Transfer switch

OTEC open or delayed transition

> **Specification sheet**

40 - 1000 Amp

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Description

OTEC 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 a stable utility is available.

ISO 9001	This transfer switch is designed and manufactured in facilities certified to ISO9001.
PTS	The Prototype Test Support (PTS) program verifies the performance integrity of the transfer switch design. Cummins Power Generation products bearing the PTS symbol meet the prototype test requirements of NFPA 70, 99, and 110 for Level 1 systems.
CSA	All switches are CSA certified up to 600 VAC.
UL	All switches are UL 1008 Listed, and factory or field installed accessories comply with the UL Listing; UL Type Rated cabinets; UL Listed CU-AL terminals.
NEMA	All switches comply with NEMA ICS 10.

Features

Microprocessor control - A fully featured microprocessor control is standard. All features, settings, and adjustments are software-enabled for ease of setup and accuracy.

Advanced transfer switch mechanism - Unique bi-directional linear actuator provides virtually friction-free, constant force, straight-line transfer switch action during automatic operation.

Manual operation - Manual operating handles, shielded termination, and over-center type contact mechanisms allow effective, manual operation, under de-energized conditions.

Positive interlocking - Mechanical and electrical interlocking prevent source-to-source connection through the power or control wiring.

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, 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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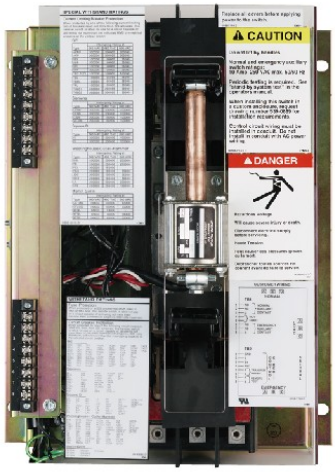
Transfer switch mechanism



- A bi-directional linear motor actuator powers OTEC 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.
- Electrical interlocks prevent simultaneous closing signals to normal and emergency contacts and interconnection of normal and emergency sources through the control wiring.
- 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 1000 A are rated up to 600 VAC, 50 or 60 Hz.
Arc interruption	Multiple leaf arc chutes cool and quench the arcs. Barriers prevent interphase flashover.
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	-22°F (-30°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
Total transfer time (source-to-source)	Will not exceed 6 cycles at 60 Hz with normal voltage applied to the actuator and without delayed transition enabled.
Manual Operation Handles	Transfer switches are equipped with permanently attached operating handles and quick-break, quick-make contact mechanisms suitable for manual operation under de-energized conditions.

Open transition - The OTEC 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. The Open Transfer OTEC is field-configurable for delayed transition below 1000 amps.

Delayed transition - The OTEC is also available as a programmed (delayed) transition transfer switch. The delayed transition OTEC 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.

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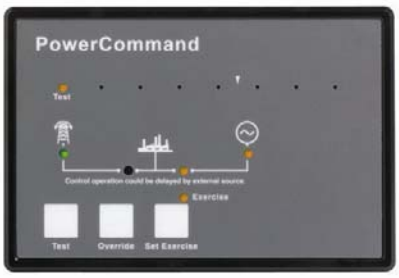
PowerCommand microprocessor control

- Simple, easy-to-use control provides transfer switch information and operator controls
- LED lamps for source availability and source connected indication, exercise mode, and test mode. LED status lamps also provided for control set-up and configuration.
- Control pushbuttons to initiate test, override time delays, and set exercise time.
- Field-configurable for in-phase or delayed (programmed) transition.
- Integral exerciser clock
- Control is prototype-tested to withstand voltage surges per EN 60947-6-1.
- Gold-flashed generator start contacts



Control functions

Voltage sensing: All phases on the normal source and single phase on generator source. Normal Source Pickup: adjustable 90-95%, Dropout: adjustable 70-90% of nominal voltage; Generator Source Pickup: 90%, dropout: 75% of nominal voltage.

Frequency sensing: Generator Source Pickup: 90% of nominal frequency; Dropout: 75% of nominal frequency.

Operating modes: Open transition with programmed transition (adjustable 0-10 seconds); Open transition with in-phase monitor and delayed transition backup; Exercise mode; and Test mode.

In-phase: Configurable for initiation of transfer functions when sources are in phase, and including ability to enable a programmed transition backup to the function so that if sources are not in-phase within 120 seconds the system will retransfer with programmed transition function.

Exerciser clock: Switch is furnished with an integral engine exerciser configurable for operation on a 7, 14, 21, or 28-day cycle with a fixed exercise period duration of 20 minutes. A 12-hr exerciser time offset allows for the convenient setting of exercise time without the need to activate the timer at the exact time that you need to schedule the generator exercise for. Software selectable capability allows for the exercising of the generator with or without load.

Time-delay functions

Engine start: Prevents nuisance genset starts due to momentary power system variation or loss. Adjustable: 0-10 seconds; default: 3 seconds.

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. Adjustable 0-300 seconds, default 5 seconds.

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. Adjustable 0-30 minutes, default 10 minutes.

Genset stop: Maintains availability of the genset for immediate reconnection in the event that the normal source fails shortly after transfer. Allows gradual genset cool down by running unloaded. Adjustable 0-30 minutes, default 10 minutes.

Delayed transition: Controls the speed of operation of the transfer switch power contacts to allow load generated voltages from inductive devices to decay prior to connecting a live source. Adjustable 0-10 seconds, default 0 seconds.

Elevator signal: Provides a relay output contact for the elevator signal relay (load disconnect). The signal can also be configured to provide a post transfer delay of the same duration. Adjustable: 0-300 seconds (requires optional elevator signal relay for use).

Options

Elevator signal relay: Provides a relay output contact for the signal relay function

Programmable exerciser clock: Provides a fully-programmable 7-day clock to provide greater flexibility in scheduling exercise periods than standard integral exerciser. Peaking function feature allows for generator operation during periods of high utility rates.

Manual restore: Provides a key switch on the front door to allow the operator to control when the switch transfers to the normal source.

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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	14,000 @ 600	225 A	098-6885	200,000 @ 600	225 A	098-6918
150, 225, 260	30,000 @ 600	400 A	098-6886	200,000 @ 600	400 A	098-6919
300, 400, 600	65,000 @ 600	1200 A	098-6887	200,000 @ 600	1200 A	098-6920
800, 1000	65,000 @ 480 50,000 @ 600	1400 A	098-6888	200,000 @ 600	1400 A	098-6921

Fuse protection

Transfer switch ampere	**WCR @ volts max. with current limiting fuses**	**Max fuse, size and type**	**Drawing reference**
40, 70, 125	200,000 @ 600	200 A Class, J, RK1, RK5, T	098-6885
150, 225, 260	200,000 @ 600	1200 A Class L or T, or 600 A class J, RK1, RK5	098-6886
300, 400, 600	200,000 @ 600	1200 A Class L or T, or 600 A Class, J, RK1, RK5	098-6887
800, 1000	200,000 @ 600	2000 A Class L or 1200 A class T or 600 A class J, RK1, RK5	098-6888

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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 U.L. type 1 enclosure

Amp rating	Height		Width		Depth Door closed		Door open		Weight		Outline drawing
	in	mm	in	mm	in	mm	in	mm	lb	kg	
40, 70, 125	27.0	686	20.5	521	12.0	305	31.5	800	82	37	0310-0544
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	19.5	495	48.5	1232	360	163	0310-0417

Dimensions - transfer switch in U.L. type 3R, 4, or 12 enclosure

Amp rating	Height		Width		Depth Door closed		Door open		Weight		Cabinet type	Outline drawing
	in	mm	in	mm	in	mm	in	mm	lb	kg		
40, 70, 125	34.0	864	26.5	673	12.5	318	36.5	927	125	57	3R, 12	0310-0453
											4	0310-0445
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	19.5	495	49.5	1257	410	186	3R, 12	0310-0457
											4	0310-0449

Transfer switch lug capacities

All lugs accept copper or aluminum wire unless indicated otherwise.

Transfer switch ampere	Cables per phase	Size
40, 70, 125	1	#12 AWG-2/0
150, 225	1	#6 AWG – 300 MCM
260	1	#6 AWG – 400 MCM
300, 400	1	3/0 – 600 MCM
300, 400	2	3/0 – 250 MCM
600	2	250 – 500 MCM
800	4	250 – 500 MCM

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Submittal detail – options and accessories

Amperage ratings
- ☐ 40
- ☐ 70
- ☐ 125
- ☐ 150
- ☐ 225
- ☐ 260
- ☐ 300
- ☐ 400
- ☐ 600
- ☐ 800
- ☐ 1000

Voltage ratings
- ☐ R020 120
- ☐ 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, 150 A +)

Frequency
- ☐ A044 60 Hertz
- ☐ A045 50 Hertz

Application
- ☐ A035 Utility to genset

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.
- ☐ B010 Type 12: indoor use (dust-tight and drip-tight, similar to IEC type IP61)
- ☐ B025 Type 4X: stainless steel enclosure

Listing
- ☐ A046 UL 1008/CSA certification

Control voltage
- ☐ M033 12V, Genset starting voltage
- ☐ M034 24V, Genset starting voltage

Control options
- ☐ J030 External exercise clock
- ☐ M032 Elevator signal relay

Battery chargers
- ☐ K001 2 amps, 12/24 volts
- ☐ KB59 15 amps, 12 volts
- ☐ KB60 12 amps, 24 volts

Auxiliary relays

Relays are UL Listed and factory installed. All relays provide (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 switch is in source 2 (emergency) position.
- ☐ L103 24 VDC coil - normal position - relay energized when switch is in source 1 (normal) position
- ☐ L201 12 VDC coil installed, not wired (for customer use)
- ☐ L202 24 VDC coil - emergency position - relay energized when switch is in source 2 (emergency) position
- ☐ L203 24 VDC coil - normal position - relay energized when switch is in source 1 (normal) position

Miscellaneous options
- ☐ M003 Terminal block – 30 points (not wired)

Warranty
- ☐ G002 1 year Basic
- ☐ G004 2 year Comprehensive
- ☐ G006 5 year Basic
- ☐ G007 5 year Comprehensive
- ☐ G008 10 year Major Components

Shipping
- ☐ A051 Packing – export box (800-1000 A)

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