

# 2301A Load Sharing and Speed Control

## APPLICATIONS

The 2301A Load Sharing and Speed Controls are designed for use in electric generator systems where multi-unit load sharing is desired. 2301A controls may be used with diesel, gas or gasoline engines, or steam or gas turbines.

Controls are available:

- for applications requiring droop and/ or isochronous speed control
- in forward- or reverse-acting models
- for single or tandem actuator installations
- with accelerating or decelerating ramps
- in several speed ranges

## DESCRIPTION

Automatic, adjustable start fuel limiting regulates the maximum fuel setting while the engine is starting. This helps decrease pollution and engine wear.

Each 2301A control has a self-contained load sensor. Most models provide a 0-200 mA output signal, designed to control Woodward EG, EGB, PB, TM, and 2301 actuators. 0-20 mA output is available for special applications. The output signal is proportional to the fuel

setting needed to attain the desired speed/load. Position feedback from the actuator is not required.

The 2301A controls are compatible with Woodward SPM-A Synchronizers, Automatic Generator Loading Controls, Process Import/Export Controls, and Automatic Power Transfer and Load Controls.

## RELIABLE CONTROL: SIMPLE ADJUSTMENTS

The 2301A Load Sharing and Speed Controls stand up well in harsh environments. Built-in protection guards against electromagnetic interference/radio frequency interference (EMI/RFI), humidity, dust and vibration.

The 2301A control contains a single printed circuit board. All potentiometers are accessible from the front of the chassis. Speed range is set on an internal dip switch, accessible from inside the cover of the control. Speeds are set according to the speed sensor frequency in Hertz. External rated speed adjustment can be connected for remote speed change and manual operation. An optional deceleration ramp is available.

- Low- and High-Voltage Models
- Idle and Rated Speed Settings
- Adjustable Idle to Rated Speed Linear Ramps
- Start Fuel Limiting
- Failed Speed Sensor Protection
- Four Switch Selectable Speed Ranges
- Isochronous Load Sharing
- EU Directive Compliant (low voltage models)



# SPECIFICATIONS

## POWER SUPPLY

High Voltage Model .....	90–150 Vdc or 88–132 Vac, 12 W Low voltage of 75 Vdc (60 Vac) and high voltage of 200 Vdc (140 Vac) for up to 5 minutes
Low Voltage Model .....	20–40 Vdc, 12 W--After power-up, a supply voltage as low as 10 Vdc or as high as 77 Vdc for up to 5 minutes

## CONTROL CHARACTERISTICS

Steady State Speed Band .....	$\pm 1/4$ of 1% of rated speed
Load Sharing .....	Within $\pm 5\%$ of rated load with speed settings matched

### Load Sensing

3-phase potentials .....	90–240 Vac, 45–66 Hz; maximum load: 3 VA per phase
3-phase currents .....	3–7 A at full load; maximum load: 1 VA
Speed Ranges (switch selectable) .....	<ul style="list-style-type: none"><li>• 500–1500 Hz</li><li>• 1000–3000 Hz</li><li>• 2000–6000 Hz</li><li>• 4000–12000 Hz</li></ul>
Speed Sensing .....	1–30 Vac; maximum load: 1 at 1 k $\Omega$
Outputs .....	<ul style="list-style-type: none"><li>• 0–200 mA, 30–40 <math>\Omega</math></li><li>• 0–400 mA, 30–40 <math>\Omega</math></li><li>• 0–20 mA, 0–600 <math>\Omega</math>, or</li><li>• 0–200 mA, 60–80 <math>\Omega</math> for tandem actuators</li></ul>

## ADJUSTMENTS

Rated Speed .....	Sets engine speed over specified range. External remote input accessible.
Idle Speed .....	Sets engine idle speed at 30%–100% of rated speed
Ramp Times .....	Idle to rated speed: 0–10 second acceleration time Rated to idle speed: 0–10 second deceleration time with special decel ramp. (Rated to idle is instantaneous without special ramp.)
Start Fuel Limit .....	25%–100% of specified maximum actuator current. Start fuel limit cannot be used with reverse-acting controls.
Gain, Reset, Actuator Compensation .....	Sets dynamic response. Adjustable to accommodate diesel or gas engines, or turbine systems.
Load Gain .....	Provides calibration of the base load level on an individual generator or the load sharing feature when two or more generators are paralleled.
Droop .....	Provides 0%–10% reduction in reference speed between no load and full load for base load conditions.

## OPTIONS

SPM-A Synchronizer .....	-5 to +5 Vdc for $\pm 3\%$ speed change or -1.5 to +1.5 Vdc for $\pm 1\%$ speed change; maximum load: 100 $\Omega$
Speed Trim .....	0 to 10% speed decrease with 0 to 100 $\Omega$ pot
Minimum Fuel .....	The minimum-fuel signal is an optional means for a normal shutdown. Opening an external contact in series with terminal 17 and the control's dc switch power will send a minimum-fuel signal to the actuator.
Droop .....	The droop contact is wired in series with the auxiliary circuit breaker contact and terminal 14, and the control's dc switch power. Isochronous operation is selected when both the droop contact and the auxiliary circuit breaker contact are closed.
Failed Speed Signal Override .....	An external contact to override the failed speed protective circuit when required for start-up.
Idle/Rated Ramp .....	An external contact to accelerate from idle to rated speed when the contact is closed. Rated-to-idle ramp is available only on special 2301A controls.

# SPECIFICATIONS (Continued)

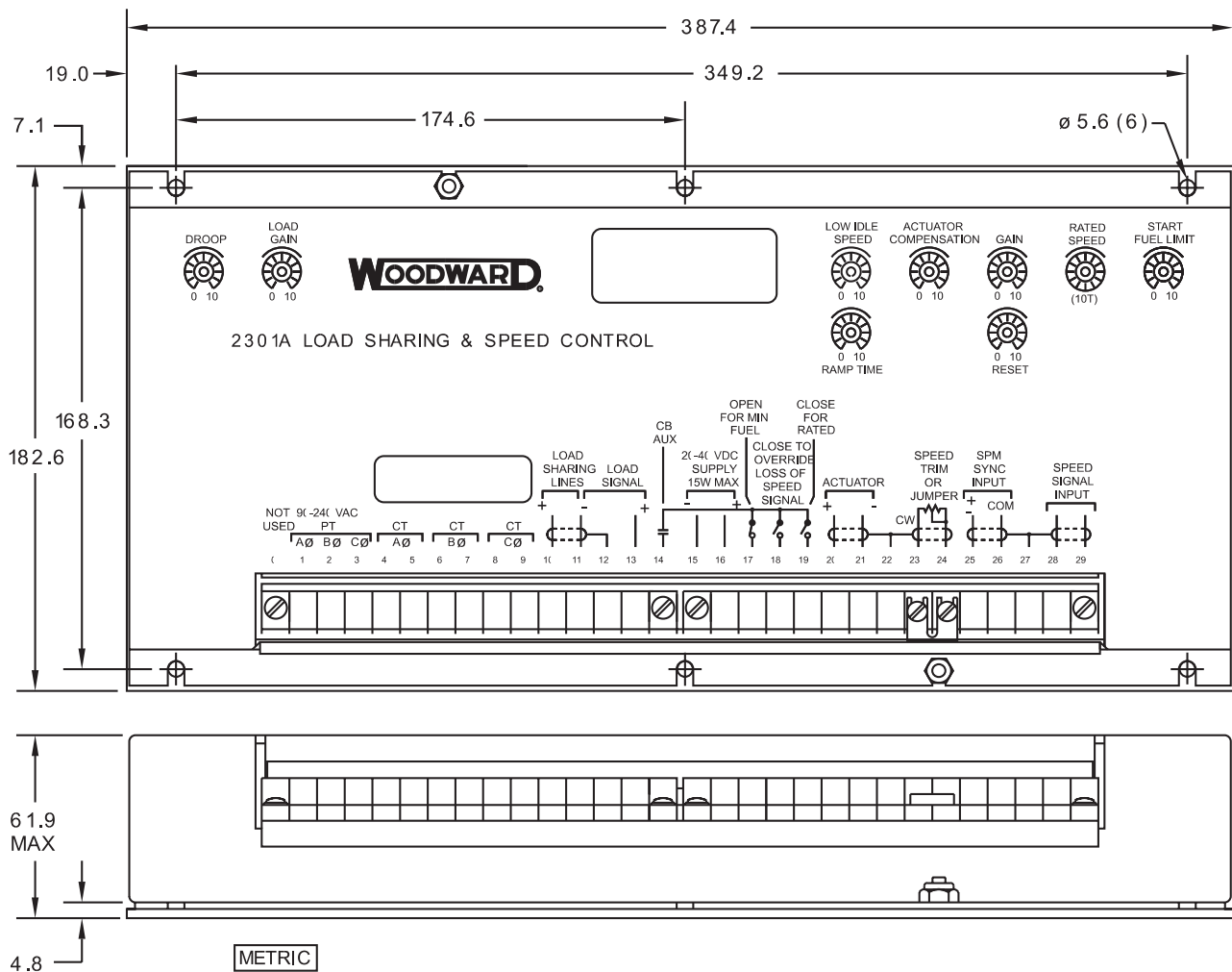
## ENVIRONMENTAL SPECIFICATIONS

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)
Vibration and Shock Tests .....	Vibration tested at 4 Gs between 5 and 500 Hz. Shock tested at 60 Gs.

## COMPLIANCE

EU Directive .....	Compliant (low voltage models)
UL .....	Listed (all models)
cUL .....	Listed (low voltage models)
CSA .....	Listed (high voltage models)

## OUTLINE DRAWING



METRIC	
CONVERSION CHART	
MM	INCH
4.8	.188
5.6	.219
7.1	.279
19.0	.748
61.9	2.437
168.3	6.625
174.6	6.874
182.6	7.188
349.2	13.748
387.4	15.251



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## DECLARATION OF INCORPORATION

In accordance with the EMC Directive 89/336/EEC and its amendments, this controlling device, manufactured by Woodward Governor Company, is applied solely as a component to be incorporated into an engine prime mover system. Woodward Governor Company declares that this controlling device complies with requirements of EN50081-2 and EN50082-2 when put into service per the installation and operating instructions outlined in the product manual.

**NOTICE: This controlling device is intended to be put into service only upon incorporation into an engine prime mover system that itself has met the requirements of the above Directive and bears the CE mark.**

For more information contact: