APECS DPG-2223-00X

Digital Controllers for Isochronous Generators with Load Sharing Capability

Description

The DPG-2223-00X digital controller is 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 all controller features through the built-in user interface. Properly tuned, this controller delivers fast engine response to speed or load change while providing precise stable isochronous operation.

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, startup and torque limits, idle speed set, and idle hold time.

The controller can also provide droop speed control with 100 user-selectable droop levels. The controller's internal FAILSAFE reacts instantly to loss of the engine speed signal or loss of remote speed potentiometer signal.

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-2100 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

- Automatic calibration of remote speed potentiometer
- Isochronous speed control
- Droop operation: 0 to 10% of set speed with 1/10 percent resolution
- User friendly / operator adjustable
- 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
  - Paralleling input
- ILS speed adjustment range: ± 5 %

Specifications

The controller's main electrical and mechanical specifications are listed here along with several performance characteristics.

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 14 terminals
Input Signal from the Magnetic Pickup:	2.0 VAC RMS minimum during cranking

(*) 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. See wiring diagrams 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:	12 oz. (341 g)
Connection:	14-terminal Euro-style connector
Mechanical Vibration	Suitable for mounting per SAE J1455; 1 to 500 Hz, 5G amplitude

Performance

Temperature Stability:	0.007 Hz @ 158°F (70°C)
Steady State Speed Band:	± 0.25% over ambient operating temperature range
Engine Speed Measurement Range:	10 MPU Hertz to 14,000 MPU Hertz
Governing Speed Range:	500 MPU Hertz to 11,000 MPU Hertz
ILS Input Voltage Measurement Range:	2.3–2.7 Vdc
ILS Input Speed Adjustment Range:	± 5% around the set speed
Droop Adjustment Range:	0–10% of the set speed
Droop Setting Resolution:	Tenths of a percent

Parameter Reference

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

PARAMETER NAME		DEFAULT	MINIMUM	MAXIMUM
1. No. of Flywheel Teeth	-001	0	0	0
	-002	0	0	572
2. Remote Speed Min *		1000	10	Remote Speed Max
3. Remote Speed Max *		1000	Remote Speed Min	11,000
4. Set Speed A*		***1000***	***Set Speed A Min***	***Set Speed A Max***
5. Idle Speed *		500	Idle Speed Min	Idle Speed Max
6. Proportional		***25***	***1***	***99***
7. Integral		***50***	***0***	***99***
8. Derivative		***25***	***0***	***99***
9. OVG @ Remote Speed Min		20	1	99
10. OVG @ Remote Speed Max		0	0	99
11. OVG @ Set Speed A		***20***	***1***	***99***
12. OVG @ Idle Speed		20	1	99
13. Gain Factor		***20***	***1***	***99***
14. Speed Filter		***16***	***1***	***24***
15. Idle Hold Time		0	0	9999
16. Accel Rate *		1000	1	11000
17. Decel Rate *		1000	1	11000
18. Startup Rate *		1000	1	11000
19. Startup Limit		1000	0	1000
20. Torque Limit		1000	0	1000
21. Integral Low Limit		0	0	Integral High Limit
22. Integral High Limit		99	Integral Low Limit	99
23. % Droop		0	0	100
24. No Load Cal		0	0	1000
25. Full Load Cal		1000	0	1000
26. Password		0	0	99
27. Over Speed Limit	-001	100	0	100
	-002*	15000	10	15000
28. Set Speed A Min *		10	10	Set Speed A
29. Set Speed A Max *		11000	Set Speed A	11000
30. Idle Speed Min *		10	10	Idle Speed
31. Idle Speed Max *		11000	Idle Speed	11000
32. Duty Cycle Limit		95	10	95
33. E1 Handler Select	-001	0	0	1
	-002	0	0	2
34. Startup Speed *		**1000**	**10**	**11000**
35. Startup Duty Cycle		30	5	95
36. Speed Pot Action		0	0	1

Parameters 4, 6, 7, 8, 11, 13, 14, and 34 require adjustment, while adjustments to the other parameters are optional.

NOTICE

Parameters marked with an asterisk (*) are displayed as RPM values when the No. of Flywheel Teeth is greater than zero. These parameters can be changed with PST max by 100 at once when engine is running.

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 36522.

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 36522 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 36522

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