



Diesel generator set 6BTA series engine

150 kVA - 170 kVA 50 Hz
135 kW 60 Hz



Description

This Cummins® commercial generator set is a fully integrated power generation system, providing optimum performance, reliability, and versatility for Stationary Standby and Prime Power Duty applications.

Features

Cummins heavy-duty engine - Rugged 4-cycle industrial diesel delivers reliable power and fast response to load changes.

Alternator - Low reactance 2/3 pitch windings; low waveform distortion with non-linear loads, fault clearing short-circuits capability and class H insulation.

Cooling system - Standard integral set-mounted radiator system, designed and tested for rated ambient temperatures, simplifies facility design requirements for rejected heat.

Control system – The PowerCommand® electronic control is standard equipment and provides total genset system integration, including auto remote start/stop, alarm and status message display.

Enclosures - Optional sound-attenuated enclosures are available.

Warranty and service - Backed by a comprehensive warranty and worldwide distributor network.

Model	3-Phase ratings				Data sheets
	Standby rating		Prime rating		
	50 Hz kVA (kW)	60 Hz kW (kVA)	50 Hz kVA (kW)	60 Hz kW (kVA)	
C150D5I	150 (120)		136 (109)		D-6625
C170D5I	170 (136)		155 (124)		D-6626
C135D6I		135 (169)		123 (153)	D-6629

Generator set specifications

Performance class	Genset models have been tested in accordance with ISO 8528-5. Consult factory for transient performance information.
Voltage regulation, no load to full load	± 1%
Random voltage variation	± 1%
Frequency regulation	Isochronous
Random frequency variation	± 0.75%
Electromagnetic Compatibility Performance	Emissions to EN 61000-6-2:2005 Immunity to EN 61000-6-4:2007+A1:2011

Engine specifications

Design	4 cycle, in-line, 6-cylinder, turbocharged and charge air-cooled, diesel
Bore	102 mm (4.02 in.)
Stroke	120 mm (4.72 in.)
Displacement	5.9 litre (360 in ³)
Cylinder block	Cast iron, 6 cylinder
Battery charging alternator	55 amps
Starting voltage	12 volt, 55 amp negative ground
Standard cooling system @ 12.7 mm H ₂ O	122 °F (50 °C) ambient radiator
Model name	C150D5I, C135D6I, C170D5I
Fuel system	Rotary type Bosch pump
Fuel filter	Ventury combo Stratapore filter
Air cleaner type	Heavy Duty, Normal Duty
Lube oil filter type(s)	Ventury combo Stratapore filter

Alternator specifications

Design	Brushless, single bearing, revolving field
Stator	2/3 pitch winding
Rotor	Single bearing, flexible disc coupling
Insulation system	Class H
Standard temperature rise	Standby 50 Hz – 163 °C/27 °C ambient Standby 60 Hz – 150 °C/40 °C ambient
Exciter type	Self excited
Phase rotation	A (U), B (V), C (W)
Alternator cooling	Direct drive centrifugal fan
AC waveform Total Harmonic Distortion (THDV)	No load < 1.8%. Non distorting balanced linear load < 5%

Available voltages

50 Hz Line-Neutral/Line-Line	60 Hz Line-Neutral/Line-Line	
• 240/416	• 277/480	• 139/240
• 230/400	• 255/440	• 127/220
• 220/380	• 220/380*	• 120/208
	• 240/416	• 115/200

Note: Some voltages may not be available on all models - consult factory for availability.

Generator set options and accessories

- Sound attenuated canopy
- Mains operated battery charger
- Residential silencer, industrial silencer
- Coolant heater, 240 V
- Alternator heater
- Main generator heater
- Exciter voltage regulator (PMG)
- Earth fault relay
- Shunt trip

Note: Some options may not be available on all models - consult factory for availability.

Control system PS0600 – Standard Controller



PowerStart 600 control operator /display panel

Generator set control PowerStart 600 – The PowerStart control is a microprocessor-based generator set monitoring and control system. The control provides a simple operator interface to the generator set, auto/ manual and remote start/stop control and shutdown fault indication. The integration of all control functions into a single control provides enhanced reliability and performance compared to conventional generator set control systems. This control has been designed and tested to meet the harsh environment in which gensets are typically applied.

- The PowerStart generator set control is suitable for use on a wide range of generator sets in non-paralleling applications. It is suitable for use with reconnectable or non-reconnectable generators, can be configured for either 50 Hz or 60 Hz and voltage and power connection from 190-600 VAC line-to-line.
- This control includes an intuitive operator interface that allows for complete genset control as well as system metering, fault annunciation, maintenance alarm, over imbalance current, configuration and diagnostics. The interface includes seven generator set status LED lamps with both internationally accepted symbols and English text to comply with customer needs. The interface also includes an LED backlit LCD display with tactile-feel soft-switches for easy operation and screen navigation. The manual/auto/stop switch function is integrated into the interface panel.
- All data on the control can be viewed by scrolling through screens with the navigation keys. The control displays the current active fault and a time-ordered history of the five previous faults.
- Power for this control is derived from the generator set starting batteries and functions over a voltage range from 8 VDC to 16 VDC.

Major Features

- Integrated 128x64 Pixel monochrome graphic LCD Display
- 12 and 24V battery operation
- Genset monitoring-monitor status of all critical engine and alternator functions
- Digital genset metering (AC and DC)
- Genset battery monitoring system to warn against a weak battery connection
- Configurable for single phase or three phase or split phase AC metering

See your distributor for more information.

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- Engine starting includes solid state output to operate external relay to start the engine, fuel shut off (FSO) and glow Plug
- Genset Protection: It protects engine and alternator
- Real time clock for fault and event stamping
- Fuel level measurement using 4-20mA input sensor
- Exerciser clock and time of delay start/stop initiate a test without load
- Maintenance due alarm based on engine running time and real time clock
- Auto Main Failure (AMF) Provides load transfer operation in open transition mode
- AMF Test with or without load options
- Utility Voltage monitoring and protection
- Remote start capability in Auto mode
- Advanced service ability using Inpower™ a PC based Software service tool
- Modbus interface for interconnecting to customer PLC/BMS
- Configurable Inputs and Outputs
- Environmental protection: The Control is designed for reliable operation in harsh environment
- Warranty and service backed by a comprehensive warranty and worldwide distributor service network
- Certification-suitable for use on generator sets that are designed, manufactured, tested and certified relevant ISO, IEC and CE standards.

Base control functions

LED INDICATING LAMPS

- For Genset Running, Remote Start, AMF Test Active, Genset Shutdown, Warning, Load connected to Genset, Load connected to Utility, Manual Mode, Stop Mode and Auto Mode.

LCD display

- 128 x 64 Pixel Monochrome Graphics display

OPERATION INTERFACE

- Six tactile-feel soft switches for LCD navigation, genset operation and control setup. These switches are indicated by

internationally accepted symbols and English text.

OPERATOR ADJUSTMENTS

- The LCD includes provisions for necessary set up and adjustment functions.
- Data Log includes engine run time and controller on time Fault History.
- Provides a record of the most recent fault Condition with Engine run time stamp, RTC stamp and occurrences
- Up to 5 events are stored in the control non-volatile memory.
- Voltage selection
 - Frequency selection
 - Genset and Utility AC Meter Calibration

AMF FUNCTIONALITY

- When Auto Mains Failure is enabled and controller is in Auto Mode and if utility goes off then control starts the Genset automatically and transfers load onto Genset. If Utility returns and is healthy then load again gets retransferred onto Utility. AMF provides load transfer operation in Open Transition transfer mode.

FUEL LEVEL FEATURE

- The Control will show the warning fault when the fuel level in the tank goes below the predefined threshold. Control includes time delays to prevent nuisance warning signals.

EXERCISE SCHEDULER

- It is used only when genset is in Auto mode. It is used to start a Scheduler schedule at No Load condition. A trim Exercise Scheduler Enable is available to enable or disable the feature.

MAINTENANCE

- Maintenance due alarm based on Engine Running Time or Real time clock

CONTROL DATA

- Access to the control software part number and software version are provided from the LCD or InPower™.

ALTERNATOR DATA

- Voltage (single or three phase line-to-line and line-to-neutral)
- Current (single or three phase)
- kVA, kVAR, kW, Power Factor (Three phase and total)
- Frequency
- Totalized positive and negative kWh, kVARh, kVAh

Utility AC data

- Voltage (three/single phase LL and LN) - Frequency

ENGINE DATA

- Starting battery voltage
- Engine running hours
- Engine temperature
- Engine oil pressure

ENGINE CONTROL

- CT ratio, and Genset ratings setup
- Start/Stop time delay setup
- Real time clock setup with daylight saving
- AMF Setup with test mode and transfer/retransfer time delays
- Modbus baud rate, parity setup
- Exercise scheduler repeat interval, Day, time and duration setup
- Maintenance due setup
- LCD brightness and contrast control

Battery operation

- Control will operate on 12V/24V batteries

AUTO START MODE

- Accepts a ground signal from remote devices to automatically start the generator set. The remote start signal will also wake up the control from sleep mode. The control can incorporate a time delay start and stop.

See your distributor for more information.

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EMERGENCY STOP

- The control annunciates when an emergency stop signal is received and the generator set immediately shuts down. The generator set is prevented from running or cranking with the switch engaged E-stop switch.

SLEEP MODE

- The control includes a configurable low current draw state to minimize starting battery current draw when the genset is not operating.

ENGINE STARTING

- The control supports automatic engine starting. Primary and backup start disconnects are achieved by battery charging alternator feedback or main alternator output frequency. The control also supports configurable glow plug control when applicable.

CYCLE CRANKING

- Configurable for the number of starting cycles (1 to 7) and duration of crank and rest periods. Control includes starter protection algorithms to prevent the operator from specifying a starting sequence that might be damaging.

SERVICE ADJUSTMENTS

- The control includes provisions for adjustment and calibration of generator set control functions. Functions include:
Time delay of 0-600 seconds prior to shutdown After signal to stop in normal operation modes. Default for both time delay periods is 0 seconds.

AUTO MAINS FAILURE FUNCTIONS

- AMF primarily means that the genset controller is controlling both the genset breaker and a utility breaker in a transfer pair arrangement. AMF is only for use in a



single genset / single utility arrangement. AMF's primary job is to keep loads powered. AMF completely manages the system by automatically starting the genset and transferring load when it detects utility failure. AMF has numerous built-in configurable sensors to determine the availability of the utility and genset sources. Sensors include under voltage, overvoltage, over/under frequency and breaker failure. PS0600 control supports only open transition (Break before Make) AMF functionality.

AMF TEST MODE

- AMF supports test mode with or without load options along with test mode duration.

LOAD TRANSFER SWITCH TYPE

- AMF breaker outputs can be continuous (contact pair) or pulsed (GTEC) type based on load transfer switch selection.

UNDERVOLTAGE SENSOR

- Three phase LL and LN under voltage sensing for pickup 85-100% and dropout adjustable from 75-98% of nominal and dropout adjustable delay from 0.1-30 sec

Overvoltage sensor

- Three phase LL and LN overvoltage sensing for dropout adjustable from 105-135% of nominal and dropout adjustable delay from 0.5-120 sec

Over/under frequency sensor

- Underfrequency sensing for pickup 85-100% and dropout adjustable from 70-85% of nominal and dropout adjustable delay from 0.1-15 sec.
- Over frequency sensing for dropout adjustable from 105-115% of nominal and dropout adjustable delay from 0.1-15 sec

TIME DELAY START AND STOP (COOLDOWN) Configurable for time delay of 0-300 seconds prior to starting after receiving a remote start signal and for

- Control provides retransfer time delays including time delay emergency to normal (0-1800 sec) and programmed transition delay (0-600 sec), time delay engine cooldown (0-3600 sec)

PROTECTIVE FUNCTIONS:

On operation of a protective function, the control will indicate a fault by illuminating the appropriate status LED, as well as display the fault code and fault description on the LCD. The nature of the fault and time of occurrence are logged in the control. The service manual and InPower™ Service Tool provide service keys and procedures based on the service codes provided. In Power is used to configure settings.

CONFIGURABLE ALARM INPUT

- The control accepts maximum three alarm inputs (contact closed to ground) to cause a shutdown or warning response from the control.

EMERGENCY STOP

- Annunciate whenever an emergency stop signal is received from external switch.

ENGINE PROTECTION

- **Low lube oil pressure warning/shutdown** - Level is pre-set to match the capabilities of the engine used. Control includes time delays to prevent nuisance shutdown signals.
- **High coolant temperature warning/shutdown** - Level is pre-set to match the capabilities of the engine used. Control includes time delays to prevent nuisance shutdown signals.
- **Low coolant temperature warning** - Indicates that engine temperature may not be high enough for 1 min. and start or proper load acceptance.
- **Sensor failure indication** - Logic is provided on the base control to detect analog sensor or interconnecting wiring failures.

General engine protection:

Low Fuel Level Warning - Indicates that engine fuel level reached the Low Fuel Level Warning Threshold (30% by default).

Charging Alternator Failure Warning - Indicates that engine charging alternator voltage reached the low/high charging alternator threshold when charging alternator enable trim is enabled.

- **Low and high battery voltage warning** - Indicates status of battery charging system (failure) by continuously monitoring battery voltage.
- **Weak battery warning** - The control will test the battery each time the generator set is signalled to start and indicate a warning if the battery indicates

High Current warning/shutdown (51)

- Implementation of the thermal damage curve with instantaneous trip level calculated based on current transformer ratio and application power rating.

Auto Mains Failure Protections:

- Breaker/ATS Switch fail to close warning - when the control signals a ATS switch to close, it will monitor the ATS switch feedback contacts and verifies that switch is closed. If the control does not sense ATS switch closure within an adjustable time period after the close signal, the fail to close warning will be initiated.
- Breaker/ATS Switch fail to open warning - when the control signals a ATS switch to open, it will monitor the ATS switch feedback contacts and verifies that switch is opened. If the control does not sense ATS switch opened within an adjustable time period after the open signal, the fail to open warning will be initiated.

ALTERNATOR PROTECTION

Battleshort Mode

- When enabled and Battle short switch is active, the control will allow non-critical shutdown faults to be bypassed. If a bypass shutdown fault occurs, the fault code and description will still be enunciated, but the genset will not shutdown. This will be followed by a fail to shutdown fault. Emergency stop critical shutdown faults are not bypassed.

Please refer to control service and operator manual for list of critical faults.

High AC voltage shutdown (59)

- Output voltage on any phase exceeds pre-set values. Values adjustable from 105-125% of nominal voltage, with time delay adjustable from 1-10 seconds. Default value is 110% for 5 seconds.

Low AC voltage shutdown (27)

- Voltage on any phase has dropped below a present value. Adjustable over a range of 50-95% of voltage, time delay 2-20 seconds. Default value is 90% for 5 seconds.

Under frequency shutdown (81 u)

- Generator set output frequency cannot be maintained. Settings are adjustable from 2-10 Hz below nominal governor set point, for a 500-2000 half cycles delay. Default: 5 Hz, 1000 half cycles.

Over frequency shutdown/warning (81 o)

- Generator set is operating at a potentially damaging frequency level. Settings are adjustable from 2-10 Hz above nominal governor set point for 100-2000 half cycles delay. Default: 5 Hz, 1000 half cycles.

See your distributor for more information.

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Loss of sensing voltage shutdown

- Shutdown of generator set will occur on loss of voltage sensing inputs to the control.

Current Imbalance Warning Fault

- Issues warning when current imbalance is observed per phase when genset is in running state. Configured to AMF specific outputs (Utility/ Genset CB Open/ Close driver) when Auto mains failure is enabled.

Communications connections include:

Control provides one RS-485 port which can be used either for PCTool interface or Modbus master interface based on protocol selection from LCD or Inpower™.

- Modbus RS485 port: Allows the control to communicate with external devices such as PLCs using Modbus protocol.
- PC tool interface: This RS-485 communication port allows the control to communicate with a personal computer running InPower™ software.
- Note — An RS-485 or USB to RS-232 converter is required for communication between control and PC.

ENVIRONMENT

The control is designed for proper operation without recalibration in ambient temperatures from -15 °C (5 °F) to +70° C (158 °F), and for storage from -20 °C (-4 °F) to +80 °C (176 °F). Control will operate with humidity up to 95%, non-condensing.

The control board is conformal coated to provide resistance to dust and moisture. The single membrane surface, which is impervious to effects of dust, moisture, oil and exhaust fumes. This panel uses a sealed membrane to provide long reliable service life in harsh environments. The control is specifically designed and tested for resistance to RFI/EMI and to resist effects of vibration to provide a long reliable life when mounted on a generator set. The control includes transient voltage surge suppression to provide compliance to referenced standards.

Field control interface

Input signals to the base control include

Configurable inputs: Control includes (1 Control includes 3 input signals which can be configured for diagnostic inputs. Out of which 1st input can also be configured as Battle short input. 2nd and 3rd inputs get configured to Utility CB status and Genset CB status when Auto mains failure is enabled.)

Output signals from the control include:

Control includes 6 configurable outputs which can be configured to Diagnostic Output, Glow Plug, Ready to load, L series governor. Configurable output 3, Configurable output 4, Configurable output 5 and Configurable output 6 get configured to AMF specific outputs (Utility/Genset CB Open/Close driver) when Auto mains failure is enabled.

SOFTWARE

InPower (beyond 11.5.2.0 version) is a PC-based software service tool that is designed to directly communicate to Power Start generator sets and transfer switches, to facilitate service and monitoring of these products.

CERTIFICATIONS

PowerStart meets or exceeds the requirements of the following codes and standards.

- EN 50081-1,2 residential/light industrial emissions or industrial emissions.
- EN 50082-1,2 residential/light industrial or industrial susceptibility.
- ISO 7637-2, level 2; DC supply surge voltage test.
- Power Start control and generator sets are designed and manufactured in ISO 9001 certified facilities.

WARRANTY

All components and subsystems are covered by an express limited one year warranty. Other optional and extended factory warranties and local distributor maintenance agreements are available

Ratings definitions

Emergency Standby Power (ESP):

Applicable for supplying power continuously to varying electrical loads for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528 and ISO 3046-1, obtained and corrected in accordance with ISO 15550).

Prime Power (unlimited running time):

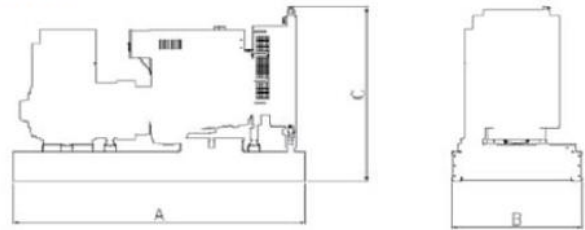
Applicable for supplying power in lieu of commercially purchased power. Prime Power is the maximum power available at a variable load for an unlimited number of hours. A 100% overload capability is available for limited time. (Equivalent to Prime Power in accordance with ISO 3046-1). This rating is not applicable to all generator set models.

Base Load (Continuous) Power:

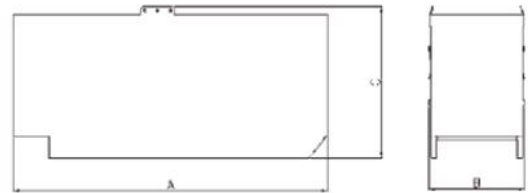
Applicable for supplying power continuously to a constant load up to the full output rating for unlimited hours. No sustained overload capability is available for this rating. Consult authorized distributor for rating. (Equivalent to Continuous Power in accordance with ISO 8528 and ISO 3046-1, obtained and corrected in accordance with ISO 15550).

This rating is not applicable to all generator set models

OPEN



ENCLOSED



This outline drawing is to provide representative configuration details for model series only.

See respective model data sheet for specific model outline drawing number.

Do not use for installation design

Weights and dimensions

Model	Open						Enclosed					
	Dim "A" mm	Dim "B" mm	Dim "C" mm	Dry wt.* kg	Wet wt.* kg	Wet wt with Fuel kg	Dim "A" mm	Dim "B" mm	Dim "C" mm	Dry wt.* kg	Wet wt.* kg	Wet wt with Fuel kg
C150D5I	2537	1276	1708	1357	1374	1800	3466	1276	2075	1825	1842	2268
C170D5I	2537	1276	1708	1409	1426	1852	3466	1276	2075	1877	1894	2320
C135D6I	2537	1276	1708	1357	1374	1800	3466	1276	2075	1825	1842	2268

* **Note:** Weights represent a set with standard features. See outline drawings for weights of other configurations.

Codes and standards

<p>ISO 9001</p> <p>ISO 14001</p> <p>ISO 45001</p>	<p>This product was manufactured in a facility whose quality management system is certified to ISO 9001 and its Health Safety Environmental Management Systems certified to ISO 14001 and ISO 45001.</p>	<p>ISO 8528</p>	<p>This generator set has been designed to comply with ISO 8528 standards.</p>
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For more information contact your local Cummins distributor or visit power.cummins.com

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