

# 721 Digital Speed Control for Power Generation Applications



## APPLICATIONS

The 721 Digital Speed Control is a powerful, configurable load sharing and speed control with a torsional filter. The 721 control governs gas or diesel reciprocating engines driving generators through flexible couplings. Using inputs from both the engine and generator sides of the coupling, the 721 control filters out torsionals in the speed signals. As a result, transient performance is improved without sacrificing steady-state stability.

The 721 Digital Control can share load between multiple engines driving a common mechanical or electrical load. It offers automatic bumpless transfer of load between engines and adjustable load and unload ramp rates. The control also provides a limiter to prevent engine overfueling or flooding during start-up.

## CONTROL DYNAMICS

The 721 Digital Control uses a 16-bit microprocessor, providing control dynamics that give smooth steady-state operation and fast response to speed and load changes. The 721 Digital Control dynamics are varied automatically as functions of both speed and load to provide better performance over the operating range of the engine. Two separate sets of dynamic adjustments are externally selectable, for circumstances where operating conditions change.

The Woodward Hand Held Programmer makes all adjustments quickly and easily through the control's ten convenient "menus" (a standard ASCII character computer terminal with an RS-422 serial port may also be used). The control saves all set points in permanent memory, which does not require batteries or other power sources to retain data. The Handheld Programmer prevents tampering with set points, yet allows entries to be changed at any time.

**Menu 1 (Dynamics Setpoints)** — adjusts the control to match the stability and transient performance of the engine.

**Menu 2 (Auxiliary Dynamics)** — same as Menu 1; sets a second set of (auxiliary) dynamics.

**Menu 3 (Speed Setting)** — sets adjustments related to speed control (speed limits, ramp times and rates, remote speed reference, tachometer, droop).

**Menu 4 (Torsional Filter)** — adjusts the control to recognize flexible coupling torsionals.

**Menu 5 (KW Load Setting)** — sets adjustments related to load control (load input range, load ramp times and rates, remote KW reference, load droop).

**Menu 6 (Fuel Limiters)** — sets fuel limit adjustments that limit and define actuator output current (idle fuel limit, maximum fuel limit, etc.).

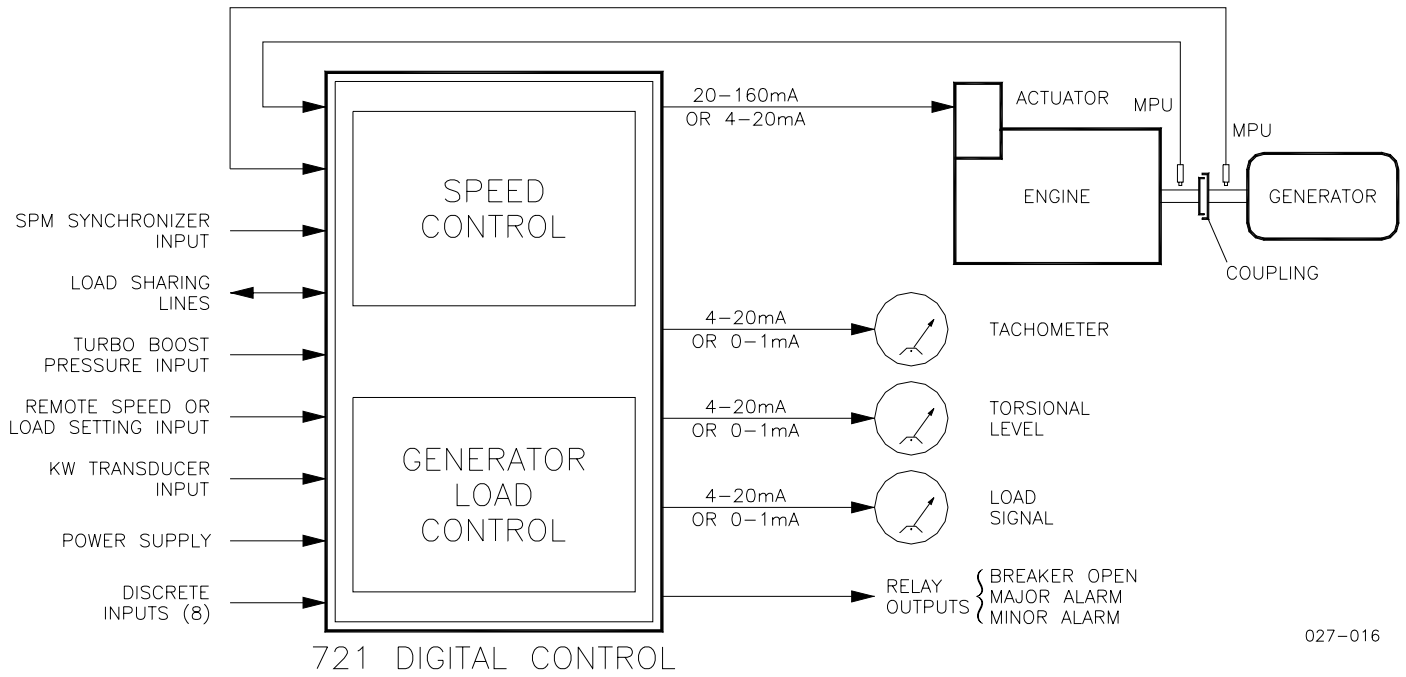
**Menu 7 (Display 1)** — Displays current values for engine speed, speed reference, generator load, load reference, actuator output, torsional level, speed control mode, load control mode.

**Menu 8 (Configuration)** — Sets control configuration (rated speed, gear teeth, actuator sense, dynamics map, alarms).

**Menu 9 (Calibration)** — Sets control calibration (key).

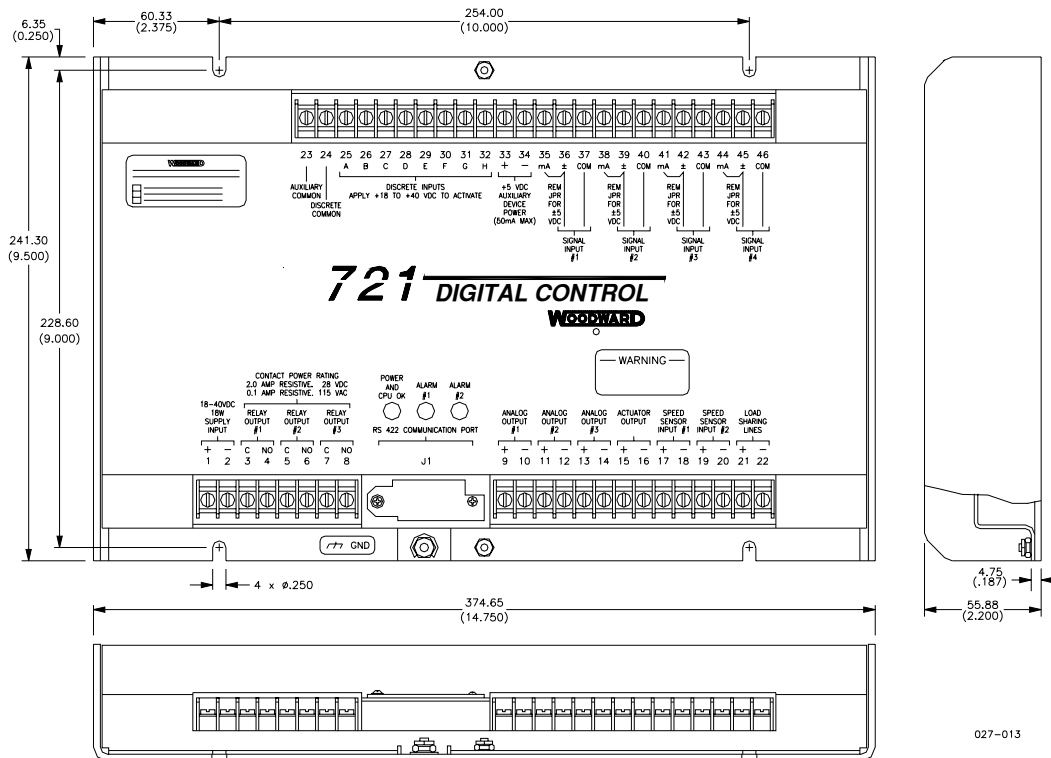
- Torsional Filter for Flexible Engine/Generator Coupling Torsionals
- Torsional Detector Can Alarm or Derate Engine on Detection of Abnormal Torsionals
- Integral Load Sharing With Soft Load/Unload Ramps and Automatic Breaker Opening
- Remote Speed and Load Setting
- User Configurable for a Wide Range of Applications
- 5 Slope Turbo-Boost Limiter
- EU Directive Compliant; UL/cUL Listed

# BLOCK DIAGRAM



027-016

# OUTLINE DRAWING



027-013

# SPECIFICATIONS

## ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	-40 to +70 °C (-40 to +158 °F)
Storage Temperature	-55 to +105 °C (-67 to +221 °F)
Humidity	95% at 38 °C (100 °F) US MIL-STD 810D, Method 507.2, Proc. III
EMI/RFI Specification	EN 50082-2 and EN 50081-2
Salt Spray	ASTM B 117-73
Mechanical Vibration	24–2000 Hz swept sine, 2.5Gs constant accel.
Mechanical Shock	US MIL-STD 810C, Method 516.2, Proc. I, II, V

## CONTROL CHARACTERISTICS

Steady State Speed Band	Rated speed $\pm\frac{1}{4}$ of 1% over all operating conditions
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## INPUTS

Speed Signal input and Range	1–2 magnetic pickups or 1–2 prox. switches 400 Hz to 15 000 Hz (8–2100 rpm)
Power Supply	18–40 Vdc (24 or 32 Vdc nominal) 88–132 Vac 50/60 Hz (120 Vac nominal) 90–150 Vdc (125 Vdc nominal)
Power Consumption	18 W nominal
Discrete Inputs	On/Off (control) Run/Stop Idle/Rated Raise/Lower Speed Failsafe Override Unload/Reset to Rated Isochronous Base Loading Isochronous/Droop

## LOAD SHARING LINES INPUT

Remote Speed/Load Setting Input	4–20 mA or 1–5 Vdc for remotely setting engine speed/load
Turbo Boost Pressure Input	4–20 mA or 1–5 Vdc from turbo boost pressure sensor, for smoke limiting and to prevent overfueling during transients
SPM Synchronizer Input	$\pm 5$ Vdc input from speed and phase matching (SPM) synchronizer
kW Transducer Input	4–20 mA or 1–5 Vdc from kW transducer

## OUTPUTS

Actuator	20–160 mA or 4–20 mA
Tachometer Output	4–20 mA or 0–1 mA for analog meter or as input to another computer
Torsional Level Signal Output	Same as tachometer output
Load Signal Output	Same as tachometer output
Relays	Breaker Open, Major Alarm, Minor Alarm

## COMPLIANCE

UL/cUL	Listed
European Union (EU)	Compliant with EMC Directive 89/336/EEC (some models)
American Bureau of Shipping (ABS)	Registered

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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.

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