I/O MODULES
Our line of pluggable input and output modules provide a low cost, versatile method for interconnecting real world analog and digital signals to data acquisition, monitoring, or control systems. All modules provide an optically isolated barrier between sensitive microprocessor or digital logic circuits and field power devices.

In the G5 and OpenLine® packages, analog and digital I/O modules are available with the same pin-out. This gives the flexibility of mixing and matching module types on the same mounting rack or base; making them perfect in applications which require interface to a variety of different sensors and loads.

The case color of the single point modules identify their function. The industry standard for single point I/O module case colors is:
- Digital AC Output Module = Black Case
- Digital DC Output Module = Red Case
- Digital AC Input Module = Yellow Case
- Digital DC Input Module = White Case

DIGITAL OUTPUT MODULES
Digital output modules are used to switch AC and DC loads such as solenoids, motors, or lamps from logic signal levels. Their inputs are directly compatible with TTL or CMOS interface circuitry.

AC output modules have zero voltage turn-on of the load to greatly reduce generated EMI and RFI. They are highly immune to electrical transients, and have built-in RC snubber networks for increased capability with inductive loads.

DC output modules can operate DC loads over a wide voltage range and have built-in voltage spike protection.

DIGITAL INPUT MODULES
Digital input modules are used to monitor the status of a load or a sensor (such as a limit switch, pressure switch, or temperature switch). The output of these modules is a logic level signal which corresponds to the status of the device being monitored. A high level output signal indicates the load is off (the switch is open). A low level output signal indicates the load is on (the switch is closed). Input modules are designed to give fast, clean switching by providing filtering and hysteresis.

Input and output modules are compatible in that the output of one can drive the input of the other.

UL, CSA AND CE APPROVALS
As one of the world’s leading manufacturers of I/O modules, we strive to assure that our products comply with all of the applicable international standards. In doing so, we believe your products will also be readily accepted and easily certified. All modules shown in this section have been tested to UL Standard 508 and are documented in UL file number E58832. Similarly, they have been tested to CSA Standard 22.2 No. 14-95M and are documented in CSA file LR38763. Additionally, OpenLine® modules were tested and passed CSA 22.2 No. 213-M1987 Class I, Div. 2 Groups A, B, C and D. Parts bearing the CE logo indicate conformance with EN50082-2 and EN50081-2 (89/336/EEC EMC directive) as well as EN60950 (61010-1) for the low voltage directive. Contact Grayhill for copies of our Declaration of Conformity or visit our website. Parts bearing the TÜV logo indicate that they were the agency which performed the EN60950 evaluation.

CONSTRUCTION AND LIFETIME WARRANTY
All of our I/O modules are hard potted with thermally conductive epoxy to withstand harsh industrial environments. The modules provide optical isolation, immunity to mechanical shock and vibration, and operate over a wide temperature range. The module cases are a solvent resistant thermoplastic which meets UL94-V-0 rating. The terminal pins are a tin-plated copper wire. Component selection and surface mount construction allow low operating junction temperatures for long life. Superior design, rigorous testing, and field data give us the confidence to back our I/O modules with the industry’s first lifetime warranty.

I/O MODULE WIRING
Analog and digital modules can be placed at any I/O location, however, to minimize the possibility of crosstalk and noise pickup it is a good practice to group similar module types together. 14 or 16 gauge wire is typically used to wire the field devices to the I/O rack terminal block.

PART NUMBER EXPLANATION: Digital I/O Modules

<table>
<thead>
<tr>
<th>Module Type</th>
<th>Function</th>
<th>Suffix</th>
<th>Logic Supply Voltage or Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>70G = Digital Module, G5 Package</td>
<td>ODC = Digital Output DC</td>
<td>MA = 240 Vac, Manual Override</td>
<td>5 Vdc, 15 Vdc, 24 Vdc = Logic Supply Voltage (Standard, Mini, G5)</td>
</tr>
<tr>
<td>70L = Digital Module, OpenLine® Package</td>
<td>IAC = Digital Input AC</td>
<td>DC Outputs: Blank = 3-60 Vdc Fast MA = 3-60 Vdc, Manual Override</td>
<td>Analog Modules: 4.75-5.25 Vdc</td>
</tr>
<tr>
<td>70M = Digital Module, Mini Package</td>
<td>IDC = Digital Input DC</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**AC Inputs:** Blank = 120 Vac DC Inputs: Blank = 3-32 Vdc
**AC Outputs:** Blank = 120 Vac MA = 120 Vac, Manual Override

**Logic Supply Voltage or Range**
- Digital Modules: Blank = 4.5-28 Vdc (OpenLine®)
- 5 Vdc, 15 Vdc, 24 Vdc = Logic Supply Voltage (Standard, Mini, G5)

**Suffix**
- DC: G = 35-60 Vac/Vdc D = 2.5–28 Vdc L = Inductive loads S = Dry Contacts
- AC: A = 220 Vac A-11 = Non-Zero Cross  
  A-5 = Normally Closed

**Logic Supply Voltage or Range**
- Digital Modules: Blank = 4.5-28 Vdc (OpenLine®)
- 5 Vdc, 15 Vdc, 24 Vdc = Logic Supply Voltage (Standard, Mini, G5)

**Analog Modules:** 4.75-5.25 Vdc
DIMENSIONS: OpenLine® Digital Modules

Dimensions shown in inches (and millimeters). Tolerances are ± .010 (0,25) unless indicated otherwise.

<table>
<thead>
<tr>
<th>Module Type</th>
<th>Output Function</th>
<th>Input Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/O Module Pin #</td>
<td>A+</td>
<td>A-</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module Type</th>
<th>Output Function</th>
<th>Input Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/O Module Pin #</td>
<td>B+</td>
<td>B-</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
</tbody>
</table>

Note: For PC board layout information, request Bulletin #745

DIMENSIONS: G5 Digital Modules

Dimensions shown in inches (and millimeters). Tolerances are ± .010 (0,25) unless indicated otherwise.
DIMENSIONS: Standard and Miniature Digital Modules

Dimensions shown in inches (and millimeters). Tolerances are ± .010 (0,25) unless indicated otherwise.

**Standard Module**

- 1.00 (25,4)
- .60 (15,2)
- 1.70 (43,2)
- 1.25 (31,8)
- .235 ± .02 (6,0 ± 0,52)
- .30 (7,6)
- .40 (10,2)
- 90 (22,9)
- 1.10 (27,9)
- 1.30 (33,0)

4-40 X 1-1/2" PHILLIPS HOLD-DOWN SCREW INCLUDED WITH EACH MODULE. MAXIMUM TORQUE = 5 FT-LB

**Miniature Module**

- .40 (10,2)
- 1.70 (43,2)
- .040/.042 (1,02/1,07)
- .20 (5,1)
- .30 (7,6)
- .40 (10,2)
- 90 (22,9)
- 1.10 (27,9)
- 1.30 (33,0)

OUTPUT MODULES HAVE ONLY TERMINALS NUMBER 1-4

**WIRING DIAGRAM: Digital I/O Modules**

- DIGITAL AC OUTPUT
- LOAD
- HOT AC SUPPLY
- NEUTRAL

- DIGITAL DC OUTPUT
- LOAD
- + DC SUPPLY
- -

- DIGITAL AC INPUT
- HOT AC SUPPLY
- NEUTRAL

- DIGITAL DC INPUT
- + DC SUPPLY
- -

- DIGITAL CONTACT CLOSURE
**I/O MODULE SIZE**

- **Miniature**
  - Saves 35% Space
- **Standard**
  - Compatible Industry Size
- **G5**
  - Fused Outputs, Integral LED
- **OpenLine®**
  - Two Channel, Fused Outputs, Integral LED

**FUNCTION**

(Check Specifications for Input and Output combinations, Feature or Option availability.)

<table>
<thead>
<tr>
<th>Function</th>
<th>Load</th>
<th>Control Vcc</th>
<th>Unique Options</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Digital AC Output</strong></td>
<td>120 Vac</td>
<td>5 Vdc</td>
<td>Random Turn-on</td>
</tr>
<tr>
<td></td>
<td>220 Vac</td>
<td>15 Vdc</td>
<td>Normally Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24 Vdc</td>
<td>Manual Override</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.5-28 Vdc</td>
<td>Inductive Load</td>
</tr>
<tr>
<td><strong>Digital DC Output</strong></td>
<td>60 Vdc</td>
<td>5 Vdc</td>
<td>Dry Contacts</td>
</tr>
<tr>
<td></td>
<td>200 Vdc</td>
<td>15 Vdc</td>
<td>Manual Override</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24 Vdc</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.5-28 Vdc</td>
<td></td>
</tr>
<tr>
<td><strong>Digital AC Input</strong></td>
<td>Supply Vcc 5 Vdc</td>
<td>Input Voltage 120 Vac</td>
<td>High DC Voltage</td>
</tr>
<tr>
<td></td>
<td>15 Vdc</td>
<td>220 Vac</td>
<td>Voltage Input</td>
</tr>
<tr>
<td></td>
<td>24 Vdc</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.5-28 Vdc</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Digital DC Input</strong></td>
<td>Supply Vcc 5 Vdc</td>
<td>Input Voltage 3 to 32 Vdc</td>
<td>Unique Options</td>
</tr>
<tr>
<td></td>
<td>15 Vdc</td>
<td></td>
<td>10 to 32 Vdc/</td>
</tr>
<tr>
<td></td>
<td>24 Vdc</td>
<td></td>
<td>15 to 32 Vac</td>
</tr>
<tr>
<td></td>
<td>4.5-28 Vdc</td>
<td></td>
<td>8 KHz Switching</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>35 to 60 Vac/Vdc</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Contact Closure</td>
</tr>
</tbody>
</table>

**Test Digital I/O Modules**

**Module Calibrator/Programmer**

The field programmer can be used to test, calibrate and transfer data to smart OpenLine® modules. On-board switches also allow testing of digital I/O modules. The programmer connects to a PC through an RS-232 serial port. Software is included to communicate with smart I/O modules.

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>70L-PROG</td>
<td>Field programmer/calibrator for OpenLine® I/O</td>
</tr>
</tbody>
</table>