Technical Datasheet #TDAX020710

Universal Input, Single Output Valve Controller
With Near Field Communication (NFC)
Configurable with E-WRITE NFC Application from Google Play

P/N: AX020710

Features:
- 1 universal signal input, user selectable as:
  - Voltage;
  - Current;
  - PWM;
  - Frequency;
  - or Digital.
- 1 output drives a solenoid, user selectable as:
  - proportional current 0-3 A;
  - proportional voltage up to Vps;
  - PWM signal;
  - or digital on/off.
- 1 auxiliary 0-5V output feedback
- +5V Reference output;
- 12Vdc, 24Vdc nominal
- PCB assembly with four (4) 2-pin push-in terminal blocks
- Multiple LED indicators
- IP00
- Smartphone running E-Write NFC Android application configures the controller when placed in close proximity.
- E-Write NFC provides flexible user configurability for application-specific input-output relationship with slope or time response.
- Protected and secure communication

Ordering Part Numbers:
AX020710 – Universal Input, Single Valve Controller, NFC, 1 8-pin Screw Terminal Block, PCB
AX020710-PG9 - Universal Input, Single Valve Controller, NFC, 1 8-pin Screw Terminal Block, Metal Box, Strain Relief (1 PG9)
AX020710-1.5M - Universal Input, Single Valve Controller, NFC, 1 8-pin Screw Terminal Block, Metal Box, 1.5 M Cable

If custom settings are requested, a unique part number will be assigned before ordering.
**Description:**
As a highly flexible controller, it accepts one command signal input and drives a solenoid up to 3A. Many control profile parameters are user configurable. A PCB form factor is available. Operation is from -40 to 85 °C. Designed to interface with 12V or 24V battery power, it is suitable for machine and industrial applications.

Using Near Field Communication (NFC), the wireless valve controller is remotely configurable via a smartphone application. Bringing the two devices within 3 cm* (1 inch) of each other, the NFC technology uses magnetic induction between two loop antennas to communicate within the globally available radio frequency ISM band of 13.56 MHz.

There are 3 models available: PCB Assembly (AX020710); PCB installed in a metal box with PG9 strain relief (AX020710-PG9); or a PCB installed in a metal box with 1.5 m unterminated cable (AX020710-1.5M).

*The distance will vary with different phones.*

**BLOCK DIAGRAM**
Technical Specifications: All specifications typical at nominal input voltage and 25°C unless otherwise specified. Specifications are indicative and subject to change. Actual performance will vary depending on the application and operating conditions. Users should satisfy themselves that the product is suitable for use in the intended application. All our products carry a limited warranty against defects in material and workmanship. Please refer to our Warranty, Application Approvals/Limitations and Return Materials Process as described on www.axiomatic.com/service.html.

Input Specifications

<table>
<thead>
<tr>
<th>Power Supply Input - Nominal</th>
<th>12Vdc or 24Vdc nominal (9…36 VDC power supply range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection</td>
<td>Reverse polarity protection is provided. Overvoltage protection up to 45V is provided. Overvoltage (undervoltage) shutdown of the output load is provided.</td>
</tr>
</tbody>
</table>

Universal Signal Input

Refer to Table 1.0 All inputs are user selectable.

**Table 1.0 – User Configurable Universal Input**

<table>
<thead>
<tr>
<th>Analog Input Functions</th>
<th>Voltage Input or Current Input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage Input</td>
<td>0-5 V (Impedance 110 kΩ) 0-10 V (Impedance 130 kΩ) +/- 5V (Impedance 110 kΩ) +/- 10V (Impedance 130 kΩ)</td>
</tr>
<tr>
<td>Current Input</td>
<td>0-20 mA (Impedance 249 Ω) 4-20 mA (Impedance 249 Ω)</td>
</tr>
</tbody>
</table>

Discrete Input Functions

Digital Input, PWM Input or Frequency Input

Input

12-bit ADC

Digital Input Level

Accepts 5V TTL and up to VPS
Threshold: Low <1 V; High >2.2 V

Digital Input

Active High or Active Low
Amplitude: 0 to +Vps

Input Impedance

1 MOhm High impedance, 10KOhm pull down, 10KOhm pull up to +6V

PWM Input

Low Frequency (10 Hz to 1 kHz) High Frequency (100 Hz to 10 kHz) 0 to 100% D.C.

Frequency Input

0.5 Hz to 50 Hz; 10 Hz to 1 kHz; or 100 Hz to 10 kHz 1 to 99% D.C.

Input Accuracy

< 1%

Input

16-bit Timer

**Maximum and Minimum Ratings**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Min</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply</td>
<td>9</td>
<td>36</td>
<td>V dc</td>
</tr>
<tr>
<td>Voltage Input</td>
<td>0</td>
<td>36</td>
<td>V dc</td>
</tr>
<tr>
<td>Current Input 0(4)-20 mA</td>
<td>0</td>
<td>12</td>
<td>V dc</td>
</tr>
<tr>
<td>Digital Input</td>
<td>0</td>
<td>36</td>
<td>V dc</td>
</tr>
<tr>
<td>PWM Duty Cycle</td>
<td>0</td>
<td>100</td>
<td>%</td>
</tr>
<tr>
<td>PWM Low Frequency</td>
<td>10</td>
<td>1 000</td>
<td>Hz</td>
</tr>
<tr>
<td>PWM High Frequency</td>
<td>100</td>
<td>10 000</td>
<td>Hz</td>
</tr>
<tr>
<td>PWM Voltage pk - pk</td>
<td>0</td>
<td>36</td>
<td>V dc</td>
</tr>
<tr>
<td>Frequency</td>
<td>0.5</td>
<td>10 000</td>
<td>Hz</td>
</tr>
</tbody>
</table>

**Lookup Table Specifications**

Lookup Table

Can be used to create different input-to-output responses
Ramp or Time Response
Up to 5 Slopes/Time slots
The user can map the Universal Input as control to the Lookup Table and configure the required slopes for the output
**Output Specifications**

Output:
- Up to 3A
- Half-bridge, High Side Sourcing, Current Sensing, Grounded Load
- High Frequency (25 kHz)

The user can select the following options for output using the E-Write NFC:
- Proportional Output Current (with current sensing) (0-3A)
- Proportional Output Voltage (up to Vps)
- Output PWM Duty Cycle (0-100% D.C.)
- Digital On/Off (Gnd-Vps)

**Configurable Parameters**
Refer to Table 2.0.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum Range</th>
<th>Maximum Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Current</td>
<td>0A</td>
<td>3A</td>
</tr>
<tr>
<td>Ramp Up / Ramp Down</td>
<td>0ms (no ramp)</td>
<td>60,000ms</td>
</tr>
<tr>
<td>Dither amplitude</td>
<td>0mA (no dither)</td>
<td>400mA</td>
</tr>
<tr>
<td>Current dither</td>
<td>50Hz</td>
<td>500Hz</td>
</tr>
<tr>
<td>PWM frequency</td>
<td>1Hz</td>
<td>25kHz</td>
</tr>
</tbody>
</table>

**Output Accuracy**
- Output Current mode ≤1%
- Output Voltage mode ≤1%
- Output PWM Duty Cycle mode ≤1%

**Output Resolution**
- Output Current mode 1 mA
- Output Voltage mode 0.1V
- Output PWM mode 0.1%

**Protection**
- Overcurrent and short circuit protection

**Auxiliary Output**
- 0-5V output is proportional to the proportional output range.
- Short circuit protection is provided.

**Auxiliary Output Scale**
- 20% of proportional output range

**Voltage Reference**
- +5V, 50 mA maximum load

**General Specifications**

**Microprocessor**
- STM32F205RET6
- 32-bit, 512 Kbit program flash

**Quiescent Current**
- 34 mA @ 24Vdc

**LED Indicator**
- Power, heartbeat, input fault indication and output fault indication

**Control Logic**
- User configurable

**Communications**
- Near Field Communication
- Full-duplex
- Data rate: 106 kbit/s
- Complies with ISO14443 (RF protocol), ISO13239, and ISO7816
- Protected and secure configuration

**User Interface**
- E-WRITE NFC Application is available from Google Play.

**Operating Conditions**
- -40 to 85 °C (-40 to 185 °F)

**Dimensions**
Model AX020710:
- 2.50 x 2.50 x 0.77 inches (63.50 x 63.50 x 19.74 mm)
- (L x W x H)
- Refer to the dimensional drawing in Figure 1.

**Dimensions – In Metal Box with strain relief**
Model: AX020710-PG9
- Metal Box with gasket and PG9 strain relief
- 114.3 x 27.9 x 79.4 mm 4.50 x 1.01 x 3.13 inches
- (W x D x H excluding PG9 strain relief)
- Refer to Figure 2.0.

Model AX0201710-1.5M
- The dimensions of the metal box are the same as above.
- The cable is 1.5M in length and is unterminated.
- Refer to Figure 3.0.

**Protection**
- IP00 for PCB
- IP67 for Metal Box once cable is added

**Vibration**
- MIL-STD-202G, Method 204D test condition C (Sine)
- and Method 214A, test condition B (Random)
- 10 g peak (Sine)
- 7.68 Grms peak (Random)

**Shock**
- MIL- STD-202G, Method 213B, test condition A
- 50g (half sine pulse, 9ms long, 8 per axis)

**Approvals**
- CE marking

**Weight**
- AX020710: 0.05 lb. (0.023 kg)
AX020710: 1 8-pin screw terminal block (Wieland P/N: 25.197.0853.0)
Use 18-20 AWG wire for connection to power and solenoid.

<table>
<thead>
<tr>
<th>PIN #</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>POWER -</td>
</tr>
<tr>
<td>2</td>
<td>POWER +</td>
</tr>
<tr>
<td>3</td>
<td>SOLENOID -</td>
</tr>
<tr>
<td>4</td>
<td>SOLENOID +</td>
</tr>
<tr>
<td>5</td>
<td>INPUT +</td>
</tr>
<tr>
<td>6</td>
<td>INPUT GND</td>
</tr>
<tr>
<td>7</td>
<td>AUXILIARY OUTPUT</td>
</tr>
<tr>
<td>8</td>
<td>+5V REFERENCE</td>
</tr>
</tbody>
</table>

Mounting
Program the unit before installing in a control panel or metal box.
Mounting holes are sized for #6 or M4 bolts on the PCB Assembly P/N: AX020710. The bolt length will be determined by the end-user’s mounting plate thickness. The mounting flange of the controller is 0.062 inches (1.5 mm) thick. If the module is mounted without an enclosure, it should be mounted vertically with connectors facing left or right to reduce likelihood of moisture entry. All field wiring should be suitable for the operating temperature range. Install the unit with appropriate space available for servicing and for adequate wire harness access.

Figure 1.0 – Dimensional Drawing of AX020710
Figure 2.0 – Dimensional Drawing of AX020710-PG9

Figure 3.0 – Dimensional Drawing of AX020710-1.5M

Form: TDAX0207100-05/05/20