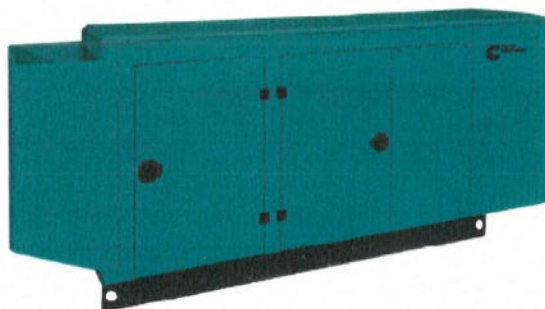




Diesel generator set

QSB5 series engine
50-125 kW @ 60 Hz
EPA Tier 3 emissions



Description

Cummins® generator sets are fully integrated power generation systems providing optimum performance, reliability and versatility for stationary Standby applications.

Features

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

Alternator - Several alternator sizes offer selectable motor starting capability with low reactance 2/3 pitch windings, low waveform distortion with non-linear loads and fault clearing short-circuit capability.

Control system - The PowerCommand® 2.3 electronic control is standard equipment and provides total generator set system integration including automatic remote starting/stopping, precise frequency and voltage regulation, alarm and status message display, output metering, auto-shutdown at fault detection and NFPA 110 Level 1 compliance.

Cooling system - Standard cooling package provides reliable running at up to 50 °C (122 °F) ambient temperature.

Enclosures - The aesthetically appealing enclosure incorporates special designs that deliver one of the quietest generators of its kind. Aluminium material plus durable powder coat paint provides the best anti-corrosion performance. The generator set enclosure has been evaluated to withstand 180 MPH wind loads in accordance with ASCE7 -10. The design has hinged doors to provide easy access for service and maintenance.

Fuel tanks - Dual wall sub-base fuel tanks are offered as optional features, providing economical and flexible solutions to meet extensive code requirements on diesel fuel tanks.

NFPA - The generator set accepts full rated load in a single step in accordance with NFPA 110 for Level 1 systems.

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

Model	Standby 60 Hz		Prime 60 Hz		Data sheets
	kW	kVA	kW	kVA	
C50D6C	50 ✓	63 ✓	45	56 ✓	NAD-6212-EN
C60D6C	60	75	54	68	NAD-6213-EN
C80D6C	80	100	72	90	NAD-6214-EN
C100D6C	100	125	90	113	NAD-6215-EN
C125D6C	125	156	112.5	141	NAD-6216-EN

Generator set specifications

Governor regulation class	ISO8528 Part 1 Class G3
Voltage regulation, no load to full load	± 1.0%
Random voltage variation	± 1.0%
Frequency regulation	Isochronous
Random frequency variation	± 0.50%
Radio frequency emissions compliance	FCC code title 47 part 15 class A and B

Engine specifications

Design	Turbocharged and charge air cooled
Bore	107 mm (4.21 in.)
Stroke	124 mm (4.88 in.)
Displacement	4.5 L (272 in³)
Cylinder block	Cast iron, in-line 4 cylinder
Battery capacity	850 amps per battery at ambient temperature of 0 °C (32 °F)
Battery charging alternator	100 amps
Starting voltage	2 x 12 volt in parallel, negative ground
Lube oil filter type(s)	Spin-on with relief valve
Standard cooling system	High ambient radiator
Rated speed	1800 rpm

Alternator specifications

Design	Brushless, 4 pole, drip proof, revolving field
Stator	2/3 pitch
Rotor	Direct coupled, flexible disc
Insulation system	Class H per NEMA MG1-1.65
Standard temperature rise	120 °C (248 °F) Standby
Exciter type	Torque match (shunt) with PMG as option
Alternator cooling	Direct drive centrifugal blower
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

1-phase	3-phase			
• 120/240	• 120/208	• 120/240	• 277/480	• 347/600
				• 127/220

Generator set options

Fuel system

- Basic fuel tanks
- Regional fuel tanks

Engine

- Engine air cleaner – normal or heavy duty
- Shut down – low oil pressure
- Extension – oil drain
- Engine oil heater

Alternator

- 120 °C temperature rise alternator
- 105 °C temperature rise alternator
- PMG excitation
- Alternator heater, 120 V
- Reconnectable full 1 phase output alternator

Control

- AC output analog meters
- Stop switch – emergency
- Auxiliary output relays (2)
- Auxiliary configurable signal inputs (8) and relay outputs (8)

Electrical

- One, two or three circuit breaker configurations
- 80% rated circuit breakers
- 80% or 100% rated LSI circuit breakers
- Battery charger

Enclosure

- Aluminium enclosure Sound Level 1 or Level 2, sandstone or green color
- Aluminium weather protective enclosure with muffler installed, green color

Cooling system

- Shutdown – low coolant level
- Warning – low coolant level
- Extension – coolant drain
- Coolant heater options:
 - < 4 °C (40 °F) – cold weather
 - < 18 °C (0 °F) – extreme cold

Exhaust system

- Exhaust connector NPT
- Exhaust muffler mounted

Generator set application

- Base barrier – elevated genset
- Radiator outlet duct adapter

Warranty

- Base warranty – 2 year/1000 hours, Standby
- Base warranty – 1 year/unlimited hours, Prime
- 3 year Standby warranty options
- 5 year Standby warranty options

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Generator set accessories

- Coolant heater ✓
- Battery heater kit ✓
- Engine oil heater ✓
- Remote control displays
- Auxiliary output relays (2)
- Auxiliary configurable signal inputs (8) and relay outputs (8) ✓
- Annunciator – RS485 ✓
- Audible alarm
- Remote monitoring device – PowerCommand 500/550
- Battery charger – stand-alone, 12 V
- Circuit breakers
- Enclosure Sound Level 1 to Sound Level 2 upgrade kit
- Base barrier – elevated generator set
- Mufflers – industrial, residential or critical
- Alternator PMG excitation ✓
- Alternator heater ✓

Control system PowerCommand 2.3

PowerCommand 2.3 control - An integrated generator set control system providing voltage regulation, engine protection and operator interface.

Control - Provides battery monitoring and testing features and smart-starting control system.

InPower™ - PC-based service tool available for detailed diagnostics.

PCCNet RS485 - Network interface (standard) to devices such as remote annunciator for NFPA 110 applications.

Control boards - Potted for environmental protection.

Ambient operation - Suitable for operation in ambient temperatures from -40 °C to +70 °C and altitudes to 13,000 feet (5,000 meters).

AC protection

- AmpSentry™ protective relay
- Over current warning and shutdown
- Over and under voltage shutdown
- Over and under frequency shutdown
- Over excitation (loss of sensing) fault
- Field overload
- Overload warning
- Reverse kW shutdown
- Reverse Var shutdown
- Short circuit protection

Engine protection

- Overspeed shutdown
- Low oil pressure warning and shutdown ✓
- High coolant temperature warning and shutdown
- Low coolant level warning or shutdown ✓
- Low coolant temperature warning
- High, low and weak battery voltage warning
- Fail to start (overcrank) shutdown
- Fail to crank shutdown
- Redundant start disconnect
- Cranking lockout
- Sensor failure indication
- Low fuel level warning or shutdown ✓
- Emergency stop ✓
- Fuel-in-rupture-basin warning or shutdown ✓

Operator/display panel

- Manual off switch
- 320 x 240 Pixels graphic LED backlight LCD with push button access for viewing engine and alternator data and providing setup, controls, and adjustments (English, Spanish, or French).

- LED lamps indicating genset running, not in auto, common warning, common shutdown, manual run mode and remote start.
- Suitable for operation in ambient temperatures from -20 °C to +70 °C

Alternator data

- Line-to-Line and Line-to-Neutral AC volts
- 3-phase AC current
- Frequency
- kVa, kW, power factor

Engine data

- DC voltage
- Lube oil pressure
- Coolant temperature

Other data

- Generator set model data
- Start attempts, starts, running hours
- Fault history
- RS485 Modbus® interface
- Data logging and fault simulation (requires InPower service tool)

Digital voltage regulation

- Integrated digital electronic voltage regulator
- 3-phase Line-to-Line sensing
- Configurable torque matching
- Fault current regulation under single or three phase fault conditions

Control functions

- Time delay start and cooldown
- Cycle cranking
- PCCNet Interface
- (2) Configurable inputs
- (2) Configurable outputs
- Remote emergency stop ✓
- Automatic Transfer Switch (ATS) control ✓
- Generator set exercise, field adjustable ✓

Options

- Auxiliary output relays (2)
- Remote annunciator with (3) configurable inputs and (4) configurable outputs
- PMG alternator excitation ✓
- PowerCommand 500/550 for remote monitoring and alarm notification (accessory)
- Auxiliary, configurable signal inputs (8) and configurable relay outputs (8) ✓

- AC output analog meters (bargraph)
 - Color-coded graphical display of:
 - 3-phase AC voltage
 - 3-phase current
 - Frequency
 - kVa
- Remote operator panel

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):

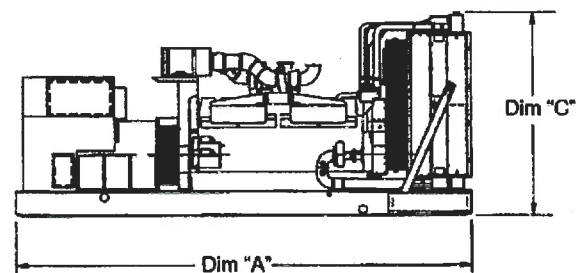
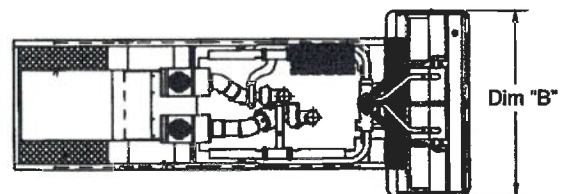
Applicable for supplying power to a constant electrical load for limited hours. Limited Time Running Power (LTP) is in accordance with ISO 8528.

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





Do not use for installation design

Model	Dim "A" mm (In.)	Dim "B" mm (In.)	Dim "C" mm (In.)	Set weight*wet kg (lbs.)
Open set				
C50D6C	2482 (98)	965 (38)	1321 (52)	958 (2113)
C60D6C	2482 (98)	965 (38)	1321 (52)	1006 (2217)
C80D6C	2482 (98)	965 (38)	1321 (52)	1054 (2324)
C100D6C	2482 (98)	965 (38)	1321 (52)	1106 (2439)
C125D6C	2482 (98)	965 (38)	1321 (52)	1173 (2586)
Weather protective enclosure				
C50D6C	2482 (98)	1016 (40)	1473 (58)	1039 (2290)
C60D6C	2482 (98)	1016 (40)	1473 (58)	1087 (2396)
C80D6C	2482 (98)	1016 (40)	1473 (58)	1135 (2503)
C100D6C	2482 (98)	1016 (40)	1473 (58)	1187 (2618)
C125D6C	2482 (98)	1016 (40)	1473 (58)	1254 (2765)
Sound attenuated enclosure Level 1				
C50D6C	3016 (119)	1016 (40)	1473 (58)	1221 (2693)
C60D6C	3016 (119)	1016 (40)	1473 (58)	1137 (2507)
C80D6C	3016 (119)	1016 (40)	1473 (58)	1185 (2614)
C100D6C	3016 (119)	1016 (40)	1473 (58)	1237 (2729)
C125D6C	3016 (119)	1016 (40)	1473 (58)	1304 (2876)
Sound attenuated enclosure Level 2 ✓				
➔ C50D6C ✓	3456 (136)	1016 (40)	1473 (58)	1228 (2708)
C60D6C	3456 (136)	1016 (40)	1473 (58)	1144 (2522)
C80D6C	3456 (136)	1016 (40)	1473 (58)	1192 (2629)
C100D6C	3456 (136)	1016 (40)	1473 (58)	1244 (2744)
C125D6C	3456 (136)	1016 (40)	1473 (58)	1311 (2891)

* Weights above are average. Actual weight varies with product configuration.

Codes and standards

Codes or standards compliance may not be available with all model configurations – consult factory for availability.

	This generator set is designed in facilities certified to ISO 9001 and manufactured in facilities certified to ISO 9001 or ISO 9002.		The generator set is available Listed to UL 2200, Stationary Engine Generator Assemblies. ✓
	The Prototype Test Support (PTS) program verifies the performance integrity of the generator set design. Cummins products bearing the PTS symbol meet the prototype test requirements of NFPA 110 for Level 1 systems. ✓	U.S. EPA	Engine certified to U.S. EPA SI Stationary Emission Regulation 40 CFR, Part 60.
	All low voltage models are CSA certified to product class 4215-01.	International Building Code	The generator set is certified to International Building Code (IBC) 2012.

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

Maderra Engineering

- ☐ REVIEWED
☒ REVIEWED AS NOTED
☐ RESUBMIT

BY: CRAIG NOSEWORTHY

DATE: April 30, 2018

Review is for conformance with the general design concept and does not relieve the Contractor from his responsibility for detail design inherent in shop drawings; for errors or omissions in the shop drawings or for meeting all requirements of Contract Documents.

- ① Genset To Be CSA-B139 Code compliant.
- ② Genset To be clw fuel/Water Separator.
- ③ All Labels To Be in English
- ④ All access panels, including Control panel Door, To be clw Locks. All Locks To be Keyed ALike.
- ⑤ Genset To be clw high oil Pressure ALARM.

For more information contact your local Cummins distributor or visit power.cummins.com

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Rev. DO

Generator set data sheet



Model: C50D6C
Frequency: 60 Hz
Fuel type: Diesel
kW rating: 50 Standby
 45 Prime
Emissions level: EPA Tier 3, stationary emergency ✓

Exhaust emission data sheet:	EDS-1250
Exhaust emission compliance sheet:	EPA-1350
Sound performance data sheet:	MSP-1300
Cooling performance data sheet:	MCP-1400
Prototype test summary data sheet:	PTS-450

Fuel consumption	Standby				Prime			
	kW (kVA)				kW (kVA)			
Ratings	50 (63)				45 (56)			
Load	1/4	1/2	3/4	Full	1/4	1/2	3/4	Full
US gph	2.10	2.90	4.00	5.30	2.00	2.70	3.70	4.70
L/hr	7.95	10.98	15.14	20.06	7.57	10.22	14.00	17.79

Engine	Standby rating	Prime rating
Engine manufacturer	Cummins Inc.	
Engine model	QSB5-G5	
Configuration	Cast iron, in-line, 4 cylinder	
Aspiration	Turbocharged and charge air-cooled	
Gross engine power output, kWm (bhp)	131 (176)	113 (152)
BMEP at set rated load, kPa (psi)	1027 (149)	928 (134.6)
Bore, mm (in.)	107 (4.21)	
Stroke, mm (in.)	124 (4.88)	
Rated speed, rpm	1800	
Piston speed, m/s (ft/min)	7.44 (1464)	
Compression ratio	17.3:1	
Lube oil capacity, L (qt)	12.2 (12.9)	
Overspeed limit, rpm	2250	

Fuel flow	
Maximum fuel flow, L/hr (US gph)	133 (35.0)
Maximum fuel inlet restriction with clean filter, mm Hg (in Hg)	127 (5.0)

Air	Standby rating	Prime rating
Combustion air, m ³ /min (scfm)	9.17 (324)	8.86 (313)
Maximum air cleaner restriction with clean filter, kPa (in H ₂ O)	1.25 (5)	

Exhaust

Exhaust flow at set rated load, m ³ /min (cfm)	17.2 (609)	16.4 (580)
Exhaust temperature, °C (°F)	328 (622)	309 (589)
Maximum back pressure, kPa (in H ₂ O)	10 (40.18)	10 (40.18)
Available exhaust back pressure with CPG sound level 2 enclosure muffler, kPa (in H ₂ O) ✓	4.5 (18.1)	5 (20.1)
Available exhaust back pressure with CPG weather enclosure muffler, kPa (in H ₂ O)	5 (20.1)	5.5 (22.1)

Standard set-mounted radiator cooling¹

Ambient design, °C (°F)	50 (122)	
Fan load, kW _m (HP)	5.22 (7)	
Coolant capacity (with radiator), L (US gal)	16 (4.2)	
Cooling system air flow, m ³ /min (scfm)	218.04 (7700)	
Total heat rejection, MJ/min (Btu/min)	8.12 (7693)	7.64 (7245)
Maximum cooling air flow static restriction, kPa (in H ₂ O)	0.12 (0.5)	

Weights²

Unit wet weight kgs (lbs)	958 (2113)
---------------------------	------------

Notes:

¹ For non-standard remote installations contact your local Cummins representative.

² Weights represent a set with standard features. See outline drawing for weights of other configurations.

Derating factors

Standby	Engine power available up to 2012 m (6,600 ft) and ambient temperatures up to 40 °C (104 °F). Above these conditions, derate at 17% per 300 m (1,000 ft) and 16% per 10 °C (18 °F).
Prime	Engine power available up to 2073 m (6,800 ft) and ambient temperatures up to 40 °C (104 °F). Above these conditions, derate at 17% per 300 m (1,000 ft) and 19% per 10 °C (18 °F).

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) is in accordance with ISO 8528, ISO 3046, AS 2789, DIN 6271 and BS 5514.

Alternator data

Standard alternators	Single phase table	Three phase table				
		120 °C	120 °C	120 °C	120 °C	120 °C
Maximum temperature rise above 40 °C ambient						
Feature code	BB90-2	B946-2	B986-2	B943-2	B952-2	BB86-2
Alternator data sheet number	ADS-203	ADS-202	ADS-202	ADS-202	ADS-202	ADS-202
Voltage ranges	120/240	120/208	120/240	277/480	347/600	127/220
Voltage feature code	R104-2	R098-2	R106-2	R002-2	R114-2	R020-2
Surge kW	59.1	61.7	61.7	61.6	61.6	61.0
Motor starting kVA (at 90% sustained voltage) Shunt	188	163	163	163	163	163
Motor starting kVA (at 90% sustained voltage) PMG	221	191	191	191	191	191
Full load current amps at Standby rating	208.3	174	151	75.3	60.2	164

Notes:

- ¹ Single phase power can be taken from a three phase generator set at up to 2/3 set rated 3-phase kW at 1.0 power factor. Also see Note 3 below. ✓
- ² The broad range alternators can supply single phase output up to 2/3 set rated 3-phase kW at 1.0 power factor.
- ³ The extended stack (full single phase output) and 4 lead alternators can supply single phase output up to full set rated 3-phase kW at 1.0 power factor. ✓

Formulas for calculating full load currents:

Three phase output	Single phase output
$\frac{\text{kW} \times 1000}{\text{Voltage} \times 1.73 \times 0.8}$	$\frac{\text{kW} \times \text{SinglePhaseFactor} \times 1000}{\text{Voltage}}$

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

For more information contact your local Cummins distributor or visit power.cummins.com

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Alternator data sheet

Frame size: UC2F

Characteristics							
Weights:		Wound stator assembly:	243 lb	110 kg			
		Rotor assembly:	247 lb	112 kg			
		Complete alternator:	732 lb	332 kg			
Maximum speed:			2250 rpm				
Excitation current:		Full load:	2 Amps				
		No load:	0.5 Amps				
Insulation system:		Class H throughout					
1 Ø Ratings (1.0 power factor) (Based on specific temperature rise at 40 °C ambient temperature)		60 Hz			50 Hz		
		Double delta	4 lead		Double delta		
		<u>120/240</u>	<u>120/240</u>		110-120 <u>220-240</u>		
125 °C rise ratings	kW/kVA	56/56	60/60		49/49		
105 °C rise ratings	kW/kVA	50/50	54/54		44/44		
3 Ø Ratings (0.8 power factor) (Based on specified temperature rise at 40 °C ambient temperature)		Upper broad range		LBR*	347/600	Broad range	
		<u>120/208</u> <u>240/416</u>	<u>139/240</u> <u>277/480</u>	<u>190-208</u> <u>380-416</u>	<u>347/600</u>	<u>110/190</u> <u>220/380</u>	<u>120/208</u> <u>240/415</u> <u>127/220</u> <u>254/440</u>
150 °C Rise ratings	kW	71	79	72	79	62	62
	kVA	89	99	89	99	77	77
125 °C Rise ratings	kW	67	75	68	75	58	58
	kVA	84	94	85	94	73	73
105 °C Rise ratings	kW	60	66	60	66	52	52
	kVA	75	83	75	83	65	65
80 °C Rise ratings	kW	52	57	52	57	45	45
	kVA	65	72	65	72	56	56
3 Ø Reactances (per unit, ± 10%) (Based on full load at 105 °C rise rating)							
Synchronous		2.27	1.87	1.95	1.63	2.04	1.71
Transient		0.17	0.14	0.15	0.13	0.16	0.14
Subtransient		0.13	0.11	0.11	0.11	0.11	0.09
Negative sequence		0.13	0.11	0.11	0.11	0.12	0.10
Zero sequence		0.09	0.07	0.07	0.07	0.09	0.07
3 Ø Motor starting							
Maximum kVA	(Shunt)	231	231	231		156	
(90% sustained voltage)	(PMG)	272	272	272		194	
Time constants (Sec)							
Transient		0.030	0.030	0.030		0.030	
Subtransient		0.008	0.008	0.008		0.008	
Open circuit		0.750	0.750	0.750		0.750	
DC		0.007	0.007	0.007		0.007	



Alternator data sheet

Frame size: UC2F

Windings		(@ 20° C)			
Stator resistance	(Line to Line, Ohms)	0.1300	0.0960	0.2040	0.1300
Rotor resistance	(Ohms)	0.8000	0.8000	0.8000	0.8000
Number of leads		12	12	6	12

* Lower broad range 110/190 thru 120/208, 220/380 thru 240/416.

CN✓



Exhaust emission data sheet C50D6C

60 Hz Diesel generator set

Engine information:

Model:	Cummins QSB5-G5	Bore:	4.21 in. (106.9 mm)
Type:	4 cycle, in-line, 4 cylinder diesel	Stroke:	4.88 in. (123.9 mm)
Aspiration:	Turbocharged	Displacement:	272 cu. in. (4.45 liters)
Compression ratio:	17.3:1		
Emission control device:	Turbocharged and charge air-cooled		

	<u>1/4</u>	<u>1/2</u>	<u>3/4</u>	<u>Full</u>	<u>Full</u>
<u>Performance data</u>	<u>Standby</u>	<u>Standby</u>	<u>Standby</u>	<u>Standby</u>	<u>Prime</u>
BHP @ 1800 RPM (60 Hz)	23	47	70	93	84
Fuel consumption (gal/Hr)	2.1	2.9	4.0	5.3	4.7
Exhaust gas flow (CFM)	285	397	511	609	580
Exhaust gas temperature (°F)	408	500	560	622	589
<u>Exhaust emission data</u>					
HC (Total unburned hydrocarbons)	0.26	0.10	0.07	0.06	0.06
NOx (Oxides of nitrogen as NO2)	3.22	2.29	2.33	2.23	2.26
CO (Carbon monoxide)	1.53	0.73	0.54	0.53	0.50
PM (Particular Matter)	0.27	0.15	0.12	0.09	0.11
Smoke (Bosch)	0.71	0.75	0.78	0.78	0.82

All values are Grams per HP - Hour

Test conditions

Data is representative of steady-state engine speed (± 25 RPM) at designated genset loads. Pressures, temperatures, and emission rates were stabilized.

Fuel specification:	ASTM D975 No. 2-D diesel fuel with 0.03-0.05% sulfur content (by weight), and 40-48 cetane number.
Fuel temperature:	99 \pm 9 °F (at fuel pump inlet)
Intake air temperature:	77 \pm 9 °F
Barometric pressure:	29.6 \pm 1 in. Hg
Humidity:	NOx measurement corrected to 75 grains H2O/lb dry air
Reference standard:	ISO 8178

The NOx, HC, CO and PM emission data tabulated here are representative of test data taken from a single engine under the test conditions shown above. Data for the other components are estimated. These data are subjected to instrumentation and engine-to-engine variability. Field emission test data are not guaranteed to these levels. Actual field test results may vary due to test site conditions, installation, fuel specification, test procedures and instrumentation. Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may result in elevated emission levels.

CN ✓



Cooling system data

C50D6C

High ambient air temperature radiator cooling system ✓

	Fuel type	Duty	Rating (kW)	Max cooling @ air flow static restriction, unhooded (inches water/mm water)					Housed in free air, no air discharge restriction		
				0.0/0.0	0.25/6.4	0.5/12.7	0.75/19.1	1.0/25.4	F231	F217	F216
				Maximum allowable ambient temperature, degree C							
60 Hz	Diesel	Standby	50	50	50	50	50	N/A	50	50	50
		Prime	45	50	50	50	50	N/A	50	50	50

Notes:

1. Data shown are anticipated cooling performance for typical generator set.
2. Cooling data is based on 1000 ft (305 m) site test location.
3. Generator set power output may need to be reduced at high ambient conditions. Refer generator set data sheet for derate schedules.
4. Cooling performance may be reduced due to several factors including but not limited to: Incorrect installation, improper operation, fouling of the cooling system, and other site installation variables.



Sound data

C50D6C 60 Hz

Sound pressure level @ 7 meters, dB(A)

See notes 2,5,7-11 listed below

Configuration	Exhaust system	Position (note 1)								8 Position average
		1	2	3	4	5	6	7	8	
Standard – unhooded	Infinite exhaust	77.2	79.5	79.4	81.8	78.5	81.1	80.6	79.7	79.9
F216-2 weather protective aluminium	Mounted	78.2	79.6	78.1	81.5	80.5	80.6	79.2	79.2	79.7
F231-2 sound attenuated level 1, aluminium	Mounted	78.1	74.8	70.3	72.5	72.2	72.7	71.9	74.9	74.1
F217-2 sound attenuated level 2, aluminium	Mounted	71.2	70.9	67.7	70.1	70.1	70.4	70.1	71.1	70.3

Sound power level, dB(A)

See notes 2-4, 7 and 8 listed below

Configuration		Octave band center frequency (Hz)										Overall sound power level
		31.5	63	125	250	500	1000	2000	4000	8000	1600	
Standard – unhooded	Infinite exhaust	53.8	79.2	87.4	92.0	100.2	102.0	100.9	97.1	92.4	87.5	106.8
F216-2 weather protective enclosure, aluminium	Mounted	55.3	85.3	93.1	94.8	99.7	101.4	99.6	96.2	91.4	81.9	106.4
F231-2 sound attenuated level 1 enclosure, aluminium	Mounted	58.4	84.0	87.6	89.7	95.6	96.4	94.8	91.7	87.3	79.4	100.7
F217-2 sound attenuated level 2 enclosure, aluminium	Mounted	57.4	83.8	87.2	87.8	92.4	91.3	89.4	86.8	82.5	71.6	97.8

Exhaust sound power level, dB(A)

See notes 4,6 and 9 listed below

Open exhaust (no muffler) @ rated load	Octave band center frequency (Hz)									Overall sound power level
	31.5	63	125	250	500	1000	2000	4000	8000	
	54	81	96	102	107	110	111	109	108	117

Note:

1. Sound pressure levels at 1 meter are measured per the requirements of ISO 3744, ISO 8528-10, ANSI S1.13, ANSI S12.1 and European Communities Directive 2000/14/EC as applicable. The microphone measurement locations are 1 meter from a reference parallelepiped just enclosing the generator set (enclosed or unenclosed).
2. Seven-meter measurement location 1 is 7 meters (23 feet) from the generator (alternator) end of the generator set, and the locations proceed counter clockwise around the generator set at 45° angles at a height of 1.2 meters (48 inches) above the ground surface. ✓
3. Sound Power Levels are calculated according to ISO 3744, ISO 8528-10, and or CE (European Union) requirements.
4. Exhaust Sound Levels are measured and calculated per ISO 6798, Annex A.
5. Reference Sound Pressure Level is 20 µPa. ✓
6. Reference Sound Power Level is 1 pW (10-12 Watt).
7. Sound data for remote-cooled generator sets are based on rated loads without cooling fan noise. ✓
8. Sound data for the generator set with infinite exhaust do not include the exhaust noise contribution.
9. Sound levels are subject to instrumentation, measurement, installation, and manufacturing variability

10. Unhoused/Open configuration generator sets refers to generator sets with no sound enclosures of any kind
11. Housed/Enclosed/Closed/Canopy configuration generator sets refer to generator sets that have noise reduction sound enclosures installed over the generator set and usually integrally attached to the skid base/base frame/fuel container base of the generator set. ✓



Data sheet

Circuit breakers

Description

This data sheet provides circuit breaker manufacturer part numbers and specifications. The circuit breaker box description is the rating of that breaker box installation on a Cummins generator. Please refer to the website of the circuit breaker manufacturer for breaker specific ratings and technical information.

Applicable models

Engine	Models					
Kubota	C10D6	C15D6	C20D6			
QSJ2.4	C20N6	C25N6	C30N6	C30N6H	C36N6	C36N6H
	C40N6	C40N6H	C50N6H	C60N6H		
B3.3	C25D6	C30D6	C35D6	C40D6	C50D6	C60D6
QSJ5.9G	C45N6	C50N6	C60N6	C70N6	C80N6	C100N6
QSJ8.9G	C125N6	C150N6				
QSB5	DSFAC	DSFAD	DSFAE	C50D6C	C60D6C	C80D6C
	C100D6C	C125D6C				
QSB7	DSGAA	DSGAB	DSGAC	DSGAD	DSGAE	
QSL9	DSHAD	DQDAA	DQDAB	DQDAC		
QSM11	DQHAB					
QSX15	DFEJ	DFEK				

Instructions

1. Locate the circuit breaker feature code or part number and use the charts below to find the corresponding manufacturer circuit breaker catalog number.
2. Use the first letter of the circuit breaker catalog number to determine the "frame" of the breaker. If the first letter is an "N", use the second letter. Then follow the corresponding website link from the table below to find the breaker catalog number description.

Please refer to the catalog numbering systems page, which is given in the chart, to understand the nomenclature of the catalog number.

Frame	Catalog name*	Catalog number description page(s)
P	0612CT0101 http://www.schneider-electric.us/en/download/document/0612CT0101/	16-17
H, J, and L	0611CT1001 http://www.schneider-electric.us/en/download/document/0611CT1001/	8-9
Q	0734CT0201 http://www.schneider-electric.us/en/download/document/0734CT0201/	4

*The following link may also be used to search specifically by the breaker part number or for the catalog name listed above. <http://products.schneider-electric.us/technical-library/>

3. Search the catalog by using the first 3 letters of the breaker catalog number and the first 5 numbers to find information such as trip curves, accessories, and dimensional details regarding the circuit breaker.

*If the catalog number starts with "N", skip the N and begin your search with the second letter.

*If the first 3 letters are "PJP," the search will not work. You will need to start with just "PJ" and use the description pages to obtain the information you are looking for on the "PJP."

Example

After finding your circuit breaker catalog number to be "PJL36120U33EACUKMOYB," navigate to the P-frame catalog by using the link provided.

Look at pages 16-17 of the pdf catalog to find the nomenclature of the breaker.

Search the P-frame spec sheet using the search "PJL36120."

<u>P</u>	<u>J</u>	<u>L</u>	<u>3</u>	<u>6</u>	<u>120</u>	<u>U33</u>	<u>E</u>	<u>AC</u>	<u>UK</u>	<u>MO</u>	<u>YB</u>
P-Frame	Interrupting Rating	Lug Connection	Poles	Voltage Rating	Ampere Rating	Trip System	Rating Plug	3 Auxiliary Switch	24 Vac/dc UVR	24 Vdc Spring charging motor	Pad lockable Push-button cover

Feature Code	Breaker Box Description	Cummins Part #	Manufacturer	Breaker Catalog Number	Trip Unit	Plug Type
KX27-2	CB, Loc B, 70A-250A, 3P, LSI, 600VAC, 80%, UL	A050J727	Schneider Electric	JDL36250CU33X	MicroLogic 3.2S	N/A
KX28-2	CB, Loc B, 70A-250A, 3P, LSI, 600VAC, 100%, UL ✓	A050J727	Schneider Electric	JDL36250CU33X ✓	MicroLogic 3.2S	N/A
KX29-2	CB, Loc C, 70A-250A, 3P, LSI, 600VAC, 100%, UL ✓	A050J727	Schneider Electric	JDL36250CU33X ✓	MicroLogic 3.2S	N/A
KX30-2	CB, Loc A, 125A-400A, 3P, LSI, 600VAC, 100%, UL	A051D115	Schneider Electric	LGL36400CU33X	MicroLogic 3.3S	N/A
KX31-2	CB, Loc B, 125A-400A, 3P, LSI, 600VAC, 100%, UL	A051D115	Schneider Electric	LGL36400CU33X	MicroLogic 3.3S	N/A
KX32-2	CB, Loc A, 200A-600A, 3P, LSI, 600VAC, 80%, UL	A044T468	Schneider Electric	NLGL36600U33X-600A	MicroLogic 3.3S	N/A
KX33-2	CB, Loc B, 200A-600A, 3P, LSI, 600VAC, 80%, UL	A044T468	Schneider Electric	NLGL36600U33X-600A	MicroLogic 3.3S	N/A
KX34-2	CB, Loc C, 15A, 3P, 600VAC, 80%, UL	A043L506	Schneider Electric	HDL36015	Thermal Magnetic	N/A
KX35-2	CB, Loc C, 20A, 3P, 600VAC, 80%, UL	A043L480	Schneider Electric	HDL36020	Thermal Magnetic	N/A
KX36-2	CB, Loc C, 25A, 3P, 600VAC, 80%, UL	A043L508	Schneider Electric	HDL36025	Thermal Magnetic	N/A
KX37-2	CB, Loc C, 30A, 3P, 600VAC, 80%, UL	A043L475	Schneider Electric	HDL36030	Thermal Magnetic	N/A
KX38-2	CB, Loc C, 40A, 3P, 600VAC, 80%, UL	A043L464	Schneider Electric	HDL36040	Thermal Magnetic	N/A
KX39-2	CB, Loc C, 50A, 3P, 600VAC, 80%, UL	A043L461	Schneider Electric	HDL36050	Thermal Magnetic	N/A
KX40-2	CB, Loc C, 60A, 3P, 600VAC, 80%, UL	A043L459	Schneider Electric	HDL36060	Thermal Magnetic	N/A
KX41-2	CB, Loc C, 70A, 3P, 600VAC, 80%, UL	A043L451	Schneider Electric	HDL36070	Thermal Magnetic	N/A
KX42-2	CB, Loc C, 80A, 3P, 600VAC, 80%, UL	A043L012	Schneider Electric	HDL36080	Thermal Magnetic	N/A



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Rev. D0





Dual wall sub-base diesel fuel tanks - 10-125 kW generator sets



Description

Cummins® offers two series of fuel tanks (basic series and regional series) for the 10~125 kW diesel generator sets. The “basic” series of fuel tanks provide economical solutions for areas with no or minimal local/regional code requirements on diesel fuel tanks. The footprint of “basic” tanks matches the generator set’s footprint. The “regional” series of fuel tanks provide flexible and upgradable solutions for areas with extensive local/regional code requirements on diesel fuel tanks. The footprint of the “regional” series of fuel tanks extends beyond the generator set to allow room for installation of optional features at factory or accessories in the field for meeting local/regional code requirements or customer specification on diesel fuel tanks. All fuel tanks and optional features are compatible with factory installed enclosures.

These tanks are constructed of heavy gauge steel and include an internally reinforced baffle structure for supporting the generator set. The fuel tank design features fewer seams and welds for better corrosion resistance performance.

These tanks are pre-treated with a conversion coating and then finished with a textured powder paint. The paint has superior UV and chemical resistance with best-in-class adhesion, flexibility, and durability to resist chipping and substrate corrosion. Both interior compartments are treated with a rust preventative for extended corrosion protection.

These tanks are UL and ULC Listed as secondary containment generator base tanks. Inner and outer containments are leak checked per UL and ULC testing procedures to ensure their integrity.

These fuel tanks are offered in various sizes to satisfy different fuel capacities requirements.

Compatible generator set model

Engine	D1703M	V2203M	4BT3.3-G5	4BTAA3.3-G7	QSB5-G5
Generator set model	C10D6	C20D6	C25D6	C50D6	C50D6C ✓
	C15D6		C30D6	C60D6	C60D6C
			C35D6		C80D6C
			C40D6		C100D6C
					C125D6C

Regional fuel tanks

Standard features:

UL 142 and ULC-S601 listed - Minimum 110% secondary IBC 2012 and 2015 certified - All optional features are seismically certified with this range of tanks and generator sets. Requires factory-installed 2 ft vent extensions or higher.

UL 142 & ULC-S601 listed - Minimum 125% secondary containment capacity.

NFPA & IFC - Capable of meeting NFPA 30, NFPA 110, and IFC codes with available factory-installed optional features.

Emergency pressure relief vents - Ensure adequate ventilation of the primary and secondary tank compartments under extreme temperature and emergency conditions.

Normal atmospheric vent - "Mushroom" style vent ensures adequate venting of the primary tank during fill, generator set running, and temperature variations. Raised above fuel fill.

Raised fuel fill - Includes lockable sealed fuel cap.

Lifting eyes - Allow lifting of fuel tank with generator set installed.

Optional features:

Secondary containment basin switch (rupture switch) - Activates a warning in the event of a primary tank leak. Side Mounted.

Low fuel level switch - Activates a warning when 40% of the fuel is left in the tank.

Fuel level gauge - Provides direct reading of fuel level. Top mounted.

Electric fuel level sender with gauge - Allows remote electrical monitoring of fuel tank level. Flying leads for customer connection.

Tank to foundation clearance - 2-inch bolt-thru risers allow visual inspection under tank including rodent barrier.

Spill containment box for fuel fill - 5 gallon capacity with integral drain (to tank). Lockable lid.

Overfill prevention valve - Shuts off fuel flow during filling at approximately 95% full*. Includes fill down tube, as needed, to terminate within 6" of the bottom of the fuel tank. Uses a 2 inch type "F" cam lock adapter for filling.

High fuel switch - Activates at 90% of full fuel level. Flying leads for customer connection.

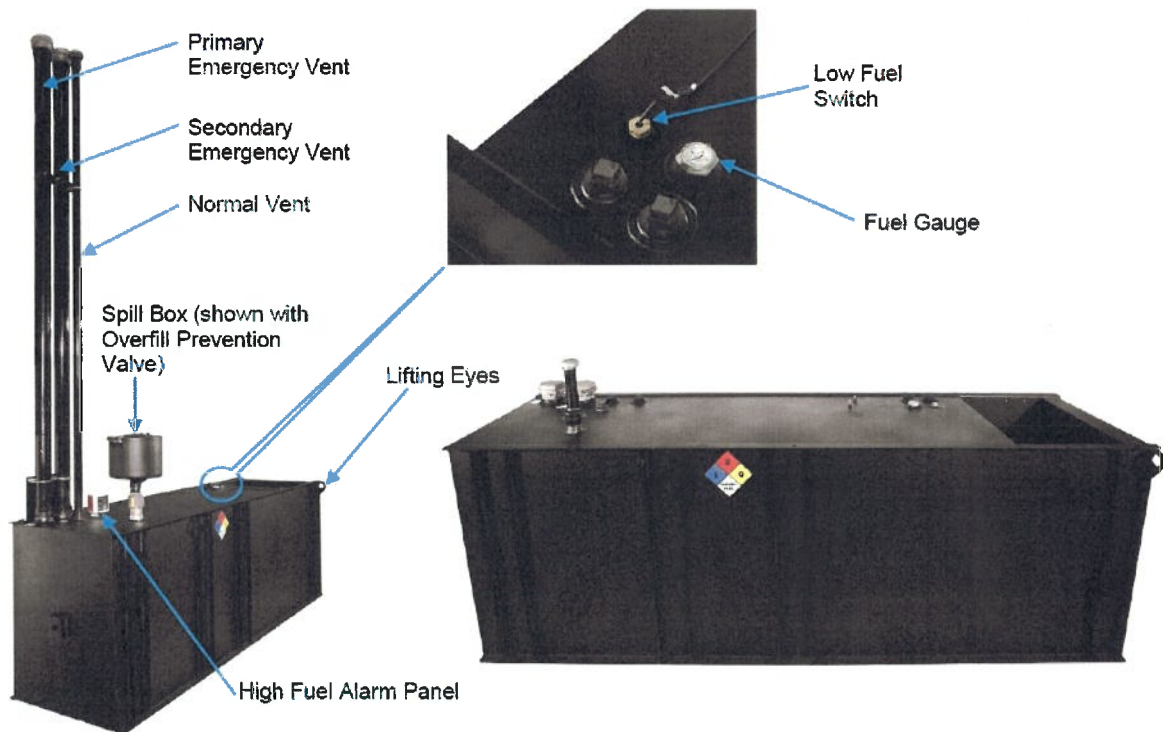
High fuel alarm panel - Provides audible & visual alarm when fuel level reaches 90% of full fuel level.

Fill drop tube - Terminates fuel fill location within 6" of the bottom of the fuel tank.

Vent extensions - Terminate normal and emergency vents (both primary and secondary) a minimum of 12 ft above the bottom of tank.

Seismic vent extensions - 2 ft normal and emergency (both primary & secondary) extensions to meet IBC/OSHPD seismic requirements.

* The OFPV inherently shuts off fuel at approximately 2" below the top of the fuel tank. Some tanks will shut off below this 95% fill level.



*Picture is for reference only. See outline drawing for tank specific information by model.

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Regional tanks

Generator set Standby power output	Generator set model	Engine model	Fuel consumption (100% load, Standby)	Tank feature code	Minimum run time feature	Tank dimensions (L x W x H)	Nominal dry weight*	Tank usable volume	Actual run time w/o OPPV	Actual run time w/OPPV
kW			gal/hr		hr	Inch	lbs	gal	hr	hr
10	C10 D6	D1703M	1.12	C301-2	24	87.6 x 34 x 15	510	74	66	56
				C303-2	48	87.6 x 34 x 15	510	74	66	56
				C305-2	72	87.6 x 34 x 23	723	132	118	107
				C307-2	96	87.6 x 34 x 23	723	132	118	107
15	C15 D6	D1703M	1.38	C301-2	24	87.6 x 34 x 15	510	74	53	45
				C303-2	48	87.6 x 34 x 15	510	74	53	45
				C305-2	72	87.6 x 34 x 23	723	132	95	86
				C307-2	96	87.6 x 34 x 32	962	195	141	132
20	C20 D6	V2203M	1.81	C301-2	24	87.6 x 34 x 15	510	74	41	35
				C303-2	48	87.6 x 34 x 23	723	132	73	66
				C305-2	72	87.6 x 34 x 32	962	195	108	101
				C307-2	96	87.6 x 34 x 32	962	195	108	101
25	C25 D6	4BT3.3-G5	2.42	C301-2	24	121 x 34 x 10.5	514	74	31	25
				C303-2	48	121 x 34 x 16.2	686	132	54	47
				C305-2	72	121 x 34 x 22.1	879	195	80	73
				C307-2	96	121 x 34 x 29.5	1120	263	109	101
30	C30 D6	4BT3.3-G5	2.81	C301-2	24	121 x 34 x 10.5	514	74	26	21
				C303-2	48	121 x 34 x 22.1	879	195	69	63
				C305-2	72	121 x 34 x 29.5	1120	263	94	87
				C307-2	96	121 x 34 x 42.0	1461	389	138	132
35	C35 D6	4BT3.3-G5	3.16	C301-2	24	121 x 34 x 16.2	686	132	42	36
				C303-2	48	121 x 34 x 22.1	879	195	62	56
				C305-2	72	121 x 34 x 29.5	1120	263	83	77
				C307-2	96	121 x 34 x 42.0	1461	389	123	117
40	C40 D6	4BT3.3-G5	3.66	C301-2	24	121 x 34 x 16.2	686	132	36	31
				C303-2	48	121 x 34 x 22.1	879	195	53	48
				C305-2	72	121 x 34 x 42.0	1461	389	106	101
				C307-2	96	121 x 34 x 42.0	1461	389	106	101
50	C50 D6	4BTAA3.3-G7	4.25	C301-2	24	121 x 34 x 16.2	686	132	31	27
				C303-2	48	121 x 34 x 29.5	1120	263	62	58
				C305-2	72	121 x 34 x 42.0	1461	389	92	87
60	C60 D6	4BTAA3.3-G7	5.04	C301-2	24	121 x 34 x 16.2	686	132	26	23
				C303-2	48	121 x 34 x 29.5	1120	263	52	49
				C305-2	72	121 x 34 x 42.0	1461	389	77	73
50	C50D6C	QSB5-G5	5.30	C301-2	24	154 x 40 x 22	1388	250	47	45
				C303-2	48	154 x 40 x 32	1657	425	80	76
				C305-2	72	154 x 40 x 32	1657	425	80	76
				C307-2	96	154 x 40 x 46	2096	625	118	112
60	C60D6C	QSB5-G5	6.10	C301-2	24	154 x 40 x 22	1388	250	41	39
				C303-2	48	154 x 40 x 32	1657	425	70	66
				C305-2	72	154 x 40 x 46	2096	625	102	97
				C307-2	96	154 x 40 x 46	2096	625	102	97
80	C80D6C	QSB5-G5	7.30	C301-2	24	154 x 40 x 22	1388	250	34	33
				C303-2	48	154 x 40 x 32	1657	425	58	55
				C305-2	72	154 x 40 x 46	2096	625	85	81
100	C100D6C	QSB5-G5	8.90	C301-2	24	154 x 40 x 22	1388	250	28	27
				C303-2	48	154 x 40 x 32	1657	425	48	45
				C305-2	72	154 x 40 x 46	2096	625	70	66
125	C125D6C	QSB5-G6	10.30	C301-2	24	154 x 40 x 22	1388	250	24	23
				C303-2	48	154 x 40 x 46	2096	625	60	58

* All weights are approximate.

Certifications/standards/codes



UL 142 Listed - Cummins dual wall sub-base tanks are UL Listed and constructed in accordance with Underwriters Laboratories Standard UL 142 "steel aboveground tanks for flammable and combustible liquids," as a "secondary containment generator base tank"



NFPA - Cummins tanks are built in accordance with all applicable NFPA codes:

- NFPA 30 - Flammable and Combustible Liquids code
- NFPA 37 - Standard for Installation and use of Stationary Combustible Engine and Gas Turbines
- NFPA 110 - Standard for Emergency and Standby Power Systems



ISO9001 - This product was designed and manufactured in facilities certified to ISO9001.



ULC - Cummins tanks are built in accordance with all applicable ULC codes

For more information contact your local Cummins distributor
or visit power.cummins.com

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CERTIFICATE OF COMPLIANCE

SEISMIC DESIGN OF NONSTRUCTURAL COMPONENTS AND SYSTEMS



Certification No.

VMA-51071-01C (REVISION 02)

Expiration Date: 07/31/2018

Certification Parameters:

The nonstructural products (mechanical and/or electrical components) listed on this certificate are **CERTIFIED¹** FOR SEISMIC APPLICATIONS in accordance with the following building code² releases.

IBC 2012, 2015

The following model designations, options, and accessories are included in this certification. Reference report number 77789-1302 and 33817-1501 as issued by Dynamic Certification Laboratories for a complete list of certified models, included accessories/options, and certified installation methods.

CUMMINS POWER GENERATION 10kW – 125kW Diesel Generator Sets

The above referenced equipment is **APPROVED** for seismic application when properly installed³, used as intended, and contains a Seismic Certification Label referencing this Certificate of Compliance⁴. As limited by the tabulated values, below grade, grade, and roof-level installations, installations in essential facilities, for life safety applications, and/or of equipment containing hazardous contents are permitted and included in this certification with an Equipment Importance Factor assigned as $I_p=1.5$. The equipment is qualified by successful seismic shake table testing at the nationally recognized Dynamic Certification Laboratories under the review of the ISO Accredited Product Certification Agency, The VMC Group.

Certified Seismic Design Levels

Certified IBC	Importance $I_p \leq 1.5$ Soil Classes A-E Risk Categories I-IV Design Categories A-F	$S_{DS} \leq 2.000 \text{ g}^7$	$S_{DS} \leq 2.000 \text{ g}^7$
		$z/h = 0.0$	$z/h \leq 1.0$
		Horizontal Design ⁵	$\frac{F_p}{W_p} = 0.4 S_{DS} I_p \frac{a_p}{R_p} (1 + 2 \frac{z}{h}) \leq 1.440 \text{ g}$
Test Datum AC156	ISO 17025 Laboratory Pre/Post-Shake Functionality Tri-axial, 5% Damping SRS	$A_{FLEX-H} \leq 3.200 \text{ g}$	$A_{FLEX-V} \leq 1.333 \text{ g}$
		$A_{RIG-H} \leq 2.400 \text{ g}$	$A_{RIG-V} \leq 0.533 \text{ g}$
		$ZPA_H \leq 2.160 \text{ g}$	$ZPA_V \leq 0.480 \text{ g}$

Certified Seismic Installation Methods

Rigid mounting from unit base to rigid structure

(CN)✓



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CERTIFICATE OF COMPLIANCE

SEISMIC DESIGN OF NONSTRUCTURAL COMPONENTS AND SYSTEMS

Certified Product Table:

Model	Power Rating	RPM	Maximum Dimensions (in)			Max Weight with Enclosure (lb)	Certified Fuel Tank Capacities (gal)	S _{DS} (g) z/h=1
			Length	Width	Height			
C10 D6	10 kW	1800	98	34	88	4,300	46, 74, 91, 132, 195, 263	2.0
C15 D6	15 kW	1800	98	34	88	4,400		
C20 D6	20 kW	1800	98	34	88	4,470		
C25 D6	25 kW	1800	131	34	88	5,890	74, 132, 195, 263, 389	
C30 D6	30 kW	1800	131	34	88	5,930		
C35 D6	35 kW	1800	131	34	88	5,960		
C40 D6	40 kW	1800	131	34	88	6,140		
C50 D6	50 kW	1800	131	34	88	6,260		
C60 D6	60 kW	1800	131	34	88	6,260		
C50 D6C ✓	50 kW	1800	170	40	104	8,943	250, 425, 625	2.5
C60 D6C	60 kW	1800	170	40	104	8,990		
C80 D6C	80 kW	1800	170	40	104	9,040		
C100 D6C	100 kW	1800	170	40	104	9,216		
C125 D6C	125 kW	1800	170	40	104	9,300		

This certification **includes** the open generator set and the enclosed generator set when installed with or without the sub-base tank. This certification also includes the sub-base tank as a stand-alone accessory. The generator set and included options shall be a catalogue design and factory supplied. The generator set and applicable options shall be installed and attached to the building structure per the manufacturer supplied seismic installation instructions. This certification **excludes** all non-factory supplied accessories, including but not limited to mufflers, isolation/restraint devices, remote control panels, remote radiators, pumps and other electrical/mechanical components.



VMA-51071-01C (Revision 01)
Issue Date: July 3, 2015
Revision Date: January 29, 2016
Expiration Date: July 31, 2018



THE VMC GROUP

The Power of Together™



**Power
Generation**

CERTIFICATE OF COMPLIANCE

SEISMIC DESIGN OF NONSTRUCTURAL COMPONENTS AND SYSTEMS

Notes and Comments:

1. All equipment listed herein successfully passed the seismic acceptance criteria for shake testing non-structural components and systems as set forth in the ICC AC-156. The Test Response Spectrum (TRS) enveloped the Required Response Spectrum (RRS) for all units tested. The units cited in this certification were representative sample(s) of a contingent of models and all remained captive and structurally sound after the seismic shake simulation. The units also remained functionally operational after the simulation testing as functional testing was completed by the equipment manufacturer before and after the seismic simulations. Although a seismic qualified unit inherently contains some wind resisting capacity, that capacity is undetermined and is excluded from this certification. Snow/Ice loads have been neglected and thus limit the unit to be installed both indoors (covered by an independent protective structure) and out of doors (exposed to accumulating snow/ice) for ground snow loads no greater than 30 psf for all applications.
2. The following building codes are addressed under this certification:

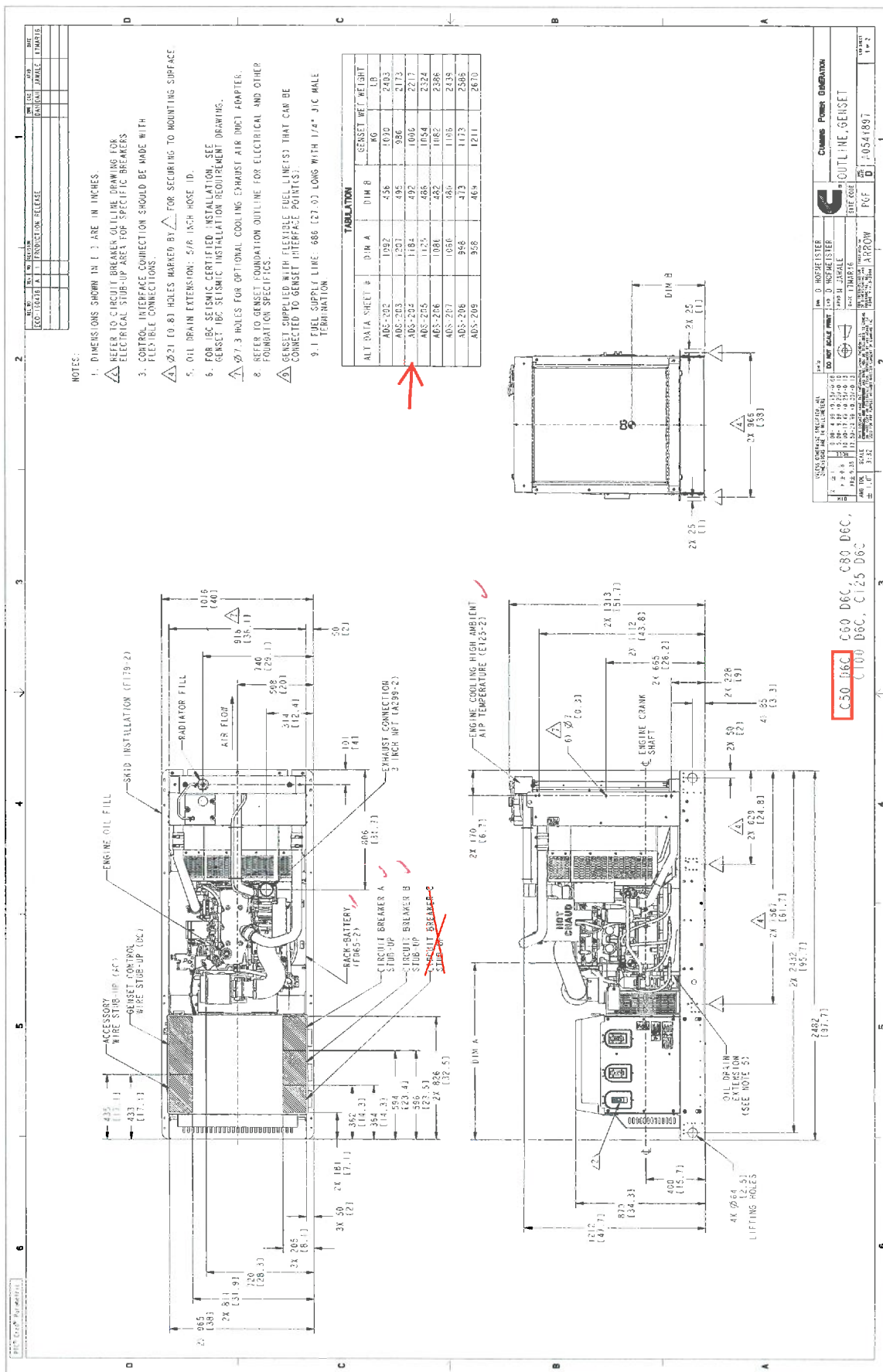
IBC 2012 – referencing ASCE7-10 and ICC AC-156
IBC 2015 – referencing ASCE7-10 and ICC AC-156
3. Refer to the manufacturer supplied installation drawings for anchor requirements and mounting considerations for seismic applications. Required anchor locations, size, style, and load capacities (tension and shear) are specified on the installation drawings. Mounting requirement details such as anchor brand, type, embedment depth, edge spacing, anchor-to-anchor spacing, concrete strength, special inspection, wall design, and attachment to non-building structures must be outlined and approved by the Engineer of Record for the project or building. Structural walls, structural floors, and housekeeping pads must also be seismically designed and approved by the project or building Structural Engineer of Record to withstand the seismic anchor loads as defined on the installation drawings. The installing contractor is responsible for observing the installation detailed in the seismic installation drawings and the proper installation of all anchors and mounting hardware.
4. For this certificate and certification to remain valid, this certificate must correspond to the "Seismic Certification Label" found affixed to the unit by the factory. The label ensures the manufacturer built the unit in conformance to the IBC seismic design criteria set forth by the Certified Seismic Qualification Agency, The VMC Group, and meets the seismic design levels claimed by this certificate.
5. Mechanical, Electrical, and Plumbing connections to the equipment must be flexibly attached as to not transfer load through the connection. The structural integrity of any conduit, cable trays, piping, ductwork and/or flexible connections is the responsibility of others. This certification does not guarantee the equipment will remain compliant to UL or NEMA standards after a seismic event.
6. This certificate applies to units manufactured at 1400 73rd Ave NE, OF 143, Minneapolis, MN 55432.
7. The qualified seismic design level stated is the lowest for all series this certificate covers, for more detailed ranges of qualified seismic design levels, see the certified product tables.

John P. Giuliano, PE
President, The VMC Group

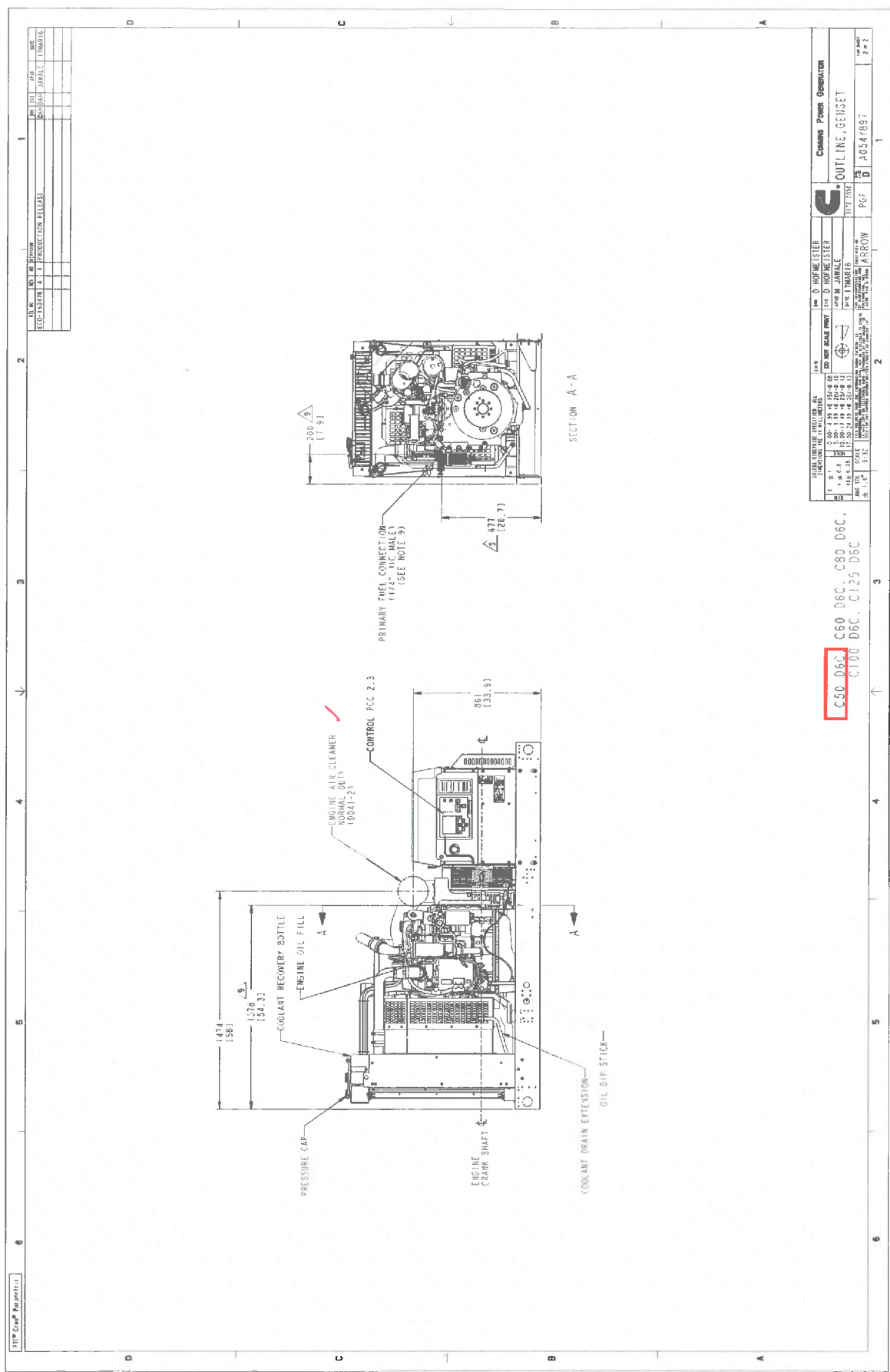
VMA-51071-01C (Revision 02)
Issue Date: July 3, 2015
Revision Date: August 16, 2016
Expiration Date: July 31, 2018



(C.N.)

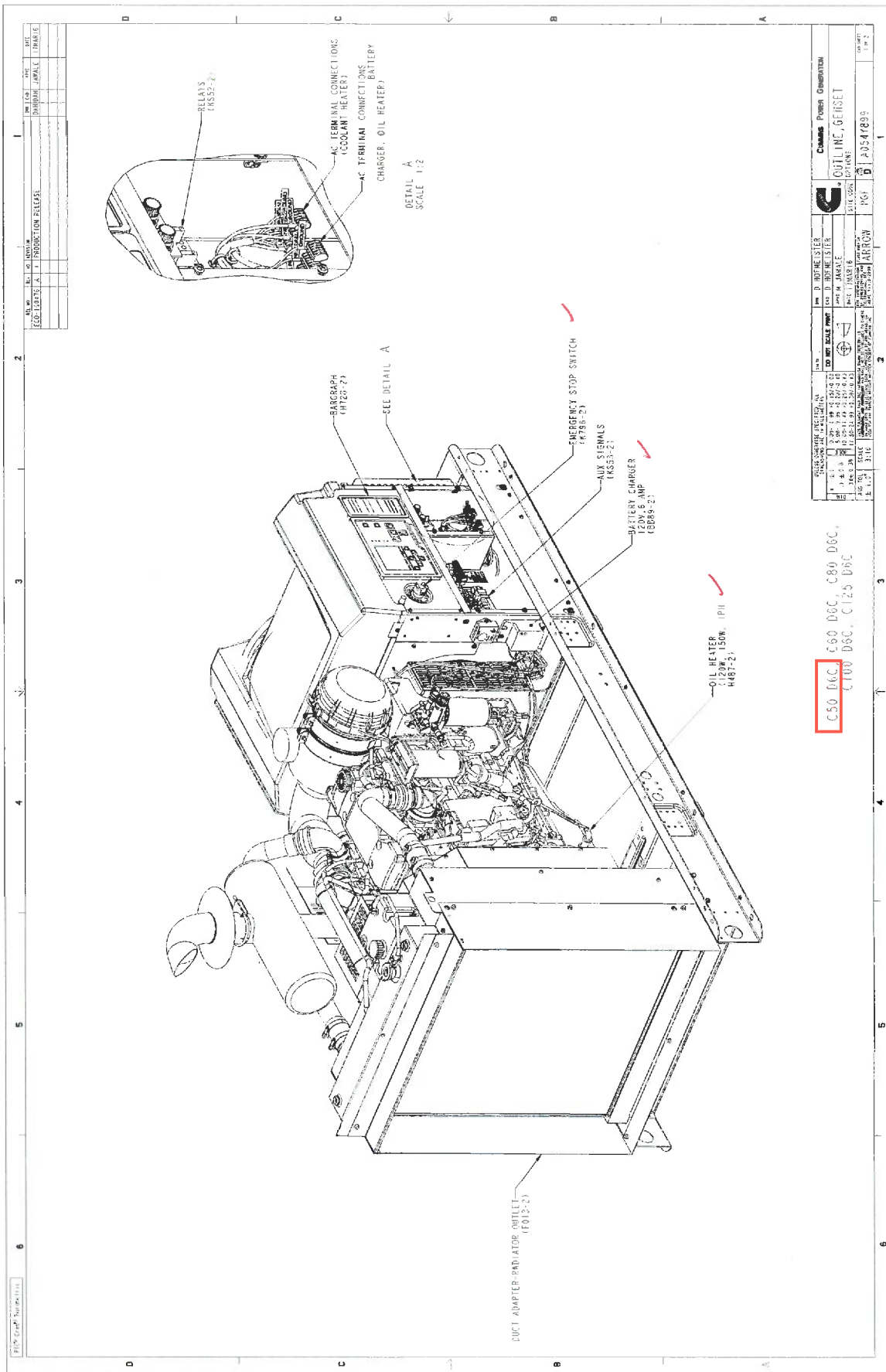


AFN027-EL-SG-010-26 of 48
Rev. D0

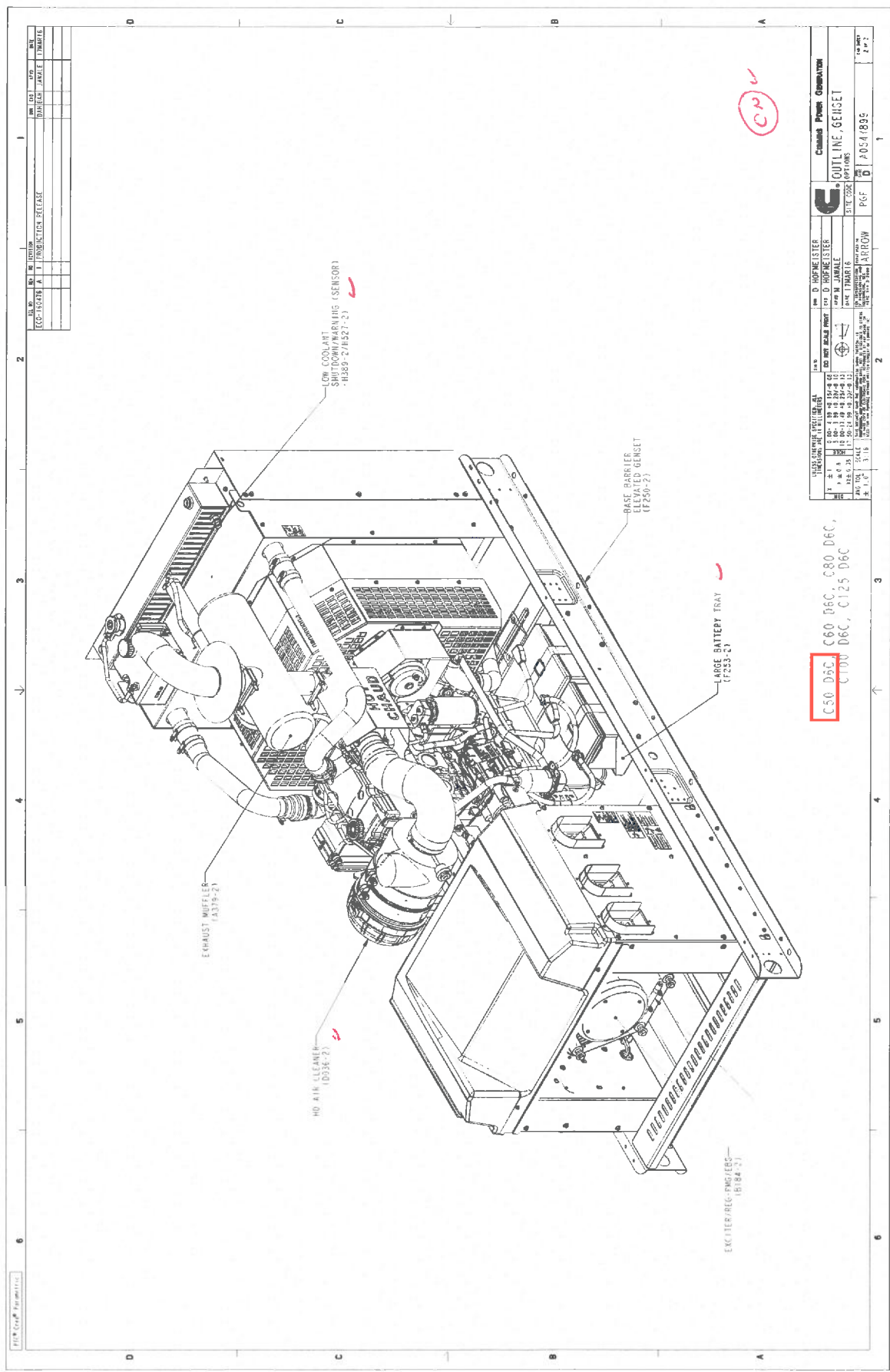


CUMMINS POWER GENERATION		DATE 10/1/87	
OUTLINE GENSET		10/1/87	
SITE 2002		Pg 5	
DATE 10/1/87		10/1/87	
DESIGNED BY JARON		10/1/87	
CHECKED BY JARON		10/1/87	
APPROVED BY JARON		10/1/87	
SCALE 1/2"		10/1/87	
GENERAL SPECIFICATIONS		DRAWING INFORMATION	
MODEL C60 D6C, C80 D6C, C100 D6C, C125 D6C		DATE 10/1/87	
DESCRIPTION Cummins Power Generation		DESIGNED BY DAVE T. HART	
DATE 10/1/87		APPROVED BY DAVE T. HART	
SCALE 1/2"		DATE 10/1/87	

C50 D6C
C60 D6C, C80 D6C, C100 D6C, C125 D6C



C50 D6C, C60 D6C, C80 D6C,
C100 D6C, C125 D6C



C50 D6C, C60 D6C, C80 D6C, C100 D6C, C125 D6C

GENSET SPECIFICATIONS 1. GENSET TYPE: DIESEL 2. GENSET POWER: 1000 kW 3. GENSET VOLTAGE: 480 V 4. GENSET FREQUENCY: 60 Hz 5. GENSET SPEED: 1800 RPM 6. GENSET WEIGHT: 10000 kg 7. GENSET LENGTH: 1000 mm 8. GENSET WIDTH: 1000 mm 9. GENSET HEIGHT: 1000 mm 10. GENSET MATERIAL: STEEL		GENSET PARTS LIST 1. GENSET PARTS LIST 2. GENSET PARTS LIST 3. GENSET PARTS LIST 4. GENSET PARTS LIST 5. GENSET PARTS LIST 6. GENSET PARTS LIST 7. GENSET PARTS LIST 8. GENSET PARTS LIST 9. GENSET PARTS LIST 10. GENSET PARTS LIST
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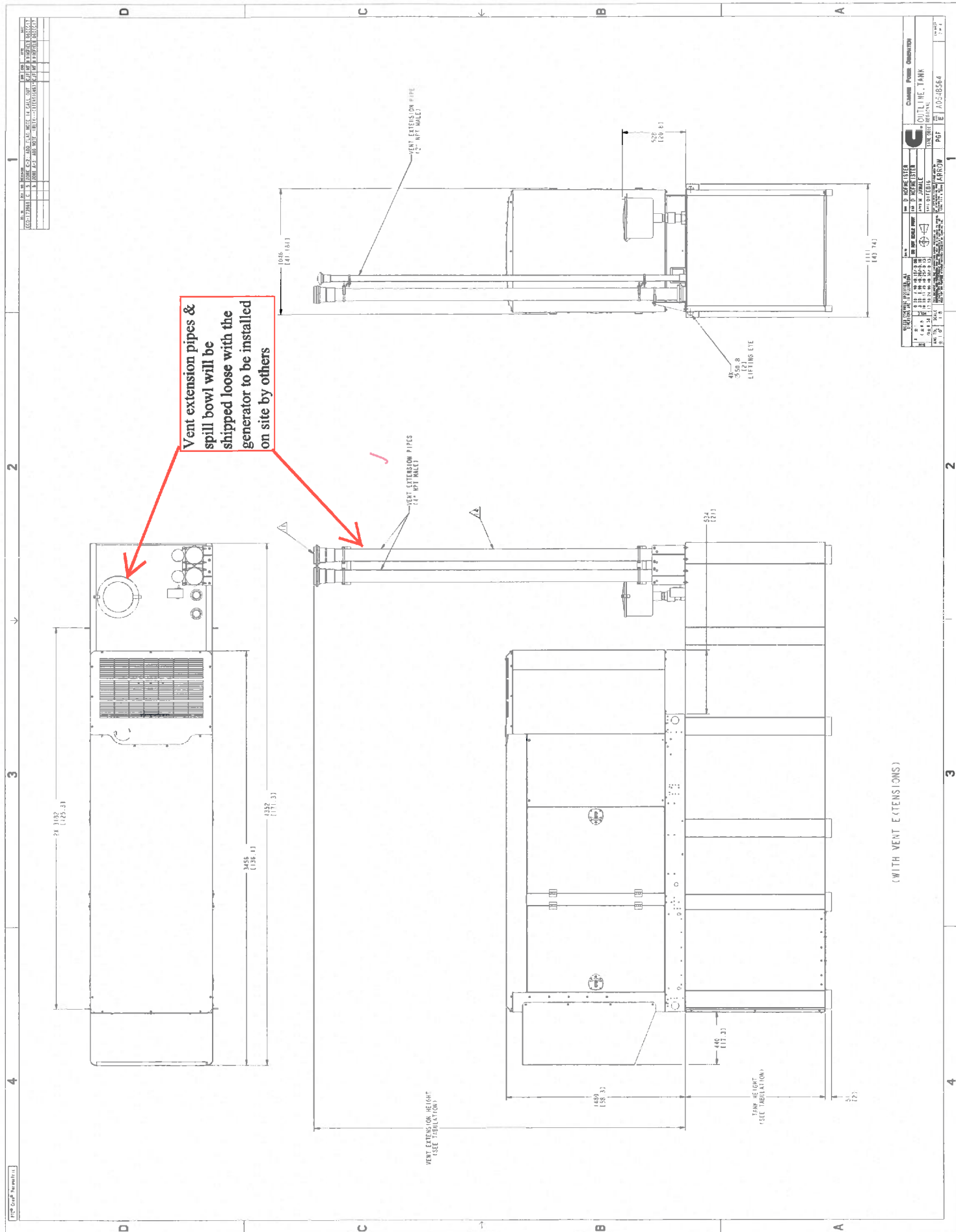
NOTES:

- Total weight of the generator
+ enclosure + 72 hours Fuel
tank (dry)=9,691 Lbs**

SENSE MODEL APPLICATION	TANK FEATURE	CODE	PRICE
C50 DEC	24 HR	C50-2	35 HR
C60 DEC	403-909	C60-2	403-912
C60 DEC	403-909	C60-3	403-912
C60 DEC	403-911	C60-4	403-912
C60 DEC	403-909	C60-5	403-912
C60 DEC	403-911	C60-6	403-912
C60 DEC	403-909	C60-7	403-912
C60 DEC	403-911	C60-8	403-912
C60 DEC	403-911	C60-9	403-912
C60 DEC	403-911	C60-10	403-912
C60 DEC	403-911	C60-11	403-912
C60 DEC	403-911	C60-12	403-912
C60 DEC	403-911	C60-13	403-912
C60 DEC	403-911	C60-14	403-912
C60 DEC	403-911	C60-15	403-912
C60 DEC	403-911	C60-16	403-912
C60 DEC	403-911	C60-17	403-912
C60 DEC	403-911	C60-18	403-912
C60 DEC	403-911	C60-19	403-912
C60 DEC	403-911	C60-20	403-912
C60 DEC	403-911	C60-21	403-912
C60 DEC	403-911	C60-22	403-912
C60 DEC	403-911	C60-23	403-912
C60 DEC	403-911	C60-24	403-912
C60 DEC	403-911	C60-25	403-912
C60 DEC	403-911	C60-26	403-912
C60 DEC	403-911	C60-27	403-912
C60 DEC	403-911	C60-28	403-912
C60 DEC	403-911	C60-29	403-912
C60 DEC	403-911	C60-30	403-912
C60 DEC	403-911	C60-31	403-912
C60 DEC	403-911	C60-32	403-912
C60 DEC	403-911	C60-33	403-912
C60 DEC	403-911	C60-34	403-912
C60 DEC	403-911	C60-35	403-912
C60 DEC	403-911	C60-36	403-912
C60 DEC	403-911	C60-37	403-912
C60 DEC	403-911	C60-38	403-912
C60 DEC	403-911	C60-39	403-912
C60 DEC	403-911	C60-40	403-912
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C60 DEC	403-911	C60-46	403-912
C60 DEC	403-911	C60-47	403-912
C60 DEC	403-911	C60-48	403-912
C60 DEC	403-911	C60-49	403-912
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C60 DEC	403-911	C60-52	403-912
C60 DEC	403-911	C60-53	403-912
C60 DEC	403-911	C60-54	403-912
C60 DEC	403-911	C60-55	403-912
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C60 DEC	403-911	C60-57	403-912
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C60 DEC	403-911	C60-61	403-912
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C60 DEC	403-911	C60-63	403-912
C60 DEC	403-911	C60-64	403-912
C60 DEC	403-911	C60-65	403-912
C60 DEC	403-911	C60-66	403-912
C60 DEC	403-911	C60-67	403-912
C60 DEC	403-911	C60-68	403-912
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C60 DEC	403-911	C60-70	403-912
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C60 DEC	403-911	C60-100	403-912

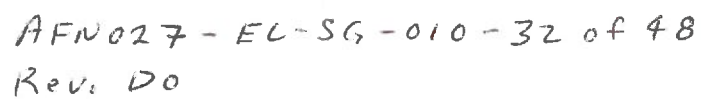
FARM NO.	FARM NAME	YEAR	TOTAL LITERS	MILKING PERIOD				C.V.	C.G.							
				MIN	MAX	MIN	MAX									
4533-93	355-8 (12)	305	1032	4274	946	12581	415	11113	210	105	1284	193	265	11	21232	15.41
4533-94	355-8 (13)	305	1032	4274	946	12581	415	11113	210	105	1284	193	265	11	21232	15.41
4533-95	355-8 (14)	305	1032	4274	946	12581	415	11113	210	105	1284	193	265	11	21232	15.41
4533-96	355-8 (15)	305	1032	4274	946	12581	415	11113	210	105	1284	193	265	11	21232	15.41
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4533-99	355-8 (18)	305	1032	4274	946	12581	415	11113	210	105	1284	193	265	11	21232	15.41
4533-00	355-8 (19)	305	1032	4274	946	12581	415	11113	210	105	1284	193	265	11	21232	15.41

[illegible]



NO.	REV.	DATE	BY	CHKD.	DESCRIPTION
1	1	10/11/11	C	A	ISSUED FOR CONSTRUCTION
2	1	10/11/11	C	A	ISSUED FOR CONSTRUCTION
3	1	10/11/11	C	A	ISSUED FOR CONSTRUCTION
4	1	10/11/11	C	A	ISSUED FOR CONSTRUCTION

NO.	REV.	DATE	BY	CHKD.	DESCRIPTION
1	1	10/11/11	C	A	ISSUED FOR CONSTRUCTION
2	1	10/11/11	C	A	ISSUED FOR CONSTRUCTION
3	1	10/11/11	C	A	ISSUED FOR CONSTRUCTION
4	1	10/11/11	C	A	ISSUED FOR CONSTRUCTION



Per Code Requirements

SEISMIC INSTALLATION NOTES:

1. THE DESIGN OF POST-INSTALLED ANCHORS IN CONCRETE USED FOR THE COMPONENT ANCHORAGE IS PRE-QUALIFIED FOR SEISMIC APPLICATIONS IN ACCORDANCE WITH "ACI 308.2R-07" AND DOCUMENTED IN A REPORT BY A REPUTABLE TESTING AGENCY.
(EX: THE EVALUATION SERVICE REPORT ISSUED BY THE INTERNATIONAL CODE COUNCIL.)
2. ANCHORS MUST BE INSTALLED TO AN EMBEDMENT DEPTH AS RECOMMENDED IN THE PRE-QUALIFICATION TEST REPORT AS DEFINED IN NOTE 1, FOR "CBC 2013" APPLICATIONS.
3. ANCHORS MUST BE INSTALLED IN MINIMUM 3000 PSI COMPRESSIVE STRENGTH NORMAL WEIGHT STRUCTURAL CONCRETE. CONCRETE AGGREGATE MUST COMPLY WITH "ASTM C33".
4. ANCHORS MUST BE INSTALLED TO THE TORQUE SPECIFICATION AS RECOMMENDED BY THE ANCHOR MANUFACTURER.
5. ANCHORS MUST BE INSTALLED IN LOCATIONS SPECIFIED ON THIS INSTALLATION DRAWING.
6. WASHERS MUST BE INSTALLED AT EACH ANCHOR LOCATION BETWEEN THE ANCHOR HEAD AND EQUIPMENT FOR TENSION LOAD DISTRIBUTION. WASHERS MUST BE TYPE A OR B PLAIN WASHERS MEETING ASME B18.21.1-2009. WASHER SIZE TO MATCH ANCHOR DIAMETER.
7. CONCRETE FLOOR SLAB AND CONCRETE HOUSEKEEPING PADS MUST BE DESIGNED FOR SEISMIC APPLICATIONS IN ACCORDANCE WITH "ACI 318-11".
8. ALL HOUSEKEEPING PAD THICKNESSES MUST BE DESIGNED IN ACCORDANCE WITH THE PRE-QUALIFICATION TEST REPORT AS DEFINED IN NOTE 1 OR A MINIMUM OF 1.5X THE ANCHOR EMBEDMENT DEPTH, WHICHEVER IS LARGEST (UNLESS NOTED OTHERWISE).
9. ALL HOUSEKEEPING PADS MUST BE TOWELLED OR CAST INTO THE BUILDING STRUCTURAL FLOOR SLAB AND DESIGNED FOR SEISMIC APPLICATION PER "ACI 318-11" AND AS APPROVED BY THE STRUCTURAL ENGINEER OF RECORD.
10. FLOOR MOUNTED EQUIPMENT (WITH OR WITHOUT A HOUSEKEEPING PAD) MUST BE INSTALLED TO A STEEL REINFORCED STRUCTURAL CONCRETE FLOOR THAT IS SEISMICALLY DESIGNED AND APPROVED BY THE ENGINEER OF RECORD TO RESIST ALL LOADS FROM EQUIPMENT BEING ANCHORED TO THE FLOOR.
11. COORDINATE REINFORCEMENT OF SUPPORT STRUCTURE WITH EQUIPMENT ANCHOR LOCATIONS.
12. ATTACHING SEISMIC CERTIFIED EQUIPMENT TO FLOOR OTHER THAN THOSE DESIGNED TO ACCEPT THE SEISMIC LOADS FROM CERTIFIED EQUIPMENT BY THE STRUCTURAL ENGINEER OF RECORD IS PROHIBITED.
13. INSTALLATION ONTO A STEEL ROOF STRUCTURE OR MANUFACTURED STEEL CURB SHALL BE COORDINATED WITH THE STRUCTURAL ENGINEER OF RECORD.
14. CONNECTIONS TO THE EQUIPMENT, INCLUDING BUT NOT LIMITED TO CONDUIT, WIRING FROM CABLE TRAYS, OTHER ELECTRICAL SERVICES OR OTHER CONNECTIONS, ARE THE RESPONSIBILITY OF THE INSTALLING CONTRACTOR AND BEYOND THE SCOPE OF THIS DOCUMENT.
FLEXIBLE ATTACHMENTS MUST BE USED FOR SEISMIC CONNECTIONS TO ISOLATED COMPONENTS OR ISOLATED EQUIPMENT.
THE FLEXIBLE ATTACHMENTS MUST PROVIDE FOR ENOUGH RELATIVE DISPLACEMENT TO REMAIN CONNECTED TO THE EQUIPMENT AND FUNCTIONAL DURING AND AFTER A SEISMIC EVENT.
15. REFER TO GENSET OUTLINE DRAWINGS FOR WEIGHT, CG AND CONFIGURATION SPECIFICS.

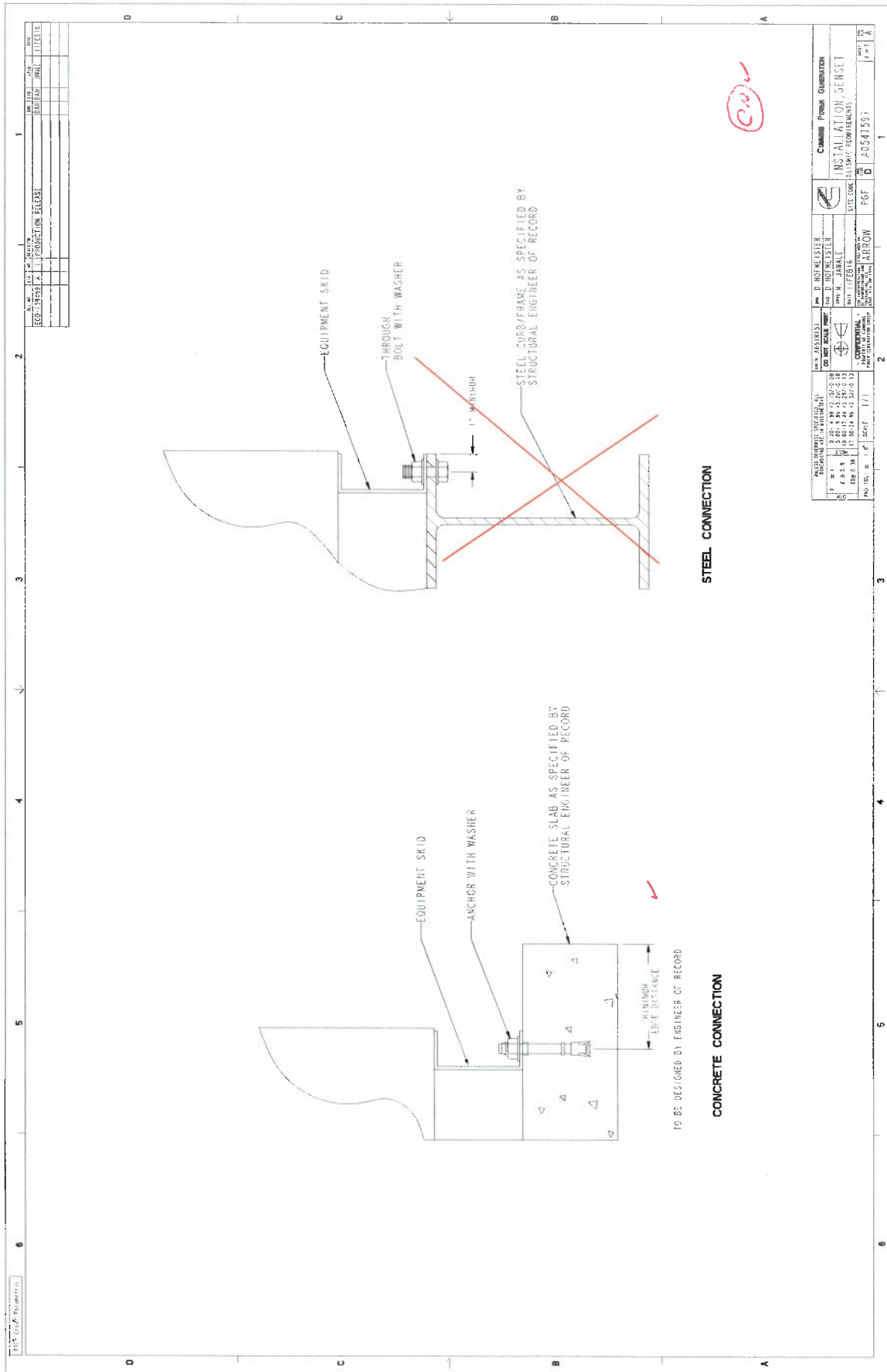
REV	DATE	DESCRIPTION	BY	CHKD
ECO-159499	A	PRODUCTION RELEASE		

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES		DATE: 01/01/16		SCALE: 1/4" = 1'-0"	
DO NOT SCALE DRAWING		DATE: 01/01/16		SCALE: 1/4" = 1'-0"	
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CHANGE POWER GENERATION		DATE: 01/01/16		SCALE: 1/4" = 1'-0"	
INSTALLATION GENSET		DATE: 01/01/16		SCALE: 1/4" = 1'-0"	
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Regulatory Review and Approval is required prior to changing this item per PG 1-01-01-116. This item impacts compliance with these External Regulations: BCOSH PD

Drawing Name: A0541597
Part Name: A0541597
Revision: A
ECO-159499
Sheet 1 of 6



SECTION	DATE	BY	CHKD	APP'D	REV	DESCRIPTION
1	11/13/12	ECO-159499	A	20541597	1	INSTALLATION - SENSEI
2						SEE CURB SLAB & DIMENSIONS
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100						SEE CURB SLAB & DIMENSIONS

Drawing Name: A0541598 Revision: A
 Part Name: A0541597 Revision: A
 ECO-159499 Sheet 4 of 6

Regulatory Review and Approval is required prior to changing this item per
 PGQ 101-01-116. This item impacts compliance with these External Regulations:
 IBC, QSHPD

PowerCommand® Annunciator

Discrete Input or PCCNet



> Specification sheet

Our energy working for you.™



Description

The Universal Annunciator Module provides visual and audible indication of up to 20 separate alarm or status conditions, based on discrete (relay) inputs or network inputs. Each LED can be controlled by either a discrete wire input or by a signal on the PCCNet network sent from an external device, such as a PCC1301 or PCC2100 (version 2.4 or later) control.

In addition to the LEDs, the annunciator can control four custom relays based on signals received over the PCCNet. When one of the annunciator's discrete inputs is activated, the annunciator will broadcast that information over the network. By taking advantage of the network, discrete inputs and custom relays, the annunciator can be used as expanded I/O for a genset controller.

Easily installed in a location to give immediate notification of an alarm or warning status. Designed to give operating/monitoring personnel quick-glance status information. The module directly senses battery voltage to provide green/yellow/red alarm and status information for that parameter.

Genset controller complies with NFPA level two requirements when used with the display but without the annunciator panel. When used with the annunciator it meets NFPA level one requirements (emergency and standby power systems). The annunciator module can also be used for monitoring of transfer switch or other equipment status.

Features

- Visual and audible warnings of up to 20 separate alarm or status conditions.
- LEDs can be controlled either via PCCNet or discrete input.
- Status of discrete inputs is broadcast on network.
- Four custom relays can be controlled over the PCCNet network.
- Configurable LED color (red, yellow or green) and selectable horn operation allows maximum flexibility.
- Standard NFPA 110 label, field configurable for other alarm status and conditions.
- Each audible alarm is annunciated, regardless of the number of existing alarm conditions displayed.
- Sealed membrane panel design provides environmental protection for internal components and is easy to clean.
- Configurable for negative (ground) input or positive input.
- Integral DC voltage sensing.
- Flush or surface mount provisions.
- UL Listed and labeled; CSA certified; CE marked.

Specifications

Signal requirements

Positive - Input impedance is 1.82 kOhms to ground; maximum input voltage = 31 VDC.

Negative - Input impedance is 1.82 kOhms to Bat+: inputs are at Bat+ level when open.

Sink/source current threshold for detection - 150 uA minimum, 3 mA maximum.

Typical conductor size: 16 ga for 304.8 m (1000 ft)

Max conductor size for terminal: 12 ga

Relay outputs

0.2 A at 125 VAC and 1 A at 30 VDC

Network connections

Use Belden 9729 two pair, stranded, shielded 24 AWG twisted pair cable for all PCCNet connections. Total network length can not exceed 1219 m (4000 ft). Up to 20 nodes can be connected to the network.

Note: Any communications wire connected to the generator set should be stranded cable.

Power

Maximum consumption: 15 watts

Battery voltage

Functional range - Audible and visual conditions operational from 6.5 to 31 VDC.

Low voltage setting - 12.0 VDC for 12 Volt nominal systems; 24.0 for 24 Volt nominal systems.

High voltage setting - 16.0 Volt for 12 Volt nominal systems; 32.0 Volt for 24 Volt nominal systems.

Alarm horn

Sound level: 90 dB at 30 cm

Physical

Weight (with enclosure): 1.4 kg (3.0 lbs)

Temperature

-20 °C to +70 °C (-4 °F to +158 °F)

Humidity

10% to 95% RH (non-condensing)

Default lamp configurations

Can be configured for current NFPA 110 standard or as a replacement for Legacy (pre-2001) NFPA 110 annunciator (300-4510 or 300 4511)

Lamp	Description	NFPA 110		
		Color	Horn	Flash
DS1	Customer fault 1	Green	No	No
DS2	Customer fault 2	Amber	No	No
DS3	Customer fault 3	Red	No	No
DS4	Genset supplying load	Amber	No	No
DS5	Charger AC failure	Amber	Yes	No
DS6	Low coolant level	Amber	Yes	No
DS7	Low fuel level	Red	Yes	No
DS8	Check generator set	Amber	No	No
DS9	Not in auto	Red	Yes	Yes
DS10	Generator set running	Amber	No	No
DS11	High battery voltage	Amber	Yes	No
DS12	Low battery voltage	Red	Yes	No
DS13	Weak battery	Red	Yes	No
DS14	Fail to start	Red	Yes	No
DS15	Low coolant temp	Red	Yes	No
DS16	Pre-high engine temp	Amber	Yes	No
DS17	High engine temp	Red	Yes	No
DS18	Pre-low oil pressure	Red	Yes	No
DS19	Low oil pressure	Red	Yes	No
DS20	Overspeed	Red	Yes	No

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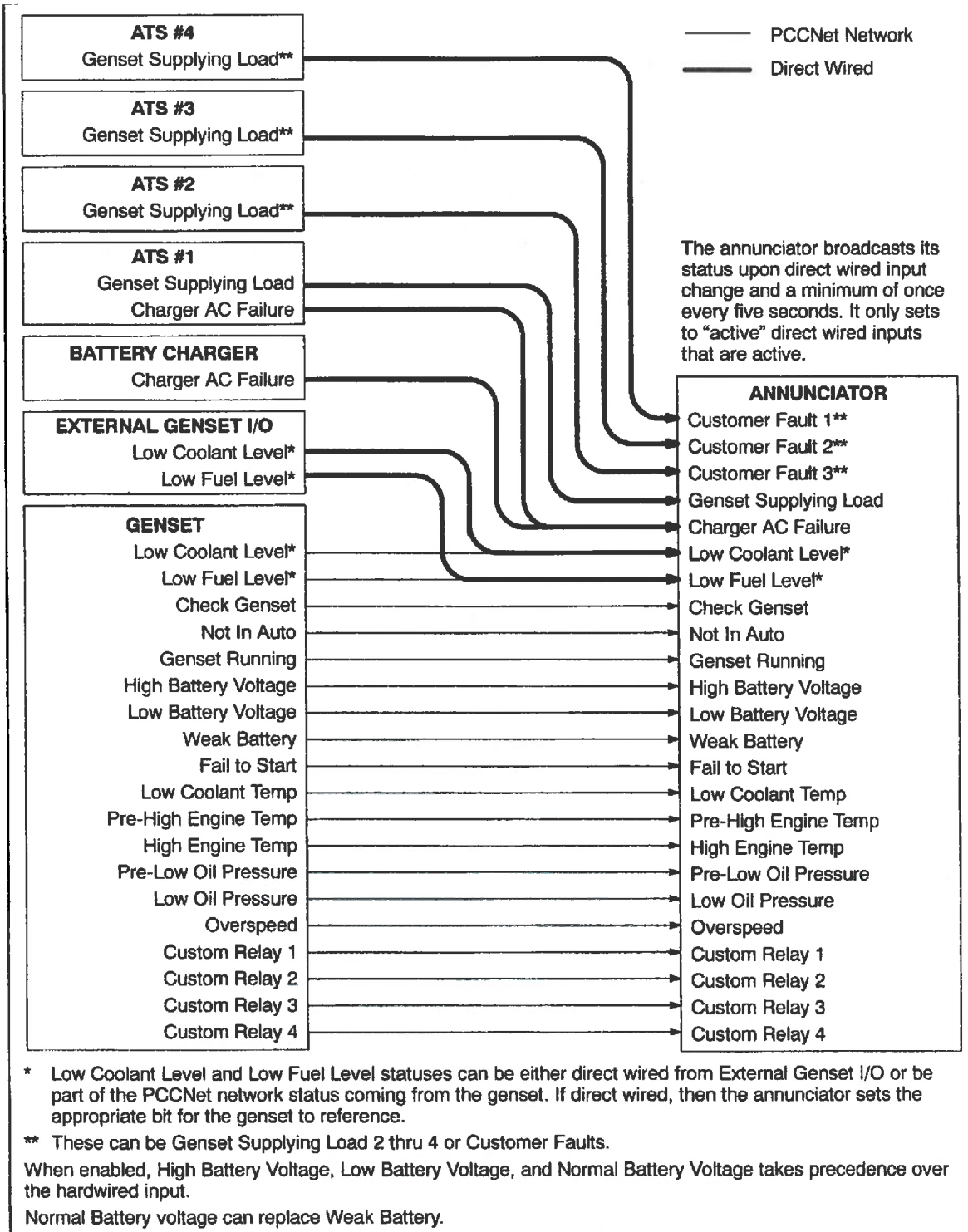
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Typical installation



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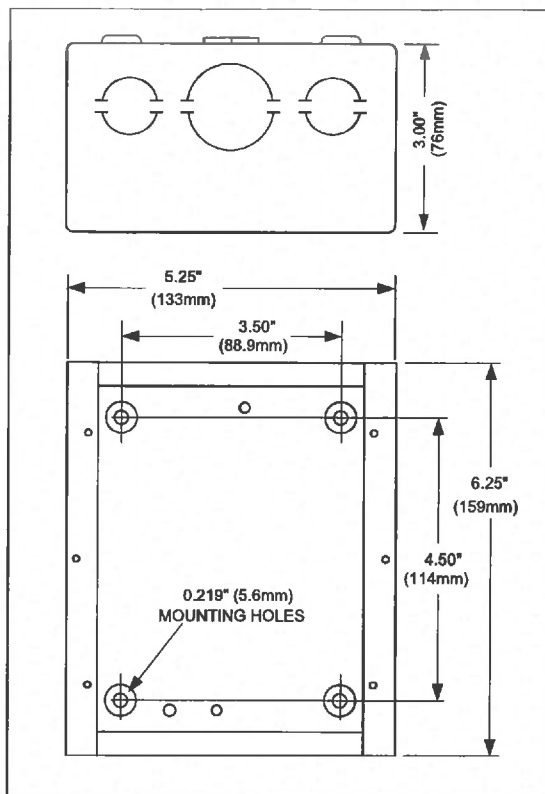
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Dimensions



Dimensions: in (mm)

Ordering information

Part number	Description
0300-5929-01	Panel mount
0300-5929-02	Panel with enclosure ✓

PCCNet
COMPATIBLE

See your distributor for more information.

Cummins Power Generation

Americas

1400 73rd Avenue N.E.
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Fax: 763 574 5298

Europe, CIS, Middle East and Africa

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Kent CT 12 5BF United Kingdom
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Asia Pacific

10 Toh Guan Road #07-01
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Singapore 608838
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Fax 65 6417 2399

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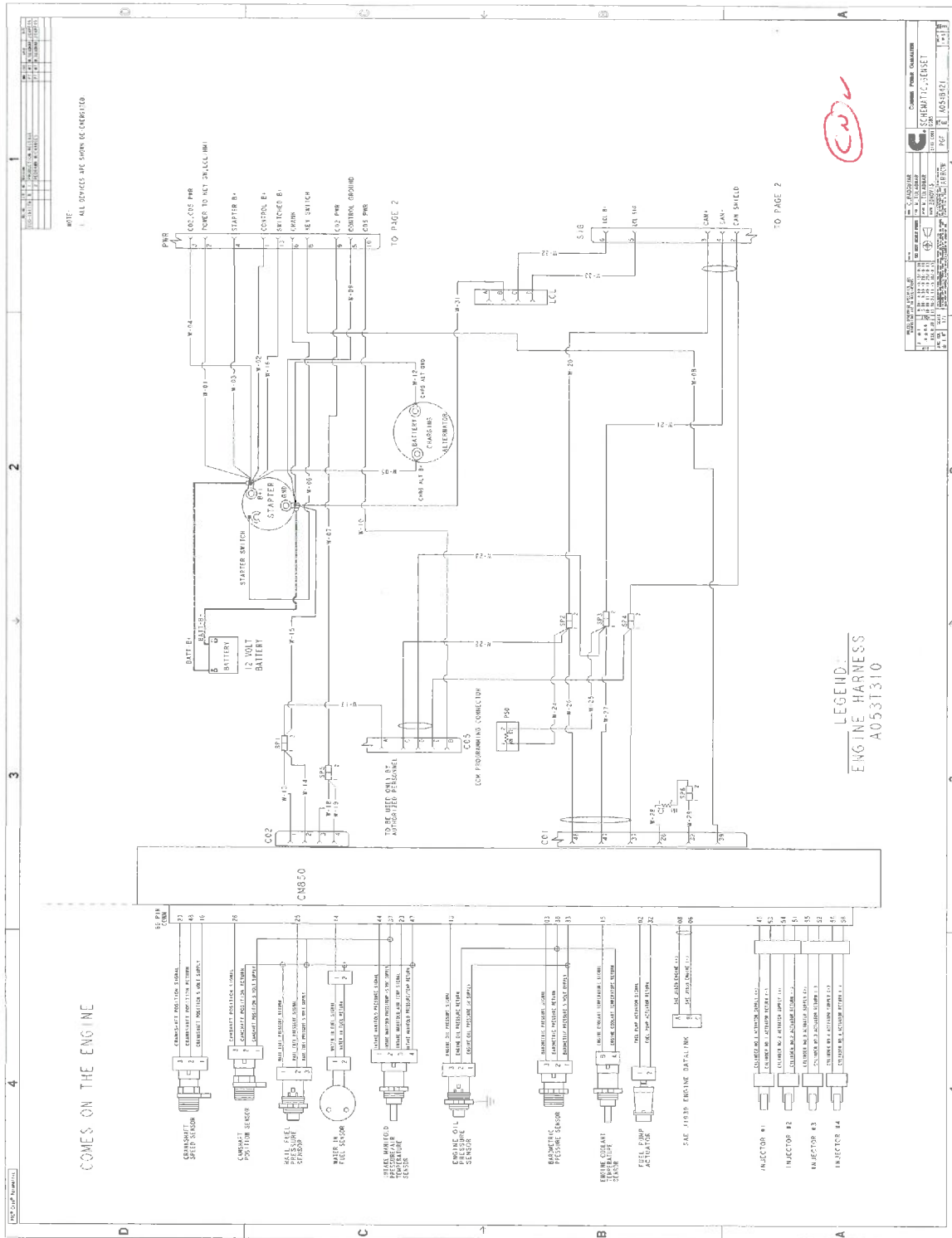
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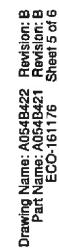


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Rev. DO

Port Au Choix
Support Garage

Specification sheet



BTPC Bypass isolation transfer switch ~~open or closed~~ transition

150 – 4000 amps



Description

BTPC bypass isolation transfer switches combine a drawout automatic transfer switch with isolation mechanism and a manual bypass switch, to provide redundant power transfer and re-transfer capability for critical need applications requiring a reliable power supply to the load. BTPC switches are available with closed transition for transferring critical loads without interruption.

Like conventional transfer switches, BTPC transfer switches are designed for operation and switching of electrical loads between primary power and Standby generator sets. The switch monitors both power sources, signals generator set startup, automatically transfers power and returns the load to the primary power source when the utility returns and stabilizes.

Features

PowerCommand® control: A fully featured Microprocessor based control with digital display. Controls allow operator to enter settings and make adjustments to software enabled features easily and accurately. Accommodates up to 8 event schedules.

Closed transition available: By briefly connecting the two sources (for 100 msec or less), the transfer from the alternate source back to the normal source occurs without interruption in the power supply to loads.

Programmed transition: Open transition timing can be adjusted to completely disconnect the load from both sources for a programmed time period, as recommended by NEMA MG-1 for transfer of inductive loads.

Closed door drawout operation: Bypass and total isolation of the automatic transfer switch occurs behind closed doors, to provide arc flash protection for operator.

For critical loads: Suitable for use in emergency, legally required and optional Standby applications.

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BTPC bypass-isolation transfer switch

Advanced transfer switch mechanism:

Unique bi-directional linear actuator provides smooth, Continuous transfer switch action during automatic operation.

Robust control system design: Optically isolated logic inputs and isolation transformers for AC power inputs provide high-voltage surge protection.

Main contacts: Heavy-duty silver alloy contacts and multi-leaf arc chutes are rated for motor loads or total system load transfer. They require no routine contact maintenance. Continuous load current not to exceed 100% of switch rating and Tungsten loads not to exceed 30% of switch rating. The automatic switch and bypass switch have the same ratings.

Communications capability: The transfer switch is capable of communicating with other transfer switches, SCADA networked accessories, or Cummins generators utilizing LonWorks® protocol. ✓

Easy service/access: Single-plug harness connection and compatible terminal markings simplify servicing. Access space is ample. Doormounted controls are field-programmable; no tool is required.

Complete product line: Cummins offers a wide range of equipment, accessories and services to suit virtually any backup power application.

Warranty and service: Products are backed by a comprehensive warranty and a worldwide network of distributors with factory-trained service technicians.



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Transfer switch mechanism

- Transfer switch mechanism is electrically operated and mechanically held in the Source 1 and Source 2 positions. The transfer switch incorporates electrical and mechanical interlocks to prevent inadvertent interconnection of the sources.
- Independent break-before-make action is used for both 3-pole and 4-pole/switched neutral switches. This design allows use of sync check operation when required, or control of the operating speed of the transfer switch for proper transfer of motor and rectifier-based loads (programmed transition feature).
- True 4-pole switching allows for proper ground (earth) fault sensing and consistent, reliable operation for the life of the transfer switch. The neutral poles of the transfer switch have the same ratings as the phase poles and are operated by a common crossbar mechanism, eliminating the possibility of incorrect neutral operation at any point in the operating cycle, or due to failure of a neutral operator.
- High pressure silver alloy contacts resist burning and pitting. Separate arcing surfaces further protect the main contacts. Contact wear is reduced by multiple leaf arc chutes that cool and quench the arcs. Barriers separate the phases to prevent interphase flashover. A transparent protective cover allows visual inspection while inhibiting inadvertent contact with energized components.
- Switch mechanism, including contact assemblies, is third party certified to verify suitability for applications requiring high endurance switching capability for the life of the transfer switch. Withstand and closing ratings are validated using the same set of contacts, further demonstrating the robust nature of the design.

Bypass mechanism

- Manual bypass switch mechanism allows the operator to select either the normal or emergency source by closing the bypass contacts. Visual indicators show bypass "source selected", bypass "closed" or "open" to either source, and automatic transfer switch isolation or "disable." Bypass of the automatic switch is accomplished with permanently mounted, mechanically operated devices without disturbing the power supply to system loads, and without opening enclosure door.
- Isolation contacts allow the automatic transfer switch and the bypass switch to be separated electrically and mechanically. The automatic transfer switch is isolated by a drawout mechanism similar to that used on power circuit breakers on transfer switches rated 1200 amps and less. On 1600-4000 amp models the drawout carriage is wheel-mounted.
- Protective safety shutters, provided on switches up to and including 1200 amps, cover the stationary power terminals on the bypass switch when the automatic transfer switch is isolated and removed.
- The drawout mechanism can be latched in one of three positions: "connected", "test", and "isolated". In the connected position the mechanism is locked. In the test position, the automatic switch is isolated but the controls receive power. In the isolated position, the automatic switch is completely isolated.
- The bypass switch mechanism is identical to the automatic switch except it is mechanically operated rather than electrically operated. Mechanical interlocks prevent operation of the bypass or automatic switches in any mode that would result in the interconnection of the sources.

PowerCommand control

PowerCommand controls are microprocessor based and developed specifically for automatic transfer switch operation. The control includes the features and options required for most applications.

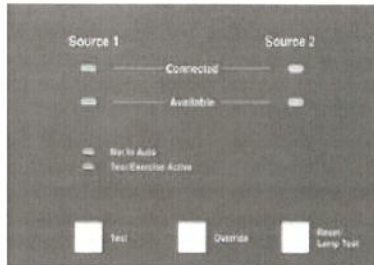
- Flash memory stores the control settings.
- Contents of the memory are not lost even if power to the controller is lost.
- On-board battery maintains the real-time clock setting and the engine start time delay.

Panels

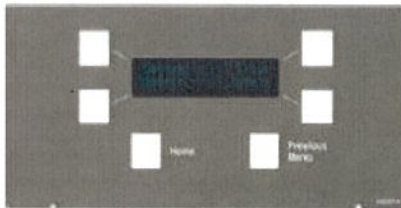
Basic indicator panel:

Source available/connected LED indicators

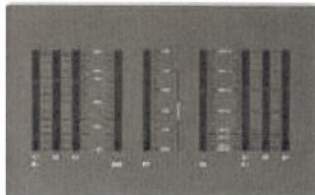
Test/exercise/bypass buttons



Digital display: Standard



Analog bar graph meter display: optional (D009)



Control functions: Level 2 control

Open transition (in-phase)

Open transition (programmed)

Closed transition: Includes fail-to-disconnect timer to prevent extended paralleling with the utility

Utility-to-genset applications

Utility-to-utility applications

Genset-to-genset applications

Software adjustable time delays:

- Engine start: 0 to 120 sec
- Transfer normal to emergency: 0 to 120 sec
- Re-transfer emergency to normal: 0 to 30 min
- Engine stop: 0 to 30 min
- Programmed transition: 0 to 60 sec

Undervoltage sensing: 3-phase normal, 3-phase emergency

- Accuracy: $\pm 2\%$
- Pickup: 85% to 98% of nominal voltage
- Dropout: 75% to 98% of pickup setting
- Dropout time delay: 0.1 to 1.0 sec

Overvoltage sensing: 3-phase normal, 3-phase emergency

- Accuracy: $\pm 2\%$
- Pickup: 95% to 99% of dropout setting
- Dropout: 105% to 135% of nominal voltage
- Dropout time delay: 0.5 to 120 sec

Over/under frequency sensing: Normal and emergency

- Accuracy: $\pm 0.05\text{Hz}$
- Pickup: $\pm 5\%$ to $\pm 20\%$ of nominal frequency
- Dropout: $\pm 1\%$ beyond pickup
- Dropout time delay: 0.1 to 15.0 sec

Voltage imbalance sensing:

- Dropout: 2% to 10%
- Pickup: 90% of dropout
- Time delay: 2.0 to 20.0 sec

Phase rotation sensing:

- Time delay: 100 msec
- Loss of single phase detection
- Time delay: 100 msec

Loss of single phase detection

- Time delay: 100 msec

Programmable genset exerciser: Eight events/schedules with or without load

PowerCommand control (continued)

Time-delay functions

Engine start: Prevents nuisance genset starts due to momentary power variation or loss. Not included in utility-to-utility systems.

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.

Engine stop: Maintains availability of the genset for immediate reconnection if the normal source fails shortly after transfer. Allows gradual genset cool-down by running unloaded. Not included in utility-to-utility applications.

Elevator pre-transfer signal: Requires optional relay signal module (M023). Delays transfer for pre-set interval of 0-60 seconds to prevent a power interruption during elevator operation.

User interfaces

Basic interface panel: LED indicators provide at-a glance source and transfer switch status for quick summary of system conditions. Test and override buttons allow delays to be bypassed for rapid system checkout.

Digital display: The digital display provides a convenient method for monitoring load power conditions, adjusting transfer switch parameters, monitoring PowerCommand network status or reviewing transfer switch events. Password protection limits access to adjustments to authorized personnel. The digital display (M018) is standard on the BTPC.

User interface options

Bar graph meter display (D009): An LED bar graph display provides an easy-to-read indicator of the level of power being supplied to the load. Information displayed includes: 3-phase voltage and current, power factor, and kilowatts. Green, amber and red LEDs provide at-a-glance indication of system acceptability.

Front panel security key (M017): Locks front panel to prevent access to digital control settings. Prevents unauthorized activation of transfer or test functions.

Control options

Relay signal module (M023): Provides relay output contacts for sending information to the building monitoring and control system. Relay outputs include: Source 1 connected/available, Source 2 connected/available, not in auto, test/exercise active, failed to disconnect, failed to synchronize, failed to transfer/re-transfer, and elevator control pre-transfer signal.

Loadshed (M007): Removes the load from the emergency power source by driving the transfer switch to the neutral position when signaled remotely. Transfers load back to the emergency source when the signal contacts open. Immediately re-transfers back to the primary source when available. For utility-to-generator applications only.

PowerCommand network interface (M031): Provides connection to the PowerCommand network. LonWorks compatible for integration with building monitoring and control system.








Load power and load current monitoring (M022):

Measures load phase and neutral, current, power factor, real power (kW) and apparent power (kVA). Warns of excessive neutral current resulting from unbalanced or nonlinear loads. Minimum current level detection is 3%.

Specifications

Voltage rating	600 VAC, 50 or 60 Hz
Arc interruption	Multiple leaf arc chutes provide dependable arc interruption.
Neutral bar	A full current-rated neutral bar with lugs is standard on enclosed 3-pole transfer switches.
Auxiliary contacts	Two isolated contacts (one for each source) indicating switch position are provided for customer use. Contacts are normally open, and close to indicate connection to the source. Wired to terminal block for easy access. Rated at 10 amps Continuous at 250VAC maximum. UL recognized and CSA-certified.
Operating temperature	-40 ° F (-40 ° C) to 140 ° F (60 ° C)
Storage temperature	-40 ° F (-40 ° C) to 140 ° F (60 ° C)
Humidity	Up to 95% relative, non-condensing
Altitude	Up to 10,000 ft (3,000 m) without de-rating
Surge withstand ratings	Voltage surge performance and testing in compliance with the requirements of IEEE C62.41 (Category B3) and IEEE C62.45.
Total transfer time (source-to-source)	Will not exceed 6 cycles at 60 Hz with normal voltage applied to the actuator and without programmed transition enabled.
Manual operation handles	External manual operator is provided via the bypass and isolation mechanism, providing quickmake/quick-break operation under load.

Certifications

	All switches are UL 1008 Listed with UL Type Rated cabinets and UL Listed CU-AL terminals. ✓		All switches comply with NFPA 70, 99 and 110 (Level 1). ✓
	All switches are certified to CSA 282 Emergency Electrical Power Supply for Buildings, up to 600 VAC. ✓		All switches comply with NEMA ICS 10.
	Suitable for use in emergency, legally required and Standby applications per NEC 700, 701 and 702.		All switches comply with IEEE 446 Recommended Practice for Emergency and Standby Power Systems.
	This transfer switch is designed and manufactured in facilities certified to ISO9001.		

Transition modes

Open transition/programmed: Controls the time required for the device to switch from source to source, so that the load-generated voltages decay to a safe level before connecting to an energized source. ✓

Recommended by NEMA MG1 to prevent nuisance tripping breakers and load damage. Adjustable 0-10 seconds, default 0 seconds. Programmed transition is standard on 150-1000 amp switches, and optional on 1200-4000 amps.

Open transition/in-phase: Initiates open transition transfer when in-phase monitor senses both sources are in phase. Operates in a break-before-make sequence. Includes ability to enable programmed transition as a back-up on 150 – 1000 amp switches and 1200 – 4000 amp switches that support programmed or closed transition. If sources are not in phase within 120 seconds, the system will transfer using programmed transition.

Closed transition: Used in applications where loads are sensitive to the momentary power interruption that occurs when performing open transition between sources. Closed transition is accomplished by briefly (<100 msec) paralleling two good sources to eliminate the momentary break in the power supply.

Genset-to-genset: Either genset can be designated as the lead genset. If the lead genset goes down or is taken offline, the transfer switch starts the second genset and transfers the load. The control can be programmed to alternate between the two gensets at a set interval up to 336 hours (2 weeks).

* Not available on 1200 amp and 4000 amp

UL withstand and closing ratings

The transfer switches listed below must be protected by circuit breakers or fuses. Referenced drawings include detailed listings of specific breakers or fuse types that must be used with the respective transfer switches. Consult with your distributor/dealer to obtain the necessary drawings. Withstand and Closing Ratings (WCR) are stated in symmetrical RMS amperes.

Transfer switch ampere	MCCB protection			Special circuit breaker protection		
	WCR @ volts max with specific manufacturers MCCBs	Max MCCB ratings	Drawing reference	With specific current limiting breakers (CLB)	Max CLB rating	Drawing reference
150, 225, 260	30,000 at 480 25,000 at 600	400 A	A048E955	200,000 at 480	400 A	A051D533
				100,000 at 600	100,000 at 600	
300, 400, 600 ✓	65,000 at 480 65,000 at 600	1200 A	A056M836	200,000 at 480	1200 A	A048J544
				100,000 at 600	100,000 at 600	
800, 1000	65,000 at 480 65,000 at 600	1400 A	A056M548	200,000 at 480	1400 A	A048J546
				100,000 at 600	100,000 at 600	
1200A, 1000A closed	85,000 at 480 65,000 at 600*	1600 A	A052L319	N/A	N/A	N/A

Fuse protection

Transfer switch ampere	WCR @ volts max. with current limiting fuses	Max fuse, size and type	Drawing reference
150, 225, 260	200,000 at 600	600 A Class J, RK1, RK5 or 1200 A Class L, T	A048E955
300, 400, 600	200,000 at 600	600 A Class J, RK1, RK5 or 1200 A Class L, T	A056M836
800, 1000	200,000 at 600	600 A Class J, RK1, RK5, 1200 A Class T, or 2000 A Class L	A056M548
1200	200,000 at 480**	3000 A Class L	A052L319
1600, 2000	200,000 at 480**	2500 A Class L	A052L322
3000	200,000 at 480**	4000 A Class L	A052L322
4000	200,000 at 480*	6000 A Class L	A052L324
	200,000 at 600*		

*CSA only

**UL only

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3-cycle ratings

Transfer switch ampere	WCR @ volts max 3 cycle rating	Max MCCB rating	Drawing reference
300, 400, 600	25,000 at 600	1200 A	A056M8336
800, 1000	42,000 at 600	1400A	A056M548
1200	50,000 at 480	1600 A	A052L319
	42,000 at 600*		
1600, 2000	100,000 at 480	4000 A	A052L322
	65,000 at 600*		
3000	100,000 at 480	4000 A	A052L322
	65,000 at 600*		
4000	100,000 at 480	5000 A	A052L324
	85,000 at 600		

*CSA only

Transfer switch lug capacities

All lugs are 90°C rated and accept copper or aluminum wire unless indicated otherwise.

Amp rating	Cables per phase	Size
150, 225	1	#6 AWG to 300 MCM
260	1	#6 AWG to 400 MCM
150, 225, 260 ¹	1	#4 AWG to 500 MCM
300, 400	1	#3/0 AWG to 600 MCM
300, 400	2	#3/0 AWG to 250 MCM
300, 400 ¹	2	#2 AWG to 600 MCM
600	2	250 MCM to 500 MCM ✓
600 ¹	2	#2 AWG to 600 MCM
800, 1000	4 ²	250 MCM to 500 MCM
800, 1000 ¹	3	300 MCM to 750 MCM
1200	4	#2 AWG to 600 MCM
1600 ³ , 2000 ³	8	#2 AWG to 600 MCM Mechanical Lug
		1/0 AWG to 750 MCM Mechanical Lug
		500 MCM Compression Lugs, Includes 96 Blackburn CTL 5002 Lugs
		600 MCM Compression Lugs, Includes 96 Blackburn CTL 6002 Lugs
3000 ³	8	750 MCM Compression Lugs, Includes 96 Blackburn CTL 7502 Lugs
		#2 AWG to 600 MCM Mechanical Lug
		1/0 AWG to 750 MCM Mechanical Lug
		500 MCM Compression Lugs, Includes 96 Blackburn CTL 5002 Lugs
4000 ³	12	600 MCM Compression Lugs, Includes 96 Blackburn CTL 6002 Lugs
		750 MCM Compression Lugs, Includes 96 Blackburn CTL 7502 Lugs
		1/0 AWG to 750 MCM

Note 1: Optional lug capacities on accessories spec sheet AC-166.

Note 2: Four-wire for neutral bar is 3-pole only.

Note 3: Can be ordered without lugs

Enclosures

The transfer switch and control are floor-mounted in a key-locking enclosure. Wire bend space complies with 2011 NEC.
Dimensions - transfer switch in UL Type 1 enclosure

Amp rating	Height		Width		Depth				Weight 3-pole type		Outline drawing
					Door closed		Door open				
	in	mm	in	mm	in	mm	in	mm	lb	kg	
150, 225, 260	71.5	1822	36.00	915	22.75	578	55.2	1402	564	256	310-0538
300, 400, 600	83.25	2115	36.00	914	22.75	578	55.2	1403	639	291	500-4726
800, 1000	90.00	2290	48.00	1219	27.75	705	62.5	1588	1097	499	310-0570
1200 3-pole ¹	90.0	2290	40.00	1016	27.00	686	67.0	1702	1980	898	310-0566
1200 4-pole ¹	90.00	2290	46.00	1168	27.00	686	73.0	1854	2185	991	310-0566
1600, 2000 3-pole ²	79.64	2023	40.76	1035	63.00	1600	102.1	2593	3139	1424	A030s193
1600, 2000 4-pole ²	79.64	2023	46.26	1175	63.00	1600	107.6	2733	3538	1605	A030x111
3000 3-pole ²	79.64	2023	40.76	1035	63.00	1600	102.1	2593	3513	1594	A030s195
3000 4-pole ²	79.64	2023	46.26	1175	63.00	1600	107.6	2733	4081	1851	A030x113
4000 3-pole ²	90.00	2290	47.50	1210	81.00	2060	128.5	3270	4730	2145	500-4488
4000 4-pole ²	90.00	2290	54.00	1370	81.00	2060	135.0	3430	5930	2689	500-4488

Note 1: Dimensions shown for Type 1 are for top entry only. If bottom or side entry is required, an adapter bay is required and the depth increases by 14 in (356 mm). See outline drawing. Adapter needs to be part of the original order.

Note 2: 1600-4000 amp switches are rear-connected. Rear or side access is required for cabling.

Dimensions - transfer switch in UL type 3R, 4, 4x, or 12 enclosure

Amp rating	Height		Width		Depth				Weight		Cabinet type	Outline drawing
					Door closed		Door open					
	in	mm	in	mm	in	mm	in	mm	lb	kg		
150, 225, 260	71.75	1822	36.00	915	22.75	578	55.20	1402	564	256	3R, 12	310-0651
	71.75	1822	36.00	915	22.75	578	55.20	1402	564	256	4, 4x	310-0652
300, 400, 600	83.25	2115	36.00	915	22.75	578	55.20	1402	639	290	3R, 12	500-4726
	83.25	2115	36.00	915	22.75	578	55.20	1402	639	290	4, 4x	500-4727
800,1000	90.0	2290	48.00	1214	27.75	705	62.50	1534	1097	498	3R	310-0711
	90.0	2290	48.00	1214	27.75	705	62.50	1534	1097	498	4, 4x, 12	310-0712
1200 3-pole ¹ 1200 4-pole ¹	90.00	2290	40.00	1016	28.25	718	65.50	1654	1980	748	3R, 12, 4, 4x	310-0734
	90.00	2290	46.00	1168	28.25	718	71.69	1821	2185	991	3R, 12, 4, 4x	310-0734
1600, 2000 3-pole ²	79.64	2023	40.76	1035	63.00	1600	102.1	2593	3139	1424	3R	A030s193
1600, 2000 4-pole ²	79.64	2023	46.26	1175	63.00	1600	107.6	2733	3538	1605	3R	A030x111
3000 3-pole ²	79.64	2023	40.76	1035	63.00	1600	102.1	2593	3513	1594	3R	A030s195
3000 4-pole ²	79.64	2023	46.26	1175	63.00	1600	107.6	2733	4081	1851	3R	A030x113
4000 3-pole ²	90.00	2290	48.50	1232	81.75	2076	131.00	3308	4730	2145	3R	500-4489
4000 4-pole ²	90.00	2290	55.00	1397	81.75	2076	137.00	3473	5930	2689	3R	500-4489

Note 1: 1200 amp switches are top entry only.

Note 2: 1600-4000 amp switches are rear-connected. Rear or side access is required for cabling.

Maderra Engineering

- ☐ REVIEWED
☒ REVIEWED AS NOTED
☐ RESUBMIT

BY: Craig Noseworthy

DATE: April 13, 2018

Review is for conformance with the general design concept and does not relieve the Contractor from his responsibility for detail design inherent in shop drawings; for errors or omissions in the shop drawings or for meeting all requirements of Contract Documents.

1. NETWORK DATA CONNECTIVITY Required.
2. Manual Override feature Required To force Generator To Start up. + Stabilize And force ATS To Transfer Load from Utility To Generator.

Submittal detail

Amperage ratings

- 150
- 225
- 260
- 300
- 400
- 600 ✓
- 800
- 1000
- 1200
- 1600
- 2000
- 3000
- 4000

Voltage ratings

- R038 190
- R021 208
- R022 220
- R023 240 ✓
- R024 380
- R025 416
- R035 440
- R026 480
- R027 600

Pole configuration

- A028 Poles - 3 (solid neutral) ✓
- A029 Poles - 4 (switched neutral)

Frequency

- A044 60 Hertz ✓
- A045 50 Hertz

Transfer mode

- A077 Open transition/in-phase
- A078 Open transition/programmed ✓
- A079 Closed transition

Application

- A035 Utility-to-genset ✓
- A036 Utility-to-utility
- A037 Genset-to-genset

System options

- A041 Single phase, 2-wire or 3-wire ✓
- A042 Three phase, 3-wire or 4-wire

Auxiliary relays

Relays are UL listed and factory installed. All relays provide two normally closed isolated contacts rated 10 amps at 600 VAC Relay terminals accept from one 18 gauge to two 12 gauge wires per terminal.

- L101 24 VDC coil - installed, not wired (for customer use)
- L102 24 VDC coil - emergency position - relay energized when switch in source 2 (emergency) position
- L103 24 VDC coil - normal position - relay energized when switch in source 1 (normal) position
- L201 12 VDC coil - installed, not wired (for customer use) ✓
- L202 12 VDC coil - emergency position - relay energized when switch in source 2 (emergency) position ✓
- L203 12 VDC coil - normal position - relay energized when switch in source 1 (normal) position ✓

Miscellaneous options

- M003 Terminal block - 30 points (not wired)
- M007 Loadshed - from emergency - drives switch to neutral position when remote signal contact closes (utility-to-genset only)
- N009 Power connect - bus stubs (150-1000 amp open construction only)

Optional lug kits

- N046 Mechanical lugs - accept up to 8 #2 - 600 MCM cables per phase (1600-3000 amps only)
- N047 Mechanical lugs - accept up to 8 750 MCM cables per phase (1600-3000 amps only)
- N050 Compression lugs - accept up to 8 500 MCM cables per phase (1600-3000 amps only)
- N051 Compression lugs - accept up to 8 600 MCM cables per phase (1600-3000 amps only)
- N052 Compression lugs - accept up to 8 750 MCM cables per phase (1600-3000 amps only)

N056 Mechanical lugs - accept up to 12 750 MCM cables per phase (4000 amps only)

Enclosure

- B001 Type 1: Indoor use, provides some protection against dirt (similar to IEC type IP30)
- B002 Type 3R: Intended for outdoor use, provides some protection from dirt, rain and snow (similar to IEC type IP34)
- B003 Type 4: Indoor or outdoor use, provides some protection from wind-blown dust and water spray (similar to IEC type IP65)
- B004 Open Construction: No enclosure - includes automatic transfer switch and controls (call factory for dimensions)
- B010 Type 12: Indoor use, some protection from dust (similar to IEC type IP61) ✓
- B025 Type 4X: Stainless steel, indoor or outdoor use, provides some protection from corrosion (similar to IEC Type IP65)

Standards

- A046 UL 1008/CSA certification ✓
- A064 NFPA 20 compliant (not available 1200- 4000 amp switches)
- A080 Seismic certification Control options
- M017 Security key - front panel ✓
- M022 Load monitoring (min current level 3%) ✓
- M023 Relay signal module. Includes pre-transfer module for elevator control
- M031 LonWorks Network Communications Module FTT-10 ✓

Meter

- D009 Analog bar graph meter ✓

Battery chargers

- K001 2 A, 12/24 V
- KB59 15 A, 12 V
- KB60 12 A, 24 V

Protective relays

- M045 Paralleling timer and lockout relays, ANSI/IEEE 62PL and 86
- M046 Paralleling timer and lockout and reverse power relays, single phase, ANSI/IEEE 62PL, 86 and 32R
- M047 Paralleling timer and lockout and reverse power relays, three phase, ANSI/IEEE 62PL, 86 and 32R

Warranty

- G010 Years 0-2: Parts, labor and travel ✓
- Years 3-5: Parts only Years 6-10: Main contacts only
- G013 Years 0-5: Comprehensive Years 6-10: Main contacts only

Shipping

- A051 Packing - export box

Accessories

- AC-166 Accessories specification sheet

For more information contact your local Cummins distributor
or visit power.cummins.com

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