AG series
Agricultural grips
Distinctive features and specifications

MECHANICAL (FOR X AND Y AXIS)
- Break Out Force: 7.6N (1.70lbf)
- Operating Force: 13.8N (3.10lbf)
- Maximum Applied Force: 1000.8N (225.00lbf)
- Mechanical Angle of Movement: 38º
- Expected Life: 1 million cycles
- Lever Action (Centering): Spring centering
- Material: Glass reinforced nylon

ENVIRONMENTAL
- Operating Temperature: -25ºC to 70ºC (-13ºF to 158ºF)
- Storage Temperature: -40ºC to 70ºC (-40ºF to 158ºF)
- Sealing: IP65 to IP67
- EMC Immunity Level (V/M): IEC 61000-4-8:2009
- EMC Emissions Level: IEC 61000-4-3:2006
- ESD: IEC 61000-4-2:2008

ELECTRICAL SENSOR
- Sensor: Hall effect
- Resolution: 1.22mV
- Supply Voltage Range: 5.00V±0.01V
- Reverse Polarity Max: -10V
- Overvoltage Max: 20V
- Output Impedance: 2Ω
- Return to Center Voltage Tolerance: ±200mV initial
- Supply Current: 13mA per sensor

STANDARD PUSHBUTTON SWITCH
CHARACTERISTICS/RATINGS
- Max Current / Voltage Rating with Resistive Load:
  400mA 32VAC - 100mA 50VDC - 125mA 125VAC
- Low Level: 10mA @ 30mV
- Electrical Life at Full Load: 500,000 cycles
- Mechanical Life: 1 million cycles
- Environmental Seal: IP67
- Action: Momentary, pushbutton
- Operating Force: 7N±3N (1.57lbf±0.67lbf)
- Total Travel: 1.9mm (0.07 inches)±0.3mm (0.01 inches)

INDEX TRIGGER SWITCH CHARACTERISTICS/RATINGS
- Electrical Resistive Load:
  5A (depending on the chosen switch)
- Electrical Inductive Load:
  3A (depending on the chosen switch)
- Low Level: 10mA @ 30mV
- Electrical Life: 1 million cycles 5A @ 28 VDC
- Mechanical Life: 25,000 cycles
- Environmental Seal: IP67
- Action: Momentary, snap-action
- Operating Force: 7.5N±2.0N (1.69lbf±0.45lbf)
- Total Travel: 0.080 inches max
- Over Travel: 0.010 inches min

NOTES:
All values are nominal.
Exact specifications may be subject to configuration.
Contact Technical Support for the performance of your specific configuration.

- Hall effect sensing
- Ergonomic design
- Multiple faceplate configurations
- Sealed up to IP67
- CANbus J1939, CANopen
  & analog output options

Note: The company reserves the right to change specifications without notice.

APEM www.apem.com
## AG series
### Agricultural grips

**Overview**

### Notes:
1. Contact Technical Support for custom options.
2. X/Y axis spring tension. Contact Technical Support for information on best possible spring for your chosen configuration.
3. Standard wire harness is 22AWG, 18" long.
4. Only one identifier wire if CANbus.

### Sealing:
- E: Environmental Sealing
- N: Not Sealed

### Operator Presence:
- 0: None
- 1: Standard
- 2: Heavy
- 3: Handle only, no spring

### Spring Tension:
- 0: None
- 1: Standard
- 2: Heavy
- 3: Handle only, no spring

### Terminator:
- P: Standard wire harness³
- D: Deutsch connectors
- B: 5 pole binder connector⁴

### Sealing:
- E: Environmental Sealing
- N: Not Sealed

### Mounting Cutout Dimensions:

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>61.00</td>
<td>(2.40)</td>
</tr>
<tr>
<td>Ø71.40</td>
<td>(2.812)</td>
</tr>
<tr>
<td>Ø7.10</td>
<td>(0.281)</td>
</tr>
</tbody>
</table>

* For Drop-in mounting only

### Notes:
1. Dimensions are in mm/(inch).
2. Actual strain relief position may vary.
3. For below panel lower profile housings, the strain relief [20.30/(0.80)] can be replaced with a rubber grommet [1.27/(0.05)], and the standard housing cap [18.54/(0.73)] can be replaced with a short cap [11.94/(0.47)]. These options are available only for joysticks without additional boards, except USB.
4. Axis orientation:
### OVERVIEW

The AG series handle can be fitted onto a one or two axis Hall effect joystick mechanism or it can be supplied as just a Fixed Grip™.

### FACEPLATE OPTIONS

The AG series may be configured with a black anodized aluminum or a plastic faceplate, providing a near limitless combination of pushbutton and linear device configuration options. Faceplate configuration options include proportional Hall effect pushbuttons, latching LED pushbuttons, LED indicators, and proportional miniature joysticks.

### JOYSTICK AND GRIP OPTIONS

The AG series handle is available with a normally open momentary index trigger.
AG series
Agricultural grips
Overview

VOLTAGE OUTPUT OPTIONS

<table>
<thead>
<tr>
<th>OPTION 00</th>
<th>OPTION 01</th>
<th>OPTION 02</th>
<th>OPTION 03</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Graph" /></td>
<td><img src="image" alt="Graph" /></td>
<td><img src="image" alt="Graph" /></td>
<td><img src="image" alt="Graph" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPTION 04</th>
<th>OPTION 05</th>
<th>OPTION 06</th>
<th>OPTION 07</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Graph" /></td>
<td><img src="image" alt="Graph" /></td>
<td><img src="image" alt="Graph" /></td>
<td><img src="image" alt="Graph" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPTION 08</th>
<th>OPTION 09</th>
<th>OPTION 10</th>
<th>OPTION 11</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Graph" /></td>
<td><img src="image" alt="Graph" /></td>
<td><img src="image" alt="Graph" /></td>
<td><img src="image" alt="Graph" /></td>
</tr>
</tbody>
</table>

Output 1 — Output 2
USB
Featuring USB 1.1 HID compliant interface, APEM’s USB joysticks are recognized as standard HID “game controller”
devices. Adhering to the HID specification, APEM’s USB joysticks are plug-and-play with most versions of Windows.
Joystick button and axis assignments are dependent upon the controlled application.

FEATURES
• USB 1.1 HID compliant “game controller” device
• Easy to install and operate
• Functions determined by controlled application

SUPPLIED WIRING
USB: USB Male Type A Connector with overmolded cable

CURSOR EMULATION
The Cursor Emulation option converts multi-axis joystick output into a mouse, trackball, or cursor control device. The
joystick’s internal microprocessor converts absolute axis position into a cursor velocity, which is translated as a
relative trackball or mouse position.

APPLICATIONS
The Cursor Emulation option is ideal for vehicle applications subjected to dirt and high vibration which makes
operating a traditional cursor control device difficult. The Cursor Emulation option is widely used in shipboard
and military applications.

FEATURES
• HID compliant “pointing device”
• Plug-and-play with USB option

SUPPLIED WIRING
USB: USB Male Type A Connector with overmolded cable
AG series
Agricultural grips

Overview

**CANbus J1939**
APEM’s CANbus joysticks conform to the SAE J1939 serial bus specification used for communications between electronic control units and vehicle components. The AG CANbus option provides I/O extension for up to eight digital and 4 analog inputs, or four digital inputs and a switch matrix of 4 x 6 for up to 24 switches.

<table>
<thead>
<tr>
<th>ELECTRICAL SPECIFICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Supply Voltage: 6VDC to 35 VDC</td>
</tr>
<tr>
<td>• Supply Current: 15mA min, +5mA per LED, +10mA per axis</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WIRING SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Red Wire: Supply Power</td>
</tr>
<tr>
<td>• Black Wire: Ground</td>
</tr>
<tr>
<td>• Green Wire: CAN high data</td>
</tr>
<tr>
<td>• White Wire: CAN low data</td>
</tr>
<tr>
<td>• Blue Wire: Identifier Select LSB</td>
</tr>
<tr>
<td>• Orange Wire: Identifier Select MSB</td>
</tr>
</tbody>
</table>

**ENVIRONMENTAL**
- Operating temperature: -25°C to +70°C (-13°F to +158°F)
- Storage temperature: -40°C to +70°C (-40°F to +158°F)

**CONNECTOR OPTIONS:**
- Cable assembly with Deutsch DT04 style plugs

**CANbus CONFIGURATION**
- Contact Technical Support for assistance.

**PINOUT INFORMATION**
The CANbus AG series joystick is available with industry standard Deutsch connectors #DT04-3P and #DT04-4P for easy installation. The pinouts are listed below.

**Deutsch connector #DT04-3P**
- White: CAN Low
- Green: CAN High

**Deutsch connector #DT04-4P**
- Black: 0V
- Red: 24V
- Violet: S0
- Gray: S1

**NOTES:**
1. Dimensions are in mm/(inch).
2. Standard cable harness is 450mm (18inch) long, 22AWG, with flying leads.

**CANopen**
- Contact Technical Support for assistance with CANopen configuration.
ADDITIONAL OUTPUT OPTIONS

DISCRETE OUTPUT
Discrete Output is a microprocessor based option providing up to 6 hi voltage/hi current, on/off outputs as well as proportional outputs. The Discrete Output provides an electronic “switch stick” function.

APPLICATIONS
The Discrete Output option is designed for small motor, reversing starters or hydraulic solenoid actuations.

DC SPECIFICATIONS

| Supply Voltage Operating: | 6.0VDC to 35VDC input power |
| Supply Current: | 30mA + 10mA per Hall sensor |
| Sourcing Outputs: | 70V AC/DC @ 1.6A max. |
| Sinking Outputs: | 70V AC/DC @ 3.2A max. |
| Discrete Output Max: | 60VDC/AC, 3.2A per discrete output |

I/O COMPLEMENT AND USER SPECIFIED PARAMETERS:
Up to 3 axis and 6 discrete sourcing or sinking outputs.

DISCRETE OUTPUT CONFIGURATION FORM:

<table>
<thead>
<tr>
<th>Discrete Output</th>
<th>Sourcing</th>
<th>Sinking</th>
<th>AC</th>
<th>DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Xfwd</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Xrev</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yfwd</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yrev</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zfwd</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zrev</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SAMPLE OF COMPLETED FORM:
(Please enter required choices for each applicable axis and return form to factory.)

<table>
<thead>
<tr>
<th>Discrete Output</th>
<th>Sourcing</th>
<th>Sinking</th>
<th>AC</th>
<th>DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Xfwd</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Xrev</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Yfwd</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Yrev</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Zfwd</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Zrev</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

VOLTAGE REGULATOR
The Voltage Regulator is a multi-wired analog option used to mate to a variety of industrial control voltages. The Voltage Regulator may be used when the supply or output voltage is greater than 5V or when bipolar output is required.

User Specified Output Voltage:
- 0-5VDC
- 0-10VDC
- ±5VDC
- ±10VDC

ELECTRICAL SPECIFICATIONS

| Supply Voltage: | (Output Voltage + 1VDC) to 30VDC |
| Supply Current: | 90mA max |