Explosion-proof Pulse-to-Pneumatic Pressure Converter Model J-APN20

User's Manual

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1. Outline

This Explosion-proof Pulse-to-Pneumatic Pressure Converter meets the requirements of pressure resistant and explosion-proof structure d2G4 for gases in explosion class 2 and flammability 4 (JIS C0903).

The J-APN20 Explosion-proof Pulse-to-Pneumatic Pressure Converter responds to up (upward) and down (downward) pulse signals. It drives pulses and a (four-phase) motor to send pneumatic pressure signals of 20 to 100 kPa (0.2 to 1.0 kgf/cm²) and feedback signals of 4 to 20 mA through a nozzle and a flapper mechanism.

In case of power failure, the converter's worm gear mechanism keeps the pneumatic pressure signal at its pre-failure position (provided that the pneumatic source is in normal operation).

The converter is structurally divided into three sections. The electrical circuit section and the terminal section are of Explosion-proof structure, and the mechanical section is of waterproof structure.
2. Specifications

2-1 Input Section

1) Up and down pulse signals
   Pulse width: While ON signals are being entered for up or down pulse signals, output
   continues to change. The speed depends on response speed changeover
   signals and speed settings.
   Pulse train: When 1,000 pulses are entered, output changes from 0% to 100% FS.

2) Up and down signals
   Contact input: contact rating
       Dry contact
       30 VDC, 20 mA or over
       Open collector
       Vce 30 V or over; Ic 20 mA or over
   Pulse train: maximum response frequency: 150 pulses/sec
              minimum pulse width: 2.5 ms
   Pulse width: minimum response pulse width: 8 ms
              output current minimum response time: 15 ms
              (at the time of maximum response speed)

3) Response speed changing signals (valid only at the time of pulse width input)
   Contact input: contact rating
       Dry contact
       30 VDC, 20 mA or over
       Open collector
       Vce 30 V or over; Ic 20 mA or over
   When signals are on: high speed 7 to 20 sec / FS variable
   When signals are off: low speed 20 to 50 sec / FS variable

2-2 Output Section

1) Pneumatic pressure signal: 20 to 100 kPa (0.2 to 1.0 kgf/cm²) (also changeable in psi,
   bar units)
   Load: 4 φ × 3 m + 20 cc

2) Feedback signal: 4 to 20 mA DC or 20 to 4 mA DC
   Signal power source can be switched between external and internal power supplies.
   24 VDC ± 15%
   Load: 480 Ω maximum at 24 VDC (4 to 20 mA DC output)
3) Limit contact signal: detected by a microswitch (select between NC and NO)
   Settings: High limit can be set within the range of 100% to 108% FS (102% ±1% as default).
   Low limit can be set within the range of -8% to 0% FS (-2% ±1% as default).
   Contact rating: 120 VAC, 0.1 A, resistance load
                  125 VDC, 0.1 A, resistance load

4) Supplied pneumatic pressure monitor: Switchable between NO and NC (closed as default when the pneumatic source is lost.)
   Setting range: 110 to 120 kPa (1.1 to 1.2 kgf/cm²) or less (set at 110 kPa (1.1 kgf/cm²) when shipped out of factory)
   Contact rating: 120 VAC, 0.1 A, resistance load
                  125 VDC, 0.1 A, resistance load

5) Power supply monitor
   When lost: open or closed
   Contact rating: 120 VAC, 0.1 A, resistance load
                  125 VDC, 0.1 A, resistance load

2-3 Performance

1) Accuracy
   Pulse train: Pulse/pneumatic pressure: ±2.0% FS
   Pneumatic pressure signal/feedback signal: ±0.5% FS
   Pulse width: Pneumatic pressure signal/feedback signal: ±0.5% FS

2) Additional accuracy
   Effect of ambient temperature change:
   Pneumatic pressure signal: ±0.5% FS / 25 ± 25 °C
   Feedback signal: ±0.6% FS / 25 ± 25 °C (against pneumatic pressure signal)
   Effect of supplied pneumatic pressure change: ±1.0% FS/20 kPa (±0.2 kgf/cm²)
   Effect of power supply fluctuations (load: 250Ω): ±0.3% FS / ±15% of rated voltage

2-4 Other

1) Power supply: 24 VDC ±15% (power consumption: 350 mA)
2) Supplied pneumatic pressure: 140±20 kPa (1.4±0.2 kgf/cm²)
   Air consumption (in equilibrium): 6 Nl/min
   Maximum air supply capacity: 20 Nl/min
   Air load capacity: 3 m pipe with internal diameter of 4 mm + 20 cc or larger
3) Ambient temperature range: -10 to + 60 °C
4) Ambient humidity range: 10 to 90 % RH
5) Vibration: 0 to 120 Hz, 0.5 G
6) Structure: pressure resistant and explosion-proof d2G4 (JIS C0903)
   Pneumatic pressure conversion section is waterproof (equivalent to JIS
   F8001, Class 3 water repellent)
7) Mounting: 2B pipe or wall surface
8) Connections
   Pneumatic pipe connection: Rc 1/4 internal thread
   Electrical pipe connection: G 3/4 internal thread
   Electrical wiring: M4 screw
9) Finish: light beige baked acrylic
10) Weight: approximately 17 kg (including air set)
11) Withstand voltage: 40 VAC for 1 minute between each terminal and the case grounding
    (500 VAC for 1 minute when the surge absorber is removed)
12) Insulation resistance: 100 MΩ or over between each terminal and the case grounding
    (500 VDC when the surge absorber is removed)
13) Electrical wiring: Recommended wiring specifications
    Wiring length: 1 km maximum
    Recommended wire material:
    Up and down signals: KPEV-S cable for pulse train input
    CVV-S cable for pulse width input
    For other signals: CVV-S cable
    To shield the cables, ground to class 3 or higher on the instrument room side.

2-5 Additional Specifications

1) With an air set: reduction valve with filter + φ 40 mm pressure gauge
2) With a pneumatic pressure gauge: φ 40 mm pressure gauge
3) Anticorrosion coating: baked acrylic coating (for corrosive atmospheres)
4) Heavy anticorrosion coating: baked epoxy coating (for corrosive liquids)
5) General silver coating: baked acrylic coating (prevents the temperature of the converter
    from rising during exposure to sunshine, radiant heat etc.)
6) Anticorrosion silver coating: baked acrylic coating (prevents the temperature rising in
    corrosive atmospheres)
7) With (two) cable adapters with pressure resistant packing (packing holes 14 and 15 mm in
    diameter)
### 3. Model Number Configuration

<table>
<thead>
<tr>
<th>Basic Model Number</th>
<th>Selectable Specifications</th>
<th>Limit Contact Signal</th>
<th>Additional Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>J-APN20</td>
<td></td>
<td></td>
<td>Explosion-proof Pulse/Air Pressure Converter</td>
</tr>
<tr>
<td>−B</td>
<td></td>
<td>24 VDC isolated</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td></td>
<td>Pulse width</td>
<td></td>
</tr>
<tr>
<td>J</td>
<td></td>
<td>Pulse train</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>0.2 to 1.0 kgf/cm²</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>3 to 15 psi</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>0.2 to 1.0 bar</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>20 to 100 kPa</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>4 to 20 mA DC</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>20 to 4 mA DC (reverse characteristics)</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td></td>
<td>Air connection: Rc ( \frac{1}{4})</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Electrical connection: G ( \frac{3}{4}) internal thread</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Standard finish</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Corrosion-resistant finish</td>
<td></td>
</tr>
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<td>3</td>
<td></td>
<td>Corrosion-proof finish</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Silver finish</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Corrosion-resistant (silver) finish</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td></td>
<td>2B pipe mounted</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td></td>
<td>Wall mounted</td>
<td></td>
</tr>
<tr>
<td>X</td>
<td></td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>With two cable adaptors with pressure resistant packing</td>
<td></td>
</tr>
<tr>
<td>X</td>
<td></td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td></td>
<td>Normally closed</td>
<td></td>
</tr>
<tr>
<td>K</td>
<td></td>
<td>Normally open</td>
<td></td>
</tr>
<tr>
<td>X</td>
<td></td>
<td>Without</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td></td>
<td>With</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td></td>
<td>Explosion-proof case (JIS C 0903 d2G4)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Built-in</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Supplied externally</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td></td>
<td>Normally closed</td>
<td></td>
</tr>
<tr>
<td>K</td>
<td></td>
<td>Normally open</td>
<td></td>
</tr>
<tr>
<td>−X</td>
<td></td>
<td>No additional specifications</td>
<td></td>
</tr>
<tr>
<td>−3</td>
<td></td>
<td>Pneumatic output gauge (40 mm)</td>
<td></td>
</tr>
<tr>
<td>−7</td>
<td></td>
<td>Air set</td>
<td></td>
</tr>
</tbody>
</table>
4. Converter Configuration

4-1 Block Diagram

Figure 4-1 Block diagram

Note 1: The up pulse and down pulse input signals should be structured so that pulse input can be cut at or above their limits in an external sequence with the use HI and Lo limit contact outputs. If input diverges from the calibrated limits and hits the mechanical stopper and the signal is not shut off, the worm gear mechanism will start chattering. Do not use the converter for a long time in this condition; it will damage the worm gear shaft bearing.
Figure 4-2 Converter configuration and names of parts
4-3 Circuitry

Figure 4-3 Circuitry
### Table 1  Power down monitor

<table>
<thead>
<tr>
<th>Jumper</th>
<th>Contact output</th>
</tr>
</thead>
<tbody>
<tr>
<td>f-d</td>
<td>Normally open</td>
</tr>
<tr>
<td>f-e</td>
<td>Normally closed</td>
</tr>
</tbody>
</table>

### Table 2  Pulse input (whether parts are present or not according to pulse width and pulse train)

| R2 | R3 | R4 | R5 | R6 | R7 | R8 | R9 | R12 | R16 | R19 | R20 | R21 | R22 | R23 | R24 | C2 | Jumper | Up/down input |
|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|----|--------|----------------|
| ✓  | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  | ◯  | ◯   | ◯   | ◯   | ◯   | ◯   | ◯   | ◯   | ◯   | ✓   | k-b, m-n, a-c | Pulse width    |
| ◯  | ◯  | ◯  | ◯  | ◯  | ◯  | ◯  | ◯  | ◯   | ◯   | ◯   | ◯   | ◯   | ◯   | ◯   | ◯   | b-c       | Pulse train    |

<table>
<thead>
<tr>
<th>C3</th>
<th>C6</th>
<th>C7</th>
<th>C8</th>
<th>C9</th>
<th>C4</th>
<th>L1</th>
<th>L4</th>
<th>L5</th>
<th>L9</th>
<th>VR1</th>
<th>VR2</th>
<th>Q1</th>
<th>Q2</th>
<th>Check bit</th>
<th>Up/down input</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>◯</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Pulse width</td>
</tr>
<tr>
<td>◯</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>◯</td>
<td>X</td>
<td>X</td>
<td>◯</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Present: ✓</td>
<td>Pulse input</td>
</tr>
<tr>
<td>Not present: ◯</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 3  D/I Power supply

<table>
<thead>
<tr>
<th>Power supply</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inside supply</td>
<td>LG1 – red, LG3 – yellow, LG4 – blue</td>
</tr>
<tr>
<td>Outside supply</td>
<td>LG2 – yellow, LG3 – blue, LG4 – red</td>
</tr>
</tbody>
</table>
5. Installation and Operation

5-1 Installation

Refer to Figure 5-1 or Figure 5-2 to mount the converter on a 2B pipe or wall.

**Cable specifications**

<table>
<thead>
<tr>
<th>Packing hole diameter</th>
<th>Applicable cable diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>13.0 – 13.9</td>
</tr>
<tr>
<td>15</td>
<td>14.0 – 14.9</td>
</tr>
</tbody>
</table>

1) 2B pipe mounted

![Diagram of 2B pipe mounted converter](image)

**Figure 5-1 2B pipe mounted**
2) Wall mounted

Figure 5-2 Wall mounted
5-2 Piping and Wiring Procedures

1) Piping
(a) For air supply, use appropriate instrumentation air. The pressure on the primary side of the air set is 200 to 990 kPa (2 to 9.9 kgf/cm²), and the pressure on the secondary side is 140±20 kPa (1.4±0.2 kgf/cm²).
(b) Pipe matching is Rc³/₄ everywhere. For conducting the work, refer to Figure 5-1 or Figure 5-2.

2) Wiring
Refer to Figures 5-3 and 5-4.

<table>
<thead>
<tr>
<th>No.</th>
<th>Symbol</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+</td>
<td>DC 24 V power supply +</td>
</tr>
<tr>
<td>2</td>
<td>-</td>
<td>DC 24 V power supply -</td>
</tr>
<tr>
<td>3</td>
<td>E</td>
<td>Ground</td>
</tr>
<tr>
<td>4</td>
<td>H, L</td>
<td>High limit contact output</td>
</tr>
<tr>
<td>5</td>
<td>C</td>
<td>Limiter output common</td>
</tr>
<tr>
<td>6</td>
<td>L, L</td>
<td>Low limit contact output</td>
</tr>
<tr>
<td>7</td>
<td>M1</td>
<td>Pneumatic pressure monitor contact output</td>
</tr>
<tr>
<td>8</td>
<td>M1</td>
<td>Pneumatic pressure monitor contact output</td>
</tr>
<tr>
<td>9</td>
<td>DWN</td>
<td>Down pulse input, collector side</td>
</tr>
<tr>
<td>10</td>
<td>UP</td>
<td>Up pulse input, collector side</td>
</tr>
<tr>
<td>11</td>
<td>C</td>
<td>Pulse input common (emitter side)/speed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>changeover switch</td>
</tr>
<tr>
<td>12</td>
<td>SPD</td>
<td>Speed changeover switch</td>
</tr>
<tr>
<td>13</td>
<td>I+</td>
<td>Feedback current output +</td>
</tr>
<tr>
<td>14</td>
<td>I−</td>
<td>Feedback current output −</td>
</tr>
<tr>
<td>15</td>
<td>P, D</td>
<td>Power monitor contact output</td>
</tr>
<tr>
<td>16</td>
<td>P, D</td>
<td>Power monitor contact output</td>
</tr>
</tbody>
</table>

Figure 5-3 Layout of terminals and connection table

Figure 5-4 With cable adapter with pressure resistant packing
3) Connections

(a) Contact output

For safety, combine the converter with a surge suppression device on the load side of contact output.

(b) Up/down signals

Open collector output is desirable for up/down signals.
1) Recommended wiring for pulse width input

Note 1: Ground the cable shield only on the instrument room (Class 3 or higher).

Note 2: Install the jumpers on the external wiring.

Note 3: Although a large number of additional functions can be selected on the pulse-to-pneumatic pressure converter, the number of external wires may be limited depending on the conduit dimensions. The cable shapes and the number of wire cores should be your guides when selecting functions.

Note 4: Ground the main unit to Class 3 or higher.
2) Recommended wiring for pulse train input
   Use KPEV-S for up and down signals and CVV-S for other signals.

Note 1: Ground the cable shield only on the instrument room (Class 3 or higher).
Note 2: Install the jumpers on the external wiring.
Note 3: Although a large number of additional functions can be selected on the pulse-to-pneumatic pressure converter, the number of external wires may be limited depending on the conduit dimensions. The cable shapes and the number of wire cores should be your guides when selecting functions.
Note 4: Ground the main unit to Class 3 or higher.
3) Recommended cables
   Up and down signals
Pulse train input cable: KPEV-S.
Pulse width input cable: CVV-S.
Signals other than up and down signals: CVV-S

① KPEV-S cable specifications
   (Used for up and down signals for pulse train output)
Polyethylene insulated vinyl sheath cable for shielded instrumentation
Performance:
   Conductor: twisted soft copper wire for electrical use (JIS C 3102)
   Insulator: polyethylene
   Pair twisting: two wire cores twisted together at a proper pitch
   Structure: 2P × 3, blanket shielding
   Electrical characteristics
      Conductor: Nominal cross area: 2 mm²
      Structure: 7 cores/0.6 mm
      Conductor resistance: 9.61 Ω/km
      Line capacity (reference value): 0.08 µF
      Sheath thickness: 1.5 mm
      External diameter: 15.0 mm

② CVV-S cable specifications
   (Used for signals other than up and down signals for pulse train output)
Vinyl insulated vinyl sheath cable for shielded instrumentation
Performance:
   Conductor: twisted soft copper wire for electrical use (JIS C 3102)
   Insulator: vinyl
   Structure: 6 cores or 8 cores, blanket shielding
   Electrical characteristics
      Conductor: Nominal cross area: 2 mm²
      Structure: 7 cores/0.6 mm
      Outside shapc: 1.8 mm
      Conductor resistance: 9.42 Ω/km
      Line capacity (reference value): 0.12 µF/km
      Sheath thickness: 1.5 mm
      External diameter: 14.0 to 15.0 mm
         (depends on the number of cores)
### Structure table CVV-S (2–30 x 1.25m²)

<table>
<thead>
<tr>
<th>No. of cores</th>
<th>Nominal profile</th>
<th>Conductor Diameter</th>
<th>Insulator thickness</th>
<th>Copper tape thickness (approximate)</th>
<th>Sheath thickness</th>
<th>External diameter (approximate)</th>
<th>Approximate mass</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mm²</td>
<td>Cores/mm</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>Kg/Km</td>
</tr>
<tr>
<td>2</td>
<td>1.25</td>
<td>7/0.45</td>
<td>1.35</td>
<td>0.8</td>
<td>0.1</td>
<td>1.5</td>
<td>9.6</td>
</tr>
<tr>
<td>3</td>
<td>1.25</td>
<td>7/0.45</td>
<td>1.35</td>
<td>0.8</td>
<td>0.1</td>
<td>1.5</td>
<td>10.5</td>
</tr>
<tr>
<td>4</td>
<td>1.25</td>
<td>7/0.45</td>
<td>1.35</td>
<td>0.8</td>
<td>0.1</td>
<td>1.5</td>
<td>11.0</td>
</tr>
<tr>
<td>5</td>
<td>1.25</td>
<td>7/0.45</td>
<td>1.35</td>
<td>0.8</td>
<td>0.1</td>
<td>1.5</td>
<td>12.0</td>
</tr>
<tr>
<td>6</td>
<td>1.25</td>
<td>7/0.45</td>
<td>1.35</td>
<td>0.8</td>
<td>0.1</td>
<td>1.5</td>
<td>13.0</td>
</tr>
<tr>
<td>7</td>
<td>1.25</td>
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<td>1.35</td>
<td>0.8</td>
<td>0.1</td>
<td>1.5</td>
<td>15.0</td>
</tr>
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<td>1.25</td>
<td>7/0.45</td>
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### Structure table CVV-S (2–30 x 2m²)

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<tr>
<th>No. of cores</th>
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<th>Conductor Diameter</th>
<th>Insulator thickness</th>
<th>Copper tape thickness (approximate)</th>
<th>Sheath thickness</th>
<th>External diameter (approximate)</th>
<th>Approximate mass</th>
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<td>mm²</td>
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<td>0.1</td>
<td>1.7</td>
<td>26</td>
</tr>
</tbody>
</table>

Packing hole diameter applicable to waterproof glands

Use either of two kinds: 14 and 15 in diameter.
6. Adjustment and Settings

6-1 Preparations

Connect the instrument as shown in Figure 6-1. Let the converter run for at least 30 minutes before operation.

For testing contact for conductivity

For testing contact for conductivity

Digital manometer

Apply load of 64 x 3 m + 20 cc or over.

Speed changeover switch

High speed at ON

Items to be prepared

1. Digital manometer
2. Ammeter
3. 24 VDC power supply
4. Pulse generator for up and down signals
5. Switch (for changing speed)
6. Air supply (with air set attached)
   200 to 990 kPa (2 to 9.9 kgf/cm²)
   No air set
   140 kPa (1.4 kgf/cm²G)
7. Tester for checking contact

Figure 6-1
6-2 Setting the Upper and Lower Limit Switches

Upper limit: 100% + 2% or – 0% FS
Lower limit: 0% + 0% or – 2% FS

Pneumatic pressure output is set at the limits mentioned below.

6-3 Adjustment of Current (Voltage) Output

Conduct the wiring and piping as described in 5-2 and 5-3. Also, see Figure 6-2.

1) Adjust the up and down input so that pneumatic pressure output become approximately \(1 \times 20\) kPa \(0.2\) kgf/cm\(^{2}\) \((0\%\) FS), then perform the zero adjustment of the P/I conversion unit to attain the current output corresponding to the pneumatic pressure output \(^{2}\).

2) Adjust the up and down input so that pneumatic pressure output become approximately \(1 \times 100\) kPa \(1.0\) kgf/cm\(^{2}\) \((100\%\) FS), then perform the span adjustment of the P/I conversion unit to attain the current output corresponding to the pneumatic pressure output.

Repeat steps 1 and 2 until the specified accuracy is achieved. For reverse characteristics, start from step (3).

\(^{1}\) Pneumatic pressure output cannot be set precisely since it step-changes in steps in accordance with a pulse motor.

\(^{2}\) To calculate the current output corresponding to pneumatic pressure output: (for voltage output, the output must be \((I \ mA \times 0.25)\) V.)

\[I = 4 + \left(\frac{P - 0.2}{0.8}\right) \times 16\]

\[I = 24 - \left(\frac{P - 0.2}{0.8}\right) \times 16\] (In the case of reverse characteristics:)

\(I:\) corresponding current output \([mA\ DC]\)
\(P:\) pneumatic pressure output \([kPa\ {kgf/cm^2}]\)

3) Shut off the air supply, and adjust the pneumatic pressure output to 0 kPa \(0\) kgf/cm\(^{2}\) \((-25\%\) FS).
Perform zero adjustment so that the current output this time becomes 24 mA.

4) Connect the air supply, and adjust the up and down input so that the air output becomes approximately \(1 \times 100\) kPa \(1.0\) kgf/cm\(^{2}\) \((100\%\) FS).
Adjust the span of the P/I conversion unit in a way to achieve the current output corresponding to the air output. (See paragraph \((2)\) Note 2 above.)
Repeat steps (3) and (4) until the specified accuracy is achieved.
6-4 Setting the Pneumatic Pressure Monitor Unit

1) If your model includes the supplied air pressure drop monitor, the alarm setting can be changed by adjusting the setting wheel on the unit (set at 110 kPa (1.1 kgf/cm²) when shipped). To raise the set value, turn the setting wheel counterclockwise.

Figure 6-3 Pneumatic pressure monitor unit
2) Connect the monitor unit terminal and customer terminal connection cables.

When used as an upper limit alarm and as a supplied pneumatic pressure-down monitor

6-5 Setting Output Speed

1) Setting high speed (See Figure 6-2.)

In Figure 5-3, the section between customer terminals (COM) and (SPD) is turned ON. Adjust the variable resistor for high speed on the main printed plate assembly (See Figure 6-2 above).

2) Setting the low speed (See Figure 6-2.)

In Figure 5-3, the section between customer terminals (COM) and (SPD) is turned OFF. Adjust the variable resistor for low speed on the main printed plate assembly (See Figure 6-2 above).
# 7. Parts List

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<tr>
<th>Key No.</th>
<th>Drawing number</th>
<th>Name</th>
<th>Quantity</th>
</tr>
</thead>
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<tr>
<td>①</td>
<td>80355952-001</td>
<td>Pneumatic pressure monitor unit (additional specifications)</td>
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</tr>
<tr>
<td>②</td>
<td>80355958-ITEM</td>
<td>P/ft conversion unit (additional specifications)</td>
<td>1a</td>
</tr>
<tr>
<td>③</td>
<td>80355955-ITEM</td>
<td>Main printed plate assembly</td>
<td>1a</td>
</tr>
<tr>
<td>④</td>
<td>80355960-ITEM</td>
<td>Mechanical case assembly (additional specification)</td>
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<tr>
<td>⑤</td>
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<td>Cover (Window)</td>
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<tr>
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<td>Terminal assembly (TB2)</td>
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<td>Cover assembly (terminal box)</td>
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</table>
8. Maintenance

8-1 Regular Maintenance

1) Check the supplied air pressure
   Keep the supplied air pressure unit clean. Drain unit and check filters regularly.
   Check the compressor, the air cleaning and dehumidifying unit, and the tank.

8-2 Periodical Maintenance and Checking

1) Check for air leaks
   Make sure that there is no air leak from the air pipe or the connection joints.

2) Check the nozzle flapper for staining
   Remove stains on the nozzle flapper of the pneumatic pressure sending unit (mechanical parts
   assembly, see Figure 6-2, with a cloth impregnated with a solvent such as petroleum,
   naphtha or chlorosene 1,1,1-Trichloroethane (Chloroethene). Wipe gently to prevent damage
   to the flapper beam (plate spring).

3) Check the gear mechanism of the pulse motor for wear
   Damaged or worn gears, especially the worm gears and worm wheels must be replaced.

4) Check the pilot relay (Figure 8-1)
   (1) Remove the pilot relay from the manifold: remove the two screws (14), the
       spring washers (15), and the gaskets.
   (2) Disassemble the pilot relay: remove the two flat-head screws (13).
   (3) Dismount parts (6) to (12). Parts (2) to (5) need not be dismounted unless they
       need replacing.
   (4) Clean the metal parts with a solvent such as petroleum, naphtha or chlorosene.
       1, 1, 1-Trichloroethane (Chloroethene).
       Do not stain the diaphragms with the solvent.
       Clean the valve stem (2) on the seal surface and the hole. Let the solvent be
       absorbed by pressing the conic spring (4) to push the valve stem (2) in the com-
       pression direction.
   (5) Check the inside of the exhaust ring (10) for stains. If stained, clean with a cloth
       impregnated with a solvent.
   (6) Dry all the parts with clean compressed air.
   (7) Replace the rubber diaphragms (8) and (11) if they are worn or damaged.
   (8) Reassemble the pilot relay: replace all parts in correct order and tighten them
       with two flat-head screws (13).
   (9) Remount the pilot relay on the manifold, position the gasket (1) correctly.
   (10) Fix the pilot relay on the manifold using mounting screws (14) and two spring
        washers (15).
5) You are recommended to replace rubber parts (such as the diaphragms and gaskets on the pilot relay, the tube for piping, and the O ring for the check plug of the pneumatic pressure sending unit) at intervals of about five years, though this may vary depending on conditions.

Figure 8-1 Pilot relay disassembled
Azbil Corporation