DIGITAL VOLTAGE REGULATOR

CATERPILLAR®

The Cat Digital Voltage Regulator is a microprocessor based control designed to provide precise voltage control, robust transient response, and generator protection with industry leading features and versatility.

Caterpillar is leading the power generation marketplace with Power Solutions engineered to deliver unmatched flexibility, expandability, reliability, and cost-effectiveness.

FEATURES

- Microprocessor based control featuring choice of three control modes standard:
  - Automatic Voltage Regulation (AVR)
  - Power Factor Regulation (PF)
  - Reactive Power Regulation (Var)
- Programmable stability settings
- Soft start control with an adjustable time setting in AVR control mode
- Dual Slope Underfrequency (volts/hertz) regulation
- Three-phase or single-phase generator voltage (RMS) sensing/regulation in AVR mode
- Single-phase generator current sensing for regulation purposes
- Field current and field voltage sensing
- Five contact sensing inputs for system interface
- One common LED for visual indication of Alarm and Shutdown fault conditions
- Fault Shutdown Driver and Alarm Output Driver for indication of Alarm and Shutdown fault conditions
- Generator paralleling with reactive droop compensation and reactive differential compensation
- Line drop compensation
- Remote communication interface via CAN 2.0B
- Ten generator protective functions
- UL 508A Recognized and CE certified

WORLDWIDE PRODUCT SUPPORT

- Worldwide parts availability through the Caterpillar dealer network
- Over 1,800 dealer branch stores operating in 166 countries.
- 99.7% of parts orders filled within 24 hours. The best product support record in the industry.
- Caterpillar dealer service technicians are trained to service every aspect of your electric power generation system.

COMPLETE SYSTEM INTEGRATION

Fully designed and factory tested to work seamlessly with Cat Generator using Shunt, PMG, or AREP excitation systems and EMCP controls.

SPECIFICATIONS

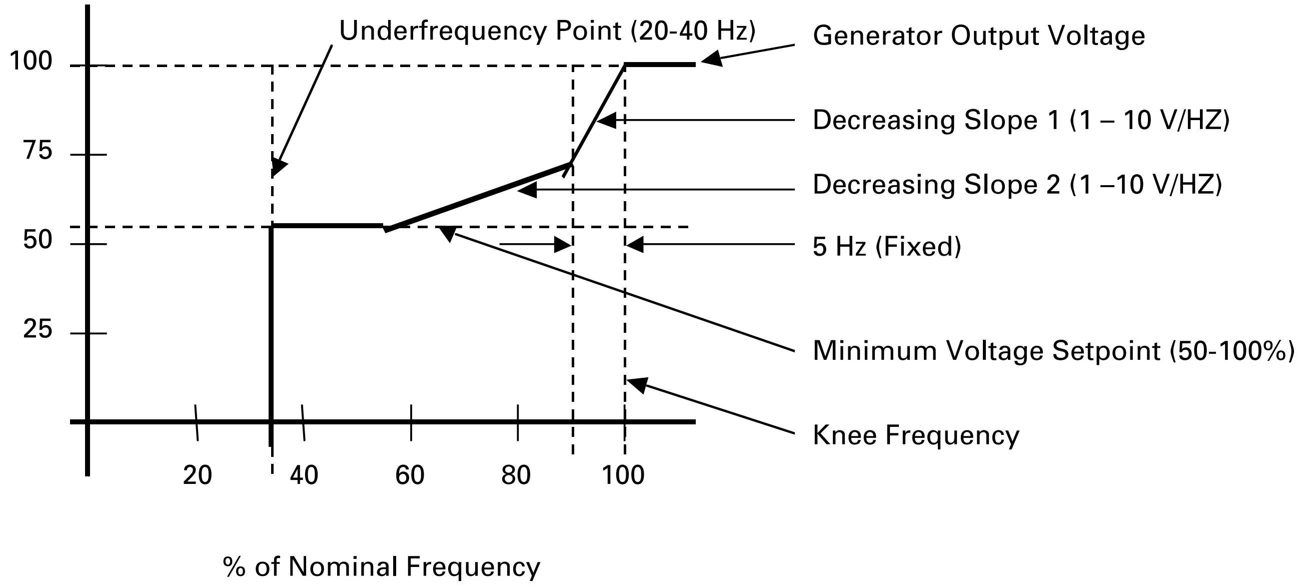
General Specifications	
Voltage Regulation	±0.25% no load to full load
Temperature Drift	±1.0% for a 40° C change
Response Time	Maximum of 10 milliseconds
Variable Sensing Range	90 to 600 Volts
Control Power	24 Vdc Supply (18 to 30 Vdc, 5VA)
Regulator Filtering	THF 3% per IEC34-1 TIF of 50 NEMA MG1-22.43
Harmonic Tolerance	0.5% Voltage regulation with 40% THD
Weight	1.47 kg (3.25 lb)
Environmental	
Operating Temperature	–40° C to 70° C (–40° F to 158° F)
Storage Temperature	–40° C to 85° C (–40° F to 185° F)
Relative Humidity	95% non-condensing 30° C to 60° C
Salt Spray	5% for 48 hrs at 38° C at 115% nominal operating voltage
Vibration	4.5G (peak) 18-2000 Hz in 3 perpendicular planes
Shock	20G
Certifications	
CE Approved	
UL Recognized	
CSA Listed	

PROTECTIVE FUNCTIONS

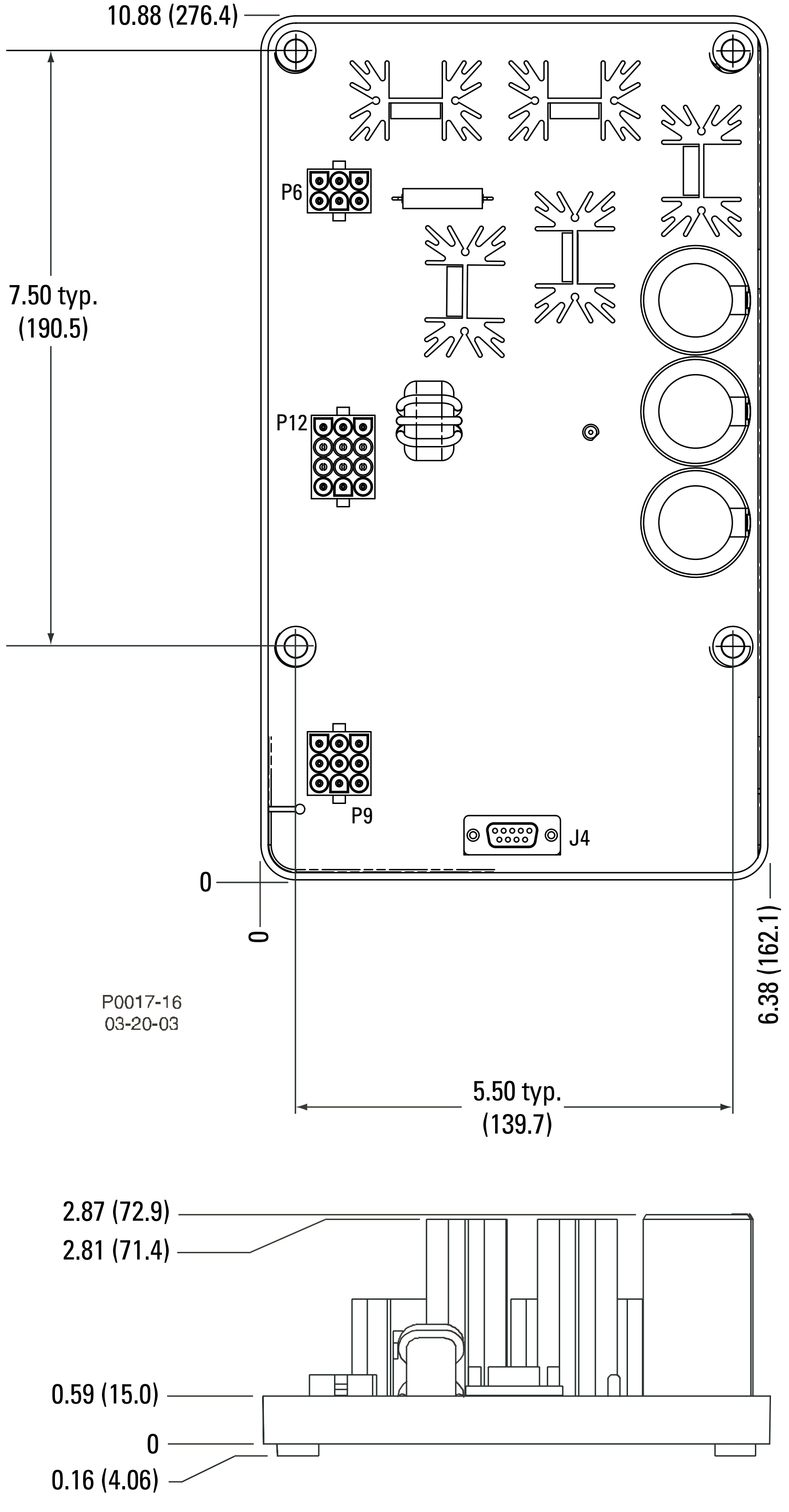
- Generator Overvoltage
- Generator Undervoltage
- Loss of Excitation
- Instantaneous Field Overcurrent
- Over Excitation
- Loss of Sensing
- Diode Fault Monitor
- Internal Watchdog Failure
- Internal Memory Failure
- Fault Reset Closed Too Long

Programmable Variables	Range of Adjustment
Voltage vs Frequency Characteristic	Two slope ranges adjustable from 1 to 10 PU in 0.1 increments
Fine Voltage Level	–10% to +10% in 0.1% increment
Droop Adjustment	0 to 10% in 0.1% increment
Overvoltage Setpoint Overvoltage Time Delay	105 to 135% of rated voltage in 1.0% increment 2 to 30 seconds in 1 second increments
Undervoltage Setpoint Undervoltage Time Delay	60 to 95% of rated voltage in 1.0% increment 10 to 120 seconds in 1 second increments
Gain	1 to 20% in 0.1% increments
Single Phase or Three Phase Sensing	
Under Frequency Point	20 to 40 Hz
Knee Frequency	45 to 65 Hz in 0.1 Hz increments
Minimum Voltage Setpoint	50 to 100% of rated voltage
Var Operating Mode	100% to –100% in 0.001 increments
PF Operating Mode	0.6 lead to 0.6 lag in 0.01 increments
Line Drop (IR) Compensation	0 to 10% in 0.1% increment
Loss of Excitation Loss of Excitation Time Delay	0.1 to 1.0 PU leading vars 0.1 to 9.9 seconds in 0.1 second increments
Over Excitation Time Delay — Fixed Time Option	0 to 12 Adc in 0.1 Adc increments 0 to 10 sec in 0.1 sec increments
Loss of Sensing Time Delay	0 to 25 sec in 1 sec increments
Diode Fault Monitor	1 to 10A rms field ripple current
Soft Start Function	1 to 120 sec

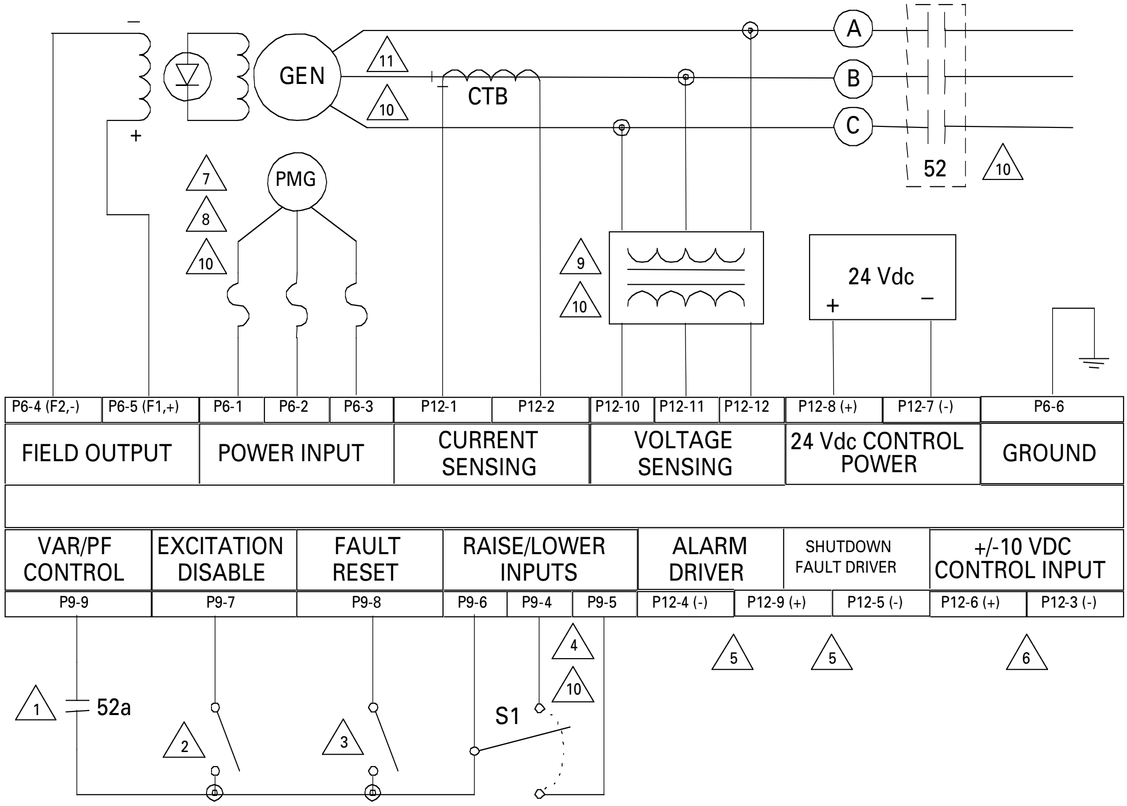
REGULATION CHARACTERISTIC — FIGURE 1



OUTLINE DRAWING — FIGURE 2



EXAMPLE CONNECTION DIAGRAM — FIGURE 3



1 Required only for Var/PF control. Var/PF is active with 52a closed, inactive with 52a open.

2 Excitation is disabled when closed, enabled when open.

3 Momentary closure resets any shutdown fault.

4 S1 (SPDT, spring -return to center-off position) adjusts regulator setpoint.

5 Normally-off, turns on for user alarm or trip.

6 Analog input voltage between -10 and +10 Vdc provides adjustment of operating setpoint.

7 External fuses should be sized to match the PMG and protect the field. Maximum fuse size should be limited to Bussmann type KTK-12 or equivalent.

8 Three-phase PMG is shown. For single-phase PMG, omit P6-3 connection.

9 Sensing potential transformer is required if line voltage exceeds 660 Vac.

10 Item not supplied by Caterpillar.

11 When generator rotation is ACB, the connections shown for CTB should be reversed.

DIGITAL
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CATERPILLAR®

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www.CAT-ElectricPower.com

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Materials and specifications are subject to change without notice.
The International System of Units (SI) is used in this publication.