

# ASCO® 4000 SERIES



Fig. 1: Three Pole 4000 Series Automatic Transfer Switch rated 800 amperes (shown with optional front connected terminals and Power Manager).

## 4000 Series

ASCO Power 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, they offer the most advanced method of transferring all types of loads, such as motors, electronic drives, UPSs and microprocessor based systems. 4000 Series Power Transfer Switches are available open or enclosed, in ampacity sizes from 30 through 4000 amperes with a limited selection of optional accessories.

## 4000 Series Power 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.
- UL listed to 1008 Transfer Switch Equipment & CSA certified to CSA 22.2 No.178-1978 Automatic Transfer Switches.
- Qualified to IEC 60947-6-1, CE marked (optional). (Limited to certain accessories.)
- Rated up to 600 VAC, 30 through 4000 amperes.
- Reliable and field proven solenoid operating mechanism.
- High withstand and close-on ratings including short time withstand current rating for optimum flexibility in circuit breaker coordination (800-4000 amperes).
- Solid, switched neutral configurations available.
- Front replaceable main and arcing contacts (800-4000 amperes).
- Programmable microprocessor controller with keypad and LCD display.
- Industrial grade user interface with integrated controls and indicating lights.
- Convenient one line diagram with switch position and source acceptability LED indicators.
- Standard ground conductor connections.
- Four auxiliary contacts, two contacts closed when switch is in normal position and two contacts closed when switch is in emergency position.\*
- Local/remote communications capability for interfacing with ASCO PowerQuest® or SiteWeb® communication products.

\*Only two contacts standard on 150-400A 4ACTS and 4NCTS

# ASCO® 4000 SERIES POWER SWITCHING SOLUTIONS



Fig. 2: Four pole, Closed-Transition Transfer Switch rated 1000 amperes in Type 1 enclosure.



Fig. 3: Four pole, Delayed-Transition Transfer Switch rated 400 amperes in Type 1 enclosure.

## 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, without control of engine generator set. 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 indication, extended parallel time protection, and transfer switch lock out are standard features.

## Delayed-Transition Transfer Switching

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

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

## 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: Three pole Non-Automatic, electrically operated 200 ampere switch shown in Type 1 enclosure.

## Withstand and Close-On Ratings for all 4000 Series Products<sup>(1)(2)</sup>

Switch Rating (Amps)		UL 1008 Withstand and Close-On Ratings				Specific Breaker Rating	"Any" Breaker (3) Rating	Short Time Withstand Ratings(4)	Short Time Duration (Cycles)	Tested Voltages
4ATS, 4NTS	4ACTS, 4ADTS, 4NCTS, 4NDTS	Current-Limiting Fuse Rating	Max. Fuse Type							
			amps	types						
30	-	100,000	60	J	10,000	10,000	N/A	-	480V	
70, 100, 125, 150, 200	-	200,000	200	J	22,000	10,000	N/A	-	480V	
230	-	100,000	300	J	22,000	10,000	N/A	-	480V	
260, 400, 600	150, 260, 400, 600	200,000	600	J	42,000	35,000	N/A	-	600V	
		200,000	800	L						
800, 1000, 1200	800, 1000, 1200	200,000	1600	L	65,000	50,000	36,000	18	600V	
1600, 2000 <sup>5</sup>	1600, 2000 <sup>5</sup>	200,000	3000	L	100,000	100,000	65,000	30	600V	
2600, 3000	2600, 3000	200,000	4000	L	100,000	100,000	65,000	30	600V	
4000	4000	200,000	6000	L	100,000	100,000	65,000	30	480V	

Notes: 1) 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.

2) Application requirements may permit higher withstand ratings for certain size switches. Contact ASCO for guidance if available short circuit current exceeds the WCR ratings shown.

3) "Any" breaker ratings are based on 1.5 cycles for 30 - 230 amp & 3 cycles for 260 - 4000 amps. Applicable to breakers with instantaneous trip elements.

4) Short time ratings are provided for applications involving breakers that do not have instantaneous trips for system coordination.

5) Optional front connected service limited to 85,000 amps for specific and any breaker rating.

# ASCO® 4000 SERIES MICROPROCESSOR CONTROLLER



Fig. 5: 4000 Series Microprocessor Controller.

The 4000 Series microprocessor controller is used with all sizes of Power Transfer Switches from 30 through 4000 amperes. It represents the most advanced digital controller 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.

The 4000 Series microprocessor controller is a Power Control Center which allows the user to easily access detailed information on: system, 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.

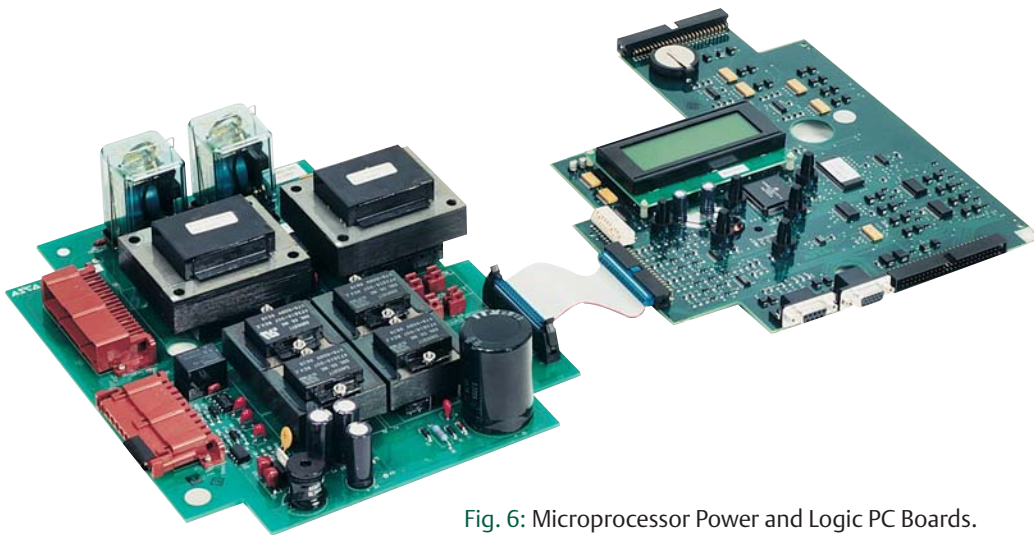


Fig. 6: Microprocessor Power and Logic PC Boards.

4000 Series Microprocessor Controller	
Emission Standard - Group 1, Class A	EN 55011:1991
Generic Immunity Standard, from which:	EN 50082-2:1995
Electrostatic Discharge (ESD) Immunity	EN 61000-4-2:1995
Radiated Electromagnetic Field Immunity	ENV 50140:1993
Electrical Fast Transient (EFT) Immunity	EN 61000-4-4:1995
Surge Transient Immunity	EN 61000-4-5:1995
Conducted Radio-Frequency Field Immunity	EN 61000-4-6:1996
Voltage Dips, Interruptions and Variations Immunity	EN 61000-4-11:1994

# ASCO® 4000 SERIES MICROPROCESSOR CONTROLLER

## Features

- Digital microprocessor.
- Touch pad programming of features and settings without the need for meters, or variable power supplies.
- 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, Portuguese, Spanish, or French. For others contact ASCO).
- Password protection to prevent unauthorized tampering of settings.
- Remote monitoring and control with ASCO PowerQuest® and SiteWeb™ communications products. Specify optional accessory 72A or 72E.
- 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 contact (N/O or N/C) 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 when 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 engine starting signal to override momentary normal source outages - adjustable 0 to 6 seconds.
- Transfer to emergency time delay - adjustable 0 to 60 minutes.
- Emergency source stabilization 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.
- Fully programmable engine exerciser with 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 time - 0.1 to 1.0 seconds.
  - Transfer switch locked out.
- Delayed transition load disconnect time delay - adjustable 0 to 5 minutes. (Delayed Transition Switches only.)

# ASCO® 4000 SERIES OPTIONAL ACCESSORIES

## Time Delays

- 2C** Provides an extended time delay on engine starting. The standard feature one time delay is adjustable from zero to six seconds. Accessory 2C allows this time delay to be adjustable from zero to sixty minutes in one second intervals factory set at five minutes.
- 1G** Similar to accessory 2C except using an external 24 volt DC power input. Available only as a feature of accessory 18Z.

## Indicators

- 14A/14B** Additional auxiliary contact sets to indicate switch position. Two sets are typically standard. Maximum number of two additional sets. (Varies by configuration)

## Neutral Conductor Options

- Solid neutral, with fully-rated terminals. (AL-CU) UL Listed.
- Conventional neutral switching pole.

*Note: Specify neutral option in catalog number, see page 18 for instructions.*

## Communications Options

- 72A** Serial communication module for remote communications to ASCO PowerQuest® or SiteWeb® products. Also allows 4000 Series Transfer Switches to communicate via Modbus/RTU.
- 72E** Ethernet connectivity module for remote communications to ASCO PowerQuest® or SiteWeb® products. Contains embedded web pages for the remote monitoring of ASCO products as well as some 3rd party devices. Also provides Serial-to-Ethernet link with ability to communicate using Modbus/TCP.

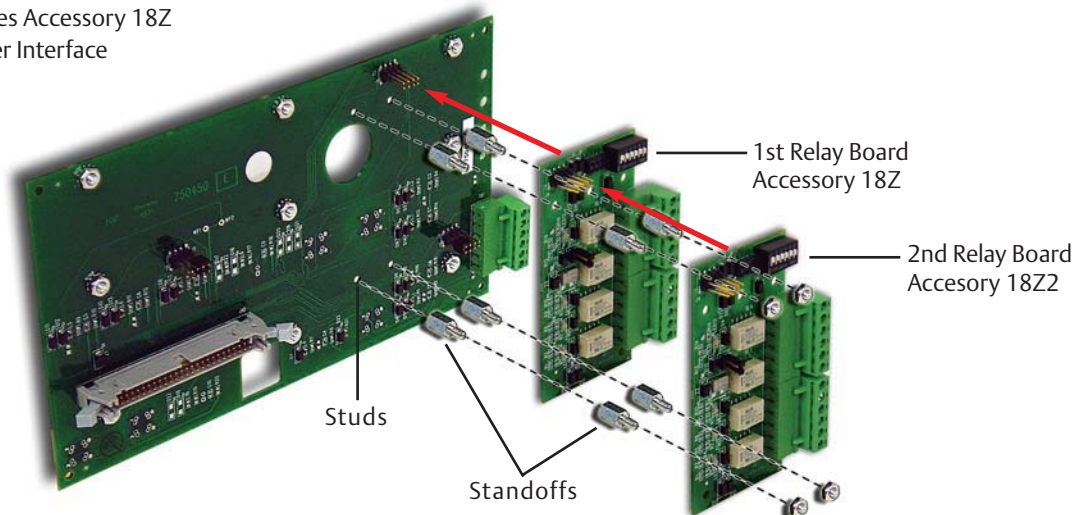
## Customer Control Circuits

- 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).

## Add-on Boards

- 18Z** Includes one Form C contact (Rated 2A @ 30VDC or .5A @ 125VAC) for each of the following:
  - Normal Source Acceptability.
  - Emergency Source Acceptability.
  - Selective Load Disconnect. - Pre and post transfer signal time delay for selective load disconnect with a programmable bypass on source failures - adjustable 0 to 5 minutes.
  - Fourth contact can be set to mimic the acceptability contacts or annunciate any combination of the acceptability contacts and/or any switch alarm conditions available:
    - Extended Parallel Time (Closed transition),
    - Failure to Synchronize (Closed transition),
    - Transfer Switch Locked Out (Closed transition),
    - Load Disconnected (Delayed transition).
  - Accessory 18Z includes an extension of the engine start time delay (feature) to 60 seconds if an external 24VDC supply is connected to a 4000 series controller. This external power source will also allow the LCD display to be active when both normal and emergency sources are unavailable.
- 18Z2** Includes two 18Z accessory boards. (Maximum of two 18Z accessory boards allowed.)

Fig. 9: 4000 Series Accessory 18Z mounting on User Interface



# ASCO® 4000 SERIES OPTIONAL ACCESSORIES

## ASCO® 5200 Series

### Power Manager

The ASCO 5200 Series Power Manager is a microprocessor based metering device that provides real-time measurements of single and three phase power systems. The Power Manager uses digital signal processing technology to measure voltage and current per phase; real, reactive and apparent power, and bi-directional energy. All measurements can be viewed locally with a backlit liquid crystal display and/or displayed remotely with ASCO PowerQuest® or SiteWeb® products.

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

### Power Metering

- Voltage:
  - Line - Line: VAB, VBC, VCA, VAVERAGE
  - Line - Neutral: VAN, VBN, VCN, VAVERAGE
- Frequency: 45.0 to 66.0 Hertz
- Current: IA, IB, IC, IAVERAGE
- Unbalance %: Voltage, Amps
- Real Power: KWA, KWB, KWC, KWNET
- Reactive Power: KVARA, KVARB, KVARC, KVARNET
- Apparent Power: KVAA, KVAB, KVAC, KVANET
- Real Energy: KWHIMPORT, KWHEXPORT, KWHNET
- Reactive Energy: KVARHIMPORT, KVARHEXPORT, KVARHNET
- Power Factor: PFA, PFB, PFC, PFNET

### Data Access

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

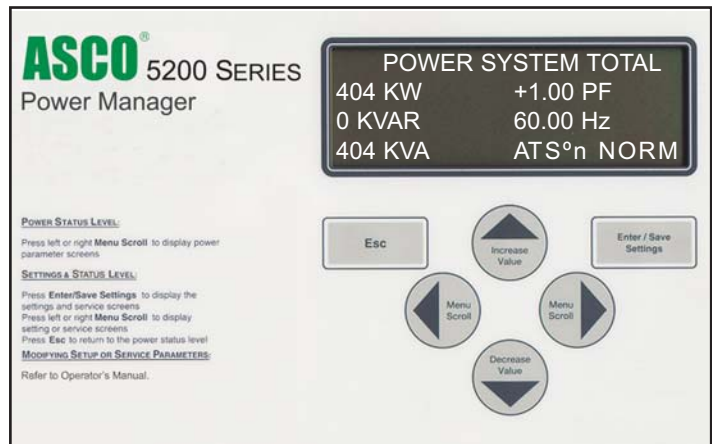


Fig. 10: ASCO 5200 Series Power Manager.

## Configurable Designations

- Local - A four line, 20 character LCD backlit display.
- Remote - With optional Acc. 72A or 72E and Power Manager monitoring systems.
- Provides user programmable setpoints based on twelve metering and I/O parameters. Each setpoint allows the user to select the parameter, the trip & reset levels, the trip & reset time delays and the alarm type or relay output to trigger. This can be used for protective relaying and peak shaving applications.

## 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

Connected To:	With Display	Without Display
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: The ASCO Power Manager is also available as a separate unit for monitoring electrical parameters anywhere in the power distribution system.

# ASCO® 4000 SERIES POWER MONITORING & CONTROL

PowerQuest® is a PC based software package. When combined with the ASCO 5110 Serial Module, the ASCO 5150 Connectivity module, the ASCO 5120 Telephone Interface Module and ASCO 5200 Series Power Manager, provide the most economical communication system for monitoring and control of power transfer switches and engine generators.

The local RS-485 network allows communications with up to 32 power transfer switches and four engine generators. An analog phone connection and ASCO telephone interface module allow for direct dial up, monitoring and control of remote locations. The ASCO Power Manager not only allows you to view current, power, and power factor readings, but also allows a remote user to control output relays that are not assigned to other setpoints.



Fig. 11: Serial Module

## 5110 Serial Module

The 5110 Serial Module is used to allow local or remote communications with ASCO PowerQuest® or SiteWeb® communication products.

The module is used to connect the 4000 Series transfer switches to a serial network via an RS-485 interface. The module has two port connectors used for ATS & Standalone Power Manager connectivity.

The serial connection is accomplished from a 5-pin terminal header/socket block. RS-485 serial networks allow for up to 32 modules to be set up in a daisy chain configuration to connect to PowerQuest® or SiteWeb® systems.



Fig. 12: Connectivity Module

## 5150 Connectivity Module

The 5150 Connectivity Module is used to bring several different serial devices that communicate at different baud rates and with different protocols to a common Ethernet media.

The module is used to connect 4000 Series transfer switches, and ASCO Remote Annunciators to a standard Ethernet TCP/IP network with standard 10base T(RJ-45) connectors. The module has customized embedded JAVA™ applets (program applications for an internet browser) for each monitored device that loads automatically to a standard Web Browser.

The module is designed to communicate with up to 8 clients such as Web applications (web pages), PowerQuest®, or third party Modbus® devices simultaneously over an Ethernet connection.



Fig. 13: Telephone Interface Module

## 5120 Telephone Interface Module

(for use with PowerQuest®)

The 5120 Telephone Interface Module (TIM) allows users to dial directly into their ASCO communications network for monitoring and/or control. The TIM connects to the ASCO communication network via RS-485 and the phone port connects directly into an analog phone jack. Also, the TIM has an RS-232 connector which allows the TIM to be used as the dialing modem.

Supplied with 120 VAC to 18 VDC (nominal) UL approved, class 2 power supply.