



# Diesel generator set C28D5T series

28 kVA @ 50 Hz



## Description

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

## Features

**Heavy-duty engine** - Rugged 4-cycle industrial diesel delivers reliable power, low emissions and fast response to load changes.

**Alternator** - Excellent motor starting capability with low reactance 2/3 pitch windings, low waveform distortion with non-linear loads.

**Control system** - The PowerCommand® 1.1 electronic control is standard equipment and provides total genset system integration, including automatic remote starting/stopping, alarm and status message display.

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

**Enclosures** - Weather-protective and sound-attenuated enclosure. Max 74 db @ 1 m @ 100% load factor.

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

**Remote operations** - High capacity 1000 L fuel tank, robust structural strength, and pilferage protected lockable enclosure.

**Extended service interval** - Optional 1000 hour fuel filter, lube oil and air filter change intervals.

**Lifting capability** - Single point lifting arrangement for ease of transportation. Additional fork-lift pockets also provided.

**Integrated ATS** - Automatic transfer switch and manual by-pass switch integrated inside the genset enclosure.

### 3-phase ratings

### 1-phase ratings\*

\* 1.0 PF

Model	Standby rating		Prime rating		Standby rating		Prime rating	
	50 Hz kVA (kW)	60 Hz kVA (kW)	50 Hz kVA (kW)	60 Hz kVA (kW)	50 Hz kVA (kW)	60 Hz kVA (kW)	50 Hz kVA (kW)	60 Hz kVA (kW)
C28 D5T	28 (22)	-	25 (19.8)	-	22 (22)	-	20 (20)	-

## Technical data

### Generator set specifications

Governor regulation	ISO8528 Part 1 Class G2
Voltage regulation, no load to full load	± 1%
Random voltage variation	± 1%
Frequency regulation	Droop
Random frequency variation	± 0.25%
EMC compatibility	Yes

### Engine specifications

Design	4 cycle, in-line, naturally aspirated
Bore	91.7 mm (3.6 in)
Stroke	127 mm (5 in)
Displacement	2.5 litre (153 in <sup>3</sup> )
Cylinder block	Alloy cast iron, in-line 3 cylinder
Battery capacity	65 AH
Battery charging alternator	36 Amps
Starting voltage	12 volt, negative ground
Fuel system	Direct injection
Fuel filter	Spin-on fuel filters with water separator
Air cleaner type	Dry type replaceable element
Lube oil filter type(s)	Spin on full flow filter
Standard cooling system	122 °F (50 °C) ambient radiator with coolant recovery system

### Alternator specifications

Design	Brushless single bearing
Stator	2/3 pitch
Insulation system	Class H
Standard temperature rise	125 °C
Exciter type	Self-excited
Phase rotation	A (U), B (V), C (W)
Alternator cooling	Direct drive centrifugal blower fan
AC Waveform Total Harmonic Distortion (THDV)	< 5% no load to full linear load, < 3% for any single harmonic
Telephone influence factor (TIF)	< 50 per NEMA MG1-22.43
Telephone harmonic factor (THF)	< 3%

### Available voltages

50 Hz Line – Line / Line – Neutral 3 phase	380/220, 400/230, 416/240
50 Hz single phase	220, 230, 240

### Generator set options

#### Engine

- Coolant heater - 240 V

#### Control panel

- Aux 101
- Automatic transfer switch

#### Service interval

- Extended service change interval

#### Warranty

- 20 months / 4000 hours / unlimited hours within the first 12 months Prime

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

## Ratings definitions

### Emergency Standby Power (ESP):

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.

### Limited-Time Running Power (LTP):

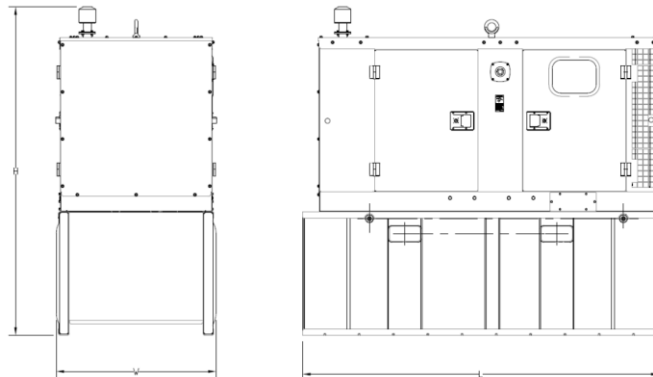
Applicable for supplying power to a constant electrical load for limited hours. Limited-Time Running Power (LTP) is in accordance with ISO 8528.

### Prime Power (PRP):

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.

### Base Load (Continuous) Power (COP):

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.



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

## Typical enclosed genset dimensions

Model	Length "L" mm	Width "W" mm	Height "H" mm	Weight* dry kg	Weight* wet kg
C28 D5T	2180	987	2006	1415	1427

\* Note: Weights represent a set with standard features. Does not include fuel. See outline drawings for weights of other configurations.

## Genset controller PC 1.1

- The PowerCommand 1.1 control is a microprocessor based generator set monitoring control system. The control provides a simple operator interface to the generator set, digital voltage regulation, digital engine speed governing, start / stop control, and protective functions.
- The PowerCommand 1.1 generator set control is suitable for use on a wide range of generator sets in non-parallel applications.
- The PowerCommand control can be configured for any frequency, voltage and power configuration from 120 to 600 VAC for 50 Hz or 60 Hz operation.
- Power for the control is derived from the generator set starting batteries. The control functions over a voltage range from 8 VDC to 35 VDC.

### Major features

- 12 or 24 VDC Battery Operation
- Digital Engine Speed Governing (optional) to provide isochronous frequency regulation.
- Digital Voltage Regulation full wave rectified single phase (Line to Line) sensing.
- Generator Set Monitoring. Monitors status of all critical engine and alternator conditions functions.
- Engine Starting includes relay drivers for start, Fuel Shut Off (FSO), and glow plug.
- Configurable Inputs and Outputs. Two discrete inputs and two dry contact relay outputs.
- Generator Set Monitoring: Displays status of all critical engine & alternator generator set functions.
- Smart Starting Control System: Integrated fuel ramping to limit black smoke & frequency overshoot.
- Advanced Serviceability using INPOWER.

### Control system

The standard control system includes a control board with an external control switch and status indicator. The control board includes all functions necessary to locally or remotely start and stop, regulate voltage, and protect the generator set.

**Control switch - RUN/OFF/AUTO** - In the OFF mode the generator set is immediately shut down (if running) and cannot be started. In the RUN mode the generator set will execute its start sequence, and operate at rated speed and voltage. In the AUTO mode, the generator set can be started with a start signal from a remote device, such as an automatic transfer switch. The fault/status lamp will flash until the generator set is at rated speed and voltage. Operation of the switch to the OFF position or activation of optional remote fault reset switch while in auto mode resets faults in the control.

## Status indications

The control has a lamp driver for external fault/status indication. Functions include:

- The lamp flashes during preheat (when used) and while the generator set is starting.
- READY TO LOAD – flashing until the rated voltage and frequency, then on continuously.
- Fault conditions are displayed by flashing a two digit fault code number.
- LED indicating lamps – includes LED indicating lamps for the following functions:
  - Not in Auto
  - Remote Start
  - Warning
  - Shutdown
  - Auto
  - Run
- Remote Emergency Stop Switch Input. Immediate shutdown of the generator set on operation.

### Base engine protection -

- Low Oil Pressure Shutdown
- High Engine Temperature Shutdown
- Underspeed/Sensor Fail Shutdown
- Fail to Start
- Battery Charging Alternator Fail Warning

### Options

Digital Engine Speed Governing to provide isochronous frequency regulation.



## GTEC transfer switch open transition

### Description

The GTEC automatic transfer switch combines reliability and flexibility in a small, economical package for transferring loads between a utility and a generator set, or between two generators.

The PowerCommand microprocessor control monitors utility and emergency Standby generator power. When utility power fails or is unsatisfactory, the control starts the generator then transfers the load from the utility to the generator. Once stable utility power returns, the switch automatically transfers the load back to the utility.

High-pressure silver alloy contacts withstand thousands of switching cycles without burning, pitting, or welding. They require no routine contact maintenance and provide 100% Continuous current ratings.

The fully integrated controller is designed for practical functionality, with LED indicators and digital push-buttons for ease of operator use.



All switches meet IEC 60947-6-1 AC31B.



All switches bear the CE mark.



This transfer switch is designed and manufactured in facilities certified to ISO9001.

### Features

**Microprocessor control** - A standard, fully featured microprocessor-based control. Software-enabled features, settings, and adjustments are available for ease of setup and accuracy.

**Advanced transfer switch mechanism** - True transfer switch mechanism with make-before-break action.

**Manual operation** - Standard handle can be used to manually operate the switch after the power source has been properly disconnected.

**Positive interlocking** - Mechanical interlocking prevents source-to-source connection through the power contacts.

**Main contacts** - Heavy-duty silver alloy contacts with multi-leaf arc chutes are rated for 100% load interruption.

**Easy service/access** - Door-mounted controls, ample access space, and compatible terminal markings allow for easy access. User-friendly controller is easily configurable in the field.

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



## Transfer switch mechanism

- A powerful and economical solenoid powers GTEC transfer switches.
- Independent break-before-make action is common for 2-pole, 3-pole and 4-pole switches. On 4-pole switches, this action prevents the objectionable ground currents and nuisance ground fault tripping that can result from overlapping neutral designs.
- Mechanical interlock prevents simultaneous closing of normal and emergency contacts.
- Electrical interlocks prevent simultaneous closing signals to normal and emergency contacts and interconnection of normal and emergency sources through the control wiring.
- Long-life, high pressure, silver alloy contacts resist burning and pitting. Contacts are mechanically held in both normal and emergency positions for reliable, quiet operation.



## Specifications

<b>Voltage rating</b>	Transfer switches up to 480 VAC, 50 Hz or 60 Hz.
<b>Amperage rating</b>	Transfer switches rated for 40 through 2000 Continuous amperes.
<b>Arc interruption</b>	Multiple leaf arc chutes cool and quench the arcs. Barriers prevent interphase flashover.
<b>Auxiliary contacts</b>	Two contacts rated at 5 A Continuous at 100 VAC or 2.5 A Continuous at 200 VAC (one for each source) are provided for customer use. Wired to terminal block for easy access.
<b>Humidity</b>	Up to 90% at 20 °C
<b>Altitude</b>	Up to 2,000 m (6,561 ft) without derating.
<b>Total transfer time (source-to-source)</b>	Will not exceed 100 msec with normal voltage applied to the actuator and without programmed transition enabled.
<b>Manual operation handles</b>	Transfer switches are equipped with a removable operating handle which allows operation during servicing in order to facilitate troubleshooting with sources of power disconnected.

## PowerCommand microprocessor control

- Simple, easy-to-use control provides transfer switch information and operator controls
- LED lamps for source availability and source connected indication, exercise mode, and test mode. LED status lamps also provided for control set-up and configuration.
- Control pushbuttons to initiate test, override time delays, and set exercise time.



### Control functions

**Under-voltage sensing:** All phases on the normal source, and single phase on generator source.

Normal source pickup: adjustable 80-95%

Dropout: adjustable 70-90% of nominal voltage

Generator source pickup: 90%

Dropout: 75% of nominal voltage.

**Over-voltage sensing:** All phases on the normal source.

Source pickup: 120%

Dropout: 125%

**Under-frequency sensing:** Default setting is OFF.

Generator source pickup: 90% of nominal frequency

Dropout: 85% of nominal frequency

Normal source pickup: 80%

Dropout: 70%

**Over-frequency sensing:** Default setting is OFF

Normal source pickup: 130%

Dropout: 140%.

### Time-delay functions

**Engine start:** Prevents nuisance genset starts due to momentary power variation or loss.

**Transfer normal to emergency:** Allows genset to stabilize before application of load. Prevents power interruption if normal source variation or loss is momentary. Allows staggered transfer of loads in multiple transfer switch systems. For genset-to-genset applications, delays transfer of load from lead to secondary generator.

**Re-transfer emergency to normal:** Allows the utility to stabilize before re-transfer of load. Prevents needless power interruption if return of normal source is momentary. Allows staggered transfer of loads in multiple transfer switch systems. For genset-to-genset applications, delays re-transfer of load from secondary back to lead generator.

## Electrical performance

The transfer switches listed below must be protected by either circuit breakers or fuses. The following WCR ratings are available when protecting the transfer switch with a circuit breaker or fuse.

### Fuse protection

Transfer switch ampere	Overload current (make-break test)	Endurance cycles at current (operational performance capability)	WCR at 480 V max with current limiting fuse	Max fuse, size and type
63	95 Amps	6,000 at 63 Amps	26,000 Amps	RT16NT-00 63 Amp IEC NH Fuse type
125	188 Amps	6,000 at 125 Amps	26,000 Amps	RT16NT-00 125 Amp IEC NH Fuse type

### Circuit breaker protection

Transfer switch ampere	Max breaker rating	Specified Circuit breaker protection Manufacturer, model and type
63	63 A	Schneider: NSX160FTM, EZD100, NSD100F, NSD100K Siemens: 3VU, 3RV1, 3VT1 ABB: Isomax S1, S2X80, Si m100
125	125 A	Schneider: NSX160FTM, NSD160K Siemens: 3VL, 3VT1 ABB: Isomax S2, Isomax S3, S3X, Sim250

For more information contact your local Cummins distributor or visit [power.cummins.com](http://power.cummins.com)

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