

ASCO Power Technologies™

ASCO 4000 SERIES Generator Paralleling Switchgear



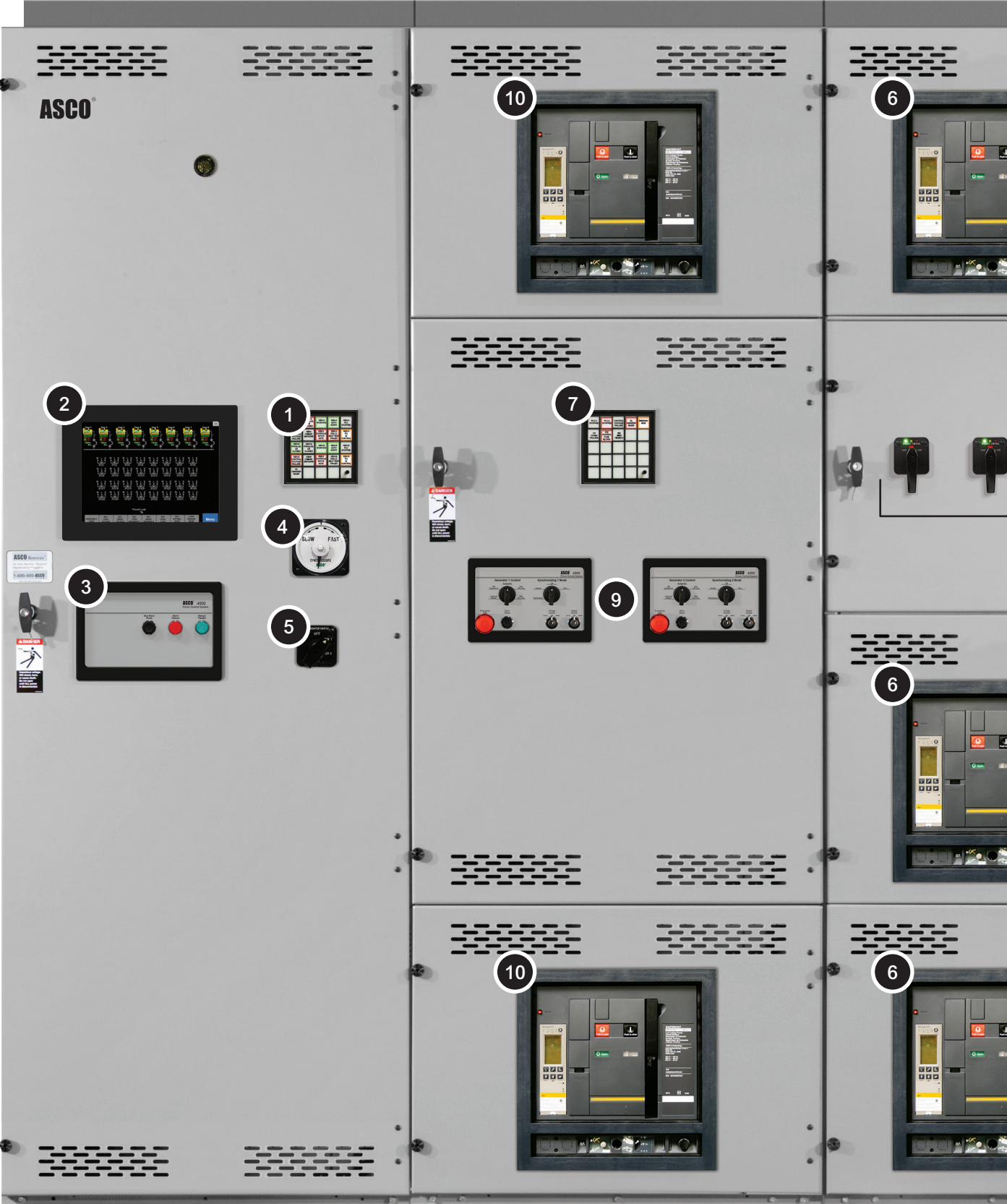
ascopower.com

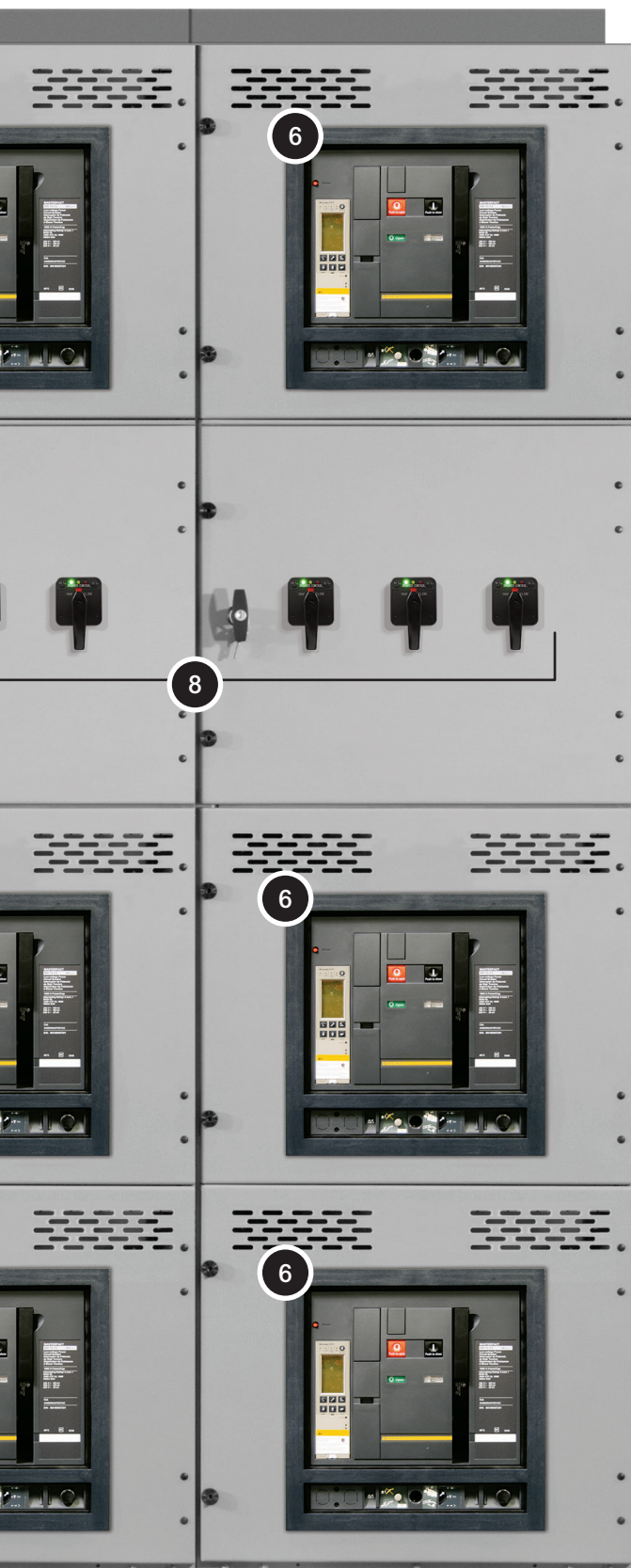
Life Is On

Schneider
Electric

Courtesy of Steven Engineering, Inc - (800) 258-9200 - sales@steveneng.com - www.stevenengineering.com

HARDWIRE BACKUP CONTROLS





- 1 System Status Panel
- 2 Operator Interface Terminal (SCADA)
- 3 System Control Station
- 4 Synchroscope (Manual Paralleling)
- 5 Mode Selector Switch
- 6 Distribution Circuit Breaker
- 7 Generator Status Panel
- 8 Manual Circuit Breaker Controls & Status
- 9 Generator Control Station
- 10 Paralleling Circuit Breaker



REFINED POWER MANAGEMENT

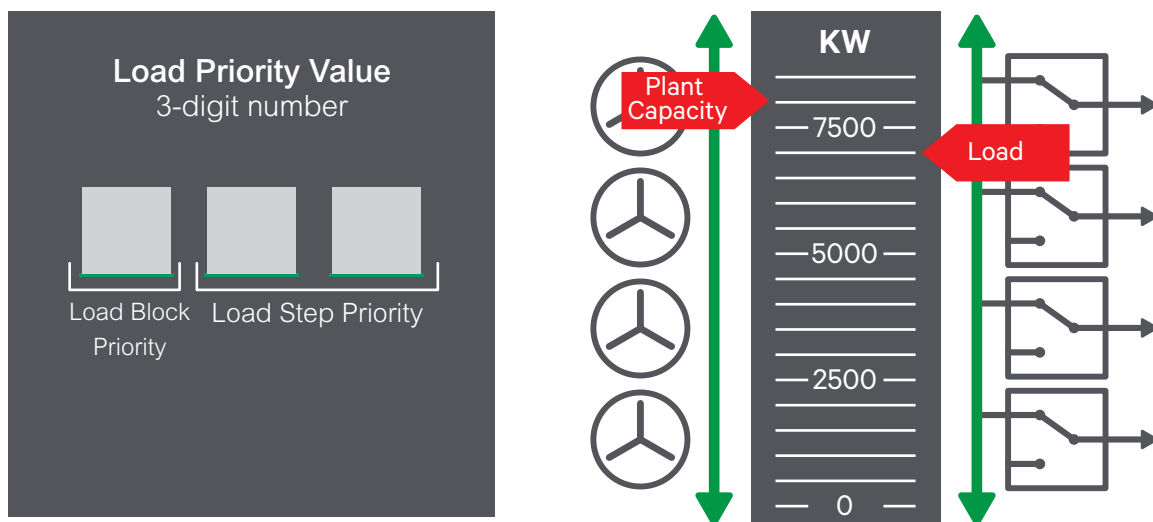
Power is managed by referencing the main bus. ASCO Power management applications, including generator load demand and load bus optimization, maximize load distribution and control generator efficiency based on actual power measurements. 4000 SERIES Generator Paralleling Switchgear power management provides the most powerful, reliable and advanced digital control by separating the control of generators from load distribution control, and independently managing each.

Generator load demand maximizes the efficiency of generator usage. After a stabilizing time delay, a generator may be started and connected to the main bus for high demand, or unloaded and shut down for low demand. It conserves fuel and reduces maintenance requirements by operating fewer generators at a more efficient level.

Bus load optimization determines the capacity for adding loads to the bus. It evaluates system utilization, based on available capacity and distribution load ratings.

Effective power management derives from the assignment of unique and structured priorities to distribution loads, which are controlled by the 4000 SERIES Generator Paralleling Switchgear via transfer switches and/or electrically operated distribution circuit breakers. For example, transfer switches which provide power to life safety loads receive a load block priority of 1 and an individual step priority within that block. If there are 5 such transfer switches, they could be assigned the load priority values of 101, 102, 103, 104 and 105.

The next group of loads may be assigned a block priority of 2; if there are 3 such transfer switches, for example, they could be assigned the load priority values of 201, 202 and 203. Because the 4000 SERIES Generator Paralleling Switchgear can control up to 32 individually prioritized transfer switches, individually controls each transfer switch per its unique priority, and allows operators to change priorities run-time, the ASCO 4000 SERIES Generator Paralleling Switchgear provides unsurpassed distribution control.



ENHANCED VISUALIZATION

By providing generator one-line and transfer switch overview screens, dynamically updated and color-coded status for readability, screens for switchgear status & control, alarm screens and operator-defined trend plots, the 4000 SERIES Generator Paralleling Switchgear color touch screens deliver a powerful, user-friendly interface that can be conveniently located throughout the facility.

FEATURES AND BENEFITS

- One-line screen for familiar representation of site installation
- Optional remote color touch screen
- Ethernet communications with Modbus® mapping for external system connectivity (CPMS, DCIM, BMS, etc)
- Engine-generator status/control screen
- Generator trending with auto-scale plots
- Historical Alarm
- ASCO transfer switch controller and metering connectivity including remote test capability
- System metering and individual generator metering screens
- Security features including multiple security levels and individual operator accounts

Historical Alarms			
DATE	TIME	DESCRIPTION	VALUE
10/17/2012	8:14:19	Generator 1 paralleling breaker is closed	Generat
10/17/2012	8:14:19	Generator 1 is running	Generat
10/17/2012	8:14:19	Generator 2 paralleling breaker is closed	Generat
10/17/2012	8:14:19	Generator 2 is running	Generat
10/17/2012	8:14:19	Generator 3 paralleling breaker is closed	Generat
10/17/2012	8:14:19	Generator 3 is running	Generat
10/17/2012	8:14:18	Gen 6 PLC Communication Failure	FALSE
10/17/2012	8:14:18	Gen 5 PLC Communication Failure	FALSE
10/17/2012	8:14:18	Gen 4 PLC Communication Failure	FALSE
10/17/2012	8:14:18	Emergency Mode	TRUE
10/17/2012	8:06:25	Master PLC Communication Failure	FALSE
10/17/2012	8:06:25	Gen 6 PLC Communication Failure	TRUE
10/17/2012	8:06:25	Gen 5 PLC Communication Failure	TRUE
10/17/2012	8:06:25	Gen 4 PLC Communication Failure	TRUE
10/17/2012	8:06:25	Gen 1 PLC Communication Failure	TRUE
10/17/2012	8:06:24	MASTER PLC DIAGNOSTIC FAULT	TRUE
10/17/2012	8:01:19	Generator 3 paralleling breaker is closed	Generat
10/17/2012	8:01:19	Generator 2 is running	Generat

Transfer Switch Controller Status

Transfer Switch Connected to Normal
Normal Source Accepted

Transfer Switch Connected to Emergency
Emergency Source Accepted

Transfer Test
Retransfer
Time Delay Bypass

Power Manager

AMPS	VOLTS
A 0	0 Van
B 0	0 Vbn
C 0	0 Vcn
	0 Vab
	0 Vbc
	0 Vca

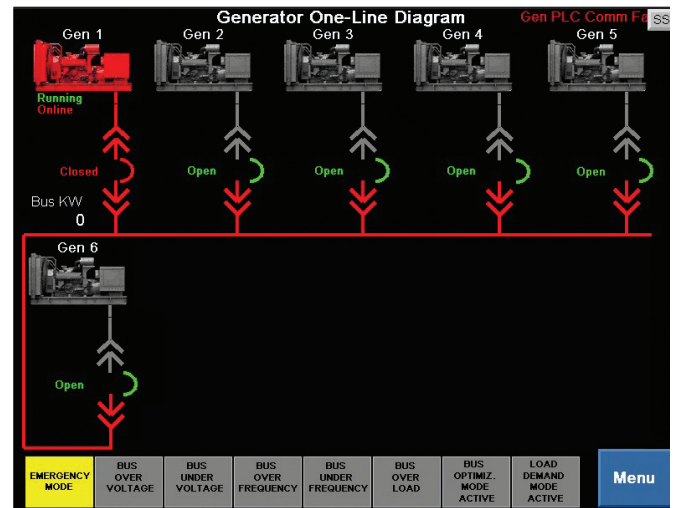
POWER	
0 KW	0.00 PF
0 KVAR	0.00 Hz
0 KVA	

Max KW Demand: 0 KW

Load on N, N ok

Selected ATS: 1
ATS Selection
Select ATS

Switch Type: Open Transition
Bypass Switch: No



Bus Optimization

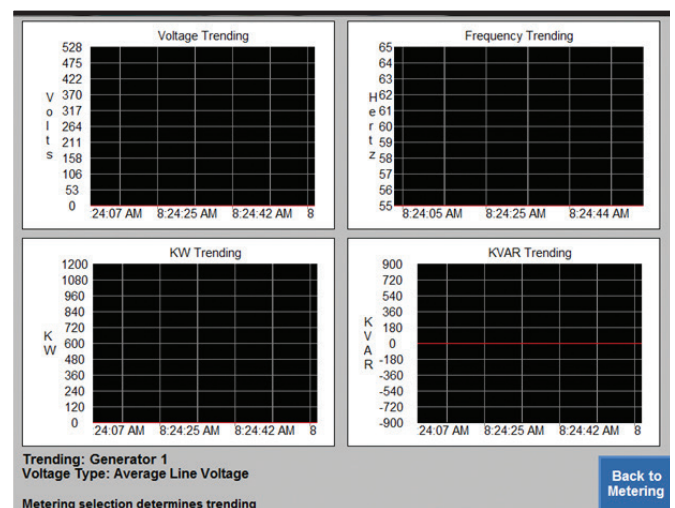
Time Delays (sec)
Entry Actual Elapsed
Step Add 5.0 5.0 0.0
Activation 30.0 30.0 30.0

of Loads calling for Emergency Power: 32
of Loads added to Emergency Power: 32
Next Load to be added: Valid only when bus op. is active.

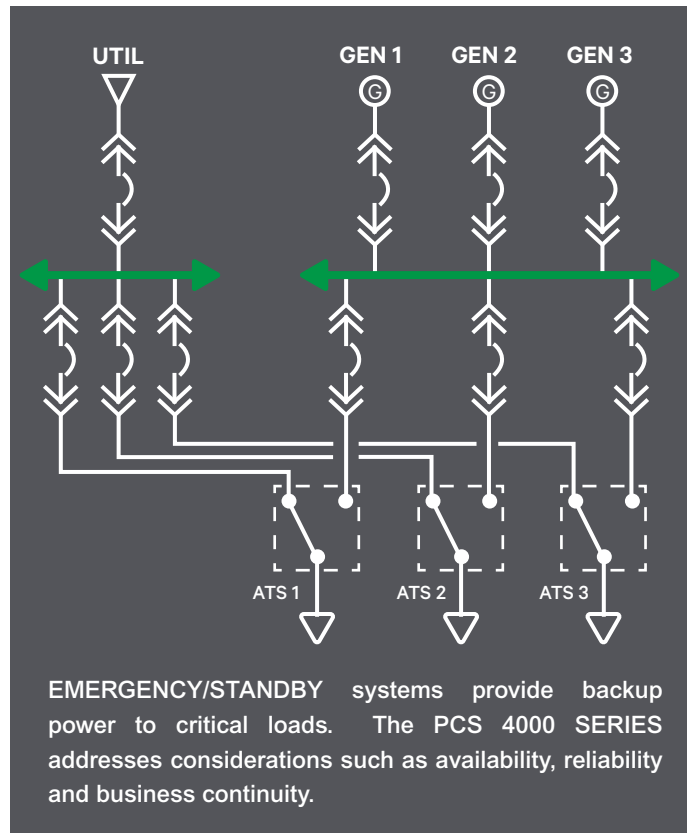
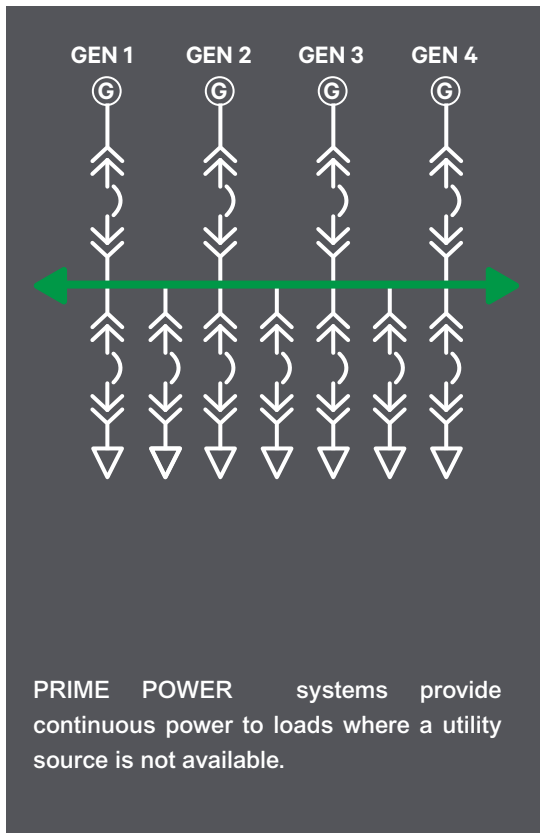
Load # 0 Gen Capacity 3000
Priority 0 Bus KW 1015
Est. KW 0 Headroom 1835
Derrated Gen Capacity 2850
KW Derate (% Rated Load) 95

BUS OPTIMIZ. MODE ACTIVE
BUS LOADED TO CAPACITY
NEXT LOAD EXCEEDS HEADROOM
BUS OVERLOAD
BUS UNDER FREQUENCY
ALL LOADS REQ. EMER. POWER ADDED
BUS UNSTABLE DUE TO OVERLOAD

Entry to Actual Menu

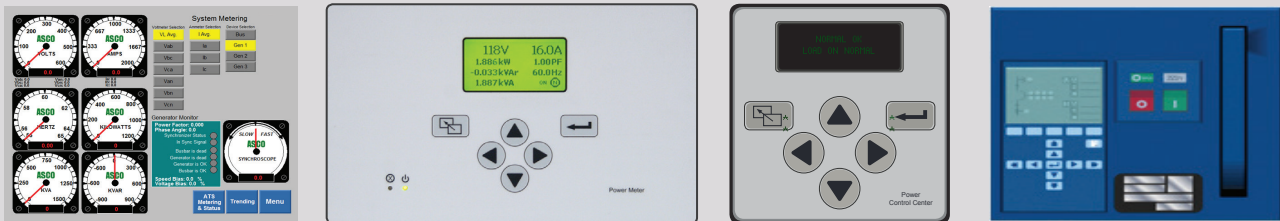


APPLICATION FLEXIBILITY



COMPLETE INTEGRATION

Integration of essential switching and control elements brings complete monitoring and control via operator interfaces:

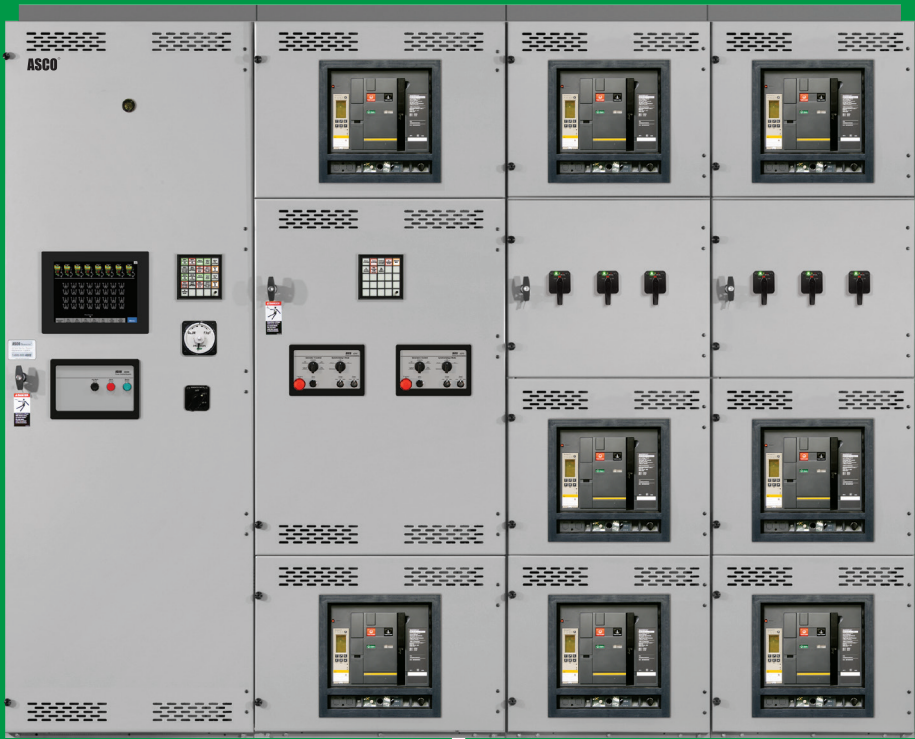


- Digital Synchronizer/Load Share Controllers
- ASCO 4000/7000 SERIES ATS Controllers
- ASCO Digital Power Meters
- Programmable Automation Controllers
- Circuit Breaker Status and Control

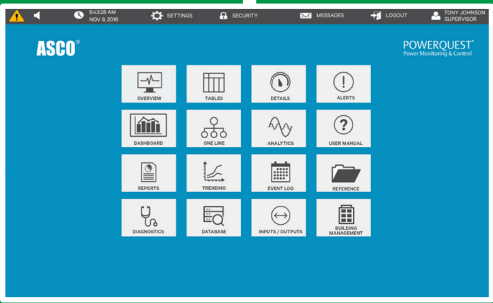
Connectivity defines the usefulness of paralleling switchgear. The flexibility of PCS 4000 switchgear takes it to a higher level. We bring the data to you with Ethernet communications and Modbus® mapping, providing connectivity to optional remote color touch screens, ASCO CPMS, SCADA systems, BMS and DCIM systems.

As a result of complete integration, operators can be notified via alarms on the local switchgear or at a conveniently located remote color touch screen. Detailed diagnostic data, such as alarm and event logs as well as system status values from digital controls, becomes accessible to technicians plugged in anywhere on the switchgear communication network. Individual accounts with assigned security levels define the level of monitoring and control available at the local or remote touch screen.

ACCESSIBLE CONNECTIVITY



Remote Color Touch Screen



Critical Power Management System (CPMS)



Building Management System (BMS)
Data Center Infrastructure Management (DCIM)

INTELLIGENT SIMULATION

The 4000 SERIES Switchgear Simulator option provides an important platform for customers to train new operators, provide continuing education to existing operators, test changes to sequences of operation, and evaluate the performance of operators and the system during a simulated crisis. Customers who maintain active training and continuous improvement policies experience measurable benefit.

The 4000 SERIES Switchgear Simulator is the practical platform to TRAIN operators, TEST sequences, and MEASURE performance.

During critical power losses, the facility control room becomes the emergency room. The value of quick decisions based on training and knowledge versus guesswork determines the duration of down-time. The necessity of simulation training becomes immediately apparent when the impact of a crisis could have been minimized if not for operator error.

When customers needed a safe and effective way to measure the performance of their 4000 Switchgear system as well as facility operators during shortened periods of numerous alarms and simulated equipment failures, ASCO provided the PCS Simulator. Its effective use can reveal the performance of sequences and operators without risk to equipment or of down-time while extending an operator's experience in both typical and unusual emergencies.

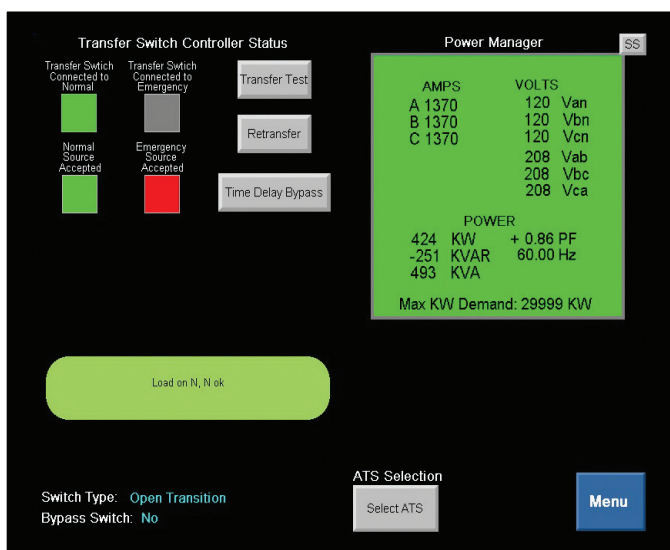
Frequently, operators need to develop experience with more scenarios in a shorter period of time than on-the-job experience, not only for typical scenarios but unusual ones as well. Additionally, they need the ability to review and correct their mistakes; typically there are no second chances with a live system.

The simulator option also benefits managers who need to develop reports that show measurable performance and improvements with respect to facility operators and system operation.

Engineers who need to evaluate existing sequences of operation as well as be able to test modifications can benefit as well. Additionally, engineers are provided a way to correct oversights and test corrections without impact to the live system.

Additional beneficiaries include owners who seek to reduce their training investment and minimize down time by developing highly effective operators, sequences, and business processes (work flow).

All of this, and more, can be accomplished locally, with minimal investment, and without putting the live system at risk. The solution? The 4000 SERIES Generator Paralleling Switchgear Simulator!



Whereas competitive simulators may utilize computer modeling, the 4000 Switchgear Simulator includes the same color touch screen as the PCS switchgear as well as a PLC to execute the actual sequence of operation from the PCS switchgear.

Included is a console, an operator interface touch screen with all master control screens from the live system, a simulator PC with screens for configuring the simulator, and a PLC with the master controls program (system I/O not included).

PCS SIMULATOR CONSOLE

DISPLAY AND CONTROLS

ONE-LINE	MASTER CONTROL STATIONS	ONE-LINE
SYNCHROSCOPE	SHOW METERING? ON	

UTILITY STATE	GEN STATUS	UNDER-FREQUENCY
UTILITY 1 ON	GENERATOR 1 ON	GPS1 OFF
UTILITY 2 ON	GENERATOR 2 ON	GPS2 OFF
	GENERATOR 3 OFF	
	GENERATOR 4 ON	

SYSTEM COMMUNICATION DIAGNOSTICS

Start
Delay: 80ms
Reset

Communication Status: Running

Average Delay: 70 ms
 Minimum Delay: 0 ms
 Maximum Delay: 350 ms

Current PLC Sweet Time: 3 ms
 Constant Sweep Mode: No
 Program Name: M9G03
 SNP ID: 0
 PLC RTC: 34310129010007
 State: Run I/O Enabled
 PLC Fault: None
 I/O Fault: None

CLOSE CONSOLE

Simulated devices and controls:

- Automatic transfer switches, including simulation of source-seeking and PLC-initiated transfers
- Power circuit breakers, including simulation of electrical charging, manual operation, control switches, lockout relay, failure to close and failure to open
- Basic generator controls, including local control switch, synchronizer mode, random start and synchronization delays, common shutdown and pre-alarm initiation

Simulator Breaker Control-SWG

Breaker Protective Device

Circuit Breaker Behind Door

Simulate Circuit Breaker Failures

Open Failure Disabled Close Failure Disabled

DANGER These controls are behind the door and require extreme safety when operating on an energized system. These controls also bypass ALL interlocks.

Rack CB Out

Circuit Breaker - ANSI Device 52

NFB1UM

Circuit Breaker Operation

BREAKER CONTROL

Open

Trip

Close

Close

⬇

System is in AUTO mode, so electrical close will NOT work.

Closed

Spring Charged

Connected Cell Partition

Manual Mechanical Controls on Circuit Breaker

Connected

Close Open

Manual Spring Charge

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Various test scenarios including:

- Generator bus under-frequency
- Utility failure/restoration
- Circuit breaker open/close failure
- Electrical interlock (for training purposes)
- Generator failure
- Circuit breaker unavailable (tripped, lockout, withdrawn)
- Failure to synchronize

ASCO® 4000 SERIES FEATURES AND OPTIONS

FEATURES	4000 SERIES
System Voltage	600V Max.
Number of Generators	4 (Up to 8 depending on configuration)
PRODUCT CONFIGURATION	
Standby/Isolated Bus	Yes
Prime Power	Yes
CONSTRUCTION	
Main Bus Amp size available	2000 to 10000 A (Type 1 Enclosure) 2000 to 6000 A (Type 3R Enclosure)
Switchgear Standard	UL 1558
Bus Bracing Level	100 KA or 200KA
Overhead Rail Lift	Optional for Type 1 Enclosure
Seismic Certification Option, SDS	2.46 (Includes rooftop installation)
IBC 2012 & OSHPD	Included with Seismic Certification Option
MASTER CONTROLS	
Master Controls Touch Screen	10" (Standard)/ 15" (Optional)
Redundant Master Touch Screens	Optional (Up to 2 Additional Color Touch Screens)
NFPA 110 Generator Monitoring	Yes
Master PLC	Yes (GE RX3i or Allen-Bradley ControlLogix)
Redundant Master PLC	Optional
Hardwired Manual Paralleling	Standard
Bus Load Optimization	Standard
General Load Demand	Standard, Includes Soft Generator Unloading
Load Shed/Add	ATS or Electrically Operated Circuit Breaker
Number of ATS's (Manually Operated Distribution CB)	1 - 32
Number of ATS's (Electrically Operated Distribution CB)	1 - 16
Simulator for Testing and Training	Optional
GENERATOR CIRCUIT BREAKERS	
Generator Paralleling Breakers	1 or 2 per cubicle (Depending on Options)
Max. Generator Breaker Frame Size	3200 A (2) 5000 A (1)
GENERATOR CONTROLS SECTION	
Generator Synchronized Type	Digital
Generator PLC	Yes
Hardwired Backup Controls	Standard
Generator Controls Touch Screen	Optional (See Note Below)
Lug Types	Mechanical (Standard / Compression (Optional)
DISTRIBUTION CIRCUIT BREAKERS	
Manually Operated	Optional
Electrically Operated	Optional (8 max., Depending on Configuration)
REMOTE MONITORING	
Remote Annunciator Panel, Color Touch Screen Type	Optional (See Note Below)
PowerQuest Remote Desktop Monitoring	Optional
NFPA Test Report Package	Optional (Consult Factory)
JC Reporting Package	Optional (Consult Factory)

Note: The PCS 4000 System supports a total of 3 color touch screens

TECHNOLOGY

Innovation, an important part of the value delivered by the 4000 SERIES switchgear, results from the process of identifying needs, creating ideas, developing and implementing solutions. Building reliable switchgear to the highest standards available, providing a 3D Building Information Model with our PCS switchgear, and leveraging over a century of technological advancement, the 4000 SERIES switchgear product delivers innovation with every watt.



SUPPORT

With Project Managers in the factories and in local sales offices, ASCO delivers the highest level of dedicated support to manage your PCS order at every stage – from submittals to start-up.



SERVICE

The quality, availability and responsiveness of switchgear service directly impacts the level of assurance experienced by owners. That is why ASCO employs factory trained engineers and technicians, places them strategically across the US, available 24 hours a day, 365 days a year, and provides them with readily accessible inventory in their vans, at regional warehouses, and from the various manufacturing centers.



Logical and user-friendly, the 4000 SERIES Switchgear includes extensively automated digital controls that allow external systems such as ASCO Critical Power Management System (CPMS) to provide audit-ready reports formatted per Joint Commission requirements.

With pre-engineered designs for reduced lead times, the 4000 SERIES paralleling switchgear delivers digital monitoring and control, reliable power management, and complete system integration with Data Center Infrastructure Management systems.



Rapidly responding to utility power interruptions, providing layered security with password protection, and automation controllers familiar to industry experts, the 4000 SERIES paralleling switchgear delivers prime and standby power to water and waste water customers.



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