Installation & Maintenance Manual
Fieldbus system - Digital unit
Type EX600-DX / EX600-DY / EX600-DM

Safety Instructions
These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of "Caution", "Warning" or "Danger". They are all important notes for safety and must be followed in addition to International standards (ISO/IEC), Japanese Industrial Standards (JIS) and other safety regulations.

**Caution**
CAUTION indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

**Warning**
WARNING indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

**Danger**
DANGER indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

This product is class A equipment that is intended for use in an industrial environment. There may be potential difficulties in ensuring electromagnetic compatibility in other environments due to conducted as well as radiated disturbances.

Safety Instructions (Continued)

Caution

- When handling, assembling or replacing the unit:
  - Avoid touching any sharp metal parts of the connectors for connecting units.
  - When assembling units, take care not to get any fingers caught between units. Injury can result.
  - When disassembling units, take care to avoid excessive force. The connection parts of the unit are firmly joined with seals and injury can result.

- After maintenance is complete, perform appropriate functional inspections. Stop operation if the equipment does not function properly. Safety cannot be assured in the case of unexpected malfunction.

- Provide grounding to assure the safety and noise resistance of the Fieldbus system. Individual grounding should be provided close to the product with a short cable.

**NOTE**
The direct current power supply to combine should be UL1310 Class2 power supply when conformity to UL is necessary.

Warning

- Do not disassemble, modify (including changing the printed circuit board) or repair. An injury or failure can result.

- Do not operate the product outside of the specifications. Do not use for flammable or harmful fluids. Fire, malfunction, or damage to the product can result. Verify the specifications before use.

- Do not operate in an atmosphere containing flammable or explosive gases. Fire or an explosion can result.

This product is not designed to be explosion proof. If using the product in an interlocking circuit:
- Provide a double interlocking system, for example a mechanical connection part of the unit are firmly joined with seals and injury can result.

- Otherwise malfunction can result, causing an accident.

- The following instructions must be followed during maintenance:
  - Turn off the power supply.
  - Stop the air supply, exhaust the residual pressure and verify that the air is released before performing maintenance. Otherwise an injury can result.

WARNING indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

**Warning (Continued)**

- Check the product regularly for proper operation.
- Otherwise malfunction can result, causing an accident.

- The following instructions must be followed during maintenance:
  - Turn off the power supply.
  - Stop the air supply, exhaust the residual pressure and verify that the air is released before performing maintenance. Otherwise an injury can result.

**Caution**

- Do not disassemble, modify (including changing the printed circuit board) or repair. An injury or failure can result.

- Do not operate the product outside of the specifications. Do not use for flammable or harmful fluids. Fire, malfunction, or damage to the product can result. Verify the specifications before use.

- Do not operate in an atmosphere containing flammable or explosive gases. Fire or an explosion can result.

This product is not designed to be explosion proof. If using the product in an interlocking circuit:
- Provide a double interlocking system, for example a mechanical

**DANGER indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.**

- Insert the valve plate into the valve plate mounting groove on the side of the SI unit. Fix using the valve plate screws (M4x6) supplied, to a torque of 0.7 to 0.8 Nm.

- Provide grounding to assure the safety and noise resistance of the Fieldbus system.

- Individual grounding should be provided close to the product with a short cable.

**NOTE**
The direct current power supply to combine should be UL1310 Class2 power supply when conformity to UL is necessary.

Summary of Product parts

- Digital input unit (EX600-DX)
- Digital output unit (EX600-DY)
- Digital I/O unit (EX600-DM)
- Digital and Analogue I/O units can be connected to the SI unit. The method is as above in (1), (2).

Names and Functions of Product (Continued)

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Status display LED</td>
<td>Displays the status of the unit.</td>
</tr>
<tr>
<td>2</td>
<td>Connector</td>
<td>Connector for inputs or outputs, using M12 or D-sub connector, or a terminal block.</td>
</tr>
<tr>
<td>3</td>
<td>Marker grooves</td>
<td>Grooves for an identification marker.</td>
</tr>
<tr>
<td>4</td>
<td>Lock screw</td>
<td>Grooves for an identification marker.</td>
</tr>
<tr>
<td>5</td>
<td>Joint bracket</td>
<td>Bracket for joining adjacent units.</td>
</tr>
<tr>
<td>6</td>
<td>Unit connector (Plug)</td>
<td>Connector for signals and power supplies to adjacent units.</td>
</tr>
</tbody>
</table>

Assembly

- Assembling the unit as a manifold
  - (1) Connect a unit to the end plate. Digital and Analogue I/O units can be connected in any order. Tighten the joint brackets to a torque of 1.5 to 1.6 Nm.
  - (2) Add more I/O units. Up to 10 units (including the SI unit) can be connected to one manifold.
  - (3) Connecting the SI unit. After connecting the required I/O units, connect the SI unit. The method is as above in (1), (2).
  - (4) Mounting the valve plate. Mount the valve plate (EX600-ZMH) to the valve manifold using the valve set screws. (M3x8) Apply 0.6 to 0.7 Nm tightening torque to the screws.
  - (5) Connect the SI unit to the valve manifold. Insert the valve plate into the valve plate mounting groove on the side of the SI unit. Fix using the valve plate screws (M4x6) supplied, to a torque of 0.7 to 0.8 Nm.

Installation

- Direct mounting
  - (1) When joining six or more units, connect the middle part of the complete EX600 unit with an intermediate reinforcing brace (EX600-ZMB2) before mounting, using 2-M4x5 screws. Tightening torque: 0.7 to 0.8 Nm.

- On rail mounting
  - (Not available for SY series valves. Refer to the SY catalogue.)
  - (1) When joining six or more units, fix the middle part of the complete EX600 unit with an intermediate reinforcing brace (EX600-ZMB2) before mounting, using 2-M4x5 screws. Tightening torque: 0.7 to 0.8 Nm.

- Mount the end plate bracket (EX600-ZMA2) to the end plate at the opposite end to the valves, using 2-M4x14 screws. Tightening torque: 0.7 to 0.8 Nm.
Mounting and Installation (Continued)

- Fix the manifold by tightening devices and unit address can be written on the marker, and can be installed on each unit. Mount the marker (EX600-ZT1) into the marker groove as required.

The signal name of the input or output

Identification marker

The signal name of the input or output devices and unit address can be written on the marker, and can be installed on each unit. Mount the marker (EX600-ZT1) into the marker groove as required.

Wiring

- Connect the M12 connector cable. The M12 SPEEDCON connector connection method is explained below:
  1. Align mark B on the metal bracket of the cable connector (plug/socket) with mark A.
  2. Align with mark C on the unit and insert the connector vertically. If they are not aligned, the connector cannot be connected correctly.
  3. When mark B has been turned 180 degrees (1/2 turn), wiring is complete. Confirm that the connection is not loose. If turned too far, it will become difficult to remove the connector.

**Configuration**

- **Pin number**
- **Signal name**

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Pin number</th>
<th>Signal name</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>24 V (Control and input)</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Input 0</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Input 1</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>0 V (Control and input)</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>FE</td>
</tr>
</tbody>
</table>

- Spring type terminal connection method.

  1. Insert a flat blade screwdriver inclined to the left into the right hole of the two holes as shown in the figure below.
  2. Insert the cable.
  3. The spring will capture the cable when the flat blade screwdriver is pulled out. This completes the connection.
## Mounting and Installation (Continued)

### Digital I/O unit

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Pin number</th>
<th>Signal name</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>EX600-DYNF</td>
<td>1</td>
<td>NC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Output 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0 V (Output)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Output 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>FE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>0 V (Output)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>24 V (Output)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>0 V (Output)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>NC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>NC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>NC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>NC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>0 V (Output)</td>
<td></td>
</tr>
</tbody>
</table>

### Configuration

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Pin number</th>
<th>Signal name</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>EX600-DYPB</td>
<td>1</td>
<td>NC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Output 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0 V (Output)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Output 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>NC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>0 V (Output)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>24 V (Output)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>0 V (Output)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>NC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>NC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>NC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>NC</td>
<td></td>
</tr>
</tbody>
</table>

## Mounting and Installation (Continued)

### Configuration

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Pin number</th>
<th>Signal name</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>EX600-DYPF</td>
<td>1</td>
<td>NC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Output 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0 V (Output)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Output 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>NC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>0 V (Output)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>24 V (Output)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>0 V (Output)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>NC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>NC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>NC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>NC</td>
<td></td>
</tr>
</tbody>
</table>

### Pin number

**EX600-DYNF**

1. Output 0
2. Output 2
3. Output 4
4. Output 6
5. Output 8
6. Output 10
7. Output 12
8. Output 14
9. NC
10. NC
11. NC
12. NC
13. 0 V (Output) 24 V (Output)

**EX600-DYPB**

1. NC
2. Output 2
3. 0 V (Output) NC
4. Output 1
5. NC
6. 0 V (Output)
7. 24 V (Output)
8. 0 V (Output)
9. NC
10. NC
11. NC
12. NC
13. 0 V (Output) 24 V (Output)

## Mounting and Installation (Continued)

### Pin number

**EX600-DYPF**

1. 0 V (Output) 24 V (Output)
2. Output 2
3. 0 V (Output) 24 V (Output)
4. Output 1
5. NC
6. 0 V (Output)
7. 24 V (Output)
8. Output 6
9. 0 V (Output) 24 V (Output)
10. Output 4
11. 0 V (Output) 24 V (Output)
12. 0 V (Output) 24 V (Output)
13. FE

**EX600-DYNF**

1. NC
2. Output 2
3. 0 V (Output) NC
4. Output 1
5. NC
6. 0 V (Output)
7. 24 V (Output)
8. 0 V (Output)
9. NC
10. NC
11. NC
12. NC
13. 0 V (Output) 24 V (Output)
**LED Display (Continued)**

<table>
<thead>
<tr>
<th>Model</th>
<th>Display Content</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ST LED is OFF. The power supply for control and input is OFF. Green ST LED is ON. The input device is ON. Red ST LED is ON. The input device has a short circuit. Red ST LED flashing. The input device OFF. &quot;0 to 15&quot; LEDs are ON. The input device is ON. &quot;0 to 15&quot; Green LEDs are ON. The input device is ON.</td>
</tr>
<tr>
<td></td>
<td>ST LED OFF. The product is operating normally. Green ST LED is ON. The input device is ON. Red ST LED is ON. The input device has a short circuit. Red ST LED flashing. The input device OFF. &quot;0 to 7&quot; LEDs are OFF. Input (left) &quot;0 to 7&quot; Green LEDs are ON. Output (right) &quot;0 to 7&quot; Green LEDs are ON.</td>
</tr>
</tbody>
</table>

**Maintenance**

- Maintenance should be performed according to the Safety Instructions.
- Perform regular maintenance and inspections.
- There is a risk of unexpected malfunction.
- Do not use solvents such as benzene, thinner etc. to clean each unit.
- Use a soft cloth to remove stains. For heavy stains, use a cloth soaked with diluted neutral detergent and fully squeezed, then wipe up the stains again with a dry cloth.
- Refer to the SMC website (URL http://www.smcworld.com) to obtain more detailed information about maintenance.

**Troubleshooting**

Refer to the LED Display. Refer to the SMC website (URL http://www.smcworld.com) to obtain more detailed information about troubleshooting.

**Outline with Dimensions**

Refer to the product catalogue or SMC website (URL http://www.smcworld.com) to obtain more detailed information about outline dimensions.

**Specification**

<table>
<thead>
<tr>
<th>Model</th>
<th>Display</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control and input</td>
<td>Power supply</td>
</tr>
<tr>
<td>24 VDC Class2</td>
<td>2 A</td>
<td>3 mA or less</td>
</tr>
<tr>
<td>24 VDC Class2</td>
<td>2 A</td>
<td>500 mA or less</td>
</tr>
</tbody>
</table>

**Vibration resistance**

10 to 57 Hz: constant amplitude 0.75 mm p-p
57 to 150 Hz: constant acceleration 49 m/s² for 2 hours each in direction X, Y and Z respectively (De-energized)

**Impact resistance**

147 m/s² 3 times each in directions of X, Y and Z respectively (De-energized)