Submittal Package

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Proposal:

KOHLER®

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Pre-Startup Checklist	PreStartUpCheckList

Generator

Kohler Model: KG150

This gas generator set equipped with a 4S12X alternator operating at 120/208 volts is rated for 150 kW/188 kVA. Output amperage: 522

Standard Features:

- EPA-Certified for Stationary Emergency Applications
- 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 generator set systems and components. Two- and five-year extended limited warranties are also available.
- Natural gas, LP gas, and dual fuel models are available.
- Air Restriction
- Alternator Protection
- Battery Rack and Cables
- Closed Crankcase Ventilation (CCV) Filters

Alternator Features:

- 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
- Oil Drain Extension
- Operation and Installation Literature
- Open Unit Accessory Kit (Duct Flange, Stone Guard, And Three-Way Exhaust Catalyst)
- The unique Fast-Response™ X excitation system delivers excellent voltage response and short-circuit capability using a rare-earth, permanent magnet (PM)-excited alternator.

Other Features:

Qty	Description
	KG150 Generator System
1	KG150 Generator Set

Includes the following:

Literature Languages	English
Approvals and Listings	UL2200 Listing/cUL Genset List
Engine	SnglFuel,UL,PreAlarm,NG,Stdby
Nameplate Rating	Standby 130C Rise
Voltage	60Hz, 120/208V, Wye, 3Ph, 4W
Alternator	4S12X
Cooling System	Unit Mounted Radiator, 50C
Skid and Mounting	Skid, 53"
Air Intake	Standard Duty
Controller	APM402
Enclosure Type	Sound
Enclosure Material	Steel
Starting Aids, Installed	1500W,120V
Electrical Accy.,Installed	Battery, 1/12V, Wet
Electrical Accy.,Installed	Battery Charger, 10A
Electrical Accy.,Installed	Run Relay
Electrical Accy.,Installed	2 Input/5 OutputModule
Rating, LCB 1	80% Rated
Amps, LCB 1	600
Trip Type, LCB 1	Electronic, LI
Interrupt Rating LCB 1	35kA at 480V
Miscellaneous Accy,Installed	Coolant in Genset
Warranty	5 Year Comprehensive
Testing, Additional	Power Factor Test,0.8,3Ph Only

1	Gaseous Fuel Filter
1	Flexible Fuel Line (Nat/LP)
1	Lit Kit, KG150 General Maintenance

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Spec Sheets

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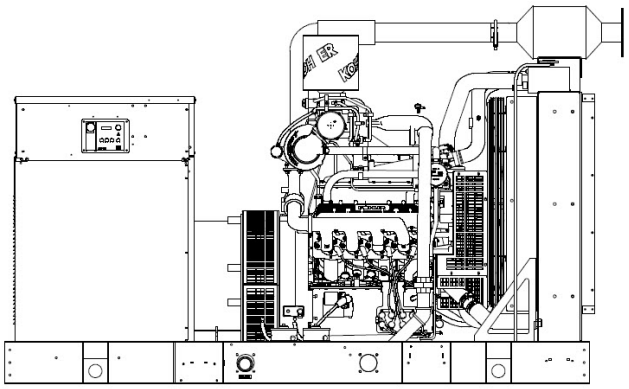
KG150
Natural Gas



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- Integral Vibration Isolation
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- Operation and Installation Literature
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- The unique Fast-Response™ X excitation system delivers excellent voltage response and short-circuit capability using a rare-earth, permanent magnet (PM)-excited alternator.

Generator Set Rating

Standby 130C Rise Ratings

Alternator	Voltage	Ph	Hz	Peak kVA	kW/kVA	Amps
4S12X	120/208	3	60		150/188	522

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: 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-8528-1 and ISO-3046-1.
Obtain technical information bulletin (TIB-101) for ratings guidelines, complete ratings definitions, and site condition derates.

Model: KG150, continued

Alternator Specifications

Specifications	Alternator
Alternator manufacturer	Kohler
Type	4-Pole, Rotating-Field
Exciter type	Brushless, Rare-Earth Permanent-Magnet
Leads, quantity	12, Reconnectable 4, 120/240 V
Voltage regulator	Solid State, Volts/Hz
Insulation	NEMA MG1
Insulation: Material	Class H
Insulation: Temperature Rise	130°C, 150°C Standby
Bearing: quantity, type	1, Sealed
Coupling	Flexible disc
Amortisseur windings	Full
Voltage regulation, no-load to full-load	Controller Dependent
One-Step Load Acceptance	100% of rating
Unbalanced load capability	100% of rating current

- NEMA MG1, IEEE, and ANSI standards compliances 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 witout collapsing the alternator field.
- Self-ventilated and dripproof construction.
- Windings are vacuum-impregnated with epoxy varnish for dependability and long life.
- Superior voltage waveform from a two-thirds pitch stator and skewed rotor.

Engine

Engine Specification

Engine Manufacturer	Kohler
Engine Model	KG10V08T-6CGS
Engine: type	10.3 L, 4-Cycle, Turbocharged and Aftercooled
Cylinder arrangement	V-8
Displacement, L (cu. in.)	10.3 (632)
Bore and stroke, mm (in.)	116.8 x 120.6 (4.6 x 4.7)
Compression ratio	9.3:1
Piston speed, m/min. (ft./min.)	434.3 (1425)
Main bearings: quantity, type	5, Tri-Metal
Rated rpm	1800
Max. power at rated rpm, kWm (BHP)	178 (239)
Cylinder head material	Cast Iron
Piston: type, material	Dished Top Cast Aluminum
Crankshaft material	Forged Steel
Valve (exhaust) material	Inconel
Governor: type, make/model	Electronic
Frequency regulation, no-load to-full load	Isochronous
Frequency regulation, steady state	±0.75%
Frequency	Fixed
Air cleaner type, all models	Dry

Model: KG150, continued

Exhaust

Exhaust System

Exhaust Manifold Type	Dry
Exhaust flow at rated kW,m3/min. (cfm)	29.3 (1035)
Exhaust temperature at rated kW, dry exhaust, EPA certified, °C (°F)	697 (1287)
Maximum allowable back pressure after catalyst, kPa (in. Hg)	16.6 (4.9)
Maximum allowable back pressure, kPa (in. Hg)	19.8 (5.87)
Exh. outlet size at eng. hookup, mm (in.)	Flanged Outlet at Catalyst, see ADV drawing

Engine Electrical

Engine Electrical System

Ignition system	Coil Pack
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., rating for --18 C (0?F)	one, 925
Battery voltage (DC)	12

Fuel

Fuel System

Fuel type	Natural Gas
Fuel supply line inlet	1.5 NPT
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.

Model: KG150, continued

Lubrication

Lubrication System

Type	Full Pressure
Oil pan capacity, L (qt.)	11.3 (12)
Oil pan capacity with filter, L (qt.)	15.1 (16)
Oil filter: quantity, type	1, Cartridge

Cooling

Radiator System

Ambient temperature, °C (°F)	50 (122)
Engine jacket water capacity, L (gal.)	11 (2.9)
Radiator system capacity, including engine, L (gal.)	34 (9)
Engine jacket water flow, Lpm (gpm)	219 (58)
Heat rejected to cooling water at rated kW, dry exhaust, kW (Btu/min.)	99 (5630)
Heat rejected to engine oil at rated kW,kW (Btu/min.)	18.3 (1041)
Water pump type	Centrifugal
Fan diameter, including blades, mm (in.)	750 (29.5)
Fan, kWm (HP)	9 (12)
Max. restriction of cooling air, intake and discharge side of radiator, kPA (in. H20)	0.125 (0.5)

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

Operation Requirements

Air Requirements

Radiator-cooled cooling air, m3/min. (scfm) *	269 (9500)
Combustion air, m3/min. (cfm)	8.50 (300)
Heat rejected to ambient air: Engine, kW (Btu/min.)	45.8 (2604)
Heat rejected to ambient air: Alternator, kW (Btu/min.)	15.7 (893)

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

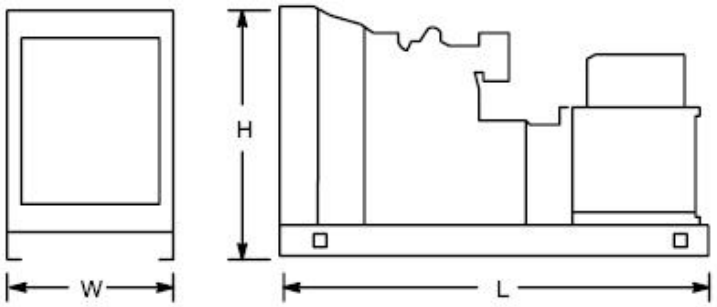
Fuel Consumption

Natural Gas, m3/hr. (cfh) at % load	Rating
Standby Fuel Consumption at 100% load	53.1 m3/hr. (1873.5 cfh)
Standby Fuel Consumption at 75% load	41.9 m3/hr. (1480.5 cfh)
Standby Fuel Consumption at 50% load	30.8 m3/hr. (1087.5 cfh)
Standby Fuel Consumption at 25% load	19.7 m3/hr. (694.5 cfh)
Standby Fuel Consumption at 0% load	8.5 (301.5)

Dimensions and Weights

Dim Weight Spec	Dim Weight Value
Fuel	All
Engine Manufacturer	Kohler
Overall Size, L x W x H, mm (in.):	2800 x 1340 x 1809 (110.2 x 52.8 x 71.2)
Weight (radiator model), wet, kg (lb.):	1500 (3310)

Model: KG150, continued



NOTE: This drawing is provided for reference only and should not be used for planning installation. Contact your local distributor for more detailed information.

APM402

Kohler® APM402 Controller

General Description and Function

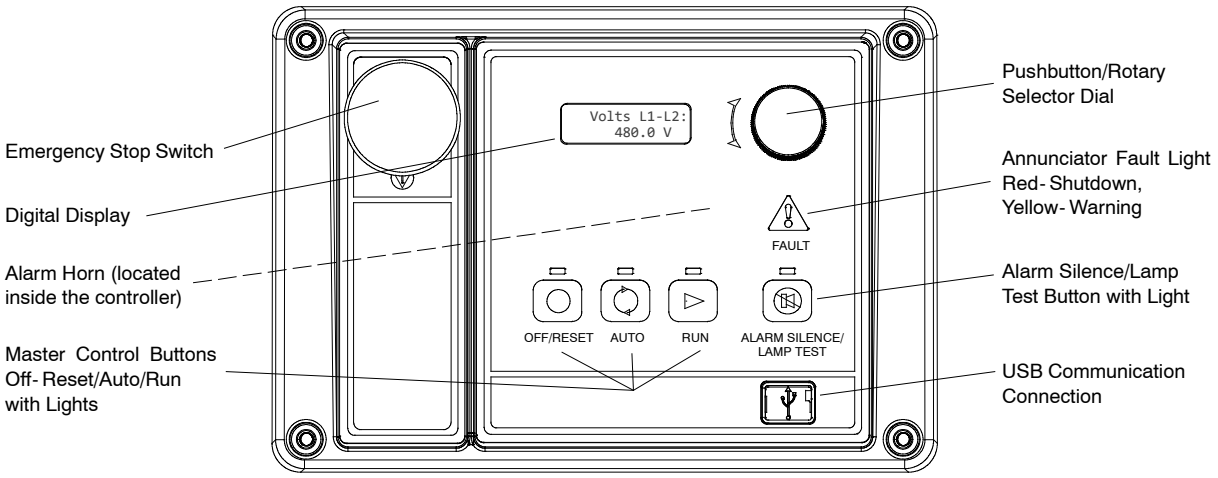
The APM402 generator set controller provides advanced control, system monitoring, and system diagnostics for optimum performance.

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

KOHLER.

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

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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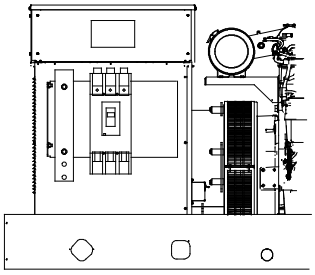
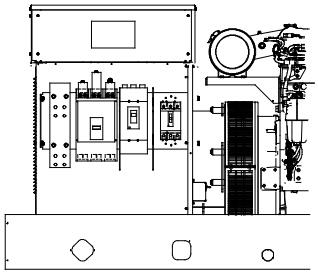
KOHLER

Industrial Generator Set Accessories

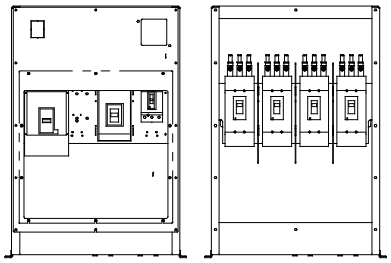
Line Circuit Breakers 15- 3250 kW



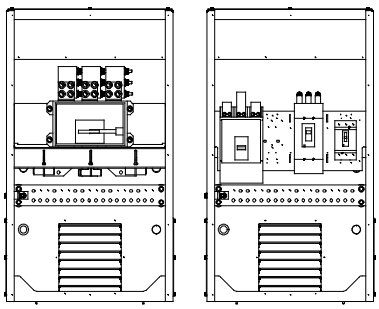
Single Circuit Breaker Kit with Neutral Bus Bar
15- 300 kW Model Shown



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.

NOTE: MG-frame does not have a long-time delay when selected with LI breakers.

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

* Includes models 300REOZJ and 300REZXC. For other 300 kW models, see the 350- 2250 kW section.

80% 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	30- 100	Magnetic, UL 1077	E (480 V max.)
		Magnetic, UL 1077 with 12 V shunt trip	
		Magnetic, UL 1077 with 24 V shunt trip	
	15- 150	Thermal magnetic	HD
	60- 150	Electronic LI	
		Electronic LSI	
		Electronic LSIG	
	60- 150	Electronic LI	HG
		Electronic LSI	
		Electronic LSIG	
	30	Magnetic 9- 325	HJ
	50	Magnetic 84- 546	
	100	Magnetic 180- 1040	
	150	Magnetic 348- 1690	
	175- 250	Thermal magnetic	JD
	250	Electronic LI	
		Electronic LSI	
		Electronic LSIG	
	250	Electronic LI	JG
		Electronic LSI	
		Electronic LSIG	
	250	Magnetic only 684- 2500	JJ
	300- 400	Thermal magnetic	LA
	400	Magnetic 500- 1000	LA
		Magnetic 750- 1600	
		Magnetic 1000- 2000	
		Magnetic 1125- 2250	
		Magnetic 1250- 2500	
		Magnetic1500- 3000	
		Magnetic 1750- 3500	
		Magnetic 2000- 4000	
	400	Electronic LI	LG
		Electronic LSI	
		Electronic LSIG	
4RX 4S/4SX 4TX 4V	30- 100	Magnetic, UL 1077	E (480 V max.)
		Magnetic, UL 1077 with 12 V shunt trip	
		Magnetic, UL 1077 with 24 V shunt trip	

Alt. Model	Ampere Range	Trip Type	C. B. Frame Size
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	
	30	Magnetic 9- 325	HJ
	50	Magnetic 84- 546	
	100	Magnetic 180- 1040	
	150	Magnetic 348- 1690	
	175- 250	Thermal magnetic	JD
	250	Electronic LI	
		Electronic LSI	
		Electronic LSIG	
	250	Electronic LI	JG
		Electronic LSI	
		Electronic LSIG	
	250	Magnetic only 684- 2500	JJ
	300- 400	Thermal magnetic	LA
	400	Magnetic 500- 1000	LA
		Magnetic 750- 1600	
		Magnetic 1000- 2000	
		Magnetic 1125- 2250	
		Magnetic 1250- 2500	
		Magnetic1500- 3000	
		Magnetic 1750- 3500	
		Magnetic 2000- 4000	
	400- 600	Electronic LI	LG
		Electronic LSI	
		Electronic LSIG	
	800	Electronic LSI	PG
		Electronic LSIG	
	800	Electronic LI	MG
4UA 4M6226	1000- 1200	Thermal magnetic	PG
		Electronic LSI	
		Electronic LSIG	
	1200	Thermal Magnetic	PJ
		Electronic LSI	
		Electronic LSIG	

15- 300* kW Line Circuit Breaker Specifications

* Includes models 300REOZJ and 300REZXC. For other 300 kW models, see the 300- 2250 kW section.

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 Decision-Maker® 6000 Controller/DPS System or 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	65	35	18
PJ	100	65	25
PL	125	100	25

Circuit Breaker Lugs Per Phase (Al/Cu)

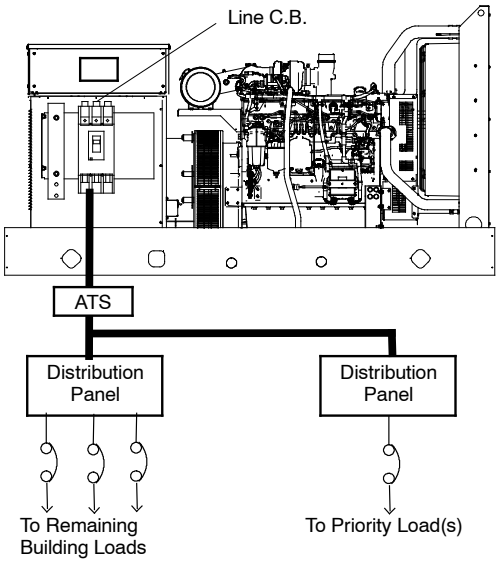
Frame Size	Ampere Range	Wire Range
E (480 V max.)	30- 100	Up to two wire terminals fitting 10-32 or 1/4-20 stud
H	15- 150	One #14 to 3/0
J	175	One 1/0 to 4/0
	200- 250	One 3/0 to 350 kcmil
LA	300- 400	One #1 to 600 kcmil or Two #1 to 250 kcmil
LG	400- 600	Two 2/0 to 500 kcmil AL/CU
M	800	Three 3/0 to 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

* Includes models 300REOZJ and 300REZXC. For other 300 kW models, see the 300- 2250 kW section.

Single Circuit Breaker Installations

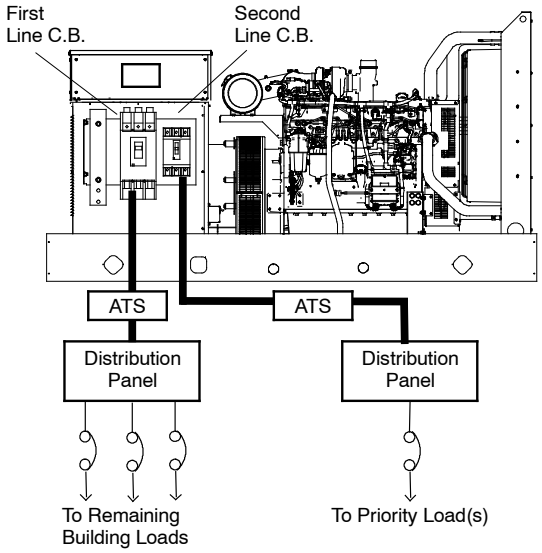
A generator set with a single circuit breaker installed typically feeds a single transfer switch and then a distribution panel. This allows protection of the entire system.



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	

300- 2250* kW Line Circuit Breaker Specifications

* Includes models 300REZXB and 300RZXB. For models 300REOZJ and 300REZXC, see the 15- 300 kW section. For KD model generator sets, see pages 8 and 9.

80% Rating Circuit Breaker

Alt. Model	Ampere Range	Trip Type	C. B. Frame Size
4M 5M 7M	15- 150	Thermal Magnetic	HD
	60- 150	Electronic LI	HD
		Electronic LSI	
		Electronic LSIG	
	175- 250	Thermal Magnetic	JD
	250	Electronic LI	
		Electronic LSI	
		Electronic LSIG	
	60- 150	Electronic LI	HG
		Electronic LSI	
		Electronic LSIG	
	250	Electronic LI	JG
		Electronic LSI	
		Electronic LSIG	
	30	9- 325 A. Mag. Trip	HJ
	50	84- 546 A. Mag. Trip	
	100	180- 1040 A. Mag. Trip	
	150	348- 1690 A. Mag. Trip	
	250	684- 2500 A. Mag. Trip	JJ
	300- 400	Thermal Magnetic	LA
	400	500- 1000 A. Mag. Trip	
		750- 1600 A. Mag. Trip	
		1000- 2000 A. Mag. Trip	
		1125- 2250 A. Mag. Trip	
		1250- 2500 A. Mag. Trip	
		1500- 3000 A. Mag. Trip	
		1750- 3500 A. Mag. Trip	
		2000- 4000 A. Mag. Trip	
	400- 600	Electronic LI	LG
		Electronic LSI	
		Electronic LSIG	
	800	Electronic LI	MG
	1000- 1200	Thermal Magnetic	PG
	800- 1200	Electronic LSI	
		Electronic LSIG	
	1200	Thermal Magnetic	PJ
		Electronic LSI	
		Electronic LSIG	
	1600- 2500	Thermal Magnetic	RJ
		Electronic LSI	
		Electronic LSIG	

100% Rating Circuit Breaker

Alt. Model	Ampere Range	Trip Type	C. B. Frame Size
4M 5M 7M	15- 150	Thermal Magnetic	HD
	60- 150	Electronic LI	HD
		Electronic LSI	
		Electronic LSIG	
	175- 250	Thermal Magnetic	JD
	250	Electronic LI	
		Electronic LSI	
		Electronic LSIG	
	60- 150	Electronic LI	HG
		Electronic LSI	
		Electronic LSIG	
	250	Electronic LI	JG
		Electronic LSI	
		Electronic LSIG	
	400	Electronic LI	LG
		Electronic LSI	
		Electronic LSIG	
	600- 1200	Electronic LSI	PG
		Electronic LSIG	
	1200	Electronic LSI	PJ
		Electronic LSIG	
	1600- 2500	Electronic LSI	RJ
		Electronic LSIG	
	1600- 3000	Electronic LSI	NW
		Electronic LSIG	

100% Rating Electrically Operated Breakers

For use as paralleling breakers.*

Alt. Model	Amps	Trip Unit	Frame
4M 5M 7M	250, 400, 600, 800, 1000, 1200	3.0 LI	PJ
		5.0 LSI	PJ
		3.0 LI	PL
		5.0 LSI	PL
	1600, 2000, 2500, 3000	Electronic LSI	NW
		Electronic LSIG	NW

* P-frame breakers can be used with the Decision-Maker® 6000 Controller/DPS System or APM603 controller.
NW breakers are for use with the APM603 only.

All circuit breakers listed in this table include line side bus and load side lugs, 24VDC motor operators, and 1 type C SDE overcurrent switch contact. P-frame breakers include 2 type C auxiliary contacts. NW breakers include 4 auxiliary contacts.

No second breakers are allowed in combination with these breakers.

Load Bus Rating

Gen. Set kW	Alt. Model	Rating, Amperes	Type
350- 2250 kW	4M/ 5M/ 7M	3000	Load Bus

300- 2250* kW Line Circuit Breaker Specifications

* Includes models 300REZXB and 300RZXB. For models 300REOZJ and 300REZXC, see the 15- 300 kW section. For KD model generator sets, see pages 8 and 9.

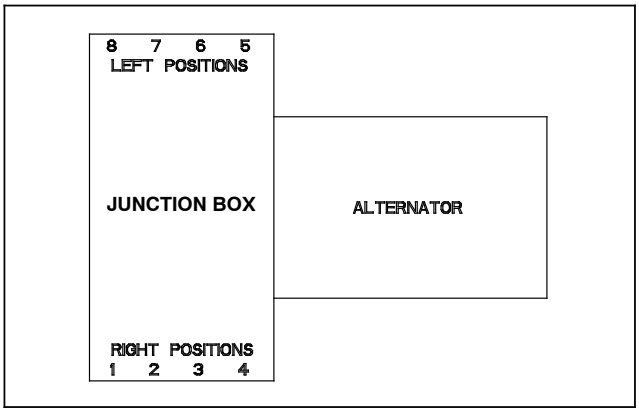
Interrupting Ratings

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			
NW	100	100	85
PG	65	35	18
PJ	100	65	25
PL	125	65	25
RJ	100	65	25

Circuit Breaker Lugs Per Phase (Al/Cu)

Frame Size	Ampere Range	Wire Range
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
M	800	Three 3/0 to 500 kcmil
P	600-800	Three 3/0 to 500 kcmil
	1000-1200	Four 3/0 to 500 kcmil
RJ	1600- 2500	(8) 1/0 to 750 kcmil or (16) 1/0 to 300 kcmil
NW	1600- 3000	(10) 1/0 to 750 kcmil or (20) 1/0 to 300 kcmil

Breaker Positions



NOTE: Breaker and load bus phasing on right positions is A- B- C and on left positions is C- B- A.

NOTE: H, HG, J, JG, and LG-frames when selected with LSIG trip require two mounting spaces (one space for the breaker and one space for the LSIG neutral). These combinations are not reflected in the Multiple Circuit Breaker Combinations table on this page.

Multiple Circuit Breaker Combinations

Alternator Model	Positions 1 or 5	2 or 6	3 or 7	4 or 8
4M/ 5M/ 7M	H/J			
	H/J	H/J		
	H/J	H/J	H/J	
	H/J	H/J	H/J	H/J
	LA			
	LA	H/J		
	LA	LA		
	LA	H/J	H/J	
	LA	LA	H/J	
	LA	LA	LA	
	LA	H/J	H/J	H/J
	LA	LA	H/J	H/J
	LA	LA	LA	H/J
	LA	LA	LA	LA
	LG			
	LG	H/J		
	LG	LA		
	LG	LG		
	LG	H/J	H/J	
	LG	LA	H/J	
	LG	LA	LA	
	LG	LG	H/J	
	LG	LG	LA	
	LG	LG	LG	
	LG	H/J	H/J	H/J
	LG	LA	H/J	H/J
	LG	LA	LA	H/J
	LG	LA	LA	LA
	LG	LG	H/J	H/J
	LG	LG	LA	H/J
	LG	LG	LA	LA
	LG	LG	LG	H/J
	LG	LG	LG	LA
	LG	LG	LG	LG †
	M/P			
	M/P		H/J	
	M/P		LA	
	M/P		LG	
	M/P		M/P ‡	
	M/P		H/J	H/J
	M/P		LA	H/J
	M/P		LA	LA
	M/P		LG	H/J
	M/P		LG	LA
	M/P		LG	LG †
	R §			
	NW §			
	LOAD BUS KIT §			

† Frame size LG is not available in position 4 with 1219 mm (48 in.) junction box.

‡ Frame sizes M/P are not available in position 3 or 4 with 1219 mm (48 in.) junction box.

§ R breakers, NW breakers, and the load bus kit occupy all four positions on a side.

800- 2500 kW KD Model Line Circuit Breaker Specifications

80% Rating Circuit Breaker

Alt. Model	Ampere Range	Trip Type	C. B. Frame Size
KH	15- 150	Thermal Magnetic	HD
	60- 150	Electronic LI	
		Electronic LSI	
		Electronic LSIG	
	60- 150	Electronic LI	HG
		Electronic LSI	
		Electronic LSIG	
	30	9- 325 A. Mag. Trip	HJ
	50	84- 546 A. Mag. Trip	
	100	180- 1040 A. Mag. Trip	
	150	348- 1690 A. Mag. Trip	
	175- 250	Thermal Magnetic	JD
	250	Electronic LI	
		Electronic LSI	
		Electronic LSIG	
	250	Electronic LI	JG
		Electronic LSI	
		Electronic LSIG	
	250	684- 2500 A. Mag. Trip	JJ
	400	2000-4800 A Mag. Trip	LG
	600	3000- 7200 A Mag. Trip	
	400- 600	Electronic LI	
		Electronic LSI	
		Electronic LSIG	
	800	Electronic LI	MG
	1000- 1200	Thermal Magnetic	PG
	800- 1200	Electronic LSI	
		Electronic LSIG	
	1200	Thermal Magnetic	PJ
		Electronic LSI	
		Electronic LSIG	
	1600- 2500	Thermal Magnetic	RJ
		Electronic LSI	
		Electronic LSIG	

100% Rating Circuit Breaker

Alt. Model	Ampere Range	Trip Type	C. B. Frame Size
KH	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- 1200	Electronic LSI	PG
		Electronic LSIG	
	1200	Electronic LSI	PJ
		Electronic LSIG	
	1600- 2500	Electronic LSI	RJ
		Electronic LSIG	
	1600- 3000	Electronic LSI	NW
		Electronic LSIG	

100% Rating Electrically Operated Breakers

For use as paralleling breakers with the APM603 controller.

Alt. Model	Amps	Trip Unit	Frame
KH	250, 400, 600, 800, 1000, 1200	3.0 LI	PJ
		5.0 LSI	PJ
		3.0 LI	PL
		5.0 LSI	PL
	1600, 2000, 2500, 3000	Electronic LSI	NW
		Electronic LSIG	NW

All circuit breakers listed in this table include line side bus and load side lugs, 24VDC motor operators, and 1 type C SDE overcurrent switch contact. P-frame breakers include 2 type C auxiliary contacts. NW breakers include 4 auxiliary contacts.

No second breakers are allowed in combination with these breakers.

Load Bus Rating

Gen. Set Model	Alt. Model	Rating, Amperes	Type
KD800- KD2500	KH	2000 3000 4000 4500	Load Bus

800- 2500 kW KD Model Line Circuit Breaker Specifications

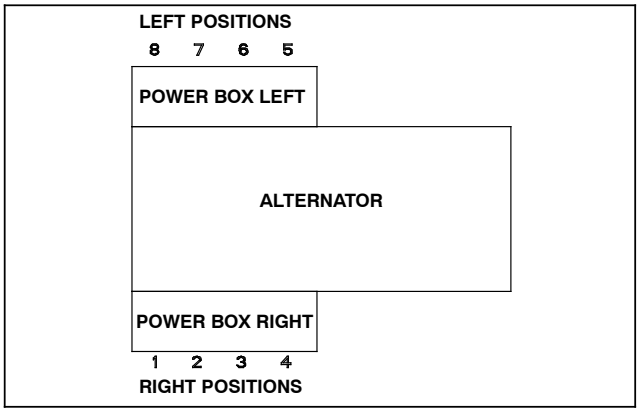
Interrupting Ratings

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
LG	65	35	18
MG			
PG			
PJ	100	65	25
RJ			
NW	100	100	85

Circuit Breaker Lugs Per Phase (Al/Cu)

Frame Size	Ampere Range	Wire Range
H	15- 150	One #14 to 3/0
J	175	One 1/0 to 4/0
	200- 250	One 3/0 to 350 kcmil
LG	400- 600	Two 2/0 to 500 kcmil
M	800	Three 3/0 to 500 kcmil
P	600-800	Three 3/0 to 500 kcmil
	1000-1200	Four 3/0 to 500 kcmil
R	1600- 2500	(8) 1/0 to 750 kcmil or (16) 1/0 to 300 kcmil
NW	1600- 3000	(10) 1/0 to 750 kcmil or (20) 1/0 to 300 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

Breaker Positions



NOTE: Breaker and load bus phasing on right positions is A- B- C and on left positions is C- B- A.

NOTE: H, J, and LG-frames when selected with LSIG trip require two mounting spaces (one space for the breaker and one space for the LSIG neutral). These combinations are not reflected in the Multiple Circuit Breaker Combinations table on this page.

Multiple Circuit Breaker Combinations

Alternator Model	Positions 1 or 5	2 or 6	3 or 7	4 or 8
KH	H/J			
	H/J	H/J		
	H/J	H/J	H/J	
	H/J	H/J	H/J	H/J
	LG			
	LG	H/J		
	LG	LG		
	LG	H/J	H/J	
	LG	LG	H/J	
	LG	LG	LG	
	LG	H/J	H/J	H/J
	LG	LG	H/J	H/J
	LG	LG	LG	H/J
	LG	LG	LG	LG
	M/P *			
	M/P *		H/J	
	M/P *		LG	
	M/P *		M/P *	
	M/P *		H/J	H/J
	M/P *		LG	H/J
	M/P *		LG	LG
	R §			
	NW §			
	LOAD BUS KIT §			

* M and P breakers occupy two positions each.

§ R breakers, NW breakers, and the load bus kit occupy all four positions on a side.

Enclosed Circuit Breakers

The following loose circuit breakers are available in NEMA 1 or NEMA 3R enclosures for remote mounting.

80% Rating Circuit Breakers

Ampere Range	Trip Type	C. B. Frame Size
15- 150	Thermal Magnetic	HD
60- 150	Electronic LI	HD
	Electronic LSI	
175- 250	Thermal Magnetic	JD
250	Electronic LI	
	Electronic LSI	
60- 150	Electronic LI	HG
	Electronic LSI	
250	Electronic LI	JG
	Electronic LSI	
30	9- 325 A. Mag. Trip	HJ
50	84- 546 A. Mag. Trip	
100	180- 1040 A. Mag. Trip	
150	348- 1690 A. Mag. Trip	
250	684- 2500 A. Mag. Trip	JJ
300- 400	Thermal Magnetic	LA
400	500- 1000 A. Mag. Trip	
	750- 1600 A. Mag. Trip	
	1000- 2000 A. Mag. Trip	
	1125- 2250 A. Mag. Trip	
	1250- 2500 A. Mag. Trip	
	1500- 3000 A. Mag. Trip	
	1750- 3500 A. Mag. Trip	
	2000- 4000 A. Mag. Trip	
400- 600	Electronic LI	LG
	Electronic LSI	
800	Electronic LI	MG
1000- 1200	Thermal Magnetic	PG
800- 1200	Electronic LSI	
1200	Thermal Magnetic	PJ
	Electronic LSI	

100% Rating Circuit Breakers

Ampere Range	Trip Type	C. B. Frame Size
15- 150	Thermal Magnetic	HD
60- 150	Electronic LI	
	Electronic LSI	
175- 250	Thermal Magnetic	JD
250	Electronic LI	
	Electronic LSI	
60- 150	Electronic LI	HG
	Electronic LSI	
250	Electronic LI	JG
	Electronic LSI	
400	Electronic LI	LG
	Electronic LSI	
600- 800	Electronic LSI	PG
	Electronic LSIG	

Circuit Breaker Lugs Per Phase (Al/Cu)

Frame Size	Ampere Range	Wire Range
H	15- 150	One #14 to 3/0
J	175	One #4 to 4/0
	200- 250	One 3/0 to 350 kcmil
LA	300	One #1 to 600 kcmil
		Two #1 to 250 kcmil
LG	250	One #2 to 500 kcmil
	400- 600	Two 2/0 to 500 kcmil
M	800	Three 3/0 to 500 kcmil
P	250-800	Three 3/0 to 500 kcmil
	1000-1200	Four 3/0 to 500 kcmil

Accessories

Accessory	Breaker Frame
Auxiliary Contacts	H, J, LA, LG, M, P
Shunt Trip 12VDC	H, J, LA, LG, M, P
Shunt Trip 24VDC	H, J, LA, LG, M, P
Undervoltage Trip 12VDC	H, J, LA, LG, M, P
Undervoltage Trip 24VDC	H, J, LA, LG, M, P
Alarm Switch	H, J, LA, LG, M, P
Overcurrent Switch	H, J, LA, LG, M, P
Note: LA frame accepts a maximum combination of (2) internal accessories (not including padlock attachment)	

Enclosed Circuit Breakers

Enclosure Specifications

Frame Size	Dimensions, L x W x H, mm (in.)	
	NEMA 1	NEMA 3R
H, J	365 x 156 x 797 (14.4 x 6.2 x 31.4)	374 x 156* x 820 (14.8 x 6.2* x 32.3)
LA	388 x 165* x 1130 (15.3 x 6.5* x 44.5)	391 x 200* x 1118 (15.4 X 7.9* X 44.0)
LG †	519 x 293 x 1515 (20.4 x 11.5 x 59.6)	519 x 293 x 1515 (20.4 x 11.5 x 59.6)
M, P	533 x 248 x 1324 (21.0 x 9.58 x 52.1)	533 x 309 x 1324 (21.0 x 12.2 x 52.1)

* Width does not include circuit breaker operating handle.

† Enclosures accept 80% rated L- frame circuit breakers 600A max OR 100% rated L-frame circuit breakers 400A max.

Solid Neutral Assemblies and Ground Kits

Frame Size	Neutral or Ground	Maximum Ampere Rating	Terminals	Conductors per Terminal	Wire Size	Type
H, J	Neutral	100	2	1	#14 to 1/0	CU
					#12 to 1/0	AL
	Neutral	250	2	1 or 2	#1 to 600 #1 to 250	AL or CU
			2	1	#4 to 300	AL or CU
	Ground	250	2	1	#6 to 300	AL or CU
LA	Neutral	400	2	1 or 2	#1 to 600	AL or CU
			2	1 or 2	#1 to 250	AL or CU
	Ground	—	2	1	#10 to 2/0	CU
			2	1	#6 to 2/0	AL
LG	Neutral	200- 1000	2	3	3/0 to 500	AL or CU
	Ground	—	4	1	#6 to 250	AL or CU
M, P	Neutral	1200	8 (4 in, 4 out)	1	3/0 to 500	AL or CU
				2	#6 to 350	AL or CU
	Ground	—	4	1	#6 to 300	AL or CU

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

Enclosed Circuit Breakers and Fused Disconnect Switches

The following loose circuit breakers and fused disconnect switches are available in NEMA 1 enclosures for remote mounting.

100% Rating 3P Circuit Breakers, 2500- 3250 kW

Amps	Trip Type	Volts	Hz	kW	Approvals
3000	Electronic LI	600	60	2500	UL891
4000		780	60	2500	UL891
4000		600	60	2800/ 3000/ 3250	UL891
5000		380	50	2500/ 2800/ 3250	IEC
5000		480	60	2800/ 3000/ 3250	IEC
3000	Electronic LSIG	600	60	2500	UL891
4000		480	60	2500	UL891
4000		600	60	2800/ 3000/ 3250	UL891
5000		380	50	2500/ 2800/ 3250	IEC
5000		480	60	2800/ 3000/ 3250	IEC

NEMA 1 Enclosure Specifications, Breakers

Size	Dimensions, L x W x H, mm (in.)	
	mm	in.
3000 A	914.4 x 914.4 x 2324	36 x 36 x 91.5
4000 A	1219 x 1067 x 2324	48 x 42 x 91.5
5000 A	1219 x 1219 x 2324	48 x 48 x 91.5

Fused Disconnect Switches 50/60 Hz, HVL-CC Switch, UL and IEC

Amps	Trip Type	Poles	Accessories
200 400 600	Fuse	3P	None
			3 Auxiliary Contacts
			3 Auxiliary Contacts and Blown Fuse Indicator
			3 Auxiliary Contacts, Blown Fuse Indicator, and Protective Relay

NEMA 1 Enclosure Specifications, Fused Disconnect Switches

Size	Dimensions, L x W x H, mm (in.)	
	mm	in.
13.8 kV	946 x 749 x 2591 *	37.25 x 29.5 x 102
4160 V	946 x 883 x 2591 *	37.25 x 34.75 x 102

* Height includes pull box.

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® generator set distributor for availability.

Section 2—General Information

The PowerPact H-, J-, and L-frame circuit breakers are designed to protect electrical systems from damage caused by overloads and short circuits. H- and J-frame circuit breakers are available with either thermal-magnetic or Micrologic™ electronic trip units. L-frame circuit breakers are available with Micrologic electronic trip unit.

H- and J-frame circuit breakers with thermal-magnetic trip units contain individual thermal (overload) and instantaneous (short circuit) sensing elements in each pole. The amperage ratings of the thermal trip elements are calibrated at 104°F (40°C) free air ambient temperature. Per the National Electric Code® (NEC®) and the Canadian Electrical Code, standard circuit breakers may only be applied continuously at up to 80% of their rating. Circuit breakers rated for 100% operation are available but require specially-designed enclosures, copper lugs, and 194°F (90°C) rated wire.

Devices with the Micrologic electronic trip unit provide adjustable protection settings for greater system flexibility. In addition to electronic protection, Micrologic trip units allow users to monitor both energy and power. Through direct access to in-depth information and networking using open protocols, PowerPact circuit breakers with Micrologic trip units let operators optimize the management of their electrical installations. Far more than a circuit breaker, these circuit breakers are a measurement and communication tool ready to meet energy-efficiency needs through optimized power requirements, increased energy availability, and improved installation management.

Applications

PowerPact H-, J-, and L-frame circuit breakers offer high performance and a wide range of interchangeable trip units to protect most applications.

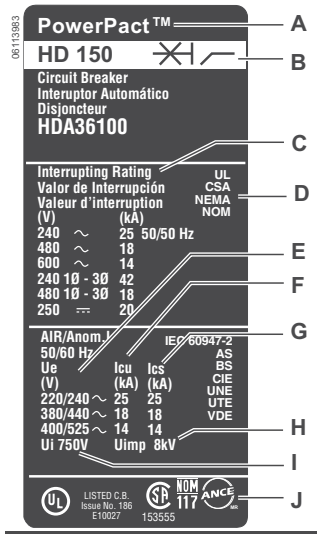
Electronic trip units provide highly accurate protection with wide setting ranges and can integrate measurement, metering and communication functions. They can be combined with the front display module (FDM121) to provide functions similar to a power meter.

Table 3: Applications

	Power Meter	PowerPact H-, J-, and L-frame circuit breakers equipped with Micrologic 5 / 6 trip units offer type A (ammeter) or E (energy) metering functions as well as communication capability. Using Micrologic trip unit sensors and intelligence, PowerPact H-, J-, and L-frame circuit breakers provide access to measurements of all the main electrical parameters on the built-in screen, on a dedicated front display module (FDM121) or through the communication network.
	Operating assistance	Integration of measurement functions provides operators with operating assistance functions including alarms tripped by user-selected measurement values, time-stamped event tables and histories, and maintenance indicators.
	Front display module	The main measurements can be read on the built-in screen of Micrologic 5 / 6 trip units. They can also be displayed on the equipment FDM121 along with pop-up windows signalling the main alarms.
	Communication Network	PowerPact H-, J-, and L-frame circuit breakers equipped with Micrologic 5 / 6 trip units provide communication capabilities. Simple RJ45 cables connect to a Modbus™ communication interface module.

General Characteristics

Faceplate Label



Characteristics indicated on the faceplate label:

A. Circuit breaker type
B. Circuit breaker disconnector symbol
C. Performance levels
D. Standards
E. Ue: Operating voltage per IEC
F. Icu: Ultimate breaking capacity per IEC
G. Ics: Service breaking capacity per IEC
H. Uimp: Rated impulse withstand voltage per IEC
I. Ui: Insulation voltage per IEC
J. Certification marks

NOTE: When the circuit breaker is equipped with an extended rotary handle, the door must be opened to view the faceplate.

Codes and Standards

H-, J-, and L-frame circuit breakers, automatic switches and electronic motor circuit protectors are manufactured and tested in accordance with the following standards.

NOTE: Apply circuit breakers according to guidelines detailed in the National Electric Code (NEC) and other local wiring codes.

Table 4: Codes and Standards (Domestic)

PowerPact H-, J-, and L-Frame Circuit Breakers	H-, J-, and L-Frame Switches	PowerPact H-, J-, and L-Frame Motor Circuit Protectors
UL 489[1]	UL 489[3]	UL 508
IEC 60947-2	IEC 60947-3	IEC 60947-2
CSA C22.2 No. 5[2]	CSA C22.2 No. 5[4]	CSA C22.2 No. 14
Federal Specification W-C-375B/GEN	Federal Specification W-C-375B/GEN	NEMA AB1
NEMA AB1	NEMA AB1	CCC
NMX J-266	NMX J-266	CE Marking
CCC	CE Marking	
CE Marking		

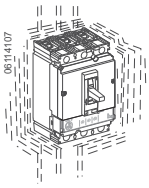
1 PowerPact H- and J-frame circuit breakers are in UL File E10027. PowerPact L-frame circuit breakers are in UL File E63335.

2 PowerPact H- and J-frame circuit breakers are in CSA File LR40970. PowerPact L-frame circuit breakers are in CSA File 69561.

3 PowerPact H- and J-frame switches are in UL File E87159.

4 PowerPact H- and J-frame switches are in CSA File LR32390.

Vibration



PowerPact H-, J-, and L-frame devices resist mechanical vibration.

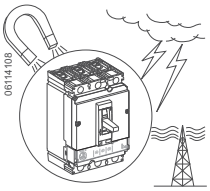
Tests are carried out in compliance with standard UL489 SA and SB for the levels required by merchant-marine inspection organizations (Veritas, Lloyd's, etc.):

PowerPact H-, J-, and L-frame circuit breaker meet IEC 60068-2-6 for vibration:

- 2.0 to 25.0 Hz and amplitude +/- 1.6 mm
- 25.0 to 100 Hz acceleration +/- 4.0 g

Excessive vibration may cause tripping, breaks in connections or damage to mechanical parts.

Electromagnetic disturbances



PowerPact H-, J-, and L-frame devices are protected against:

- overvoltages caused by circuit switching
- overvoltages caused by an atmospheric disturbances or by a distribution-system outage (such as from failure due to lightning)
- devices emitting radio waves (radios, walkie-talkies, radar, etc.)
- electrostatic discharges produced directly by users

PowerPact H-, J-, and L-frame devices have successfully passed the electromagnetic-compatibility tests (EMC) defined by the following international standards:

- IEC/EN 60947-2: Low-voltage switchgear and controlgear, part 2: Circuit breakers:
  - Annex F: Immunity tests for circuit breakers with electronic protection
  - Annex B: Immunity tests for residual current protection
- IEC/EN 61000-4-2: Electrostatic-discharge immunity tests
- IEC/EN 61000-4-3: Radiated, radio-frequency, electromagnetic-field immunity tests
- IEC/EN 61000-4-4: Electrical fast transient/burst immunity tests
- IEC/EN 61000-4-5: Surge immunity tests
- IEC/EN 61000-4-6: Immunity tests for conducted disturbances induced by radio frequency fields
- CISPR 11: Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment.

These tests ensure that:

- no nuisance tripping occurs
- tripping times are respected

Tropicalization

The materials used in PowerPact circuit breakers will not support the growth of fungus and mold.

PowerPact circuit breakers have passed the test defined below for extreme atmospheric conditions.

Dry cold and dry heat:

- IEC 68-2-1–dry cold at -55 °C
- IEC 68-2-2–dry heat at +85° C

Damp heat (tropicalization)

- IEC 68-2-30–damp heat (temperature + 55° C and relative humidity of 95%)
- IEC 68-2-52 level 2–salt mist

Special Ratings

The H-frame and J-frame circuit breakers also comply with the following special ratings:

- HACR rating
- SWD switch duty rating (applies only to 15 and 20 A / 277 Vac or less, 2P and 3P)
- HID high intensity discharge lighting rating (15–50 A)

The L-frame circuit breakers complies with the following special rating:

- HACR rating

Marine Ratings

UL Marine Listed/CSA Certified Circuit Breakers (UL489 Supplement SA)

The PowerPact H- and J-frame circuit breakers with thermal-magnetic trip units meet the UL 489 Supplement SA requirements for use on vessels of any length under or over 65 ft. (19.8 m). The PowerPact H-, J-, and L-frame circuit breakers with Micrologic™ electronic trip units meet the UL 489 Supplement SA for use on vessels over 65 ft. (19.8 m) in length. Marine circuit breakers must not use aluminum or aluminum alloys for terminal connections and must be calibrated at an ambient temperature of 104° F (40° C). Standard circuit breakers should not be specified or used in the place of marine rated circuit breakers.

Circuit breakers can be ordered with the Marine SA listing by adding the suffixes “LC” (copper lugs) and “YA” (marine) to the catalog number.

UL Naval Listed/CSA Certified Circuit Breakers (UL 489 Supplement SB)

The PowerPact H-, J-, and L-frame circuit breakers with Micrologic trip units meet the UL 489 Supplement SB requirements for use on naval vessels. These circuit breakers are subject to various vibration tests as described in UL 489 Supplement SB. Naval circuit breakers must not use aluminum or aluminum alloys for terminal connections and must be calibrated at an ambient temperature of 122° F (50° C). Standard circuit breakers should not be specified or used in the place of navel rated circuit breakers.

Circuit breakers can be ordered with the Naval SB listing by adding the suffixes “LC” (copper lugs) and “YA1” (naval) to the catalog number.

American Bureau of Shipping (ABS)

The PowerPact H-, J-, and L-Frame circuit breakers are certified to ABS-NVR (American Bureau of Shipping - Naval Vessel Rules), for use on Naval vessels.

Table 6: Circuit Breakers

Circuit Breaker		**150 A H-Frame**					**250 A J-Frame**					**400 A L-Frame**					**600 A L-Frame**				
Circuit Breaker Type		HD	HG	HJ	HL	HR	JD	JG	JJ	JL	JR	LD	LG	LJ	LL	LR	LD	LG	LJ	LL	LR
Number of poles[1]		2, 3				3	2, 3				3	3, 4					3, 4				
Amperage Range (A)		15-150					70-250					70-400					200-600				
UL 489 Circuit Breaker Ratings																					
UL/CSA/NOM (kA rms)	240 Vac	25	65	100	125	200	25	65	100	125	200	25	65	100	125	200	25	65	100	125	200
	480 Vac	18	35	65	100	200	18	35	65	100	200	18	35	65	100	200	18	35	65	100	200
	600 Vac	14	18	25	50	100	14	18	25	50	100	14	18	25	50	100	14	18	25	50	100
	250 Vdc[2]	20	20	20	20	---	20	20	20	20	---	---	---	---	---	---	---	---	---	---	---
	500 Vdc[2, 3]	---	---	---	---	---	---	20	---	---	---	---	---	---	---	---	---	---	---	---	---
IEC 947-2 Circuit Breaker Ratings																					
Ultimate breaking capacity (Icu) (kA rms)	220/240 Vac	25	65	100	125	150	25	65	100	125	150	25	65	100	125	150	25	65	100	125	150
	380/415 Vac	18	35	65	100	125	18	35	65	100	125	18	35	65	100	125	18	35	65	100	125
	440/480 Vac	18	35	65	100	125	18	35	65	100	125	18	35	65	100	125	18	35	65	100	125
	500/525 Vac	14	18	25	50	75	14	18	25	50	75	14	18	25	50	75	14	18	25	50	75[4]
	690 Vac	---	---	---	---	20	---	---	---	---	20	---	---	---	---	20	---	---	---	---	20
	250 Vdc[2]	---	---	---	---	---	20	20	20	20	---	---	---	---	---	---	---	---	---	---	---
	500 Vdc[2, 3]	---	---	---	---	---	20	20	20	20	---	---	---	---	---	---	---	---	---	---	---
Service breaking capacity (Ics)	% Icu	100%					100%					100%					100%				
Insulation Voltage	V_i	750 Vac					750 Vac					750 Vac					750 Vac				
Impulse Withstand Voltage	V_{imp}	8 kVac					8 kVac					8 kVac					8 kVac				
Operational Voltage	V_e	690 Vac					690 Vac					690 Vac					690 Vac				
Sensor Rating	I_n	150 A					250 A					400 A					600 A				
Utilization Category	---	A					A					A					A				
Operations (Open-Close Cycles)																					
Without Current		4000					5000					5000					5000				
With Current		4000					1000					1000					1000				
Protection and Measurements																					
Short-circuit protection	Magnetic only	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Overload/short-circuit protection	Thermal-magnetic	■	■	■	■	■	■	■	■	■	■	---	---	---	---	---	---	---	---	---	---
	Electronic	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	with neutral protection (Off-0.5-1-OSN)[5]	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	with ground fault protection	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	with zone selective interlocking (ZSI)[6]	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Display / I, V, f, P, E, THD measurements / interrupted-current measurement		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Options	Front display module (FDM121)	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Operating assistance	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Counters	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Histories and alarms	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Metering Com	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Device status/control com	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Dimensions / Weight / Connections																					
Dimensions 3P (Unit Mount) in. (mm)	Height	6.4 (163)					7.5 (191)					13.38 (340)					13.38 (340)				
	Width	4.1 (104)					4.1 (104)					5.51 (140)					5.51 (140)				
	Depth	3.4 (86)					3.4 (86)					4.33 (110)					4.33 (110)				
Weight 3P - lb. (Kg)		4.8 (2.2)					5.3 (2.4)					13.2 (6.0)					13.7 (6.2)				
Connections / Terminations	Unit Mount	■					■					■					■				
	I-Line™	■					■					■					■				
	Rear Connection	■					■					■					■				
	Plug-In	■					■					■					■				
	Drawout	■					■					■					■				
	Optional Lugs	■					■					■					■				

1 H and J-frame breakers with Micrologic™ trip units available only with 3P. The HJ, HL and the J-Frame 2P breakers are 3P modules.

2 DC not available with PowerPact H, J or L-frame circuit breakers with Micrologic trip units.

3 500 Vdc specific catalog numbers, ungrounded UPS systems only.

4 I_{cs} for 600 A L-frame circuit breaker at 525 V is 19 kA.

5 OSN: Over Sized Neutral protection for neutrals carrying high currents (e.g. 3rd harmonics).

6 ZSI using restraint wires.

PowerPact H-, J-, and L-frame Circuit Breaker Trip Units

Table 7: Micrologic™ Trip Unit Features

Features	Micrologic Trip Unit (X = Standard Feature, O = Available Option					
	Standard		Ammeter		Energy	
	3.2/3.3	3.2S/3.3S	5.2A/5.3A	6.2A/6.3A	5.2E/5.3E	6.2E/6.3E
LI	X					
LSI[1]		X	X		X	
LSIG/Ground Fault Trip[2]				X		X
Ground-Fault Alarm Trip				X		X
Current Settings Directly in Amperes	X	X	X	X	X	X
True RMS Sensing	X	X	X	X	X	X
UL Listed	X	X	X	X	X	X
Thermal Imaging	X	X	X	X	X	X
LED for Long-Time Pickup	X	X	X	X	X	X
LED for Long-Time Alarm	X	X	X	X	X	X
LED Green “Ready” Indicator	X	X	X	X	X	X
Up to 12 Alarms Used Together			X	X	X	X
Digital Ammeter			X	X	X	X
Zone-Selective Interlocking[3]			X	X	X	X
Communications	O	O	O	O	O	O
LCD Display			X	X	X	X
Front Display Module FDM121			O	O	O	O
Advanced User Interface			X	X	X	X
Neutral Protection			X	X	X	X
Contact Wear Indication[4]			X	X	X	X
Incremental Fine Tuning of Settings			X	X	X	X
Load Profile[4, 5]			X	X	X	X
Power Measurement					X	X
Power Quality Measurements					X	X

1 The LSI with 3.2S/3.3S trip units have fixed short time and long time delays.

2 Requires neutral current transformer on three-phase four-wire loads.

3 ZSI for H/J-frame devices is only IN. ZSI for L-frame devices is IN and OUT.

4 Indication available using the communication system only.

5 % of hours in 4 current ranges: 0–49%, 50–79%, 80–89%, and >90% I_n.

Thermal-Magnetic or Electronic Trip Unit?

Thermal-magnetic trip units (available on H- and J-frame circuit breakers only) protect against overcurrents and short-circuits using tried and true techniques. For applications requiring installation optimization and energy efficiency, electronic trip units offering more advanced protection functions combined with measurements.

Trip units using digital electronics are faster as well as more accurate. Wide setting ranges make installation upgrades easier. Designed with processing capabilities, Micrologic trip units can provide measurement information and device operating assistance. With this information, users can avoid or deal more effectively with disturbances and can play a more active role in system operation. They can manage the installation, anticipate events and plan any necessary servicing.

Accurate Measurements for Complete Protection

PowerPact H-, J-, and L-frame circuit breakers devices offer excellent measurement accuracy from 15 amperes on up to the short-circuit currents. This is made possible by a new generation of current transformers combining “iron-core” sensors for self-powered electronics and “air core” sensors (Rogowski coils) for measurements. The protection functions are managed by an ASIC (Application Specific Integrated Circuit) component that is independent of the measurement functions. This independence ensures immunity to conducted and radiated disturbances and a high level of reliability.

Numerous Security Functions

Torque-limiting screws	The screws secure the trip unit to the circuit breaker. When the correct tightening torque is reached, the screw heads break off. Optimum tightening avoids any risk of temperature rise. A torque wrench is no longer required.
Easy and sure changing of trip units	All trip units are interchangeable, without wiring. A mechanical mismatch-protection system makes it impossible to mount a trip unit on a circuit breaker with a lower rating.
“Ready” LED for a continuous self-test	The LED on the front of the electronic trip units indicates the result of the self-test running continuously on the measurement system and the tripping release. As long as the green LED is flashing, the links between the CTs, the processing electronics and the tripping mechanism are operational. The circuit breaker is ready to protect. A minimum current of 15 to 50 A, depending on the device, is required for this indication function.
A patented dual adjustment system for protection functions.	Available on Micrologic™ 5 / 6 trip units, the system consists of: • an adjustment using rotary switches sets the maximum value • an adjustment using the keypad or made remotely, fine-tunes the setting. This setting may not exceed the first one. It can be read directly on the Micrologic trip unit screen, to within one ampere and a fraction of a second.

Section 6—Trip Units

Available Trip Units

- PowerPact H-, J-, and L-Frame circuit breakers offer a range of thermal-magnetic and Micrologic™ electronic trip units in interchangeable cases. Thermal-magnetic trip units are designed to open automatically under overload or short circuit. H-frame and J-frame thermal-magnetic circuit breakers contain individual thermal (overload) and instantaneous (short circuit) sensing elements in each pole.
- Micrologic electronic trip units provide intelligent operation, with wide setting ranges make installation upgrades easier. Designed with processing capabilities, Micrologic trip units can provide measurement information and device operating assistance to supply all of the information required to manage the electrical installation and optimize energy use.

  Micrologic trip units offer excellent measurement accuracy, using a new generation of current transformers combining “iron-core” sensors for self-powered electronics and “air-core” sensors (Rogowski coils) for measurements. The protection functions are managed by an ASIC component that is independent of the measurement functions. This independence ensures immunity to conducted and radiated disturbances and a high level of reliability.

  An LED on the front of the electronic trip units indicates the result of the self-test running continuously on the measurement system and the tripping release. When the green LED is flashing, the links between the CTs, the processing electronics and the Mitop release are operational. The circuit breaker is ready to protect. A minimum current of 15 to 50 A, depending on the device, is required for this function.

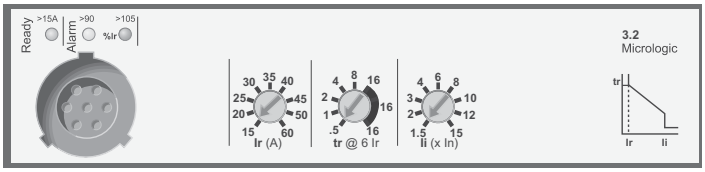
  The dual adjustment for protection functions on Micrologic 5 / 6 consists of:

  — an adjustment using rotary switches sets the maximum value
  — an adjustment, made using the keypad or remotely, fine-tunes the setting. This setting may not exceed the first one. It can be read directly on the Micrologic screen, to within one ampere and a fraction of a second.

NOTE: All the trip units have a transparent sealable cover that protects access to the adjustment rotary switches.

Micrologic™ 3 Trip Units

Micrologic 3 trip units can be used on PowerPact H-, J-, and L-Frame circuit breakers with performance levels D/G/J/L.



They provide:

- standard protection of distribution cables
- indication of:
  - — overloads (using LEDs)
  - — overload tripping (using the SDx relay module).

Circuit breakers equipped with Micrologic 3 trip units can be used to protect distribution systems supplied by transformers.

Protection

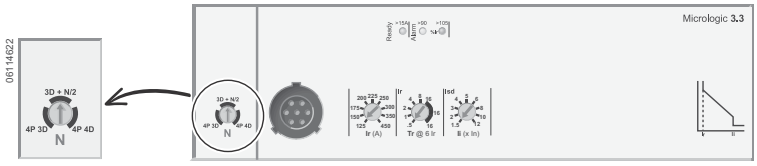
Settings are made using the adjustment rotary switches.

Overloads: Long time protection (I_r)

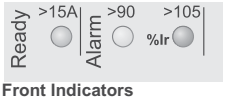
Inverse time protection against overloads with an adjustable current pick-up Ir set using a rotary switch and an adjustable time delay t_r.

Neutral protection

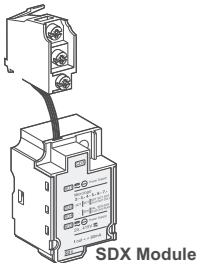
- On 3-pole L-frame circuit breakers, neutral protection is not possible.
- On four-pole L-frame circuit breakers, neutral protection may be set using a three-position switch:
  - — switch position 4P 3D: neutral unprotected
  - — switch position 4P 3D + N/2: neutral protection at half the value of the phase pick-up, (0.5 x Ir)
  - — switch position 4P 4D: neutral fully protected at I_r



Indicators



Front Indicators



SDX Module

Front indicators

- The green “Ready” LED blinks slowly when the electronic trip unit is ready to provide protection. It indicates the trip unit is operating correctly.
- Orange overload pre-alarm LED: steady on when I > 90% I_r
- Red overload LED: steady on when I > 105% I_r

Remote indicators

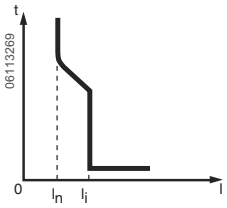
An overload trip signal can be remotely checked by installing an SDx relay module inside the circuit breaker. This module receives the signal from the Micrologic electronic trip unit through an optical link and makes it available on the terminal block. The signal is cleared when the circuit breaker is reclosed. See page 94.

Section 10—Installation Recommendations

Operating conditions

Temperature Derating

- PowerPact H-, J-, and L-frame circuit breakers may be used between -13°F and 158°F (-25 °C and +70 °C). For temperatures higher than 104° F (40° C°) inside the enclosure, devices must be derated.
- Circuit breakers should be put into service under normal ambient, operating-temperature conditions.
- The permissible storage-temperature range for PowerPact H-, J-, and L-frame circuit breakers in the original packing is -58°F[1] and 185°F (-50 °C[1] and +85 °C).



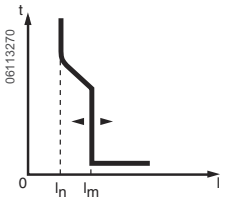
H-Frame Trip Curve

(I_n) Fixed threshold thermal protection against overload
(I_i) **Fixed** threshold instantaneous protection against short circuits

Table 124: Temperature Derating for H-Frame Trip Unit Thermal Protection—Long-Time

Temperature[1]		Rating (A) I_n															
°C	°F																
-10	14	23	30	38	46	53	60	68	76	88	103	112	123	137	160	180	221
0	32	21	28	36	43	49	56	63	71	83	97	107	117	131	151	171	207
10	50	20	26	33	40	46	52	59	66	77	90	101	111	126	141	161	194
20	68	18	24	31	37	42	48	54	62	72	84	96	105	120	132	152	180
30	86	17	22	28	34	39	44	50	56	66	77	88	98	110	121	139	165
40	104	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**	**60**	**70**	**80**	**90**	**100**	**110**	**125**	**150**
50	122	12	17	21	25	30	34	38	43	53	62	72	80	86	95	109	131
60	140	9	14	17	20	24	28	31	35	46	53	63	70	72	80	93	111

1 Shaded areas indicate temperature rerated values, non-shaded areas inside an enclosure are standard circuit breaker ampere ratings at 104° F (40° C°).



J-Frame Trip Unit

(I_n) Fixed threshold thermal protection against overload
(I_m) Adjustable instantaneous protection against short circuits

Table 125: Temperature Derating for J-Frame Trip Unit Thermal Protection—Long-Time

Temperature[1]		Rating (A) I_n				
°C	°F					
-10	14	221	264	289	330	377
0	32	207	247	273	310	354
10	50	194	230	256	290	330
20	68	180	213	240	270	307
30	86	165	194	220	248	279
40	104	**150**	**175**	**200**	**225**	**250**
50	122	131	150	176	193	214
60	140	111	124	151	160	177

1 Shaded areas indicate temperature rerated values, non-shaded areas are standard circuit breaker ampere ratings at 104° F (40° C°).

1 -40°F (-40 °C) for Micrologic™ trip units with an LCD screen.

PowerPact H-, J- and L-Frame Circuit Breakers Equipped with Electronic Trip Units

Electronic trip units are not affected by variations in temperature. If the trip units are used in high-temperature environments, the Micrologic™ trip unit setting must nevertheless take into account the temperature limits of the circuit breaker.

Changes in temperature do not affect measurements by electronic trip units.

- The built-in CT sensors with Rogowski coils measure the current.
- The control electronics compare the value of the current to the settings defined for 104°F (40°C).

Because temperature has no effect on the CT measurements, the tripping thresholds do not need to be modified.

However, the temperature rise caused by the flow of current combined with the ambient temperature increases the temperature of the device. To avoid reaching the thermal withstand value, it is necessary to limit the current flowing through the device, that is the maximum I_r setting as a function of the temperature.

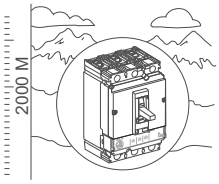
The table below indicates the maximum long-time (LT) protection setting I_r (A) depending on the ambient temperature.

Table 126: Derating Circuit Breakers with Micrologic Trip Units

Type of Device	Rating	Temperature						
		104°F (40°C)	113°F (45°C)	122°F (50°C)	131°F (55°C)	140°F (60°C)	149°F (65°C)	158°F (70°C)
H-Frame								
Unit-mount, plug-in or drawout	60 A	No derating						
	100 A	No derating						
	150 A	No derating						
J-Frame								
Unit-mount	250	250	250	250	245	237	230	225
Plug-in or drawout	250	250	245	237	230	225	220	215
L-Frame								
Unit-mount	400	400	400	400	390	380	370	360
Plug-in or drawout	400	400	390	380	370	360	350	340
Unit-mount	600	600	600	600	585	570	550	535
Plug-in or drawout	600	570	550	535	520	505	490	475

Example. A unit-mount PowerPact L-frame circuit breaker equipped with a Micrologic can have a maximum I_r setting of:

- 400 A up to 122°F (50 °C)
- 380 A up to 140°F (60 °C)



Altitude derating

Altitude does not significantly affect the characteristics of PowerPact H-, J-, and L-frame circuit breakers circuit breakers up to 6560 ft (2000 m). Above this altitude, it is necessary to take into account the decrease in the dielectric strength and cooling capacity of air.

The following table gives the corrections to be applied for altitudes above 6560 ft (2000 m). The breaking capacities remain unchanged.

Table 127: Altitude Derating

Altitude		6560 ft (2000 m)	9840 ft (3000 m)	13120 ft (4000 m)	16400 ft (5000 m)
Dielectric withstand voltage		3000 V	2500 V	2100 V	1800 V
Insulation voltage	V_i	800 V	700 V	600 V	500 V
Maximum operational voltage	V_e	690 V	590 V	520 V	460 V
Average current capacity (A) at 104°F (40°C)	I_n x	1 0.	0.96	0.93	0.9

400 Hz Derating

Application of H- and J-frame circuit breakers at frequencies above 60 Hz requires that special consideration be given to the effects of high frequency on the circuit breaker characteristics. Thermal and instantaneous operations must be treated separately.

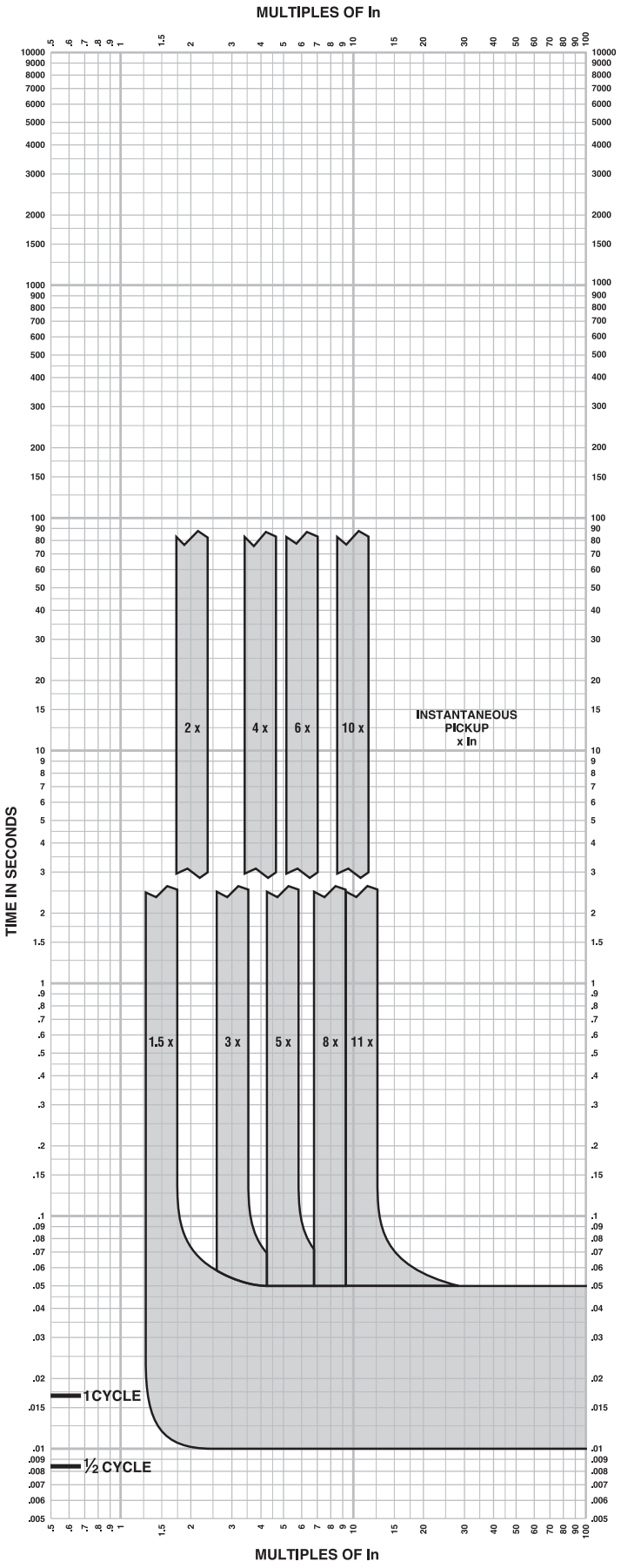
At frequencies below 60 Hz, the thermal derating of PowerPact H and J-frame circuit breakers is negligible. However, at frequencies above 60 Hz, thermal derating is required.

One of the most common high frequency applications is at 400 Hz.

Table 128: 400 Hz Derating

Circuit Breaker	400 Hz Derating Multiplier
H-Frame	0.95
J-Frame	0.90
L-Frame, 400 A	0.80
L-Frame, 600 A	0.65

For more information, refer to Data Bulletin 0100DB0101, *Determining Current Carrying Capacity in Special Applications*.



MICROLOGIC™ ELECTRONIC TRIP UNITS
Micrologic™ 3.3/3.3S/5.3A or E/6.3A or E
Instantaneous Trip Curve
600A L-Frame

The time-current curve information is to be used for application and coordination purposes only.

Notes:

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately 20 minutes is required between overloads to completely reset thermal-imaging.
2. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
3. In = Maximum dial setting of Ir.
   600A L-Frame: In = 600A = Max Ir setting

Curves apply from -35ºC to +70ºC (-31ºF to +158ºF) ambient temperature.

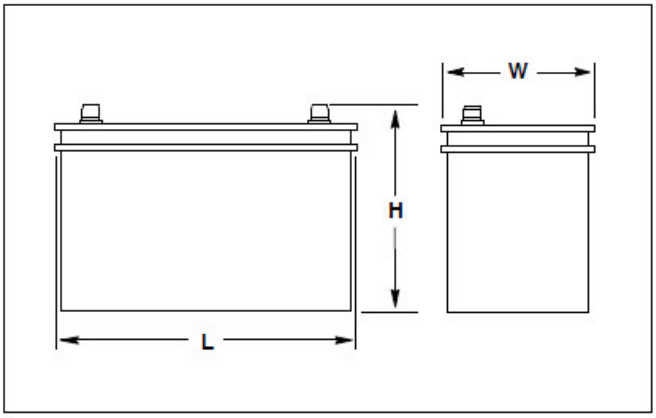
Schneider Electric

Drawing No. S1A8147600
March 2011

KOHLER®

ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED

Typical Overall Dimensions

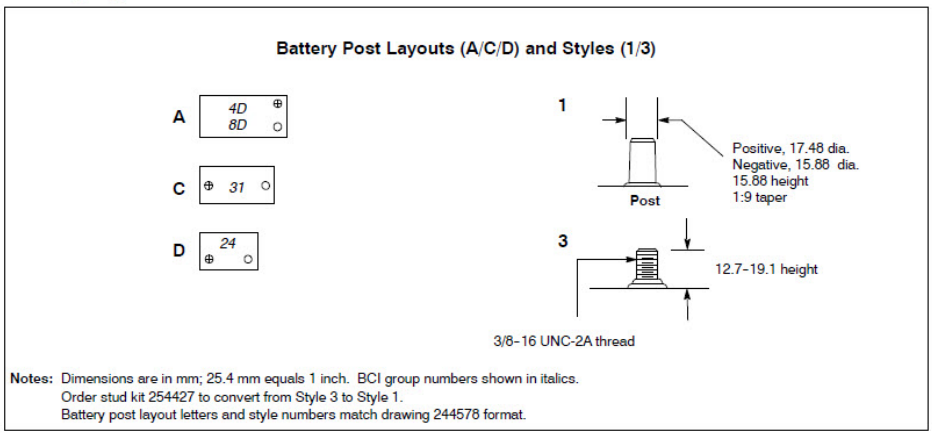


Standard Features

- 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	324586	1	31	330.2 (13.0)	173.0 (6.8)	239.8 (9.4)	950	185	C/3

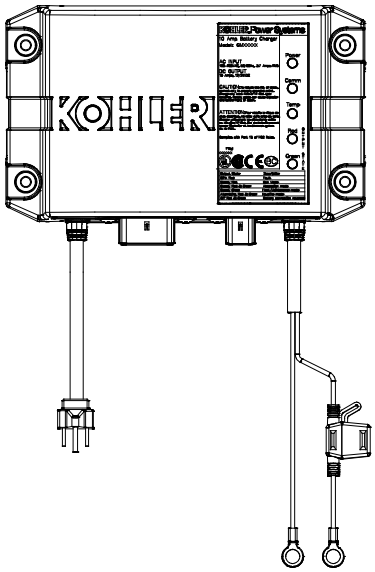
Battery Specifications



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.

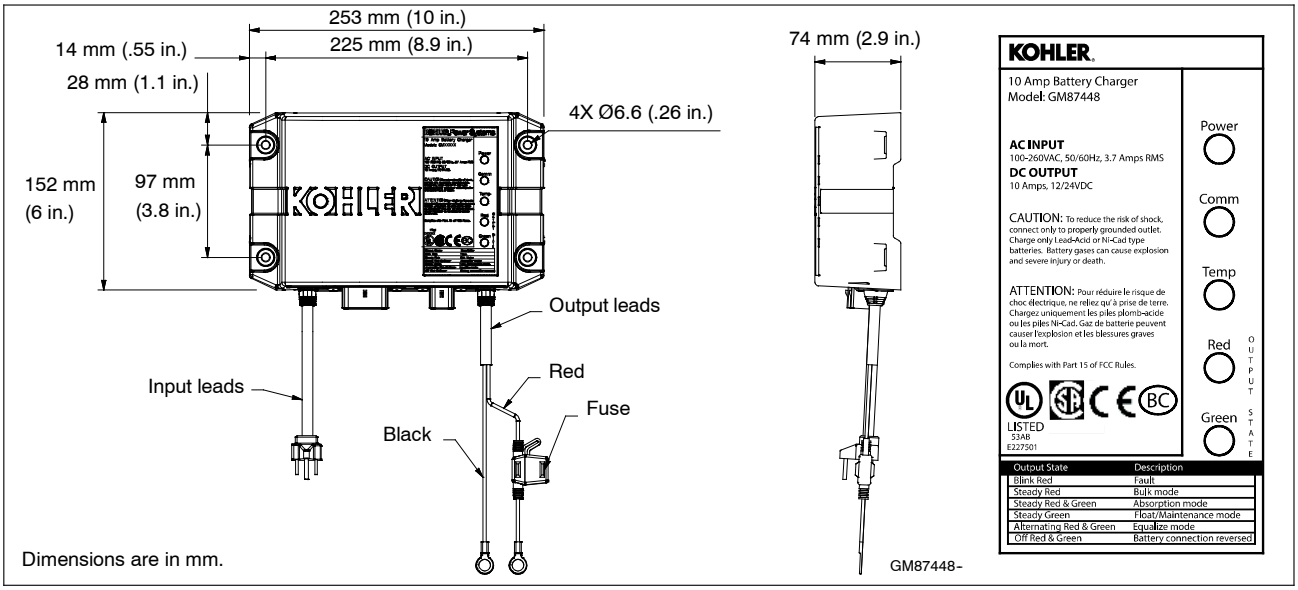
With the optional battery temperature sensor connected, the battery charger can adjust output voltages for optimal charging.

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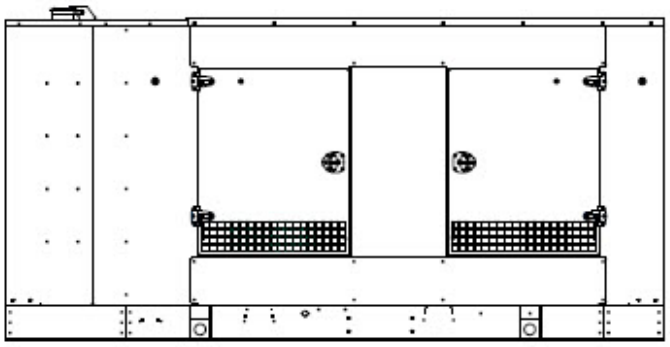
Availability is subject to change without notice. Kohler Co. reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever. Contact your local Kohler® generator distributor for availability.

KOHLER®

Sound Enclosure

ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED



Standard Enclosure

Sound Enclosure Standard Features

• Internal-mounted critical silencer and flexible exhaust connector.

• Skid-mounted, steel construction with hinged doors. Steel enclosures are recommended for high humidity and or high salt/coastal regions.

• 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.

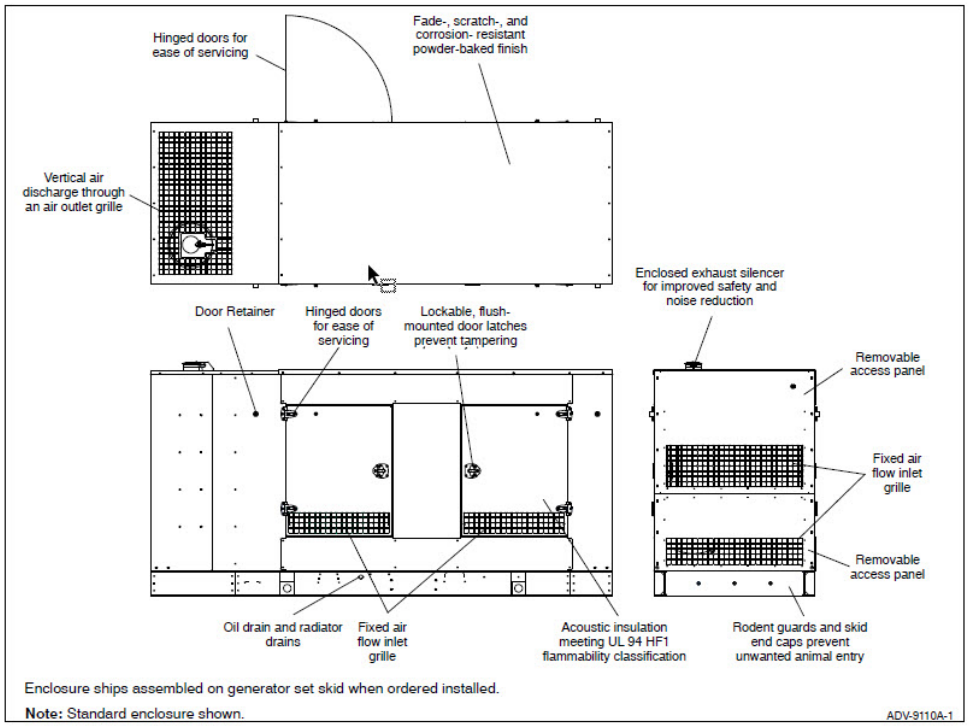
• Vertical air inlet and outlet discharge to redirect air and reduce noise.

• 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-lined air discharge hood.

• Steel sound enclosure is analyzed to 150 mph (241 kph) wind load rating.

Standard Weather and Sound Enclosure



Sound Enclosure Features

- Available in steel (14 gauge) formed panel, solid construction.
- 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.
- Sound-attenuating design. Mechanically restrained acoustic insulation UL 94 HF1 listed for flame resistance.
- Cooling air discharge. The sound enclosures include acoustic insulation with urethane film.

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	3502 (137.9)	1340 (52.8)	70	1949 (76.7)	2132 (4703)

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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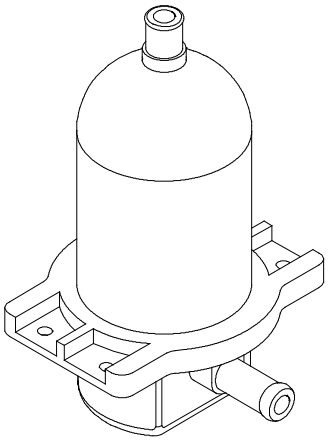
Industrial Generator Set Accessories

Engine Block Heater Kits



Block Heater Kit, typical

Applicable Models

- KG40- KG125
- KG150- KG200
- KG150R
- 25- 45REZG
- 25- 60REZGB
- 50REZGC/125REZGC/150REZGC
- 50- 60REOZJD
- 50REOZJE
- 80REZGD/100REZGD
- 80RZGD/100RZGD
- 80- 200REOZJF
- 80- 150REOZJG4
- 125RZGC/150RZGC
- 125REOZJG/180REOZJG

Standard Features

- UL- C/US listed
- CE compliant
- Controls for automatic operation
- Compact design
- Easy to install

Description

The engine block heater kit heats the engine coolant in cold ambient, warming the cylinders, oil, and charge air circuit which all help to give a faster starting time. The engine block heater uses thermosiphon action to circulate warm coolant into the engine and supplies constant heating to the engine. The engine block heater kit helps to extend element life and gives a significant reduction in electrical consumption.

The engine block heater kit is recommended for ambient temperatures below 10°C (50°F).

The engine block heater kits are available in 120 V, 240 V, and 277 V versions.

Block Heater Specifications

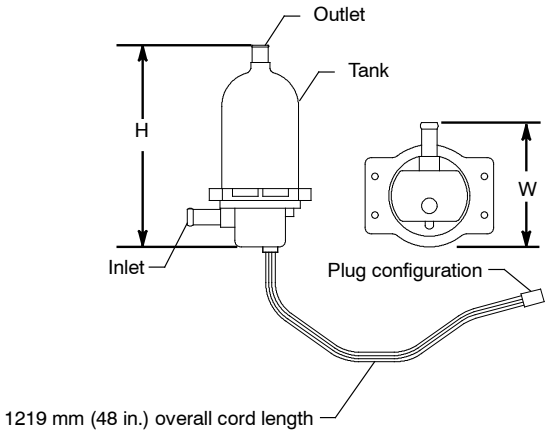
Heating Fluid	Water, Coolant Mix (50% Glycol/50% Water)
Max. Pressure	90 psi (620 kPa)
Heating Element Material	Incoloy 800
Inlet/Outlet Plumbing	0.625 in. hose barb
System Ingress	IP41
Power Connection	NEMA Plug and EURO Plug
Power Chord Length	48 in. (1219 mm)

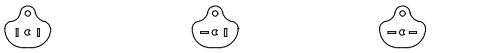
Specifications

Block Heater Kit Number	Component	Watts	Voltage	Phase	Thermostat Temperature	
					ON	OFF
GM58098- KA1	358311	1000	120	1	27°C (80°F)	38°C (100°F)
GM75536- KA1	326228	1500	120	1	49°C (120°F)	60°C (140°F)
GM75555- KA5	GM75552	1800	120	1	27°C (80°F)	38°C (100°F)
GM75555- KA6	GM75553	2000	240	1		
GM75556- KA1	352945	1500	120	1		
GM75557- KA1	352945	1500	120	1		
GM75564- KA1	358311	1000	120	1		
GM75565- KA1	352945	1500	120	1		
GM77944- KA1	352945	1500	120	1		
GM77944- KA2	352946	1500	240	1		
GM85060- KA1	GM75552	1800	120	1		
GM85060- KA2	GM75553	2000	240	1		
GM89427- KA2	GM75552	1800	120	1		
GM91708- KA1	352945	1500	120	1		
GM94248- KA1	352945	1500	120	1		
GM104799- KA1	352945	1500	120	1		
GM105165- KA1	352945	1500	120	1		
GM105165- KA2	352946	1500	240	1		
GM105409- KA1	352945	1500	120	1		
GM105409- KA2	352946	1500	240	1		

Dimensions and Weights

Overall Size, H x W, mm (in):	199 x 122 (7.8 x 4.8)
Weight, kg (lb):	0.77 (1.7)





120 V. 15 A.
NEMA 5- 15P

120 V. 20 A.
NEMA 5- 20P

240 V. 15 A.
NEMA 6- 15P

Plug configuration

326220- CMP

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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

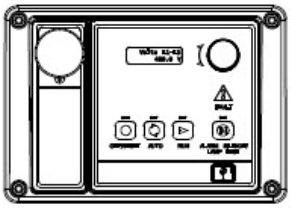
DISTRIBUTED BY:

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® generator distributor for availability.

KOHLER®

ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED

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

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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. 5.0 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

Jumpers

- 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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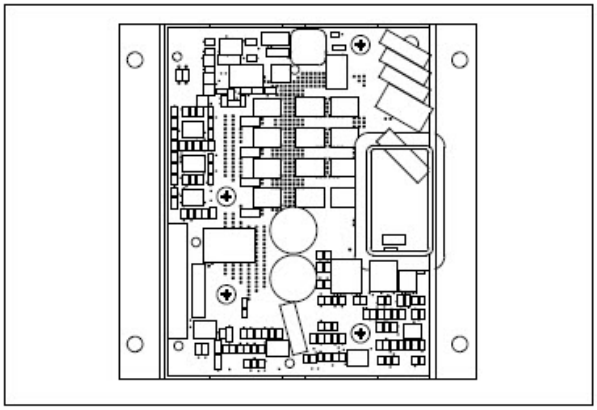

- Interfaces between the controller and alternator assembly using rotor field leads, auxiliary power windings, and optic board leads.
- Allows the Decision-Maker® controllers the ability to control a wound-field alternator using the same control signal as Fast Response™ alternator.
- Permits the generator 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.

Modbus® is a registered trademark of Schneider Electric.

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Alternator Data

TECHNICAL INFORMATION BULLETIN

Alternator Data Sheet

Alternator Model: 4S12X
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	146.5 (183.0)	155.0 (193.5)	160.0 (200.0)	168.0 (210.0)	181.0 (226.0)	178.5 (223.0)	189.0 (236.0)
127/220 254/440	3	0.8	Wye	136.0 (170.0)	143.0 (178.5)	146.5 (183.0)	152.5 (190.5)	164.0 (205.0)	162.0 (202.5)	171.5 (214.0)
120/208 240/416	3	0.8	Wye	130.0 (162.5)	136.5 (170.5)	139.0 (173.5)	144.0 (180.0)	154.5 (193.0)	152.5 (190.5)	161.5 (201.5)
110/190 220/380	3	0.8	Wye	118.5 (148.0)	124.5 (155.5)	126.5 (158.0)	131.0 (163.5)	140.5 (175.5)	139.0 (173.5)	147.0 (183.5)
120/240	3	0.8	Delta	130.0 (162.5)	136.5 (170.5)	139.0 (173.5)	144.0 (180.0)	154.5 (193.0)	152.5 (190.5)	161.5 (201.5)
120/240	1	1.0	Dogleg	81.0 (81.0)	90.5 (90.5)	95.0 (95.0)	105.0 (105.0)	106.0 (106.0)	106.0 (106.0)	106.0 (106.0)
347/600	3	0.8	Wye	135.0 (169.0)	143.0 (179.0)	147.0 (184.0)	155.0 (194.0)	172.0 (215.0)	168.0 (210.0)	180.0 (225.0)

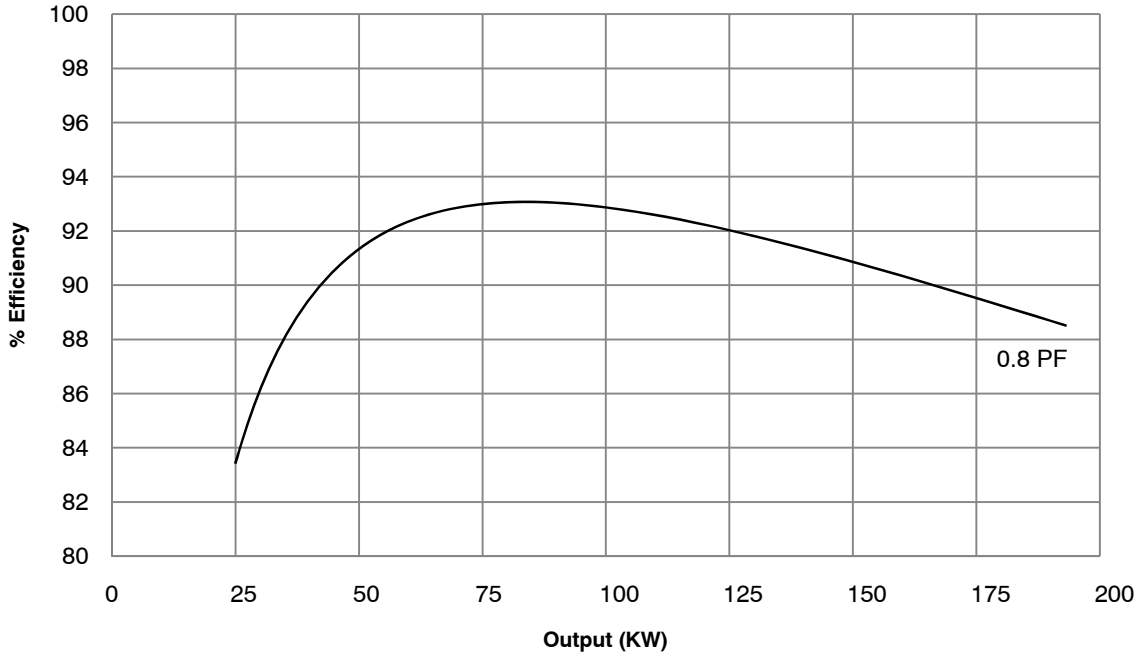
* All data tested in accordance with IEEE Standard 115. Kohler Co. reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever.

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

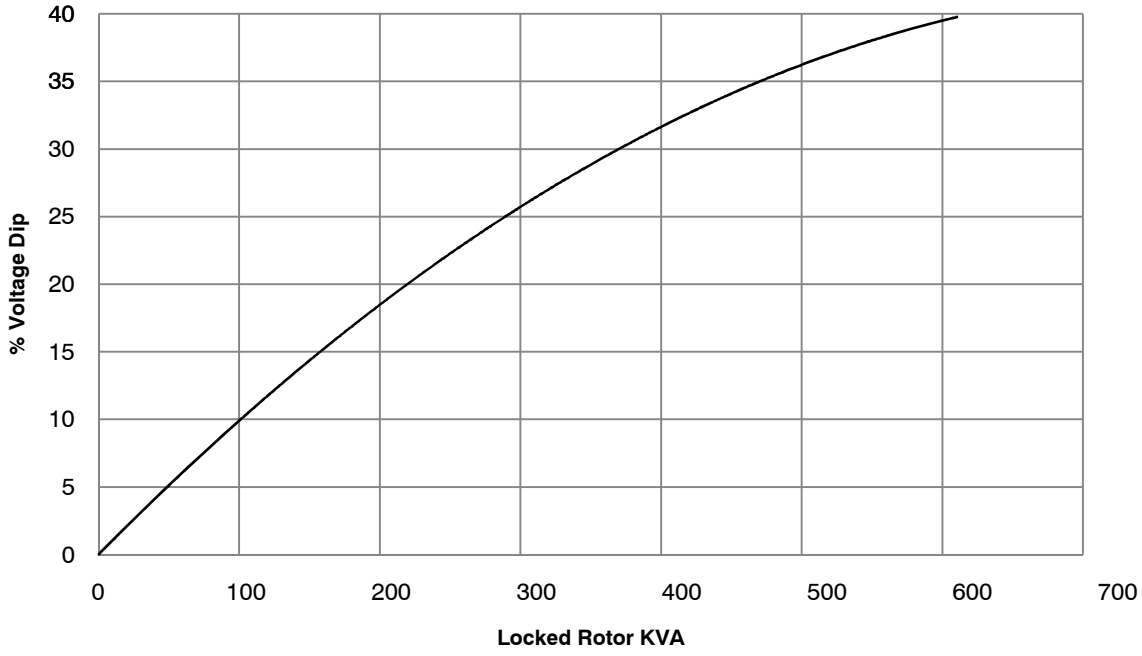
	Symbol	PerUnit	Ohms
Typical Cold Resistances			
Phase Resistance		0.031	0.008
Rotor Resistance		20.58	5.239
Typical Reactances			
Synchronous			
Direct	X_d	4.982	1.268
Quadrature	X_q	2.468	0.628
Transient			
Unsaturated	X'_{du}	0.504	0.128
Saturated	X'_d	0.443	0.113
Subtransient			
Direct	X''_d	0.171	0.044
Quadrature	X''_q	0.169	0.043
Negative Sequence	X_2	0.17	0.043
Zero Sequence	X_0	0.013	0.003

	Symbol	Value
Typical Time Constants		
Armature Short Circuit	T_a	0.012 sec.
Transient Short Circuit	T'_d	0.154 sec.
Transient Open Circuit	T'_{do}	1.728 sec.
Typical Field Current		
Full Load	If_{FL}	21.1 amps
No Load	If_{NL}	3.8 amps
Typical Short Circuit Ratio		0.201
Harmonic Distortion		
RMS Total Harmonic Distortion		4.04%
Max. Single Harmonic		5th
Deviation Factor (No Load, L-L)		<5%
Telephone Influence Factor		<50
Insulation Class		
per NEMA MG1-1.66		H
Phase Rotation		ABC

4S12X, 60 Hz, 139/240, 277/480 Volts, Wye
TYPICAL ALTERNATOR EFFICIENCY*

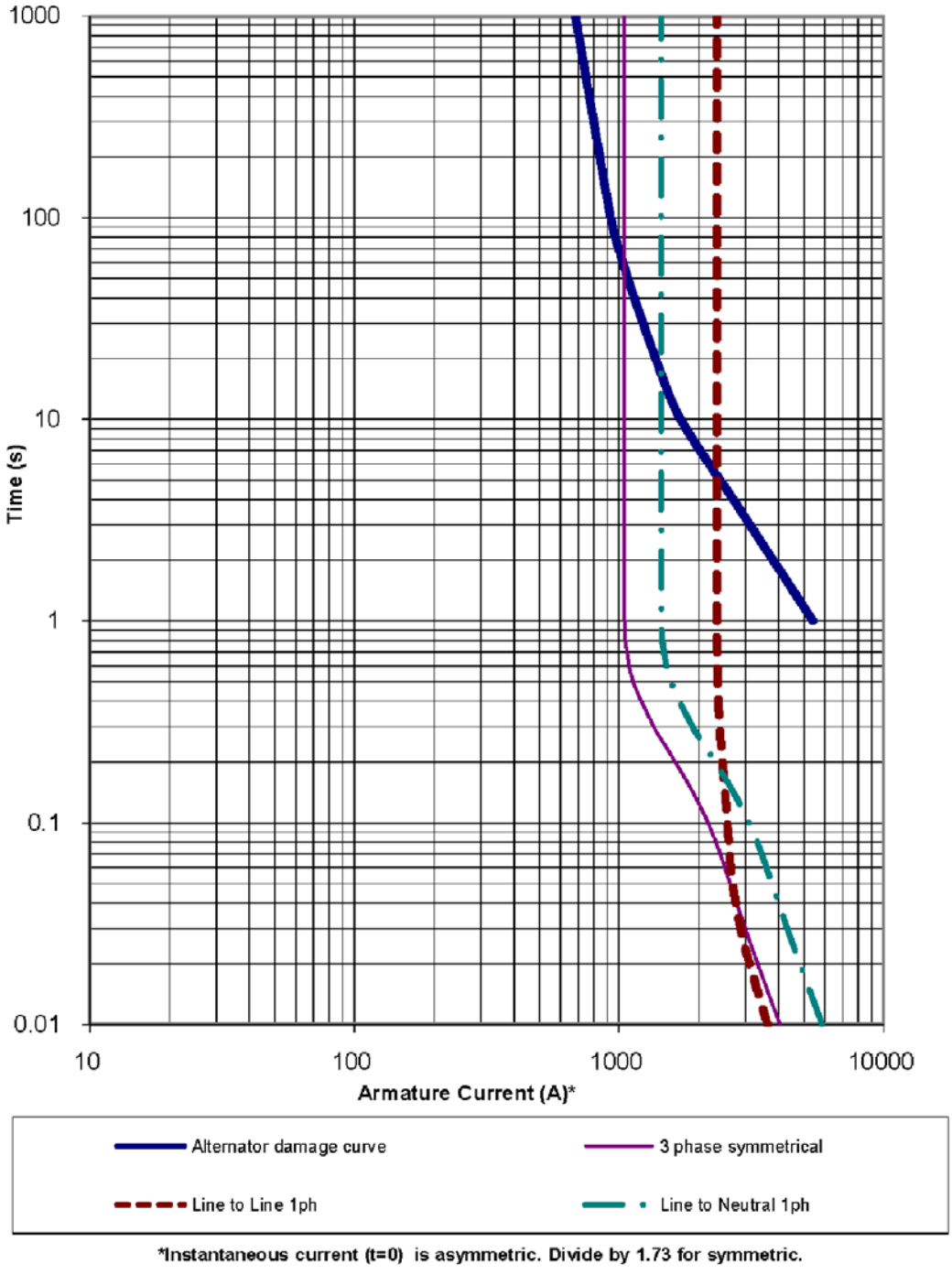


4S12X, 60 Hz, 139/240, 277/480 Volts, Wye
TYPICAL MOTOR STARTING CHARACTERISTICS*



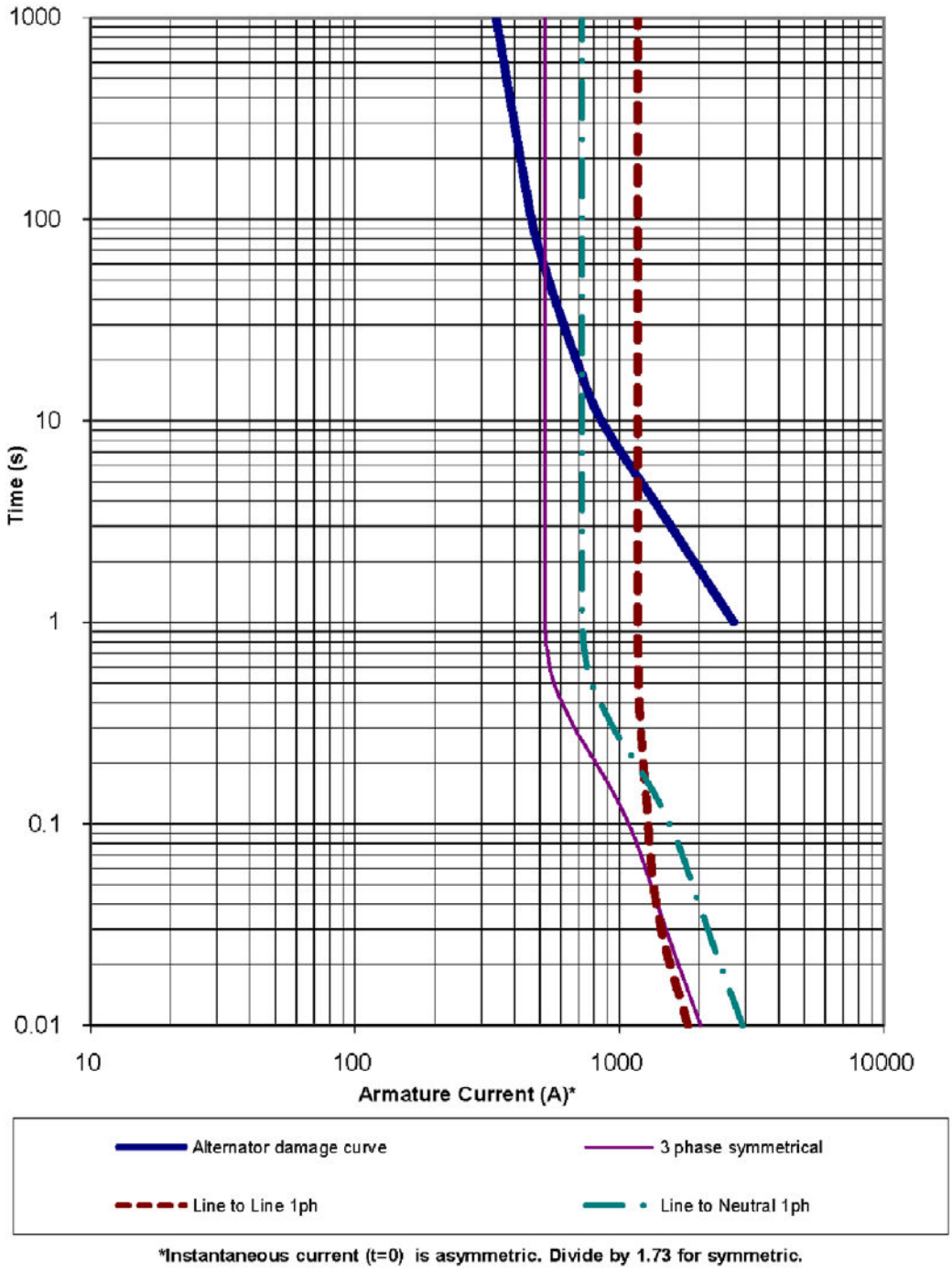
* All data tested in accordance with IEEE Standard 115. Kohler Co. reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever.

4S12X, 60 Hz, Low Wye or Delta Connection
SHORT CIRCUIT DECREMENT CURVE



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

4S12X, 60 Hz, High Wye Connection
SHORT CIRCUIT DECREMENT CURVE



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

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Cooling Data

TECHNICAL INFORMATION BULLETIN

Generator Set Cooling System Data Sheet

	50°C Ambient Temperature Cooling System								
KG150 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)*	52 (126)	48 (118)	46 (115)	44 (111)	41 (106)	37 (99)	47 (117)
	Cooling system airflow	m^3/min *(ft^3/min)*	270 (9500)	246 (8700)	234 (8300)	221 (7800)	205 (7200)	188 (6600)	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.

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Sound Data

TECHNICAL INFORMATION BULLETIN

Generator Set Sound Data Sheet

			Sound Pressure Data in dB(A)					
Generator Set Model	**Hz**	**Load**	**Raw Exhaust (No Catalyst, No Silencer)**	**Raw Exhaust (Open Unit Catalyst, No Silencer)**	**Open Unit, Isolated Exhaust**	**Weather Enclosure**	**Standard Sound**	**Premium Sound**
KG150	**60**	100% Load	111.0	101.9	81.3	79.4	70.9	69.1
		No Load	95.8	94.5	75.6	73.7	63.0	61.2

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.

KG150		**60 Hz**		**Sound Pressure Levels, dB(A)**								
Load	Distance, m (ft)	Enclosure	Measurement Clock Position	Octave Band Center Frequency (Hz)								Overall Level
				63	125	250	500	1000	2000	4000	8000	
100% Load	7 (23)	Premium Sound	3:00	50.9	59.8	62.4	62.1	60.8	58.7	53.7	48.2	68.3
			1:30	47.5	60.5	60.8	63.3	62.9	59.6	55.3	48.2	68.9
			12:00-Engine	48.9	60.2	61.8	62.9	62.8	60.2	57.7	51.3	69.2
			10:30	50.1	60.5	62.3	64.2	63.3	60.5	57.5	51.4	69.8
			9:00	47.8	57.3	60.1	61.4	61.5	59.9	55.3	48.9	67.6
			7:30	49.4	60.1	62.8	61.7	62.8	62.4	54.3	49.2	69.3
			6:00-Alternator	51.6	60.7	64.2	62.7	64.0	63.7	56.8	52.7	70.6
			4:30	49.0	60.1	62.6	61.2	62.2	61.4	53.1	49.6	68.8
			8-pos. log avg.	49.6	60.0	62.3	62.5	62.6	61.1	55.8	50.2	69.1

				Sound Pressure Levels, dB(A)								
Load	Distance, m (ft)	Enclosure	Measurement Clock Position	Octave Band Center Frequency (Hz)								Overall Level
				63	125	250	500	1000	2000	4000	8000	
100% Load	7 (23)	Standard Sound	3:00	52.0	60.7	58.8	65.0	58.6	56.0	52.8	50.3	68.3
			1:30	49.8	56.7	59.6	64.8	61.3	57.9	53.6	50.1	68.4
			12:00-Engine	52.1	56.8	56.5	62.3	60.0	57.1	57.7	51.2	67.0
			10:30	52.8	64.1	58.1	65.2	61.3	58.5	55.7	53.7	69.7
			9:00	55.3	61.4	62.1	67.8	60.8	58.4	55.8	53.0	70.7
			7:30	53.0	60.4	64.1	69.1	64.6	59.7	55.4	54.4	72.2
			6:00-Alternator	56.8	61.4	66.5	72.2	63.4	60.8	57.0	54.7	74.3
			4:30	53.5	59.4	62.9	68.8	64.6	60.0	54.6	53.2	71.8
			8-pos. log avg.	53.6	60.7	62.2	67.9	62.3	58.8	55.6	52.9	70.9

				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	79.4	79.1	76.0	79.1	81.0	80.3	78.0	80.5	79.4

				Sound Pressure Levels, dB(A)								
Load	Distance, m (ft)		Measurement Clock Position	Octave Band Center Frequency (Hz)								Overall Level
				63	125	250	500	1000	2000	4000	8000	
100% Load	7 (23)	Open Unit, Isolated Exhaust	3:00	49.3	61.1	72.6	74.7	74.3	76.1	71.0	65.7	81.3
			1:30	53.7	61.2	69.4	74.5	74.2	75.7	71.6	68.6	81.0
			12:00-Engine	51.8	62.3	71.9	69.8	70.9	71.6	67.7	61.7	77.9
			10:30	49.8	62.2	69.3	75.8	73.2	74.5	73.0	69.7	81.0
			9:00	52.8	63.0	72.9	76.5	74.9	78.2	73.3	68.5	82.9
			7:30	53.3	62.6	73.7	76.5	74.6	75.8	72.9	69.1	82.2
			6:00-Alternator	51.5	63.6	72.2	75.8	72.6	71.3	67.7	62.9	79.9
			4:30	51.0	62.9	73.2	76.8	75.5	76.9	71.6	65.6	82.4
			8-pos. log avg.	51.9	62.4	72.2	75.4	74.0	75.5	71.5	67.3	81.3

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	
100% Load	1 (3.3)	Raw Exhaust (Open Unit Catalyst, No Silencer)	68.6	92.4	97.1	92.9	93.4	95.5	89.2	78.4	101.9

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	
100% Load	1 (3.3)	Raw Exhaust (No Catalyst, No Silencer)	74.3	87.7	97.1	101.8	102.0	104.0	106.6	102.6	111.0

KG150		60 Hz		Sound Pressure Levels, dB(A)								
Load	Distance, m (ft)	Enclosure	Measurement Clock Position	Octave Band Center Frequency (Hz)								Overall Level
				63	125	250	500	1000	2000	4000	8000	
No Load	7 (23)	Premium Sound	3:00	37.9	49.1	51.1	54.0	49.0	48.1	44.4	38.6	58.1
			1:30	39.0	46.9	54.1	56.7	53.4	50.5	44.1	38.1	60.6
			12:00-Engine	40.3	49.0	51.9	53.5	51.6	50.2	44.6	38.3	58.8
			10:30	40.6	50.9	52.3	55.1	51.2	50.9	44.7	38.4	59.6
			9:00	41.7	50.8	53.6	54.4	52.0	50.4	46.1	39.7	59.8
			7:30	42.2	49.5	56.3	55.4	52.6	51.1	45.7	38.5	60.9
			6:00-Alternator	43.2	56.0	63.3	57.2	53.7	52.4	47.0	39.6	65.5
			4:30	39.3	50.3	55.7	55.9	53.7	51.1	45.6	39.3	61.1
			8-pos. log avg.	40.8	51.2	56.9	55.4	52.4	50.7	45.4	38.9	61.2

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)	Standard Sound	3:00	39.7	50.9	52.9	55.8	50.8	49.9	46.2	40.4	59.9
			1:30	40.8	48.7	55.9	58.5	55.2	52.3	45.9	39.9	62.4
			12:00-Engine	42.1	50.8	53.7	55.3	53.4	52.0	46.4	40.1	60.6
			10:30	42.4	52.7	54.1	56.9	53.0	52.7	46.5	40.2	61.4
			9:00	43.5	52.6	55.4	56.2	53.8	52.2	47.9	41.5	61.6
			7:30	44.0	51.3	58.1	57.2	54.4	52.9	47.5	40.3	62.7
			6:00-Alternator	45.0	57.8	65.1	59.0	55.5	54.2	48.8	41.4	67.3
			4:30	41.1	52.1	57.5	57.7	55.5	52.9	47.4	41.1	62.9
			8-pos. log avg.	42.6	53.0	58.7	57.2	54.2	52.5	47.2	40.7	63.0

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	72.7	74.7	72.9	73.0	75.2	74.3	71.5	74.4	73.7

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	44.7	56.0	64.4	65.3	68.2	69.5	67.3	61.3	74.6
			1:30	46.5	55.7	65.6	70.0	70.7	70.7	68.1	62.9	76.6
			12:00-Engine	46.8	57.3	68.8	64.8	69.1	68.6	65.0	58.5	74.8
			10:30	45.3	56.0	63.8	68.6	69.7	68.4	65.8	58.7	74.9
			9:00	45.9	57.6	68.1	71.2	69.4	71.8	68.2	61.3	77.1
			7:30	44.9	58.6	66.6	70.5	69.3	70.2	67.3	60.4	76.2
			6:00-Alternator	44.8	59.1	68.2	67.7	65.6	65.0	61.5	52.6	73.4
			4:30	43.7	57.9	66.9	70.1	70.1	70.0	67.3	59.4	76.3
			8-pos. log avg.	45.4	57.4	66.9	69.0	69.2	69.6	66.7	60.1	75.6

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)	60.9	83.1	82.7	88.6	89.0	88.1	83.7	75.2	94.5

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 Catalyst, No Silencer)	59.6	83.3	86.6	89.6	89.8	89.6	85.0	78.6	95.8

KOHLER®

Exhaust System Data

TECHNICAL INFORMATION BULLETIN

Enclosed Generator Set Exhaust System Data Sheet

Model	Enclosure Type	Consumed Back Pressure in. Hg (in. H_2O)	Consumed Back Pressure kPa	Back Pressure Limit(s) in. Hg (in. H_2O)	Back Pressure Limit(s) kPa	Flex Exhaust Tube(s)	Silencer	Drawing
KG150	All Weather and Sound Enclosures	1.9 (26.0)	6.4	5.8 (80.0)	19.8	GM105539 Flex Tube	GM107092 Catalyst Muffler	ADV-9045

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®

KG150

60 Hz. Gas Generator Set (NG Only)
EPA Certified for Stationary Emergency Applications
EMISSION DATA SHEET

ENGINE INFORMATION

Model:	KG10V08T-6CGS	Bore:	116.8mm (4.6 in.)
Nameplate kW @ 1800 RPM:	169 (NG)	Stroke:	120.6mm (4.7 in.)
Type:	4-Cycle,V8 Cylinder	Displacement:	10.3 L (632 cu. in.)
Aspiration:	Turbocharged	EPA Family:	NKHXB10.3TNL
Compression Ratio:	9.3:1	EPA Certificate:	NKHXB10.3TNL-003
Catalyst Required:	Yes		

EXHAUST EMISSION DATA (g/kW-hr):

	NG
CO_2	650
NOx	0.31
VOC	0.04
CO	0.14
BSFC	259

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 estimate 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 EPA engine test methods, fuel specifications and reference conditions and is subject 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
2022 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: **NKHXB10.3TNL-003**

Effective Date: 12/22/2021
Expiration Date: 12/31/2022

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 12/22/2021
Revision Date: N/A

Manufacturer: Kohler Co.
Engine Family: NKHXB10.3TNL
Mobile/Stationary Certification Type: Stationary
Fuel : LPG/Propane
Natural Gas (CNG/LNG)
Emission Standards :
Stationary Part 1048
NMHC + NOx (g/kW-hr) : 2.7
HC + NOx (g/kW-hr) : 2.7
CO (g/kW-hr) : 4.4
Part 60 Subpart JJJ Table 1
NOx (g/Hp-hr) : 2.0
VOC (g/Hp-hr) : 1.0
CO (g/Hp-hr) : 4.0
Emergency Use Only : Y

Pursuant to Section 213 of the Clean Air Act (42 U.S.C. section 7547) and 40 CFR Part 60, 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, 40 CFR Part 60 and produced in the stated model year.

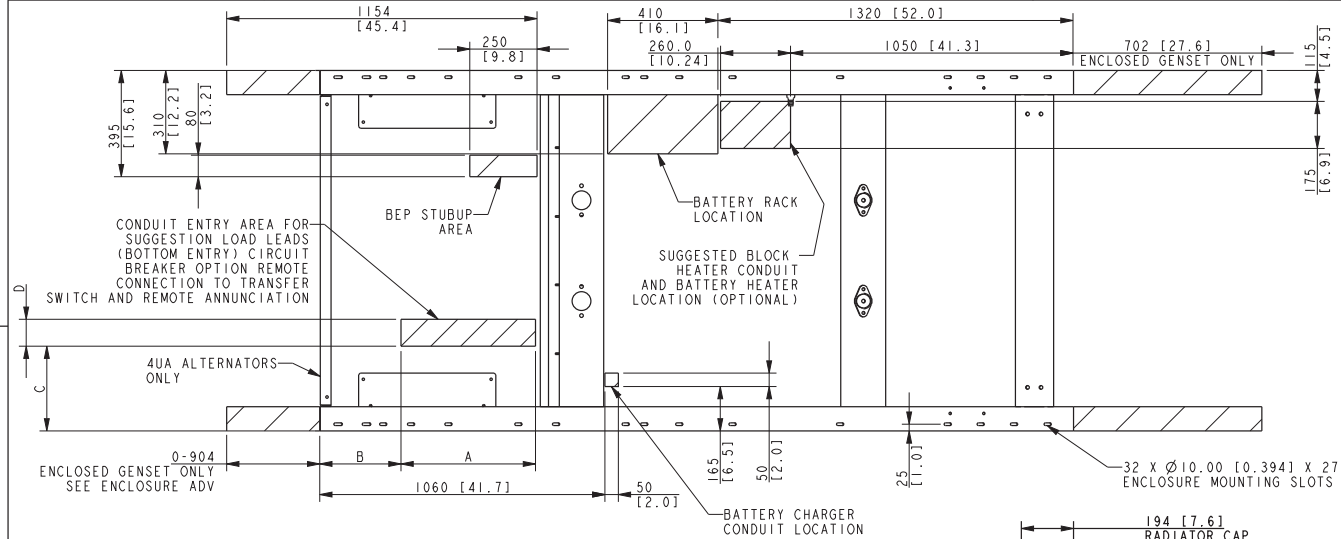
This certificate of conformity covers only those new nonroad spark-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60, 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60, 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, 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, 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



	4UA9, 4UA13 mm [IN]	4R13X, 4S12X, 4T13X, 4S13X mm [IN]
A	500 [19.7]	400 [15.7]
B	302 [11.9]	400 [15.7]
C	315 [12.4]	300 [11.8]
D	100 [3.9]	150 [5.9]
E	1376 [54.2]	1244 [49.0]
F	50 [2.0]	311 [12.2]

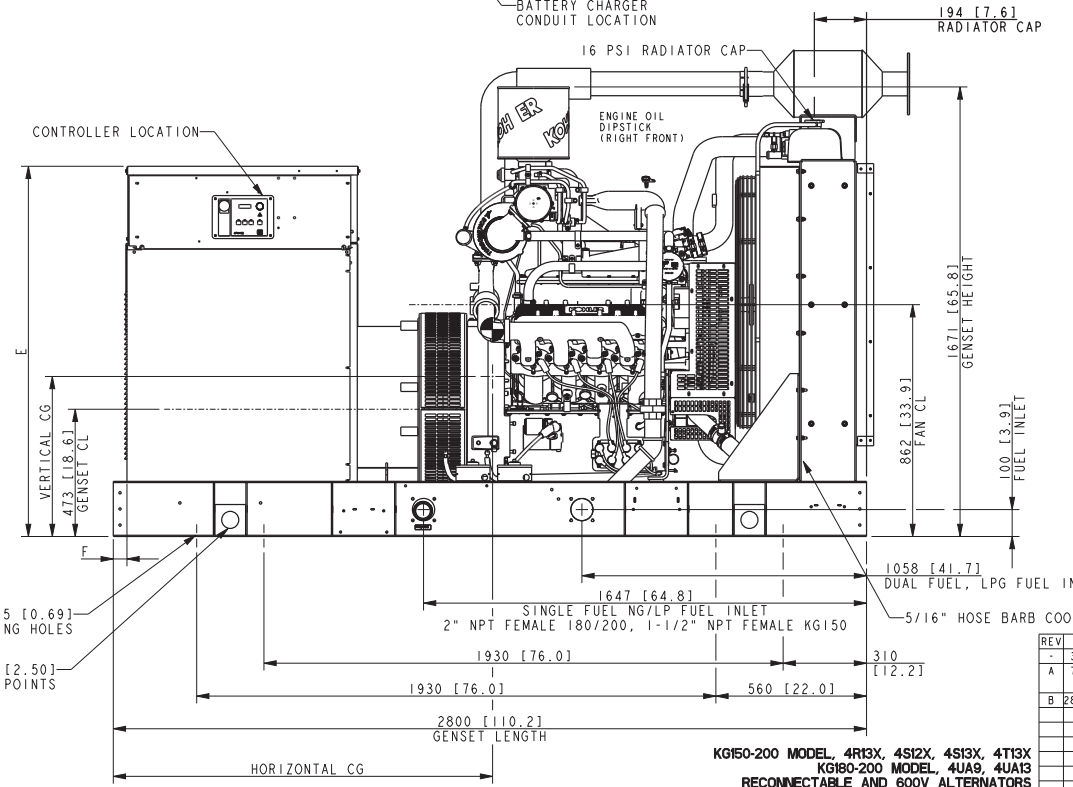
NOTES:

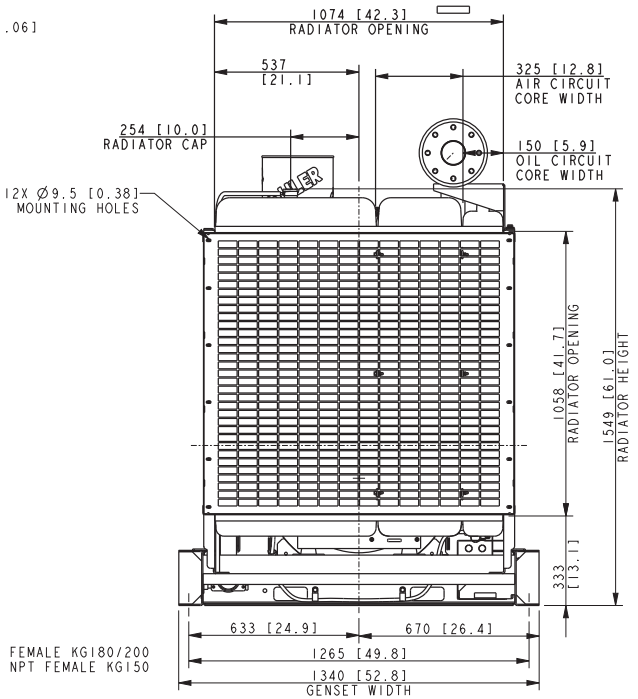
1. IF ENCLOSURE IS INSTALLED, REFER TO ENCLOSURE ADV.
2. IF IBC CERTIFICATION IS REQUIRED SEE SEISMIC ADV FOR INSTALLATION INSTRUCTIONS.

NOTE: DIMENSIONS IN [ ] ARE ENGLISH EQUIVALENTS.

MODEL	ALTERNATOR	GENSET MAX WEIGHT kg (lb)	HORIZONTAL CG mm [IN]	VERTICAL CG mm [IN]
KG150	4R13X	1420 [3135]	1410 [55.5]	600 [23.5]
KG150	4T13X	1420 [3135]	1410 [55.5]	600 [23.5]
KG150 / KG180	4S12X	1460 [3225]	1380 [54.3]	585 [23.0]
KG150 / KG180 / KG200	4S13X	1500 [3310]	1350 [53.3]	585 [23.0]
KG200	4UA9	1850 [4085]	1230 [48.5]	555 [21.8]
KG180 / KG200	4UA13	2030 [4480]	1155 [45.5]	555 [21.8]

* WOOD BASE IS AN ADDITIONAL 120 kg [265 lb]





KG150-200 MODEL, 4R13X, 4S12X, 4S13X, 4T13X
KG180-200 MODEL, 4UA9, 4UA13
RECONNECTABLE AND 600V ALTERNATORS

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	3-19-20	NEW DRAWING [CT202736]	PAS
A	7-14-21	(D-7) DIM 1154 ADDED, DIM 250 ADDED;(D-8) DIM 80 ADDED, DIM 395 ADDED [CT213319]	WHA
B	28OCT2021	SEE SHEET 2 [CT215755]	SAK

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	PAS	3-19-20
CHECKED	DJV	3-19-20
APPROVED	WDG	3-19-20

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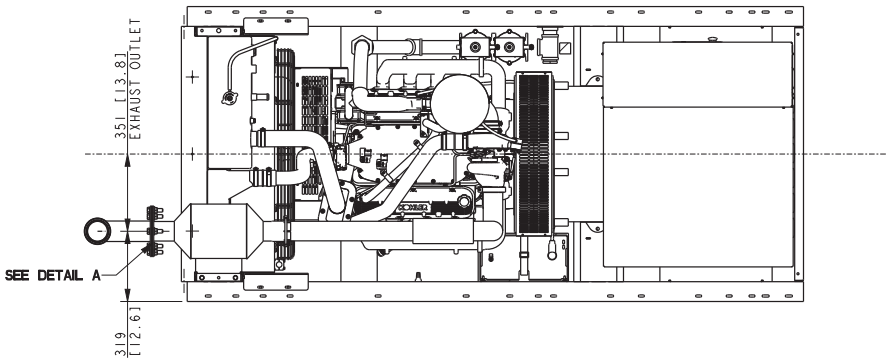
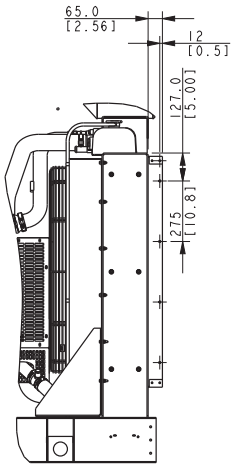
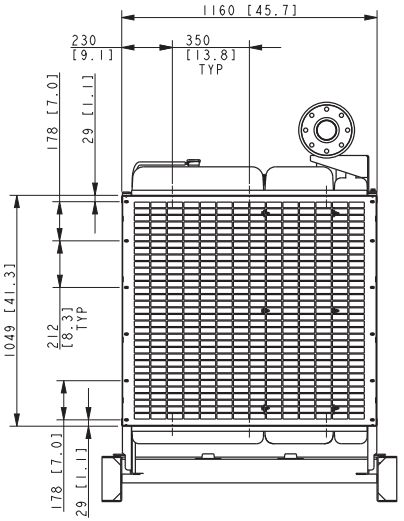
TITLE: DIMENSION PRINT, KG150-200

SCALE 0.11 | CAD NO. | SHEET 1 of 3

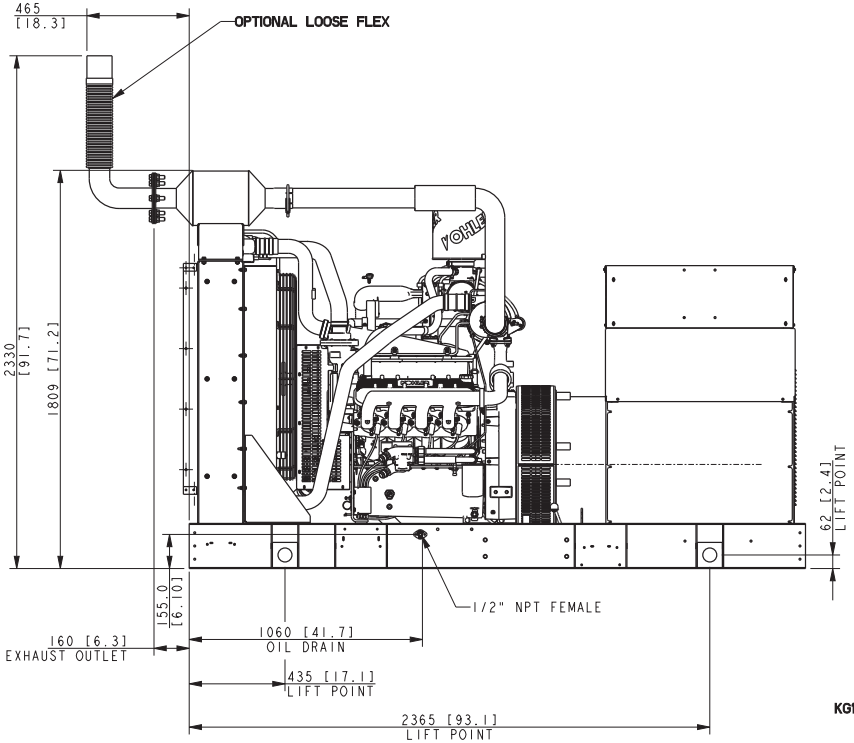
DWG NO. ADV-9045 | D

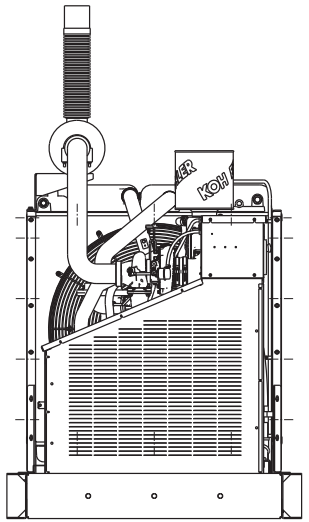


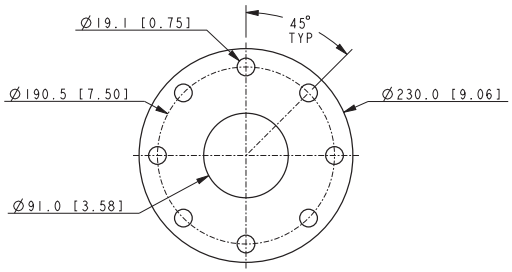




OPTIONAL RADIATOR DUCT FLANGE AND STONE GUARD







SCALE 0.38

EXHAUST OUTLET
ASME B16.5 NPS 4

DETAIL A

KG150-200 MODEL, 4R13X, 4S12X, 4S13X, 4T13X
KG180-200 MODEL, 4UA9, 4UA13
RECONNECTABLE AND 600V ALTERNATORS

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	3-19-20	NEW DRAWING [CT202736]	PAS
A	7-14-21	SEE SHEET 1 [CT213319]	WHA
B	28OCT2021	VIEWS UPDATED TO SHOW FLEX EXHAUST, (B-812330 ADDED, (C-8) 465 ADDED [CT215755]	SAK

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	PAS	3-19-20
CHECKED	DJV	3-19-20
APPROVED	WDG	3-19-20

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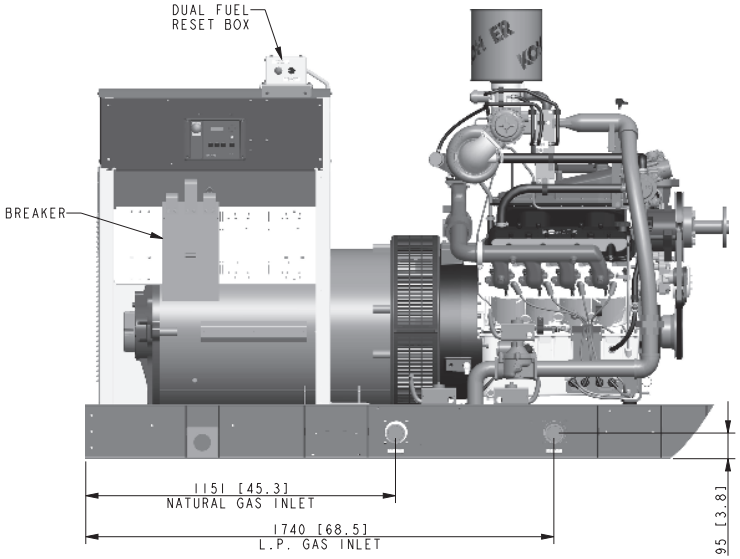
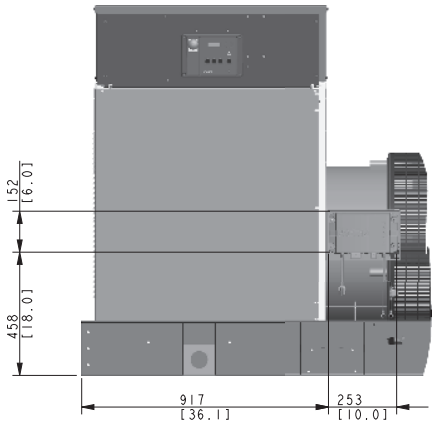
TITLE: DIMENSION PRINT, KG150-200

SCALE 0.09 | CAD NO. | SHEET 2 of 3

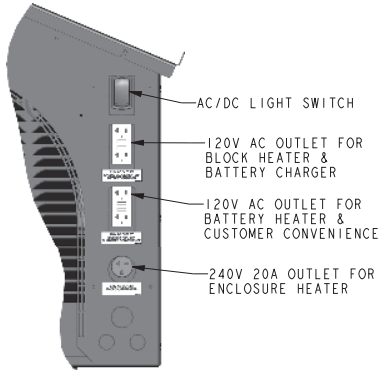
DWG NO. ADV-9045 | D



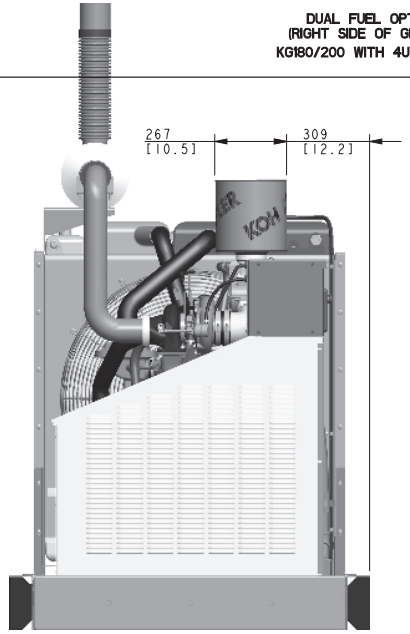
DUAL FUEL OPTION
(RIGHT SIDE OF GENSET)
KG180/200 WITH 4UA SHOWN

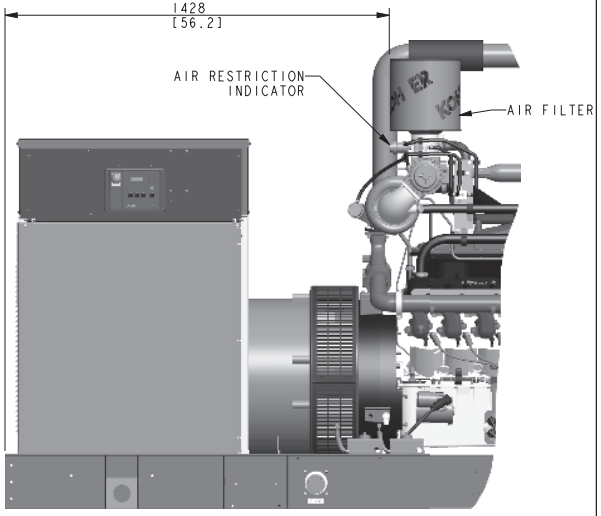


BATTERY CHARGER
(RIGHT SIDE OF GENSET)

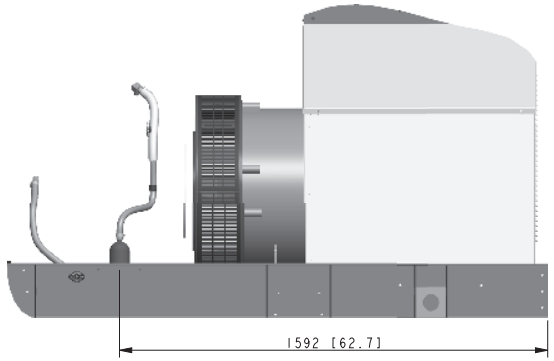


BASIC ELECTRICAL PACKAGE
SCALE 0.25
VIEW OF FRONT OF JUNCTION BOX
FROM FRONT OF GENSET





STANDARD DUTY AIR CLEANER
(RIGHT SIDE OF GENSET)



BLOCK HEATER
(LEFT SIDE OF GENSET)

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	3-19-20	NEW DRAWING [CT202736]	PAS
A	7-14-21	SEE SHEET 1 [CT213319]	WHA
B	28OCT2021	SEE SHEET 2 [CT215755]	SAK

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	PAS	3-19-20
CHECKED	DJV	3-19-20
APPROVED	WDG	3-19-20

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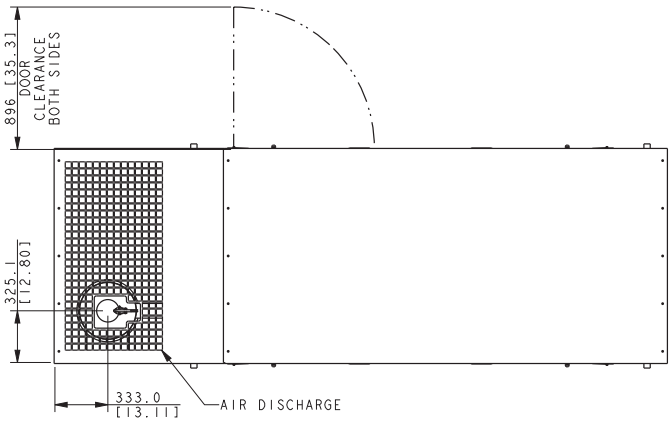
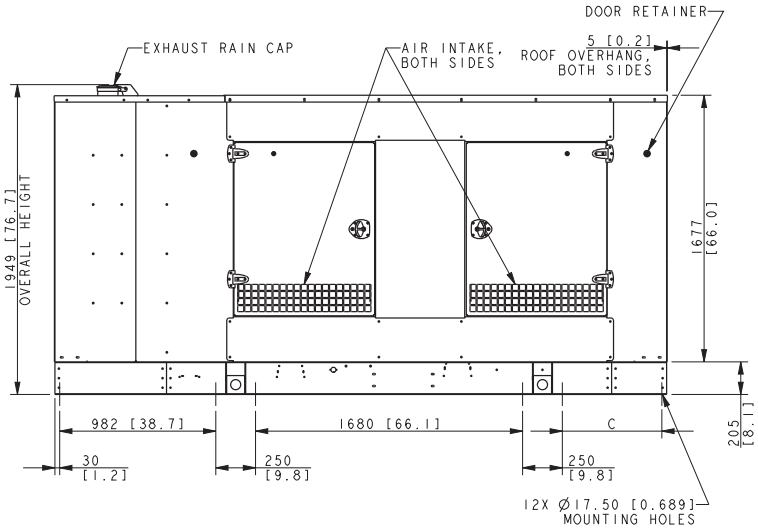
TITLE
DIMENSION PRINT, KG150-200

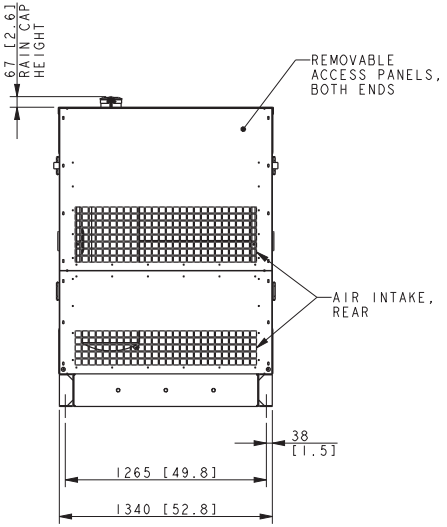
SCALE 0.11 | CAD NO. | SHEET 3 of 3

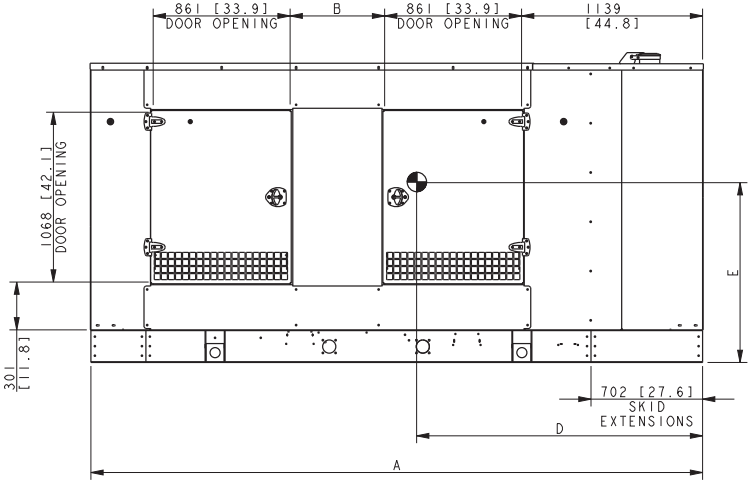
DWG NO. ADV-9045 | D

ENCLOSURE INFORMATION							
NODE	MODEL	ENCLOSURE WEIGHT kg [lb]	LENGTH DIM A mm [in]	DOOR DIM B mm [in]	MOUNTING DIM C mm [in]	HOR CG DIM D mm [in]	VER CG DIM E mm [in]
150	STANDARD STEEL SOUND	632 [1393]	3502 [137.9]	335 [13.2]	NA	1593 [62.7]	1089 [42.9]
	STANDARD STEEL WEATHER	611 [1347]				1590 [62.6]	1082 [42.6]
	STANDARD ALUM SOUND	476 [1050]				1547 [60.9]	1045 [41.2]
180-200	STANDARD STEEL SOUND	668 [1472]	3848 [151.5]	595 [23.4]	626 [24.6]	1741 [68.5]	1100 [43.3]
	STANDARD STEEL WEATHER	645 [1422]				1743 [68.6]	1082 [42.6]
	STANDARD ALUM SOUND	607 [1339]				1793 [70.6]	1136 [44.7]









NOTE:

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

DIMENSIONS IN [ ] ARE ENGLISH EQUIVALENTS

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	15NOV2019	NEW DRAWING [CT200025]	ZJS
A	07MAY2020	(D-1) REMOVED NON-PRODUCTION MODEL	
		INFORMATION FROM TABLE [CT204048]	ZJS
B	25JUL2020	SEE SHEET 2 [CT205576]	SSS

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	ZJS	15NOV2019
CHECKED	KJB	15NOV2019
APPROVED	JMP	15NOV2019

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KOHLER, WISCONSIN 53044

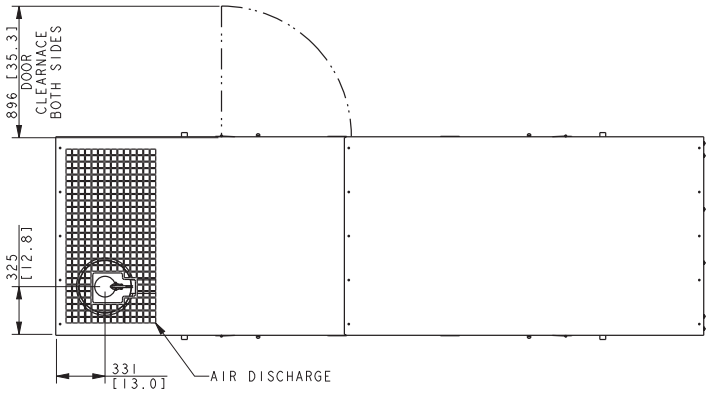
TITLE: DIMENSION PRINT, KG150-200 10.3L ENCL

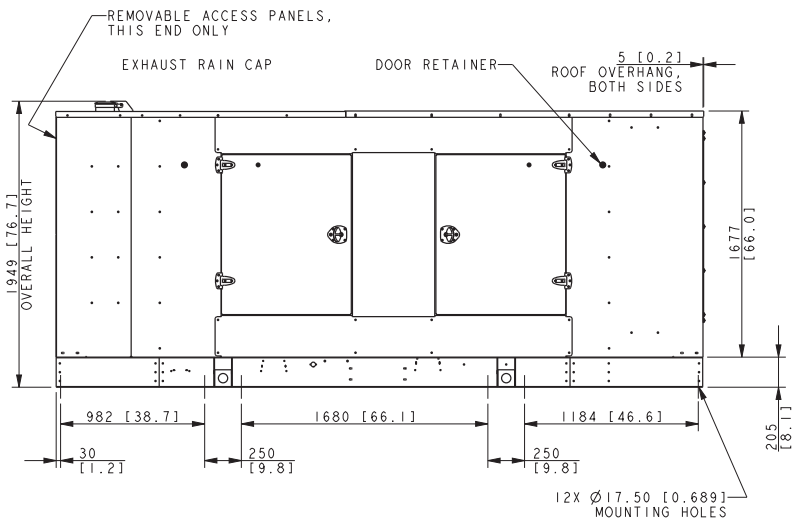
SCALE 0.07 | CAD NO. | SHEET 1 of 3

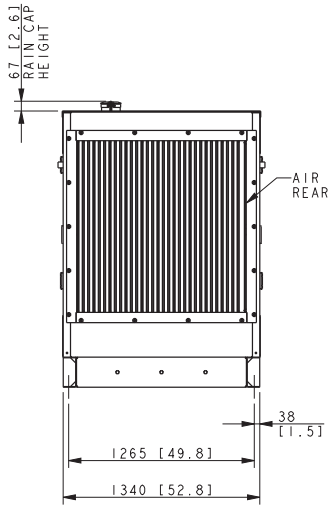
DWG NO. ADV-9110 | D

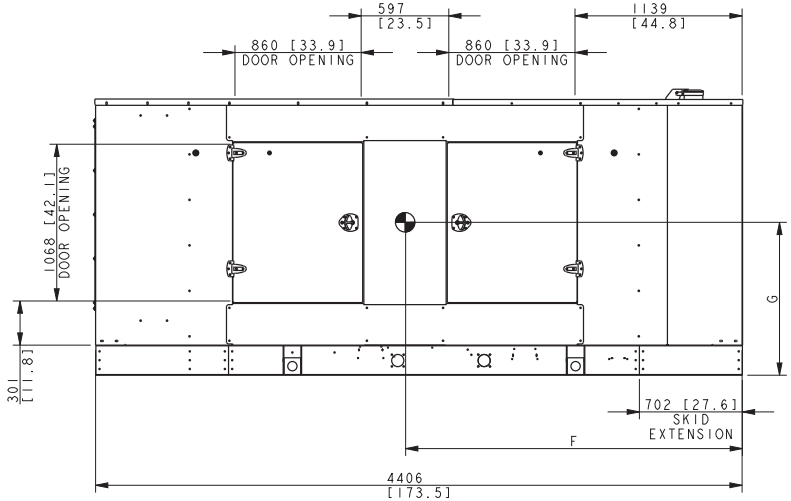
KG150 STANDARD
KG180-200 STANDARD
ENCLOSURES

ENCLOSURE INFORMATION				
NODE	MODEL	ENCLOSURE WEIGHT kg [lb]	HOR CG DIM F mm [in]	VER CG DIM G mm [in]
150-200	PREMIUM STEEL SOUND	780 [1720]	2243 [88.3]	1087 [42.8]
	PREMIUM ALUM SOUND	608 [1340]	2293 [90.3]	1042 [41]









NOTE:

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

DIMENSIONS IN [ ] ARE ENGLISH EQUIVALENTS

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	15NOV2019	NEW DRAWING [CT200025]	ZJS
A	07MAY2020	SEE SHEET 1 [CT204048]	ZJS
B	25JUL2020	(D-3) "PREMIUM" WAS "CONFIGURED" [CT205576]	SSS

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	ZJS	15NOV2019
CHECKED	KJB	15NOV2019
APPROVED	JMP	15NOV2019

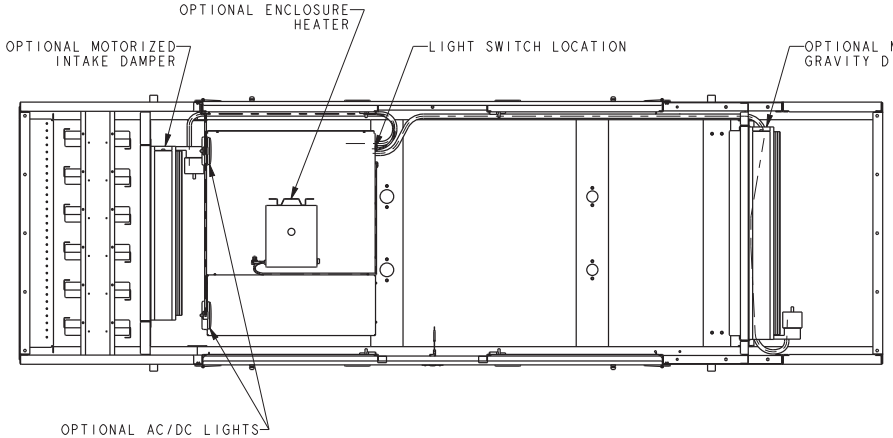
KOHLER
KOHLER, WISCONSIN 53044

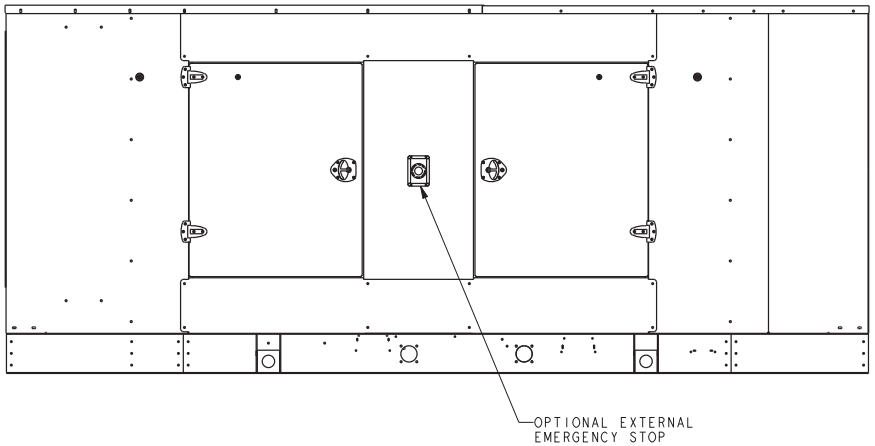
TITLE: DIMENSION PRINT, KG150-200 10.3L ENCL

SCALE 0.06 | CAD NO. | SHEET 2 of 3

DWG NO. ADV-9110 | D

KG150-200 CONFIGURED ENCLOSURES





KG150-200 CONFIGURED OPTIONAL ACCESSORIES

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	15NOV2019	NEW DRAWING [CT200025]	ZJS
A	07MAY2020	SEE SHEET 1 [CT204048]	ZJS
B	25JUL2020	SEE SHEET 2 [CT205576]	SSS

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	ZJS	15NOV2019
CHECKED	KJB	15NOV2019
APPROVED	JMP	15NOV2019

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KOHLER, WISCONSIN 53044

TITLE: **DIMENSION PRINT, KG150-200 10.3L ENCL**

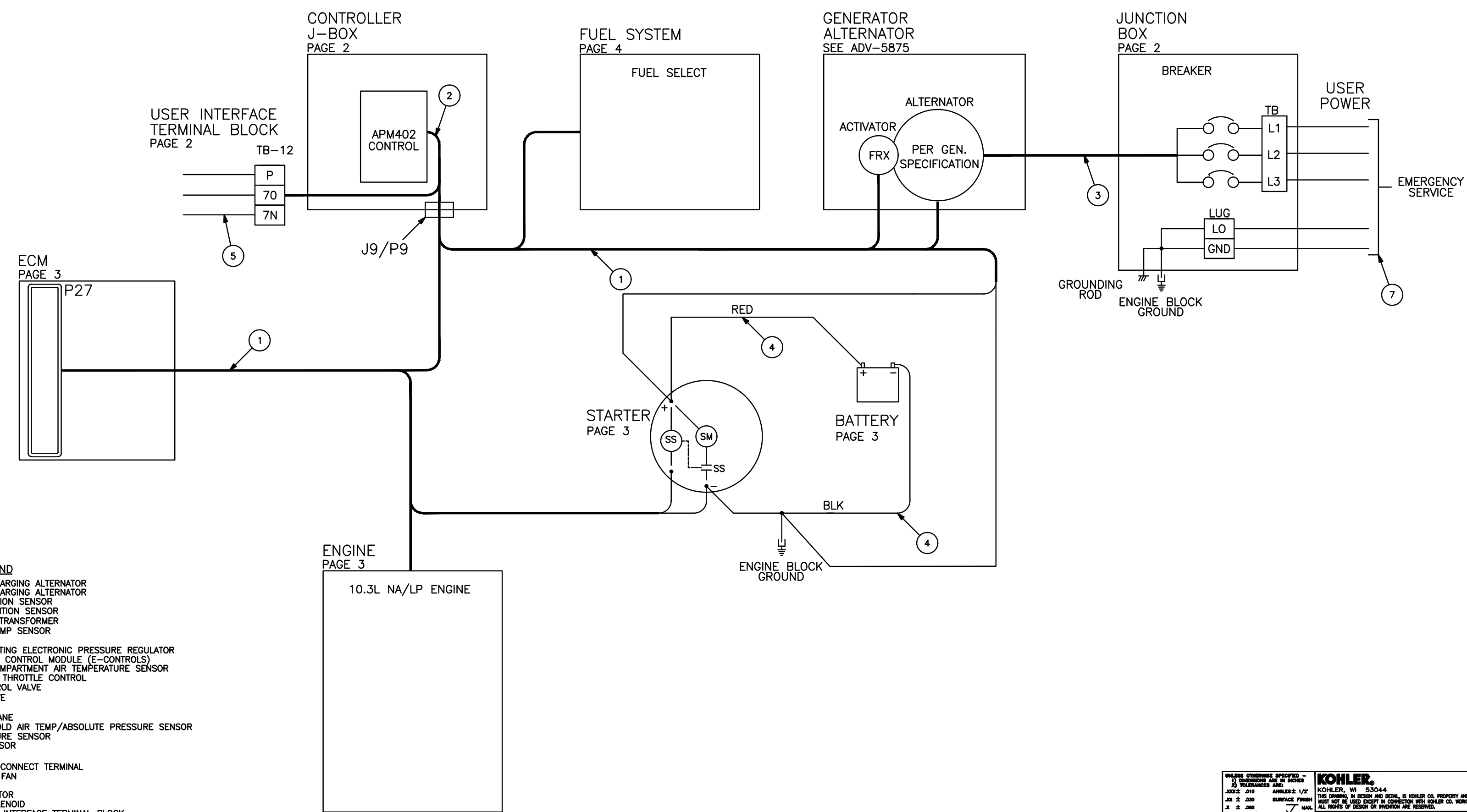
SCALE 0.08 | CAD NO. | SHEET 3 of 3

DWG NO. **ADV-9110** | **D**

KOHLER®

Wiring Schematics

REV	DATE	REVISION	BY	MF
–	2–14–19	NEW DRAWING [CT193735]	TEV	
A	2–14–20	SEE SHEET 3 [CT201938]	TEV	
B	5–14–20	SEE SHEET 3 AND 4 [CT203817]	SBR	



LEGEND

BCA – BATTERY CHARGING ALTERNATOR
BCA – BATTERY CHARGING ALTERNATOR
CAS – CAM POSITION SENSOR
CPS – CRANK POSITION SENSOR
CT(#) – CURRENT TRANSFORMER
CTS – COOLANT TEMP SENSOR
D(#) – DIODE
DEPR – DIRECT ACTING ELECTRONIC PRESSURE REGULATOR
ECM – ELECTRONIC CONTROL MODULE (E–CONTROLS)
ECTS – ENGINE COMPARTMENT AIR TEMPERATURE SENSOR
ETC – ELECTRONIC THROTTLE CONTROL
FCV – FUEL CONTROL VALVE
FV(#) – FUEL VALVE
IC – IGNITION COIL
LP – LIQUID PROPANE
MAT/MAP – MANIFOLD AIR TEMP/ABSOLUTE PRESSURE SENSOR
OPS – OIL PRESSURE SENSOR
O2 – OXYGEN SENSOR
P(#) – PLUG
QCON(#) – QUICK CONNECT TERMINAL
RF(#) – RADIATOR FAN
STAT –STATOR
SM – STARTER MOTOR
SS – STARTER SOLENOID
TB12 – CUSTOMER INTERFACE TERMINAL BLOCK
TB# – TERMINAL BLOCK #
⏚ – ENGINE BLOCK GROUND

APM402 CONTROLLER

UNLESS OTHERWISE SPECIFIED –
1) DIMENSIONS ARE IN INCHES
2) TOLERANCES ARE:
.XXX ± .010 ANGLES ± 1/2°
.XX ± .030 SURFACE FINISH
.X ± .060 MAX.
FRACTIONS ±

APPROVALS		DATE
DRAWN	SMH	8–01–18
CHECKED	JLS	8–01–18
APPROVED	JLS	8–01–18

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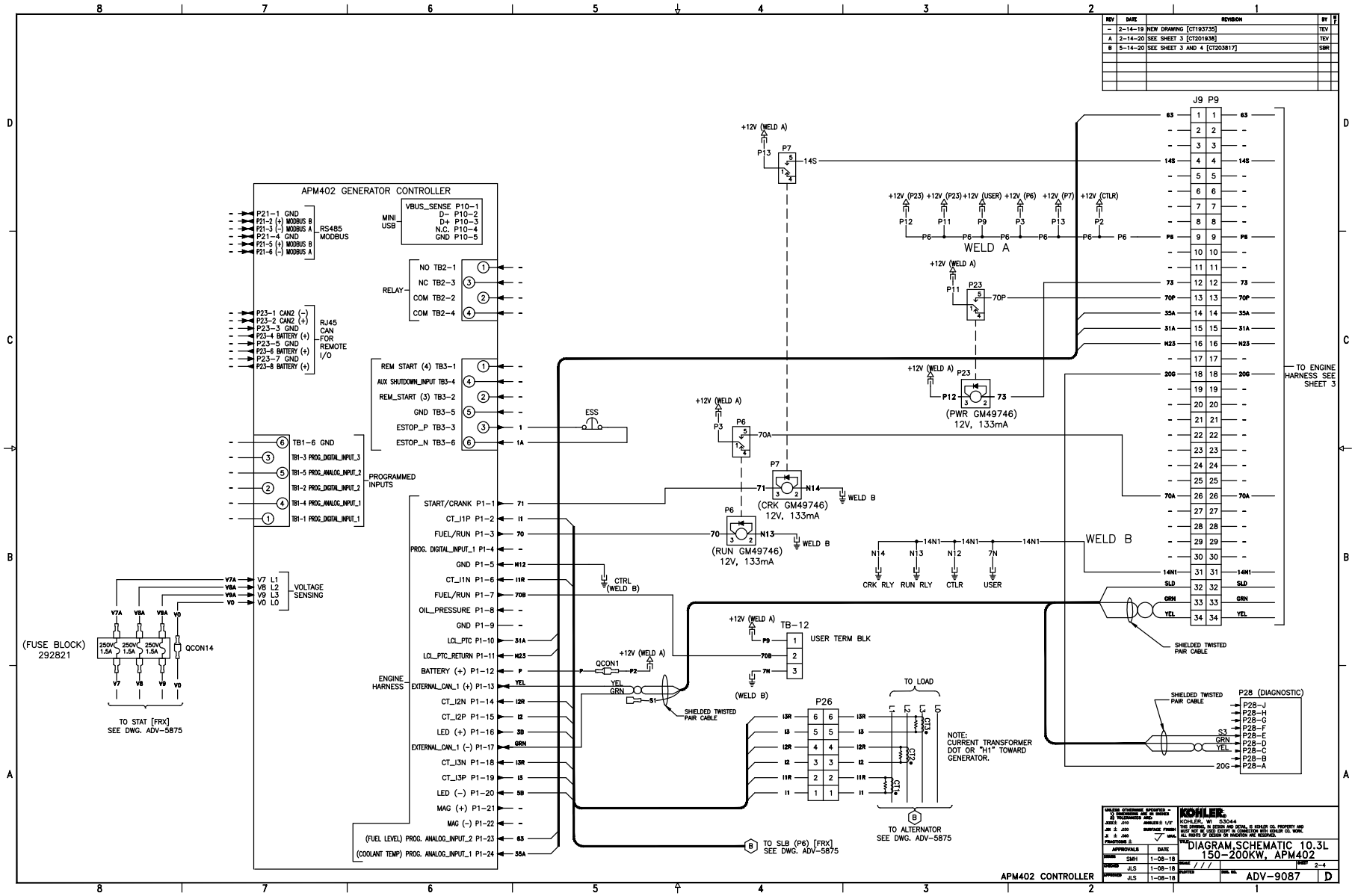
KOHLER, WI 53044

TITLE DIAGRAM,SCHEMATIC 10.3L 150–200kW, APM402

SCALE / / / SHEET 1–4
PLOTTED DWG. NO. ADV–9087 D



REV	DATE	REVISION	BY
–	2-14-19	NEW DRAWING [CT193735]	TEV
A	2-14-20	SEE SHEET 3 [CT201938]	TEV
B	5-14-20	SEE SHEET 3 AND 4 [CT203817]	SBR

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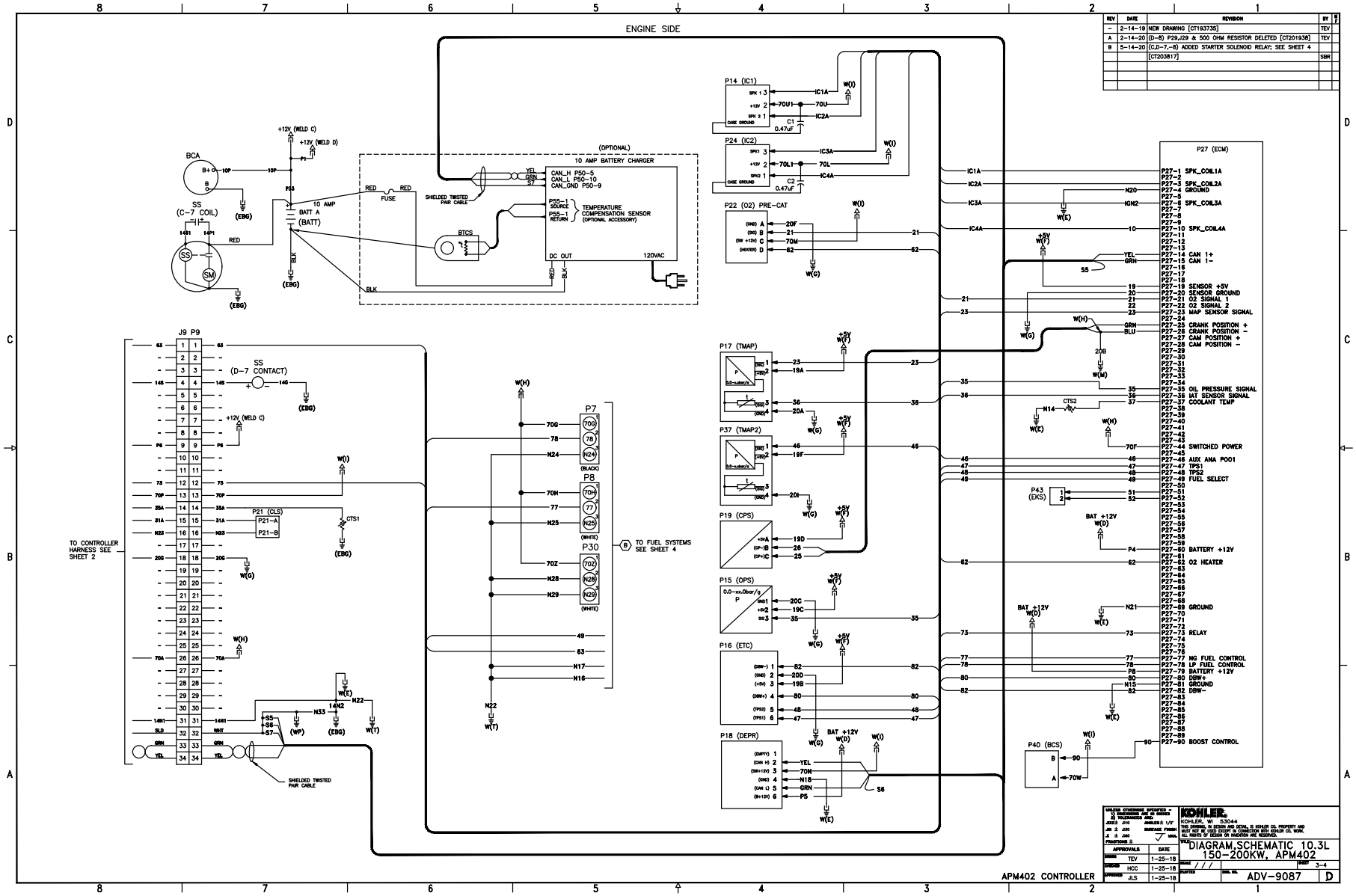
DIAGRAM,SCHEMATIC 10.3L 150-200KW, APM402

APPROVALS	DATE
SMH	1-08-18
JLS	1-08-18
JLS	1-08-18

SIZE D | DWG NO. ADV-9087 | REV D | SHEET 2-4



REV	DATE	REVISION	BY
–	2-14-19	NEW DRAWING [CT193735]	TEV
A	2-14-20	(D-8) P29,J29 & 500 OHM RESISTOR DELETED [CT201938]	TEV
B	5-14-20	(C,D-7,-8) ADDED STARTER SOLENOID RELAY; SEE SHEET 4	
		[CT203817]	SBR

APPROVALS	DATE
DRAWN TEV	1-25-18
CHECKED HCC	1-25-18
APPROVED JLS	1-25-18

KOHLER Co.
KOHLER, WI 53044

DIAGRAM,SCHEMATIC 10.3L 150-200KW, APM402

SHEET 3-4

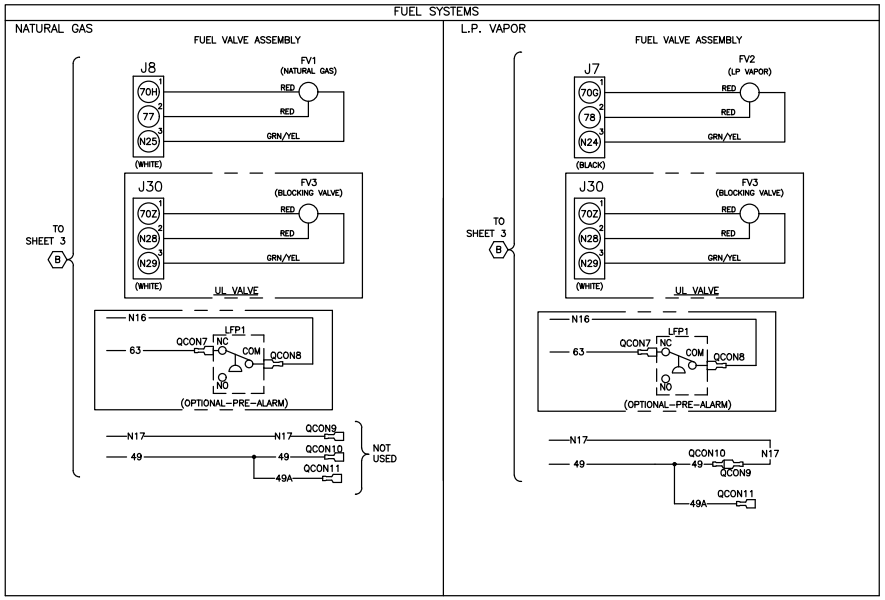
PLOTTED

DWG. NO. ADV-9087

D

FUEL SYSTEMS

REV	DATE	REVISION	BY
–	2-14-19	NEW DRAWING [CT193735]	TEV
A	2-14-20	SEE SHEET 3 [CT201936]	TEV
B	5-14-20	(A,B,C-1 TO 3) DELETED AUTO CHANGEOVER OPTION; SEE	
		SHEET 3 [CT203817]	SBR



APM402 CONTROLLER

APPROVALS	DATE
SMH	8-01-18
JLS	8-01-18
JLS	8-01-18

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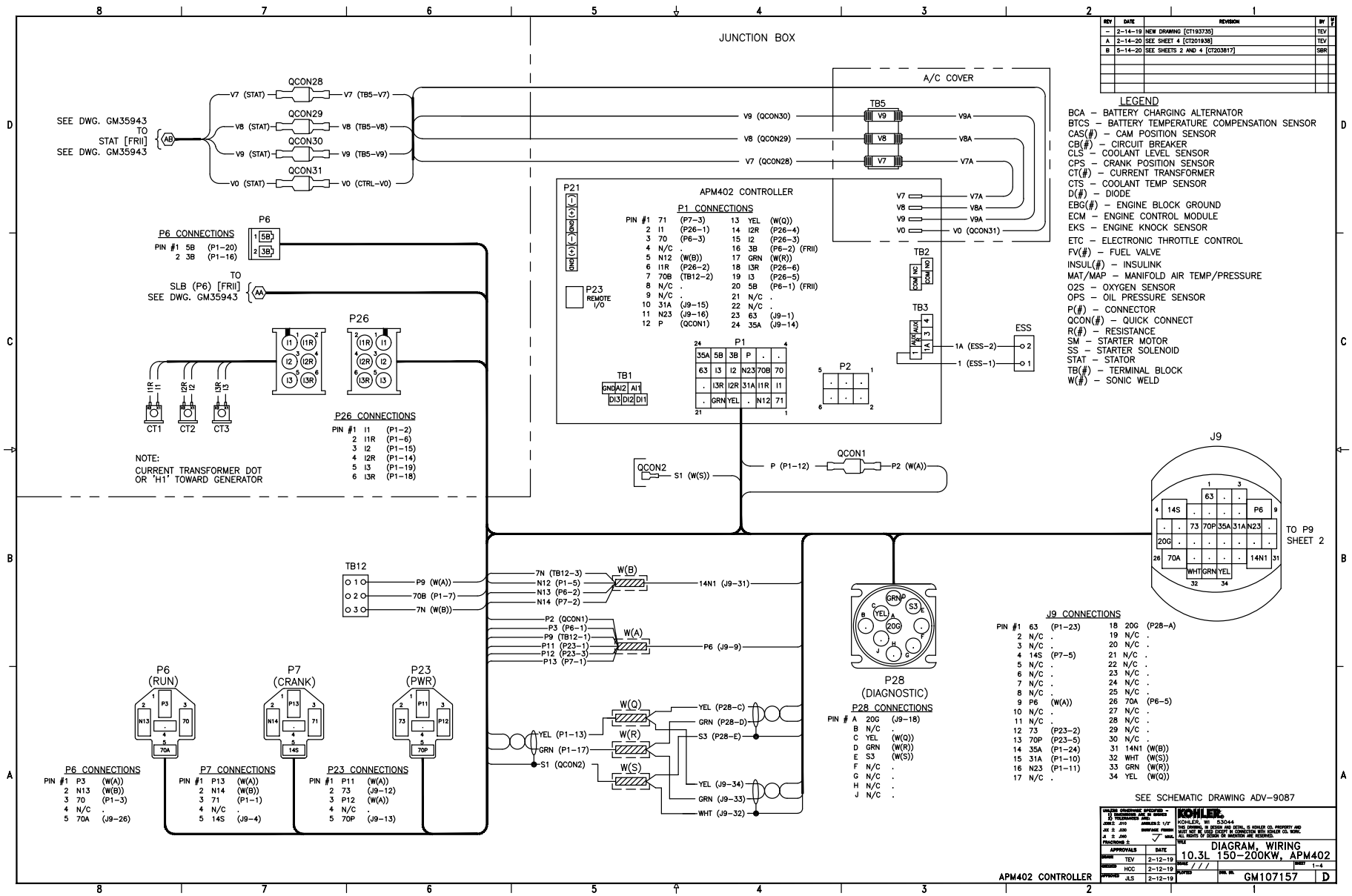
TITLE: DIAGRAM,SCHEMATIC 10.3L 150–200KW, APM402

SCALE: / / / SHEET 4–4

PLOTTED DWG. NO. ADV–9087 D



REV	DATE	REVISION	BY
–	2-14-19	NEW DRAWING [CT193735]	TEV
A	2-14-20	SEE SHEET 4 [CT201938]	TEV
B	5-14-20	SEE SHEETS 2 AND 4 [CT203817]	SBR

LEGEND

BCA – BATTERY CHARGING ALTERNATOR
BTCS – BATTERY TEMPERATURE COMPENSATION SENSOR
CAS(#) – CAM POSITION SENSOR
CB(#) – CIRCUIT BREAKER
CLS – COOLANT LEVEL SENSOR
CPS – CRANK POSITION SENSOR
CT(#) – CURRENT TRANSFORMER
CTS – COOLANT TEMP SENSOR
D(#) – DIODE
EBG(#) – ENGINE BLOCK GROUND
ECM – ENGINE CONTROL MODULE
EKS – ENGINE KNOCK SENSOR
ETC – ELECTRONIC THROTTLE CONTROL
FV(#) – FUEL VALVE
INSUL(#) – INSULINK
MAT/MAP – MANIFOLD AIR TEMP/PRESSURE
O2S – OXYGEN SENSOR
OPS – OIL PRESSURE SENSOR
P(#) – CONNECTOR
QCON(#) – QUICK CONNECT
R(#) – RESISTANCE
SM – STARTER MOTOR
SS – STARTER SOLENOID
STAT – STATOR
TB(#) – TERMINAL BLOCK
W(#) – SONIC WELD

P1 CONNECTIONS

PIN #1	71	(P7-3)	13	YEL	(W(Q))
2	I1	(P26-1)	14	I2R	(P26-4)
3	70	(P6-3)	15	I2	(P26-3)
4	N/C	.	16	3B	(P6-2) (FRII)
5	N12	(W(B))	17	GRN	(W(R))
6	I1R	(P26-2)	18	I3R	(P26-6)
7	70B	(TB12-2)	19	I3	(P26-5)
8	N/C	.	20	5B	(P6-1) (FRII)
9	N/C	.	21	N/C	.
10	31A	(J9-15)	22	N/C	.
11	N23	(J9-16)	23	63	(J9-1)
12	P	(QCON1)	24	35A	(J9-14)

P28 CONNECTIONS

PIN #	A	20G	(J9-18)		
	B	N/C	.		
	C	YEL	(W(Q))		
	D	GRN	(W(R))		
	E	S3	(W(S))		
	F	N/C	.		
	G	N/C	.		
	H	N/C	.		
	J	N/C	.		

J9 CONNECTIONS

PIN #1	63	(P1-23)	18	20G	(P28-A)
2	N/C	.	19	N/C	.
3	N/C	.	20	N/C	.
4	14S	(P7-5)	21	N/C	.
5	N/C	.	22	N/C	.
6	N/C	.	23	N/C	.
7	N/C	.	24	N/C	.
8	N/C	.	25	N/C	.
9	P6	(W(A))	26	70A	(P6-5)
10	N/C	.	27	N/C	.
11	N/C	.	28	N/C	.
12	73	(P23-2)	29	N/C	.
13	70P	(P23-5)	30	N/C	.
14	35A	(P1-24)	31	14N1	(W(B))
15	31A	(P1-10)	32	WHT	(W(S))
16	N23	(P1-11)	33	GRN	(W(R))
17	N/C	.	34	YEL	(W(Q))

SEE SCHEMATIC DRAWING ADV-9087

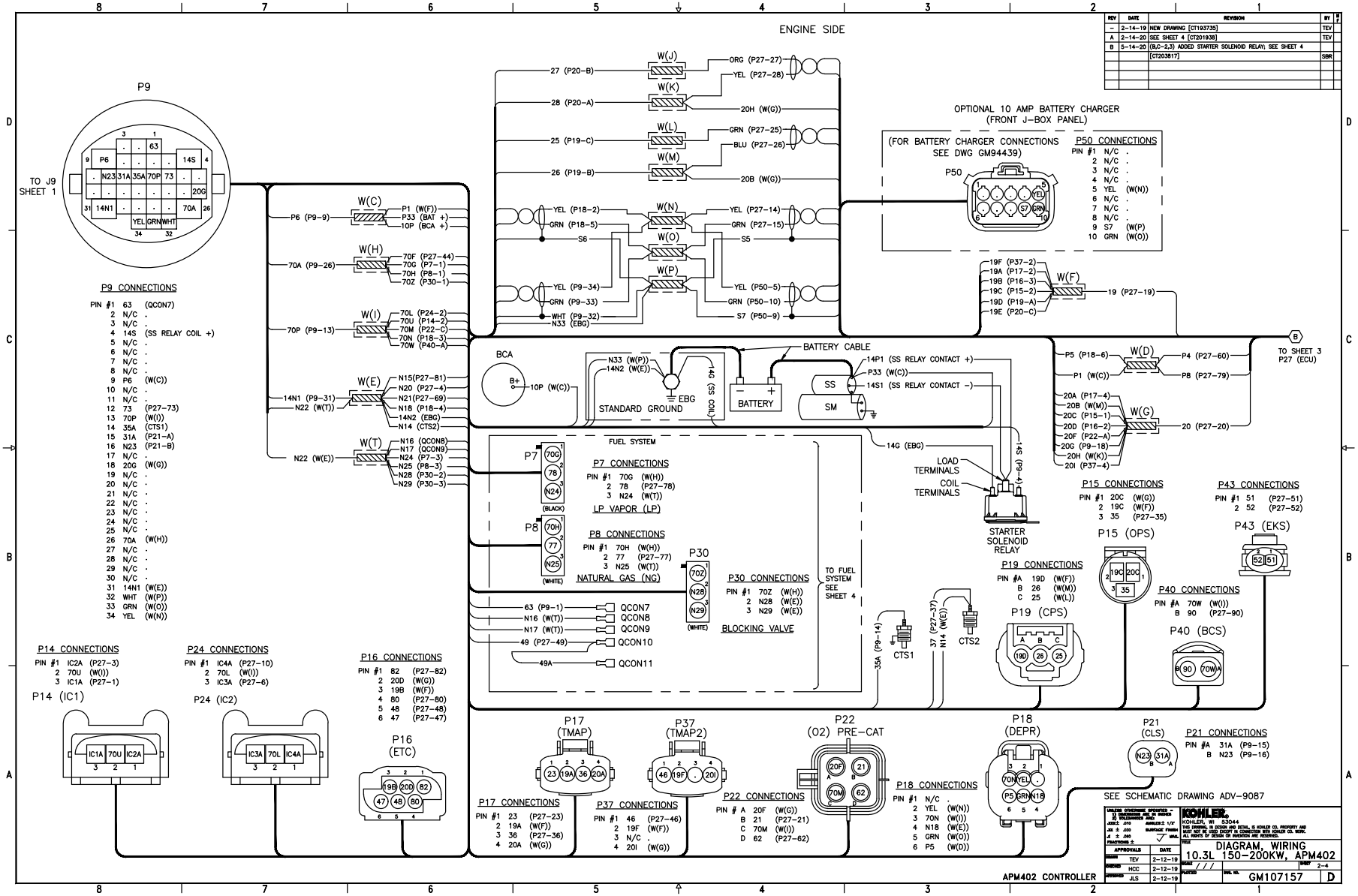
APPROVALS	DATE
TEV	2-12-19
HCC	2-12-19
JLS	2-12-19

KOHLER, WI 53044

DIAGRAM, WIRING
10.3L 150-200KW, APM402

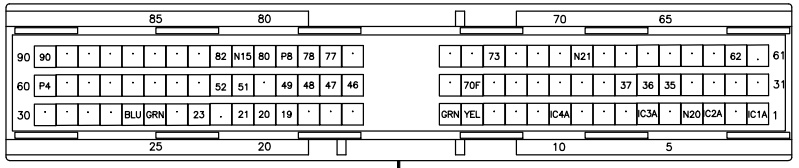
SIZE D | DWG. NO. GM107157 | REV D

SHEET 1-4


ENGINE SIDE
REV | DATE | REVISION | BY
– | 2-14-19 | NEW DRAWING [CT193735] | TEV
A | 2-14-20 | SEE SHEET 4 [CT201938] | TEV
B | 5-14-20 | (B,C-2,3) ADDED STARTER SOLENOID RELAY; SEE SHEET 4 [CT203817] | SBR
P9
TO J9 SHEET 1
P9 CONNECTIONS
PIN #1 63 (QCON7)
2 N/C .
3 N/C .
4 14S (SS RELAY COIL +)
5 N/C .
6 N/C .
7 N/C .
8 N/C .
9 P6 (W(C))
10 N/C .
11 N/C .
12 73 (P27-73)
13 70P (W(I))
14 35A (CTS1)
15 31A (P21-A)
16 N23 (P21-B)
17 N/C .
18 20G (W(G))
19 N/C .
20 N/C .
21 N/C .
22 N/C .
23 N/C .
24 N/C .
25 N/C .
26 70A (W(H))
27 N/C .
28 N/C .
29 N/C .
30 N/C .
31 14N1 (W(E))
32 WHT (W(P))
33 GRN (W(O))
34 YEL (W(N))
W(C) P6 (P9-9) P1 (W(F)) P33 (BAT +) 10P (BCA +)
W(H) 70A (P9-26) 70F (P27-44) 70G (P7-1) 70H (P8-1) 70Z (P30-1)
W(I) 70P (P9-13) 70L (P24-2) 70U (P14-2) 70M (P22-C) 70N (P18-3) 70W (P40-A)
W(E) 14N1 (P9-31) N22 (W(T)) N15(P27-81) N20 (P27-4) N21(P27-69) N18 (P18-4) 14N2 (EBG) N14 (CTS2)
W(T) N22 (W(E)) N16 (QCON8) N17 (QCON9) N24 (P7-3) N25 (P8-3) N28 (P30-2) N29 (P30-3)
W(J) 27 (P20-B) ORG (P27-27) YEL (P27-28)
W(K) 28 (P20-A) 20H (W(G))
W(L) 25 (P19-C) GRN (P27-25) BLU (P27-26)
W(M) 26 (P19-B) 20B (W(G))
W(N) YEL (P18-2) YEL (P27-14)
W(O) GRN (P18-5) S6 GRN (P27-15) S5
W(P) YEL (P9-34) GRN (P9-33) WHT (P9-32) N33 (EBG) YEL (P50-5) GRN (P50-10) S7 (P50-9)
OPTIONAL 10 AMP BATTERY CHARGER (FRONT J-BOX PANEL)
(FOR BATTERY CHARGER CONNECTIONS SEE DWG GM94439)
P50
P50 CONNECTIONS
PIN #1 N/C .
2 N/C .
3 N/C .
4 N/C .
5 YEL (W(N))
6 N/C .
7 N/C .
8 N/C .
9 S7 (W(P)
10 GRN (W(O))
W(F) 19F (P37-2) 19A (P17-2) 19B (P16-3) 19C (P15-2) 19D (P19-A) 19E (P20-C) 19 (P27-19)
BCA
B+ 10P (W(C))
N33 (W(P)) 14N2 (W(E)) 49 (SS COIL) EBG STANDARD GROUND
BATTERY CABLE
BATTERY
14P1 (SS RELAY CONTACT +) P33 (W(C)) 14S1 (SS RELAY CONTACT –) SS SM
14G (EBG)
LOAD TERMINALS
COIL TERMINALS
STARTER SOLENOID RELAY
14P (SS) 14S (SS)
W(D) P5 (P18-6) P1 (W(C)) P4 (P27-60) P8 (P27-79)
W(G) 20A (P17-4) 20B (W(M)) 20C (P15-1) 20D (P16-2) 20F (P22-A) 20G (P9-18) 20H (W(K)) 20I (P37-4) 20 (P27-20)
TO SHEET 3 P27 (ECU)
P15 CONNECTIONS
PIN #1 20C (W(G))
2 19C (W(F))
3 35 (P27-35)
P15 (OPS)
P43 CONNECTIONS
PIN #1 51 (P27-51)
2 52 (P27-52)
P43 (EKS)
P40 CONNECTIONS
PIN #A 70W (W(I))
B 90 (P27-90)
P40 (BCS)
FUEL SYSTEM
P7
P7 CONNECTIONS
PIN #1 70G (W(H))
2 78 (P27-78)
3 N24 (W(T))
LP VAPOR (LP)
P8
P8 CONNECTIONS
PIN #1 70H (W(H))
2 77 (P27-77)
3 N25 (W(T))
NATURAL GAS (NG)
P30
P30 CONNECTIONS
PIN #1 70Z (W(H))
2 N28 (W(E))
3 N29 (W(E))
BLOCKING VALVE
TO FUEL SYSTEM SEE SHEET 4
63 (P9-1) QCON7
N16 (W(T)) QCON8
N17 (W(T)) QCON9
49 (P27-49) QCON10
49A QCON11
35A (P9-14) CTS1
37 (P27-37) N14 (W(E)) CTS2
P19 CONNECTIONS
PIN #A 19D (W(F))
B 26 (W(M))
C 25 (W(L))
P19 (CPS)
P14 CONNECTIONS
PIN #1 IC2A (P27-3)
2 70U (W(I))
3 IC1A (P27-1)
P14 (IC1)
P24 CONNECTIONS
PIN #1 IC4A (P27-10)
2 70L (W(I))
3 IC3A (P27-6)
P24 (IC2)
P16 CONNECTIONS
PIN #1 82 (P27-82)
2 20D (W(G))
3 19B (W(F))
4 80 (P27-80)
5 48 (P27-48)
6 47 (P27-47)
P16 (ETC)
P17 (TMAP)
P17 CONNECTIONS
PIN #1 23 (P27-23)
2 19A (W(F))
3 36 (P27-36)
4 20A (W(G))
P37 (TMAP2)
P37 CONNECTIONS
PIN #1 46 (P27-46)
2 19F (W(F))
3 N/C .
4 20I (W(G))
P22 (02) PRE-CAT
P22 CONNECTIONS
PIN # A 20F (W(G))
B 21 (P27-21)
C 70M (W(I))
D 62 (P27-62)
P18 (DEPR)
P18 CONNECTIONS
PIN #1 N/C .
2 YEL (W(N))
3 70N (W(I))
4 N18 (W(E))
5 GRN (W(O))
6 P5 (W(D))
P21 (CLS)
P21 CONNECTIONS
PIN #A 31A (P9-15)
B N23 (P9-16)
SEE SCHEMATIC DRAWING ADV-9087
APM402 CONTROLLER
KOHLER Co.
KOHLER, WI 53044
DIAGRAM, WIRING
10.3L 150-200KW, APM402
GM107157
D

REV	DATE	REVISION	BY
–	2-14-19	NEW DRAWING [CT193735]	TEV
A	2-14-20	SEE SHEET 4 [CT201938]	TEV
B	5-14-20	SEE SHEETS 2 AND 4 [CT203817]	SBR

P27
(ENGINE ECU)



TO SHEET 2 (B)

P27 CONNECTIONS

PIN			
#1	IC1A	(P14-3)	
2	N/C	.	
3	IC2A	(P14-1)	
4	N20	(W(E))	
5	N/C	.	
6	IC3A	(P24-3)	
7	N/C	.	
8	N/C	.	
9	N/C	.	
10	IC4A	(P24-1)	
11	N/C	.	
12	N/C	.	
13	N/C	.	
14	YEL	(W(N))	
15	GRN	(W(O))	
16	N/C	.	
17	N/C	.	
18	N/C	.	
19	19	(W(F))	
20	20	(W(G))	
21	21	(P22-B)	
22	N/C	.	
23	23	(P17-1)	
24	N/C	.	
25	GRN	(W(L))	
26	BLU	(W(M))	
27	N/C	.	
28	N/C	.	
29	N/C	.	
30	N/C	.	
31	N/C	.	
32	N/C	.	
33	N/C	.	
34	N/C	.	
35	35	(P15-3)	
36	36	(P17-3)	
37	37	(CTS2)	
38	N/C	.	
39	N/C	.	
40	N/C	.	
41	N/C	.	
42	N/C	.	
43	N/C	.	
44	70F	(W(H))	
45	N/C	.	

PIN			
#46	46	(P37-1)	
47	47	(P16-6)	
48	48	(P16-5)	
49	49	(QCON10)	
50	N/C	.	
51	51	(P43-1)	
52	52	(P43-2)	
53	N/C	.	
54	N/C	.	
55	N/C	.	
56	N/C	.	
57	N/C	.	
58	N/C	.	
59	N/C	.	
60	P4	(W(D))	
61	N/C	.	
62	62	(P22-D)	
63	N/C	.	
64	N/C	.	
65	N/C	.	
66	N/C	.	
67	N/C	.	
68	N/C	.	
69	N21	(W(E))	
70	N/C	.	
71	N/C	.	
72	N/C	.	
73	73	(P9-12)	
74	N/C	.	
75	N/C	.	
76	N/C	.	
77	77	(P8-2)	
78	78	(P7-2)	
79	P8	(W(D))	
80	80	(P16-4)	
81	N15	(W(E))	
82	82	(P16-1)	
83	N/C	.	
84	N/C	.	
85	N/C	.	
86	N/C	.	
87	N/C	.	
88	N/C	.	
89	N/C	.	
90	90	(P40-B)	

SEE SCHEMATIC DRAWING ADV-9087

APM402 CONTROLLER

UNLESS OTHERWISE SPECIFIED – 1) DIMENSIONS ARE IN INCHES 2) TOLERANCES ARE: .XX ± .010 .XXX ± .005 FRACTIONS ± 1/64 ANGLES ± 1/2° SURFACE FINISH 125

KOHLER.
KOHLER, WI 53044

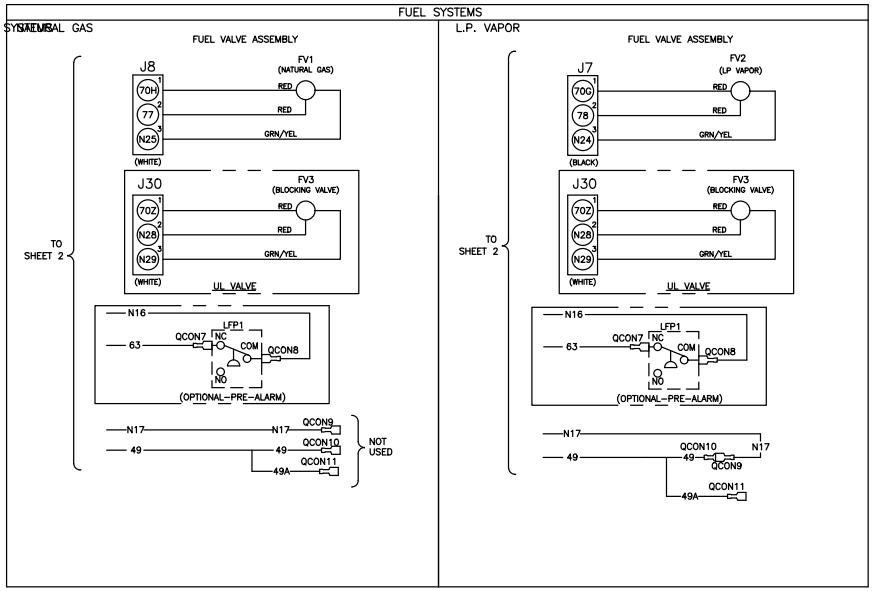
APPROVALS	DATE
DRAWN TEV	2-12-19
CHECKED HCC	2-12-19
APPROVER JLS	2-12-19

TITLE: DIAGRAM, WIRING
10.3L 150-200KW, APM402

SCALE /// SHEET 3-4
PLOTTED FINAL NO. GM107157 D

REV	DATE	REVISION	BY
A	2-14-20	SHEET 4 ADDED [CT201938]	TEV
B	5-14-20	(B,C-1,-2) REMOVED AUTOCHANGEOVER OPTION; SEE SHEET 2	
		[CT203817]	SBR

FUEL SYSTEMS



SEE SCHEMATIC DRAWING ADV-9087

APM402 CONTROLLER

APPROVALS		DATE
DRAWN	TEV	2-12-19
CHECKED	HCC	2-12-19
ENGINEER	JLS	2-12-19

KOHLER CO.
KOHLER, WI 53044
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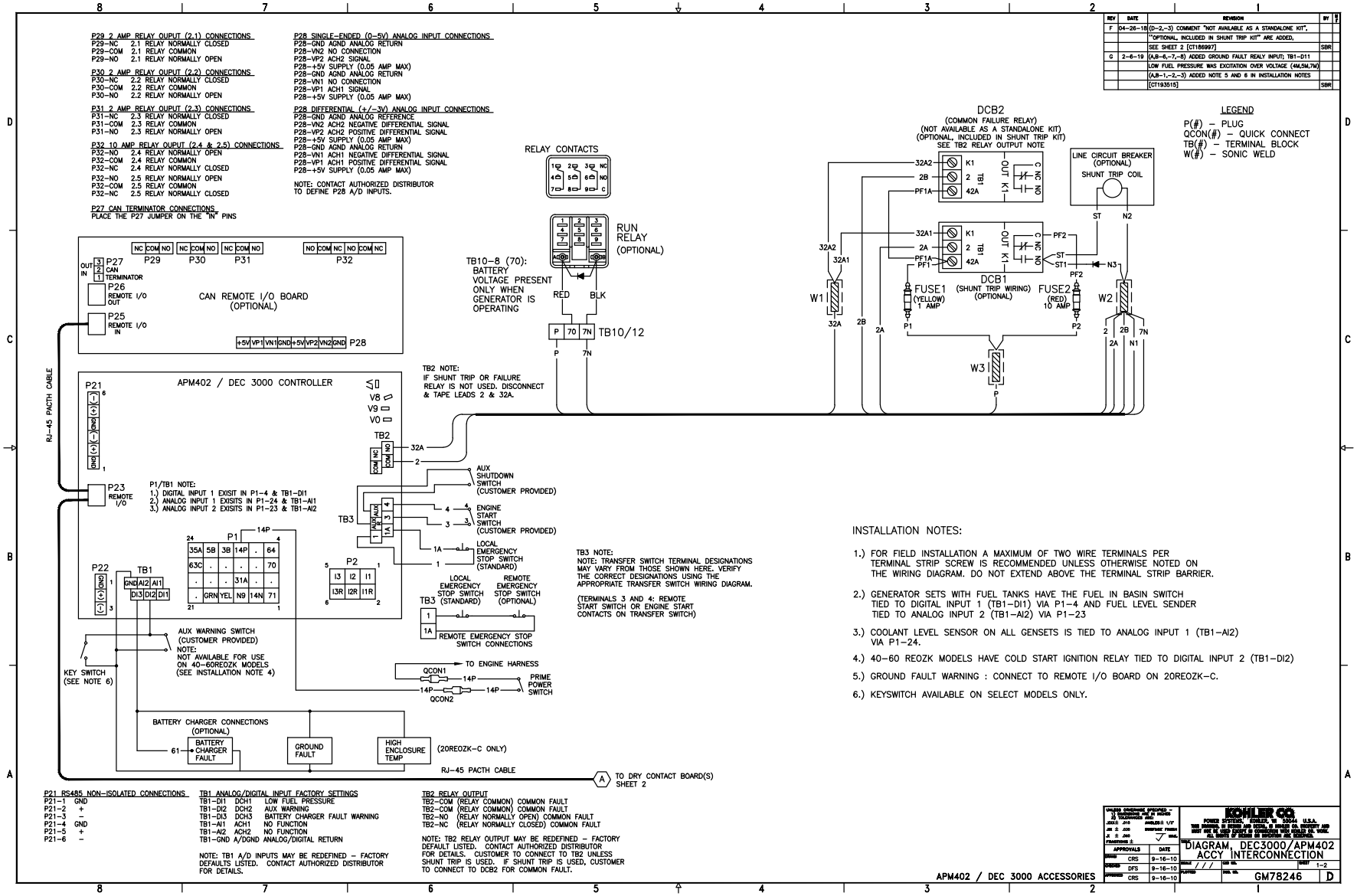
TITLE: DIAGRAM, WIRING
10.3L 150-200KW, APM402

SCALE: NONE | SHEET: 4-4

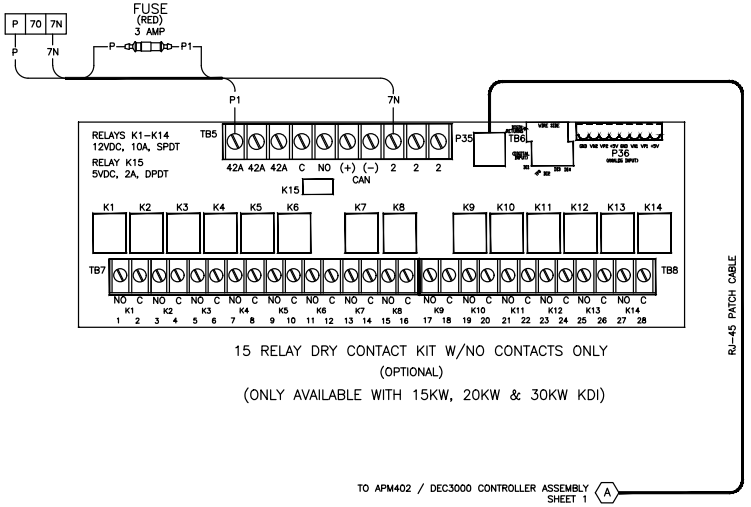
PLOTTED | PROJ. NO. GM107157 | D



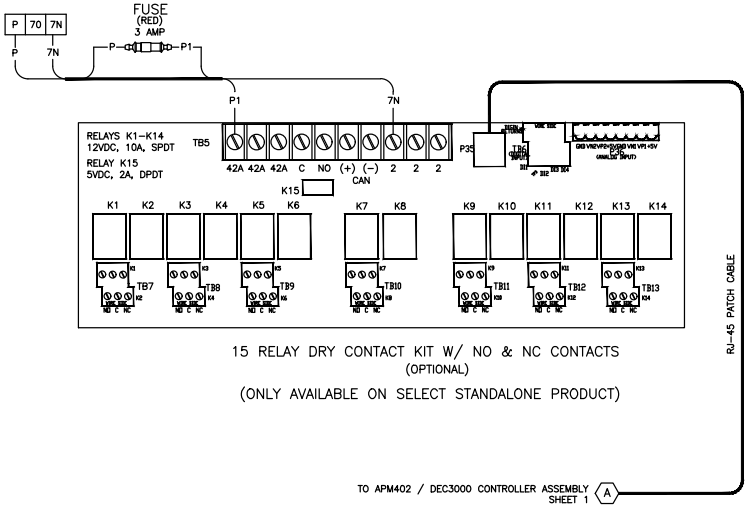
REV	DATE	REVISION	BY
F	04-26-18	(D-2,-3) COMMENT "NOT AVAILABLE AS A STANDALONE KIT", "OPTIONAL, INCLUDED IN SHUNT TRIP KIT" ARE ADDED, SEE SHEET 2 [CT186997]	SBR
G	2-6-19	(AJ-8,-7,-8) ADDED GROUND FAULT REALY INPUT; TB1-DI1 LOW FUEL PRESSURE WAS EXCITATION OVER VOLTAGE (4M,5M,7M) (AJ-1,-2,-3) ADDED NOTE 5 AND 6 IN INSTALLATION NOTES [CT193515]	SBR

APPROVALS	DATE
CRS	9-16-10
DFS	9-16-10
CRS	9-16-10

REV	DATE	REVISION	BY	M F
F	04-26-18	(B-6,-2) COMMENT "APM402 / DEC 3000 ACCESSORIES" IS ADDED		
		SEE SHEET 1 [CT186997]	SBR	
G	2-6-19	SEE SHEET 1 [CT193515]	SBR	



15 RELAY DRY CONTACT KIT W/NO CONTACTS ONLY
(OPTIONAL)
(ONLY AVAILABLE WITH 15KW, 20KW & 30KW KDI)



15 RELAY DRY CONTACT KIT W/ NO & NC CONTACTS
(OPTIONAL)
(ONLY AVAILABLE ON SELECT STANDALONE PRODUCT)

APM402 / DEC 3000 ACCESSORIES

APPROVALS	DATE
DFS	9-18-15
CRS	9-18-15
DFS	9-18-15

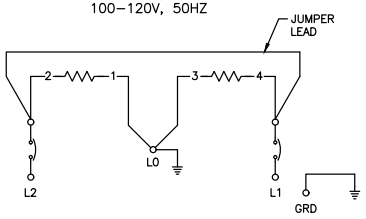
KOHLER CO.
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

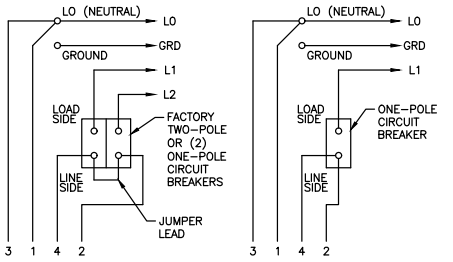
TITLE: DIAGRAM, DEC3000/APM402 ACCY INTERCONNECTION

SCALE: /// | DRW NO. GM78246 | SHEET 2-2 | SIZE D

REV	DATE	REVISION	BY
AB	10-4-19	SEE SHEET 4 [CT199071]	DS
AC	02-25-20	SEE SHEET 5 [CT202143]	SBR

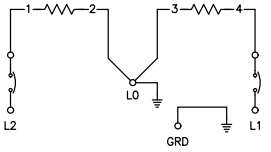
100–120V, 60HZ
100–120V, 50HZ

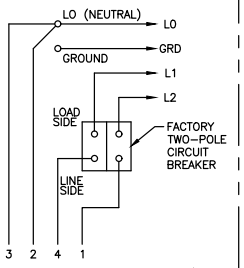




PB3, PB5 OR ADC2100 REGULATORS

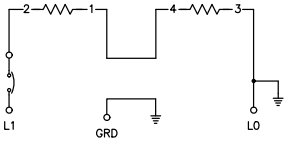
100–120/200–240V, 60HZ
100–120/200–240V, 50HZ

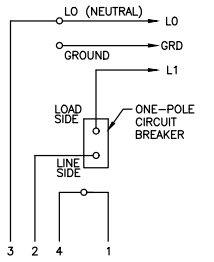




PB3, PB5, ADC2100, PERMANENT MAGNET (PM) AND WOUND FIELD (WF) REGULATORS

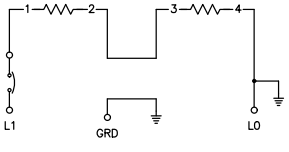
220–240V, 50HZ

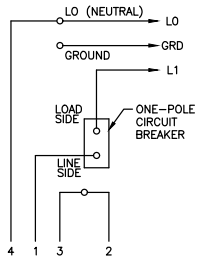




NON–ADC2100 REGULATORS

220–240V, 50HZ





ADC2100 REGULATORS
ADC2/ADC2D REGULATORS
RDC2 REGULATORS

NOTE:
FOR 230 VAC, 1PH, 50 HZ CONNECT LEADS #2 AND #3 PER GM38314 DRAWING

NOTES:
SOME 4E, 4 LEAD, DEDICATED SINGLE PHASE STATORS HAVE DUAL LEADS LABELED 1, 2, 3, 4, AND 1A, 2A, 3A, 4A. IN THIS CASE CONNECT 1 & 1A, 2 & 2A, 3 & 3A, 4 & 4A
SOME STATORS HAVE DUAL LEADS. ALWAYS CONNECT LEADS OF THE SAME LABEL TOGETHER.

SINGLE PHASE
4 LEAD ALTERNATORS

APPROVALS	DATE
DRAWN CRS	9-25-06
CHECKED TLK	9-25-06
APPROVED TLK	9-25-06

KOHLER CO.
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

TITLE: DIAGRAM, ALTERNATOR CONNECTIONS

SCALE NONE | SHEET 1–5

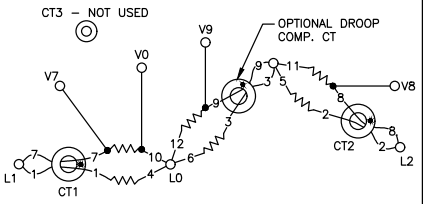
DRAWING NO. ADV–5875 | D

REV	DATE	REVISION	BY	M F
AB	10-4-19	SEE SHEET 4 [CT199071]	DS	
AC	02-25-20	SEE SHEET 5 [CT202143]	SBR	

12 LEAD ALTERNATOR, 3 WIRE, SINGLE PHASE

60 HZ: 100/200V
60 HZ: 120/240V
50 HZ: 100/200V
50 HZ: 110/220V

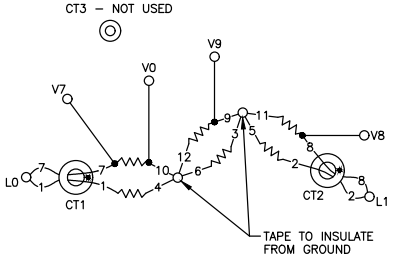
SOME SETS NOT RATED FOR SINGLE PHASE – SEE MANUALS



TB3 UP V7 LO METER SCALE LAMP JUMPER

12 LEAD ALTERNATOR, 3 WIRE, SINGLE PHASE

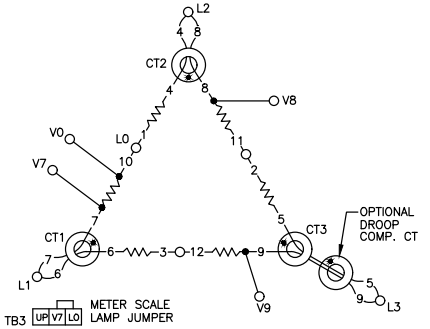
60 HZ: 240V
50 HZ: 220V
(MARINE ONLY)



TB3 UP V7 LO METER SCALE LAMP JUMPER

12 LEAD ALTERNATOR, 4 WIRE, DELTA

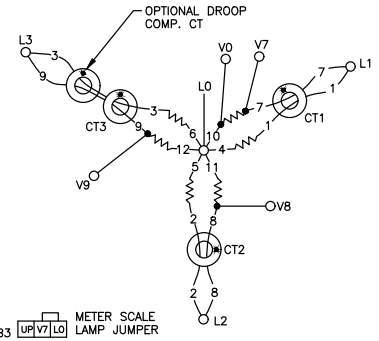
60 HZ: 120/240V
50 HZ: 110/220V



TB3 UP V7 LO METER SCALE LAMP JUMPER

12 LEAD ALTERNATOR, 4 WIRE, LOW WYE

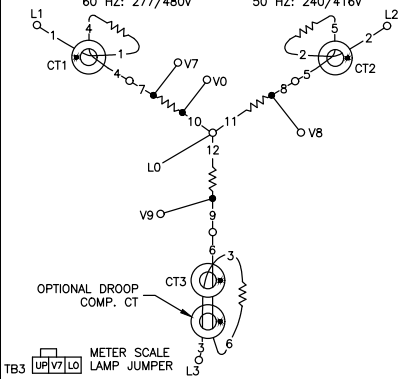
60 HZ: 120/208V
60 HZ: 127/220V
60 HZ: 139/240V
50 HZ: 110/190V
50 HZ: 115/200V
50 HZ: 120/208V



TB3 UP V7 LO METER SCALE LAMP JUMPER

12 LEAD ALTERNATOR, 4 WIRE, HI WYE

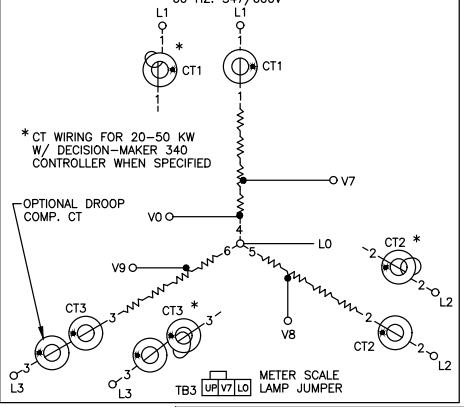
60 HZ: 220/380V
60 HZ: 240/416V
60 HZ: 277/480V
50 HZ: 220/380V
50 HZ: 230/400V
50 HZ: 240/416V



TB3 UP V7 LO METER SCALE LAMP JUMPER

6 LEAD ALTERNATOR, 4 WIRE, WYE

60 HZ: 347/600V



TB3 UP V7 LO METER SCALE LAMP JUMPER

NOTES:
CURRENT TRANSFORMER DOT OR "H1" TOWARD GENERATOR.
CURRENT TRANSFORMERS NOT USED ON ALL SETS.
SOME STATORS HAVE DUAL LEADS. ALWAYS CONNECT LEADS OF THE SAME LABEL TOGETHER.

PHASE ROTATION

A	B	C
L1	L2	L3

3 PHASE
FRII ALTERNATORS,
20–60KW WOUND EXCITER FIELD ALTERNATORS,
AND 10–20KW SMALL STANDBY

UNLESS OTHERWISE SPECIFIED – 1) DIMENSIONS ARE IN INCHES 2) TOLERANCES ARE: .XXX± .010 ANGLES± 1/2° .XX ± .030 SURFACE FINISH .X ± .060 MAX. FRACTIONS ±

APPROVALS	DATE
DRAWN DFS	7-28-92
CHECKED TLK	6-23-99
APPROVED JMH	6-23-99

TITLE: DIAGRAM, ALTERNATOR CONNECTIONS

SCALE: NONE | CAD NO. | SHEET 2-8

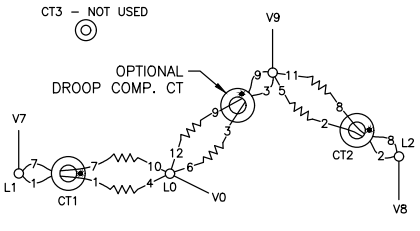
PLOTTED | DWG. NO. ADV-5875 | C

REV	DATE	REVISION	BY	M
AB	10-4-19	SEE SHEET 4 [CT199071]	DS	
AC	02-25-20	SEE SHEET 5 [CT202143]	SBR	

12 LEAD ALTERNATOR, 3 WIRE, SINGLE PHASE

60 HZ: 100/200V
60 HZ: 120/240V
50 HZ: 100/200V
50 HZ: 110/220V

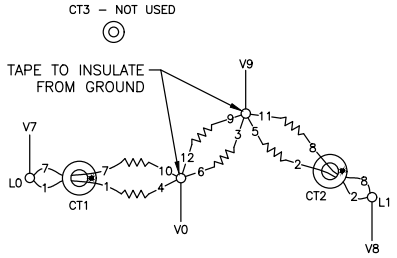
SOME SETS NOT RATED FOR SINGLE PHASE – SEE MANUALS



TB3 UP V7 LO METER SCALE LAMP JUMPER

12 LEAD ALTERNATOR, 3 WIRE, SINGLE PHASE

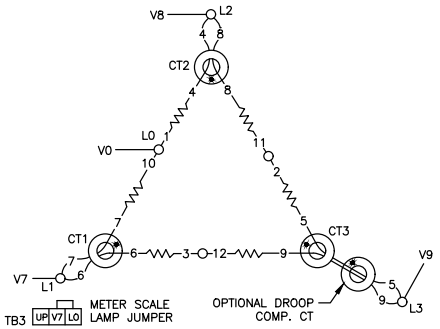
60 HZ: 240V
50 HZ: 220V
(MARINE ONLY)



TB3 UP V7 LO METER SCALE LAMP JUMPER

12 LEAD ALTERNATOR, 4 WIRE, DELTA

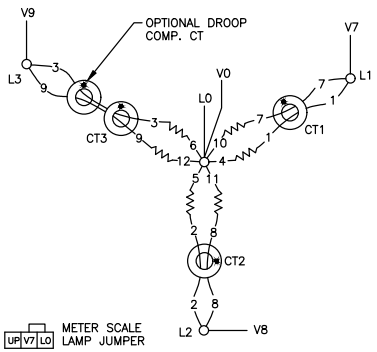
60 HZ: 120/240V
50 HZ: 110/220V



TB3 UP V7 LO METER SCALE LAMP JUMPER

12 LEAD ALTERNATOR, 4 WIRE, LOW WYE

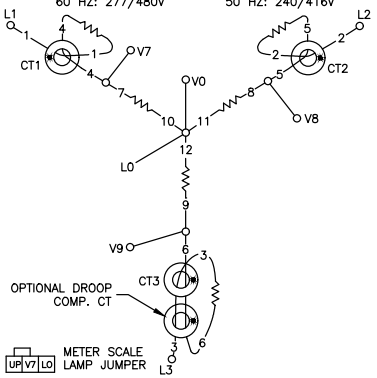
60 HZ: 120/208V
60 HZ: 127/220V
60 HZ: 139/240V
50 HZ: 110/190V
50 HZ: 115/200V
50 HZ: 120/208V



TB3 UP V7 LO METER SCALE LAMP JUMPER

12 LEAD ALTERNATOR, 4 WIRE, HI WYE

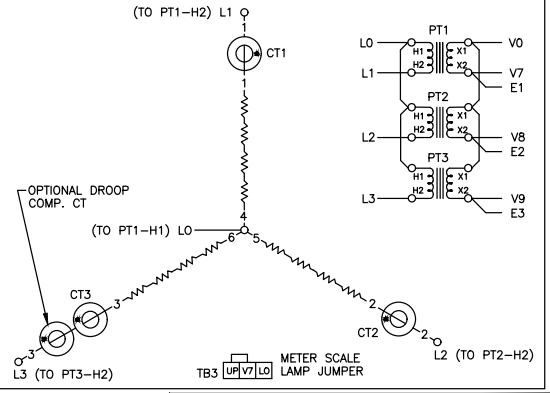
60 HZ: 220/380V
60 HZ: 240/416V
60 HZ: 277/480V
50 HZ: 220/380V
50 HZ: 230/400V
50 HZ: 240/416V



TB3 UP V7 LO METER SCALE LAMP JUMPER

6 LEAD ALTERNATOR, 4 WIRE, WYE

60 HZ: 347/600V



TB3 UP V7 LO METER SCALE LAMP JUMPER

NOTES:

CURRENT TRANSFORMER DOT OR "H1" TOWARD GENERATOR.
CURRENT TRANSFORMERS NOT USED ON ALL SETS.
SOME STATORS HAVE DUAL LEADS. ALWAYS CONNECT LEADS OF THE SAME LABEL TOGETHER.

PHASE ROTATION

A	B	C
L1	L2	L3

3 PHASE
60 (I.M.S.)–300 KW WOUND EXCITER FIELD
600V FRII
ALTERNATORS

UNLESS OTHERWISE SPECIFIED – 1) DIMENSIONS ARE IN INCHES 2) TOLERANCES ARE: .XXX ± .010 ANGLES ± 1/2° .XX ± .030 SURFACE FINISH .X ± .060 FRACTIONS ± MAX.

APPROVALS		DATE
DRAWN	LDS	8-25-98
CHECKED	TLK	6-23-99
APPROVED	JMH	6-23-99

KOHLER CO.
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

TITLE: DIAGRAM, ALTERNATOR CONNECTIONS

SCALE	CAD NO.	SHEET
NONE		3-8
PLOTTED	DWG. NO.	
	ADV-5875	C

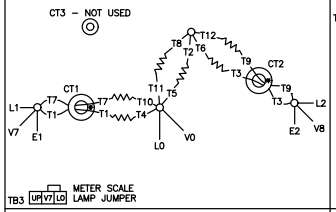
REV	DATE	REVISION	BY	CHK
AB	10-4-19	(D-6,7,8) 12 LEAD ALTERNATOR: 3 WIRE, SINGLE PHASE & 4		
		WIRE, DELTA RECONNECTION DIAGRAM UPDATED [CT199071]	DS	
AC	02-25-20	SEE SHEET 5 [CT202143]	SBR	

3 PHASE GENERATOR CONNECTIONS

12 LEAD ALTERNATOR, 3 WIRE, SINGLE PHASE

60 HZ: 100/200V
60 HZ: 120/240V
50 HZ: 100/200V
50 HZ: 110/220V

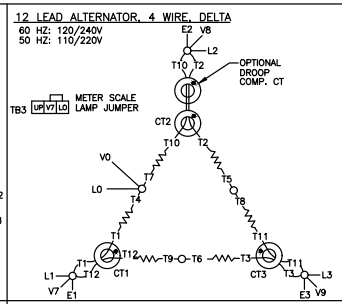
SOME SETS NOT RATED FOR SINGLE PHASE – SEE MANUALS



TB3 UP V7 L0 METER SCALE LAMP JUMPER

12 LEAD ALTERNATOR, 4 WIRE, DELTA

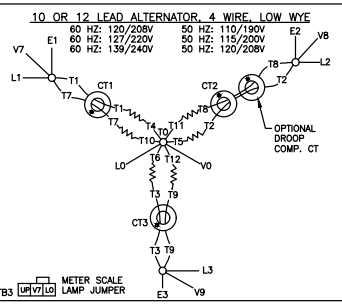
60 HZ: 120/240V
50 HZ: 110/220V



TB3 UP V7 L0 METER SCALE LAMP JUMPER

10 OR 12 LEAD ALTERNATOR, 4 WIRE, LOW WYE

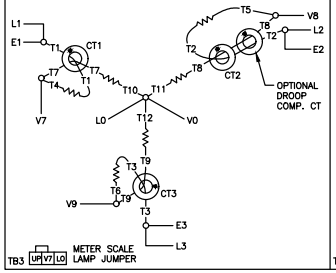
60 HZ: 120/208V 50 HZ: 110/190V
60 HZ: 127/220V 50 HZ: 115/200V
60 HZ: 139/240V 50 HZ: 120/208V



TB3 UP V7 L0 METER SCALE LAMP JUMPER

10 OR 12 LEAD ALTERNATOR, 4 WIRE, HI WYE

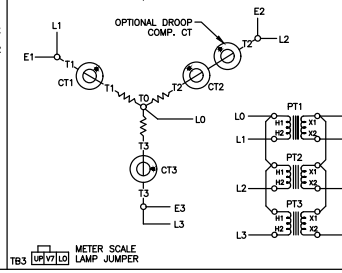
60 HZ: 220/380V 50 HZ: 220/380V
60 HZ: 240/416V 50 HZ: 230/400V
60 HZ: 277/480V 50 HZ: 240/416V



TB3 UP V7 L0 METER SCALE LAMP JUMPER

4 LEAD ALTERNATOR, 4 WIRE, WYE

60 HZ: 220/380V 50 HZ: 220/380V
60 HZ: 240/416V 50 HZ: 230/400V
60 HZ: 277/480V 50 HZ: 240/416V
60 HZ: 347/600V



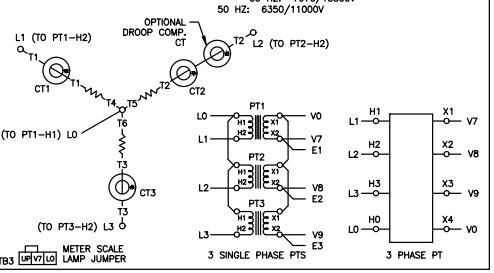
TB3 UP V7 L0 METER SCALE LAMP JUMPER

6 LEAD ALTERNATOR, 4 WIRE, WYE (MARATHON)

60 HZ: 2400/4160V
50 HZ: 1905/3300V
50 HZ: 3810/6600V

6 LEAD ALTERNATOR, 4 WIRE, WYE (BAYLOR)

60 HZ: 4160/7200V
60 HZ: 7200/12470V
60 HZ: 7620/13200V
60 HZ: 7970/13800V
50 HZ: 6350/11000V



TB3 UP V7 L0 METER SCALE LAMP JUMPER

3 SINGLE PHASE PTS

3 PHASE PT

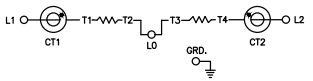
PHASE ROTATION

A	B	C
L1	L2	L3

SINGLE PHASE GENERATOR CONNECTIONS

4 LEAD ALTERNATOR, 3 WIRE, DEDICATED SINGLE PHASE

60 HZ: 120/240V
50 HZ: 110/220V



TB3 UP V7 L0 METER SCALE LAMP JUMPER

NOTES:

ON 10 LEAD GENERATORS, LEADS T10, T11 & T12 ARE ALL BROUGHT OUT TOGETHER AND LABELED "T0".

CURRENT TRANSFORMER DOT OR "H1" TOWARD GENERATOR.
CURRENT TRANSFORMERS NOT USED ON ALL SETS.

SOME STATORS HAVE DUAL LEADS. ALWAYS CONNECT LEADS OF THE SAME LABEL TOGETHER.

APPROVALS		DATE
DRAWN	DFS	5-27-04
CHECKED	JS	5-27-04
APPROVED	JS	5-27-04

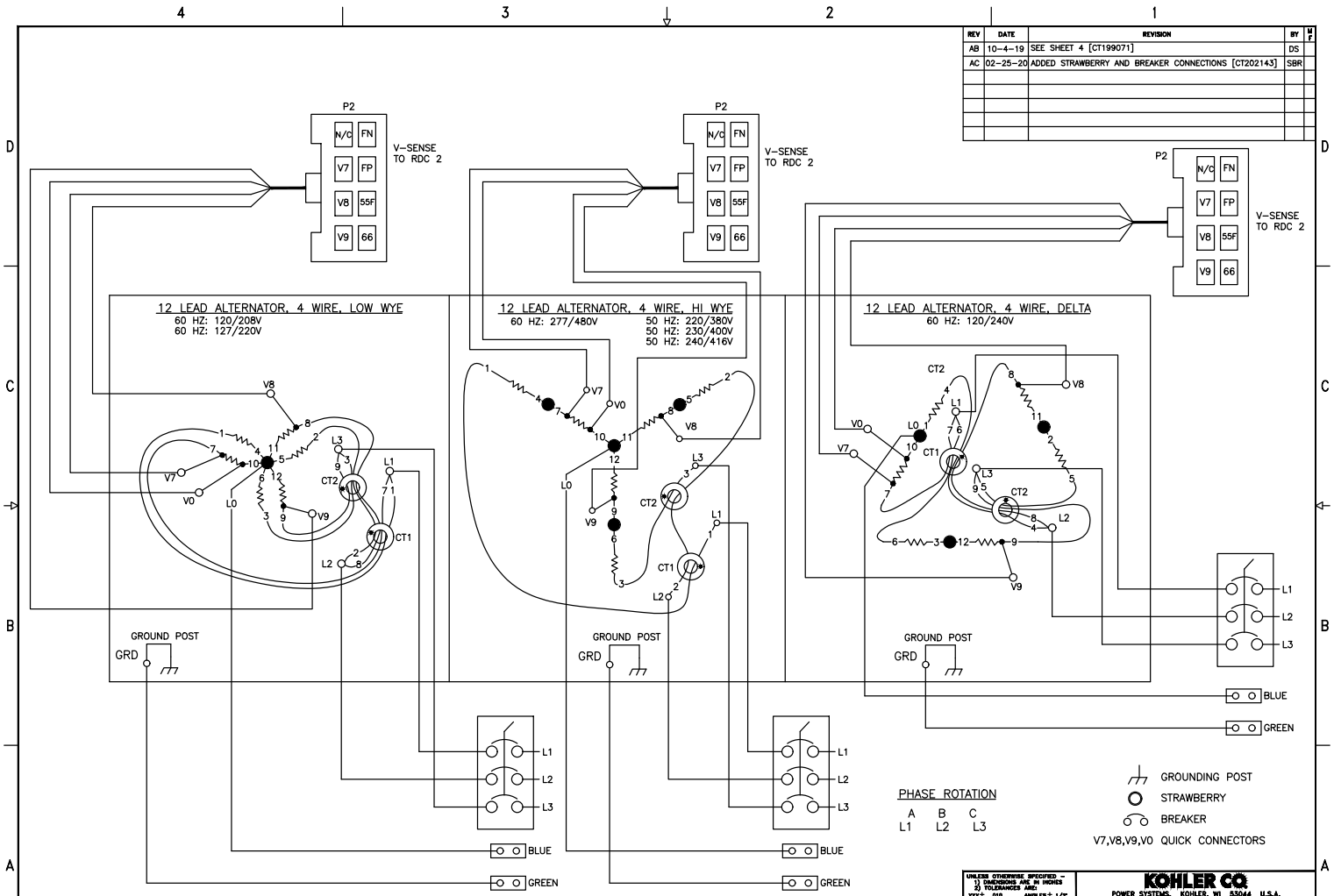
KOHLER CO.
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

TITLE: DIAGRAM, ALTERNATOR CONNECTIONS

SCALE: NONE | DWG NO. | SHEET 4–8

SIZE: D | DWG NO. ADV-5875

MARATHON ALTERNATORS



REV	DATE	REVISION	BY	M F
AB	10-4-19	SEE SHEET 4 [CT199071]	DS	
AC	02-25-20	ADDED STRAWBERRY AND BREAKER CONNECTIONS [CT202143]	SBR	

NOTES:

CURRENT TRANSFORMER DOT OR "H1" TOWARD GENERATOR.
SOME STATORS HAVE DUAL LEADS. ALWAYS CONNECT LEADS OF THE SAME LABEL TOGETHER.

3 PHASE
RDC2 CONTROLLER
w/2 CURRENT TRANSFORMERS

UNLESS OTHERWISE SPECIFIED – 1) DIMENSIONS ARE IN INCHES 2) TOLERANCES ARE: .XXX± .010 ANGLES± 1/2° .XX ± .030 SURFACE FINISH .X ± .060 MAX. FRACTIONS ±

APPROVALS	DATE
DRAWN CRS	5-21-12
CHECKED PH	5-21-12
APPROVED PH	5-21-12

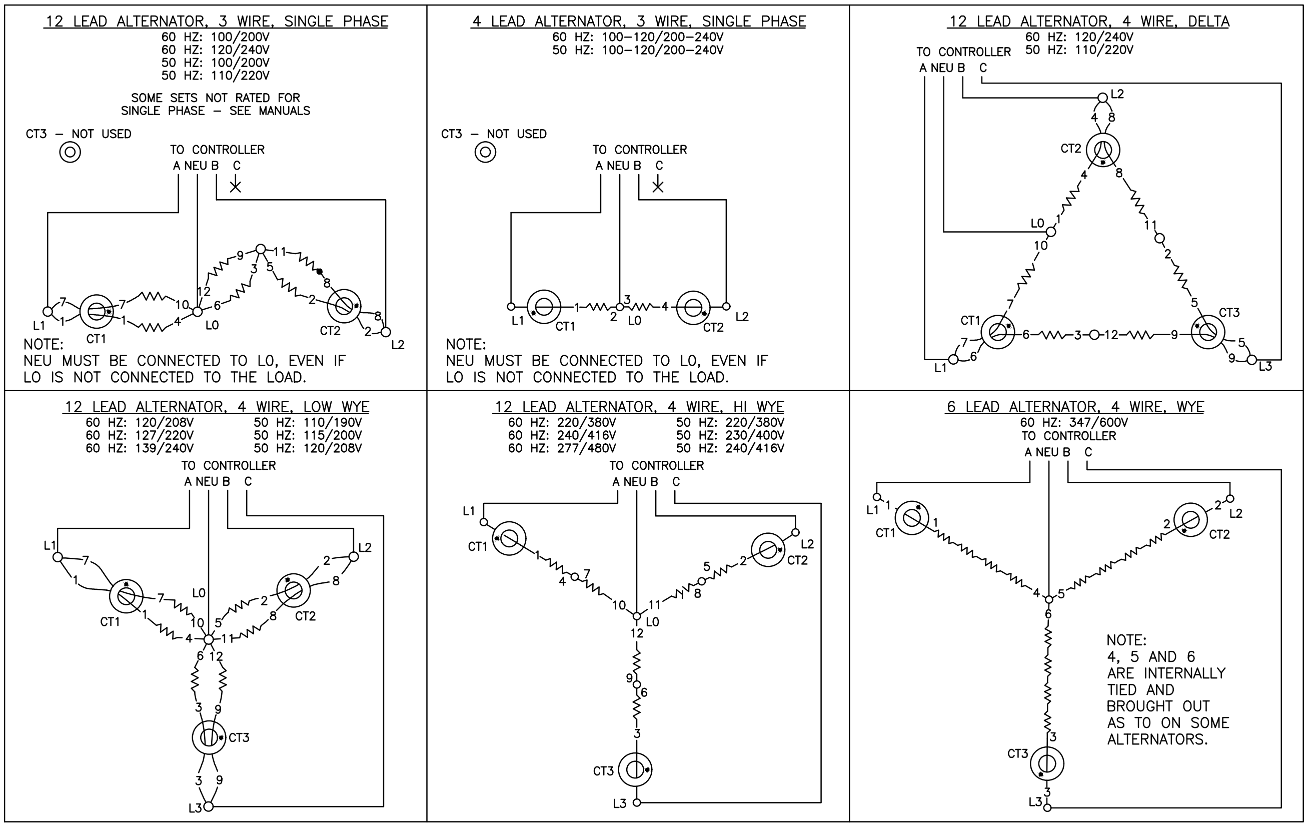
KOHLER CO.
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

TITLE: DIAGRAM, ALTERNATOR CONNECTIONS

SCALE: NONE | CAD NO. | SHEET 5-8

PLOTTED | DWG. NO. ADV-5875 | C

REV	DATE	REVISION	BY	MF
AB	10-4-19	SEE SHEET 4 [CT199071]	DS	
AC	02-25-20	SEE SHEET 5 [CT202143]	SBR	



NOTES:
CURRENT TRANSFORMER DOT OR "H1" TOWARD GENERATOR.
CURRENT TRANSFORMERS NOT USED ON ALL SETS.
SOME STATORS HAVE DUAL LEADS. ALWAYS CONNECT LEADS
OF THE SAME LABEL TOGETHER.

PHASE ROTATION

A	B	C
L1	L2	L3

APM603 CONTROLLER
DEC3500 CONTROLLER

UNLESS OTHERWISE SPECIFIED –
1) DIMENSIONS ARE IN INCHES
2) TOLERANCES ARE:
.XXX ± .010 ANGLES ± 1/2°
.XX ± .030 SURFACE FINISH
.X ± .060 MAX.
FRACTIONS ±

APPROVALS		DATE
DRAWN	PRH	5-27-04
CHECKED	IF	5-27-04
APPROVED	IF	5-27-04

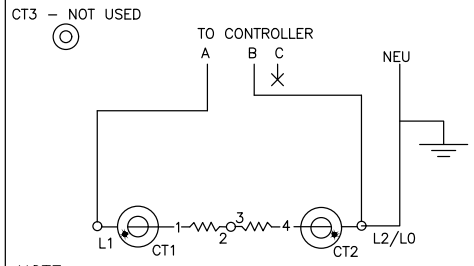
TITLE: DIAGRAM, ALTERNATOR CONNECTIONS

SCALE: NONE | CAD NO. | SHEET 6-8

PLOTTED | DWG. NO. ADV-5875 | D

REV	DATE	REVISION	BY
AB	10-4-19	SEE SHEET 4 [CT199071]	DS
AC	02-25-20	SEE SHEET 5 [CT202143]	SBR

4 LEAD ALTERNATOR, 2 WIRE, SINGLE PHASE
60 HZ: 200-240V
50 HZ: 200-240V



NOTE:
NEU MUST BE CONNECTED TO L2/L0, EVEN IF LO IS NOT CONNECTED TO THE LOAD.

NOTES:

CURRENT TRANSFORMER DOT OR "H1" TOWARD GENERATOR.

CURRENT TRANSFORMERS NOT USED ON ALL SETS.

SOME STATORS HAVE DUAL LEADS. ALWAYS CONNECT LEADS OF THE SAME LABEL TOGETHER.

PHASE ROTATION

A	B	C
L1	L2	L3

APM603 CONTROLLER
DEC3500 CONTROLLER

APPROVALS	DATE
PRH	5-27-04
IF	5-27-04
IF	5-27-04

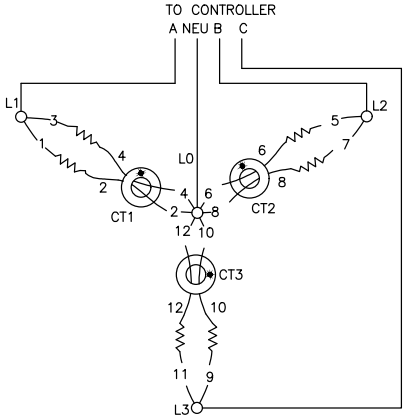
KOHLER CO.
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

TITLE: DIAGRAM, ALTERNATOR CONNECTIONS
SCALE: NONE | SHEET: 7-8
DRAWING NO.: ADV-5875 | D

REV	DATE	REVISION	BY
AB	10-4-19	SEE SHEET 4 [CT199071]	DS
AC	02-25-20	SEE SHEET 5 [CT202143]	SBM

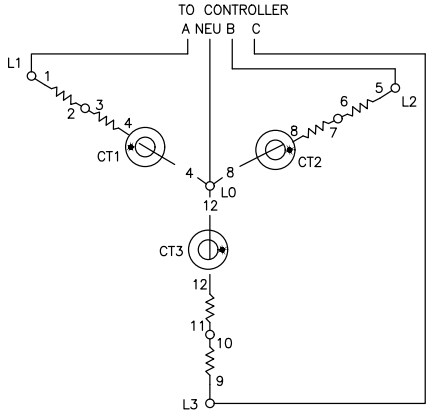
12 LEAD ALTERNATOR, 4 WIRE, LOW WYE, PARALLEL STAR

60 HZ: 120/208V 50 HZ: 110/190V
60 HZ: 127/220V 50 HZ: 115/200V
60 HZ: 139/240V 50 HZ: 120/208V



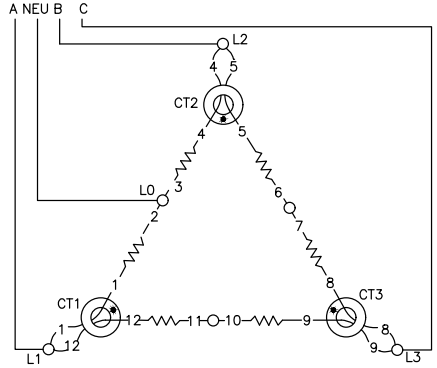
12 LEAD ALTERNATOR, 4 WIRE, HI WYE, SERIES STAR

60 HZ: 220/380V 50 HZ: 220/380V
60 HZ: 240/416V 50 HZ: 230/400V
60 HZ: 277/480V 50 HZ: 240/416V



12 LEAD ALTERNATOR, 4 WIRE, DELTA

60 HZ: 120/240V
50 HZ: 110/220V



NOTES:
CURRENT TRANSFORMER DOT OR "H1" TOWARD GENERATOR.
CURRENT TRANSFORMERS NOT USED ON ALL SETS.
SOME STATORS HAVE DUAL LEADS. ALWAYS CONNECT LEADS OF THE SAME LABEL TOGETHER.

PHASE ROTATION

A	B	C
L1	L2	L3

APM802 CONTROLLER
DEC3500 CONTROLLER
MECC ALTE ALTERNATOR

APPROVALS	DATE
PRH	5-27-04
IF	5-27-04
IF	5-27-04

KOHLER CO.
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

TITLE: DIAGRAM, ALTERNATOR CONNECTIONS
SCALE: NONE DO NO. SHEET 8-8
DWG NO. ADV-5875 D

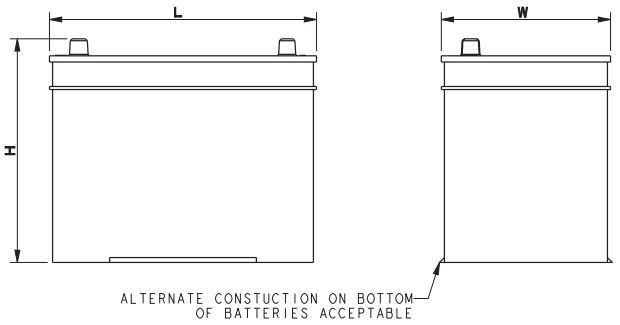
KOHLER®

Miscellaneous

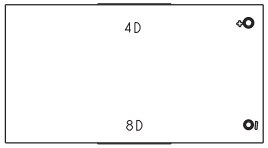
PART NO.	REV		SAE DIMENSION L	SAE DIMENSION W	SAE DIMENSION H	VOLTAGE	COLD CRANKING AMPS AT 0°F MINIMUM	RESERVE CAP MINUTES AT 80°F MINIMUM	POST LAYOUT /STYLE	CHARGE TYPE	BATTERY CONSTRUCTION	BCI GROUP	INTERNAL RESISTANCE (MΩ)
~~244578~~	~~AF~~		~~333.5 [13.13]~~	~~181.1 [7.13]~~	~~238.5 [9.39]~~	~~6~~	~~700~~	~~275~~	~~B/1~~	~~DRY~~	~~SEE NOTE 1~~	~~~~	-
~~244750~~	~~AD~~		~~342.9 [13.50]~~	~~173.2 [6.82]~~	~~238.3 [9.38]~~	~~12~~	~~600~~	~~165~~	~~D/1~~	~~DRY~~	~~SEE NOTE 1~~	~~~~	-
~~239102~~	~~AK~~		~~198.1 [7.80]~~	~~133.4 [5.25]~~	~~187.5 [7.38]~~	~~12~~	~~200~~	~~32~~	~~D/2~~	~~DRY~~	~~SEE NOTE 1~~	~~~~	-
~~289515~~	~~AC~~		~~539.8 [21.25]~~	~~282.7 [11.13]~~	~~276.4 [10.88]~~	~~12~~	~~1150~~	~~450~~	~~A/1~~	~~DRY~~	~~SEE NOTE 1~~	~~~~	-
~~291918~~	~~AC~~		~~333.2 [13.12]~~	~~173.0 [6.81]~~	~~239.8 [9.44]~~	~~12~~	~~700~~	~~150~~	~~C/3~~	~~WET~~	~~SEE NOTE 1~~	~~~~	-
~~299981~~	~~AD~~		~~333.2 [13.12]~~	~~173.0 [6.81]~~	~~239.8 [9.44]~~	~~12~~	~~700~~	~~150~~	~~C/3~~	~~DRY~~	~~SEE NOTE 1~~	~~~~	-
~~254425~~	~~AD~~		~~333.2 [13.12]~~	~~173.0 [6.81]~~	~~239.8 [9.44]~~	~~12~~	~~1000~~	~~200~~	~~C/3~~	~~WET~~	~~SEE NOTE 1~~	~~~~	-
~~299982~~	~~AC~~		~~333.2 [13.12]~~	~~173.0 [6.81]~~	~~239.8 [9.44]~~	~~12~~	~~950~~	~~200~~	~~C/3~~	~~DRY~~	~~SEE NOTE 1~~	~~~~	-
~~324367~~	~~BM~~		~~208.0 [8.19]~~	~~179.4 [7.06]~~	~~196.9 [7.75]~~	~~12~~	~~675~~	~~90~~	~~C/1~~	~~WET~~	~~SEE NOTE 1~~	~~~~	-
~~324368~~	~~AC~~		~~206.5 [8.13]~~	~~166.9 [6.57]~~	~~205.2 [8.08]~~	~~12~~	~~675~~	~~90~~	~~C/1~~	~~DRY~~	~~SEE NOTE 1~~	~~~~	-
~~324586~~	~~BU~~	☐	~~330.2 [13.00]~~	~~173.0 [6.81]~~	~~239.8 [9.44]~~	~~12~~	~~950~~	~~185~~	~~C/3~~	~~WET~~	~~SEE NOTE 2~~	~~31~~	-
324587	BT		330.2 [13.00]	173.0 [6.81]	239.8 [9.44]	12	950	200	C/3	DRY	SEE NOTE 2	31	-
~~256984~~	~~BT~~	☐	~~273.0 [10.75]~~	~~173.0 [6.81]~~	~~228.6 [9.00]~~	~~12~~	~~650~~	~~120~~	~~D/1~~	~~WET~~	~~SEE NOTE 1~~	~~24~~	-
225289	BR		273.0 [10.75]	173.0 [6.81]	228.6 [9.00]	12	650	130	D/1	DRY	SEE NOTE 1	24	-
~~345197~~	~~BS~~		~~273.0 [10.75]~~	~~173.0 [6.81]~~	~~228.6 [9.00]~~	~~12~~	~~510~~	~~80~~	~~E/1~~	~~WET~~	~~SEE NOTE 2~~	~~24F~~	-
354147	BT		330.2 [13.00]	173.0 [6.81]	239.8 [9.44]	12	700	170	C/3	WET	SEE NOTE 2	31	-
~~354148~~	~~BU~~		~~330.2 [13.00]~~	~~173.0 [6.81]~~	~~239.8 [9.44]~~	~~12~~	~~700~~	~~150~~	~~C/3~~	~~DRY~~	~~SEE NOTE 2~~	~~31~~	-
345309	BR		219.2 [8.63]	153.9 [6.06]	212.9 [8.38]	12	525	-	E/1	WET	SEE NOTE 1	55	-
~~GM22348~~	~~AC~~		~~525.3 [20.68]~~	~~220.5 [8.68]~~	~~251.0 [9.88]~~	~~12~~	~~1000~~	~~320~~	~~A/1~~	~~DRY~~	~~SEE NOTE 1~~	~~~~	-
GM22349	BR		527.1 [20.75]	282.4 [11.12]	276.4 [10.88]	12	1150	400	A/1	DRY	SEE NOTE 1	8D	-
~~GM34399~~	~~BT~~	☐	~~527.1 [20.75]~~	~~282.4 [11.12]~~	~~276.4 [10.88]~~	~~12~~	~~1400~~	~~430~~	~~A/1~~	~~WET~~	~~SEE NOTE 1~~	~~8D~~	-
~~GM48784~~	~~BT~~	☐	~~208.0 [8.19]~~	~~173.0 [6.81]~~	~~196.9 [7.75]~~	~~12~~	~~525~~	~~70~~	~~D/1~~	~~WET~~	~~~~	~~26~~	-
~~GM75512~~	~~BT~~	☐	~~238.0 [9.38]~~	~~129.0 [5.06]~~	~~223.0 [8.81]~~	~~12~~	~~500~~	~~85~~	~~D/1~~	~~WET~~	~~-~~	~~51~~	-
10702000701	A		527.1 [20.75]	216.0 [8.50]	258.0 [10.16]	12	1050	290	A/1	WET	-	4D	-
10702001800	A		527.1 [20.75]	216.0 [8.50]	254.0 [10.0]	12	1110	380	A/1	AGM	SEE NOTE 3	4D	-
GM106681	-	☐	260.0 [10.25]	171.0 [6.75]	208.0 [8.19]	12	690	105	D/1	WET	-	34	4.29
GM106375	-	☐	330.2 [13.00]	171.0 [6.75]	239.8 [9.44]	12	925	180	C/3	WET	SEE NOTE 2	31	3.31
GM106373	-	☐	260.0 [10.25]	171.0 [6.75]	229.0 [9.00]	12	650	95	D/1	WET	SEE NOTE 1	24	4.71
GM106377	-	☐	527.1 [20.75]	279.0 [11.0]	254.0 [10.00]	12	1400	380	A/1	WET	SEE NOTE 1	80	2.53
GM106369	-	☐	208.0 [8.19]	172.0 [6.77]	200.0 [7.87]	12	500	95	D/1	WET	-	26	5.85
GM106374	-	☐	237.0 [9.32]	125.0 [4.94]	220.0 [8.66]	12	500	70	D/1	WET	-	51	5.00

NOTE: DIMENSIONS IN [ ] ARE ENGLISH EQUIVALENTS.

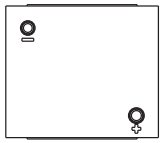
☐ INDICATES PART NUMBERS AFFECTED BY LATEST DRAWING REVISION



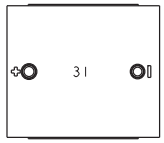
LAYOUT A



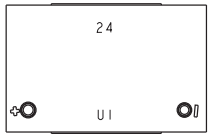
LAYOUT B



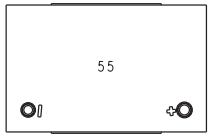
LAYOUT C



LAYOUT D



LAYOUT E



REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
BY	5-6-16	(C-6) 10702001800: COLD CRANKING AMPS 1110	
		WAS 1100 [CTI46053]	BGW
CA	4-15-19	(C-8) GM106681, GM106375, GM106373,	
		GM106377, GM106369 & GM106374 ADDED; (D-3)	
		INTERNAL RESISTANCE (MΩ) COLUMN ADDED;	
		(D-8) 324586 & 256984 VOIDED; (C-8)	
		GM34399, GM48784, GM75512	
		VOIDED;(A,B-8,7,6,5,4) VIEWS & NOTES MOVED	
		TO SHEET 2, SHEET 2 ADDED [CTI94425]	DS

DO NOT SCALE, REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN MILLIMETERS
GENERAL TOLERANCES: X.XX ± 0.25, X.X ± 1.0, X ± 1.5, ANGLES ± 0°30'
SURFACE FINISH 125 MAX.
THIRD ANGLE PROJECTION

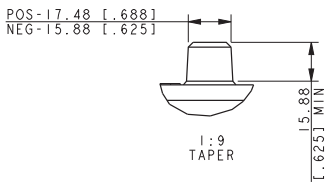
APPROVALS		DATE
DRAWN	SLR	4-15-19
CHECKED	EB	4-15-19
APPROVED	RAD	4-15-19

TITLE: DWG, BATTERY, DRY CHARGED

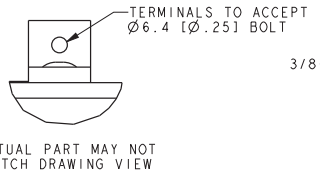
SCALE 0.30 | CAD NO. | SHEET 1 of 2

DWG NO. 244578-CMP | D

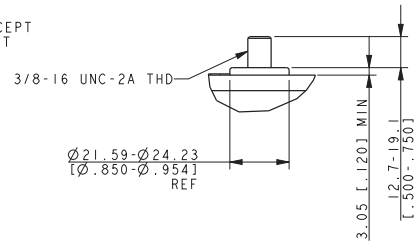
STYLE 1



STYLE 2



STYLE 3



NOTES:
1) STYLE 3 CAN BE CONVERTED TO STYLE 1 BY INSTALLATION OF 254427 STUD CONVERTION KIT.
2) BATTERIES USING ``STYLE 3'' STUDS MUST HAVE EITHER THE ``POS'' OR ``NEG'' STUD CLEARLY IDENTIFIED.
3) STYLE 3 TERMINAL TORQUE 10 Nm [15 FT LBS].
4) "POS" & "NEG" IDENTIFICATION MUST BE MARKED AS SHOWN ON THE PART LAYOUT AND WITHIN 5mm OF THE STUD.

NOTES: (APPLIES TO ALL BATTERIES)
SAE J537 DIMENSIONS ARE MAX ALLOWABLE DIMENSIONS.
COLD CRANKING AMPS ARE MINIMUM ACCEPTABLE VALUES.
HOLD DOWN DESIGN IN COMPLIANCE WITH SAE STANDARDS.
BATTERY WARNING LABEL TO BE LOCATED ON TAP OF BATTERY. (BETWEEN TERMINALS ON LAYOUT D)
MANUFACTURER MUST PROVIDE A CERTIFICATE CONTAINING MFGRS. NAME, MFGRS. PART NUMBER,
AND KOHLER PART NUMBER CERTIFYING THAT THE BATTERY WAS BUIT TO INDUSTRY STANDARDS.
SEE N.F.P.A.-110 FOR SPECIFIC DETAILS. CERTIFICATE REQUIRED ONLY ONCE PER BATTERY PART NUMBER.
MAY NOT BE CALCIUM-CALCIUTYPE.

NOTES: (CHARGE TYPE)
ALL DRY CHARGED BATTERIES MUST BE SUPPLIED WITH ACTIVATION INSTRUCTIONS ADHERED TO BATTERY
AND LOOSE. BATTERY MUST ALSO BE IDENTIFED ON TOP AS: ``DRY CHARGED, MUST ADD BATTERY GRADE
ELECTROLYTE, SEE ACTIVATION INSTRUCTIONS''.
BATTERIES SHOULD BE RECEIVED APPROPRIATELY MARKED AS DRYCHARGED OR WET STORAGE.
ONE OF THE BATTERY POSTS MUST BE SHIELDED WHEN BATTERIES ARE WET CHARGED.
BATTERIES WHEN SHIPPED DRY - DO NOT REQUIRE POST PROTECTORS.

NOTES: (BATTERY CONSTRUCTION)
1) MUST BE LEAD-CALCIUM HYBRID OR LEAD-ANTIMONY TYPE.
2) LEAD-CALCIUM GRID.
3) ABSORBED GLASS MAT. (AGM)

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
CA	4-15-19	NEW DRAWING; SEE SHEET 1 [CT194425]	DS

DO NOT SCALE, REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS IN MILLIMETERS
GENERAL TOLERANCES:
X.XX ± 0.25
X.X ± 1.0
X ± 1.3
ANGLES ± 0°30'
SURFACE FINISH 125 MAX.
THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	DS	4-15-19
CHECKED	GFR	4-15-19
APPROVED	AMM	4-15-19

TITLE
DWG, BATTERY, DRY CHARGED

SCALE 0.30 | CAD NO. | SHEET 2 of 2
DWG NO. **244578-CMP** | **D**

OVERVIEW:
THE AUTOMATIC MULTI-LEVEL FLOAT/ EQUALIZE CHARGER SPECIFIED BELOW IS INTENDED TO CHARGE ENGINE STARTING BATTERIES EITHER INDEPENDENT OR IN CONJUNCTION WITH AN ENGINE DRIVEN CHARGING SYSTEM.

BATTERY TYPES TO BE CHARGED:
- LEAD ACID
  - AGM
  - GEL CELL
  - HIGH PERFORMANCE AGM
  - FLOODED
- NICKEL CADMIUM (NiCd)

INPUT AC:
- INPUT VOLTAGE: 90-265V SINGLE PHASE
- INPUT FREQUENCY: 47-63 Hz

INPUT LEAD:
APPROXIMATELY 1.8M (72") (REF) TYPE SJTOW -40°C TO 105°C UL RATED WIRE AND INSULATION. TERMINATED IN PRE-MOLDED UL RATED 3 PRONG NEMA 5-15 MALE AC PLUG.

DC OUTPUT:
10A @ 12V
10A @ 24V
VOLTAGE REGULATION: +/-1% (VOLTAGE AT EACH STAGE IS TOPOLOGY DEPENDENT)

OUTPUT LEAD:
APPROX. 1.8M (72") (REF) TYPE SJTOOW -40°C TO 105°C UL RATED WIRE WITH RED AND BLACK WIRE INSULATION. TERMINATED IN 9.5 mm (REF) RING STYLE TERMINALS.

FUSES:
THE FUSE MUST BE LOCATED APPROXIMATELY 6" FROM RING TERMINAL ON RED OUTPUT LEAD.
20A ATC

ENVIRONMENTAL:
- STORAGE TEMPERATURE RANGE: -40 TO +85°C (-40 TO +185°F)
- OPERATING TEMPERATURE RANGE: -20 TO +70°C (-4 TO +158°F)
- HUMIDITY: 5 TO 95% (NON-CONDENSING)
- SALT SPRAY TESTING - ASTM B117
- CORROSIN RESISTANT FROM GASSING OF BATTERIES

REVERSE POLARITY PROTECTION:
THE CHARGER SHALL SUSTAIN NO DAMAGE WHEN INCORRECTLY CONNECTED TO THE BATTERY IN REVERSE ORIENTATION.

MOUNTING:
4 NON-THREADED THROUGH HOLES FOR M6 FASTENERS TO PASS THOUGH

ENCLOSURE:
SHALL PROTECT THE CHARGER COMPONENTS FROM RAIN, SNOW, DUST AND DRIPPING WATER AND UNINTENTIONAL INPACTS. ALL INTERNAL COMPONENTS PROTECTED FROM WATER DROPLETS.

INDICATORS:
- POWER: INDICATES THE ACCEPTABILITY OF AC INPUT TO THE CHARGER
- COMMUNICATION: INDICATES THE STATE OF THE COMMUNICATION SYSTEM
- TEMPERATURE COMPENSATION: INDICATES THE STATE OF THE TEMPERATUARE COMPENSATION SUBSYSTEM WHEN INSTALLED
- VOLTAGE OUTPUT: INDICATES THE STATE OF THE BATTERY AND CERTAIN FAULT CONDITIONS.

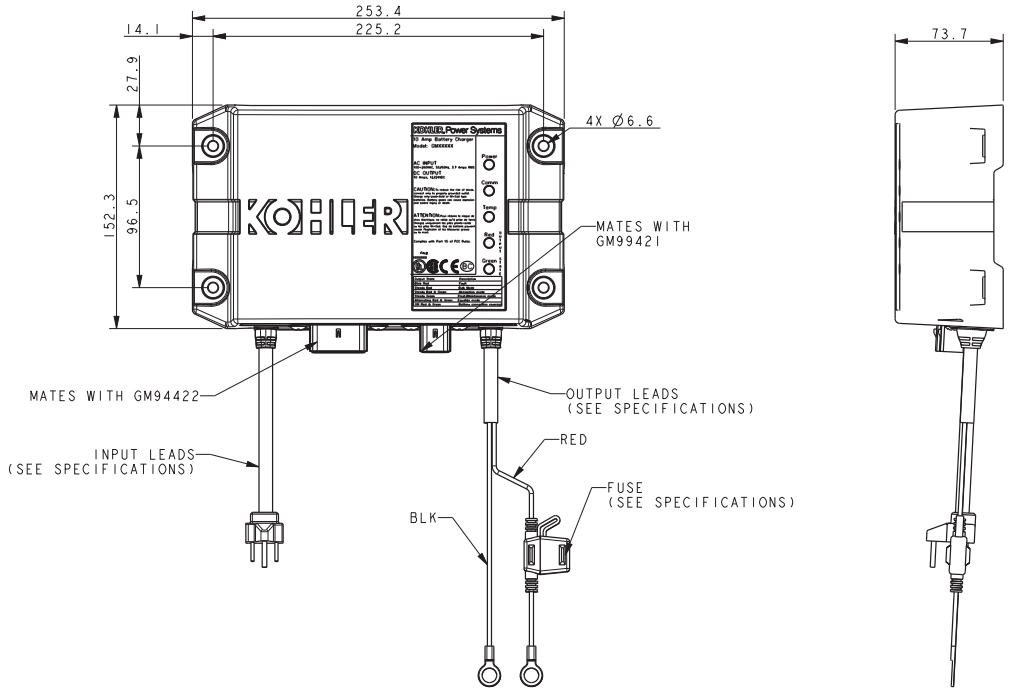
DOCUMENTATION:
THERE SHALL BE AN INSTALLATION / OPERATIONAL MANUAL SUPPLIED WITH EACH CHARGER. PER KOHLER SUPPLIED ARTWORK.

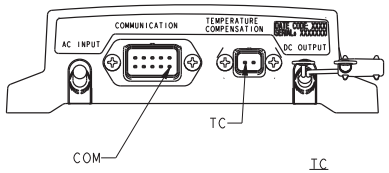
CERTIFICATIONS (US AND CANADA):
- UL1236
- CSA - C22.2 NO 107.2-01
- FCC- TITLE 47, PART 15 CLASS A
- CE
- EN 61000-6-2
- CEC AND DOE
- NFPA-110 LEVEL1 (WHEN SUPPORTED WITH APPLICABLE KOHLER CONTROLLER)
- IBC

PRODUCT LABELING:
THE LABEL ATTACHED TO THE CHARGER SHALL HAVE THE FOLLOWING INFORMATION:
- UL LISTING
- KOHLER PART NUMBER
- DESCRIPTION OF ALL INDICATOR
- OUTPUT CURRENT AND VOLTAGE
- INPUT VOLTAGE AND FREQUENCY

PACKAGING LABEL:
THE PACKAGING LABEL SHALL CONTAIN THE FOLLOWING INFORMATION:
- KOHLER P/N
- DESCRIPTION - BATTERY CHARGER
- MFG. MODEL NO.
- MFG. PART NUMBER
- DATE CODE

WARRANTY:
2 YEAR FROM DATE OF PURCHASE FROM MANUFACTURE.





COM
PIN 1 N/C
2 ID SEL 1
3 ID SEL 2
4 N/C
5 CAN-H
6 N/C
7 ID SEL 1 RTN
8 ID SEL 2 RTN
9 CAN-GND
10 CAN-L

TC
PIN 1 TC SENSOR W1
2 TC SENSOR W2

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	9-22-14	NEW DRAWING [CT91634]	SAM
A	5-9-17	(C-4,2) MATING NOTE ADDED (A-2, 4) PIN CONNECTIONS ADDED [CT174256]	SAM

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 125 MAX.
THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	SAM	9-22-14
CHECKED	SAM	9-22-14
APPROVED	AGT	9-22-14

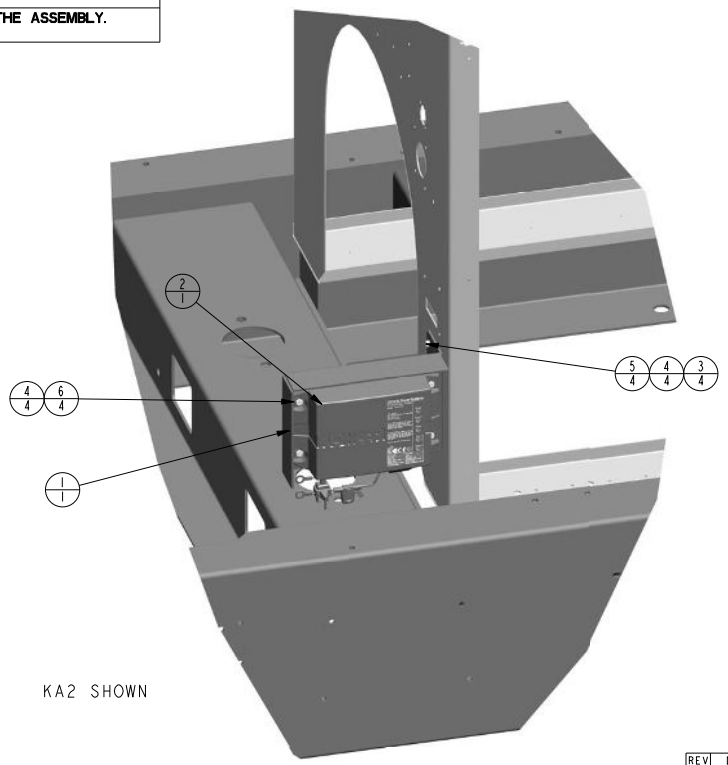
KOHLER CO. METRIC PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

TITLE
CHARGER, BATTERY 10 AMP

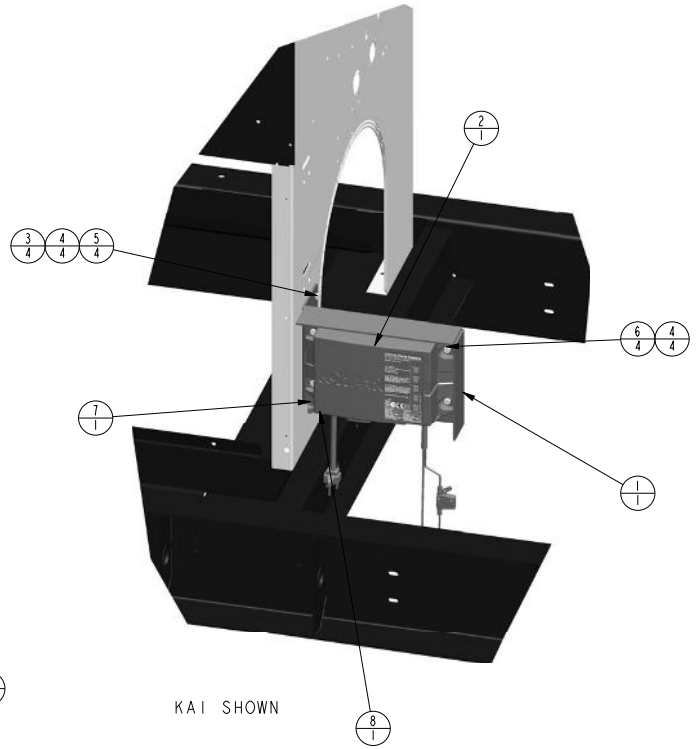
SCALE 0.50 CAD NO. SHEET 1 of 1
DWG NO. GM87448 D

GROUP NO.	ITEM	PART NO	QTY	DESCRIPTION
GM103365-KA1				BATTERY CHARGER, 12V 10A
	1	GM103339	1	BRACKET, BATTERY CHARGER
	2	GM87448	1	CHARGER, BATTERY
	3	M125A-06-80	4	WASHER, PLAIN 6.4 ID X 12.0 OD
	4	M6923-06-80	8	NUT, HEX 6MM
	5	M933-06016-60	4	SCREW, HEX CAP
	6	M933-06025-60	4	SCREW, HEX CAP
	7	361567	1	BASE, TIE WRAP SNAPIN
	8	X-468-1	1	CABLE TIE
GM103365-KA2				BATTERY CHARGE, 12V 10A
	1	GM103340	1	BRACKET, BATTERY CHARGER
	2	GM87448	1	CHARGER, BATTERY
	3	M125A-06-80	4	WASHER, PLAIN 6.4 ID X 12.0 OD
	4	M6923-06-80	8	NUT, HEX 6MM
	5	M933-06016-60	4	SCREW, HEX CAP
	6	M933-06025-60	4	SCREW, HEX CAP

THIS IS AN AUTOMATED TABLE. ALL UPDATES MUST BE MADE IN THE ASSEMBLY. ITEM 7 IS FIXED



KA2 SHOWN



KA1 SHOWN

NOTE: FOR PROPER ASSEMBLY METHOD OF HARDWARE, USE G-585 AS A GUIDELINE.

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	5-1-17	NEW DRAWING [CT173023]	SAM

DO NOT SCALE, REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS IN MILLIMETERS
GENERAL TOLERANCES:
X.XX ± 0.25
X.X ± 1.0
X ± 1.3
ANGLES ± 0°30'
SURFACE FINISH 63 MAX.

THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	SAM	5-1-17
CHECKED	KJB	5-1-17
APPROVED	KJB	5-1-17

KOHLER.
KOHLER, WISCONSIN 53044

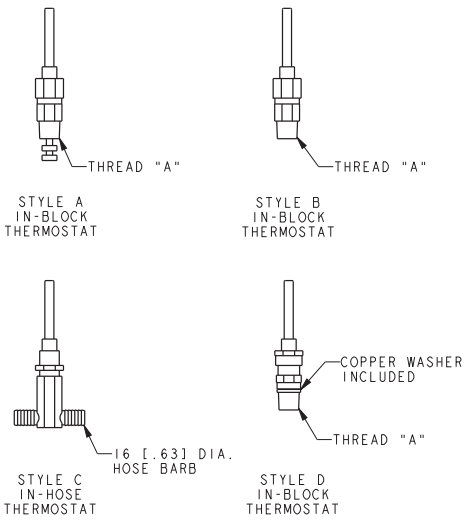
TITLE
DWG, ASSY BATTERY CHARGER 10A

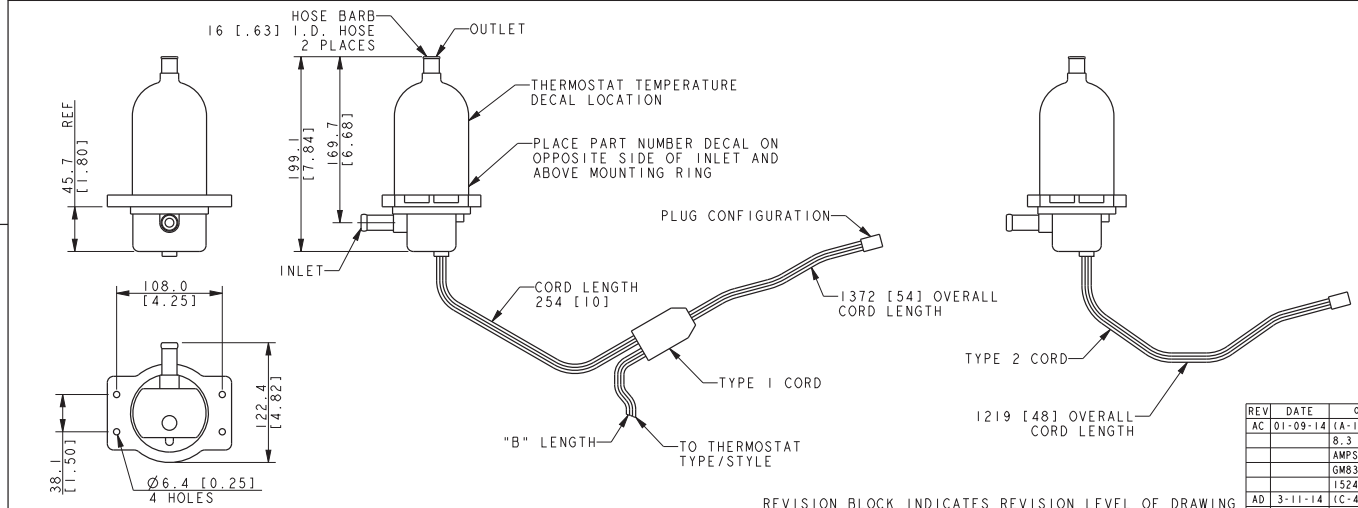
SCALE 0.25 | CAD NO. | SHEET 1 of 1

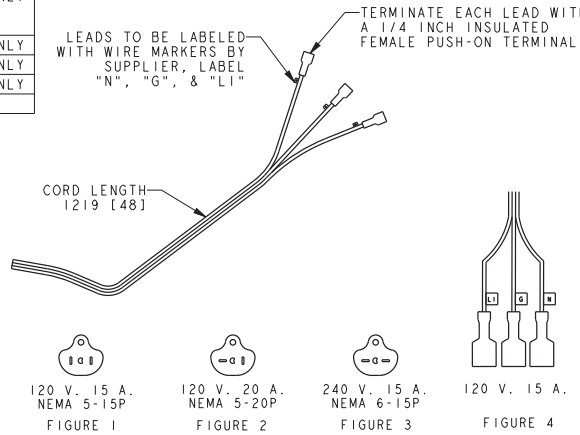
DWG NO. **GM103365** | **D**

PART NO.	REV		VOLTS	WATTS	AMPS	THERMOSTAT TYPE/STYLE	REMOTE SENSOR TEMP. RANGE	TANK SENSOR TEMP RANGE	THREAD SIZE "A"	PLUG CONFIG.	LENGTH "B"	CORD TYPE	REMARKS
324930	W		120	1800	15.0	IN BLOCK/B	38°/49°C[100°/120°F]	49°/60°C[120°/140°F]	1/2 NPT	FIG-2	1575 [62.0]	1	-
324931	W		240	2000	8.3	IN BLOCK/B	38°/49°C[100°/120°F]	49°/60°C[120°/140°F]	1/2 NPT	FIG-3	1575 [62.0]	1	-
326220	W		120	1000	8.3	IN BLOCK/A	38°/49°C[100°/120°F]	49°/60°C[120°/140°F]	5/8-18 UNF 2A	FIG-1	1372 [54.0]	1	-
326221	W		240	1000	4.2	IN BLOCK/A	38°/49°C[100°/120°F]	49°/60°C[120°/140°F]	5/8-18 UNF 2A	FIG-3	1372 [54.0]	1	-
326222	W		120	1000	8.3	IN HOSE/C	27°/38°C[80°/100°F]	38°/49°C[100°/120°F]	-	FIG-1	1372 [54.0]	1	-
326224	Z		240	1000	4.2	IN HOSE/C	27°/38°C[80°/100°F]	38°/49°C[100°/120°F]	-	FIG-3	1372 [54.0]	1	-
326228	W		120	1500	12.5	IN BLOCK/A	38°/49°C[100°/120°F]	49°/60°C[120°/140°F]	1/2 NPT	FIG-1	1372 [54.0]	1	-
326229	W		240	1500	6.3	IN BLOCK/A	38°/49°C[100°/120°F]	49°/60°C[120°/140°F]	1/2 NPT	FIG-3	1372 [54.0]	1	-
326234	W		120	1800	15.0	IN BLOCK/A	38°/49°C[100°/120°F]	49°/60°C[120°/140°F]	1/2 NPT	FIG-2	1575 [62.0]	1	-
326235	W		240	2000	8.3	IN BLOCK/A	38°/49°C[100°/120°F]	49°/60°C[120°/140°F]	1/2 NPT	FIG-3	1575 [62.0]	1	-
326247	W		120	1500	12.5	IN BLOCK/A	38°/49°C[100°/120°F]	49°/60°C[120°/140°F]	5/8-18 UNF 2A	FIG-1	1372 [54.0]	1	-
326248	W		240	1500	6.3	IN BLOCK/A	38°/49°C[100°/120°F]	49°/60°C[120°/140°F]	5/8-18 UNF 2A	FIG-3	1372 [54.0]	1	-
336703	W		120	1500	12.5	IN HOSE/C	16°/27°C[60°/80°F]	38°/49°C[100°/120°F]	-	FIG-1	1372 [54.0]	1	-
352945	Y		120	1500	12.5	-	-	27°/38°C[80°/100°F]	-	FIG-1	1524 [60.0]	2	IN-BASE SENSING UNIT ONLY
352946	W		240	1500	6.3	-	-	27°/38°C[80°/100°F]	-	FIG-3	1219 [48.0]	2	IN-BASE SENSING UNIT ONLY
358311	Y		120	1000	8.3	-	-	27°/38°C[80°/100°F]	-	FIG-1	-	2	IN-BASE SENSING UNIT ONLY
358327	W		240	1000	4.2	-	-	27°/38°C[80°/100°F]	-	FIG-3	-	2	IN-BASE SENSING UNIT ONLY
GM23005	W		120	1800	15.0	IN BLOCK/D	27°/38°C[80°/100°F]	49°/60°C[120°/140°F]	28-1.25 6g METRIC	FIG-2	762 [30.0]	1	-
GM23006	W		240	2000	8.3	IN BLOCK/D	27°/38°C[80°/100°F]	49°/60°C[120°/140°F]	28-1.25 6g METRIC	FIG-3	762 [30.0]	1	-
GM24947	W		240	2000	8.3	IN BLOCK/A	38°/49°C[100°/120°F]	49°/60°C[120°/140°F]	M14-1.5 METRIC	FIG-3	1575 [62.0]	1	-
GM24948	W		120	1800	15.0	IN BLOCK/A	38°/49°C[100°/120°F]	49°/60°C[120°/140°F]	M14-1.5 METRIC	FIG-2	1575 [62.0]	1	-
GM28585	W		120	1000	8.3	-	-	27°/38°C[80°/100°F]	-	FIG-1	-	2	CORD THERMOSTAT [40°/60°F]
GM31942	Y		120	1000	8.3	IN BLOCK/A	27°/38°C[80°/100°F]	49°/60°C[120°/140°F]	1/2 NPT	FIG-1	1372 [54.0]	1	-
GM31943	Y		240	1000	4.2	IN BLOCK/A	27°/38°C[80°/100°F]	49°/60°C[120°/140°F]	1/2 NPT	FIG-3	1372 [54.0]	1	-
GM62682	Y		120	1000	8.3	-	-	27°/38°C[80°/100°F]	-	FIG-4	-	3	-
GM75552	AA		120	1800	15.0	-	-	27°/38°C[80°/100°F]	-	FIG-2	-	2	IN-BASE SENSING UNIT ONLY
GM75553	AA		240	2000	8.3	-	-	27°/38°C[80°/100°F]	-	FIG-3	-	2	IN-BASE SENSING UNIT ONLY
GM83980	AD		120	1000	8.3	-	-	16°/27°C[60°/80°F]	-	FIG-1	1524 [60.0]	2	IN-BASE SENSING UNIT ONLY INCLUDES THERMOSTAT TEMPERATURE DECAL
GM83981	AB		120	1500	12.5	-	-	16°/27°C[60°/80°F]	-	FIG-1	1219 [48.0]	2	IN-BASE SENSING UNIT ONLY INCLUDES THERMOSTAT TEMPERATURE DECAL
GM95436	-		120	500	4.2	-	-	27°/38°C[80°/100°F]	-	FIG-1	-	2	IN-BASE SENSING UNIT ONLY
GM95437	-		240	500	2.1	-	-	27°/38°C[80°/100°F]	-	FIG-3	-	2	IN-BASE SENSING UNIT ONLY
GM103846	-		120	1800	15.0	-	-	16°/27°C[60°/80°F]	-	FIG-2	-	2	IN-BASE SENSING UNIT ONLY

THIS IS AN MANUAL TABLE.







PLUG CONFIGURATION

VALUES IN [ ] ARE ENGLISH EQUIVALENTS.

☐ INDICATES PART NUMBERS AFFECTED BY LATEST REVISION

REVISION BLOCK INDICATES REVISION LEVEL OF DRAWING NOT PART REVISION. SEE PART REVISION LEVEL BEHIND PART NUMBER FOR CURRENT PART REVISION LEVEL.

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
AC	01-09-14	(A-1) 326220-CMP WAS 326220; (C-8) 358311 AMPS	
		8.3 WAS 4.2; GM31942 AMPS 8.3 WAS 12.5; GM31943	
		AMPS 4.2 WAS 6.3; GM62682 AMPS 8.3 WAS 4.2;	
		GM83980 AMPS 8.3 WAS 4.2; (D-4) 352945 "LENGTH	
		1524 WAS 1219" [CT68393]	PAS
AD	3-11-14	(C-4) GM83980 "LENGTH" 1524 WAS 1219 [CT74793]	JMR
AE	11-12-14	(B-8) GM95436 AND GM95437 ADDED [CT99196]	DRA
AF	8-10-17	(B-8) GM103846 ADDED [CT177684]	SAM
AG	4-10-19	(B-4) "CORD TYPE 2" ADDED FOR GM95436 & GM95437 [CT194828]	PAS

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 125 MAX. THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	SAM	9-22-11
CHECKED	CF	9-22-11
APPROVED	CF	9-22-11

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

TITLE: DWG, HEATER, BLOCK

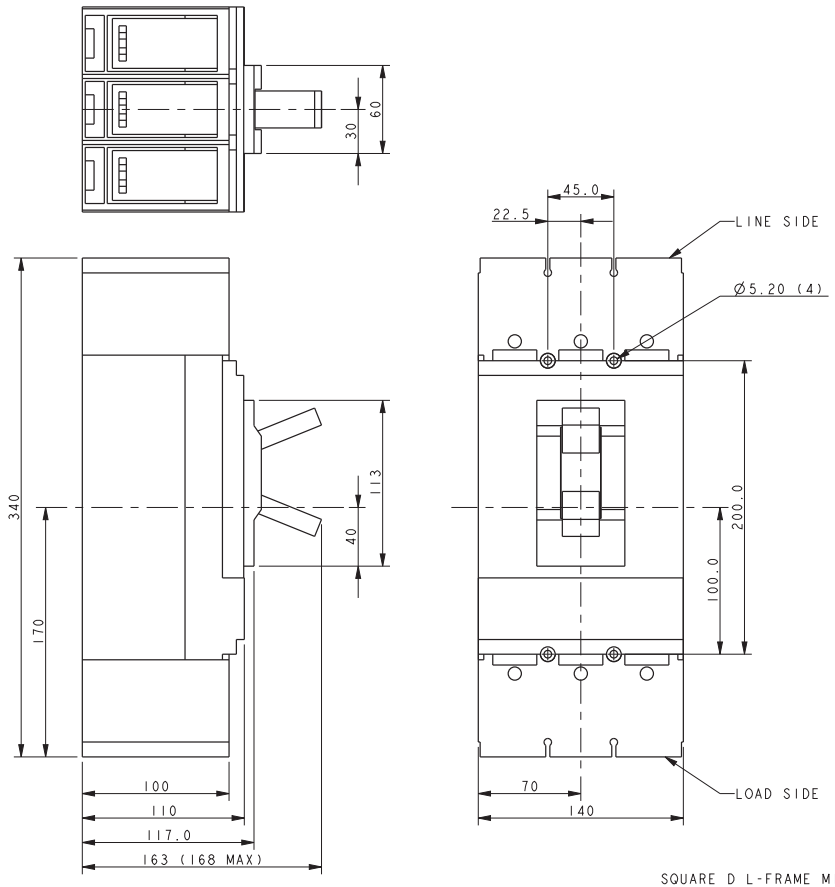
SCALE 0.40 | CAD NO. | SHEET 1 of 1

DWG NO. 326220-CMP | D

PART NO.	PART REV		DESCRIPTION	AMPS	INTERRUPT kA @480 VAC	CONNECTION TYPE		POLES	VOLTS	RATING	TRIP TYPE	SQUARE D PART NO.
						LINE	LOAD					
GM85432-1	-		BREAKER, CIRCUIT 400A LGP	400	35	BUS	AL600LS52K3 LUGS	3	600	80%	MICROLOGIC 3.3 LI	LGP36400U31X
GM85432-2	-		BREAKER, CIRCUIT 400A LGP							80%	MICROLOGIC 3.3S LSI	LGP36400U33X
GM85432-3	-		BREAKER, CIRCUIT 400A LGP							80%	MICROLOGIC 6.3A LSIG	LGP36400U44X
GM85432-4	-		BREAKER, CIRCUIT 400A LGP							100%	MICROLOGIC 3.3 LI	LGP36400CU31X
GM85432-5	-		BREAKER, CIRCUIT 400A LGP							100%	MICROLOGIC 3.3S LSI	LGP36400CU33X
GM85432-6	-		BREAKER, CIRCUIT 400A LGP							100%	MICROLOGIC 6.3A LSIG	LGP36400CU44X
GM85432-7	-		BREAKER, CIRCUIT 600A LGP	600	35	BUS	AL600LS52K3 LUGS	3	600	80%	MICROLOGIC 3.3 LI	LGP36600U31X
GM85432-8	-		BREAKER, CIRCUIT 600A LGP							80%	MICROLOGIC 3.3S LSI	LGP36600U33X
GM85432-9	-		BREAKER, CIRCUIT 600A LGP							80%	MICROLOGIC 6.3A LSIG	LGP36600U44X

CONNECTION CHART		
CONNECTION TYPE	CONNECTIONS (PER PHASE)	TORQUE
BUS	(1) M10	50 Nm [442 IN-LB]
AL600LS52K3 LUGS	(2) 2/0-500 KCMIL AL/CU	50 Nm [442 IN-LB]

NOTE:
(4) M5 X 85 MOUNTING SCREWS, WASHERS AND NUTS INCLUDED.
(3) M10 X 25 BUS CONNECTION SCREWS AND SPRING WASHERS INCLUDED.



SQUARE D L-FRAME MICROLOGIC BREAKERS

▲ DENOTES A CRITICAL CHARACTERISTIC THAT MUST BE ADDRESSED IN THE PRODUCTION CONTROL PLAN.
TOTAL QUANTITY OF CRITICAL CHARACTERISTICS ON THIS DRAWING = 0

◇ DENOTES A MAJOR CHARACTERISTIC THAT MUST BE ADDRESSED IN THE PRODUCTION CONTROL PLAN.
TOTAL QUANTITY OF MAJOR CHARACTERISTICS ON THIS DRAWING = 0

KOHLER PART NUMBER TO BE CLEARLY VISIBLE ON CIRCUIT BREAKER AND ON INDIVIDUAL PACKAGING.

☐ INDICATES PART NUMBERS AFFECTED BY LATEST DRAWING REVISION

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	4-3-12	NEW DRAWING [CT145I6]	WSD

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 32 MAX.
THIRD ANGLE PROJECTION

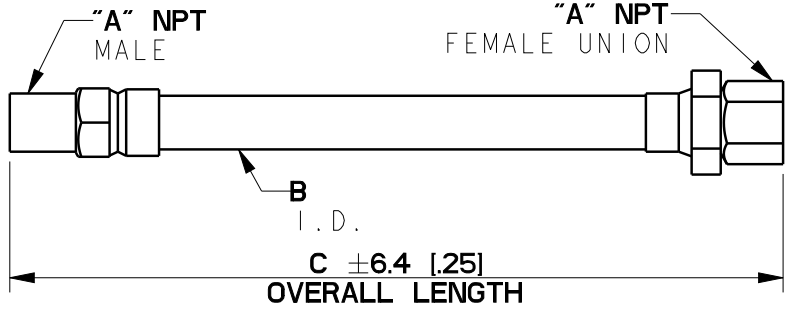
APPROVALS		DATE
DRAWN	WSD	4-3-12
CHECKED	WSD	4-3-12
APPROVED	AJH	4-3-12

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

TITLE
DWG, CIRCUIT BREAKER

SCALE 0.60 | CAD NO. | SHEET 1 of 1
DWG NO. GM85432-CMP | D

PART NO.	REV		A	B	C		SERVICE ONLY
					MM	IN	
X-504-1	AT	□	1/2	1/2	304.8	12	
X-504-2	AS		3/4	3/4	304.8	12	X
~~X-504-12~~	~~AS~~		~~3/8~~	~~3/8~~	~~385.8~~	~~15 3/16~~	
X-504-16 *	AT	□	2	2	457.2	18	
X-504-17	AS		1	1	508.0	20	X
X-504-18	AS		3/4	3/4	730.3	28 3/4	X
X-504-20 *	AT	□	1	1	736.6	29	
X-504-21 *	AV	□	1	1	457.2	18	
X-504-22 *	AV	□	1 1/2	1 1/2	717.6	28 1/4	
~~X-504-23~~	~~AS~~		~~1~~	~~1~~	~~342.9~~	~~13 1/2~~	
X-504-25 *	AU	□	1/4	3/8	1066.8	42	
X-504-26 *	AU	□	3	3	838.2	33	
X-504-27 *	A	□	2	2	825	32 1/2	
THIS IS A MANUAL TABLE							



MATERIAL:
ANNULAR CORRUGATED BRONZE/STAINLESS STEEL HOSE WITH BRONZE/
STAINLESS STEEL TUBULAR WIRE BRAID OR EQUIV.

FITTINGS-
FEMALE UNION - STEEL OR BRASS (NO GALVANIZED FITTING)
ALL FLUX USED IN BRAZING MUST BE REMOVED.
INSTALL HAND TIGHT.
* PRODUCT SHALL MEET UL 536 AND ULC ORD-C536 FOR CANADA
-USE-
NATURAL GAS, LP FUEL, GASOLINE, DIESEL FUEL, WATER & OIL.

NOTE:
PAINT MALE ENDS OF FUEL LINE
1200° F, HIGH TEMPERATURE BLACK.

THIS ASSEMBLY OR PART MUST COMPLY WITH PEP-RML-001

□ INDICATES PART NUMBERS AFFECTED BY LATEST DRAWING REVISION

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
AW	1-9-19	(A-2,3) NOTE: CSA B149 WAS CSA 8.1 [CT192179]	PAS
AY	3-11-19	(C-3) X-504-2, 12, 17, 18 & 23 VOIDED;	
		'SERVICE ONLY' COLUMN ADDED; X-504-1, 16,	
		20, 25, 26, 27 CSA ASTERISK ADDED [CT194154]	ARP
BA	10-9-19	(B-1,2) NOTE "PRODUCT SHALL MEET UL 536...CANADA" WAS	
		"MUST MEET CSA B149"; (C-1,2) MATERIAL NOTE UPDATED;	
		(D-4) X-504-1: "*" SYMBOL REMOVED; (B-4)	
		"PEP-RML-001" NOTE ADDED; (D-1,2) VIEW & NOTES	
		UPDATED [CT199012]	YBY

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

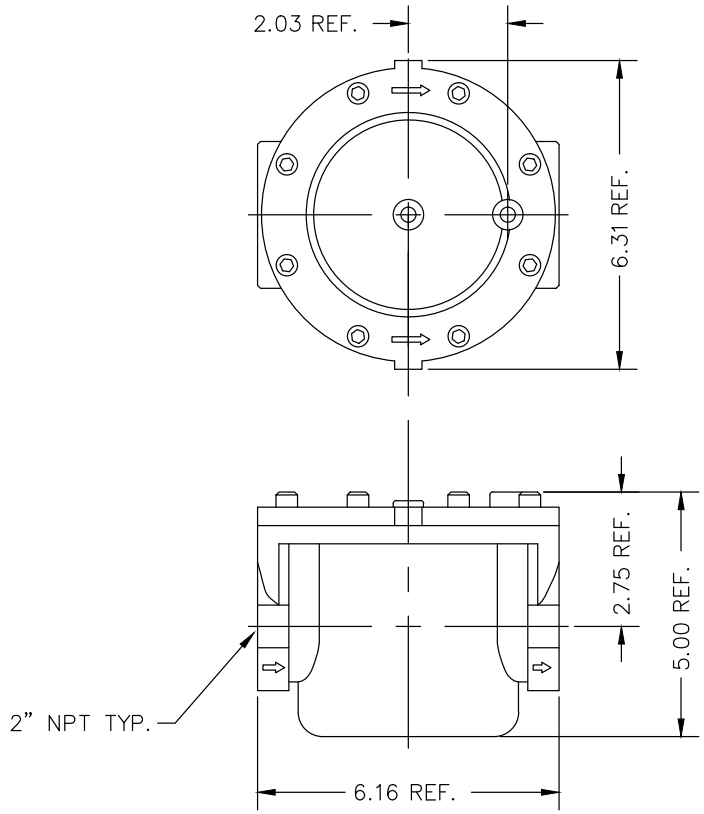
APPROVALS		DATE
DRAWN	DKO	11-19-62
CHECKED	EB	9-21-68
APPROVED	SAS	2-22-84

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

TITLE
DWG, LINE, FLEX FUEL

SCALE 1.00 | CAD NO. | SHEET 1 of 1
DWG NO. X-504 | B

REV	DATE	REVISION	BY	M F
–	10–25–96	NEW DRAWING [48003]	KDW	



NOTES:
USE REPLACEMENT ELEMENT #343304.
MATERIAL: CAST ALUMINUM HOUSING.
FILTER MATTING: POLYPROPYLENE IMPREGNATED FLEECE.
MAX. OPERATING INLET PRESSURE 15 PSI (1 BAR).
AMBIENT TEMP. LIMIT 175° F.

135–275 KW S50G & S60G

UNLESS OTHERWISE SPECIFIED –
1) DIMENSIONS ARE IN INCHES
2) TOLERANCES ARE:
.XXX± .010 ANGLES± 1/2°
.XX ± .030 SURFACE FINISH
.X ± .060 √ MAX.
FRACTIONS ±

APPROVALS	DATE
DRAWN KDW	10–28–96
CHECKED	
APPROVED	

KOHLER CO.
GENERATOR DIVISION, KOHLER, WI 53044 U.S.A.

TITLE: FILTER, GAS

SCALE	CAD NO.	SHEET
1/2	343302.DWG	1–1
PLOTTED	DWG. NO. 343302	B

KOHLER®

Warranty

Stationary Standby and Prime Power Industrial Generator Set One-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	One (1) year from registered startup or two thousand (2000) hours (whichever occurs first). In any event, the warranty period will expire not later than thirty (30) months from the date of shipment from Kohler Co.'s factory.
Stationary Prime Power Generator Set & Accessories	One (1) year from registered startup or two thousand (2000) hours (whichever occurs first). In any event, the warranty period will expire not later than thirty (30) months from the date of shipment from Kohler Co.'s factory.

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. Additional expenses for repairs performed after normal business hours, i.e. overtime or holiday labor rates.
8. Rental of equipment during the performance of warranty repairs.
9. Removal and replacement of non-Kohler-supplied options and equipment.
10. Non-Kohler replacement parts. Replacement of a failed Kohler part with a non-Kohler part voids the warranty on that part.
11. Radiators replaced rather than repaired.
12. Fuel injection pumps not repaired by an authorized Kohler service representative.
13. Non-Kohler-authorized repair shop labor without prior approval from Kohler Co. Warranty Department.
14. Engine fluids such as fuel, oil, or coolant/antifreeze.
15. Shop supplies such as adhesives, cleaning solvents, and rags.
16. Expenses incurred investigating performance complaints unless the problem is caused by defective Kohler materials or workmanship.
17. Maintenance items such as fuses, lamps, filters, spark plugs, loose or leaking clamps, and adjustments.
18. 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-5374 12/15f

Stationary Standby Industrial Generator Set Extended Five-Year or Three Thousand (3000)-Hour Comprehensive 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	Five (5) years from registered startup or three thousand (3000) 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 comprehensive 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 comprehensive 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.
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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.

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KOHLERPower.com

TP-5561 8/16f

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Certification

Certificate of Registration

QUALITY MANAGEMENT SYSTEM - ISO 9001:2015

This is to certify that:

Kohler Power Systems
N7650 Lakeshore Road
Sheboygan
Wisconsin
53083
USA

Holds Certificate No: **FM 727336**

and operates a Quality Management System which complies with the requirements of ISO 9001:2015 for the following scope:

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

For and on behalf of BSI:

Carlos Pitanga, Chief Operating Officer Assurance – Americas

Original Registration Date: 1995-02-28
Effective Date: 2021-11-07
Latest Revision Date: 2021-10-29
Expiry Date: 2024-11-06

...making excellence a habit.™

Certificate No: **FM 727336**

Location	Registered Activities
Kohler Power Systems - GK 900 Highland Drive Bldg 604 Kohler Wisconsin 53004 USA	Manufacture of leads and harness, automatic transfer switches and switchgear. Distribution of generator sets.
Kohler Power Systems N7650 Lakeshore Road Sheboygan Wisconsin 53083 USA	Design, manufacture, and distributor support for electrical generators, automatic transfer switches and switchgear.
Kohler Power Systems 300 N Dekora Woods Blvd Saukville Wisconsin 53080 USA	Manufacture of fuel tanks, skids, fabricated components and generators.
Kohler Power Systems Muth Warehouse 2821 Muth Court Sheboygan Wisconsin 53083 USA	The distribution of generator sets.
Kohler Power Systems KWIP Warehouse 4327 County EE Sheboygan Wisconsin 53081 USA	Receiving, sequencing and warehousing of generator components.

Original Registration Date: 1995-02-28

Latest Revision Date: 2021-10-29

Effective Date: 2021-11-07

Expiry Date: 2024-11-06

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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G18-56 12/05b

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PreStartup Checklist

Generator Set/Transfer Switch Installation Checklist

This document has generic content and some items may not apply to some applications. Check only the items that apply to the specific application. Read and understand all of the safety precautions found in the Operation and Installation Manuals. Make the following installation checks before performing the Startup Checklist.

Note: Use this form as a general guide, along with any applicable codes or standards. Comply with all applicable codes and standards. Improper installation voids the warranty.

Equipment Room or Weather Housing

Yes	Does Not Apply		
❑	❑	1.	Is the equipment installed in a fire-resistant room (made of non-combustible material) or in an outdoor weather housing?
❑	❑	2.	Is there adequate clearance between the engine and floor for service maintenance?
❑	❑	3.	Is there emergency lighting available at the equipment room or weather housing?
❑	❑	4.	Is there adequate heating for the equipment room or outdoor weather housing?
❑	❑	5.	Is the equipment room clean with all materials not related to the emergency power supply system removed?
❑	❑	6.	Is the equipment room protected with a fire protection system?

Engine and Mounting

❑	❑	7.	Is the mounting surface(s) properly constructed and leveled?
❑	❑	8.	Is the mounting surface made from non-combustible material?
❑	❑	9.	Was the generator-to-engine alignment performed after attaching the skid to the mounting base? Generator sets with two-bearing generators require alignment.

Lubrication

❑	❑	10.	Is the engine crankcase filled with the specified oil?

Cooling and Ventilation

❑	❑	11.	Is the cooling system filled with the manufacturer's specified coolant/antifreeze and purged of air?
❑	❑	12.	Is there adequate inlet and outlet air flow (electric louvers adjusted and ventilation fan motor(s) connected to the corresponding voltage)?
❑	❑	13.	Is the radiator duct properly sized and connected to the air vent or louver?
❑	❑	14.	Are flexible sections installed in the cooling water lines?

Fuel

❑	❑	15.	Is there an adequate/dedicated fuel supply?
❑	❑	16.	Are the fuel filters installed?
❑	❑	17.	Are the fuel tanks and piping installed in accordance with applicable codes and standards?
❑	❑	18.	Is there adequate fuel transfer tank pump lift capacity and is the pump motor connected to the corresponding voltage?
❑	❑	19.	Is the fuel transfer tank pump connected to the emergency power source?
❑	❑	20.	Are flexible fuel lines installed between the engine fuel inlet and fuel piping?
❑	❑	21.	Is the specified gas pressure available at the fuel regulator inlet?
❑	❑	22.	Does the gas solenoid valve function?
❑	❑	23.	Are the manually operated fuel and cooling water valves installed allowing manual operation or bypass of the solenoid valves?

Exhaust

❑	❑	24.	Is the exhaust line sized per guidelines and does it have flexible connector(s)? Is the flexible connector(s) straight?
❑	❑	25.	Is there an exhaust line condensate trap with a drain installed?
❑	❑	26.	Is the specified silencer installed and are the hanger and mounting hardware tightened?
❑	❑	27.	Is a heat-isolating thimble(s) installed at points where exhaust lines pass through combustible wall(s) or partition(s)?
❑	❑	28.	Is the exhaust line free of excessive bends and restrictions? Is the backpressure within specifications?
❑	❑	29.	Is the exhaust line installed with a downward pitch toward the outside of the building?
❑	❑	30.	Is the exhaust line protected from entry by rain, snow, and animals?
❑	❑	31.	Does the exhaust system outlet location prevent entry of exhaust gases into buildings or structures?
❑	❑	32.	Are individuals protected from exposure to high temperature exhaust parts and are hot parts safety decals present?

AC Electrical System

❑	❑	33.	Does the nameplate voltage/frequency of the generator set and transfer switch match normal/utility source ratings?
❑	❑	34.	Do the generator set load conductors have adequate ampacity and are they correctly connected to the circuit breakers and/or the emergency side of the transfer switch?
❑	❑	35.	Are the load conductors, engine starting cables, battery charger cables, and remote annunciator leads installed in separate conduits?
❑	❑	36.	Is the battery charger AC circuit connected to the corresponding voltage?

Transfer Switch, Remote Control System, Accessories

❑	❑	37.	Is the transfer switch mechanism free of binding? **Note:** Disconnect all AC sources and operate the transfer switch manually.
❑	❑	38.	Are the transfer switch AC conductors correctly connected? Verify lead designations using the appropriate wiring diagrams.
❑	❑	39.	Is all other wiring connected, as required?

Batteries and DC Electrical System

❑	❑	40.	Does the battery(ies) have the specified CCA rating and voltage?
❑	❑	41.	Is the battery(ies) filled with electrolyte and connected to the battery charger?
❑	❑	42.	Are the engine starting cables connected to the battery(ies)?
❑	❑	43.	Do the engine starting cables have adequate length and gauge?
❑	❑	44.	Is the battery(ies) installed with adequate air ventilation?
❑	❑	45.	Are the ends of all spark plug wires properly seated onto the coil/distributor and the spark plug?

Special Requirements

❑	❑	46.	Is the earthquake protection adequate for the equipment and support systems?
❑	❑	47.	Is the equipment protected from lightning damage?

Generator Set/Transfer Switch Startup Checklist

This document has generic content and some items may not apply to some applications. Check only the items that apply to the specific application. Read and understand all of the safety precautions found in the Operation and Installation Manuals. Complete the Installation Checklist before performing the initial startup checks. Refer to Service Bulletin 616 for Warranty Startup Procedure Requirements regarding generator set models with ECM-controlled engines.

Yes	Does Not Apply		
❑	❑	1.	Verify that the engine is filled with oil and the cooling system is filled with coolant/antifreeze.
❑	❑	2.	Prime the fuel system.
❑	❑	3.	Open all water and fuel valves. Temporarily remove the radiator cap to eliminate air in the cooling system. Replace radiator cap in step 21.
❑	❑	4.	Place the generator set master switch in the OFF/RESET position. Observe Not-in-Auto lamp and alarm, if equipped, on the controller.
❑	❑	5.	Press the lamp test, if equipped on controller. Do all the alarm lamps on the panel illuminate?
❑	❑	6.	Open the main line circuit breakers, open the safeguard breaker, and/or remove fuses connected to the generator set output leads.
❑	❑	7.	Turn down the speed control (electronic governor) or speed screw (mechanical governor).*
❑	❑	8.	Verify the presence of lube oil in the turbocharger, if equipped. See the engine and/or generator set operation manual.
❑	❑	9.	Place the generator set master switch in the RUN position. Allow the engine to start and run for several seconds.
❑	❑	10.	Verify that the day tank, if equipped, is energized.
❑	❑	11.	Place the generator set master switch in the OFF/RESET position. Check for oil, coolant, and exhaust leaks.
❑	❑	12.	Turn on the water/oil heaters and fuel lift pumps.
❑	❑	13.	Check the battery charger ammeter for battery charging indication.
❑	❑	14.	Place the generator set master switch in the RUN position. Verify whether there is sufficient oil pressure. Check for oil, coolant, and exhaust leaks.
❑	❑	15.	Close the safeguard circuit breaker. Adjust the engine speed to 50/60 Hz if equipped with an electronic governor or to 52.8/63 Hz if equipped with a mechanical governor.*
❑	❑	16.	If the speed is unstable, adjust according to the appropriate engine and/or governor manual.*
❑	❑	17.	Adjust the AC output voltage to match the load voltage using the voltage adjusting control. See the generator set/controller operation manual.
❑	❑	18.	Allow the engine to reach normal operating coolant temperature.
❑	❑	19.	Check the operating temperature on city water-cooled models and adjust the thermostatic valve as necessary.
❑	❑	20.	Manually overspeed the engine to cause an engine shutdown (68-70 Hz on 60 Hz models and 58-60 Hz on 50 Hz models). Place the generator set master switch in the OFF/RESET position.*
❑	❑	21.	Check the coolant level, add coolant as necessary, and replace the radiator cap. Verify that all hose clamps are tight and secure.
❑	❑	22.	Place the generator set master switch in the RUN position.
❑	❑	23.	Verify the engine low oil pressure and high coolant temperature shutdowns.*
❑	❑	24.	Check the overcrank shutdown.*
❑	❑	25.	Place the generator set master switch in the OFF/RESET position.
❑	❑	26.	Open the normal source circuit breaker or remove fuses to the transfer switch.
❑	❑	27.	Disconnect the power switching device and logic controller wire harness at the inline disconnect plug at the transfer switch.
❑	❑	28.	Manually transfer the load to the emergency source.
❑	❑	29.	Close the normal source circuit breaker or replace fuses to the transfer switch.
❑	❑	30.	Check the normal source voltage, frequency, and phase sequence on three-phase models. The normal source must match the load.
❑	❑	31.	Open the normal source circuit breaker or remove fuses to the transfer switch.
❑	❑	32.	Manually transfer the load to the normal source.
❑	❑	33.	Close the generator set main line circuit breakers, close the safeguard breaker, and/or replace the fuses connected to the transfer switch.
❑	❑	34.	Place the generator set master switch in the RUN position.
❑	❑	35.	Check the generator set voltage, frequency, and phase sequence on three-phase models. The generator set must match normal source and load.
❑	❑	36.	Place the generator set master switch in the OFF/RESET position.
❑	❑	37.	Open the generator set main line circuit breakers, open the safeguard breaker, and/or remove the fuses connected to the transfer switch.
❑	❑	38.	Reconnect the power switching device and logic controller wire harness at the inline disconnect plug at the transfer switch.
❑	❑	39.	Close the normal source circuit breaker or replace fuses to the transfer switch. Place the generator set master switch to the AUTO position.
❑	❑	40.	Close the generator set main line circuit breakers, close the safeguard breaker, and/or replace the fuses connected to the transfer switch.
❑	❑	41.	Place the transfer switch in the TEST position (load test or open normal source circuit breaker). **NOTE:** Obtain permission from the building authority before proceeding. This procedure tests transfer switch operation and connects building load to generator set power.
❑	❑	42.	Readjust frequency to 50 or 60 Hz with total building loads.*
❑	❑	43.	Verify that the current phase is balanced for three phase systems.
❑	❑	44.	Release the transfer switch test switch or close the normal circuit breaker. The transfer switch should retransfer to the normal source after appropriate time delay(s).
❑	❑	45.	Allow the generator set to run and shut down automatically after the appropriate cool down time delay(s).
❑	❑	46.	Set the plant exerciser to the customer's required exercise period, if equipped.
❑	❑	47.	Verify that all options on the transfer switch are adjusted and functional for the customer's requirements.
❑	❑	48.	If possible, run the building loads on the generator set for several hours or perform the load bank test if required.
❑	❑	49.	Verify that all the wire connections from the generator set to the transfer switch and optional accessories are tight and secure.
❑	❑	50.	Verify that the customer has the appropriate engine/generator set and transfer switch literature. Instruct the customer in the operation and maintenance of the power system.
❑	❑	51.	Fill out the startup notification at this time and send the white copy to the Generator Warranty Dept. Include the warranty form if applicable.

* Some models with an Engine Electronic Control Module (ECM) may limit or prohibit adjusting the engine speed or testing shutdowns. Refer to appropriate documentation available from the manufacturer.