

ASCO® 7000 Series

When Critical Power
Protection is Essential

Automatic Transfer Switches



ASCO®

THE POWER AUTHORITY

Critical Loads Demand **ASCO**[®]

Healthcare Facilities
Commercial Buildings/Industrial Buildings
Data Processing
Telecommunications Centers
Process Manufacturing

As we become more dependent on the quality and reliability of electrical power, interruption or complete loss of power can create serious and even crippling financial losses, or impose dangers to life and safety.

Automatic Switch Company (ASCO) provides the solutions to handle the transfer of critical loads to emergency sources reliably and with state of the art products. Using ASCO products can mean the difference between a minor inconvenience and a major catastrophe. You'll find ASCO Automatic Transfer Switches wherever there is a critical load to be protected.

When flexibility in power switching is a must, ASCO offers a variety of product solutions to meet virtually every application requirement. That's why the 7000 Series is available in the conventional, two-position transfer configuration, plus closed or delayed transition modes of operation. Additionally, switched or overlapping neutral options provide for reliable operation of ground fault protection systems and reduction of voltage transients from unbalanced load switching.

ASCO automatic transfer switches are the first CE Marked, IEC 60947-6-1 compliant and Kema Keur marked Automatic Transfer Switch in the world.



ASCO® The Recognized Leader in Power Transfer Switch Technology **Offers the Most Advanced Automatic Transfer Switches in the World.**

7000 Series

ASCO Automatic Transfer Switches are the standard of the industry. High speed transfer of loads between alternate sources of power, regardless of ampacity size, is achieved by a reliable, field proven solenoid operating mechanism. When combined with a programmable microprocessor controller with keypad and LCD display, it offers the most advanced method of transferring all types of loads, such as, motors, electronic drives, UPS's and microprocessor based systems. It is the only true double throw, inherently interlocked transfer switch in the industry and is available in ampacity sizes from 30 through 4000 amperes. 7000 Series automatic transfer switches are available open or enclosed, with the largest selection of optional accessories offered anywhere.



Fig. 1 7000 Series Automatic Transfer Switch rated 3 pole 1200 amperes (shown with optional data monitor).

7000 Series Automatic Transfer Switches **Product Features**

- Conventional two-position transfer configuration, plus closed and delayed transition modes of operation. All configurations available with either automatic or non-automatic control.
- Qualified and listed to UL 1008 and CSA automatic transfer equipment standards.
- Independently qualified and listed to IEC 60947-6-1, CE and Kema Keur marked (optional).
- Rated up to 600 VAC, 30 through 4000 amperes.
- Reliable and field proven solenoid operating mechanism.
- High withstand and close-on ratings including 30 cycle withstand current rating for optimum flexibility in circuit breaker coordination (1000-4000 amperes).
- Solid, switched, or overlapping neutral conductor options.
- Front replaceable main and arcing contacts (600-4000 amperes).
- Programmable microprocessor controller with keypad and LCD display.
- Centrally located terminal block for customer control connections (260-4000 amperes).
- Heavy-duty, 16mm, industrial grade control switches and indicating lights.
- Switch position indicators and true source acceptability lights.
- Standard ground lug or ground bus connection.
- Four auxiliary contacts, two contacts closed when switch is in normal position and two contacts closed when switch is in emergency position.
- Local/remote serial communications capability for interfacing with ASCO PowerQuest products.

ASCO® 7000 Series Switching Solutions



Fig. 2 Closed-Transition Bypass Transfer Switch rated 4 pole 800 amperes.

Closed-Transition Transfer Switching

ASCO Automatic Closed-Transition Transfer Switches feature main contacts that overlap, permitting the transfer of electrical loads without power interruption. The switch transfers in a make-before-break mode if both sources are within acceptable parameters. Control logic continuously monitors source conditions and automatically determines whether the load transfer should be open (conventional non-overlap mode) or closed transition. Available 150 through 4000 amperes.

Closed-Transition Transfer within 5 electrical degrees is achieved passively. Active control of the engine generator is not required. Therefore, no additional control wire runs are required between the ATS and engine generator set governor. Plus, protective relaying may not be required under normal operation since the contact overlap time is less than 100 milliseconds (consult your local utility on protective relay requirements).

Failure to synchronize annunciation and extended parallel time protection is built-in to all 7000 Series closed transition controls to prevent abnormal operation.

Delayed Transition Transfer Switching

ASCO Delayed Transition Transfer Switches are designed to provide transfer of loads between power sources with an intentional load disconnect position for an adjustable period of time. Applications include older style variable frequency drives, rectifier banks, and specialized medical equipment.

- Available 150 through 4000 amperes.
- Utilizes reliable, field proven solenoid operating mechanisms.
- Mechanical interlocks to prevent direct connection of both sources.
- Indicator light (16mm, industrial grade type LED) for load disconnect position.
- Adjustable time delay for load disconnect position.



Fig. 3 Delayed Transition Transfer Switch rated 4 pole 1200 amperes.

ASCO® 7000 Series Switching Solutions

Non-Automatic Transfer Switching

ASCO Non-Automatic Transfer Switches are electrically operated units which are operated with manual control switches mounted locally or at remote locations.

- Sizes from 30 through 4000 amperes.
- Microprocessor based controller provides for addition of optional accessories.
- Controller prevents inadvertent operation under low voltage conditions.
- Low control circuit operating currents allow for long line runs between remotely mounted manual control switches and the transfer switch.
- Source acceptability lights inform operator if sources are available to accept load.
- Standard inphase monitor can be activated for transferring motor loads.



Fig. 4 Non-Automatic operated, electrically operated 400 ampere switch shown in Type 1 enclosure.

Withstand and Close-On Ratings for all 7000 Series Products

Switch Rating amps	UL 1008 Withstand and Close-On Ratings at 480 Volts AC					30 Cycles Long Time Withstand Ratings
	Current-Limiting Fuse Rating	Max. Fuse Size		Specific Breaker Rating	“Any” Breaker Rating	
		amps	types			
30	100,000	60	J	10,000	10,000	N/A
70, 100, 150	200,000	200	J	22,000	10,000	N/A
150*,260, 400	200,000	600	J	42,000	35,000	N/A
600, 800	200,000	1200	L	65,000	50,000	N/A
1000, 1200	200,000	2000	L	85,000	85,000	65,000
1600, 2000	200,000	3000	L	100,000	100,000	65,000
3000, 4000	200,000	6000	L	100,000	100,000	65,000

Notes: All values are available symmetrical RMS amperes and tested in accordance with the withstand and close-on requirements of UL 1008. See publication 1128 for more information on withstand and close-on ratings for ASCO transfer switches. Application requirements may permit higher withstand ratings for certain size switches (Contact ASCO).

* 150 amp 7000 Series in bypass-isolation configurations have higher WCR as indicated.

ASCO® 7000 Series Switching Solutions

Automatic Transfer Bypass-Isolation Switching

ASCO Automatic Transfer & Bypass-Isolation Switches are available in open transition, closed transition and delayed transition designs. The bypass and isolation features allow power transfer switches to be inspected, tested, and maintained without any interruption of power to the load.



Fig. 5 Bypass-Isolation Transfer Switch rated 4 pole 2000 Amperes.

- Available 150 to 4000 amperes.
- Bypass switch and transfer switch have identical electrical ratings.
- Heavy duty mechanical interlocks prevent undesirable operation.
- Bypass contacts carry current only during bypass mode.
- Allows bypass-isolation without load interruption.
- Transfer switch is drawout design for ease of maintenance.
- Bypass and isolation handles are permanently mounted. The bypass switch has dead front quick-make, quick-break operation for transferring of loads between live sources.
- Bypass switch is fully rated for use as a manual 3-position transfer switch.
- Bypass and isolation functions are simple, requiring a total of two operating handles.
- No toggle switches, push buttons, selector switches or levers are required for bypass-isolation operation.
- Mechanical flag indicators show bypass and transfer switch positions.

Transfer Switch Drawout Features (1000-2000 amperes)

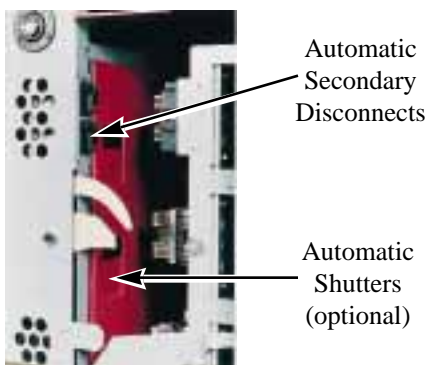


Fig. 6 Bypass-Isolation Transfer Switch secondary disconnects and optional automatic shutters.

- Automatic secondary disconnects remove all control power as switch is withdrawn.
- Drawout carriage provides for easy transfer switch maintenance and/or removal via commercially available breaker hoists.
- For optional transfer switch lifting yoke, specify accessory 82B.
- For optional automatic shutters which close when the transfer switch is withdrawn to provide bus isolation, specify accessory 82C.

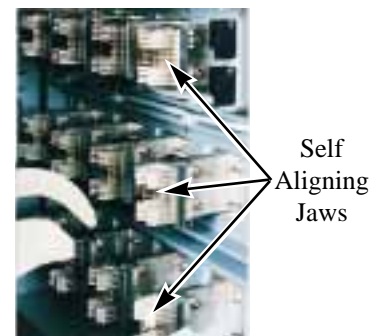
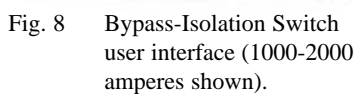


Fig. 7 Bypass-Isolation Transfer Switch Self Aligning power Jaws.

Bypass and Isolation Handles - *Simple as 1, 2, 3*



The diagram illustrates a power system configuration. A 220kV busbar is shown at the top right, connected to a power source. A Bypass Switch is located between the busbar and the Automatic Transfer Switch (ATS). The ATS is a switch that can route power from the busbar to either a Load (L) or a Neutral (N) point. The Load (L) is represented by a set of three vertical bars, and the Neutral (N) is represented by a vertical bar with a horizontal line. The ATS is controlled by a Bypass Switch, which is shown in a dashed state, indicating it is not currently in the bypass position. The ATS is also controlled by a Load (L) and a Neutral (N) point, which are shown in a solid state, indicating they are currently active.

The diagram illustrates a power system configuration. A 'Bypass Switch' is shown at the top, with a dashed line indicating a fault on the transmission line it bypasses. Below it, an 'Automatic Transfer Switch' is depicted, which can transfer load between two sources. The system includes three main busbars labeled E, L, and N. Busbar E is connected to a faulted transmission line. Busbar L is connected to a healthy transmission line. Busbar N is connected to a healthy transmission line. The Automatic Transfer Switch is shown transferring load from busbar E to busbar N. The diagram also shows a fault on a transmission line, indicated by a lightning bolt symbol, and a fault on a busbar, indicated by a lightning bolt symbol.

ASCO® 7000 Series Microprocessor Controller



Fig. 9 7000 Series Microprocessor Controller.

The 7000 Series Microprocessor Based Controller is used with all sizes of Automatic Transfer Switches from 30 through 4000 amperes. It represents the most advanced digital based microprocessor control panel in the industry and includes, as standard, all of the voltage, frequency, control, timing and diagnostic functions required for most emergency and standby power applications.

Because of severe voltage transients frequently encountered with industrial distribution systems, the microprocessor logic board is separated and isolated from the power board as shown below. This improves electrical noise immunity performance and helps assure compliance with the rigorous transient suppression standards highlighted below.

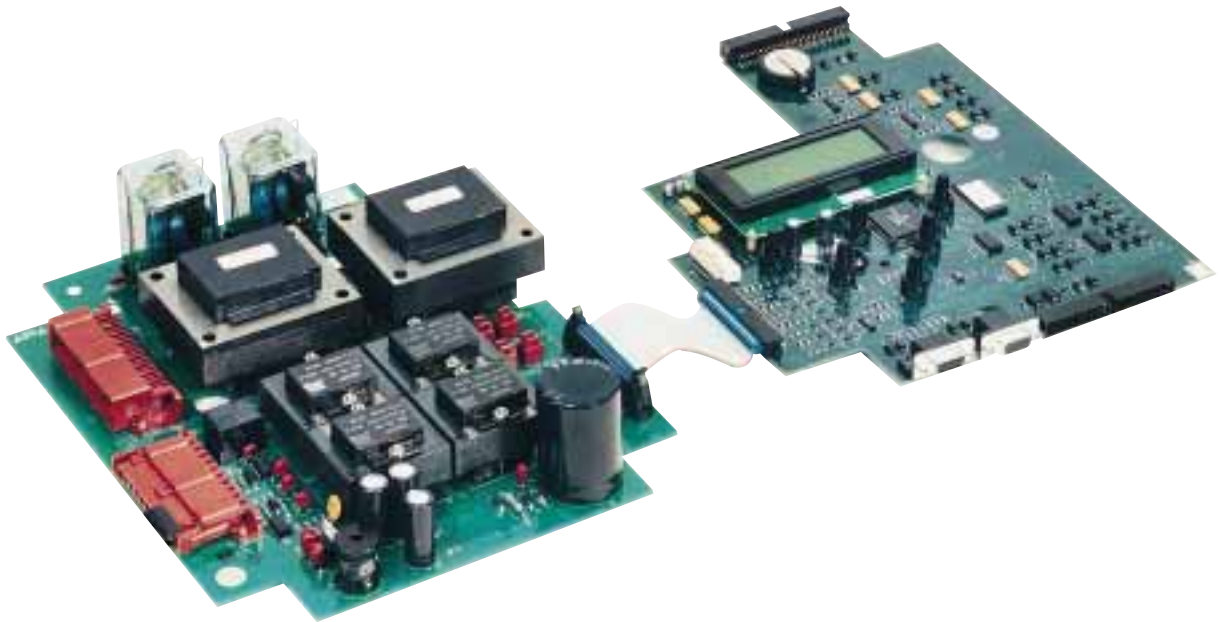


Fig.10 Microprocessor Power and Logic PC Boards.

7000 Series Microprocessor Based Controller

Ring wave test.

Class B Conducted and Class A Radiated Emission.

Electrostatic Discharge Immunity, direct contact and air discharge.

Radiated Electromagnetic Field Immunity.

Electrical Fast Transient Immunity.

Surge Immunity.

Conducted Disturbance Immunity.

IEEE472 (ANSI C37.90A)

EN55011 1991

IEC1000-4-2

IEC1000-4-3

IEC1000-4-4

IEC1000-4-5

IEC1000-4-6

ASCO® 7000 Series Microprocessor Controller

Features

- The same controller can be used for open, closed and delayed transition control sequences.
- Digital microprocessor.
- Touch pad programming of features and settings without the need for meters, variable power supplies and reference manuals.
- Sixteen (16) selectable operating voltages available in a single Controller.
- On-board diagnostics provide control panel and ATS status information to analyze system performance.
- Displays and counts down active timing functions.
- Selectable multi-language display (English, German, Spanish, French. For others contact ASCO).
- Password protection to prevent unauthorized tampering.
- Serial communications board (RS-422/485 protocol) for viewing adjustments and features with ASCO PowerQuest communications products. Specify optional accessory 72A.
- Programmable load shed option for SYNCHROPOWER® bus optimization applications. Specify optional accessory 30B.

Voltage and Frequency Sensing

- 3-Phase under and over voltage settings on normal and emergency sources.
- Under and over frequency settings on normal and emergency.
- True RMS Voltage Sensing with +/- 1% accuracy; Frequency Sensing Accuracy is +/- 0.2%.
- Selectable settings: single or three phase voltage sensing on normal and emergency; 50 or 60Hz.
- Phase sequence sensing for phase sensitive loads.
- Voltage unbalance detection between phases.

Status and Control Features

- Output contacts for engine-start signals.
- Selection between “commit/no-commit” on transfer to emergency after engine start and normal restores before transfer.
- Advanced inphase algorithm which automatically measures the frequency difference between the two sources and initiates transfer at appropriate phase angles to minimize disturbances from transferring motor loads.
- Event log displays 99 logged events with the time and date of the event, event type and event reason.
- Output signals for remote indication of normal and emergency source acceptability
- Statistical ATS/System monitoring data screens which provide:
 - Total number of ATS transfers.
 - Number of ATS transfers caused by power source failure.
 - Total number of days ATS has been in operation.
 - Total number of hours that the normal and emergency sources have been available.

Time Delays

- Engine start time delay - delays all engine starting signals to override momentary normal source outages - adjustable 0 to 6 seconds (can be extended to 60 minutes with external 24 volt DC source).
- Transfer to emergency time delay - adjustable 0 to 60 minutes.
- Emergency source failure time delay to ignore momentary transients during initial generator set loading - adjustable 0 to 6 seconds.
- Retransfer to normal time delay with two settings:
 - Power failure mode - 0 to 60 minutes.
 - Test mode - 0 to 60 minutes.
- Unloaded running time delay for engine cooldown - adjustable 0 to 60 minutes.
- Pre and post transfer signal time delay for selective load disconnect with a programmable bypass on source failures - adjustable 0 to 5 minutes. This signal can be used to drive a customer furnished relay, or for (2) sets of double throw contacts rated 3 amps at 480 volts AC, specify ASCO optional accessory 31Z.
- Fully programmable engine exerciser with (7) seven independent routines to exercise the engine generator, with or without loads, on a daily, weekly, bi-weekly or monthly basis.
- Contains all alarm signals, logic and time delays for use with closed transition switches.
 - Insynch time delay - 0 to 3 seconds.
 - Failure to synchronize - 1 to 5 minutes.
 - Extended parallel - 0.1 to 1.0 seconds.
- Delayed transition load disconnect time delay - adjustable 0 to 5 minutes.

ASCO® 7000 Series User Controls and Indicators

Control Switches and Indicating Lights for Conventional 2-Position Switches

- 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 normal source failure for system test function.
 - Reset Delay Bypass: Momentary position to bypass transfer and re-transfer time delay.



Fig. 11 7000 Series User Controls and Indicators.

Control Switches and Indicating Lights for Closed Transition Switches



Fig. 12 7000 Series User Controls and Indicators.

- **Extended Parallel Time** - Provides visual indication when the pre-set extended parallel time is exceeded and automatically opens the emergency or normal main contacts. The ATS remains locked out until the alarm reset switch is operated.
- **Failure To Synchronize** - Visually displays a failure to synchronize alarm if the time delay settings is exceeded.
- **TS 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** - Allows transfer between sources in an open transition mode.

7000 Series Transfer Control Center



Fig. 13 7000 Series Transfer Control Center.

The 7000 Series microprocessor controller is a Transfer Control Center which allows the user to easily access detailed information on: system status; power source parameters; voltage, frequency and time delay settings; optional feature settings; historical event log; and system diagnostics. A four line, (20) character LCD has a backlit display which enables easy viewing under all conditions. The user can navigate through all screens using only six buttons, which also allows selection of: 18 different source parameter settings; 16 standard time delays; 12 standard feature settings; up to (7) independent engine exercise routines; and even the language (English, German, Spanish, French, etc.) which appears on the display.

Since the Transfer Control Center must be visible and operable through the enclosure door, it has been qualified for use in industrial and outdoor applications. This includes installation in Type 3R (raintight), 4 (weatherproof) and 12 (oiltight and dusttight) enclosures.

ASCO® 7000 Series Transfer Control Center Screens

Status

System Status

Normal OK
Load on Normal

Displays system status in clear, concise language. Message shown indicates normal source is acceptable and the load is connected to the normal source.

Source Status

Normal Source
Vab=480V.....ABC
Vbc=480V.....Vunbal=1%
Vca=480V.....60.0Hz

Displays voltage for each phase, frequency, phase rotation and voltage unbalance for both normal and emergency sources.

Time Delay Status

Normal OK
TD.Engine.Cooldown:
4min15s

Active time delay status displays time remaining until next control event.

Inphase Transfer Mode

Emerg OK
Waiting for In-Sync
-45° 0.02HZ Vdf=1.1%

Displays the relative phase angle between sources, the frequency difference and voltage differential to indicate the controller is awaiting an inphase condition.

Settings

Voltage and Frequency Settings

Normal Voltage
Dropout.....75%.360V
Pickup.....90%.432V
O.V. Trip.....110%.582V

Provides voltage and frequency setting values for normal and emergency sources. Voltage pick-up, dropout and trip settings are set in percentage of nominal voltage and are also displayed in rms voltage values.

Time Delay Settings

TD N>E Xfer Signal
Bypass if N Fail: No
Pre Xfer: 0 min 20S
Post Xfer: 0 min 20S

Provides direct reading display for setting time delays.

Engine Exerciser

P1.....Engine.Exerciser
Enable:.....Yes....WLoad:....Yes
Start:19h30. ALL MON
Run.Time:.....2h15min

Seven independent programs, load/no load selection, flexible run times and daily, weekly, bi-weekly and monthly exercise routines.

Feature Settings

Shed Load
Direction: From E
Inphase: No TD/0.25

Standard features can be activated with the keypad. As an example, when enabled, the “shed load” option causes the transfer switch to transfer the load off of the specified source. If desired, the load shed transfer can be made inphase.

Data Logging

ATS Statistics

ATS Statistics
ATS Total Xfers: 46
SRC Fail Tot Xfers: 20
Days Energized: 36.5

Instant availability of statistical information on total number of ATS transfers, number of transfers caused by power failures and total days controller has been energized, plus more.

Historical Event Log

16.AUG02/95.....13h10:17
Eng.Start.....NormFail.
15.AUG02/95.....13h10:25
Xfer.N>E.....

Displays detailed information for last 99 events, including time of occurrence, length of event, date and reason for event.

ASCO® 7000 Series Optional Accessories

Time Delays

- 2C** An extended time delay on engine starting.
Adjustable from 0 to 60 min in 1 second steps.
Factory set at 5 minutes.

Note: 7000 Series controller provides a similar standard time delay which can be extended to 60 minutes with an external 24 volt DC source.

Manual Controls for Automatic Transfer Switches

- 6C** Reset switch for manual retransfer to normal with automatic retransfer in the event of emergency source failure.
- 6D** Selector switch for automatic/manual retransfer to normal. Automatic bypass if emergency fails.

Engine Generator Controls and Accessories

- 12** Three position engine control selector switch.
Positions: 1 - Stop 2 - Automatic
 3 - Engine Test

Note: Engine controls containing “engine stop” positions should be located at the engine generator. (Consult ASCO for application assistance).

Indicators

- 14A/14B** Additional auxiliary contact sets to indicate switch position. Two sets are standard. Specify total number of sets if more are required.
- 18B** Two-pole, double-throw contacts operate when emergency source voltage is present at transfer switch terminals.
- 18G** Two-pole, double-throw contacts operate when normal source voltage is present at transfer switch terminals.
- 99** “Push-to-Test” feature on all pilot light indicators.

Customer Control Circuits

- 30A** Load-shedding circuit initiated by opening of a customer-supplied contact.
- 30B** Load-shedding circuit initiated by removal of customer-supplied control voltage. (Specify voltage).
- 31Z** Selective load disconnect control contacts (two provided) which operate with time delay prior to and/or after load transfer and retransfer.
- 43R** Terminal block for all customer control connections on 30-150 amp only (standard on all other sizes).

Notes: An externally operable quick-make, quick-break (QM QB), manual handle is available on some 7000 Series product configurations. (Consult ASCO for guidance).

Neutral Conductor Options

- Solid neutral, with fully-rated terminals. (AL-CU) UL Listed.
- Conventional neutral switching pole.
- Overlapping neutral transfer contacts. Allows for proper ground-fault sensing and avoids generator voltage transients during transfer.

Notes: Specify neutral option in catalog number, see page 16 for instructions.

Extension Harness

- 37B** Six foot (6') extension harness to increase distance between transfer switch and control panel on open-type units.

Analog Load Metering Options

- 23B** Three phase ammeter with selector switch (with current transformers and shorting blocks).
- 24B** Three phase voltmeter with selector switch.
- Notes:* Refer to ASCO 7000 Series Data Monitor on page 13 which provides voltage, frequency and power monitoring.

Serial Communications

- 72A** Serial communication module for remote communications to ASCO PowerQuest products.

Surge Protection - ASCO Pulsar 450 rated 40KA

- 73AC1** Normal source protection. (3Ø, 4wire WYE)
- 73AC2** Emergency source protection. (3Ø, 4wire WYE)
- 73AC3** Load side protection. (3Ø, 4wire WYE)

Notes: Other distribution voltages available (Contact ASCO).

Bypass Isolation Switch Options

- 14A1** Auxiliary contact to close in “Bypass to Normal” position.
- 14B1** Auxiliary contact to close in “Bypass to Emergency” position.
- 14T** Auxiliary contact to close when transfer switch is in “Automatic” position.
- 14U** Auxiliary contact to close when transfer switch is in “Isolate” position.
- 14V** Auxiliary; contact to close when transfer switch is in “Test” position.

ATS Bypass Isolation Drawout Features

(1000-2000 amperes)

- 82B** Transfer switch lifting yoke to facilitate the removal of the transfer switch from the drawout carriage.
- 82C** Automatic shutters to provide isolation of bus stabs.

ASCO® 7000 Series Optional Accessories

ASCO® PowerQuest® Data Monitor

The ASCO PowerQuest Data Monitor is a micro-processor based metering device that provides real-time measurements of single and three phase power systems. The Data Monitor uses digital signal processing technology to measure voltage and current per phase; real, reactive and apparent power, and bi-directional energy. All measurements are viewed locally with a backlit liquid crystal display and can be displayed remotely with ASCO PowerQuest products.

Direct voltage input for systems up to 600 Volts AC can be monitored without the use of external potential transformers (PTs). Measures 3 phase currents and a fourth current input is available for measuring current in the neutral conductor. The Data Monitor includes one discrete input for transfer switch position, eight general purpose discrete inputs, and four relay outputs for controlling or monitoring external devices.

Power Metering

- Voltage:
 - Line - Line: V_{AB} , V_{BC} , V_{CA} , $V_{AVERAGE}$
 - Line - Neutral: V_{AN} , V_{BN} , V_{CN} , $V_{AVERAGE}$
- Frequency: 45.0 to 66.0 Hertz
- Current: I_A , I_B , I_C , $I_{AVERAGE}$
- Unbalance %: Voltage, Amps
- Real Power: KW_A , KW_B , KW_C , KW_{NET}
- Reactive Power: $KVAR_A$, $KVAR_B$, $KVAR_C$, $KVAR_{NET}$
- Apparent Power: KVA_A , KVA_B , KVA_C , KVA_{NET}
- Real Energy: KWH_{IMPORT} , KWH_{EXPORT} , KWH_{NET}
- Reactive Energy: $KVARH_{IMPORT}$, $KVARH_{EXPORT}$, $KVARH_{NET}$
- Power Factor: PF_A , PF_B , PF_C , PF_{NET}

Data Access

- 8 digital inputs, 4 digital outputs.
- Input/Output 15-character, user definable screen display for identification of input/output signals.

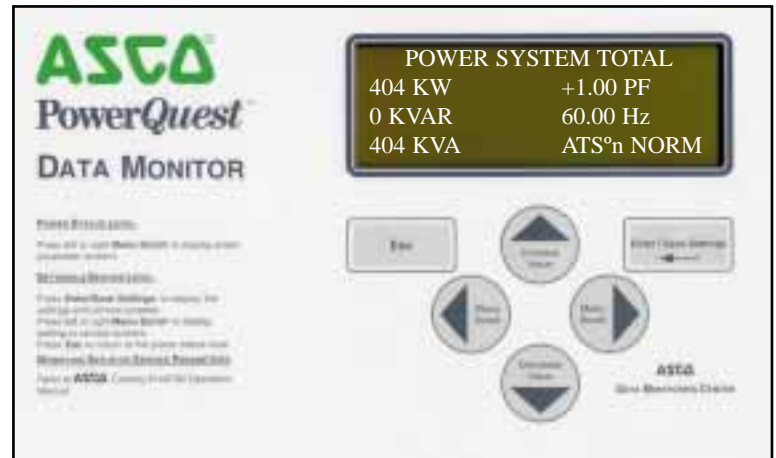


Fig. 14 ASCO Data Monitor.

Configurable Designations

- Local - A 4 line 20 character LCD backlit display.
- Remote - With optional Acc. 72A communication module and ASCO PowerQuest monitoring systems.

Integrated ATS Features

- When configured on load of ATS:
 - Displays ATS position.
 - Displays power data as a function of ATS position (normal/emergency).
 - Accumulates energy data separately for normal and emergency sources.

Optional Configurations and Connection Arrangements

<u>Connected To:</u>	<u>With Display</u>	<u>Without Display</u>
Load	Acc. 85L	Acc. 75L
Normal	Acc. 85N	Acc. 75N
Emergency	Acc. 85M	Acc. 75M

Add suffix "A" to above designations if neutral conductor monitoring is required.

Note: Accessory 75 and 85 includes component mounting, CTs, shorting blocks and all necessary interwiring.

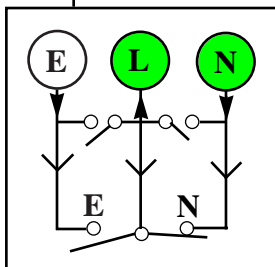
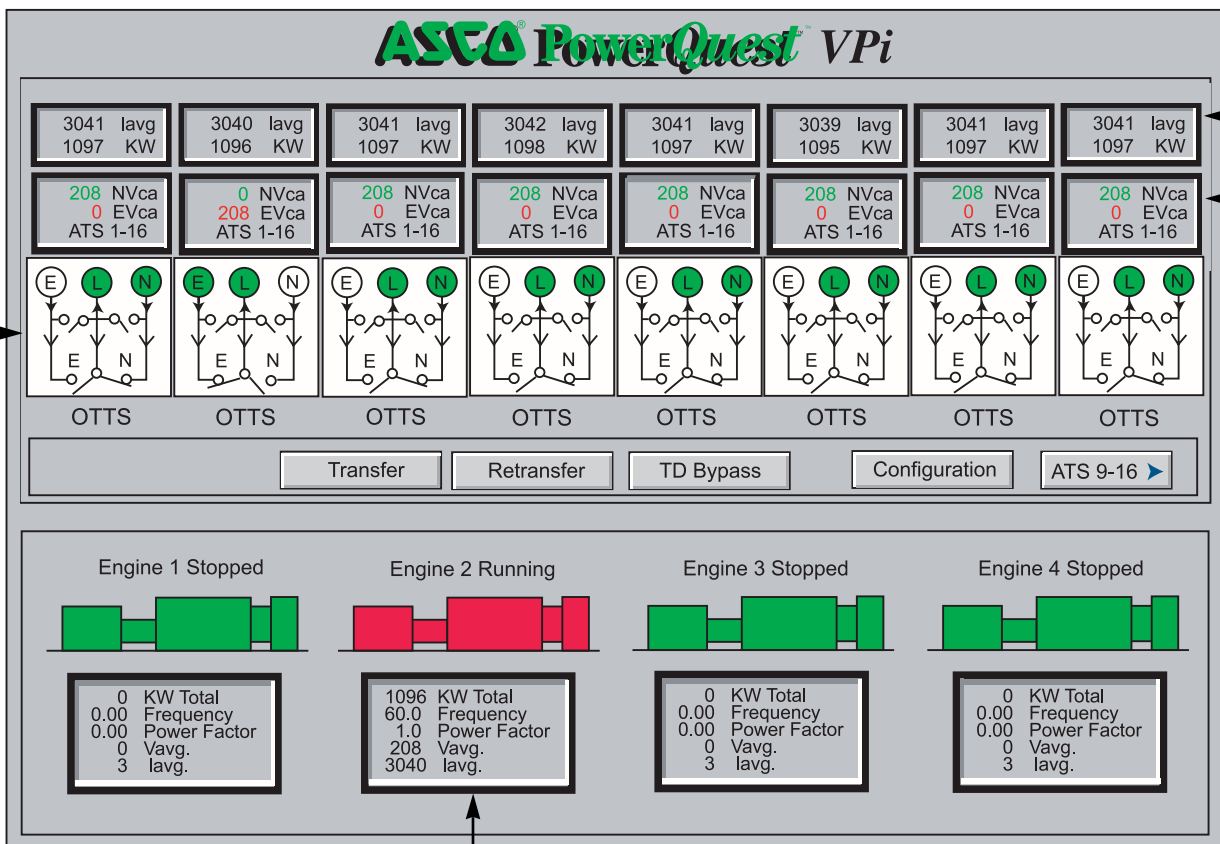
Note: Consult ASCO publications 3014, 3016 and 3047 for specifications and ordering information on ASCO PowerQuest products. The ASCO PowerQuest Data Monitor is also available as a separate unit for monitoring electrical parameters anywhere in the power distribution system.

ASCO® PowerQuest™ VPi



The ASCO PowerQuest VPi monitoring and control management system is available in a windows operating system that allows the monitoring and control of transfer switches and engine generators from a personal computer. With an ASCO modem connection, you can remotely access and/or control your emergency power system, from around the corner or around the world.

Summary Screen

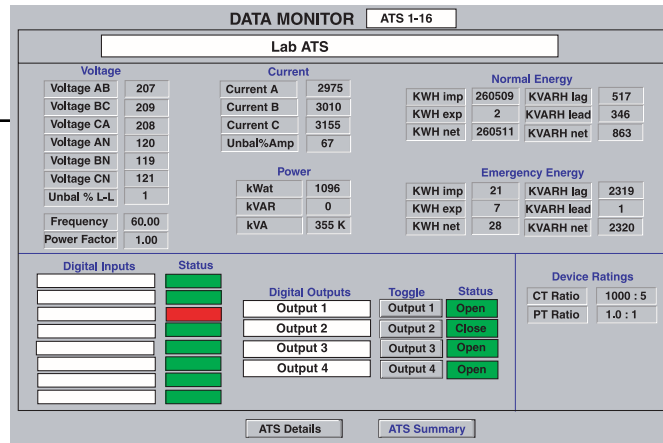


Convenient One-Line Diagram

- Colored icons highlighted to show source availability and which source is connected to load.
- Contacts move on icon to indicate main contact position of transfer and bypass switch. (Automatic transfer and automatic transfer and bypass isolation switches must be provided with optional accessory 14 auxiliary contacts shown on page 12.)
- Bypass switch contacts appear on icon when configured by user input data.

Note: Consult ASCO publications 3014, 3016 and 3047 for specifications and ordering information on ASCO PowerQuest products.

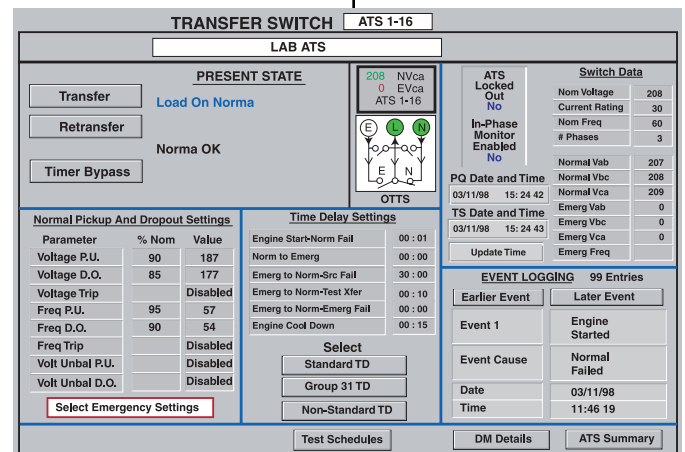
Data Monitor Detail Screen



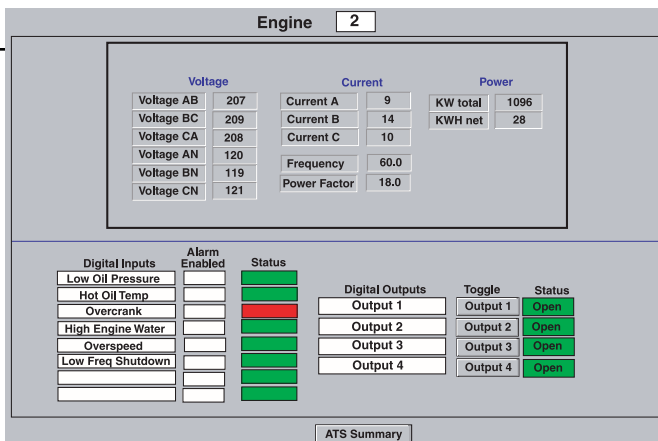
- Voltage: phase to phase; phase to neutral and voltage unbalance.
- 3 phase currents and neutral (optional).
- Frequency.
- Kilowatt hours - normal and emergency.
- Status and control of (4) digital outputs.
- Status of (8) digital inputs.
- Device ratings: CT and PT ratio.

Transfer Switch Detail Screen

- ATS rating and identification data is displayed.
- Allows remote testing and time delay bypass.
- Voltage, frequency, phase sequence, voltage unbalance and time delay settings can be checked.
- Viewing of engine exercise schedules.
- Displays phase to phase voltage on normal and emergency.
- Provides complete system status message from 7000 series microprocessor controller.
- View event log on the last 99 events for each ATS.
- Arrange test schedules for transfer switches.
- Provides for monitoring of local site or up to 1000 remote sites.



Engine-Generator Details



- Voltage: Phase to phase; Phase to neutral
- Current for each phase.
- Kilowatts and kilowatt hours total.
- Frequency and power factor.
- Status and control of (4) digital outputs which can be customized by the user.
- Status of (8) digital inputs.
- “Alarm Enabled” selection. These alarms flash the “engine-generator” icon on the summary screen.
- Digital inputs for engine malfunctions are derived from engine mounted sensors (supplied by others).

ASCO® 7000 Series Ordering Information

To order an ASCO 7000 Series Automatic Transfer Switch, complete the following catalog number:
Mfr Part Number Complete (Accessories included): 7ATS A3 1000 N5X0,6D,18B,18G,31Z,37B

7 A TS + A + 3 + 1000 + N + 5X +

		Product		Neutral Code		Phase Poles	Amperes		Voltage Code		Grp Code	Cabinet	
A	Automatic	TS	Conventional 2-Position	---	No Neutral	2	30	1000	A	115	5	---	No Cabinet
		TB	Open Transition Bypass	A	Solid Neutral	3	70	1200	B	120	5X	C	Type 1 enclosure
		CTS	Closed Transition				100	1600	C	208		D	Type 1 gasketed
		CTB	Closed Transition Bypass	B	Switched Neutral		150	2000	D	220		E	Type 2 enclosure
		DTS	Delayed Transition				260	3000	E	230		F	Type 3R enclosure
		DTB	Delayed Transition Bypass	C	Overlapping Neutral		400	4000	F	240		G	Type 4 enclosure
							600		G	277		H	Type 4X enclosure (stainless steel)
N	Non-Automatic						800		H	380		I	Type 5 enclosure
									I	400		J	Type 6 enclosure
									J	415		K	Type 7 enclosure
									K	440		L	Type 12 enclosure
									L	460			
									M	480			
									N	550			
									P	575			
									Q	600			

Note: Switches rated 30-150, 600-2000 amps available with 2, 3 or either switched neutral (4 poles) or overlapping neutral (optional).

For 4 pole applications on switches rated 260 to 400 amps and 3000 to 4000 amps specify overlapping switched neutral (optional).

Overlapping neutral is not available on delayed transition transfer products.

**The Example Catalog Number above is 7ATS A3400N5XC
(X could be for Accessory 85L ASCO Data Monitor connected to load).**

**7A TS, 7N TS, 7A DTS, 7A CTS,
7N DTS, 7N CTS**

**Sizes of UL-Listed Solderless Screw-Type
Terminals for External Power Connections**

Switch Rating amps	Max # of Conductors per Terminal	Range of AL-CU Conductor Sizes
30, 70, 100	One	# 14 to 2/0 AWG
150	One	#8 to 3/0 AWG
240-400	One	#4 AWG to 600 MCM
	Two	#1/0 AWG to 250 MCM
600-800	Three	#2 AWG to 600 MCM
1000-1200 ¹	Four	#1/0 AWG to 750 MCM
1600-2000	Six	#1/0 AWG to 750 MCM
3000-4000 ²	Suitable for Bus Bar Connection	

- Notes:
- Unit is designed for top cable entry of emergency and load and bottom entry of normal. Optionally, the switch may be supplied with reverse source and/or bottom entry load. A cable pull box is also available for all top or bottom cable access (optional).
 - All main terminals are rear connected. 3000 and 4000 amp switches are arranged for bus bar connection. Contact ASCO if provisions for cable connection are required.

**7A TB, 7N TB, 7A DTB, 7A CTB,
7N DTB, 7N CTB**

**Sizes of UL-Listed Solderless Screw-Type
Terminal for External Power Connections**

Switch Rating amps	Max # of Conductors per Terminal	Range of AL-CU Conductor Sizes
150,260,400	One	# 4 AWG to 600 MCM
	Two	# 1/0 AWG to 250 MCM
600-800	Three	# 2 AWG to 600 MCM
1000-1200 ¹	Four	# 1/0 AWG to 750 MCM
1600-2000 ¹	Six	# 1/0 AWG to 750 MCM
3000 ¹	Eight	# 2 AWG to 600 MCM
4000 ¹	Twelve	# 2 AWG to 600 MCM

- Notes:
- All main terminals are rear connected.

ASCO® 7000 Series Designed to Fit Anywhere

Automatic 2-Position Transfer Switching 7A TS, 7N TS

Switch Rating amps	Poles	Width inches (mm)	Height inches (mm)	Depth inches (mm)
<i>Enclosed UL Type 1</i>				
30, 70, 100, 150	2, 3 or 3 with neutral B/C	18 (457)	48 (1219)	13 (330)
260, 400	2, 3, or 3 with neutral C	22 (559)	48 (1219)	13 (330)
600, 800	2, 3 or 3 with neutral B/C	30 (762)	63(1600)	17½ (445)
1000, 1200 ¹	2, 3 or 3 with neutral B/C	38 (965)	87 (2210)	23 (584)
1600, 2000 ²	2, 3 or 3 with neutral B/C	38 (965)	91 (2311)	48 (1219)
3000 ²	2, 3, or 3 with neutral C	37 (940)	91 (2311)	60 (1524)
4000 ²	2, 3, or 3 with neutral C	46 (1168)	91 (2311)	72 (1829)
<i>Open Configuration</i>				
30, 70, 100, 150	2, 3 or 3 with neutral B/C	10¼ (260)	10¼ (260)	5½ (140)
260, 400	2 or 3	12 (305)	18½ (470)	6-7/8 (175)
260, 400	2, 3, or 3 with neutral C	14½ (368)	18½ (470)	6-7/8 (175)
600, 800	2 or 3	19¼ (489)	25 (635)	11 (279)
600, 800	3 with neutral B/C	22¾ (578)	25 (635)	11 (279)
1000, 1200	2, 3 or 3 with neutral B/C	33¼ (845)	43 (1092)	22¼ (565)
1600, 2000	2, 3 or 3 with neutral B/C	33¼ (845)	28 (711)	33½ (842)
3000	2, 3, or 3 with neutral C	31½ (800)	52 (1321)	22½ (572)
4000	2, 3, or 3 with neutral C	41 (1041)	52 (1321)	25½ (648)

Notes: 1. Unit is designed for top cable entry of emergency and load and bottom entry of normal. Optionally, the switch may be supplied with reverse source and/or bottom entry load. A cable pull box is also available for all top or all bottom cable access when required (optional).

2. Enclosures for 1600 - 4000 amp are free-standing with removable top, sides, and back.

Shipping Weights

2-Position Transfer Switching 7A TS, 7N TS

Switch Rating amps	Poles	Enclosed lb (kg)	Open* lb (kg)
30, 70, 100	2	67 (31)	15 (7)
30, 70, 100	3	70 (32)	18 (8)
30, 70, 100	3 with B/C	73 (33)	21 (10)
150	2	69 (32)	17 (8)
150	3	72 (33)	20 (9)
150	3 with B/C	75 (34)	23 (11)
260, 400	2	117 (53)	37 (17)
260, 400	3	125 (57)	45 (21)
260, 400	3 with C	133 (61)	53 (24)
600, 800	2	250 (114)	135 (62)
600, 800	3	260 (118)	145 (66)
600, 800	3 with B/C	320 (145)	155 (71)
1000, 1200	2	870 (395)	335 (152)
1000, 1200	3	920 (417)	385 (174)
1000, 1200	3 with B/C	970 (440)	435 (197)
1600, 2000	2	1110 (503)	370 (167)
1600, 2000	3	1160 (525)	420 (190)
1600, 2000	3 with B/C	1210 (548)	470 (213)
3000	2	1983 (900)	750 (340)
3000	3	2133 (968)	900 (409)
3000	3 with C	2233 (1013)	1000 (454)
4000	2	2208 (1002)	975 (443)
4000	3	2433 (1104)	1200 (545)
4000	3 with C	2533 (1149)	1300 (590)

Notes: * Open widths include transfer switch and control panel. 1600-4000 amp enclosures require ventilation openings, refer to drawings for details.

ASCO® 7000 Series Designed to Fit Anywhere

Closed Transition and Delayed Transition Transfer Switching

7A DTS, 7A CTS, 7N DTS, 7N CTS

Switch Rating amps	Poles	Width inches (mm)	Height inches (mm)	Depth inches (mm)
<i>Enclosed UL Type 1</i>				
150, 260, 400 ¹	2, 3 or 3 with neutral C	24 (610)	63 (1600)	17½ (445)
600, 800	2, 3 or 3 with neutral B/C	30 (762)	63 (1600)	17½ (445)
1000, 1200 ²	2, 3 or 3 with neutral B	38 (965)	87 (2210)	23 (584)
1600, 2000 ³	2, 3 or 3 with neutral B	38 (965)	91 (2311)	48 (1219)
3000 ³	2, 3 or 3 with neutral C	37 (940)	91 (2311)	60 (1524)
4000 ³	2, 3 or 3 with neutral C	46 (1168)	91 (2311)	72 (1829)
<i>Open Configuration</i>				
150, 260, 400	2, 3 or 3 with neutral C	14 ¾ (375)	30 (762)	5 7/8 (149)
600, 800	2 or 3 with neutral B/C	19¼ (489)	28¾ (730)	11 (279)
600, 800	2 or 3 with neutral B/C	22¾ (578)	28¾ (730)	11 (279)
1000, 1200	3 or 3 with neutral B	33¼ (845)	43 (1092)	22¼ (565)
1600, 2000	2, 3 or 3 with neutral B	33¼ (845)	28 (711)	29 (737)
3000	2, 3 or 3 with neutral C	31½ (800)	52 (1321)	26½ (637)
4000	2, 3 or 3 with neutral C	41 (1041)	52 (1321)	29½ (749)

- Notes: 1. For 400 amp, 7A DTS and 7N DTS with neutral code B; dimensions are 30 (762) X 63 (1600) x 1742 (445).
 2. Unit is designed for top cable entry of emergency and load and bottom entry of normal. Optionally, the switch may be supplied with reverse source and/or bottom entry load. A cable pull box is also available for all top or all bottom cable access when required (optional).
 3. Enclosures for 1600 - 4000 amp are free-standing with removable top, sides, and back.

Shipping Weights

Closed Transition and Delayed Transition Transfer Switching

7A DTS, 7A CTS, 7N DTS, 7N CTS

Switch Rating amps	Poles	Enclosed lb (kg)	Open* lb (kg)
150, 260, 400	2	137 (62)	45 (21)
150, 260, 400	3	145 (66)	53 (24)
150, 260, 400	3 with C	153 (69)	63 (28)
600, 800	2	260 (118)	145 (66)
600, 800	3	270 (122)	155 (71)
600, 800	3 with B/C	330 (150)	165 (75)
1000, 1200	2	1005 (456)	470 (213)
1000, 1200	3	1055 (478)	520 (236)
1000, 1200	3 with B	1105 (501)	570 (258)
1600, 2000	2	1300 (590)	505 (229)
1600, 2000	3	1350 (612)	555 (252)
1600, 2000	3 with B	1400 (635)	605 (274)
3000	2	2000 (908)	767 (348)
3000	3	2150 (976)	917 (416)
3000	3 with C	2230 (1012)	997 (452)
4000	2	2360 (1071)	1127 (511)
4000	3	2580 (1171)	1347 (611)
4000	3 with C	2680 (1217)	1447 (657)

- Notes: * Open widths include transfer switch and control panel. 1600-4000 amp enclosures require ventilation openings, refer to drawings for details.

Automatic Transfer Bypass-Isolation Switching with Transfer Switch Engaged 7A TB, 7N TB

Switch Rating amps	Poles	Width inches (mm)	Height inches (mm)	Depth inches (mm)
<i>Enclosed UL Type 1</i>				
150, 260, 400 ¹	2, 3 or 3 with neutral C	28½ (724)	62 (1575)	19 (483)
600, 800 ²	2, 3 or 3 with neutral B/C	36 (914)	90 (2286)	22 (559)
1000, 1200 ³	2, 3 or 3 with neutral B/C	38 (965)	91 (2311)	60 (1524)
1600, 2000 ³	2, 3 or 3 with neutral B/C	38 (965)	91 (2311)	60 (1524)
3000 ⁴	2, 3 or 3 with neutral C	78 (1981)	91 (2311)	72 (1829)
4000 ⁴	2, 3 or 3 with neutral C	96½ (2451)	91 (2311)	72 (1829)
<i>Open Configuration</i>				
150, 260, 400 ¹	2 or 3	14 ¾ (375)	61½ (1553)	22¼ (565)
150, 260, 400 ¹	3 with neutral C	19¾ (500)	61½ (1553)	22¼ (565)
600, 800 ²	2 or 3	23¾ (603)	67¼ (1708)	24¾ (629)
600, 800 ²	2, 3 or 3 with neutral B/C	27¼ (692)	67¼ (1708)	24¾ (629)
1000, 1200 ³	2, 3 or 3 with neutral B/C	38 (965)	72 (1829)	38 (965)
1600, 2000 ³	2, 3 or 3 with neutral B/C	38 (965)	72 (1829)	38 (965)

- Notes:
- Handles extend 3½ inches (89mm).
 - Handles extend 6¼ inches (159mm) standard enclosures for 600 - 800 amp sizes are suitable for top cable entrance only. Specify 44" wide enclosure for bottom cable entry.
 - Recommended clearance to enclosure: 3 feet (914mm) from rear, 4 feet (1219mm) from front (25 inches required for transfer switch drawout).
 - For 3000 - 4000 amp sizes, ATS and bypass sections can be reversed, contact ASCO. Recommended clearance to enclosure: 3 feet (914mm) from rear, 5 feet (1524mm) from front (3 feet required for transfer switch rollout).

Shipping Weights

Automatic Transfer Bypass-Isolation Switching with Transfer Switch Engaged 7A TB, 7N TB

Switch Rating amps	Poles	Enclosed lb (kg)	Open* lb (kg)
150, 260, 400	2	340 (154)	135 (61)
150, 260, 400	3	350 (158)	145 (66)
150, 260, 400	3 with C	360 (163)	155 (70)
600, 800	2	695 (315)	370 (168)
600, 800	3	710 (322)	385 (175)
600, 800	3 with B/C	725 (329)	425 (193)
1000, 1200	2	1910 (866)	1280 (507)
1000, 1200	3	2130 (966)	1280 (580)
1000, 1200	3 with B/C	2350 (1066)	1440 (652)
1600, 2000	2	2180 (989)	1300 (589)
1600, 2000	3	2360 (1070)	1550 (702)
1600, 2000	3 with B/C	2540 (1152)	1800 (815)
3000	3	5100 (2314)	----
3000	3 with C	5500 (2495)	----
4000	3	6300 (2858)	----
4000	3 with C	6900 (3130)	----

- Notes: * Open widths include transfer switch, bypass-isolation switch and control panel. 1000-4000 amp enclosures require ventilation openings, refer to drawings for details.

Automatic Transfer Bypass-Isolation in Closed Transition and Delayed Transition Switching. 7A DTB, 7A CTB, 7N DTB, 7N CTB

Switch Rating amps	Poles	Width inches (mm)	Height inches (mm)	Depth inches (mm)
<i>Enclosed UL Type 1</i>				
150, 260, 400 ^{1.5}	2, 3 or 3 with neutral C	28½ (724)	74 (1880)	19 (483)
600, 800 ²	2, 3 or 3 with neutral B/C	36 (914)	90 (2286)	22 (559)
1000, 1200 ³	2, 3 or 3 with neutral B/C	38 (965)	91 (2311)	60 (1524)
1600, 2000 ³	2, 3 or 3 with neutral B/C	38 (965)	91 (2311)	60 (1524)
3000 ⁴	2, 3 or 3 with neutral C	78 (1981)	91 (2311)	72 (1829)
4000 ⁴	2, 3 or 3 with neutral C	96½ (2451)	91 (2311)	72 (1829)
<i>Open Configuration</i>				
150, 260, 400 ^{1.5}	2 or 3	14 ¾ (375)	61½ (1553)	22¼ (565)
150, 260, 400 ^{1.5}	3 with neutral C	19¾ (500)	61½ (1553)	22¼ (565)
600, 800 ²	2 or 3	23¾ (603)	67¼ (1708)	24¾ (629)
600, 800 ²	2, 3 or 3 with neutral B/C	27¼ (692)	67¼ (1708)	24¾ (629)
1000, 1200 ³	2, 3 or 3 with neutral B/C	38 (965)	72 (1829)	38 (965)
1600, 2000 ³	2, 3 or 3 with neutral B/C	38 (965)	72 (1829)	38 (965)

- Notes:
1. Handles extend 3½ inches (89mm).
 2. Handles extend 6¼ inches (159mm) standard enclosures for 600 - 800 amp sizes are suitable for top cable entrance only. Specify 44" wide enclosure for bottom cable entry.
 3. Recommended clearance to enclosure: 3 feet (914mm) from rear, 4 feet (1219mm) from front (25 inches required for transfer switch drawout).
 4. For 3000 - 4000 amp sizes, ATS and bypass sections can be reversed, contact ASCO. Recommended clearance to enclosure: 3 feet (914mm) from rear, 5 feet (1524mm) from front (3 feet required for transfer switch rollout).
 5. 400 amp, 7A DTB and 7N DTB with neutral code B are 36 (914)W x 90 (2286)H x 22 (559)D.
 6. Overlapping neutral (code C) not available on 7A DTB and 7N DTB switching arrangements.

Shipping Weights

Automatic Transfer Bypass-Isolation in Closed Transition and Delayed Transition Switching. 7A DTB, 7A CTB, 7N DTB, 7N CTB

Switch Rating amps	Poles	Enclosed lb (kg)	Open* lb (kg)
150, 260, 400	2	340 (154)	145 (66)
150, 260, 400	3	350 (158)	155 (70)
150, 260, 400	3 with C	360 (163)	165 (75)
600, 800	2	695 (315)	385 (175)
600, 800	3	710 (322)	400 (181)
600, 800	3 with B/C	750 (340)	440 (200)
1000, 1200	2	2045 (928)	1225 (556)
1000, 1200	3	2265 (1027)	1415 (642)
1000, 1200	3 with B	2485 (1127)	1575 (714)
1600, 2000	2	2315 (1050)	1435 (651)
1600, 2000	3	2495 (1132)	1685 (764)
1600, 2000	3 with B	2675 (1213)	1935 (878)
3000	3	5100 (2314)	----
3000	3 with C	5500 (2495)	----
4000	3	6300 (2858)	----
4000	3 with C	6900 (3130)	----

- Notes: * Open widths include transfer switch, bypass-isolation switch and control panel. 1000-4000 amp enclosures require ventilation openings, refer to drawings for details.

Automatic Switch Co.

800-937-ASCO

www.asco.com

ASIA • AUSTRALIA • BRAZIL • CANADA • GERMANY • JAPAN • MEXICO • SOUTH AFRICA • UNITED ARAB EMIRATES • UNITED KINGDOM • UNITED STATES

Florham Park, New Jersey 07932 USA