1   DESCRIPTION

The +/-10V Isolated Analog Output Module (HE693DAC410) provides four analog output channels, with 14-bits of resolution, and 1500VAC (RMS) isolation channel-to-channel and channel-to-ground. The module converts digital values (-32,000 to +32,000) residing in %AQ registers to analog voltage signals (-10 to +10V). The %AQ values are set by the ladder logic program in the PLC CPU. The module may be set to "default to 0V" or "hold last state" when the PLC is taken out of RUN mode. This is accomplished with a configuration parameter in the configuration software.
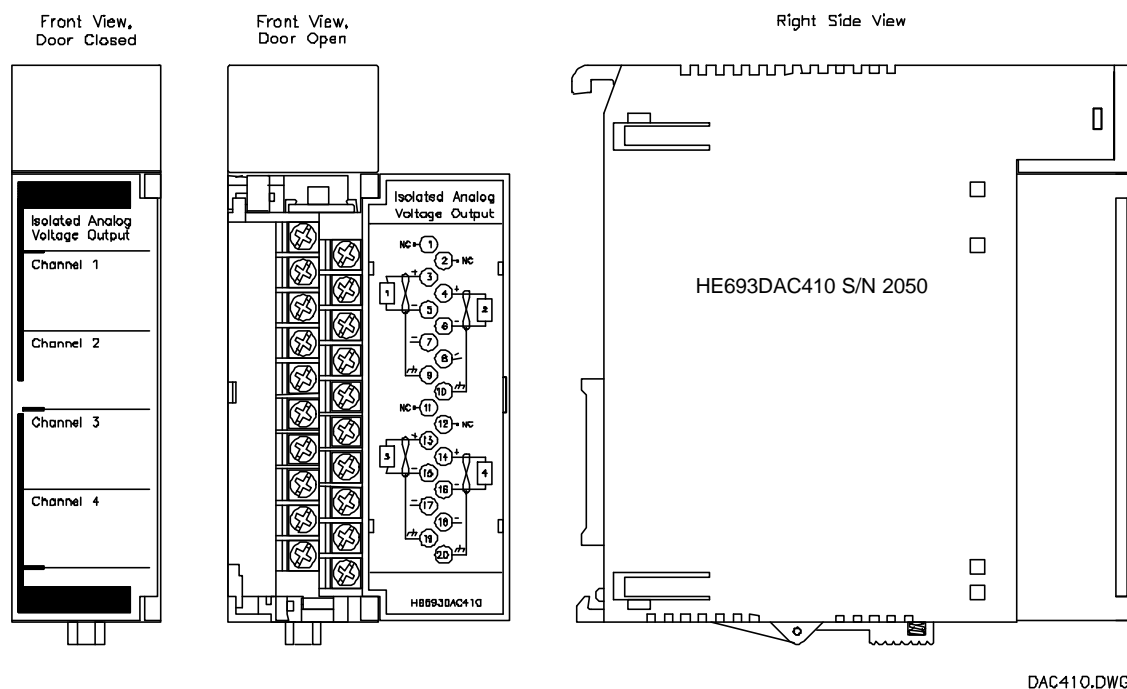

Figure 1 – HE693DAC410 Module

2   SPECIFICATIONS

Table 1 - HE693DAC410 Specifications			
Power Consumption, max	100mA @ 5VDC	**Maximum Linearity Error**	0.1% full scale
	120mA @ 24VDC	**Load Impedance**	≥ 2kohms
Current Surge on Power-up	250mA for 10ms. @ 5VDC	**Voltage Output Resolution**	1.25mV
	900mA for 30ms. @ 24VDC		
Number of Channels	4	**Common Mode Isolation**	1500VAC (RMS), +/- 2000VDC
I/O Required	4 %AQ	**Channel to Channel**	1500VAC (RMS), +/- 2000VDC
Output Range	+/- 10VDC	**Operating Temperature**	0 to 60°C
D/A Resolution	13 bits plus sign	**Relative Humidity**	5% to 95%, non-condensing

3   CONFIGURATION

```
                          ———— SOFTWARE   CONFIGURATION ————————————
  SLOT     Catalog #: FOREIGN                    FOREIGN MODULE
   2
 FRGN
           Module ID  :   3
           %I Ref Adr :   %I0001   Byte 1   : 00000001   Byte 9    : 00
           %I Size    :     0      Byte 2   : 00000000   Byte 10   : 00
           %Q Ref Adr :   %Q0001   Byte 3   : 00         Byte 11   : 00
           %Q Size    :     0      Byte 4   : 00         Byte 12   : 00
           %AI Ref Adr:   %AI001   Byte 5   : 00         Byte 13   : 00
           %AI Size   :     0      Byte 6   : 00         Byte 14   : 00
           %AQ Ref Adr:   %AQ001   Byte 7   : 00         Byte 15   : 00
           %AQ Size   :     4      Byte 8   : 00         Byte 16   : 00
```

Figure 2 - LM90 Foreign Module Configuration.

To reach this screen in the LM90 Configuration Package, select I/O Configuration (F1), cursor over to the slot containing the module and select Other (F8), and Foreign (F3).

Table 2 – Configuration Parameters		
%AQ Size	Byte 1	Bytes 2-5
4	0001	0: Default to 0V 1: Hold Last State

The necessary parameters are %AQ Size, Byte 1, and Bytes 2-5.

4   SCALING

Table 3 - Scaling	
Scaling	Smallest Step Change
%AQ = Volts / 10 x 32,000	4 (dec) = 1.25mV

The module converts each %AQ decimal value into an analog voltage between -10 and +10 volts. The two least significant bits of each %AQ are always 0, therefore the smallest decimal step change is 4, which corresponds to 1.25mV.
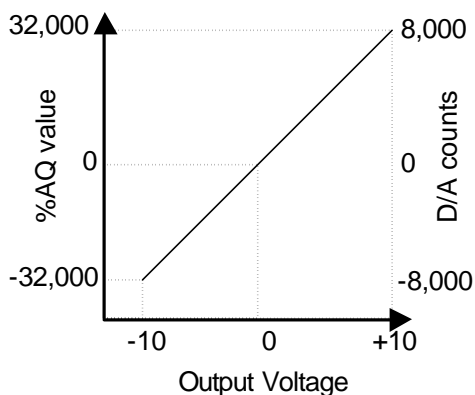
**Figure 3 - Output Voltage vs. %AQ Value
and Output Voltage vs. D/A Counts**
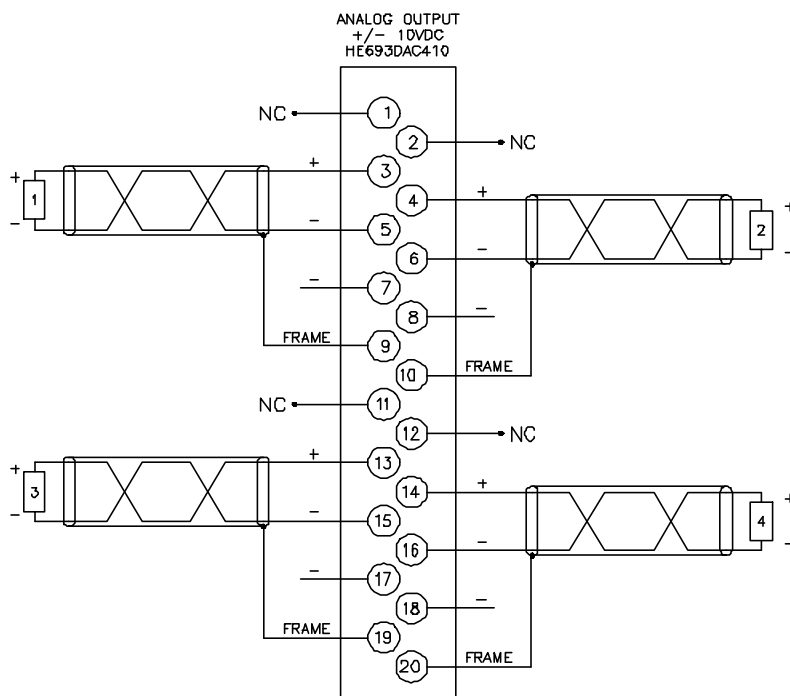
5   WIRING

Figure 4 - Wiring

6   SAFETY AND INSTALLATION

All applicable codes and standards need to be followed in the installation of this product.
The following safety precautions need to be followed.

Wiring needs to be routed in its own conduit.

Shielded, twisted pair extension wiring offers best noise immunity.

If shielded wiring is used, a good earth ground connection, at one end only, is critical. If shields are connected at the module end, terminals 9, 10, 19 and 20 are used as the shield ground point.

Adhere to the following safety precautions whenever any type of connection is made to the module.

Connect the green safety (earth) ground first before making any other connections.

When connecting to electric circuits or pulse-initiating equipment, open their related breakers. Do not make connections to live power lines.

Make connections to the module first; then connect to the circuit to be monitored.

Route power wires in a safe manner in accordance with good practice and local codes.

Wear proper personal protective equipment including safety glasses and insulated gloves when making connections to power circuits.

Ensure hands, shoes, and floor are dry before making any connection to a power line.

Make sure the unit is turned OFF before making connection to terminals. Make sure all circuits are de-energized before making connections.

Before each use, inspect all cables for breaks or cracks in the insulation. Replace immediately if defective.

7   TECHNICAL ASSISTANCE

For assistance and technical manual updates, contact Technical Support at the following locations: