

## ASCO 4000 SERIES Digital Generator Paralleling Switchgear



**ASCO**<sup>®</sup>

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

DISCOVER THE AWESOME POWER  
OF THE ASCO 4000 SERIES  
DIGITAL GENERATOR PARALLELING  
CONTROL SWITCHGEAR



# Master Its Power

You're in Total Command

The 4000 SERIES Digital Generator Paralleling Control Switchgear is a winning combination of...

The proven and trusted features that have helped make ASCO the world leader in power transfer switching and control...

And cutting-edge, user friendly digital technology.

The ASCO 4000 SERIES Digital Generator Paralleling Control Switchgear is an advanced, multiple-engine power control solution that starts, synchronizes, parallels, monitors and protects emergency, standby, and prime power systems.

The 4000 Power Control System gives you ASCO's unsurpassed engine control and load management expertise.

Parallel up to eight engines and manage up to 64 automatic transfer switches.

Control a power system from easy-to-operate screens at the system, or monitor remotely from a control center or anywhere in the world over the Internet. Monitor your power 24x7x365.

\*Dual - Generator Control Section shown with optional touch screen

# System Flexibility

## 4000 SERIES Digital Generator Paralleling Control Switchgear

System flexibility empowers you as never before.

Now you can customize the paralleling control switchgear using a variety of configurable modules based

on a standard engineering design. Create exactly the power control solution you want, whether for two, three, four or up to eight engine-generators. The

modules reduce lead and delivery times, and facilitate installation and start up, so customize a system to your requirements and still meet tight deadlines. You also

have the freedom to specify the circuit breakers and engine-generators you prefer, giving you the flexibility to configure exactly the system you want.

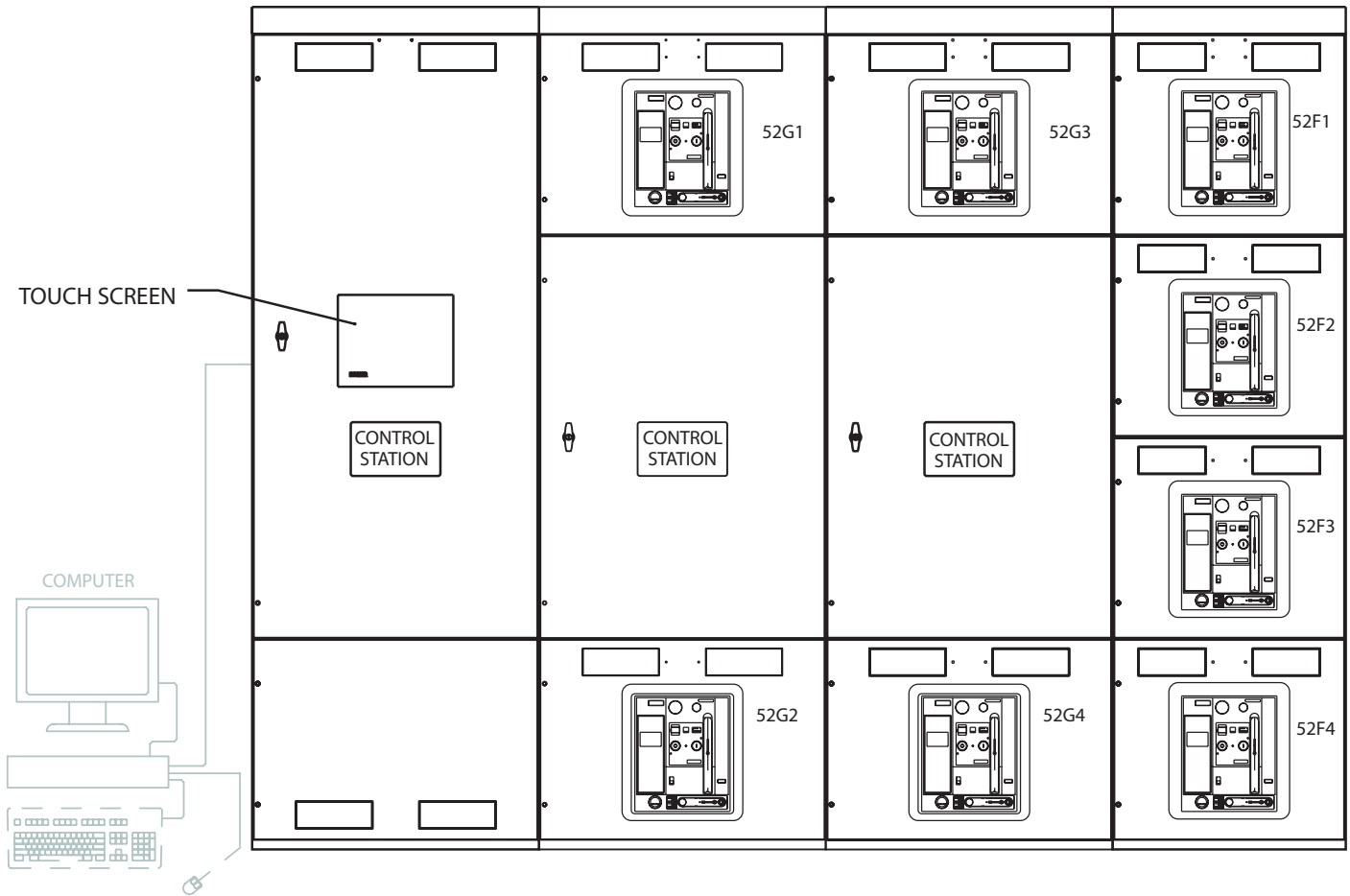


## Powerful Features

The feature-rich 4000 SERIES provides functionality previously found only in switchgear for business-critical applications. Now, many of those functions are available for facilities needing emergency, standby, and prime power.

Powerful features of the generator paralleling switchgear include:

- ASCO's next-generation digital control platform, which expands the boundaries of operation, control and communication.
- Compatibility with multiple brands of engine-generators.
- Compatibility with multiple brands of circuit breakers.
- Generator load demand control.
- Bus optimization.
- Load management.
- Sophisticated communications capabilities.
- Redundant processors as standard equipment for ensuring continuous, reliable operation.
- Automated manual paralleling of engines with a graphical synchroscope.
- Remote diagnostics for convenience.
- Remote system monitoring and control.
- kW load sharing.
- Var/PF sharing.
- Real time information for timely, accurate decision making.
- Data trending.
- Compact flash card and slot for quick and easy screen capture.
- Constructed and labeled to the strict UL 1558 standard.
- Smaller footprint that responds to increasingly tight space constraints.
- Nationwide, 24x7x365 support from ASCO Services—the largest power transfer and generator paralleling control switchgear service company coast to coast.



# A 24x7x365 Commander

The 4000 SERIES stands guard 24x7x365, ensuring immediate and reliable response to a loss of normal source power.

## When Normal Power Fails...

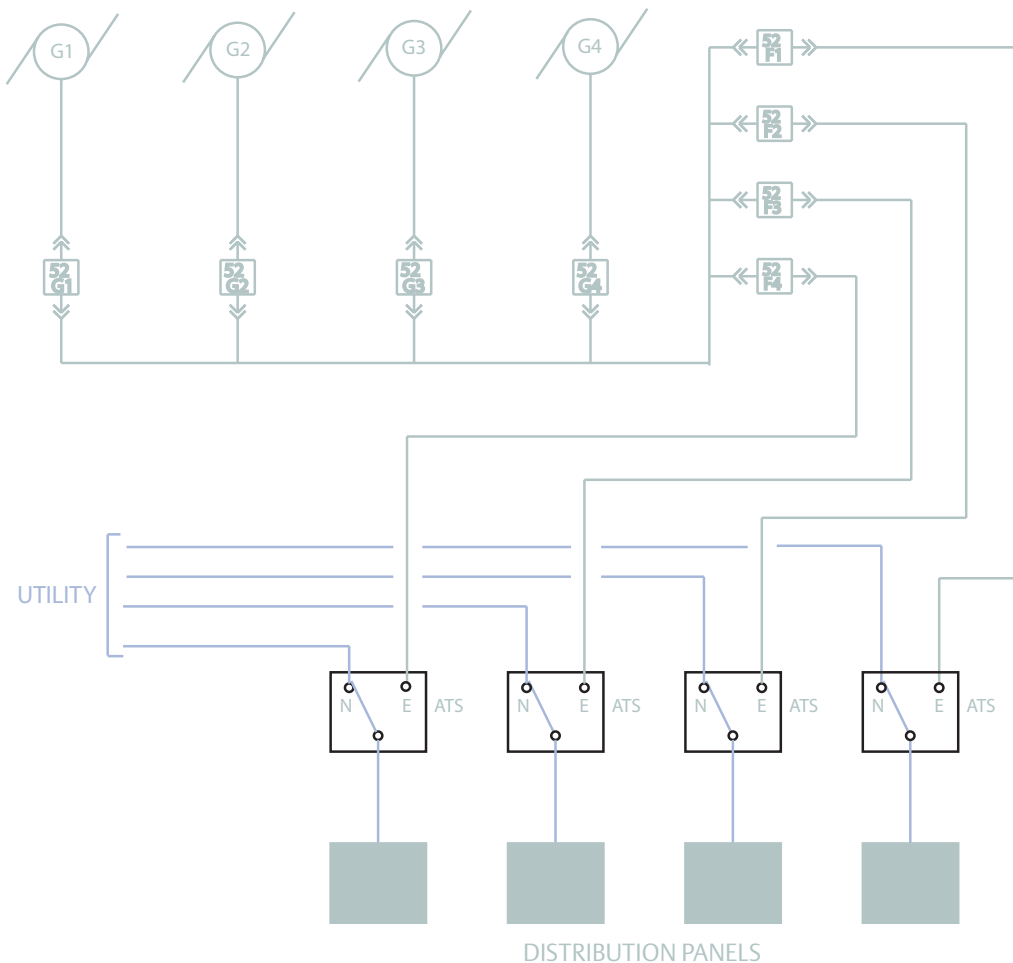
With engine starting controls set on automatic, the generator paralleling switchgear stands by, awaiting a signal from automatic transfer switches to automatically start and synchronize two or more engine-generators when power fails.

Receiving the signal, the switchgear initiates multiple engine-generator start up. The first generator to achieve 90 percent of rated voltage and frequency connects to the emergency bus. Interlocks permit only one generator to connect in the event of simultaneous generator availability.

When the first generator connects to the bus, a signal initiates connection of the priority one loads to the emergency bus.

The remaining engine-generators activate their synchronizers in each Digital Generator Paralleling Controller in the switchgear by automatically synchronizing the on-coming generator(s) with the bus.

When synchronized, the switchgear parallels the on-coming generator(s) to the bus. Once each generator is added to the bus, the switchgear signals automatic transfer switches to connect the associated priority loads to the emergency bus.



This elevation (opposite page) and one-line schematic show a typical, four engine-generator paralleling control switchgear configuration. Available distribution modules and remote controller can be integrated into the switchgear.

### If a Generator Fails...

If a generator fails while operating in the automatic mode, the 4000 SERIES disconnects it from the bus and shuts it down. The switchgear signals the associated priority loads to shed.

The switchgear activates audible and visual alarms to indicate the condition. A control push-button permits operators to override the load shed circuits.

If a bus overloads, causing an under-frequency condition, the switchgear automatically resets the manual override to prevent sustained bus overloading.

### Managing Load Demand...

When the switchgear is set on load demand operation, it automatically manages the number of generators online, based on total power requirements.

The switchgear compares the actual load of the total generator bus to the running reserve capacity of total generators.

Depending on pre-determined kW set-points and time delays, the switchgear starts, synchronizes and soft loads generators on line. It also takes low priority engine-generator(s) off-line. It will soft unload the engine, open the circuit breaker and initiate the cool down sequence.

If a bus under frequency or kW overload occurs while engine(s) are cooling down, the running units actively synchronize and parallel to the bus.

If engines are not running, the control system immediately gives the rested engine(s) start signals and parallels them to the bus.

If a bus under frequency or kW overload occurs while generators are on line, the associated loads are shed, the condition is alarmed and a manual reset is required.

### Restoring To Normal Source...

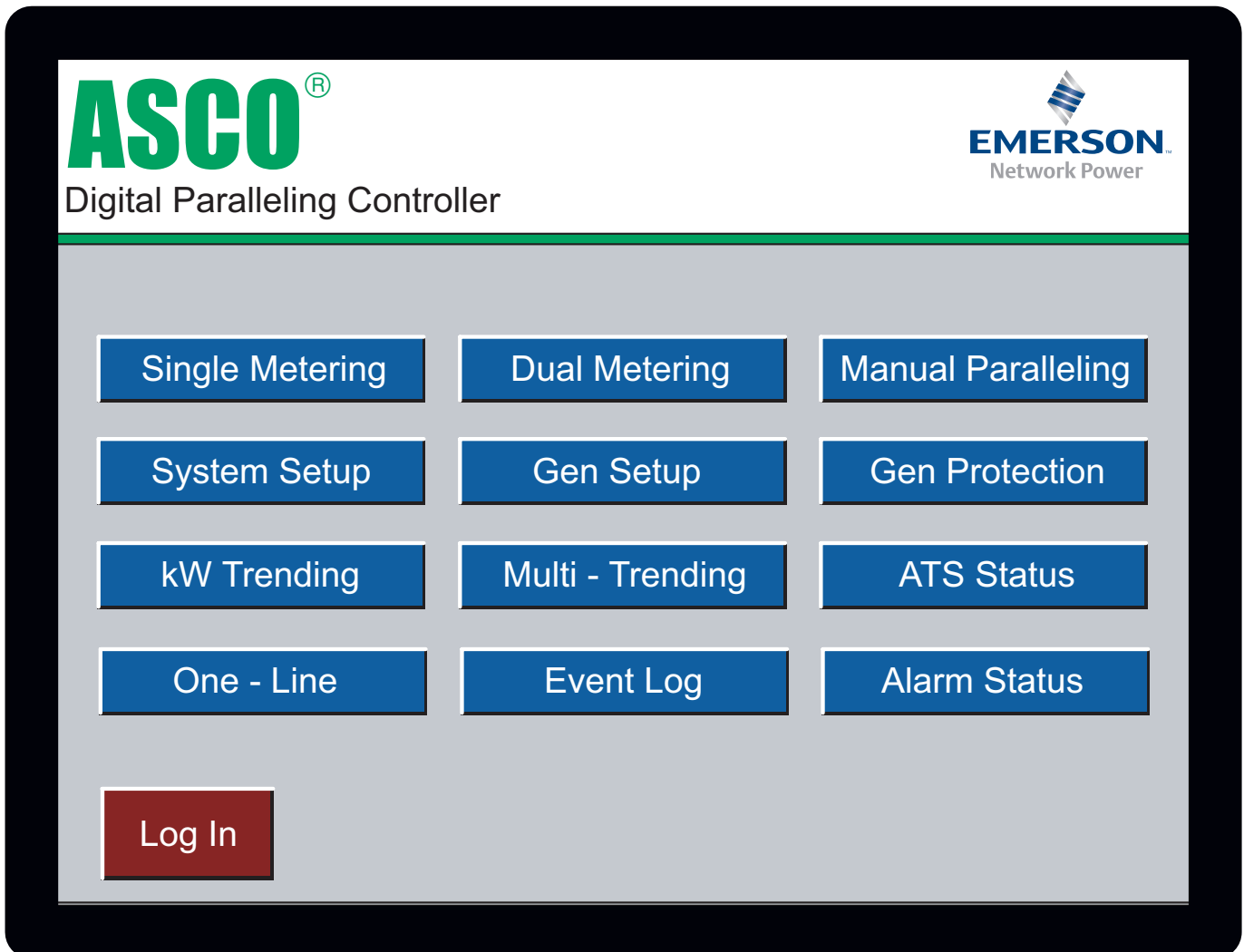
When the automatic transfer switches signal that commercial power has been restored and the transfer switches have retransferred loads to the normal source, the switchgear simultaneously opens the generator circuit breakers.

The engines then run for a no-load, user-defined cool-down period. The control system stands poised for the next power failure or regular system test.

# Powerful Control

Quickly Access Easy-to-Understand Displays

All screen displays can be reached directly from the Main Menu. Information is presented clearly using easy-to-understand graphics, including both digital and analog-style displays for at-a-glance supervision.



**Main Menu. Easily navigate through all screen displays from the Main Menu. Log in here to gain access to various levels of information.**

# Simplify Power System Management

## Advanced Digital Control Provides Reliability, Flexibility

The 4000 SERIES Generator Paralleling Switchgear debuts ASCO's next-generation digital paralleling controller. The unit offers the reliability of an industrial programmable logic controller.

The next-generation technology combines a controller, touch screen operator interface, networking and I/O with programmable software for graphics and logic.

The unit provides true, integrated control of each engine-generator and simplifies power system operation, control and communication.

The controller automatically **operates** the system to efficiently add loads to the bus. It also ensures that engine-generators assume the highest priority loads first and manages the number of engine-generators needed to power those loads.

**Operation** is immediate and reliable, giving you peace of mind. Operational parameters can be set up through the touch screen, without a laptop computer.

The system controller provides power monitoring, relay protection, generator paralleling and intelligent load management functions for the emergency prime power and/or standby power system applications.

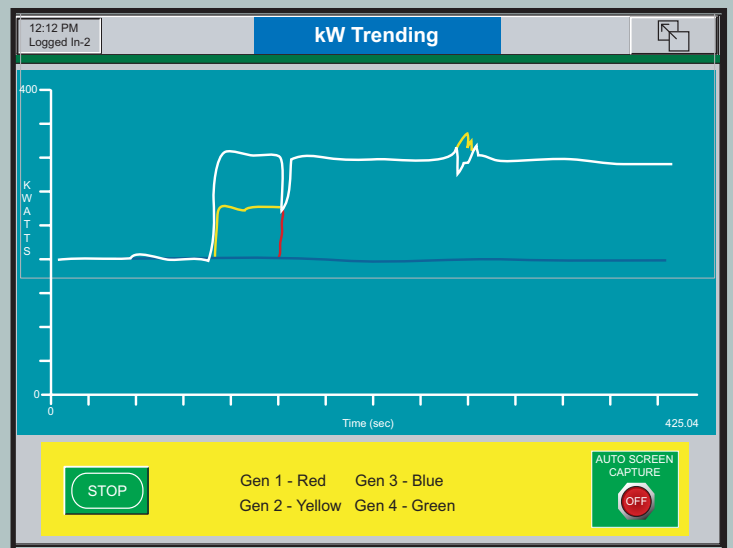
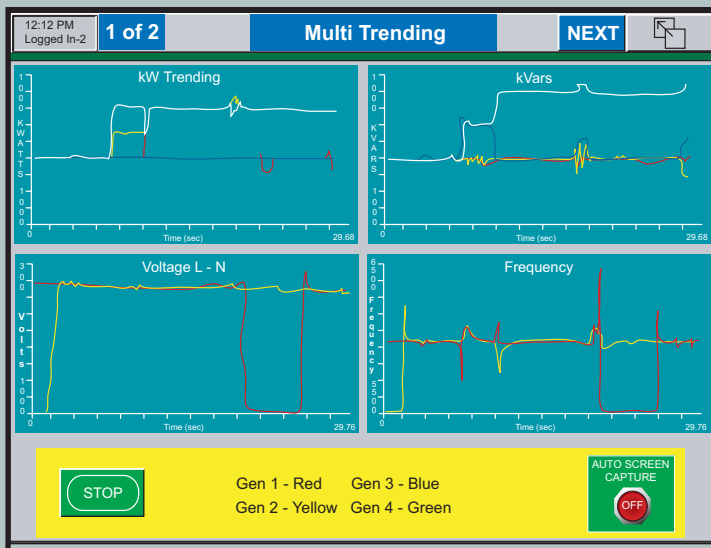
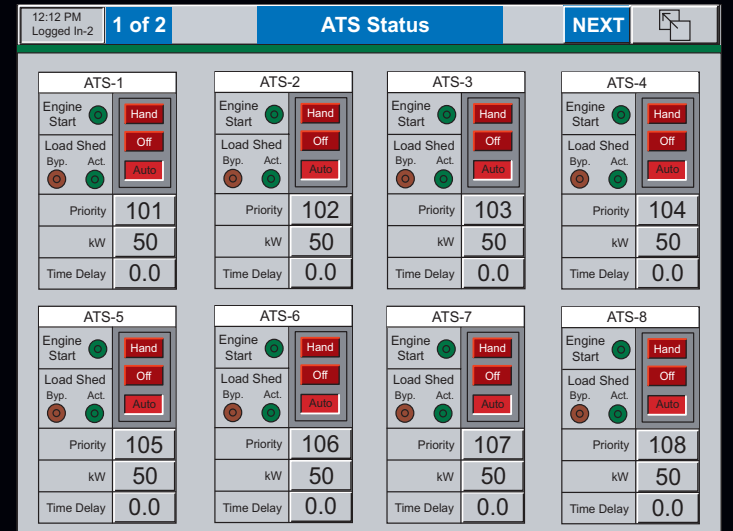
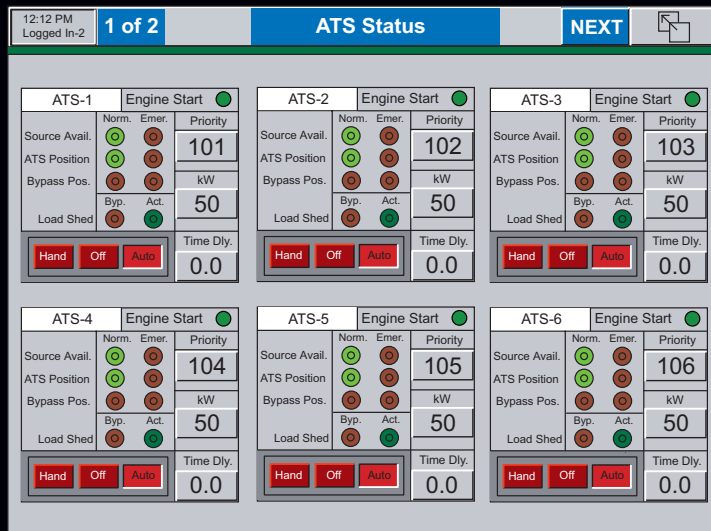
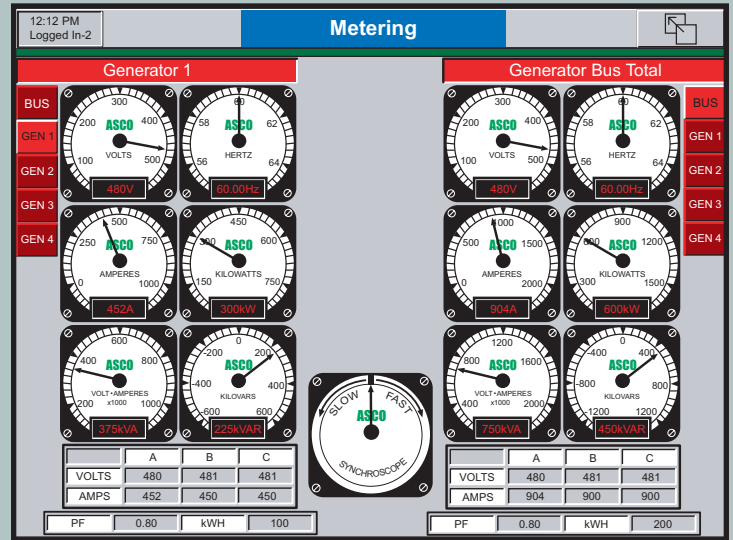
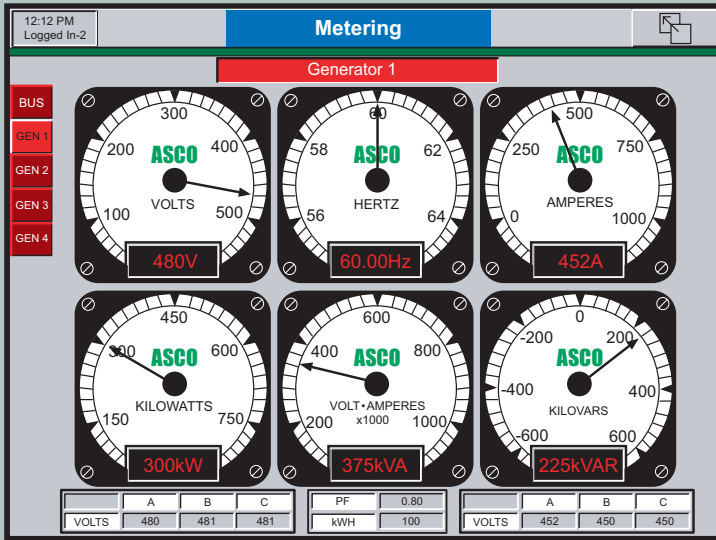
The capabilities of the digital paralleling controller enable you to tailor the breadth and ease of control you want in your onsite power system.

The controller **communicates** through an Ethernet connection with a range of building networks using most major media and protocols. Seamlessly integrating with your existing communications infrastructure eliminates the expense of extra hardware and software, and facilitates start up.

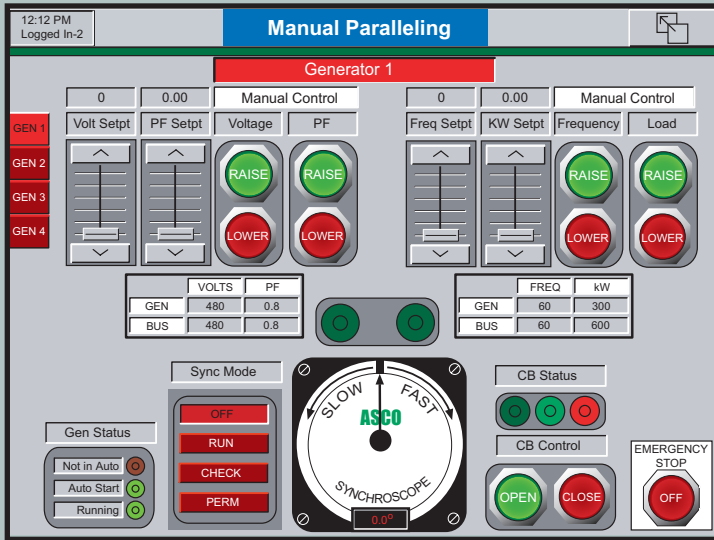
---

## System Highlights

- Dual three phase 600 Vac inputs and dual three phase 0-5 amp inputs, with true RMS sensing and phase angle relationships
- Peer-to-peer networking between units (CAN, Ethernet)
- Manual paralleling using graphical push buttons and synchroscope via master touch screen
- Manual paralleling (optional) using physical provisions mounted on a master door
- Graphical trending of the generators
- Power metering of the three phase sources
- Three phase protection on the generator
- Dual remote diagnostics with reciprocal back up—one uses an industrial-grade analog modem, the other an Ethernet IP connection
- Optional hot-backup processor capability
- Compact flash slot and card for capturing screen displays and data for remote analysis
- Flexible third-party communication connectivity
- A wide selection of system optional accessories
- Choice of two current breaker brands (Square - D or Siemens)







**LEFT**

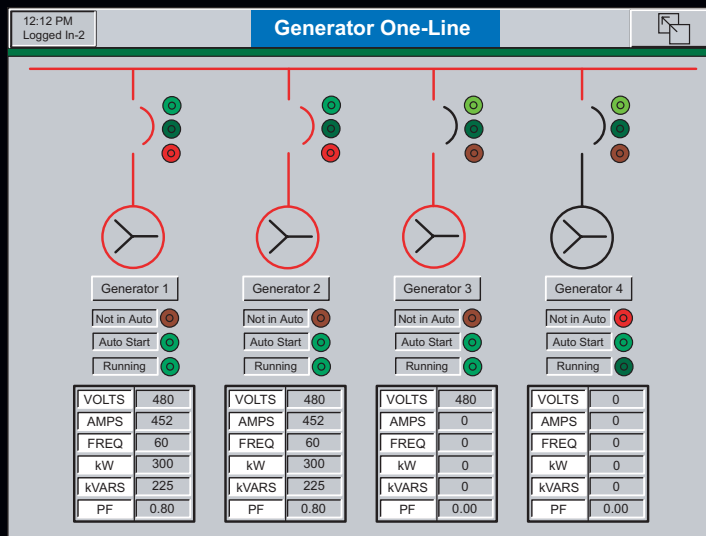
**Single Metering.** View metering for a single source. Meter sizes are comparable with standard switch-board meters.

**CENTER**

**Dual Metering.** Simultaneously view metering for any two generators. When viewing bus metering on the right side, a synchroscope will show if the source on the left side is in phase with the bus.

**RIGHT**

**Manual Paralleling.** Manually adjust the voltage and frequency of the on-coming generator and manually initiate the closing of the paralleling breaker.



**LEFT**

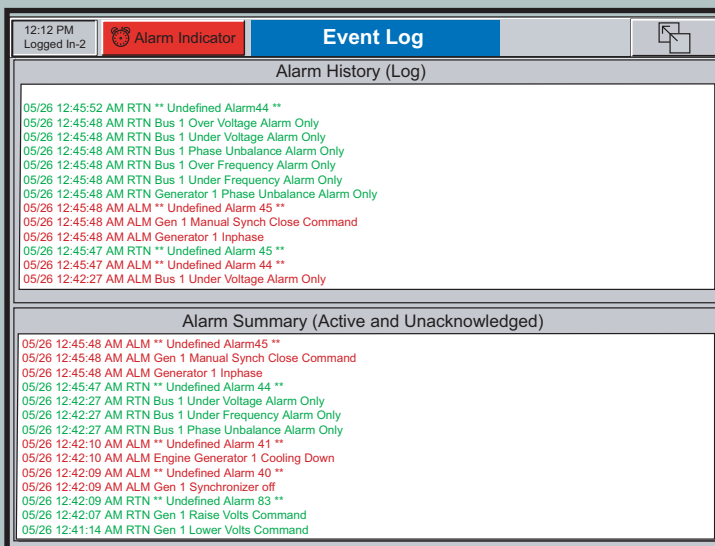
**ATS Status.** If the ATSs are provided with communications capability, this advanced ATS Status screen provides additional information, such as source availability and ATS position.

**CENTER**

**ATS Status.** View the status of up to eight ATSs per screen, as well as enter the priority, kW and time delay for each ATS. Each ATS can also be placed in Hand, Off, or Automatic mode.

**RIGHT**

**One Line.** See up to four generators on a single screen with power flow indication, metering, and status information.



**LEFT**

**Multi-Trending.** Trend up to four parameters per screen at the same time with the option to automatically perform a screen capture to a compact flash card every five minutes.

**CENTER**

**Single Trend.** If you only need to trend one parameter, the single trending screen provides a large area with the option to automatically perform a screen capture to a compact flash card every five minutes.

**RIGHT**

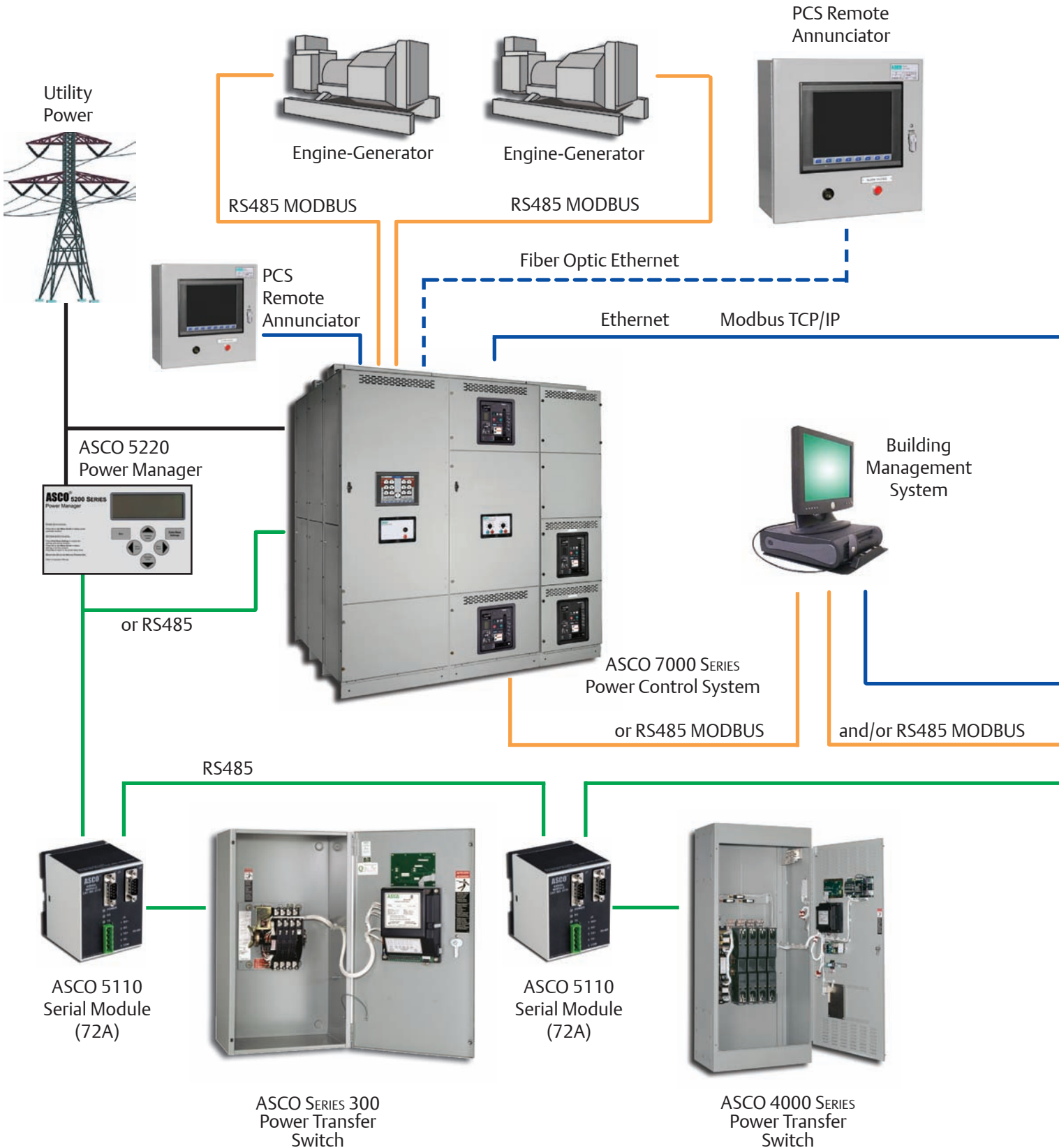
**Event Log.** See a history of all alarms as well as a summary of the currently active unacknowledged alarms.

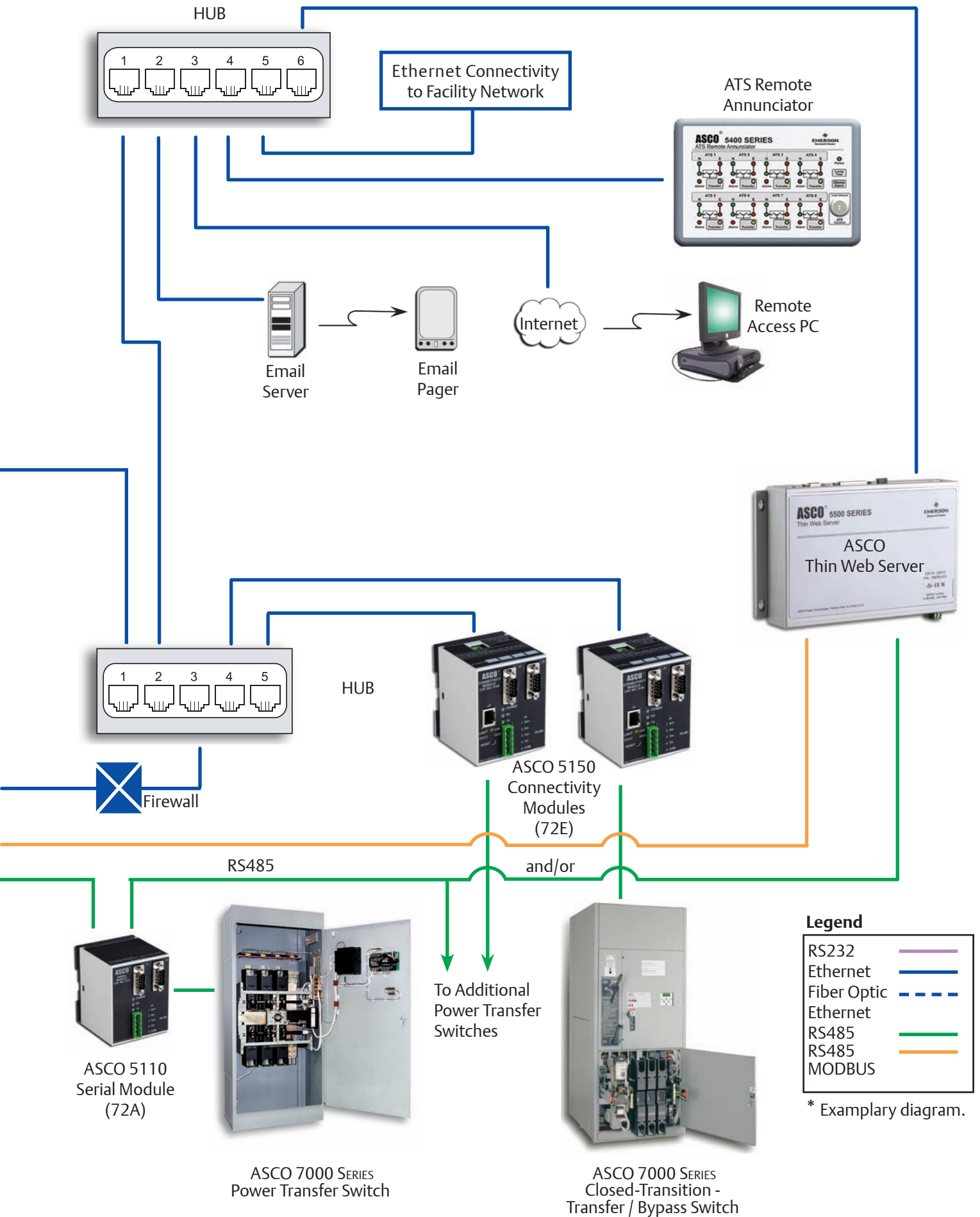
# Network Your Emergency Power System \*

ASCO communications products make it easy to monitor your prime power, emergency and/or standby power distribution systems onsite or remotely.

Local area networks and remote networks are supported with either single or multiple points of access.

Web-enabled communications allow access to your power system from anywhere in the world.





# 4000 SERIES Building Blocks



Control modules offer broad flexibility to create a power control system tailored to your specific requirements.

**Master Control** module supervises up to eight engine-generators.

Options include a redundant processor for added reliability and capacity to manage up to 64 automatic transfer switches.

The main bus is available in amperages of 3000, 6000 and 10,000 at 100KAIC.

A 12 in. touch screen for controlling the power system is standard.

**Single Generator With Master Control** module provides the same capabilities as the Master Control module and includes controls and a breaker for a single generator.

It is a space-saving, compact solution for power systems with an odd number of generators.

It accommodates your circuit breaker of choice and includes 100KAIC, LSIA function with an electronic trip unit.

This module also is available as a **Single Generator**, without Master Control. The Single Generator module is used in three engine-generator systems that require a redundant master controller.

**Dual Generator** module provides controls and circuit breakers for two engine-generators.

It is a space-saving, cost-effective solution for power systems with up to eight generators.

The main bus is available in amperages of 3000, 6000 and 10,000 at 100KAIC.

It accommodates your circuit breaker of choice and includes 100KAIC, LSIA function with an electronic trip unit.

A 12 in. touch screen is optional.

# Typical Engine-Generator Configurations

The 4000 SERIES standard engineering design demonstrates how easily you can customize a system to your specific requirements.

A Master Control module and Dual Generator module comprise digital generator paralleling control switchgear for a two engine-generator emergency, standby, and prime power system.



Two modules—a Single Generator with Master Control and a Dual Generator with redundant control—comprise switchgear for a three engine power system.

Three engine systems requiring redundant master control would need three modules—Master Control, Single Generator and Dual Generator.



**BELOW**  
A Master Control module and four Dual Generator modules comprise switchgear for an eight engine-generator power system.



# 4000 SERIES System

AS YOU LEARN ABOUT THE 4000 SERIES, IT'S NATURAL TO ASK IF IT CAN SATISFY THE SPECIFIC REQUIREMENTS YOU HAVE FOR A POWER CONTROL SYSTEM.

If the system is for a healthcare facility, for example, can the touch screen quickly access JCAHO<sup>1</sup> records and information to help satisfy reporting requirements?

Does it have automatic load shed control? How about a system one-line schematic overview?

The answers are, 'Yes.' What are your specific requirements?

## Standard Features

- Load demand with operator adjustment of settings
- Ethernet or RS485 connectivity to Building Management System
- Test with load
- Test without load
- Automated manual paralleling with graphical synchroscope
- Alarms
- LCD touch screen
- Automatic synchronizing and paralleling controls

## Optional Accessories

- One touch screen per Generator module
- Remote annunciation
- Redundant master PLC
- Load control for up to 64 ATS's

1. Joint Commission on Accreditation of Healthcare Organizations

- Electrical operation load bank breakers(EO)
- Breaker lifting devices (portable or overhead)
- Spare parts
- Extended warranty
- ATS Status
- Dual Metering
- kW Trending
- Multi-Trending
- Manual Paralleling
- Log In
- Event Log

## Controls

- Touch screen is standard with the Master module; optional with Generator modules
- Automatic synchronizing and paralleling controls
- Controls hardware
  - Master PLC redundancy
  - Distributed processing
  - High speed CANbus

## Touch Screen

- 12 in. color TFT on Master module
- Display on each pair of generators is optional
- System overview screen with one line schematic
- Real time clock
- JCAHO records are available if the generator(s) is/are properly equipped
- Screens:
  - Main Menu
  - Generator One-Line Metering
  - System Status
  - Alarm Status

## System Control

- Automatic standby
- Load management control
- Automatic load shed control
- Controller on each generator, optional
- Redundant master controllers, optional
- Automatic generator load demand control
- Emergency stop

## Engine-Generator Control

- Engine-generator of your choice
- Automatic engine start
- Adjustable engine cool-down timer
- Automatic synchronizer
- Engine governor control, load sharing, soft loading/unloading
- Voltage regulator con-

# Specifications\*

---

- trol VAR/PF sharing
- Automated manual paralleling

## Metering

- Voltage A-B, B-C, C-A (or AN, BN, CN)
- Current A,B,C
- Frequency
- Power factor
- kW
- kVAR

## Generator

### Protective Relaying

- Device 27/59 under/over voltage
- Device 81 O/U over/under frequency
- Device 15 Automatic synchronizer
- Device 32 Reverse power
- Device 40 Loss of excitation
- Device 25 Synch check

### Engine Alarms (if properly equipped)

- Low coolant temperature pre-alarm
- High coolant temperature pre-alarm and shutdown
- Low oil pressure pre-alarm and shutdown
- Low fuel alarm
- Low engine battery alarm

- Overcrank shutdown
- Overspeed shutdown

## Circuit Breakers

- Breaker brand of your choice
- Drawout
- UL 1066 with two-step energy storage
- 100KAIC Rated
- 5 Cycle closing
- Electrically operated on generators and manually operated on distribution
- Auxilliary and bell alarm contacts
- Trip unit with LSIA functions on generators and LSIG or LSI function on distribution

## Power Supply

- Best DC source selector system
- Power from 24 VDC engine cranking batteries
- DC-DC converter

## Enclosure and Bus

- Constructed and labeled to UL1558 is standard
- Up to 600V 3 phase 4 wire AC system with 100% neutral and (25%) ground bus
- Main bus amperage up to 10,000 amps

- Silver plated copper bus
- Braced for 100KAIC
- NEMA 1 (3R available)
- ANSI Gray
- Shipping splits at each section to ease installation

## Serial Based Communications

- Engine network communications
- Automatic Transfer Switches
  - Standard for 32 ATSS, optional for 64 ATSS
  - Hard-wired start signals
  - Hard-wired load shed relays
- Building Management Network
  - Modbus RTU serial RS 485
  - Modbus TCP Ethernet
- High reliability, industrially hardened redundant capability on single path
- High speed automation network

\* For detailed specifications please request publication 3135

# ASCO Power Technologies®

ASCO Power Technologies  
50 Hanover Road Florham Park  
NEW JERSEY 07932  
USA

800 800 ASCO  
WWW.ASCOPOWER.COM

ASIA

AUSTRALIA

BRAZIL

CANADA

GERMANY

JAPAN

MEXICO

SOUTH AFRICA

SOUTH AMERICA

UNITED ARAB EMIRATES

UNITED KINGDOM

UNITED STATES

## Emerson Network Power.

The world leader in business-critical continuity.

■ AC Power Systems

■ Embedded Power

■ Power Switching & Controls

■ Site Monitoring

■ Connectivity

■ Integrated Cabinet Solutions

■ Precision Cooling

■ Surge & Signal Protection

■ DC Power Systems

■ Outside Plant

■ Services

**EmersonNetworkPower.com**