MICHIGAN CUSTOM MACHINES, INC.

Product Highlight:
GASOLINE INJECTOR DRIVER

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The purpose of the programmable gasoline injector module or"PGIM" is to provide the customer with a universal means of firing any gasoline PFI fuel injector in a manner that duplicates the OEM waveform characteristics. The board has various connection options as well as the ability to communicate with a PC or PLC or operate in a standalone operation.

Background

A typical PFI Fuel injector requires a current pulse driven at a certain voltage and current. In many cases this pulse has two phases; a pull-in and a hold-in phase. The impedance of the coil in the injector varies by manufacture and influences the electrical characteristics of the driver requirements. Usually the current delivered to the injector must be delivered to a peak level (called the pull0in current) and then reduced (the hold-in phase) once the injector actuator has moved. The reduction in current keeps the injector solenoid from burning up once the work from the solenoid has been done. During the holding phase, the current is dithered at a high frequency to minimize the hysteresis within the injector. This sequence is called a pulse and typically PFI injectors are measured in grams/pulse or GPP. Most PFI injectors are fired at a certain frequency and the pulse width is varied. The combination of OEM accuracy and control for a variety of injectors has made the task of a common driver a challenge for the testing industry, until now.

Module Features:

- Programmable waveform through Ethernet I/P port.
- Manually configurable waveform through selector switches
- Card Edge and terminal wiring options
- Perfect OEM waveform duplication
- Able to synchronize with external logic signal
- Ethernet I/P communication protocol allows easy interface to machine controls.
- Protection for open or shorted Injector connection
- Zener voltage applied during current drop from pull-in current to hold-in current, and current drop when turning off
- Sensing resistor included for external measurements

Description

The PGIM can be used to fire a gasoline injector with a precise waveform that is configurable by the end user. It synchronizes with a logic signal for pulse width and frequency. Waveform levels can be changed dynamically as needed with communication though an Ethernet port using Ethernet IP protocol. Examples for interfacing to a PLC can be provided. The module is also designed to set waveform levels with selector switches for simpler applications that require infrequent configuration and no communication. An injector solenoid can be energized for static flow testing.

The PGIM was designed for:

- OEM Future product development, giving extended experimental range over the production ECU
- Test bench integration for endurance testing fuel injectors
- Production test machine integration for in-line and end-of-line testing
- Lab bench or audit bench integration
- Expanded use with custom firmware
- Customers that test several injector types and brands on the same equipment

Using the PGIM for your application eliminates the need to use several different dedicated cards for different injectors on a platform that has been designed and calibrated for precision, exceeding production hardware.

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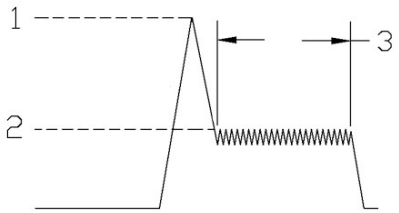
Flexibility

No matter what your requirements, the PGIM can deliver. The following waveform is an example of a waveform for a PFI injection cycle. The various programmable features controlled by the PGIM are numerically labeled and described in the following table. Though this example shows two current levels, virtually anything else is possible.



Programmable Features

Controlled Feature	Name	Description	Range	Resolution
1	Pull-In Current	Current driven to the solenoid to initially begin movement of the actuator. The solenoid will be driven to the peak level, and upon reaching it, the current command will then change to the hold level. If the peak current is not reached, the pull-in phase can be configured to timeout after 4mSec (via jumper).	0-6.7A	100 mA
2	Hold-in Current	Current high level delivered to the solenoid during the hold-in phase.	0-6.7A	100 mA
3	Hold-In Duration	Current low level delivered to the solenoid during the hold-in phase. This may be set equal to the Hold-in High Current for the tightest current control.	0-6.7A	100 mA

Specifications

- Card Voltage Supply: 10-30 VDC
- Independent Injector Voltage Supply: 10-30 VDC
- Current Control Principle: Low-Side Switching
- Current Control: 6.7 A Maximum, 100 mA Resolution
- Current Levels: Set by selector switches or communication via Ethernet/IP
- Pulse Logic Signal: 5 VDC, Sinking or Sourcing (selectable with jumpers)
- Peak Time-out at 4 mSec (enabled with jumper)
- Zener Voltage: Injector Voltage Supply + 18 Volts
- Sense Resistor: 0.1 Ohms Low-Side