>
</tr>
</tbody>
</table>

**Hysteresis mode (Factory default settings)**

<table>
<thead>
<tr>
<th>Switch output</th>
<th>Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>( P_{L} )</td>
</tr>
<tr>
<td>OFF</td>
<td>( P_{H} )</td>
</tr>
</tbody>
</table>

**Window comparator mode**

<table>
<thead>
<tr>
<th>Switch output</th>
<th>Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>( P_{L} )</td>
</tr>
<tr>
<td>OFF</td>
<td>( P_{H} )</td>
</tr>
</tbody>
</table>

**Hysteresis mode (Factory default settings)**

<table>
<thead>
<tr>
<th>Switch output</th>
<th>Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>( P_{L} )</td>
</tr>
<tr>
<td>OFF</td>
<td>( P_{H} )</td>
</tr>
</tbody>
</table>

**Window comparator mode**

<table>
<thead>
<tr>
<th>Switch output</th>
<th>Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>( P_{L} )</td>
</tr>
<tr>
<td>OFF</td>
<td>( P_{H} )</td>
</tr>
</tbody>
</table>

---

- If the switch output change point becomes beyond the set pressure range as the pressure set value is changed, the hysteresis (H) is corrected automatically.

---

### Display mode (d\(\frac{1}{2}\)S)

The display can be flipped vertically. The following describes how to change the display mode after the product has been purchased.

#### <Operating procedure>

1. Keep the button pressed for 2 seconds or longer in the measurement mode. When “S □” is displayed, press the button eight times. “d\(\frac{1}{2}\)S” and current set value are displayed alternately.

2. Press the or button to select a display mode you want to use.

3. After selected, keep the button pressed for 2 seconds or longer. The setting is then completed to return to the measurement mode.

When the flip-display is selected, the button operation is changed as shown in the Fig. on the right.
Other Settings

- Peak/Bottom value display function
  The maximum (minimum) pressure up to now from the power ON is detected to update the data. This pressure is displayed in the peak (bottom) value display mode. In the peak value display mode, keep the button pressed for 1 second or longer to blink the maximum pressure value and hold it. To cancel the hold display, keep the button pressed for 1 second or longer again. In the bottom value display mode, keep the button pressed for 1 second or longer to blink the minimum pressure value and hold it. To cancel the hold display, keep the button pressed for 1 second or longer again. Keep the button and button pressed at the same time for 1 second or longer during hold display to initialize the maximum (minimum) pressure value.

- Zero-clear function
  The display value can be adjusted to zero when the pressure to be measured is within the range of ±10%F.S. from the factory default setting. (Due to individual product differences, the zero-clear range varies ±1 digit.) Keep the and buttons pressed at the same time for 1 second or longer to reset the display value to zero. The mode then returns to the measurement mode automatically.

- Keylock function
  This function prevents incorrect operations such as accidentally changing the set-value. If any button is operated when the key is locked, “LoC” is displayed for approx. 1 sec. Keep the button pressed for 5 seconds or longer in the measurement mode. The current setting “LoC” or “UnL” is displayed. (Perform the same operation when unlocking the key.) When “LoC” is displayed, keep the and buttons pressed at the same time for 5 seconds or longer. “000” is displayed, and then you are prompted to change the security code. After a desired security code has been entered completely, the set security code is displayed. After checking, press the button.

- Unlock setting
  1. Keep the button pressed for 5 seconds or longer in the measurement mode. “LoC” is then displayed.
  2. Press the or button to select the unlock “UnL”.
  3. Press the button. You are prompted to enter the security code. For details about how to enter the security code, refer to “Security code entering/changing procedure” described below.
  4. When the secret code is correct, “UnL” is displayed. Press any of the, and buttons. The key is unlocked to return to the measurement mode. If the security code is incorrect, “FAL” is displayed and you are prompted to enter the security code again. If the security code entry is continuously failed three times, “LoC” is displayed to return to the measurement mode.

Changing of security code
With the factory default settings, the security code is set at “000”, but it can be changed to a desired value.

<Operating procedure - Security code is not used.>
1. Keep the button pressed for 5 seconds or longer in the measurement mode. The current setting “LoC” or “UnL” is displayed. (Perform the same operation when unlocking the key.)
2. Press the or button to select “Lock” or “Unlock”.
3. Press the button to set the selection.

<Operating procedure - Security code is used.>
- Lock setting
  1. Keep the button pressed for 5 seconds or longer in the measurement mode. “UnL” is then displayed.
  2. Press the or button to select the lock “LoC”.
  3. Press the button to set the selection.
- Unlock setting
  1. Keep the button pressed for 5 seconds or longer in the measurement mode. “LoC” is then displayed.
  2. Press the or button to select the unlock “UnL”.
  3. Press the button. You are prompted to enter the security code. For details about how to enter the security code, refer to “Security code entering/changing procedure" described below.

Security code entering/changing procedure
The 1st digit starts blinking. Press the or button to set the numeric value. Press the button. The numeric value at the next digit starts blinking. (When pressing the button at the most significant digit, the 1st digit then starts blinking.) After a desired security code has been entered completely, keep the button pressed for 1 second or longer. (If no key is operated for 30 seconds or longer during security code entry/change operation, the mode will return to the measurement mode automatically.)
LLB1 Series

Pressure Switch

Model

PSE510-R06

Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value/Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>PSE510-06</td>
</tr>
<tr>
<td>Operating pressure range</td>
<td>0 to 1 MPa</td>
</tr>
<tr>
<td>Maximum operating pressure</td>
<td>1 MPa</td>
</tr>
<tr>
<td>Fluid</td>
<td>Air/Non-corrosive gas</td>
</tr>
<tr>
<td>Output specifications</td>
<td>Analog output (1 to 5 V Load impedance: 10 kΩ or more)</td>
</tr>
<tr>
<td>Power supply voltage</td>
<td>12 to 24 VDC (Ripple ±10% or less)</td>
</tr>
<tr>
<td>Current consumption</td>
<td>10 mA or less</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>0 to 50°C (No condensation)</td>
</tr>
<tr>
<td>Temperature characteristics (Based on 25°C)</td>
<td>±1%F.S. or less</td>
</tr>
<tr>
<td>Repeatability</td>
<td>±1.5%F.S. or less</td>
</tr>
<tr>
<td>Withstand voltage</td>
<td>1000 VAC 50/60 Hz for 1 min. between external terminal and case</td>
</tr>
<tr>
<td>Insulation resistance</td>
<td>2 MΩ (500 VDC measured via megometer) between external terminal and case</td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>10 to 500 Hz Pulse width 1.5 mm or acceleration 98 m/s² (at the smaller vibration) to X, Y, Z direction (2 hours)</td>
</tr>
<tr>
<td>Impact resistance</td>
<td>980 m/s² to X, Y, Z direction (3 times for each direction)</td>
</tr>
<tr>
<td>Enclosure</td>
<td>IP40</td>
</tr>
</tbody>
</table>

Internal Circuit

Lead wire colors inside ( ) in the internal circuit of the contact protection box are those prior to conformity with IEC standards.

Main circuit

- DC (+) Brown (Red) ---- Power supply + Terminal
- OUT Black (White) ---- Analog output
- DC (-) Blue (Black) ---- Power supply GND terminal

Dimensions

- ø6 reducer

- Piping specifications R06 ø6 reducer

- Pressure specifications 0 For high-pressure (0 to 1 MPa)
Element Replacing Procedure

1. Remove the case.
   - Remove the hexagon socket head cap screws (4 locations) that secure the case and pull out the case in the direction indicated by an arrow.
   * To remove the hexagon socket head cap screws, use the hexagon wrench for M3 (width across flats, 2.5).

2. Remove the element.
   - Take out the stopper and pull out the element in the direction indicated by an arrow.

3. Mount an element.
   - Mount a new element.
   - Lightly screw in the stopper by hand and tighten it with a tool such as spanner until it is no longer turned.

4. Mount the case.
   - Mount the case in the direction indicated by an arrow and secure it with the hexagon socket head cap screws (4 locations).
   * To tighten the hexagon socket head cap screws, use the hexagon wrench for M3 (width across flats, 2.5).
   * Tightening torque 0.6 to 1 N·m

---

Air-blow Module **LLB1 Series**

---

HAA
HAW
AT
IDF
IDU
IDF
FS
IDFA
IDFB
IDH
ID
IDG
ID
AMG
AFF
AM
AMD
AMH
AME
AMF
ZFC
SF
SFD
SFD
LLB
AD
GD

365
LLB1 Series
Air-blow Module/Precautions 1
Be sure to read this before handling the products.
Refer to back page 50 for Safety Instructions.

Design and Selection

⚠️ Warning

1. Confirm the specifications.
   Give careful consideration to the operating conditions such as
   the application, fluid and environment, and use within the op-
   erating ranges specified in this catalog.
2. Ensure sufficient space for maintenance activities.
   Provide space required for maintenance.
3. Fluid pressure range
   Supplied fluid pressure must be within the operating pressure
   range specified in the catalog.

⚠️ Warning

1. If air leakage increases or equipment does not oper-
   ate properly, stop operation.
   After mounting is completed, confirm that it has been done
correctly by performing a suitable function test and leakage
test.

Mounting

⚠️ Warning

1. Do not operate under the conditions listed below
due to a risk of malfunction.
   In locations having corrosive gases, organic solvents, and
   chemicals, or in locations in which these elements are likely to
   adhere to the equipment.
   In locations in which salt water, water, or water vapor could
   come in contact with the equipment.
   In locations that are exposed to direct sunlight. (Shield the
   equipment from sunlight to prevent its resin material from ul-
   traviolet ray degradation or overheating.)
   In locations that have a heat source and poor ventilation.
   (Shield the equipment from heat sources to protect it from
   softening degradation due to radiated heat.)
   In locations that are exposed to shocks and vibrations.
   In locations with high humidity or a large amounts of dust.
2. When the product is used for blowing, use caution
to prevent the work from being damaged by en-
trained air from the surrounding area.
   When the compressed air is used for air blow, the exhausted
   air from the blow nozzle may have taken in airborne foreign
   matter (such as solid particle, fluid particle) from the surround-
ing air. The foreign matter will be sprayed on the work, and the
   airborne foreign matter may adhere to it. Therefore, use cau-
tion for the surrounding environment.

Recommended Pneumatic Circuit

3. ISO compressed air quality class
   The class regarding the cleanliness of compressed air (solid
   particles, moisture and oil) stipulated by ISO 8573-1: 1991
   (JIS B8392-1: 2000)

<table>
<thead>
<tr>
<th>Quality class</th>
<th>Maximum particle size (µm)</th>
<th>Minimum pressure dew point (°C)</th>
<th>Maximum oil concentration (mg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.1</td>
<td>−70</td>
<td>0.01</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>−40</td>
<td>1.0</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>−20</td>
<td>1.0</td>
</tr>
<tr>
<td>4</td>
<td>15</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>40</td>
<td>7</td>
<td>25</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

Notation system
Example) Solid particle size: 0.1 µm
Pressure dew point: 3°C
Oil concentration: 0.1mg/m³
With the above conditions, notation of the quality class is 1, 4, 2.
Caution

1. Preparation before piping
Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and other debris from inside the pipe.
Install piping so that it does not apply pulling, pressing, bending or other forces on the module unit.

2. Cautions on use of One-touch fittings

1) Installation of tubing
(1) Cut the tubing perpendicularly, being careful not to damage the outside surface. Use an SMC tube cutter “TK-1”, “TK-2” or “TK-3”. Do not cut the tubing with pliers, nippers, scissors, etc. If the tubing is cut with a tool other than the tube cutter, the tubing cut surface becomes slant or flattened. The tubing cannot be connected securely, causing the tubing disconnection or air leak after connection. Additionally, cut the tubing with sufficient length.

(2) Grasp the tubing, slowly push it into the One-touch fitting until it comes to a stop.

(3) Pull the tubing back gently to make sure it has a positive seal. Insufficient installation may cause air to leak or the tubing to release.

(4) Do not apply unnecessary forces such as twisting, pulling, moment loads, vibration and impact, etc. on fittings or tubing.

2) Removal of tubing
(1) Push the release button flange evenly and sufficiently to release the tube.

(2) Pull out the tubing while keeping the release button depressed. If the release button is not held down sufficiently, the tubing cannot be withdrawn.

(3) To reuse the tubing, remove the previously lodged portion of the tubing. If the lodged portion is left on without being removed, it may result in air leakage and removal of the tubing difficult.

Other Tube Brands

Caution

1. When tubing of brands other than SMC’s are used, verify that the tubing O.D. satisfies the following accuracy:

1) Polyolefin tubing: Within ±0.1 mm
2) Polyurethane tubing: Within +0.15 mm, within –0.2 mm
3) Nylon tubing: Within ±0.1 mm
4) Soft nylon tubing: Within ±0.1 mm

Do not use tubing which does not meet these outside diameter tolerances. It may not be possible to connect them, or they may cause other trouble, such as air leakage or the tube pulling out after connection.

The recommended tube for the clean fitting is polyolefin tube. Other tubes can satisfy the performance in terms of leakage, tensile strength, etc., but impair the cleanliness. Note this point for use.
Precautions on Regulator

**Warning**

1. **Confirm the specifications.**
   
   Products represented in this catalog are designed only for use in compressed air systems. Do not operate at pressures or temperatures, etc., beyond the range of specifications, as this can cause damage or malfunction. Please contact SMC when using a fluid other than compressed air.

2. **Do not use the products described in this catalog as “safety accessories” defined in 2.1.3 of Article 1 and in 1.4 of Article 3 in “Pressure Equipment Directive (97/23/EC)”.**
   
   In “Pressure Equipment Directive”, “safety accessories” are defined as devices that are designed to prevent the pressure equipment from exceeding its allowable limit value.

3. **Check the set pressure range.**
   
   Be sure to install an appropriate safety device if it is predicted that the output pressure exceeding the set pressure range may cause the outlet equipment to break or malfunction.

4. **Residual pressure relief when releasing the inlet pressure**
   
   When releasing the inlet pressure with the outlet pressure set at low pressure level, the outlet pressure may not be removed (residual pressure relief).
   
   Be sure to install an appropriate pressure relief circuit to remove the outlet pressure completely.

5. **Product is used in the closed circuit or balance circuit at the outlet.**
   
   Please contact SMC since the product may not be used in such circuit.

**Adjustment**

**Warning**

1. **Set the regulator while verifying the displayed values of the inlet and outlet pressure gauges.**
   
   Turning the knob excessively can cause damage to the internal parts.

2. **Do not use a tool on the pressure regulator knob as this can cause damage. It must be operated by hand.**

**Caution**

1. **Check the inlet pressure before setting.**

2. **Set the outlet pressure range for the regulator in a range that is 85% or less of the inlet pressure.**
   
   At this time, be sure to set the outlet pressure within the set pressure range.

3. **Adjust pressure after unlocking the pressure regulator knob.** If the steps are performed in incorrect order, this may cause the knob to break or the outlet pressure to fluctuate.

4. **Rotating the knob clockwise increases the outlet pressure, and rotating the knob counterclockwise decreases the pressure. (Set the pressure in the increase direction.)**

5. **Pressure gauge indicator adjusting procedure.**
   
   When adjusting the indicator on the pressure gauge, be sure to follow the steps below since an open/close type lens is used.
   
   1. **Open the lens by fingernail in the direction indicated by an arrow.**

   ![Open the lens.

   2. **Adjust the indicator needle with a flat blade screwdriver.**

   ![Adjust the indicator needle.

   3. **Close the lens in the direction indicated by an arrow and push it until the snapping sound is heard.**

   ![Close the lens with a snapping sound.
LLB1 Series
Specific Product Precautions 2

Be sure to read this before handling the products. Refer to back page 50 for Safety Instructions.

Precautions on Regulator

**Warning**

Mount the regulator while carefully observing the screw tightening torque.

If the screw is tightened with a tightening torque exceeding the specified level, this may cause the mounting screw, body, or switch, etc. to break.

Additionally, if the screw is tightened with a tightening torque less than the specified level, the connection thread part may become loose.

1. **Tightening torque of the holding screw securing the blanking plate to the body**

   1) Mount the O-ring into the O-ring groove of the body.
   2) With the square nuts (1 pc. each on the diagonal left and right) mounted on the body, mount the blanking plate with two holding screws.

   **Tightening torque:** $0.32 \pm 0.03 \text{ N\cdot m}$

2. **Tightening torque of the holding screw securing the pressure gauge to the body**

   1) Mount the O-ring into the O-ring groove of the body.
   2) Turn the cover assembly $15^\circ$ in the direction indicated by an arrow to remove it upward.
   3) With the square nuts (1 pc. each on the diagonal left and right) mounted on the body, mount the pressure gauge with the holding screws.

   **Tightening torque:** $0.32 \pm 0.03 \text{ N\cdot m}$

   4) Insert the convex parts on the bottom of the cover assembly into the concave parts of the pressure gauge, and then turn the cover assembly $15^\circ$ in the direction opposite to the direction indicated by an arrow.

3. **The digital pressure switch to the body**

   **Tightening torque of the holding screw securing**
   1) Mount the O-ring into the O-ring groove of the body.
   2) With the square nuts (1 pc. each on the diagonal left and right) mounted on the body, put the groove part of the adapter on the side opposite to the knob, and then mount the adapter with two holding screws.

   **Tightening torque:** $0.32 \pm 0.03 \text{ N\cdot m}$

   3) Mount the switch body.

   4) Insert the lock pin all the way inside the groove part of the adapter.

   The switch body can be replaced by removing and inserting the lock pin.

4. **The regulator to the manifold block**

   **Tightening torque of the holding screw securing**
   1) Mount two O-rings into the O-ring groove of the regulator body.
   2) Mount the regulator body on the manifold block with two holding screws.

   **Tightening torque:** $0.32 \pm 0.03 \text{ N\cdot m}$
Precautions on Regulator

Handling

⚠️ Caution

One-touch fitting replacing procedure
One-touch fitting is a type of cassette. So, it can be replaced easily.
One-touch fitting is secured with the clip from the bottom of the regulator body to prevent disconnection. After the regulator has been removed, take out the clip with a flat blade screwdriver and replace the One-touch fitting with a new one.
To mount a new One-touch fitting, insert it until it is in contact with the inner part, and then insert the clip to the specified position again.

Connector mounting procedure
Pinch the lever and connector body by fingers and insert the lever straight into the pin. Push the lever claw into the concave groove of the switch body to lock it.

Connector removing procedure
Push down the lever by your thumb to disengage the claw from the concave groove and pull out the lever straight to remove it.
LLB1 Series

Specific Product Precautions 4

Be sure to read this before handling the products. Refer to back page 50 for Safety Instructions.

Precautions on Digital Pressure Switch

⚠️ Warning

1. Do not attempt to disassemble, modify (including exchanging the printed circuit boards), or repair the product.
   An injury or failure can result.

2. Do not operate the product beyond the specifications.
   Otherwise, a fire, malfunction or switch damage can result.

3. Do not use in an environment where flammable gas or explosive gas exists.
   Usage may cause a fire or explosion. This digital pressure switch does not have the explosion protected construction.

4. Do not use the product in a place where static electricity is a problem.
   It may result in system failure or malfunction.

⚠️ Caution

Be sure to perform appropriate functional inspection and leak inspection after completion of the maintenance and inspection work.

Stop the operation if any trouble, such as malfunction or leak is found.

If any leak occurs in a part other than the piping, the pressure sensor may be broken. If this happens, shut down the power and stop the pressure supply.

Otherwise, an unexpected malfunction may occur and it will become impossible to secure the safety.

Handling precautions

Strictly observe the contents shown below when handling the digital pressure switch.

Otherwise, the digital pressure switch may be broken or become faulty, causing a malfunction.

- Do not drop or hit the switch or apply an excessive impact (100m/s²) to it.
- Do not stretch the lead wire strongly or raise the switch by pulling the lead wire. (Tensile strength, 50N or less)
- Do not make any incorrect wiring.
- Do not perform the wiring work with the power turned ON.
- Do not run the wiring in the same route as the power cable or high-voltage line.
- Ground the FG terminal securely when using a generally available switching power supply.
- Do not push a setting button with a sharp object.
- Perform the warm-up operation for 20 to 30 min.
  A display drift of approx. ±1% occurs immediately after the power has been turned ON.
- Use a UL certified product that is a class 2 power supply unit in conformity with UL1310 or a class 2 transformer in conformity with UL1585 for DC power supply to be combined.
- The digital pressure switch becomes a UL certified product only when the UL mark is put on the switch body.

Descriptions and functions

<table>
<thead>
<tr>
<th>Body</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator light (green): Displays the switch operation status.</td>
</tr>
<tr>
<td>3-digit LED: Displays the current pressure condition, set mode and error code. The display mode can be selected from four options: fixed green single-color reading, fixed red single-color reading, green reading interlocked with output for switching to red reading, or red reading interlocked with output for switching to green reading.</td>
</tr>
</tbody>
</table>

button: Use this button to change the mode or increase the ON/OFF set value. It also allows you to switch to the peak value display mode.

button: Use this button to change the mode or decrease the ON/OFF set value. It also allows you to switch to the bottom value display mode.

button: Use this button to switch the mode and set the set value.
Precautions on ON/OFF Valve

**Warning**

1. **Cannot be used as an emergency shutoff valve, etc.**
   The valves presented in this catalog are not designed for safety applications such as an emergency shutoff valve. If the valves are used in this type of system, other reliable safety assurance measures should also be adopted.

2. **This solenoid valve cannot be used for explosion proof applications.**

3. **Ensure sufficient space for maintenance activities.**
   Provide space required for maintenance.

4. **Pressure (including vacuum) holding**
   It is not usable for an application such as holding the pressure (including vacuum) inside of a pressure vessel because air leakage is entailed in a valve.

**Selection**

1. **Confirm the specifications.**
   Give careful consideration to the operating conditions such as the application, fluid and environment, and use within the operating ranges specified in this catalog.

2. **Fluid**
   1) **Type of fluids**
      Confirm the material of the parts in contact with fluid and applicable fluid to verify whether or not the fluid can be used.
   2) **Flammable fluid**
      Cannot be used in the flammable fluid.
   3) **Corrosive gas**
      Cannot be used since it will lead to cracks by stress corrosion or result in other incidents.

3. **Air quality**
   1) **Use clean air.**
      Do not use compressed air that contains chemicals, synthetic oils including organic solvents, salt or corrosive gases, etc., as it can cause damage or malfunction.
   2) **Install air filters.**
      Install air filters close to valves at their upstream side. A filtration degree of 5 µm or less should be selected.
   3) **Install an aftercooler or air dryer, etc.**
      Compressed air that contains excessive drainage may cause malfunction of valves and other pneumatic equipment. To prevent this, install an aftercooler or air dryer, etc.
   4) **If excessive carbon powder is generated, eliminate it by installing mist separators at the upstream side of valves.**
      If excessive carbon powder is generated by the compressor, it may adhere to the inside of the valves and cause malfunction. Refer to SMC Best Pneumatics catalog for further details on compressed air quality.

**Warning**

4. **Ambient environment**
   Use within the operable ambient temperature range. Confirm the compatibility between the product’s composition materials and the ambient atmosphere. Be certain that the fluid used does not touch the external surface of the product.

5. **Countermeasures against static electricity**
   Take measures to prevent static electricity since some fluids can cause static electricity.

**Caution**

1. **Leakage voltage**
   In particular, when a resistor is used in parallel with the switching element or when a C-R element (surge voltage suppressor) is used to protect the switching element, the leakage current flows through the resistor or C-R element, causing the valve not to turn OFF. Carefully check this point.

**Caution**

1. **Leakage voltage**
   DC coil is 2% or less of the rated voltage.

2. **Low temperature operation**
   1. The valve can be used in an ambient temperature of between −10 to −20°C. However, take measures to prevent freezing or solidification of impurities, etc.
LLB1 Series
Specific Product Precautions 6

Be sure to read this before handling the products.
Refer to back page 50 for Safety Instructions.

Precautions on ON/OFF Valve

Mounting

⚠️ Warning
1. If air leakage increases or equipment does not operate properly, stop operation.
After mounting is completed, confirm that it has been done correctly by performing a suitable function test.
2. Do not apply external force to the coil section.
When tightening is performed, apply a wrench or other tool to the outside of the piping connection parts.
3. Avoid sources of vibration, or adjust the arm from the body to the minimum length so that resonance will not occur.

⚠️ Caution
1. Preparation before piping
Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and other debris from inside the pipe.
Install piping so that it does not apply pulling, pressing, bending or other forces on the module unit.

Piping

⚠️ Caution
1. Preparation before piping
Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and other debris from inside the pipe.
Install piping so that it does not apply pulling, pressing, bending or other forces on the module unit.

Operating Environment

⚠️ Warning
1. Do not use the product in a place where corrosive gas, chemicals, brine, water and/or water steam are present or can splash on it.
2. Do not use the product in a place with the explosive atmosphere.
3. Avoid using the product in a place where vibration or impact can occur.
4. Do not use the product in the vicinity of a heat source or under radiant heat.
5. In locations where there is contact with spatter from water, oil, solder, etc., take suitable protective measures.

Lubrication

⚠️ Caution
1. This solenoid valve can be used without lubrication.

Maintenance

⚠️ Warning
1. Low frequency operation
Switch valves at least once every 30 days to prevent malfunction. Also, in order to use it under the optimum state, conduct a regular inspection once a half year.
2. Do not disassemble the product. Once the product has been disassembled, SMC does not warrant such product.
When it is required to disassemble the product, contact SMC or SMC sales representative.

Connection and electric circuit diagram

⚠️ Caution
With power-saving circuit (Polarity is provided.)

Electric waveform of power-saving type
(at rated voltage of 24 VDC)
Precautions on Restrictor

⚠️ Warning
1. **Restrictor cannot be used as a stop valve, which requires zero leakage. It is tolerant to some extent of leakage as a specification.**
2. **Check the number of rotations of the needle valve.**
   It does not rotate further because it has a drop-out prevention mechanism. Check the number of needle rotations. Rotating the needle too much may cause damage.
3. **Do not use tools such as pliers to rotate the knob.**
   It can cause idle rotation of the knob or damage.

Precautions on Filter

⚠️ Warning
1. **Air equipment which is mounted on the outlet side may generate dust.**
   If air equipment is installed on the outlet side, the equipment may generate dust, and it will be a factor to deteriorate cleanliness. Examine the position to install air equipment.
2. **Set operating flow rate within the specified range.**
   - [Specified range]
     LLB1: 100 L/min (ANR) or less
   If the operating flow rate is out of the specified range, it will cause functional deterioration and breakage.
3. **The filter should be installed in a place where pulsation does not occur.**
4. **This product cannot operate compressed air which contains fluid such as water and oil.**
   - For the air source for this product, install a dryer, mist separator, micro mist separator, super mist separator, odor removal filter, etc.
   - Generally, compressed air contains following particle contaminants:
     - Moisture (Condensate)
     - Dust in atmospheric air
     - Deteriorated oil exhausted from the compressor
     - Solid foreign matter such as rust or oil in the piping
5. **Flush air into the piping for cleaning before installing the product.**
   To decrease the affect of dust from a connection, also flush air into the piping before using the product for the first time and when replaced.

Installation

Maintenance

⚠️ Warning
1. **When removing the product, exhaust the air and ensure the air is released to atmosphere before removing it.**
2. **When the element comes to the end of its life, immediately replace it with a new filter or replacement element.**
   —Service life of element—
   1) After 1 year of usage has elapsed.
   2) When the set flow rate is not achieved even if it has been less than 1 year since operation started.

Operating Environment

⚠️ Warning
1. **Do not operate under the conditions listed below due to a risk of malfunction.**
   - In locations having corrosive gases, organic solvents, and chemicals, or in locations in which these elements are likely to adhere to the equipment.
   - In locations in which salt water, water, or water vapor could come in contact with the equipment.
   - In locations that are exposed to direct sunlight. (Shield the equipment from sunlight to prevent its resin material from ultraviolet ray degradation or overheating.)
   - In locations that have a heat source and poor ventilation. (Shield the equipment from heat sources to protect it from softening degradation due to radiated heat.)
   - In locations that are exposed to shocks and vibrations.
   - In locations with high humidity or a large amounts of dust.
2. **When the product is used for blowing, use caution to prevent the work from being damaged by entrained air from the surrounding area.**
   When the compressed air is used for air blow, the exhausted air from the blow nozzle may have taken in airborne foreign matter (such as solid particle, fluid particle) from the surrounding air. The foreign matter will be sprayed on the work, and the airborne foreign matter may adhere to it. Therefore, use caution for the surrounding environment.