

733

Digital Control

Applications

The Woodward 733 Digital Control manages and controls reciprocating engines (gas, diesel, or dual fuel) used in power generation, marine propulsion, locomotive and industrial engine, and process markets.



The 733 has been specifically designed to enable it to be mounted directly on the engine, withstanding the high temperature and vibration environment. The 733 can also be mounted inside control cabinets if required.

The 733 is available in several versions:

- As a standalone speed control with functions and configuration similar to other Woodward digital controls such as 723. The control also has plug-and-play network connectivity to the Woodward ProAct™ Digital Actuator family that provides a complete all-electric governing solution that can be engine mounted. The control can receive its commands either through hard-wired inputs or via a network.
- As the main control unit within an engine management system. The control is designed for network connectivity to other Woodward or customer-selected devices, such as I/O modules (remote or integrated within the 733 package), actuators, ignition controls, air/exhaust and fuel flow control valves, power management controls, and EFI solenoid drivers. It may be programmed to perform all engine functions such as speed, air and fuel control, monitoring, alarms, engine protection and sequencing.

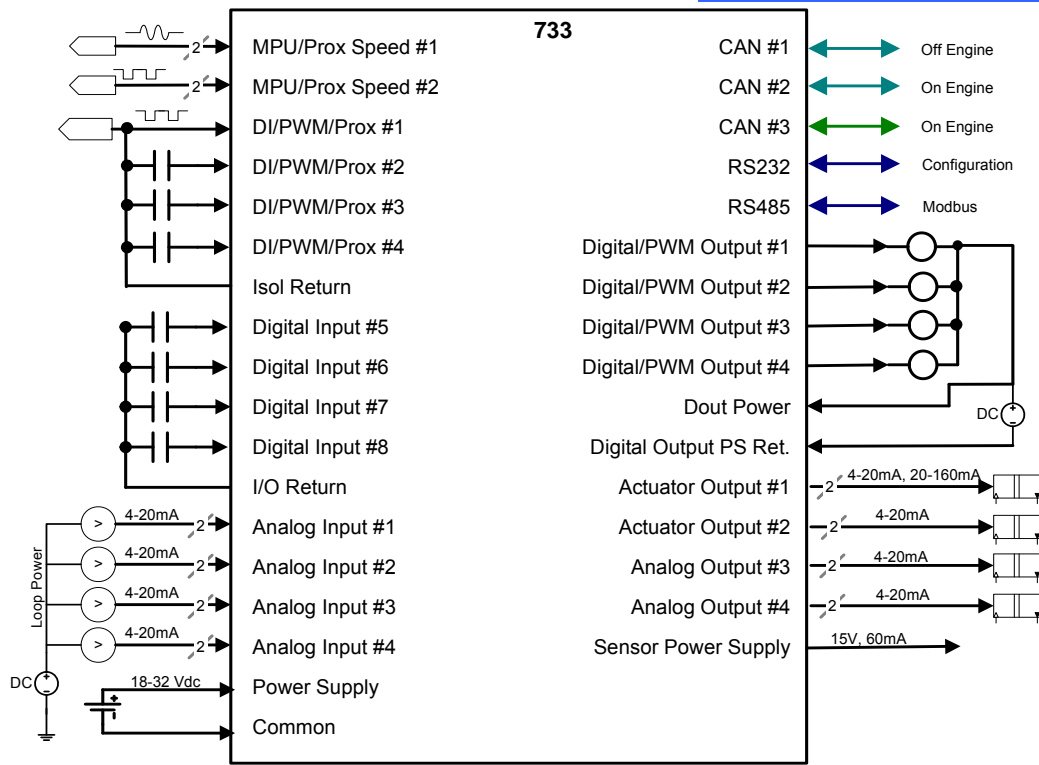
Programming

The 733 is programmed using Woodward's proven Graphical Application Programmer (GAP™). GAP is a dedicated, high-level, block-oriented programming language specifically designed for simple and quick implementation of difficult engine control strategies. GAP functions are easily modified and expanded, allowing fast creation of new applications.

Adjustments

Adjustments may be made quickly and easily through the Woodward Watch Window or Control View PC Configuration Interfaces. Both adjustment methods are menu-driven. The control will save all set points to non-volatile memory upon command. More information is on our website (www.woodward.com).

- On-engine speed control
- On-engine management system
- Expandable hardware and software
- Distributed control via CAN networking
- Powerful PowerPC core
- Local configuration port
- 2 serial ports with Modbus® * and ServLink protocol choices
- 3 CAN ports supporting multiple protocols
- Woodward GAP™ programming environment
- Multiple programming loop times available—5 to 160 ms
- CSA and CSAUL listed
- CE Compliant



733 Control Block Diagram

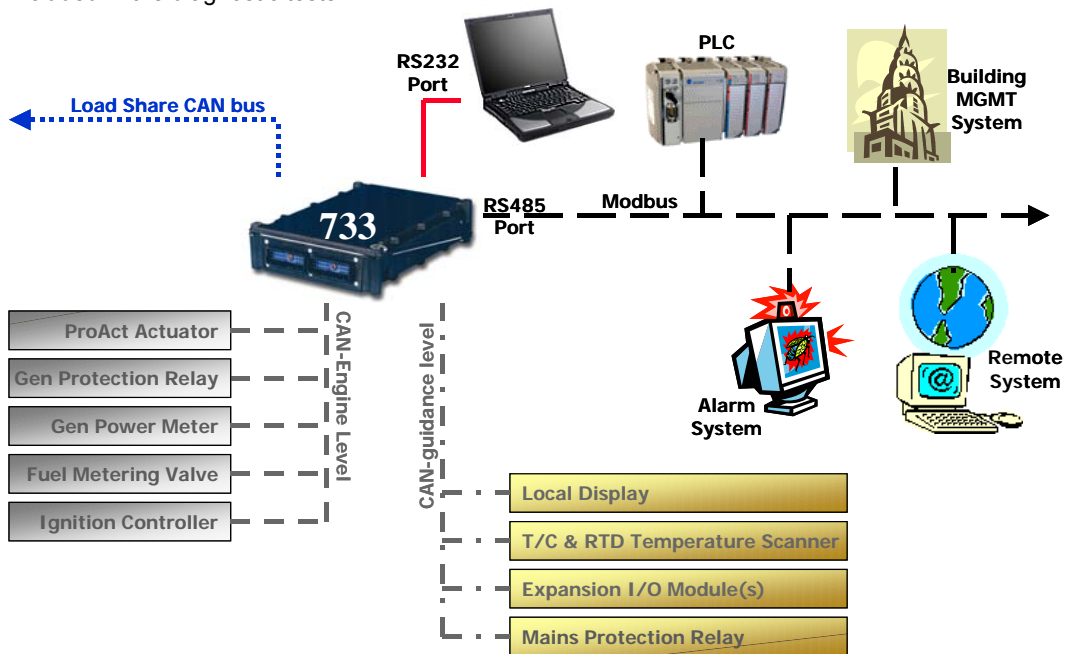
Communications

The 733 provides two isolated serial interfaces—one RS-232 and the other RS-485. Both ports feature an industry-standard Modbus protocol (ASCII or RTU) that can interface to a Modbus master or slave device such as a Human/Machine Interface (HMI). These ports also support Woodward ServLink protocol for a Watch Window or Control View PC interface. Baud rates are tunable to meet specific user requirements.

The 733 also provides three CAN ports, one of which is isolated if requested. All ports feature J1939 and CANOpen. These ports can be used for distributed control with other devices such as actuators, valves, other 733s (to load share for example), and to communicate with other on-engine devices such as I/O modules and displays. The isolated port is well suited for communication to off-engine components like PLCs, ship and building systems.

Self-Diagnostics

The 733 has integrated diagnostics to determine the control and IO integrity. Memories, processor, IO, and baseline power supply monitoring are included in the diagnostic tests.



Typical 733 System Diagram

Specifications

Input Power

Voltage	18–32 Vdc (Transients to 9 Vdc minimum)
Power Consumption	< 22 W at 24 Vdc
Inrush Current	< 1.5 A at 24 Vdc (~2 ms)

Speed Signal Inputs (2)

Speed Input Voltage	Magnetic Pickup: 1.4–70.0 V peak-to-peak Proximity Probe: 5–28 Vdc
Speed Input Frequency	10 Hz to 25 kHz
Proximity Input Duty Cycle	10–90% to 10 kHz, 20–80% to 20 kHz
Magnetic Pickup Diagnostics	Open wire detection

Discrete Inputs (8)

Type	4 isolated inputs can be configured for PWM, digital, or proximity probes 4 non-isolated inputs are dedicated discrete inputs
Discrete Input Impedance	Sinking with internal pull-up 15 k Ω
Proximity Probe Frequency/Duty Cycle	10 Hz – 7 kHz / 10–90% to 3 kHz, 20–80% to 7 kHz
PWM Frequency/Duty Cycle	100 Hz – 1 kHz / 10–90% duty cycle

Analog Inputs (4)

Type	4–20 mA, transducers externally powered
Input Impedance	200 Ω
Resolution	12 bits
Accuracy	0.5% of full scale

Current Outputs, 4–20 mA (3)

Type	4–20 mA
Accuracy	0.5% of full scale
Resolution	14 bits
Diagnostics	Current readback provided

Current Outputs, 4–20/20–160 mA (1)

Type	4–20 mA or 20–160 mA
Accuracy	0.8% of full scale (4–20 mA) or 1.1% of full scale (20–160 mA)
Resolution	14 bits
Diagnostics	Current readback provided

Discrete/PWM Outputs (4)

Type	Isolated outputs sinking to dedicated return Each output can be configured as either a discrete or PWM output
Max Output Current	500 mA (Boolean) or 150 mA (PWM)
PWM Frequency Range	50–1000 Hz (configurable)

Proximity Probe Power Output (1)

Voltage Level	15 Vdc, isolated
Current Limit	60 mA

Environment

Operating Temperature	–40 to +100 °C (–40 to +212 °F)
Storage Temperature	–40 to +120 °C (–40 to +248 °F)
Humidity	95% at +60 °C (+140 °F)
Mechanical Vibration	US MIL-STD 202F, Method 214A, TC(B)
Mechanical Shock	US MIL-STD 810C, Method 516.2, Procedure I
Enclosure Protection	IP-66

Regulatory Compliance

North American:

CSA: CSA Certified for Class I, Division 2, Groups A, B, C, and D, T3C at 100 °C ambient. For use in Canada and the United States.

European Compliance for CE Marking:

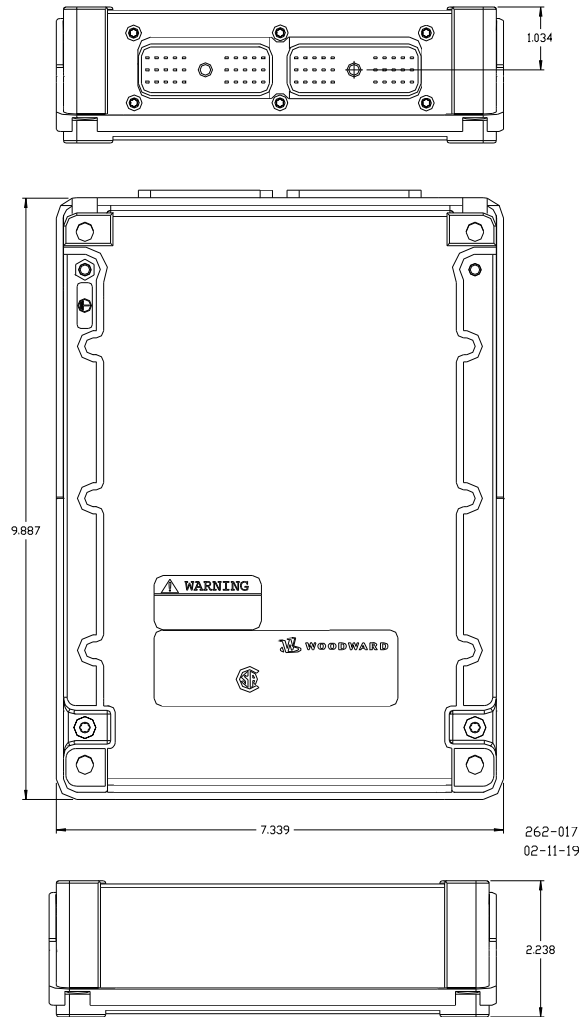
EMC Directive:

Declared to 89/336/EEC COUNCIL DIRECTIVE of 03 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility.

ATEX – Potentially Explosive

Atmospheres Directive:

Declared to 94/9/EEC COUNCIL DIRECTIVE of 23 March 1994 on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres. Zone 2, Category 3, Group II G, EEx nA II T3 X



733 Outline Drawing



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Distributors & Service

Woodward has an international network of distributors and service facilities. For your nearest representative, call the Fort Collins plant or see the Worldwide Directory on our website.

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2011/4/Colorado