

OTPC-SE service entrance transfer switch open transition 40-1000 amp



> **Specification sheet**
40 – 1000 Amp

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Description

OTPC service entrance 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 switch monitors both power sources, signals generator set startup, automatically transfers power, and returns the load to the primary power source when the utility returns and stabilizes.

The service entrance transfer switch meets UL 1008 standards for service entrance applications. The switch contains an UL-listed overcurrent disconnect device on the main incoming utility source.



All switches are UL 1008 listed and labeled, with UL-type rated cabinets and UL-listed CU-AL terminals.

NEC

Suitable for use in emergency, legally required and standby applications per NEC 700, 701 and 702.



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.



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

Features

PowerCommand® control – Choose Level 1 or Level 2 microprocessor-based control. Control allows operator to enter settings and make adjustments to software-enabled features, easily and accurately.

Overcurrent disconnect device - Square D UL-Listed 489 molded case circuit breaker.

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

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

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

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

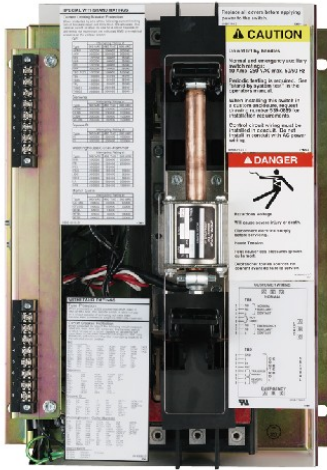
Main contacts - Heavy-duty silver alloy contacts with multi-leaf arc chutes are rated for 100% load interruption. They require no routine contact maintenance and provide 100% continuous current ratings.

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

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

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

Transfer switch mechanism



- A bi-directional linear motor actuator powers the transfer switch. 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 4-pole/switched neutral switches, this action prevents 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.
- 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.
- Contact wear is reduced by multiple leaf arc chutes that cool and quench the arcs. Barriers separate the phases to prevent interphase flashover. A transparent protective cover allows visual inspection.

Specifications

Voltage rating	480 VAC, 50 or 60 Hz.
Arc interruption	Multiple leaf arc chutes provide dependable arc interruption.
Neutral bar	A full current-rated neutral bar with lugs is standard on enclosed 3-pole transfer switches.
Auxiliary contacts	Two isolated contacts (one for each source) indicating switch position are provided for customer use. Contacts are normally open, and close to indicate connection to the source. Wired to terminal block for easy access. Rated at 10 amps continuous at 250 VAC maximum. UL recognized, and CSA-certified.
Operating and storage temperature	-13° F (-25° 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	Voltage surge performance and testing in compliance with the requirements of IEEE C62.41 (Category B3) and IEEE C62.45.
Total transfer time (source-to-source)	Will not exceed 6 cycles at 60 Hz with normal voltage applied to the actuator and without programmed transition installed.
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.
Overcurrent disconnect device	Service entrance switches have a Square D UL 489 listed molded case circuit breaker. 1000 amp switches also have a current transformer and integral residual ground fault protection.

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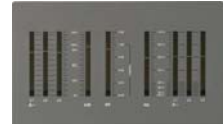


PowerCommand control

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

- Flash memory stores the control settings.
- Contents of memory are not lost even if power to the controller is lost.
- On-board battery maintains the real-time clock setting and the engine start time delay.
- Choice of two control packages allows selection of the most suitable control for the application.

Bargraph



Basic Indicator Panel



Digital Display



Control functions

Level 1 control (C023)

Open transition (in-phase)

Open transition (programmed)

Utility-to-genset applications

Software adjustable time delays

Engine start: 0 to 15 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, 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: $\pm 5\%$ to $\pm 20\%$ of nominal frequency

Dropout: $\pm 1\%$ beyond pickup

Dropout time delay: 0.1 to 15.0 sec

Programmable genset exerciser: One event/schedule with or without load

Basic indicator panel

Source available/connected LED indicators

Test/exercise/bypass buttons

Digital display – optional (M018)

Bar graph meter display – optional (D009)

Date/time-stamped event recording: 50 events

Load sequencing: Optional with network communications module (M031). Provides control for eight steps of load with an adjustable time delay for each step on transfer, retransfer, or both.

Level 2 control (C024)

Open transition (in-phase)

Open transition (programmed)

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

Utility-to-genset applications

Software adjustable time delays

Engine start: 0 to 120 sec

Transfer normal to emergency: 0 to 120 sec

Re-transfer emergency to normal: 0 to 30 min

Engine stop: 0 to 30 min

Programmed transition: 0 to 60 sec

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

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

Pickup: 95% to 99% of dropout setting

Dropout: 105% to 135% of nominal voltage

Dropout time delay: 0.5 to 120 sec

Over/under frequency sensing: normal and emergency

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 without load

Basic indicator panel

Source available/connected LED indicators

Test/exercise/bypass buttons

Digital display - standard

Bar graph meter display (D009)

Date/time-stamped event recording: 50 events

Load sequencing: Optional with network communications module (M031). Provides control for eight steps of load with an adjustable time delay for each step on transfer, re-transfer, or both.

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Transition modes

Open transition/programmed: Controls the time required for the device to switch from source to source, so that the load-generated voltages decay to a safe level before connecting to an energized source. Recommended by NEMA MG-1 to prevent nuisance-tripping breakers and load damage. Adjustable 0–10 seconds; default 0 seconds.

Open transition/in-phase: Initiates open transition transfer when in-phase monitor senses both sources are in phase. Operates in a break-before-make sequence. Includes ability to enable programmed transition as a back-up. If sources are not in phase within 120 seconds, the system will transfer using programmed transition.

Time-delay functions

Engine start: Prevents nuisance genset starts due to momentary power variation or loss.

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.

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

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

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

User interfaces

Basic interface panel

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

Digital display (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 is optional with the PowerCommand Level 1 control and comes standard with the Level 2 control.

User interface options

Front panel security key (M017)

Locks front panel to prohibit access to digital control settings. Prevents unauthorized activation of transfer or test functions.

Bar graph meter display (D009)

An LED bar graph display provides an easy-to-read indicator of the level of power being supplied to the load. Information displayed includes: 3-phase voltage and current, power factor, and kilowatts. Green, amber, and red LEDs provide at-a-glance indication of system acceptability. Available as an option with the Level 2 PowerCommand microprocessor control.

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

Control options

Loadshed (M007)

Removes the load from the emergency power source by driving the transfer switch to the neutral position when signaled remotely. Transfers load back to the emergency source when the signal contacts open. Immediately re-transfers to the primary source when it is available.

PowerCommand network interface (M031)

Provides connection to the PowerCommand network. LonWorks compatible for integration with building monitoring and control systems.

Load power and load current monitoring (M022)

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

Relay signal module (M023)

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

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UL withstand and closing ratings

Withstand and closing ratings (WCR) are stated in symmetrical RMS amperes.

Transfer switch ampere	WCR at volts max with specific manufacturers MCCBs	Breaker provided	Trip Unit
40, 70, 125 3-pole only	35,000 at 480	Square D type HG	Standard fixed trip unit
150, 225, 250	65,000 at 480	Square D type DJ	STR23SP
300, 400, 600	65,000 at 480	Square D type PJ	Micrologic 3.0
800	65,000 at 480	Square D type RJ	Micrologic 3.0A
1000	65,000 at 480	Square D type RJ	Micrologic 6.0A

Transfer switch lug capacities

All lugs accept copper or aluminum wire unless indicated otherwise.

Amp rating	Emergency and load		Service	
	Cables per phase	Size	Cables per phase	Size
40, 70, 125	1	#12 AWG-2/0	1	#14 AWG-3/0
150, 225	1	#6 AWG - 300 MCM	1	#2 AWG-600 MCM
250	1	#6 AWG - 400 MCM		#2 AWG-500 MCM
300, 400	1	3/0 - 600 MCM	3	3/0 - 500 MCM
	2	3/0 - 250 MCM		
600	2	250 - 500 MCM	3	3/0 - 500 MCM
800, 1000	4	250 - 500 MCM	4	600 MCM

Enclosures

The transfer switch and control are mounted in a key-locking enclosure. Wire bend space complies with 2008 NEC. The 3R enclosure has double doors; no safety cover is required. 40-600 amp switches are wall-mounted; 800-1000 amp switches are floor-mounted. All can be top, bottom, left or right connected.

Dimensions - transfer switch in UL type 1 enclosure

Amp rating	Height		Width		Depth				Weight		Outline drawing
	in	mm	in	mm	Door closed		Door open		lb	kg	
					in	mm	in	mm			
40, 70, 125 3-pole	45.8	1164	32.0	814	16.3	413.0	45.9	1165	300	136	0500-4721
150, 225, 250	73.6	1869	32.3	820	19.7	499.0	49.6	1259	500	227	0500-4606
300, 400, 600	74.5	1892	34.4	873	20.1	510.4	50.9	1293	520	236	0500-4611
800, 1000	90	2286	39	991	26.3	667	61.8	1570	920	417	0500-4608

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

Amp rating	Height		Width		Depth				Weight		Outline drawing
	in	mm	in	mm	Door closed		Door open		lb	kg	
					in	mm	in	Mm			
40, 70, 125 3-pole	45.8	1164	32.0	814	16.3	413.0	45.9	1165	340	154	0500-4721
150, 225, 250	73.6	1869	32.3	820	19.7	499.0	49.6	1259	580	263	0500-4606
300, 400, 600	74.5	1892	34.4	873	20.1	510.4	50.9	1293	600	272	0500-4611
800, 1000	90	2286	39	991	26.3	667	61.8	1570	920	417	0500-4608

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Submittal detail – options

Amperage ratings

- 40
- 70
- 125
- 150
- 225
- 250
- 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

Pole configuration

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

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)
- B010 Type 12: Indoor use, dust-tight and drip-tight (similar to IEC type IP61)

Standards

- A046 UL 1008 certification
- A080 Seismic certification

Controls

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

Control options

- M017 Security key - front panel
- M018 Digital display
- M022 Load monitoring (min current level 3%)
- M023 Elevator signal relay
- M031 LonWorks Network Communications Module (FTT-10)

Meters

- D009 Bar graph meter display

Battery chargers

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

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
- N013 Extension harness

Optional lug kits

- N020 Terminal block – re-transfer 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

Accessories

- AC-167 Accessories specifications sheet

Cummins Power Generation

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