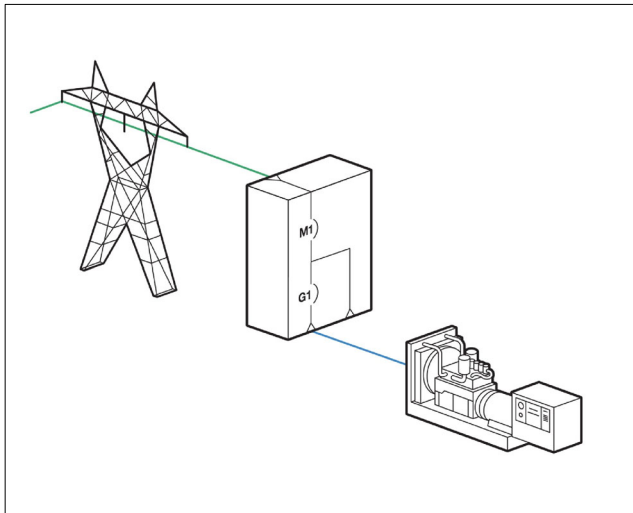
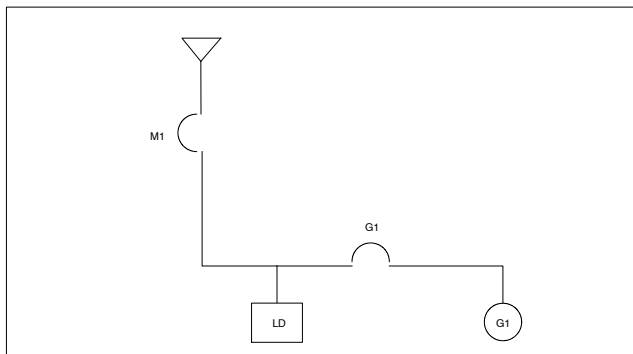


Single Utility – Single Generator



Typical Single Utility Multiple Generator System



Typical Single Line

General Description

The generator provides power in the event of a loss of utility service or provides power to supplement the utility.

In a typical single utility single generator power system the entire facility is placed on generator power during a power outage. The power transfer takes place using breakers in the paralleling switchgear.

Available Transition Types

- Open transfer
- Closed transfer
 - Fast (under 100 msec.)
 - Soft (ramp transfer at a user adjustable kW/sec. rate)

Available Modes of Operation

- Emergency standby
- System test
- Peak shave
 - Base load mode
 - Import mode
 - Interruptible mode

Standard Features

- User definable load management

User Interface

- Complete system metering, annunciation, settings and control using touchscreen.
- Electrical and mechanical metering of the generator set
- Event and alarm logging
- 15 in. touchscreen standard. Optional larger sizes are available.

Communication and Controls

- Status and metering data available via Modbus® TCP/IP
- Optional manual control, front panel metering and status indication is available.

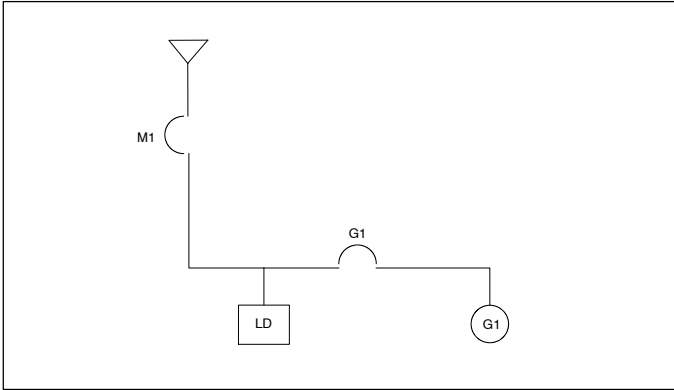
Available UL Listings

- UL891 - Switchboard
- UL1558 - Switchgear
- UL Listed medium voltage

Typical Sequence of Operation

The following are typical sequences for a single utility - single generator system. Other sequences and derivations from these sequences are available.

Note: Any system that parallels with the utility typically requires permission and coordination with the utility.



Loss of Utility Power

When utility power is lost, the utility breaker opens and the generator starts. After the generator reaches rated speed and voltage it connects to the bus.

Return of Utility Power

When utility power returns, a utility return timer starts. When this timer expires, the system will return to utility power. The transfer back will be one of the following methods.

Open Transfer

The load is disconnected from one source before being connected to another. The generator breaker opens and the open transfer timer starts. When this timer expires, the utility breaker closes.

Closed Transfer

The source from which the load is being transferred and the source to which the load is being transferred to are connected together. The time the two sources will be connected together will vary depending on the type of transfer desired or allowed.

Fast Transfer

The generator synchronizes to the utility. When synchronized, the utility breaker closes and the generator breaker opens within 100 ms of the utility breaker closing.

Soft (Ramp) Transfer

The generator synchronizes to the utility. When synchronized, the utility breaker closes. The load is transferred from the generator back to the utility at a user-adjustable kW/sec. When the generator reaches its unloaded setpoint, the generator breaker opens.

After the generator main breaker opens, the generator will stop running after the cool down timer expires.

System Test

The system can be tested with or without facility load.

Test without Facility Load

When the operator initiates the test, the generator starts and runs. The generator breaker remains open.

Test with Facility Load (Storm Mode)

When the operator initiates the test, the generators starts. After the generator reaches rated speed and voltage, the transfer from utility power to generator power will be accomplished using one of the following types of transfers:

Open Transfer

The load is disconnected from one source before being connected to another. The utility breaker opens and the open transfer timer starts. When this timer expires, the generator breaker closes.

Closed Transfer

The source from which the load is being transferred and the source to which the load is being transferred to are connected together. The time the two sources will be connected together will vary depending on the type of transfer desired or allowed.

Fast Transfer

The generator synchronizes to the utility. When synchronized, the generator breaker closes and the utility breaker opens within 100 ms of the generator breaker closing.

Soft (Ramp) Transfer

The generator synchronizes to the utility. When synchronized, the generator breaker closes. The load is transferred from the utility to the generator at a user-adjustable kW/sec. When the utility reaches its unloaded setpoint, the utility breaker opens.

The transfer back to utility power after the test is the same as the return to utility power.

Peak Shave

Peak shaving is used to reduce your facility's electrical power consumption during periods of high demand on the power utility. A peak shave system can remain paralleled to the utility or it can remove your facility's loads from the utility and place them on generator power.

Base Load Mode

The generator remains paralleled to the utility producing power at a preset base load setpoint. If the base load setpoint is greater than the facility load, the extra power is exported to the utility.

When Base Load Mode is initiated, the generator starts. After it reaches rated speed and voltage, the generator synchronizes to the utility. When synchronized, the generator breaker closes and the generator ramps to the base load setpoint.

Import Mode

The generator remains paralleled to the utility producing power and maintaining a preset kW level flowing in from the utility. The generator output varies to support the load and maintain the fixed amount of power flowing in from the utility. If the load is high, the maximum generator output is limited to the high kW load limit setpoint.

When Import Load Mode is initiated, the generator starts. After it reaches rated speed and voltage, the generator synchronizes to the utility. When synchronized, the generator breaker closes and the generator ramps to maintain the import mode setpoint.

Interruptible (Isolate) Mode

The generator parallels to utility, the facility load is transferred from the utility to the generators as described in Test with Facility Load.

Control Architecture

Standard

As a standard, every Kohler system is designed to be fully functional in the unlikely event of a touchscreen failure. If the touchscreen fails, the operator, using hardwired switches can:

- Place all automatic controls in Auto.
- Start the generators and initiate the auto synchronization process.

Standard Features

Load Management

Each load is assigned a priority level. Load management determines when priority levels are signaled to disconnect (shed) and reconnect (add). The system controls feeder breakers, transfer switches or dry contacts for interface to a building management system.

Load Add

Loads can be added based on the following considerations:

- **Generator bus capacity:** Loads are added based on the kW capacity of the bus and a preset kW demand of the load.

Load Shed

A load shed event can be triggered by:

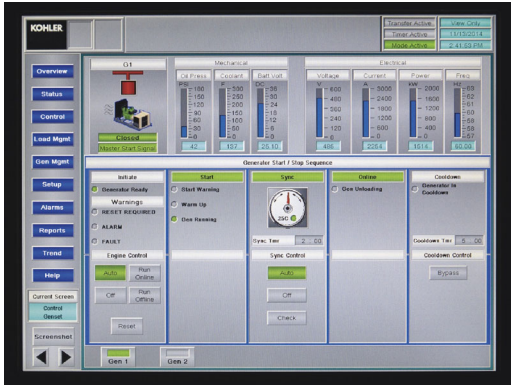
- **kW overload:** When the load on the generator reaches the overload setpoint, low-priority loads are sequentially shed until the load falls below the overload setpoint or as a block of preset loads.
- **Underfrequency:** Underfrequency is often an indication that the generators are fully loaded and cannot supply additional power to the load. When the bus frequency reaches its underfrequency setpoint, preset loads are shed.

Operator Interface

With basic knowledge of paralleling switchgear, the operator can navigate the system simply and intuitively without reading a manual. The intuitive interface eliminates fear of operational errors by clearly showing "if this, then that" before a sequence is initiated.

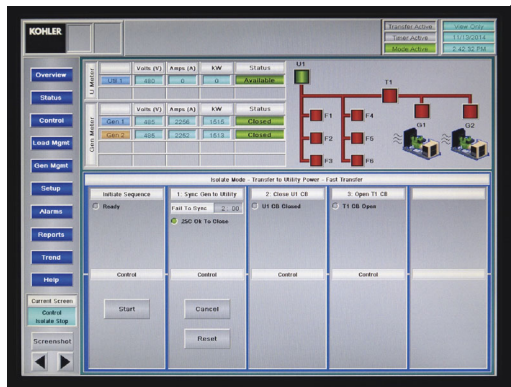
Right Information at the Right Time

By providing pertinent information on each screen, the operator always knows the reaction to an action.



Example of Control: Generator Screen

- Used to monitor and manually control the generator.
- Contains typical controls such as the generator AUTO/OFF/RUN ONLINE/RUN OFFLINE switches and generator synchronizer control switch.
- Shows generator status and metering information.



Example of Control: Transfer to Utility Screen

- Used to monitor and manually initiate the transfer from generator power to utility power.
- Top half of screen shows power source metering and an active single-line diagram.
- Lower half of screen contains the controls and displays current status of the sequence embedded in an active flowchart of the sequence of operation.



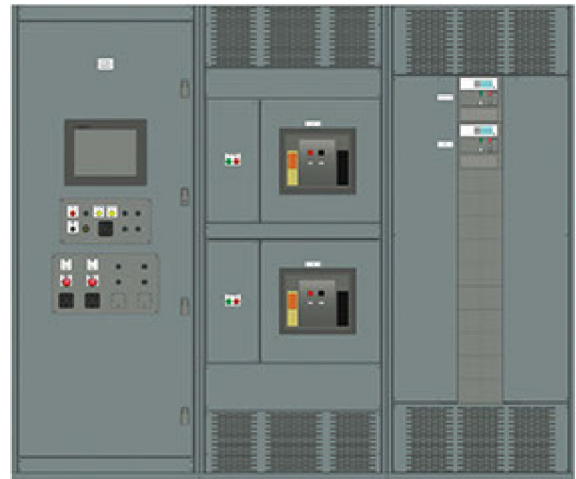
Example of Setup: System Status

- An example of the user configuration and setup screens available.
- Allows the user to define parameters and timers used to determine a loss of utility power and set other time delays in the system.

PD-2000 SERIES

The PD-2000 Series is UL 891 listed and allows extreme flexibility in design while providing a strong standard for safety and performance.

- Rear access standard, front access available
- Shallow depth (36–42 in.) available
- UL 489 fixed or drawout breakers
- Molded-case breakers available for distribution
- Bus ratings through 10,000 amps/150 kA withstand
- Complete selection of breaker trip options
- Complete selection of power monitoring options
- NEMA 1, NEMA 3R available



PD-2000 Series

PD-3000 SERIES

Offering the highest standard in bus withstand and breaker ratings, the PD-3000 Series is UL 1558 listed. The series is designed with reliability and serviceability in mind.

- Drawout breakers standard
- UL 1066 drawout breakers
- Complies with ANSI C37.20.1
- Bus ratings through 10,000 amps/200 kA withstand
- Complete selection of breaker trip options
- Complete selection of power monitoring options
- NEMA 1, NEMA 3R available



PD-3000 Series

PD-4000 SERIES

Available through 15 kV, the PD-4000 Series provides a complete solution by utilizing the strength of the digital control system combined with utility-grade protective relays.

- UL MV switchgear listing through 15 kV
- Complies with ANSI metal-clad switchgear requirements
- Bus and breaker ratings through 3000 amps
- Complete selection of protective relay options, power monitoring, neutral grounding resistors and control battery systems
- NEMA 1, NEMA 3R shelter aisle available



PD-4000 Series



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For the nearest sales and service outlet in the
US and Canada, phone 1-800-544-2444
KOHLERPower.com

PD-Series Features

PD-SERIES FEATURES	PD-2000	PD-3000	PD-4000
Low voltage switchboard (UL/cUL 891)	X		
Low voltage switchgear (UL/cUL 1558)		X	
Medium voltage metal-clad switchgear (UL/cUL listed)			X
NEMA 1	X	X	X
NEMA 3R	X	X	X
Short-circuit rating up to 200 kA		X	X
Short-circuit rating up to 150 kA	X		
Bus rating up to 10,000 A	X	X	
Bus rating up to 3000 A			X
Maximum voltage 600 V	X	X	
Maximum voltage 15 kV			X
60 Hz	X	X	X
50 Hz	X	X	X
Parallel up to 32 generators	X	X	X
15" color touch screen (optional touch screen sizes available)	X	X	X
Customizable controls, relays and metering	X	X	X

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