# Output Analog Function Module-101

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Introduction

The Output Analog Function Module (FM-OAN101-0) provides two independent analog signals (0 to 20 mA) from a single FM slot controlled by a DCM140.

Each channel operates in either an Auto or Manual mode. The OAN operates as follows (step numbers correspond to numbers in Figure 1):

1. The DCM140 provides a control signal.
2. The OAN latches the signal and converts it to a proportional 0 to 20 mA signal, which is conditioned and distributed as current control to the field device. A 0 to 10 VDC signal can also be controlled by use of an external resistor.

   In Auto mode, the signal remains under control of the DCM140.
3. Manually controlled Auto/Manual switches can disable the DCM140 control of the OAN outputs. The statuses of these switches are reported back to the DCM140.
4. With an Auto/Manual switch in the Manual position, the module output is controlled by a manual adjustment on the OAN. (Clockwise increases the output.)

![Figure 1: OAN Function Diagram](image-url)
• The OAN must connect to a DCM140, which is communicating to an NCM200 (or higher) loaded with Release 5.02 (or later) software.

• The OAN provides two independent analog signals; it functions as a current source (not current control).

• Each output signal of the OAN is independently software-selectable: 0 to 20 mA or 4 to 20 mA. (See *Setting the Software Span*, further on in this document.)

• Each output signal of the OAN can be converted from current to voltage by attaching a resistor, as shown under *Applications Wiring Diagrams*. A single OAN can control both current and voltage outputs.
Figures 2 and 3 show the connections required to control 0 to 20 mA applications. Figure 3’s method uses only three wires.

Figure 2: Connections for Proportional 0 to 20 mA Applications

Figure 3 connects two separate field devices while using only three wires.

Figure 3: 3-Wire Connections for Proportional 0 to 20 mA Applications
Figure 4 shows the required connections for one output of proportional 0 to 10 VDC (connected to field device 2). Convert current to voltage by attaching a resistor to the output line.

**Figure 4: Connections for Proportional 0 to 10 Volt Applications**

- The 0 to 10 VDC application requires that the software span is set to 0 to 20 mA.
- The OAN can control two current outputs, one current and one voltage output, or two voltage outputs.
- Use wire-wound or metal-film resistors, with 1% accuracy, and having a power rating of 1/4 watt. Position the resistors near the field device to avoid line length compensation.

When converting to VDC, it is necessary to take into account the impedance of the field device. Table 1 lists the size of resistor necessary to produce a desired voltage range, given the total impedance. (Standard 1% resistor sizes are listed at the end of each row to help match the appropriate resistor to a standard size.) For low-impedance devices (less than 500 ohms) use the current output.
Table 1: Resistor Sizes Needed for Voltage Scale Versus Impedance

<table>
<thead>
<tr>
<th>Req. Volt Scale</th>
<th>Field Device Impedance (In Ohms)</th>
<th>Calculated Parallel Resistance</th>
<th>Some Standard 1% Resistor Values</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50K</td>
<td>20K</td>
<td>10K</td>
</tr>
<tr>
<td>10V</td>
<td>505</td>
<td>513</td>
<td>526</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5V</td>
<td>251</td>
<td>253</td>
<td>256</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2V</td>
<td>100</td>
<td>100.5</td>
<td>101</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If additional offset adjustments are necessary to compensate for line length resistances, refer to adjustments to Linearization Parameter 1, as described in the Analog Input Object Technical Bulletin, in Vol. III of the Metasys Network Technical Manual.
Commissioning Procedures

**Overview**

To commission an OAN Function Module:

1. Install the unit.
2. Set the software span to either 0 to 20 mA or 4 to 20 mA.
3. Verify the field device performance.

**Assumptions**

The following procedure for the physical installation of the Output Analog (OAN) Function Module assumes:

- Panel (NCU or NEU) modules are installed, complete with NCM200 (or later) and Operator Workstation (Release 5.02 or later) software.
- Connections to field devices are complete, and follow NEC and local codes.
- You have engineering drawings defining details for the installation.
- You are familiar with Metasys® Network terminology, and the location and operation of power switches.

**Installation**

For each OAN Function Module in the network, perform the following steps.

1. Check that both Auto/Manual switches are set to Manual.
2. Check that the potentiometer output is not set higher than the mid-range position as shipped from the factory (Counter-Clockwise decreases output).

![Figure 5: OAN Auto/Manual Switch and Potentiometer Locations](image)

Note: If using a long screwdriver on the potentiometer, be careful to not over-torque the knob, which could damage either the potentiometer or the knob.
3. Refer to the engineering drawings, and identify the proper panel and slot number location for this module.

4. Install and latch the module in the appropriate slot by plugging it into the base frame by hand. (Described in the NCU/NEU Technical Bulletin.)

5. Verify that the point object defined in the System summary, the function module, and the field device are connected as defined by the engineering drawing.

   Ensure that you connect each device through terminal blocks corresponding to the subslot defined in software for that device:

   - Channel 1 refers to subslot 1, whose wires connect to terminal blocks 1 and 2.
   - Channel 2 refers to subslot 2, whose wires connect to terminal blocks 4 and 5.

![Figure 6: Terminal Block Connections Leading to an OAN101](image-url)
The OAN generates a default output range of 0 to 20 mA. Use software to generate an offset range of 4 to 20 mA, through DDL, GPL, or on-line generation. The method is to select the appropriate Span Type for the device.

Span Type 0 is used to generate the full output range. While designating a Span Type of 0, commanding the device to 4 mA would require a command of 20% (assuming a span of 0 to 100).

Span Type 1 is used to generate the 4 to 20 mA output range. While designating a Span Type of 1, commanding the device to 4 mA would require a command of 0%.


Device verification assumes that the operating software for the network has been downloaded to the NCM controlling the panel, and the software span has been set.

For each OAN Function Module on the network, perform the following steps.

1. Select the System summary that includes this OAN object.
2. Set the Auto/Manual switch to Auto.
3. Use the software’s override command and verify that the object’s Value attribute (as seen in the summary) matches the actual value for the field device. If the values do not match, refer to the troubleshooting chart in the next section.
Troubleshooting Procedures

Figure 7 (next page) is a troubleshooting flowchart that applies to failures between point objects and field devices connected through the OAN.
Figure 7: OAN Troubleshooting
Ordering Information

<table>
<thead>
<tr>
<th>Description</th>
<th>Product Code Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Analog Function Module</td>
<td>FM-OAN101-0</td>
</tr>
</tbody>
</table>

There is no replacement part to the OAN FM.