Transfer switch OTPC open, closed, or delayed transition

> Specification sheet

40 - 4000 Amp

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Description

OTPC transfer switches are designed for operation and switching of electrical loads between primary power and standby generator sets. They are suitable for use in emergency, legally required and optional standby applications. The switches monitor both power sources, signal generator set startup, automatically transfer power and return the load to the primary power source once the utility returns and is stabilized.

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

The OTPC product line offers a transfer switch that is the right solution for every application. The switch is available in open, delayed and closed transitions.

UL	All switches are UL 1008 Listed with UL Type Rated cabinets and UL Listed CU-AL terminals.
CSA	All switches are certified to CSA 282 Emergency Electrical Power Supply for Buildings, up to 600 VAC.
NEC	Equipment shall be suitable for use in systems compliant to 700, 701 and 702.
NFPA	All switches comply with NFPA 70, 99 and 110.
NEMA	All switches comply with NEMA ICS 10.
IEEE	All switches comply with IEEE 446 Recommended Practice for Emergency and Standby Power Systems.
ISO 9001	This transfer switch is designed and manufactured in facilities certified to ISO9001.

Features

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

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

Communications capability - The transfer switch is capable of communicating with other transfer switches, accessories with a SCADA network or with Cummins Power Generation generators utilizing LonWorks® protocol.

Main contacts - Heavy-duty silver alloy contacts with separate arcing surfaces and multi-leaf arc chutes are rated for total system transfer including overload interruption.

Easy service/access - Plug connections, door-mounted controls, ample access space for all top and all bottom power connections, and compatible terminal markings. The control is field programmable.

Product lines, accessories and services - Cummins Power Generation offers a wide range of accessories and services to suit your requirements.

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

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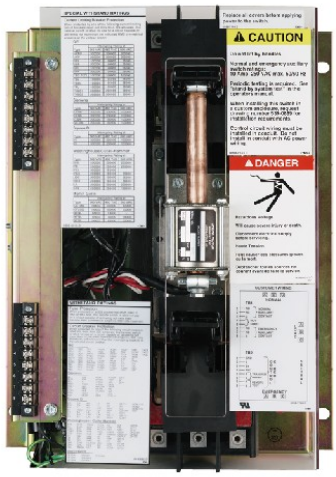
Transfer switch mechanism



- A bi-directional linear motor actuator powers OTPC Transfer Switches. This design provides virtually friction-free, constant force, straight-line transfer switch action with no complex gears or linkages.
- Independent break-before-make action is used for both 3-pole and 4-pole/switched neutral switches. On 3-pole/switched neutral switches, this action also prevents the objectionable ground currents and nuisance ground fault tripping that can result from overlapping designs.
- A mechanical interlock prevents simultaneous closing of normal and emergency contacts.
- Long-life, high pressure, silver alloy contacts resist burning and pitting. Separate arcing surfaces further protect the main contacts. Contacts are mechanically held in both normal and emergency positions for reliable, quiet operation.
- Superior arc interruption is accomplished through multiple leaf arc chutes that cool and quench the arcs. Barriers separate the phases and prevent inter-phase flashover.

Specifications

Voltage rating	Transfer switches rated from 40 A through 4000 A are rated up to 600 VAC, 50 or 60 Hz.
Arc interruption	Multiple leaf arc chutes cool and quench the arcs. Covers prevent interphase flashover and are transparent for visual inspection.
Neutral bar	A full current-rated neutral bar with lugs is standard on enclosed 3-pole transfer switches.
Auxiliary contacts	Two contacts (one for each source) are provided for customer use. Wired to terminal block for easy access. Rated at 10A continuous and 250 VAC maximum.
Operating temperature	-40 °F (-40 °C) to 140 °F (60 °C)
Storage temperature	-40 °F (-40 °C) to 140 °F (60 °C)
Humidity	Up to 95% relative, non-condensing
Altitude	Up to 10,000 ft (3,000 m) without derating
Surge withstand ratings	Surge-tested for location category B3, per IEEE C 62.41. Testing per IEEE 62.45. Control tested to European Surge Test EN 61000-4-5.
Total transfer time (source-to-source)	Will not exceed 6 cycles at 60 Hz with normal voltage applied to the actuator and without programmed transition installed.
Manual operation handles	Transfer switches rated through 1000 A are equipped with permanently attached operating handles and quick-break, quick-make contact mechanisms suitable for manual operation. Transfer switches over 1000 A are equipped with manual operators for service use only under de-energized conditions.

Open transition - The OTPC automatic transfer switch, equipped with in-phase monitor, determines when to transfer the load from one source to another. The switch contacts operate in a break-before-make sequence[1].

Delayed (programmed) transition - The OTPC is also available as a delayed transition transfer switch. The delayed transition OTPC completely disconnects the load from both sources for an adjustable period of time to allow regenerative voltage to decay to a safe level prior to connecting to the new source. By allowing motor fields to decay, nuisance tripping breakers and load damage are prevented. Delayed transition transfer is recommended by NEMA MG-1.

Closed transition - Closed transition transfer is required in applications with loads sensitive to momentary power interruptions. The switch contacts operate in a make-before-break sequence. The OTPC with closed transition allows the seamless transfer of critical loads from one source to another by paralleling the two sources momentarily (for less than 100 msecs).

[1] The standard OTPC below 1000 amps is field-configurable for either delayed or in-phase transition.

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PowerCommand microprocessor control

PowerCommand controls are microprocessor based and developed specifically for automatic transfer switch operation. The control provides features and options useful for most applications. Flash memory is used to store control settings. The contents of the memory are not lost even if power to the controller is lost. There is also an on-board battery to maintain the real-time clock setting and the engine start time delay. A choice of two control packages allows flexibility for determining the most suitable level of control for a given application:

Level 1 control (C023)

Open transition (in-phase transition)
Delayed transition (programmed transition)
Utility-to-genset applications
Software adjustable time delays:
- Engine start: 0 to 15 sec
- Transfer normal to emergency: 0 to120 sec
- Retransfer emergency to normal: 0 to 30 min
- Engine stop: 0 to 30 min
- Delayed transition: 0 to 60 sec

Undervoltage sensing - 3-phase normal, 1-phase emergency
- Pickup: 85% to 98% of nominal voltage
- Dropout: 75% to 98% of pickup setting
- Dropout time delay: 0.1 to 1.0 sec

Overvoltage sensing - 3-phase normal, 1-phase emergency
- Dropout: 105% to 135% of nominal voltage
- Pickup: 95% to 99% of dropout setting
- Dropout time delay: 0.5 to 120 sec

Over/under frequency sensing
- Pickup: ±5% to ±20% of nominal frequency
- Dropout: ±1% beyond pickup
- Dropout time delay: 0.1 to 15.0 sec

Programmable genset exerciser - One event/schedule with or w/o load
Basic indicator panel
- Source available/connected LED indicators
- Test/exercise/bypass buttons
- Digital display - optional
- Analog bargraph metering - optional

Date/time-stamped event recording - 50 events
Load sequencing (optional with network communications module)

Level 2 control (C024)

Open transition (in-phase transition)
Delayed transition (programmed transition)
Closed transition
Utility-to-genset applications
Utility-to-utility applications
Genset-to-genset applications
Software adjustable time delays:
- Engine start: 0 to 120 sec
- Transfer normal to emergency: 0 to 120 sec
- Retransfer emergency to normal: 0 to 30 min
- Engine stop: 0 to 30 min
- Programmed transition: 0 to 60 sec

Undervoltage sensing - 3-phase normal, 3-phase emergency
- Pickup: 85% to 98% of nominal voltage
- Dropout: 75% to 98% of pickup setting
- Dropout time delay: 0.1 to 1.0 sec

Overvoltage sensing - 3-phase normal, 3-phase emergency
- Dropout: 105% to 135% of nominal voltage
- Pickup: 95% to 99% of dropout setting
- Dropout time delay: 0.5 to 120 sec

Over/under frequency sensing
- Pickup: ±5% to ±20% of nominal frequency
- Dropout: ±1% beyond pickup
- Dropout time delay: 0.1 to 15.0 sec

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

Phase rotation sensing
- Time delay: 100 msec

Loss of single phase detection
- Time delay: 100 msec

Programmable genset exerciser - Eight events/schedules with or w/o load
Basic indicator panel
- Source available/connected LED indicators
- Test/exercise/bypass buttons
- Digital display - standard
- Analog bargraph metering - optional

Date/time-stamped event recording - 50 events
Load sequencing (optional with Network Communications Module)

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Time-delay functions

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

Transfer normal to emergency: Allows genset to stabilize before application of load. Prevents power interruption if normal source variation or loss is momentary. Allows staggered transfer of loads in multiple transfer switch systems.

Retransfer emergency to normal: Allows the utility to stabilize before retransfer of load. Prevents needless power interruption if return of normal source is momentary. Allows staggered transfer of loads in multiple transfer switch systems.

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

Delayed (programmed) transition: Transfers load to neutral position, disconnected from sources, to allow inductive load voltages to decay.

Fail to disconnect timer: Signals external device to disconnect either the genset or utility to prevent extended operation in parallel with the utility.

User interfaces

Basic interface panel

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

Digital display (M018)

The digital display provides a convenient method for monitoring load power conditions, adjusting transfer switch parameters, monitoring PowerCommand network status or reviewing transfer switch events. Password protection limits access to adjustments to authorized personnel. The digital display comes standard with the Level 2 PowerCommand microprocessor control and is optional with the level 1 control.

User interface options

Front panel security key (M017)

Front panel access can be locked out using this option. Prevents unauthorized transfers or testing. Prevents unauthorized adjustments via the digital display.

Analog bar graph meter (D009)

An LED bar graph display provides easy to read indication for normal and emergency voltages and frequencies, load currents, power factor, and kilowatts. Green, amber, and red LEDs provide at-a-glance indication of system acceptability. Available as an option with the Level 2 PowerCommand microprocessor control.

Control options

Relay signal module (M023)

Provides an adjustable transfer pre-signal time delay of 0 to 60 seconds to prevent interruption of power during elevator operation. Relay outputs include: Source 1 Connected and Available, Source 2 Connected and Available, Not in Auto, Test/Exercise Active, Failed to Disconnect, Failed to Synchronize, Failed to Transfer/Retransfer, and Transfer pre-signal (elevator signal).

Loadshed (M007)

Removes the load from the emergency power source by driving the transfer switch to the neutral position when signaled remotely. Transfers load back to the emergency source when the signal contacts open. Immediate retransfer to the preferred source when it is re-established.

PowerCommand network interface (M031)

Provides connection to the PowerCommand network. LonWorks compatible for integration into customer monitoring strategy.

Load power and load current monitoring (M022)

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

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

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UL withstand and closing ratings

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

	MCCB protection			Current limited breaker protection		
Transfer switch ampere	**WCR @ volts max with specific manufacturers MCCBs**	**Max MCCB rating**	**Drawing reference**	**With specific current limiting breakers (CLB)**	**Max CLB rating**	**Drawing reference**
40, 70, 125 3-pole	14,000 @ 480 14,000 @ 600	225 A	0098-6885	200,000 @ 480 100,000 @ 600	225 A	0098-6918
40, 70, 125 4-pole	30,000 @ 480 30,000 @ 600	400 A	0098-6886	200,000 @ 480 100,000 @ 600	400 A	0098-6919
150, 225, 260	30,000 @ 480 30,000 @ 600	400 A	0098-6886	200,000 @ 480 100,000 @ 600	400 A	0098-6919
300, 400, 600	65,000 @ 480 65,000 @ 600	1200 A	0098-6887	200,000 @ 480 100,000 @ 600	1200 A	0098-6920
800, 1000	65,000 @ 480 50,000 @ 600	1400 A	0098-6888	150,000 @ 480 100,000 @ 600	1400 A	0098-6921
1000, 1200	85,000 @ 480 65,000 @ 600	1600 A	0098-7312	85,000 @ 480 65,000 @ 600	1600 A	0098-7312
1600, 2000	100,000 @ 480 85,000 @ 600	4000 A	0098-7311	100,000 @ 480 85,000 @ 600	4000 A	0098-7311
3000	100,000 @ 480 85,000 @ 600	4000 A	0098-7313	100,000 @ 480 85,000 @ 600	4000 A	0098-7313
4000	100,000 @ 480 85,000 @ 600	5000 A	0098-8576	100,000 @ 480	5000 A	0098-8576

Fuse protection

Transfer switch ampere	**WCR @ volts max. with current limiting fuses**	**Max fuse, size and type**	**Drawing reference**
40, 70, 125 3- and 4-pole	200,000 @ 480 200,000 @ 600	200 A Class, J, RK1, RK5	0098-6885
150, 225, 260	200,000 @ 480 200,000 @ 600	600 A Class, J, RK1, RK5 1200 A Class L	0098-6886
300, 400, 600	200,000 @ 480 200,000 @ 600	1200 A Class L 1200 A Class L	0098-6887
800, 1000	200,000 @ 480 200,000 @ 600	2000 A Class L	0098-6888
1000, 1200	200,000 @ 480 150,000 @ 600	3000 A Class L	0098-7312
1600, 2000	200,000 @ 480 150,000 @ 600	2500 A Class L	0098-7311
3000	200,000 @ 480 150,000 @ 600	4000 A Class L	0098-7313
4000	200,000 @ 480 150,000 @ 600	6000 A Class L	0098-8576

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3 cycle ratings

Transfer switch ampere	WCR @ volts max 3 cycle rating	Max MCCB rating	Drawing reference
1000, 1200	50,000 @ 480	1600 A	0098-7312
	42,000 @ 600		
1600, 2000	100,000 @ 480	4000 A	0098-7311
	85,000 @ 600		
3000	100,000 @ 480	4000 A	0098-7313
	85,000 @ 600		
4000	100,000 @ 480	5000 A	098-8576
	85,000 @ 600		

Transfer switch lug capacities

All lugs accept copper or aluminum wire unless indicated otherwise.

Amp rating	Cables per phase	Size
40, 70, 125 3-pole	1	#12 AWG-2/0
40 4-pole	1	#14 AWG-2/0
70, 125 4-pole	1	#6 AWG - 300 MCM
150, 225	1	#6 AWG - 300 MCM
260	1	#6 AWG - 400 MCM
300, 400	1	3/0 - 600 MCM
	2	3/0 - 250 MCM
600	2	250 - 500 MCM
800, 1000	4	250 - 500 MCM
1000, 1200	4	#2 AWG to 600 MCM
1600, 2000	8	#2 AWG to 600 MCM (lugs optional)
3000	8	#2 AWG to 600 MCM (lugs optional)
4000	12	#2 AWG to 600 MCM (lugs optional)

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Enclosures

The transfer switch and control are mounted in a key-locking enclosure. Wire bend space complies with 2008 NEC.

Dimensions - transfer switch in UL type 1 enclosure

Amp rating	Height		Width		Depth				Weight		Outline drawing
					Door closed		Door open				
	in	mm	in	mm	in	mm	in	mm	lb	kg	
40, 70, 125 3-pole	27.0	686	20.5	521	12.0	305	31.5	800	82	37	0310-0544
40, 70, 125 4-pole	35.5	902	26.0	660	16.0	406	41.0	1042	165	75	0500-4896
150, 225	35.5	902	26.0	660	16.0	406	41.0	1042	165	75	0310-0414
260	43.5	1105	28.5	724	16.0	406	43.0	1093	170	77	0310-0540
300, 400, 600	54.0	1372	25.5	648	18.0	457	42.0	1067	225	102	0310-1307
800, 1000	68.0	1727	30.0	762	20.6	524	48.5	1232	360	163	0310-0417
1000, 1200	76.3	1937	36.0	915	22.7	577	54.0	1372	450	204	0310-0482
1600, 2000*	90.0	2290	36.0.	915	48.0	1219	84.0	2134	1100	499	0310-0483
3000*	90.0	2290	36.0	915	48.0	1219	84.0	2134	1250	567	0310-0484
4000*	90.0	2290	46.5	1180	60.0	1520	106	2700	1850	839	0500-4485

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

Amp rating	Height		Width		Depth				Weight		Cabinet type	Outline drawing
					Door closed		Door open					
	in	mm	in	mm	in	mm	in	mm	lb	kg		
40, 70, 125 3-pole	34.0	864	26.5	673	12.5	318	36.5	927	125	57	3R, 12,	0310-0453
40, 70, 125 4-pole	42.5	1080	30.5	775	16.0	406	44.0	1118	215	97	3R, 12	0500-4896
											4	0500-4896
150, 225	42.5	1080	30.5	775	16.0	406	44.0	1118	215	97	3R, 12	0310-0454
											4	0310-0446
260	46.0	1168	32.0	813	16.0	406	46.0	1168	255	102	3R, 12	0310-0455
											4	0310-0447
300, 400, 600	59.0	1499	27.5	699	16.5	419	41.5	1054	275	125	3R, 12	0310-1315
											4	0310-1316
800, 1000	73.5	1867	32.5	826	20.8	529	49.5	1257	410	186	3R, 12	0310-0457
											4	0310-0449
1000, 1200	76.3	1937	36.0	915	22.7	577	54.0	1372	450	204	3R, 12, 4	0310-0482
1600, 2000*	90.0	2290	35.5	826	50.9	1293	80.0	2032	1100	499	3R, 12, 4	0310-0744
3000*	90.0	2290	38.0	965	51.0	1295	84.5	2146	1250	567	3R	0310-0745
4000*	90.0	2290	49.0	1244	60.0	1524	105	2654	1850	839	3R	0500-4486

Dimensions - transfer switch in UL type 4X stainless steel enclosure

Amp rating	Height		Width		Depth				Weight		Cabinet type	Outline drawing
					Door closed		Door open					
	in	mm	in	mm	in	mm	in	mm	lb	kg		
40, 70, 125 3-pole	46.0	1168	32.0	813	16.0	406	46.0	1168	255	102	4X	0500-4184
40, 70, 125 4-pole	46.0	1168	32.0	813	16.0	406	46.0	1168	255	102	4X	0500-4896
150, 225	46.0	1168	32.0	813	16.0	406	46.0	1168	255	102	4X	0500-4184
260	46.0	1168	32.0	813	16.0	406	46.0	1168	255	102	4X	0500-4184
300, 400, 600	73.5	1867	32.5	826	19.5	495	49.5	1257	410	186	4X	0500-4185
800, 1000	73.5	1867	32.5	826	19.5	495	49.5	1257	410	186	4X	0500-4185
1000, 1200	70.0	1778	40.0	1016	19.8	502	59.0	1499	450	204	4X	0306-5300
1600,2000	90.0	2290	35.5	826	50.9	1293	80.0	2032	1100	499	4X	0310-0744

* Rear or side access is required to complete power wiring installations.

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Submittal detail – options (accessories specification sheet AC-167)

Amperage ratings
- ☐ 40
- ☐ 70
- ☐ 125
- ☐ 150
- ☐ 225
- ☐ 260
- ☐ 300
- ☐ 400
- ☐ 600
- ☐ 800
- ☐ 1000
- ☐ 1200
- ☐ 1600
- ☐ 2000
- ☐ 3000
- ☐ 4000

Voltage ratings
- ☐ R020 120*
- ☐ R038 190
- ☐ R021 208
- ☐ R022 220
- ☐ R023 240
- ☐ R024 380
- ☐ R025 416
- ☐ R035 440
- ☐ R026 480
- ☐ R027 600

* Line to neutral voltage (not available on 1200-1500 amp switches)

Pole configuration
- ☐ A028 Poles - 3 (solid neutral)
- ☐ A029 Poles - 4 (switched neutral)

Frequency
- ☐ A044 60 Hertz
- ☐ A045 50 Hertz

Transfer mode
- ☐ A077 In phase transition (open transition)
- ☐ A078 Delayed transition (programmed transition)
- ☐ A079 Closed transition (available 1000-4000 amps, for closed transition below 1000 amps, see CHPC spec sheet S-1437)

Application
- ☐ A035 Utility to genset
- ☐ A036 Utility to utility
- ☐ A037 Genset to genset

System options
- ☐ A041 Single Phase, 2-wire or 3-wire (not available 1200-4000 amps)
- ☐ A042 Three Phase, 3-wire or 4-wire

Enclosure
- ☐ B001 Type 1: General purpose indoor (similar to IEC type IP30)
- ☐ B002 Type 3R: Intended for outdoor use (dustproof and rainproof) (Similar to IEC type IP34)
- ☐ B003 Type 4: Indoor or outdoor use (watertight) (Similar to IEC type IP65)
- ☐ B004 Open Construction: No enclosure - includes automatic transfer switch and controls
- ☐ B010 Type 12: Indoor use, dust-tight and drip-tight (similar to IEC type IP61)
- ☐ B025 Type 4X: Indoor or outdoor use (watertight) (similar to IEC Type IP65)

Standards
- ☐ A046 UL 1008/CSA certification
- ☐ A064 NFPA 20 compliant (not available 1200-4000 A)
- ☐ A080 Seismic certification

Controls
- ☐ C023 Switch control - level 1
- ☐ C024 Switch control - level 2

Control options
- ☐ M017 Security key - front panel
- ☐ M018 Display - digital
- ☐ M022 Monitoring - load
- ☐ M023 Module - relay
- ☐ M031 Communications - LonWorks Network Communications Module (FTT-10)

Meters
- ☐ D009 Digital bar graph meters

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

Protective relays
- ☐ M036 62PL relay
- ☐ M038 86 Lock-out relay

Auxiliary relays - Relays are UL Listed and factory installed. All relays provide (2) normally open and (2) normally closed isolated contacts rated 10 A @ 600 VAC. Relay terminals accept (1) 18 gauge to (2) 12 gauge wires per terminal.
- ☐ L101 24 VDC coil - installed, not wired (for customer use).
- ☐ L102 24 VDC coil - emergency position - relay energized when ATS in source 2 (emergency) position.
- ☐ L103 24 VDC coil - normal position - relay energized when ATS in source 1 (normal) position
- ☐ L201 12 VDC coil - installed, not wired
- ☐ L202 12 VDC coil - emergency position - relay energized when ATS in source 2 (emergency) position
- ☐ L203 12 VDC coil - normal position - relay energized when ATS in source 1 (normal) position

Miscellaneous options
- ☐ M003 Terminal block - 30 points (not wired)
- ☐ M007 Load shed - from emergency - drives switch to neutral position when remote signal contact closes
- ☐ N009 Power connect - bus stabs (150-1200 amp open construction only)
- ☐ N013 Extension harness

Optional lug kits
- ☐ N008 Terminal lugs - cable (1600-3000 amps only)
- ☐ N020 Terminal block - retransfer inhibit

Warranty
- ☐ G002 One year basic
- ☐ G004 Two year comprehensive
- ☐ G006 Five year basic
- ☐ G007 Five year comprehensive
- ☐ G008 Ten year major components

Shipping
- ☐ A051 Packing - export box

Cummins Power Generation

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