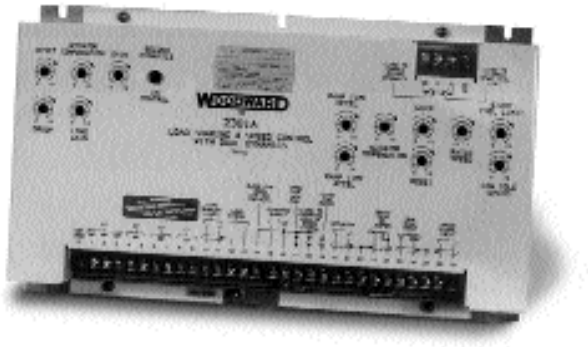
Dual Dynamics 2301A

Load Sharing and Speed Control

Applications



The 2301A Dual Dynamics Load Sharing and Speed Control is designed for use in applications where the response time of the engine changes dramatically between start-up and rated or unloaded and loaded situations, or in dual-fuel applications.

Each set of dynamics has its own gain, reset, and actuator compensation adjustments. The selection of dynamics is made by a switch contact. An LED (light emitting diode) on the front of the 2301A control indicates when the alternate set of dynamics is being used to control the engine.

The control is used in electric generator systems for which load sharing is desired. It can be used with diesel or gas engines (or steam or gas turbines), and is compatible with all Woodward electronic controls. Dual dynamics controls are available for forward- or reverse-acting applications.

2301A controls with dual dynamics provide 0–200 mA output signals, designed to control Woodward EGB, EA, UA, TM, and 2301 actuators. The output signal is proportional to the needed fuel setting to attain the desired speed/load. Position feedback from the actuator is not required.

The electronic governor is compatible with Woodward SPM-A synchronizers, Generator Loading Controls, and Automatic Power Transfer and Load Controls.

Description

The 2301A Load Sharing and Speed Control with Dual Dynamics is housed in a sheet-metal chassis and consists of a single printed-circuit board. All potentiometers are accessible from the front of the chassis.

Speed range is set on an internal DIP switch, available inside the cover of the control. Speeds are set according to the sensor-output frequency in Hertz.

Each set of dynamics offered in this control is independently set to provide the exact response needed by the engine at a specific condition. The choice of dynamics is selected by a switch position. The switch may be a part of the auxiliary breaker in a generator system, or may be automatically set by other changes in the process being powered.

The start-fuel limit feature can prevent start-up overshoot and excessive start-up smoke. The start-fuel limit is automatically removed from direct-acting controls when the engine nears selected speed. On reverse-acting controls, the start-fuel limit must be disabled by the use of wiring contacts after start-up is complete.

All 2301A controls feature an internal, isolated power supply for improved noise immunity and ground-loop protection. The units provide maximum protection from electromagnetic and radio-frequency interference.

- Low and high gain dynamics are switch selectable for dual fuels or low and high speed operation
- Isochronous or droop speed control
- Isochronous load sharing
- Low- and high-voltage models
- Idle and rated speed setting
- Linear idle-to-rated speed ramp
- Start fuel limit

Specifications

Load Sensing, 3-Phase Potentials	90 to 240 Vac, 45 to 66 Hz, maximum load 3 VA per phase
Load Sensing, 3-Phase Currents	3 to 7 A at full load, maximum load 1 VA
Speed Range	A switch selects one of the following speed ranges: 500 to 1500 Hz 1000 to 3000 Hz 2000 to 6000 Hz 4000 to 12 000 Hz
Speed Sensing	1 to 30 Vac, maximum load 1 kΩ at 1 kHz
SPM-A Synchronizer (optional)	–5 to +5 Vdc for –3.3% to +3.3% or –1.5 to +1.5 Vdc for –1% to 1% speed change Maximum load is 100 kΩ
Speed Trim (optional)	0 to 10% speed decrease with 0 to 100 Ω pot (1 W)
Minimum Fuel (optional)	Opening an external contact in series with terminal 17 and the dc power to the control will send a minimum-fuel signal to the actuator. The minimum-fuel signal is an optional means for a normal shutdown.
Droop (optional)	The droop contact is wired in series with the auxiliary circuit breaker contact and terminal 14, and the dc power to the control. Isochronous operation is selected when both the droop contact and the auxiliary circuit breaker contact are closed.
Failed Speed Signal Override (optional)	An external contact to override the failed speed protective circuit when required for start-up
Idle/Rated Ramp (optional)	An external contact to accelerate from idle to rated speed when the contact is closed
Weight	About 2.2 kg (4.9 lb), depending on model

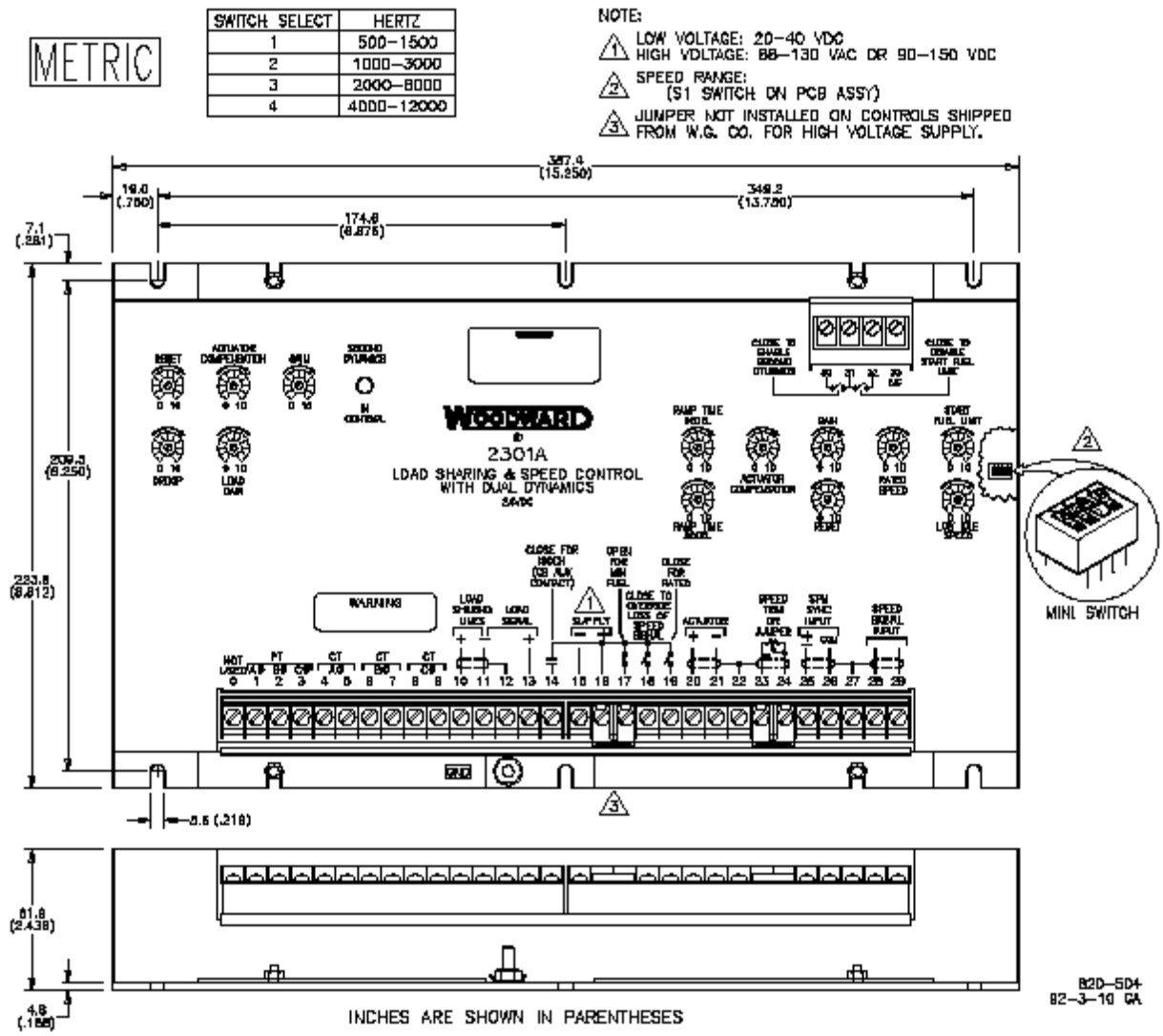
Adjustments

Rated Speed	Sets engine speed over specified range
Idle Speed	Sets engine idle speed at 30% to 100% of rated speed
Ramp Times	0 to 22 s acceleration time from idle to rated speed 0 to 22 s deceleration time from rated to idle speed
Start Fuel Limit	25% to 100% of specified maximum actuator current. When used with reverse-acting systems, the limit must be disabled after start-up is complete.
Gain, Reset, and Actuator Compensation (both dynamics)	Sets dynamic response. Adjustable to accommodate diesel, gas, or turbine engines. Totally different adjustments for each set of dynamics.
Load Gain	Provides calibration of the load on an individual generator when two or more generators are paralleled
Droop	Provides 0 to 10% reduction in reference speed between no load and full load

Control Characteristics

Steady State Speed Band	±0.25% of rated speed
Load Sharing	Within ±5% of rated load with speed settings matched
Power Supply, High Voltage Model	90 to 150 Vdc or 88 to 132 Vac 50/60 Hz
Power Supply, Low Voltage Model	20 to 40 Vdc
Operating Temperature	–40 to +85 °C (–40 to +185 °F)
Storage Temperature	–55 to +105 °C (–67 to +221 °F)
Maximum Ambient Humidity	95% at 38 °C (100 °F)

Technical Manual	82046



Outline Drawing of 2301A with Dual Dynamics
(Do not use for construction)

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2011/4/Colorado