



Engine Component Guide

Engine Controls & Actuation



Model 0175, 0250, 0300 Series



DYNA 2000 & 2500
Linear Actuator



APECS 4500 Controller



DPG Speed Controls



L-Series Position Controller with
Integrated Throttle Body (ITB)



L-Series Harness



Magnetic Pickups



Magnetic Pickup Harness



EPG Governing System: Actuator,
Speed Control & Mag pickup



Woodward Small Engine Controls & Actuation



Woodward's engine control systems are considered among the best by OEMs worldwide. The controllers and actuators adapt to a variety of applications and provide some of the most flexible solutions on the market today.

Specifications and manuals are available from www.woodward.com for DPG, APECS, MPU, L-series and EPG.

DPG, APECS, L-Series & EPG Electronic Speed Controls

Woodward's worldwide reputation as a leading manufacturer of control systems is enhanced by this full line of products for industrial engines:

- DPG (Digital Programmable Governor) digital controller family with enhanced software features.
- APECS (Advanced Proportional Engine Control System) digital controller family.
- Magnetic speed pickups and MPU harnesses.
- L-Series integral digital speed-control / actuator systems with enhanced software features.
- EPG (Electrically Powered Governor) analog controller family.



APECS Series & EPG Actuators

Woodward's linear and rotary actuators meet the needs of a variety of applications. Paired with our controllers and accessory components they create motion control system solutions that save you time and money.

- Linear actuators from 4.0 lb-ft to 15.0 lb-ft: 0175, 0225, 0250, 0275, 0300
- Rotary actuators from 05 lb-ft to 5.4 lb-ft

Apecs Rotary Actuators: 0175, 0250, 0300 series available.



APECS Linear Actuators

| Description | Old Part Number | Woodward Part Number | |
|--|---------------------|----------------------|--|
| Dyna 2000 (work capacity 0.25 ft-lb, standard shaft seal & linear ball bushings, output travel 0.775-0.825"/19.68-20.95 mm) | | | |
| 12 Vdc | DYNC-10202-000-0-12 | DC10202-000-012 | |
| 24 Vdc | DYNC-10202-000-0-24 | DC10202-000-024 | |
| DYNC 2500 (work capacity 0.50 ft-lb, standard shaft seal & linear ball bushings, output travel 0.775-0.825"/19.68-20.95 mm) | | | |
| 12 Vdc | DYNC-10502-000-0-12 | DC10502-000-012 | |
| 24 Vdc | DYNC-10502-000-0-24 | DC10502-000-024 | |

GCS SERVICE & SUPPORT

World Class Technical Assistance (TAG) service@govconsys.com

Available 24/7 to answer questions and troubleshoot your problems in real-time, GCS has the experience and expertise to assist you in retrofitting and sizing the proper controls for your application.

Woodward Training Program

Learn about Woodward product operations, calibration/testing procedures, tuning, maintenance, programming, fault-finding, troubleshooting, and repair. Select from our extensive roster of scheduled classes or design a custom class. Customized, on-demand training can be delivered in-house or on-site. Contact training@govconsys.com for details.

Contact **GCS** at www.govconsys.com or email us at service@govconsys.com



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Woodward DPG (Digital Programmable Governor) Digital Controller Family



Woodward DPG digital controllers for diesel or gas-fueled engines perform across a wide speed range and allow the adjustment of set speed and gain with a built-in user interface. Independent, programmable, proportional, integral, and derivative gains provide custom governor response to diverse engine applications. The COMM port provides access to all other controller settings, allowing adaptation to each application during service and initial configuration. Internal FAILSAFE reacts instantly to loss of engine speed signal and allows actuator to return to minimum fuel.

DPG 2100 Controller

Isochronous engine control



- Automatic calibration of remote speed potentiometer
- Isochronous speed control
- User friendly / operator adjustable
- Superior temperature stability
- Reverse battery protection
- Smoke control on start up
- Serial communication port

DPG 2200 Controller

Isochronous or droop control



- Isochronous or droop speed control
- Remote speed indexing
- Paralleling input

DPG 2300 Controller

Off-highway applications



- Isochronous or droop speed control
- Remote speed indexing
- Paralleling input

Please refer to the chart below to select your DPG controller. For applications with DPGs that are not on this list, please contact GCS Tech Support Team, service@govconsys.com

| DPG Part Number | MPU Input | IGN Input | Speed | Droop | Gain Pot | Speed Trim Pot | Raise Lower | Speed Select | Keypad | Display | Computer Program Required | Product Specification | Tech Manual |
|-----------------|-----------|-----------|--------------|-------|----------|----------------|-------------|--------------|--------|---------|---------------------------|-----------------------|-------------|
| DPG-2101-00X | X | | 1+ Idle Time | | X | | | | 2-Key | | Manual | 36502 | 36526 |
| DPG-2111-00X | X | | 1+ Idle Time | | X | | | | | | Manual | 36502 | 36536 |
| DPG-2133-00X | X | | 2+ Idle Time | | X | | X | X | 2-Key | | Manual | - | 36537 |
| DPG-2145-00X | | X | 2+ Idle Time | | X | | X | X | 2-Key | | Manual | 36502 | 36526 |
| DPG-2146-00X | | X | 1+ Idle Time | | X | | | | 2-Key | | Manual | 36502 | 36526 |
| DPG-2155-00X | X | | 2+ Idle Time | | X | | X | X | 2-Key | | Manual | 36502 | 36526 |
| DPG-2201-00X | X | | 2+ Idle Time | X | | | X | X | 4-Key | X | X | 36503 | 36523 |
| DPG-2223-00X | X | | 2+ Idle Time | X | | X | | X | 4-Key | X | X | - | 36522 |
| DPG-2302-00X | X | | 4 | | | X | | X | 4-Key | X | X | 36504 DYN320 | 36527 |
| DPG-2345-00X | | X | 4 | | | X | | X | 4-Key | X | X | - | 36527 |
| DPG-2401-00X | X | | 2+ Idle Time | X | | X | | X | 4-Key | X | X | - | 36525 |

Woodward recommends a device surge protection be installed for all DPG's to reduce surge pulses.

Part # 12V: 8923-1271.KIT / 24V: 8923-1272.KIT

NOTES:

1. DPG-2401-00X is limited to 3.5 Amps continuous, all other models are 7 Amps continuous
2. DPG-2145-00X and DPG 2155-00X Use a 12 Pin Mini AMP connector (AMP 770581-1)
3. All -001 Suffix part numbers accept only HZ parameters (not Flywheel teeth)
4. Modify GAIN FACTOR only if you run out of adjustment in a PID or OVG term
5. Speed filter value for 6-8 cylinder engines =16, 3-4 cylinder engines = 24

ACCESSORIES FOR LAPTOP CONFIGURATION (REQUIRED)

- Programming Harness 8447-1003 DPG
- USB to Serial Port Converter Kit 5995-0032

5995-0032 KIT INCLUDES

- Blue Serial to USB Converter • 10 ft Serial Cable • Gender Charger

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Woodward APECS Speed Controls



Diesel emissions control, CAN communications, and engine protection are all possible with the APECS family of electronic controllers. Woodward's Advanced Proportional Engine Controls System (APECS) provides isochronous or multi-speed engine governing through a wide speed range. The complete system consists of a powerful microprocessor-based controller driving a precision proportional actuator. The actuator is connected to the engine's throttle or fuel pump speed lever to precisely control engine speed.



APECS 4500 Controller

Advanced electronics in APECS 4500 provide maximum control and optimal engine performance. Adaptive features include autocrank, droop governing, glow plug control, and analog input (remote speed pot). CAN/J1939 bus interface allows communication and diagnostics among engine components. Typical applications: generator sets, compressors, construction machinery, and farm vehicles.

REQUIRES PROGRAMMING WITH LAPTOP



APECS 3000 Controller

APECS 3000 controllers are isochronous engine governors that control and limit engine speed by adjusting the fuel control lever with a proportional actuator. Configurable for operation at up to four different speeds. No manual adjustments; all features are software configured with the APECS Calibration Tool. Well-suited for generator sets, compressors/pumps, utility vehicles, and construction equipment.

REQUIRES PROGRAMMING WITH LAPTOP



APECS 2000 Controller

The APECS 2000 is an isochronous controller for diesel, gasoline, CNG, and LPG engines. Calibration/adjustments of Proportional, Integral and Derivative (PID) gains are performed manually without the need for specialized software. Features: reverse polarity protection, electrostatic discharge protection, and protection against miswiring. Diagnostics take account of broken signal leads and overspeed conditions, responding with failsafe measures. Engine compartment mountable and compatible with APECS actuators. Ideal for gensets, construction equipment, and farming machinery.

MANUAL ADJUSTMENT NO COMPUTER REQUIRED

For programming assistance contact service@govconsys.com

APECS Speed Controllers

| Controller Model | Part Number | Manually Adjusted | Computer Calibrated | PID Controller | Tech Manuals | Calibration Kit Part Number |
|--|-------------|-------------------|---------------------|----------------|--------------|-----------------------------|
| APECS 500 (manually adjusted or computer calibrated) | SA-4492 | X | X | | 36513 | SA-5206 |
| APECS 2000 (manually adjusted, PID controller) | SA-4389 | X | | X | 36734 | n/a |
| APECS 3000 (computer calibrated) | SA-4450 | | X | | 36716 | SA-4455 |
| APECS 3100 (computer calibrated) | SA-4451 | | X | | and | |
| APECS 3200 (computer calibrated) | SA-4452 | | X | | SE-4049 | |
| APECS 3400 (computer calibrated) | SA-4471 | | X | | | |
| APECS 4500 (computer calibrated) | SA-4489 | | X | | 36752 | SA-4488 |
| APECS 4500 with CAN (computer calibrated) | 8800-1006 | | X | | and 37571 | |

USB to Serial Port Converter Kit (p/n 5995-0032) includes: Blue Serial to USB Converter, 10 ft Serial Cable, Gender Changer

Calibration kit required for all computer-calibrated controls.

*Connector kit required for all series 4500 and 5000 – SA-4490

Note: APECS 4800 Service Tool is OEM specific.

Contact **GCS** at www.govconsys.com or email us at service@govconsys.com



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Woodward Magnetic Pickups and Proximity Switches for Electronic Controls



Temperature Range: -100°F to +225°F (-73.3°C to +107.2°C)

Casing: Non-magnetic stainless steel or Non-magnetic, with corrosion protective finish.

Sealing: Capable of functioning immersed in motor oil or diesel fuel.

Capable of functioning in 95% humidity.



Product Specificatons: 36533 Magnetic Pickups 5/8 and 3/4 SAE Threads

36563 Magnetic Pickups 3/8-24 SAE Threads

| MPU | PART NUMBER | LEADS | OUTPUT VOLTAGE | RESISTANCE (Ohms) | Dim. X | Dim. Y |
|---------------|--|-------|----------------|-------------------|--------|--------|
| 3/4-16 | DYNT-13200 | YES | 3.6V | 3.6V | 2.97" | 2.37" |
| | DYNT-13300 | YES | 3.6V | 3.6V | 3.90" | 3.30" |
| | DYNT-13400 | YES | 3.6V | 3.6V | 2.97" | 2.37" |
| | DYNT-13500 | YES | 3.6V | 3.6V | 3.90" | 3.30" |
| | DYNT-19200 | YES | 3.6V | 3.6V | 2.97" | 2.37" |
| 5/8-18 | DYNT-10100 | NO | 3.6V | 3.6V | 2.5" | 3.6" |
| | DYNT-10200 | NO | 3.6V | 3.6V | 4.0" | 5.1" |
| | DYNT-15200 | NO | *10V | 10V | 4.0" | 5.1" |
| | DYNT-10300 | NO | 3.6V | 3.6V | 1.0" | 2.1" |
| | DYNT-10400 | NO | 3.6V | 3.6V | 3.0" | 4.1" |
| | DYNT-15400 | NO | *10V | 10V | 3.0" | 4.1" |
| | DYNT-10500 | NO | 3.6V | 3.6V | 6.0" | 7.1" |
| | DYNT-10600 | NO | 3.6V | 3.6V | 5.0" | 6.1" |
| | DYNT-15600 | NO | *10V | 10V | 5.0" | 6.1" |
| | DYNT-11100 | NO | 3.6V | 3.6V | 2.5" | 3.6" |
| | DYNT-16100 | NO | *10V | 10V | 2.5" | 3.6" |
| 3/8-24 | DYNT-17100 | YES | 3.6V | 3.6V | 1.00" | 1.43" |
| | DYNT-17150 | YES | 3.6V | 3.6V | 1.68" | 2.10" |
| | DYNT-17200 | YES | 3.6V | 3.6V | 2.27" | 2.70" |
| | DYNT-17400 | YES | 3.6V | 3.6V | 4.00" | 4.43" |
| *NOTE | NO = Does not come with leads, need to purchase MPU Harness separately C101-10 Metric pickup sizing available upon request. We offer metric pickups by request. *Higher Output Voltage | | | | | |

| MPU | PART NUMBER | LEADS | OUTPUT VOLTAGE | RESISTANCE (Ohms) | LENGTH | WIDTH (min) |
|---------------|-------------|-------|----------------|-------------------|--------|-------------|
| 3/8-24 | DYNT-12100 | YES | 3.6V | 385 | 3.00" | 5.00" |
| | DYNT-12700 | YES | 3.6V | 385 | 4.50" | 5.00" |

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WOODWARD L-Series Speed Control

The Woodward **L-Series Speed Control** is a microprocessor-based engine speed controller with built in Actuator in a small package.

The **L-Series** can easily be programmed to match the operating parameters of every engine you produce.

With many built-in functions, the **L-Series** speed control allows a high-volume packager to stock one part number, but implement a wide variety of engine control strategies.

- Integrated Throttle Body actuators for speed control, position control, and air/fuel control.
- L-Series integral digital speed-control/actuator systems with enhanced software features.
- Stanadyne actuators integrated with pump and retrofit kits for TQ-125 & ST-125 applications.
- Steady State Work = 0.26ft-lb, 60° rotation



Important information if converting from LCS to L-Series

- **Wiring change is required to convert old LCS to modern L-Series.**
- **MOVE PIN 2 TO HOLE 5 AND PUT BLANKING PLUG IN HOLE 2.**
Refer to Woodward Product Manual 26250 for L-Series Integrated Speed Control calibration procedure
- Contact GCS Tech Support (service@govconsys.com) for a free copy of the standard L-Series manual
Information required prior to programming.
- Rated speed engine.
- Number of flywheel teeth.

L-Series Service Tool

The **L-Series Service Tool** is used to configure, adjust, monitor, and troubleshoot the **L-Series Control**. The service tool runs on a personal computer and communicates with the **L-Series Control** through a serial connection. **The Service Tool** provides troubleshooting and monitoring of control parameters. One version of the Service Tool applies to all **L-Series**. The screen content is automatically generated based on the control and its configuration.

- Allows both On-Line and Off-Line Configuration.
- Provides calibration, PID tuning and trending capabilities.
- Configuration Reading (from control).
- Configuration Writing (to control).
- PID tuning and Position Calibration.

Woodward Software Products Download Instructions

1. Before downloading, registration is required: <https://www.woodward.com/registration.aspx>
2. After registration, select "Support" from the top menu bar and click on "Software" from the dropdown menu.
3. Enter **APECS, DPG or L-Series** in the Search box (do not change Software and Product Category).
4. Click on "Search" to display a list of service tools.
5. Select the software file and click on the **RED** download button.

L-Series Integrated Gas Mixer, Throttle Body, and Programmable Speed Control / Actuator



The L-Series is designed for use on gaseous fueled industrial engines between 5 and 100 kW (7 and 134 hp). The throttle and venturi sizes are between 24 and 50 mm. Applications include power generation, refrigeration units, pumps, irrigation, and mobile industrial. The mixer can be used with propane and natural gas and requires a zero pressure regulator. The throttle body incorporates the proven Woodward L-Series speed control, which operates the throttle plate. The LC-50 can be programmed via the RS-232 port of a PC/laptop to a variety of configurations.

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EPG Electronic Governor



Electrically powered governor (EPG) systems are designed for precise speed control of diesel and gasoline engines. They are especially suited to prime movers without a mechanical drive or hydraulic oil supply for the governor which has low-mass, low-friction fuel linkages.

The 512/524 and 1712/1724 EPGs are three-component governing systems for 12 or 24 Vdc operation.

All EPG systems include an actuator, an electronic speed control, and magnetic pickup. Isochronous electronic controls are available with either start-fuel limit or with switch selected dual dynamics. Droop controls are available for certain types of parallel generator applications. Load sharing devices are available for use with the isochronous models used in paralleled applications.



Actuators are available in 12 Vdc or 24 Vdc models with the following work outputs:

- 512/524 (full governor travel of 30°): 512 = 0.7 J (0.5 ft-lb); 524 = 1.0 J (0.75 ft-lb).
- 1712/1724 (full governor travel of 35°): 1712 = 1.6 J (1.2 ft-lb); 1724 = 2.3 J (1.7 ft-lb).
- Actuator output shaft is 0.375"-36 SAE serrated on each end.

Woodward Manual 82493: Isochronous Models 512/524 and 1712/1724: Standard, Start Fuel Limit, Dual Dynamics

NOTE: EPG Wire Kit, Installation Kit, and Magnetic pickups are sold separately. For assistance selecting the correct kits and programming support, contact GCS Tech Support Team, service@govconsys.com.

EPG Part Numbers

Actuators

| | |
|--------------------------|----------|
| Model 512, 12 Vdc | 8256-022 |
| Model 524, 24 Vdc | 8256-021 |
| Model 1712, 12 Vdc | 8256-017 |
| Model 1724, 24 Vdc | 8256-016 |

Speed Control (Isochronous)

The following part numbers represent a 3000–6000 Hz range; contact Woodward for part numbers of different speed ranges.

| | |
|---|----------|
| 12 Vdc, 512 or 1712 SC for Diesel or Turbine, w/ Start Fuel Limit | 8290-186 |
| 12 Vdc, 512 or 1712 SC for Natural Gas or Gasoline, w/ Start Fuel Limit | 8290-187 |
| 24 Vdc, 524 or 1724 SC for Diesel or Turbine, w/ Start Fuel Limit | 8290-184 |
| 24 Vdc, 524 or 1724 SC for Natural Gas or Gasoline, w/ Start Fuel Limit | 8290-185 |

Speed Control (Droop) For 512/524 and 1712/1724 Series Systems

The following part numbers represent a 3000–6000 Hz range; contact Woodward for part numbers of different speed ranges.

| | |
|--------------------------------------|----------|
| 12 Vdc, Diesel or Turbine | 8290-192 |
| 24 Vdc, Diesel or Turbine | 8290-191 |
| 24 Vdc, Natural Gas or Turbine | 8290-045 |

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- CEUs & PDH Credits



Fuel Measurement Systems



Diesel Engine Systems



Air Starter Systems



Exhaust Emissions, SRT and SCR Systems



Oil Filtration



Instrumentation



Surge / Lightning Protection



GCS is part of the MSHS Group offering turn-key solutions for prime movers in marine and land-based power applications.

We specialize in innovative control system integration and monitoring solutions. Our unmatched 24/7 service, technical support, training, and engineering services ensure that GCS is your partner for the lifecycle of your control, monitoring, and measuring systems.

GCS is proud of achieving ISO9001:2008 certification awarded by Lloyds Register Quality Assurance (LRQA)

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