

DATA SHEET

HSC-2

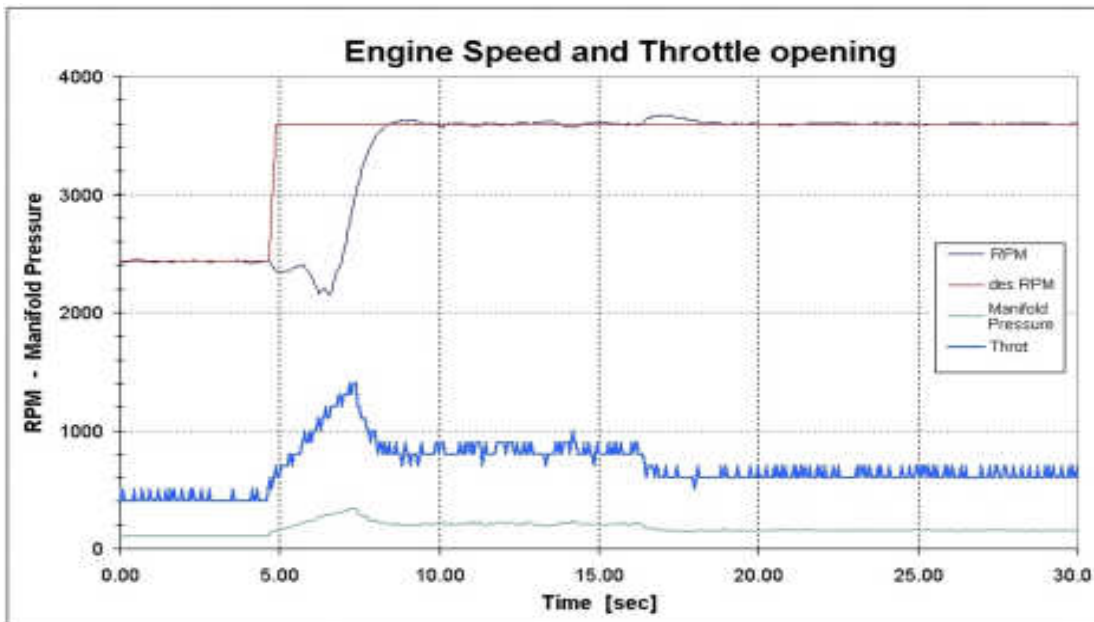
Nov. 30, 2004 Version 1
 March 9, 2005 Version 2
 March 21, 2005 Version 3
 June 1, 2005 Version 4
 Oct. 2, 2005 Version 5

- Dimensions 4.3"x 2.8"x 1.1"
- 16-bit high performance processor
- MOSFET drivers give high efficiency
- PC-Board assembly is suspended in soft polyurethane: superior vibration handling



HSC-2 Housing without label

Typical acceleration in variable speed generator mode



There are different linear and rotary actuators available for the HSC-2. Control currents up to 5A are supported.



ROTARY ACTUATORS



KOKUSAN-DENKI ACTUATOR

226 Terrace Drive, Mundelein, IL 60060
Tel: (847) 970-7955 Fax: (847) 949-6042 Web: www.ElectronicControl.com

SPECIFICATIONS FOR ELECTRONIC GOVERNOR, MODEL HSC-2

This spec governs the control module and actuator:

1. Supply Voltage

All performance criteria will be met in the entire range between 10...16 volts.
Slower speed operation is available between 6 ...10 volts as occurring during cold starts.

2. Compatibility

The electronic governor system will work with all single cylinder and 2-cylinder engines up to 28 HP. Larger engines can be serviced with HSC-3 or HSC-1.

3. Speed Range

The system is capable of governing speeds from 1000 rpm to 6000 rpm. When calibrated for gen set applications, the speed range is 1800 – 3600 rpm.

4. Voltage Protection

The unit goes into standby mode if the supply voltage goes over 16 volts.

5. Operating Current

The supply current for the ECU is below .12 Amp. The actuator may consume between .4 and 6 Amps, depending on model and operating mode.

6. Operation Temperature Range

-40°C to +85°

7. Storage Temperature Range

-50°C to +110°C.

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8. Over Speed Limit

The system has a special rev-limiter that strongly closes the throttle plate when 4000 rpm is reached or the user selected maximum speed.

9. Speed Sensor on Ring Gear

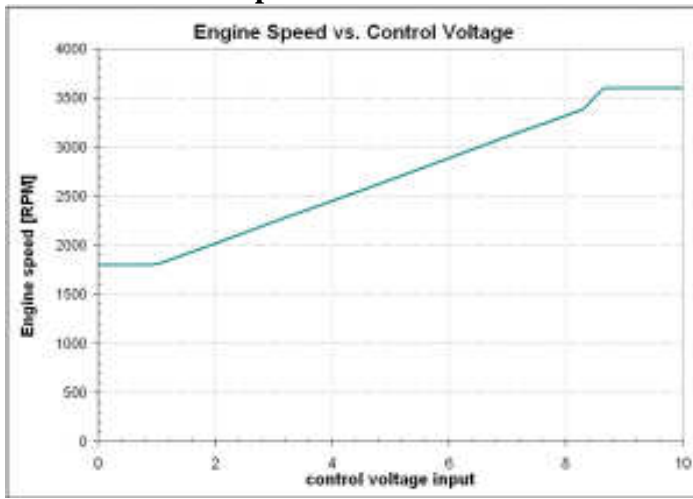
A flywheel speed sensor may be used; inductive type or Hall effect types are specified. In most cases, the ignition shut-off wire delivers a useable signal for the HSC-2, and no sensor at all is needed here for engine speed control.

10. Wheel Speed Sensor

For limiting vehicles' top speed, a Hall Effect sensor may be installed on the drive shaft or gearbox. This will allow the HSC-2 to reduce engine power when a certain vehicle speed is reached and then maintain that maximum vehicle speed.

FEATURES

Variable Speed Generator Mode



The engine speed will be selected by the control voltage to the HSC-2:

0 – 1 volt	-	1800 rpm
1 – 9 volts	-	Speeds between 1800 – 3600 rpm
9 – 16 volts	-	3600 rpm

Example: 3.22 volts = 2300 rpm

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Operating Accuracy and Response in Genset Mode

- Maximum low speed variation +/- 35 rpm from desired engine speed.
- The high-speed unloaded condition variation is within +/- 30 rpm.
- Transient Operation

The recovery time, when going to a loaded condition, will be tunable to the individual engine. The under shoot and over shoot will be less than 450 rpm at low speed and 350 rpm at high speed. Tuning for no overshoot is possible too with a small loss in response time.

ENGINE STARTING

The system will assist starting by opening the throttle plate during cranking and starting by only a small amount, preventing a lean condition of the carburetor.

DRIVE-BY-WIRE-CONTROL

The HSC-2 is also designed for drive-by-wire duty. In that operating mode, a foot pedal position sensor will signal the desired engine power, which the HSC-2 will then dial in with it's throttle actuator. While performing that, it still obeys to the max. – RPM number, which the customer selected. Thus the maximum engine speed will not be exceeded. If a wheel speed sensor is also installed, a maximum ground speed will also be maintained.

When in drive-by-wire mode, this system provides excellent throttle feel and drive ability. It performs much better in this application than variable speed governors.

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ENVIRONMENTAL TESTING

The system will operate the engine through the below cited conditions without problems.

Temperature Cycling, 20 cycles of the following, module and actuator:

1. -40°C 60 minutes
2. -40°C to 85°C 40 minutes evenly ramped
3. 85°C 60 minutes
4. 85°C to -40°C 40 minutes evenly ramped

These tests will be passed at 10v, 12 v, 14 v and 16v system voltage without detrimental effects. Various models of actuators may have different temperature specifications.

RADIO FREQUENCY/ELECTRO MAGNETIC EMISSIONS

Radio and Electro magnetic resistance: The system will work in an RF-field of 0 up to 80v/m at frequencies from 1MHz to 10 HGz. The emitted peak levels are much less than the ones emitted by the ignition system.

VOLTAGE TRANSIENT PROTECTION

The ECU will withstand positive transients including load dump and mutual coupling. Also negative pulses generated by inductive switching and starter motor field spiking.

- + 40v on supply pin for up to 10 msec
- + 20v on supply pin for up to 365 days
- + 80v on supply pin for up to 1 msec
- 14v on supply pin for up to 10 msec

VIBRATION

+/- 5 g for 1 hr in all 3 directions 10 HZ ... 1000 Hz

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HUMIDITY RESISTANCE

The unit will survive at least 10 cycles of this test while operating.

Time	Temp [C]	Rel. Humidity
0	25	50
.5	85	95
2.0	85	95
3.5	-20	50
5.5	-20	50
6.5	38	90
7.5	38	90
8.0	85	95

DURABILITY

Service life of HSC-2 will be in excess of 8500 h at temperatures between -40°C and +60°C.

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