

**Model:** C8D5 (X-Series)  
**Frequency:** 50  
**Fuel Type:** Diesel

» Generator set data sheet



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<b>Spec sheet:</b>	SS23-CPGK
<b>Noise data sheet (Open/enclosed):</b>	ND50-OS550 / ND50-CS550
<b>Airflow data sheet:</b>	AF50-550
<b>Derate data sheet (Open/enclosed):</b>	DD50-OS550 / DD50-CS550
<b>Transient data sheet:</b>	TD50-550

<b>Fuel consumption</b>	Standby				Prime			
	kVA (kW)				kVA (kW)			
Ratings	8.3 (6.6)				7.5 (6)			
Load	1/4	1/2	3/4	Full	1/4	1/2	3/4	Full
gph	0.3	0.4	0.5	0.6	0.3	0.4	0.5	0.6
L/hr	1.54	1.87	2.31	2.86	1.40	1.70	2.10	2.60

<b>Engine</b>	Standby rating	Prime rating
Engine manufacturer	Cummins	
Engine model	X1.3G2	
Configuration	4 Cycle; In-line; 2 Cylinder Diesel	
Aspiration	Naturally Aspirated	
Gross engine power output, kWm	11.8	10.6
BMEP at set rated load, kPa	711	672
Bore, mm	95	
Stroke, mm	91	
Rated speed, rpm	1500	
Piston speed, m/s	4.55	
Compression ratio	18.5:1	
Lube oil capacity, L	4.5	
Overspeed limit, rpm	2050	
Regenerative power, kW	2	
Governor type	Electronic	
Starting voltage	12 Volts DC	

<b>Fuel flow</b>	
Maximum fuel flow, L/hr	40
Maximum fuel inlet restriction, mm Hg	73
Maximum fuel inlet temperature (°C)	60

<b>Air</b>	
Combustion air, m <sup>3</sup> /min	11.60
Maximum air cleaner restriction, kPa	3.73 (HD clean element)



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<b>Exhaust</b>	<b>Standby rating</b>	<b>Prime rating</b>
Exhaust gas flow at set rated load, m <sup>3</sup> /min	12.19	12.19
Exhaust gas temperature, °C	550	530
Maximum exhaust back pressure, kPa	4.133	

<b>Standard set-mounted radiator cooling</b>		
Ambient design, °C	50	
Fan load, KW <sub>m</sub>	<1	
Coolant capacity (with radiator), L	4.65	
Cooling system air flow, m <sup>3</sup> /sec @ 12.7mmH <sub>2</sub> O	0.388	
Total heat rejection, BTU/min	7.5 ( to coolant)	7.5 ( to coolant)
Maximum cooling air flow static restriction mmH <sub>2</sub> O	0.125	

### Open set derating factors kVA (kW)

Note: Standard open genset options running at 400V, 150m above sea level. For enclosed product derates, please refer to datasheet - DD50-CS550.

	<b>27 °C</b>	<b>40 °C</b>	<b>45 °C</b>	<b>50 °C</b>	<b>55 °C</b>
<b>Standby</b>	10 (8)	9.6 (7.68)	9.4 (7.52)	9.2 (7.36)	9 (7.2)
<b>Prime</b>	9.4 (8)	9.4 (7.5)	9.4 (7.5)	9.4 (7.5)	8.6 (6.9)

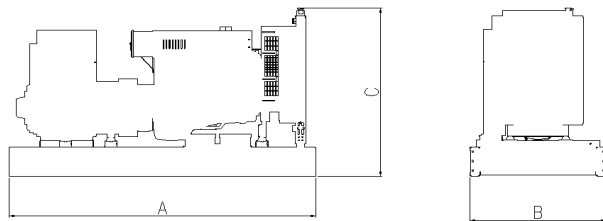
<b>Weights*</b>	<b>Open</b>	<b>Enclosed</b>
Unit dry weight kgs	N/A	RTF
Unit wet weight kgs	N/A	596

\* Weights represent a set with standard features. See outline drawing for weights of other configurations

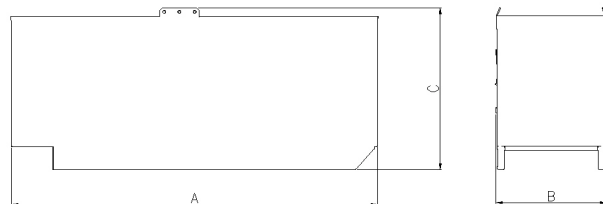
<b>Dimensions</b>	<b>Length</b>	<b>Width</b>	<b>Height</b>
Standard open set dimensions	N/A	N/A	N/A
Enclosed set standard dimensions	1460	850	1130

### Genset outline

#### Open set



#### Enclosed set



Outlines are for illustrative purposes only. Please refer to the genset outline drawing for an exact representation of this model.

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## Alternator data

Feature code	Connection <sup>1</sup>	Temp rise degrees C	Duty <sup>2</sup>	Alternator	Voltage
-	1 Phase	150/125C	S/P	PI044F	230
-	3 Phase	150/125C	S/P	PI044D	415

## Ratings definitions

Emergency Standby Power (ESP)	Limited-Time running Power (LTP):	Prime Power (PRP)	Base Load (Continuous) Power (COP)
Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.	Applicable for supplying power to a constant electrical load for limited hours. Limited Time Running Power (LTP) is in accordance with ISO 8528.	Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.	Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) in accordance with ISO 8528, ISO 3046, AS 2789, DIN 6271 and BS 5514.

## Formulas for calculating full load currents:

### Three phase output

$$\frac{\text{kW} \times 1000}{\text{Voltage} \times 1.73 \times 0.8}$$

### Single phase output

$$\frac{\text{kW} \times \text{Single Phase Factor} \times 1000}{\text{Voltage}}$$

See your distributor for more information.

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# Generator set control PowerStart 0500



## > Specification sheet

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## Power Generation

### Description

The PowerStart control is a microprocessor-based generator set monitoring and control system. The control provides a simple operator interface to the generator set, 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-parallel 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, 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.

### Features

**LCD display** - 16 character x 2 line alphanumeric LED backlight LCD.

**Generator set monitoring and protection.**

**12 VDC battery operation.**

**Engine Starting** - Includes solid state output to operate external relays start the engine, fuel shut off (FSO), and glow plugs. Start disconnect is achieved by monitoring main alternator frequency.

**Remote Start Capability** – Interface to transfer switch

**Environmental protection** – The control is designed for reliable operations in harsh environments.

**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 to relevant ISO, IEC Mil Std. and CE standards.

## Base control functions

### LCD capability

LED indicating lamps - For genset running, remote start, shutdown, warning, manual, auto and stop.

LCD display - 16 character x 2 line alphanumeric LED backlight LCD.

Operation interface - Six tactile-feel membrane 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.

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

Data logs - Includes engine run time and controller on time.

Fault history - Provides a record of the most recent fault conditions with control hours time stamp. Up to 5 events are stored in the control non-volatile memory.

### Alternator data

- Voltage (single or three phase line-to-line and line-to-neutral)
- Current (single or three phase)
- KVA (three phase and total)
- Frequency

### Engine data

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

Service adjustments - The control includes provisions for adjustment and calibration of generator set control functions. Functions include:

- Voltage selection
- Frequency selection
- Configurable input set up
- Configurable output set up
- Meter calibration
- Units of measurement

### Engine control

Battery operation - PowerStart will operate on 12 VDC batteries.

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

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.

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.

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 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.

## 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. InPower is used to configure settings.

### Protective functions include:

**Configurable alarm input** - The control accepts up to one alarm input (contact closed to ground) to cause a shutdown or warning response from the control.

**Emergency stop** - Annunciated whenever an emergency stop signal is received from external switch.

### Engine protection

Low lube oil pressure warning/shutdown - Level is preset to match the capabilities of the engine used. Control includes time delays to prevent nuisance shutdown signals.

High engine temperature warning/shutdown - Level is preset to match the capabilities of the engine used. Control includes time delays to prevent nuisance shutdown signals.

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Low coolant temperature warning – Indicates that engine temperature may not be high enough for a 10 second 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 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 signaled to start and indicate a warning if the battery indicates impending failure.

Fail to start shutdown - The control will indicate a fault if the generator set fails to start by the completion of the engine crank sequence.

Cranking lockout - The control will not allow the starter to attempt to engage or to crank the engine when the engine is running.

### **Alternator protection**

High AC voltage shutdown (59) - Output voltage on any phase exceeds preset 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 preset 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.

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

## **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 control include:**

- Remote start
- Local and emergency stop
- Configurable customer inputs: Control includes (1) input signal from customer discrete devices for shutdown of genset, as well as “Cust I/P Fault” message displayed.

### **Output signals from the control include:**

Configurable output: Control includes (1) solid state driver rated at 1 A. This output can be configured to activate on ready to load, or common warning and common shutdown condition.

### **Communications connections include:**

PC tool interface: This RS-485 communication port allows the control to communicate with a personal computer running InPower software.

Note – An RS-232 or USB to RS-485 converter is required for communication between PC and control.

## **Software**

InPower (beyond 6.0 version) is a PC-based software service tool that is designed to directly communicate to PowerStart generator sets and transfer switches, to facilitate service and monitoring of these products.

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## Certifications

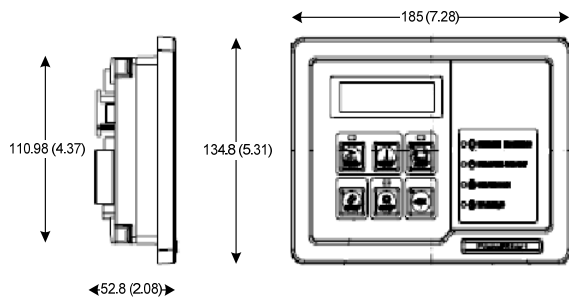
PowerStart meets or exceeds the requirements of the following codes and standards:

- CE marking: The control is suitable for use on generator sets to be CE-marked.
- 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.
- Mil Std 202C, Method 101 and ASTM B117: Salt fog test.
- PowerStart 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.

## Mechanical drawing



## See your distributor for more information

### Cummins Power Generation

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**Warning:** Back feed to a utility system can cause electrocution and/or property damage. Do not connect to any building electrical except through an approved device or after building main breaker is open.

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