SYSTEMS ELECTRONICS GROUP

SYSTEMS M200 INTERFACE MODULES

M273: HIGH SPEED SOLENOID DRIVER

- **High speed solenoid driver that improves solenoid response time, repeatability, and reliability**
- **Provides 39 volt DC turn "on" pulse for faster solenoid "on" response and 13.5 volt holding voltage for faster solenoid "off" response**
- **Adjustable turn "on" pulse (5 to 25 milliseconds)**
- **Optically isolated 10-30 VDC differential input**
- **Optimized for 24VDC solenoids**
- **Rated for 5 Amp inrush and 3 Amp continuous current**
- **LED status indication of solenoid energized**
- **Powered from external +24VDC and –15VDC user power supplies**
- **Removable Field Wiring Connector**
- **Standard 3" x 3" x 1" DIN Rail Mountable Module**

General Description

The M273 is a High Speed Solenoid driver which reduces the response time (both "on" and "off") and improves the repeatability of +24VDC solenoids. Compared to a standard solid-state output, which applies and maintains +24VDC to the solenoid, the M273 applies a pulsed turn "on" voltage of 39VDC for a user adjustable number of milliseconds when the solenoid is first energized. It then drops to a holding voltage of 13.5 volts until the solenoid is de-energized. Improvement in solenoid response time from 50 to 100% can be obtained using the M273.

The advantages of this type of driver are: When the solenoid is energized, the initial pulse provides a turn "on" voltage which is considerably greater than the rated voltage of the solenoid (which causes no damage to the solenoid since it is of a short duration). This provides a greater degree of energy to overcome the initial inertia of the spool quicker with a greater degree of repeatability. After a user adjustable number of milliseconds, the voltage drops to a holding voltage which is lower than the rated voltage of the solenoid but enough to maintain the solenoid in the energized state (at a lower energy level). When the solenoid is then de-energized, it will then turn "off" quicker because less energy needs to be dissipated from the coil. The M273 incorporates a transient suppressor

General Description (cont'd)

which allows the inductive back-EMF of the coil at turn "off" to drop to –39 volts. This also contributes to a quicker turn "off" since the energy is dissipated at a higher voltage. Note that fly-back diodes should not be added to the solenoid coil for this reason.

The M273 input is a 10-30VDC optically isolated differential input. This is usually driven from a 10-30VDC output from a PLC. The output of the M273 is then wired directly to the respective solenoid (see figure 1 for a typical wiring diagram). The output of the M273 is rated for up to a 5 amp inrush current for 50 milliseconds with a continuous holding current of 2 amps. An LED is provided on the front of the M273 to indicate when the solenoid is "on". This LED is driven directly from the M273 output. The M273 requires +24VDC and –15VDC power from user supplied power supplies rated appropriately for the required current.

The initial high voltage turn "on" pulse is user adjustable from 5 to 25 milliseconds via a potentiometer accessible through the front of the M273 (factory preset to 10 milliseconds). This is used to optimize the turn "on" time of the solenoid. Turning the potentiometer counter-clockwise decreases the pulse time. Turning the potentiometer clockwise increase the pulse time.

Typical applications include any +24VDC solenoid applications which require the quickest possible solenoid response times or the greatest degree of repeatability.

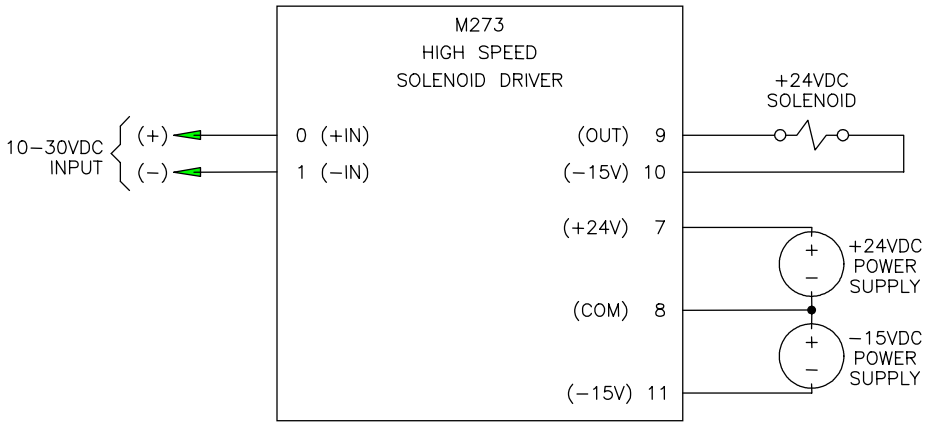

Figure 1
Typical Wiring Diagram of M273

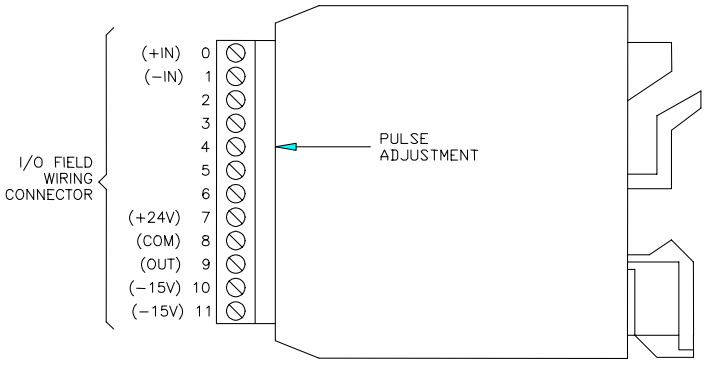

Figure 2
Connector Pin-Out

M273: HIGH SPEED SOLENOID DRIVER

Specifications

Module Size:	
Length:	3.25”
Height:	3.75”
Width:	1.00”
Input Section:	
Vin (on-min):	10.0 volts
Vin (on-max):	30.0 volts
Vin (off-min):	5.0 volts
Input Current (max):	27 milliamps at Vin=30volts
Input to Output Optical Isolation:	1500 Vrms
Input Configuration:	Can be wired for Sourcing, Sinking, or Differential
Output Section:	
Vout (Turn “on”):	39 volts DC (typical)
Vout (Hold):	13.5 volts DC (typical)
Output Current (Inrush < 50msec):	5 Amps
Output Current (Continuous):	2 Amps
Output Impedance (“on”):	0.50 ohms
Output Impedance (“off”):	2.5K ohms
Output Response Time (“on”):	10 microseconds (max)
Output Response Time (“off”):	100 microseconds (max)
Power Required:	
+24VDC Power:	
Voltage:	+24VDC +/-25% Regulated or Unregulated
Current:	Rated for inrush current of solenoid (min)
-15VDC Power:	
Voltage:	-15VDC +/-10% Regulated
Current:	Rated for inrush current of solenoid Plus 100mAmp
Temperature Ranges:	
Storage:	0 to 85 degrees C
Operating:	0 to 60 degrees C
Relative Humidity:	5 to 95% non-condensing