



Specifications Systems Operation Testing and Adjusting

Caterpillar Digital Voltage Regulator (CDVR)

Important Safety Information

Most accidents that involve product operation, maintenance and repair are caused by failure to observe basic safety rules or precautions. An accident can often be avoided by recognizing potentially hazardous situations before an accident occurs. A person must be alert to potential hazards. This person should also have the necessary training, skills and tools to perform these functions properly.

Improper operation, lubrication, maintenance or repair of this product can be dangerous and could result in injury or death.

Do not operate or perform any lubrication, maintenance or repair on this product, until you have read and understood the operation, lubrication, maintenance and repair information.

Safety precautions and warnings are provided in this manual and on the product. If these hazard warnings are not heeded, bodily injury or death could occur to you or to other persons.

The hazards are identified by the "Safety Alert Symbol" and followed by a "Signal Word" such as "DANGER", "WARNING" or "CAUTION". The Safety Alert "WARNING" label is shown below.



The meaning of this safety alert symbol is as follows:

Attention! Become Alert! Your Safety is Involved.

The message that appears under the warning explains the hazard and can be either written or pictorially presented.

Operations that may cause product damage are identified by "NOTICE" labels on the product and in this publication.

Caterpillar cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this publication and on the product are, therefore, not all inclusive. If a tool, procedure, work method or operating technique that is not specifically recommended by Caterpillar is used, you must satisfy yourself that it is safe for you and for others. You should also ensure that the product will not be damaged or be made unsafe by the operation, lubrication, maintenance or repair procedures that you choose.

The information, specifications, and illustrations in this publication are on the basis of information that was available at the time that the publication was written. The specifications, torques, pressures, measurements, adjustments, illustrations, and other items can change at any time. These changes can affect the service that is given to the product. Obtain the complete and most current information before you start any job. Caterpillar dealers have the most current information available.



When replacement parts are required for this product Caterpillar recommends using Caterpillar replacement parts or parts with equivalent specifications including, but not limited to, physical dimensions, type, strength and material.

Failure to heed this warning can lead to premature failures, product damage, personal injury or death.

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Specifications Section

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Electrical

SMCS Code: 4467

Table 1

Specifications	
Regulation	0.25% from no load to full load.
Regulator temperature drift	Less than $\pm 1\%$ for any 40 °C (72 °F) change over the ambient operating temperature range.
Configurable Volts/Hz characteristic	Two slope ranges adjustable from 1 to 10 V/Hz. See the Regulation Characteristic Illustration.
Regulator response time	Maximum of 10 milliseconds.
Regulator sensing	True RMS 3-phase sensing is standard. Single phase sensing is available. Variable sense range: 90 to 600 volts.
Regulator stability	The regulator maintains stable output voltage within 0.25% for total harmonic distortion of the generator output voltage waveform up to 30%, and within 0.50% for total harmonic distortion of the generator output voltage waveform up to 40%. These values are based on a typical 6 SCR bridge.
Telephone influence factor (TIF)	Less than 50. Complies with MIL STD 461C Part 9 and VDE 0875 level N.
Fine voltage adjust range	$\pm 10\%$ of regulator sensing voltage.
Regulator voltage gain (Line loss compensation)	Adjustable from 0 to 10%.
Fault detection and identification	Diagnostics identify operation outside of programmed limits. Specific fault information is available even after the unit has been powered down. CANBUS only.
Harmonic tolerance	For total harmonic distortion of the generator output voltage waveform up to 30%, the regulator maintains stable output voltage within 0.25%. For total harmonic distortion of the generator output voltage waveform up to 40%, the regulator maintains stable output voltage within 0.50%. These values are based on a typical 6 SCR bridge.
Reactive droop adjustment	Adjustable from 0 to 10%.
Overexcitation protection	Shuts off generator output when excitation current exceeds normal operating currents for 10 seconds or instantaneous shutoff if output current exceeds approximately 28 Amperes.
Ambient operating temperature	-40 °C (-40 °F) to +70 °C (+ 158 °F).
Storage temperature range	-40 °C (-40 °F) to +85 °C (+ 185 °F).
Power dissipation	5 watts at idle, 55 watts at rated output.
Shock	Withstands up to 20 g's in three mutually perpendicular planes .
Vibration	Withstands 4.5 g's at frequencies between 18 and 2000 Hz in three mutually perpendicular planes.
Salt fog	5% salt spray for 48 hours at 38 °C (100.4 °F) at 115% of the nominal operating voltage.
Weight	1.47 kg (3.24 lb.).
Electromagnetic compatibility	Meets 89/336/EEC Electromagnetic Compatibility Directive.
Power supply	24 \pm 6 volt DC power supply required (0.5 amp).

(continued)

(Table 1, contd)

Specifications		
Conformity	UL	UL Recognized per Standard 508, UL File No. E97035.
	CSA	Certified per Standard CAN/CSA-C22.2 No. 14-95, CSA Dile No. LR 23131.
	CE	Conforms to the following standards: Radiated Emissions EN50081-2, Radiated Immunity (electric field) EN61000-4-3 (10 V/m), Radiated Immunity (conducted) EN61000-4-6 (10 VRMS), Conducted Emissions EN50081-2 (EN55011, Class A), ESD Immunity EN50082-2 (4 KV contact, 8 KV air), EFT Immunity EN50082-2 (2 KV coupling clamp), Magnetic Immunity EN50082-2 (30ARMS, 50 Hz), Safety EN61010-1.

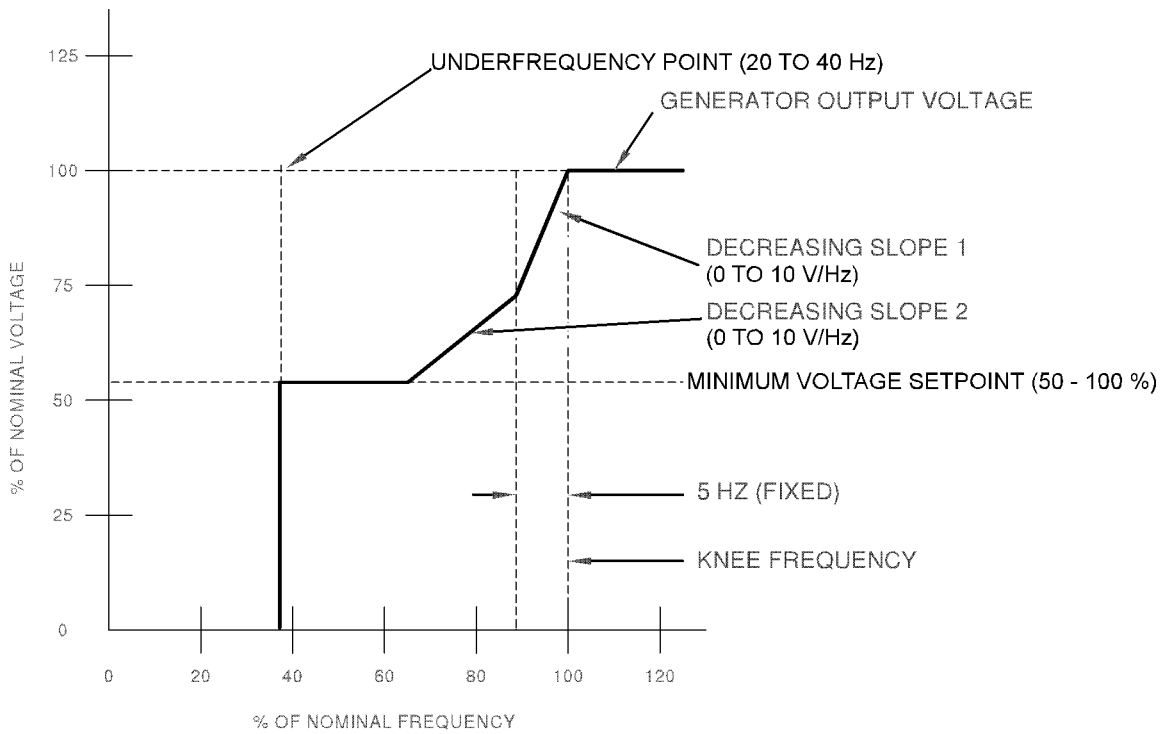


Illustration 1
Regulation Characteristic

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Table 2

Summary of Operating Parameters				
Parameter	Specifications			
Voltage Regulation Rating	120 to 15000 Volts			
Generator Type	PM SE Internal Excitation (IE)			
Power Input	Voltage ⁽¹⁾	Frequency	Burden (Continuous)	
	80 to 264 Volts (3Ø) 100 to 280 Volts (1Ø)	50 to 400 Hz	1150 VA (63 VDC applications) or 1900 VA (125 VDC applications)	
Output Rating	Maximum Continuous		Maximum Forcing (10 Seconds)	
	Voltage	Current	Voltage	Current
	63 or 125 Volts	12 or 10 Amperes	125 or 250 Volts	25 or 20 Amperes
Sensing	Voltage		Maximum VA Burden per Ø	
	90 to 600 Volts		1 VA	
Reactive Droop	Maximum Current		Maximum VA Burden	
	5 Amperes		1 VA	
Exciter Field Resistance	Minimum Resistance		Maximum Resistance	
	3 Ohms		39 Ohms	

⁽¹⁾ As the CDVR input voltage increases, the PWM duty cycle decreases. As PWM duty cycle decreases, system stability may decrease as well. Powering the CDVR with a voltage closer to the low end of this range is preferred.

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Dimensions

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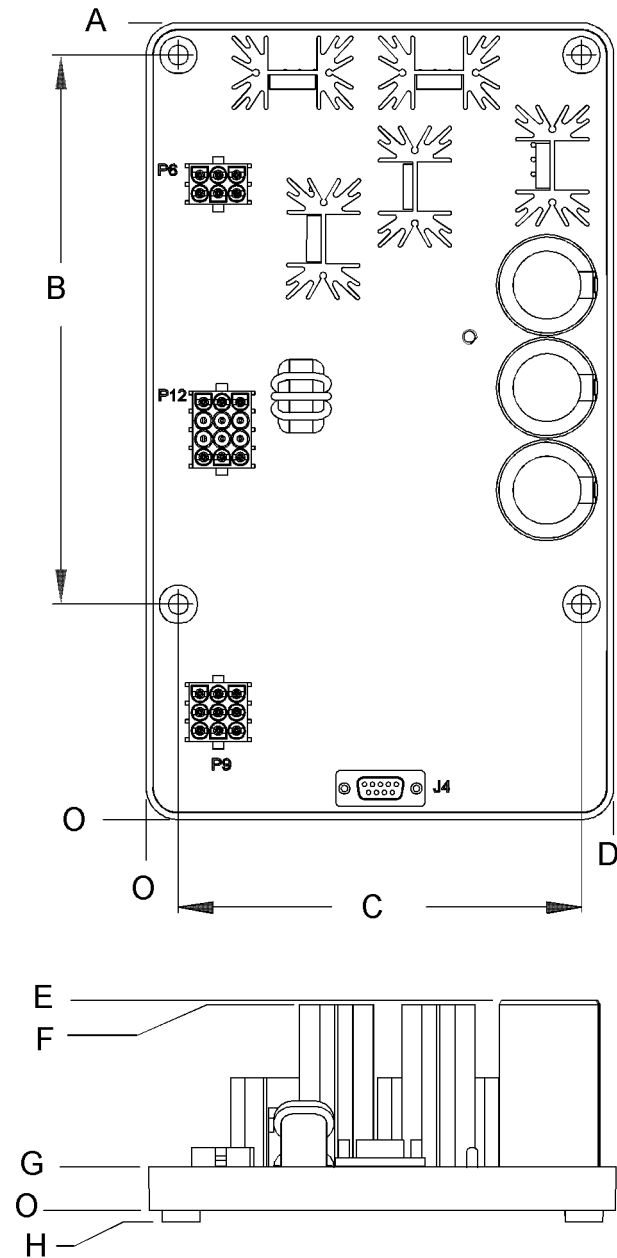


Illustration 2

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Dimensions of the Caterpillar Digital Voltage Regulator

- (A) 276.4 mm (10.88 inch)
- (B) 190.5 mm (7.50 inch)
- (C) 139.7 mm (5.50 inch)
- (D) 162.1 mm (6.38 inch)
- (E) 72.9 mm (2.87 inch)
- (F) 71.4 mm (2.81 inch)
- (G) 15.0 mm (0.59 inch)
- (H) 4.06 mm (0.16 inch)

Systems Operation Section

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General Information

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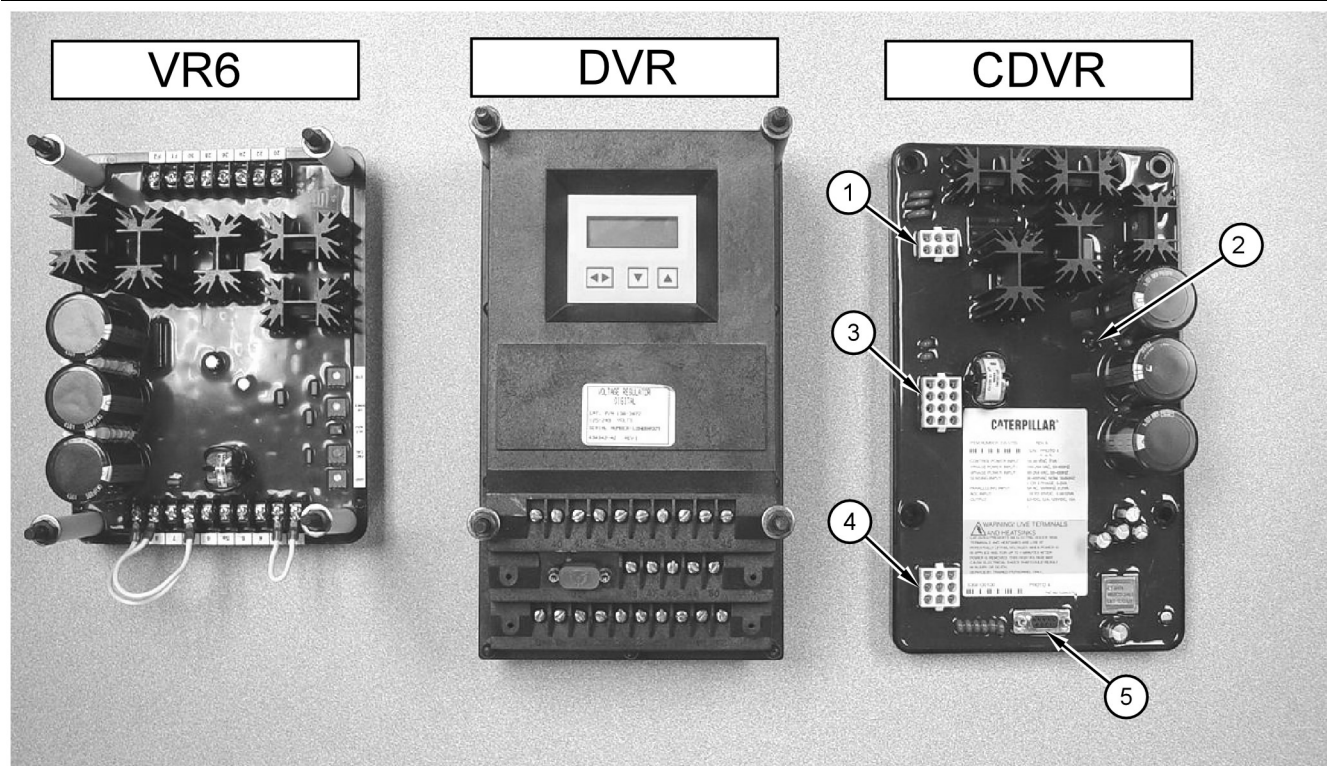


Illustration 3

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(1) "P6" Connector
 (2) LED Indicator

(3) "P12" Connector
 (4) "P9" Connector

(5) "J4" Connector

The Caterpillar Digital Voltage Regulator (CDVR) is a microprocessor based voltage regulator. The main purpose of a digital voltage regulator is to regulate the output voltage of a generator that is used with an engine generator set. Control power for the Digital Voltage Regulator is supplied from an external 24 DCV source. The power stage of the Digital Voltage Regulator can be supplied from a multi-pole, high frequency, permanent magnet generator (PMG), from the generator output (shunt excitation), or from auxiliary windings that are included on some generators. Connections to the Digital Voltage Regulator are made through three multi-pin, plug type connectors. The communication between the Digital Voltage Regulator and a service tool is accomplished using a CANBUS protocol.

The Caterpillar Digital Voltage Regulator has three multiple-pin, plug-type connectors. These connectors are labeled "P6", "P9", and "P12". See illustration 3.

Connector "P6" is a six-pin header that mates with a six-pin connector. Connector "P9" is a nine-pin header that mates with a nine pin connector. Connector "P12" is a twelve pin header that mates with a twelve pin connector.

The regulator has a nine pin D sub connector that is labeled "J4". This connector is used for interface with IBM compatible personal computers.

Note: The Caterpillar Digital Voltage Regulator should be hard wired to earth ground with at least a 16 AWG copper wire that is attached to the ground terminal "P6-6".

Note: When the unit is configured in a system with other devices, a separate lead should be used to ground the bus from each device.