
Power Systems

# Transfer Switches Made Easy: A Guide for Selecting Transfer Switches

**PowerHour** webinar series for consulting engineers

**Experts you trust. Excellence you count on.**

November 20th, 2019 11:00 PDT / 13:00 CDT

*(1PDH issued by Cummins)*

# Welcome!

PowerHour is designed to help our engineer partners to…

- Keep up to date on products, technology, and codes and standards development
- Interact with Cummins experts and gain access to ongoing technical support
- Participate at your convenience, live or on-demand
- Earn Professional Development Hours (PDH)

Technical tips:

- Audio is available through teleconference, or your computer (don't forget to unmute)
- You are in **"listen only"** mode throughout the event
- Use the **WebEx Q&A Panel** to submit questions, comments, and feedback throughout the event. We will provide sufficient Q&A time after presentation
- If you lose audio, get disconnected, or experience a poor connection, please disconnect and reconnect
- Report technical issues using the **WebEx Q&A Panel**, or email powergenchannel@cummins.com

# Meet your panelists

## Cummins presenter:

Munir Kaderbhai,
Product Manager, Transfer Switch
Cummins Inc.

## Cummins facilitator:

Tom Bakritzes,
Global Sales Training Manager
Cummins Inc.

**Your local Cummins contacts:**

- Western Canada: Ian Lindquist (ian.Lindquist@cummins.com), Western Canada Region
- Eastern Canada: Melvin Nicholas (melvin.nichols@cummins.com), Eastern Canada Region
- AZ, ID, NM, NV: Carl Knapp (carl.knapp@cummins.com), Rocky Mountain Region
- CO, MT, ND, UT, WY: Chris Scott (chris.scott@cummins.com), Rocky Mountain Region
- Northern IL, IA: John Kilinskis (john.a.kilinskis@cummins.com), Central Region
- UP of MI, MN, East ND, WI: Michael Munson (michael.s.munson@cummins.com), Central Region
- NE, SD, West MO, KS: Earnest Glaser (earnest.a.glaser@cummins.com), Central Region
- South IL, East MO: Jeff Yates (jeffrey.yates@cummins.com), Central Region
- TX, OK, AR, LA, MS, AL, Western TN: Scott Thomas (m.scott.thomas@cummins.com), Gulf Region
- FL, GA, NC, SC, Eastern TN: Robert Kelly (robert.kelly@cummins.com), South Region
- NY, NJ, CT, PA, MD: Charles Attisani (charles.attisani@cummins.com), East Region
- CA, HI: Brian E Pumphrey (brian.pumphrey@cummins.com), Pacific Region
- WA, OR, AK: Tom Tomlinson (tom.tomlinson@cummins.com), Pacific Region
- For other states and territories, email powergenchannel@cummins.com or visit http://power.cummins.com/sales-service-locator

# Disclaimer

The views and opinions expressed in this course shall not be considered the official position of any regulatory organization and shall not be considered to be, nor be relied upon as, a Formal Interpretation.

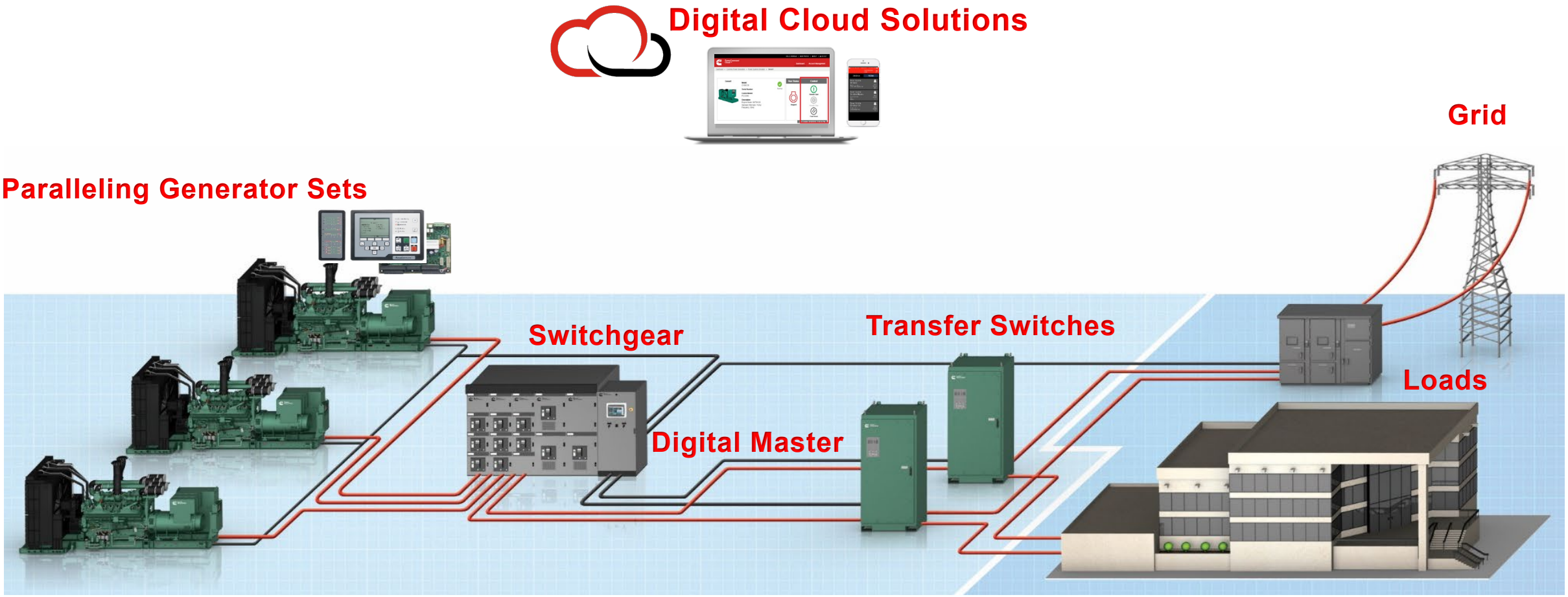
Participants are encouraged to refer to the entire text of all referenced documents. In addition, when it doubt, reach out to the Authority Having Jurisdiction.

# Course Objectives:
# A Guide for Selecting Transfer switches

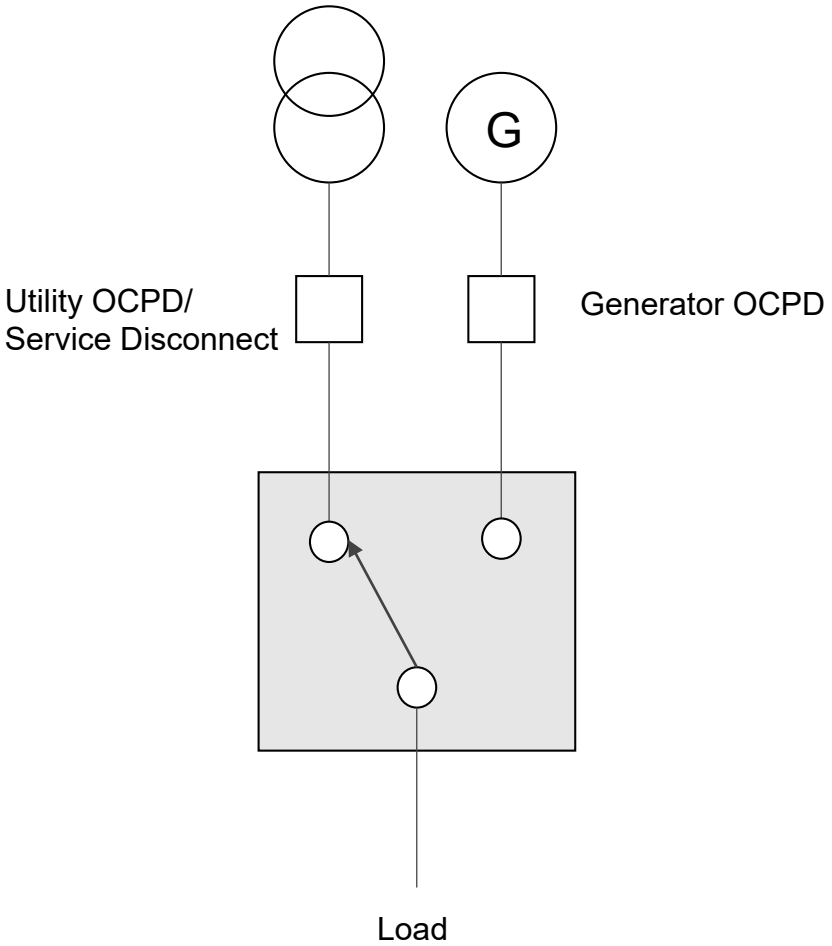
**After completing this course, participants will be able to:**

- Understand the different variants of UL1008 transfer switches and know when to use them
- Have a list of basic selection criteria and step-by-step guide to help them with their transfer switch selection process
- Have a better understanding of some of the common pitfalls in ATS selection process and how to avoid them.

# Power System Building Blocks



# What is a Transfer Switch?



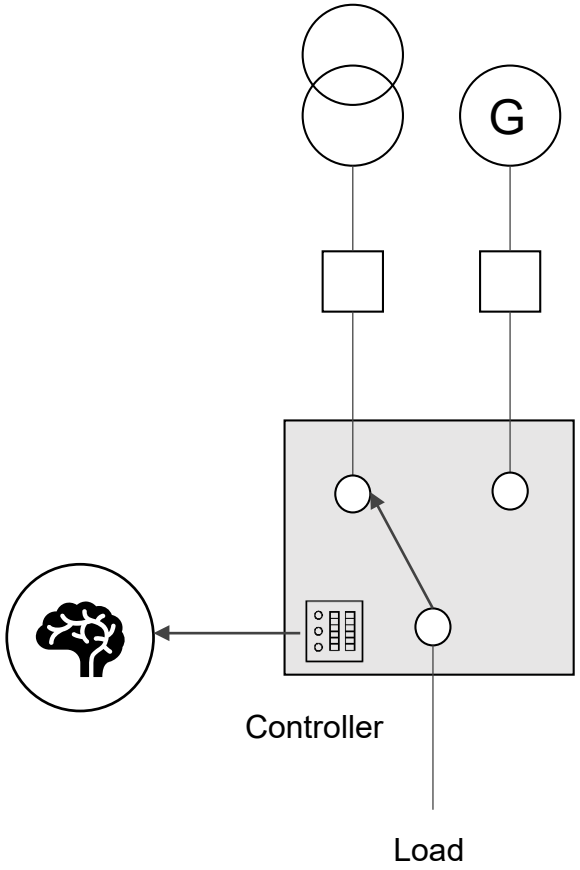

Overcurrent Protection Device

- Monitors the availability and quality of two connect power sources
- Transfers power consumed by electrical loads connected to the transfer switch output between two sources based on source availability

# Key Considerations When Selecting a Transfer Switch

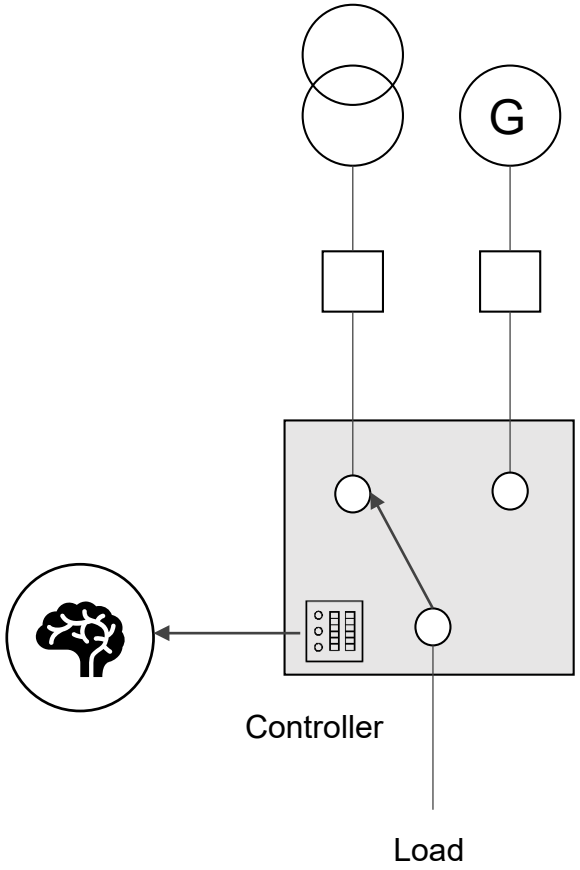
- *Switch type*
- *Transition type*
- *Application*
- *Grounding schemes*
- *Cable sizes and entry requirements*
- *Enclosures*
- *Voltage*
- *Current*
- *Fault current*
- *Selective coordination*
- *Type of load in the systems per Codes & Standards*

# Different Types of Transfer Switches

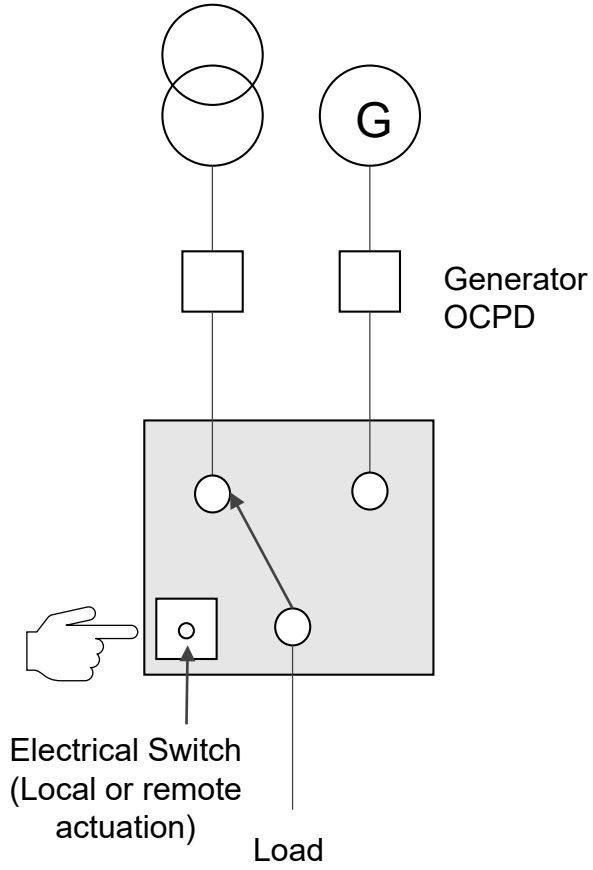



**Automatic Transfer Switch**

# Different Types of Transfer Switches

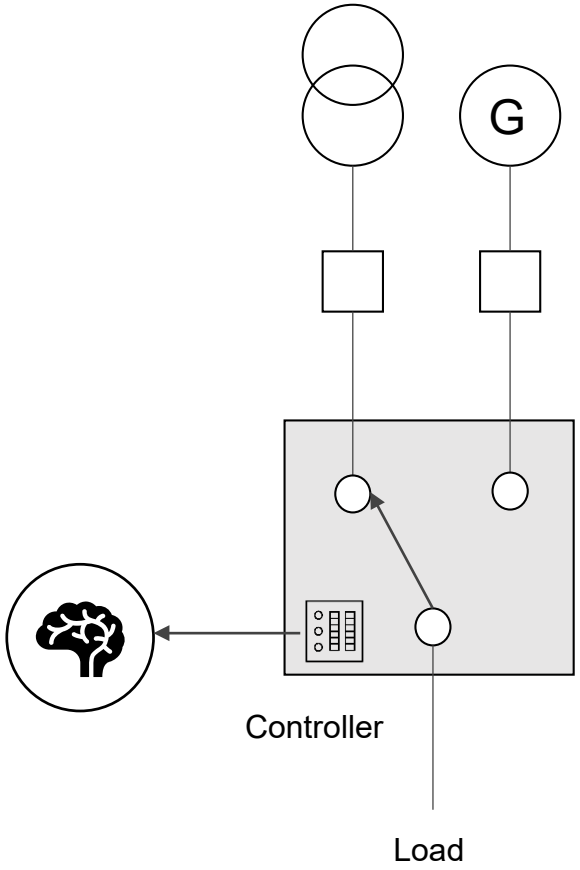



**Automatic Transfer Switch**

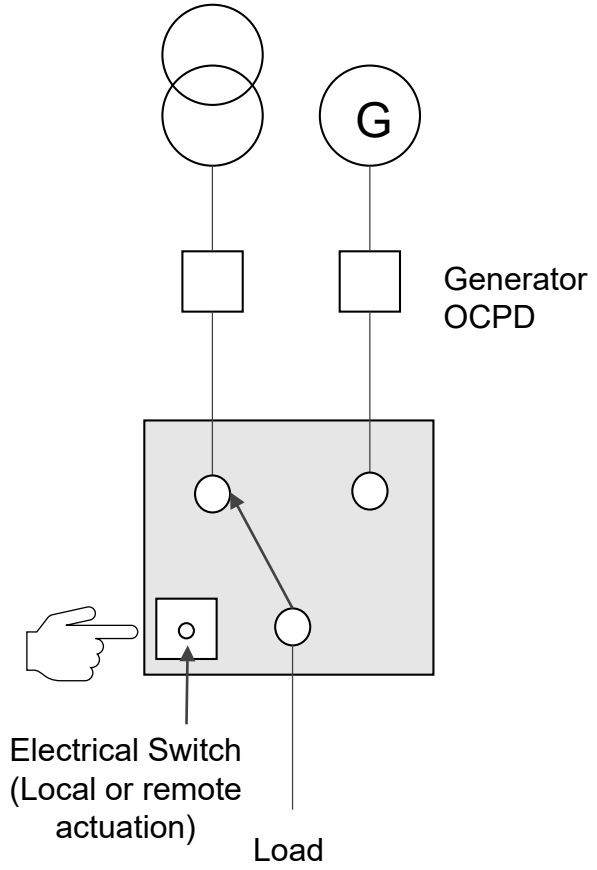



**Non-Automatic Transfer Switch**

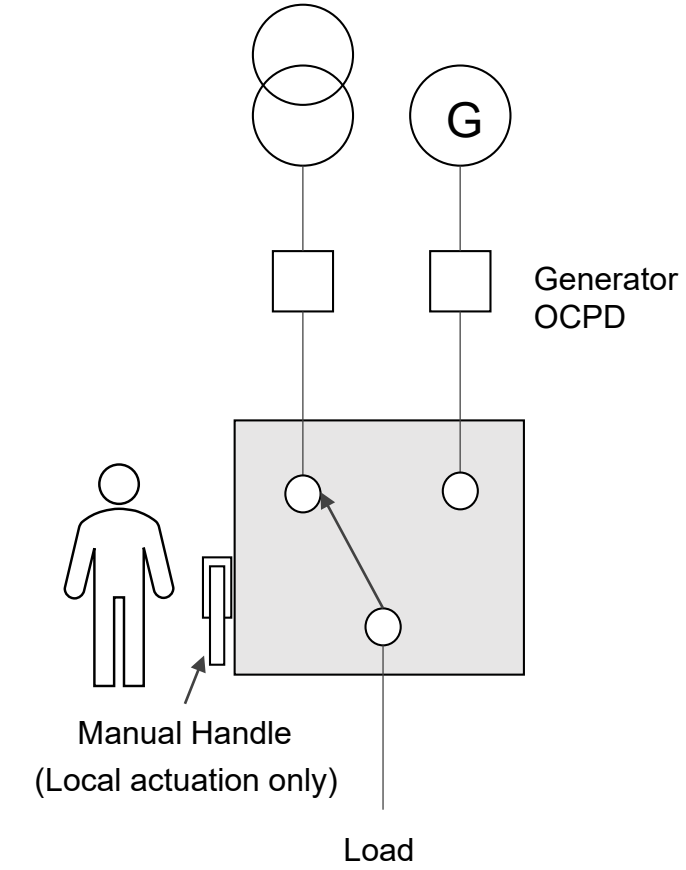
# Different Types of Transfer Switches




**Automatic Transfer Switch**

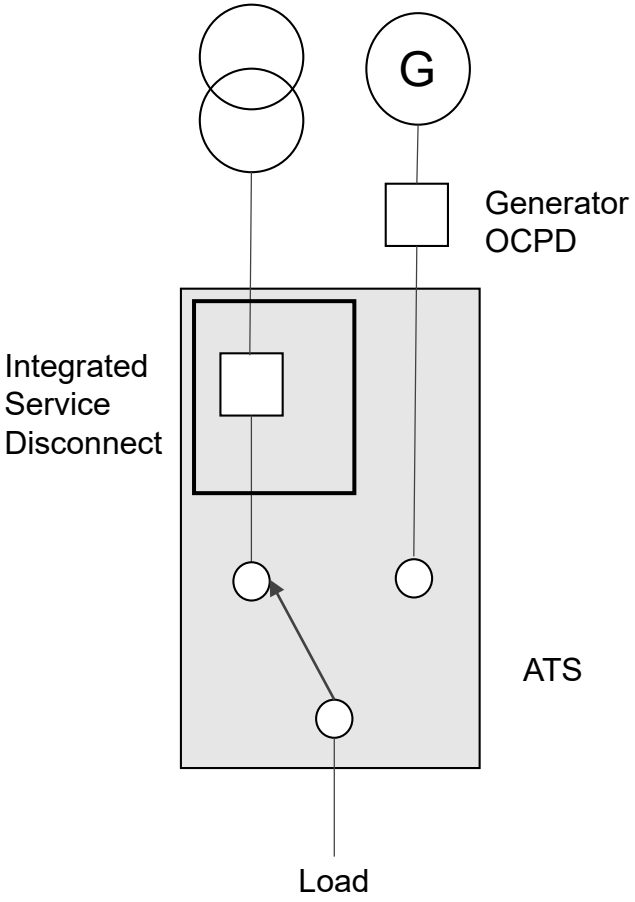



**Non-Automatic Transfer Switch**



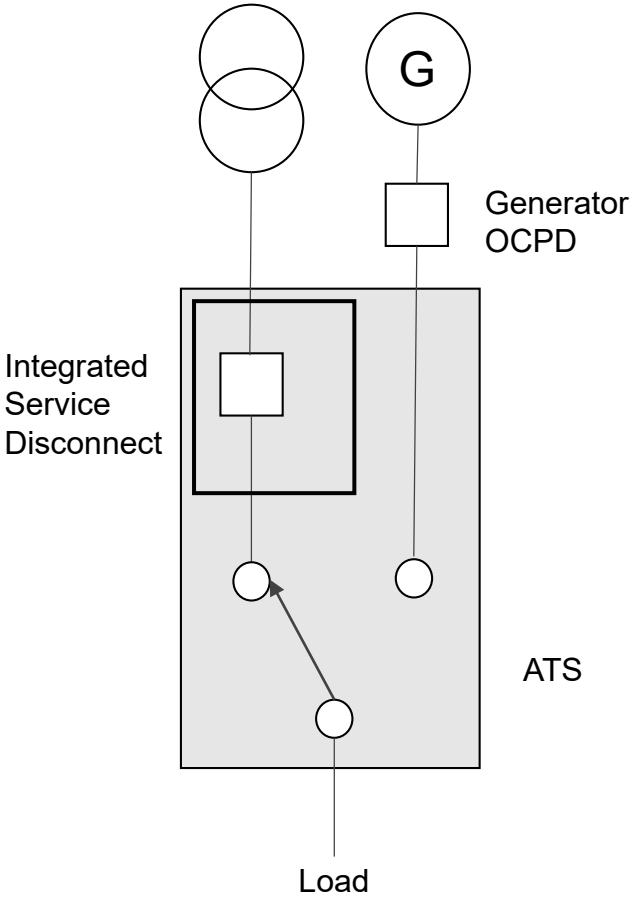

**Manual Transfer Switch**

# Different Types of Transfer Switches

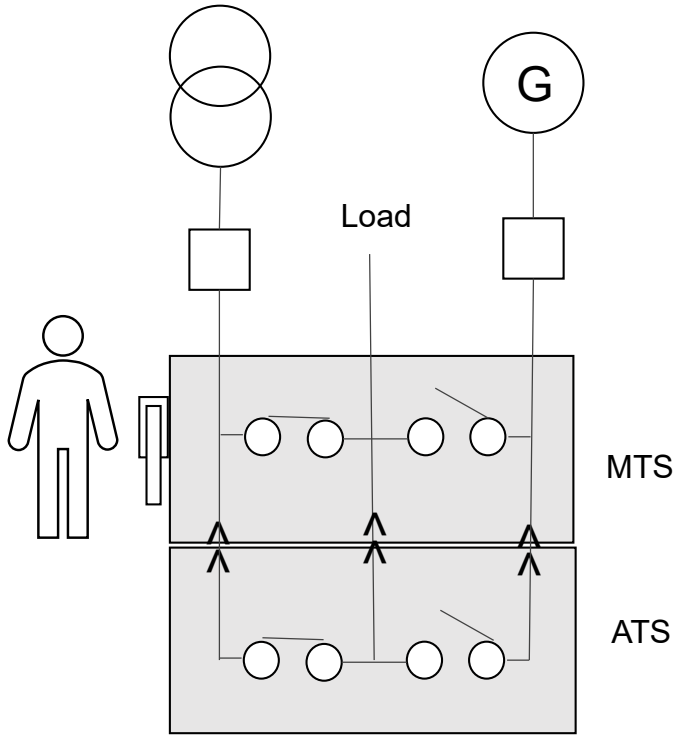



**Service Entrance Rated Transfer Switch**

# Different Types of Transfer Switches

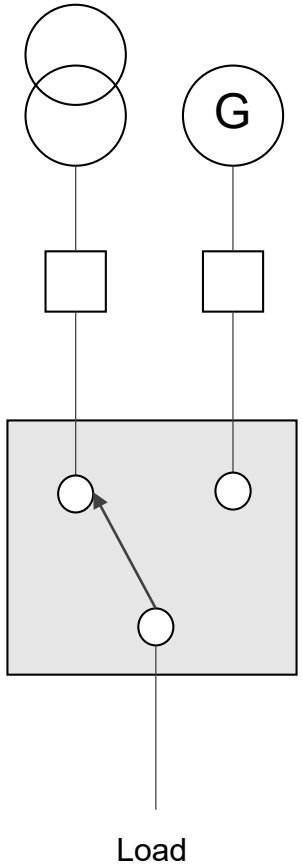



**Service Entrance Rated Transfer Switch**



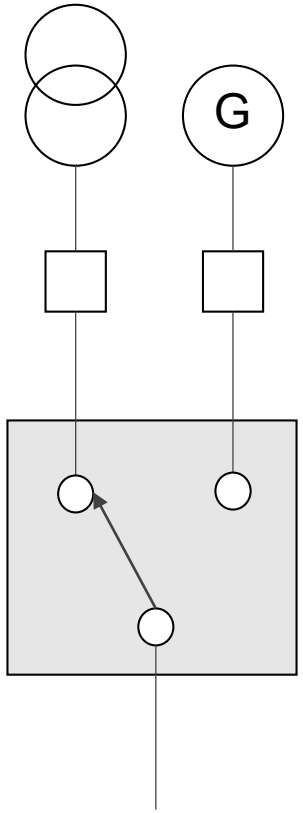

**Bypass Isolation Transfer Switch**

# Transfer Switch Application

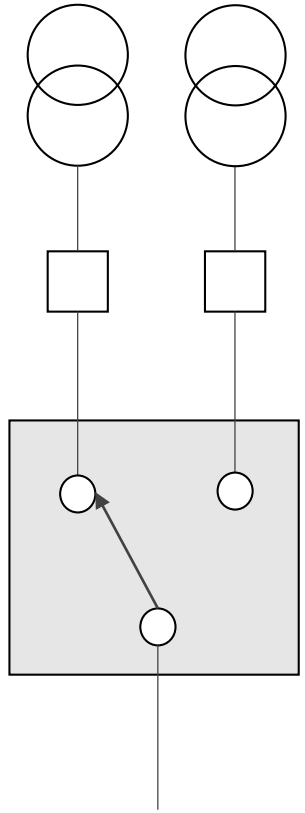



**Utility to Generator**
For facilities with a standby power system and a single utility feed

# Transfer Switch Application

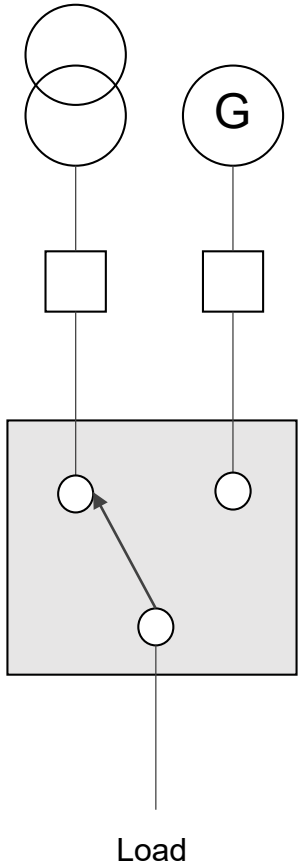



**Utility to Generator**
For facilities with a standby power system and a single utility feed

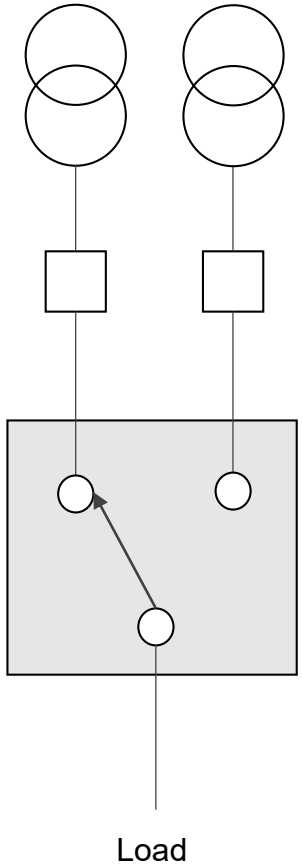



**Utility to Utility**
For use in facilities with redundant feeds but no standby generator

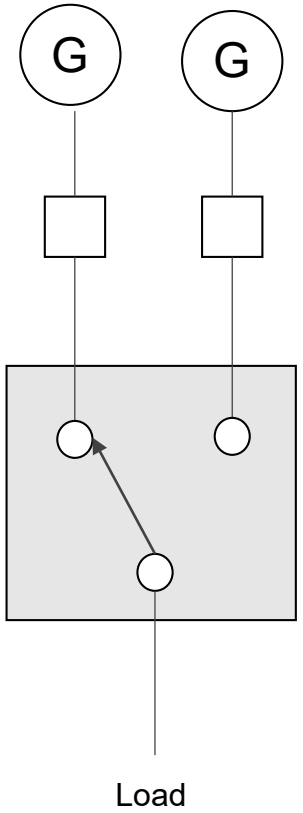
# Transfer Switch Application




**Utility to Generator**
For facilities with a standby power system and a single utility feed



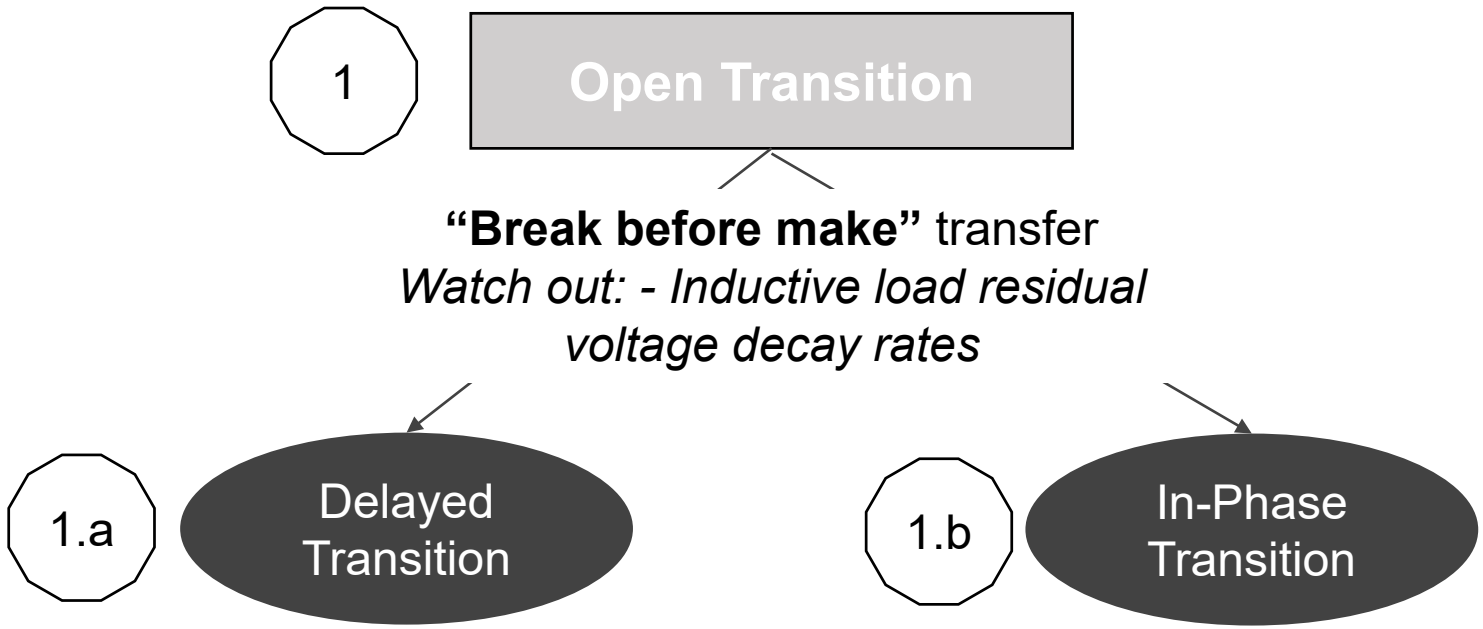

**Utility to Utility**
For use in facilities with redundant feeds but no standby generator




**Generator to Generator**
For facilities with a prime power system using multiple on-site generators

# Transition Types

There are two ways to transition the loads:




**“Break before make”** transfer
*Watch out: - Inductive load residual voltage decay rates*

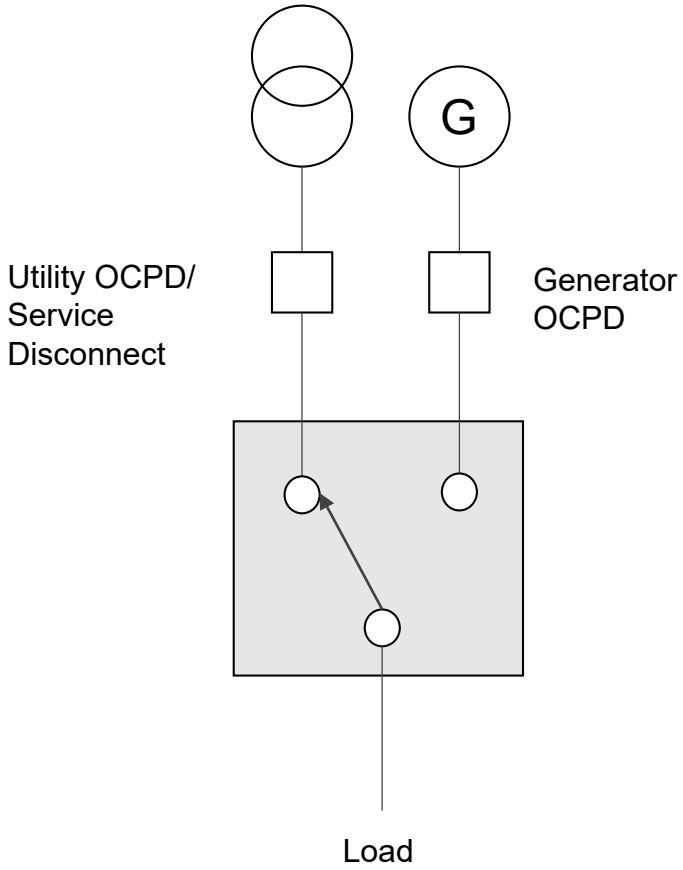
**“”Make before break”** transfer
*Watch out: - Safeguards and extensive documentation required by utility may add cost and complexity*

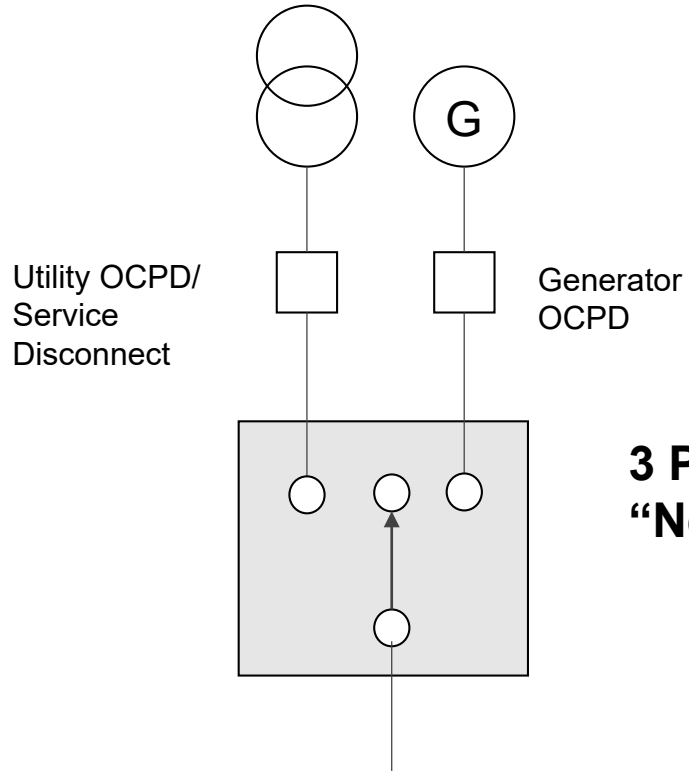
- Adjustable neutral position delay
- Flexible, simple, reliable
- Best option for large motors
- Step loading generators possible

- Based on synchronization of sources
- “Fast” – typically 30ms – 50ms delay
- Okay for resistive loads and small inducive loads

# Two Position vs. Three Position Switches

**2 Position**
**“Double Throw”**




**3 Position**
**“Neutral Position Delay”**

Good choice for switches requiring:

- Delayed Transition
- Load shed – won’t transfer to “dead” source

# Concept Check

Which transition types are not suitable for stored energy loads (large motors, MRIs)?

a) Open (In Phase)
b) Open (Delayed)
c) Closed
d) Both b) and c)

# Concept Check

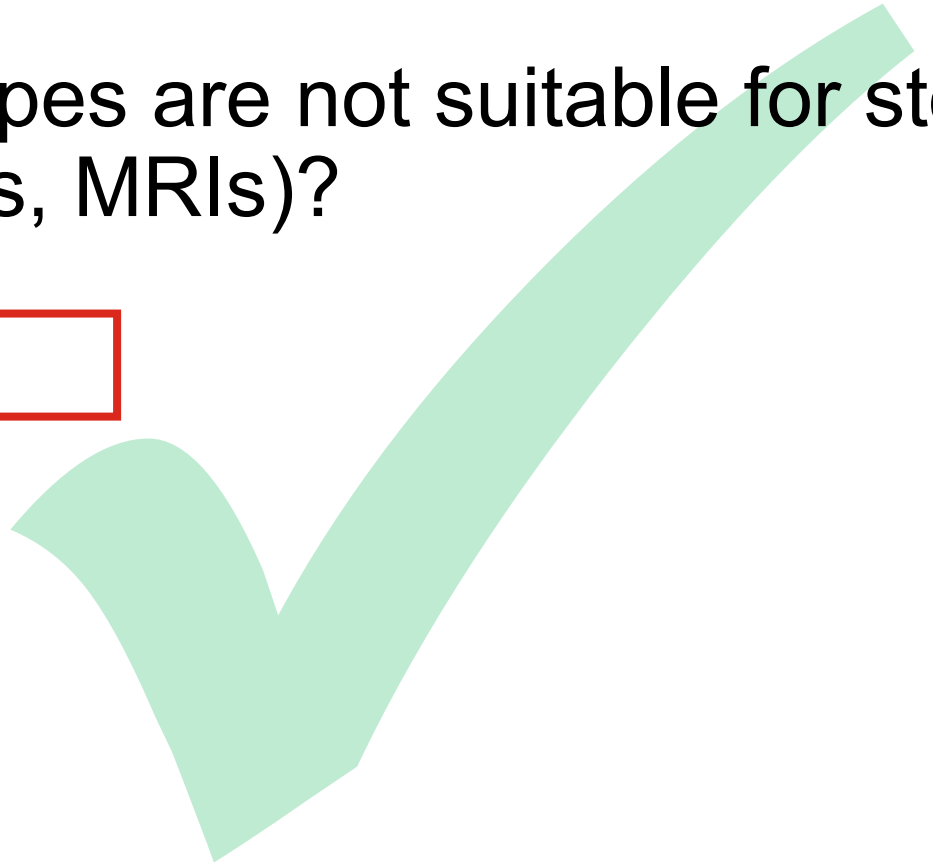
Which transition types are not suitable for stored energy loads (large motors, MRIs)?

a) Open (In Phase)

b) Open (Delayed)

c) Closed

d) Both b) and c)



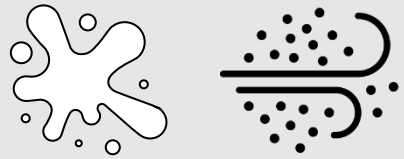
# Lets Get Grounded on 3 Pole vs. 4 Pole

- Choice depends on grounding scheme of the system
- NFPA70 (NEC) requires some systems to have ground fault protection (GFP)
- Complications and errors less likely by using 4 pole transfer switches

# Enclosure Types and Selection Criteria

Choice based on: (1) Placement, (2) Environmental conditions

## Indoor



Dust
Light/Indirect
Splashing

Ingress of solid
foreign objects
(Dust, fibers, etc.)

NEMA
Type 1

NEMA
Type 12

Not dust-tight

Knockout free

## Outdoor

Falling rain &
ice formation

Weather tight
(weatherproof)

Type 4 +
corrosion
resistance

NEMA
Type 3R

NEMA
Type 4

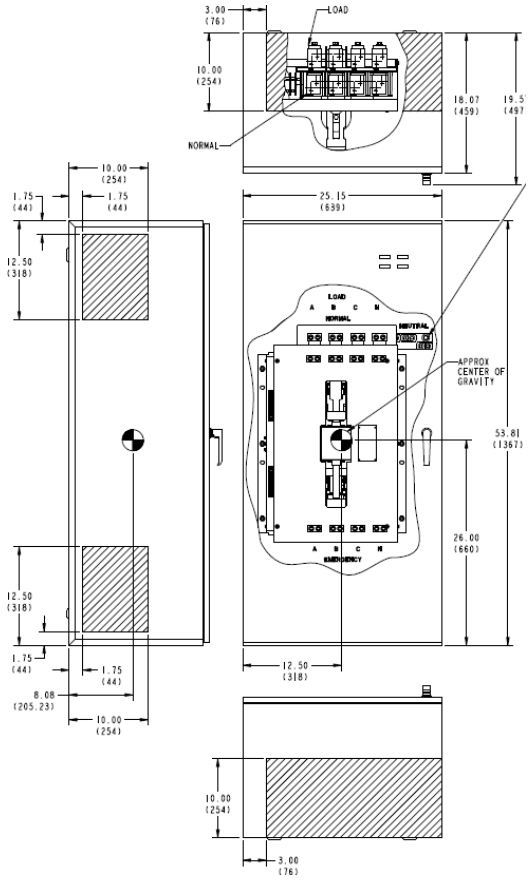
NEMA
Type 4X

Not rain-tight
Not water-tight

Stainless steel
is best

# Cable Size and Entry Requirements

- Detailed information is typically provided in transfer switch specification sheets and/or outline drawings
- Information to look for:
  - Cable entry
  - Lug options and capacities
    - Mechanical lugs or Compression lugs may be available
    - 90°C rated and accept copper or aluminum wire




NOTES:

1. UL TYPE 1 ENCLOSURE
2. APPROX. WEIGHT: 225 LBS
   MASS: 102 kg
3. DIMENSIONS IN ( ) ARE MILLIMETRES.
4. LUG CAPACITY: 300, 400 AMP
   (QUANTITY 1 WIRE) 3/0-600 (95-300) MCM CU-AL
   (QUANTITY 2 WIRES) 3/0-250 (25-120) MCM CU-AL
   LUG CAPACITY: 600 AMP
   (QUANTITY 2 WIRES) 250-500 (120-240) MCM CU-AL.
5. USE SEPARATE CONDUITS FOR CONTROL WIRING AND POWER WIRING. DO NOT COMBINE.
6. SHADED AREA INDICATES WIRING AND CABLE ENTRANCE AREA DO NOT INSTALL OUTSIDE OF SHADED AREA.
7. WIRE BENDING SPACE CONFORMS TO NATIONAL ELECTRICAL CODE (NFPA70).
8. REFER TO THE NATIONAL ELECTRICAL CODE FOR MINIMUM CLEAR SPACE IN FRONT OF THIS ENCLOSURE.
9. 4 POLE SWITCHED NEUTRAL TRANSFER SWITCH SHOWN. A SOLID NEUTRAL BAR IS PROVIDED WITH 3 POLE TRANSFER SWITCHES.

***Example: Snapshot of Cummins OTPCC ATS Outline Drawing – Type 1 Enclosure***

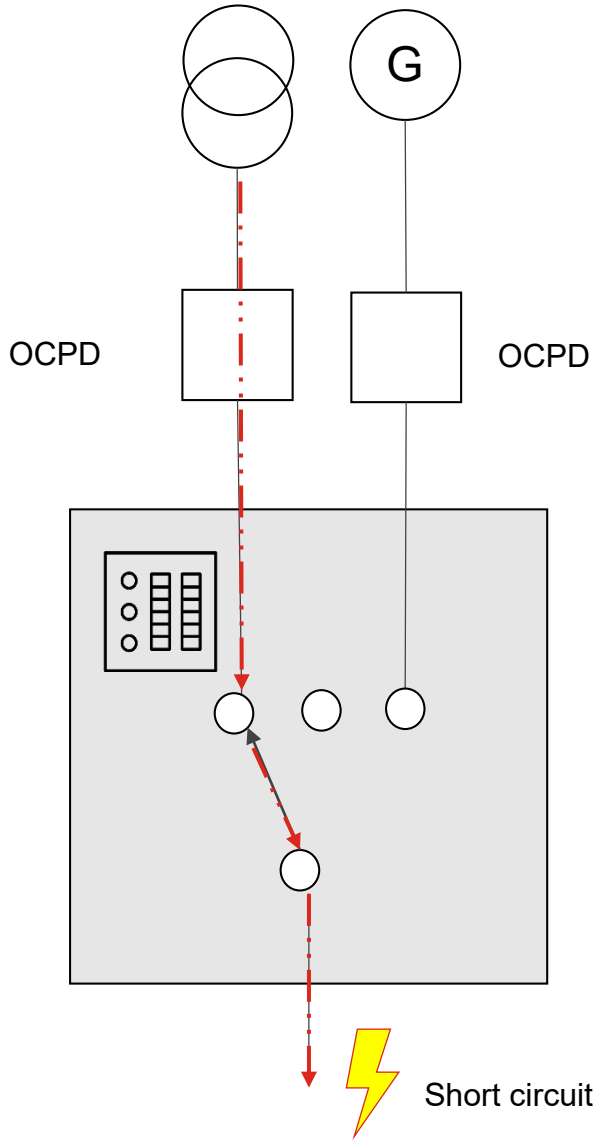
# Voltage Selection

- Transfer Switches designed to have two unsynchronized power sources connected to it
- A well designed UL transfer switch will provide adequate spacing and insulation to cope with the increased voltage stress.
- Typical AC Voltages: 120, 208, 240, 480, 600 volts, single or three phase, 50/60Hz

# Current Rating Selection

- Switches are rated for continuous current → hold maximum value for three hours or more.
- Typically capable of carrying 100% of the rated current at an ambient temperature of 40° C
- Typically, the most commonly used ampere ratings range from 40 to 4000 amperes.
- Switch frame size will dictate the current rating range and WCR Ratings
- Service Entrance Rated Transfer Switches may be rated at 80%
- Anticipate future load requirements during the planning process - select a transfer switch with a continuous current rating equal to the total of the anticipated load

# Overcurrent Protection



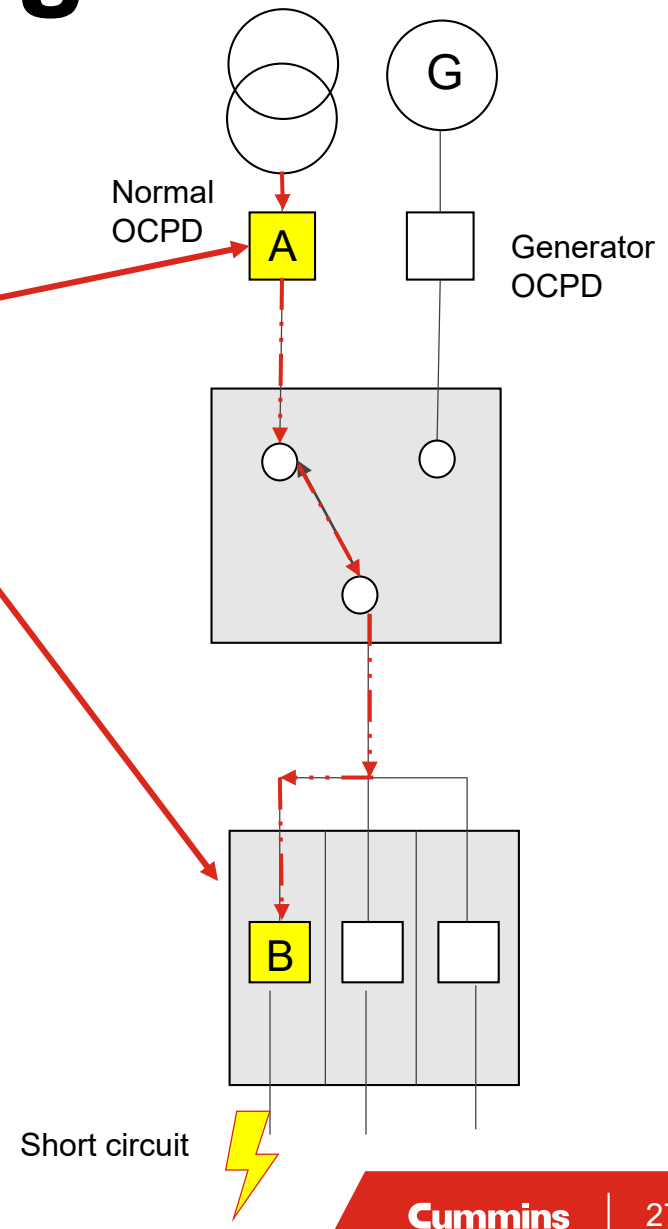

- A fault downstream of the transfer switch will result in a short circuit current flowing through the transfer switch
- High level of fault currents will cause the following stresses on the transfer switch:
  - Thermal
  - Magnetic
- Transfer switch must be provided with overcurrent protection devices (OCPD) on both sources
- Available fault current needs to be determined
- Withstand and close rating of the transfer switch must matched to the available fault current

# Selective Coordination Challenges from ATS Perspective

Selective Coordination is required for emergency, legally required standby and critical operations power systems circuits

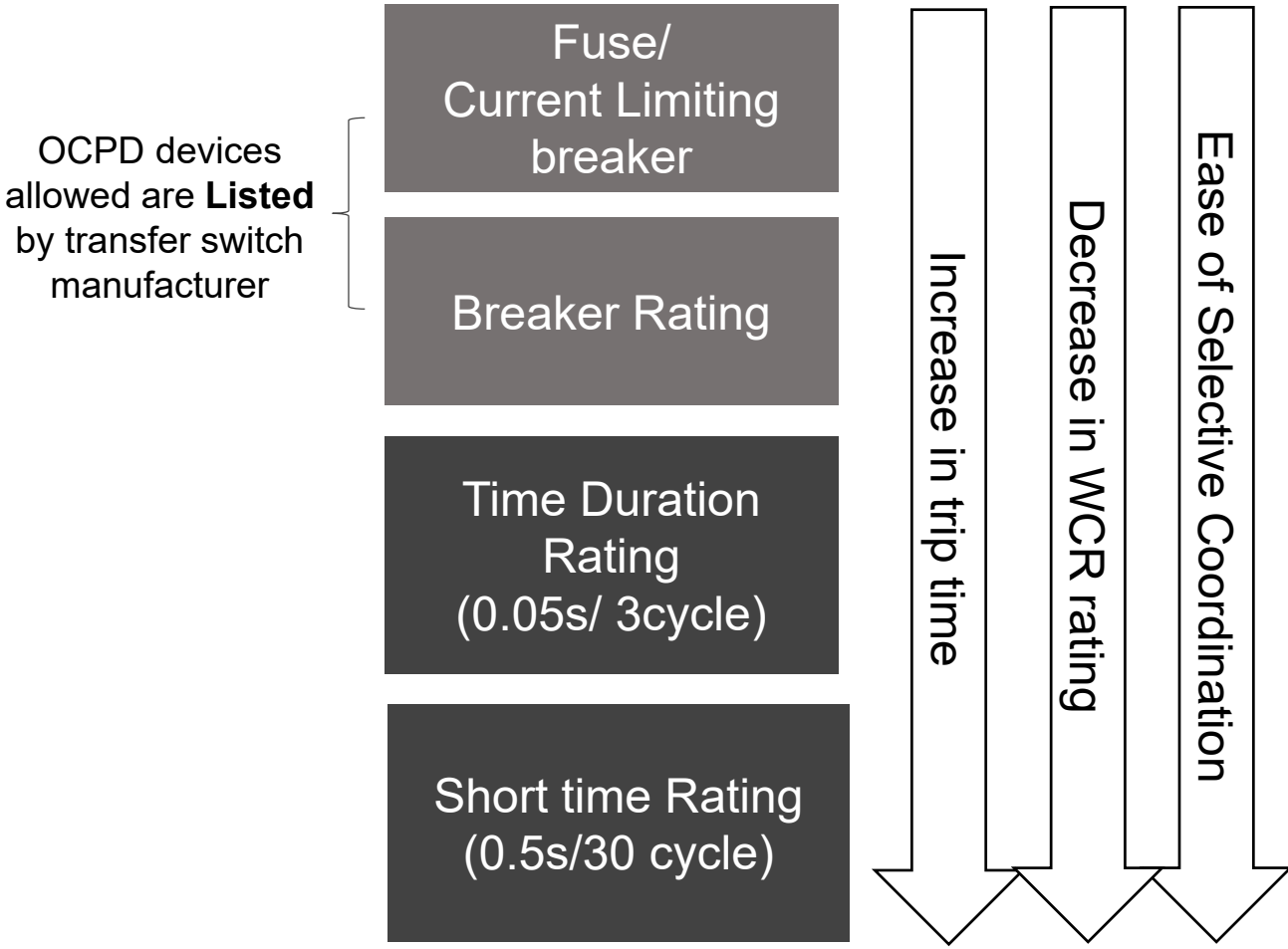
- **NEC-2017, 700.32, 701.27, and 708.54** "…over-current devices shall be selectively coordinated…"

- Selective coordination will require time delays to be set on OCPDs
  - In the example shown, A ***must*** trip after B → Time delay on A
- Time delay setting of OCPD A will depend on the available fault current from either source & the device B trip curve characteristic
- For the duration of the OCPD A time delay, the ATS must be able to:
  - Withstand the fault
  - Close into the fault
- Transfer switches manufacturer will publish a **Withstand and Close** rating



# UL 1008 Short Circuit Ratings

- UL 1008 requires all ATS to have a withstand and closing rating (WCR)
- Rating can either be time based or specific OCPD (breaker/fuse) based
- OCPD based ratings allow for higher WCR ratings but requires the ATS to be protected by a “listed” breaker or fuse
- Allowing for either time based or specific breaker based ratings enables flexibility for a cost effective design



# ATS Short Circuit Ratings

| Amps | ATS Model | Bypass Model | Fuse protection | | | Specific Breaker Protection (Common) | | | Specific Breaker Protection (General) | | | Time Based Ratings | | | | Short Time Ratings | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Max Fuse, Size and type | WCR @ Volts | | WCR @ Volts | | | WCR @ Volts | | | Time | WCR @ Volts | | | Time | WCR @ |
| | | | | 480 | 600 | 240 | 480 | 600 | 240 | 480 | 600 | (sec) | 240 | 480 | 600 | (sec) | 480V |
| | OTEC, OTPC | BTPC | 600 A Class J, RK1, RK5 or 1200 A Class L, T | 200,000 | 200,000 | 125,000 | 100,000 | 50,000 | 200,000 | 200,000 | 200,000 | | | | | | |
| 260 | OHPC, CHPC | | 400 A Class J or T or 200 A Class RK1 or 100 A ClassrK5 | 200,000 | 200,000 | | | | 200,000 | 200,000 | 200,000 | 0.050 | 25,000 | 25,000 | 18,000 | 0.167 | 25,000 |
| | OTEC, OTPC | BTPC | 600 A Class J, RK1, RK 5 or 1200 A Class L, T | 200,000 | 200,000 | 125,000 | 100,000 | 50,000 | 200,000 | 200,000 | 200,000 | 0.050 | 25,000 | 25,000 | 25,000 | | |
| 300 | OHPC, CHPC | | 400 A Class J or T or 200 A Class RK1 or 100 A ClassrK5 | 200,000 | 200,000 | 125,000 | 100,000 | 50,000 | 200,000 | 200,000 | 200,000 | 0.050 | 35,000 | 35,000 | 22,000 | 0.500 | 30,000 |

Several Short Circuit Ratings are available at each amp node

Specific overcurrent device ratings are substantially higher than time based ratings

- As high as 200,000 amps with current limiting breakers and fuses

# UL1008 Listing and Operation

**Emergency, Legally Required, Critical Operation Power (NFPA70 – 700/701/708)**

- Require UL1008 WPWR - Automatic Transfer Switches for Use in Emergency Systems
- Automatic or Bypass Isolation
- Manual/Non-Automatic not permitted

**Optional Standby (NFPA70 – 702)**

- Requires UL1008 WPXT- Automatic Transfer Switches for Use in Optional Standby Systems
- Automatic or bypass isolation
- Manual/Non-Automatic permitted

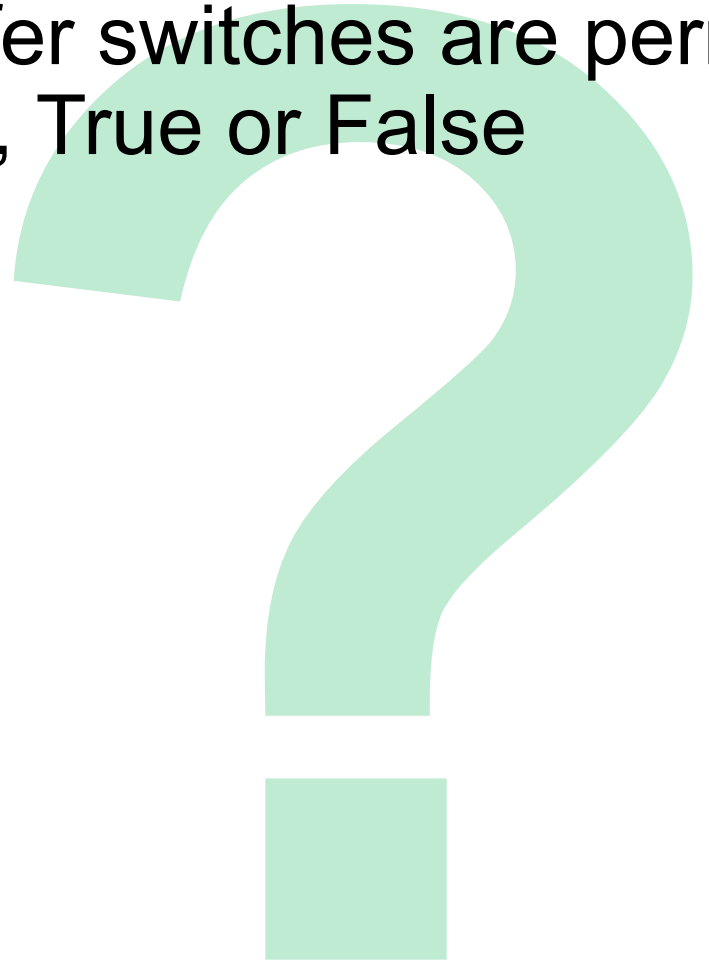
**Healthcare (NFPA70 – 517/NFPA99/OSHPD)**

- Require UL1008 WPWR - Automatic Transfer Switches for Use in Emergency Systems
- Automatic or Bypass Isolation
- While not specifically required by code in all jurisdictions, it may be advantageous to ensure ATSs are equipped with bypass/isolation capabilities.
- Health care facilities in California, governed by Office of Statewide Health Planning and Development (OSHPD) mandate the use of Bypass Isolation switches in certain systems

# Concept Check

Non-automatic transfer switches are permitted for Emergency Systems, True or False

a) True
b) False

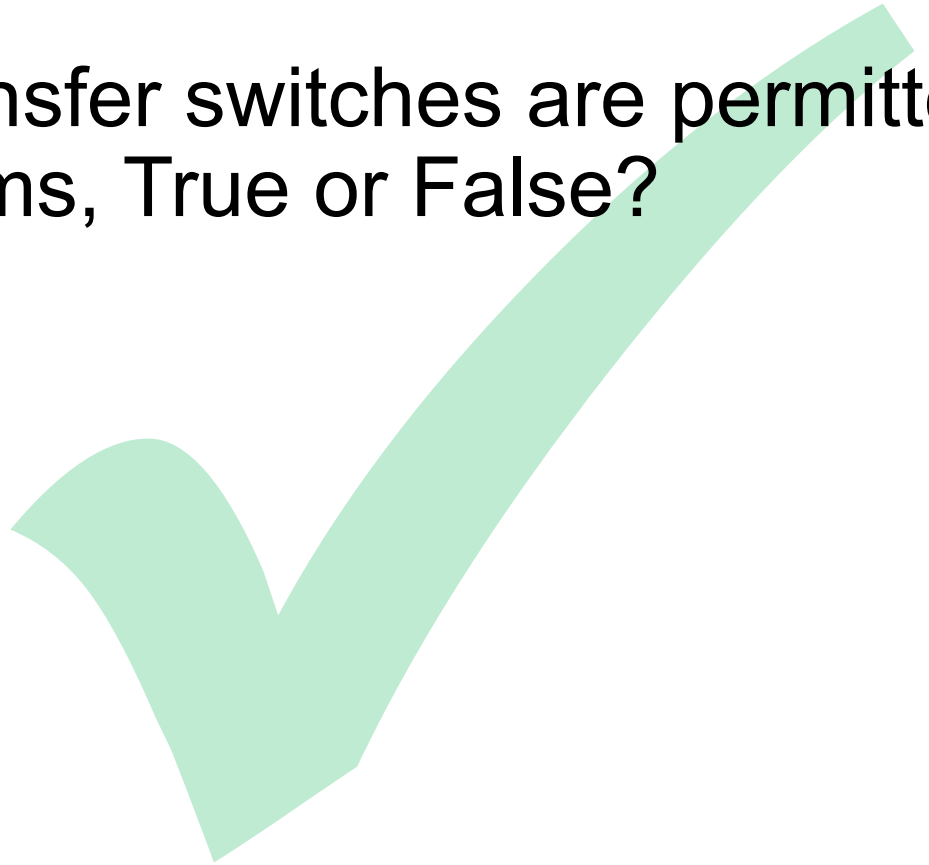


# Concept Check

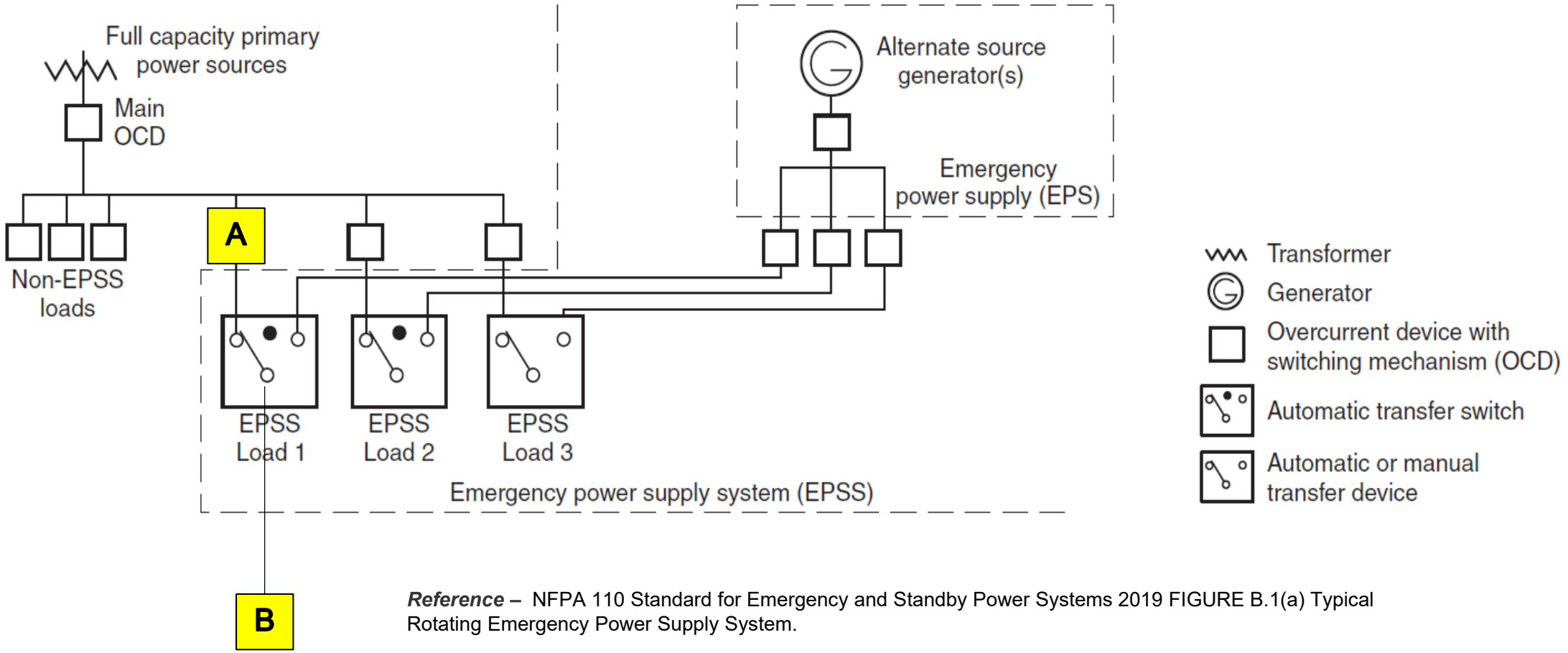
Non-automatic transfer switches are permitted for Emergency Systems, True or False?

a) True

b) False



# Example of Typical System




***Reference –*** NFPA 110 Standard for Emergency and Standby Power Systems 2019 FIGURE B.1(a) Typical Rotating Emergency Power Supply System.

# System Parameters → ATS Specification

**Scenario**

EPSS 1 – Healthcare Emergency System

Environmentally controlled, indoor installation

NFPA110 – 1 sec time delay required

Voltage – 277/480V, 3 Phase, 60Hz

Service disconnect is available upstream

GFP is required

Consists of HVAC load

Load current – 450A

Available fault current – 35,000 Amps

Selective coordination is required with downstream MCCB breaker

**Specification**

Switch Type – Bypass Isolation

UL1008 Listing - Emergency System

Application – Utility to Generator

Transition Type – Open transition, delayed

Voltage – 277/480V, 3 Phase, 60Hz

Current Rating – 600A

4 Pole ATS

NEMA Type 1 Enclosure

# Match Available Fault Current to Transfer Switch WCR Ratings

Available fault current < Selected WCR Rating?

- Available fault current = 35,000 at 480V
- MCCB Based WCR = 65,000 at 480V

- Remember to check approved breaker list published by the manufacturer and select breaker based on selective coordination needs

**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 | | | Special circuit breaker protection | | |
|---|---|---|---|---|---|---|
| | WCR @ volts max with specific manufacturers MCCBs | Max MCCB ratings | Drawing reference | With specific current limiting breakers (CLB) | Max CLB rating | Drawing reference |
| 150, 225, 260 | 30,000 at 480<br>25,000 at 600 | 400 A | A048E955 | 200,000 at 480 | 400 A | A051D533 |
| | | | | 100,000 at 600 | 100,000 at 600 | |
| 300, 400, 600 | 65,000 at 480<br>65,000 at 600 | 1200 A | A056M836 | 200,000 at 480 | 1200 A | A048J544 |
| | | | | 100,000 at 600 | 100,000 at 600 | |
| 800, 1000 | 65,000 at 480<br>65,000 at 600 | 1400 A | A056M548 | 200,000 at 480 | 1400 A | A048J546 |
| | | | | 100,000 at 600 | 100,000 at 600 | |

**Specific Circuit Breaker Manufacturer and Type Listing**

When protected by a circuit breaker of a specific manufacturer and type, and up to the maximum breaker amperes listed below, this transfer switch is suitable for use in a circuit capable of delivering up to the short circuit current and voltage listed below, but no more than the rating of specific circuit breaker.

| Short Circuit Current RMS Symmetrical Amperes | Short Circuit AC Voltage | Maximum Breaker Amperes |
|---|---|---|
| 65000 | 600 | 1200 |

**GE**

| | | | | | | |
|---|---|---|---|---|---|---|
| TEYD | TEYH | TEYL | | | | |

**Siemens**

| | | | | | | |
|---|---|---|---|---|---|---|
| BQCH | HDGA | HHLD6[2] | HLXD6[2] | LFGA | NDGA | QJH2 |
| BQD | HED4 | HHLXD6[2] | HMD6[1,2] | LJGA | NFGA | |
| CQD | HED6 | HJD6 | HMG | LLGA | NGB | |
| ED2 | HFD6 | HJGA | HMXD6[1,2] | LLGB | NGG | |
| ED4 | HFGA | HJXD6 | HQJ2H | LMD6[1,2] | NJGA | |
| ED6 | HFXD6 | HLD6[2] | JD6 | LMG | NLGA | |
| FD6 | HHFD6 | HLGA | JXD2 | LMXD6[1,2] | NLGB | |
| FD6A | HHFXD6 | HLGB | JXD6 | LXD6[2] | NMG | |
| FXD6 | HHJD6 | HLMD6[1,2] | LD6[2] | MD6[1,2] | QJ2 | |
| FXD6A | HHJXD6 | HLMXD6[1,2] | LDGA | MXD6[1,2] | QJ2H | |

1 - Limited to 600 amps maximum
2 - Limited to 240 volts maximum
3 - Limited to 480 volts maximum

**Square D**

| | | | | | |
|---|---|---|---|---|---|
| PA | PAF | PAL | PH | PHF | PHL |

**Eaton**

| | | | | | |
|---|---|---|---|---|---|
| BAB | DK[4] | EGH | HFD | JGE | QBHW |
| CHKD[4] | ED | EGS | HJD | JGH | QC |
| CHLD[4] | EDB | EHD | HKD | JGS | QCHW |
| CHMDL[4] | EDC | FD | HLD[4] | KD | QHCX |
| CKD[4] | EDH | FDB | HMDL[4] | KDB | QHPX |
| CLD[4] | EDS | GD | HQP | LD[4] | QPHW |
| CLDC[4] | EGB | GHB | JD | MDL[4] | |
| CMDL[4] | EGE | GHC | JDB | QBH | |

4 - 310 trip unit only

A056M836 A

# Summary

**Transfer Switches Made Easy: A Guide for Selecting Transfer switches**

- We talked about the different variants of UL1008 transfer switches
- We went over a list of basic selection criteria and step-by-step guide to help them with their transfer switch selection process
- We talked about how some common application issues can be avoided by specifying the right type of transfer switch

**Key Takeaway:**

When it comes to selecting the right transfer switch for a facility, engineers need to sort through a wide array of product features such as transfer switch types, operation modes, ratings, etc. Furthermore, each installation may have many variables that need to be accounted for. The content in this course covers some key criteria that may help you get started. However, to build your expertise, I recommend you dig deeper into each of the topics covered.

# Additional Resources

**Cummins White Papers**

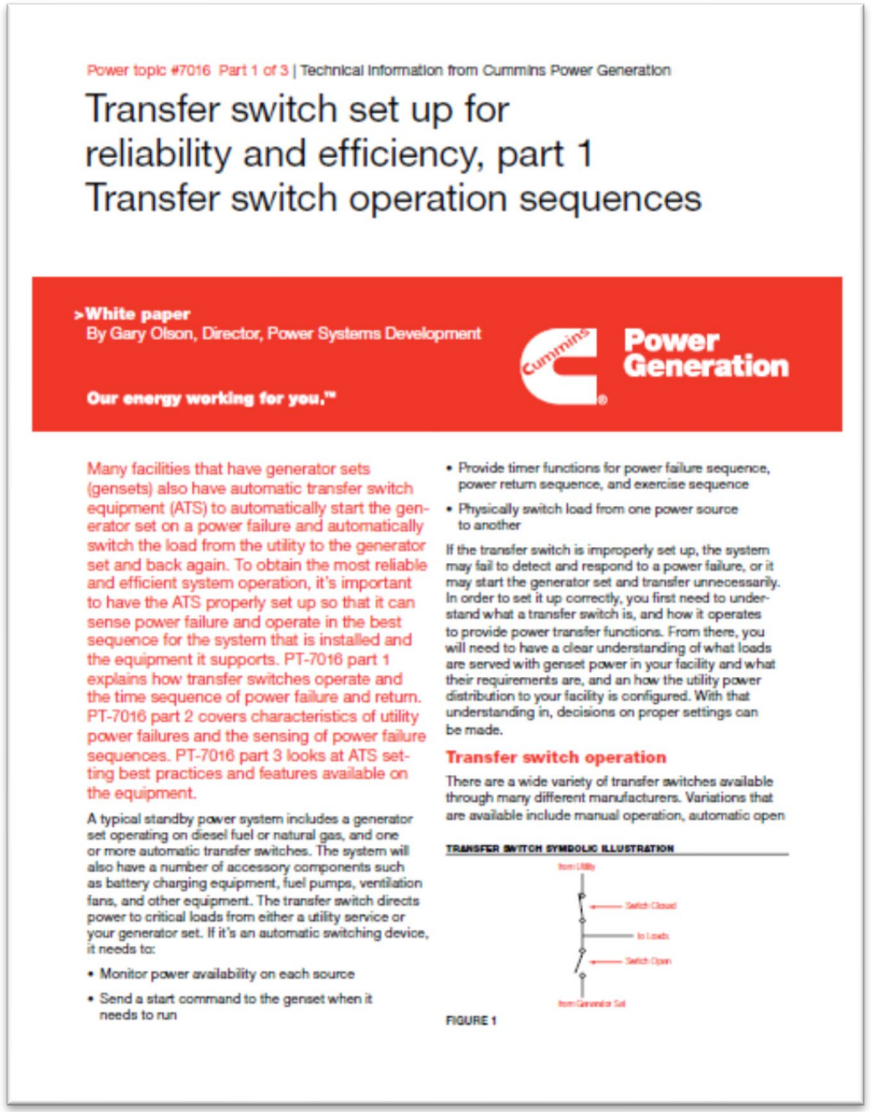
- Transfer switch set up for reliability and efficiency, parts 1, 2 & 3
- UL 1008 Withstand and Close on Ratings
- Grounding of AC generators and switching the neutral in emergency and standby power systems, part one & part 2

**Cummins On-Demand Webinars**

- Transfer Switch Operation and Application
- UL 1008 ATS Withstand and Close On Ratings

**Cummins Application Manual**

- Transfer Switch Application Manual, T-011



Power topic #7016 Part 1 of 3 | Technical information from Cummins Power Generation

Transfer switch set up for reliability and efficiency, part 1
Transfer switch operation sequences

>White paper
By Gary Olson, Director, Power Systems Development

Our energy working for you.™

Power Generation

Many facilities that have generator sets (gensets) also have automatic transfer switch equipment (ATS) to automatically start the generator set on a power failure and automatically switch the load from the utility to the generator set and back again. To obtain the most reliable and efficient system operation, it's important to have the ATS properly set up so that it can sense power failure and operate in the best sequence for the system that is installed and the equipment it supports. PT-7016 part 1 explains how transfer switches operate and the time sequence of power failure and return. PT-7016 part 2 covers characteristics of utility power failures and the sensing of power failure sequences. PT-7016 part 3 looks at ATS setting best practices and features available on the equipment.

A typical standby power system includes a generator set operating on diesel fuel or natural gas, and one or more automatic transfer switches. The system will also have a number of accessory components such as battery charging equipment, fuel pumps, ventilation fans, and other equipment. The transfer switch directs power to critical loads from either a utility service or your generator set. If it's an automatic switching device, it needs to:

- Monitor power availability on each source
- Send a start command to the genset when it needs to run
- Provide timer functions for power failure sequence, power return sequence, and exercise sequence
- Physically switch load from one power source to another

If the transfer switch is improperly set up, the system may fail to detect and respond to a power failure, or it may start the generator set and transfer unnecessarily. In order to set it up correctly, you first need to understand what a transfer switch is, and how it operates to provide power transfer functions. From there, you will need to have a clear understanding of what loads are served with genset power in your facility and what their requirements are, and an how the utility power distribution to your facility is configured. With that understanding in, decisions on proper settings can be made.

**Transfer switch operation**

There are a wide variety of transfer switches available through many different manufacturers. Variations that are available include manual operation, automatic open

TRANSFER SWITCH SYMBOLIC ILLUSTRATION

FIGURE 1

# Q&A

Type your questions, comments, feedback in the **WebEx Q&A box**. We will get to as many questions as we can

We will publish consolidated FAQ along with presentation and webinar recording on powersuite.cummins.com

## Your local Cummins contacts:

- Western Canada: Ian Lindquist (ian.Lindquist@cummins.com), Western Canada Region
- Eastern Canada: Melvin Nicholas (melvin.nichols@cummins.com), Eastern Canada Region
- AZ, ID, NM, NV: Carl Knapp (carl.knapp@cummins.com), Rocky Mountain Region
- CO, MT, ND, UT, WY: Chris Scott (chris.scott@cummins.com), Rocky Mountain Region
- Northern IL, IA: John Kilinskis (john.a.kilinskis@cummins.com), Central Region
- UP of MI, MN, East ND, WI: Michael Munson (michael.s.munson@cummins.com), Central Region
- NB, SD, West MO, KS: Earnest Glaser (earnest.a.glaser@cummins.com), Central Region
- South IL, East MO: Jeff Yates (Jeffery.yates@cummins.com), Central Region
- TX: Scott Thomas (m.scott.thomas@cummins.com), Gulf Region
- FL, GA, SC, NC and Eastern TN: Robert Kelly (robert.kelly@cummins.com), South Region
- NY, NJ, CT, PA, MD:  Charles Attisani (charles.attisani@cummins.com ): East Region
- CA, HI: Brian E Pumphrey (brian.Pumphrey@cummins.com), Pacific Region
- WA, OR, AK: Tom Tomlinson (tom.tomlinson@cummins.com), Pacific Region
- For other states and territories, email powergenchannel@cummins.com or visit http://power.cummins.com/sales-service-locator

# Closing

Watch out for a follow-up email including:.

- A Link to webinar recording and presentation
- A PDH Certificate

Visit powersuite.cummins.com for:

- PowerHour webinar recording, presentation and FAQ archive
- Other Cummins Continuing Education programs
- Sizing and specification development tools

Upcoming PowerHour Webinars:

- December – Distributed Generation Applications (Microgrids)

Please contact Mohammed Gulam if you have any questions related to the PowerHour webinar (mohammed.gulam@cummins.com)


Cummins