Sales and Service

TABLE OF CONTENTS

Cummins Sales and Service

BILL OF MATERIAL

Making people's lives better by powering a more prosperous world.

April 26, 2023

Bill of Material REV1

Item	Description	Qty
1	**C70N6, 70kW, 60Hz, Standby, Natural Gas/Propane Genset**	1
C70 N6	C70N6, 70kW, 60Hz, Standby, Natural Gas/Propane Genset	
A331-2	Duty Rating - Standby Power (ESP)	
L155-2	Emissions Certification - SI, EPA, Emergency, Stationary, 40CFR60	
L193-2	NFPA 110 Type 10 Level 1 Capable	
L195-2	CSA 149B Compliant	
B184-2	Exciter/Regulator - Permanent Magnet Generator, 3 Phase Sensor	
R114-2	Voltage - 347/600, 3 Phase, Wye, 4 Wire	
B952-2	Alternator - 60Hz, 6L, 600/347V, 120C, 40C Ambient	
09800	Enclosure-None	
F253-2	Larger Battery Rack	
F179-2	Skidbase - Housing Ready	
H609-2	Control Mounting - Left Facing	
H703-2	PowerCommand 2.3 Controller	
H012-2	Gauge - Oil Pressure	
H569-2	Warning - Low Fuel Gas Pressure	
H606-2	Analog Meters - AC Output	
H720-2	AmpSentryTM UL Listed Protective Relay	
K796-2	Stop Switch - Emergency	
KS52-2	Relays - Auxiliary, Qty 2, 25A - 15V DC/10A - 30V DC	
KS53-2	Signals - Auxiliary, 8 Inputs/8 Outputs	
H536-2	Control Display Language - English	
KV03-2	Load Connection - Single	
KV41-2	Circuit Breaker, Location A, 125A, 3P, 600 Volts AC, 80%, UL	
A366-2	Engine Governor - Electronic, Isochronous	
C284-2	Single Gas Fuel - NG or LP Vapor	
A422-2	Engine Starter - 12 Volt DC Motor	
A299-2	Exhaust Connector - NPT	
D041-2	Engine Air Cleaner - Normal Duty	
A333-2	Battery Charging Alternator	
E125-2	Engine Cooling - Radiator, High Ambient Air Temperature, Ship Fitted	
H389-2	Shutdown - Low Coolant Level	
E089-2	Extension - Coolant Drain	
F013-2	Duct Adaptor - Radiator Outlet	
H669-2	Engine Coolant - 50% Antifreeze, 50% Water Mixture	
E154-2	Coolant Heater, Extreme Cold Ambient	
H487-2	Engine Oil Heater - 120 Volts AC, Single Phase	
H706-2	Engine Oil	
L026-2	Cummins Certified Test Record	
L028-2	Genset Warranty - 2 Years or 1000 hours Comprehensive	
L050-2	Literature - English	
A322-2	Packing - Skid, Poly Bag	
H268-2	Extension - Oil Drain	
	<u>Accessories – Shipped loose to site and installed on site by Cummins technician</u>	
P-START UP	Battery G78DT72	1
S-INC	Alarm Installation Kit-Audible, Engine Shutdown A043F059	1
S-INC	Circuit Breaker Installation-1SPDT, Auxiliary Contacts A043X785	1

	Accessories – Shipped loose to site and installed on site by site contractor	
P-ACC	10A Battery Charger - SENS Microgenius Charger 12/24V 10A M3-22-1210-D	1
S-INC	Muffler, Critical-Side Inlet, End Outlet, 3.0"NPT 0155-2342-07	1
S-INC	Exhaust Pipe Package-Side Inlet, 3.0" to 3.0"NPT 0155-2707	1
S-INC	Solenoid Valve-1"NPT Inlet/Outlet, 12VDC, 5PSI 0307-2890	1
P-ACC	Fuel Flex 18" OAL pn I16C18FJ16MP16 and Pipe Connector 1" JIC, 1" MNPT pn S3748-16H	1
2	**Onsite Startup and Commissioning with 4 hours load test, 1 hour building test and 1 hour training**	1

NOTES:

- Generator & Transfer Switch Start-up & Commissioning (Cummins supplied Generator & Transfer Switch only).
  - Transfer switch commissioning must occur at the same time as generator set commissioning if additional trips are required additional charges may apply.
  - Start-up/commissioning is quoted during regular working hours if after-hours service is required, additional charges may apply.
- Testing on-site includes a 4-hours full load test and 1 hour with a building load test. The generator location must be within the first two floors of the building, if not additional charges may apply,
  - Load bank testing is with a resistive type load bank unless specifically noted.
- 1-hour training will be provided.
  - Training must occur on the same day as the stat-up, or additional charges may apply.
- End-user training, if required, will be provided at additional cost. Please consult with Cummins for a cost adder.
- This proposal is based on Email dated March 6th 2023 available at the time of quoting.
- Standby Rating based on Applicable for supplying emergency power for the duration of normal power interruption.
  - No sustained overload capability is available for this rating – not applicable to standby applications.
- Complete electrical coordination study (if required) by others.
- All onsite fuel is by others
- Payment Milestone –
  - (90% upon shipping of the generator set, 10% after commissioning.)
- Please make sure any purchase order issued relating to this quote refers to the quote number and is issued in the name of CUMMINS CANADA ULC

An order for the equipment covered by this quotation will be accepted on a hold for release basis. Your order will not be released and scheduled for production until written approval to proceed is received in our office. Such submittal approval shall constitute acceptance of the terms and conditions of this quotation unless the parties otherwise agree in writing. The current lead time of approved drawings is 3-4 week ARO.

Lead time at the time of quote is estimated as below (for each type of equipment provided under this quote), to be confirmed or revised on the date of a confirmed order or the approval of engineering drawings, whichever is later. Lead-times are subject to changes without notice.

- at 35 to 37 weeks for Generator set, to be confirmed at the time of order base on factory load.

Sales and Service

GENERATOR SPECIFICATION

Making people's lives better by powering a more prosperous world.

Specification sheet

Spark-ignited generator set

45–100 kW Standby

EPA emissions

Description

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

Features

Gas engine - Rugged 4-cycle Cummins QSJ5.9G spark-ignited engine delivers reliable power. The electronic air/fuel ratio control provides optimum engine performance 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® 1.1 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. The PowerCommand 2.3 control is also optional and is UL 508 Listed and provides AmpSentry™ protection.

Cooling system - Standard cooling package provides reliable running at up to 50 ℃ (122 ℉) 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.

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.

	Natural gas		Propane		
	Standby		Standby		
Model	**kW**	**kVA**	**kW**	**kVA**	**Data sheets**
C45 N6	45	56	45	56	NAD-6093-EN
C50 N6	50	63	50	63	NAD-6094-EN
C60 N6	60	75	60	75	NAD-6095-EN
C70 N6	70	88	70	88	NAD-6096-EN
C80 N6	80	100	80	100	NAD-6097-EN
C100 N6	100	125	100	125	NAD-6098-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	± 0.25% @ 60 Hz
Radio frequency emissions compliance	Meets requirements of most industrial and commercial applications

Engine specifications

Design	Naturally aspirated or turbocharged (varies by generator set model)
Bore	102.1 mm (4.02 in.)
Stroke	119.9 mm (4.72 in.)
Displacement	5.9 liters (359 in^3)
Cylinder block	Cast iron, in-line 6 cylinder
Battery capacity	850 amps at ambient temperature of 0 °F to 32 °F (-18 °C to 0 °C)
Battery charging alternator	52 amps
Starting voltage	12 volt, negative ground
Lube oil filter type(s)	Spin-on with relief valve
Standard cooling system	50 °C (122 °F) ambient cooling system
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 ºC (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
- Single fuel - natural gas or propane vapor, field selectable
- Dual fuel – natural gas and propane vapor auto changeover
- Low fuel gas pressure warning

Engine
- Engine air cleaner
- Shut down – low oil pressure
- Extension – oil drain
- Engine oil heater

Alternator
- 120 °C temperature rise alternator
- 105 °C temperature rise alternator
- PMG
- 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
- 100% rated LSI circuit breakers
- Battery charger

Enclosure
- Sound Level 1 or Level 2 enclosure, sandstone or green color
- Weather protective enclosure with muffler installed, green color
- Winter protective enclosure, green color

Cooling system
- Shutdown – low coolant level
- Warning – low coolant level
- Extension – coolant drain
- Coolant heater options:
  - <4 °C (40 °F) – cold weather
  - <-17 °C (0 °F) – extreme cold

Exhaust system
- Exhaust connector NPT
- Exhaust muffler mounted

Generator set application
- Base barrier – elevated genset
- Battery rack, standard battery
- Battery rack, larger battery
- Radiator outlet duct adapter

Warranty
- Base warranty – 2 year/1000 hours, Standby
- 3 year Standby warranty options
- 5 year Standby warranty options

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Generator set accessories

- Coolant heaters – ~~1000 W~~/1500 W
- Battery rack, ~~standard~~/larger battery
- Battery heater kit
- Engine oil heater
- Remote control displays
- Auxiliary output relays (2)
- Auxiliary configurable signal inputs (8) and relay outputs (8)
- Annunciator – RS485
- 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
- Alternator heater

Control system PowerCommand 1.1

PowerCommand control is an integrated generator set control system providing voltage regulation, engine protection, operator interface and isochronous governing (optional). Major features include:

- Battery monitoring and testing features and smart starting control system.
- Standard PCCNet interface to devices such as remote annunciator for NFPA 110 applications.
- Control boards potted for environmental protection.
- Control suitable for operation in ambient temperatures from -40 ℃ to +70 ℃ (-40 ℉ to +158 ℉) and altitudes to 5000 meters (13,000 feet).
- Prototype tested; UL, CSA, and CE compliant.
- InPower™ PC-based service tool available for detailed diagnostics.

Operator/display panel

- Manual off switch
- Alpha-numeric display with pushbutton access for viewing engine and alternator data and providing setup, controls and adjustments (English or international symbols)
- LED lamps indicating generator set running, not in auto, common warning, common shutdown, manual run mode and remote start
- Suitable for operation in ambient temperatures from -40 ℃ to +70 ℃
- Bargraph display (optional)

AC protection

- Over current warning and shutdown
- Over and under voltage shutdown
- Over and under frequency shutdown
- Over excitation (loss of sensing) fault
- Field overload

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

Alternator data

- Line-to-Line and Line-to-neutral AC volts
- 3-phase AC current
- Frequency
- Total kVa

Engine data

- DC voltage
- Lube oil pressure
- Coolant temperature
- Engine speed

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 governing (optional)

- Integrated digital electronic isochronous governor
- Temperature dynamic governing

Digital voltage regulation

- Integrated digital electronic voltage regulator
- 2-phase Line-to-Line sensing
- Configurable torque matching

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)
- Digital governing
- AC output analog meters (bargraph)
  - Color-coded graphical display of:
    - 3-phase AC voltage
    - 3-phase current
    - Frequency
    - kVa
- Remote operator panel
- PowerCommand 2.3 control with AmpSentry protection

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):

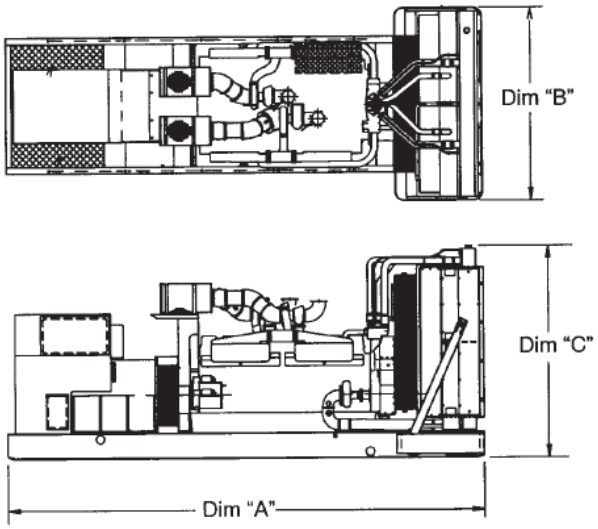
Applicable for supplying power to a constant electrical load for limited hours. Limited Time Running Power (LTP) is in accordance with ISO 8528.

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

REFER TO THE DRAWINGS
FOR WEIGHTS & DIMENSIONS

Codes and standards

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

	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.		The generator set is available Listed to UL 2200, Stationary Engine Generator Assemblies.
International Building Code	The generator set is certified to International Building Code (IBC) 2012.		All low voltage models are CSA certified to product class 4215-01.
	This generator set is designed in facilities certified to ISO 9001 and manufactured in facilities certified to ISO 9001 or ISO 9002.	**U.S. EPA**	Engine certified to U.S. EPA SI Stationary Emission Regulation 40 CFR, Part 60.

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.

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NAS-6092-EN - 06DEC2019.DOCX (12/19) A054P028

Generator set data sheet

Model:	**C70 N6**
Frequency:	**60 Hz**
Fuel type:	**Natural gas/propane**
kW rating:	**70 natural gas Standby** **70 propane Standby**
Emissions level:	**EPA Emissions**

Fuel consumption

	Natural gas Standby				Propane Standby			
	kW (kVA)				kW (kVA)			
Ratings	70 (88)				70 (88)			
Load	**1/4**	**1/2**	**3/4**	**Full**	**1/4**	**1/2**	**3/4**	**Full**
scfh	406.4	596.7	796.0	970.0	168.8	245.7	311.1	390.0
m^3/hr	11.51	16.9	22.54	27.47	4.78	6.98	8.81	11.04

Engine

	Natural gas Standby rating	Propane Standby rating
Engine model	QSJ5.9G-G3	
Configuration	Cast iron, in-line 6 cylinder	
Aspiration	Turbocharged and after-cooled	
Gross engine power output, kWm (bhp)	121.3 (162.7)	
Bore, mm (in.)	102.1 (4.02)	
Stroke, mm (in.)	119.9 (4.72)	
Rated speed, rpm	1800	
Compression ratio	8.5:1	
Lube oil capacity, L (qt.)	14.2 (15)	
Overspeed limit, rpm	2250	

Fuel supply pressure

Minimum operating pressure, kPa (in H_2O)	1.5 (6.0)
Maximum operating pressure, kPa (in H_2O)	3.2 (13.0)

Air

	Natural gas Standby rating	Propane Standby rating
Combustion air, m^3/min (scfm)	6.9 (244.6)	6.9 (245.3)
Maximum normal duty air cleaner restriction, kPa (in H_2O)	0.4 (1.5)	0.4 (1.5)
Maximum heavy duty air cleaner restriction, kPa (in H_2O)	3.7 (15)	3.7 (15)

Exhaust	Natural gas Standby rating	Propane Standby rating
Exhaust flow at rated load, m^3/min (cfm)	21.2 (749.9)	19.6 (690.8)
Exhaust temperature, °C (°F)	635.2 (1175.3)	645.6 (1194.1)
Exhaust maximum back pressure, kPa (in H_2O)	7 (28.1)	7 (28.1)

Standard set-mounted radiator cooling[1]

Ambient design, °C (°F)	50 (122)
Fan load, kW (HP)	9 (12)
Coolant capacity (with radiator), L (US gal)	16 (4.2)
Cooling system air flow, m^3/min (scfm)	218.0 (7700)
Maximum cooling air flow static restriction, kPa (in H_2O)	0.12 (0.5)

Weights[2]

Unit dry weight kgs (lbs)	1153 (2542)
Unit wet weight kgs (lbs)	1192 (2628)

REFER TO THE DRAWINGS FOR WEIGHTS & DIMENSIONS

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.

Alternator data

Standard alternators		Natural gas/propane single phase table	Natural gas/propane three phase table					Full single phase output, reconnectable
Maximum temperature rise above 40 °C ambient		120 °C	120 °C	120 °C	120 °C	120 °C	120 °C	120 °C
Feature code		BB90-2	B986-2	B946-2	B943-2	B952-2	BB86-2	BB88-2
Alternator data sheet number		ADS-205	ADS-205	ADS-205	ADS-204	ADS-204	ADS-204	ADS-207
Voltage ranges		120/240	120/240	120/208	277/480	347/600	127/220	120 - 480
Voltage feature code		R104-2	R106-2	R098-2	R002-2	R114-2	R020-2	Varies by voltage
Surge kW		99.5	102.8	102.8	102.8	102.8	102.2	Varies by voltage
Motor starting kVA (at 90% sustained voltage)	Shunt	260	260	260	231	231	231	360
	PMG	306	306	306	272	272	272	423
Full load current amps at Standby rating		292	211	243	105	84	230	Varies by voltage

Alternator data (continued)

Optional alternators for improved starting capability		Natural gas/propane single phase table	Natural gas/propane three phase table					Full single phase output, reconnectable
Maximum temperature rise above 40 °C ambient		105 °C	105 °C	105 °C	105 °C	105 °C	105 °C	105 °C
Feature code		BB91-2	BB94-2	BB93-2	BB95-2	BB92-2	BB85-2	BB87-2
Alternator data sheet number		ADS-206	ADS-205	ADS-205	ADS-205	ADS-205	ADS-205	ADS-207
Voltage ranges		120/240	120/240	120/208	277/480	347/600	127/220	120 - 480
Voltage feature code		R104-2	R106-2	R098-2	R002-2	R114-2	R020-2	Varies by voltage
Surge kW		97.7	102.8	102.8	103.6	103.6	103.6	Varies by voltage
Motor starting kVA (at 90% sustained voltage)	Shunt	313	260	260	260	260	260	360
	PMG	368	306	306	306	306	306	423
Full load current amps at Standby rating		292	211	243	105	84	230	Varies by voltage

Derating factors

Natural gas/propane

Standby	Engine power available up to 2591 m (8500 ft.) at ambient temperatures up to 40 °C (104 °F). Above these elevations derate at 4% per 305 m (1000 ft.) and 2% per 10 °C above 40 °C (104 °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.

Formulas for calculating full load currents:

Three phase output

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

Single phase output

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

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.

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NAD-6096-EN-1.DOCX (12/18)

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)		**60 Hz**			**50 Hz**	
(Based on specific temperature rise at 40 °C ambient temperature)		Double delta	4 lead		Double delta	
		120/240	120/240		110-120 220-240	
125 °C rise ratings	kW/kVA	56/56	60/60		49/49	
105 °C rise ratings	kW/kVA	50/50	57/57		44/44	

3 Ø Ratings (0.8 power factor)		Upper broad range		LBR*	347/600	Broad range		
(Based on specified temperature rise at 40 °C ambient temperature)		120/208 240/416	139/240 277/480	190-208 380-416	347/600	110/190 220/380	120/208 240/415	127/220 254/440
150 °C Rise ratings	kW	71	79	72	79	62	62	59
	kVA	89	99	89	99	77	77	74
125 °C Rise ratings	kW	67	75	68	75	58	58	56
	kVA	84	94	85	94	73	73	70
105 °C Rise ratings	kW	60	66	60	66	52	52	50
	kVA	75	83	75	83	65	65	62
80 °C Rise ratings	kW	52	57	52	57	45	45	43
	kVA	65	72	65	72	56	56	53

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	1.45
Transient	0.17	0.14	0.15	0.13	0.16	0.14	0.12
Subtransient	0.13	0.11	0.11	0.11	0.11	0.09	0.08
Negative sequence	0.13	0.11	0.11	0.11	0.12	0.10	0.09
Zero sequence	0.09	0.07	0.07	0.07	0.09	0.07	0.06

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.

Specification Sheet

PowerCommand® 2.3 Control System

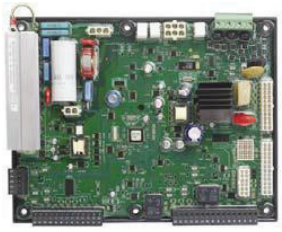
Control System Description

The PowerCommand control system is a microprocessor-based generator set monitoring, metering and control system designed to meet the demands of today's engine driven generator sets. The integration of all control functions into a single control system provides enhanced reliability and performance, compared to conventional generator set control systems. These control systems have been designed and tested to meet the harsh environment in which gensets are typically applied.

Features

- 320 x 240 pixels graphic LED backlight LCD.
- Multiple language support.
- AmpSentry™ protective relay - true alternator overcurrent protection.
- Real time clock for fault and event time stamping.
- Exerciser clock and time of day start/stop.
- Digital voltage regulation. Three phase full wave FET type regulator compatible with either shunt or PMG systems.
- Generator set monitoring and protection.
- 12 and 24 VDC battery operation.
- Modbus® interface for interconnecting to customer equipment.
- Warranty and service. Backed by a comprehensive warranty and worldwide distributor service network.
- Certifications - suitable for use on generator sets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std., CE, UKCA and CSA standards.

PowerCommand Digital Genset Control PCC 2300



Description

The PowerCommand generator set control is suitable for use on a wide range of generator sets in non-paralleling applications. The PowerCommand control is compatible with shunt or PMG excitation style. It is suitable for use with reconnectable or non-reconnectable generators, and it can be configured for any frequency, voltage and power connection from 120-600 VAC Line-to-Line.

Power for this control system is derived from the generator set starting batteries. The control functions over a voltage range from 8 VDC to 30 VDC.

Features

- 12 and 24 VDC battery operation.
- Digital voltage regulation - Three phase full wave FET type regulator compatible with either shunt or PMG systems. Sensing is three phase.
- Full authority engine communications (where applicable) - Provides communication and control with the Engine
- due to thermal Control Module (ECM).
- AmpSentry" protection provides industry-leading alternator overcurrent protection:
  - Time-based generator protection applicable to both line-to-line and line-to-neutral, that can detect an unbalanced fault condition and swiftly react appropriately. Balanced faults can also be detected by AmpSentry and appropriate acted upon.
- Reduces the risk of Arc Flash overload or electrical faults by inverse time protection
- Common harnessing - with higher feature Cummins controls. Allows for easy field upgrades.
- Generator set monitoring - Monitors status of all critical engine and alternator functions.
- Digital genset metering (AC and DC).
- Genset battery monitoring system to sense and warn against a weak battery condition.
- Configurable for single or three phase AC metering.
- Engine starting - Includes relay drivers for starter, Fuel Shut Off (FSO), glow plug/spark ignition power and switch B+ applications.
- Generator set protection – Protects engine and alternator.
- Real time clock for fault and event time stamping.
- Exerciser clock and time of day start/stop.
- Advanced serviceability - using InPower™, a PC-based software service tool.
- Environmental protection - The control system is designed for reliable operation in harsh environments. The main control board is a fully encapsulated module that is protected from the elements.
- Modbus interface for interconnecting to customer equipment.
- Configurable inputs and outputs - Four discrete inputs and four dry contact relay outputs.
- Warranty and service - Backed by a comprehensive warranty and worldwide distributor service network.
- Certifications - Suitable for use on generator sets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std., CE and CSA standards.

Base Control Functions

HMI Capability

Operator adjustments - The HMI includes provisions for many set up and adjustment functions.

Generator set hardware data - Access to the control and software part number, generator set rating in kVA and generator set model number is provided from the HMI or InPower.

Data logs - Includes engine run time, controller on time, number of start attempts, total kWh, and load profile (control logs data indicating the operating hours at percent of rated kW load, in 5% increments. The data is presented on the operation panel based on total operating hours on the generator.)

Fault history - Provides a record of the most recent fault conditions with control date and time stamp. Up to 32 events are stored in the control non-volatile memory.

Alternator data

- Voltage (single or three phase Line-to-Line and Line-to-Neutral)
- Current (single or three phase)
- kW, kVar, power factor, kVA (three phase and total)
- Frequency

AmpSentry: 3x current regulation for downstream tripping/motor inrush management. Thermal damage curve (3-phase short) or fixed timer (2 sec for 1- Phase Short or 5 sec for 2-Phase short).

Engine data

- Starting battery voltage
- Engine speed
- Engine temperature
- Engine oil pressure
- Engine oil temperature
- Intake manifold temperature
- Comprehensive Full Authority Engine (FAE) data (where applicable)

Service adjustments - The HMI includes provisions for adjustment and calibration of generator set control functions. Adjustments are protected by a password. Functions include:

Service adjustments (continued)

- Engine speed governor adjustments
- Voltage regulation adjustments
- Cycle cranking
- Configurable fault set up
- Configurable output set up
- Meter calibration
- Display language and units of measurement

Engine Control

SAE-J1939 CAN interface to full authority ECMs (where applicable). Provides data swapping between genset and engine controller for control, metering and diagnostics.

12 VDC/24 VDC battery operations - PowerCommand will operate either on 12 VDC or 24 VDC batteries.

Temperature dependent governing dynamics (with electronic governing) - modifies the engine governing control parameters as a function of engine temperature. This allows the engine to be more responsive when warm and more stable when operating at lower temperature levels.

Isochronous governing - (where applicable) Capable of controlling engine speed within +/-0.25% for any steady state load from no load to full load. Frequency drift will not exceed +/-0.5% for a 33 °C (60 °F) change in ambient temperature over an 8 hour period.

Droop electronic speed governing - Control can be adjusted to droop from 0 to 10% from no load to full load.

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

Remote and local emergency stop - The control accepts a ground signal from a local (genset mounted) or remote (facility mounted) emergency stop switch to cause the generator set to immediately shut down. The generator set is prevented from running or cranking with the switch engaged. If in sleep mode, activation of either emergency stop switch will wakeup the control.

Sleep mode - The control includes a configurable low current draw state to minimize starting battery current draw when the genset is not operating. The control can also be configured to go into a low current state while in auto for prime applications or applications without a battery charger.

Engine starting - The control system supports automatic engine starting. Primary and backup start disconnects are achieved by one of two methods: magnetic pickup or main alternator output frequency. The control also supports configurable glow plug control when applicable.

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

Time delay start and stop (cooldown) - Configurable for time delay of 0-300 seconds prior to starting after receiving a remote start signal and for time delay of 0-600 seconds prior to shut down after signal to stop in normal operation modes. Default for both time delay periods is 0 seconds.

Alternator Control

The control includes an integrated three phase Line-to-Line sensing voltage regulation system that is compatible with shunt or PMG excitation systems. The voltage regulation system is a three phase full wave rectified and has an FET output for good motor starting capability.

Major system features include:

Digital output voltage regulation - Capable of regulating output voltage to within +/-1.0% for any loads between no load and full load. Voltage drift will not exceed +/- 1.5% for a 40 ºC (104 ºF) change in temperature in an eight hour period. On engine starting or sudden load acceptance, voltage is controlled to a maximum of 5% overshoot over nominal level. The automatic voltage regulator feature can be disabled to allow the use of an external voltage regulator.

Droop voltage regulation - Control can be adjusted to droop from 0-10% from no load to full load.

Torque-matched V/Hz overload control - The voltage roll-off set point and rate of decay (i.e. the slope of the V/Hz curve) is adjustable in the control.

Fault current regulation - PowerCommand will regulate the output current on any phase to a maximum of three times rated current under fault conditions for both single phase and three phase faults. In conjunction with a permanent magnet generator, it will provide three times rated current on all phases for motor starting and short circuit coordination purpose.

Protective Functions

On operation of a protective function the control will indicate a fault by illuminating the appropriate status LED on the HMI, as well as display the fault code and fault description on the LCD. The nature of the fault and time of occurrence are logged in the control. The service manual and InPower service tool provide service keys and procedures based on the service codes provided.

Protective functions include:

Battle Short Mode

When enabled and the *battle short* switch is active, the control will allow some shutdown faults to be bypassed. If a bypassed shutdown fault occurs, the fault code and description will still be annunciated, but the genset will not shutdown. This will be followed by a *fail to shutdown* fault. Emergency stop shutdowns and others that are critical for proper operation are not bypassed. Please refer to the control application guide or manual for list of these faults.

Derate

The derate function reduces output power of the genset in response to a fault condition. If a derate command occurs while operating on an isolated bus, the control will issue commands to reduce the load on the genset via contact closures or modbus.

Configurable Alarm and Status Inputs

The control accepts up to four alarm or status inputs (configurable contact closed to ground or open) to indicate a configurable (customer-specified) condition.

The control is programmable for warning, shutdown or status indication and for labeling the input.

Emergency Stop

Annunciated whenever either emergency stop signal is received from external switch.

Full Authority Electronic Engine Protection

Engine fault detection is handled inside the engine ECM. Fault information is communicated via the SAE-J1939 data link for annunciation in the HMI.

General Engine Protection

Low and high battery voltage warning - Indicates status of battery charging system (failure) by continuously monitoring battery voltage.

Weak battery warning - The control system will test the battery each time the generator set is signaled to start and indicate a warning if the battery indicates impending failure.

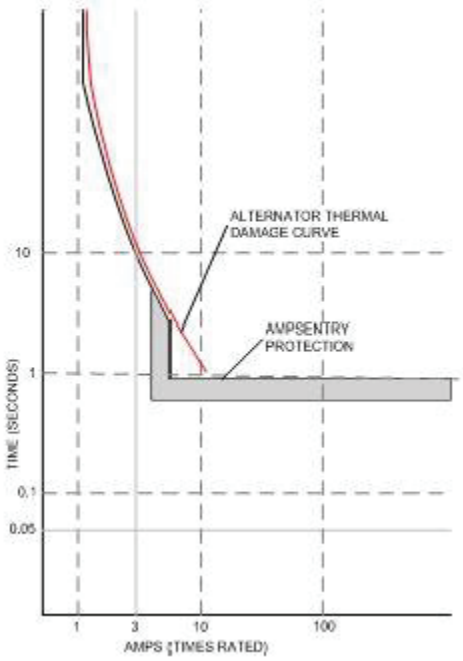
Fail to start (overcrank) shutdown - The control system will indicate a fault if the generator set fails to start by the completion of the engine crack sequence.

Fail to crank shutdown - Control has signaled starter to crank engine but engine does not rotate.

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

Alternator Protection

AmpSentry protective relay - A comprehensive monitoring and control system integral to the PowerCommand Control System that guards the electrical integrity of the alternator and power system by providing protection against a wide array of fault conditions in the generator set or in the load. It also provides single and three phase fault current regulation so that downstream protective devices have the maximum current available to quickly clear fault conditions without subjecting the alternator to potentially catastrophic failure conditions. Thermal damage curve (3-Phase short) or fixed timer (2 sec for 1-Phase short, 5 sec for 2-Phase short). See document R1053 for a full-size time over current curve.



AmpSentry Maintenance Mode (AMM) - Instantaneous tripping, if AmpSentry Maintenance mode is active (50mS response to turn off AVR excitation/shutdown genset) for arc flash reduction when personnel are near genset.

High AC voltage shutdown (59) - Output voltage on any phase exceeds preset values. Time to trip is inversely proportional to amount above threshold. Values adjustable from 105-125% of nominal voltage, with time delay adjustable from 0.1-10 seconds. Default value is 110% for 10 seconds.

Low AC voltage shutdown (27) - Voltage on any phase has dropped below a preset value. Adjustable over a range of 50-95% of reference voltage, time delay 2-20 seconds. Default value is 85% for 10 seconds. Function tracks reference voltage. Control does not nuisance trip when voltage varies due to the control directing voltage to drop, such as during a V/Hz roll-off during synchronizing.

Under frequency shutdown (81 u) - Generator set output frequency cannot be maintained. Settings are adjustable from 2-10 Hz below reference governor set point, for a 5- 20 second time delay. Default: 6 Hz, 10 seconds.

Under frequency protection is disabled when excitation is switched off, such as when engine is operating in idle speed mode.

Over frequency shutdown/warning (81 o) - Generator set is operating at a potentially damaging frequency level. Settings are adjustable from 2-10 Hz above nominal governor set point for a 1-20 second time delay. Default: 6 Hz,
20 seconds, disabled.

Overcurrent warning/shutdown - Thresholds and time delays are configurable. Implementation of the thermal damage curve with instantaneous trip level calculated based on current transformer ratio and application power rating.

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

Field overload shutdown - Monitors field voltage to shutdown generator set when a field overload condition occurs.

Over load (kW) warning - Provides a warning indication when engine is operating at a load level over a set point.

Adjustment range: 80-140% of application rated kW, 0-120 second delay. Defaults: 105%, 60 seconds.

Reverse power shutdown (32) - Adjustment range: 5-20% of standby kW rating, delay 1-15 seconds. Default: 10%, 3 seconds.

Reverse Var shutdown - Shutdown level is adjustable: 15-50% of rated Var output, delay 10-60 seconds. Default: 20%, 10 seconds.

Short circuit protection - Output current on any phase is more than 175% of rating and approaching the thermal damage point of the alternator. Control includes algorithms to protect alternator from repeated over current conditions over a short period of time.

Field Control Interface

Input signals to the PowerCommand control include:

- Coolant level (where applicable)
- Fuel level (where applicable)
- Remote emergency stop
- Remote fault reset
- Remote start
- Battleshort
- Rupture basin
- Start type signal
- Configurable inputs - Control includes (4) input signals from customer discrete devices that are configurable for warning, shutdown or status indication, as well as message displayed

Output signals from the PowerCommand control include:

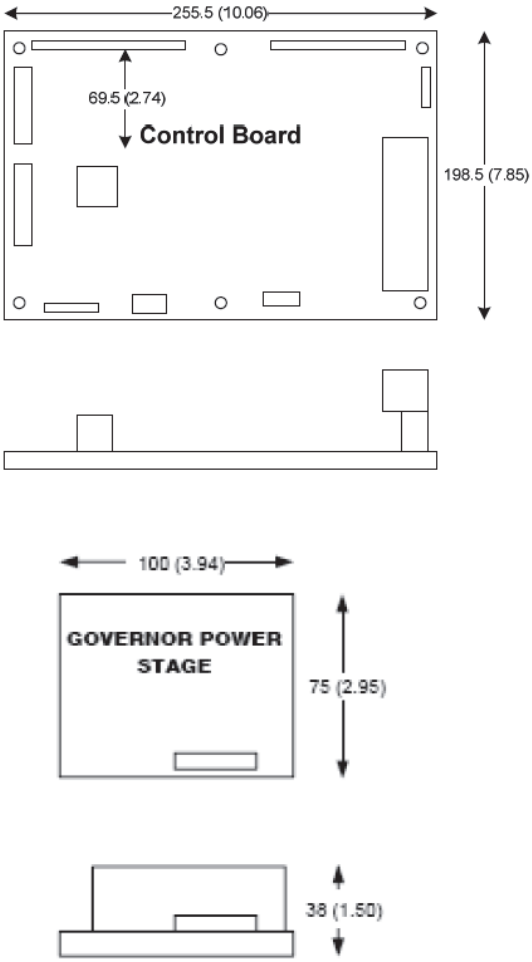
- Load dump signal: Operates when the generator set is in an overload condition.
- Delayed off signal: Time delay based output which will continue to remain active after the control has removed the run command. Adjustment range: 0 – 120 seconds. Default: 0 seconds.
- Configurable relay outputs: Control includes (4) relay output contacts (3 A, 30 VDC). These outputs can be configured to activate on any control warning or shutdown fault as well as ready to load, not in auto, common alarm, common warning and common shutdown.
- Ready to load (generator set running) signal: Operates when the generator set has reached 90% of rated speed and voltage and latches until generator set is switched to off or idle mode.

Communications Connections Include:

- PC tool interface: This RS-485 communication port allows the control to communicate with a personal computer running InPower software.
- Modbus RS-485 port: Allows the control to communicate with external devices such as PLCs using Modbus protocol.

  Note - An RS-232 or USB to RS-485 converter is required for communication between PC and control.
- Networking: This RS-485 communication port allows connection from the control to the other Cummins products.

Mechanical Drawings



PowerCommand Human Machine Interface HMI320

Description

This control system includes an intuitive operator interface panel that allows for complete genset control as well as system metering, fault annunciation, configuration and diagnostics. The interface includes five genset status LED lamps with both internationally accepted symbols and English text to comply with customer's needs. The interface also includes an LED backlit LCD display with tactile feel soft-switches for easy operation and screen navigation. It is configurable for units of measurement and has adjustable screen contrast and brightness.

The *run/off/auto* switch function is integrated into the interface panel.

All data on the control can be viewed by scrolling through screens with the navigation keys. The control displays the current active fault and a time-ordered history of the five previous faults.

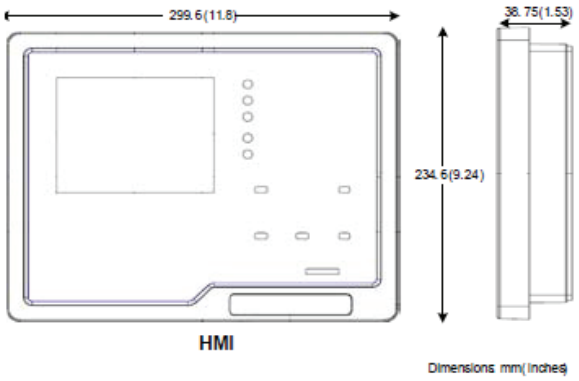
Features

- LED indicating lamps:
  - Genset running
  - Remote start
  - Not in auto
  - Shutdown
  - Warning
  - Auto
  - Manual and stop
- 320 x 240 pixels graphic LED backlight LCD.
- Four tactile feel membrane switches for LCD defined operation. The functions of these switches are defined dynamically on the LCD.
- Seven tactile feel membrane switches dedicated screen navigation buttons for up, down, left, right, ok, home and cancel.
- Six tactile feel membrane switches dedicated to control for auto, stop, manual, manual start, fault reset and lamp test/panel lamps.
- Two tactile feel membrane switches dedicated to control of circuit breaker (where applicable).
- Allows for complete genset control setup.
- Certifications: Suitable for use on generator sets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std., CE and CSA standards.
- LCD languages supported: English, Spanish, French, German, Italian, Greek, Dutch, Portuguese, Finnish, Norwegian, Danish, Russian and Chinese Characters.

Communications connections include:

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

Mechanical Drawing



Software

InPower (beyond 6.5 version) is a PC-based software service tool that is designed to directly communicate to PowerCommand generator sets and transfer switches, to facilitate service and monitoring of these products.

Environment

The control is designed for proper operation without recalibration in ambient temperatures from -40 ºC to +70º C (-40 ºF to 158 ºF) and for storage from -55 ºC to +80 ºC (-67 ºF to 176 ºF). Control will operate with humidity up to 95%, non-condensing.

The HMI is designed for proper operation in ambient temperatures from -20 ºC to +70 ºC (-4 ºF to 158 ºF) and for storage from -30 ºC to +80 ºC (-22 ºF to 176 ºF).

The control board is fully encapsulated to provide superior resistance to dust and moisture. Display panel has a single membrane surface, which is impervious to effects of dust, moisture, oil and exhaust fumes. This panel uses a sealed membrane to provide long reliable service life in harsh environments.

The control system is specifically designed and tested for resistance to RFI/EMI and to resist effects of vibration to provide a long reliable life when mounted on a generator set. The control includes transient voltage surge suppression to provide compliance to referenced standards.

Certifications

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

- NFPA 110 for level 1 and 2 systems.
- ISO 8528-4: 1993 compliance, controls and switchgear.
- CE marking: The CE marking is only valid when equipment is used in a fixed installation application. Material compliance declaration is available upon request.
- UKCA marking: The UKCA marking is only valid when equipment is used in a fixed installation application. Material compliance declaration is available upon request.
- EN50081-1,2 residential/light industrial emissions or industrial emissions.
- EN50082-1,2 residential/light industrial or industrial susceptibility.
- ISO 7637-2, level 2; DC supply surge voltage test.
- Mil Std 202C, Method 101 and ASTM B117: Salt fog test.
- UL 6200 recognized and suitable for use on UL 2200 Listed generator sets.
- CSA C282-M1999 compliance
- CSA 22.2 No. 14 M91 industrial controls.
- PowerCommand control systems and generator sets are designed and manufactured in ISO 9001 certified facilities.

Warranty

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

PCCNet COMPATIBLE

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

Our energy working for you.™

PDS-1569 | PD00000157 | (02/22)

Sound data
C70 N6 60 Hz

Sound pressure level @ 7 meters, dB(A)

See notes 1-6 listed below

Configuration		Position (note 1)								8 Position average
		1	2	3	4	5	6	7	8	
Standard – unhoused	Infinite exhaust	74.6	78.8	77.4	80.7	77.1	80.9	78.6	78.7	78.7
F216-2 weather protective enclosure, aluminium	Mounted	76.7	80.8	79.3	82.8	79.7	82.4	79.6	79.8	80.5
F231-2 sound attenuated level 1 enclosure, aluminium	Mounted	74.5	73.8	69.5	72.1	72	71.9	69.4	74.6	72.6
F217-2 sound attenuated level 2 enclosure, aluminium	Mounted	70	71.2	68.6	70.6	70.6	70.5	67.5	71.4	70.2

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	
Standard – unhoused	Infinite exhaust	53.8	70.3	81.5	90.6	99.2	101.2	101.0	95.9	91.6	106.1
F216-2 weather protective enclosure, aluminium	Mounted	55.4	89.6	96.6	93.2	100.2	100.3	99.2	96.1	93.5	106.4
F231-2 sound attenuated level 1 enclosure, aluminium	Mounted	56.8	73.1	82.1	88.8	95.7	96.4	95.2	91.5	86.7	101.6
F217-2 sound attenuated level 2 enclosure, aluminium	Mounted	56.7	72.7	82.0	87.0	94.0	92.3	90.5	87.1	82.8	98.3

Exhaust sound power level, dB(A)

See note 2 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	
	41.3	78.0	86.2	84.9	94.7	95.0	96.2	98.8	96.9	103.8

Note:

1. Position 1 faces the generator front per ISO 8528-10. The positions proceed around the generator set in a counter-clockwise direction in 45° increments. All positions are at 7 m (23 ft) from the surface of the generator set and 1.2 m (48 in) from floor level.
2. Sound levels are subject to instrumentation, measurement, installation and manufacturing variability.
3. Data based on full rated load.
4. Sound data for generator set with infinite exhaust do not include exhaust noise.
5. Sound pressure levels are measured per ANSI S1.13 and ANSI S12.18, as applicable.
6. Reference sound pressure is 20 µPa.
7. Sound power levels per ISO 3744 and ISO 8528-10, as applicable.
8. Reference power = 1 pw (10^{-12} W).
9. Exhaust sound power levels are per ISO 6798, as applicable.

2023 EPA Exhaust Emission Compliance Statement
C70 N6
Standby
60 Hz Spark Ignited Generator Set

Compliance Information:

The engine used in this generator set complies with U.S. EPA emissions regulations under the provisions of 40 CFR Part 60, Stationary Emergency Spark-Ignited emissions limits when tested per ISO 8178 D1.

Engine Manufacturer:	Cummins Inc.
EPA Certificate Number:	PCEXB05.9ALB-006
Effective Date:	07/25/2022
Date Issued:	07/25/2022
EPA Engine Family (Cummins Emissions Family):	PCEXB05.9ALB

Engine Information:

Model:	QSJ5.9G-G3	Bore:	4.02 in. (102 mm)
Engine Nameplate HP:	113.6	Stroke:	4.72 in. (120 mm)
Type:	4 Cycle, In-Line, 6 Cylinder	Displacement:	359.0 cu. in. (6 liters)
Aspiration:	Turbocharged and Aftercooled	Compression Ratio:	8.5:1
Emission Control Device:	Electronic Air/Fuel Ratio Control and Closed-Loop Breather System	Exhaust Stack Diameter:	4.0 in (102 mm)

U.S. Environmental Protection Agency Station Emergency SI Emission Limits

	Grams per BHP-hr			Grams per kWm-hr		
Natural Gas	**NOx**	**VOC**	**CO**	**NOx**	**VOC**	**CO**
EPA Emissions Limit	2.0	1.0	4.0	2.7	1.3	5.4

	Grams per BHP-hr			Grams per kWm-hr		
Propane (LP)	**NOx**	**VOC**	**CO**	**NOx**	**VOC**	**CO**
EPA Emissions Limit	2.0	1.0	4.0	2.7	1.3	5.4

Tests conducted using alternate methods, instrumentation, fuel or reference conditions can yield different results.

Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may result in elevated emission levels.

Cummins Sales and Service

ACCESSORIES

Making people's lives better by powering a more prosperous world.

CUMMINS / ONAN BATTERY PROGRAM

Specifications:

Part Number	Cold Cranking Amps	Voltage	Length "	Width "	Height "	SAE Type	Shipping Weight lbs
G78DT72	850	12	10.2	7	8	34/78 DT	39

Note: All batteries are shipped wet & charged.

SENS®

MicroGenius®

Genset Battery Chargers

12 & 24 Volts, 6 to 60 Amps

Small. Powerful. Rugged.

Hardened switchmode powertrain - delivers first-class abuse resistance and energy efficiency
Patented charging algorithms - recharge faster and more safely; cut risk of sudden battery failure
UL Listed for emergency generators - from 6 to 60 amp output
Tested to high vibration levels - survive harsh genset duty
Standard J-1939 and Modbus communications - facilitate genset and building integration
Small, lightweight packages - enable installation in smaller spaces

c UL US LISTED CE BC

SENS® STORED ENERGY SYSTEMS

Robust reliability. More power in less space.

SENS MicroGenius advanced technology genset battery chargers deliver from 6 to 60 amps at 12 or 24 volts.

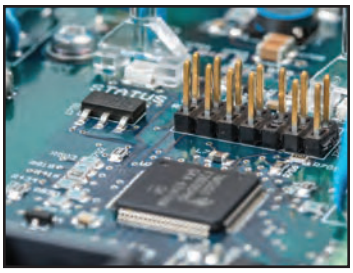
MicroGenius is the only family of genset chargers that meets all modern battery charging and energy efficiency regulations.

- UL listed to category BBHH required for "Emergency Generators"
- Legal for sale under California and Oregon energy efficiency regulations
- All units survive harsh EN 60068 standard vibration abuse at the 4G level

State-of-the-art features

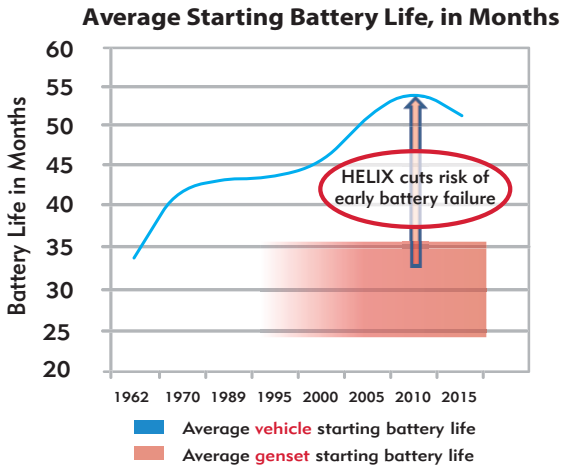
Patented Dynamic Boost™ charging

Dynamic Boost charges batteries faster and more completely than similarly rated conventional chargers, but with lower risk of overcharge.



Safer, more reliable battery performance

Revolutionary HELIX™ (High Efficiency, LIfe-eXtending) technology from SENS reduces the risk of both early and catastrophic genset battery failures.



UL listed for emergency and standby generator duty

MicroGenius chargers rated 6 through 60A output are UL listed to category code BBHH "Emergency & Standby Generators"

UL ONLINE CERTIFICATIONS DIRECTORY

BBHH.EX6409
Battery Chargers for Engine-driven Emergency and Standby Power

Dependable modular architecture

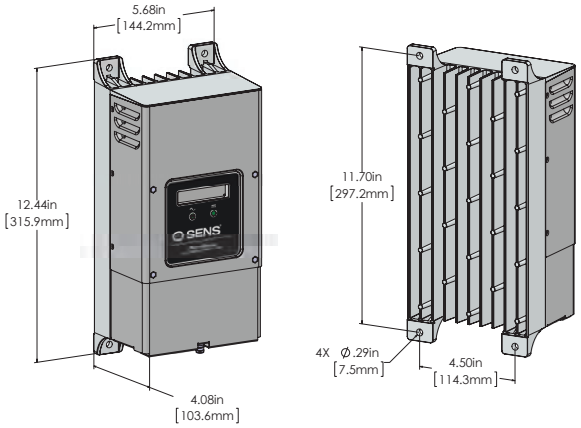
MicroGenius S2 and S4 employ multiple MicroGenius 450 chargers that enable either higher current output, internal redundancy or multiple outputs.

SENS®
STORED ENERGY SYSTEMS

MicroGenius 2

6.0 lbs. (2.8 kg)

Choose MicroGenius 2 if your DC current requirement is ≤15A



Specifications for MicroGenius 2: 6A to 15A Output

		MicroGenius 180	MicroGenius 300	MicroGenius 450
AC input	VAC, Hz	90-265[1] VAC, 47-63 Hz		
	Protection	Supplementary overcurrent protection fuse, transient protected to EN 61000-4-5 level 4		
	Power factor & efficiency	PF >.95 typical; efficiency to 93%; meets CEC Title 20 Efficiency Regulations; standby AC draw < 3W		
DC output	Volts, amps	12V/24V nom., 10A/6A	12V/24V nom., 12A/10A	12V/24V nom., 15A/15A (24V, 12A max below 170 VAC)
	Charging modes	Multi-stage, including float, boost and two additional HELIX voltages in flooded lead-acid battery program		
	Current limit	Factory set at 100% of rating. Field adjustable w/optional keypad or from PC.[2]		
	Charging characteristic	Constant voltage, current limited; patented Dynamic Boost control and HELIX (when FLA battery is selected)		
	Line & load regulation	±0.5%		
	Output ripple	< 30 mVrms with or without battery. Delivers fast-responding, stable, well-filtered DC without battery.		
	Battery temp. compensation	Standard. Optional remote battery temperature probe.[3]		
	Output protection	Current limit, supplementary overcurrent protection fuse, transient protected		
	Dead battery charge	Starts into, and recharges zero volt battery without user intervention		
	Parallel operation	Two or more chargers operate with all modes synchronized for increased current or fault tolerance[4]		
Adjustment & Controls	Charge mode control	Fully automatic patented Dynamic Boost system (VRLA or ultracap charging program disables boost mode). Manually initiated timed boost & commissioning modes available with keypad option.[5]		
	Adjustments	12 or 24-volt; battery type program; fine voltage setting; alarm setpoints; alarm relay mapping		
	Battery type programs	Flooded lead-acid, AGM or Ni-Cd for engine starting; VRLA for reserve power; ultracapacitor		
	Field voltage adjustment	3 methods: jumper pins, from front panel keypad[5] or from PC[2]		
Status display	LEDs	Two multi-color front panel status LEDs		
	Metering & status display	Optional. Voltmeter accurate to +2%; ammeter to +5%; 20-character display of status & alarm messages.[6]		
Alarms	Alarms	Factory set, field reconfigurable. Alarm functions announced on the J-1939 and Modbus ports and on the optional LCD include summary, AC fail, charger fail, high DC volts, low DC volts, low cranking volts, overvoltage shutdown, reverse polarity battery, incompatible battery, invalid settings, I/O bus inactive, thermal fold back, no temperature probe, current limiting, ground fault and low current. Any alarm is assignable to Form C contacts.		
	Alarms: Form C contacts	Optional. Two[7] or five[8] Form C contacts, each rated 30V, 2A resistive, assignable. Standard configuration includes summary, AC fail, charger fail, high DC volts, low DC volts and low cranking volts.		
Networking	J-1939 communications	CAN 2.0 extended ID on RJ-45 port		
	Modbus communications	Modbus RS-485 on RJ-45 port		
	SENSbus	Proprietary bus for connection of paralleled chargers and SENS accessories		
Environmental	Operating temperature[9] (convection cooled)	-40C to +70C; full spec from -40C to +60C	-40C to +70C; full spec from -40C to +50C	-40C to +70C; full spec from -40C to +40C
	Humidity	5% to 95%, non-condensing		
	Ingress protection	IP 22; NEMA 3R; UL Listed "Rainproof"		
	Vibration & shock resistance	Vib: Swept Sine (EN60068-2-6): 4G, 18-500 Hz, 3 axes. Random: 20-500Hz, .01G²/Hz. Shock: EN 60068-2-27 (15G)		
	Electrical transient	ANSI/IEEE C62.41 & EN 61000-4-12 on power terminals		
Abuse protection	Reverse polarity	Charger self-protects without fuse clearing. Indication via LED & optional LCD.		
	Wrong voltage battery	Charger-battery voltage mismatch shuts down charger. Indication via LED & optional LCD.		
	Overvoltage shutdown	Selective; shutdown only operates if charger causes the overvoltage condition		
	Overtemperature protection	Gradual output power reduction if heatsink temperature becomes excessive		
Regulatory compliance	North America	C-UL Listed for US & Canada: UL 1236 categories BBGQ, BBHH, BBJY and QWIR[10], CSA 22.2, No. 107.2. Certified to UL 1236 supplements SB (marine), SC (fire pump) and SE (emergency generator).		
		NFPA-70, NFPA-110[11]		
		FCC Part 15, Class B		
		Seismic: Rigid & non-structure wall mount; max S_{DS} of 2.5G. IBC 2000-2015, Calif. BC 2007-2016		
		American Bureau of Shipping, type approved		
	European Union (CE)	EMC: 2014/30/EU (EN 61000-6-2 & EN 61000-6-4)		
		LVD: 2014/35/EU (EN 60335-1 & EN 60335-2-29)		
		RoHS 2: 2011/65/EU (EN 50581)		
Construction	Housing/configuration	Die-cast aluminum heatsink base with stainless steel covers & fasteners		
	Connections	AC & DC terminal blocks: 20 to 10 AWG. J-1939 and Modbus-485: RJ-45. Form C alarms: 28 to 16 AWG		

1 When set for 24-volt output, full 15A output of 450W available above 170 VAC input, 12A output current max between 100 VAC and 170 VAC input 2 Requires optional computer to charger adapter SENS p/n 209254 plus free SENS software available at www.sens-usa.com 3 Remote battery temp sensor is optional. Order SENS p/n 209481 4 Requires standard RJ-45 network cable to connect paralleling bus. Order SENS p/n 208118-72 (72-inch length) or 208118-180 (180-inch length) 5 Requires that digit 12 of the model number be F 6 Requires that digit 12 of the model number be D, E, or F 7 Models with E as digit 12 of the model number include 2 ea. Form C alarm contacts 8 Models with D or F as digit 12 of the model number include 5 ea. Form C alarm contacts 9 At 65 deg. C and above the LCD display may be unreadable and display life will be reduced 10 Except 180W unit in 24V configuration, which is not listed to QWIR 11 All chargers equipped with an alarm / display board meet NFPA-110 requirements. For chargers without an alarm / display board to meet NFPA-110, charger volts, amps and charger fail alarm available on the J-1939 port must be annunciated by the genset control panel.

SENS®
STORED ENERGY SYSTEMS

How To Order MicroGenius 2

M3-22-1210-D

Product Type	Power	-	Output Volts	-	Output Current	-	Alms & Comms	Adapter & RTS
M	4	-	22	-	1515	-	F	N
A	B		C		D		E	F

	Parameter	Code	Value
A	Product Family	M	MicroGenius 2
B	Power	1	180W
		3	300W
		4	450W
C	Output Voltage	22	12/24V
D	Output Current	~~1006~~	10A @ 12V; 6A @ 24V (180W only)
		1210	12A @ 12V; 10A @ 24V (300W only)
		1515	15A @ 12V; 15A @ 24V (450W only)
E	Alarm & Communication Options	A	Base model; includes J-1939 & Modbus communications
		D	Base model + LCD display + 5 ea. Form C alarm relays
		E	Base model + LCD display + 2 ea. Form C alarm relays
		F	Base model + LCD + 5 ea. Form C relays + keypad control
F	Adapter Plate & Remote Temperature Sensor Options	F	FC to MicroGenius 2 adapter plate (enclosed charger only)
		G	MicroGenius 150 to MicroGenius 2 adapter plate (enclosed charger only)
		L	LC to MicroGenius 2 adapter plate (enclosed charger only)
		N	NRG10 to MicroGenius 2 adapter plate (enclosed charger only)
		T	Remote Temperature Sensor shipped with charger

How To Order MicroGenius S2 & S4

Product Type	Enclo-sure	-	Protect. Options	Comms	Config	-	Port A Code	Port A Redun.	Port B Code	Port B Redun.	Port C Code	Port C Redun.	Port D Code	Port D Redun.
S	4	-	C	1	0	-	H	0	0	0	0	0	0	0
A	B		C	D	E		F							

Contact the factory to configure chargers with multiple outputs or internal redundancy.

	Parameter	Code	Value
A	Product Family	S	MicroGenius S
B	Enclosure	2	S2 chassis
		4	S4 chassis
C	AC & DC protection configuration	A	Standard, no circuit breakers
		B	AC and DC circuit breakers (S4 only)
		C	AC and DC breakers plus supplementary surge protection (S4 only)
D	Communications	0	J-1939 and Modbus RS-485
		1	J-1939 and Modbus TCP/IP
		2	J-1939 and Modbus RS-485 with RJ-45 to terminal block adapter
		3	J-1939 and Modbus TCP/IP with RJ-45 to terminal block adapter
E	Configuration	0	Standard
		R	19" rack mount ears (S4 only)
		T	23" rack mount ears (S4 only)
F	Output Current	A	15A (S4 only)
		B	20A (S2 only)
		D	30A (S2 or S4)
		F	45A (S4 only)
		H	60A (S4 only)

Contact SENS or your local sales representative for additional specification, engineering and installation information, or visit SENS' website for latest available data. Specification subject to change without notice.

Contact Information

Sales 1.866.736.7872 • 303.678.7500 • Fax 303.678.7504 • info@sens-usa.com • **www.sens-usa.com**
Stored Energy Systems, LLC 1840 Industrial Circle, Longmont, CO 80501 USA

PowerPact™ H-, J-, and L-Frame Circuit Breakers

HDL36125

SQUARE D™

by Schneider Electric

Catalog Numbering

Table 1: Circuit Breaker Catalog Numbers

Segment	Character	Description	—	H	D	L	3	6	125	~~W~~	~~T~~	—	— — — — —
Brand	—	Square D											
	N	Schneider Electric											
Frame	H	H-Frame											
	J	J-Frame											
	L	L-Frame											
Performance Level (kA)	See Table 2												
Terminations	L	Lugs Line/Load Side											
	M	Lugs Line Side											
	P	Lugs Load Side											
	F	Bus Bar											
	A	A-Line											
	S	Rear Connected											
	N	Plug-in											
	D	Drawout											
	K	Reverse I-Line											
Poles	2	Two Pole											
	3	Three Pole											
	4	Four Pole											
Voltage	6	600 V											
	4	480 V											
Amperage	060	60 A											
	100	100 A											
	150	150 A											
	250	250 A											
	400	400 A											
	600	600 A											
	000	Switch or Frame Only											
Mission Critical	W	(J- and L-frame with D, G, J and L-interrupting ratings											
Trip Unit	See Table 3												
I-Line Phasing													
Accessory Suffix Code	See Table 4												

Table 2: Interrupting Rating

	UL® / CSA® / NOM®					IEC 647-2 Icu/Ics					
	240 Vac	480 Vac	600 Vac	250 Vdc[1]	500 Vdc[2]	220/240 Vac	380/440/415 Vac	500/525 Vac	690 Vac	250 Vdc[1]	500 Vdc[3]
D	25 kA	18 kA	14 kA	20 kA	—	25/25 kA	18/18 kA	14/14 kA	—	20 kA	20 kA
G	65 kA	35 kA	18 kA	20 kA	20 kA	65/65 kA	35/35 kA	18/18 kA	—	20 kA	20 kA
J	100 kA	65 kA	25 kA	20 kA	—	100/100 kA	65/65 kA	25/25 kA	—	20 kA	20 kA
L	125 kA	100 kA	50 kA	20 kA	50 kA	125/125 kA	100/100 kA	50/50 kA	—	20 kA	20 kA
R	200 kA	200 kA	100 kA	—	—	150 kA	125 kA	75 kA	20 kA	—	—

1 250 Vdc ratings only available with PowerPact H or J circuit breakers with thermal-magnetic trip units (not including MCP).

2 UL 500 Vdc ratings only available with PowerPact H-, J-, and L-frame circuit breakers with thermal-magnetic trip units (not including MCP).

3 IEC 500 Vdc rating only available on PowerPact J-frame circuit beakers.

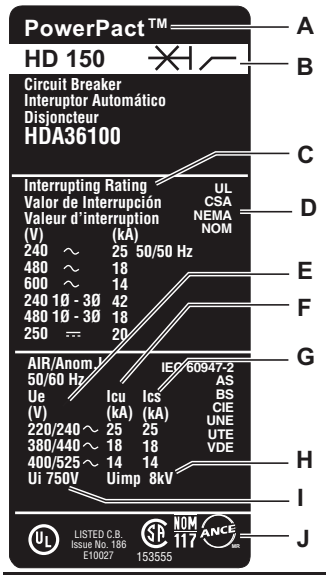
Table 3: Trip Unit Numbering

Trip Unit Type	Character	Description
Micrologic Trip Units	U31 X	LI Standard Protection
	U33X	LSI Standard Protection
	U43X	LSI plus Ammeter
	U44X	LSIG plus Ammeter
	U53X	LSI plus Energy Management
	U54X	LSIG plus Energy Management
	M37X	Magnetic Only (L-Frame Only)
	M38X	Motor Protector Circuit Breaker
	S40X	400 A Molded Case Switch (L-Frame Automatic Switch)
	S60X	600 A Molded Case Switch (L-Frame Automatic Switch)
	F40	400 A L-Frame Only (No Trip Unit)
	F60	600 A L-Frame Only (No Trip Unit)
Thermal-Magnetic Trip Units	—	Standard Fixed Trip Unit (Suitable for reverse connection)
	F06	60 A H-Frame Only (No trip unit)
	F15	150 A H-Frame Only (No trip unit)
	F25	250 A J-Frame Only (No trip unit)
	T	Complete Circuit Breaker (Frame + removable trip unit)
	S15	150 A Molded Case Switch (H-Frame automatic switch)
	S17	175 A Molded Case Switch (J-Frame automatic switch)
	S25	250 A Molded Case Switch (J-Frame automatic switch)
	C	100% Rated Continuous Current Rating[1]
	M71	30 A H-Frame Motor Circuit Protector (MCP)
	M72	50 A H-Frame Motor Circuit Protector (MCP)
	M73	100 A H-Frame Motor Circuit Protector (MCP)
	M74	150 A H-Frame Motor Circuit Protector (MCP)
	M75	250 A J-Frame Motor Circuit Protector (MCP)
	D81	500 Vdc 150–175 A J-Frame Molded Case Circuit Breaker
	D82	500 Vdc 200–250 A J-Frame Molded Case Circuit Breaker
	D87	500 Vdc 30–70 A H-Frame Molded Case Circuit Breaker
	Dxx	500 Vdc 300A–1200A L-Frame Molded Case Circuit Breaker (Refer to Table 9 for details)
	R	100% Rated Continuous Current Rating Complete Circuit Breaker (frame + removable trip unit)

[1] 100% ratings valid for:
Three-pole H/J frame unit mount and busbar connection
Three-pole/four-pole L-frame 250 A and 400 A unit mount
Three-pole L-frame 250 A and 400 A I-Line

General Characteristics

Faceplate Label



Characteristics indicated on the faceplate label:

A. Circuit breaker type
B. Circuit breaker disconnector symbol
C. Performance levels
D. Standards
E. Ue: Operating voltage per IEC
F. Icu: Ultimate breaking capacity per IEC
G. Ics: Service breaking capacity per IEC
H. Uimp: Rated impulse withstand voltage per IEC
I. Ui: Insulation voltage per IEC
J. Certification marks

NOTE: When the circuit breaker is equipped with an extended rotary handle, the door must be opened to view the faceplate.

Codes and Standards

H-, J-, and L-frame circuit breakers, automatic switches and electronic motor circuit protectors are manufactured and tested in accordance with the following standards.

NOTE: Apply circuit breakers according to guidelines detailed in the National Electric Code (NEC) and other local wiring codes.

Table 8: Codes and Standards (Domestic)

PowerPact H-, J-, and L-Frame Circuit Breakers	H-, J-, and L-Frame Switches	PowerPact H-, J-, and L-Frame Motor Circuit Protectors
UL 489[1]	UL 489[3]	UL 508
IEC 60947-2	IEC 60947-3	IEC 60947-2
CSA C22.2 No. 5[2]	CSA C22.2 No. 5[4]	CSA C22.2 No. 14
Federal Specification W-C-375B/GEN	Federal Specification W-C-375B/GEN	NEMA AB1
NEMA AB1	NEMA AB1	CCC
NMX J-266	NMX J-266	CE Marking
CCC	CE Marking	
CE Marking		

1 PowerPact H- and J-frame circuit breakers are in UL File E10027. PowerPact L-frame circuit breakers are in UL File E63335.

2 PowerPact H- and J-frame circuit breakers are in CSA File LR40970. PowerPact L-frame circuit breakers are in CSA File 69561.

3 PowerPact H- and J-frame switches are in UL File E87159.

4 PowerPact H- and J-frame switches are in CSA File LR32390.

Table 11: Circuit Breakers

Circuit Breaker		150 A H-Frame					250 A J-Frame					400 A L-Frame					600 A L-Frame					1200 A L-Frame	
Circuit Breaker Type		HD	HG	HJ	HL	HR	JD	JG	JJ	JL	JR	LD	LG	LJ	LL	LR	LD	LG	LJ	LL	LR	LG	LL
Number of poles[1]		2	3			3	2, 3				3	3, 4					3, 4					4	
Amperage Range (A)		15-150					70-250					70-400					200-600					700-1200	
UL 489 Circuit Breaker Ratings																							
Breaking Capacity (AIR) UL/CSA/NOM (kA rms)	240 Vac	25	65	100	125	200	25	65	100	125	200	25	65	100	125	200	25	65	100	125	200	—	—
	480 Vac	18	35	65	100	200	18	35	65	100	200	18	35	65	100	200	18	35	65	100	200	—	—
	600 Vac	14	18	25	50	100	14	18	25	50	100	14	18	25	50	100	14	18	25	50	100	—	—
	250 Vdc[2]	20	20	20	20	—	20	20	20	20	—	—	—	—	—	—	—	—	—	—	—	—	—
	500 Vdc[2, 3]	—	20	—	50	—	—	20	—	—	50	—	20	—	—	50	—	20	—	20	—	20	50
IEC 947-2 Circuit Breaker Ratings																							
Ultimate breaking capacity (Icu) (kA rms)	220/240 Vac	25	65	100	125	150	25	65	100	125	150	25	65	100	125	150	25	65	100	125	150	—	—
	380/415 Vac	18	35	65	100	125	18	35	65	100	125	18	35	65	100	125	18	35	65	100	125	—	—
	440/480 Vac	18	35	65	100	125	18	35	65	100	125	18	35	65	100	125	18	35	65	100	125	—	—
	500/525 Vac	14	18	25	50	75	14	18	25	50	75	14	18	25	50	75	14	18	25	50	75[4]	—	—
	690 Vac	—	—	—	—	20	—	—	—	—	20	—	—	—	—	20	—	—	—	—	20	—	—
	250 Vdc[2]	—	—	—	—	—	20	20	20	20	—	—	—	—	—	—	—	—	—	—	—	—	—
	500 Vdc[2, 3]	—	—	—	—	—	20	20	20	20	—	—	—	—	—	—	—	—	—	—	—	—	—
Service breaking capacity (Ics)	% Icu	100%					100%					100%					100%					—	—
Insulation Voltage	V_i	750 Vac					750 Vac					750 Vac					750 Vac					—	—
Impulse Withstand Voltage	V_{imp}	8 kVac					8 kVac					8 kVac					8 kVac					—	—
Operational Voltage	V_e	690 Vac					690 Vac					690 Vac					690 Vac					—	—
Sensor Rating	I_n	150 A					250 A					400 A					600 A					—	—
Utilization Category	—	A					A					A					A					—	—
Operations (Open-Close Cycles)																							
Without Current		4000					5000					5000					5000					—	
With Current		4000					1000					1000					1000					—	
Protection and Measurements																							
Short-circuit protection	Magnetic only	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Overload/short-circuit protection	Thermal-magnetic	X	X	X	X	X	X	X	X	X	X	—	—	—	—	—	—	—	—	—	—	X	X
	Electronic	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	with neutral protection (Off-0.5-1-OSN)[5]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	with ground fault protection	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	with zone selective interlocking (ZSI)[6]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Display / I, V, f, P, E, THD measurements / interrupted-current measurement		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Options	Front display module (FDM121)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	Operating assistance	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	Counters	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	Histories and alarms	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	Metering Com	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	Device status/control com	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Dimensions / Weight / Connections																							
Dimensions (Three-Pole Unit Mount) in. (mm)	Height	6.4 (163)					7.5 (191)					13.38 (340)					13.38 (340)					13.38 (340)	
	Width	4.1 (104)					4.1 (104)					5.51 (140)					5.51 (140)					5.51 (140)	
	Depth	3.4 (86)					3.4 (86)					4.33 (110)					4.33 (110)					4.33 (110)	
Weight - lb. (Kg)		4.8 (2.2)					5.3 (2.4)					13.2 (6.0)					13.7 (6.2)					13.7 (6.2)	
Connections / Terminations	Unit Mount	X					X					X					X					X	
	I-Line	X					X					X					X					—	
	Rear Connection	X					X					X					X					X[7]	
	Plug-In	X					X					X					X					—	
	Drawout	X					X					X					X					—	
	Optional Lugs	X					X					X					X					—	

1 H and J-frame breakers with Micrologic trip units available only with three poles. The HJ, HL and the J-Frame two pole circuit breakers are three pole modules.

2 DC not available with PowerPact H, J or L-frame circuit breakers with Micrologic trip units.

3 500 Vdc specific catalog numbers, ungrounded UPS systems only.

4 I_{cs} for 600 A L-frame circuit breaker at 525 V is 19 kA.

5 OSN: Over Sized Neutral protection for neutrals carrying high currents (e.g. 3rd harmonics).

6 ZSI using restraint wires.

7 Rear connection is not available for 700–1200 A four pole L-frame circuit breakers.

H- and J-Frame Catalog Numbers

Unit-Mount Circuit Breaker Catalog Numbers

Table 18: PowerPact H-Frame 150 A Unit-Mount[1] Thermal-Magnetic Circuit Breakers (600 Vac, 250 Vdc) with Factory Sealed Trip Unit (Suitable for Reverse Connection)

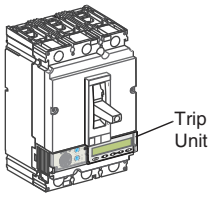
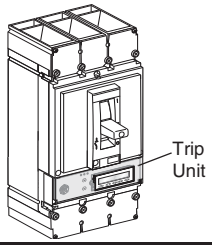
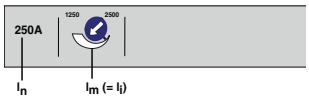
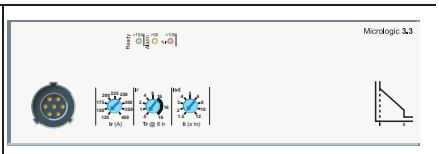
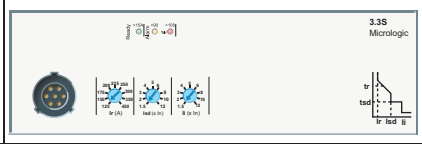
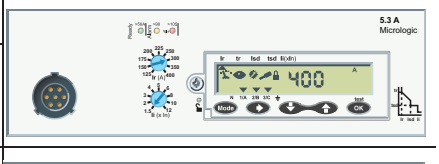
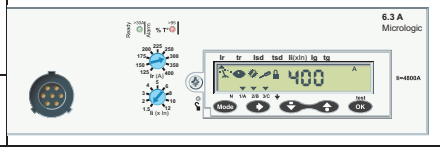
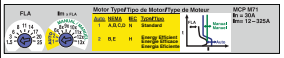
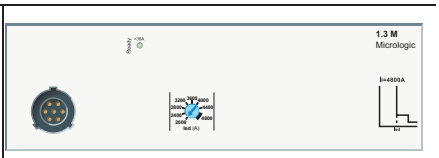
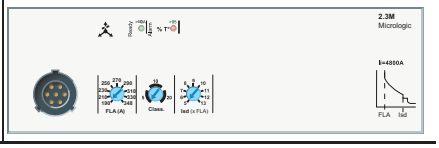
Current Rating at 104°F (40°C)	Fixed AC Magnetic Trip		Interrupting Rating							
			D		G		J[2]		L[2]	
	Hold	Trip	Standard (80%) Rated	100% Rated	Standard (80%) Rated	100% Rated	Standard (80%) Rated	100% Rated	Standard (80%) Rated	100% Rated
H-Frame, 150 A, Two-Pole, 600 Vac 50/60 Hz, 250 Vdc[3]										
15 A	350 A	750 A	HDL26015	HDL26015C	HGL26015	HGL26015C	HJL26015	HJL26015C	HLL26015	HLL26015C
20 A	350 A	750 A	HDL26020	HDL26020C	HGL26020	HGL26020C	HJL26020	HJL26020C	HLL26020	HLL26020C
25 A	350 A	750 A	HDL26025	HDL26025C	HGL26025	HGL26025C	HJL26025	HJL26025C	HLL26025	HLL26025C
30 A	350 A	750 A	HDL26030	HDL26030C	HGL26030	HGL26030C	HJL26030	HJL26030C	HLL26030	HLL26030C
35 A	400 A	850 A	HDL26035	HDL26035C	HGL26035	HGL26035C	HJL26035	HJL26035C	HLL26035	HLL26035C
40 A	400 A	850 A	HDL26040	HDL26040C	HGL26040	HGL26040C	HJL26040	HJL26040C	HLL26040	HLL26040C
45 A	400 A	850 A	HDL26045	HDL26045C	HGL26045	HGL26045C	HJL26045	HJL26045C	HLL26045	HLL26045C
50 A	400 A	850 A	HDL26050	HDL26050C	HGL26050	HGL26050C	HJL26050	HJL26050C	HLL26050	HLL26050C
60 A	800 A	1450 A	HDL26060	HDL26060C	HGL26060	HGL26060C	HJL26060	HJL26060C	HLL26060	HLL26060C
70 A	800 A	1450 A	HDL26070	HDL26070C	HGL26070	HGL26070C	HJL26070	HJL26070C	HLL26070	HLL26070C
80 A	800 A	1450 A	HDL26080	HDL26080C	HGL26080	HGL26080C	HJL26080	HJL26080C	HLL26080	HLL26080C
90 A	800 A	1450 A	HDL26090	HDL26090C	HGL26090	HGL26090C	HJL26090	HJL26090C	HLL26090	HLL26090C
100 A	900 A	1700 A	HDL26100	HDL26100C	HGL26100	HGL26100C	HJL26100	HJL26100C	HLL26100	HLL26100C
110 A	900 A	1700 A	HDL26110	HDL26110C	HGL26110	HGL26110C	HJL26110	HJL26110C	HLL26110	HLL26110C
125 A	900 A	1700 A	HDL26125	HDL26125C	HGL26125	HGL26125C	HJL26125	HJL26125C	HLL26125	HLL26125C
150 A	900 A	1700 A	HDL26150	HDL26150C	HGL26150	HGL26150C	HJL26150	HJL26150C	HLL26150	HLL26150C
H-Frame, 150 A, Three-Pole, 600 Vac 50/60 Hz, 250 Vdc										
15 A	350 A	750 A	HDL36015	HDL36015C	HGL36015	HGL36015C	HJL36015	HJL36015C	HLL36015	HLL36015C
20 A	350 A	750 A	HDL36020	HDL36020C	HGL36020	HGL36020C	HJL36020	HJL36020C	HLL36020	HLL36020C
25 A	350 A	750 A	HDL36025	HDL36025C	HGL36025	HGL36025C	HJL36025	HJL36025C	HLL36025	HLL36025C
30 A	350 A	750 A	HDL36030	HDL36030C	HGL36030	HGL36030C	HJL36030	HJL36030C	HLL36030	HLL36030C
35 A	400 A	850 A	HDL36035	HDL36035C	HGL36035	HGL36035C	HJL36035	HJL36035C	HLL36035	HLL36035C
40 A	400 A	850 A	HDL36040	HDL36040C	HGL36040	HGL36040C	HJL36040	HJL36040C	HLL36040	HLL36040C
45 A	400 A	850 A	HDL36045	HDL36045C	HGL36045	HGL36045C	HJL36045	HJL36045C	HLL36045	HLL36045C
50 A	400 A	850 A	HDL36050	HDL36050C	HGL36050	HGL36050C	HJL36050	HJL36050C	HLL36050	HLL36050C
60 A	800 A	1450 A	HDL36060	HDL36060C	HGL36060	HGL36060C	HJL36060	HJL36060C	HLL36060	HLL36060C
70 A	800 A	1450 A	HDL36070	HDL36070C	HGL36070	HGL36070C	HJL36070	HJL36070C	HLL36070	HLL36070C
80 A	800 A	1450 A	HDL36080	HDL36080C	HGL36080	HGL36080C	HJL36080	HJL36080C	HLL36080	HLL36080C
90 A	800 A	1450 A	HDL36090	HDL36090C	HGL36090	HGL36090C	HJL36090	HJL36090C	HLL36090	HLL36090C
100 A	900 A	1700 A	HDL36100	HDL36100C	HGL36100	HGL36100C	HJL36100	HJL36100C	HLL36100	HLL36100C
110 A	900 A	1700 A	HDL36110	HDL36110C	HGL36110	HGL36110C	HJL36110	HJL36110C	HLL36110	HLL36110C
125 A	900 A	1700 A	HDL36125	HDL36125C	HGL36125	HGL36125C	HJL36125	HJL36125C	HLL36125	HLL36125C
150 A	900 A	1700 A	HDL36150	HDL36150C	HGL36150	HGL36150C	HJL36150	HJL36150C	HLL36150	HLL36150C

1 Standard lug kit: AL150HD. Terminal wire range: 14–3/0 AWG Al or Cu.

2 UL Listed/CSA Certified as current-limiting circuit breakers.

3 HD and HG circuit breakers are true two-pole construction.

Table 62: Trip Unit Availability

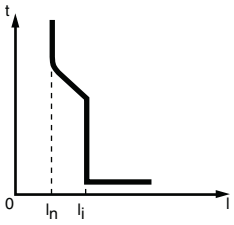
Trip Unit Type	Trip Unit	H-, J-Frame	Trip Unit	L-Frame
				
Distribution Protection Thermal-Magnetic	T-M		N/A	
Distribution Protection LI	Micrologic 3.2 and 3.2-W		Micrologic 3.3 and 3.3-W	
Distribution Protection LSI Fixed ST and LT delays	Micrologic 3.2S and 3.2S-W		Micrologic 3.3S and 3.3S-W	
Distribution Protection LSI + Ammeter	Micrologic 5.2 A and 5.2 A-W		Micrologic 5.3 A and 5.3 A-W	
Distribution Protection LSI + Energy Monitoring	Micrologic 5.2 E and 5.2 E-W		Micrologic 5.3 E and 5.3 E-W	
Distribution Protection LSIG + Ammeter	Micrologic 6.2 A and 6.2 A-W		Micrologic 6.3 A and 6.3 A-W	
Distribution Protection LSIG + Energy Monitoring	Micrologic 6.2 E and 6.2 E-W		Micrologic 6.3 E and 6.3 E-W	
Motor Circuit Protection Magnetic Only	M		N/A	
Motor Protection Micrologic 1 M	N/A		Micrologic 1.3M	
Motor Protection Micrologic 2 M	Micrologic 2.2 M		Micrologic 2.3 M	

NOTE: W = mission critical trip unit.

Protection of Distribution Systems

Thermal-Magnetic Trip Units

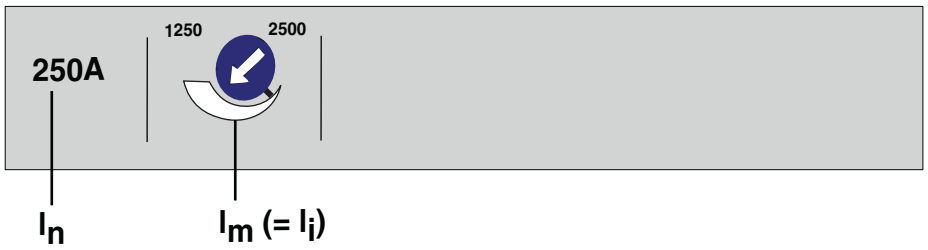
TM thermal-magnetic trip units can be used on PowerPact H and J-frame circuit breakers with interrupting levels D/G/J/L. Thermal-magnetic trip units are available in factory sealed or field-interchangeable constructions.

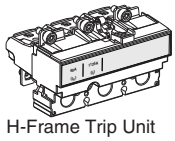


H-Frame Trip Curve

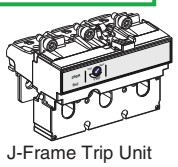
(I_n) Fixed threshold thermal protection against overload

(I_i) **Fixed** threshold instantaneous protection against short circuits





H-Frame Trip Unit



J-Frame Trip Unit

Table 63: H-Frame ~~and J-Frame~~ Three-Pole Field-Installable Thermal-Magnetic Trip Unit

15–60 A H-Frame		70–150 A H-Frame		150–250 A J-Frame	
Amperage	**Cat. No.**	**Amperage**	**Cat. No.**	**Amperage**	**Cat. No.**
15 A	**HT3015**	70 A	**HT3070**	150 A	**JT3150**
20 A	**HT3020**	80 A	**HT3080**	175 A	**JT3175**
25 A	**HT3025**	90 A	**HT3090**	200 A	**JT3200**
30 A	**HT3030**	100 A	**HT3100**	225 A	**JT3225**
35 A	**HT3035**	110 A	**HT3110**	250 A	**JT3250**
40 A	**HT3040**	125 A	**HT3125**	—	—
45 A	**HT3045**	150 A	**HT3150**	—	—
50 A	**HT3050**	—	—	—	—
60 A	**HT3060**	—	—	—	—

Accessory Connections

Electrical accessories are fitted with numbered terminal blocks for wires with the following maximum size:

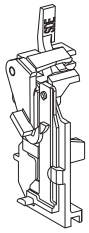
- 16 AWG (1.5 mm^2) for auxiliary switches (OF1 or OF2), and shunt trip (MX) or undervoltage trip (MN)
- 14 AWG (2.5 mm^2) for the motor operator

Auxiliary switch wiring exits fixed mounted devices through a knock-out in the front cover.

NOTE: See page 140 for plug-in and page 142 for drawout options.

Auxiliary and Alarm Indication Contacts

Auxiliary Switch (OF)/
Alarm Switch (SD)



Overcurrent Trip
Switch Actuator (SDE)

Auxiliary indication contacts provide remote information of the circuit breaker status and can thus be used for indications, electrical locking, relays, etc.

Table 88: Auxiliary and Alarm Indication Contacts

Applications	**Open/Closed—Auxiliary Switches (OF)** • Indicates the position of the circuit breaker contacts **Trip Indication—Alarm Switch (SD)** • Indicates that the circuit breaker has tripped due to an overload, short circuit or ground fault, the operation of a shunt trip or undervoltage trip or the "push-to-trip" button • Resets when the circuit breaker is reset **Overcurrent Trip Switch (SDE)** • Indicates that the circuit breaker has tripped due to an overload, short circuit or ground fault • Resets when the circuit breaker is reset The above switches are also available in low-level versions (with gold flash plating) capable of switching very low loads (e.g., for controlling PLCs or electronic circuits) **Rotary Handle Indicator: CAO (early-break) and CAF (early-make)** • Fitted in the rotary handle module (see page 127)
Installation & Connection	• The auxiliary switch (OF), alarm switch (SD), and overcurrent trip switch (SDE) indication contacts snap into cavities behind the front accessory cover of the circuit breaker. • One model serves for all indication functions depending on where it is fitted in the circuit breaker. • The overcurrent trip switch (SDE) in a circuit breaker equipped with a thermal-magnetic or Micrologic 1/2/3 trip unit requires the SDE actuator.
Standards	• The internal accessories comply with requirements of Underwriters Laboratories® Inc. (UL®). • UL 489 and Canadian Standard Association C22.2 No. 5-02 Standards. • All internal accessories are Listed for field installation per UL file E103955 and Certified under CSA file LR 69561. • Auxiliary indicator contacts comply with UL 489, CSA C22.2 No. 5-02 and IEC 60947-5 Standards. "Low-level" indicator contacts are not UL Recognized.

Table 89: Electrical Characteristics

Characteristic	Standard		Low-Level[1]	
Supplied as Standard (Form C)	4		4	
Maximum Number of Contacts	4		4	
Rated Thermal Current	6 A		5 A	
Minimum Load	100 mA at 24 V		1 mA at 4 V	
Operational Current	AC	DC	AC	DC
24 V	6 A	6 A	5 A	5 A
48 V	6 A	2.5 A	5 A	2.5 A
110 V	6 A	0.6 A	5 A	0.6
220/240 V	6 A	—	5 A	—
250 V	—	0.6 A	5 A	0.3 A
380/440 V	6 A	—	5 A	—
480 V	6 A	—	5 A	—
660/690 V	6 A	—	—	—

1 If the maximum voltage and current is exceeded, the low-level function of the switch will be lost but the switch will continue to function as a standard switch.

Table 90: Auxiliary Switch Catalog Numbers

Contacts	Factory-Installed Suffix	Field-Installable Kit No.	Kit Qty.
1A/1B Standard	AA	**S29450**	1
2A/2B Standard	AB	**S29450**	2
1A/1B Low-Level (Gold)	AE	**S29452**	1
2A/2B Low-Level (Gold)	AF	**S29452**	2

Table 91: Alarm/Overcurrent Trip Switch Catalog Numbers

Suffix	Switch	Kit No.	Kit Qty.
PowerPact L-Frame PowerPact H/J-Frame with Micrologic 5/6 trip units			
BC	Alarm Switch	S29450	1
BH	Alarm Switch Low-Level	S29452	1
BD	Overcurrent Trip Switch Standard	S29450	1
BJ	Overcurrent Trip Switch Low-Level	S29452	1
BE	Alarm Switch and Overcurrent Trip Switch, Standard	S29450	2
BK	Alarm Switch and Overcurrent Trip Switch, Low-Level	S29452	2
PowerPact H/J-Frame with Thermal-Magnetic or Micrologic 1/2/3 trip units			
BC	Alarm Switch	S29450	1
BH	Alarm Switch, Low-Level	S29452	1
BD	Overcurrent Trip Switch, Standard SDE Actuator	S29450 S29451	1 1
BJ	Overcurrent Trip Switch, Low-Level SDE Actuator	S29452 S29451	1 1
BE	Alarm Switch and Overcurrent Trip Switch, Standard SDE Actuators	S29450 S29451	2 2
BK	Alarm Switch and Overcurrent Trip Switch, Low-Level SDE Actuators	S29452 S29451	2 2

Table 125: Mechanical Lug Kits for H-Frame and J-Frame Circuit Breakers

	Circuit Breaker Application				Number of Wires Per Lug and Wire Range	Kit Cat. No.	Qty Per Kit
	Standard	Ampere Rating	Optional	Ampere Rating			
Al Lugs for Use with Al or Cu Wire	HD, HG, HJ, HL	15–150 A			(1) 14–3/0 AWG Al or Cu	**AL150HD**	3
	JD, JG, JJ, JL	150–175 A			(1) 4-4/0 AWG Al or Cu	**AL175JD**	3
	JD, JG, JJ, JL	200–250 A	JD, JG, JJ, JL	150–175 A	(1) 3/0–350 kcmil Al or Cu	**AL250JD**	3
Cu Lugs for Use with Cu Wire Only			HD, HG, HJ, HL	15–150 A	(1) 14–2/0 AWG Cu	**CU150HD**	3
			JD, JG, JJ, JL	150–250 A	(1) 1/0–300 kcmil Cu	**CU250JD**	3
Control Wire Terminal for H-frame lug kit						**S37423**	2
Control Wire Terminal for J-frame lug kit						**S37424**	2

Table 126: Mechanical Lug Kits for L-Frame Circuit Breakers[1]

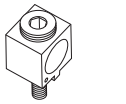
	Circuit Breaker Application				Number of Wires Per Lug and Wire Range[2]	Kit Cat. No.	Qty Per Kit	Type of Terminal Shield[3]
	Ampere Rating	Poles	Unit Mount	I-Line				
Al Lugs for Use with Al or Cu Wire	250	3	X	X	(1) 2 AWG–500 kcmil Al	**AL400L61K3**	3	Short
		4	X	—	(1) 2 AWG–600 kcmil Cu	**AL400L61K4**	4	Medium
	400/600	3	X	—	(2) 2/0 AWG–500 kcmil Al or Cu	**AL600LS52K3[4]**	3	Medium
		4	X	—		**AL600LS52K4[4]**	4	Medium
	400/600	3	X	X	(2) 3/0 AWG–500 kcmil Al or Cu	**AL600LF52K3[4]**	3	Short
Cu Lugs for Use with Cu Wire Only	250/400	3	X	X	(1) 2 AWG–500 kcmil Al	**CU400L61K3**	3	Short
		4	X	—	(1) 2 AWG–600 kcmil Cu	**CU400L61K4**	4	Medium
	400/600	3	X	—	(2) 2/0 AWG–500 kcmil Al or Cu	**CU600LS52K3[4]**	3	Medium
		4	X	—		**CU600LS52K4[4]**	4	Medium
	400/600	3	X	X	(2) 3/0 AWG–500 kcmil Al or Cu	**CU600LF52K3[4]**	3	Short

1 For lug pack information, see Figure 36 on page 177.

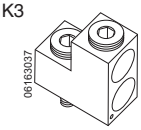
2 For control wire installation, use an 8-32 x 1/4 in. screw (not provided) into tapped control wire hole in lower left hand corner of lug.

3 For terminal shield dimensions, see Figure 36 on page 177.

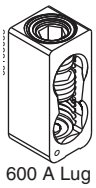
4 Terminal shields are included in mechanical lug kits.



400 A Lug
AL400L6IK3



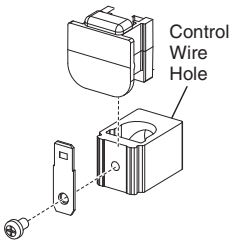
600 A Lug
AL600LS52K3



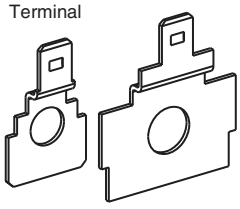
600 A Lug
AL600LF52K3

Voltage Takeoff (Control Wire Terminals) for Mechanical Lugs and Terminal Nuts

Mechanical Lug Control Wire Terminal



Busbar Control Wire Terminal



Powerpact H- and J-Frame mechanical lugs may be equipped with a separate control wire termination. The kit is available factory installed or as a field installable kit. The adaptor is secured underneath the lug and has a tab extension suitable for attachment of a 0.250 inch slip-on connector.

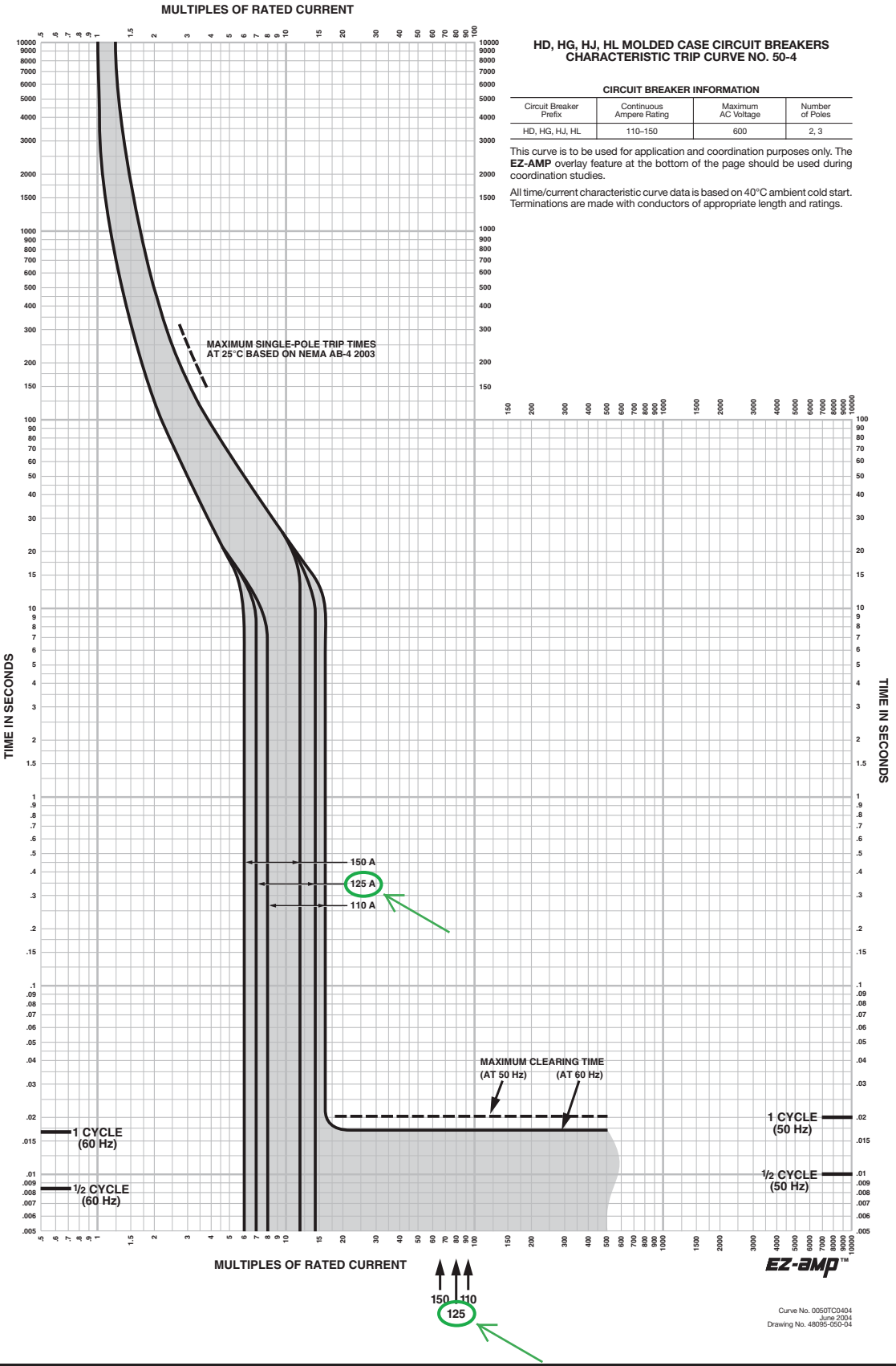
All L-frame mechanical lugs are pre-tapped for control wires. For control wire installation, use an 8-32 x 1/4 in. screw (not provided) into tapped control wire hole in lower left hand corner of the lug.

Fully insulated type connectors must be used to prevent live parts from extending into the wiring gutter area.

Table 127: Control Wire Terminals

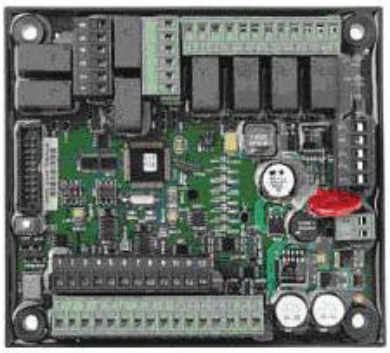
Description	Frame	Cat. No.	Qty Per Kit
Mechanical Lugs			
Control Wire Terminal for H-Frame Lugs	HD/HG/HJ/HL	**S37423**	2
Control Wire Terminal for J-Frame Lugs	JD/JG/JJ/JL	**S37424**	2
Busbar Connection			
Control Wire Terminal for H-Frame Terminal Nut	HD/HG/HJ/HL	**S37429**	2
Control Wire Terminal for J-Frame Terminal Nut	JD/JG/JJ/JL	**S37430**	2

Figure 73: H-Frame 110–150 A (HD, HG, HJ, and HL) Thermal-Magnetic Trip



Specification sheet

PowerCommand® input/output expansion module AUX 101 and AUX 102



Description

The PowerCommand AUX 101 input/output module and the AUX 102 input/output expansion module provide up to sixteen (16) relay output and up to twelve (12) discrete/analog inputs for auxiliary control and monitoring of the power system.

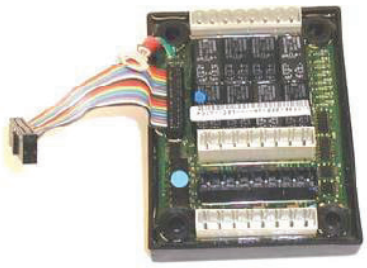
Analog/discrete inputs can be used for system fault expansion and/or generator set metering.

Relay outputs can be used for controlling equipment such as motors, louvers, lamps, fans and pumps. The relays may be configured individually from the genset control operator interface or using InPower™ software.

The AUX 101 and AUX 102 modules are compatible with genset controls supporting a PCCNet network and require a twisted pair connection. This includes the PCC 1301 control.

AUX 101 - Contains eight (8) Form-C relay output sets and eight (8) discrete/analog inputs.

AUX 102 - Easily connects to the AUX 101 to provide an additional eight (8) Form-C relay outputs and (4) additional discrete inputs.



AUX 102 - Expansion

Features

- Up to sixteen (16) configurable Form-C relays provide easy control of system equipment such as lamps, louvers, motors and pumps. LED status of each relay.
- Up to twelve (12) configurable discrete inputs for monitoring equipment status and faults. Equipment status and faults will be annunciated.
- Up to eight (8) analog inputs. Analog inputs can be assigned one of seven preprogrammed functions:
  - Oil temperature
  - Exhaust temperature
  - Fuel level
  - Ambient temperature
  - Alternator RTD
  - Speed bias (for manual paralleling only)
  - Voltage bias (for manual paralleling only)
- Two 5 VDC voltage sources for use with active senders.
- Four programmable current sources for use with resistive senders.
- Two status LEDs:
  - DS1 (green) indicates the AUX 101 is connected to the network and operating normally
  - DS2 (red) indicates the AUX 101 has lost its connection or is not connected to the network
- Device number indicator. Seven segment LED used to uniquely define more than one AUX 101 on the same network.
- May be connected at any point in the PCCNet network.
- Plug-and-play networking - No binding required.
- Pluggable terminal blocks allow easy one-time wiring.
- Less wiring makes installation and system upgrades quick and easy
- PowerCommand controls are supported by a worldwide network of independent distributors who provide parts, service and warranty support.
- UL Listed and labeled; CSA certified; CE and UKCA compliant.

Specifications

Signal requirements

Network connections: RS485, twisted-pair 78 kbps
Control power: 5-40 VDC
Current

- 200 mA typical at 12 V, no active relay
- 100 mA typical at 24 V, no active relay
- 800 mA at 12 V, all relays active

Terminations for control power accept wire up to 16 ga.

Environment

The AUX 101 and AUX 102 are designed for proper operation in ambient temperatures from -40 °C to +60 °C (-40 °F to +140 °F) and for storage from -40 °C to +80 °C (-40 °F to +176 °F). Modules will operate with humidity up to 95%, non-condensing

Relay ratings (AUX 101)

- Normally closed: 3 A at 250 VAC or 30 VDC
- Normally open: 5 A at 250 VAC or 30 VDC

Relay ratings (AUX 102)

- 2 A at 125 VAC, 2 A at 30 VDC

Input ratings (AUX 101)

- Active low inputs
- Maximum voltage 24 VDC (inputs 1 - 6)
- Maximum voltage 40 VDC (inputs 7 - 8)

Network length

Maximum 1219 m (4000 ft)

Approved wiring

Cat 4 or Cat 5 (stranded)

Configurations

All configurations are stored in the main genset control and are modified from the generator set control HMI or using InPower PC software.

Discrete/analog inputs:

Each AUX 101 input can be configured as discrete or analog. AUX 102 inputs are discrete only. Discrete inputs have the following configuration options:

- Active high or active low
- Event, warning or shutdown
- Programmable text (displayed on genset HMI and InPower software)

Analog inputs have a set of predefined functions and can only be configured on certain module inputs. Below is a list of functions and possible module inputs:

- Input 1 - Voltage bias (-3 to +3 VDC)*
- Input 2 - Speed bias (0 to +5 VDC)*
- Inputs 3 – 6
  - Oil temperature
  - Exhaust temperature
  - Ambient air temperature
  - Fuel level
  - Alternator temperature

Inputs are defaulted to disabled

* Please note that speed and voltage bias interfaces are for manual paralleling only and must not be used with automatic paralleling controls.

Relay outputs

Outputs can be configured to energize on occurrence of any event or fault code supported by the genset control. The relay outputs default to the following:

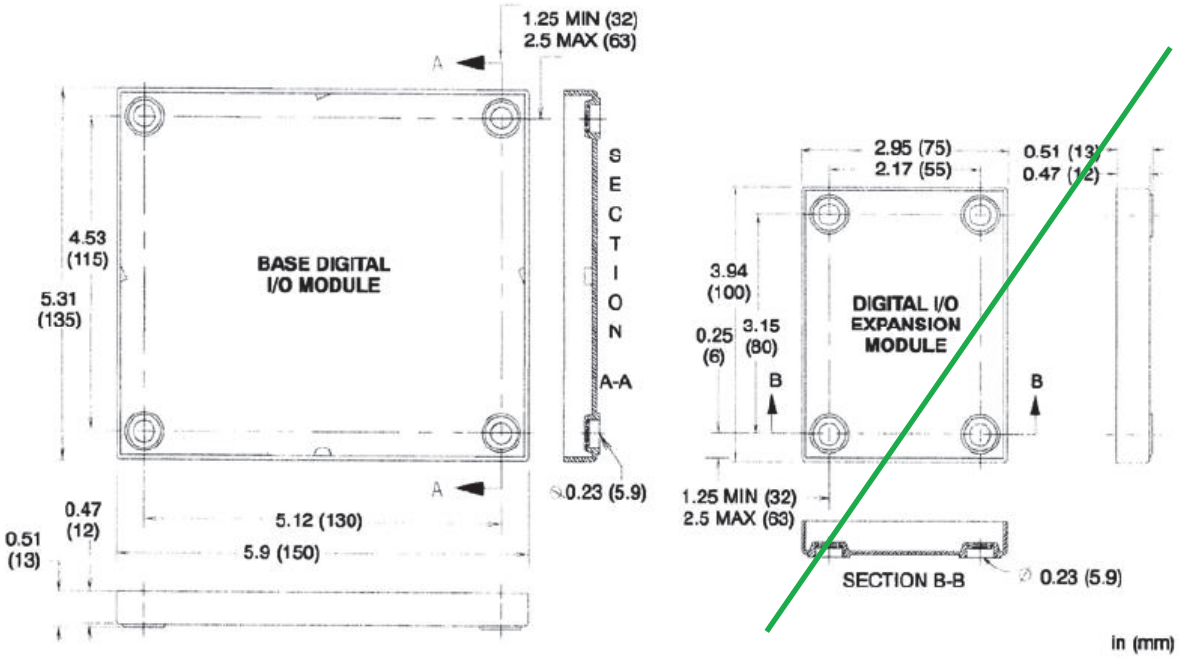
AUX 101

1 - Low oil pressure
2 - High engine temperature
3 - Charger AC failure
4 - Battery (low, weak, high)
5 - Engine overspeed
6 - Fail-to-start
7 - Not-in-auto
8 - Generator set running

AUX 102

9 - Pre-low oil pressure
10 - Pre-high engine temperature
11 - Low coolant level*
12 - Low fuel level*
13 - Low coolant temperature
14 - Common alarm
15 - Not defined
16 - Not defined

Dimensions



Ordering information

Part number	Description
0541-1291	AUX 101 Digital Input/output Module - Base – PCC 1301
0184-0263	AUX 101 Digital Input/output Module - Base – PCC 1301 on DN and GN model generator sets
0630-3142	AUX 102 Digital Input/output Module wiring diagram - Instruction sheet C693
0541-0772	AUX 102 Digital Input/output Module - Expansion

PCCNet logo

Look for this logo on spec sheets of PCCNet compatible devices.

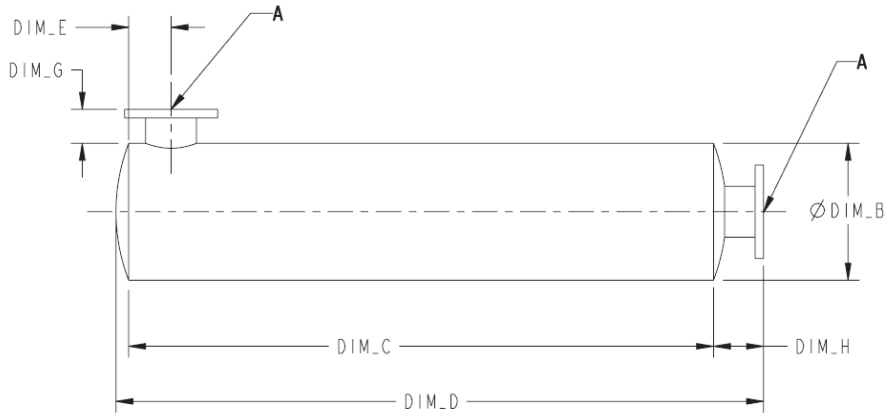
PCCNet COMPATIBLE

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

Our energy working for you.™

S-1503-UKCA-UPDATE (02/22)

Off-Center Side Inlet Mufflers



Industrial – Attenuation Levels 12 -18 dBa

	Dimensions								
Part Number	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**Weight (lbs)**
0155-2340-01	6.0” ASA Flange	14.1	27.0	34.5	5.0	0	4.0	6.0	67
0155-2340-02*	8.0” ASA Flange	18.1	46.0	53.2	8.0	0	4.0	3.9	154
0155-2340-03*	10.0” ASA Flange	22.1	44.0	54.3	9.0	0	4.0	6.4	210
0155-2340-04*	12.0” ASA Flange	22.1	59.0	69.3	11.0	0	4.0	5..9	262
0155-2340-05	5.0” ASA Flange	12.1	31.0	32.5	4.0	0	4.0	4.7	62
0155-2340-06	4.0” NPT	9.0	30.0	35.4	4.0	0	3.0	3.7	34
0155-2340-07	3.0” NPT	8.5	29.0	33.6	3.0	0	3.0	3.1	24
0155-2340-08	2.5” NPT	8.1	26.0	29.9	3.0	0	2.5	3.1	22
0155-2340-09	2.0” NPT	7.6	21.0	24.5	2.5	0	2.0	2.1	14

Residential – Attenuation Levels 18-35 dBa

	Dimensions								
Part Number	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**Weight (lbs)**
0155-2341-01	6.0” ASA Flange	14.1	54.0	61.5	5.0	3.0	4.0	5.7	110
0155-2341-02*	8.0” ASA Flange	22.1	50.0	60.3	8.0	0	4.0	7.0	207
0155-2341-03*	10.0” ASA Flange	22.1	78.1	88.3	8.0	0	4.0	6.9	295
0155-2341-04**	12.0” ASA Flange	26.1	72.0	83.4	9.0	0	4.0	7.5	363
0155-2341-05	5.0” ASA Flange	14.1	40.0	47.5	4.0	2.6	4.0	5.7	84
0155-2341-06	4.0” NPT	10.1	47.0	52.1	4.0	0	3.0	4.0	52
0155-2341-07	3.0” NPT	10.1	36.0	41.1	3.0	1.8	3.0	4.0	39
0155-2341-08	2.5” NPT	9.0	36.0	40.8	3.0	1.5	2.5	3.4	33
0155-2341-09	2.0” NPT	8.1	30.0	33.4	2.5	0	2.0	2.8	22
0155-2341-10*	14.0” ASA Flange	36.1	84.1	97.9	10.0	0	4.0	8.5	792

Critical – Attenuation Levels 25-35 dBa

	Dimensions								
Part Number	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**Weight (lbs)**
0155-2342-01*	6.0” ASA Flange	16.1	69.0	76.4	5.0	3.1	4.0	5.9	180
0155-2342-02*	8.0” ASA Flange	22.1	72.1	82.3	8.0	0	4.0	6.9	255
0155-2342-03*	10.0” ASA Flange	26.1	72.1	83.4	9.0	0	4.0	7.4	387
0155-2342-04*	12.0” ASA Flange	30.1	96.0	108.4	10.0	0	4.0	8.0	610
0155-2342-05	5.0” ASA Flange	14.1	60.0	67.5	4.0	2.6	4.0	5.7	112
0155-2342-06*	4.0” NPT	12.1	55.0	61.2	4.0	1.8	3.0	4.5	82
0155-2342-07	3.0” NPT	11.1	47.0	52.8	3.0	0	3.0	4.3	58
0155-2342-08	2.5” NPT	10.1	45.0	49.3	3.0	0	2.5	3.5	50
0155-2342-09	2.0” NPT	9.0	38.0	42.4	2.5	0	2.0	3.0	34
0155-2342-10*	14.0” ASA Flange	42.3	96.0	111.6	10.0	0	4.0	9.5	1290

** Parts are special use or sale order; manual allocation*
***Part is not orderable from Fridley or a PDC. Part number needs to be ordered from SR Sales*

LPG regulators

Gas pressure regulators with an internal relief valve. Not for use with LPG liquid.

Part number	Maximum capacity	NPT pipe size		Inlet pressure	Outlet pressure	Orifice size
		In	Out			
0148-0033	190 ft³/h	1/4"	1/2"	To 250 psi	6 oz/in²	9/64"
0148-0343	1800 ft³/h	1-1/4"	1-1/4"	to 25 psi	6 oz/in²	1/2"
0148-0363	7750 ft³/h	1-1/2"	1-1/2"	to 25 psi	6 oz/in²	1"
0148-0597		3/4"	3/4"		3-1/2" to 5" H20	
0148-0637		3/4"	3/4"		3-1/2" to 5" H20	
0148-0948	550 ft³/h	1/2"	3/4"	to 200 psi	6 oz/in²	1/4"
0148-1202		1"	1"		3-1/2" to 5" H20	
0148-1231		3/4"	3/4"		3-1/2" to 5" H20	

Note: Part number 0148-0597 natural gas regulator can be converted to a 0148-0637 LPG vapor regulator by removing spring (0148-0952) and mounting with spring housing down.

Fuel strainers - liquid or vapor withdrawal

LPG vapor Part number	Fitting size	LPG liquid Part number	Fitting size
149-0558	3/4"	149-0625	1/4"
149-0752	1"		
149-0624	1-1/4"		
149-0751	2"		
149-1241	3"		

Solenoid valves

For natural gas, LPG vapor, LPG liquid, diesel or gasoline fuel (UL approved).

Natural gas or LPG vapor

For gas pressures not exceeding	NPT fitting size (female)	12 VDC part number	24 VDC part number
0.5 psi	3/4"	307-0312	N/A
1.5 psi	3/4"	307-2930	N/A
5.0 psi	3/4"	307-2892	307-2895
5.0 psi	1"	307-2890	N/A
5.0 psi	1-1/4"	307-2891	N/A
5.0 psi	2"	307-2893	307-2894

Natural gas or LPG vapor

Not to be used in temperatures below 34 °F.

For gas pressures not exceeding	NPT fitting size (female)	12 VDC part number	24 VDC part number
25 psi	3/4"	307-0834	307-0863
25 psi	1"	307-0836	N/A
25 psi	1-1/4"	307-0837	N/A
15 psi	2"	307-0840	307-0841

LPG liquid, diesel, gasoline

Pipe Size	Gasoline	Diesel	LPG	12 VDC part number	24 VDC part number
1/4"	Yes	Yes	Yes	307-0268	N/A
1/4"	Yes	Yes	Yes	N/A	307-0757
1/8"	Yes	Yes	No	307-0565	307-0603
3/8"	No	Yes	No	N/A	307-2703

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Cummins Power Generation

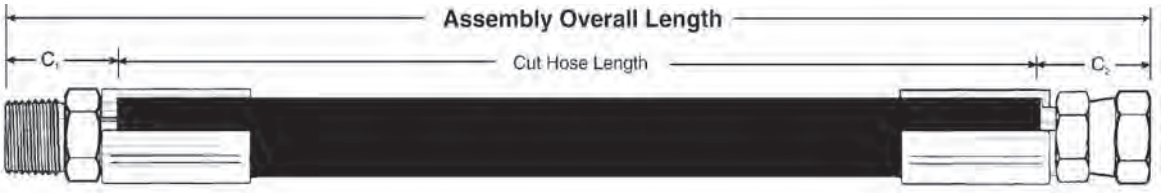
U.L. / C.S.A. APPROVED TYPE I PROPANE / NATURAL GAS HOSE ASSEMBLIES

GAS~FLO

Used To Conduct Natural Gas In A Gaseous State And Propane In Either A Liquid Or Gaseous State Up To 350 P.S.I.

Factory Made Assemblies are available in a variety of configurations and hose lengths, enter overall length in inches where applicable. Length Tolerances for Propane Hose Assemblies and Specified Hose Lengths.

Length Range:	Tolerance
For Lengths from 0 up to and including 36"	±1/4"
For Lengths above 36"	±1% of length measured to the nearest 1/8 of an inch.



HOSE ASSEMBLY DESCRIPTIONS:

I4C	Type **I 1/4** I.D. Hose **C**rimp Ends
I4LTC	Type I (**L**ow Pressure **T**hermoplastic)
I4TC	Type I (**T** = Thermoplastic)
FC	**F**emale **C**ylinder Thread
FJ	**F**emale **J**IC
FP	**F**emale **P**ipe
FS	**F**emale **S**wivel SAE Flare **Ex:** (6 = 3/8)
FW	**F**emale **W**elding End
MC	**M**ale **C**ylinder Thread
MI	**M**ale **I**nverted Flare
MP	**M**ale **P**ipe
POL	**POL** End
POLHW	**POL** End with **H**and **W**heel
POLNE	**POL** End with **N**o **E**xcess Flow
QDC	**Q**uick **D**isconnect **C**oupler End
QDN	**Q**uick **D**isconnect **N**ipple End
QCC	**QCC**1 ACME Connection

SPECIALTY CODES

GR	**G**as **R**egulator End
P	Suffix for **P**ackaged Product (Not All Items Available Packaged)

Rubber Temperature Range: -60°F To 212°F (-51°C To 100°C)
Thermoplastic Temperature Range: -40°F To 140°F (-40°C To 60°C)

MP MALE PIPE THREAD — **1/4 & 3/8 I.D. ONLY.** — **MP** MALE PIPE THREAD

NOTE: 1/2 & LARGER C/W STEEL ENDS

PART No.	MP	MP	Hose I.D.	Hose
I4C _ _ MP2MP2	1/8	1/8	1/4	Rubber
I4C _ _ MP4MP4	1/4	1/4	1/4	Rubber
I6C _ _ MP6MP6	3/8	3/8	3/8	Rubber
I8C _ _ MP8MP8	1/2	1/2	1/2	Rubber
I12C _ _ MP12MP12	3/4	3/4	3/4	Rubber
I16C _ _ MP16MP16	1	1	1	Rubber
* I20C _ _ MP20MP20	1-1/4	1-1/4	1-1/4	Rubber

* 1-1/4" TEMPERATURE RANGE: -40°F To 180°F (-40°C To 82°C)

• NOTE: _ _ ENTER OVERALL LENGTH IN INCHES WHERE APPLICABLE.

FS 45° S.A.E. FEMALE FLARE — **1/4 & 3/8 I.D. ONLY.** — **MP** MALE PIPE THREAD

PART No.	FS	MP	Hose I.D.	Hose
I4C_ _FS6MP4	3/8	1/4	1/4	Rubber
I4C_ _FS6MP6	3/8	3/8	1/4	Rubber
I6C_ _FS6MP6	3/8	3/8	3/8	Rubber
I8C_ _FS8MP8	1/2	1/2	1/2	Rubber

• NOTE: _ _ ENTER OVERALL LENGTH IN INCHES WHERE APPLICABLE.

FS 45° S.A.E. FEMALE FLARE — **1/4 & 3/8 I.D. ONLY.** — **FS** 45° S.A.E. FEMALE FLARE

NOTE: 1/2 & LARGER C/W STEEL ENDS

PART No.	FS	FS	Hose I.D.	Hose
I4C_ _FS6FS6	3/8	3/8	1/4	Rubber
I4TC_ _FS6FS6	3/8	3/8	1/4	Thermoplastic
I6C_ _FS6FS6	3/8	3/8	3/8	Rubber
I8C_ _FS8FS8	1/2	1/2	1/2	Rubber
I12C_ _FS12FS12	3/4	3/4	3/4	Rubber

• NOTE: _ _ ENTER OVERALL LENGTH IN INCHES WHERE APPLICABLE.

TO BE INSTALLED BY LICENSED GAS FITTERS ONLY.

C

U.L. / C.S.A. APPROVED TYPE I PROPANE HOSE ASSEMBLIES

Used To Conduct Propane In Either A Liquid Or Gaseous State Up To 350 P.S.I.

Rubber Temperature Range: -60°F To 212°F (-51°C To 100°C)
Thermoplastic Temperature Range: -40°F To 140°F (-40°C To 60°C)

C

FJ
37° S.A.E.
FEMALE FLARE

MP
MALE PIPE
THREAD

PART No.	FJ	MP	Hose I.D.	Hose
I12C_ _FJ12MP12	3/4	3/4	3/4	Rubber
I16C_ _FJ16MP16	1	1	1	Rubber
I20C_ _FJ20MP20	1-1/4	1-1/4	1-1/4	Rubber

NOTE: C/W STEEL ENDS

• NOTE: _ _ ENTER OVERALL LENGTH IN INCHES WHERE APPLICABLE.

18" LENGTH

FJ
37° S.A.E.
FEMALE FLARE

FJ
37° S.A.E.
FEMALE FLARE

PART No.	FJ	FJ	Hose I.D.	Hose
I12C_ _FJ12FJ12	3/4	3/4	3/4	Rubber
I16C_ _FJ16FJ16	1	1	1	Rubber
I20C_ _FJ20FJ20	1-1/4	1-1/4	1-1/4	Rubber

NOTE: C/W STEEL ENDS

• NOTE: _ _ ENTER OVERALL LENGTH IN INCHES WHERE APPLICABLE.

FS
45° S.A.E.
FEMALE FLARE

FW
FEMALE WELDING
9/16-18 L.H.

PART No.	FS	FW	Hose I.D.	Hose
I4C_ _FS4FW	1/4	9/16-18 L.H.	1/4	Rubber

• NOTE: _ _ ENTER OVERALL LENGTH IN INCHES WHERE APPLICABLE.

FW
FEMALE WELDING
9/16-18 L.H.

FW
FEMALE WELDING
9/16-18 L.H.

PART No.	FW	FW	Hose I.D.	Hose
I4C_ _FWFW	9/16-18 L.H.	9/16-18 L.H.	1/4	Rubber
I6C_ _FWFW	9/16-18 L.H.	9/16-18 L.H.	3/8	Rubber

• NOTE: _ _ ENTER OVERALL LENGTH IN INCHES WHERE APPLICABLE.

FC
1"-20 SWIVEL FEMALE
CYLINDER THREAD

MC
1"-20 SWIVEL MALE
CYLINDER THREAD

PART No.	FC	MC	Hose I.D	Hose
I4C_ _FCMC	1"-20	1"-20	1/4	Rubber
I4TC_ _FCMC	1"-20	1"-20	1/4	Thermoplastic

• NOTE: _ _ ENTER OVERALL LENGTH IN INCHES WHERE APPLICABLE.

• SUFFIX WITH "P" FOR PACKAGED ASSEMBLY.

TO BE INSTALLED BY LICENSED GAS FITTERS ONLY.

SLEEVE

PART No.	Tube
S3721-4	1/4
S3721-6	3/8
S3721-8	1/2
S3721-10	5/8
S3721-12	3/4
S3721-16	1
S3721-20	1-1/4

SLEEVE NUT

PART No.	Tube
S3720-4	1/4
S3720-6	3/8
S3720-8	1/2
S3720-10	5/8
S3720-12	3/4
S3720-16	1
S3720-20	1-1/4

REDUCER Female JIC To Male JIC (ONE PIECE TYPE)

PART No.	Female Tube	Male Tube
S3735-46	1/4	3/8
S3735-64	3/8	1/4
S3735-65	3/8	5/16
S3735-68	3/8	1/2
S3735-84	1/2	1/4
S3735-86	1/2	3/8
S3735-810	1/2	5/8
S3735-812	1/2	3/4
S3735-106	5/8	3/8
S3735-108	5/8	1/2
S3735-1012	5/8	3/4
S3735-124	3/4	1/4
S3735-126	3/4	3/8
S3735-128	3/4	1/2
S3735-1210	3/4	5/8
S3735-1216	3/4	1
S3735-164	1	1/4
S3735-166	1	3/8
S3735-168	1	1/2
S3735-1610	1	5/8
S3735-1612	1	3/4
S3735-1620	1	1-1/4
S3735-2012	1-1/4	3/4
S3735-2016	1-1/4	1
S3735-2024	1-1/4	1-1/2
S3735-2416	1-1/2	1
S3735-2420	1-1/2	1-1/4
S3735-3220	2	1-1/4
S3735-3224	2	1-1/2

UNION Male JIC To Male JIC

PART No.	Tube	Tube
S3742-4	1/4	1/4
S3742-43	1/4	3/16
S3742-5	5/16	5/16
S3742-6	3/8	3/8
S3742-64	3/8	1/4
S3742-65	3/8	5/16
S3742-8	1/2	1/2
S3742-84	1/2	1/4
S3742-86	1/2	3/8
S3742-10	5/8	5/8
S3742-106	5/8	3/8
S3742-108	5/8	1/2
S3742-12	3/4	3/4
S3742-126	3/4	3/8
S3742-128	3/4	1/2
S3742-1210	3/4	5/8
S3742-16	1	1
S3742-1612	1	3/4
S3742-20	1-1/4	1-1/4
S3742-2016	1-1/4	1
S3742-24	1-1/2	1-1/2
S3742-32	2	2

UNION Male JIC To Male JIC (LARGE HEX)

PART No.	Tube
S3742H-6	3/8

CONNECTOR Male JIC To Female Pipe

PART No.	Tube	Pipe
S3746-4A	1/4	1/8
S3746-4B	1/4	1/4
S3746-6B	3/8	1/4
S3746-6C	3/8	3/8
S3746-6D	3/8	1/2
S3746-8B	1/2	1/4
S3746-8C	1/2	3/8
S3746-8D	1/2	1/2
S3746-10D	5/8	1/2
S3746-10E	5/8	3/4
S3746-12D	3/4	1/2
S3746-12E	3/4	3/4
S3746-12H	3/4	1
S3746-16E	1	3/4
S3746-16H	1	1
S3746-20J	1-1/4	1-1/4
S3746-24K	1-1/2	1-1/2
S3746-32M	2	2

CONNECTOR Male JIC To Male Pipe

PART No.	Tube	Pipe
S3748-2A	1/8	1/8
S3748-3A	3/16	1/8
S3748-4A	1/4	1/8
S3748-4B	1/4	1/4
S3748-4C	1/4	3/8
S3748-4D	1/4	1/2
S3748-5A	5/16	1/8
S3748-5B	5/16	1/4
S3748-5C	5/16	3/8
S3748-6A	3/8	1/8
S3748-6B	3/8	1/4
S3748-6C	3/8	3/8
S3748-6D	3/8	1/2
S3748-6E	3/8	3/4
S3748-8B	1/2	1/4
S3748-8C	1/2	3/8
S3748-8D	1/2	1/2
S3748-8E	1/2	3/4
S3748-8H	1/2	1
S3748-10C	5/8	3/8
S3748-10D	5/8	1/2
S3748-10E	5/8	3/4
S3748-10H	5/8	1
S3748-12C	3/4	3/8
S3748-12D	3/4	1/2
S3748-12E	3/4	3/4
S3748-12H	3/4	1
S3748-16D	1	1/2
S3748-16E	1	3/4
S3748-16H	1	1
S3748-16J	1	1-1/4
S3748-16K	1	1-1/2
S3748-20H	1-1/4	1
S3748-20J	1-1/4	1-1/4
S3748-20K	1-1/4	1-1/2
S3748-24J	1-1/2	1-1/4
S3748-24K	1-1/2	1-1/2
S3748-32K	2	1-1/2
S3748-32M	2	2

CONNECTOR 37° Tube to British Standard Pipe Parallel Male

PART No.	Tube	BSPP
S3748BSPP-44	1/4	1/4
S3748BSPP-64	3/8	1/4
S3748BSPP-66	3/8	3/8
S3748BSPP-88	1/2	1/2

Notice to Installers

Please call Cummins Sale and Service if you have any questions regarding the installation of the Cummins Power Systems generator set and associated equipment.
Cummins Sale and Service is committed to providing technical support and installation recommendations as required by the installing contractors to ensure that the genset installation meets Cummins Power Systems installation requirements and will provide our mutual customer with the performance and trouble free operation expected.

Electrical Installers

Installment of control and load conductors is normally the responsibility of the electrical contractor.

Termination of the **Power** conductors is normally the responsibility of the electrical contractor.

Termination of the Control conductors is normally Cummins Sale and Service responsibility, and is coordinated prior to commissioning time. If you have any questions about size, quantity or location of control conductors, please call us. Control conductors should be stranded, TEW type wire.