

Transfer switch BTPC open, closed or delayed transition



> **Specification sheet**
150 - 4000 Amp

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**Power
Generation**

Description

The Cummins Power Generation BTPC series bypass isolation transfer switch combines an automatic transfer switch with a drawout isolation mechanism and a manual bypass switch. It provides a redundant power transfer and retransfer capability for critical-need applications that require a reliable power supply to the load.

For the most sophisticated applications requiring minimum power interruption during transfer, the BTPC with closed transition offers the best solution. By connecting both of the sources together for a period (not to exceed 100ms) transfer from the alternate source back to the normal takes place seamlessly without power interruptions.



All switches are UL 1008 Listed with UL Type Rated cabinets and UL Listed CU-AL terminals.



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.



All switches comply with NFPA 70, 99 and 110.



All switches comply with NEMA ICS 10.



All switches comply with IEEE 446 Recommended Practice for Emergency and Standby Power Systems.



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

Features

Bypass to normal or emergency power source - The BTPC is a two-source system which can bypass the automatic transfer switch to engage normal or emergency power sources.

Mechanical and electrical interlocks - Reliable mechanical interlocks prevent source-to-source connections. An electrical interlock prohibits closing to a dead source.

PowerCommand® control - A standard, fully featured microprocessor-based control. Software-enabled features, settings, and adjustments are available for ease of setup and accuracy. Optically isolated logic inputs and high isolation transformers for AC power inputs provide high-voltage surge protection.

Communications capability - The BTPC 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 are rated for total system transfer including overload interruption.

Easy service/access - Plug connections, door-mounted controls, ample access space, and compatible terminal markings.

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

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

Transfer switch mechanism



- Manual bypass switch mechanism allows the operator to select either the normal or emergency source by closing the bypass contacts. Visual indicators show bypass source selected, bypass "closed" or "open" to either source, and automatic transfer switch isolation or "disable."
- Isolation contacts allow the automatic transfer switch and the bypass switch to be separated electrically and mechanically. The automatic transfer switch is isolated by a drawout mechanism similar to that used on power circuit breakers.
- The drawout mechanism can be latched in one of three positions: connected, test, and isolated. In the connected position the mechanism is locked. In the test position, the transfer switch is isolated but the controls receive power. In the isolated position, the switch is completely isolated.
- The automatic transfer switch can be rolled out on extension rails and can be removed with overhead lifting equipment. Wheel-mounted carriages are standard on 1600 A to 4000 A models.
- Protective safety shutters are provided on switches up to and including 1200 A, which cover the stationary power terminals on the bypass switch when the automatic transfer switch is isolated and removed.

Specifications

Voltage rating	600 VAC
Arc interruption	Leaf arc chutes cool and quench the arcs. See-through arc chute covers prevent interphase flashover and allow visual inspection.
Neutral bar	A full current-rated neutral bar with lugs is standard on enclosed 3-pole transfer switches.
Auxiliary contacts	Easily accessible auxiliary contacts are rated at 10 A continuous and 250 VAC maximum. UL recognized, and CSA-certified.
Operating temperature	-40 °F (-40 °C) to 140 °F (60 °C)
Storage temperature	-40 °F (-40 °C) to 140 °F (60 °C)
Humidity	Up to 95% relative, non-condensing
Altitude	Up to 10,000 ft (3,000 m)
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.

In-phase transition - The BTPC 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 sequence¹.

Delayed (programmed) transition - The BTPC is also available as a programmed (delayed) transition transfer switch. The delayed transition BTPC 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 connections 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. This allows the seamless transfer of critical loads from one source to another by paralleling the two sources momentarily (for less than 100 msec).

¹The standard BTPC below 1000 amp is field-configurable for either delayed transition 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. Control features include:

Level 2 control

Open transition (in-phase transition)

Delayed transition (programmed transition)

Closed transition (momentary overlap)

Utility-to-genset applications

Utility-to-utility 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: $\pm 5\%$ to $\pm 20\%$ of nominal frequency

Dropout: $\pm 1\%$ beyond pickup

Dropout time delay: 0.1 to 15.0 sec

Voltage imbalance sensing

Dropout: 2% to 10%

Pickup: 90% of dropout

Time delay: 2.0 to 20.0 sec

Phase rotation sensing

Time delay: 100 msec

Loss of single phase detection

Time delay: 100 msec

Programmable genset exerciser - Eight events/schedules with or w/o load

Basic indicator panel

Source available/connected LED indicators

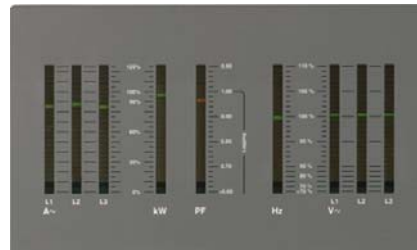
Test/exercise/bypass buttons

Digital display - standard

Analog bargraph metering - optional

Date/time-stamped event record - 50 events

Load sequencing (optional with Network Communications Module)



Optional analog bargraph



Basic indicator panel



Digital display

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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.

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 LED's 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.

Transfer switch ampere	MCCB protection			Current limited breaker protection		
	WCR @ volts max with specific manufacturers MCCBs	Max MCCB rating	Drawing reference	With specific current limiting breakers (CLB)	Max CLB rating	Drawing reference
150, 225, 260	30,000 @ 480	400 A	0098-6889	200,000 @ 480	400 A	0098-6919
	25,000 @ 600			100,000 @ 600		
300, 400	65,000 @ 480	1200 A	0098-6887	200,000 @ 480	1200 A	0098-6923
	65,000 @ 600			100,000 @ 600		
600, 800, 1000	65,000 @ 480	1400 A	0098-6891	200,000 @ 480	1400 A	0098-6924
	65,000 @ 600			100,000 @ 600		
1000, 1200 (closed transition)	85,000 @ 480	1600 A	0098-7312	85,000 @ 480	1600 A	Use MCCB ratings
	65,000 @ 600			65,000 @ 600		
1600, 2000	100,000 @ 480	2500 A	0098-7311	100,000 @ 480	2500 A	Use MCCB ratings
	85,000 @ 600			85,000 @ 600		
3000	100,000 @ 480	4000 A	0098-7313	100,000 @ 480	4000 A	Use MCCB ratings
	85,000 @ 600			85,000 @ 600		
4000	100,000 @ 480	5000 A	0098-8576	100,000 @ 480	5000 A	Use MCCB ratings
	85,000 @ 600			85,000 @ 600		

Fuse protection

Transfer switch ampere	WCR @ volts max. with current limiting fuses	Max fuse, size and type	Drawing reference
150, 225, 260	200,000 @ 600	600 A Class J, RK1, RK5 or 1200 A Class L, T	0098-6889
300, 400	200,000 @ 600	600 A Class J, RK1, RK5 or 1200 A Class L, T	0098-6890
600, 800, 1000	200,000 @ 600	600 A Class J, RK1, RK5, 1200 A Class T, or 2000 A Class L	0098-6891
1200	200,000 @ 480 150,000 @ 600	2000 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

3 cycle ratings

Transfer switch ampere	WCR @ volts max 3 cycle rating	Max MCCB rating	Drawing reference
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	0098-8576
	85,000 @ 600		

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Enclosures

The transfer switch and control are mounted in a key-locking enclosure. Wire bend space complies with 2005 NEC.

Dimensions - transfer switch in UL type 1 enclosure

Amp rating	Height		Width		Depth				Weight 3-pole type		Outline ² drawing
	in	mm	in	mm	Door closed		Door open		lb	kg	
					in	mm	in	mm			
150, 225, 260	71.75	1822	36.00	915	22.75	578	55.20	1402	564	256	310-0538
300, 400, 600	83.25	2115	36	914	22.75	578	55.2	1403	639	291	310-0535
800, 1000	90.00	2290	48	1219	27.75	705	62.5	1588	1097	499	310-0570
1000 ¹ , 1200 3-pole	90.00	2290	40	1016	27.00	686	67.0	1702	1980	898	310-0566
1000 ¹ , 1200 4-pole	90.00	2290	46	1168	27.00	686	73.0	1854	2185	991	310-0566
1600, 2000 3-pole	90.00	2290	40	1016	62.00	1575	102.0	2591	3085	1399	310-0567
1600, 2000 4-pole	90.00	2290	50	1270	62.00	1575	112.0	2845	3650	1656	310-0567
3000 3-pole	90.00	2290	40	1016	74.00	1880	114.0	2897	4100	1860	310-0568
3000 4-pole	90.00	2290	50	1270	74.00	1880	124.0	3150	5010	2273	310-0568
4000 3-pole	90.00	2290	47.5	1210	81	2060	128.5	3270	4730	2145	500-4488
4000 4-pole	90.00	2290	54	1370	81	2060	135	3430	5930	2689	500-4488

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

Amp rating	Height		Width		Depth				Weight		Cabinet type	Outline ² drawing
	in	mm	in	mm	Door closed		Door open		lb	kg		
					in	mm	in	mm				
150, 225, 260	71.75	1822	36.00	915	22.75	578	55.20	1402	564	256	3R, 12	310-0651
	71.75	1822	36.00	915	22.75	578	55.20	1402	564	256	4, 4x	310-0652
300, 400, 600	83.25	2115	36.00	915	22.75	578	55.20	1402	639	290	3R, 12	310-0653
	83.25	2115	36.00	915	22.75	578	55.20	1402	639	290	4, 4x	310-0654
800, 1000	90.00	2290	48.00	1214	27.75	705	62.50	1534	1097	498	3R, 12	310-0711
	90.00	2290	48.00	1214	27.75	705	62.50	1534	1097	498	4, 4x	310-0712
1000 ¹ , 1200 3-pole ³	90.00	2290	40.00	1016	28.25	718	65.50	1654	1980	748	3R, 12, 4, 4x	310-0734
1000 ¹ , 1200 4-pole ³	90.00	2290	46.00	1168	28.25	718	71.69	1821	2185	991	3R, 12, 4, 4x	310-0734
1600, 2000 3-pole ⁴	90.00	2290	43.52	1105	62.77	1594	99.77	2534	3085	1399	3R, 12, 4, 4x	310-0725
1600, 2000 4-pole ⁴	90.00	2290	53.52	1359	62.77	1594	109.77	2788	3650	1656	3R, 12, 4, 4x	310-0725
3000 3-pole ⁴	90.00	2290	43.52	1105	74.77	1899	111.77	2839	3970	1801	3R	310-0726
3000 4-pole ⁴	90.00	2290	53.52	1359	74.77	1899	121.77	3093	5070	2300	3R	310-0726
4000 3-pole ⁴	90.00	2290	48.5	1232	81.75	2076	131	3308	4730	2145	3R	500-4489
4000 4-pole ⁴	90.00	2290	55.0	1397	81.75	2076	137	3473	5930	2689	3R	500-4489

Transfer switch lug capacities

All lugs accept copper or aluminum wire unless indicated otherwise. Adapters that will accept compression lugs are available.

Amp rating	Cables per phase	Size
150, 225	1	#6 AWG to 300 MCM
260	1	#6 AWG to 400 MCM
150, 225, 260 ⁵	1	#4 AWG to 500 MCM
300, 400	1	#3/0 AWG to 600 MCM
300, 400	2	#3/0 AWG to 250 MCM
300, 400 ⁵	1	350 MCM to 1000 MCM
300, 400 ⁵	2	#2 AWG to 600 MCM
600	2	250 MCM to 500 MCM
600 ⁵	2	#2 AWG to 600 MCM
800, 1000	4	250 MCM to 500 MCM
800, 1000 ⁵	3	300 MCM to 750 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)

Note 1: Closed transition only.

Note 2: On the outline drawing the BT door is shown. All physical dimensions are the same for BT and BTPC.

Note 3: Dimensions shown are for top entry only. If bottom or side entry is required, an adapter bay is required and the depth increases by 14 in. (356 mm). See outline drawing. Adapter needs to be part of the original order.

Note 4: 1600 through 4000 A are rear connected. Allow 36-inch wide (914 mm) space at rear for access to cable compartment.

Note 5: Optional lug capacities.

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Submittal detail – options (accessories specification sheet AC-166)

Amperage ratings

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

Voltage ratings

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

Pole configuration

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

Frequency

- A044 60 Hertz
- A045 50 Hertz

Transfer mode

- A077 Open transition (in-phase transition)
- A078 Delayed transition (programmed transition)
- A079 Closed transition

Application

- A035 Utility to genset
- A036 Utility to utility

System options

- A041 Single phase, 2-wire or 3-wire
- 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 (not available for 1200-4000 A)
- 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

Control options

- M017 Security key - front panel
- M022 Monitoring - load
- M023 Module - relay signal
- 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.

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

Miscellaneous options

- M003 Terminal block - 30 points (not wired)
- M007 Load shed - from emergency - drives switch to neutral position when remote signal contact closes
- N008 Terminal lugs - cable (1600-3000 amp only)
- N009 Power connect - bus stabs (150-1000 amp open construction only)

Optional lug kits

- N008 Terminal lugs - cable (1600-3000 amps only)

Warranty

- G002 One yr basic
- G004 Two yr comprehensive
- G006 Five yr basic
- G007 Five yr comprehensive
- G008 Ten yr major components

Shipping

- A051 Packing - export box

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