APECS DPG-21XX-00X

Digital Controllers for Isochronous Generators

Description

DPG-21XX-00X digital controllers are used primarily to govern diesel or gas fueled engines of generator sets. This microprocessor-based, digital controller performs across a wide speed range and allows adjustment of set speed and gain parameters with the built-in user interface. The COMM port provides access to all other controller settings, allowing adaptation to each application during service and initial configuration.

Separately programmable Proportional, Integral, and Derivative gains are provided for tailoring controller response to many engine applications. Other adjustments include acceleration and deceleration ramp rates, idle speed set, hold time, and more.

Properly tuned, this controller delivers fast engine response to speed or load change while providing precise stable isochronous operation.

The controller's internal FAILSAFE reacts instantly to loss of the engine speed signal, allowing the actuator to return to minimum fuel.

Actuator Compatibility

DYNA 2000	DYNA 70000	DYNA 8000	APECS 0150	EPG 512
DYNA 2500	DYNA 70025	DYNA 8200	APECS 0250	EPG 1724
	DYNA 10141	DYNA 8400	APECS 0300	

Power Flow Series Gas Valves
APECS Linkage Free Integral Type

Other Models Available

DPG-2200 Series – for Genset Applications
DPG-2300 Series – for Off-Road Vehicles
DPG-2400 Series – for EFC Applications

Calibration Tool

DPG Calibration Kit P/N 8447-1003

- Isochronous speed control
- Precision frequency control: 0.25%
- Superior temperature stability
- Reverse battery protection
- Input voltage range: 9–30 Vdc
- Smoke control on start up
- Remote setup
- Serial communications port

Specifications

DPG-21XX-00X controllers are compliant with applicable CE Directives—EMC. The controller's main electrical and mechanical specifications are listed here along with several performance characteristics.

The table below shows the controller series' five available hardware configurations.

Model No.	Connector Style Options		Speed Sensing Options		Adj. Set Speeds	Remote Speed INC and DEC
	7-wire Euro	12-pin Molex	Magnetic Pickup	Ignition Sense		
DPG-2101-00X	✓		✓		1 + idle	
DPG-2145-00X		✓		✓	2 + idle	✓
DPG-2146-00X	✓			✓	1 + idle	
DPG-2155-00X		✓	✓		2 + idle	✓

Electrical

Operating Voltage Range:	9–30 Vdc *
Rated Output Current:	7 A Maximum (continuous)
Maximum Surge Current:	14 A (not to exceed ten seconds)
Connections:	Terminal strip with 7 Euro style terminals or a quick connector with 12 pins
Input Signal from Magnetic Pickup:	2.0 VAC RMS minimum during cranking
Input Signal from Engine's Ignition System:	40 V minimum during cranking

(*) All cabling for these controllers is limited to less than 30m (98.4').
Power cabling is limited to less than 10m (32.8') in total length.
See wiring diagrams in User Manual 36526 for specific cable types required.

Mechanical

Ambient Operating Temperature:	-40°F to +185°F (-40°C to +85°C)
Sealing:	Oil, water, and dust resistant via conformal coating and die cast enclosure
Weight:	10 oz. (284 g)

Performance

Steady State Speed Band:	± .25% over ambient operating temperature range
Engine Speed MPU Measurement Range:	10 MPU Hertz to 14,000 MPU Hertz
Governing Speed Rangewith MPU:	500 MPU Hertz to 11,000 MPU Hertz
Engine Speed Ignition Measurement Range:	2 Hertz to 350 Hertz
Governing Speed Range with Ignition:	25 Hertz to 300 Hertz

Suggested Mating Connectors for DPG-2145-00X & DPG-2155-00X Models

AMP 770581-1	Mini universal Mate-N-Lock
AMP 171637-3 or 794407-3	Duplex finish socket
AMP 90707-1	Crimping hand tool for 18 gauge wire
AMP 408-4137	Crimping documentation
AMP 189727-1	Socket extraction tool

Parameter Reference

The parameter list provides information regarding each of the parameters that can be adjusted when a computer is connected to the controller via the COMM port and Universal PST program. The COMM port and Universal PST are intended only for configuration and periodic service. **Do not leave a computer and/or COMM cable connected to the COMM port.** The following table lists each of the parameters and their default, minimum, and maximum values. Several of the parameters have minimum and maximum values set by other parameters. *Speed* and *Rate* values are shown as Hertz values.

PARAMETER LIST FOR DPG-2101-00X (MPU) & DPG-2146-00X (IGNITION) (These controllers use the 7-terminal Euro style screw terminal connector.)					
	PARAMETER NAME		**DEFAULT**	**MINIMUM**	**MAXIMUM**
Opt.	1. No. of Flywheel Teeth or Pulses per revolution	-001	0	0	0
		-002	0	0	572
Req.	**2. Set Speed A**		**1000 (25)**	**Set Speed A Min**	**Set Speed A Max**
N/A	3. Not Available				
Opt.	4. Idle Speed		50 (20)	Idle Speed Min	Idle Speed Max
Req.	**5. Proportional**		**25**	**1**	**99**
Req.	**6. Integral**		**50**	**0**	**99**
Req.	**7. Derivative**		**25**	**0**	**99**
Req.	**8. OVG @ Set Speed A**		**Use the controller's built-in GAIN potentiometer**		
N/A	9. Not Available				
Opt.	10. OVG @ Idle Speed		20	1	99
Req.	**11. Gain Factor**		**20 (40)**	**1**	**99**
Req.	**12. Speed Filter**		**16 (4)**	**1**	**24**
Opt.	13. Idle Hold Time		0	0	9999
Opt.	14. Accel Rate		1000 (3000)	1	9999
Opt.	15. Decel Rate		1000 (3000)	1	9999
Opt.	16. Startup Rate		1000 (3000)	1	9999
Opt.	17. Integral Low Limit		0	0	Integral High Limit
Opt.	18. Integral High Limit		99	Integral Low Limit	99
N/A	19. Password		Not Available		
Opt.	20. Over Speed Limit	-001	100	0	100
		-002	15000 (450)	0	15000 (450)
Opt.	21. Set Speed A Min		10 (2)	10 (2)	Set Speed A
Opt.	22. Set Speed A Max		11000 (300)	Set Speed A	11000 (300)
N/A	23. Not Available				
N/A	24. Not Available				
Opt.	25. Idle Speed Min		10 (2)	10 (2)	Idle Speed
Opt.	26. Idle Speed Max		11000 (300)	Idle Speed	11000 (300)
Opt.	27. Duty Cycle Limit		95	10	95
Req.	**28. Startup Speed**		**1000 (25)**	**10 (2)**	**11000 (300)**
Opt.	29. Startup Duty Cycle		30	5	95
Req. = Parameter adjustment is required to achieve basic governing. Opt. = Parameter use is optional. NA = Parameter is not available. Default, Minimum and Maximum values in parenthesis apply when the controller uses ignition pulses to sense engine speed, which would be the case for a DPG-2146-00X controller					

NOTICE

All Speed and Rate values are shown as Hertz values (parameters 2, 4, 14-16, 20-22, 25-26). Changing the value of parameter 1 will cause different default values to be displayed based on the Hertz to RPM formula. These parameters can be changed with PST max by 100 (MPU input) or 10 (IGNITION input) at once when engine is running.

Parameter Reference (cont'd.)

The following table lists each of the parameters and their default, minimum, and maximum values. Several of the parameters have minimum and maximum values set by other parameters. *Speed* and *Rate* values are shown as Hertz values.

PARAMETER LIST FOR DPG-2155-00X (MPU) & DPG-2145-00X (IGNITION) (These controllers use the 12-terminal quick connect.)					
	PARAMETER NAME		**DEFAULT**	**MINIMUM**	**MAXIMUM**
Opt.	1. No. of Flywheel Teeth or Pulses per Revolution	-001	0	0	0
		-002	0	0	572
Req.	**2. Set Speed A**		**1000 (25)**	**Set Speed A Min**	**Set Speed A Max**
Opt.	3. Set Speed B		1000 (25)	Set Speed B Min	Set Speed B Max
Opt.	4. Idle Speed		50 (20)	Idle Speed Min	Idle Speed Max
Req.	**5. Proportional**		**25**	**1**	**99**
Req.	**6. Integral**		**50**	**0**	**99**
Req.	**7. Derivative**		**25**	**0**	**99**
Req.	**8. OVG @ Set Speed A**		**Use the controller's built-in GAIN potentiometer**		
Opt.	9. OVG @ Set Speed B		20	1	99
Opt.	10. OVG @ Idle Speed		20	1	99
Req.	**11. Gain Factor**		**20 (40)**	**1**	**99**
Req.	**12. Speed Filter**		**16 (4)**	**1**	**24**
Opt.	13. Idle Hold Time		0	0	9999
Opt.	14. Accel Rate		1000 (3000)	1	9999
Opt.	15. Decel Rate		1000 (3000)	1	9999
Opt.	16. Startup Rate		1000 (3000)	1	9999
Opt.	17. Integral Low Limit		0	0	Integral High Limit
Opt.	18. Integral High Limit		99	Integral Low Limit	99
N/A	19. Password		Not Available		
Opt.	20. Over Speed Limit	-001	100	0	100
		-002	15000 (450)	0	15000 (450)
Opt.	21. Set Speed A Min		10 (2)	10 (2)	Set Speed A
Opt.	22. Set Speed A Max		11000 (300)	Set Speed A	11000 (300)
Opt.	23. Set Speed B Min		10 (2)	10 (2)	Set Speed A
Opt.	24. Set Speed B Max		11000 (300)	Set Speed B	11000 (300)
Opt.	25. Idle Speed Min		10 (2)	10 (2)	Idle Speed
Opt.	26. Idle Speed Max		11000 (300)	Idle Speed	11000 (300)
Opt.	27. Duty Cycle Limit		95	10	95
Req.	**28. Startup Speed**		**1000 (25)**	**10 (2)**	**11000 (300)**
Opt.	29. Startup Duty Cycle		30	5	95

Req. = Parameter adjustment is required to achieve basic governing.
Opt. = Parameter use is optional. NA = Parameter is not available.

Default, Minimum and Maximum values in parenthesis apply when the controller uses ignition pulses to sense engine speed, which would be the case for a DPG-2145-00X controller.

NOTICE

All *Speed* and *Rate* values are shown as Hertz values (parameters 2-4, 14-16, 20-26). Changing the value of parameter 1 will cause different default values to be displayed based on the Hertz to RPM formula. These parameters can be changed with PST max by 100 (MPU input) or 10 (IGNITION input) at once when engine is running.

Parameter Reference (cont'd.)

The following table lists each of the parameters and their default, minimum, and maximum values. Several of the parameters have minimum and maximum values set by other parameters. *Speed* and *Rate* values are shown as Hertz values.

PARAMETER LIST FOR DPG-2111-00X (These controllers use the 7-terminal Euro style screw terminal connector.)				
	PARAMETER NAME	**DEFAULT**	**MINIMUM**	**MAXIMUM**
N/A	1. Number of Flywheel Teeth	0	0	0
Req.	**2. Set Speed A**	**1000**	**Set Speed A Min**	**Set Speed A Max**
N/A	3. Not Available			
Opt.	4. Idle Speed	50	Idle Speed Min	Idle Speed Max
Req.	**5. Proportional**	**25**	**1**	**99**
Req.	**6. Integral**	**50**	**0**	**99**
Req.	**7. Derivative**	**25**	**0**	**99**
Req.	**8. OVG @ Set Speed A**	**20**	**1**	**99**
		The controller's built-in GAIN ADJUST potentiometer provides a +/-20% adjustment range of the nominal gain value entered.		
N/A	9. Not Available			
Opt.	10. OVG @ Idle Speed	20	1	99
Req.	**11. Gain Factor**	**20**	**1**	**99**
Req.	**12. Speed Filter**	**16**	**1**	**24**
Opt.	13. Idle Hold Time	0	0	9999
Opt.	14. Accel Rate	1000	1	9999
Opt.	15. Decel Rate	1000	1	9999
Opt.	16. Startup Rate	1000	1	9999
Opt.	17. Integral Low Limit	0	0	Integral High Limit
Opt.	18. Integral High Limit	99	Integral Low Limit	99
N/A	19. Password	Not Available		
Opt.	20. Over Speed Limit	100	0	100
Opt.	21. Set Speed A Min	10	10	Set Speed A
Opt.	22. Set Speed A Max	11000	Set Speed A	11000
N/A	23. Not Available			
N/A	24. Not Available			
Opt.	25. Idle Speed Min	10	10	Idle Speed
Opt.	26. Idle Speed Max	11000	Idle Speed	11000
Opt.	27. Duty Cycle Limit	95	10	95
Req.	**28. Startup Speed**	**1000**	**10**	**11000**
Opt.	29. Startup Duty Cycle	30	5	95

Req. = Parameter adjustment is required to achieve basic governing.
Opt. = Parameter use is optional.
N/A = Parameter is not available.

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. See the Declaration of Conformity in Manual 36526 and Manual 36536 (DPG-2111-00X).

EMC LIMITATIONS

Cabling

All cabling for this unit is limited to less than 30m (98.4').

Power cabling is limited to less than 10m (32.8') in total length from its source; power is intended to be from a local bus structure. The control is not intended to have a power bus that is derived from a plant-wide distribution system, remote source, or similar "mains" type distribution systems. The power to the control should also be a dedicated circuit, directly to the battery or source via a power and return wire that are routed together.

See Manual 36526 and Manual 36536 for additional regulatory information, limitations, and wiring diagrams with specific, required cable types.

Power Bus

The power bus is intended to be a local bus and to have inductive load kickback events suppressed. Therefore, the control's power input is not designed to withstand a charging system load dump, heavy inductive kickbacks, or heavy surge type pulses. If the control is installed outside its intended usage, as described in this manual, centralized voltage pulse suppression should be implemented to help protect the control and other components on the bus. (See the installation instructions in User Manual 36526.)

COMM Port

The COMM port is intended to be a service port, with only temporary connection during service or initial configuration. The COMM port is susceptible to some EMC phenomena and possible unintentional battery return currents.

1. Battery return (B-) is also the communication signal common; typically PCs connect the communication signal's common to protective earth. The PC grounding can provide an unintended return path for B- currents. If B- and the PC are grounded to protective earth, a communication isolator should be used between the PC and the control. Damage to the PC or control, and/or unintended operation may result from a broken battery return wire or the parallel path.
2. The pins inside the COMM port plug are susceptible to damage by ESD discharges, static electricity arcs. Care should be taken not to touch them with tools or put fingers into the port. Always touch your hand or tool to a grounded piece of metal (discharge ESD) before coming in contact with the COMM port.
3. The input is susceptible to RF noise such as switching transients and transmitter signals coupled into the communication cable. Cable orientation and short cable length may be used to eliminate these issues, depending on the severity of the environment.

Related Documentation

Manual 36526: DPG-2101-00X / DPG-2145-00X / DPG-2146-00X / DPG-2155-00X

Manual 36536: DPG-2111-00X

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