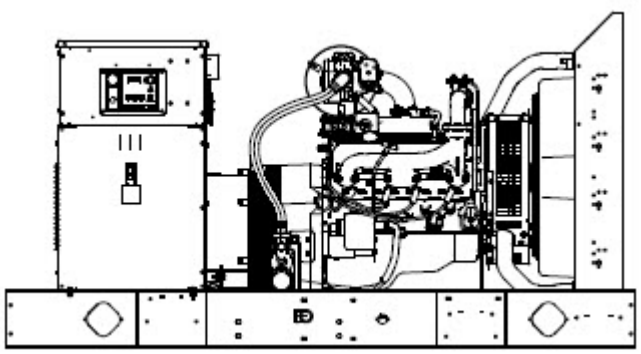
KOHLER®

KG45
Natural Gas



Standard Features

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The 60 Hz generator set offers a UL 2200 listing.
- The generator set accepts rated load in one step.
- The 60 Hz generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
- A one-year limited warranty covers all systems and components. Two- and five-year extended warranties are also available.
- Alternator Protection
- Battery Rack and Cables
- Electronic, Isochronous Governor
- Gas Fuel System (includes fuel mixer, electronic secondary gas regulator, gas solenoid valve, and flexible fuel line between the engine and the skid-mounted fuel system components)
- Integral Vibration Isolation
- Local Emergency Stop Switch

Alternator Features

- Oil Drain Extension
- Operation and Installation Literature
- The unique Fast-Response™ II excitation system delivers excellent voltage response and short circuit capability using a permanent magnet (PM)-excited alternator.

Generator Set Ratings

Standby 130C Rise Ratings

Alternator	Voltage	Ph	Hz	kW/kVA	Amps
4P7BX	120/240	1	60	44 / 44	184

RATINGS: All three-phase units are rated at 0.8 power factor. All single-phase units are rated at 1.0 power factor.
Standby Ratings: Standby ratings apply to installations served by a reliable utility source. The standby rating is applicable to varying loads for the duration of a power outage. There is no overload capability for this rating. Ratings are in accordance with ISO-3046/1, BS 5514, AS 2789, and DIN 6271.

Model: KG45, continued

Alternator Specifications

Specifications	Alternator
Alternator manufacturer	Kohler
Type	4-Pole, Rotating-Field
Exciter type	Brushless, Rare-Earth Permanent-Magnet
Leads, quantity	4P7BX, 4P8X: 12, Reconnectable 4Q8X, 4Q10X: 4, 110-120/220-240 V
Voltage regulator	Solid State, Volts/Hz
Insulation	NEMA MG1
Insulation: Material	Class H
Insulation: Temperature Rise	130°C, Standby
Bearing: quantity, type	1, Sealed
Coupling	Flexible Disc
Amortisseur windings	Full
Voltage regulation, no-load to full-load Permanent magnet (PM) alternator	Controller Dependent
One-Step Load Acceptance	100% of rating
Unbalanced load capability	100% of Rated Standby Current

• The unique Fast-Response X excitation system delivers excellent voltage response and short-circuit capability using a rare-earth, permanent magnet (PM) -excited alternator.
• The brushless, rotating-field alternator has broadrange reconnectability.
• NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting.
• Sustained short-circuit current of up to 300% of the rated current for up to 10 seconds.
• Sustained short-circuit current enabling downstream circuit breakers to trip without collapsing the alternator field.
• Self-ventilated and dripproof construction.

Engine

Engine Specification

Engine Manufacturer	Kohler
Engine Model	KG6208 6.2 L
Engine: type	Natural Aspiration
Cylinder arrangement	V-8
Displacement, L (cu. in.)	6.2 (378)
Bore and stroke, mm (in.)	101.6 x 95.25 (4.00 x 3.75)
Compression ratio	10.5:1
Rated rpm	1800
Max. power at rated rpm, kWm (BHP)	77.0 (103)
Cylinder head material	Cast Aluminum
Piston: type, material	High Silicon Aluminum
Crankshaft material	Cast Iron
Valve (exhaust) material	Forged Steel
Governor: type, make/model	Electronic
Frequency regulation, no-load to-full load	Isochronous
Frequency regulation, steady state	±1.0%
Frequency	Fixed
Air cleaner type, all models	Dry

Model: KG45, continued

Exhaust

Exhaust System

Exhaust Manifold Type	Dry
Exhaust flow at rated kW,m3/min. (cfm)	10.8 (382)
Exhaust temperature at rated kW, dry exhaust, °C (°F)	671 (1240)
Maximum allowable back pressure, kPa (in. Hg)	10.2 (3.0)
Exh. outlet size at eng. hookup, mm (in.)	76 (3.0) OD

Engine Electrical

Engine Electrical System

Ignition system	Electronic, Distributor
Battery charging alternator: Ground (negative/positive)	Negative
Battery charging alternator: Volts (DC)	12
Battery charging alternator: Ampere rating	130
Starter motor rated voltage (DC)	12
Battery, recommended cold cranking amps (CCA): Qty., CCA rating each	One, 630
Battery voltage (DC)	12

Fuel

Fuel System

Fuel type	Natural Gas
Fuel supply line inlet	1 NPTF
Natural gas/LPG fuel supply pressure, kPa (in. H20). Fuel supply pressure measured at the generator set fuel inlet downstream of any fuel system equipment accessories.	1.74-2.74 (7-11)

Fuel Composition

Fuel Composition

Natural Gas: Methane, % by volume	90 min.
Natural Gas: Ethane, % by volume	4.0 max.
Natural Gas: Propane, % by volume	1.0 max.
Natural Gas: Propene, % by volume	0.1 max.
Natural Gas: C4 and higher, % by volume	0.3 max.
Natural Gas: Sulfur, ppm mass	25 max.
Natural Gas: Lower heating value, kJ/m3 (Btu/ft3), min.	33.2 (890)

* Fuels with other compositions may be acceptable. If your fuel is outside the listed specifications, contact your local distributor for further analysis and advice.

Lubrication

Lubrication System

Type	Full Pressure
Oil pan capacity, L (qt.)	5.7 (6.0)
Oil pan capacity with filter, L (qt.)	7.1 (7.5)
Oil filter: quantity, type	1, Cartridge

Model: KG45, continued

Cooling

Radiator System

Ambient temperature, °C (°F)	50 (122)
Engine jacket water capacity, L (gal.)	7.3 (1.93)
Radiator system capacity, including engine, L (gal.)	20.8 (5.5)
Engine jacket water flow, Lpm (gpm)	129 (34.1)
Heat rejected to cooling water at rated kW, dry exhaust, kW (Btu/min.)	59.9 (3405)
Water pump type	Centrifugal
Fan diameter, including blades, mm (in.)	533 (21)
Fan, kWm (HP)	1.7 (2.3)
Max. restriction of cooling air, intake and discharge side of radiator, kPA (in. H20)	0.125 (0.5)

* Enclosure with internal silencer reduces ambient temperature capability by 5°C (9°F).

Operation Requirements

Air Requirements

Radiator-cooled cooling air, m3/min. (scfm) *	120 (4250)
Combustion air, m3/min. (cfm)	4.1 (146)
Heat rejected to ambient air: Engine, kW (Btu/min.)	30.9 (1760)
Heat rejected to ambient air: Alternator, kW (Btu/min.)	7.7 (440)

*Air density = 1.20 kg/m3 (0.075 lbm/ft3)

Fuel Consumption

Natural Gas, m3/hr. (cfh) at % load	Rating
Standby Fuel Consumption at 100% load	22.8 m3/hr. (805 cfh)
Standby Fuel Consumption at 75% load	17.1 m3/hr. (603 cfh)
Standby Fuel Consumption at 50% load	11.7 m3/hr. (413 cfh)
Standby Fuel Consumption at 25% load	7.0 m3/hr. (248 cfh)

APM402

Kohler® APM402 Controller

General Description and Function

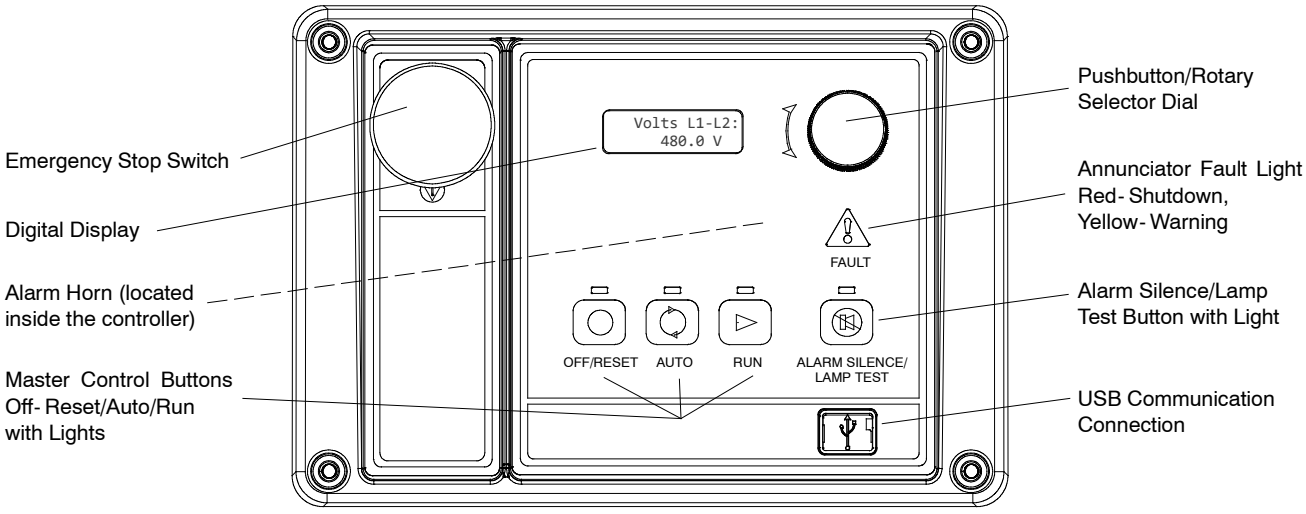
The APM402 generator set controller provides advanced control, system monitoring, and system diagnostics for optimum performance.

The APM402 controller meets NFPA 110, Level 1 when equipped with the necessary accessories and installed per NFPA standards.

The APM402 controller uses a patented hybrid voltage regulator and unique software logic to manage alternator thermal overload protection features normally requiring additional hardware. Additional features include:

- A digital display and pushbutton/rotary selector dial provide easy local access to data.
- Measurements selectable in metric or English units.
- The controller can communicate directly with a personal computer via a network or serial configuration using SiteTech™ or Monitor III software.
- The controller supports Modbus® protocol. Use with serial bus or Ethernet networks. (Ethernet requires an external Modbus®/Ethernet converter module.)
- Scrolling display shows critical data at a glance.
- Digital display of power metering (kW and kVA).
- Integrated hybrid voltage regulator providing ±0.5% regulation.
- Built-in alternator thermal overload protection.

Modbus® is a registered trademark of Schneider Electric.



User Interface Controls and Components

- Emergency stop switch
- Backlit LCD digital display with two lines of 12 characters *(see User Interface Displays for menus)*
- Alarm horn indicates generator set shutdown and warning faults
- Environmentally sealed membrane keypad with three master control buttons with lights
  - Off/Reset (red)
  - Auto (green)
  - Run (yellow)
- Pushbutton/rotary selector dial for menu navigation
  - Rotate dial to access main menus
  - Push dial and rotate to access sub menus
  - Press dial for 3 seconds to return to top of main menu
- Annunciator fault light
  - System shutdown (red)
  - System warning (yellow)
- Alarm silence/lamp test button
  - Alarm silence
  - Lamp test
- USB and RS-485 connections
  - Allows software upgrades
  - Provides access for diagnostics
  - PC communication using SiteTech™ or Monitor III software
- Dedicated user inputs
  - Remote emergency stop switch
  - Remote 2-wire start for transfer switch
  - Auxiliary shutdown
- Integrated hybrid voltage regulator
- Auto-resettable circuit protection mounted on circuit board.
- One relay output standard. Optional five relay output available.
- One analog and three digital inputs standard. Optional two inputs available.

NFPA 110 Requirements

In order to meet NFPA 110, Level 1 requirements, the generator set controller monitors the engine/generator functions/faults shown below.

- Engine functions:
  - Overcrank
  - Low coolant temperature warning
  - High coolant temperature warning
  - High coolant temperature shutdown
  - Low oil pressure shutdown
  - Low oil pressure warning
  - High engine speed
  - Low fuel (level or pressure) *
  - Low coolant level
  - EPS supplying load
  - High battery voltage
  - Low battery voltage
- General functions:
  - Master switch not in auto
  - Battery charger fault *
  - Lamp test
  - Contacts for local and remote common alarm
  - Audible alarm silence button
  - Remote emergency stop *

* Function requires optional input sensors or kits and is engine dependent, see Controller Displays as Provided by the Engine ECM.

User Interface Displays

The listing below has ● denoting main menus and ○ denoting sub-menus.

- Overview
  - Software version
  - Active shutdowns and warnings (if any are present)
  - Engine run time, total hours
  - Average voltage line-to-line
  - Frequency
  - Average current
  - Coolant temperature
  - Fuel level or pressure *
  - Oil pressure
  - Battery voltage
- Engine Metering
  - Engine speed
  - Oil pressure
  - Coolant temperature
  - Battery voltage
- Generator Metering
  - Total power, VA
  - Total power, W
  - Rated power, %
  - Voltage, L- L and L- N for all phases
  - Current, L1, L2, L3
  - Frequency
- GenSet Information
  - Generator set model number
  - Generator set serial number
  - Controller serial number
- GenSet Run Time
  - Engine run time, total hours
  - Engine loaded, hours
  - Number of engine starts
  - Total energy, kWh
- GenSet System
  - System voltage
  - System frequency, 50 or 60 Hz
  - System phase, single or three (wye or delta)
  - Power rating, kW
  - Amp rating
  - Power type, standby or prime
  - Measurement units, metric or English (user selectable)
  - Alarm silence, always or auto only (NFPA 110)
  - Manual speed adjust *
- GenSet Calibration
  - Voltage, L- L and L- N for all phases
  - Current, L1, L2, L3
  - Reset calibration
- Voltage Regulation
  - Adjust voltage, ±10%
- Digital Inputs
  - Input settings and status
- Digital Outputs
  - Output settings and status
- Analog Inputs
  - Input settings and status
- Event Log
  - Event history (stores up to 1000 system events)
- Selector Switch (requires initial activation by SiteTech™)

Controller Features

- **AC Output Voltage Regulator Adjustment**. The voltage adjustment provides a maximum of ±10% of the system voltage.
- **Alarm Silence.** The controller can be set up to silence the alarm horn only when in the AUTO mode for NFPA-110 application or Always for user convenience.
- **Alternator Protection**. The controller provides generator set overload and short circuit protection matched to each alternator for the particular voltage/phase configuration.
- **Automatic Restart**. The controller automatic restart feature initiates the start routine and recrank after a failed start attempt.
- **Common Failure Relay.** This relay is integrated on the controller circuit board. Contacts are rated 2 amps at 32 VDC or 0.5 amp at 120 VAC.
- **Communication.** Controller communication is available.
- **Cyclic Cranking.** The controller has programmable cyclic cranking.
- **ECM Diagnostics.** The controller displays engine ECM fault code descriptions to help in engine troubleshooting.
- **Engine Start Aid**. The starting aid feature provides control for an optional engine starting aid.
- **Event Logging**. The controller keeps a record (up to 1000 entries) for warning and shutdown faults. This fault information becomes a stored record of system events and can be reset.
- **Historical Data Logging**. Total number of generator set successful starts is recorded and displayed.
- **Integrated Hybrid Voltage Regulator**. The voltage regulator provides ±0.5% no-load to full-load regulation with three-phase sensing.
- **Lamp Test**. Press the alarm silence/lamp test button to verify functionality of the indicator lights.
- **LCD Display.** Adjustable contrast for improving visibility.
- **Measurement Units.** The controller provides selection of English or metric displays.
- **Power Metering**. Controller digital display provides kW and kVA.
- **Programming Access (USB)**. Provides software upgrades and diagnostics.
- **Remote Reset**. The remote reset function resets faults and allows restarting of the generator set without going to the master control switch off/reset position.
- **Remote Monitoring Panel.** The controller is compatible with the Kohler® Remote Serial Annunciator.
- **Run Time Hourmeter**. The generator set run time is displayed.
- **Time Delay Engine Cooldown (TDEC)**. The TDEC provides a time delay before the generator set shuts down.
- **Time Delay Engine Start (TDES)**. The TDES provides a time delay before the generator set starts.
- **Voltage Selection Menu.** This menu provides the capability of quickly switching controller voltage calibrations. Requires initial activation using SiteTech™ software. **NOTE:** Generator set output leads require voltage reconnection.

Controller Functions

The following chart shows which functions cause a warning or shutdown. All functions are available as relay outputs.

Warning causes the fault light to show yellow and sounds the alarm horn signaling an impending problem.

Shutdown causes the fault light to show red, sounds the alarm horn, and stops the generator set.

	Warning Function	Shutdown Function
Engine Functions		
Critically high fuel level *	○	
ECM communication loss		●
ECM diagnostics	●	●
Engine over speed		●†
Engine start aid active		
Engine under speed		●
Fuel tank leak *	○	○
High battery voltage	●	
High coolant temperature	●	●†
High fuel level *	○	
Low battery voltage	●	
Low coolant level		●
Low coolant temperature	●	
Low cranking voltage	●	
Low engine oil level *	○	○
Low fuel level (diesel models) *	○	○
Low fuel pressure (gas models) *	○	
Low oil pressure	●	●†
No coolant temperature signal		●
No oil pressure signal		●
Overcrank		●†
Speed sensor fault	●	
General Functions		
Alarm horn silenced		
Analog inputs	○	○
Battery charger fault *	●	
Chicago code active *		
Common fault **(includes †)**		●
Common warning	●	
Digital inputs	○	○
Emergency stop		●†
Engine cooldown (delay) active		
Engine start delay active		
Engine started		
Engine stopped		
EPS supplying load		
Generator running		
Input/output communication loss	●	
Internal failure		●
Master switch not in auto	●	
NFPA 110 alarm active		
Remote start		
System ready		
Generator Functions		
AC sensing loss	●	●
Alternator protection		●
Ground fault input *	●	
kW overload		●
Locked rotor		●
Overfrequency		●
Overvoltage (each phase)		●
Underfrequency		●
Undervoltage (each phase)		●

● Standard function
○ Available user function
* Function requires optional input sensors or kits and is engine dependent; see Controller Displays as Provided by the Engine ECM.
† Items included with common fault shutdown

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Controller Displays as Provided by the Engine ECM	Engine Manufacturer (and Model)						
	Kohler Diesel (KDI M, TM*)	Kohler Diesel (KDI TCR)	Kohler Gas (KG2204, KG2204T)	Kohler Gas (KG6208, KG6208T, KG10V08, KG10V08T)	GM and PSI/Doosan	John Deere	Volvo
Intake air pressure							D
Intake air Temperature		D		D	D	D	D
Coolant level			D	D	D	D	D
Coolant temperature		D	C/S/D	C/S/D	C/S/D	C/S/D	C/S/D
Crankcase pressure							D
ECM battery voltage	S		S/D	S	S		
Engine speed	C/S/D	C/S/D	C/S/D	C/S/D	C/S/D	C/S/D	C/S/D
Fuel pressure		D		C/S/D	C/S/D	C/S†	C/S/D
Fuel temperature		D				S/D	S
Oil level				S†	S†	S†	S†
Oil pressure		C/S/D	D	C/S/D	C/S/D	C/S/D	C/S/D
Oil temperature			S				SD

C = Value displayed on controller, S = Value displayed in Site Tech, D = ECU diagnostic is supported
* Electronic governor and ECM are optional on KDI M and TM engines.
† Controller uses local analog input to obtain this information.

Note: REOZMD/ROZMC (Mitsubishi engines) have an ECM but do not send signals to the generator set controller.

Note: See the generator set specification sheet for engine model identification.

Controller Specifications

- Power source with circuit protection: 12- or 24-volt DC
- Power drain: 200 milliamps at 12 VDC or 100 milliamps at 24 VDC
- Humidity range: 5% to 95% noncondensing
- Operating temperature range: -40°C to +70°C (-40°F to +158°F)
- Storage temperature range: -40°C to +85°C (-40°F to +185°F)
- Standards:
  - CE Directive
  - NFPA 99
  - NFPA 110, Level 1
  - CSA 282-09
  - UL 508
  - ASTM B117 (salt spray test)
- Panel dimensions—W x H, 229 x 160 mm (9.0 x 6.3 in.)

Communication and PC Software Available Options

Refer to G6-76 Monitor III Software and the communication literature for additional communication and PC software information including Modbus® communication.

❑ **Monitor III Software for Monitoring and Control (Windows®-based user interface)**

❑ **Converter, Modbus®/Ethernet.** Supports a power system using controllers accessed via the Ethernet. Converter is supplied with an IP address by the site administrator. Refer to G6-79 for converter details.

❑ **Converter, RS-232/RS-485.** Supports a power system using controllers accessed via a serial (RS-232) connection.

APM402 Available Options

❑ **Float/Equalize Battery Charger** available with 6 or 10 amp output for 12 or 24V DC voltage output. The 10 amp model provides NFPA 110 charging and alarming capability.

❑ **Manual Speed Adjust** available for applications using closed transition ATS. Adjustment range for 60 Hz: 1751-1849 rpm (58.2-61.8 Hz) and for 50 Hz: 1451-1549 rpm (48.2-51.8 Hz).

❑ **Prime Power Switch** prevents battery drain during generator set non-operation periods and when the generator set battery cannot be maintained by an AC battery charger.

❑ **Remote Emergency Stop Switch** available as a wall mounted panel to remotely shut down the generator set.

❑ **Remote Monitoring Panel.** The Kohler® Remote Serial Annunciator (RSA) enables the operator to monitor the status of the generator set from a remote location, which may be required for NFPA 99 and NFPA 110 installations, and up to four Automatic transfer switches.

❑ **Run Relay** provides a relay indicating that the generator set is running.

❑ **Shunt Trip Wiring** provides relay outputs to trip a shunt trip circuit breaker and to signal the common fault shutdowns. Contacts rated at 10 amps at 28 VDC or 120 VAC.

❑ **Two Input/Five Output Module** provides a generator set mounted panel with two inputs and five relay outputs.

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Modbus® is a registered trademark of Schneider Electric.

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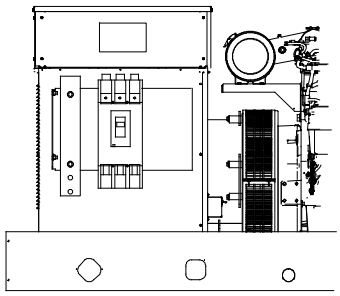
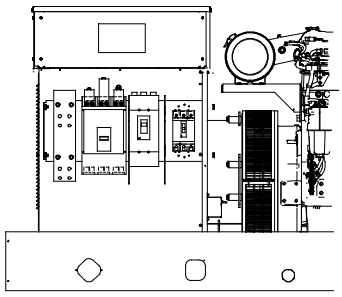
KOHLER®

Industrial Generator Set Accessories

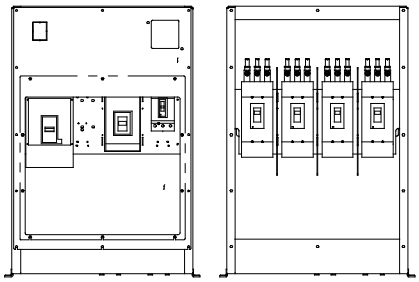
Line Circuit Breakers 15-3250 kW



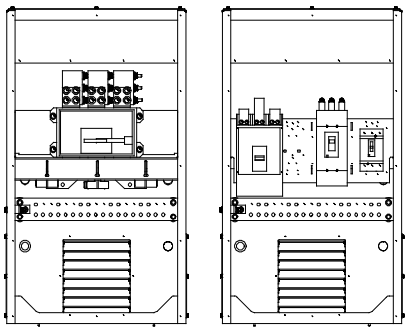
Single Circuit Breaker Kit with Neutral Bus Bar
15-300 kW Model Shown



Multiple Circuit Breaker Kit with Neutral Bus Bar
180-300 kW Model Shown



Multiple Circuit Breaker Kits with Neutral Bus Bar
350-2250 kW Model Shown
(also applies to some 300 kW models)



Circuit Breaker Kits with Neutral Bus Bar
800-2500 kW KD Model Shown

Standard Features

- The line circuit breaker interrupts the generator set output during a short circuit and protects the wiring when an overload occurs. Use the circuit breaker to manually disconnect the generator set from the load during generator set service.
- Circuit breaker kits are mounted to the generator set and are provided with load-side lugs and neutral bus bar.
- Kohler Co. offers a wide selection of molded-case line circuit breaker kits including single, dual, and multiple configurations for each generator set.
- Four types of line circuit breakers are available: (see page 2 for definitions and pages 3 and 4 for application details)
  - Magnetic trip
  - Thermal magnetic trip
  - Electronic trip
  - Electronic with ground fault (LSIG) trip
- In addition, line circuit breakers are offered with 80% and 100% ratings.
- Single line circuit breaker kits allow circuit protection of the entire electrical system load.
- Dual line circuit breaker kits allow circuit protection of selected priority loads from the remaining electrical system load.
- Multiple line circuit breaker kits with field connection barrier allow circuit protection for special applications (350-2500 kW models and selected 80-300 kW models).
- Up to four line circuit breakers can be used on 350-2500 kW models.
- Line circuit breakers comply with the following codes and standards unless otherwise stated.
  - UL 489 Molded Case Circuit Breakers
  - UL 1077 Supplementary Protectors
  - UL 2200 Stationary Engine Generator Assemblies

Line Circuit Breaker Types

Magnetic Trip

The magnetic trip features an electromagnet in series with the load contacts and a moveable armature to activate the trip mechanism. When a sudden and excessive current such as a short circuit occurs, the electromagnet attracts the armature resulting in an instantaneous trip.

Thermal Magnetic Trip

Thermal magnetic trip contains a thermal portion with a bimetallic strip that reacts to the heat produced from the load current. Excessive current causes it to bend sufficiently to trip the mechanism. The trip delay is dependent on the duration and excess of the overload current. Elements are factory- calibrated. A combination of both thermal and magnetic features allows a delayed trip on an overload and an instantaneous trip on a short circuit condition.

Electronic Trip

These line circuit breakers use electronic controls and miniature current transformers to monitor electrical currents and trip when preset limits are exceeded.

LI breakers are a combination of adjustable trip functions including long-time ampere rating, long-time delay, and instantaneous pickup. LSI breakers have all of the LI breaker features plus short-time pickup, short-time delay, and defeatable instantaneous pickup. LSIG breakers have all of the LSI breaker features plus ground-fault pickup and delay.

Electronic with Ground Fault Trip

The ground fault trip feature is referred to as LSIG in this document. Models with LSIG compare current flow in phase and neutral lines, and trip when current unbalance exists.

Ground fault trip units are an integral part of the circuit breaker and are not available as field-installable kits. The ground fault pickup switch sets the current level at which the circuit breaker will trip after the ground fault delay. Ground fault pickup values are based on circuit breaker sensor plug only and not on the rating plug multiplier. Changing the rating plug multiplier has no effect on the ground fault pickup values.

80% Rated Circuit Breaker

Most molded-case circuit breakers are 80% rated devices. An 80% rated circuit breaker can only be applied at 80% of its rating for continuous loads as defined by NFPA 70. Circuit conductors used with 80% rated circuit breakers are required to be rated for 100% of the circuit breaker's rating.

The 80% rated circuit breakers are typically at a lower cost than the 100% rated circuit breaker but load growth is limited.

100% Rated Circuit Breaker

Applications where all UL and NEC restrictions are met can use 100% rated circuit breakers where 100% rated circuits can carry 100% of the circuit breaker and conductor current rating.

The 100% rated circuit breakers are typically at a higher cost than the 80% rated circuit breaker but have load growth possibilities.

When applying 100% rated circuit breakers, comply with the various restrictions including UL Standard 489 and NEC Section 210. If any of the 100% rated circuit breaker restrictions are not met, the circuit breaker becomes an 80% rated circuit breaker.

Line Circuit Breaker Options

❑ Alarm Switch

The alarm switch indicates that the circuit breaker is in a tripped position caused by an overload, short circuit, ground fault, the operation of the shunt trip, an undervoltage trip, or the push-to-trip pushbutton. The alarm resets when the circuit breaker is reset.

❑ Auxiliary Contacts

These switches send a signal indicating whether the main circuit breaker contacts are in the open or closed position.

❑ Breaker Separators (350- 2500 kW)

Provides adequate clearance between breaker circuits.

❑ Bus Bars

Bus bar kits offer a convenient way to connect load leads to the generator set when a circuit breaker is not present.
15- 300 kW. Bus bar kits are available on alternators with leads for connection to the generator set when circuit breakers are not ordered.
350- 2500 kW. A bus bar kit is provided when no circuit breaker is ordered. Bus bars are also available in combination with circuit breakers or other bus bars on the opposite side of the junction box. On medium voltage (3.3 kV and above) units, a bus bar kit is standard (not applicable to KD models).

❑ Field Connection Barrier

Provides installer wiring isolation from factory connections.

❑ Ground Fault Annunciation

A relay contact for customer connection indicates a ground fault condition and is part of a ground fault alarm.

❑ Lockout Device (padlock attachment)

This field-installable handle padlock attachment is available for manually operated circuit breakers. The attachment can accommodate three padlocks and will lock the circuit breaker in the OFF position only.

❑ Lugs

Various lug sizes are available to accommodate multiple cable sizes for connection to the neutral or bus bar.

❑ Overcurrent Trip Switch

The overcurrent trip switch indicates that the circuit breaker has tripped due to overload, ground fault, or short circuit and returns to the deenergized state when the circuit breaker is reset.

❑ Shunt Trip, 12 VDC or 24 VDC

A shunt trip option provides a solenoid within the circuit breaker case that, when momentarily energized from a remote source, activates the trip mechanism. This feature allows the circuit breaker to be tripped by customer-selected faults such as alternator overload or overspeed. The circuit breaker must be reset locally after being tripped. Tripping has priority over manual or motor operator closing.

❑ Shunt Trip Wiring

Connects the shunt trip to the generator set controller. (standard on KD models with the APM802 controller)

❑ Undervoltage Trip, 12 VDC or 24 VDC

The undervoltage trips the circuit breaker when the control voltage drops below the preset threshold of 35%- 70% of the rated voltage.

15- 300 kW Line Circuit Breaker Specifications

100% Rating Circuit Breaker

Alt. Model	Ampere Range	Trip Type	C. B. Frame Size
4D/4E	15- 150	Thermal magnetic	HD
	60- 150	Electronic LI	
		Electronic LSI	
		Electronic LSIG	
	60- 150	Electronic LI	HG
		Electronic LSI	
		Electronic LSIG	
4P/4PX 4Q/4QX	15- 150	Thermal magnetic	HD
	60- 150	Electronic LI	
		Electronic LSI	
		Electronic LSIG	
	60- 150	Electronic LI	HG
		Electronic LSI	
		Electronic LSIG	
	175- 250	Thermal magnetic	JD
	250	Electronic LI	JD
		Electronic LSI	
		Electronic LSIG	
	250	Electronic LI	JG
		Electronic LSI	
		Electronic LSIG	
	400	Electronic LI	LG
		Electronic LSI	
		Electronic LSIG	
4RX 4S/4SX 4TX 4V 4UA 4M6226	15- 150	Thermal magnetic	HD
	60- 150	Electronic LI	
		Electronic LSI	
		Electronic LSIG	
	60- 150	Electronic LI	HG
		Electronic LSI	
		Electronic LSIG	
	175- 250	Thermal magnetic	JD
	250	Electronic LI	
		Electronic LSI	
		Electronic LSIG	
	250	Electronic LI	JG
		Electronic LSI	
		Electronic LSIG	
	400	Electronic LI	LG
		Electronic LSI	
		Electronic LSIG	
	600- 800	Electronic LSI	PG
		Electronic LSIG	
4UA 4M6226	1000- 1200	Electronic LSI	PG
		Electronic LSIG	
	1200	Electronic LSI	PJ
		Electronic LSIG	

100% Rating Electrically Operated Breakers

For use as paralleling breakers with the APM603 controller.

Generator-Mounted P-Frame, 24VDC Electrically Operated			
Alt. Model	**Amps**	**Trip Unit**	**Frame**
4RX 4S/4SX 4TX 4V	250 400 600 800	3.0 LI	PJ
		5.0 LSI	PJ
		3.0 LI	PL
		5.0 LSI	PL
4UA 4M6226	250 400 600 800 1000 1200	3.0 LI	PJ
		5.0 LSI	PJ
		3.0 LI	PL
		5.0 LSI	PL

All circuit breakers listed in this table include line side bus and load side lugs, 24VDC motor operators, 2 type C auxiliary contacts, and 1 type C SDE overcurrent switch contact. No second breakers are allowed in combination with these breakers.

Interrupting Ratings

Circuit Breaker Frame Size	240 Volt, kA	480 Volt, kA	600 Volt, kA
HD	25	18	14
HG	65	35	18
HJ	100	65	25
JD	25	18	14
JG	65	35	18
JJ	100	65	25
LA	42	30	22
LG	65	35	18
MG			
PG			
PJ	100	65	25
PL	125	100	25

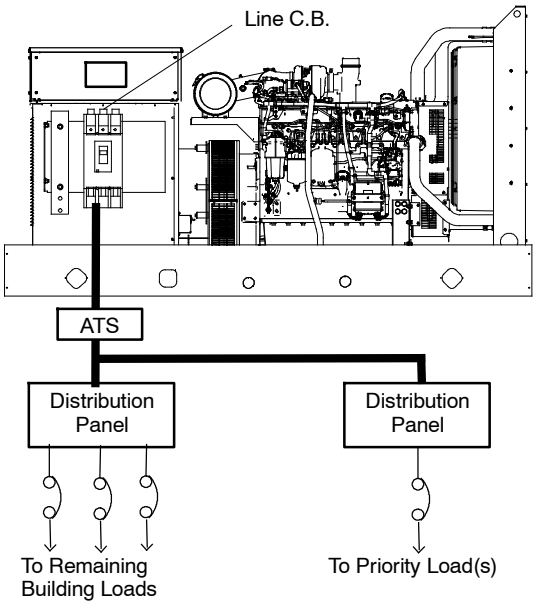
Circuit Breaker Lugs Per Phase (Al/Cu)

Frame Size	Ampere Range	Wire Range
E (480 V max.)	30- 100	Up to two wire terminals fitting 10-32 or 1/4-20 stud
H	15- 150	One #14 to 3/0
J	175	One 1/0 to 4/0
	200- 250	One 3/0 to 350 kcmil
LA	300- 400	One #1 to 600 kcmil or Two #1 to 250 kcmil
LG	400- 600	Two 2/0 to 500 kcmil AL/CU
M	700-800	Three 3/0 to 500 kcmil
P	600-800	Three 3/0 to 500 kcmil
	1000-1200	Four 3/0 to 500 kcmil
Mechanical Load Lugs Included with H, J, and LG LSIG Neutrals		
H	60- 150	One #14 to 3/0 AL/CU
J	250	One 3/0 to 350 kcmil AL/CU
LG	400- 600	Two 4/0 to 500 kcmil AL/CU

15- 300 kW Line Circuit Breaker Applications

Single Circuit Breaker Installations

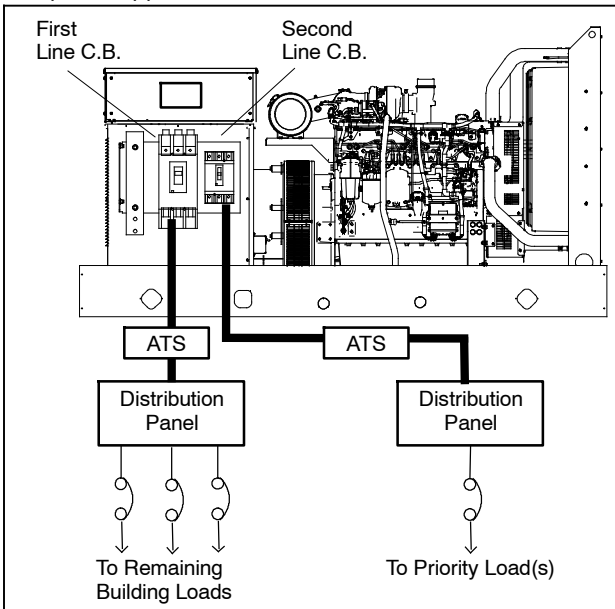
A generator set with a single circuit breaker installed typically feeds a single transfer switch and then a distribution panel. This allows protection of the entire system.



Single line circuit breaker configuration where circuit breaker can trip causing all power to building loads including priority load to be disrupted.

Multiple Circuit Breaker Installations

A generator set with dual circuit breakers installed is used to separate critical loads. Typically, one circuit breaker will feed a main transfer switch with noncritical loads and the other circuit breaker will feed a second transfer switch that feeds critical or priority loads. Multiple circuit breakers allow circuit protection for special applications.



Dual line circuit breaker configuration where first circuit breaker can trip allowing second circuit breaker to continue supplying power to priority load(s).

Circuit Breaker Combinations

Alternator Model	First C. B. Frame	Second C. B. Frame	Third C. B. Frame	Trip Type
ALL except 4D/4E	H	—	—	All
	J	—	—	
	LA	—	—	
	LG	—	—	
4D/4E	H	—	—	Standard or LSIG
	H	H	—	No LSIG
4P/4PX 4Q/4QX	H	H or J	—	No LSIG
	J		—	
	LA		—	
	LG	H, J or LG	—	
4RX 4S/4SX 4TX 4V	M	—	—	All
	P	—	—	All
	H or J	H or J	—	No LSIG
	LA	H, J, or LA	—	
	LG	H, J, LA, or LG	—	
	M			
	P			
	H or J	H or J	H or J	
4UA 4M6226	M or P	—	—	All
	H or J	H or J	—	All
	LA	H, J, or LA	—	
	LG	H, J, LA, or LG	—	
	M or P	H, J, LA, or LG	—	
	P	P	—	No LSIG
	H or J	H or J	H or J	
	LA	H or J	H or J	
		LA	H, J, or LA	
	LG	H or J	H or J	
		LA	H, J, or LA	
		LG	H, J, LA, or LG	
	M or P	H or J	H or J	
		LA	H, J, or LA	
		LG	H, J, or LG	

Powerpact® H- and J-Frame 15A to 250A Molded Case Circuit Breakers

HD and HG 2-Pole

H-Frame 150A

J-Frame 250A

Delivering unmatched application flexibility

Well-suited to a wide range of applications, the Powerpact H- and J-Frame Molded Case Circuit Breakers feature a full complement of field installable accessories, field installable trip units and improved interrupting ratings. These Molded Case Circuit Breakers deliver unmatched design flexibility for 15A to 250A applications and share identical mounting holes, handle locations, trim dimensions and accessories, allowing customers to standardize equipment designs for 15A to 250A applications.

Full-Featured Performance

- H-Frame – 150A available in both standard and 100% ratings with standard amperage ratings from 15 to 150A. Interrupting ratings (AIR) include D-18kA, G-35kA, J-65kA and L-100kA at 480VAC
- J-Frame – 250A available in both standard and 100% ratings with standard amperage ratings from 150A to 250A. Interrupting ratings (AIR) include D-18kA, G-35kA, J-65kA, and L-100kA at 480VAC
- Field installable accessories are common for H- and J-Frame Circuit Breakers to make stocking and installation easy
- Unique snap-in terminals make converting bus bar and lug configurations simple and easy
- Field-installable trip units lower inventory costs and reduce stocking space by configuring products at point of use
- Allows design standardization for 15A to 250A applications with common mounting holes, handle locations, and trim dimensions for both H- and J-Frame Circuit Breakers
- Many configuration options provide application flexibility, with I-Line®, plug-in, drawout, rear connected, distribution lug, crimp lug and din-rail configurations
- Motor operators, rotary handles and cable operators provide options for integrating into a variety of applications
- Certified to global standards, including UL, IEC, CSA and NOM

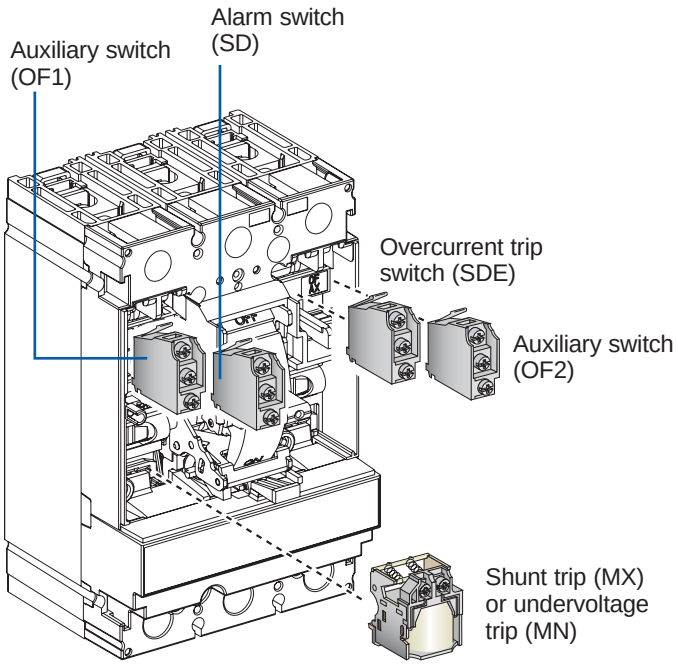
H-Frame **J-Frame** **H-Frame** **J-Frame**

Standardize Designs

Designed to help simplify the design process, the Powerpact H- and J-Frame Molded Case Circuit Breakers feature common mounting holes, handle locations and trim dimensions.

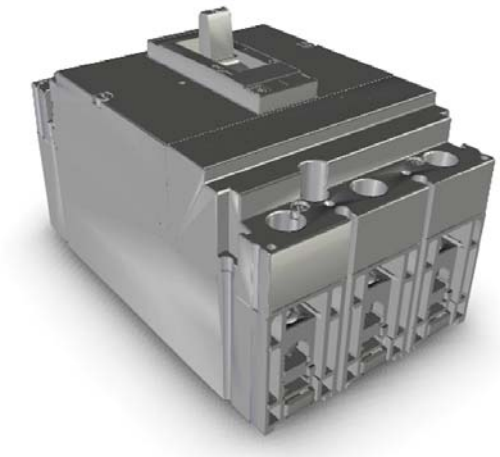
Consolidate Inventory

Reduce inventory costs with the Powerpact H- and J-Frame Molded Case Circuit Breakers. These circuit breakers are designed to work with common components like operating handles, auxiliary switches, shunt trips and many other accessories. They also offer savings in the form of rationalized mounting pans, door trims and enclosures.



Simplify Installation

Field-installable accessories provide flexibility for late specification changes or installation at point of use. Auxiliary switches, shunt trip and undervoltage release are easy to install, reliable and common to many Powerpact Circuit Breakers.



Streamline Design Integration

Comprehensive technical literature, CAD drawings and 3D models are available online to support the Powerpact H- and J-Frame Circuit Breaker line. In addition, 3D models can be downloaded in most CAD formats.

Easy to Convert

Unique snap-in lugs make converting between bus bar and lug options simple and easy. Whether the application calls for lugs on the line side, load side or both, conversions are simple, making the Powerpact H- and J-Frame Molded Case Circuit Breakers ideal for applications that require configuring products at the point of use. The terminal nut or mechanical lug is set on a plastic retainer that slides and snaps into place, without the use of tools.

Bus Bar Option

Lug Option

Powerpact® H- and J-Frame 15A to 250A Molded Case Circuit Breakers

Multiple Configurations

Cradle

Plug-in Base

I-Line

Rear Connected

Ordering Flexibility for Various Applications

- **Purchase Standard Circuit Breaker**
  Features fixed trip unit capable of reverse connection.
- **Circuit Breaker and Separate Trip Units***
  Save valuable inventory costs by configuring products at point of use. Only three frame sizes are needed to cover the entire range from 15A to 250A (shown below with H-Frame Circuit Breaker).
- **Purchase the Complete Circuit Breaker with Field-Interchangeable Trip Unit***
  Respond to last minute specification changes with the flexibility of a field interchangeable trip unit.

**Marked line and load and not suitable for reverse connection*

Contact your Square D sales representative for additional information. Or, visit www.us.SquareD.com.

Schneider Electric - North American Operating Division

1415 S. Roselle Road
Palatine, IL 60067
Tel: 847-397-2600
Fax: 847-925-7500

Order Number 0611HO0401

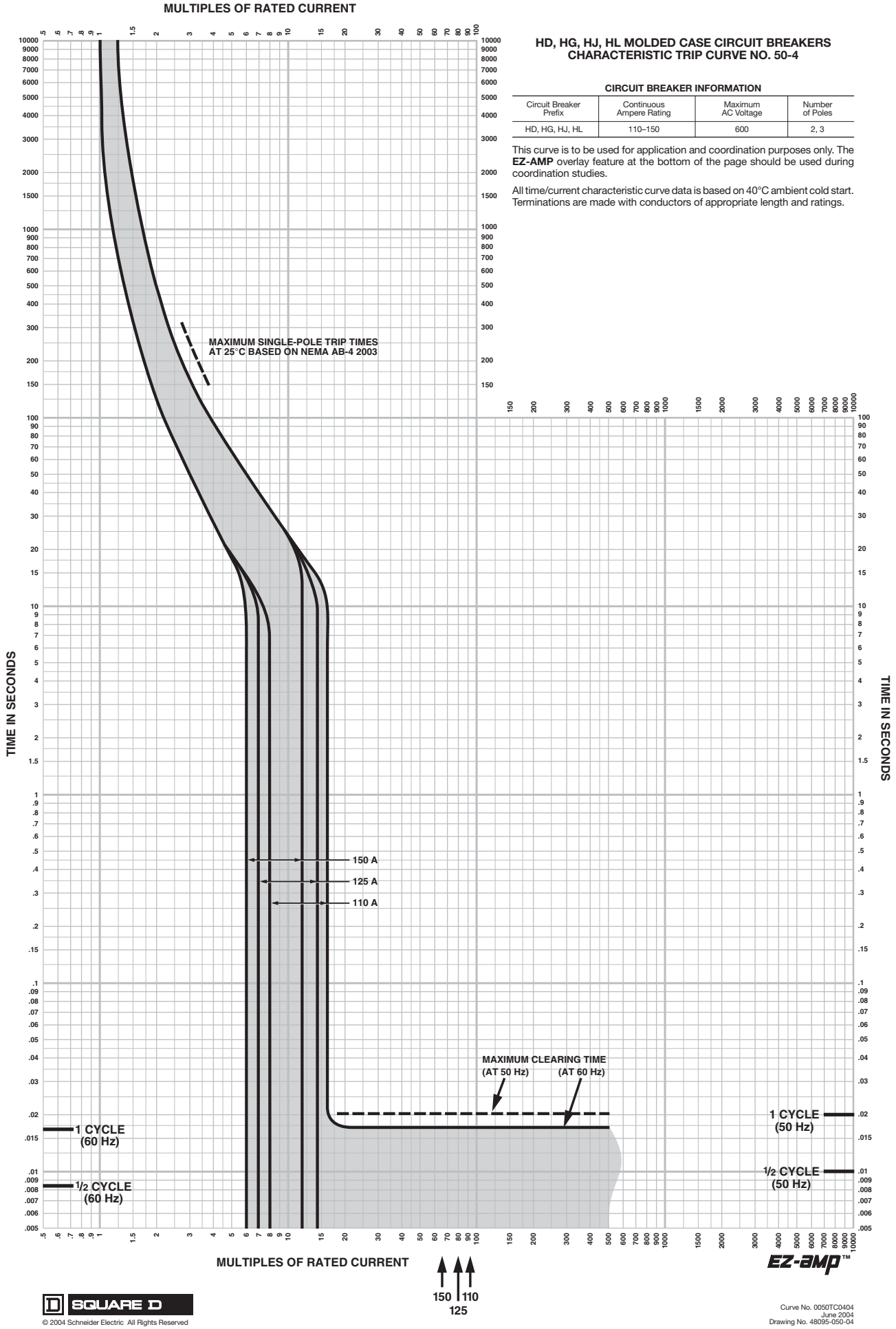
HD, HG, HJ, HL MOLDED CASE CIRCUIT BREAKERS
CHARACTERISTIC TRIP CURVE NO. 50-4

CIRCUIT BREAKER INFORMATION

Circuit Breaker Prefix	Continuous Ampere Rating	Maximum AC Voltage	Number of Poles
HD, HG, HJ, HL	110–150	600	2, 3

This curve is to be used for application and coordination purposes only. The **EZ-AMP** overlay feature at the bottom of the page should be used during coordination studies.

All time/current characteristic curve data is based on 40°C ambient cold start. Terminations are made with conductors of appropriate length and ratings.



EZ-amp™

SQUARE D

Curve No. 0050TC0404
June 2004
Drawing No. 48095-050-04

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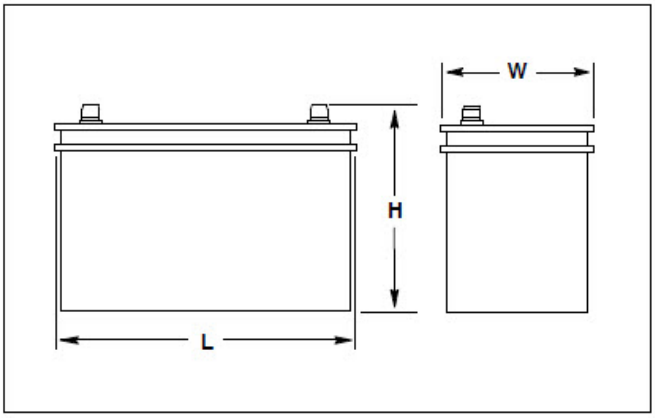
Typical Overall Dimensions

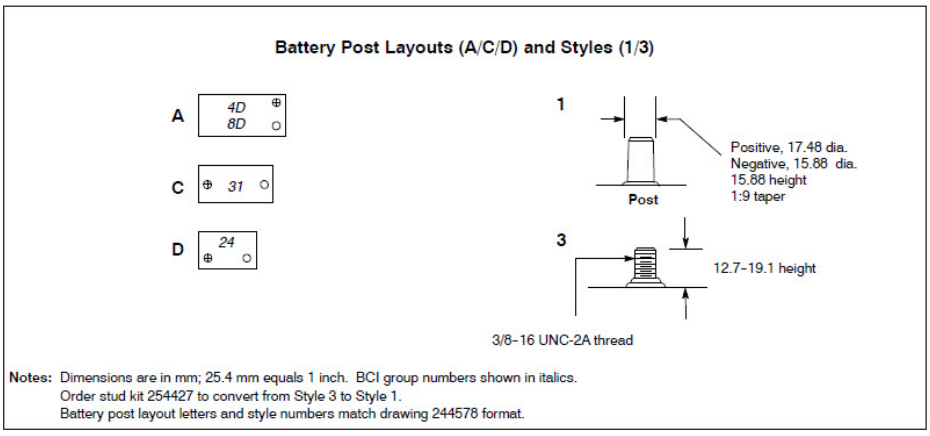


Standard Features

- Kohler Co. selects batteries to meet the engine manufacturer's specifications and to comply with NFPA requirements for engine-cranking cycles.
- Heavy-duty starting batteries are the most cost-effective means of engine cranking and provide excellent reliability in generator set applications.
- Tough polypropylene cases protect against life-shortening vibration and impact damage.
- Batteries are rated according to SAE standard J-537.
- All batteries are 12-volts. Kits that contain two or four batteries are availabe for 24-volt systems and/or systems with redundant starters.
- Wet- and dry-charged batteries have lead-calcium or lead-antimony plates and use sulferic acide electrolyte. Removable cell covers allow checking of electrolyte specific gravity.
- Absorbant glass mat (AGM) batteries are sealed and maintenance free.
- Batteries are for applications below and above 0°C (32°F).

Charge Type*	Battery Part Number	Battery Qty. per Size	BCI Group Size	Battery SAE Dimension, mm (in.)			Cold Cranking Amps at 18ºC (0ºF) Min.	Reserve Capacity Minutes at 27º (80ºF) Min.	Battery Post Layout and Style
				L	W	H			
Wet	256984	1	24	273.0 (10.8)	173.0 (6.8)	228.6 (9.0)	650	130	D/1

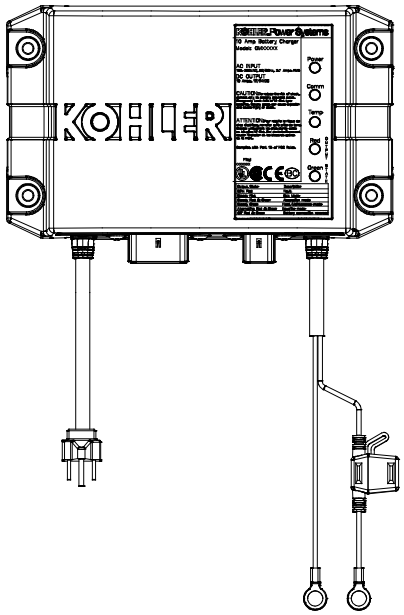
Battery Specifications



KOHLER

Industrial Generator Set Accessories

12/24 Volt, 10 Amp
Automatic Multi-Stage Battery Charger



The battery charger is a fully-automatic, high efficiency battery charger that charges batteries rapidly and safely. The battery charger is designed for an industrial environment.

The battery charger is designed for operation with an engine cranking battery.

The battery charger is universal voltage input capable, comes with a standard 120 V/60 Hz AC plug, and charges 12 VDC or 24 VDC battery systems.

Five LED lights indicate power, communication status, temperature compensation status, charge curve, and charger status.

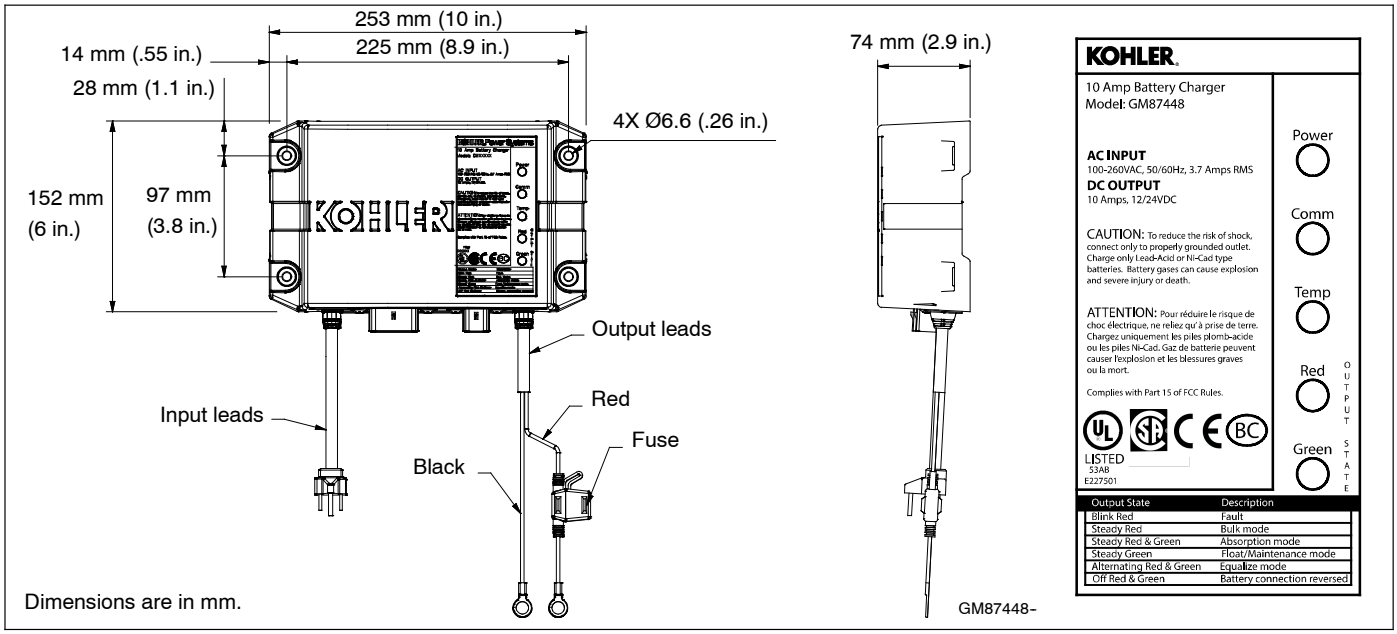
With the optional battery temperature sensor connected, the battery charger can adjust output voltages for optimal charging.

Standard Features

- 12 or 24 VDC output
  - Automatic voltage detection
- Automatic multi-stage charging modes
  - Recovery charge
  - Bulk charge
  - Absorption charge
  - Float charge
  - Equalize charge
- Charges the following type batteries:
  - Flooded lead acid (FLA)
  - AGM
  - Gel cell
  - High performance AGM
  - Nickel-cadmium (NiCad)
- 5 LED status indicators
- Durable potted assembly for waterproofing and vibration resistance
- Reverse-polarity protection
- Short-circuit protection
- Electronically limited output current
- Optional temperature compensation (FLA only)
- User adjustable parameters to support optimal manufacturer recommended charge curve.
- Code compliance:
  - UL 1236 Listed
  - NFPA 110, Level 1 compatible (when used with Kohler controller and connected to engine harness)
  - CSA - C22.2 No. 107.2-01
  - FCC - Title 47, Part 15 Class A
  - CE
  - IBC 2015
  - OSHPD

DC Output		AC Input			Shipping Weight	
Volts (Nominal)	Amps	Volts (Nominal)	Amps	**Overall Dimensions** W x D x H	kgs	lbs
12/24	10	100-260	3.7	253 mm x 152 mm x 74 mm (10.0 in x 6.0 in x 2.9 in)	3.6	7.9

KOHLER CO., Kohler, Wisconsin 53044 USA
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales and service outlet in the US and Canada, phone 1-800-544-2444
KOHLERPower.com



Specifications

AC Input	100–260 VAC
Frequency Input	50/60 Hz
DC Output	10 Amps @ 12 VDC or 10 Amps @ 24 VDC (On battery voltage regulation ±1%; current is electronically limited
Fuse Protection	15 amps ATC
Battery Types	Flooded Lead Acid (FLA) AGM Gel Cell High Performance AGM Nickel-Cadmium (NiCad)
Monitoring	
LED Indications	Power Communication Temperature compensation Output charger curve and charger status: ○ Red ○ Green
Environmental	
Operating	-20° to 70°C (-4° to 158° F)
Storage	-40° to 85°C (-40° to 185° F)
Relative Humidity	5 to 95% (non-condensing)
Salt Spray Testing	ASTM B117
Corrosion Resistant	From battery gases

Enclosure	
Environmental Resistant	From rain, snow, dust, and dripping water
Battery Connections	
Lead Length	1.8 m (6 ft.) red and black leads
Battery Connections	9.5 mm (3/8 in.) ring terminals
AC Power Connections	
Lead Length	1.8 m (6 ft.)
Storage	Standard US style 3-prong AC plug
Available Options	
Temperature compensation	

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Availability is subject to change without notice. Kohler Co. reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever. Contact your local Kohler® generator distributor for availability.

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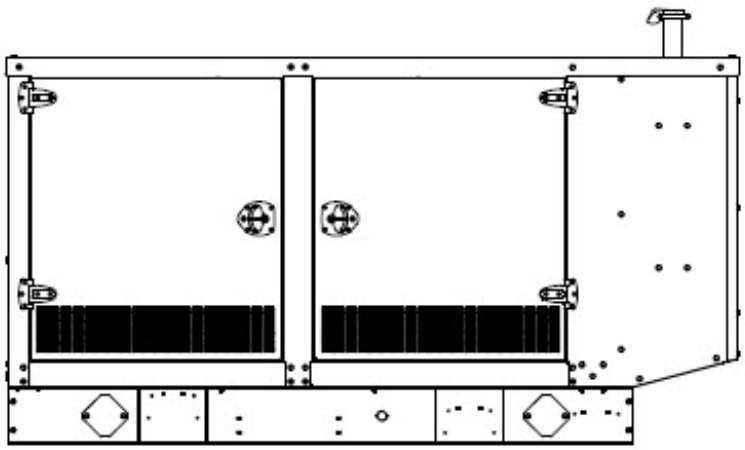
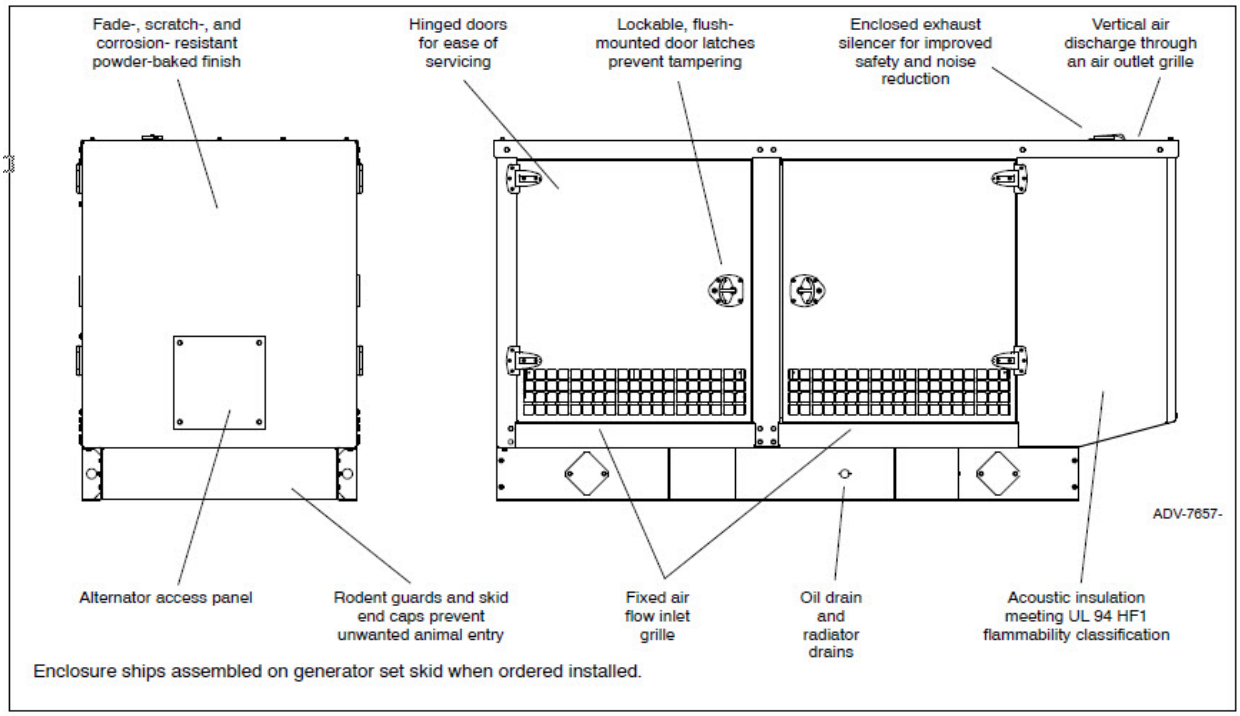


Sound Enclosure Standard Features

- Internal-mounted critical silencer and flexible exhaust connector.
- Skid-mounted, steel construction with hinged doors.
- Fade-, scratch-, and corrosion-resistant Kohler® Power Armor automotive-grade textured finish.
- Enclosure has four access doors which allow for easy maintenance.
- Lockable, flush-mounted door latches.
- Vertical air inlet and outlet discharge to redirect air and reduce noise.
- Acoustic insulation that meets UL 94 HF1 flammability classification and repels moisture adsorption.
- Sound attenuated enclosure that uses up to 51 mm (2 in.) of acoustic insulation, acoustic-lined air intle hoods, and acoustic-lined air discharge hood.
- 291 kph (181 mph) wind load analyzed for aluminum enclosures only.

Weather and Sound Enclosure



Sound Enclosure Features

- Available in steel (14 gauge) formed panel, solid construction. Preassembled package offering corrosion resistant, dent resilient structure that mounts directly to lift base or fuel tank.
- Power Armor automotive-grade finish resulting in advanced corrosion and abrasion protection as well as enhanced edge coverage and color retention.
- Internal critical exhaust silencer offering maximum component life and operator safety.
- Interchangeable modular panel construction. Allows complete serviceability or replacement without compromising enclosure design.
- Cooling/combustion air intake with a horizontal air inlet. Sized for maximum cooling airflow.
- Service access. Multi-personnel doors for easy access to generator set control and servicing of the oil fill and battery.
- Cooling air discharge, The sound enclosures include acoustic insulation with urethane film.
- Sound attenuating design. Mechanically restrained acoustic insulation UL 94 HF1 listed for flame resistance.
- Enclosed critical silencer and three-way catalyst standard on KG100 and KG125 (optional on KG80)
- Available in steel (14 gauge) formed panel, solid construction. Preassembled package offering corrosion resistant, dent resilient structure that mounts directly to lift base or fuel tank.
- Power Armor automotive-grade finish resulting in advanced corrosion and abrasion protection as well as enhanced edge coverage and color retention.
- Internal critical exhaust silencer offering maximum component life and operator safety.
- Interchangeable modular panel construction. Allows complete serviceability or replacement without compromising enclosure design.
- Cooling/combustion air intake with a horizontal air inlet. Sized for maximum cooling airflow.
- Service access. Multi-personnel doors for easy access to generator set control and servicing of the oil fill and battery.
- Cooling air discharge, The sound enclosures include acoustic insulation with urethane film.
- Sound attenuating design. Mechanically restrained acoustic insulation UL 94 HF1 listed for flame resistance.
- Enclosed critical silencer and three-way catalyst standard on KG100 and KG125 (optional on KG80)

Fuel Tank Capacity, L (gal.)	Est. Fuel Supply Hours at 60 Hz with Full Load	Max. Length, mm (in.)	Max. Width, mm (in.)	Sound Pressure Level, dB(A)	Max. Height, mm (in.)	Weight, kg (lb.)
Lift base	0	2585 (101.8)	1078 (42.4)	65	1513 (60.3)	1106 (2438)

Note: Data in table is for reference only, refer to the respective ADV drawings for details.
Max. weight includes the generator set (wet) with largest alternator option, enclosure, and silencer.
Log average sound pressure level of 8 measured positions around perimeter of the unit at a distance of 7 m (23 ft). Refer to TIB-114 for details.

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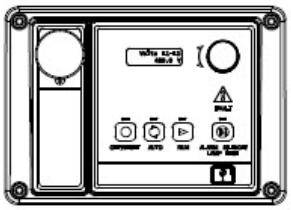
Integral Voltage Regulator with Kohler® APM402/ Decision-Maker® 3000 and Menu-Driven Selections (15-1000 kW Generator Set Models)



APM402 and Decision-Maker® 3000 Controller with Integral Voltage Regulator

The voltage regulator is integral to the controller and uses patented hybrid voltae regulator design providing ±0.5% no-load to full-load regulation using root-mean-square (RMS) voltage sensing. The voltage regulator features three-phase sensing and is available for 12- or 24-volt engine electrical systems.

Voltage Regulators

The following information provides general features, specifications, and functions of available voltage regulators.

This information generally applies to a single generator set and multiple generator sets with paralleling applications. Refer to the respective generator set specification sheet and see your authorized distributor for information regarding specific voltage regulator applications and availability.

Integral Voltage Regulators with APM402/Decision-Maker® 3000 Controllers

Calibration	Digital Display	Range Settings	Default Selection
Voltage Adjustment	Volt Adj	±10% of System Voltage	System Voltage
Underfrequency Unload or Frequency Setpoint	Frequency Setpoint	42 to 62 Hz	2.5 Hz Below Nominal Frequency
Underfrequency Unload Scope	Slope	0-10% of System Voltage (Volts per Cycle)	5% of System Voltage

KOHLER®

Specification/Feature	Integral with APM402/Decision-Maker® 3000
Generator Set Availability	15-1000 kW
Type	Patented Hybrid Design
Status and Shutdown Indicators	LEDs and Text LCD Display
Operating Temperature	-40°C to 70°C (-40°F to 158°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5-95% Non-Condensing
Circuit Protection	Solid-State, Redundant Software and Fuses
Sensing, Nominal	100-240 Volts (L-L), 50-60 Hz
Sensing Mode	RMS, Single- or 3-Phase
Input Requirements	8-36 VDC
Continuous Output	5 VDC @ 100mA max. 5.0 ADC with GM88453 Activator Board
Maximum Output	5 VDC @ 100mA max. 7.8 ADC with GM88453 Activator Board
Transition Frequency	42.0-62.0Hz
Exciter Field Resistance	4-30 Ohms with GM88453 Activator Board
No-Load to Full-Load Voltage Regulation	±0.5%
Thermal Drift	<0.5% (-40°C to 70°C) [-40°F to 158°F] Range
Response Time	Less than 5µS
System Voltage Adjust.	±10%
Voltage Adjustment	Controller Menu Knob
Remote Voltage Adjustment	not available
Paralleling Capability	not available
VAR/PF Control Input	not available

Integral Voltage Regulator with APM402/Decision-Maker® 3000 Controller

- The APM402/Decision-Maker® 3000 digital display and pushbutton/rotary dial provide access to data. A two-line LCD display provides complete and concise information. A two-line vacuum fluorescent display provides complete and concise information.
- The Decision-Maker® 3000 graphical display and pushbutton/rotary dial provide access to data. A five-line, 35-characters per line LCD display provides complete and concise information include gain, ramp rate, reactive droop, VAR control (P, I, D gains) and PF control (P, I, D gains).
- The controllers provide ISO 8528-5, Class G3, compliance for transient response on some 20-300 kW generator set models. Both controllers support Modbus®.
- These controllers can control Fast Response™ II, Fast Response™ X, and wound field alternators using the GM88453 activator board.

Voltage Regulator Menu

- Voltage adjustment, ±10% of system voltage
- V/Hz cut-in, 42-62 Hz
- Underfrequency unload slope, 0-10% of system voltage

Generator Set Calibration Menu (APM402/DEC 3000)

- L1-L2 volts
- L2-L3 volts (3-phase)
- L3-L1 volts (3-phase)
- L1-N volts
- L2-N volts
- L3-N volts (3-phase)

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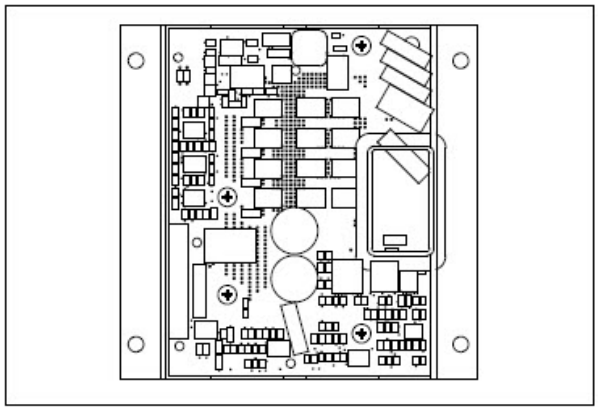
Activator Board GM88453



- Interfaces between the controller and alternator assembly using rotor field leads, auxiliary power windings, and optic board leads.
- Allows the Decision-Maker® controllers the ability to control a wound-field alternator using the same control signal as Fast Response™ alternator.
- Permits the generator set controller to control the current to the exciter field of a wound-field excited alternator.
- Contains two isolated relay driver outputs (RDO) rated at 250 mA. Provides RDO outputs indicating a field over-excitation condition and that the alternator is supplying voltage to the activator.

Model KEP-DFNC-0150S-MK

KOHLER®

ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED

Transfer Switch Standard Features

- Service entrance automatic transfer switches incorporate an isolating mechanism and overcurrent protection on the utility supply, eliminating the need to have a separate, upstream utility source circuit breaker/ disconnect switch
- UL 1008 listed, file #58962
- IBC seismic certification available
- Fully enclosed silver alloy contacts provide high withstand rating
- 3-cycle short circuit current withstand-tested in accordance with UL 1008
- Completely separate utility and generator set power switching units provide redundancy (no common parts) and are easy to service
- Utility disconnect power switching units have overcurrent protection; generator disconnect is available with or without overcurrent protection
  - Molded case circuit breakers (MCCB) include thermal magnetic or electronic trip overcurrent protection (80% rated)
  - Molded case switches (MCSW) do not include overcurrent protection (100% rated) (available on generator disconnect only)
  - Insulated case circuit breakers (ICCB) include elecronic trip overcurrent protection (100% rated)
  - Insulated case switches (ISCW) do not include overcurrent protection (100% rated) (available on generator disconnect only)
- Inherent stored-energy design prevents damage if manually switched while in service
- Heavy duty brushless gear motor and operating mechanism provide mechanical interlocking and extreme long life with minimal maintenance
- Safe manual operation permits easy operation even under adverse conditions
- All mechanical and control devices are visible and readily accessible
- Padlockable service disconnect control switch
- Status indicators
- Two-position control circuit isolation switch disconnects utility power to the transfer switch controller
- Load shed (Forced transfer from Emergency to OFF). (Customer-supplied signal {contact closure} is required for the forced transfer to OFF function.)
- NEMA 1, 3R, 4X and 12 enclosures are availalble

KOHLER®

Service Disconnect Switch

- Service disconnect to OFF position
- Two-position switch with padlockable cover disconnects the normal source and emergency sources
- Controller display show Service Disconnected and the NOT IN AUTO LED flashes
- Lamp illuminates to indicate that the switch is in the DISCONNECT position

Decision-Maker® MPAC 1500 Controller

- LCD display, 4 lines x 20 characters, backlit
- Complete programming and viewing capability at the door using the keypad and LCD display
- LED indicators: Source available, transfer switch position, service required (fault), and "not in auto"
- Modbus communication is standard
- Programmable voltage and frequency pickup and dropout settings
- Programmable time delays
- Programmable generator exerciser
- Time-based load control
- Current-based load control (current-sensing kit required)
- Two programmable inputs and two programmable outputs (one programmable input and one programmable output are used for factory connections on these models are are not available for customer connection)
- Up to four I/O extension modules available
- RS-485 communication standard
- Ethernet communication standard
- Threee-source system
- Prime power

For more information about Decision-Maker® MPAC 1500 features and functions, see specification sheet G11-128.

Codes and Standards

The ATS meets or exceeds the requirements of the following specifications:

- EN6100-4-4 Fast Transient Immunity Severity Level 4
- EN61000-4-5 Surge Immunity Class 4 (voltage sensing and programmable inputs only)
- EIC Specifications for EMI/EMC Immunity:
  - CISPR 11, Radiated Emissions
  - IEC 1000–4–2, Electrostatic Discharge
  - IEC 1000–4–3, Radiated Electromagnetic Fields
  - IEC 1000–4–4, Electrical Fast Transients (Bursts)
  - IEC 1000–4–5, Surge Voltage
  - IEC 1000–4–6, Conducted RF Disturbances
  - IEC 1000–4–8, Magnetic Fields
  - IEC 1000–4–11, Voltage Dips and Interruptions
- IEC 60947-6-1, Low Voltage Switchgear and Control Gear; Multifunction Equipment; Automatic Transfer Switching Equipment
- IEEE Standard 446, IEEE Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications
- IEEE 472 (ANSI C37.90A) Ring Wave Test
- NEMA Standard ICS 10-2005, Electromechanical AC Transfer Switch Equipment
- NFPA 70, National Electric Code
- NFPA 99, Essential Electrical Systems for Health Care Facilities
- NFPA 110, Emergency and Standby Power Systems
- Underwriters Laboratories UL 1008, Standard for Automatic Transfer Switches for Use in Emergency Standby Systems file #58962

Application Data

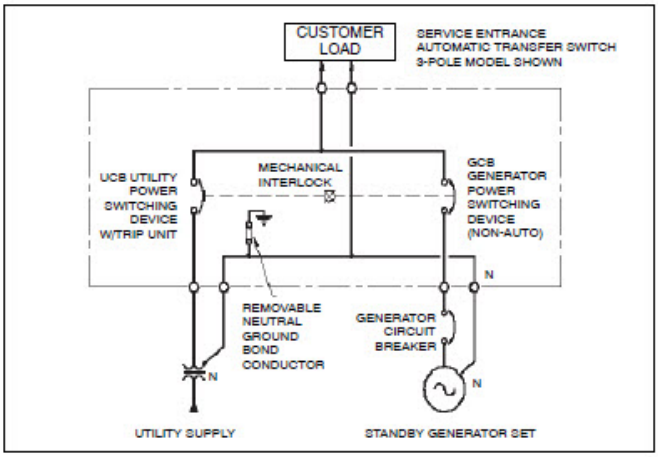
Environmental Specifications	
Operating Temperature	-15°C to 50°C (5°F to 122°F)
Storage Temperature	-20°C to 70°C (-4°F to 158°F)
Humidity	95% noncondensing

Ratings

Interrupting Capacity Current Rating With Integral Overcurrent Protection* (No upstream circuit breaker protection required)				
			Amps RMS	
Power Switching Device	Switch Rating, Amps	Voltage, Max.	Amps RMS @ 240 V	Amps RMS @ 480 V

Molded Case	0150	0600	65,000	25,000
With molded case/insulated case switching devices equipped with integral overcurrent protection.				

Typical Single-Line Diagram



Cable Sizes

Cable Sizes, Al/Cu Wire				
Model	Amps	Circuit Breaker (per phase)	Neutral	Ground
KEP, MCCB	150	(2) #2 - 4/0 AWG	(3) #14 - 2/0 AWG	(3) #14 - 1/0 AWG

Circuit Breaker Specifications

KEP Molded Case Circuit Breakers (MCCB)								
Breaker			Utility Disconnect			Generator Disconnect (note that units with MCSW selectedwill not have a trip unit)		
Mfr	Model	Amps	Trip Unit	Type	Trip Unit Function	Trip Unit	Type	Trip Unit Function
ABB	Tmax Ts3	100	NI	BM/EL	TM	NI	BM/EL	TM
	Tmax Ts3	150	NI	BM/EL	TM	NI	BM/EL	TM
	Tmax Ts3	200	NI	Electronic	TM	NI	Electronic	TM
	Tmax T5	250 2P/3P	PR221	Electronic	LS/I	PR221	Electronic	LS/I
	Isomax S5	250 4P	PR211	Electronic	LI	PR211	Electronic	LI
	Tmax T6	400	PR221	Electronic	LS/I	PR221	Electronic	LS/I
	Tmax T6	600	PR221	Electronic	LS/I	PR221	Electronic	LS/I
	Tmax T6	800	PR221	Electronic	LS/I	PR221	Electronic	LS/I
	Tmax T7	1000	PR33/P	Electronic	LSIG	PR33/P	Electronic	LSIG
	Tmax T7	1200	PR33/P	Electronic	LSIG	PR33/P	Electronic	LSIG

NI= Non-interchangeable TM = Thermal/Magnetic

BM/EL = Bimetal/Electromagnet MCSW = Molded Case Switch

Circuit Breaker Specifications

KEP Molded Case Circuit Breakers (ICCB)								
Breaker			Utility Disconnect			Generator Disconnect (note that units with MCSW selectedwill not have a trip unit)		
Mfr	Model	Amps	Trip Unit	Type	Trip Unit Function	Trip Unit	Type	Trip Unit Function
Schneider	NW	800	ML5.0A	Electronic	LSI	ML 3.0	Electronic	LI
	NW	1000	ML6.0A	Electronic	LSIG	ML 3.0	Electronic	LI
	NW	1200	ML6.0A	Electronic	LSIG	ML 3.0	Electronic	LI
	NW	1600	ML6.0A	Electronic	LSIG	ML 3.0	Electronic	LI
	NW	2000	ML6.0A	Electronic	LSIG	ML 3.0	Electronic	LI
	NW	2500	ML6.0A	Electronic	LSIG	ML 3.0	Electronic	LI
	NW	3000	ML6.0A	Electronic	LSIG	ML 3.0	Electronic	LI
	NW	4000	ML6.0A	Electronic	LSIG	ML 3.0	Electronic	LI
ICSW= Insulated Case Switch ML= Micrologic								

Weights and Dimensions

See ADV drawings for weights and dimensions. Allow 15% additional weight for packing materials

Accessories

Accessories are available either factory-installed or as loose kits, unless otherwise noted.

Heater, Anti-Condensation

- Hygrostat-controlled 120 VAC strip heater (customer supplied voltage source required)
- 100 or 250 watts (sized for enclosure)
- Protective 15 Amp circuit breaker

Warranty

Warranty

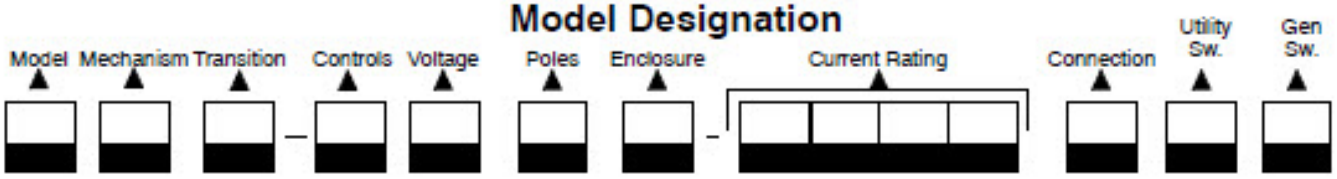
-

Padlockable User Interface Cover

- With or without window
- Cover without window standard on NEMA 3R enclosures

Model KEP-DFNC-0150S-MK , continued

Model Designation



Record the transfer switch model designation in the boxes. The transfer switch model designation defines characteristics and ratings as explained below.

Sample Model Designation: **KEP-DMTA-0400S-NK**

Model

K: Kohler

Mechanism

E: Service Entrance Rated

Transition

P: Programmed

Controller

D: Decision-Maker® MPAC 1500, Automatic

Voltage/Frequency

C:	208 Volts/60 Hz	M:	480 Volts/60 Hz
F:	240 Volts/60 Hz	R:	220 Volts/60 Hz
K:	440 Volts/60 Hz		

Number of Poles/Wires

N: 2 Poles/3 Wires, Solid Neutral
T: 3 Poles/4 Wires, Solid Neutral
V: 4 Poles/4 Wires, Switched Neutral

Enclosure

A:	NEMA 1	C:	NEMA 3R
B:	NEMA 12	F:	NEMA 4X

Current, Amps

0100	0600	2000
0150	0800	2500
0200	1000	3000
0250	1200	4000
0400	1600	

Connections

S: Standard

Utility Switching Device

M: MCCB w/thermal magnetic trip 100–200 A
N: MCCB w/electronic trip 250–800 A
P: MCCB w/electronic trip and GF 1000-1200 A
R: ICCB w/electronic trip 800 A
T: ICCB w/electronic trip and GF 1000–4000 A

Generator Switching Device

K: MCSW 100–1200 A
M: MCCB w/thermal magnetic trip 100–200 A
N: MCCB w/electronic trip 250–1200 A
Q: ICSW 800–4000 A
R: ICCB w/electronic trip 800–4000 A

Note: Some selections are not available for every model. Contact your Kohler distributor for availability.

KOHLER®

Automatic Transfer Switch Controller

Decision-Maker® MPAC 1500

Model KBS with Decision-Maker® MPAC 1500 Controller

Applicable Models

Model	Description
KCS	Standard-Transition Any Breaker ATS ‡
KCP	Programmed-Transition Any Breaker ATS ‡
KCC	Closed-Transition Any Breaker ATS §
KBS	Standard-Transition Mechanically Operated Bypass/Isolation ATS §
KBP	Programmed-Transition Mechanically Operated Bypass/Isolation ATS §
KBC	Closed-Transition Mechanically Operated Bypass/Isolation ATS §
KAS	Standard-Transition Electrically Operated Bypass/Isolation ATS §
KAP	Programmed-Transition Electrically Operated Bypass/Isolation ATS §
KEP	Service Entrance ATS §

‡ Available with automatic or non-automatic controller
§ Available with automatic controller only

Decision-Maker® MPAC 1500 Controller Standard Features

- Microprocessor-based controller
- Environmentally sealed user interface
- LCD display, 4 lines x 20 characters, backlit
- Dynamic function keypad with tactile feedback pushbuttons allows complete programming and viewing capability at the door
- LED indicators: Source available, transfer switch position, service required (fault), and not in auto
- Broadrange voltage sensing (208- 600 VAC) on all phases
- Phase-to-phase sensing and monitoring with 0.5% accuracy on both sources
- Line-to-neutral monitoring
- Frequency sensing with 0.5% accuracy on both sources
- Anti-single phasing protection
- Phase rotation sensing for three-phase systems
- Real-time clock with automatic adjust for daylight saving time and leap year
- Run time clock and operation counter
- Time-stamped event log
- Fail-safe transfer for loaded test and exercise functions
- DIP switches: password disable and maintenance
- Isolated RS-485 ports for Modbus connections (9.6, 19.2, and 57.6 kbps)
- Standard Ethernet communications with RJ45 connector for 10/100 ethernet connection
- Modbus® RTU and Modbus® TCP/IP protocols (Modbus® register map available)
- USB port. Connect a personal computer and use Kohler® SiteTech™ software to view events and adjust settings *
- Available in automatic and non-automatic versions; see supervised transfer control switch on page 5

Programmable Features

- Programming and monitoring methods:
  - Monitoring and password-protected programming at the door using the keypad and display
  - Program using a PC with Kohler SiteTech software *
- Over/undervoltage and over/underfrequency for all phases of the normal and emergency sources
- Adjustable time delays
- Load/no load/auto-load test and load/no-load exercise functions
- Programmable inputs and outputs
- Load bank control for exercise or test
- Time-based and current-based† load control, nine individual time delays for selected loads
- In-phase monitor (3-phase only)
- Password protection, three security levels

* SiteTech software is available to Kohler-authorized distributors and dealers.

† Requires current sensing kit.

Modbus is a registered trademark of Schneider Electric.

Decision-Maker® MPAC 1500 Controller Features

User Interface LED Indicators

- Contactor position: source N and source E
- Source available: source N and source E
- Service required (fault indication)
- Not in automatic mode

LCD Display

- System status
- Line-to-line voltage
- Line-to-neutral voltage
- Active time delays
- Source frequency
- Preferred source selection
- System settings
- Common alarms
- Load current, each phase (current sensing kit required)
- Inputs and outputs
- Faults
- Time/date
- Address
- Event history
- Maintenance records
- Exerciser schedule
- Exerciser mode
- Time remaining on active exercise

Dynamic Function Tactile Keypad Operations

- Scroll up/down/forward/back
- Increase/decrease/save settings
- End time delay
- Start/end test or exercise
- Reset fault
- Lamp test

DIP Switches

- Maintenance mode
- Password disable

Event History

- View time and date-stamped events on the display or on a personal computer equipped with Kohler® SiteTech™ software. *****
- Download complete event history files using Kohler SiteTech software and a PC connected to the USB port. *****

Main Logic Board Inputs and Outputs

- Two (2) programmable inputs
- Two (2) programmable outputs

† System parameters are factory-set per order.

Modbus is a registered trademark of Schneider Electric.

Communications

- Ethernet communications with RJ-45 connector for 10/100 ethernet connection
- Isolated RS-485 ports for Modbus communications
- Modbus® RTU and Modbus® TCP/IP protocols (Modbus® register map available)
- USB Port. Use SiteTech software to upload or download files and adjust transfer switch settings
  - Application software
  - Event history files
  - Language files
  - Parameter settings
  - Usage reports
  - Feature configuration

Programmable Features

- System voltage, 208- 600 VAC †
- System frequency, 50/60 Hz †
- Single/three-phase operation †
- Standard/programmed/closed-transition operation †
- Bypass/isolation enable/disable †
- Service entrance enable/disable †
- Preferred source selection allows the normal or emergency source to be used when both sources are available (alarm module required)
- Phase rotation: ABC/BAC/none selection with error detection
- Voltage and frequency pickup and dropout settings
- Voltage unbalance, enable/disable
- In-phase monitor: enable/disable and phase angle
- Transfer commit/no commit
- Source/source mode: utility/gen, gen/gen, utility/utility, or utility/gen/gen for 3-source systems
- Passwords, system and test
- Three-source system setup allows the use of one utility source and two generator sets
- Time, date, automatic daylight saving time enable/disable
- Time delays (see table)
- Exerciser: calendar mode, loaded/unloaded up to 21 events
- Test: loaded/unloaded/auto load (1- 60 minutes)
- Remote test: loaded/unloaded
- Automatic override on generator failure (loaded test and exercise)
- Peak shave delay enable/disable
- Current monitoring (current sensing kit required)
- Load control pre/post-transfer delays, 9 individual time delays for selected loads
- Current-based load control settings: high/low current levels and load add/remove priority for 9 separate loads (current sensing kit required)
- Prime power sequence alternates between two generator sets with adjustable generator set runtimes
- Resettable historical data

Decision-Maker® MPAC 1500 Controller Features, Continued

Programmable Inputs

- Bypass contactor disable (for bypass/isolation switches)
- Forced transfer to OFF (programmed-transition models only; requires load shed accessory)
- Inhibit transfer
- Low battery voltage (external battery supply module required)
- Peak shave/area protection input
- Remote common fault
- Remote test
- Remote end time delay
- Remotely monitored inputs, four (4) available
- Service disconnect (for service entrance models)
- Three-source system disable

Programmable Outputs

- Alarm silenced
- Audible alarm
- Chicago alarm control
- Common alarm events
- Contactor position
- Exercise active
- Fail to open, source 1/source 2 (service entrance models)
- Fail to close, source 1/source 2 (service entrance models)
- Failure to acquire preferred source
- Failure to acquire standby source
- Failure to transfer
- Generator engine start, source N and E
- I/O module faults
- In-phase monitor synch
- Load bank control
- Load control active (pre/post transfer delay, up to 9 outputs)
- Loss of phase fault, source N and E
- Low battery fault (external battery supply module required)
- Maintenance mode
- Non-emergency transfer
- Not in automatic mode
- Over/underfrequency faults, source N and E (generator)
- Over/undervoltage faults, source N and E
- Peak shave/area protection active
- Phase rotation error, source N and E
- Preferred source supplying load
- Software-controlled relay outputs (four maximum)
- Source available, preferred and standby
- Standby source supplying load
- Test active
- Three-source system disable
- Transfer switch auxiliary contact fault
- Transfer switch auxiliary contact open
- Voltage unbalance, source N and E

Voltage and Frequency Sensing

Parameter	Default	Adjustment Range
Undervoltage dropout	90% of pickup	75%-98%
Undervoltage pickup	90% of nominal	85%-100%
Overvoltage dropout *	115% of nominal*	106%-135%
Overvoltage pickup	95% of dropout	95%-100%
Unbalance enable	Disable	Enable/Disable
Unbalance dropout	20%	5%-20%
Unbalance pickup	10%	3%-18%
Voltage dropout time	0.5 sec.	0.1-9.9 sec.
Underfrequency dropout	99% of pickup	95%-99%
Underfrequency pickup	90% of nominal	80%-95%
Overfrequency dropout	101% of pickup	101%-115%
Overfrequency pickup	110% of nominal	105%-120%
Frequency dropout time	3 sec.	0.1-15 sec.

* 690 volts, maximum. Default = 110% for 600 volt applications.

Adjustable Time Delays

Time Delay	Default	Adjustment Range
Engine start, Source S2	3 sec.	0-6 sec. †
Engine start, Source S1 (gen/gen)	3 sec.	
Engine cooldown, Source S2	5 min.	0-60 min.
Engine cooldown, S1 (gen/gen)	5 min.	
Fail to acquire standby source	1 min.	
Fail to acquire preferred source	1 min.	
Transfer, preferred to standby	3 sec.	
Transfer, standby to preferred	15 min.	
Transfer, off to standby	1 sec.	1 sec. - 60 min.
Transfer, off to preferred	1 sec.	
Fail to synchronize	60 sec.	10 sec - 15 min.
Auto load test termination after transfer	1 sec.	1 sec.-60 min.
Prime power run duration	6 min.	6 min. - 100 days (6 min. increments)
Load Control Time Delays:		
Pretransfer to preferred	0 sec.	0-60 min.
Post-transfer to preferred	0 sec.	
Pretransfer to standby	0 sec.	
Post-transfer to standby	0 sec.	
Load add Source1/Source2	0 sec.	
Load remove Source1/Source2	0 sec.	

Note: Time delays are adjustable in 1 second increments, except as noted.

† Engine start time delay can be extended to 60 minutes with an External Battery Supply Module Kit.

Accessory Modules

The mounting kit holds up to five optional modules.

Module Current Draw Specifications, mA	
Alarm Module	75
Standard I/O Module	75
High Power I/O Module	100
Maximum Total Current *	300

* If an External Battery Module is installed, there is no current restriction.

❑ Standard Input/Output Module

Inputs	
Available Inputs	2
Input Definition	Contact closure
Current	5 mA Max
Connection Type	Terminal Strip
Wire Size	#14- 24 AWG
Max Distance	700 feet
Outputs	
Outputs Available	6
Contact Type	Form C (SPDT)
Contact Voltage Rating	2 A @ 30 VDC 500 mA @ 125 VAC
Connection Type	Terminal Strip
Wire Size	#14- 24 AWG

❑ High-Power Input/Output Module

Inputs	
Available Inputs	2
Input Definition	Contact closure
Current	5 mA Max
Connection Type	Terminal Strip
Wire Size	#14- 24 AWG
Max Distance	700 feet
Outputs	
Outputs Available	3
Contact Type	Form C (SPDT)
Contact Voltage Rating	12 A @ 24 VDC 12 A @ 250 VAC 10 A @ 277 VAC 2 A @ 480 VAC
Connection Type	Terminal Strip
Wire Size	#14- 24 AWG
Environmental Specifications	
Temperature	- 40°C to 85°C (- 40°F to 185°F)
Humidity	35% to 85% noncondensing

❑ Alarm Module

- 90 dB Audible alarm
- Any alarm function can be programmed to trigger the audible alarm
- Chicago alarm function
- Preferred source selection
- Supervised transfer control (supervised transfer control switch required)
- Connection for external alarm

External Alarm Connection Specifications	
Wire Size	#12- 22 AWG Cu
Contact Voltage Rating	500 mA @ 120 VAC
	250 mA @ 240 VAC

❑ External Battery Supply Module

- Energizes the ATS controls using an external battery when no source power is available
- Allows extended engine start time delays
- Allows the use of any combination of accessory modules (no current draw restriction, maximum of five modules total)
- Connects to one or two batteries, 12 VDC or 24 VDC system
- Current draw, 140 mA @ 12 VDC, 86 mA @ 24 VDC
- Provides low external battery voltage indication to the transfer switch controller
- Reverse-polarity protected

Other Controller Accessories

Accessories are available either factory-installed or as loose kits, unless otherwise noted.

❑ Controller Disconnect Switch

- Disconnects power to controller without disconnecting load
- Mounts inside the enclosure

❑ Current Sensing Kit

- Monitor current on all phases with 1% accuracy

❑ Digital Meter

- Measure and display voltage, current, frequency, and power
- 35 programmable alarms
- LCD display, 67 x 62.5 mm (2.65 x 2.5 in.)
- Pushbutton operation
- Password- protected programming menus
- Two digital inputs
- Two digital outputs
- Two Form A relay outputs
- Serial port for optional network connections
- Data logging
- Factory- installed

❑ Load Shed Kit

- Forced transfer from Emergency to OFF for programmed-transition and closed-transition models
- Customer-supplied signal (contact closure) is required for the forced transfer to OFF function
- Factory-installed and loose kits available for models KCC and KCP
- Factory-installed only for other programmed-transition and closed-transition models

❑ Padlockable User Interface Cover

- Provides additional protection against unauthorized access
- Standard on NEMA 3R enclosures

❑ RSA III Remote Serial Annunciator

- Monitors the generator set
- Monitors Normal and Emergency source status and connection
- Monitors ATS common alarm
- Allows remote testing of the ATS
- For more information about RSA III features and functions, see specification sheet G6- 139.

❑ Supervised Transfer Control Switch

- Standard on models with non-automatic controls
- Optional for models with automatic controls
- Auto, manual, and transfer positions
- Automatic and non-automatic modes
- Alarm module required

Supervised Transfer Control Switch Operation for Automatic and Non-Automatic Transfer Switches		
Switch Position	**Automatic Switches**	**Non-Automatic Switches**
AUTO	• Automatically transfers to the standby source, when available, if the preferred source is lost. • Transfers back to the preferred source when it becomes available.	
MANUAL	• Automatically transfers to an available source if the connected source is lost. • Test, peak shave, and loaded exercise commands will transfer to the standby source. • Does not automatically transfer back to preferred when both sources are available.	• Does not automatically transfer to an available source when the connected source is lost. • Test, peak shave, and loaded exercise commands are ignored. • Does not automatically transfer back to preferred when both sources are available. • Transfers only when the switch is manually moved to the TRANSFER position as described below.
TRANSFER (momentary switch position)	• Does not initiate an engine start sequence. Generator set engine must be signalled to start by an event such as a loss of utility, loaded test, loaded exercise, etc. • Allows transfer to the other source, if available. An event such as a loss of utility, loaded exercise, or loaded test must first initiate the transfer sequence. • Time delays will operate. Wait for time delays to expire, or press the End Time Delay button. • Operates pre- and post-transfer load control time delays if both sources are available. • MANUAL TRANSFER is displayed when the ATS is ready to transfer.	

KOHLER CO., Kohler, Wisconsin 53044 USA
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales and service outlet in the US and Canada, phone 1-800-544-2444
KOHLERPower.com

Environmental Specifications	
Operating Temperature	-20°C to 70°C (-4°F to 158°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% noncondensing

Main Board I/O Specifications	
Output contact type	Isolated form C (SPDT)
Output contact rating	1 amp @ 30 VDC, 500 mA @120 VAC
I/O terminals wire size	#12-24 AWG

DISTRIBUTED BY:

Availability is subject to change without notice. Kohler Co. reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever. Contact your local Kohler® Power Systems distributor for availability.

KOHLER®

Alternator Data

TECHNICAL INFORMATION BULLETIN

Alternator Data Sheet

Alternator Model: 4P7BX
Frequency: 60 Hz
Speed: 1800 RPM
Leads: 12 (6 Lead, 600 Volt)

Voltage L-N/L-L	Phase	Power Factor	Connection	kW* (kVA)						
				Class B	Class F				Class H	
				80°C Continuous	90°C Lloyds	95°C ABS	105°C Continuous	130°C Standby	125°C Continuous	150°C Standby
139/240 277/480	3	0.8	Wye	47.5 (59.0)	51.0 (63.5)	52.0 (65.0)	54.5 (68.0)	60.0 (75.0)	58.5 (73.0)	61.5 (76.5)
127/220 254/440	3	0.8	Wye	47.0 (58.5)	49.5 (61.5)	50.5 (63.0)	52.0 (65.0)	57.5 (71.5)	56.0 (70.0)	59.5 (74.0)
120/208 240/416	3	0.8	Wye	45.5 (56.5)	47.0 (58.5)	48.0 (60.0)	49.5 (61.5)	54.5 (68.0)	53.5 (66.5)	57.0 (71.0)
110/190 220/380	3	0.8	Wye	41.5 (51.5)	42.5 (53.0)	43.5 (54.0)	45.0 (56.0)	49.5 (61.5)	48.5 (60.5)	52.0 (65.0)
120/240	3	0.8	Delta	45.5 (56.5)	47.0 (58.5)	48.0 (60.0)	49.5 (61.5)	54.5 (68.0)	53.5 (66.5)	57.0 (71.0)
120/240	1	1.0	Dogleg	38.0 (38.0)	39.5 (39.5)	40.0 (40.0)	41.5 (41.5)	44.5 (44.5)	44.0 (44.0)	46.5 (46.5)
120/240	1	0.8	Dogleg	28.5 (35.5)	30.0 (37.5)	30.5 (38.0)	31.5 (39.0)	34.0 (42.5)	33.5 (41.5)	35.5 (44.0)
347/600	3	0.8	Wye	47.0 (58.5)	49.5 (61.5)	50.5 (63.0)	52.0 (65.0)	57.5 (71.5)	56.0 (70.0)	59.5 (74.0)

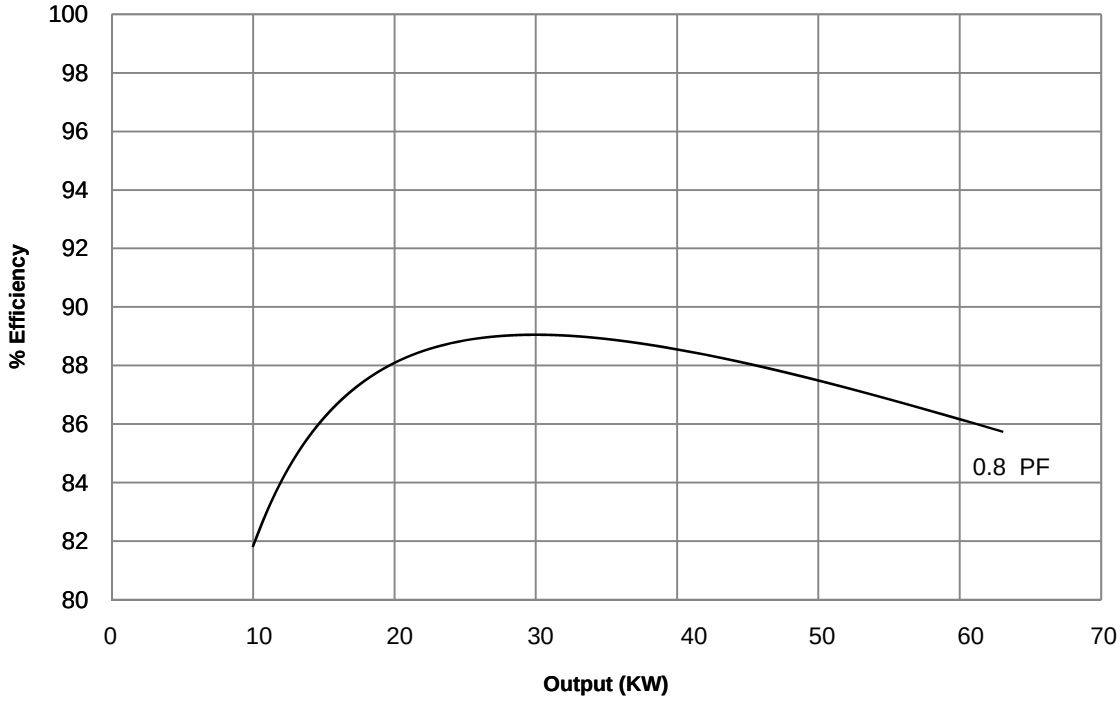
* All data tested in accordance with IEEE Standard 115. Kohler Co. reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever.

Submittal Data: 139/240 Volts, 0.8 PF, 1800 RPM, 60 Hz, 3 Phase, 130°C Rise

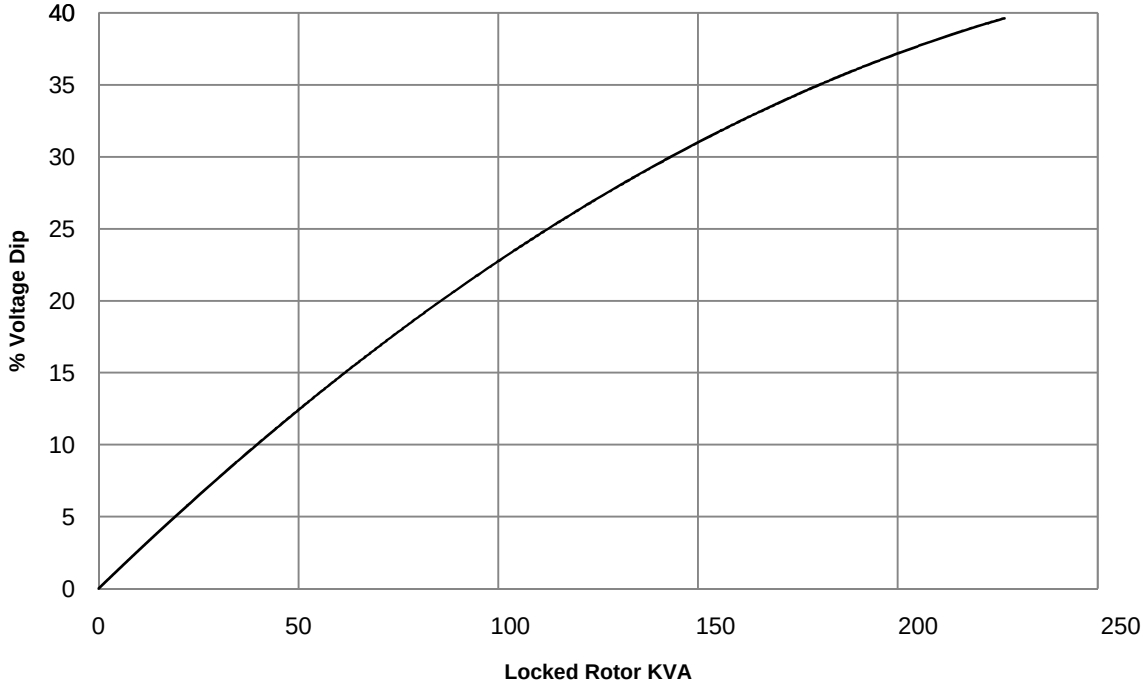
	Symbol	PerUnit	Ohms
Typical Cold Resistances			
Phase Resistance		0.035	0.027
Rotor Resistance		7.439	5.714
Typical Reactances			
Synchronous			
Direct	X_d	3.579	2.749
Quadrature	X_q	1.738	1.335
Transient			
Unsaturated	X'_{du}	0.392	0.301
Saturated	X'_d	0.345	0.265
Subtransient			
Direct	X''_d	0.163	0.125
Quadrature	X''_q	0.148	0.114
Negative Sequence	X_2	0.155	0.119
Zero Sequence	X_0	0.012	0.009

	Symbol	Value
Typical Time Constants		
Armature Short Circuit	T_a	0.008 sec.
Transient Short Circuit	T'_d	0.068 sec.
Transient Open Circuit	T'_{do}	0.702 sec.
Typical Field Current		
Full Load	If_{FL}	17.9 amps
No Load	If_{NL}	4.0 amps
Typical Short Circuit Ratio		0.277
Harmonic Distortion		
RMS Total Harmonic Distortion		3.27%
Max. Single Harmonic		5th
Deviation Factor (No Load, L-L)		<5%
Telephone Influence Factor		61.2
Insulation Class		
per NEMA MG1-1.66		H
Phase Rotation		ABC

4P7BX, 60 Hz, 139/240, 277/480 Volts, Wye
TYPICAL ALTERNATOR EFFICIENCY*

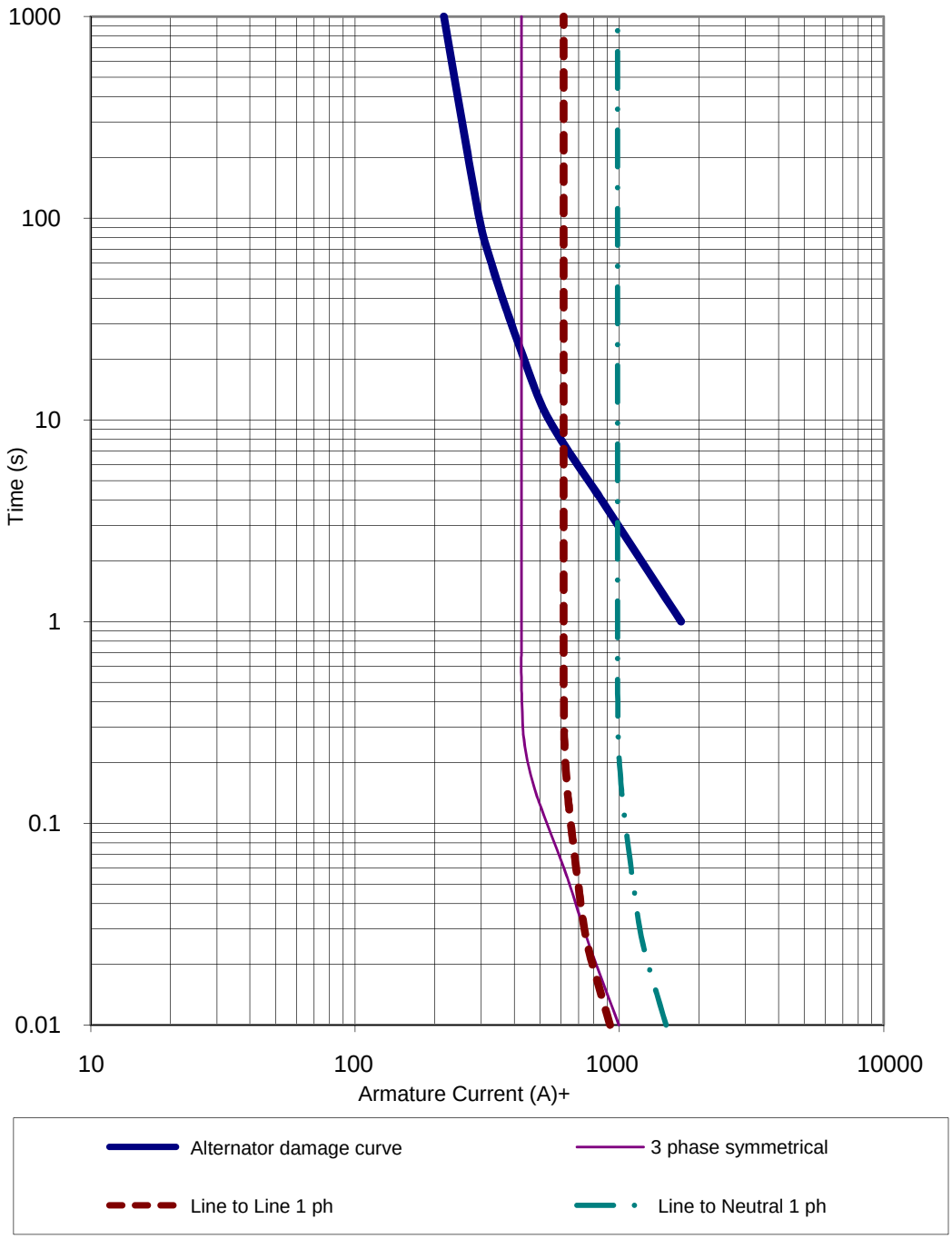


4P7BX, 60 Hz, 139/240, 277/480 Volts, Wye
TYPICAL MOTOR STARTING CHARACTERISTICS*



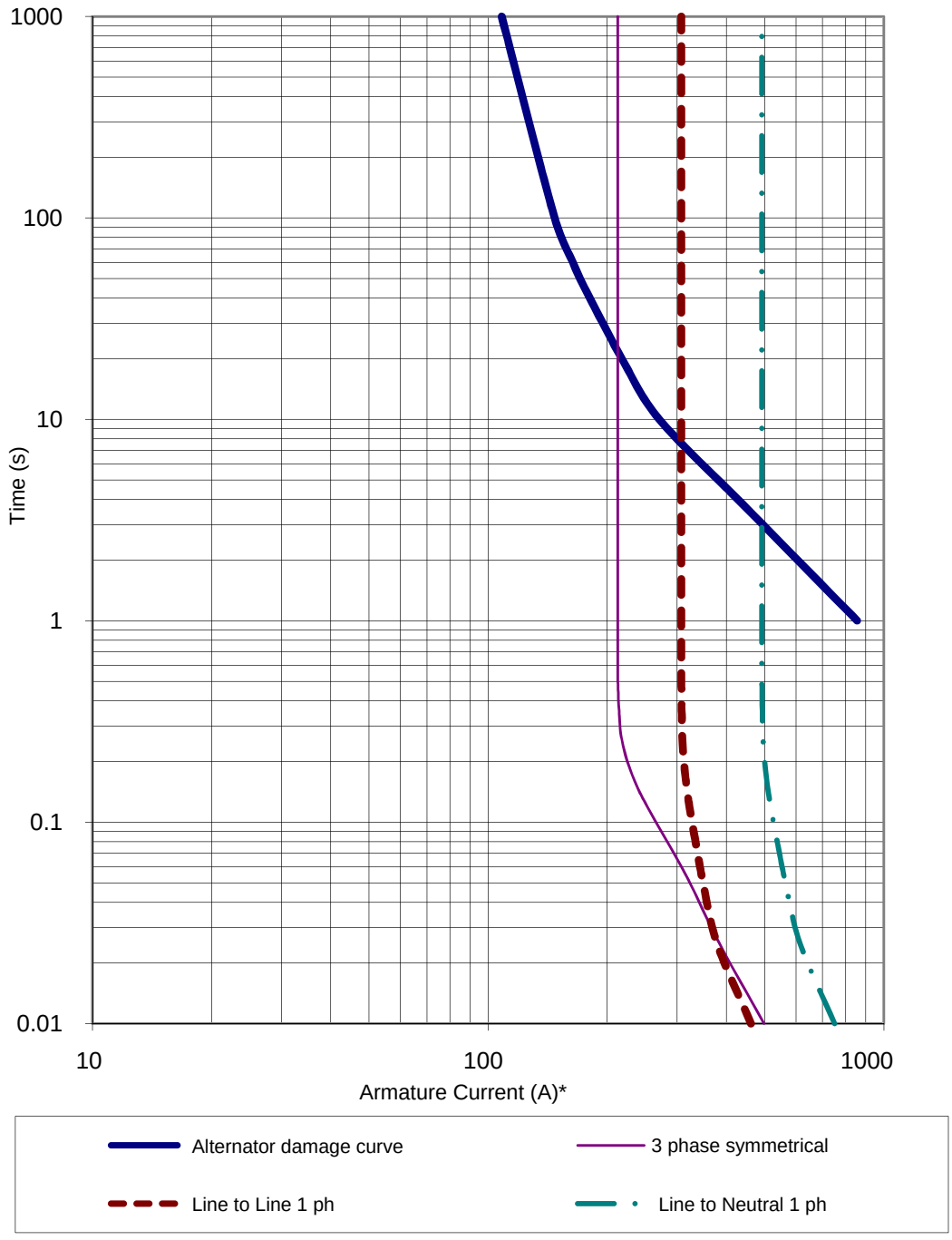
* All data tested in accordance with IEEE Standard 115. Kohler Co. reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever.

4P7BX, 60 Hz, Low Wye or Delta Connection
SHORT CIRCUIT DECREMENT CURVE



* Instantaneous current (t=0) is asymmetric. Divide by 1.73 for symmetric.

4P7BX, 60 Hz, High Wye Connection
SHORT CIRCUIT DECREMENT CURVE



* Instantaneous current (t=0) is asymmetric. Divide by 1.73 for symmetric.

KOHLER®

Cooling Data

TECHNICAL INFORMATION BULLETIN

Generator Set Cooling System Data Sheet

	50°C Ambient Temperature Cooling System								
KG45 60Hz (Standby Duty)	**Total external restriction on open unit[7]**	Pa *(in.H_2O)*	0 (0)	125 (0.5)	187 (0.75)	250 (1)	312 (1.25)	375 (1.5)	**Enclosed Units**
	Maximum allowable ambient temperature	°C *(°F)*	50 (122)	46 (115)	43 (109)	40 (104)	NA (NA)	NA (NA)	45 (113)
	Cooling system airflow	m^3/min *(ft^3/min)*	120 (4200)	107 (3800)	99 (3500)	91 (3200)	NA (NA)	NA (NA)	NA (NA)

1. The data shown above is the anticipated cooling performance for a typical generator set when following proper installation techniques.
2. Cooling performance is based on operation at 100 m (328 ft.) above sea level. For elevations higher than 100 m (328 ft.), typical cooling performance derate is 1°C (1.8°F) per 250 m (820 ft.).
3. For high ambient conditions, check TIB-101 for the generator set power output derate schedule.
4. Incorrect installation, improper operation, fouling of the cooling system, and other variable conditions may reduce cooling performance.
5. Kohler manufactured sound enclosed models are rated in free air with no additional restriction. Consult factory for other variants or conditions such as additional ducting or hoods.
6. Performance is based on a 50/50 water and ethylene glycol mixture.
7. Total external restriction includes restriction upstream and downstream of the unit – any ducting supplying intake air to the unit and any ducting for the discharge.

KOHLER®

Sound Data

TECHNICAL INFORMATION BULLETIN

Generator Set Sound Data Sheet

			Sound Pressure Data in dB(A)			
Generator Set Model	**Hz**	**Load**	**Raw Exhaust**	**Open Unit, Isolated Exhaust**	**Weather Enclosure**	**Sound Enclosure**
KG45	60	100% Load	110.0	80.8	78.9	65.0
		No Load	101.0	80.4	78.5	62.6
Note: Sound pressure data is the logarithmic average of eight perimeter measurement points at a distance of 7 m (23 ft.), except Raw Exhaust data which is a single measurement point at 1 m (3.3 ft.) from the mouth of a straight pipe exhaust.						

KG45	**60 Hz**

				Sound Pressure Levels dB(A)								
				Octave Band Center Frequency (Hz)								Overall Level
Load	Distance, m (ft.)	Enclosure	Measurement Clock Position	63	125	250	500	1000	2000	4000	8000	
100% Load	7 (23)	Sound	3:00	42.1	53.2	55.4	58.3	60.2	57.7	54.3	47.6	65.1
			1:30	38.4	47.9	55.7	59.8	57.4	57.9	53.9	46.8	64.6
			12:00-Engine	42.5	51.0	54.1	60.0	61.9	58.8	54.1	47.4	66.0
			10:30	42.9	53.7	56.0	59.1	61.7	57.0	52.2	45.8	65.6
			9:00	43.6	54.0	54.4	57.2	58.1	53.6	49.1	43.6	63.1
			7:30	41.9	51.8	55.2	58.8	60.6	56.1	51.7	44.7	64.7
			6:00-Alternator	43.5	54.3	54.1	58.5	59.9	57.0	51.8	43.6	64.6
			4:30	41.9	50.9	55.0	59.0	62.4	57.8	54.0	47.3	65.9
			8-pos. log avg.	42.3	52.5	55.0	58.9	60.6	57.2	52.9	46.1	65.0

				Sound Pressure Levels dB(A)								
Load	Distance, m (ft.)	Enclosure	Measurement Clock Position	3:00	1:30	12:00 Eng.	10:30	9:00	7:30	6:00 Alt.	4:30	8-pos. log avg.
100% Load	7 (23)	Weather	Overall Levels	78.6	78.3	79.9	81.7	78.8	78.6	73.3	78.3	78.9

				Sound Pressure Levels dB(A)								
				Octave Band Center Frequency (Hz)								Overall Level
Load	Distance, m (ft.)		Measurement Clock Position	63	125	250	500	1000	2000	4000	8000	
100% Load	7 (23)	Open Unit, Isolated Exhaust	3:00	40.2	54.7	67.7	72.9	76.2	75.2	70.3	61.1	80.5
			1:30	38.6	52.9	66.6	70.3	76.1	74.6	71.7	64.7	80.2
			12:00-Engine	46.1	59.5	69.1	76.0	76.1	76.0	72.8	64.4	81.8
			10:30	42.7	57.2	67.0	74.0	77.7	80.1	75.2	66.2	83.6
			9:00	41.0	54.0	68.1	73.5	74.6	76.5	71.5	62.4	80.7
			7:30	43.2	55.7	66.1	72.3	75.1	76.5	70.8	60.6	80.5
			6:00-Alternator	43.0	56.6	66.3	70.5	69.7	67.9	61.5	51.0	75.2
			4:30	41.7	55.5	66.3	72.5	75.1	75.9	69.9	60.1	80.2
			8-pos. log avg.	42.6	56.2	67.3	73.1	75.5	76.3	71.6	62.8	80.8

			Sound Pressure Levels dB(A)								
			Octave Band Center Frequency (Hz)								Overall Level
Load	Distance, m (ft.)	Exhaust	63	125	250	500	1000	2000	4000	8000	
100% Load	1 (3.3)	Raw Exhaust (No Silencer)	74.3	89.8	100.9	102.7	103.5	105.1	101.4	82.3	110.0

KG45	60 Hz

Load	Distance, m (ft.)	Enclosure	Measurement Clock Position	Sound Pressure Levels dB(A)								
				Octave Band Center Frequency (Hz)								Overall Level
				63	125	250	500	1000	2000	4000	8000	
No Load	7 (23)	Sound	3:00	43.8	51.0	53.4	56.0	57.9	51.8	45.0	37.6	62.0
			1:30	38.6	46.9	54.9	59.0	54.1	52.3	47.3	35.0	62.1
			12:00-Engine	42.3	49.3	54.0	59.2	59.2	56.5	49.5	41.9	64.1
			10:30	43.0	49.1	53.4	57.9	60.1	54.0	46.8	38.9	63.6
			9:00	42.8	48.9	51.4	55.2	56.1	50.8	44.8	38.0	60.6
			7:30	40.6	48.4	53.6	57.1	58.0	53.1	47.0	36.7	62.3
			6:00-Alternator	42.4	48.0	52.5	56.5	57.1	53.5	47.9	35.7	61.8
			4:30	42.1	48.8	54.0	57.8	59.1	52.8	47.3	37.5	63.0
			8-pos. log avg.	42.2	48.9	53.5	57.5	58.0	53.4	47.2	38.2	62.6

Load	Distance, m (ft.)	Enclosure	Measurement Clock Position	Sound Pressure Levels dB(A)								
				3:00	1:30	12:00 Eng.	10:30	9:00	7:30	6:00 Alt.	4:30	8-pos. log avg.
No Load	7 (23)	Weather	Overall Levels	78.2	77.8	79.3	81.3	78.2	78.1	72.8	78.1	78.5

Load	Distance, m (ft.)		Measurement Clock Position	Sound Pressure Levels dB(A)								
				Octave Band Center Frequency (Hz)								Overall Level
				63	125	250	500	1000	2000	4000	8000	
No Load	7 (23)	Open Unit, Isolated Exhaust	3:00	39.9	52.9	66.8	72.5	75.7	75.1	69.8	60.8	80.1
			1:30	37.3	51.3	65.6	69.8	75.7	74.2	71.4	64.7	79.7
			12:00-Engine	42.4	53.4	68.7	75.7	75.5	75.4	71.3	63.2	81.2
			10:30	41.5	53.2	66.1	73.9	77.3	79.6	74.7	65.8	83.2
			9:00	40.3	51.5	66.9	73.1	73.8	76.0	71.0	62.0	80.1
			7:30	39.8	51.6	65.3	72.0	74.6	76.0	70.0	60.1	80.0
			6:00-Alternator	40.4	54.3	65.5	70.5	69.0	67.4	60.2	49.6	74.7
			4:40	40.9	52.8	66.0	72.4	74.7	75.9	69.9	60.0	80.0
			8-pos. log avg.	40.5	52.7	66.5	72.8	75.0	75.9	71.0	62.4	80.4

Load	Distance, m (ft.)	Exhaust	Sound Pressure Levels dB(A)								
			Octave Band Center Frequency (Hz)								Overall Level
			63	125	250	500	1000	2000	4000	8000	
No Load	1 (3.3)	Raw Exhaust (No Silencer)	63.8	74.8	92.5	95.5	94.3	95.4	90.0	81.0	101.0

TECHNICAL INFORMATION BULLETIN

Enclosed Generator Set Exhaust System Data Sheet

Model	Enclosure Type	Consumed Back Pressure (in H20)	Consumed Back Pressure (in Hg)	Back Pressure Limit(s) (in H20)	Back Pressure Limit(s) (in Hg)	Flex Exhaust Tube(s)	Silencer	Drawing
KG45	All Weather and Sound Enclosures	21.0	1.5	40.8	3.0	GM103336 Flex Tube	GM103334	ADV-8967

1. Total system exhaust back pressure is applicable to generator sets equipped with Kohler standard enclosure packages.
2. For generator sets with multiple exhaust outlets, total system exhaust back pressure value represents each outlet.
3. The total system back pressure should not exceed the manufacturer's recommended limit.
4. The total back pressure only includes exhaust components installed inside the Kohler enclosure. Customers must calculate any additional back pressure caused by piping, extensions, or components added after the silencer outlet. Refer to the installation manual for additional details.

KOHLER®

Emissions Data

KOHLER®

KG45

60 Hz. Gas Generator Set

EPA Certified for Stationary Emergency Applications

EMISSION DATA SHEET

ENGINE INFORMATION

Model:	KG6208	Bore:	101.6mm (4.00 in.)
Nameplate kW @ 1800 RPM:	73 (NG) 77 (LPG)	Stroke:	95.25mm (3.75 in.)
Type:	4-Cycle,V8 Cylinder	Displacement:	6.2 L (378 cu. in.)
Aspiration:	Natural	EPA Family (LP):	MKHXB06.2NLP
Compression Ratio:	10.5:1	EPA Family (NG):	MKHXB06.2NNG
Catalyst Required:	No	EPA Certificate (LP):	MKHXB06.2NLP-005
		EPA Certificate (NG):	MKHXB06.2NNG-006

EXHAUST EMISSION DATA (g/kW-hr):

	LPG	NG
CO_2	890	776
NOx	6.7	6.8
THC+NOx*	8.3	7.2
CO	30.4	20.0
BSFC	315	298

*NG fuel is NMHC+NOx

TEST METHODS AND CONDITIONS

Standby and overload ratings based on ISO 3046. Continuous ratings based on ISO 8528.
Nameplate power rating is measured at the flywheel operating at standard conditions in a test cell.
Production tolerances in engines and installed components can account for power variations of +/- 5%. Corrections for altitude, temperature and excessive exhaust and intake restrictions should be applied to power calculations.

Electrical ratings are an estimated based on assumed fan and generator losses and may vary depending on actual equipment losses.
Emission rates are based on multi-mode, cycle-weighted testing in accordance with EPA regulations.
BSFC is based on cycle-weighted gross flywheel power rating and does not include fan or generator losses.

Data was taken from a single engine test according to the test methods, fuel specification and reference conditions stated above and is subjected to instrumentation and engine-to-engine variability. Tests conducted with alternate test methods, instrumentation, fuel or reference conditions may yield different results.

Data and specifications subject to change without notice.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2021 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **Kohler Co.**
(U.S. Manufacturer or Importer)

Certificate Number: MKHXB06.2NNG-006

Effective Date: 12/01/2020

Expiration Date: 12/31/2021

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 12/01/2020

Revision Date: N/A

Manufacturer: Kohler Co.
Engine Family: MKHXB06.2NNG
Mobile/Stationary Certification Type: Stationary
Fuel : Natural Gas (CNG/LNG)
Emission Standards :
Part 90 Phase 1
CO (g/kW-hr) : 519.0
NMHC + NOx (g/kW-hr) : 13.4
Emergency Use Only : Y

Pursuant to Section 213 of the Clean Air Act (42 U.S.C. section 7547) and 40 CFR Part 60, 1065, 1068, and 60 (stationary only and combined stationary and mobile) and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following nonroad engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new nonroad spark-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60. This certificate of conformity does not cover nonroad engines imported prior to the effective date of the certificate.

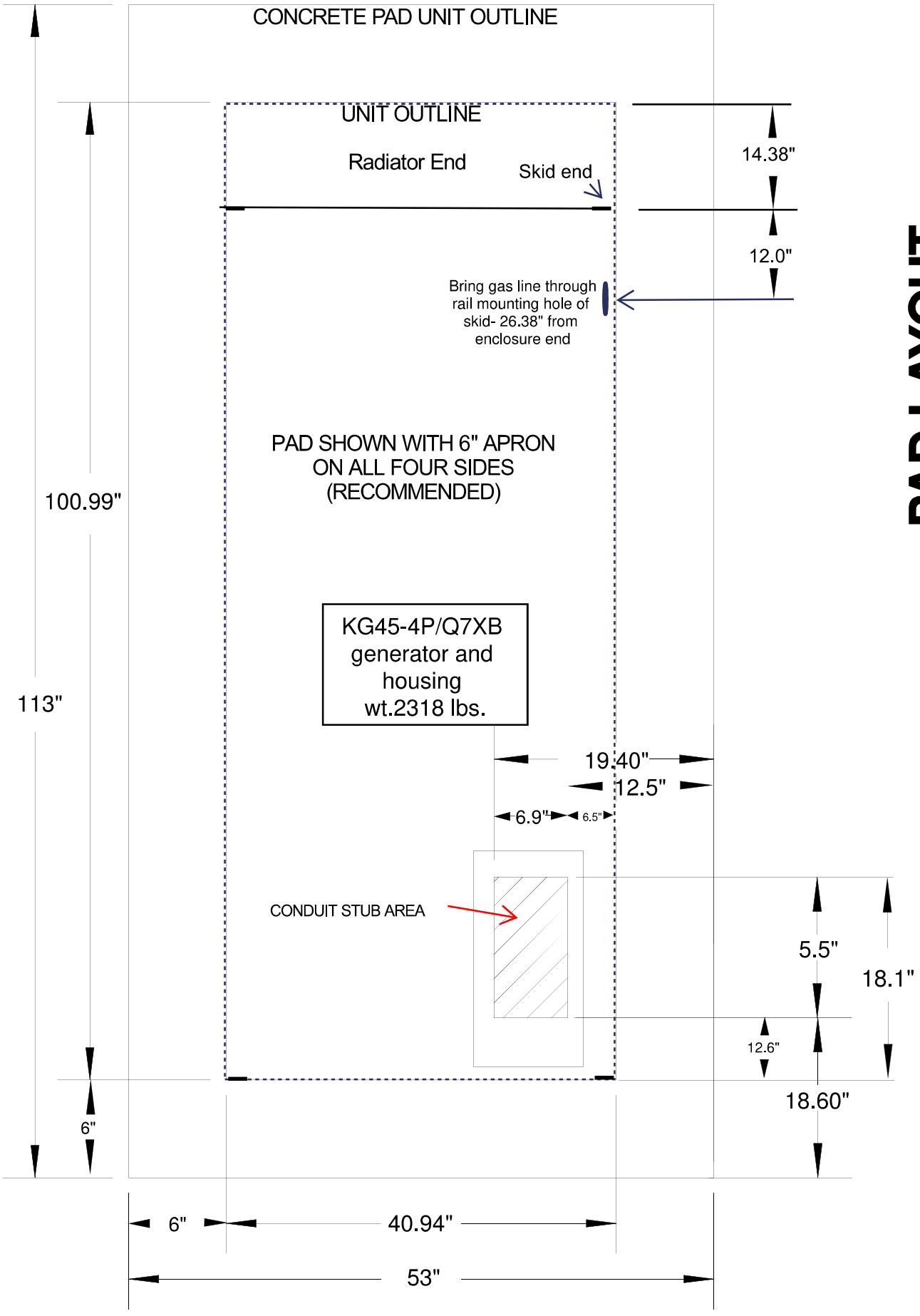
It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068.20 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60.

This certificate does not cover large nonroad engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

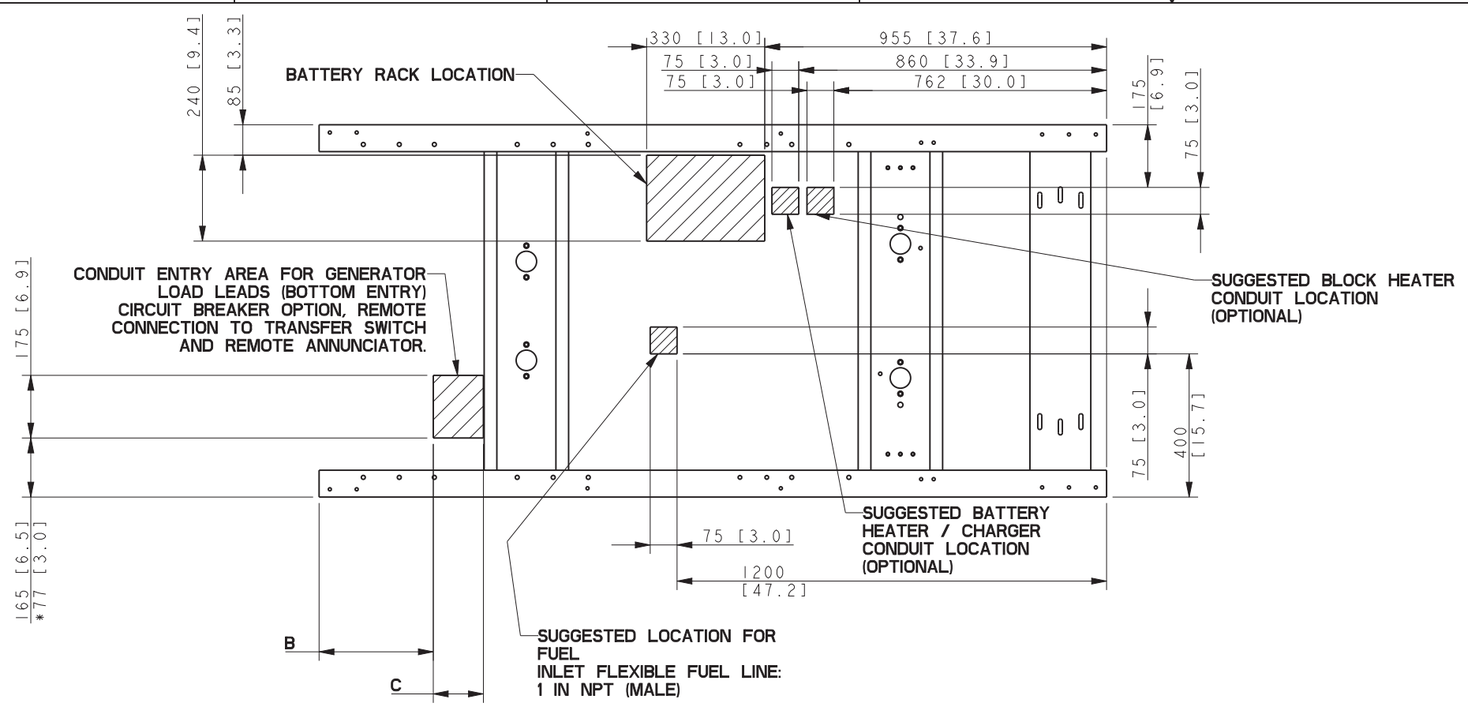
KOHLER®

Dimensional Drawings

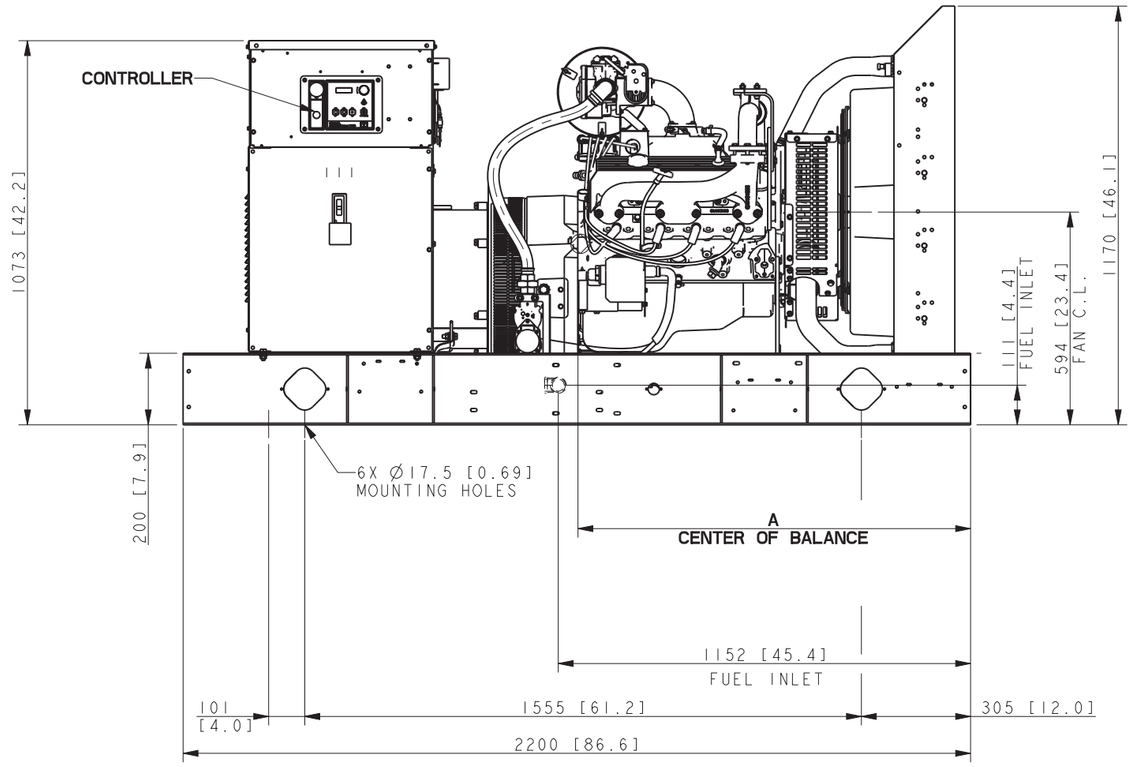
PAD LAYOUT

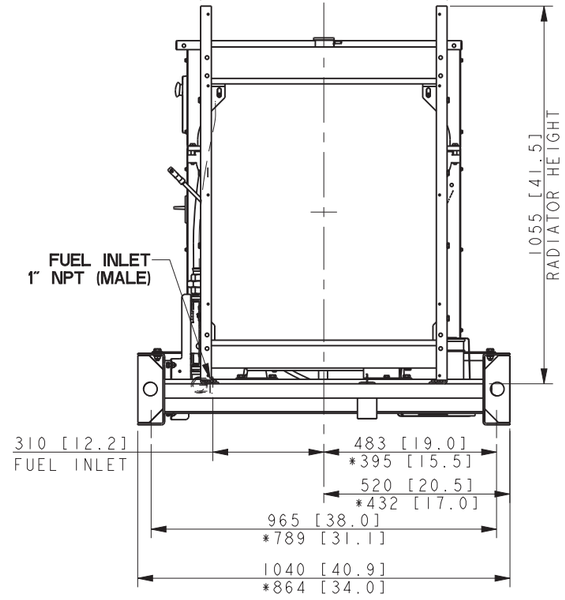


NOTE: This pad layout is designed to assist in preferred conduit locations. Please refer to the tank ADV drawing for exact dimensions.



MODEL	ALTERNATOR	WEIGHT (WET)	A	B	C
40kW	4P5X/4Q5X	771 Kg [1699 LBS]	1005[39.6]	319[12.6]	140[5.5]
40kW/45kW	4P7BX/4Q7BX	807 Kg [1780 LBS]	1045[41.1]	319[12.6]	140[5.5]
60kW	4P7BX	807 Kg [1780 LBS]	1045[41.1]	219[8.6]	240[9.4]
45kW/60kW	4P8X	828 Kg [1825 LBS]	1056[41.5]	219[8.6]	240[9.4]
50kW	4P8X/4Q8X	828 Kg [1825 LBS]	1056[41.5]	219[8.6]	240[9.4]
45kW	4Q10X	862 Kg [1900 LBS]	1088[42.9]	219[8.6]	240[9.4]
50W/60kW	4P10X/4Q10X	862 Kg [1900 LBS]	1088[42.9]	219[8.6]	240[9.4]





NOTES:
1. IF IBC CERTIFICATION IS APPLICABLE OR REQUIRED SEE SEISMC ADV FOR INSTALLATION INSTRUCTIONS.
2. DIMENSIONS IN [] ARE ENGLISH STANDARD EQUIVALENTS.
3. * - ASTERISK DENOTES 864 [34.0] SKID WIDTH.

RECONNECTABLE & 600V ALTERNATOR

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	10-6-17	NEW DRAWING [CT179982]	JWL

DO NOT SCALE. REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN MILLIMETERS GENERAL TOLERANCES: N/A

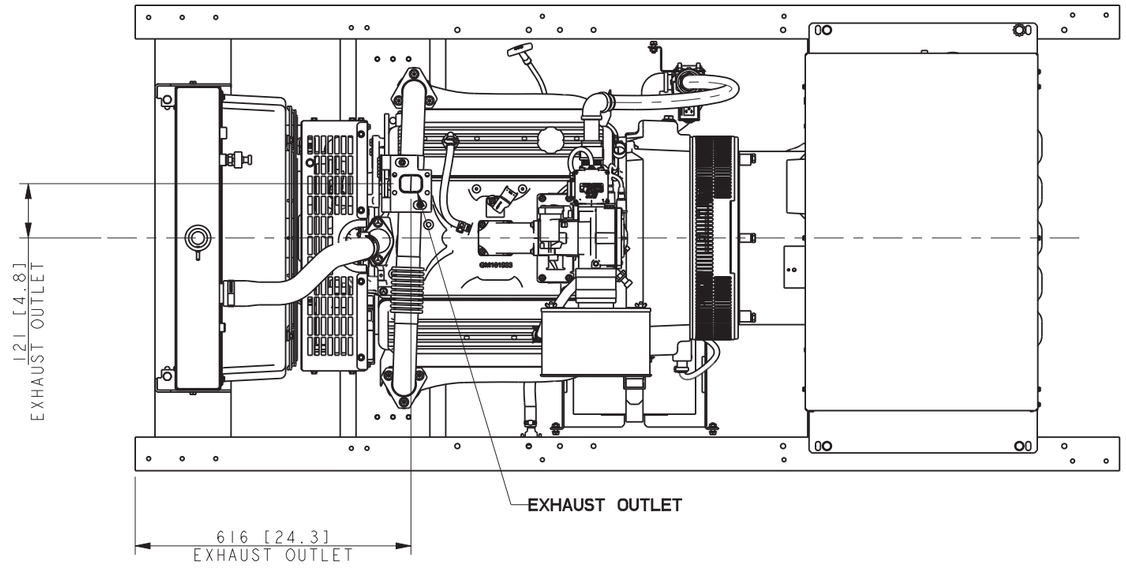
THIRD ANGLE PROJECTION

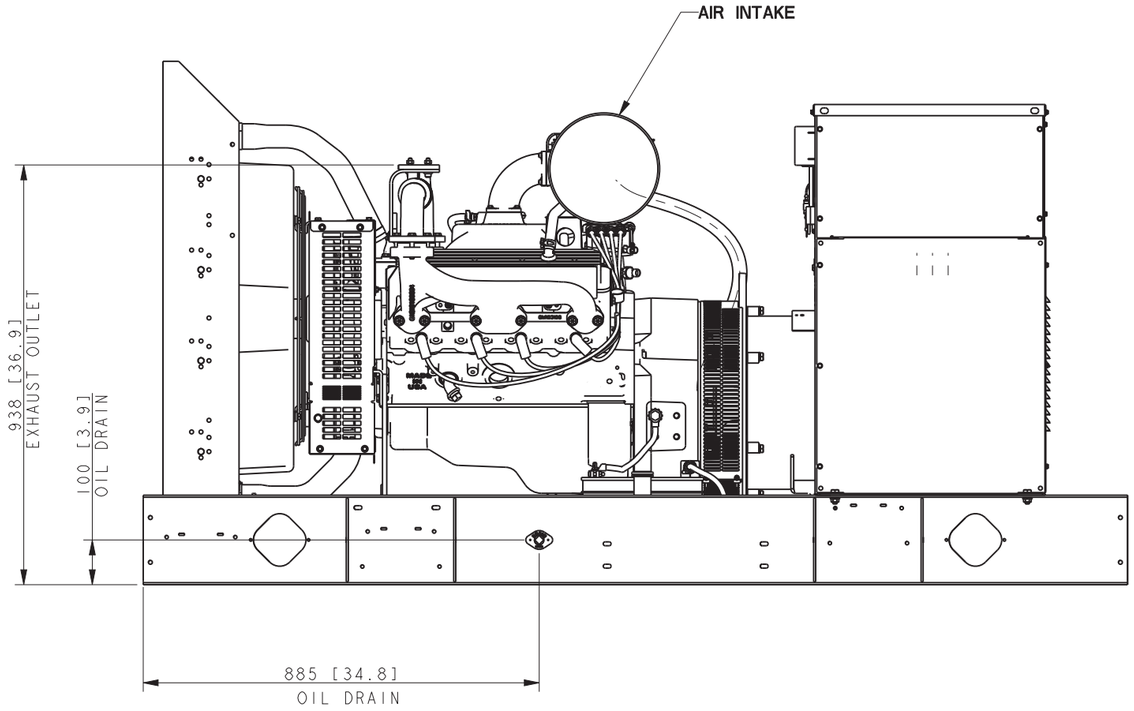
APPROVALS		DATE
DRAWN	JWL	10-6-17
CHECKED	DJV	10-6-17
APPROVED	KJT	10-6-17

TITLE
DIMENSION PRINT, 40-60 KW

SCALE 0.15 | CAD NO. | SHEET 1 of 4

DWG NO. ADV-8967 | D





RECONNECTABLE & 600V ALTERNATOR

NOTES:
1. IF IBC CERTIFICATION IS APPLICABLE OR REQUIRED SEE SEISMC ADV FOR INSTALLATION INSTRUCTIONS.
2. DIMENSIONS IN [] ARE ENGLISH STANDARD EQUIVALENTS.
3. * - ASTERISK DENOTES 864 [34.0] SKID WIDTH.

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	10-6-17	NEW DRAWING [CT179982]	JWL

DO NOT SCALE. REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS IN MILLIMETERS
GENERAL TOLERANCES: N/A

THIRD ANGLE PROJECTION

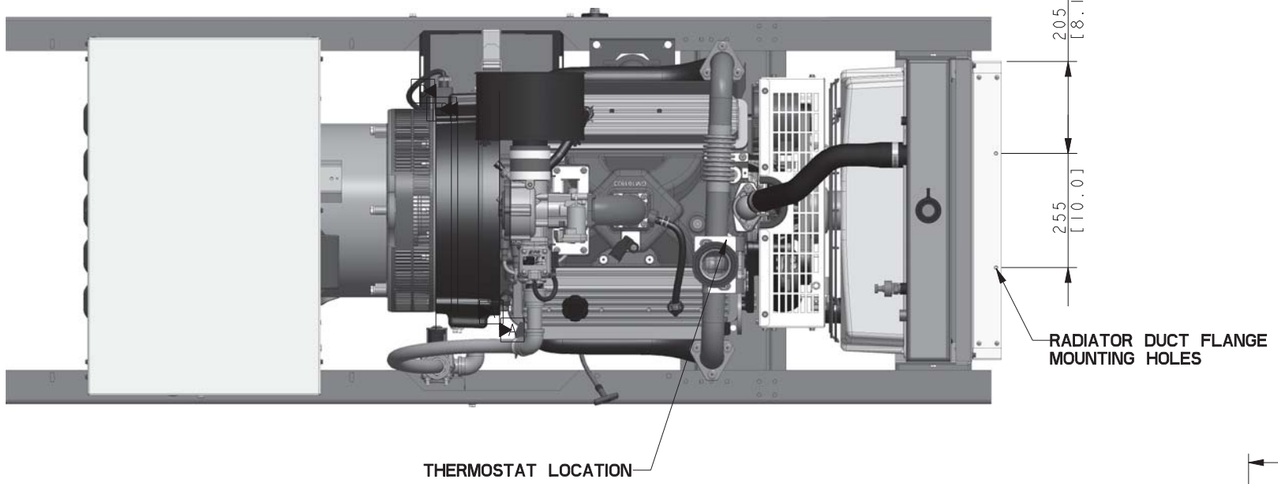
APPROVALS	DATE
DRAWN JWL	10-6-17
CHECKED DJV	10-6-17
APPROVED KJT	10-6-17

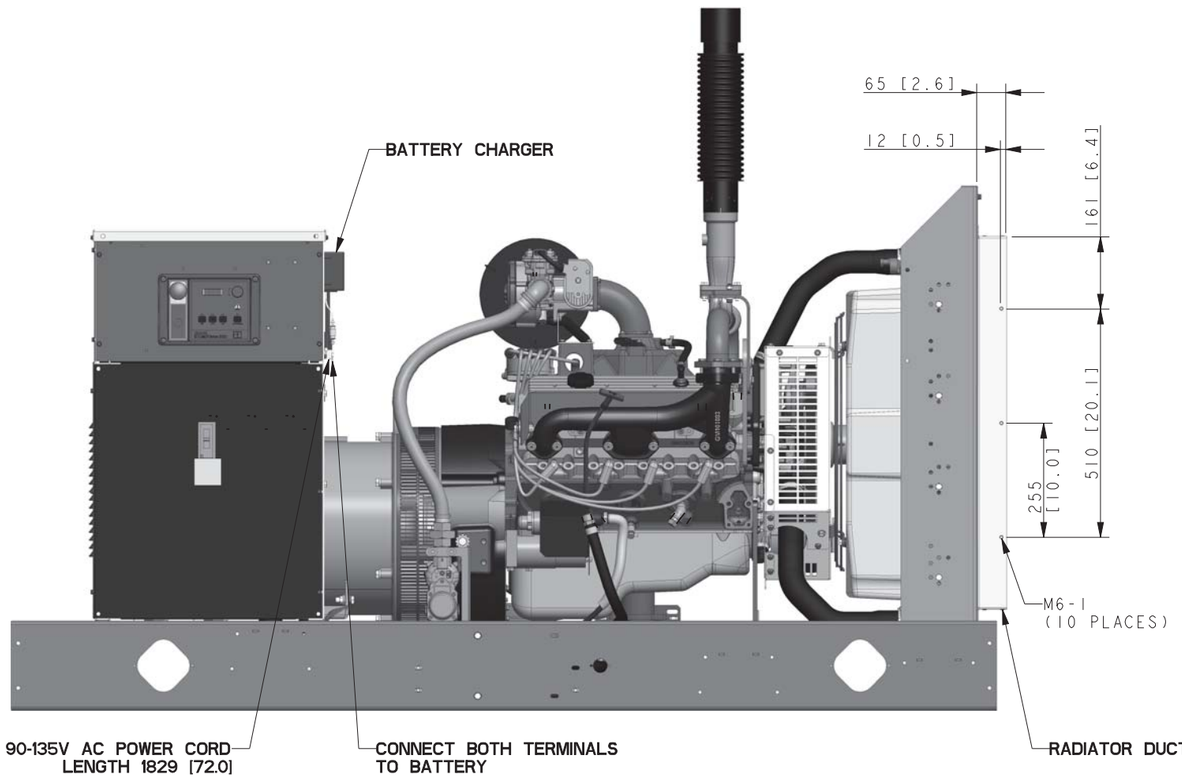
KOHLER
KOHLER, WISCONSIN 53044

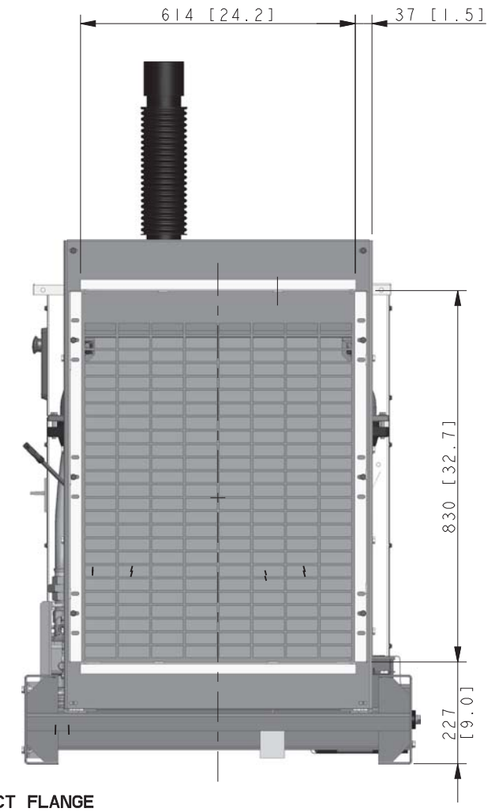
TITLE
DIMENSION PRINT, 40-60 KW

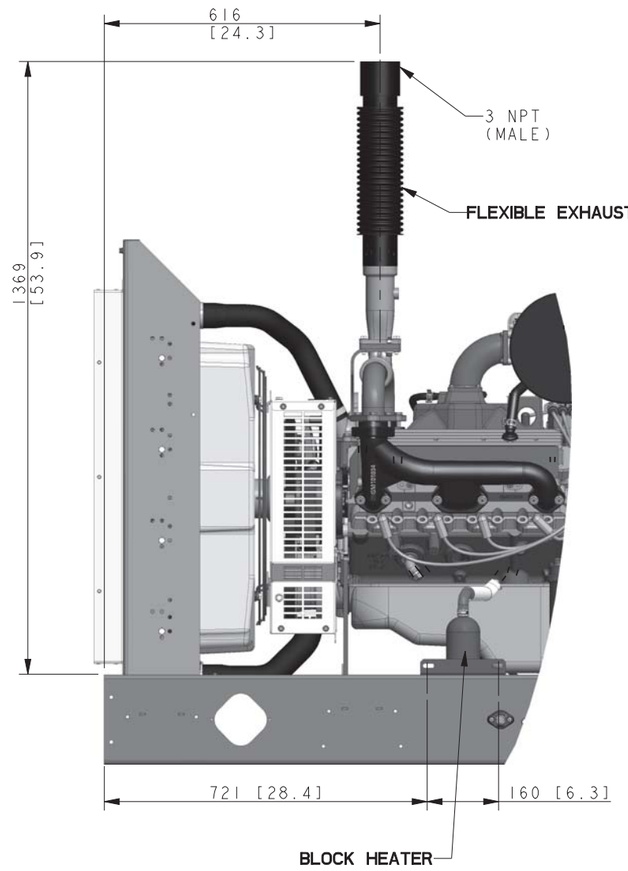
SCALE 0.15 | CAD NO. | SHEET 2 of 4

DWG NO. ADV-8967 | D









NOTES:
1. IF IBC CERTIFICATION IS APPLICABLE OR REQUIRED SEE SEISMC ADV FOR INSTALLATION INSTRUCTIONS.
2. DIMENSIONS IN [] ARE ENGLISH STANDARD EQUIVALENTS.
3. * - ASTERISK DENOTES 864 [34.0] SKID WIDTH.

RECONECTABLE & 600V ALTERNATOR

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	10-5-17	NEW DRAWING [CT179982]	JWL

DO NOT SCALE. REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN MILLIMETERS GENERAL TOLERANCES: N/A

THIRD ANGLE PROJECTION

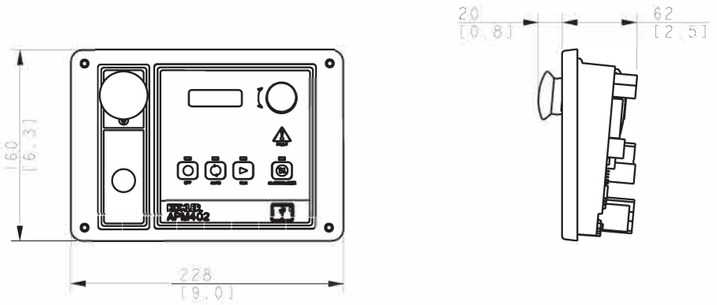
APPROVALS		DATE
DRAWN	JWL	10-5-17
CHECKED	DJV	10-5-17
APPROVED	KJT	10-5-17

KOHLER.
KOHLER, WISCONSIN 53044

TITLE
DIMENSION PRINT, 40-60 KW

SCALE 0.15 | CAD NO. | SHEET 4 of 4

DWG NO. ADV-8967 | D



APM 402

15-300KW
CONTROLLER

DIMENSIONS IN [] ARE ENGLISH EQUIVALENTS.

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
–	10-15-10	NEW DRAWING [90099]	DJV
A	4-14-14	(A-4) 15-300KW WAS 20-300KW [CT77716]	CEK
B	3-28-18	(D-3) APM 402 CONTROLLER ADDED [CT185945]	ADP

UNLESS OTHERWISE SPECIFIED -
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X.XX ±
X.X ±
X ±
ANGLES ±
SURFACE FINISH MAX.
THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	DJV	10-15-10
CHECKED	DJV	10-15-10
APPROVED	JDZ	10-15-10

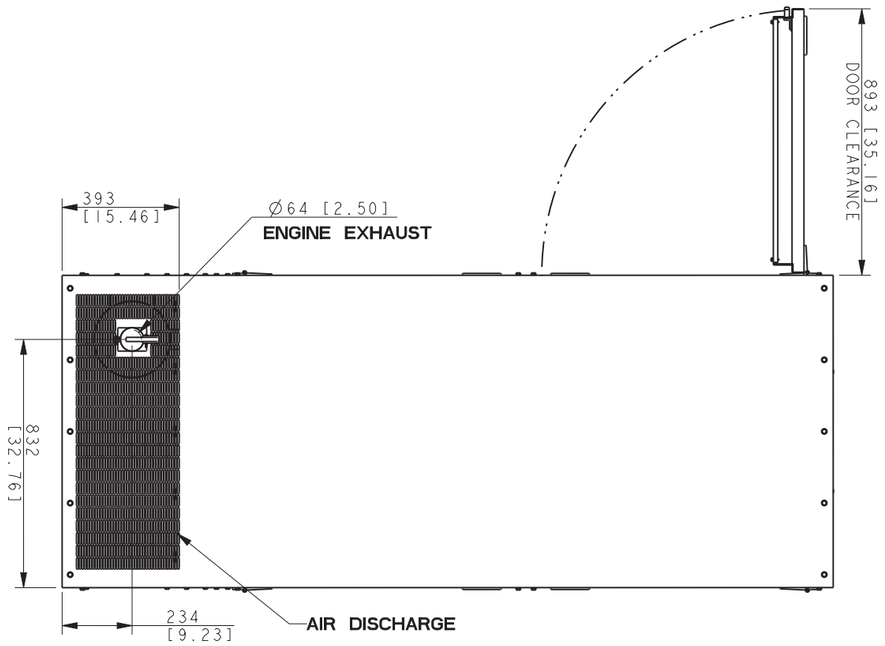
KOHLER CO. METRIC | PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

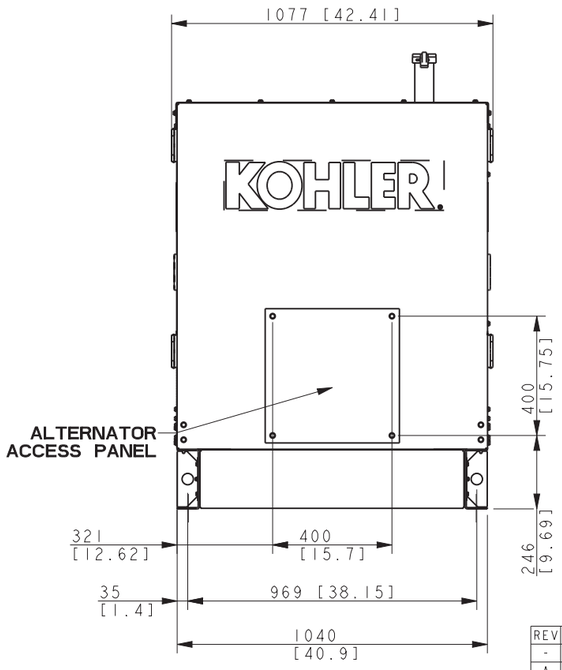
TITLE
DIMENSION PRINT, CONTROLLER

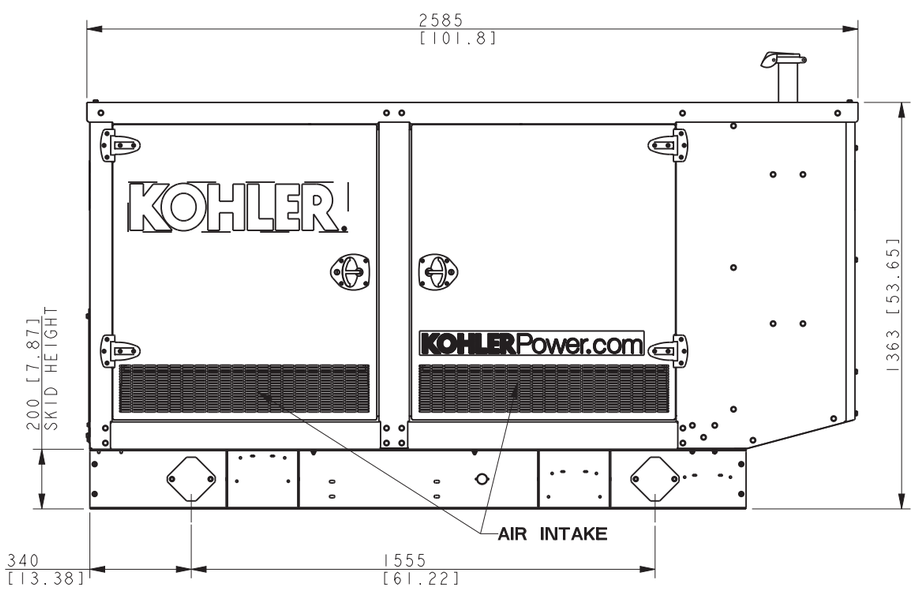
SCALE 0.40 | CAD NO. | SHEET 1 of 1

DWG NO. ADV-7935 | D

MODEL	GENSET WEIGHT (WET) WITH ENCLOSURE		ENCLOSURE ONLY
40kW 4P5X/4Q5X	STEEL WEATHER	1010 Kg [2226 LBS]	239 Kg [527 LBS]
	STEEL SOUND	1015 Kg [2237 LBS]	244 Kg [538 LBS]
	ALUMINUM SOUND	922 Kg [2034 LBS]	152 Kg [335 LBS]
40kW 4P7BX/4Q7BX 45kW 4P7BX/4Q7BX 60kW 4P7BX	STEEL WEATHER	1046 Kg [2307 LBS]	239 Kg [527 LBS]
	STEEL SOUND	1051 Kg [2318 LBS]	244 Kg [538 LBS]
	ALUMINUM SOUND	959 Kg [2115 LBS]	152 Kg [335 LBS]
45kW 4P8X 50kW 4P8X/4Q8X 60kW 4P8X	STEEL WEATHER	1062 Kg [2341 LBS]	239 Kg [527 LBS]
	STEEL SOUND	1067 Kg [2352 LBS]	244 Kg [538 LBS]
	ALUMINUM SOUND	975 Kg [2149 LBS]	152 Kg [335 LBS]
45kW 4Q10X 50kW 4P10X/4Q10X 60kW 4P10X/4Q10X	STEEL WEATHER	1101 Kg [2427 LBS]	239 Kg [527 LBS]
	STEEL SOUND	1106 Kg [2438 LBS]	244 Kg [538 LBS]
	ALUMINUM SOUND	1014 Kg [2235 LBS]	152 Kg [335 LBS]







NOTE:
IF IBC CERTIFICATION IS REQUIRED, SEE SEISMIC ADV FOR INSTALLATION INSTRUCTIONS

KG40-KG60
3PH RECONNECTABLE, 1PH AND 600V ALTERNATORS

DIMENSIONS IN [ ] ARE INCH EQUIVALENTS

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	10-6-17	NEW DRAWING [CTI79982]	JWL
A	4-12-18	(D,2) 959 Kg [2115 LBS] WAS 1062 Kg [2341 LBS],	
		1062 Kg [2341 LBS] WAS 1067 Kg [2352 LBS],	
		1067 Kg [2352 LBS] WAS 1002 Kg [2209 LBS]	
		[PR06949]	JWL

DO NOT SCALE. REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS IN MILLIMETERS
GENERAL TOLERANCES: N/A

THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	JWL	10-6-17
CHECKED	DJV	10-6-17
APPROVED	KJT	10-6-17

KOHLER.
KOHLER, WISCONSIN 53044

TITLE
DIMENSION PRINT, 40-60 KW ENCLOSURE

SCALE 0.40 | CAD NO. | SHEET 1 of 1

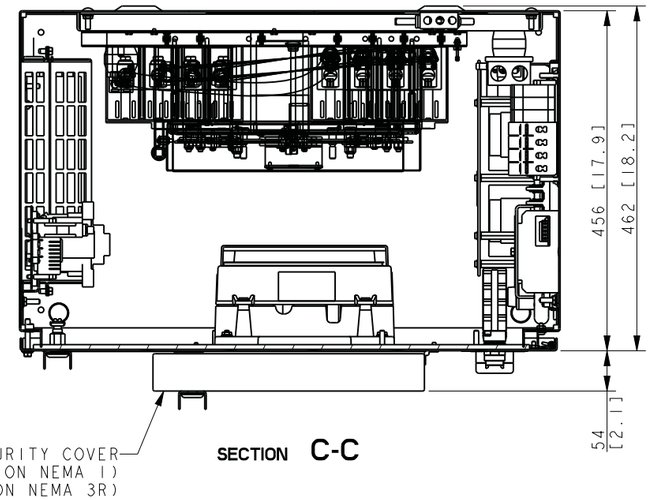
DWG NO. **ADV-9039** | **D**

SEISMIC MOUNTING NOTE:
FOR SEISMIC CERTIFIED UNITS,
MOUNT WITH THE FOLLOWING HARDWARE:

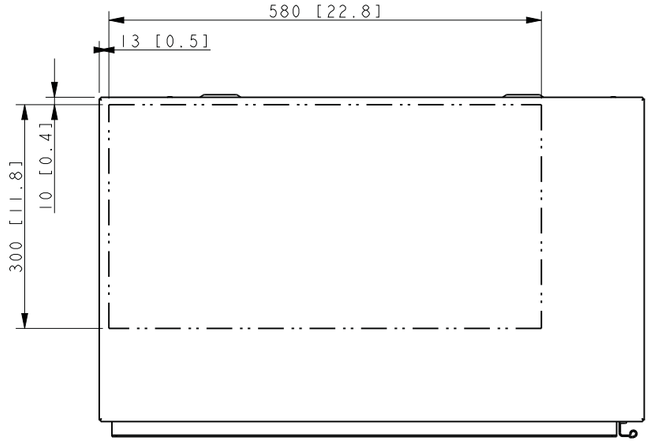
WALL MOUNTED (STEEL)
Ø9.53 [.375] Dia. SAE GRADE 1/ ASTM A307 BOLTS.

WALL MOUNTED (CONCRETE)
Ø9.53 [.375] Dia. HILTI KWIK BOLT TZ-CS WITH MIN. EMBEDMENT 50.8 [2.00]; EDGE DISTANCE OF 101.6 [4.00] ON A 101.6 [4.00] THICK 4000 PSI CONDRETE WALL. HARDWARE TO COMPLY WITH SPECIFICATIONS ON ADV-7456.

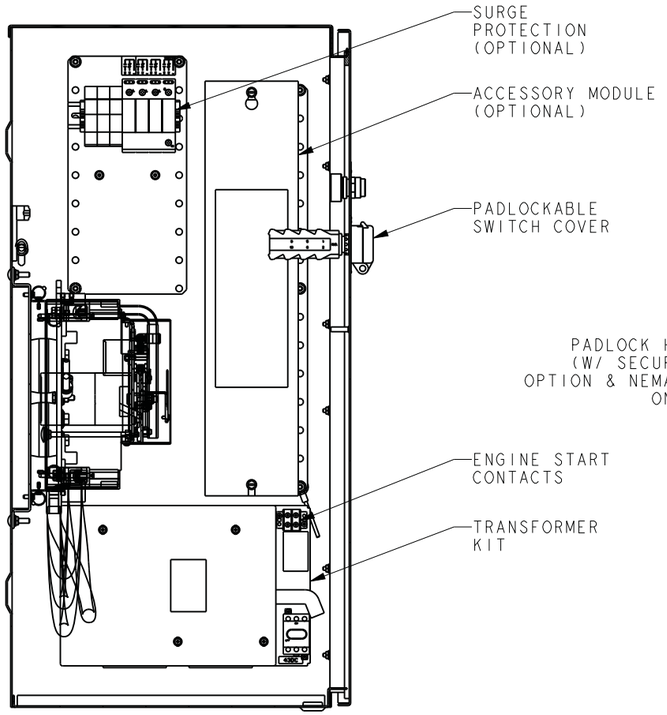
NOTES:
1. DIMENSION IN [ ] ARE INCHES.
2. FINISH:
   NEMA 1 & 3R: ANSI 49 GRAY
3. REFER TO OPERATOR'S MANUAL PRIOR TO INSTALLING SWITCH & OPERATION OF SWITCH.
4. OMIT CENTER POLE ON 2 POLE SWITCHES.
5. FOR SEISMIC CERTIFIED UNITS, REFER TO ADV-7456 AND INSTALLATION INSTRUCTIONS.



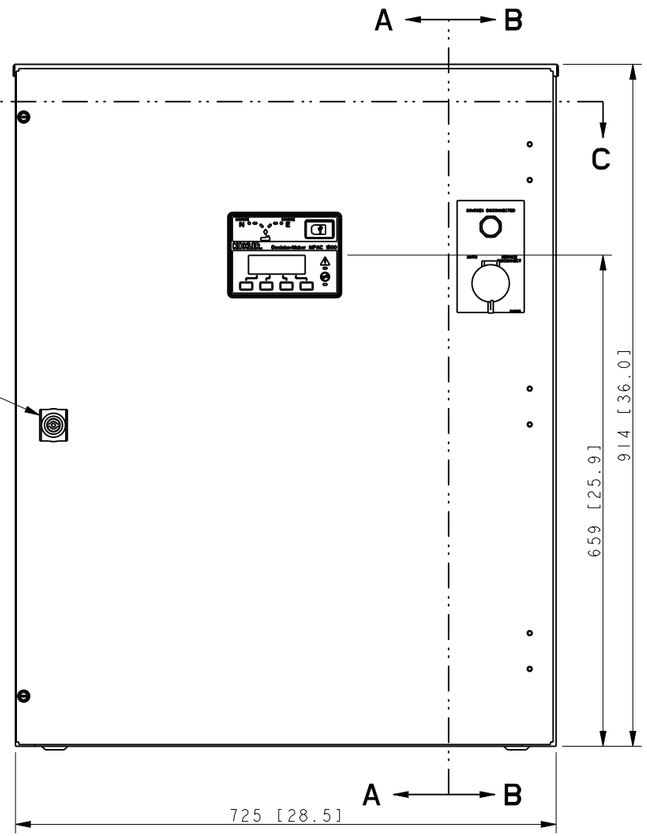
SECTION C-C

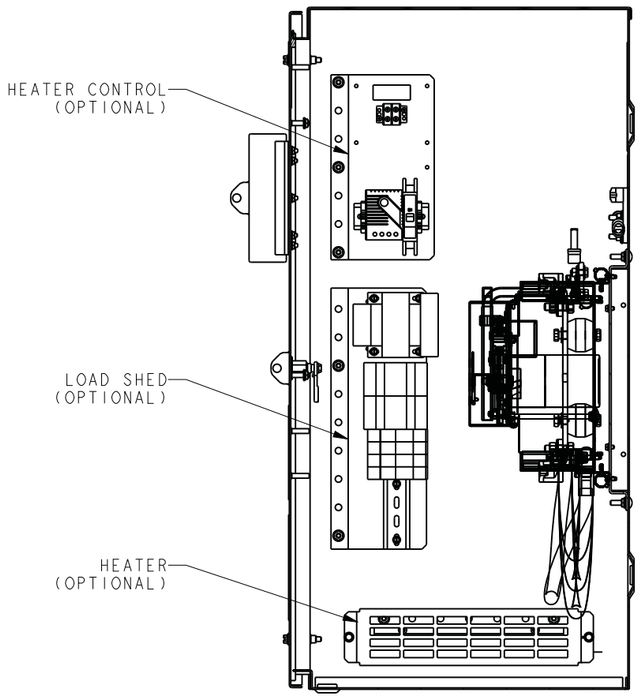


RECOMMENDED ENTRANCE AREA
TOP & BOTTOM



SECTION B-B





SECTION A-A

NOTE:
ALLOW FOR MINIMUM DOOR SWING CLEARANCE. OF 762 [30] IN FRONT OF CABINET.

SEE ADV-8565 FOR FULL MODEL CODE DEFINITION									
STYLE	MECHANISM	TRANSITION	MPAC LOGIC	VOLTS	POLES	NEUTRAL	ENCLOSURE	AMPS	CONNECTION
KEP MCCB	SERVICE ENT	PROGRAMMED	1500	208-480	2,3,4	SOLID,SW	1,3R	100,150,250	STANDARD
KEP MCCB	SERVICE ENT	PROGRAMMED	1500	208-240	2,3,4	SOLID,SW	1,3R	200	STANDARD

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	8-27-13	NEW DRAWING [CT54441]	BTW
A	3-4-14	(B-2) LOAD SHED OPTION SHOWN; [CT70817]	BTW
B	1-14-15	VIEWS UPDATED; [CT112665]	BTW

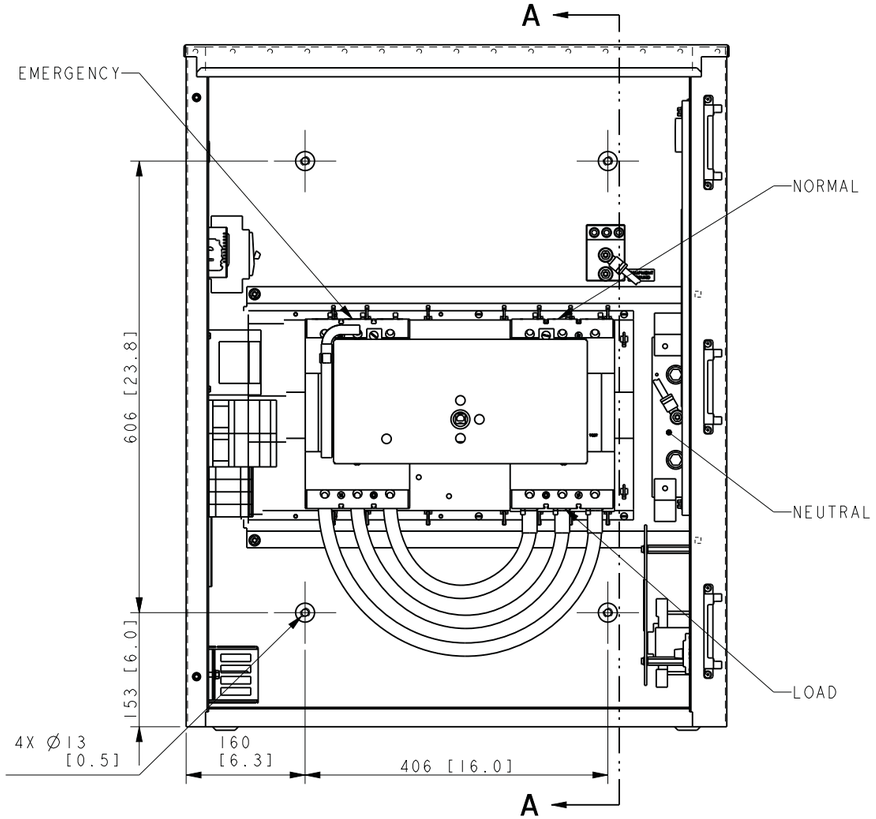
UNLESS OTHERWISE SPECIFIED -
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X.XX ± 0.25
X.X ± 1.0
X ± 1.5
ANGLES ± 0° 30'
SURFACE FINISH MAX.
THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	BTW	8-27-13
CHECKED	BTW	8-27-13
APPROVED	MTL	8-27-13

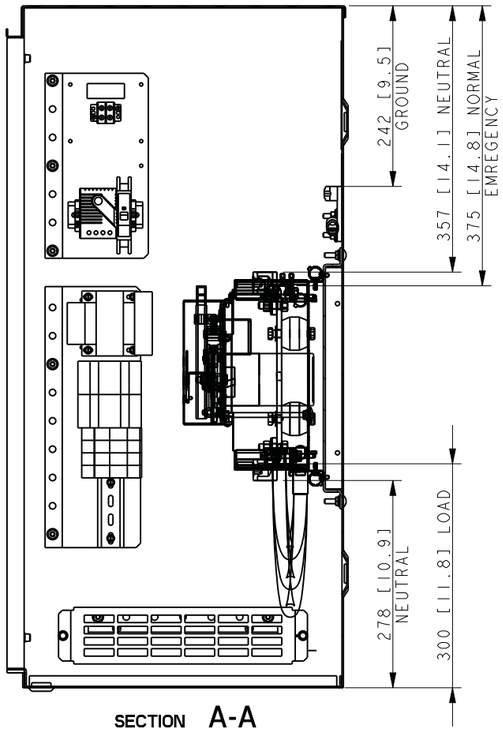
KOHLER CO. METRIC PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

TITLE
DIMENSION PRINT

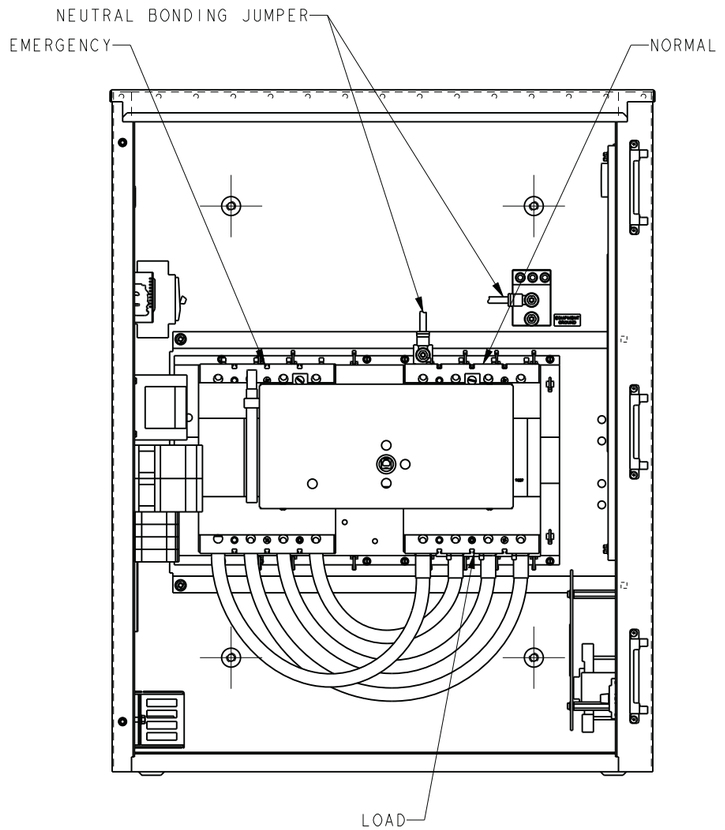
SCALE 1.00 | CAD NO. | SHEET 1 of 2
DWG NO. ADV-8612 | D



250 AMP 3 POLE SHOWN
(DOOR REMOVED TO SHOW INTERNAL COMPONENTS)
NOTE: OMIT CENTER POLE ON 2 POLES SWITCHES.



SECTION A-A



250 AMP 4 POLE SHOWN
(DOOR REMOVED TO SHOW INTERNAL COMPONENTS)

SCREW TYPE TERMINALS FOR EXTERNAL POWER CONNECTIONS			
SWITCH RATING (AMPS)	RANGE OF AL/CU WIRE SIZE		
	CIRCUIT BREAKER PER PHASE	NEUTRAL	GROUND
100	(1) #14-1/0 AWG	(3) #14-2/0 AWG	(3) #14-1/0
150	(2) #2-4/0 AWG	(3) #14-2/0 AWG	(3) #14-1/0
200	(1) #6-350 KCMIL	(3) #6-350 KCMIL	(3) #14-1/0
250	(1) #6-350 KCMIL	(3) #6-350 KCMIL	(3) #14-1/0

APPROX. WEIGHTS KG (LBS)			
AMPS	2 POLE	3 POLE	4 POLE
100	68 [150]	68 [150]	68 [150]
150	68 [150]	68 [150]	68 [150]
200	68 [150]	68 [150]	N/A
250	81 [178]	81 [178]	81 [178]

SERVICE DISCONNECT BREAKERS ARE 80% RATED.
CONTINUOUS LOAD CURRENT IS NOT TO EXCEED 80% OF BREAKER RATING.

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	8-27-13	NEW DRAWING [CT54441]	BTW
A	3-4-14	SEE SHEET 1 [CT70817]	BTW
B	1-14-15	SEE SHEET 1 [CT112665]	BTW

UNLESS OTHERWISE SPECIFIED -
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X.XX ± 0.25
X.X ± 1.0
X ± 1.5
ANGLES ± 0° 30'
SURFACE FINISH MAX.
THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	BTW	8-27-13
CHECKED	BTW	8-27-13
APPROVED	MTL	8-27-13

KOHLER CO. METRIC PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

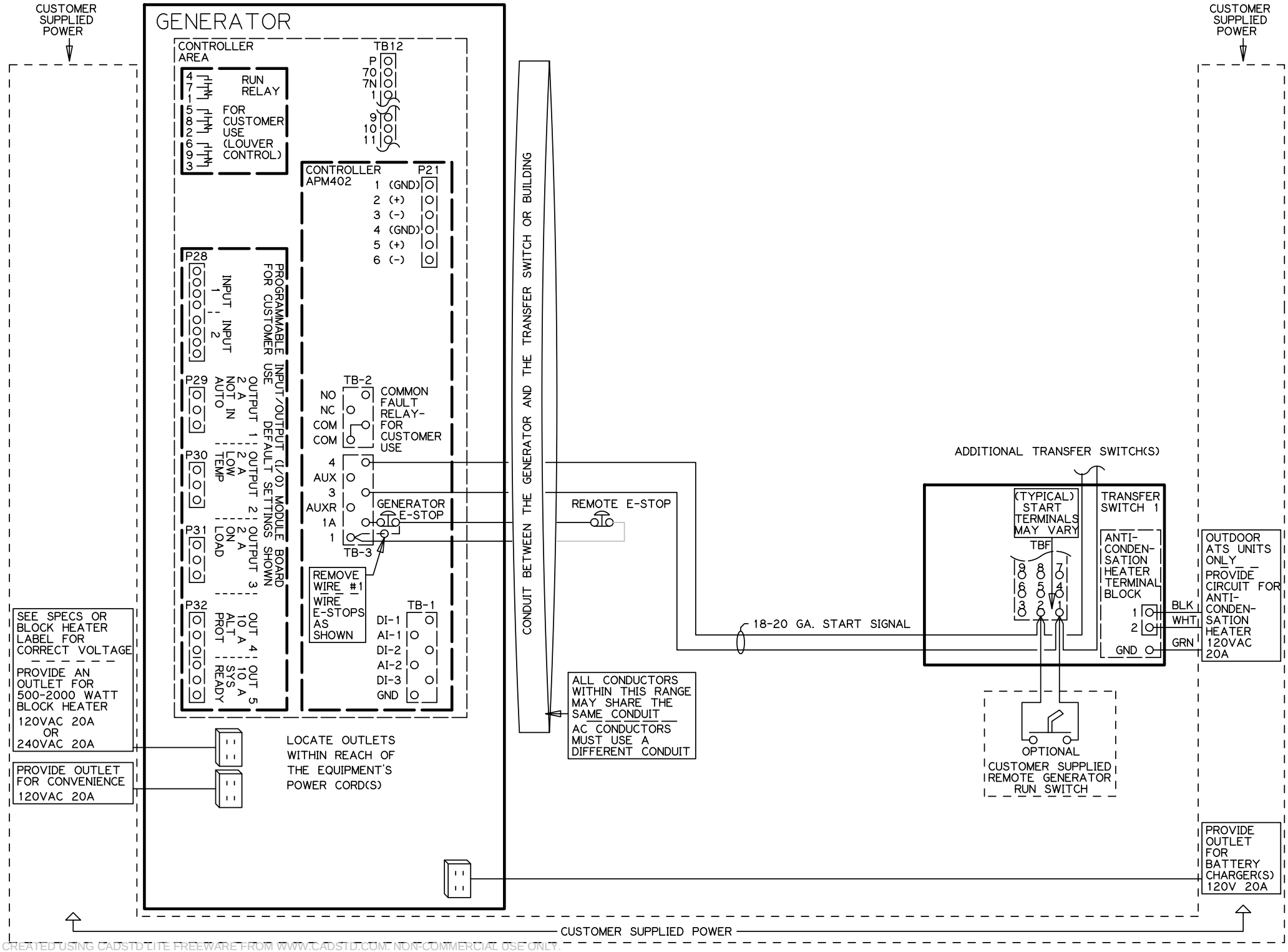
TITLE
DIMENSION PRINT

SCALE 0.25 | CAD NO. | SHEET 2 of 2
DWG NO. ADV-8612 | D

KOHLER®

Wiring Schematic

FIELD WIRING APM402 CONTROLLER



KOHLER®

Warranty

Stationary Standby Industrial Generator Set Extended Two-Year or Two Thousand (2000)-Hour Limited Warranty

Your Kohler product has been manufactured and inspected with care by experienced craftsmen. If you are the original end user, Kohler Co. warrants, for the period indicated below, each product to be free from defects in materials and workmanship. In the event of a defect in materials or workmanship, Kohler Co. will repair, replace, or make appropriate adjustment at Kohler Co.'s option if the product, upon Kohler Co.'s inspection, is found to be properly installed, maintained, and operated in accordance with Kohler Co.'s instruction manuals. A Kohler distributor, dealer, or authorized service representative must perform startup.

Kohler Product	**Warranty Coverage**
Stationary Standby Generator Set & Accessories	Two (2) years from registered startup or two thousand (2000) hours (whichever occurs first).

This warranty is effective only upon Kohler Co.'s receipt of an extended warranty registration form and warranty fee within one year of registered startup. The extended limited warranty start date is determined by the standard limited warranty requirements and runs concurrent with the standard limited warranty during the first year. To receive extended limited warranty coverage, the provisions of the standard limited warranty registration must be met.

The following will **not** be covered by the warranty:

1. Normal wear, routine tuneups, tuneup parts, adjustments, and periodic service.
2. Damage, including but not limited to damage caused by accidents, improper installation or handling, faulty repairs not performed by an authorized Kohler service representative, improper storage, or acts of God.
3. Damage caused by operation at speeds, or with fuel, loads, conditions, modifications or installation contrary to published specifications.
4. Damage caused by negligent maintenance such as:
   a. Failure to provide the specified type and sufficient quantity of lubricating oil.
   b. Failure to keep the air intake and cooling fin areas clean.
   c. Failure to service the air cleaner.
   d. Failure to provide sufficient coolant and/or cooling air.
   e. Failure to perform scheduled maintenance as prescribed in supplied manuals.
   f. Failure to regularly exercise the generator set under load (stationary applications only).
5. Original installation charges and startup costs.
6. Starting batteries and the following related expenses:
   a. Labor charges related to battery service.
   b. Travel expenses related to battery service.
7. Engine coolant heaters, heater controls, and circulating pumps after the first year of the warranty period.
8. Additional expenses for repairs performed after normal business hours, i.e. overtime or holiday labor rates.
9. Rental of equipment during the performance of warranty repairs.
10. Removal and replacement of non-Kohler-supplied options and equipment.
11. Non-Kohler replacement parts. Replacement of a failed Kohler part with a non-Kohler part voids the warranty on that part.
12. Radiators replaced rather than repaired.
13. Fuel injection pumps not repaired by an authorized Kohler service representative.
14. Non-Kohler-authorized repair shop labor without prior approval from Kohler Co. Warranty Department.
15. Engine fluids such as fuel, oil, or coolant/antifreeze.
16. Shop supplies such as adhesives, cleaning solvents, and rags.
17. Expenses incurred investigating performance complaints unless the problem is caused by defective Kohler materials or workmanship.
18. Maintenance items such as fuses, lamps, filters, spark plugs, loose or leaking clamps, and adjustments.
19. Travel time and mileage exceeding 300 miles round trip.

To obtain warranty service, call 1-800-544-2444 for your nearest authorized Kohler service representative or write Kohler Co., Service Department, MS072, Kohler, WI 53044 USA.

KOHLER CO. SHALL NOT BE LIABLE FOR SPECIAL, INCIDENTAL, AND/OR CONSEQUENTIAL DAMAGES OF ANY KIND including, but not limited to, incidental and/or consequential labor costs, installation charges, telephone charges, or transportation charges in connection with the replacement or repair of defective parts.

This is our exclusive written warranty. We make no other express warranty nor is anyone authorized to make any on our behalf.

ANY IMPLIED OR STATUTORY WARRANTY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, IS EXPRESSLY LIMITED TO THE DURATION OF THIS WARRANTY. Some states do not allow limitations on how long an implied warranty lasts, or the exclusion or limitation of incidental and/or consequential damages, so the above limitation or exclusion may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

KOHLER®

KOHLER CO., Kohler, Wisconsin 53044
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales/service outlet in the US and Canada, phone 1-800-544-2444
KOHLERPower.com

TP-5497 8/16f

Transfer Switch Extended Two-Year Limited Warranty

Your Kohler product has been manufactured and inspected with care by experienced craftsmen. If you are the original end user, Kohler Co. warrants, for the period indicated below, each product to be free from defects in materials and workmanship. In the event of a defect in materials or workmanship, Kohler Co. will repair, replace, or make appropriate adjustment at Kohler Co.'s option if the product, upon Kohler Co.'s inspection, is found to be properly installed, maintained, and operated in accordance with Kohler Co.'s instruction manuals. A Kohler distributor, dealer, or authorized service representative must perform startup.

Kohler Product	**Warranty Coverage**
Transfer switch and factory-supplied transfer switch accessories	Two (2) years from the registered startup date.
Transfer switch main contacts	Ten (10) years from the registered startup date.

This warranty is not effective unless a proper extended warranty registration form and warranty fee have been sent to Kohler Co. within one year of registered startup. The extended warranty start date is determined by the standard warranty requirements and runs concurrent with the standard warranty during the first year. To receive extended warranty coverage, the provisions of the standard warranty registration must be met.

The following will **not** be covered by the warranty:

1. Normal wear, periodic service, and routine adjustments.
2. Damage, including but not limited to damage caused by accidents, improper installation or handling, faulty repairs not performed by an authorized Kohler service representative, improper storage, or acts of God.
3. Damage caused by:
   a. Operation above or below rated capacity, voltage, or frequency.
   b. Modifications.
   c. Installation contrary to published specifications and codes.
4. Damage caused by negligent maintenance such as:
   a. Failure to provide a clean, dry environment.
   b. Failure to perform recommended exercising.
   c. Failure to perform scheduled maintenance as prescribed in supplied manuals.
   d. Use of parts and/or procedures other than factory-supplied or -approved replacement parts and/or procedures.
5. Non-Kohler replacement parts. Replacement of a failed Kohler part with a non-Kohler part voids the warranty on that part.
6. Original installation charges and startup costs.
7. Additional expenses for repair after normal business hours, i.e. overtime or holiday labor rates.
8. Rental of equipment during performance of warranty repairs.
9. Removal and replacement of non-Kohler-supplied options and equipment.
10. Non-Kohler-authorized repair shop labor without prior approval from Kohler Co. Warranty Department.
11. Expenses incurred investigating performance complaints unless the problem is caused by defective Kohler materials or workmanship.
12. Maintenance items such as fuses, lamps, and adjustments.
13. Labor and travel charges after the second year of the transfer switch main contacts warranty period.
14. Travel time and mileage exceeding 300 miles round trip.

To obtain warranty service, call 1-800-544-2444 for your nearest authorized Kohler service representative or write Kohler Co., Kohler Power Systems Service Department, MS072, Kohler, WI 53044 USA.

KOHLER CO. SHALL NOT BE LIABLE FOR SPECIAL, INCIDENTAL, AND/OR CONSEQUENTIAL DAMAGES OF ANY KIND including, but not limited to, incidental and/or consequential labor costs, installation charges, telephone charges, or transportation charges in connection with the replacement or repair of defective parts.

This is our exclusive written warranty. We make no other express warranty nor is anyone authorized to make any on our behalf.

ANY IMPLIED OR STATUTORY WARRANTY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, IS EXPRESSLY LIMITED TO THE DURATION OF THIS WARRANTY. Some states do not allow limitations on how long an implied warranty lasts, or the exclusion or limitation of incidental and/or consequential damages, so the above limitation or exclusion may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

KOHLER®

KOHLER CO. Kohler, Wisconsin 53044
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales/service outlet in the US and Canada, phone 1-800-544-2444
KOHLERPower.com

Stationary Emergency Standby Engine – Five Years
FEDERAL EXHAUST EMISSIONS CONTROL
WARRANTY STATEMENT
YOUR WARRANTY RIGHTS AND OBLIGATIONS

The US Environmental Protection Agency ("US EPA") and Kohler Co. are pleased to explain the exhaust emissions control systems warranty on your 2019-2021 Stationary Emergency Standby engine. In the USA, Stationary Emergency Standby engines and engine powered equipment must be designed, built and equipped to meet US EPA stringent anti-smog standards. Kohler Co. must warrant the emissions control systems on your Stationary Emergency Standby engine for the period listed below provided there has been no abuse, neglect or improper maintenance of your Stationary Emergency Standby engine.

Your exhaust emission control systems may include parts such as carburetors, fuel-injection systems, the ignition system, turbocharger, intercooler, and catalytic converters.

MANUFACTURER'S WARRANTY COVERAGE:

The 1995 and later Stationary Emergency Standby engine is warranted for five years. If any exhaust emission-related part on your Stationary Emergency Standby engine is defective, the part will be repaired or replaced by Kohler Co.

OWNER'S WARRANTY RESPONSIBILITIES:

As the Stationary Emergency Standby engine ultimate purchaser, you are responsible for the performance of the required maintenance listed in your owner's manual. Kohler Co. recommends that you retain all receipts covering maintenance on your Stationary Emergency Standby engine, but Kohler Co. cannot deny warranty solely for the lack of receipts. As the Stationary Emergency Standby engine ultimate purchaser, you should however be aware that Kohler Co. may deny you warranty coverage if your Stationary Emergency Standby engine or a part has failed due to use other than Stationary Emergency Standby installations, abuse, neglect, improper maintenance or unapproved modifications.

You are responsible for presenting your Stationary Emergency Standby engine to a Kohler Co. distributor or dealer as soon as a problem exists. The warranty repairs should be completed in a reasonable amount of time, not to exceed 30 days. If you have a question regarding your warranty coverage, you should contact a Kohler distributor or dealer at 1-800-544-2444 or www.kohlergenerators.com.

GENERAL EMISSIONS WARRANTY COVERAGE

The warranty period begins on the date the engine or equipment is delivered to an ultimate purchaser. Kohler Co. warrants to the ultimate purchaser and each subsequent purchaser that the Stationary Emergency Standby engine is:

designed, built, and equipped so as to conform with all applicable regulations adopted by US EPA; and free from defects in materials and workmanship that cause the failure of a warranted part to be identical in all material respects to the part as described in the engine manufacturer's application for certification.

The warranty on emissions-related parts is as follows:

1. Any warranted part that is not scheduled for replacement as required maintenance in the owner's manual supplied, is warranted for the warranty period stated above. If any such part fails during the period of warranty coverage, the part will be repaired or replaced by Kohler Co. at no charge to the ultimate purchaser. Any such part repaired or replaced under the warranty will be warranted for the remaining warranty period.

2. Any warranted part that is scheduled only for regular inspection in the owner's manual supplied, is warranted for the warranty period stated above. Any such part repaired or replaced under warranty will be warranted for the remaining warranty period.

3. Any warranted part that is scheduled for replacement as required maintenance in the owner's manual supplied, is warranted for the period of time prior to the first scheduled replacement point for that part. If the part fails prior to the first scheduled replacement, the part will be repaired or replaced by Kohler Co. at no charge to the ultimate purchaser. Any such part repaired or replaced under warranty will be warranted for the remainder of the period prior to the first scheduled replacement point for the part.

4. Add-on or modified parts that are not exempted by the Air Resources Board may not be used. The use of any nonexempt add-on or modified parts by the ultimate purchaser will be grounds for disallowing a warranty claim. The manufacturer will not be liable to warrant failures of warranted parts caused by the use of a non-exempt add-on or modified part.

PARTS COVERED BY WARRANTY

Listed below are the parts (if equipped) covered by the Federal Warranty. Some parts listed below may require scheduled maintenance and are warranted up to the first scheduled replacement point for that part.

- Oxygen sensor
- Intake manifold
- Exhaust manifold
- Catalytic muffler
- Thermal reactor muffler
- Fuel line, fuel line fittings and clamps
- Spark advance module
- Crankcase breather
- Turbocharger
- Intercooler
- Air Injection System
  - Air pump or pulse valve assembly
  - Control/distribution valve
  - Distribution manifold
  - Air hoses
  - Vacuum lines
- Ignition module(s) with high tension lead
- Gaseous fuel regulator
- Electronic control unit
- Carburetor or fuel injection system
- Fuel metering valve
- Air filter, fuel filter, and spark plugs (only to first replacement point)

Limitations

This Emission Control Systems Warranty shall **not** cover any of the following:

a. Special, incidental and/or consequential damages of any kind, including, but not limited to loss of time, inconvenience, loss of use of the engine or equipment, etc. in connection with the repair or replacement of defective parts.

b. Diagnosis and inspection fees that do not result in eligible warranty service being performed.

KOHLER

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KOHLERPower.com

TP-7125 8/18

KOHLER®

Certification

Certificate of Registration

nqa global assurance

This is to certify that the Quality Management System of:

Kohler Power Systems

N7650 Lakeshore Road
Sheboygan WI 53083
United States of America

Central function listed above. See appendix for additional locations

applicable to:

Design, manufacture, and distributor support for electrical generators, alternators, fuel tanks, automatic transfer switches and switchgear

has been assessed and approved by
National Quality Assurance, U.S.A., against the provisions of:

ISO 9001:2015

Certificate Number:	16852
EAC Code:	19, 17
Certified Since:	February 28, 1995
Valid Until:	November 6, 2021
Reissued:	November 7, 2018
Cycle Issued:	November 7, 2018

For and on behalf of NQA, USA

ANAB ACCREDITED ISO/IEC 17021 MANAGEMENT SYSTEMS CERTIFICATION BODY

G15-152 11/18

Certificate of Registration

nqa global assurance

Appendix to Certificate Number: 16852

Includes Facilities Located at:

Kohler Power Systems Certificate Number 16852 N7650 Lakeshore Road Sheboygan WI 53083 United States of America	Design, manufacture, and distributor support for electrical generators, automatic transfer switches and switchgear
Kohler Power Systems Certificate Number 16852 300 N Dekora Woods Blvd. Saukville WI 53080 United States of America	Manufacturer of fuel tanks, skids, fabricated components and generators
Muth Warehouse Certificate Number 16852 2821 Muth Court Sheboygan WI 53083 United States of America	The distribution of generator sets
KWIP Warehouse Certificate Number 16852 4327 County EE Sheboygan WI 53081 United States of America	Receiving, sequencing and warehousing of generator components

Certified Since: February 28, 1995

Valid Until: November 6, 2021

Reissued: November 7, 2018

Cycle Issued: November 7, 2018

PROTOTYPE TEST REPORT

KOHLER

Models Covered: **KG45, KG50**
Model Tested: **KG50**
Cooling System Tested: **50C**

Alternator Tested: **4P8X**
Engine Tested: **KG6.2L**
Voltage Tested: **208V**

GENSET

Maximum power test to assure that the prime mover and alternator have sufficient capacity to operate within specifications.

Meets Rated Load

Steady-state load test to ensure voltage stability meets or exceed ISO8528-5 requirements and to verify compliance with steady state speed control specifications.

Natural Gas

± 1.00 % Frequency Band

± 0.50 % Voltage Deviation

LP Gas

± 1.00 % Frequency Band

± 0.50 % Voltage Deviation

Transient load tests per NEMA MG1-32.18, and ISO 8528 to verify specifications of transient voltage regulation, voltage dip, voltage overshoot, recovery voltage, and recovery time. Values shown for model tested above. Please contact factory for additional details.

Natural Gas

Full Load Acceptance	Full Load Rejection
18.1 % Voltage Dip	**21.5** % Voltage Overshoot
0.54 Seconds of Recovery Time	**0.57** Seconds of Recovery Time
11.4 % Frequency Dip	**6.13** % Frequency Overshoot
1.53 Seconds of Recovery Time	**2.17** Seconds of Recovery Time

G2 ISO8528-5 Class (G1, G2, G3)

LP Gas

Full Load Acceptance	Full Load Rejection
18.0 % Voltage Dip	**20.5** % Voltage Overshoot
0.77 Seconds of Recovery Time	**0.39** Seconds of Recovery Time
14.0 % Frequency Dip	**4.85** % Frequency Overshoot
1.11 Seconds of Recovery Time	**2.31** Seconds of Recovery Time

G2 ISO8528-5 Class (G1, G2, G3)

PROTOTYPE TEST REPORT

Models Covered: **KG45, KG50**
Model Tested: **KG50**
Cooling System Tested: **50C**
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Voltage Tested: **208V**

GENSET

NFPA 110 one step testing to determine the amount of time required for the generator set to reach 90% voltage and frequency to allow the ATS to transfer.

Complies with NFPA 110 Type 10

Vibrational analysis, to verify that generator vibrations are within acceptable limits per ISO 8528-9.

Complies

Torsional analysis data, to verify torsional effects are not detrimental and that the generator set will provide dependable service as specified.

Complies

Generator set cooling and air flow tests to verify maximum operating ambient temperature. (Cooling system test results are available on TIB-118)

Acoustical noise intensity and sound attenuation effects tests. (Acoustical noise results are available on TIB-114 &115)

Exhaust Back Pressure test completed to demonstrate within engine limitation
(Exhaust back pressure test results are available on TIB-119)

ALTERNATOR

Alternator temperature rise test per NEMA MG1-32.6. Standby and prime ratings of the alternator are established during this test.

Alternator overload test per NEMA MG1-32.8. Motor starting tests per NEMA MG1-32.18.5 to evaluate capabilities of generator, exciter, and regulator system.

Three-phase symmetrical short-circuit test per NEMA MG1-32.13 to demonstrate short circuit performance, mechanical integrity, ability to sustain short-circuit current.

Harmonic analysis, voltage waveform deviation per NEMA MG1-32.10 to confirm that the generator set is producing clean voltage within acceptable limits.

(Alternator detailed test results are available on TIB-102)

Kohler Standby/Prime Generator Set Test Program

Testing is an integral part of quality assurance. In keeping with our uncompromising commitment to quality, safety, and reliability, every Kohler Standby/Prime power generator set undergoes an extensive series of prototype and production testing.

Prototype Testing

Prototype testing includes the potentially destructive tests necessary to verify design, proper function of protective devices and safety features, and reliability expectations. Kohler's prototype testing includes the following:

- Alternator temperature rise test per NEMA MG1-32.6. Standby and prime ratings of the alternator are established during this test.
- Maximum power test to assure that the prime mover and alternator have sufficient capacity to operate within specifications.
- Alternator overload test per NEMA MG1-32.8.
- Steady-state load test to ensure voltage regulation meets or exceeds ANSI C84.1, NEMA MG1-32.17 requirements and to verify compliance with steady-state speed control specifications.
- Transient test to verify speed controls meets or exceeds specifications.
- Transient load tests per NEMA MG1-32.18, and ISO 8528 to verify specifications of transient voltage regulation, voltage dip, voltage overshoot, recovery voltage, and recovery time.
- Motor starting tests per NEMA MG1-32.18.5 to evaluate capabilities of generator, exciter, and regulator system.
- Three-phase symmetrical short-circuit test per NEMA MG1-32.13 to demonstrate short circuit performance, mechanical integrity, ability to sustain short-circuit current.
- Harmonic analysis, voltage waveform deviation per NEMA MG1-32.10 to confirm that the generator set is producing clean voltage within acceptable limits.
- Generator set cooling and air flow tests to verify maximum operating ambient temperature.
- Reliability tests to demonstrate product durability, followed by root cause analysis of discovered failures and defects. Corrective action is taken to improve the design, workmanship, or components.
- Acoustical noise intensity and sound attenuation effects tests.

Production Testing

In production, Kohler Standby/Prime generator sets are built to the stringent standards established by the prototype program. Every Kohler generator set is fully tested prior to leaving the factory. Production testing includes the following:

- Stator and exciter winding high-potential test on all generators. Surge transient tests on stators for generators 180 kW or larger. Continuity and balance tests on all rotors.
- One-step, full-load pickup tests to verify that the performance of each generator set, regulator, and governor meets published specifications.
- Regulation and stability of voltage and frequency are tested and verified at no load, 1/4 load, 1/2 load, 3/4 load, and full-rated load.
- Voltage, amperage, frequency and power output ratings verified by full-load test.
- The proper operation of controller logic circuitry, prealarm warnings, and shutdown functions is tested and verified.
- Any defect or variation from specification discovered during testing is corrected and retested prior to approval for shipment to the customer.

Torsional analysis data, to verify torsional effects are not detrimental and that the generator set will provide dependable service as specified, is available upon request.

Kohler offers other testing at the customer's request at an additional charge. These optional tests include power factor testing, customized load testing for specific application, witness testing, and a broad range of MIL-STD-705c testing. A certified test report is also available at an additional charge.

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KohlerPowerSystemscom

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Kohler Automatic Transfer Switch Test Program
Non-Bypass Models

Testing is an integral part of quality assurance. In keeping with our uncompromising commitment to quality, safety, and reliability, every Kohler Automatic Transfer Switch (ATS) undergoes an extensive series of performance and production testing.

Performance Testing

All Kohler ATSs are UL1008 listed, which includes the following performance tests:

- General – Normal Operation
- Overvoltage
- Undervoltage
- Overload
- Temperature Rise
- Endurance
- Dielectric Voltage – Withstand
- Short Circuit Withstand
- Short Circuit Close- On
- Dielectric Voltage – Withstand (repeated)
- Strength of insulating base and support

EMC/EMI Immunity Verification

Controls and printed circuit board assemblies are evaluated to IEC and IEEE tests, including:

- EN61000- 4- 4 Fast Transient Immunity Severity Level 4
- EN61000- 4- 5 Surge Immunity Class 4 (voltage sensing and programmable inputs only)
- IEC Specifications for EMI/EMC Immunity:
  - CISPR 11, Radiated Emissions
  - IEC 1000- 4- 2, Electrostatic Discharge
  - IEC 1000- 4- 3, Radiated Electromagnetic Fields
  - IEC 1000- 4- 4, Electrical Fast Transients (Bursts)
  - IEC 1000- 4- 5, Surge Voltage
  - IEC 1000- 4- 6, Conducted RF Disturbances
  - IEC 1000- 4- 8, Magnetic Fields
  - IEC 1000- 4- 11, Voltage Dips and Interruptions
- IEEE 472 (ANSI C37.90A) Ring Wave Test

Production Testing

Every Kohler ATS is fully tested prior to leaving the factory. Visual inspections are also performed by the mechanism manufacturer as well as Kohler personnel during assembly and final test. Production testing includes the following:

- Electrical operation testing on all ATSs
- Verification of controller communication
- Verification of controller settings
- Voltage calibration
- Automatic transfer switch operation when Normal source is lost
  - Verify engine start signal
  - Verify transfer to Emergency position when Emergency source is available
- Automatic Transfer switch operation when Normal source returns
  - Verify transfer to Normal position
  - Verify engine start signal is removed

CSA Certification

CSA Certification is also available upon request. CSA certification includes the following additional test:

- Dielectric test at 1000V plus twice the maximum rated voltage

Options Testing

The operation of all installed options is verified. Tested options include:

- Input/Output Modules
- Supervised Transfer Control Switch
- Preferred Source Switch
- Load Shed, Normal and Emergency
- Line-to- Neutral Monitoring
- Digital Meter setup and operation

Kohler offers other testing at the customer's request at an additional charge. These optional tests include customized load testing for specific application, witness testing, and contact resistance testing. A certified test report is also available at an additional charge.

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