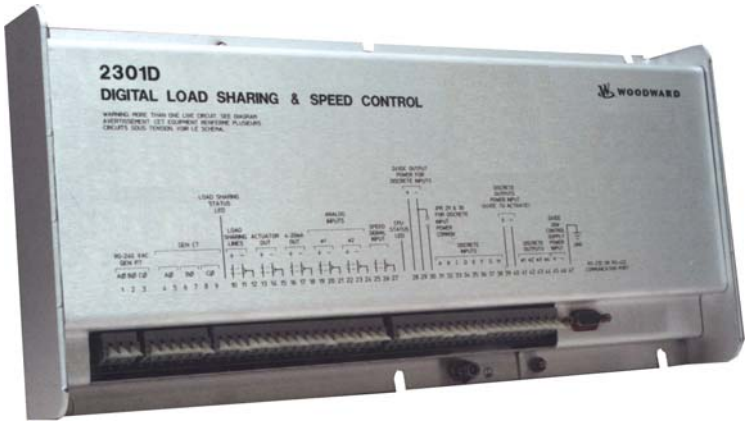
Product Specification
03239C



2301D-J Digital Governor
for Medium & High Speed Engines and Generators with Automatic Load Sharing

- **Digital speed control**
- **Alternate dynamics**
- **Compatible with existing load sharing system**
- **Remote speed & load reference**
- **Analog and discrete outputs**
- **Soft load transfer**
- **PC configurable with Woodward Watch Window Software**
- **For engines of the rated speed, 400-3600 rpm**
- **Actuator output current 0-180 mA, 0-20 mA, 4-20 mA or 180-0 mA(reverse acting) software configurable**

Description

The Woodward 2301D-J is a microprocessor-based generator and engine control with automatic load sharing and speed control.

The control is housed in a sheet-metal chassis and consists of a single printed circuit board.

The 2301D-J adds a soft-loading/unloading feature to the control system equivalent to the old 2301A LSSC plus Woodward Digital Reference Unit. This control switches its operation mode bumplessly between isochronous mode and droop mode.

The 2301D-J is configured using a computer with Woodward Watch Window software. The configuration software is supplied with each control, and users may download from the Woodward web site as well. The computer connects to the 2301D through a 9-pin connector (RS-232 port).

Power supply voltage for the 2301D-J is 18-40 Vdc (nominal 24 Vdc).

I/O

The 2301D-J has following inputs and outputs.

- KW input (1):
  3 phase PT input: 90-240 Vac/45-65 Hz
  3 phase CT input: 2-6 A at the rated generator load

- MPU input (1):
  Input range: 100-20 000 Hz, 1-30 Vac
  Rated speed control range:
  - for medium&high speed 600-3600 rpm

- Analog inputs (2):
  Input signal: software configurable to one of ±2.5V, 4-20 mA, 0-5 V or 1-5 V with each input channel.
  Input 1: Synchronizer input.
  Input 2: configurable to one of following inputs:
  - Remote speed reference input
  - Remote baseload reference input
  - Remote speed bias input
  - Manifold air pressure input

- Discrete inputs (8): 8 input channels are used to detect 10 command/ status inputs below.
  - RUN/STOP command
  - Idle/Rated speed
  - MPU failure override
  - Speed/Load raise
  - Speed/Load lower
  - Auto unloading command
  - Isochronous/Droop
  - Generator Circuit Breaker Aux contact input
  - Remote speed (load) reference select
  - Baseload operation

- Actuator output (1): the current range is 0-180 mA, 0-20 mA, 4-20 mA or 180-0 mA (for reverse acting).

- 4-20 mA analog output (1): configur-ed to Engine speed, Speed reference, Actuator output, Generator KW output or Generator KW reference.

- Discrete outputs (4): Low-side drivers with maximum sink current of 200 mA. A 12 Vdc or 24 Vdc external power must be connected to each load.

  Two are for fixed use (not configurable):
  - Speed switch
  - Generator Circuit Breaker open

  Two are configurable outputs: Each output is configurable to one of following status signals
  - CPU failure
  - MPU failure
  - C.B. closed in isochronous operation
  - C.B. closed in droop operation
  - In baseload operation
  - KW switch

Control Functions

2301D-J features speed control, load control, operation mode transfer between the isochronous mode and the droop mode while operating a generator with load, and various fuel limit functions.

Speed Control:

- Engine's rated speed range: 400-3600 rpm
- Transfer between 'Isochronous' and 'KW droop'
- Simple speed droop control (No generator KW droop function)
- Idle/Rated speed selection
- Raise/Lower speed with contact inputs
- Remote speed reference with an external analog input signal
- Either a single gain or a 4 slope gain curve (gain is determined corresponding to the load) is available
- Alternate dynamics (switched when the engine load reached the preset level)

Fuel Limit:

- Start fuel limit (Lower limit, Upper limit, Ramp rate from Lower limit to Upper limit)
- Maximum fuel limit
- Manifold air pressure fuel limiter is configurable
- Torque fuel limiter is configurable

Generator load control:

- Isochronous load sharing (with soft-loading function to load the generator from the Circuit Breaker close to the Load sharing start)
- Soft-loading (before beginning the Isochronous load sharing, and in the beginning of generator loading after the generator circuit breaker was closed while in KW droop operation)
- Soft-unloading (with the generator circuit breaker open signal when the generator load reached the unload trip level.)
- Isochronous and Baseload control
- KW droop control

Isochronous/Droop transfer:

Transferable from isochronous load sharing operation to KW droop operation bumplessly without any frequency or load fluctuation. When transferring from KW droop operation to generator load sharing operation, the generator load is ramped smoothly from the KW droop level to the isochronous load sharing level by the soft-loading function.

Isochronous baseload operation:

The baseload reference is raised/lowered with Raise/Lower contact inputs or an analog remote signal to the desired load level.

The generator load is maintained to the constant level specified in spite of any Mains frequency variation while in the baseload operation.

Woodward Part Numbers

2301D-J's part number is as follows:

- For medium and high speed (400-3600 rpm) engine control:
  P/N 8273-126 revision D or upper

NOTE: Former 8273-125 and 8273-126 were integrated to 8273-126 when its revision was changed to 'D'.

Woodward Watch Window software must be used to operate and tune a 2301D-J control. (The Watch Window software is attached to each 2301D-J.)

- Watch Window standard version:
  P/N 8928-316

2301D-J Hardware Specification

Part numbers:

8273-126 ---------- 2301D-J (For medium and high speed engine control, Rated Speed range: 600-3600 rpm)
8928-316 ---------- Standard Watch Window (2301D tuning software tool kit)

Power Supply:

Power Supply Rating ..... 18-40 Vdc (Nominal 24-32 Vdc)
Power Consumption ..... less than or equal to 20 W normal

Power Supply Voltage	Input Current
18 V	589 mA
24 V	431 mA
32 V	320 mA

Inrush Current ..... 7 A for 0.1 msec

Speed Control:

Steady State Speed Band ... ±0.25 % of rated speed

Inputs and Outputs:

MPU input ..... 100-20 000 Hz (400-3600 rpm)
Discrete inputs (8)..... 3 mA input current @ 24 Vdc power supply voltage (input impedance is about 5.2 kΩ)
Synchronizer input ..... ±2.5 V (default), 4-20 mA, 1-5 V or 0-5 V
Aux input ..... 4-20 mA (default), 1-5 V, 0-5 V or ±2.5 V
Actuator output ..... 0-180 mA, 4-20 mA, 0-20 mA or 180-0 mA (for reverse acting)
Aux output ..... 4-20 mA; maximum impedance 680 Ω
Discrete outputs (4) ..... externally powered Low side drivers (12 Vdc or 24 Vdc power supply voltage) 200 mA maximum sink current
Communication port..... RS-232 or RS-422, 9-pin D connector, 1200-38 400 baud, full duplex

Environmental Specification:

Operating temperature..... –40 °C to +70 °C (–40 °F to +158 °F)
Storage temperature..... –40 °C to +105 °C (–40 °F to +221 °F)
Humidity ..... +95 % at +20 °C to +55 °C (+68 °F to +131 °F) Lloyd's Register of Shipping Specification Humidity Test 1
Mechanical Vibration ..... Lloyd's Register of Shipping Specification Vibration Test 2
Mechanical Shock..... US MIL-STD 810C, Method 516.2, Procedure I (basic design test), Procedure II (transit drop test, packaged), Procedure V (bench handling)

Regulatory Compliance:

European Compliance for CE Mark:

EMC Directive..... Certified to 89/336/EEC COUNCIL DIRECTIVE of 03 May 1989 on the approximation of the laws of the member states relating to electromagnetic compatibility.

Low Voltage Directive..... Certified to the 73/23/EEC COUNCIL DIRECTIVE of 19 February 1973 on the harmonization of the laws of the Member States relating to electrical equipment designed for use within certain voltage limits.

North American Compliance:

CSA ..... CSA Certified for Ordinary Locations for use in Canada and USA

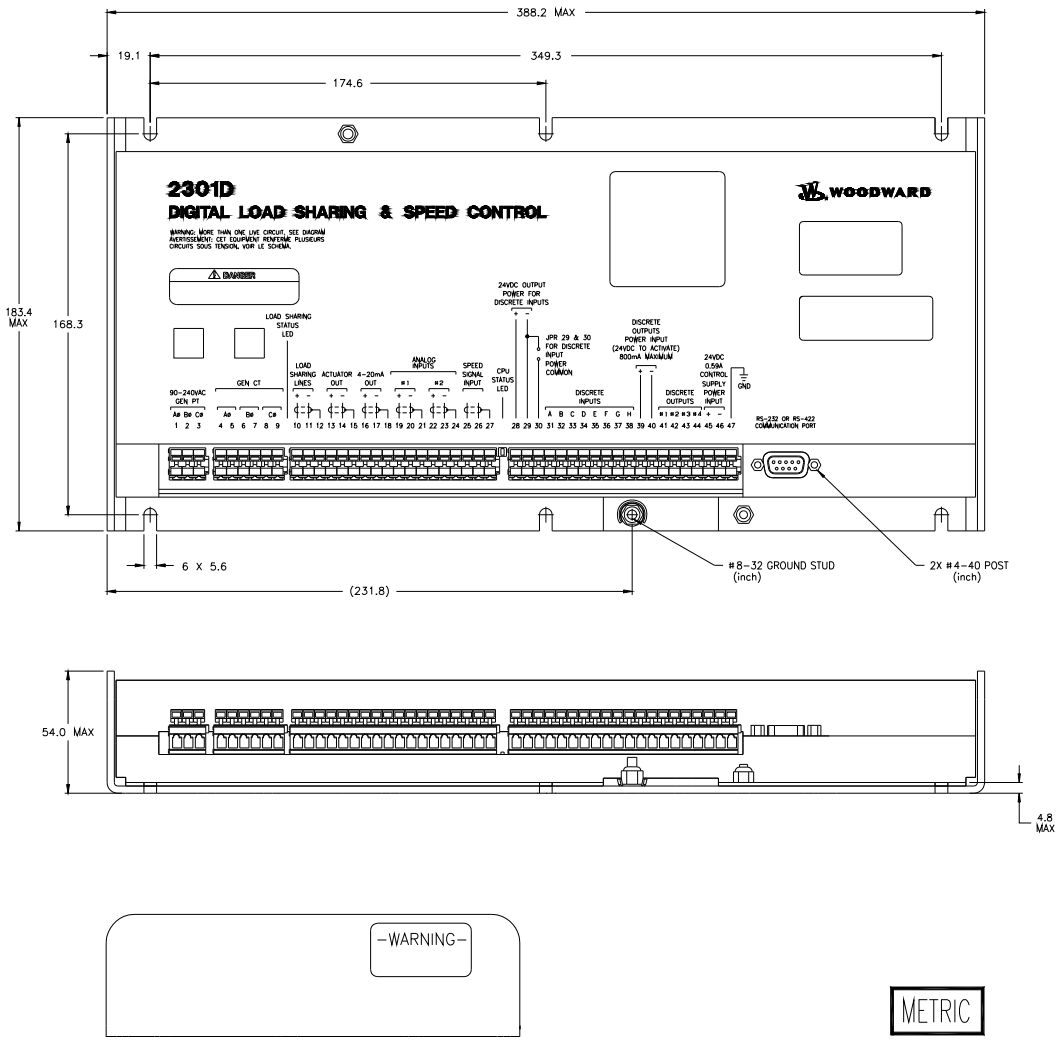
NOTE: Wiring must be in accordance with applicable electric codes with the authority having jurisdiction.

Woodward/
Industrial Controls
PO Box 1519
Fort Collins CO, USA
80522-1519
1000 East Drake Road
Fort Collins CO 80525
Ph: (1)(970) 482-5811
Fax: (1)(970) 498-3058

Distributors & Service
Woodward has an international network of distributors and service facilities. For your nearest representative call (1)(800) 835-5182 or see the Worldwide Directory on our web site.

Corporate Headquarters
Rockford IL, USA
Ph: (1)(815) 877-7441

www.woodward.com



2301D-J Outline Drawing

[Ref:JP03239C]

Printed in Japan
2010/08/Makuhari

For more information

Woodward Governor (Japan), Ltd.

WBG Marive West 19F
2-6 Nakase, Mihama-ku, Chiba-shi,
Chiba, 261-7119 Japan
Phone: +81 (43) 213-2191 Fax: +81 (43) 213-2199
E-Mail: tomsal@woodward.com
www.woodward.com/ic/japan/