

Diesel Generator Set PowerBox™ 20X

Optimal power. One compact, versatile package



The Power of One™

Leading the way in fully integrated power solutions

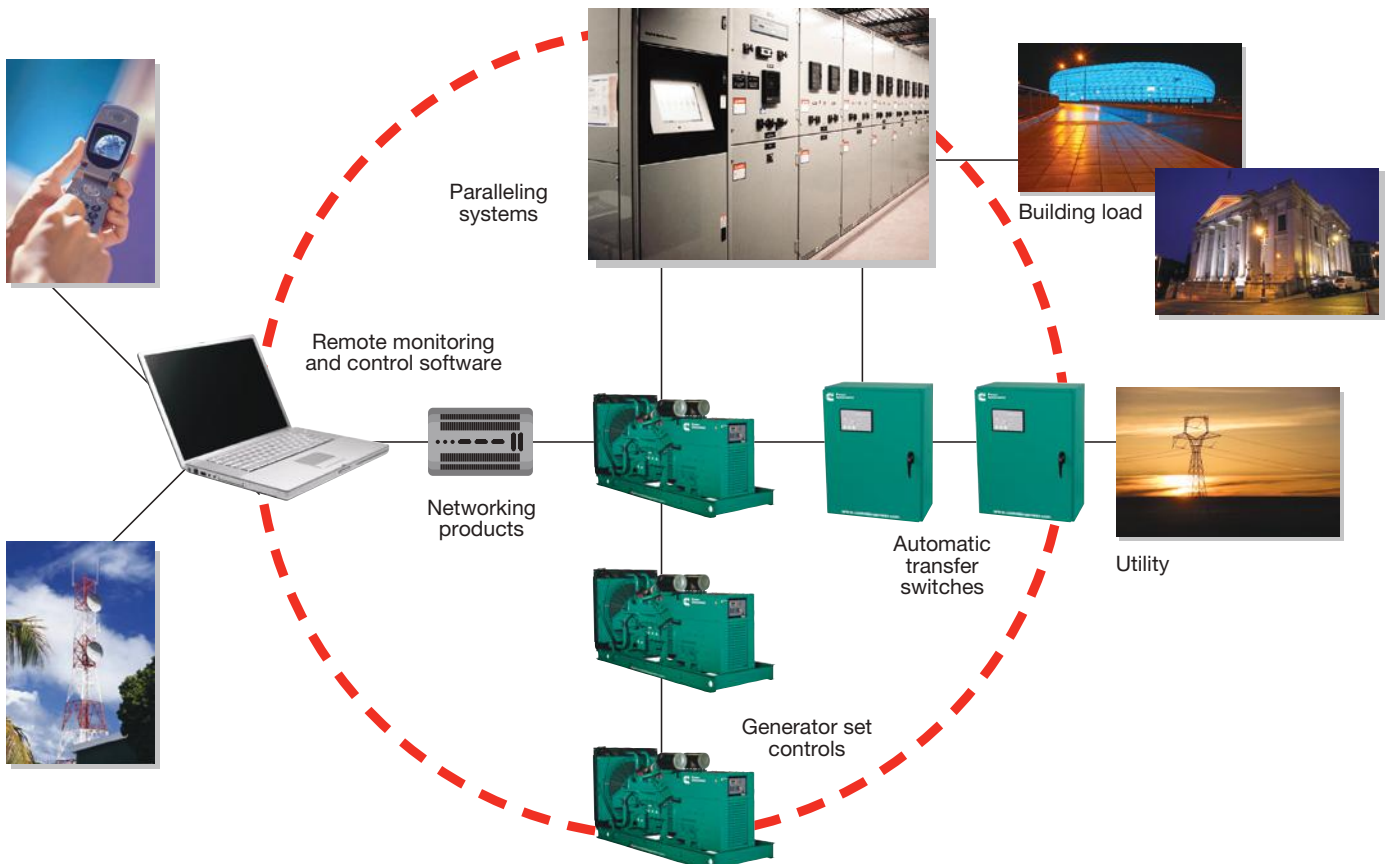
Part of Cummins Inc., Cummins Power Generation is a world leader in integrated total power systems as well as the world's only provider of pre-integrated PowerCommand® commercial power systems. From the engine and the alternator to the transfer equipment and controls, all major components for our power systems are manufactured by divisions of Cummins. This integral approach means that all components are designed and built to work together from the start. The result? Smaller equipment footprints, reduced installation time and higher reliability. That's The Power of One.™

Total power solutions. One global source

We are in the business to help you power yours. Whatever your energy needs — from a single generator set to complete turnkey systems — Cummins Power Generation (CPG) has the right solution to help you meet them. CPG gensets, PowerCommand control, automatic transfer switches, digital paralleling and networking can be customized to suit your energy needs with minimal time or maintenance.

In addition to providing the right equipment, we deliver leading-edge and value-added power generation solutions that include:

- Careful system evaluation up front to answer current and future challenges
- GenSize,™ a comprehensive, easy-to-use generator set sizing software to help determine the best power solution for your application
- PowerCommand power control technology for easy integration with legacy systems
- Single-source supply, warranty and total aftermarket support
- Peak lopping power systems for precise and safe paralleling with utility



Setting the benchmark for performance and reliability

Diesel Generator PowerBox 20X

An industry leader, Cummins Power Generation continues to raise the bar for electric power generation with its C1250 D2R PowerBox 20X. This commercial generator set is a fully integrated, robust power generation system that sets new benchmarks in performance, reliability and efficiency for standby service and prime power — even in hot and harsh operating environments.

Dual frequency to meet diverse energy needs

To meet today's diverse energy needs, the versatile PowerBox 20X unit is both 50 and 60 Hz capable, with a wide voltage range for continuous, prime or standby applications in commercial, residential, industrial, utilities and more.

An engine that works harder, longer

Cummins KTA50G3 engine is recognized for performance, reliability and durability worldwide. With its very high derating threshold for temperatures, altitudes and humidity, the KTA50G3 engine ranks among the top performers in the harshest operating environments.

Proven performance in harsh environments

The performance of every PowerBox 20X unit is tested and proven both in the factory and on-site. Rigorous factory testing has affirmed that the generator is capable of meeting the 50 and 60 Hz continuous ratings up to the Limiting Ambient Temperature of 50 degrees Celsius.

Big power comes in a compact package

The one megawatt generator unit is housed in a 20-foot "CSC plated" ISO container. With space at a premium, the compact yet high-performance PowerBox 20X delivers optimal, cost-effective power in less space than any other generator set in the industry.

Greater mobility, lower transportation cost

To meet the increasing demand for electricity, the PowerBox 20X unit comes in a standard ISO container for easy transportation across borders and regions. The CSC-certified modules can be shipped around the world like regular containers, which means lower freight and transportation costs.



Prime power for a 65 MW power plant at Ula, Saudi Arabia

Easy to use

Developed with end users in mind, the PowerBox 20X unit is quick to install and easy to maintain.

New cooling system for trailblazing performance

The cooling system is engineered to meet Limiting Ambient Temperature of 50 degrees Celsius at continuous rating. Now it also features a larger low fin density radiator to avoid plugging from dirt and debris. Designed with vertical hot air discharge, the PowerBox 20X is suitable for multiple sets installation.

Improved serviceability & durability

Every PowerBox 20X unit is designed with serviceability and durability in mind. New features are incorporated not only to make servicing fast and easy, but also to enhance the product life. For instance, insulated combustion-air pipe work is added to this power unit that will further protect combustion air from heat to seal joints against dust ingress.

Designed and built for optimal performance from inside out

Features	Benefits
<p>Container</p> <ul style="list-style-type: none"> • Standard ISO 20' container • CSC certified • Standard 4-point lift with side ladder and fork lift slots • Proper surface preparation with sand blast, primer & top coat • Air inlet filter • Container roof structure designed to allow extension of the exhaust pipe up to 6m • All hardware including door, hinges and louvres are within the envelope of the container • Heavy duty door hardware and stainless steel hinges • Durable Metal flooring inside the container • Well Insulated exhaust silencer mounted inside the container with rain cap • Large louvred double access doors with removable dust filters; side doors access • Controller accessible from outside of the container • External topping points and drain points for fuel, oil & water • Non-treated acoustic louver <p>Safety Features</p> <ul style="list-style-type: none"> • Lockable side doors with internal panic release • All side doors provided with 'lock-in' feature • Emergency stop button at both sides of the container 	<p>Lower Transportation & Storage Costs</p> <ul style="list-style-type: none"> • Stackable like a regular container to save shipping costs and storage • Easy to handle and transport across regions and borders <p>Outstanding Durability & Reliability</p> <ul style="list-style-type: none"> • Durable finish and protection • Safeguard against dust and sand ingress • Suitable for multiple sets installation • Minimize damage during shipment and transportation <p>Improved Serviceability</p> <ul style="list-style-type: none"> • Easy access for setup, operations and monitoring <p>Environment Friendly</p> <ul style="list-style-type: none"> • Enhanced noise reduction <p>Safety & Protection</p> <ul style="list-style-type: none"> • Prevent door swing • Facilitate easy access to the operator for emergency shutdown
<p>Genset</p> <ul style="list-style-type: none"> • Greater versatility with Dual Frequency (50 and 60 Hz), and wide voltage range options • Fuel pre-filter with water separator; spin on fuel filters • Heavy duty air cleaner fitted as standard • Heavy duty maintenance-free battery at better location for easy access • Heat shields and fan guards • 50 Hz - 87 dBA @ 1m at 75% load* • 60 Hz - 91 dBA @ 1m at 75% load (85 dBA @ 7m at 75% load)* • 110% internal bunding for all fluids within the genset compartment <p>Chassis</p> <p>Each unit is fitted within anti-vibration system, with bonded rubber mount fitted as standard</p>	<p>Optimal Performance</p> <ul style="list-style-type: none"> • Suitable for Continuous, Prime and Standby applications • Better filtration and optimal performance in harsh environments • Capable of working up to 55°C with minimal derate • Genset package certified to meet EU Machinery, Low Voltage and EMI directives • Lower Maintenance & Operation Costs • CE guarding compliance for safety and protection <p>Noise & Environmental Protection</p> <ul style="list-style-type: none"> • Weather and soundproof to meet the stringent noise level requirements at free field condition • Reduces vibrations transmission through the chassis
<p>Cummins Engine</p> <ul style="list-style-type: none"> • Cummins KTA 50, 50 litre heavy duty engine with ratings up to 1270 kW • Rugged 4-cycle industrial diesel engine • Low derating for temperature, altitude and humidity • Step Timing Control System (STC) ensures optimum engine timing at all combinations of load and ambient temperatures 	<p>Proven Technology</p> <ul style="list-style-type: none"> • Leads the way in reliability, fuel efficiency and high performance • Reliable power, low emission and fast response to load changes. Also ensures minimal heat rejection • Optimal performance even in the harshest climate • Improved cold starting, reduced light load fuel consumption and enhanced engine efficiency



The Diesel Generator Set PowerBox 20X incorporates features and benefits that set new industry standards. Together with an integrated approach to power solution and services from Cummins Power Generation, it's easy to see why Cummins generator sets are the preferred choice of electric power customers around the world.

Features	Benefits
<p>Alternator (AC Generator)</p> <p>Next generation alternator model P7B complements the design and performance of Cummins engine</p> <ul style="list-style-type: none"> • Brushless and 2/3 pitch winding design • PMG excitation system • Epoxy Resin Insulation on all windings using VPI process 	<p>Durability & Reliability</p> <ul style="list-style-type: none"> • Reduces maintenance requirement and eliminates arcing hazard • Allows for better operation with non-linear loads • Provides sustained short circuit under fault conditions; improves performance of alternator with cyclical and non-linear loads • Protects windings from environment contaminants
<p>Cooling System</p> <p>Cummins cooling packages minimize heat rejection, and meet Limiting Ambient Temperature of 50 °C at Continuous rating</p>	<p>Enhanced Performance & Easy Maintenance</p> <ul style="list-style-type: none"> • Suitable for multiple sets installation with vertical hot air discharge • Easy access to jet wash to maintain the radiator
<p>PowerCommand® Control System</p> <p>Most advanced, reliable and capable generator set control system available in the market today</p> <ul style="list-style-type: none"> • Convenient, easy-to-operate customer interface with integrated generator to set governing, voltage, regulation protection and paralleling functionality 	<p>System Integration</p> <ul style="list-style-type: none"> • Can be configured for multiple set parallel installations and grids connection
<p>Electrical System</p> <ul style="list-style-type: none"> • PowerCommand Control, PC 3.3 with paralleling selectable between generator set to generator set or generator set to utility • Dual frequency electric fan suitable for both 50 and 60 Hz operations • Auxiliary supply connection, 220 - 240VAC • Internal Lighting of 24VDC / 240VAC and 240V Socket Plug • External access to bus bar connection <p>Safety Features</p> <ul style="list-style-type: none"> • Standard motorized 4-pole circuit breaker. Fixed Type • Re-connectable Neutral/ Earth link • Limit Switch on main circuit breaker door • Low coolant level shutdown • Battery Isolator 	<p>Enhanced Performance & Easy Operation</p> <ul style="list-style-type: none"> • Continued day and night operation • Easy to install and operate <p>Safety & Protection</p> <ul style="list-style-type: none"> • Earth leakage protection • Auto shutdown when circuit breaker door is open to ensure operator safety • Radiator protection
<p>Fuel System</p> <ul style="list-style-type: none"> • Standard free standing 900-litre fuel tank with external gauge • Fuel filter with water separator • External fuel connection (3-way valve) 	<p>Easy Operation</p> <ul style="list-style-type: none"> • External fuel connection ensures easy connection to external fuel storage tank
<p>Options</p> <ul style="list-style-type: none"> • Battery charger • Anti condensation heater • Added safety features include low fuel warning & shutdown and fuel leakage warning • Water jacket heater • Automatic oil top up system with 50 litre lubricating oil tank 	

PowerBox 20X

C1250 D2R 50Hz

60Hz

Fuel consumption	Standby				Prime				Standby				Prime			
	kVA (kw)				kVA (kw)				kVA (kw)				kVA (kw)			
Ratings	1400 (1120)				1258 (1005)				1588 (1270)				1400 (1120)			
Load	1/4	1/2	3/4	Full	1/4	1/2	3/4	Full	1/4	1/2	3/4	Full	1/4	1/2	3/4	Full
US gph	21.9	40.4	58.4	77.4	20.1	36.7	52.6	68.9	27.5	45.8	65.4	87.2	23.5	41.5	58.6	76.9
L/hr	83	153	221	293	76	139	199	261	104	173	248	330	89	157	222	291

Engine	Standby				Prime				Standby				Prime			
Engine manufacturer	Cummins															
Engine model	KTA50G3															
Configuration	4-Cycle; 60° Vee; 16-Cylinder Diesel															
Aspiration	Turbocharged and Aftercooled															
Gross engine power output, kWm	1227				1097				1380				1220			
BMEP at set rated load, kPa	1951				1744				1827				1620			
Bore, mm	159															
Stroke, mm	159															
Rated speed, rpm	1500								1800							
Piston speed, m/s	7.9								9.5							
Compression ratio	13.9:1															
Lube oil capacity, L	151															
Overspeed limit, rpm	1800 ±150								2100 ±150							
Regenerative power, kWm	116								168							
Governor type	Electronic															
Starting voltage	24 Volts DC															

Fuel flow	
Maximum fuel flow, L/hr	625
Maximum fuel inlet restriction, mm Hg	203
Maximum fuel inlet temperature (°C)	60

Air	
Combustion air, m³/min	104.8
Maximum air cleaner restriction, mm H ₂ O	635

Exhaust	Standby				Prime				Standby				Prime			
Exhaust gas flow at set rated load, m³/min	240.7				223.7				257.7				237.8			
Exhaust gas temperature, °C	525				520				475				460			
Maximum exhaust back pressure, mmHg	51															

50 Hz Rating

Ambient Temp	Continuous		Prime	
	kVA	kW	kVA	kW
40 deg C	1005	804	1258	1005
45 deg C	1005	804	1258	1005
50 deg C	1005	804	1258	1005
55 deg C	1005	804	1131	905

60 Hz Rating

Ambient Temp	Continuous		Prime	
	kVA	kW	kVA	kW
40 deg C	1120	896	1400	1120
45 deg C	1120	896	1400	1120
50 deg C	1120	896	1400	1120
55 deg C	1120	896	1281	1025

RATING DEFINITIONS

Standby:	Limited Time Running:	Prime (Unlimited Running Time):	Base Load (Continuous):
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 is in accordance with ISO 8528.	Applicable for supplying power to varying electrical load for unlimited hours. Prime Power 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 in accordance with ISO 8528, ISO 3046, AS 2789, DIN 6271 and BS 5514.

PowerBox 20X

<p>Generator Set Specifications</p> <p>Governor Regulation Class Voltage Regulation, No Load to Full Load Frequency Regulation Random Frequency Variation Radio Frequency Emissions Compliance</p>	<p>ISO 8528 ± 1% Isochronous ± 0.25% In compliance with BS 800 & VDE levels G & N</p>
<p>Engine Specifications</p> <p>Design Bore Stroke Displacement Cylinder Block Battery Capacity Battery Charging Alternator Starting Voltage Fuel System Fuel Filter Air Cleaner Type Lube Oil Filter Type(s) Standard Cooling System</p>	<p>4 cycle, 60° Vie, 16 Cylinder Diesel 159 mm (6.25 in.) 159 mm (6.25 in.) 50.3 liter (3067 in³) Cast iron 2 parallel strings of 2 x 12V, 75A/hr 35 A 24 volt, negative ground Direct injection Spin on fuel filters with water separator Dry replaceable element with restriction indicator Spin on full flow filter 122°F (50°C) ambient radiator</p>
<p>Alternator Specifications</p> <p>Design Stator Rotor Insulation System Standard Temperature Rise Exciter Type Phase Rotation Alternator Cooling AC Waveform Total Harmonic Distortion Telephone Influence Factor (TIF) Telephone Harmonic Factor (THF)</p>	<p>Brushless 4 pole, revolving field 2/3 pitch Single bearing, flexible disc Class H Class H Permanent Magnet Generator (PMG) A (U), B (V), C (W) Direct drive centrifugal blower fan 1.5% < 50 per NEMA MG1-22.43 < 2%</p>
<p>Standard Features</p> <p>Fuel System:</p> <ul style="list-style-type: none"> • 900 liter fuel tank • Fuel pre-filter with water separator • External fuel connection (3-way valve) supplied as standard • Side external gauge for fuel <p>Manual oil drain pump Battery isolator Charging alternator</p> <p>Electrical:</p> <ul style="list-style-type: none"> • PowerCommand® Paralleling Control • Paralleling selectable between generator set to generator set or generator set to utility • Motorised 4 pole Circuit Breaker. Fixed type • External access to bus bar connection • Re-connectable Neutral/Earth link 	<p>Safety:</p> <ul style="list-style-type: none"> • Fuel leakage warning • Low fuel level warning and shutdown • Low coolant level shutdown • Limit switch to shut down Genset when the power section door (Load Busbar compartment) is open. • Emergency stop button <ul style="list-style-type: none"> • Earth leakage protection • Dual frequency electric fan • Lighting 24v DC/240VAC • Aux supply: 220-240VAC • Key switch for the PowerCommand paralleling control • Audible alarm
<p>Generator Set Options</p> <p>Electric fuel pump with external fuel connection Water jacket heater Automatic oil top up system with 50 liters lubricating oil tank</p>	<p>Anti-condensation heater Battery charger, 240V, 24VDC, 15AMP</p>

Control system

PowerCommand® 3.3 – The PowerCommand® control system is an integrated microprocessor-based generator set control system providing voltage regulation, engine protection, alternator protection, operator interface and isochronous governing

AmpSentry – Includes integral AmpSentry protection, which provides a full range of alternator protection functions that are matched to the alternator provided

Power management – Control function provides battery monitoring and testing features and smart starting control system

Advanced control methodology – Three phase sensing, full wave rectified voltage regulation, with a PWM output for stable operation with all load types

Communications interface – Control comes standard with PCCNet and Modbus interface

Regulation compliant – Prototype tested: UL, CSA and CE compliant

Service – InPower™ PC-based service tool available for detailed diagnostics, setup, data logging and fault simulation

Reliable design – The control system is designed for reliable operation in harsh environments

Multi-language support

Operator Panel Features

Operator panel features – The operator panel, in addition to the alternator, displays the Utility/AC Bus data

Operator/display functions

- 320 x 240 pixels graphic LED backlight LCD
- Auto, manual, start, stop, fault reset and lamp test/panel lamp switches
- Alphanumeric display with pushbuttons
- LED lamps indicating genset running, remote start, not in auto, common shutdown, common warning, manual run mode, auto mode and stop

Paralleling control functions

- Digital frequency synchronization and voltage matching
- Isochronous kW and kvar load sharing controls
- Droop kW and kvar control
- Sync check
- Extended paralleling (Peak Shave/Base Load)
- Digital power transfer control (AMF) provides load transfer operation in open or closed transition or soft (ramping) transfer mode

Alternator data

- Line-to-neutral and line-to-line AC volts
- 3-phase AC current
- Frequency
- kW, kvar, power factor kVA (three phase and total)

Engine data

- DC voltage
- Engine speed
- Lube oil pressure and temperature
- Coolant temperature
- Comprehensive FAE data (where applicable)

Other data

- Genset model data
- Start attempts, starts, running hours, kW hours

- Load profile (operating hours at % load in 5% increments)
- Fault history
- Data logging and fault simulation (requires InPower)

Standard control functions

Digital governing (optional)

- Integrated digital electronic isochronous governor
- Temperature dynamic governing

Digital voltage regulation

- Integrated digital electronic voltage regulator
- 3-phase, 4-wire line-to-line sensing
- Configurable torque matching

AmpSentry AC protection

- AmpSentry protective relay
- Over current and short circuit shutdown
- Over current warning
- Single and three phase fault regulation
- Over and under voltage shutdown
- Over and under frequency shutdown
- Overload warning with alarm contact
- Reverse power and reverse var shutdown
- Field overload

Engine protection

- Battery voltage monitoring, protection and testing
- Over speed shutdown
- Low oil pressure warning and shutdown
- High coolant temperature warning and shutdown
- Low coolant level warning or shutdown
- Low coolant temperature warning
- Fail to start (over crank) shutdown
- Fail to crank shutdown
- Cranking lockout
- Sensor failure indication
- Low fuel level warning or shutdown
- Fuel-in-rupture-basin warning or shutdown
- Full authority electronic engine protection

Control functions

- Time delay start and cool down
- Real time clock for fault and event time stamping
- Exerciser clock and time of day start/stop
- Data logging
- Cycle cranking
- Load shed
- Configurable inputs and outputs (4)
- Remote emergency stop

Options

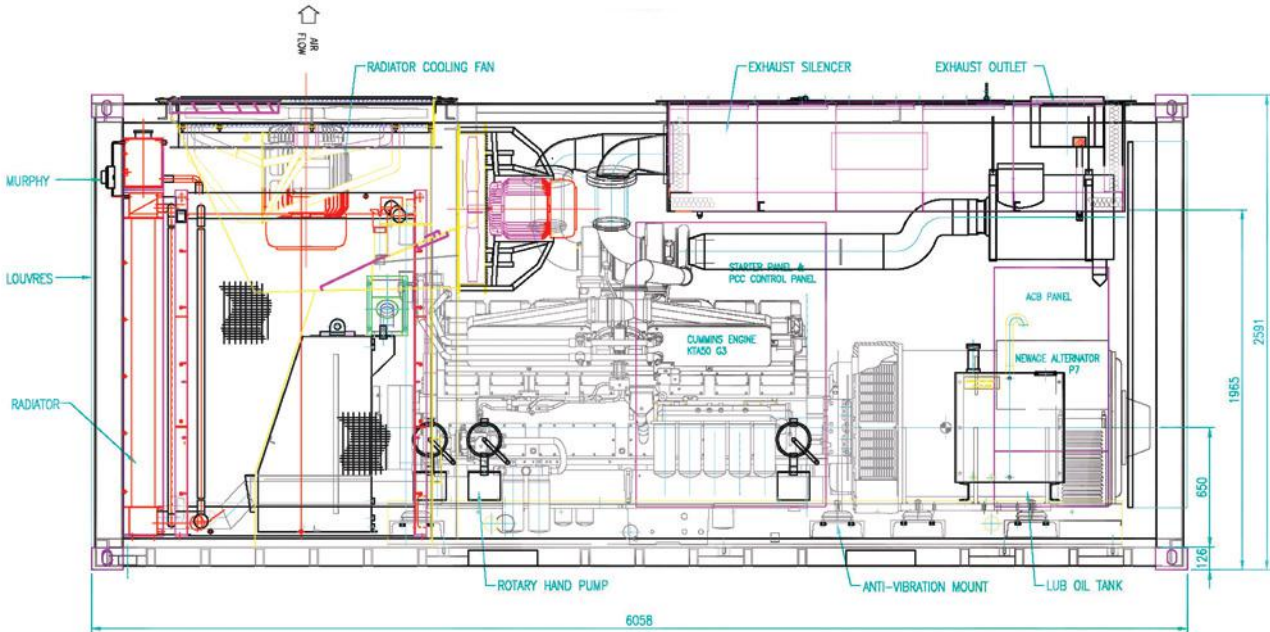
- Auxiliary output relays (2)



PowerCommand 3.3 control operator/display panel

PowerBox 20X

Front View



Right Side View



External access to electrical connection

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

Model (mm)	Length (mm)	Width (mm)	Height (mm)	Set Weight*	
				Dry (kg)	Wet (kg)
C1250 D2R	6058	2438	2591	16879	18132

*Note: Weights represent a set with standard features. Specifications may change without notice.

Our innovation. Your solutions

Cummins Power Generation's PowerBox 20X is specially engineered to provide optimal, cost-effective power even in the harshest environments. Whatever your needs wherever in the world, the PowerBox 20X is the choice for reliable energy and your bottom line.

The new PowerBox 20X is ideal for long-term power projects in a wide variety of on-site prime power applications such as powering remote villages, industrial plants, refineries or mining operations. Whether paralleled with the utility or isolated from the grid, these power units are designed to be easy to use.

Greater versatility in a compact package made Cummins Power Generation's PowerBox 20X the preferred choice for a wide array of applications around the world.



Power Plant



Construction



Refinery



Remote Island



Mining

Dedicated to Your Needs

Our commitment goes beyond the sale, by helping customers keep their equipment running better and fixing it quickly when it breaks down.

Our global distributor network has factory-trained and certified technicians with full-stocked parts and service vehicles.

To find out more about our integrated range of products, specifications and solutions or to discuss your site requirements, please contact your local Power Generation distributor or visit our website at www.cumminspower.com.



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