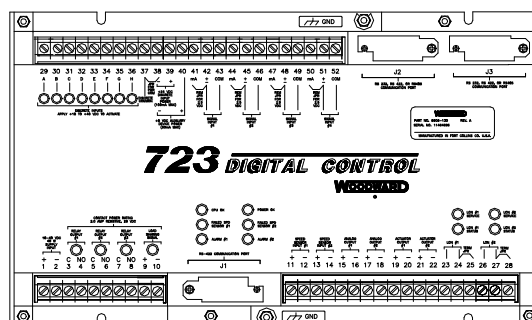




**Product Manual 02784
(Revision A)
Original Instructions**



**723 Digital Speed Control
for Reciprocating Engines—
DSLC™ Compatible**

9907-031, 9907-032, 9907-033, 9907-034

Installation and Operation Manual

Chapter 1. General Information

Introduction

This manual describes the Woodward 723 DSLC™ Compatible Digital Speed Control, models 9907-031 (low voltage), 9907-032 (high voltage), 9907-033 (low voltage with torsional filter), and 9907-034 (high voltage with torsional filter).

Declaration of Incorporation

In accordance with the EMC Directive 89/336/EEC and its amendments, this controlling device, manufactured by the Woodward Governor Company, is applied solely as a component to be incorporated into an engine prime mover system. Woodward declares that this controlling device complies with the 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.

Application

This 723 Digital Speed Control controls the speed and load of reciprocating engines in generator set service, including those with flexible couplings (see Figure 1-1). The control includes inputs for two magnetic pickups (MPUs) or proximity switches for monitoring flexible coupling torsionals, an input for a remote speed or load setting, an input for output fuel limiting, an internal speed reference for local control of speed, and a speed bias input for the DSLC™ Digital Synchronizer and Load Control.

One LON channel can be used to support Woodward LinkNet input/output nodes for monitoring functions. The other LON channel can be used to tap into the DSLC for monitoring parameters.

The two serial channels can interface to a Modbus® * master device such as a Human/Machine Interface(HMI) to monitor the control and engine parameters.

*—Modbus is a trademark of Schneider Automation Inc.

Manual 02784**723 Control/DSLC Compatible****Remote Speed Reference (Signal Input #3; Terminals 48/49)**

Connect a remote speed reference transmitter to Signal Input #3. The input signal must be an isolated high-quality signal. No connection is required to this input if this function is not needed by the application.

Use a shielded twisted-pair cable to connect a 4 to 20 mA current transmitter or 1 to 5 Vdc voltage transmitter to terminals 48(+) and 49(–). When using a voltage transmitter, remove the jumper between terminals 48 and 47. An input impedance of 250 Ω is present when the jumper is installed. Without the jumper installed, the input impedance will be greater than 10 M Ω . This input is not isolated from the other control inputs and outputs, and an isolation device must be installed if the transmitter output is not isolated. A failure of the input signal is detected for input values less than 2.0 mA (0.5 Vdc). A detected failure will remain until the failure is repaired and an Alarm Reset is issued.

Ext Fuel Limit (Signal Input #4; Terminals 51/52)

Connect an External Fuel Limit transmitter to Signal Input #4. The input signal must be an isolated high-quality signal representing the External Fuel Limit signal. This signal input will allow an external signal to limit the fuel demand. It is typically used to set a maximum fuel demand limit based on a parameter such as manifold air pressure or exhaust temperature. No connection is required to this input if this function is not needed by the application.

Use a shielded twisted-pair cable to connect a 4 to 20 mA External Fuel Limit current transmitter or 1 to 5 Vdc External Fuel Limit voltage transmitter to terminals 51(+) and 52(–). When using a voltage transmitter, remove the jumper between terminals 51 and 50. An input impedance of 250 Ω is present when the jumper is installed. Without the jumper installed, the input impedance will be greater than 10 M Ω . This input is not isolated from the other control inputs and outputs, and an isolation device must be installed if the transmitter output is not isolated. A failure of the input signal is detected for input values less than 2.0 mA (0.5 Vdc). A detected failure will remain until the failure is repaired and an Alarm Reset is issued.

Communication Ports J2 and J3

Communication Ports J2 and J3 are used to connect two separate Modbus devices to the 723 control. These devices are used to read control parameters as well as read inputs from the LinkNet nodes. The Modbus device connected to J3 can additionally drive LinkNet nodes and also drive certain 723 control parameters. The Modbus device can be any master device capable of communicating with Modbus standard protocol. This includes any Modbus compatible PC, any compatible SCADA system, etc.

Communication Ports J2 and J3 can be software configured for a wide variety of serial communications. Either port can be set to standard specifications for RS-232, RS-422, or RS-485. Additionally the BAUD rates can be independently set for 1200, 2400, 4800, 9600, 19200, or 38400. The only restriction is that if one port is set for a BAUD rate of 38400, the other port must be set to the same rate. Stop bits on either port can be set at 1, 1.5, or 2. Parity can be set for OFF, ODD, or EVEN. The data must be formatted as ASCII on Port J2. On Communication Port J3, the data may be formatted as either ASCII or RTU.

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Grounding and Shielding

The RS-422 specifications state that a ground wire is needed if there is no other ground path between units. The preferred method to do this is to include a separate wire in the cable that connects the circuit grounds together. Connect the shield to earth ground at one point only. The alternate way is to connect all circuit grounds to the shield, and then connect the shield to earth ground at one point only. If the latter method is used, and there are non-isolated nodes on the party line, connect the shield to ground at a non-isolated node, not an isolated node. Figures A-5 and A-6 illustrate these cabling approaches.

IMPORTANT Non-isolated nodes may not have a signal ground available. If signal ground is not available, use the alternate wiring scheme in Figure A-6 with the signal ground connection removed on those nodes only.

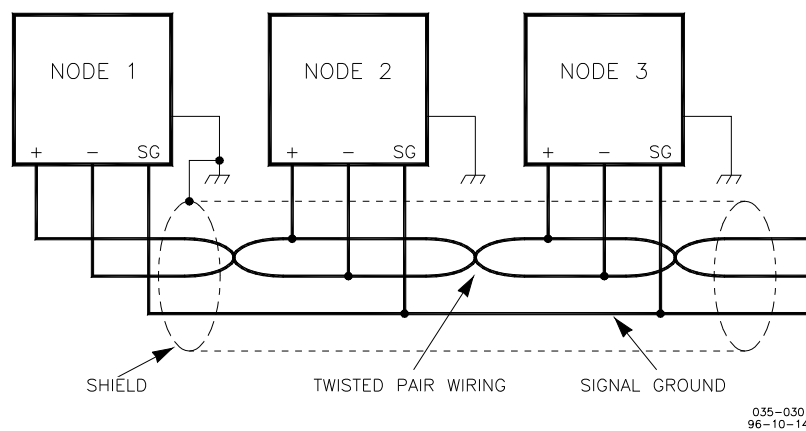


Figure A-5. Preferred Multipoint Wiring Using Shielded Twisted-pair Cable with a Separate Signal Ground Wire

IMPORTANT The SG (signal ground) connection is not required if signal ground is unavailable.

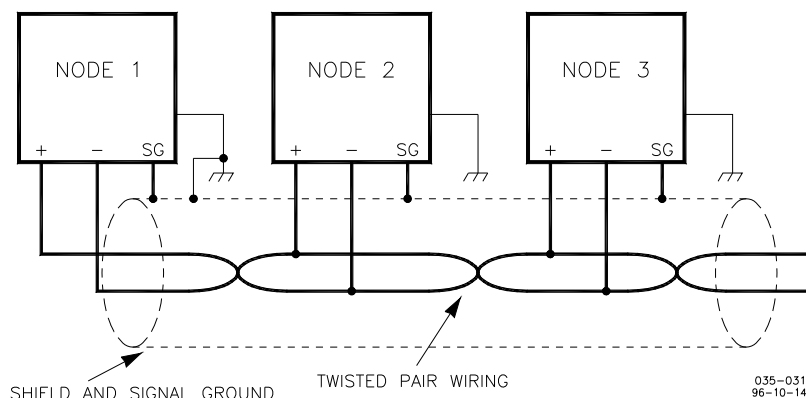


Figure A-6. Alternate Multipoint Wiring Using Shielded Twisted-pair Cable without a Separate Signal Ground Wire

Appendix B. LinkNet® I/O Network

Introduction

The LinkNet® option provides distributed I/O capabilities for the 723 control system through LON #1. The LinkNet I/O modules, while slower and less powerful than on-board I/O, are well suited for functions which are not time-critical, such as sequencing and monitoring.

Network Architecture

An I/O network consists of the 723 LON #1 channel, which provides independent network trunks of up to 18 I/O modules. The LinkNet I/O modules, or nodes, on each trunk are attached to the 723 via a single twisted-pair wire (see end of this Appendix for correct wiring geometry).

Each LinkNet I/O module has two rotary switches that are used to set its network address. On installation, these switches must be dialed so that the I/O module's network address of 1–18 matches the network address defined for this I/O module in the application program. The I/O modules may be placed in any order on the network, and gaps are allowed in the address sequence.

Hardware

Each network consists of one LinkNet channel of a 723 and many I/O modules. The I/O modules include thermocouple inputs, RTD inputs, 4–20 mA inputs, and discrete inputs as well as 4–20 mA and relay outputs. All of the analog modules consist of six channels per module. The Relay Output module contains eight channels, and the Discrete Input module has 16 channels.

Each I/O module is housed in a plastic, field-termination-module-type package for DIN rail mounting. The LinkNet I/O modules can be mounted in the control cabinet or in any convenient location in the vicinity of the engine that meets the temperature and vibration specifications.

I/O Module Specifications

Accuracy

1% at 25 °C without field calibration

Power Supply Input

18 to 32 Vdc

Isolation

Network to I/O channel: 277 Vac

Power supply input to network: 277 Vac

I/O channel to I/O channel: 0 V

Power supply input to I/O channel: 500 Vdc except for discrete inputs, discrete input power comes directly from power supply input

723 Control Specifications

Woodward Part Numbers:	
9907-031	723 with low-voltage power supply
9907-032	723 with high-voltage power supply
9907-033	723 with torsional filter and low-voltage power supply
9907-034	723 with torsional filter and high-voltage power supply
9907-205	Hand Held Programmer
Power Supply Rating	18–40 Vdc (24 or 32 Vdc nominal)
Power Consumption	90–150 Vdc (125 Vdc nominal) 40 W nominal, 7 A inrush current
Steady State Speed Band	±0.25% of rated speed
Magnetic Pickup	90–15 000 Hz (200–2100 rpm)
Proximity Switch	90–1000 Hz (200–2100 rpm)
Discrete Inputs (8)	10 mA at 24 Vdc
Remote Load Setting Input	4–20 mA or 1–5 Vdc
Manifold Pressure Limiting Input	4–20 mA or 1–5 Vdc
DSL Input	±5 Vdc from SPM-A synchronizer
Auxiliary Input	±5 Vdc from SPM-A synchronizer
Actuator Output	0–200 mA
Configurable Actuator Output	4–20 or 0–200 mA to meter, computer, or actuator
Configurable Analog Outputs (2)	4–20 or 0–1 mA to meter or computer
Relay Outputs	Major Alarm, Minor Alarm
Programmer Serial Port (J1)	RS-422, 9-pin D connector, 1200 baud, full duplex
Communication Ports (J2, J3)	RS-232, RS-422, RS-485, 9-pin connector, 1200 to 38 400 baud, full duplex
Ambient 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
EMI/RFI Susceptibility	EN50081-2 and EN50082-2
Humidity	US MIL-STD 810D, Method 507.2, Procedure III
Mechanical Vibration	24 2000 Hz swept sine, 2.5 Gs constant acceleration, resonant dwells 1 million cycles, total time 6 hours/axis
Mechanical Shock	US MIL-STD 810C, Method 516.2, Procedure I (basic design test), Procedure II (transit drop test, packaged), Procedure V (bench handling)
Salt Spray	ASTM B 117-73



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