Transfer switch
Service Entrance OTPC

> Specification sheet
40 - 600 Amp

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Description

Cummins Power Generation's 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 Service Entrance Transfer Switches are Listed under UL 1008, the Standard for Transfer Switch Safety. The service entrance switches adhere to all National Electrical Code (NEC) and National Fire Protection Association (NFPA).

The Service Entrance transfer switch monitors utility power 24 hours a day and 7 days a week. When utility power becomes unsatisfactory or fails; the genset is signaled to start, then automatically transfers the load. When stable utility voltage returns, the transfer switch will automatically switch electrical load from the generator to the utility.

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

Overcurrent disconnect device - UL Listed 489, Square D breaker.

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 both 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 Service Entrance 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 600 A are rated up to 480 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 and storage temperature	-13 °F (-25 °C) to 140 °F (60 °C) (breaker operating temperature)
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 Service Entrance 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.

Delayed (programmed) transition - The Service Entrance is also offered standard with programmed (delayed) transition. The delayed transition Service Entrance 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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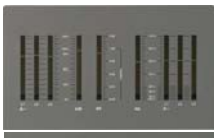
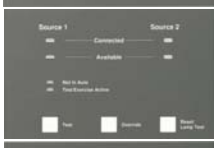
PowerCommand microprocessor control

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:

Bargraph



Basic Indicator Panel



Digital Display

Standard PC feature control (C023 and C024)

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
- 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: ±5% to ±20% of nominal frequency
- Dropout: ±1% beyond pickup
- Dropout time delay: 0.1 to 15.0 sec

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

Level 1 control (C023)

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

Level 2 control (C024)

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

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.

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

Transfer switch ampere	WCR @ volts max with specific manufacturers MCCBs
40, 70, 125 3-pole only	35,000 @ 480
150, 225, 250	65,000 @ 480
300, 400, 600	65,000 @ 480

Transfer switch lug capacities

All lugs accept copper or aluminum wire unless indicated otherwise.

	Emergency and load		Service	
Amp rating	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

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

	Height		Width		Depth				Weight		Outline drawing
					Door closed		Door open				
Amp rating	in	mm	in	mm	in	mm	in	mm	lb	kg	
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

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

	Height		Width		Depth				Weight		Outline drawing
					Door closed		Door open				
Amp rating	in	mm	in	mm	in	mm	in	mm	lb	kg	
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

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Submittal detail – options (accessories specification sheet AC-170)

Amperage ratings
- ☐ 40
- ☐ 70
- ☐ 125
- ☐ 150
- ☐ 225
- ☐ 250
- ☐ 300
- ☐ 400
- ☐ 600

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) (not available 40-125 amp)

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

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

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 - 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

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