

## *ASCO Medium Voltage Power Transfer Switches*



**ASCO**<sup>®</sup>

  
**EMERSON**<sup>™</sup>  
Network Power



## Product information and specification guide

ASCO protects medium voltage loads by offering maintainable and highly proven power transfer switches. The switches can be configured with protective relays and other options to meet specific project requirements.

Switching at medium voltage is often preferred when most loads in a facility require protection, or when protected power is needed at distances. By placing the switch near the source, often outside, and often with service entrance, many costly installation complications can be avoided.

Data centers and health care facilities, in particular, are being protected with medium voltage emergency stand-by power. Other typical facilities include high-rise commercial buildings, sports stadiums, water and waste treatment plants, and power generation stations.

ASCO has been manufacturing custom switchgear and transfer switches since 1947. It dedicates over 600,000 square feet of factory and office space, across four facilities, to designing and building systems that meet a range of demanding performance requirements.

---

Innovative designs anticipate and satisfy your evolving power switching and controls requirements. ASCO has developed every significant innovation in power transfer technology since it debuted its first power transfer switch in 1920.

---





A pair of medium voltage circuit breakers and an ASCO Group 5 Microprocessor Controller are the heart of ASCO Medium Voltage Power Transfer Systems.

## The Family of ASCO Medium Voltage Power Transfer Switches



ASCO Series 977 Medium Voltage Power Transfer System

While ASCO Medium Voltage Power Transfer Switches are functionally similar to low voltage transfer switches, they use a pair of medium voltage circuit breakers rather than an ASCO solenoid operating mechanism. An ASCO 7000 Series Power Control Center manages the breaker operation to transfer critical loads between power sources.

There are three standard base model switches available that can be provided with most options and accessories that are often required. Custom modifications can also be accommodated.

We build the switches under strict quality control in a factory-controlled environment, then conduct testing that complies with ANSI C37.20.2 Production Tests guidelines.

Medium voltage switches can be specified by selecting one of the base models shown in the chart below, then define specifics and options.

Base models include a complete transfer system comprising a structure, controls, circuit breakers and potential transformers. They provide basic functionality at the nominal amperage and voltage.

Specify your system by selecting one of the base models shown in the chart below, then define specifics and options.

Model	Voltage	Interrupting Capacity	Breaker Amperage Rating	Construction
977	15kV	25kAIC 40kAIC 50kAIC	1200A	Metal-clad switchgear per ANSI C37.20.2 and UL 1008A Listed, with drawout vacuum circuit breakers and utility grade transformers.
977	15kV	25kAIC 40kAIC 50kAIC	2000A	Metal-clad switchgear per ANSI C37.20.2 with drawout vacuum circuit breakers and utility grade transformers. UL Recognized switchgear.
974	5kV	40kAIC 50kAIC	1200A	Metal-clad switchgear per ANSI C37.20.2 and UL 1008A Listed, with drawout vacuum circuit breakers and utility grade transformers.
974	5kV	40kAIC 50kAIC	2000A	Metal-clad switchgear per ANSI C37.20.2 with drawout vacuum circuit breakers and utility grade transformers. UL Recognized switchgear.
973	5kV	25kAIC 31kAIC	600A	IEC fixed-mount breakers in a single section metal-clad structure with utility grade transformers. Not UL Listed or Recognized.



Compare ASCO Medium Voltage Power Transfer Systems for reliability, ease of maintenance, code compliance and seismic certification.

## ASCO Series 977 Medium Voltage Power Transfer System



Series 977 Medium Voltage Power Transfer System, single section



Series 977 Medium Voltage Power Transfer System, two-section enclosure with right door open

The ASCO Series 977 Medium Voltage Automatic Transfer System provides high reliability and ease of maintenance. This model complies with requirements of the:

- UL 1008A Standard For Medium Voltage Power Transfer Systems (1200A Models)
- American National Standards Institute, Inc. (ANSI)
- Institute of Electrical & Electronic Engineers (IEEE), C37.20.2 Switchgear Assemblies, C57.13 Standard Requirements for Instrument Transformers National Fire Protection Association (NFPA)
- NFPA 70-1999 National Electrical Code

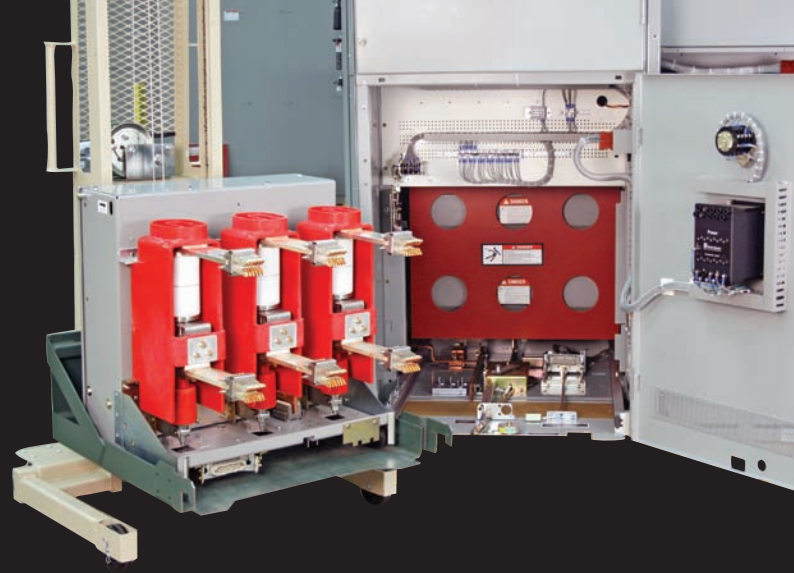
The Series 977 is rated at 15 kV, 1200 amps, 25 kAIC, 3 phase, 3 wire, 50 or 60 Hz. An ampere rating of 2000 amps and 40 kAIC and 50 kAIC also are available.

The indoor medium voltage power transfer system comprises two vertical sections. They combine to form an enclosure that meets the

Seismic requirements of the International Building Code. Contained in the enclosure are three, 1200 amp, 25 kAIC draw out vacuum bottle circuit breakers. They are electrically interlocked in the open transition mode, with auxiliary contacts as required.

Besides circuit breakers and microprocessor controller, other primary system components include:

- Potential transformers, normal feed, 95 kV BIL
- Potential transformers, emergency feed, 95 kV BIL
- 3 phase, 1200 amp insulated copper main bus
- Protective barriers that isolate major components.



Base models include a complete transfer system comprising a structure, controls, circuit breakers and potential transformers.

They provide basic functionality at the nominal amperage and voltage.

You can configure them for open, closed, or delayed transition power transfer.

Soft load transition requires an optional controller.

## ASCO Medium Voltage Power Transfer Switches

### Base Model Features:

	977		974		973
Breaker Ampacity	1200A	2000A	1200A	2000A	600A
Number of sections	2	3	2	3	1
NEMA 1 Footprint (Inches)	72Wx91D	108Wx91D	72Wx91D	108Wx91D	36Wx72D
UL 1008A	Yes	No	Yes	No	No
ANSI C37.20.2	Yes	Yes	Yes	Yes	No
Seismic Certification	Yes	Yes	Yes	Yes	No
Insulation Level (BIL)	95kV	95kV	60kV	60kV	60kV
Insulated Bus	Yes	Yes	Yes	Yes	Yes
Cable Barriers	Yes	Yes	Yes	Yes	No
11 GA Steel	Yes	Yes	Yes	Yes	Yes
Drawout Breakers	Yes	Yes	Yes	Yes	No
Distribution Available	Yes	Yes	Yes	Yes	No
Protective Relays Available	Yes	Yes	Yes	Yes	Yes
NEMA 3R available	Yes	Yes	Yes	Yes	Yes
NEMA 4X available	No	No	No	No	Yes

### Ratings

The 977 and 974 models with 1200A breakers are Listed to UL 1008A; these switches are suitable for use in emergency power systems for hospitals, per NFPA 99, and NEC Article 700.

Switches based on 2000A breakers are not UL 1008A Listed, but are manufactured to the similar requirements of ANSI C37.20 and utilize UL Recognized cubicle constructions.

All ASCO Medium Voltage Power Transfer Switches are built using the same ASCO/Underwriters Laboratories manufacturing procedures

as those used for ASCO generator paralleling control switchgear, under UL File # E231663.

The 973 model uses an IEC rated breaker for international applications, and therefore is not UL certified.

### Transfer Switch Controller

The ASCO 7000 Series Control Center provides refined and proven transfer control.

This is the same controller used on low voltage switches, and is described in detail later in this brochure.

### Circuit Breakers: 977 and 974

Circuit breakers provide superior reliability and maintainability compared to contactors. Each circuit breaker contains three separately mounted vacuum interrupters with an integral contact wear gap indicator. Stored energy devices allow fast operation to interrupt and isolate faults.

Breakers can be removed easily for inspection and maintenance. Bypass functions are not required since breakers can be replaced while the loads are fed from the alternate source.

### Capacitors

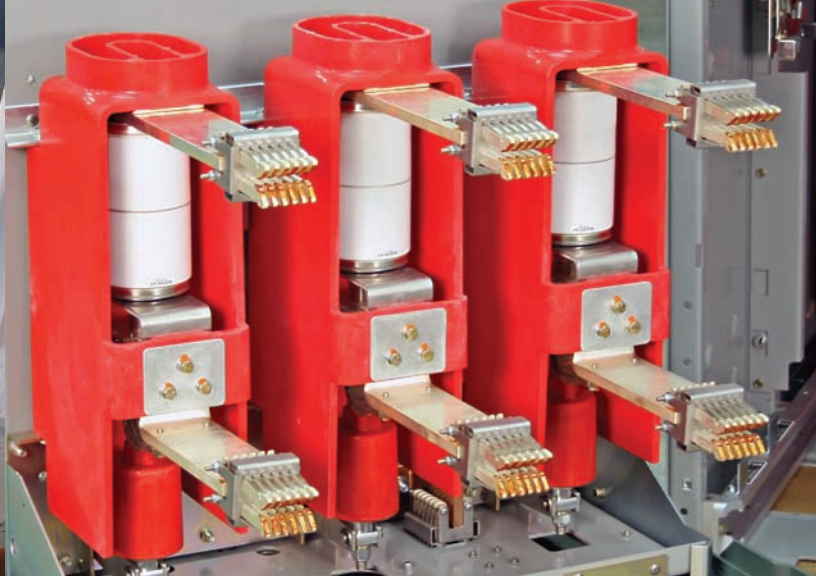
Capacitor trip devices provide the power to trip the breakers open in the event of a power outage, protecting loads from potential transients.

### Instrument Transformers

Transformers are chosen to provide accurate waveforms to control and protect your loads.

ASCO uses ANSI metering class transformers which are built per ANSI C57.13 standards to assure the highest reliability.

The transformers are protected by oversized Class E fuses to assure no malfunctions could cause loads to be unprotected.



## ASCO Series 974 Medium Voltage Power Transfer System

Like the Series 977, the Series 974 Medium Voltage Power Transfer System comprises two vertical sections.

The Series 974 is rated at 5 kV, 1200 Amps, 40kAIC, 3 phase, 3 wire, 50 or 60 Hz and compliant with UL1008A.

Contained in the enclosure are three, 1200 amp, 40 kAIC drawout vacuum bottle circuit breakers. They are electrically interlocked in the open transition mode, with auxiliary contacts as required.

An ampere rating of 2000 amps and a short circuit rating of 50 kAIC also is available.

This system also has a drawout

vacuum bottle breaker configuration, is available in open, closed and delayed power transfer modes of operation and features the Group 5 Controller for dependable operation.

The system is available in a NEMA 3R enclosure and is UL listed for medium voltage.

Other primary components include:

- Potential transformers, normal feed, 4160 volts, 60 kV BIL
- Potential transformers, emergency feed, 4160 volts, 60 kV BIL
- 3 phase, 1200 amp insulated copper main bus
- Protective barriers that isolate major components.



## ASCO Series 973 Medium Voltage Power Transfer System

The ASCO Series 973 Medium Voltage Power Transfer System is a single-section configuration. The Series 973 is rated at 5 kV, 600 amps, 25 kAIC, 3 phase, 3 wire, 50 or 60 Hz. A 31 kAIC is optional.

The Series 973 features fixed-mounted LF1 circuit breakers using SF-6 gas. It is available in open, closed and delayed power transition modes of operation. The Group 5 Controller is standard and the system is available in a NEMA 3R enclosure.



# Optional Components

## Protective Relays

A variety of brands and models are available to meet specific project requirements. Relays are mostly utility grade with current and voltage signals being hard wired. Typically a lock-out relay is also provided to allow a manual reset after faults occur.

Select protective relays that satisfy your specific requirements. Specifically designed multifunction relays—including differential, overcurrent, loss of phase, loss of excitation, and reverse power—are available to help protect generators.

Utility tie relays protect the utility source from generators and are usually prescribed by the local utility.

They include overcurrent, reverse power and loss of phase. Overcurrent and other relays located upstream can protect loads.

A qualified consulting engineer can determine the relays best suited to your particular power distribution system.

## Communication and Connectivity Capabilities

A number of communications and connectivity capabilities are optionally

available to facilitate monitoring and operation:

- An optional connectivity module(72E) enables remote monitoring and control
- An optional power manager that senses single and 3 phase voltage and current, and displays a variety of power parameters. RS-485 Communications Module

## Power Monitoring

Power monitoring systems are commonly specified for many facilities with medium voltage distribution systems. They provide information about potential fault problems, which helps building operators determine whether equipment may need repair or maintenance.

It is important to carefully specify the local area network that the design engineer intends for that system, how other communication devices may enter into the system and how the owner may access the data.

## Control/Metering

Advanced electronic control, monitoring and metering ensure you get accurate and precise operational information when you need it, both locally and remotely. It provides the information you need to make the right decisions. Refer to the table below for a range of control and metering features and benefits.

## Additional Controller Features and Parameters

- Touch-pad programming, without the need for meters or variable power supplies
- Sixteen selectable rating voltages
- On-board diagnostic control panel and ATS status information for analyzing system performance
- Active timing function display and countdowns
- Password protection to prevent unauthorized tampering of settings
- Remote monitoring and control with ASCO PowerQuest®
- Historical event log
- Statistical ATS systems monitoring information

The controller meets or exceeds a range of requirements for Electromagnetic Compatibility.

(EMC):IEEE472

(ANSI C37.90A)Ring Wave TestENC55011 1991

Class A Conducted and Radiated Emission EN61000-4-2 Electrostatic Discharge Immunity

Direct Contact Air Discharge EN61000-4-3 Radiated Electromagnetic Field Immunity

EN61000-4-4 Electrical Fast Transient Immunity

EN61000-4-5 Surge Immunity

ENV50141 HF Conducted Disturbances Immunity

ASCO 7000 Series Microprocessor Controller

## Control and Metering Features and Benefits

<i>Plug and harness design</i> Standard microprocessor control panel with LCD display	<i>Enhances safety and ease of troubleshooting</i> Ensures proper operation under all conditions using state-of-the art technology
<i>Frequency sensing and emergency, standard</i>	<i>Protects against bogging down generator that has not come up to speed</i>
<i>Touch pad programming for features and settings</i>	<i>Provides accurate field adjustability of time delays and voltage settings, without using special tools, meters or power supplies.</i>
<i>Surge and transient protection: Compliance with (EN55011:1991), (EN 50082-2:1995), (EN 61000-4-2:1995), (ENV 50140:1993), (EN 61000-4-4:1995), (EN 61000-4-5:1995), (EN 61000-4-6:1996), (EN 61000-4-11:1994)</i>	<i>Protects against spurious electromagnetic pulses or electrical transients on power or serial lines</i>
<i>Event log with statistical and diagnostic screens</i>	<i>Facilitates troubleshooting and testing of up to 99 events</i>
<i>Automatic engine exerciser</i>	<i>Standard load/no load exerciser timer with seven independent programmable test schedules</i>
<i>In-phase monitor, built-in, standard</i>	<i>Eliminates excessive motor inrush current, without the need for a neutral, or "off" position</i>
<i>Serial communications capability with plug-in card</i>	<i>Enables control and monitoring of ATS's from a local area network or through the Internet</i>



## Power Control Center

### 7000 Series Power Control Center



**ASCO 7000 Series  
Microprocessor  
Controller**

ASCO 7000 Series Medium Voltage Power Transfer Switches use the proven, microprocessor-based Power Control Center to manage circuit breakers. Designed specifically for this purpose, it contains timers and control logic that protect your loads.

It is the industry's most advanced digital controller. All voltage, frequency, control, timing and diagnostic functions required for most emergency and standby power applications are standard.

The microprocessor logic board is separated and isolated from the power board to protect against the severe voltage transients frequently experienced with industrial distribution systems. This improves electrical noise immunity and helps comply with rigorous transient suppression standards.

Operators easily can access detailed information on a range of parameters: System status, power source, frequency settings and a variety of optional feature settings.

A four-line, 20-character LCD with backlit display ensures easy viewing under all conditions.

Navigating through all screens requires using only six buttons. Eighteen different source parameter settings, 16 standard time delays, up to seven independent engine exercise routines and a number of languages, including English, German, Spanish, and French, can be selected.

Since the Power Control Center must be visible and operable through the enclosure door, it qualifies for industrial and outdoor applications. It can be installed in Type 3R (outdoor/rainproof), four weatherproof and 12 indoor/industrial enclosures.

A wide variety of standard and optional components are available to configure the system and level of performance required to satisfy your facility's unique needs. With decades of experience building transfer switches, ASCO designs protective circuits and interlocks that will help avert malfunctions.

The stand alone systems are self powered so they can automatically protect your loads under any conditions.

#### **Additional controller features and parameters**

- Touch-pad programming, without the need for meters or variable power supplies
- Sixteen selectable rating voltages
- On-board diagnostic control panel and ATS status information for analyzing system performance
- Active timing function display and countdowns
- Password protection to prevent unauthorized tampering of settings
- Remote monitoring and control with ASCO PowerQuest®
- Historical event log
- Statistical ATS systems monitoring information

The controller meets or exceeds a range of requirements for Electromagnetic Compatibility (EMC): IEC 472 (ANSI C37.90A) Ring Wave Test EN 55011 1991 Class A Conducted and Radiated Emission EN 61000-4-2 Electrostatic Discharge Immunity, Direct Contact Air Discharge EN 61000-4-3 Radiated Electromagnetic Field Immunity EN 61000-4-4 Electrical Fast Transient Immunity EN 61000-4-5 Surge Immunity EN 50141 HF Conducted Disturbances Immunity. ASCO 7000 Series Microprocessor Controller



# Control Switches and Indicating Lights

Control switches and indicating lights provide at-a-glance status of system operation.

Conventional 2-Position Switches include:

- Switch position indicating lights (16 mm, industrial grade LEDs)
- Source acceptability indicating lights with true indication of the acceptability of each source, as determined by the voltage, frequency, voltage unbalance, and phase sequence settings of the control panel (16mm, industrial grade LEDs).

Three position (16mm, industrial grade type) selector switch:

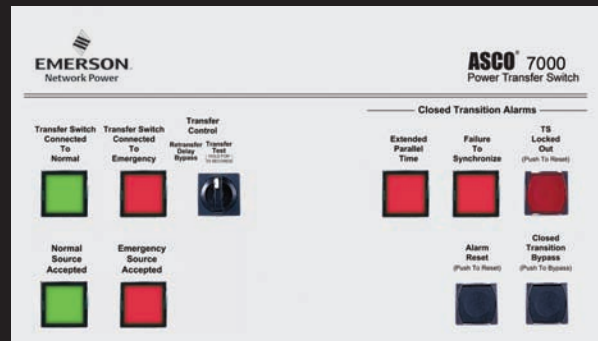
- Automatic: normal maintained position
- Test: momentary position to simulate nor-

mal source failure for system test function

- Reset Delay Bypass: momentary position to bypass transfer and re-transfer time delay.

Closed Transition Switches show:

- Extended Parallel Time: Provides visual indication when the pre-set extended parallel time has been exceeded. The controls automatically open the emergency or normal main contacts. Separate contact also available to shunt trip external breaker.
- Failure To Synchronize: Visually displays a failure to synchronize



alarm if the time delay settings is exceeded, during closed transition transfer operation.

- Transfer Switch Locked Out: Prevents transfer in either direction if the extended parallel time is exceeded.
- Alarm Reset: Resets extended parallel

and failure to synchronize alarms.

- Closed Transition Bypass: Push button allows transfer between sources in an open transition mode.
- A variety of optional features and components can be added to enhance system control and communication.

## Accessories

1G External 24VDC auxiliary power connections

2C Adjustable, extended time delay on engine start (2CK for key operated)

3AA Extended retransfer time delay

5J Override selector switch to simulate a normal source failure and cause ATS to remain in the emergency position regardless of emergency source condition or normal source availability (5JK for key operated)

5JL Override selector switch to simulate a normal source failure and cause ATS to remain in the emergency position regardless of emergency source condition or normal source availability. Pilot light indicates active.

5K Key operated Feature 5 test switch

5L Test selector switch with override retransfer to normal in the event of emergency source failure (5LK for key operated)

5LL Test selector switch with override retransfer to normal in event of emergency source failure. Pilot light indicates active.

5L1 Test switch to simulate normal source failure includes automatic override return to normal in the event of emergency source failure (5LK1 for key operated)

6C Reset switch to manually retransfer the automatic transfer switch to the normal source after the feature 3A retransfer time delay expires (6CK for key operated)

6DK Key operated retransfer to normal mode two-position selector switch permits selection of manual or automatic manual retransfer

6J Selector switch for automatic or manual transfer to normal and emergency. Transfer mode selects automatic or manual; and manual mode control selects normal or emergency source. (6JK for key operated)

18B 2 pole D/T contacts that operate when emergency source voltage is present

18G 2 pole D/T contacts that operate when normal source voltage is present

30B Load shed circuit

31Z Selective load disconnect circuit

44A 120VAC strip heater includes mounting bracket, thermostat and terminal block

73N Distribution Class surge arrestors on normal source

73E Distribution Class surge arrestors on emergency source

102B Basler BE-1 Reverse Power Relay, 3 Phase

106 Softload Controls

NOTE: Many other standard accessories available for ASCO low voltage power transfer switches can also be applied to medium voltage transfer switch products. Please consult the factory for details.

# Applications And a Variety of Requirements

Applications for medium voltage power transfer systems include:

Transferring medium voltage power requires a system that differs considerably from low voltage power transfer systems, which operate at less than 600 volts.

There are dramatic differences in size of load, construction, cost, location, maintenance and protection.

Protection issues, for example, include increased short-circuit currents,

additional protective relaying such as differential protection, and synchronous check relaying, among others. Relay specifications need to consider utility relaying and settings.

The sequence of circuit breaker operation also demands careful planning.

Ground-fault sensing issues due to multiple source grounding can become complex.

Also, local power utilities may determine the selection of distribution system voltage and influence speci-

fication requirements for equipment construction and protective relays.

In fact, metal-enclosed, load-interrupter switchgear meeting ANSI C37.20.3-4 duty-cycle ratings may need to be specified.

Work with a manufacturer of medium voltage power transfer systems who understands these issues and can help you resolve the design, operational and service challenges you face. That will help ensure a reliable system that performs dependably over time.

## Applications and a Variety of Requirements

Applications for medium voltage automatic transfer switches include:

A single generator that protects a single load. Typically generator protective relays, and utility inter tie relays are added to a service entrance rated switch.

Multiple generators and a generator paralleling control system. Base model switches are typically applied.

A unit substation where the transfer system feeds a transformer which feeds a low voltage distribution line-up. Transformers and low voltage switchgear can be quoted by Asco on request.

An N+1 on-site power system that does not require paralleling multiple generators.

Soft loading utility and on-site power sources to facilitate cogeneration or peaking.

## ASCO Medium Voltage Transfer Switches Ordering Information

Medium Voltage Transfer Switch Catalog Numbers									
Series	Mode	Transition	Short Circuit KAIC	Cable Entry	Breaker Ampacity	System Voltage	Control Voltage	Accessories	Enclosures
77	A	C	0 2 5	T	1200	Z	3	X	C
73	A = Auto	O = Open	025	T = Top	600	T = 2,400 U = 4,160 V = 11,000 W = 12,470 X = 13,200 Y = 13,800 Z = 14,400	1 = 120VAC 3 = 24VDC 5 = 48VDC 6 = 125VDC	0=None X=Yes Z=VAT	C = Type 1
74		C = Closed	040	B = Bottom	1200				F = Type 3R
77		D = Delayed S = Softload	050	M = Mixed	2000				H = Type 4X R = Type 3RX

## ASCO Medium Voltage Transfer Switches Accessories

85L	Power Manager w/ Display on Load
85N	Power Manager w/ Display on Normal
85M	Power Manager w/ Display on Emergency
109N	Basler BE1-50/51 on Normal
109E	Basler BE1-50/51 on Emergency
109AE	SR489 on Emergency
138B	TOC Breaker Truck Operated Contact Switch
108SL	SEL351S on Load
108SN	SEL351S On Normal

108SE	SEL351S on Emergency
118FL	SR350 on Load
118FN	SR350 on Normal
118FE	SR350 on Emergency
136A	3" Infrared Viewports
73ND	Lightning Arrestor Distribution GE Tranquell
73NT	Lightning Arrestor Intermediate GE Tranquell
73NU	Lightning Arrestor Utility GE Tranquell
137A	Mimic Bus On Front

138A	Service Entrance Labeled Switch
139A	Special Breaker Section Orientation
Call	Special Distribution Section Required



ASCO Medium Voltage Power Transfer Systems optimize reliability and total cost of ownership.

## Compare Technology, Support and Service

When evaluating manufacturers, compare their technology, technical support and service.

### Technology

ASCO is the world's largest manufacturer of world class power transfer technology.

ASCO products move 100 million kilowatts every day. Reliably. Repeatedly.

ASCO commercialized the first power transfer switch in 1920. Today, ASCO innovations stand as milestones in power transfer.

Like low voltage power transfer switches, ASCO Medium Voltage Power Transfer Switches optimize reliability and total cost of ownership.

An integrated power system offers digital control, high reliability, dependable operation, networked connectivity, seamless servicing and simplified staff training.

ASCO integrated systems are the reference point for reliability, configurability and reduced maintenance requirements.

Specify exactly the medium voltage power transfer system you need. With so much at stake, protect your facility's Business-Critical Continuity™ and your reputation.

### Support

ASCO Support comprises highly-skilled teams of factory-based and geographically dispersed applications engineering teams led by Project Systems Managers.

Properly specifying medium voltage power transfer switches demands a thorough understanding of a range of issues you need to solve.

A team assigned to your project will work with you every step of the way, from design to commissioning.

Its support that makes the difference between a project that's smooth and one that's not.

They will help you develop solutions that reduce installation costs and save time.

Single sourcing enhances project management, accountability, procurement, delivery, installation and commissioning.

### Service

ASCO fields a nationwide network of 100+highly trained, full time, fully equipped technicians.

They're factory trained and located coast to coast to respond to your emergencies fast.

They partner with 450+Emerson Electrical Reliability Services technicians to offer unparalleled service.

Select a manufacturer who can help you resolve the design, operational and service challenges you face.

Select ASCO for a reliable, medium voltage switch that will perform dependably over time.

Contact 800-800-ASCO, or visit [www.emersonnetworkpower.com/ASCO](http://www.emersonnetworkpower.com/ASCO).

# ASCO Power Technologies®

ASCO Power Technologies  
50 Hanover Road  
Florham Park, NJ 07932  
USA

800 800 ASCO  
[www.emersonnetworkpower.com/ASCO](http://www.emersonnetworkpower.com/ASCO)  
[www.ascoapu.com](http://www.ascoapu.com)

## Emerson Network Power.

The global leader in enabling *Business-Critical Continuity™*.

- |                |  |                              |                               |
|----------------|--|------------------------------|-------------------------------|
| ■ AC Power     | ■ Embedded Computing                     | ■ Outside Plant              | ■ Racks & Integrated Cabinets |
| ■ Connectivity | ■ Embedded Power                         | ■ Power Switching & Controls | ■ Services                    |
| ■ DC Power     | ■ Infrastructure Management & Monitoring | ■ Precision Cooling          | ■ Surge Protection            |

Emerson Network Power and the Emerson Network Power logo are trademarks and service marks of Emerson Electric Co. ©2011 Emerson Electric Co.

Publication 3242

© March, 2011

Printed in the U.S.A.