APECS 4800 Control System

Applications

Woodward's APECS 4800 Control System combines a digital electronic controller with a rotary or linear actuator to provide speed control of diesel engines under 75 hp (56 kW). Primarily used for engine governing on small generators, the 4800 system is also well suited for throttle actuation on off-road light utility vehicles or construction equipment. Typical applications include stationary and mobile generator sets, construction machinery, and farm vehicles. The system provides accurate, reliable, and durable control over the service life of the engine in the extreme operating environment found in power generation and industrial applications.

CAN 2.0B SPECIFICATION

CAN functionality of the APECS 4800 controller conforms to SAE J1939 protocol, the CAN bus standard adopted widely by engine and vehicle manufacturers for communication and diagnostics among engine components.

The 4800 performs serial communication in accordance with CAN Specification 2.0B. By receiving data from engine components and transmitting commands, the 4800 can be used to command engine speed and communicate engine-operating parameters

Description

The 4800 Control System provides maximum control and optimal engine performance. By adjusting the fuel control lever with a Woodward position feedback actuator the 4800 system controls and limits engine speed.

The 4800 can provide emissions control for NOx with EGR valve control and particulate material reduction through smoke limiting.

The 48-pin digital controller provides isochronous speed control, actuator position control, torque limiting, droop, glow plug control, CAN J1939 based communications, and additional engine management and protection functions to optimize engine operating efficiency.

ENGINE CONTROL
The controller measures engine speed, compares it to the desired engine speed setpoint, and adjusts the current to the actuator to achieve the appropriate engine fueling command. The actuator may be attached to a fuel shutdown lever, a mechanical governor lever, or directly to the injector pump rack.

In stationary and mobile gensets and in industrial applications such as excavators the actuator adjusts the diesel fuel rack position to maintain the desired speed of the engine. The actuator also returns the engine fuel rack to minimum fuel position, shutting off the fuel flow to the cylinders. In performance of both functions, the actuator confirms its position by returning a signal to the controller.

- Emissions control for NOx and particulates

- Fully electronic governing system for diesel engines under 75 hp (56 kW)

- CAN/J1939 bus interface

- Configurable for isochronous speed control, torque limiting, and droop

- Drive-by-wire speed select option

- Engine management and protection

- Position feedback actuator mounts directly to engine

- Easy to customize and reprogram with calibration software

Controller Specifications

Electrical

Operating Voltage	9-32 Vdc
12 Vdc Supply Voltage	9-16 Vdc
24 Vdc Supply Voltage	18-32 Vdc

Environmental

Ambient Operating Temperature	-40°F to 185°F [-40°C to 85°C]
Ambient Storage Temperature	-40°F to 221°F [-40°C to 105°C]
Vibration	7 Grms
Shock	1 meter drop on concrete
EMC	Tests based on JASO-D001-94 ISO 7637, ISO-10605, ISO-11452, CISPR 25 / ISO 13766, and EN-61000
Enclosure	Weatherproof case and sealed connectors. Rated to IP67
Calibration	Requires standard serial cable and software for calibration (Woodward Toolkit)
Mounting	Off engine and away from exhaust manifold and pipes
Weight	Approx. 1.2 lb (0.54 kg)

Controller Dimensions

Dimensions in brackets are in millimeters
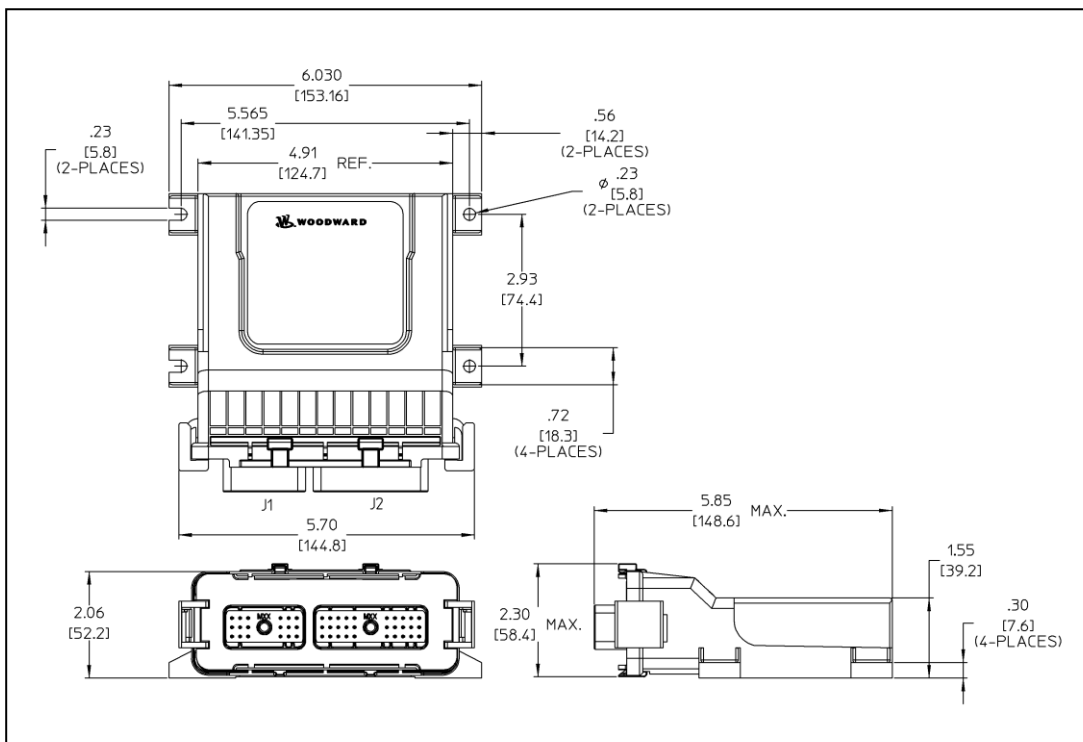
Controller Features

- *CAN/J1939 bus interface* can be used to command engine speed and communicate engine-operating parameters.

- *Control capabilities* include engine speed, rate of acceleration control, drive-by-wire operation, variable speed operation, and PTO operation.

- *Calibration* is simple using the Woodward Toolkit service tool. The controller can be calibrated on any IBM-compatible PC, allowing for easy customization and re-programmability.

- *Speed input* uses a magnetic pickup.

- *Internal diagnostics* monitor engine operation and display fault codes to indicate engine or system malfunction. Built-in engine protection capability can monitor engine coolant and oil pressure.

Programmable Features

- *Analog speed setpoint input* is suitable for use with a potentiometer or an accelerator pedal position sensor (idle verification available).

- *Autocrank* permits remote start operation of engines.

- *Auxiliary output* drives a lamp or relay.

- *Droop governing* allows non-isochronous speed governing.

- *Engine protection input* protects against adverse conditions such as loss of engine oil pressure or excessive coolant temperature.

- *Engine start-up functions* facilitate engine stability during warm-up, glowplug control, and smoke reduction.

- *PID gain adjustment* allows governor response to be adjusted by user.

- *Switch input* permits selection between analog speed setpoint input and fixed speed setpoints.

- *Torque limit over the full speed range provide engine overload protection.*

- *Positive and negative droop* can either be fixed or as a function of speed. This allows generator to be in droop parallel with the MAINS. On utility vehicles or construction equipment it improves operation during loading and unloading.

- *Input and output circuit* diagnostics protect the inputs and outputs from failure due to compromised field wiring.

- *Limp home mode and/or shutdown logic* protects the engine from damage and/or allows the machine to operate well enough to be brought out of the field for repair.

- *Exhaust gas recirculation* reduces the NO_X emissions by cooling the combustion process.

Rotary or Linear Actuators

Woodward has a variety of actuators suited to many OEM requirements. Please contact a Woodward sales representative for information on rotary and linear actuators that may be paired with the APECS 4800 controller.

Calibration

The APECS 4800 controller is configured using Woodward's Toolkit, which can be downloaded from www.woodward.com/software. This calibration tool monitors system operation and assists in diagnosis of system faults. It is also capable of monitoring all sensor inputs, control outputs, and diagnostic functions through a single access point to the controller.

The recommended computer and system software to support Toolkit is:

- IBM compatible personal computer equipped with a CD-ROM drive and a serial port with DB-9 connector capable of 38,400 baud communication
- Windows software: 2000 / XP / Vista / NT 4.0 Service Pack 6a
- Microsoft .NET Framework Version 2.0
- 96 MB of available RAM memory and a hard disk with at least 2.0 megabyte of free disk space
- SVGA capable video card and monitor, capable of 256 colors and 800 x 600 display
- Serial port and standard serial communication cable

For more information contact:

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