Submittal Package

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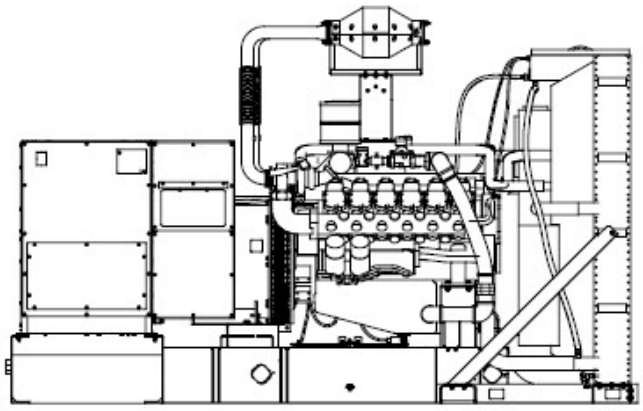
QTY	ITEM
1	**KOHLER Model 400REZXB, EPA Certified Natural Gas Generator Set** 400kW, @ 0.8 PF, 60 Hz, 3 Phase, UL 2200, 120/208 Volt – **APM402** / Controller meets NFPA 110 – **Enclosure:** Sound / Aluminum, **186** MPH Wind Load Rated, Critical Silencer – Basic Electrical Package with DC lights and Pre-Wired Accessories, Single Phase – Unit Mounted Radiator – Block Heater **208** Volt, **6000** Watt – Flexible Fuel Lines – Gaseous Fuel Filter – Line Circuit Breaker, 3 Pole, 100% Rated, **1200A** LSI with Shunt Trip and Aux Contacts – Generator Heater – Battery Rack and Cables – Starting Battery, Lead Acid – Battery Charger: **10** Amps – Remote Emergency Stop, Break Glass – Remote Annunciator Panel – Certified Factory Test @ 0.8 P.F. – 4 Engine, Generator Parts, Maintenance Manuals & 1 Electronic Manual – Vibration Isolators: Internal
1	**Automatic Transfer Switch: 208** Volt, **3** Ph, **3** Pole, **1200** Amp Model: KEP-DCTC-1200S-TQ, NEMA 3R – Service Entrance Rated with o ICCB Utility Disconnect, ERMS switch o ICSW Generator Disconnect – Additional I/O
1	**Warranty and Services:** – 5 Year Comprehensive Warranty – Initial Start Up and Check Out of System – On Site Testing (Load Bank)
1	**Supplied by Others:** – Off-loading @ Job Site – Installation of System – Supply of Fuel – Fuel & Electrical Piping – All Infrared, 3rd Party and NETA Testing by Others

KOHLER®

Spec Sheets

KOHLER®

400REZXB
Natural Gas



Standard Features

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The 60 Hz generator set offers a UL 2200 listing.
- The generator set accepts rated load in one step.
- The 60 Hz generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
- A one-year limited warranty covers all systems and components. Two- and five-year extended warranties are also available.
- EPA-certified for Stationary and Mobile Emergency and Non-Emergency Applications
- Alternator Protection
- Battery Rack and Cables
- Closed Crankcase Ventilation (CCV) Filters
- Integral Vibration Isolation
- Local Emergency Stop Switch

Alternator Features

- Low Coolant Level Shutdown
- Oil Drain Extension
- Operation and Installation Literature
- Three-Way Exhaust Catalyst
- The pilot-excited, permanent magnet (PM) alternator provides superior short-circuit capability.

Generator Set Ratings

Standby130C Ratings

Alternator	Voltage	Ph	Hz	kW/kVA	Amps
5M4024	120/208	3	60	400 / 500	1388

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.
Prime Power Ratings: At varying load, the number of generator set operating hours is unlimited. A 10% overload capacity is available for one hour in twelve.
Ratings are in accordance with ISO-8528-1 and ISO-3046-1. For limited running time and continuous ratings, consult the factory.
Obtain technical information bulletin (TIB-101) for ratings guidelines, complete ratings definitions, and site condition derates.
The generator set manufacturer reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever. For dual fuel engines, use the LP gas ratings for both the primary and secondary fuels.

Model: 400REZXB, continued

Alternator Specifications

Specifications	Alternator
Alternator manufacturer	Kohler
Type	4-Pole, Rotating-Field
Exciter type	Brushless, Permanent-Magnet Pilot Exciter
Leads, quantity	10/12, Reconnectable
Voltage regulator	Solid State, Volts/Hz
Insulation	NEMA MG1
Insulation: Material	Class H, Synthetic, Nonhydroscopic
Insulation: Temperature Rise	130°C, 150°C Standby
Bearing: quantity, type	1, Sealed
Coupling	Flexible disc
Amortisseur windings	Full
Rotor balancing (50Hz)	125%
Rotor balancing (60Hz)	125%
Voltage regulation, no-load to full-load RMS	Controller Dependent
One-Step Load Acceptance	100% of rating
Unbalanced load capability	100% of Rated Standby Current

- NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting.
- Sustained short-circuit current of up to 300% of the rated current for up to 10 seconds.
- Sustained short-circuit current enabling down stream circuit breakers to trip without collapsing the alternator field.
- Self-ventilated and dripproof construction.
- Superior voltage waveform from a two-thirds pitch stator and skewed rotor.
- Digital solid-state, volts-per-hertz voltage regulator with +/-0.25% no-load to full-load regulation.
- Brushless alternator with brushless pilot exciter for excellent load response.

Engine

Engine Specification

Engine Manufacturer	Doosan
Engine Model	D219TIC
Engine: type	21.9 L, 4-Cycle,Turbocharged, Charge Air-Cooled
Cylinder arrangement	V-12
Displacement, L (cu. in.)	21.9 (1338)
Bore and stroke, mm (in.)	128 x 142 (5.04 x 5.59)
Compression ratio	10.5:1
Piston speed, m/min. (ft./min.)	511 (1677)
Main bearings: quantity, type	14, Precision Half-Shell
Rated rpm	1800
Max. power at rated rpm, kWm (BHP)	451 (605)
Cylinder head material	Cast Iron
Crankshaft material	Forged Steel
Governor: type, make/model	Electronic
Frequency regulation, no-load to-full load	Isochronous
Frequency regulation, steady state	±0.5%
Frequency	Fixed
Air cleaner type, all models	Dry

Model: 400REZXB, continued

Exhaust

Exhaust System

Exhaust Manifold Type	Wet
Exhaust flow at rated kW, kg/hr. (cfm)	1787 (2546)
Maximum allowable back pressure after catalyst, kPa (in. Hg)	5.1 (1.5)
Exhaust temperature at rated kW, dry exhaust, °C (°F)	600 (1112)
Maximum allowable back pressure, kPa (in. Hg)	10.2 (3)
Exh. outlet size at eng. hookup, mm (in.)	Flanged Outlet at Catalyst, see ADV drawing

Engine Electrical

Engine Electrical System

Battery charging alternator: Ground (negative/positive)	Negative
Battery charging alternator: Volts (DC)	24
Battery charging alternator: Ampere rating	45
Starter motor rated voltage (DC)	24
Battery, recommended cold cranking amps (CCA): Qty., CCA rating each	Two, 1000
Battery voltage (DC)	12

Fuel

Fuel System

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

Fuel Composition

Fuel Composition

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

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

Lubrication

Lubrication System

Type	Full Pressure
Oil pan capacity, L (qt.)	40 (42.3)
Oil pan capacity with filter, L (qt.)	47.1 (49.7)
Oil filter: quantity, type	2, Cartridge
Oil cooler	Water-Cooled

Model: 400REZXB, continued

Cooling

Radiator System

Ambient temperature, °C (°F)	50 (122)
Engine jacket water capacity, L (gal.)	53 (14)
Radiator system capacity, including engine, L (gal.)	242 (64)
Engine jacket water flow, Lpm (gpm)	660 (174)
Heat rejected to cooling water at rated kW, dry exhaust, kW (Btu/min.)	453 (25760)
Heat rejected to air charge cooler at rated kW, dry exhaust, kW (Btu/min.)	38 (2150)
Water pump type	Centrifugal
Fan diameter, including blades, mm (in.)	1321 (52)
Fan, kWm (HP)	31.3 (42)
Max. restriction of cooling air, intake and discharge side of radiator, kPA (in. H20)	0.125 (0.5)

* Weather and sound enclosures with internal silencer reduce ambient temperature capability by 5°C (9°F).

Operation Requirements

Air Requirements

Radiator-cooled cooling air, m3/min. (scfm) *	821 (29000)
Combustion air, kg/hr. (cfm)	1682 (841)
Heat rejected to ambient air: Engine, kW (Btu/min.)	66 (3765)
Heat rejected to ambient air: Alternator, kW (Btu/min.)	23 (1309)

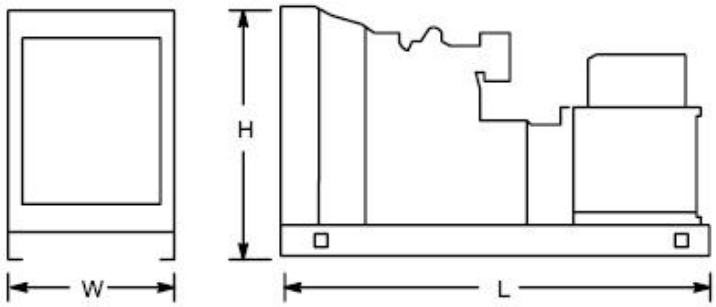
*Air density = 1.20 kg/m3 (0.075 lbm/ft3)

Fuel Consumption

Natural Gas, m3/hr. (cfh) at % load	Rating
Standby Fuel Consumption at 100% load	119.8 m3/hr. (4231 cfh)
Standby Fuel Consumption at 75% load	93.4 m3/hr. (3298 cfh)
Standby Fuel Consumption at 50% load	65.6 m3/hr. (2317 cfh)
Standby Fuel Consumption at 25% load	40.0 m3/hr. (1413 cfh)
Prime Fuel Consumption at 100% load	109.2 m3/hr. (3856 cfh)
Prime Fuel Consumption at 75% load	85.1 m3/hr. (3005 cfh)
Prime Fuel Consumption at 50% load	60.5 m3/hr. (2137 cfh)
Prime Fuel Consumption at 25% load	37.7 m3/hr. (1331 cfh)

Dimensions and Weights

Dim Weight Spec	Dim Weight Value
Fuel	All
Engine Manufacturer	Doosan
Overall Size, L x W x H, mm (in.):	3900 x 1975 x 2464 (153.5 x 77.8 x 97.0)
Weight (radiator model), wet, kg (lb.):	4162 (9175)



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

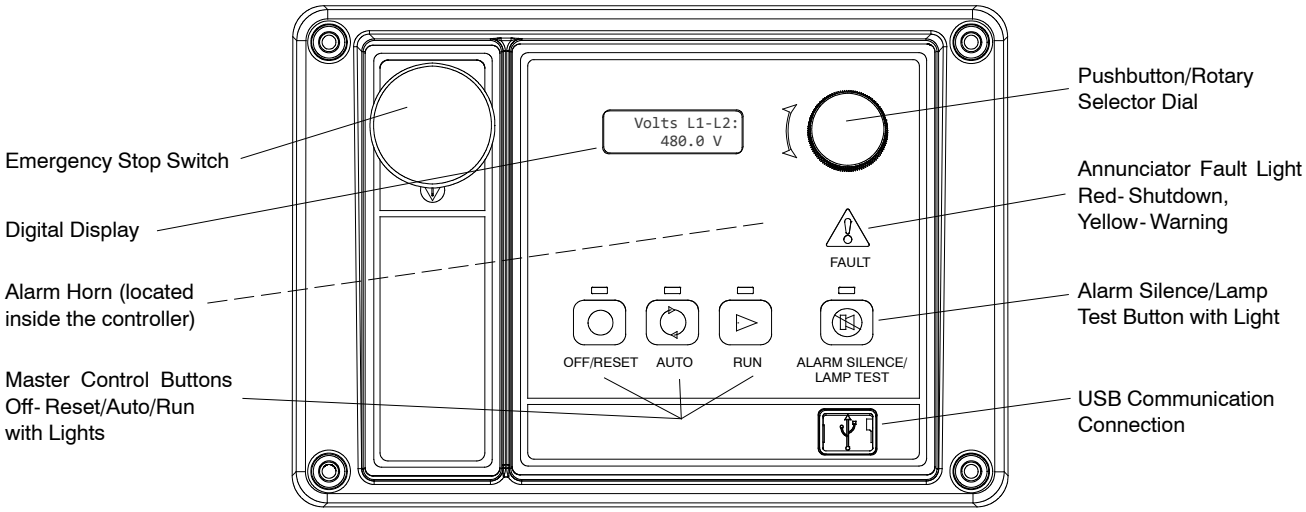
General Description and Function

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.



User Interface Controls and Components

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

NFPA 110 Requirements

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

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

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

User Interface Displays

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

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

Controller Features

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

Controller Functions

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

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

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

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

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

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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)	GM/PSI and Kohler Gas (KG6208, KG6208T)	DD/MTU	Doosan	John Deere	Volvo
Intake air pressure					S/D			D
Intake air Temperature		D		D	S/D	D	D	D
Coolant level			D	D	D	D	D	D
Coolant temperature		D	C/S/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	S		
Engine model number	S	S		S	S	S	S	S
Engine serial number	S	S		S	S	S	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	C/S/D
Fuel pressure		D		C/S/D	C/S	C/S/D	C/S†	C/S/D
Fuel rate			S	S		S	S	S
Fuel temperature		D			S		S/D	S
Oil level				S†	S/D†	S†	S†	S†
Oil pressure		C/S/D	D	C/S/D	C/S/D	C/S/D	C/S/D	C/S/D
Oil temperature			S		D			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.

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.

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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Windows® is a registered trademark of Microsoft Corporation.

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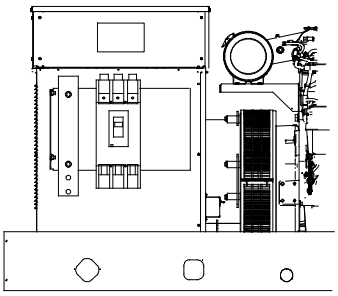
KOHLER POWER SYSTEMS

CIRCUIT BREAKER(S)

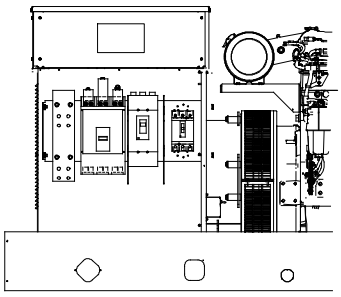
KOHLER®

Industrial Generator Set Accessories

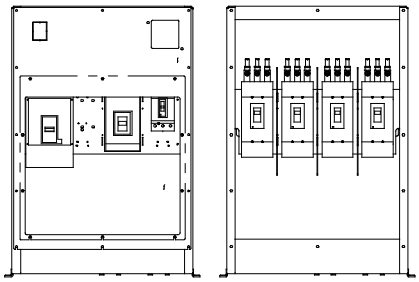
Line Circuit Breakers 15- 3250 kW



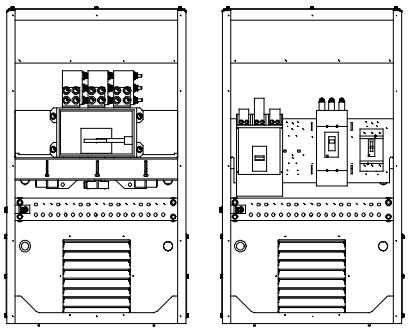
Single Circuit Breaker Kit with Neutral Bus Bar
15- 300 kW Model Shown



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



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



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

Standard Features

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

Line Circuit Breaker Types

Magnetic Trip

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

Thermal Magnetic Trip

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

Electronic Trip

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

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

Electronic with Ground Fault Trip

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

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

80% Rated Circuit Breaker

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

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

100% Rated Circuit Breaker

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

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

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

Line Circuit Breaker Options

❑ Alarm Switch

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

❑ Auxiliary Contacts

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

❑ Breaker Separators (350- 2500 kW)

Provides adequate clearance between breaker circuits.

❑ Bus Bars

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

❑ Field Connection Barrier

Provides installer wiring isolation from factory connections.

❑ Ground Fault Annunciation

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

❑ Lockout Device (padlock attachment)

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

❑ Lugs

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

❑ Overcurrent Trip Switch

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

❑ Shunt Trip, 12 VDC or 24 VDC

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

❑ Shunt Trip Wiring

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

❑ Undervoltage Trip, 12 VDC or 24 VDC

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

350- 2250 kW Line Circuit Breaker Specifications

(All 350- 2250 kW generator sets *except* KD models; see pages 8 and 9 for KD model generator sets)

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	
	700- 800	Thermal Magnetic	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	
	3000	Electronic LSI	NW
		Electronic LSIG	

Load Bus Rating

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

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

100% Rating Electrically Operated Breakers

For use as paralleling breakers with the APM603 controller.

Alt. Model	Amps	Trip Unit	Frame
4M, 5M*	250 400 600 800 1000 1200	3.0 LI	PJ
		5.0 LSI	PJ
		3.0 LI	PL
		5.0 LSI	PL

* Lead units 4M and 5M except 5M4044, extension box style 2 (small extension box).

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.

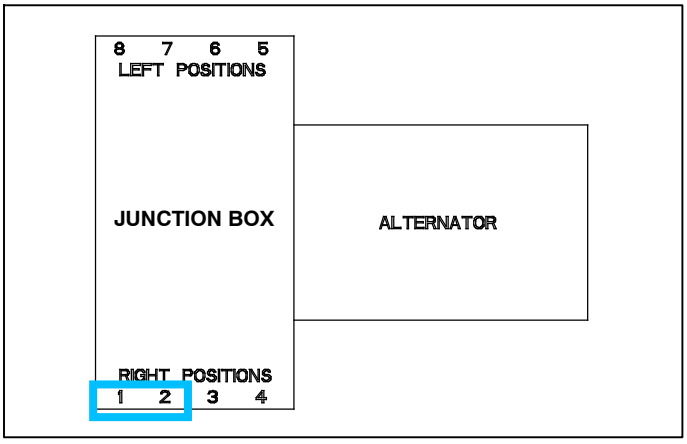
350- 2250 kW Line Circuit Breaker Specifications

(All 350- 2250 kW generator sets *except* KD models; see pages 8 and 9 for KD model generator sets)

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	700-800	Three 3/0 to 500 kcmil
P	600-800	Three 3/0 to 500 kcmil
	1000-1200	Four 3/0 to 500 kcmil
RJ	1600- 2500	(8) 1/0 to 750 kcmil or (16) 1/0 to 300 kcmil
NW	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

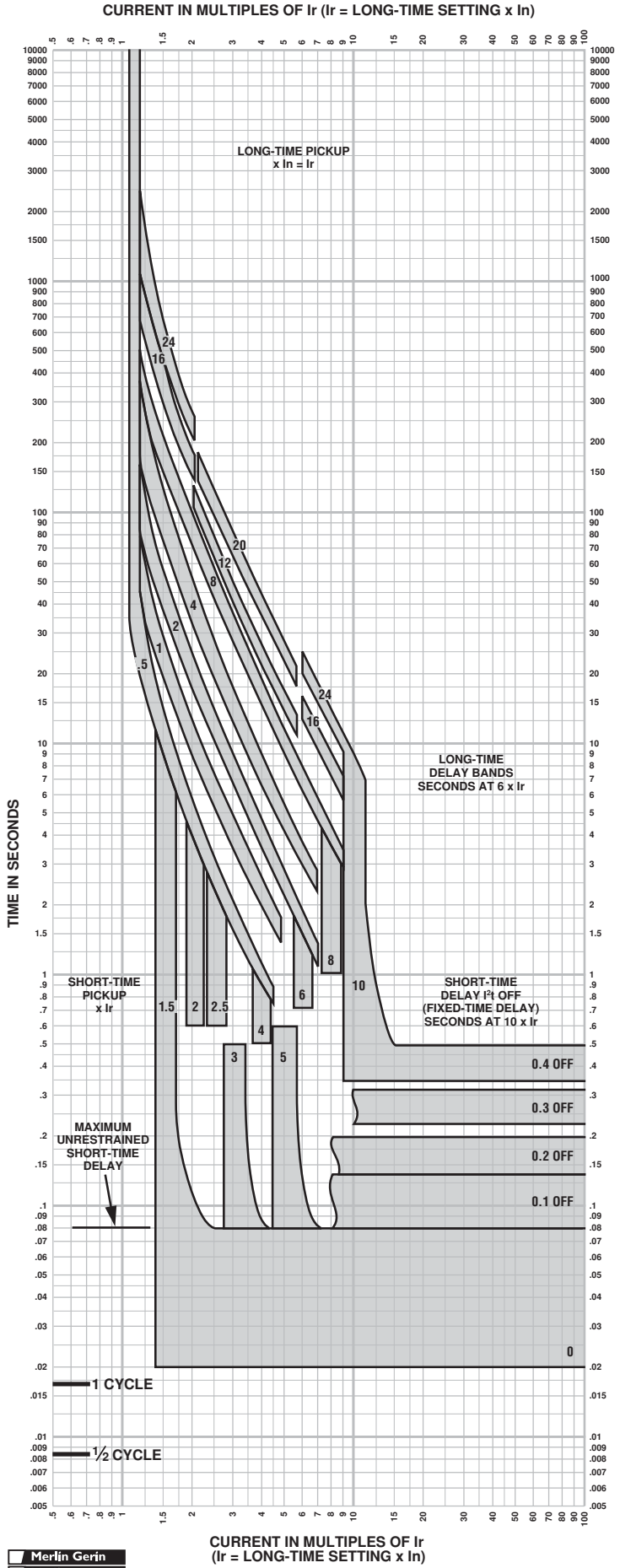
Alternator Model	Positions 1 or 5	2 or 6	3 or 7	4 or 8
4M/ 5M/ 7M	H/J			
	H/J	H/J		
	H/J	H/J	H/J	
	H/J	H/J	H/J	H/J
	LA			
	LA	H/J		
	LA	LA		
	LA	H/J	H/J	
	LA	LA	H/J	
	LA	LA	LA	
	LA	H/J	H/J	H/J
	LA	LA	H/J	H/J
	LA	LA	LA	H/J
	LA	LA	LA	LA
	LG			
	LG	H/J		
	LG	LA		
	LG	LG		
	LG	H/J	H/J	
	LG	LA	H/J	
	LG	LA	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 NW is not available with 1219 mm (48 in.) junction box.

† 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.



MICROLOGIC® 5.0/6.0 A/P/H TRIP UNIT CHARACTERISTIC TRIP CURVE NO. 613-4

Long-time Pickup and Delay
Short-time Pickup and I^2t OFF Delay

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

Curves apply from -30°C to +60°C ambient temperature.

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. The end of the curve is determined by the interrupting rating of the circuit breaker.
3. With zone-selective interlocking on, short-time delay utilized and no restraining signal, the maximum unrestrained short-time delay time band applies regardless of the setting.
4. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
5. For a withstand circuit breaker, instantaneous can be turned OFF. See 613-7 for instantaneous trip curve. See 613-10 for instantaneous override values.
6. Overload indicator illuminates at 100%.

Merlin Gerin
Modicon
Square D
Telemecanique
Federal Pioneer
Federal Pacific
Schneider Electric Brands

Schneider Electric

Curve No. 0613TC0004
December 2000
Drawing No. B48095-613-04

POWERPACT® P- and R-Frame Molded Case Circuit Breakers (Standard or 100% rated up to 2500 A)

The most compact and innovative molded case circuit breakers

P-Frame 1200 A

R-Frame

POWERPACT Molded Case Circuit Breakers lead the industry with proven, reliable protection and innovative design. Providing unparalleled performance and control, this generation of P- and R-frame circuit breakers features exclusive MICROLOGIC® Trip Units, which allow for a range of sophisticated applications for metering and monitoring. In addition, units can be interchanged to allow for maximum flexibility and are field-installable for easy upgrades as needed.

The compact P- and R-frame circuit breakers permit smaller footprint and higher density installations using I-LINE® Panelboards and Switchboards. These circuit breakers are available in 100% rated construction up to 2500 A to meet a broad range of commercial and industrial application needs.

Full-Featured Performance

- P-frame – 1200 A available in both standard and 100% ratings with sensor sizes 250–1200 A. Interrupting ratings (AIR) G-35kAIR, J-65kAIR and L-100kAIR at 480 VAC
- R-frame – 2500 A available in both standard and 100% ratings with sensor sizes 600–2500 A. Interrupting ratings (AIR) G-35kAIR, J-65kAIR and L-100kAIR at 480 VAC
- Compact breaker size allows for smaller footprint installations using I-LINE Panelboards and Switchboards. 9" width on P-frame designs and 15" width on R-frame designs provide increased density installations
- Most field-installable accessories are common to all frame sizes for easier stocking and installation
- Selection of four interchangeable MICROLOGIC Trip Units with POWERLOGIC® power metering and monitoring capabilities available in advanced trip units
- Compatible with POWERLOGIC® systems and high amperage power circuit breakers
- Built-in MODBUS® protocol provides an open communications platform and eliminates the need to purchase additional, proprietary network solutions
- Connection options include bus, cable or I-Line for installation flexibility
- Additional options are available for 5-cycle closing, stored energy mechanisms and draw-out mounting of 1200 A breakers

POWERPACT® P- and R-Frame Molded Case Circuit Breakers
(Standard or 100% rated up to 2500 A)

Onboard Intelligence

For “smarter breakers,” a range of MICROLOGIC® Trip Units provides advanced functionality, such as a communications interface, and power metering and monitoring capabilities. With the appropriate MICROLOGIC Trip Unit, you can communicate with breakers, gather power information, monitor events and remotely control breakers based on predetermined conditions, leading to substantial savings in electrical system operating costs.

These interchangeable, microprocessor-controlled, plug-in devices provide the next generation of protection, measurement and control functions, delivering not only greater electrical system safety but also improved system integration and coordination.

MICROLOGIC® Trip Units

Choose the Model that Meets Your Needs

MICROLOGIC 3.0 and 5.0

- Basic circuit protection including long-time, instantaneous and optional short-time adjustments

MICROLOGIC 3.0A, 5.0A and 6.0A

- Long-time, instantaneous and optional short-time adjustments
- Integrated ammeter and phase loading bar graph
- LED trip indicator
- Zone selective interlocking with downstream and upstream breakers
- Optional ground-fault protection
- Optional MODBUS® communications interface

MICROLOGIC 5.0P and 6.0P

- Long-time, instantaneous and optional short-time adjustments
- Advanced relay protection (current imbalance, under/over voltage, etc.)
- Inverse Definite Minimum Time Lag (IdmtL) long-time delay curve shaping for improved coordination
- Basic power metering and monitoring functions
- Standard MODBUS communications interface compatibility with POWERLOGIC® installations
- Standard GF alarm on 5.0P. 6.0P has equipment ground-fault tripping protection

MICROLOGIC 5.0H and 6.0H

- All 5.0P and 6.0P functions
- Enhanced POWERLOGIC power metering and monitoring capabilities
- Basic power quality (harmonic) measurement
- Waveform capture

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

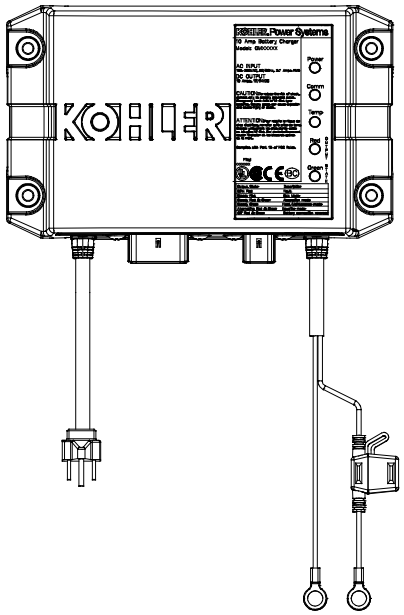
Order Number 0612HO0201

SQUARE D
Schneider Electric

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.

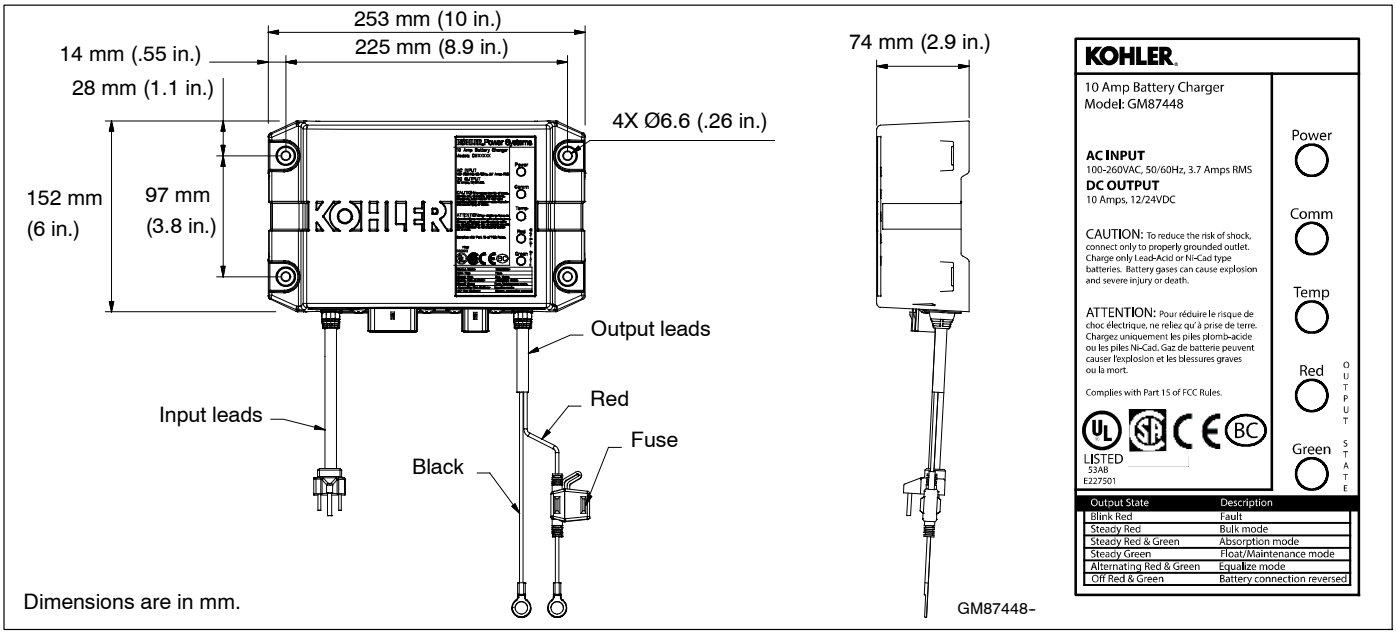
With the optional battery temperature sensor connected, the battery charger can adjust output voltages for optimal charging.

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	

DISTRIBUTED BY:

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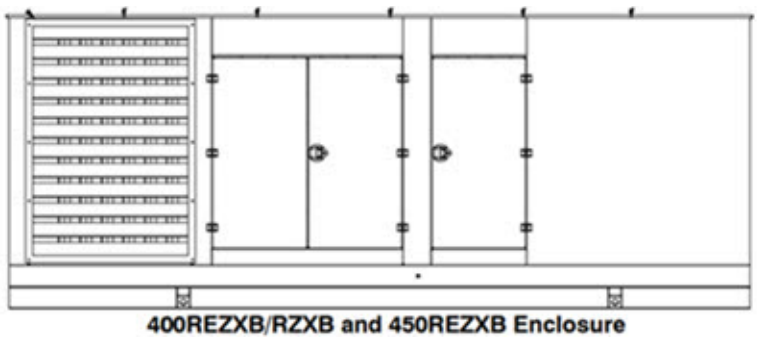
KOHLER®

Sound Enclosure

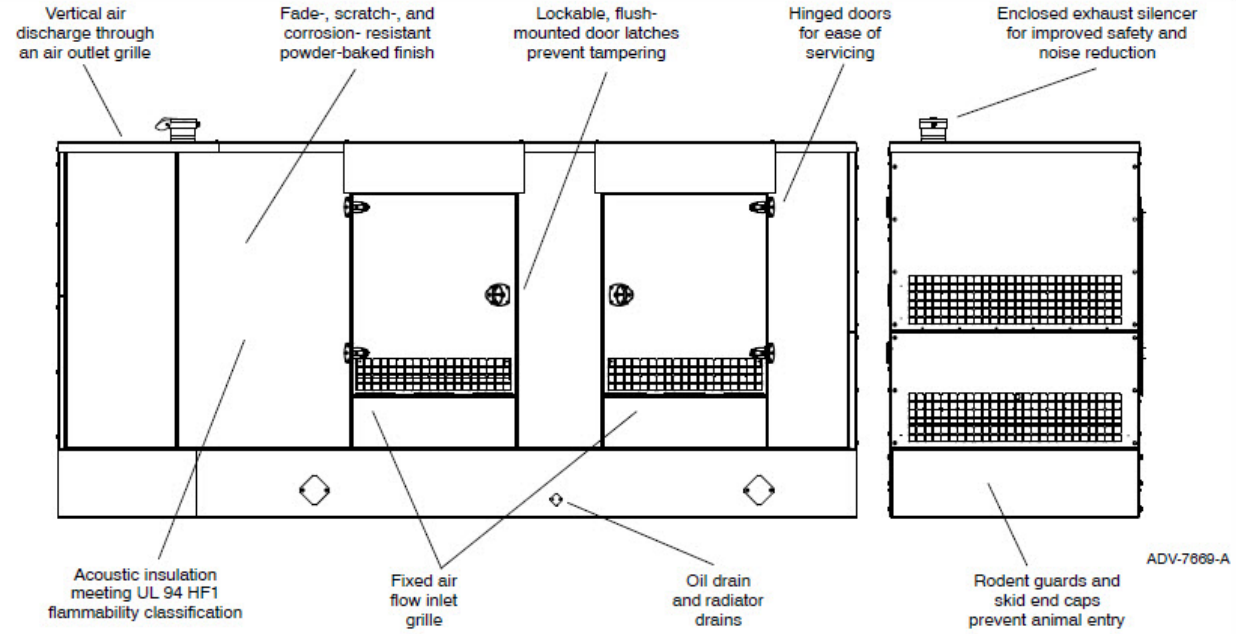
ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED



400REZXB/RZXB and 450REZXB Enclosure

Sound Enclosure Standard Features

- Internal-mounted critical silencer and flexible exhaust connector.
- Skid-mounted, aluminum construction with hinged doors. Aluminum 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 six (300-450 kW) large access doors which allow for easy maintenance.
- Lockable, flush-mounted door latches.
- Vertical air inlet and outlet hoods with 90 degree angles to redirect air and reduce noise.
- Automatic door holders keep doors open during maintenance.
- Acoustic insulation that meets UL94 HF1 flammability classification.
- Acoustic insulation that meets UL 94 HF1 flammability classification and repels mositure adsorption.
- Aluminum sound enclosure is certified to 186 mph (299 kph) wind load rating for 250-450REZXB/RZXB and 300REZXC models.



Enclosure ships assembled on generator set skid when ordered installed.
Note: 180/200REZXB/RZXB shown, other models are similar.

Sound Enclosure Features

- Available in aluminum formed panel, solid construction. Preassembled package offering corrosion resistant, dent resilient structure mounting directly to skid.
- Power Armor automotive-grade finish resulting in advanced corrosion and abrasion protection as well as enchanced edge coverage and color retention.
- Internal critical exhaust silencer offering maximum component life and operator safety.
- Note: Installing an additional length of exhaust tail pipe may increase backpressure levels. Please refer to the generator set spec sheet for the maximum backpressure value.
- Interchangeable modular panel construction. Allows complete serviceability or replacement without compromising enclosure design.
- Cooling/combustion air intake with a horizontal air inlet. Sized for maximum cooling airflow.
- Service access. Multi-personnel doors for easy access to generator set control and servicing of the oil fill and battery.
- Cooling air discharge. Weather protective design featuring a vertical air discharge outlet grille. Redirects cooling air up and above enclosures to reduce noise ambient.
- Attenuated design. Acoustic insulation UL 94 HF1 listed for flame resistance offering up to 25 mm (1 in.) mechanically restrained acoustic insulation.
- 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	7320 (284.6)	2493 (98.2)	70.8	2858 (112.5)	6043 (13323)

Note: Refer to the respective ADV drawings for details.
Weight includes the generator set (wet), enclosure, and silencer.
The generator set weight represents the largest alternator option.

Accessories

Battery Charger, Mounted.

DC Light Package
Prewired DC light package offering an economical alternative light source within the enclosure, as a complement to the BEP or a source

Mounting, prewiring of DC output and AC input when optional BEP is selected. Battery charger located inside the enclosure and accessible through an access door.

Miscellaneous Package Options
Block Heater, Junction Box. Factory-supplied block heater prewired to a junction box providing a convenient location for the customer wiring of the block heater.

Basic Electrical Package (BEP)
Distribution panel/load center. Prewired AC power distribution of all factory-installed features including block heater, two GFCI-protected internal 120-volt service receptacles, internal lighting, and commercial grade wall switch.The load center powered by building source power and protected by a main circuit breaker, rated for 100 amps with capacity and circuit positions for future expansion.AC power distribution installed in accordance with NEC and all wiring within EMT thin wall conduit. Four incandescent or fluorescent lights located within UL-listed fixtures designed for wet locations.

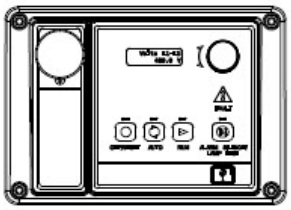
of light when AC power is not available.Battery drain limited with fuse protection and controlled through a 0-60 minute, spring-wound, no-hold timer.

Ventilation Fan, 22.6 cm/min. (800 cfm) Wall mount.
Direct drive 3-blade 305 mm (12 in.) aluminum propeller fan with automatic shutters, driven by a totally enclosed air-over motor housed within a corrosion-resistant housing.

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. 7.8 ADC with GM88453 Activator Board
Transition Frequency	42.0-62.0Hz
Exciter Field Resistance	4-30 Ohms with GM88453 Activator Board
No-Load to Full-Load Voltage Regulation	±0.5%
Thermal Drift	<0.5% (-40°C to 70°C) [-40°F to 158°F] Range
Response Time	Less than 5µS
System Voltage Adjust.	±10%
Voltage Adjustment	Controller Menu Knob
Remote Voltage Adjustment	not available
Paralleling Capability	not available
VAR/PF Control Input	not available

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

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

Voltage Regulator Menu

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

Generator Set Calibration Menu (APM402/DEC 3000)

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

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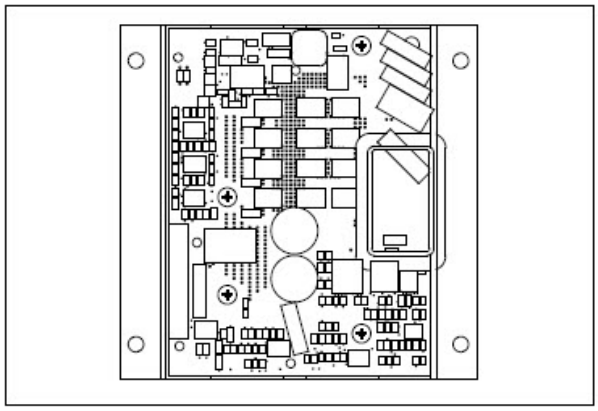
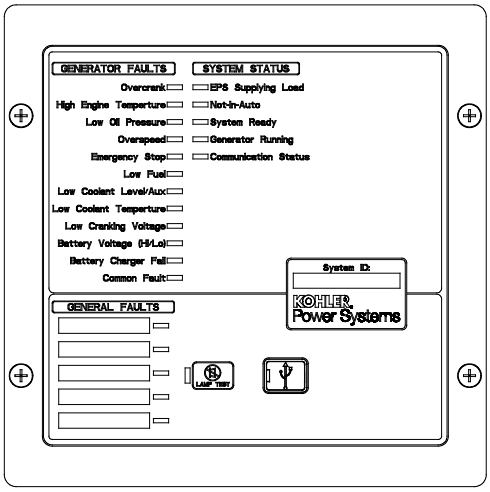
Activator Board GM88453



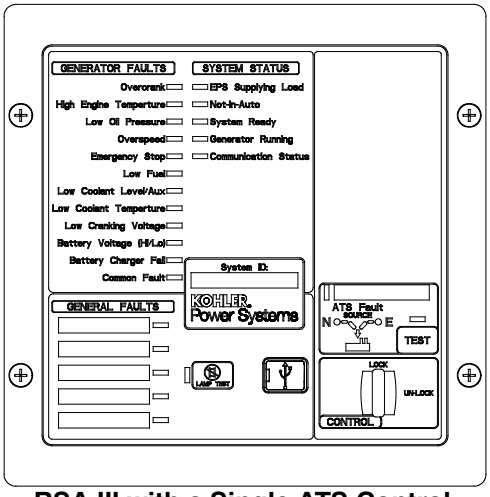
- Interfaces between the controller and alternator assembly using rotor field leads, auxiliary power windings, and optic board leads.
- Allows the Decision-Maker® controllers the ability to control a wound-field alternator using the same control signal as Fast Response™ alternator.
- Permits the generator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

KOHLER POWER SYSTEMS

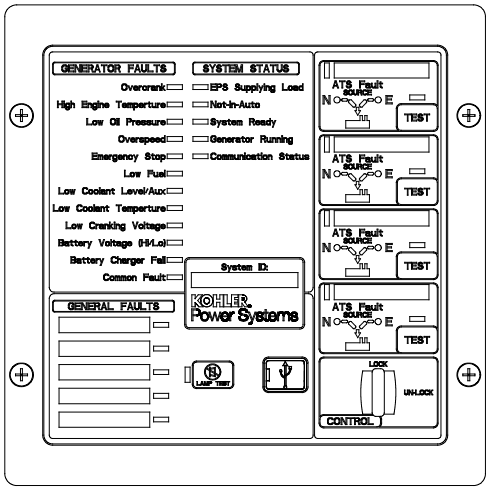
ANNUNCIATOR



RSA III



RSA III with a Single ATS Control



RSA III with Four ATS Controls

Remote Serial Annunciator III (RSA III) for Kohler® Controllers

- Monitors the generator set equipped with one of the following controllers:

APM402	Decision-Maker® 3000
APM603	Decision-Maker® 3500
APM802	Decision-Maker® 6000
Decision-Maker® 3+	Decision-Maker® 8000
Decision-Maker® 550	KPC 1000

- Allows monitoring of the common alarm, remote testing of the automatic transfer switch, and monitoring of the normal/emergency source for up to four ATS with any of the following controllers:

  Decision-Maker® MPAC® 750, 1200, and 1500

  MPAC® 1000 and 1500
- Configuration via a personal computer (PC) software.
- Writable surfaces (white boxes in illustrations) for user-defined selections.
- Uses Modbus® RTU protocol.
- Controller connections:

  RS-485 for serial bus network

  USB port. Connect a personal computer and use Kohler® SiteTech™ software to view events and adjust settings. *

  12-/24-volt DC power supply

  120/208 VAC power supply (available accessory)
- Meets the National Fire Protection Association Standard NFPA 110, Level 1.

Dimensions

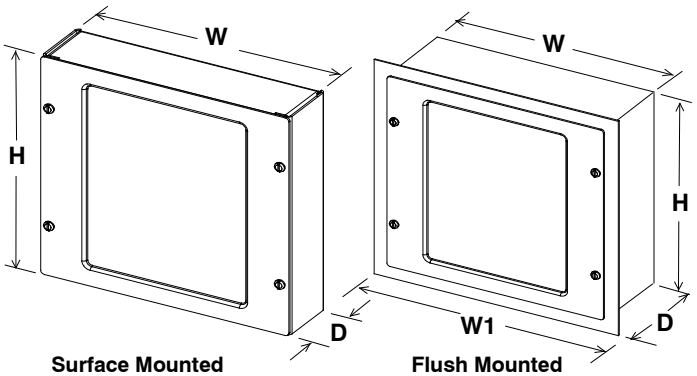
- Dimensions—W x H x D, mm (in.).

  Surface Mounted:
  203 x 203 x 83 (8.0 x 8.0 x 3.3)

  Flush Mounted (Inside Wall):
  203 x 203 x 76 (8.0 x 8.0 x 3.0)
  Flush mounting plate W1: 254 (10.0)

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

Modbus® is a registered trademark of Schneider Electric.



Surface Mounted Flush Mounted

Fault and Status Conditions	Fault LEDs	Fault Horn	System Ready LED	Generator Running LED	Communication Status LED
Overcrank Shutdown	Red	On	Red	Off	Green
High Engine Temperature Warning *	Yellow	On	Red	Green	Green
High Engine Temperature Shutdown	Red	On	Red	Off	Green
Low Oil Pressure Warning *	Yellow	On	Red	Green	Green
Low Oil Pressure Shutdown	Red	On	Red	Off	Green
Overspeed Shutdown	Red	On	Red	Off	Green
Emergency Stop *	Red	On	Red	Off	Green
Low Coolant Level/Aux. Shutdown	Red	On	Red	Off	Green
Low Coolant Temperature *	Yellow	On	Red	Off	Green
Low Cranking Voltage	Yellow	On	Red	Off	Green
Low Fuel—Level or Pressure *	Yellow	On	Red	Green or Off	Green
Not-In-Auto	Red	On	Red	Green or Off	Green
Common Fault	Red	On	Green	Green or Off	Green
Battery Charger Fault (1) *	Yellow	On	Red	Green or Off	Green
Battery Charger Fault (2) *	Yellow	On	Green	Green or Off	Green
High Battery Voltage *	Yellow	Off	Green	Green or Off	Green
Low Battery Voltage *	Yellow	Off	Green	Green or Off	Green
User Input #1 (Warning)	Yellow	Off	Green	Green or Off	Green
User Input #1 (Shutdown)	Red	On	Green	Off	Green
User Input #2 (Warning)	Yellow	Off	Green	Green or Off	Green
User Input #2 (Shutdown)	Red	On	Green	Off	Green
User Input #3 (Warning) (1) †	Yellow	Off	Green	Green or Off	Green
User Input #3 (Shutdown) (1) †	Red	On	Green	Off	Green
User Input #4 (Warning) (1)	Yellow	Off	Green	Green or Off	Green
User Input #4 (Shutdown) (1)	Red	On	Green	Off	Green
User Input #5 (Warning) (1)	Yellow	Off	Green	Green or Off	Green
User Input #5 (Shutdown) (1)	Red	On	Green	Off	Green
EPS Supplying Load	Yellow	Off	Green	Green	Green
Communications Status (Fault mode)	—	Off	Green or Red	Green or Off	Red
ATS Fault (RSA III with ATS Controls only)	Red	On	Red or Yellow	Green or Off	Green

Green LEDs appear as steady on when activated.
Yellow LEDs slow flash when activated except steady on with EPS supplying load and high battery voltage.
Red LEDs slow flash when activated except fast flash with loss of communication and not-in-auto.

Specifications

- LED indicating lights for status, warning, and/or shutdown.
- Power source with circuit protection: 12- or 24-volt DC
- Power source with120/208 VAC, 50/60 Hz adapter (option)
- Power draw: 200 mA
- Humidity range: 0% to 95% noncondensing
- Operating temperature range: - 20°C to +70°C (- 4°F to +158°F)
- Storage temperature range: - 40°C to +85°C (- 40°F to +185°F)
- Standards:
  - NFPA 110, level 1
  - UL 508 recognized
  - CE directive
  - NFPA 99
  - ENS 61000- 4- 4
  - EN6II-4-4 fast transient immunity
- RS-485 Modbus® isolated port @ 9.6/19.2/38.4/57.6 kbps (default is 19.2 kbps)
- USB device port
- NEMA 1 enclosure

(1) All generator set controllers except Decision-Maker® 3+ controller.
(2) Decision-Maker® 3+ controller only.
* May require optional kit or user-provided device to enable function and LED indication.
† Digital input #3 is factory-set for high battery voltage on the Decision-Maker® 3+ controller.
Modbus® is a registered trademark of Schneider Electric.

ATS Controls (RSA III with ATS controls only)

- ATS position LED (normal or emergency)
- Power source indicator LED (normal or emergency)
- ATS fault LED
- Key-operated lock/unlock switch for Test feature
- Test pushbutton

NFPA Requirements

- NFPA 110 compliant
- Engine functions:
  - High battery voltage warning *
  - High engine temperature shutdown
  - High engine temperature warning *
  - Low battery voltage warning *
  - Low coolant level/aux. shutdown
  - Low coolant temperature warning *
  - Low cranking voltage
  - Low fuel warning (level or pressure) *
  - Low oil pressure shutdown
  - Low oil pressure warning *
  - Overcrank shutdown
  - Overspeed shutdown
- General functions:
  - Audible alarm silence
  - Battery charger fault *
  - Lamp test
  - Master switch not-in-auto

Fault and Status LEDs and Lamp Test Switch

Alarm Horn. Horn sounds giving a minimum 90 dB at 0.1 m (0.3 ft.) audible alarm when a warning or shutdown fault condition exists except on high/low battery voltage or EPS supplying load.

Alarm Silenced. Red LED on lamp test switch lights when alarm horn is deactivated by alarm silence switch.

Alarm Silence Switch. Lamp test switch quiets the alarm during servicing. The horn will reactivate upon additional faults.

ATS Fault. Red LED lights when ATS fails to transfer.

Battery Charger Fail. LED lights if battery charger malfunctions. Requires battery charger with alarm contact.

Battery Voltage Hi/Lo. LED flashes if battery or charging voltage drops below preset level. LED lights steady if battery voltage exceeds preset level.

Common Fault. LED lights when a single or multiple common faults occur.

Communication Status. Green LED lights indicating annunciator communications functional. Red LED indicates communication fault.

EPS Supplying Load. LED lights when the Emergency Power System (EPS) generator set is supplying the load (APM402, APM603, APM802, and Decision-Maker® 550, 3000, 3500, 6000, and 8000 controllers) or when transfer switch is in the emergency position (Decision-Maker® 3+ controller).

Emergency Stop. LED lights and engine stops when emergency stop is made. May require a local emergency stop switch on some Decision-Maker® 3+ controllers.

Generator Running. LED lights when generator set is in operation.

High Engine Temperature. Red LED lights if engine has shut down because of high engine coolant temperature. Yellow LED lights if engine coolant temperature approaches shutdown range. Requires warning sender on some models.

Lamp Test (Switch). Switch tests all the annunciator indicator LEDs and horn.

Low Coolant Level/Aux. LED lights when engine coolant level is below acceptable range on radiator-mounted generator sets only. When used with a Decision-Maker® 3+ controller, the LED indicates low coolant level or an auxiliary fault shutdown. Requires user-supplied low coolant level switch on remote radiator models.

Low Coolant Temperature. LED lights if optional engine block heater malfunctions and/or engine coolant temperature is too low. Requires prealarm sender on some models.

Low Cranking Voltage. LED lights if battery voltage drops below preset level during engine cranking.

Low Fuel (Level or Pressure). LED lights if fuel level in tank approaches empty with diesel models or fuel pressure is low on gas models. Requires customer-supplied switch.

Low Oil Pressure. Red LED lights if generator set shuts down because of insufficient oil pressure. Yellow LED lights if engine oil pressure approaches shutdown range. Requires warning sender on some models.

Not In Auto. LED lights when the generator set controller is not set to automatic mode.

Overcrank. LED lights and cranking stops if engine does not start in either continuous cranking or cyclic cranking modes.

Overspeed. LED lights if generator set shuts down because of overspeed condition.

System Ready. Green LED lights when generator set master switch is in AUTO position and the system senses no faults. Red LED indicates system fault.

User-Defined Digital Inputs #1-#5. Monitors five digital auxiliary inputs (can be configured as warnings or shutdowns). User-defined digital inputs are selected via the RSA III master for local or remote (generator set or ATS). The user-defined digital input can be assigned via PC using SiteTech™ setup software.

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

Accessories

- ❑ Power source adapter kit 120/208 VAC, 50/60 Hz.
- ❑ Modbus®/Ethernet converter GM41143-KP2 for serial to Ethernet communication.
- ❑ Communication module GM32644-KA1 or GM32644-KP1 is required with Decision-Maker® 3+ controllers.

Modbus® is a registered trademark of Schneider Electric.

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.

SCREW-COVER, TYPE 1

APPLICATION

Use this enclosure in commercial and general industrial applications that require a junction or pull box. For flush installations, order flush covers and door frames separately.

FEATURES

- Unique keyhole screw slots in the cover
- Available with or without knockouts. Various sizes of easy-to-remove concentric knockouts on all four sides of standard boxes with knockouts.
- Optional flush-mounted door frame available
- Optional flush covers
- Flat, removable covers fastened with plated steel screws
- Provision for grounding
- Mounting holes on back of box

SPECIFICATIONS

- 16, 14 or 12 gauge steel or plated steel

FINISH

ANSI 61 gray polyester powder paint finish inside and out. Unless otherwise specified, all custom pull boxes are finished with ANSI 61 gray polyester powder paint.

ACCESSORIES

Flush Covers
Flush-Mount Door Frames
Grounding Device
Type 1 Locking Window Pull Box Accessory
Touch-Up Paint

BULLETIN: A90P1

INDUSTRY STANDARDS

UL 50, 50E Listed; Type 1; File No. E27525
cUL Listed per CSA C22.2 No 40; Type 1; File No. E27525

NEMA/EEMAC Type 1
IEC 60529, IP30

Standard Product **Screw-Cover Type 1 Pull Boxes with Knockouts**

Catalog Number	AxBxC in.	AxBxC mm	Style	Number of Cover Screws	Knockout Pattern Along "A" Sides	Knockout Pattern Along "B" Sides
ASE4X4X3	4.00 x 4.00 x 3.00	102 x 102 x 76	Painted	2	B-C	B-C
ASG4X4X3	4.00 x 4.00 x 3.00	102 x 102 x 76	Galvanized	2	B-C	B-C
ASE6X6X3	6.00 x 6.00 x 3.00	152 x 152 x 76	Painted	2	B-C-D	B-C-D
ASG6X6X3	6.00 x 6.00 x 3.00	152 x 152 x 76	Galvanized	2	B-C-D	B-C-D
ASE8X6X3	8.00 x 6.00 x 3.00	203 x 152 x 76	Painted	2	F-G-H-I	B-C-D
ASG8X6X3	8.00 x 6.00 x 3.00	203 x 152 x 76	Galvanized	2	F-G-H-I	B-C-D
ASE16X14X3	16.00 x 14.00 x 3.00	406 x 356 x 76	Painted	4	B-C-D-E-F-G-H	B-C-D-E-F-G-H
ASE18X14X3	18.00 x 14.00 x 3.00	457 x 356 x 76	Painted	4	A-B-C-D-E-F-G-H-I	B-C-D-E-F-G-H
ASE4X4X4	4.00 x 4.00 x 4.00	102 x 102 x 102	Painted	2	B-C	B-C
ASG4X4X4	4.00 x 4.00 x 4.00	102 x 102 x 102	Galvanized	2	B-C	B-C
ASE6X4X4	6.00 x 4.00 x 4.00	152 x 102 x 102	Painted	2	B-C-D	B-C
ASG6X4X4	6.00 x 4.00 x 4.00	152 x 102 x 102	Galvanized	2	B-C-D	B-C
ASE6X6X4	6.00 x 6.00 x 4.00	152 x 152 x 102	Painted	2	B-C-D	B-C-D
ASG6X6X4	6.00 x 6.00 x 4.00	152 x 152 x 102	Galvanized	2	B-C-D	B-C-D
ASE8X6X4	8.00 x 6.00 x 4.00	203 x 152 x 102	Painted	2	F-G-H-I	B-C-D
ASG8X6X4	8.00 x 6.00 x 4.00	203 x 152 x 102	Galvanized	2	F-G-H-I	B-C-D
ASE8X8X4	8.00 x 8.00 x 4.00	203 x 203 x 102	Painted	4	F-G-H-I	F-G-H-I
ASG8X8X4	8.00 x 8.00 x 4.00	203 x 203 x 102	Galvanized	4	F-G-H-I	F-G-H-I
ASE10X8X4	10.00 x 8.00 x 4.00	254 x 203 x 102	Painted	4	F-G-H-I	F-G-H-I
ASG10X8X4	10.00 x 8.00 x 4.00	254 x 203 x 102	Galvanized	4	F-G-H-I	F-G-H-I
ASE10X10X4	10.00 x 10.00 x 4.00	254 x 254 x 102	Painted	4	F-G-H-I	C-D-E-F-G
ASG10X10X4	10.00 x 10.00 x 4.00	254 x 254 x 102	Galvanized	4	F-G-H-I	C-D-E-F-G
ASE12X8X4	12.00 x 8.00 x 4.00	305 x 203 x 102	Painted	4	C-D-E-F-G	F-G-H-I
ASG12X8X4	12.00 x 8.00 x 4.00	305 x 203 x 102	Galvanized	4	C-D-E-F-G	F-G-H-I
ASE12X10X4	12.00 x 10.00 x 4.00	305 x 254 x 102	Painted	4	C-D-E-F-G	C-D-E-F-G
ASG12X10X4	12.00 x 10.00 x 4.00	305 x 254 x 102	Galvanized	4	C-D-E-F-G	C-D-E-F-G
ASE12X12X4	12.00 x 12.00 x 4.00	305 x 305 x 102	Painted	4	C-D-E-F-G	C-D-E-F-G
ASG12X12X4	12.00 x 12.00 x 4.00	305 x 305 x 102	Galvanized	4	C-D-E-F-G	C-D-E-F-G
ASE16X12X4	16.00 x 12.00 x 4.00	406 x 305 x 102	Painted	4	B-C-D-E-F-G-H	C-D-E-F-G
ASG16X12X4	16.00 x 12.00 x 4.00	406 x 305 x 102	Galvanized	4	B-C-D-E-F-G-H	C-D-E-F-G
ASE18X12X4	18.00 x 12.00 x 4.00	457 x 305 x 102	Painted	4	A-B-C-D-E-F-G-H-I	C-D-E-F-G
ASG18X12X4	18.00 x 12.00 x 4.00	457 x 305 x 102	Galvanized	4	A-B-C-D-E-F-G-H-I	C-D-E-F-G
ASE18X18X4	18.00 x 18.00 x 4.00	457 x 457 x 102	Painted	4	A-B-C-D-E-F-G-H-I	A-B-C-D-E-F-G-H-I
ASG18X18X4	18.00 x 18.00 x 4.00	457 x 457 x 102	Galvanized	4	A-B-C-D-E-F-G-H-I	A-B-C-D-E-F-G-H-I
ASE24X12X4	24.00 x 12.00 x 4.00	610 x 305 x 102	Painted	4	A-B-C-D-E-F-G-H-I	C-D-E-F-G
ASE24X24X4	24.00 x 24.00 x 4.00	610 x 610 x 102	Painted	4	A-B-C-D-E-F-G-H-I	A-B-C-D-E-F-G-H-I
ASG24X24X4	24.00 x 24.00 x 4.00	610 x 610 x 102	Galvanized	4	A-B-C-D-E-F-G-H-I	A-B-C-D-E-F-G-H-I
ASE30X24X4	30.00 x 24.00 x 4.00	762 x 610 x 102	Painted	6	A-B-C-D-E-F-G-H-I	A-B-C-D-E-F-G-H-I

KOHLER POWER SYSTEMS

ATS

Model KEP-DCTC-1200S-TQ

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ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED

Transfer Switch Standard Features

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

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Service Disconnect Switch

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

Decision-Maker® MPAC 1500 Controller

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

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

Codes and Standards

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

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

Application Data

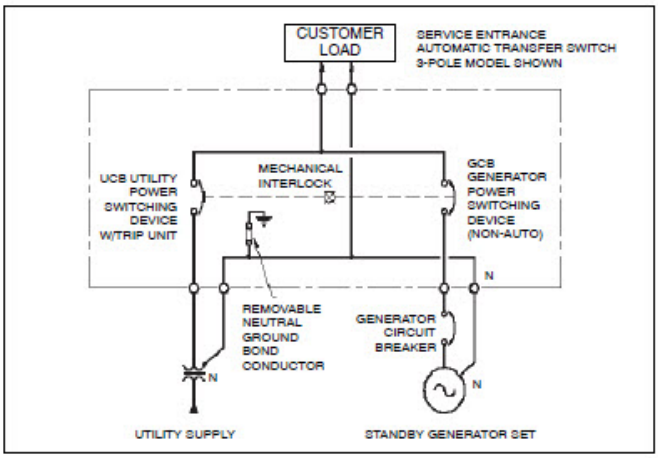
Environmental Specifications	
Operating Temperature	-15°C to 50°C (5°F to 122°F)
Storage Temperature	-20°C to 70°C (-4°F to 158°F)
Humidity	95% noncondensing

Ratings

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

Insulated Case	1200	0600	100,000	100,000
With molded case/insulated case switching devices equipped with integral overcurrent protection.				

Typical Single-Line Diagram



Cable Sizes

Cable Sizes, Al/Cu Wire				
Model	Amps	Circuit Breaker (per phase)	Neutral	Ground
KEP, ICCB	1200	(4) 3/0 - 750 KCMIL	(12) 3/0 - 750 KCMIL	(3) #6 - 250 KCMIL

Circuit Breaker Specifications

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

Circuit Breaker Specifications

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

Weights and Dimensions

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

Accessories

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

Accessory Modules

The mounting kit holds up to five optional modules. The maximum total current draw is 300 mA. If an External Battery Module is installed, there is no current restriction.

- Alarm Module
- External Battery Supply Module
- Standard I/O Module
- High Power I/O Module

Warranty

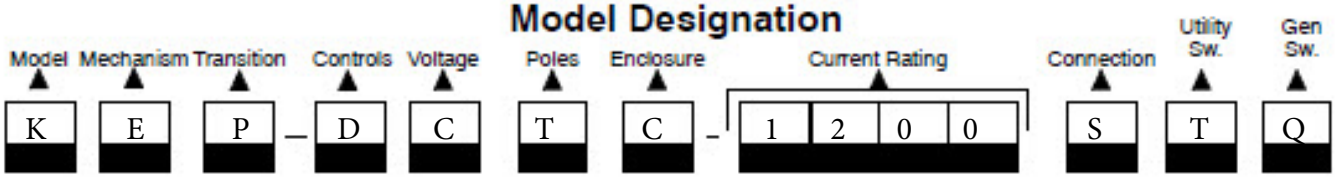
-

Standard Input/Output Module

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

Warranty

Model Designation



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

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

Model
K: Kohler

Mechanism
E: Service Entrance Rated

Transition
P: Programmed

Controller
D: Decision-Maker® MPAC 1500, Automatic

Voltage/Frequency

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

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

Enclosure

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

Current, Amps

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

Connections
S: Standard

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

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

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

KOHLER

Automatic Transfer Switch Controller

Decision-Maker® MPAC 1500

Model KBS with Decision-Maker® MPAC 1500 Controller

Applicable Models

Model	Description
KCS	Standard-Transition Any Breaker ATS ‡
KCP	Programmed-Transition Any Breaker ATS ‡
KCC	Closed-Transition Any Breaker ATS §
KBS	Standard-Transition Bypass/Isolation ATS §
KBP	Programmed-Transition Bypass/Isolation ATS §
KBC	Closed-Transition Bypass/Isolation ATS §
KGS	Standard-Transition Bypass/Isolation ATS §
KGP	Programmed-Transition Bypass/Isolation ATS §
KEP	Service Entrance ATS §

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

Decision-Maker® MPAC 1500 Controller Standard Features

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

Programmable Features

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

* SiteTech software is available to Kohler-authorized distributors and dealers.
† Requires current sensing kit.

Modbus is a registered trademark of Schneider Electric.

Decision-Maker® MPAC 1500 Controller Features

User Interface LED Indicators

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

LCD Display

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

Dynamic Function Tactile Keypad Operations

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

DIP Switches

- Maintenance mode
- Password disable

Event History

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

Main Logic Board Inputs and Outputs

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

Communications

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

Programmable Features

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

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

† System parameters are factory-set per order.

Modbus is a registered trademark of Schneider Electric.

Decision-Maker® MPAC 1500 Controller Features, Continued

Programmable Inputs

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

Programmable Outputs

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

Voltage and Frequency Sensing

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

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

Adjustable Time Delays

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

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

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

Accessory Modules

The mounting kit holds up to five optional modules.

Module Current Draw Specifications, mA	
Alarm Module	75
Standard I/O Module	75
High Power I/O Module	100
Maximum Total Current *	300
* If an External Battery Module is installed, there is no current restriction.	

Standard Input/Output Module

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

High-Power Input/Output Module

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

Alarm Module

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

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

External Battery Supply Module

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

Other Controller Accessories

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

❑ Controller Disconnect Switch

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

❑ Current Sensing Kit

- Monitor current on all phases with 1% accuracy

❑ Digital Meter

- Measure and display voltage, current, frequency, and power for both sources
- Programmable visual alarms for high voltage, low voltage, and high current
- Three digital outputs
- Serial port for optional network connections
- Password-protected programming menus
- Joystick operation
- Factory-installed
- Joystick operation
- Available factory-installed
- For more information, see TT-1506, Digital Power Meters.

❑ Line-to-Neutral Voltage Monitoring

- Monitors all line-to-neutral voltages

❑ Load Shed Kit

- Forced transfer from Emergency to OFF for programmed-transition models
- Customer-supplied signal (contact closure) is required for the forced transfer to OFF function
- Factory-installed only

❑ Padlockable User Interface Cover

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

❑ RSA III Remote Serial Annunciator

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

❑ Supervised Transfer Control Switch

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

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

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

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

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

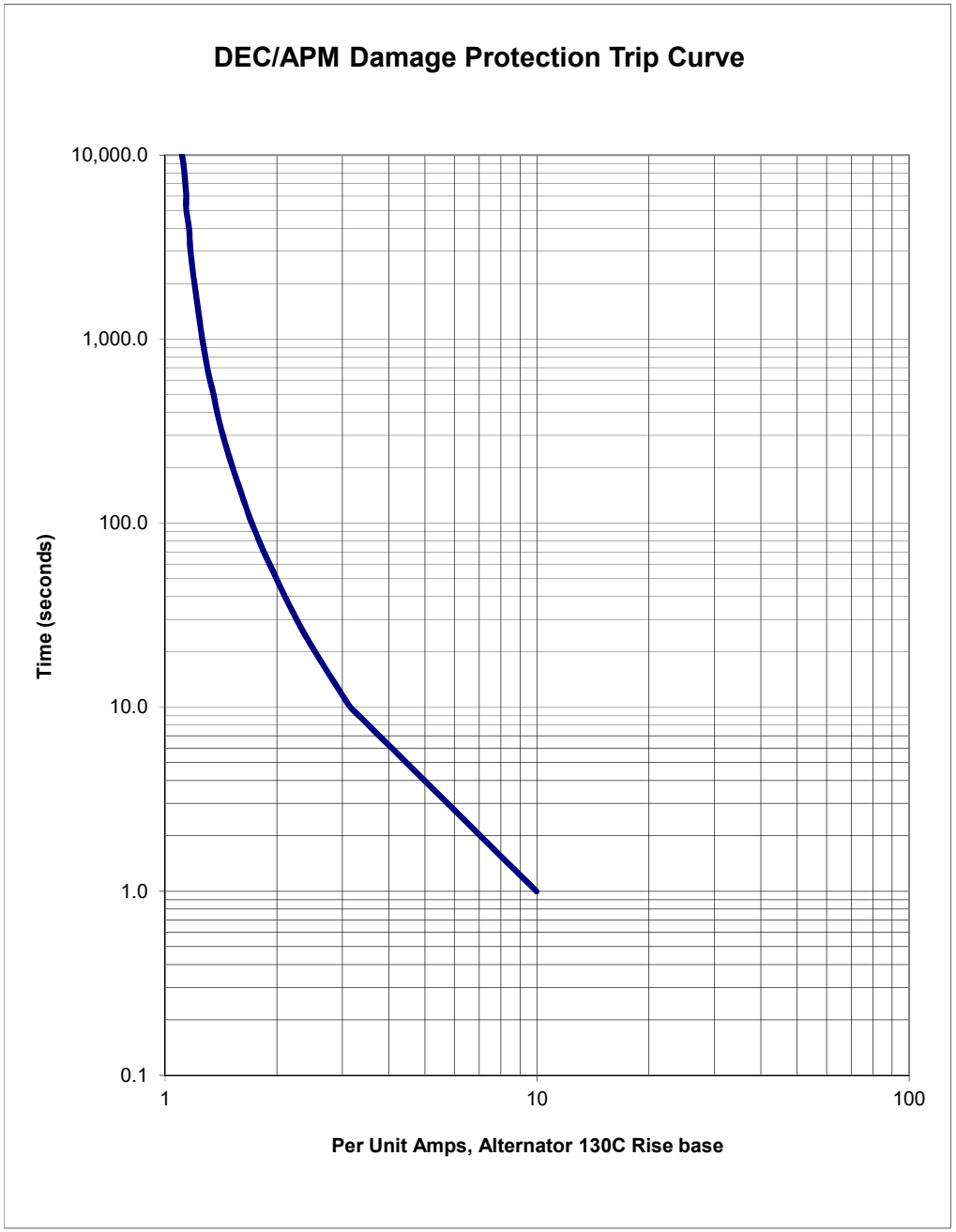
DISTRIBUTED BY:

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

KOHLER®

Alternator Data

Seconds	Per Unit Armature Current
1	9.96
2	7.04
3	5.75
4	4.98
5	4.45
6	4.07
7	3.76
8	3.52
9	3.32
10	3.15
11	3.05
17	2.66
25	2.37
35	2.17
45	2.04
55	1.95
70	1.84
85	1.77
100	1.71
110	1.68
200	1.52
300	1.43
400	1.38
500	1.35
600	1.32
750	1.29
900	1.27
1000	1.26
1100	1.25
2000	1.20
3000	1.17
4000	1.16
5000	1.14
6000	1.14
7500	1.13
9000	1.12
10000	1.11
20000	1.1
50000	1.08
100000	1.07



TECHNICAL INFORMATION BULLETIN

Alternator Data Sheet

Alternator Model: 5M4024 (8-22-11)

Kilowatt ratings at	1800 RPM	60 Hertz	10 LEADS	Standard 3 phase
kW (kVA)	3 Phase	0.8 Power Factor		Dripproof or Open Enclosure

	Class B	Class F					Class H		
Voltage*	80° C ① Continuous	90° C ① Lloyds	95° C ① ABS	105° C ② British Standard	105° C ① Continuous	130° C ① Standby	125° C ② British Standard	125° C ① Continuous	150° C ① Standby
480/240	380 (475)	415 (519)	430 (538)	450 (563)	450 (563)	475 (594)	460 (575)	475 (594)	505 (631)
460/230	400 (500)	430 (538)	445 (556)	470 (588)	470 (588)	485 (606)	485 (606)	485 (606)	490 (613)
440/220	400 (500)	425 (531)	420 (525)	455 (569)	455 (569)	465 (581)	465 (581)	465 (581)	465 (581)
416/208	385 (481)	405 (506)	400 (500)	435 (544)	435 (544)	440 (550)	440 (550)	440 (550)	450 (563)
380/190	350 (438)	370 (463)	370 (463)	400 (500)	400 (500)	400 (500)	400 (500)	400 (500)	400 (500)

① *Rise by resistance method, Mil-Std-705, Method 680.1b.* ② *British Standard Rating per BS 5000*

Submittal Data: 480 Volts*, 475.2 kW, 594 kVA, 0.8 P.F., 1800 RPM, 60 Hz, 3 Phase **STD. CONNECTION**

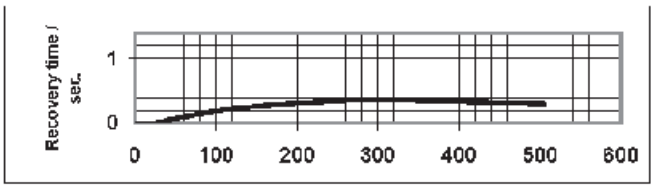
Mil-Std-705B Method	Description	Value
301.1b	Insulation Resistance	>1.5 Meg
302.1a	High Potential Test	
	Main Stator	2000 Volts
	Main Rotor	1500 Volts
	Exciter Stator	1500 Volts
	Exciter Rotor	1500 Volts
	PMG Stator	1500 Volts
401.1a	Stator Resistance, Line to Line	
	High Wye Connection	0.0132 Ohms
	Rotor Resistance	0.376 Ohms
	Exciter Stator	23 Ohms
	Exciter Rotor	0.045 Ohms
	PMG Stator	2.1 Ohms
410.1a	No Load Exciter Field Amps at 240/480 Volts Line to Line	0.7 A DC
420.1a	Short Circuit Ratio	0.647
421.1a	Xd Synchronous Reactance	3.06 pu
		1.184 ohms
422.1a	X2 Negative Sequence React.	0.234 pu
		0.091 ohms
423.1a	X0 Zero Sequence Reactance	0.056 pu
		0.022 ohms
425.1a	X'd Transient Reactance	0.176 pu
		0.068 ohms
426.1a	X"d Subtransient Reactance	0.148 pu
		0.057 ohms
–	Xq Quadrature Synchronous	1.14 pu
		0.442 ohms
427.1a	T'd Transient Short Circuit Time Constant	0.121 sec.
428.1a	T"d Subtransient Short Circuit Time Constant	0.012 sec.
430.1a	T'do Transient Open Circuit Time Constant	1.77 sec.
432.1a	Ta Short Circuit Time Constant of Armature Winding	0.021 sec.

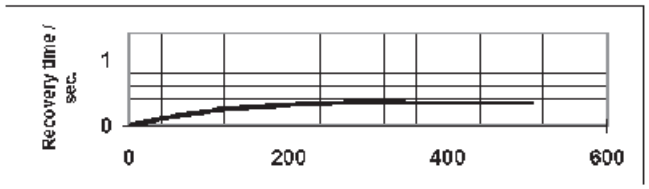
Mil-Std-705B Method	Description	Value
505.3b	Overspeed	2250 RPM
507.1c	Phase Sequence CCW-ODE	ABC
508.1c	Voltage Balance, L-L or L-N	0.20%
601.4a	L-L Harmonic Maximum - Total (Distortion Factor)	5.0%
601.4a	L-L Harmonic Maximum - Single	3.0%
601.1c	Deviation Factor	5.0%
--	TIF (1960 Weightings)	< 50
--	THF (IEC, BS & NEMA Weightings)	< 2 %
652.1a	Shaft Current	< 0.1 ma
--	Main Stator Capacitance to ground	0.019 mfd
	Additional Prototype Mil-Std Methods are Available on Request.	
--	Generator Frame	572
--	Type	MAGNAMAXDVR
--	Insulation	Class H
--	Coupling - Single Bearing	Flexible
--	Amortisseur Windings	Full
--	Excitation	Ext. Voltage Regulated, Brushless
--	Cooling Air Volume	1550 CFM
--	Heat rejection rate	1860 Btu's/min
--	Full load current	714 amps
--	Minimum Input hp required	680.8
	Efficiency at rated load :	93.6%
--	Full load torque	1986 Lb-ft

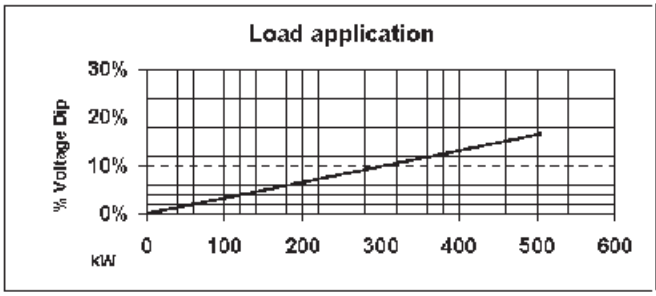
* Voltage refers to wye (star) connection, unless otherwise specified.

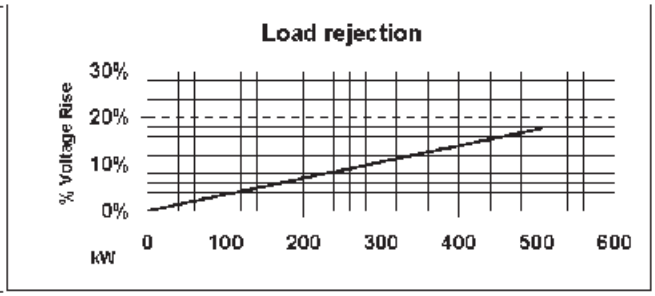
TYPICAL DYNAMIC CHARACTERISTICS

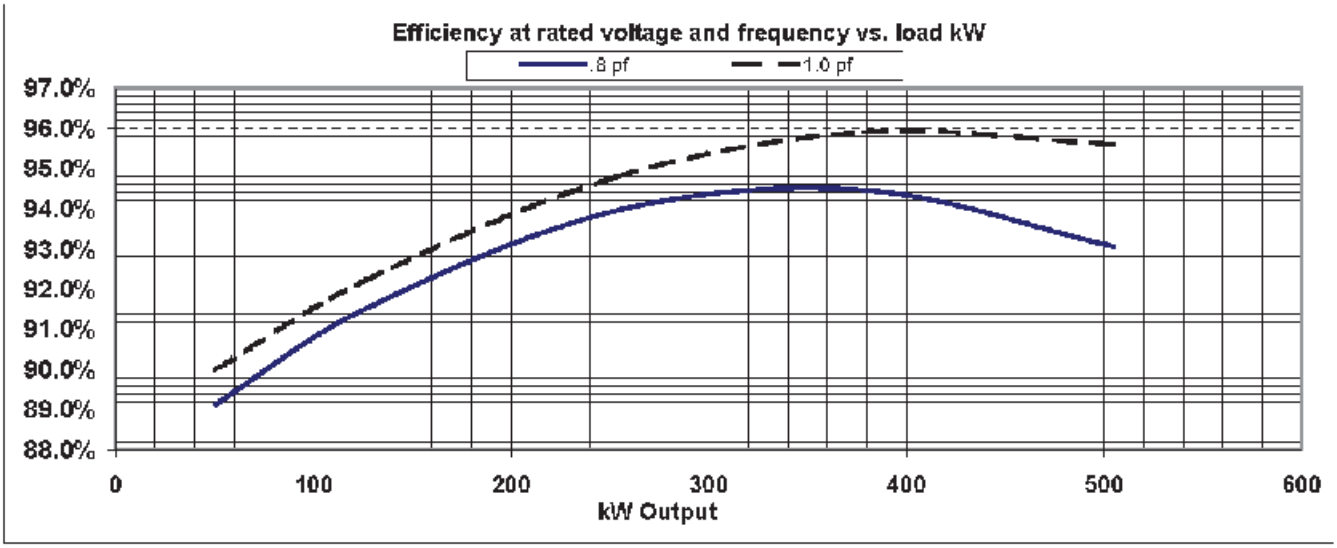
Alternator Model: 5M4024

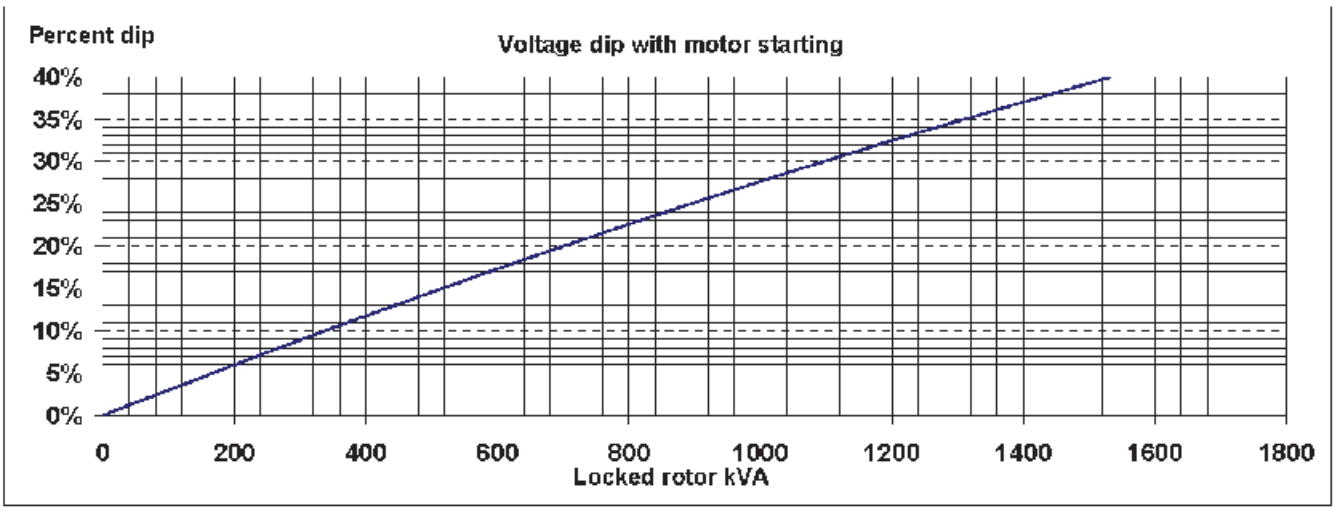








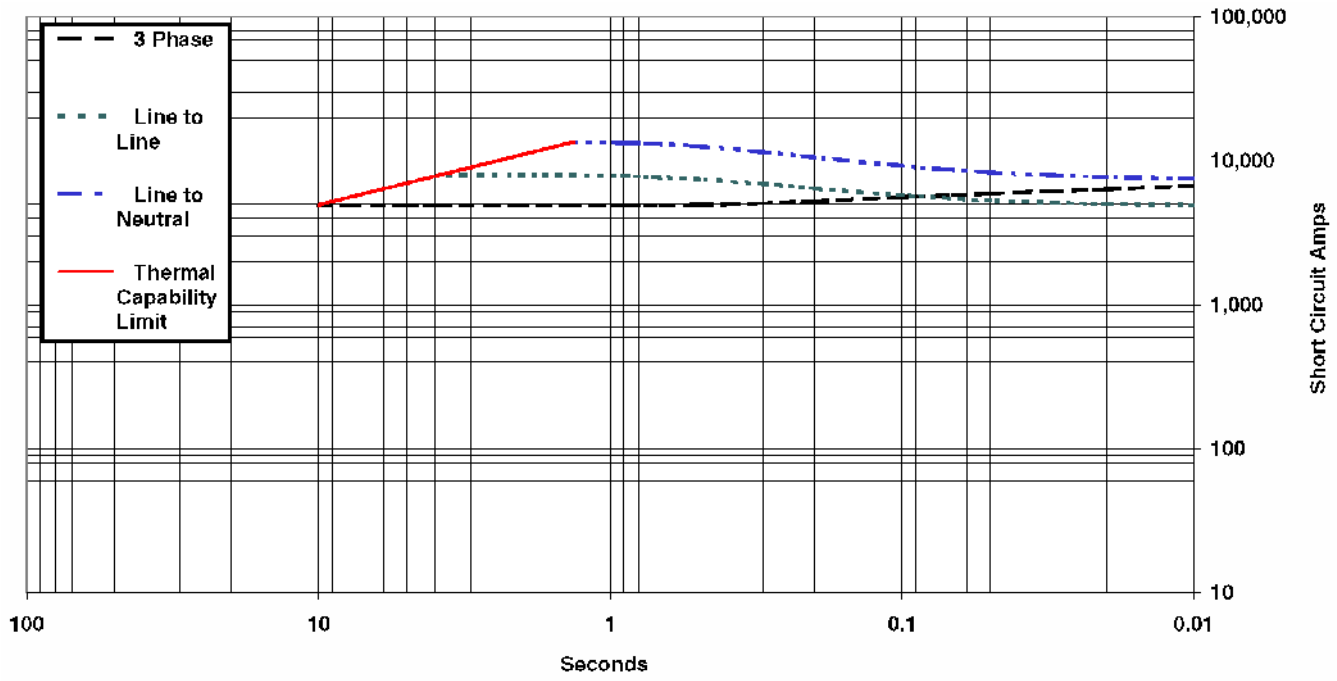




Voltage refers to wye (star) connection, unless otherwise specified.

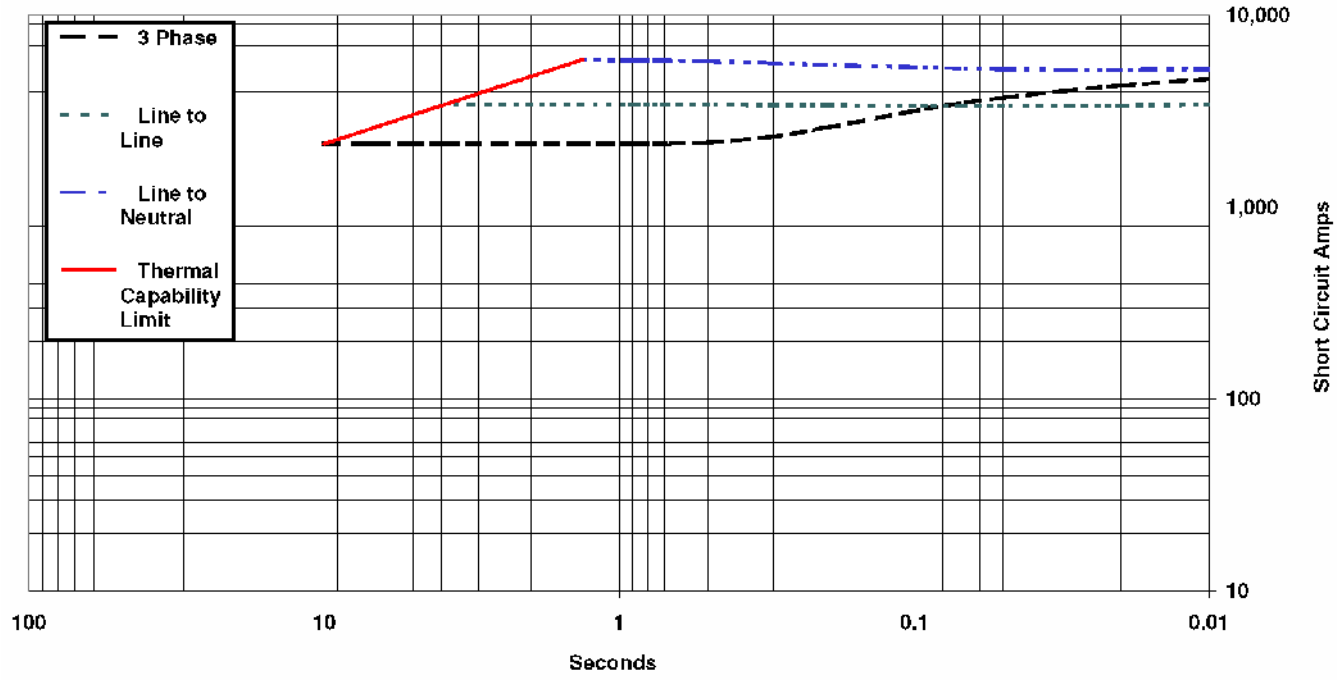
5M4024, 60 Hz, Low Wye or Delta Connection
SHORT CIRCUIT DECREMENT CURVE

Full Load Current: 1649 Amps **Steady State S.C. Current:** 4947 Amps **Max. 3 ph. Symm. S.C. Current:** 8328 Amps



5M4024, 60 Hz, High Wye Connection
SHORT CIRCUIT DECREMENT CURVE

Full Load Current: 714 Amps **Steady State S.C. Current:** 2142 Amps **Max. 3 ph. Symm. S.C. Current:** 4824 Amps



NOTE: Symmetrical component values are shown, maximum asymmetrical values are 1.732 times the symmetrical values.

KOHLER®

Sound Data

TECHNICAL INFORMATION BULLETIN

Generator Set Sound Data Sheet

			Sound Pressure Data in dB(A)			
Generator Set Model	**Hz**	**Load**	**Raw Exhaust**	**Open Unit, Isolated Exhaust**	**Weather Enclosure**	**Sound Enclosure**
400REZXB	60	100% Load	97.9	89.8	87.9	70.8
		No Load	95.9	89.3	87.4	69.6

Note: Sound pressure data is the logarithmic average of eight perimeter measurement points at a distance of 7 m (23 ft.), except Raw Exhaust data which is a single measurement point at 1 m (3.3 ft.) from the mouth of a straight pipe exhaust.

400REZXB **60 Hz**

				Sound Pressure Levels dB(A)								
				Octave Band Center Frequency (Hz)								Overall Level
Load	Distance, m (ft.)	Enclosure	Measurement Position	63	125	250	500	1000	2000	4000	8000	
100% Load	7 (23)	Sound	Right	58.8	61.0	65.0	62.6	61.1	60.4	55.4	52.1	70.0
			Front-Right	59.9	63.5	62.2	63.3	63.6	59.7	53.3	47.5	70.2
			Front	53.8	60.1	60.7	65.4	63.1	59.8	52.8	45.0	69.6
			Front-Left	61.0	64.3	63.8	65.4	64.3	61.5	56.6	49.3	71.6
			Left	60.2	63.9	63.5	64.9	62.3	63.5	59.9	55.0	71.5
			Back-Left	55.9	60.8	65.8	65.3	61.9	63.6	60.9	54.0	71.5
			Back	62.4	65.4	62.9	61.7	57.5	56.7	51.1	44.1	69.9
			Back-Right	59.3	63.6	66.0	65.7	61.8	63.2	57.3	53.5	71.8
			8-pos. log avg.	59.6	63.2	64.1	64.5	62.3	61.6	57.1	51.6	70.8

				Sound Pressure Levels dB(A)								
Load	Distance, m (ft.)	Enclosure	Measurement Position	Right	Front-Right	Front	Front-Left	Left	Back-Left	Back	Back-Right	8-pos. log avg.
100% Load	7 (23)	Weather	Overall Levels	89.4	88.7	87.0	88.0	86.5	88.0	85.8	88.7	87.9

				Sound Pressure Levels dB(A)								
				Octave Band Center Frequency (Hz)								Overall Level
Load	Distance, m (ft.)		Measurement Position	63	125	250	500	1000	2000	4000	8000	
100% Load	7 (23)	Open Unit, Isolated Exhaust	Right	65.2	73.2	78.9	86.1	85.1	85.2	80.5	78.2	91.3
			Front-Right	63.4	69.4	78.2	82.5	86.9	84.2	79.9	76.8	90.6
			Front	68.1	72.9	80.2	79.5	85.6	81.6	76.3	70.3	88.9
			Front-Left	62.7	69.6	78.2	81.5	86.2	83.3	79.3	76.4	89.9
			Left	69.1	74.3	74.1	79.7	83.4	82.9	79.5	76.2	88.4
			Back-Left	62.6	71.2	76.5	81.0	85.7	84.1	80.0	78.2	89.9
			Back	67.4	72.7	77.9	79.9	81.3	83.7	74.7	69.9	87.7
			Back-Right	71.7	76.2	76.9	80.7	87.0	84.2	80.1	76.9	90.6
			8-pos. log avg.	67.4	73.0	77.9	81.9	85.5	83.8	79.2	76.2	89.8

			Sound Pressure Levels dB(A)								
			Octave Band Center Frequency (Hz)								Overall Level
Load	Distance, m (ft.)	Exhaust	63	125	250	500	1000	2000	4000	8000	
100% Load	1 (3.3)	Raw Exhaust (No Silencer)	79.2	83.8	86.0	91.7	93.3	90.5	87.8	82.5	97.9

400REZXB	60 Hz

Load	Distance, m (ft.)	Enclosure	Measurement Position	Sound Pressure Levels dB(A)								
				Octave Band Center Frequency (Hz)								Overall Level
				63	125	250	500	1000	2000	4000	8000	
No Load	7 (23)	Sound	Right	57.1	56.9	59.3	59.9	59.0	58.5	55.1	49.1	66.8
			Front-Right	57.9	61.3	60.4	62.4	63.4	57.8	52.5	45.6	68.9
			Front	56.1	60.5	59.5	64.3	62.9	59.3	50.8	41.7	69.1
			Front-Left	60.6	64.2	63.9	64.2	63.8	60.6	55.9	46.5	71.1
			Left	58.4	62.2	63.6	63.1	60.1	62.4	59.6	52.4	70.2
			Back-Left	52.9	58.3	64.9	64.5	60.9	62.5	60.8	52.0	70.5
			Back	62.2	65.0	59.1	61.5	56.8	54.8	50.9	43.1	69.1
			Back-Right	60.1	63.8	62.2	63.1	60.2	60.2	56.7	51.0	69.9
			8-pos. log avg.	58.9	62.3	62.2	63.1	61.4	60.1	56.7	49.1	69.6

Load	Distance, m (ft.)	Enclosure	Measurement Position	Sound Pressure Levels dB(A)								
				Right	Front-Right	Front	Front-Left	Left	Back-Left	Back	Back-Right	8-pos. log avg.
No Load	7 (23)	Weather	Overall Levels	88.7	88.4	86.9	87.9	86.3	87.7	83.1	88.3	87.4

Load	Distance, m (ft.)		Measurement 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	Right	67.4	73.0	77.3	85.3	85.5	83.8	80.9	71.9	90.6
			Front-Right	62.1	69.1	75.5	80.4	87.4	84.1	79.9	73.0	90.3
			Front	66.1	71.8	79.2	78.2	85.7	82.0	76.3	69.4	88.8
			Front-Left	63.9	69.5	77.5	80.2	86.5	83.6	79.0	71.4	89.8
			Left	65.2	71.3	72.7	77.4	84.7	82.5	79.3	70.0	88.2
			Back-Left	65.8	72.5	76.7	79.9	86.1	83.7	79.6	71.9	89.6
			Back	63.4	69.5	73.1	79.4	80.1	77.9	74.3	66.5	85.0
			Back-Right	72.0	76.2	76.5	78.0	87.2	83.9	80.0	73.1	90.2
			8-pos. log avg.	66.9	72.3	76.5	80.6	85.8	83.0	79.1	71.3	89.3

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	
No Load	1 (3.3)	Raw Exhaust (No Silencer)	64.4	78.0	85.3	89.4	92.0	88.9	83.7	76.8	95.9

KOHLER®

Exhaust System Data

TECHNICAL INFORMATION BULLETIN

Enclosed Generator Set Exhaust System Data Sheet

Model	Enclosure Type	Consumed Back Pressure (in H20)	Consumed Back Pressure (in Hg)	Back Pressure Limit(s) (in H20)	Back Pressure Limit(s) (in Hg)	Flex Exhaust Tube(s)	Silencer	Drawing
400REZXB	All Weather and Sound Enclosures	29.0	2.1	40.8	3.0	GM69644 Flex Tube (Left Side) GM69645 Flex Tube (Right Side) Doosan Supplied Dual Catalysts GM73955 Dual Flex Tubes	GM64224 Dual Mufflers	ADV-7989

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®

PSI 2020 Stationary & Mobile 60 Hz Certified Power Generation Rating Data															
Generator Model	**Engine**	**Speed**	**Freq**	**Fuel**	**Duty Cycle**	**BHP**	**KWm**	**Flywheel power [2,3]**		**Engine Family**	**C02[6]**	**NOx[6]**	**CO[6]**	**VOC[6,7]**	**bsfc[5]**	**Catalyst**
		RPM	**Hz**					**HP**	**kW**		**(g/KW-hr)**	**(g/KW-hr)**	**(g/kW-hr)**	**(g/kW-hr)**	**(g/kW-hr)**	
400REZXB	D219TIC, 21.9L	1800	60	NG	Emergency/Non-Emergency	605	451	650	484.7	LPSIB21.9NGP	881.3	0.08	0.13	0.01	0.22	Yes
	D219TIC, 21.9L	1800	60	LP	Emergency	605	451	472	352.0	LPSIB21.9NGP	590.7	0.03	0.34	0.05	0.27	Yes

[1] Standby and overload ratings based on ISO3046. Continuous ratings based on ISO 8528.

[2] All ratings are gross flywheel horsepower corrected to 77ºF at an altitude of 328 feet with no cooling fan or alternator losses using heating value for NG of 1015 BTU/SCF.

[3] Production tolerances in engines and installed components can account for power variations of +/- 5%. Altitude, temperature and excessive exhaust and intake restrictions should be applied to power calculations.

[4] Electrical ratings are an estimated based on assumed fan and generator losses and may vary depending on actual equipment losses.

[5] Bsfc is based on 100% gross flywheel power rating and does not include fan or generator losses.

[6] Emissions shown are certified third-party Zero-hour data points suitable for site permitting calculations

[7] For NG, NMHC is reported in place of VOC for this report

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2020 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: Power Solutions International, Inc.
(U.S. Manufacturer or Importer)

Certificate Number: LPSIB21.9NGP-020

Effective Date: 10/02/2019

Expiration Date: 12/31/2020

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 10/02/2019

Revision Date: N/A

Manufacturer: Power Solutions International, Inc.
Engine Family: LPSIB21.9NGP
Mobile/Stationary Certification Type: Mobile and Stationary
Fuel : LPG/Propane
Natural Gas (CNG/LNG)
Emission Standards :
Part 60 Subpart JJJ Table 1
CO (g/Hp-hr) : 2.0
VOC (g/Hp-hr) : 0.7
NOx (g/Hp-hr) : 1.0
Mobile Part 1048
HC + NOx (g/kW-hr) : 2.7
CO (g/kW-hr) : 4.4
NMHC + NOx (g/kW-hr) : 2.7
Stationary Part 1048
NMHC + NOx (g/kW-hr) : 2.7
HC + NOx (g/kW-hr) : 2.7
CO (g/kW-hr) : 4.4
Emergency Use Only : N

Pursuant to Section 213 of the Clean Air Act (42 U.S.C. section 7547) and 40 CFR Part 1048, 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 1048, 40 CFR Part 60 and produced in the stated model year.

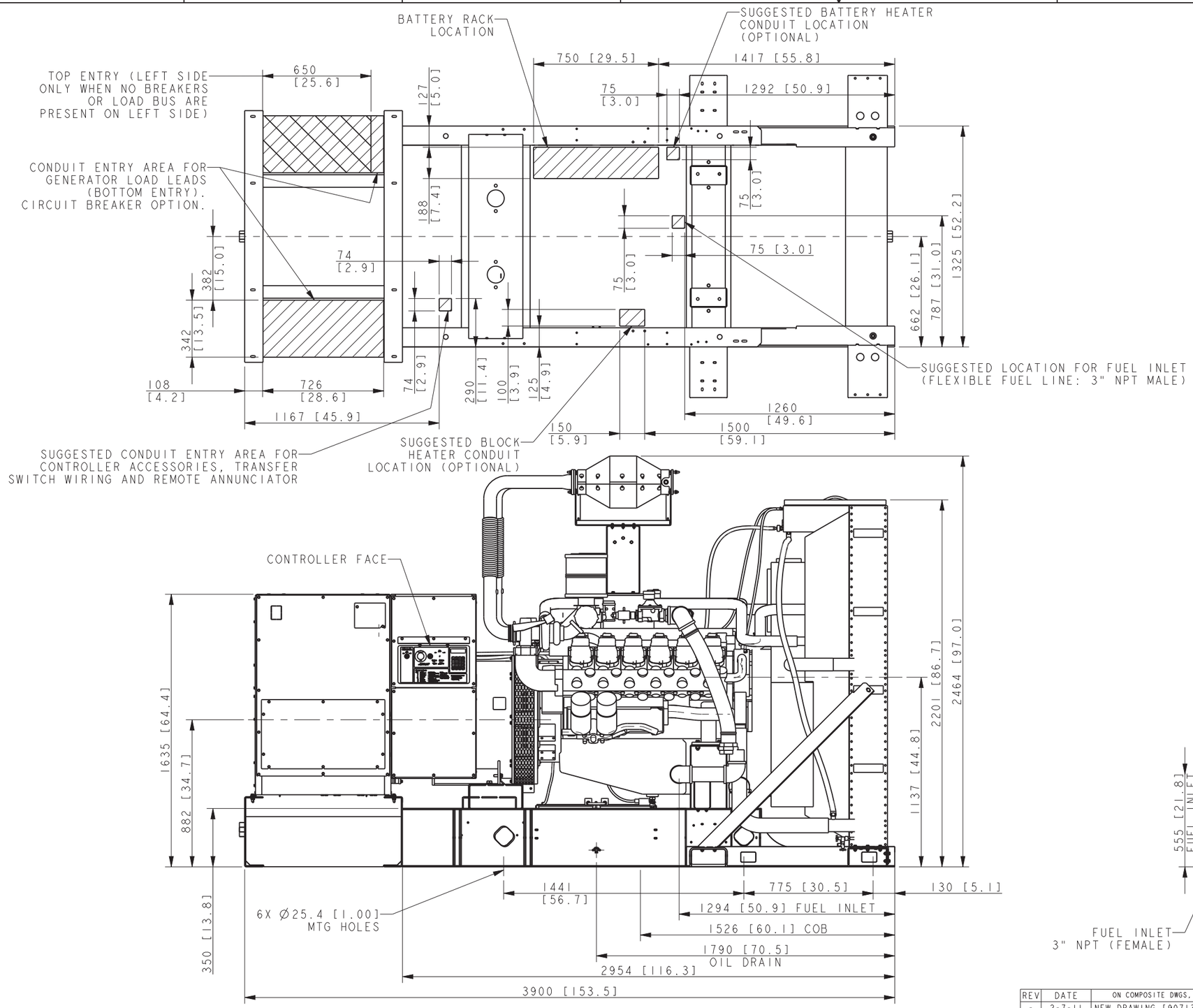
This certificate of conformity covers only those new nonroad spark-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 1048, 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 1048, 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 1048, 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 1048, 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



ALTERNATOR FRAME	CONNECTION
~~4M4200~~	~~4 LEAD~~
5M4024	10 LEAD
~~5M4027~~	~~12 LEAD~~
5M4160	4 LEAD
5M4028	10 LEAD
5M4270	4 LEAD

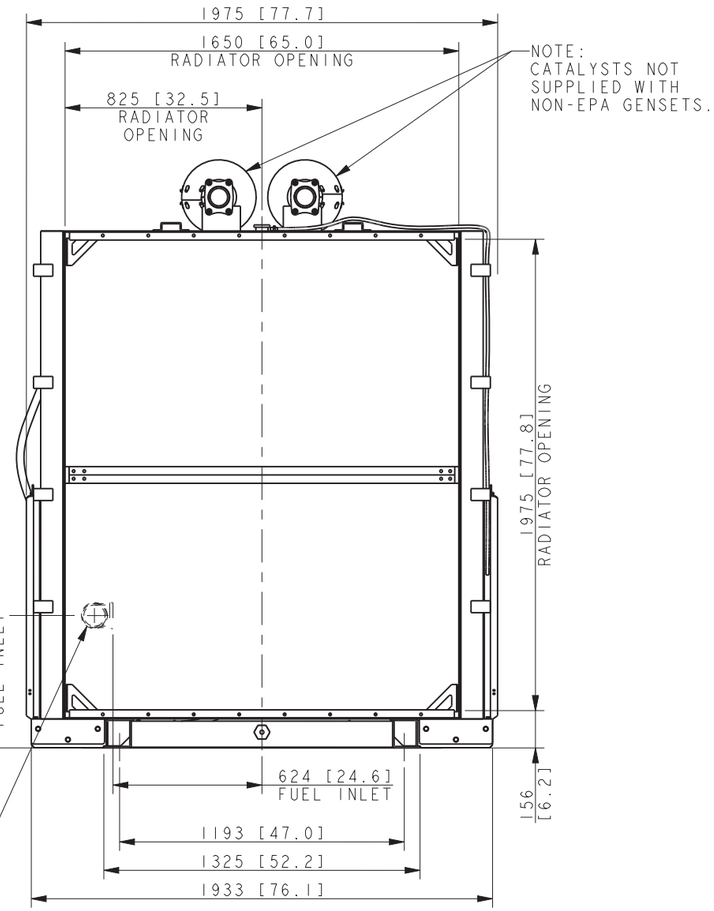
ALL LEAD CONNECTIONS USE 10MM [3/8] HARDWARE.

NOTES:

1) DIMENSIONS IN [] ARE INCH EQUIVALENTS.

2) WHEN A HOUSING IS USED THE FUEL LINE MUST BE STUBBED UP FROM DIRECTLY UNDER THE UNIT OR BROUGHT IN FROM THE END OF SKID

MAX. WEIGHT (WET) 4170 KG [9175 LBS] LESS ACCESSORIES



400 & 450 MODEL RECONNECTABLE 380V, 600V ALT 22 LITER DOOSAN, EPA & NON-EPA

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	2-7-11	NEW DRAWING [90713-3]	AWK
A	5-18-11	(D-7/8) TOP CONDUIT ENTRY AREA ADDED;	
		(C/D-7/8) 726 WAS 706, 108 WAS 118, 382 WAS	
		392, 342 WAS 322 [91691]	AWK
B	11-19-18	(A-4) 400 & 450 WAS 400; (D-2) 5M4028 &	
		5M4270 ADDED; (A-1) DRAWING DESCRIPTION	
		UPDATED; SEE SHEET 2 & 3 [CTI91432]	SLR

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

APPROVALS		DATE
DRAWN	AWK	2-7-11
CHECKED	CWF	2-7-11
APPROVED	WRD	2-7-11

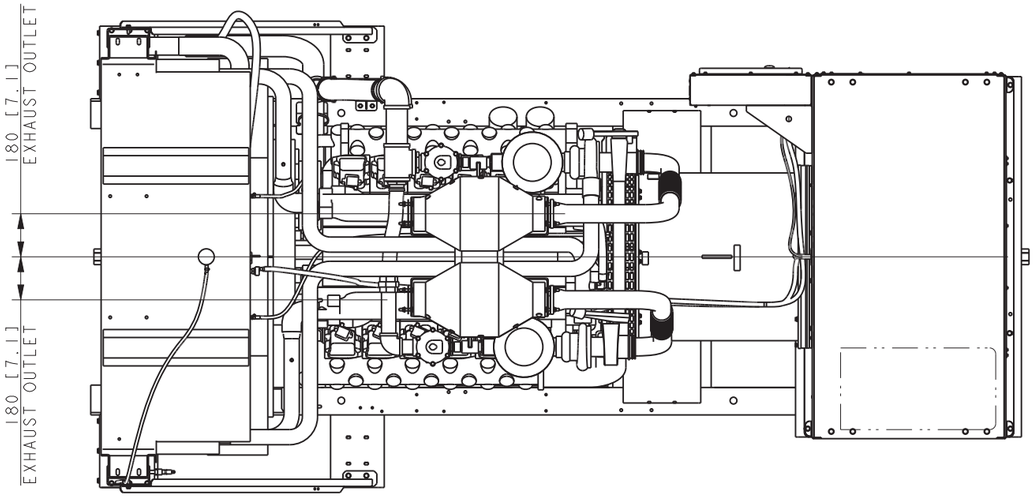
KOHLER CO. METRIC | PRO-E

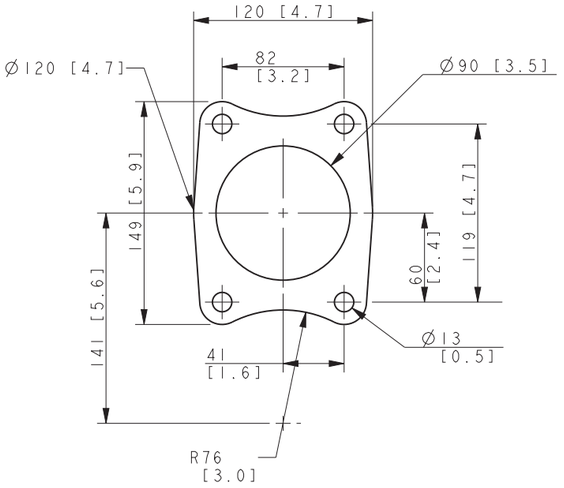
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

TITLE: **DIMENSION PRINT, 400 & 450 REZXB/RZXB**

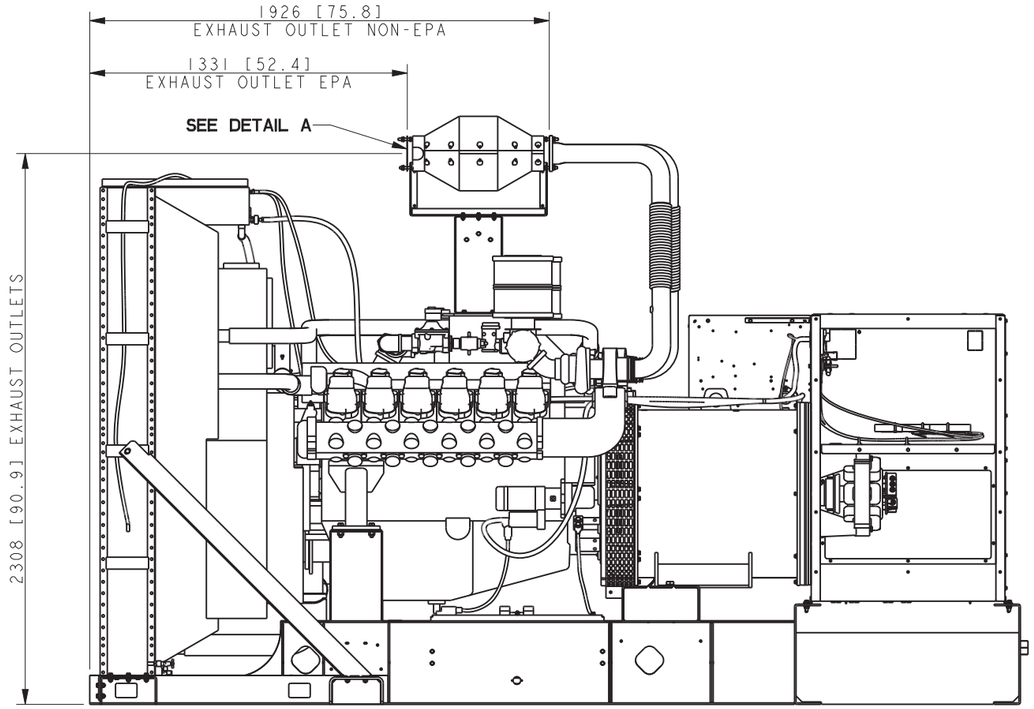
SCALE 0.08 | CAD NO. | SHEET 1 of 3

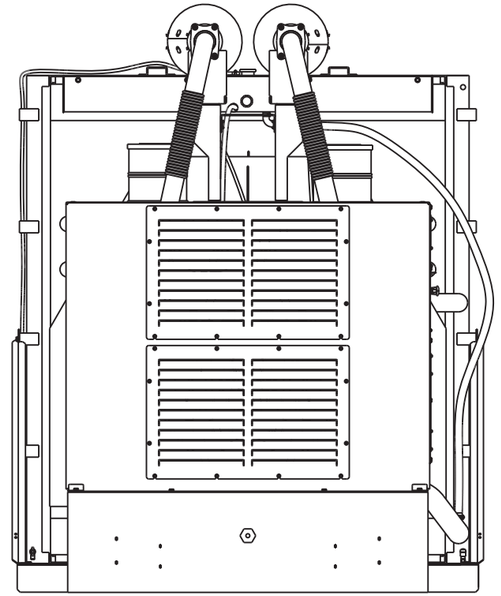
DWG NO. **ADV-7989** | **D**





DETAIL A
EXHAUST OUTLETS
SCALE 0.50





REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	2-7-11	NEW DRAWING [90713-3]	AWK
A	5-18-11	SEE SHEET 1 [91691]	AWK
B	11-19-18	(A-4) 400 & 450 WAS 400; SEE SHEET 1 & 3 [CTI91432]	SLR

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

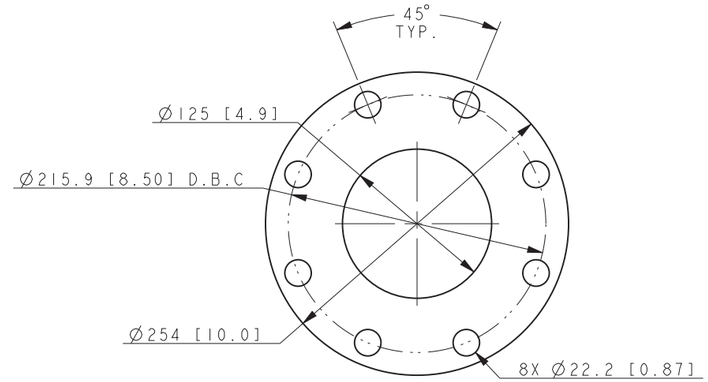
APPROVALS		DATE
DRAWN	AWK	2-7-11
CHECKED	CWF	2-7-11
APPROVED	WRD	2-7-11

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

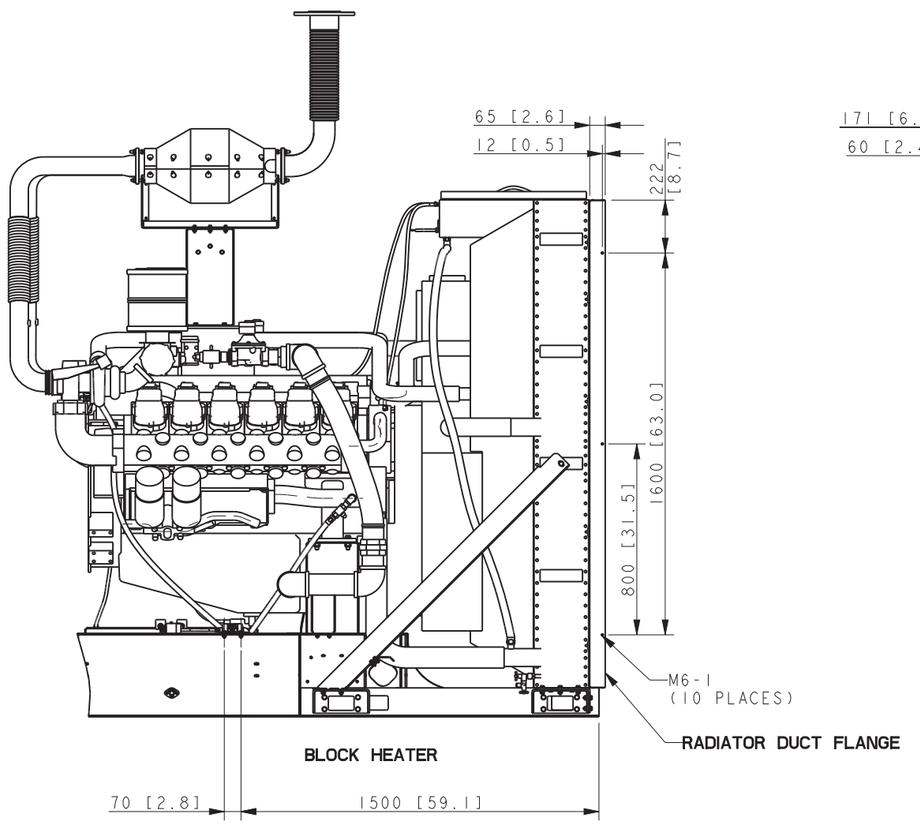
TITLE
DIMENSION PRINT, 400 & 450 REZXB/RZXB

SCALE 0.08 | CAD NO. | SHEET 2 of 3
DWG NO. **ADV-7989** | **D**

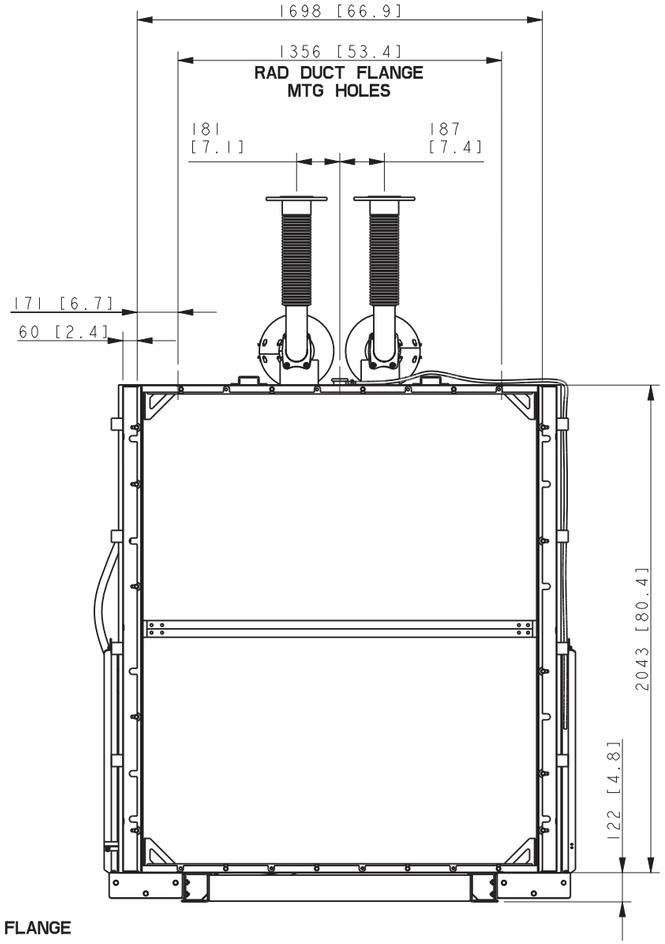
400 & 450 MODEL
RECONNECTABLE
380V, 600V ALT
22 LITER DOOSAN, EPA & NON-EPA

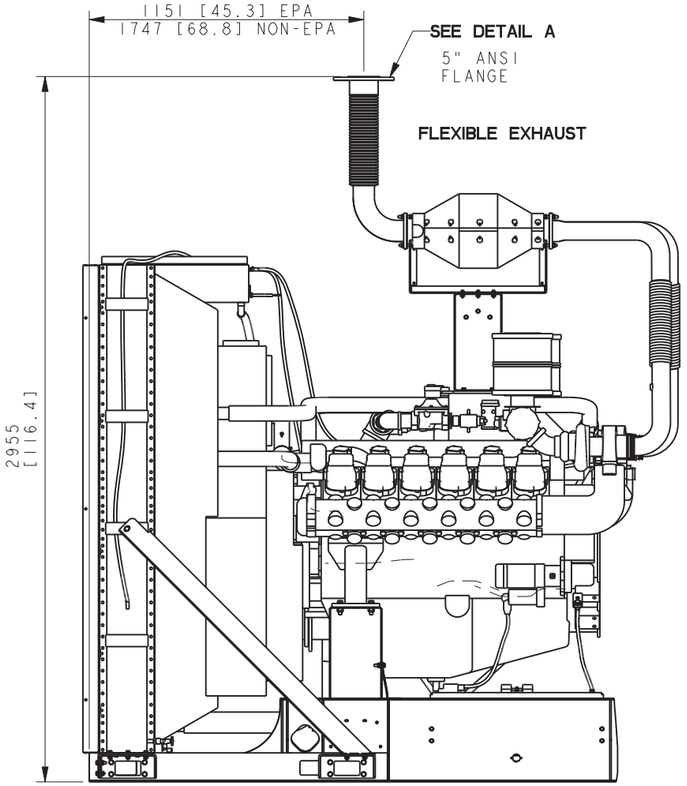


DETAIL A



BLOCK HEATER





NOTES:
DIMENSIONS IN [] ARE INCH EQUIVALENTS.

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	4-21-09	NEW DRAWING [88272-6]	DJG
A	11-19-18	(A-4) 400 & 450 WAS 400; (A-1) DRAWING	
		DESCRIPTION UPDATED [CT191432]	SLR
B	2-11-19	(C-1,2) 5" ANSI FLANGE WAS 4" NPT (MALE);	
		(D-1,2) DETAIL VIEW A ADDED [CT193325]	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 √ MAX.

THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	DJG	4-21-09
CHECKED	CWF	4-21-09
APPROVED	JAS	4-21-09

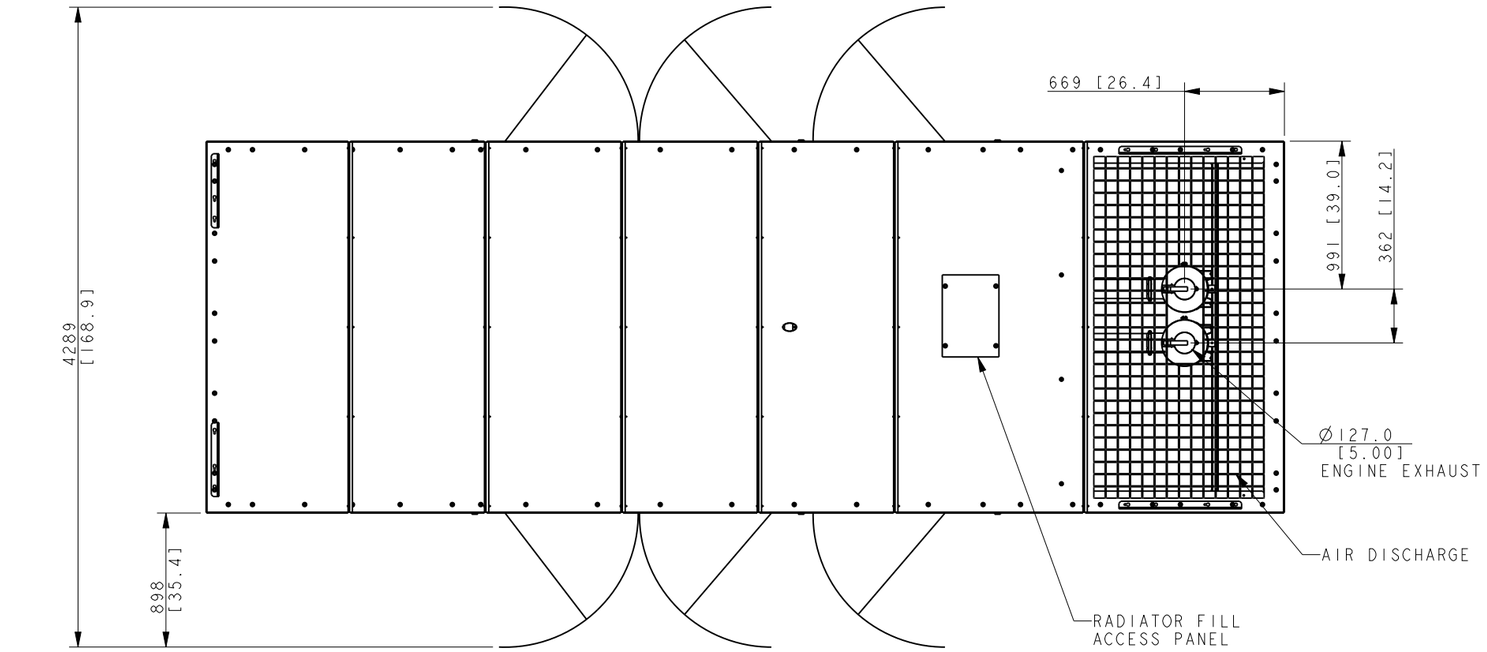
TITLE: DIMENSION PRINT, 400 & 450 REZX

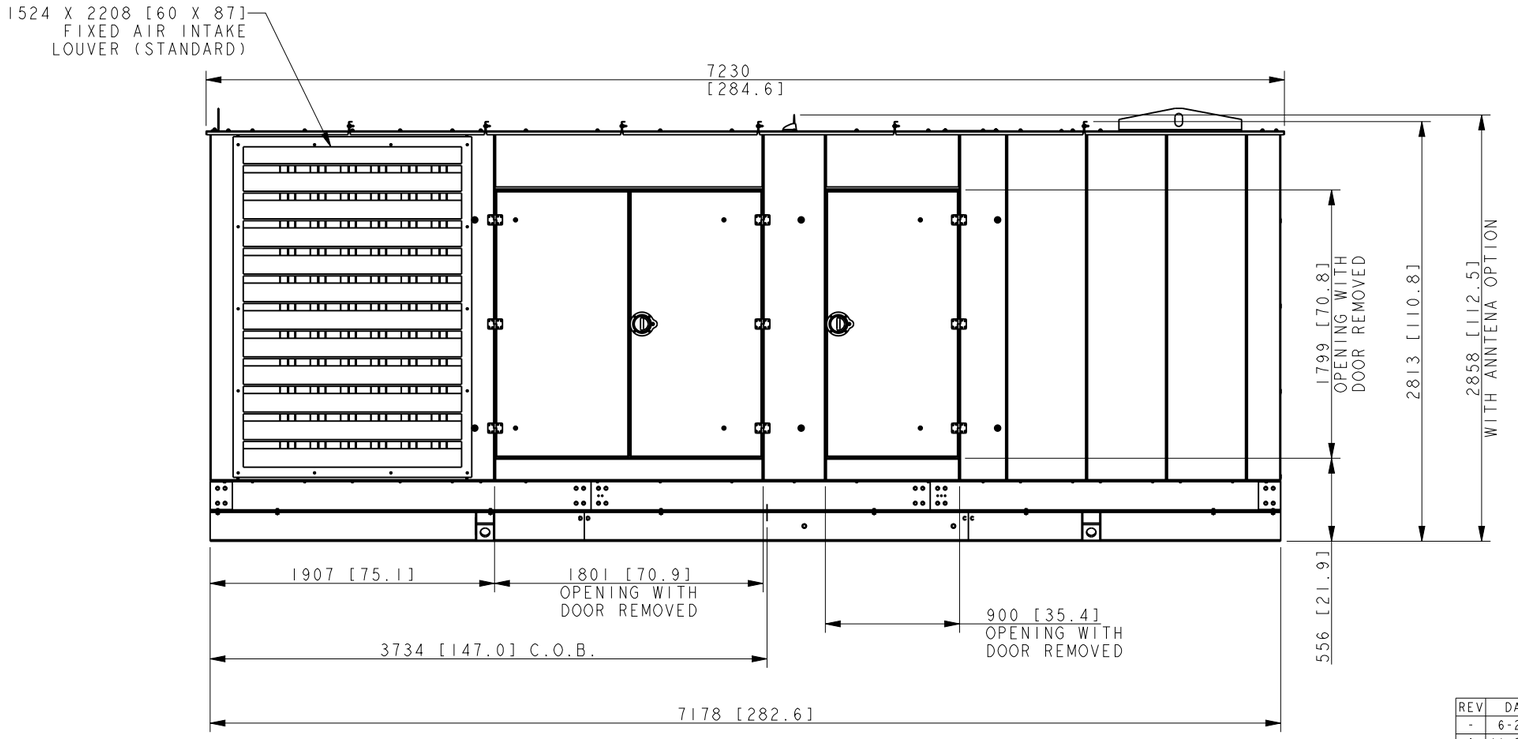
SCALE 0.40 | CAD NO. | SHEET 1 of 1

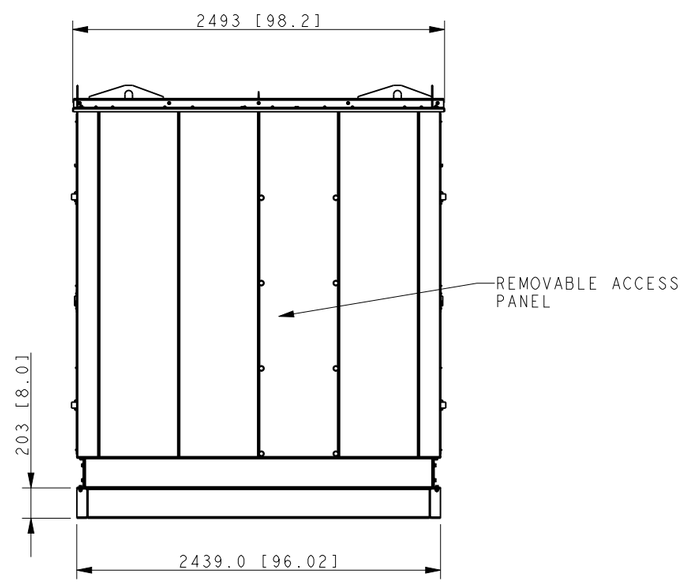
DWG NO. ADV-7701 | D

400 & 450 MODEL
RECONNECTABLE
380V, 600V ALT
22 LITER DOOSAN, EPA & NON-EPA

MODEL	ENCLOSURE WEIGHT	
400 REZXB / 400 RZXB	STEEL WEATHER	2327 Kg [5120 LBS]
	STEEL SOUND	2555 Kg [5620 LBS]
	ALUMINUM SOUND	1873 Kg (4120 LBS)







REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	6-2-11	NEW DRAWING [90394]	GFR
A	11-25-13	SEE SHEET 3 [CT64662]	SAM
B	9-27-17	(C-4) DIM. Ø127.0 [5.00] ADDED [CT177004]	SRM

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	GFR	6-2-11
CHECKED	JMS	6-2-11
APPROVED	AJD	6-2-11

KOHLER CO. METRIC | PRO-E

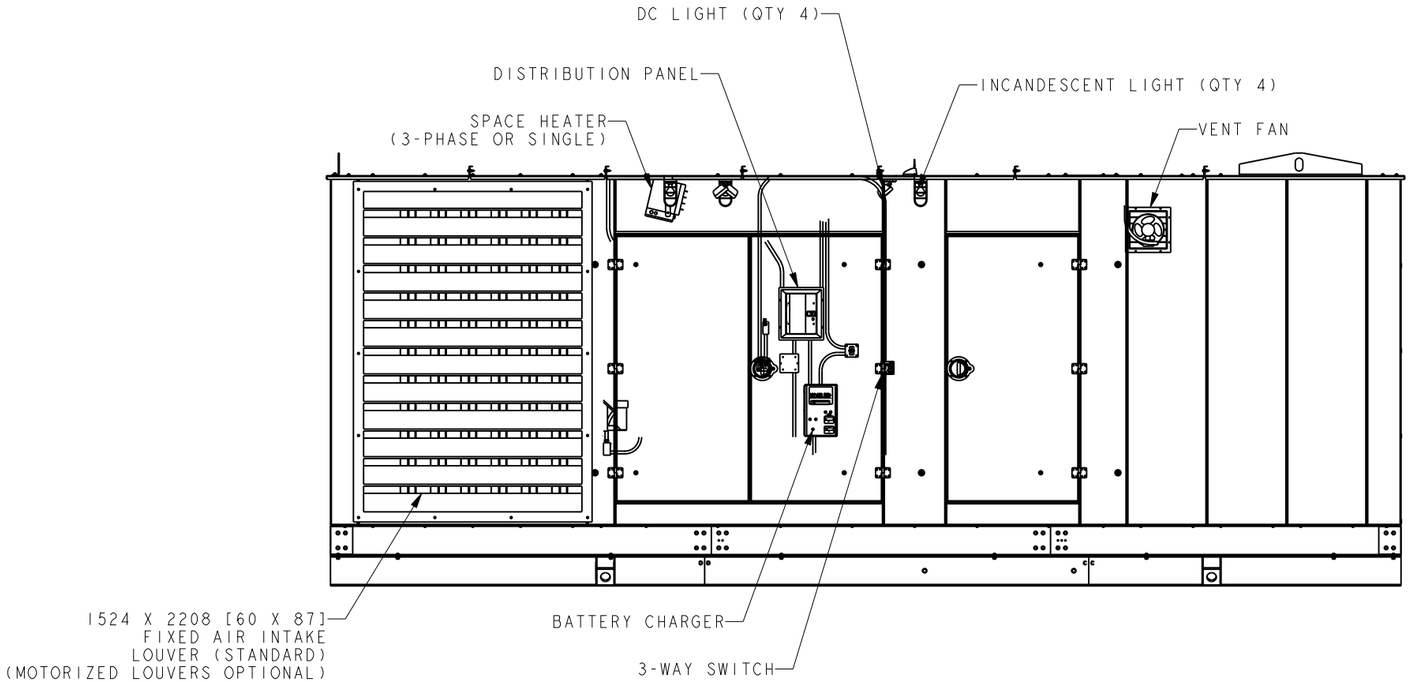
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

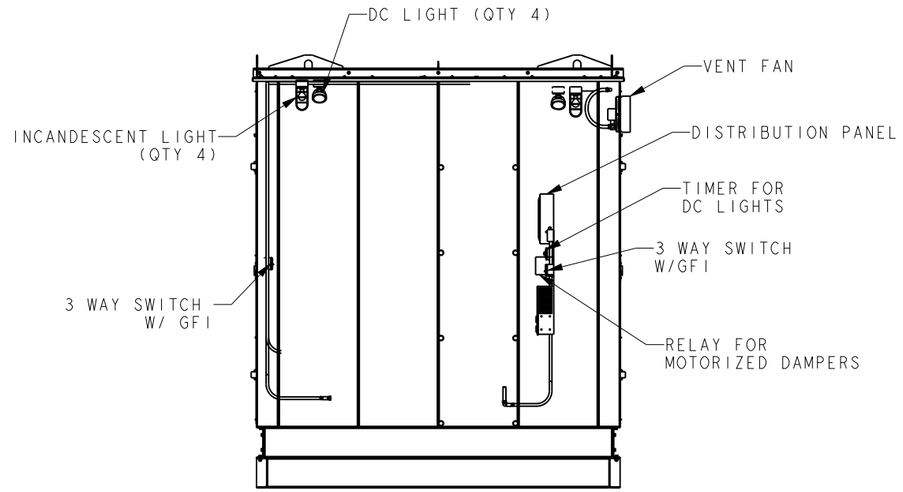
TITLE
DIMENSION PRINT

SCALE 0.05 | CAD NO. | SHEET 1 of 3

DWG NO. ADV-8163 | D

400 kW DOOSAN ENCLOSURE WITH LIFTING BASE





400 kW DOOSAN ENCLOSURE
ELECTRICAL OPTIONS

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	6-2-11	NEW DRAWING [90394]	GFR
A	11-25-13	SEE SHEET 3 [CT64662]	SAM
B	9-27-17	SEE SHEET 1 [CT177004]	SRM

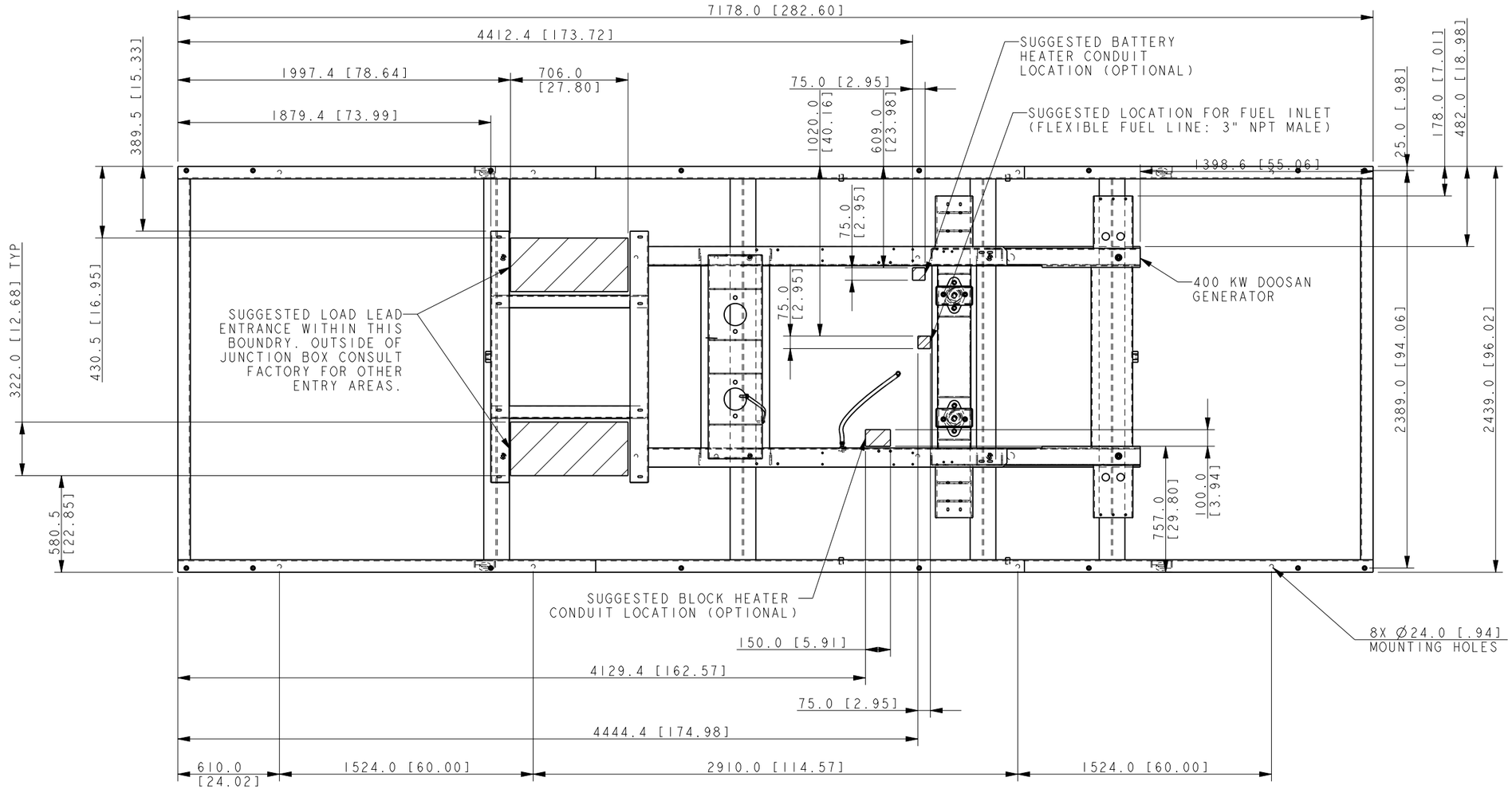
UNLESS OTHERWISE SPECIFIED -
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X.XX ± 0.25
X.X ± 1.0
X ± 1.5
ANGLES ± 0° 30'
SURFACE FINISH MAX.
THIRD ANGLE PROJECTION

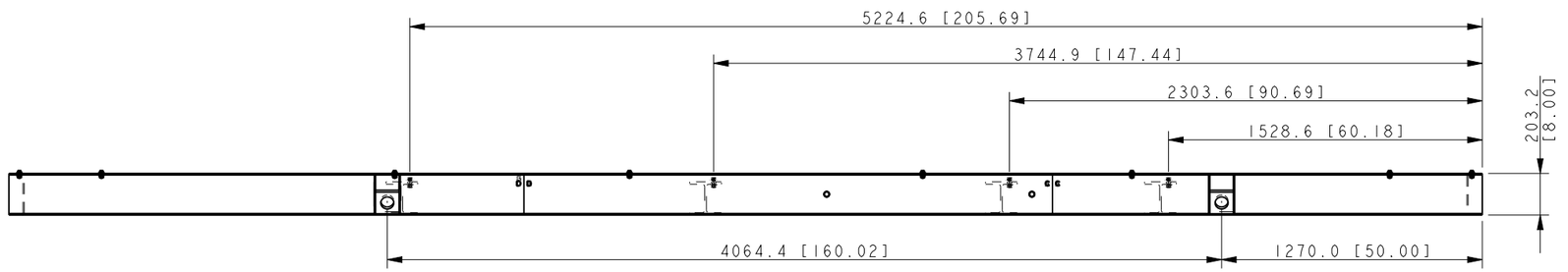
APPROVALS		DATE
DRAWN	GFR	6-2-11
CHECKED	JMS	6-2-11
APPROVED	AJD	6-2-11

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

TITLE
DIMENSION PRINT

SCALE 0.05 | CAD NO. | SHEET 2 of 3
DWG NO. **ADV-8163** | **D**





REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	6-2-11	NEW DRAWING [90394]	GFR
A	11-25-13	(C-3) DIM'S TO HOLES ADDED [CT64662]	SAM
B	9-27-17	SEE SHEET 1 [CT177004]	SRM

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 GFR	6-2-11
CHECKED JMS	6-2-11
APPROVED AJD	6-2-11

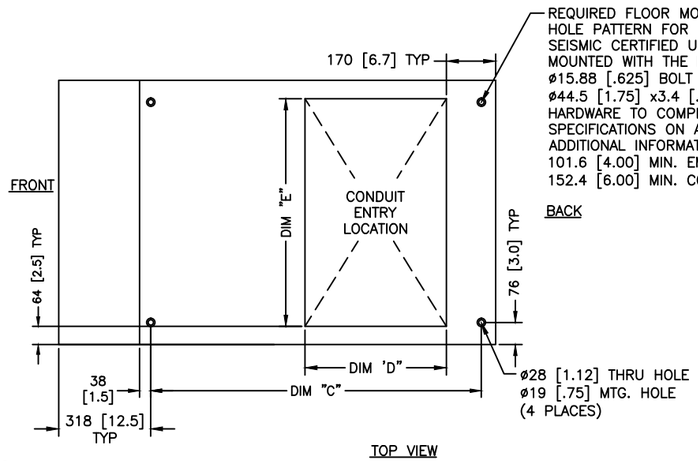
KOHLER CO. METRIC PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

TITLE
DIMENSION PRINT

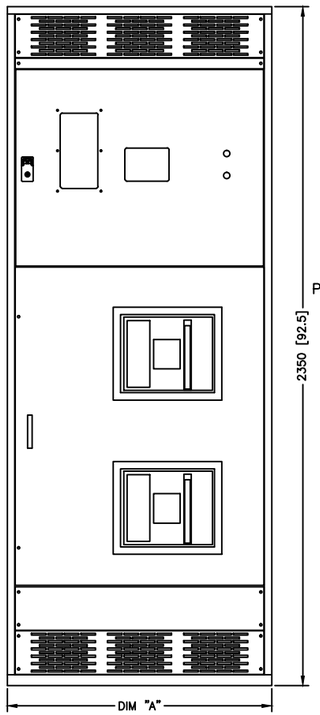
SCALE 0.07 | CAD NO. | SHEET 3 of 3
DWG NO. ADV-8163 | D

SCREW TYPE TERMINALS FOR EXTERNAL POWER CONNECTIONS			
SWITCH RATING (AMPS)	RANGE OF AL/CU WIRE SIZE		
	CIRCUIT BREAKER PER PHASE	NEUTRAL	GROUND
800	(3) 3/0–750 kcmil	(9) 3/0–750 kcmil	(3) #6–250 kcmil
1000	(4) 3/0–750 kcmil	(12) 3/0–750 kcmil	(3) #6–250 kcmil
1200	(4) 3/0–750 kcmil	(12) 3/0–750 kcmil	(3) #6–250 kcmil
1600	(5) 3/0–750 kcmil	(15) 3/0–750 kcmil	(3) #6–250 kcmil
2000	(6) 3/0–750 kcmil	(18) 3/0–750 kcmil	(3) #6–250 kcmil
2500	(8) 3/0–750 kcmil	(24) 3/0–750 kcmil	(3) #6–250 kcmil
3000	(9) 3/0–750 kcmil	(27) 3/0–750 kcmil	(3) #6–250 kcmil
4000	(12) 3/0–750 kcmil	(36) 3/0–750 kcmil	(3) #6–250 kcmil

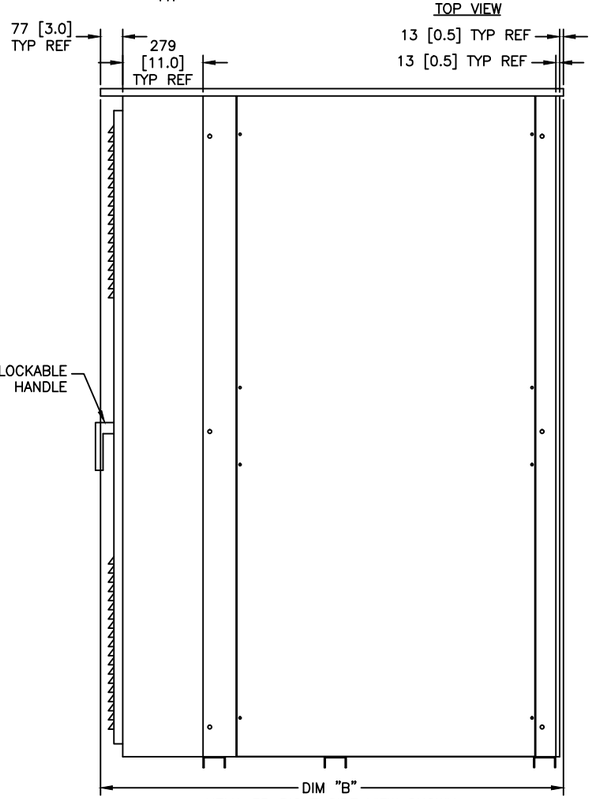
REV	DATE	REVISION	BY
–	8–28–13	NEW DRAWING [CT54441]	BTW
A	2–17–15	(C–2) MTG. HOLES DIM C, 2500–4000 AMPS: 1449 [57.0] WAS 1754 [69.0]; [CT106772]	BTW



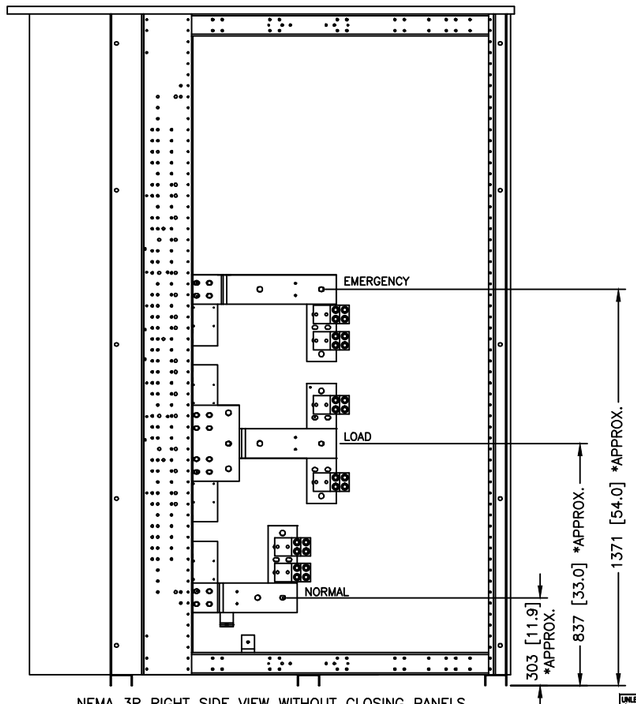
ENCLOSURE MEASUREMENTS						
AMPS	POLES	CABINET WIDTH DIM. A	CABINET DEPTH DIM. B	MOUNTING HOLE DIM. C	CONDUIT ENTRY DIM. D	CONDUIT ENTRY DIM. E
800	3 & 4	914 [36]	1600 [63]	1144 [45.0]	489 [19.2]	787 [31.0]
1000	3 & 4	914 [36]	1600 [63]	1144 [45.0]	489 [19.2]	787 [31.0]
1200	3 & 4	914 [36]	1600 [63]	1144 [45.0]	489 [19.2]	787 [31.0]
1600	3 & 4	914 [36]	1754 [69]	1296 [51.0]	489 [19.2]	787 [31.0]
2000	3 & 4	914 [36]	1754 [69]	1296 [51.0]	489 [19.2]	787 [31.0]
2500	3	914 [36]	1906 [75]	1449 [57.0]	565 [22.3]	787 [31.0]
	4	1067 [42]	1906 [75]	1449 [57.0]	565 [22.3]	939 [37.0]
3000	3	914 [36]	1906 [75]	1449 [57.0]	565 [22.3]	787 [31.0]
	4	1067 [42]	1906 [75]	1449 [57.0]	565 [22.3]	939 [37.0]
4000	3 & 4	1372 [54]	1906 [75]	1449 [57.0]	565 [22.3]	1244 [48.0]



FRONT VIEW
FRONT DOOR REMOVED



NEMA 3R RIGHT SIDE VIEW SHOWN



NEMA 3R RIGHT SIDE VIEW WITHOUT CLOSING PANELS

	APPROX. WEIGHTS KG (LBS)	
(AMPS)	3 POLE	4 POLE
800	553 [1220]	644 [1420]
1000	590 [1240]	653 [1440]
1200	562 [1240]	653 [1440]
1600	607 [1340]	635 [1400]
2000	616 [1360]	653 [1440]
2500	635 [1400]	671 [1480]
3000	653 [1440]	689 [1520]
4000	929 [2050]	1315 [2900]

* LUG ARRANGEMENT DIMENSIONS DEPEND ON AMPERAGE

METRIC CAD FILE

SEE ADV–8565 FOR FULL MODEL CODE DEFINITION

STYLE	MECHANISM	TRANSITION	MPAC LOGIC	VOLTS	POLES	NEUTRAL	ENCLOSURE	AMPS	CONNECTION
KEP ICCB	SERVICE ENT	PROGRAMMED	1500	208–480	3,4	SOLID SW	3R	800,1000,1200,1600,2000,2500,3000,4000	STANDARD

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

APPROVALS		DATE
DRAWN	BTW	8–28–13
CHECKED	BTW	8–28–13
APPROVED	MTL	8–28–13

PLOTTED DATE

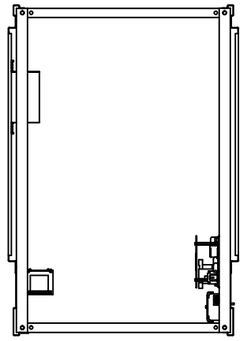
KOHLER CO.
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

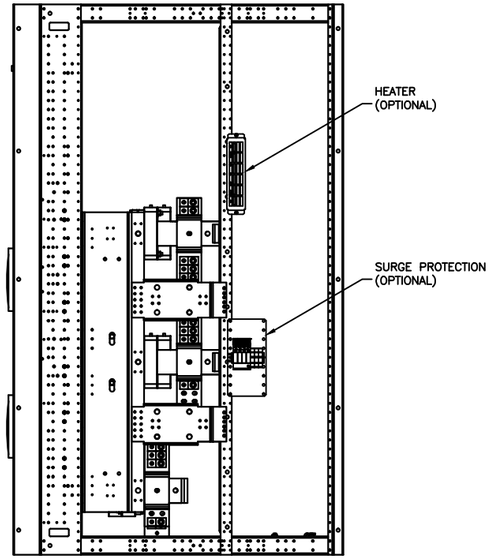
TITLE: DIMENSION PRINT

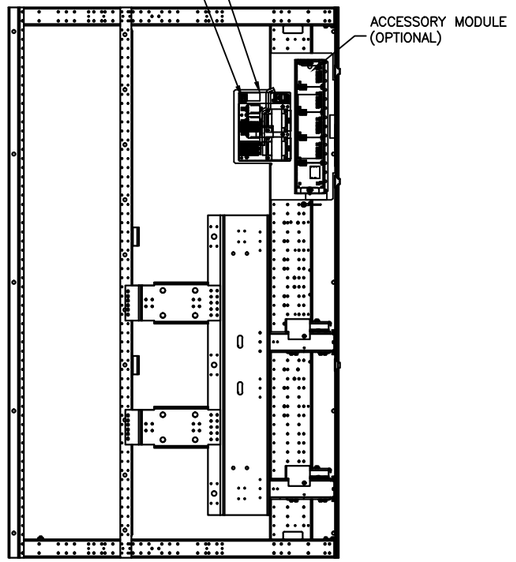
SCALE .12 | CAD NO. | SHEET 1–2

DWG. NO. ADV–8619 | D

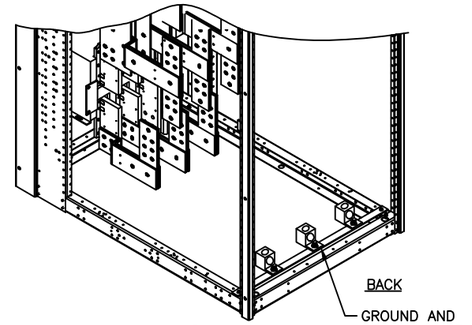
REV	DATE	REVISION	BY
–	8-28-13	NEW DRAWING [CT54441]	BTW
A	2-17-15	SEE SHEET 1 [CT106772]	BTW

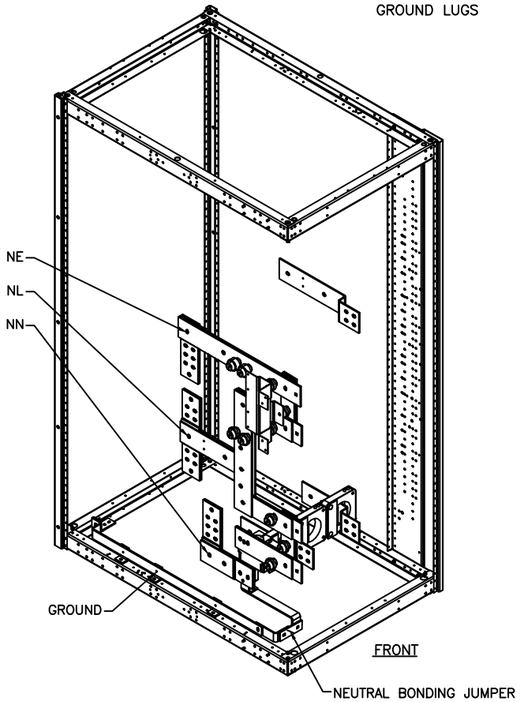


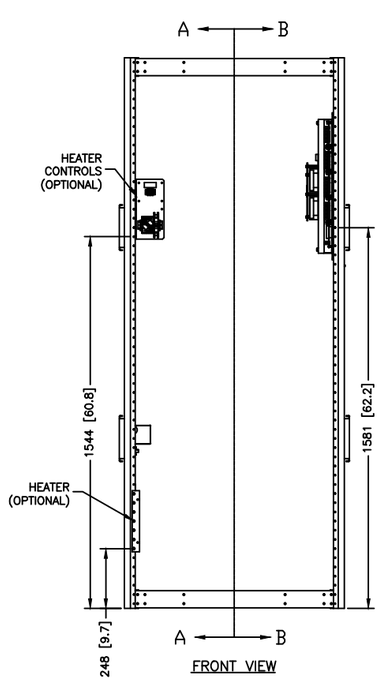




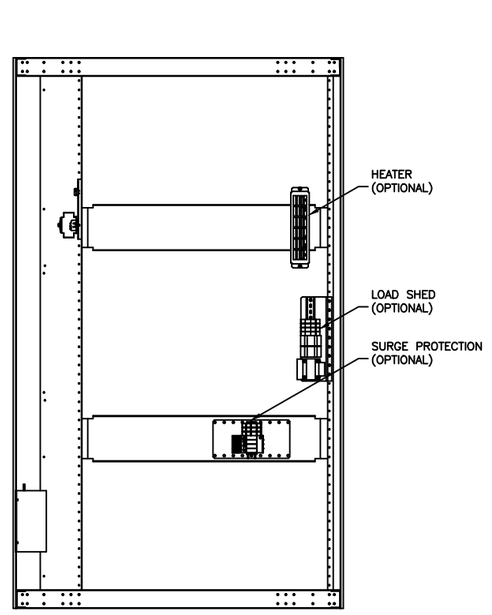
ALTERNATIVE COMPONENT MOUNTING LOCATIONS
FOR VARIOUS FRAME CONFIGURATIONS



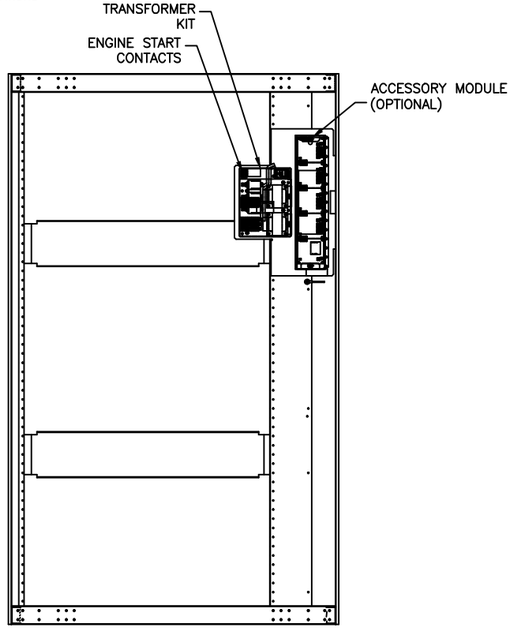




FRONT VIEW



SECTION A–A



SECTION B–B

NEMA 3R COMPONET REMOVED FOR CLARITY

METRIC CAD FILE

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

APPROVALS		DATE
DRAWN	BTW	8-28-13
CHECKED	BTW	8-28-13
APPROVED	MTL	8-28-13

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

TITLE: DIMENSION PRINT

SCALE: .1 | CAD NO. | SHEET 2-2

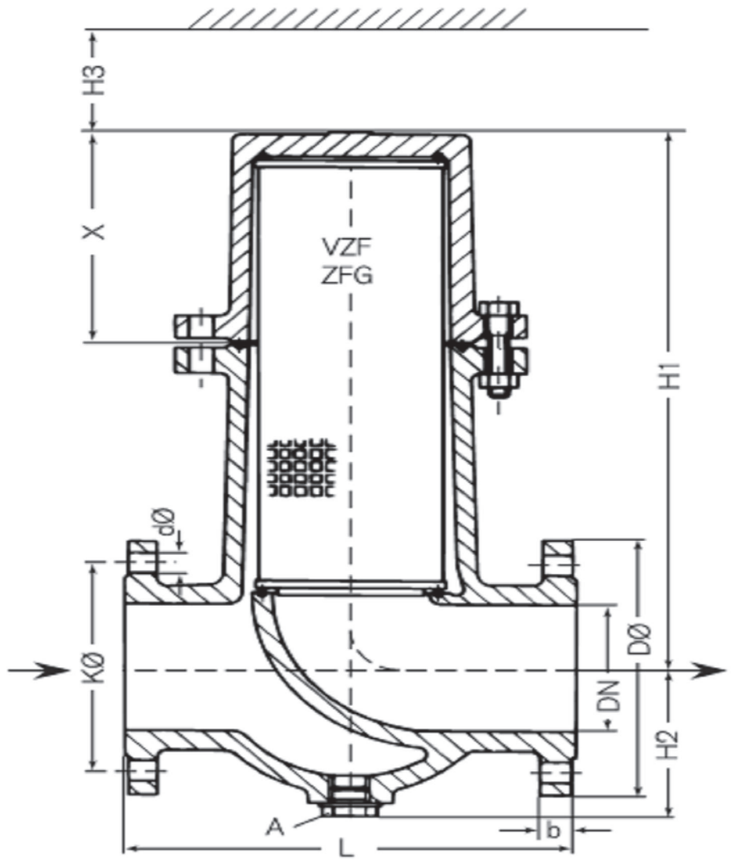
DWG. NO. ADV-8619 | D

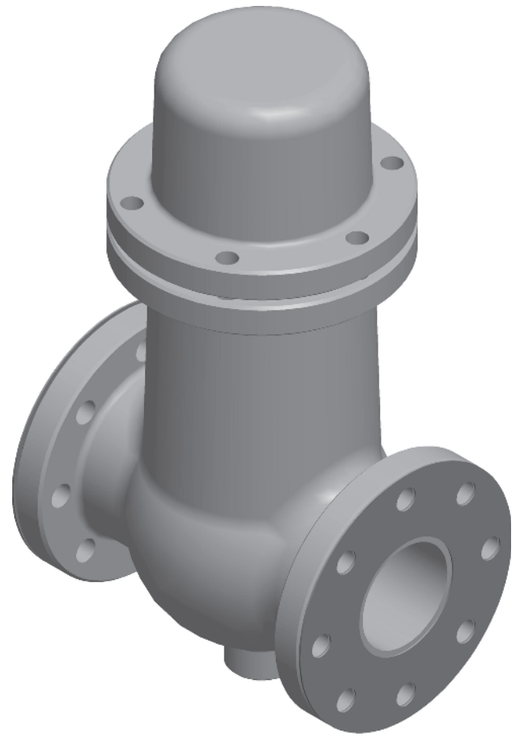
PLOTTED DATE

KOHLER®

Miscellaneous

TYPE VZF DN 80									
DN	H1 (mm)	H2 (mm)	L (mm)	DØ (mm)	KØ (mm)	b (mm)	dØ (mm)	x (mm)	H3 (mm)
80	376	125	270	200	160	24	18	131	210





NOTES:
- FILTRATION EFFICIENCY OF 99.5% FOR PARTICLES >2µM (MICRO)
- OPERATING PRESSURE: 16 BAR
- MAX ADMISSIBLE DIFFERENTIAL PRESSURE: 0.5 BAR

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

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

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	8-11-15	NEW DRAWING [CTI20683]	VPP

SURFACE FINISH MAX.

THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	VPP	8-11-15
CHECKED	RAM	8-11-15
APPROVED	RAM	8-11-15

KOHLER CO. METRIC PRO-E

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

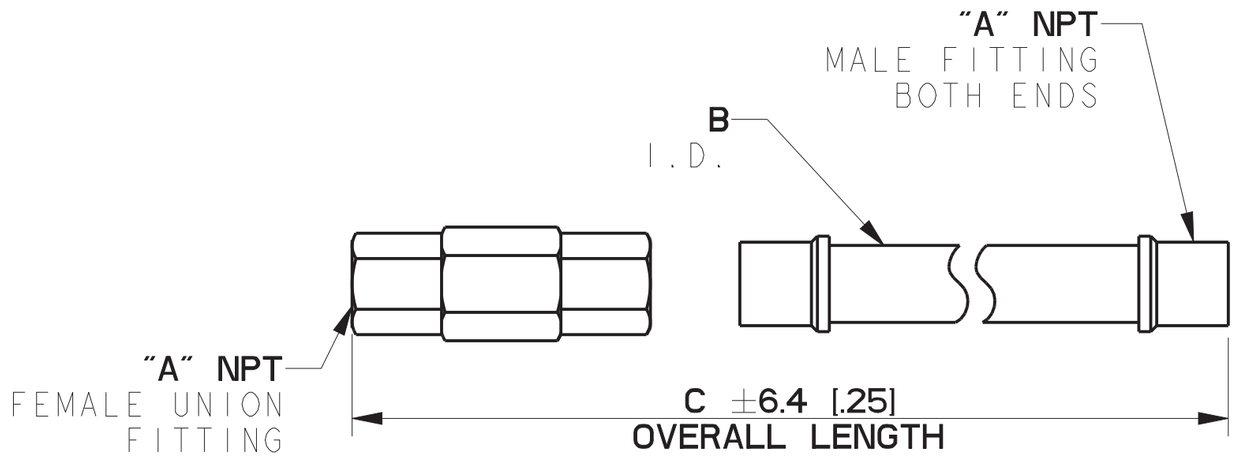
TITLE
FILTER, FUEL

SCALE 0.50 | CAD NO. | SHEET 1 of 1

DWG NO. GM98890 | D

PART NO.	REV	A	B	C	
				MM	IN
X-504-1	AS	1/2	1/2	304.8	12
X-504-2	AS	3/4	3/4	304.8	12
X-504-12	AS	3/8	3/8	385.8	15 3/16
X-504-16	AS	2	2	457.2	18
X-504-17	AS	1	1	508.0	20
X-504-18	AS	3/4	3/4	730.3	28 3/4
X-504-20	AS	1	1	736.6	29
X-504-21	AS	1	1	457.2	18
X-504-22	AS	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	AT	1/4	3/8	1066.8	42
X-504-26	AT	3	3	838.2	33
X-504-27	-	2	2	825	32 1/2

THIS IS A MANUAL TABLE



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

MATERIAL:
ANNULAR CORRUGATED BRONZE/STAINLESS STEEL HOSE WITH BRONZE/ STAINLESS STEEL TUBULAR WIRE BRAID OR EQUIV. AND COMPLY WITH NFPA54 NATIONAL FUEL GAS CODE.

FITTINGS-
FEMALE UNION - STEEL OR BRASS (NO GALVANIZED FITTING)
ALL FLUX USED IN BRAZING MUST BE REMOVED.
INSTALL HAND TIGHT.

-USE-
NATURAL GAS, LP FUEL, GASOLINE, DIESEL FUEL, WATER & OIL.

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
AP	1-14-04	(C-3) FEMALE UNION SHOWN AS A SEPERATE PART;	
		(A-4) FITTINGS NOTE REVISED [70727]	SAM
AR	5-26-04	(B-2) OVERALL LENGTH DIM. RELOCATED TO	
		INCLUDE FEMALE FITTING & ± .25 TOL WAS	
		+.25/-.12 [72490]	JMS
AS	3-18-05	(B-2) PAINT MALE END NOTE ADDED [74505]	SAM
AT	7-31-09	REDRAWN IN PRO-E; (C-4) X-504-25 & X-504-26	
		ADDED; [88172]	KRH
AU	5-28-18	(C-4) X-504-27 ADDED [CTI87723]	PAR

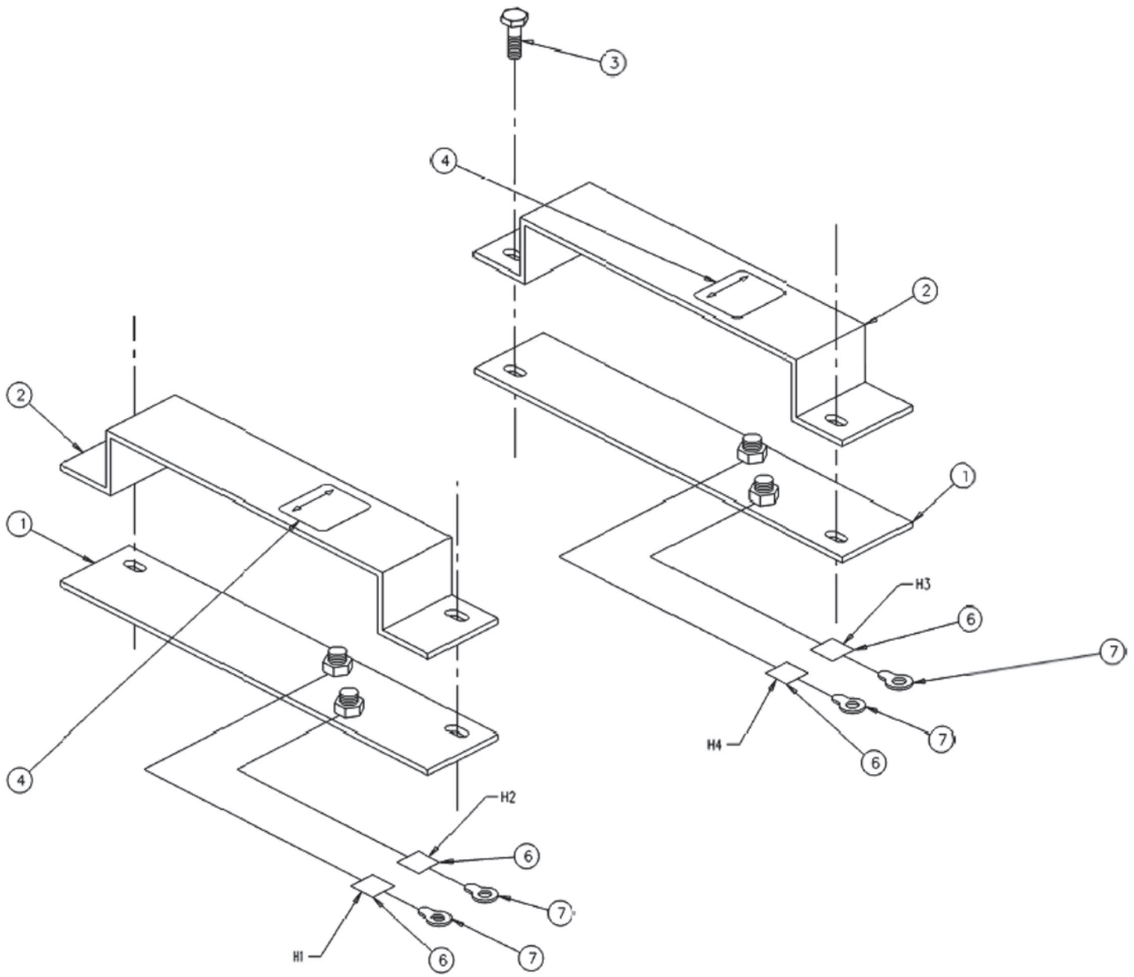
UNLESS OTHERWISE SPECIFIED -
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X.XX ± 0.25
X.X ± 1.0
X ± 1.5
ANGLES ± 0° 30'
SURFACE FINISH MAX.
THIRD ANGLE PROJECTION

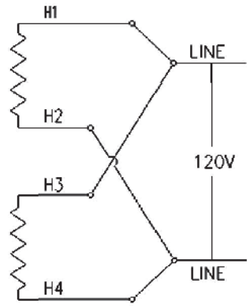
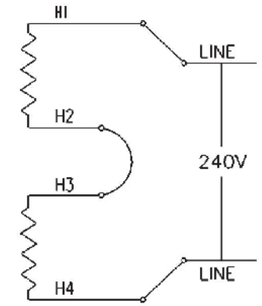
APPROVALS		DATE
DRAWN	DKO	11-19-62
CHECKED	EB	9-21-68
APPROVED	SAS	2-22-84

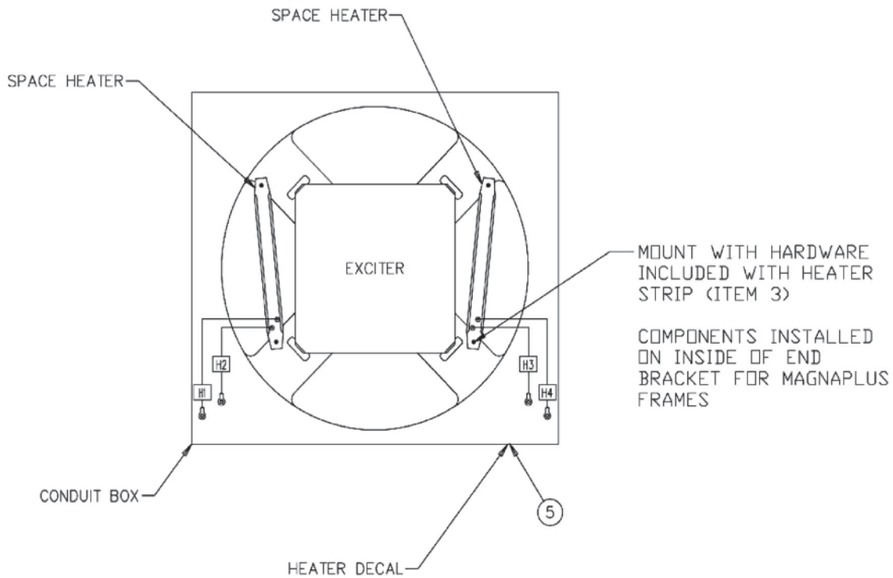
KOHLER CO. | METRIC | PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

TITLE
LINE, FLEX FUEL

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



SPACE HEATERS 60/50 HZ. 120/240 VOLTS	
120 VOLT CONN.	240 VOLT CONN.
	



NOTE:

1. ALIGN THE SPACE HEATER AND GUARDS WITH THE PREDRILLED HOLES IN THE FRONT BRACKET AND MOUNT WITH THE SCREWS PROVIDED IN THE SPACE HEATER KIT.
2. APPLY THE SPACE HEATER CONNECTION DECAL ON THE BOTTOM OF THE CONDUIT BOX IN A VISIBLE LOCATION.
3. WIRE THE SPACE HEATER TO EITHER 120 VOLTS OR 240 VOLTS ACCORDING TO THE CONNECTION DIAGRAM. INSULATE THE CONNECTION.
4. ASSEMBLE CAUTION DECAL IN DIRECTION OF ARROW.

DESCRIPTION			FOR #572-575 AND #740 FRAMES			FOR #431-433 FRAME - MAGNAMAX			FOR #430-433 FRAME - MAGNAPLUS		
			REV			REV			REV		
KOHLER KIT NUMBER				H	272800		H	279750	☐	-	GM109472-KA1
PURCHASED COMPLETE FROM MARATHON			☐	A	272803	☐	A	279749	☐	-	GM109471
1	2	SPACE HEATER			A-211138-33			A-211138-32			A-211138-32
2	2	GUARD			A-525855			A-525591			B-527461
3	4	SCREW			A-9646-75			A-9646-75			A-9646-75
4	2	DECAL, CAUTION			A-525590			A-525590			A-525590
5	1	DECAL, CONNECTION			A-510663			A-510663			A-510663
6	8	MARKERS			A-57829B			A-57829B			A-57829B
7	4	LEAD ASSEMBLY			L6H16W-24B8B8			L6H16W-24B8B8			L6H16W-42B8B8
ITEM	QTY.	DESCRIPTION			PART NO. MARATHON			PART NO. MARATHON			PART NO. MARATHON

350-1000 KW DDC
120/240 VOLT MARATHON GENERATOR HEATER
TOTAL HEATER WATTAGE 500 WATTS

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
D	6-24-97	(A-2) 1000 KW WAS 800 KW [50803]	JDH
E	5-18-98	(A-2,A-7) #572, 573, 574, 575 & 740 WAS #570;	
		#433 WAS #430 [54622]	LDS
F	10-29-98	(A-6,7,8) KIT # AND DESCRIPTION ADDED [56529]	LDS
G	9-21-09	(B-1) X-101-8 (4), X-465-7 (4) AND X-25-53 (8)	
		REMOVED (C-1) NOTE REVISED [88337]	SAM
H	7-11-12	(B-1) VIEW A-A REMOVED , HARDWARE NOTE ADDED [CT15979]	SAM
J	7-31-19	CREO FORMAT WAS AUTOCAD; (A-7,8) TABLE UPDATED;	
		(A-6) GM109471 AND GM109472-KA1 ADDED; (B-2)	
		NOTE ADDED [CT197472]	HM

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 MAX.

THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	DCC/RD	10-20-86
CHECKED	RLD	10-26-86
APPROVED	DRF	11-29-86

KOHLER.
KOHLER, WISCONSIN 53044

TITLE
DRAWING, ASSEMBLY

SCALE | CAD NO. | SHEET 1 of 1

DWG NO. **S-272000** **D**

KOHLER®

Warranty

Transfer Switch One-Year Limited Warranty

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

Kohler Product	**Warranty Coverage**
Transfer switch and factory-supplied transfer switch accessories	One (1) year from the registered startup date. In any event, the warranty period will expire not later than thirty (30) months from the date of shipment from Kohler Co.'s factory.
Transfer switch main contacts	Ten (10) years from the registered startup date. In any event, the warranty period will expire not later than eleven (11) years and six (6) months from the date of shipment from Kohler Co.'s factory.

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

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

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

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

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

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

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

KOHLER®

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

TP-5373 4/15f

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.

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Phone 920-457-4441, Fax 920-459-1646
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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.
13. Fuel injection pumps not repaired by an authorized Kohler service representative.
14. Non-Kohler-authorized repair shop labor without prior approval from Kohler Co. Warranty Department.
15. Engine fluids such as fuel, oil, or coolant/antifreeze.
16. Shop supplies such as adhesives, cleaning solvents, and rags.
17. Expenses incurred investigating performance complaints unless the problem is caused by defective Kohler materials or workmanship.
18. Maintenance items such as fuses, lamps, filters, spark plugs, loose or leaking clamps, and adjustments.
19. Travel time and mileage exceeding 300 miles round trip.

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

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

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

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

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

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TP-5561 8/16f

Transfer Switch Extended Five-Year 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**
Transfer switch and factory-supplied transfer switch accessories	Five (5) years from registered startup date.
Transfer switch main contacts	Ten (10) years from the registered startup date.

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

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

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

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

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

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

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

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

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TP-6087 4/15d

KOHLER®

Certification

Certificate of Registration

nqa global assurance

This is to certify that the Quality Management System of:

Kohler Power Systems

N7650 Lakeshore Road
Sheboygan WI 53083
United States of America

Central function listed above. See appendix for additional locations

applicable to:

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

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

ISO 9001:2015

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

For and on behalf of NQA, USA

ANAB ACCREDITED ISO/IEC 17021 MANAGEMENT SYSTEMS CERTIFICATION BODY

G15-152 11/18

Certificate of Registration

nqa global assurance

Appendix to Certificate Number: 16852

Includes Facilities Located at:

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

Certified Since: February 28, 1995

Valid Until: November 6, 2021

Reissued: November 7, 2018

Cycle Issued: November 7, 2018

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160 SW 12TH AVE SUITE 106, DEERFIELD BEACH, FL 33442
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Technical Evaluation Report

DIVISION: 48 10 00–ELECTRICAL POWER GENERATION EQUIPMENT

THIS DOCUMENT CONTAINS (4) PAGES: THE FIRST PAGE MUST BEAR AN ORIGINAL SIGNATURE & SEAL OF THE CERTIFYING PE TO BE VALID FOR USE

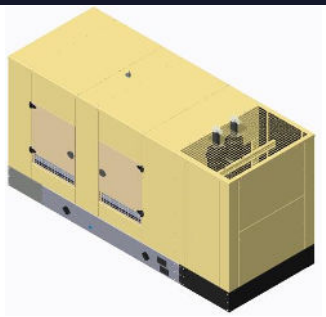
(Issued April 5, 2019 Subject to Renew January 1, 2021) or next code cycle

EVALUATION SUBJECT: **250REZXB/300REZXC Sound Aluminum Enclosure**

TER-18-6258.14

REPORT HOLDER:

KOHLER POWER SYSTEMS
7650 LAKESHORE ROAD
SHEBOYGAN, WI 53083 USA
(920) 457-4441 | KOHLERPOWER.COM



NOTE: THE GRAPHICAL DEPICTIONS IN THIS REPORT ARE FOR ILLUSTRATIVE PURPOSES ONLY AND MAY DIFFER IN APPEARANCE.

SCOPE OF EVALUATION (compliance with the following codes):

THIS IS A STRUCTURAL (WIND) PERFORMANCE EVALUATION ONLY. NO ELECTRICAL OR TEMPERATURE PERFORMANCE RATINGS OR CERTIFICATIONS ARE OFFERED OR IMPLIED HEREIN.

This Product Evaluation Report is being issued in accordance with the requirements of the **Florida Building Code Sixth Edition (2017)** per FBC Section 104.11.1, FMC 301.15, FBC Building Ch. 16, ASCE-7-10, and FBC Residential M1202.1, FS 471.025. The product noted on this report has been tested and/or evaluated as summarized herein.
IN ACCORDANCE WITH THESE CODES EACH OF THESE REPORTS MUST BEAR THE ORIGINAL SIGNATURE & RAISED SEAL OF THE EVALUATING ENGINEER.

SUBSTANTIATING DATA:

• Product Evaluation Documents
Substantiating documentation has been submitted to provide this TER and is summarized in the sections below.
• Structural Engineering Calculations
Structural engineering calculations have been prepared which evaluate the product based on comparative and/or rational analysis to qualify the following design criteria:

- Maximum allowable unit enclosure wind pressure integrity
- Maximum allowable uplift, sliding, & overturning moment for ground.

Calculation summary is included in this TER and appears below. NOTE: No 33% increase in allowable stress has been used in the design of this product.

INSTALLATION:

The product(s) listed above shall be installed in strict compliance with this TER & manufacturer-provided enclosure model specifications.
The product components shall be of the material specified in the manufacturer-provided product specifications. All screws, bolts and rivet must be installed in accordance with the applicable provisions & anchor manufacturer's published installation instructions.

LIMITATIONS & CONDITIONS OF USE:

Use of this product shall be in strict accordance with this TER as noted herein. The supporting host structure shall be designed to resist all superimposed loads as determined by others on a site-specific basis as may be required by the Authority Having Jurisdiction. No evaluation is offered for the host supporting structure by use of this document; Adjustment factors noted herein and the applicable codes must be considered, where applicable. All supporting components which are permanently installed shall be protected against corrosion, contamination, and other such damage at all times. This evaluation does not offer any evaluation to meet large missile impact debris requirements if requires.
Yearly inspections, during equipment maintenance or after named storm, all screws, cabinet components, and anchor bolts are to be verified. All damaged cabinet components, loosen, corroded, broken screws or anchor bolts shall be replaced to ensure structural integrity for hurricane wind forces.

FINISH:

Baked enamel.

UNIT CASING MATERIAL:

1/8" Al 5052-H32 top panel. 1/8" Al 5052-H32 for side panels and 1/4" steel ASTM A36 for bottom skids, secured with 3/16" rivets grade 51, A2-70 M8 Bolts, and M12 bolts class 8.8 (see dimensional drawing for specific locations).

OPTIONS:

This evaluation is valid for KOHLER 250REZXB/300REZXC Sound Aluminum Enclosure model dimensions shown on the final page of this report.
This evaluation includes standard product only. Contact Factory for Engineering Special (ES) orders. Any structural changes outside of the factory would void this certificate.

STRUCTURAL PERFORMANCE:

Models referenced herein are subject to the following design limitations:
ASCE-710 Exposure Category D
Risk Category III / IV
HVHZ Rated* (& NON-HVHZ)
Only for ground installations
Flat terrain only

Maximum Wind Speed:
$V_{(Ultimate)}$ = 181 MPH

ABOUT THIS DOCUMENT:

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ORIGINAL SIGNATURE AND RAISED SEAL
OR DIGITAL SEAL REQUIRED TO BE VALID PER CODE:

P.E. SEAL REQUIRED

April 5, 2019

Frank L. Bennardo, P.E., SECB
ENGINEERING EXPRESS®
FL PE #0046549 FLCA #9885

☐ Signed by If Checked:
TROY BISHOP, PE
FL PE #76131

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The FBC 6th Edition (2017) defines APPROVED SOURCE (Section 202) as: "An independent person, firm or corporation, approved by the building official, who is competent and experienced in the application of engineering principles to materials, methods or systems analyses." Engineering Express® professionals meet the competency requirements as defined in the FBC and can seal their work. Engineering Express® is regularly engaged in conducting and providing engineering evaluations of single-element and full-scale building systems tests.

*MIAMI DADE AND BROWARD COUNTY

SECTION 2 SUMMARY

Engineering Express has reviewed the design requirements per the Florida Building Code Sixth Edition (2017) and ASCE 7-10 for the structural integrity of the above referenced Kohler aluminum housing unit with steel skid to withstand a $V_{ULTIMATE}$ wind speed=181 MPH, Exposure "D" Risk Category III/ IV. Our analysis includes the unit framing and housing only and requires that a permanent near-grade (non-rooftop) attachment to a concrete, metal, or wood host structure as certified/verified by others. Steel skid tie-down anchor locations shall conform to those illustrated on sheet 3 of this TER. Additionally, the unit shall not be installed in a location susceptible to channeling effects from upwind obstacles. It shall be the installer's responsibility to ensure that the criteria for the unit housing integrity, as listed above, is applicable for use at the location of installation and the mounting method meets or exceeds the requirements of the local code and it is approved by the appropriate local authority before installation.

This certification is intended to certify the structural capacity and integrity of the structural framing members, wall and roof sheet metal skins, generator skid and internal structural connections only for the sound aluminum enclosure aforementioned. Design of the generator itself, mechanical designs, energy/electrical criteria, generator slab support, anchorage and tie-down method accompanying components and all non-structural items shall be verified by others and outside the scope of this certification. Upon analysis of the aluminum housing unit vs. the critical ultimate design loads illustrated below, this engineer has concluded that the aluminum housing enclosure provides adequate resistance to the specified ultimate design loads.

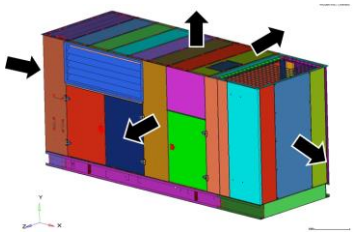
Structural Engineering Calculations

Structural engineering calculations have been prepared which evaluate the aluminum unit housing based on rational analysis using Finite Element Analysis to qualify the following design criteria:

1. Maximum ultimate design pressure as a result of the aforementioned design criteria:

Load Case 1

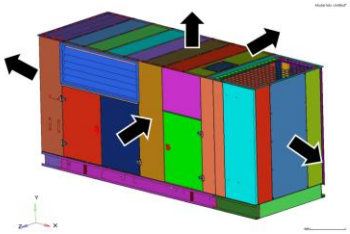
(Wind parallel to long side)



Pressure in PSF						
Load case	Wind Direction	Rear Wall	Front Wall	Left Wall	Right Wall	Roof
1	Longitudinal Direction (psf)	58.01	-46.26	-46.26	-44.79	-91.78

Load Case 2

(Wind perpendicular to long side)

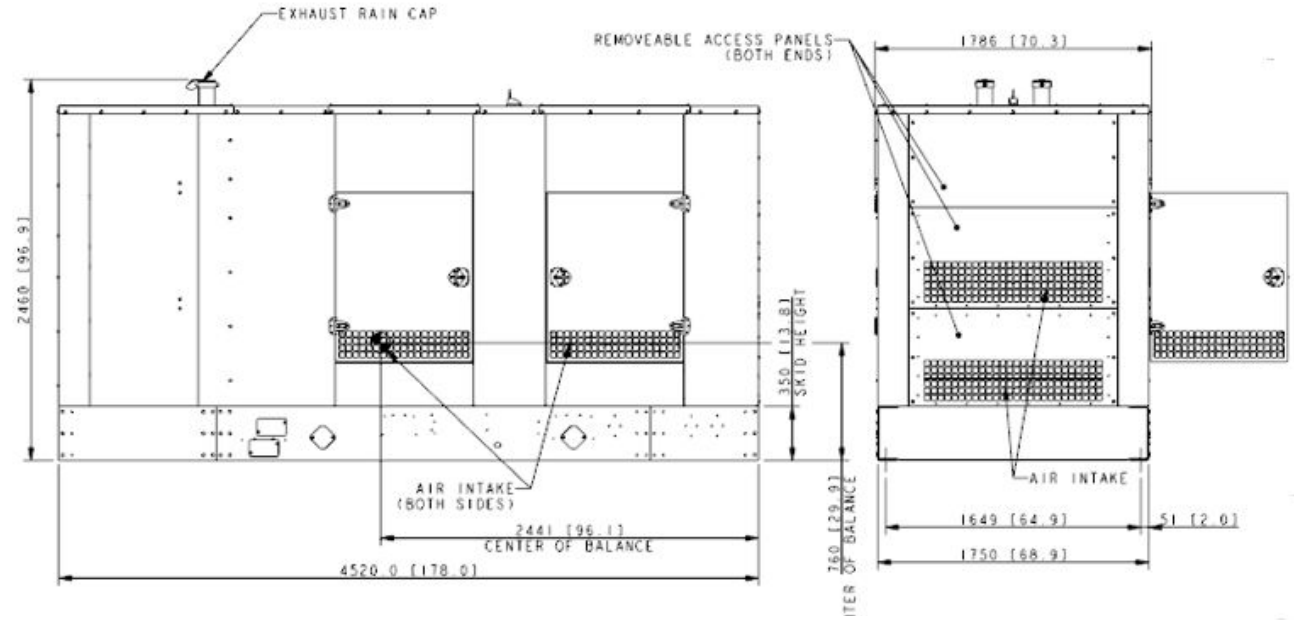


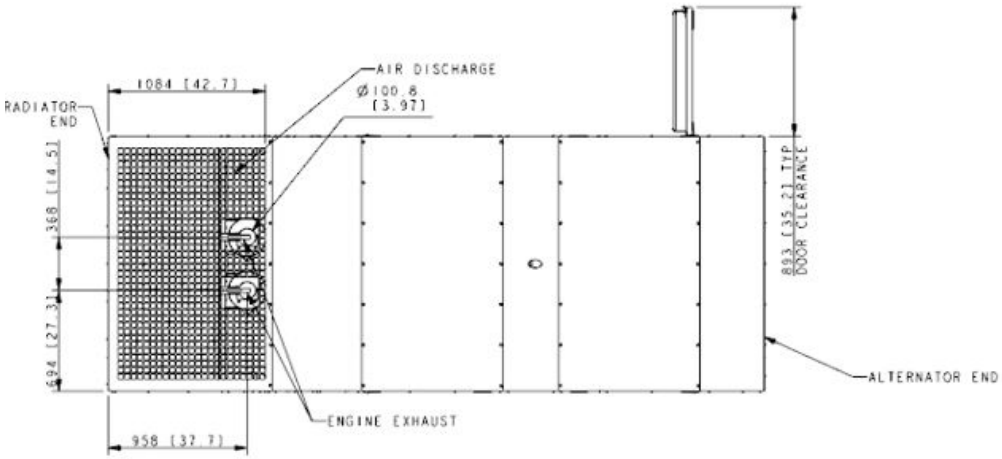
Pressure in PSF						
Load case	Wind Direction	Rear Wall	Front Wall	Left Wall	Right Wall	Roof
2	Transverse Direction (psf)	-46.26	-46.26	58.01	-44.79	-91.78

2. Maximum housing unit dimensions: 178.20"L x 70.30"W x 96.90" H.
3. Enclosure materials have been analyzed for yield and ultimate stresses using Von Mises stress criteria in accordance with the 2015 Aluminum Design Manual & AISC Steel Construction Manual 14th Edition. For both load case Von Mises Stress stood below ultimate strength; therefore, the sound aluminum enclosure will provide enough structural capacity to resist wind pressures shown.
4. All internal connection capacities, including bolted and welded components, have been checked for applicable tension and shear by applying a unity interaction equation where applicable and have been approved by this office.

All installation work shall follow the minimum requirements of the Florida Building Code Sixth Edition (2017) in addition to any additional site-specific requirements for tie-down certification which is not included in this letter. Except as expressly provided herein, no additional affirmations are intended. Thank you for your attention to this matter.

SECTION 3 DIMENSIONS & ELEVATIONS

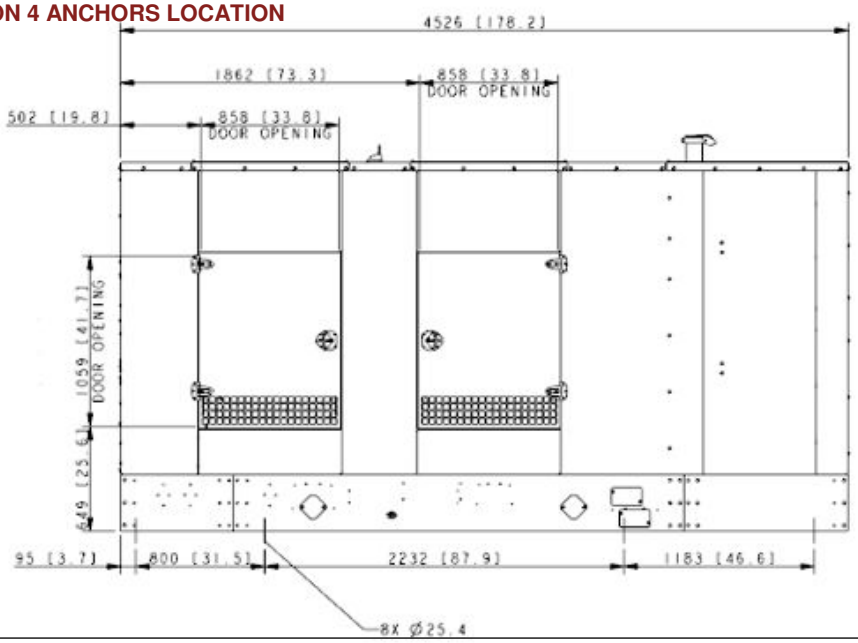




Note:

Enclosure housing must bear the official insignia of Kohler Power with model name referenced above for applicability and validity of this letter.

SECTION 4 ANCHORS LOCATION



Note:

Anchors to be calculated on a site-specific basis. (8) anchors location per manufacturer, (4) per long side. Additional holes might be added as needed.

IN ALL CONDITIONS IT IS THE RESPONSIBILITY OF THE PERMIT HOLDER TO ENSURE THE HOST STRUCTURE IS CAPABLE OF WITHSTANDING THE RATED GRAVITY, LATERAL, AND UPLIFT FORCES BY SITE-SPECIFIC DESIGN. NO WARRANTY OF ANY KIND, EXPRESSED OR IMPLIED, IS OFFERED BY ENGINEERING EXPRESS AS TO THE INTEGRITY OF THE HOST STRUCTURE TO CARRY DESIGN FORCE LOADS INCURRED BY THIS UNIT.

SECTION 5 ENCLOSURE MODELS INCLUDED

GENERATOR	ENCLOSURE TYPE	ENCLOSURE DRAWING NUMBER	REVISION & DATE	ADV	REVISION & DATE
250REZXB 300REZXC	250REZXB/300REZXC SOUND LAUMINUM ENCLOSURE	GM87415-KA3	Revision C 06/22/16	ADV-7718	Revision G 09/06/18

LIMITATIONS & CONDITIONS OF USE (cnt'd):

Production Drawings**:**
The following drawings shall be accessible if required for a full permit application to be submitted to the Authority Having Jurisdiction in conjunction with this TER:

- Electrical schematic(s)
- Final assembly drawings and parts lists sufficient to detail primary components, operator controls, and their locations
- Complete set of mechanical drawings for all machined parts
- Complete part specifications (including manufacturer's model numbers, size, ratings, etc.) for all purchased parts
- Specification sheets for all parts/components
- Drawings showing all construction details
- Product label drawing(s) showing all required marking information. The label drawing shall show the proposed label location on the equipment and artwork showing the manufacturer's name, address, model and serial numbers, equipment ratings, warning markings.

Drawing and Change Control**:**
The manufacturer shall establish a system of product configuration control that shall allow no unauthorized changes to the product. Changes to critical documents, identified in this Technical Evaluation Report, must be reported to, and authorized by, this office prior to implementation for production.

Survivability**:**
This evaluation report is valid for a newly installed unit and does not include certification of the product beyond a design event if impacted, contact this office for any reevaluation needs as designated by the Authority Having Jurisdiction.

Durability
Components or component assemblies shall not deteriorate, crack, fail, or lose functionality due to galvanic corrosion or weathering.
Each component or component assembly shall be supported and oriented in its intended installation position. All exposed *plastic* components shall be certified to resist sunlight exposure as specified by ASTM B117, or ASTM G155 in Broward or Miami Dade counties.

PROTOTYPE TEST REPORT

KOHLER

Models Covered: **300REZXC**
Model Tested: **300REZXC**
Cooling System Tested: **50C**

Alternator Tested: **4UA13**
Engine Tested: **D146L**
Voltage Tested: **480V**

GENSET

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

Meets Rated Load

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

Natural Gas

± 0.50 % Frequency Band

± 0.50 % Voltage Deviation

LP Gas

± 0.50 % Frequency Band

± 0.50 % Voltage Deviation

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

Natural Gas

Full Load Acceptance

53.5 % Voltage Dip
4.43 Seconds of Recovery Time
22.0 % Frequency Dip
5.78 Seconds of Recovery Time

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

Full Load Rejection

18.9 % Voltage Overshoot
2.22 Seconds of Recovery Time
14.1 % Frequency Overshoot
1.89 Seconds of Recovery Time

PROTOTYPE TEST REPORT

KOHLER

Models Covered: **300REZXC**
Model Tested: **300REZXC**
Cooling System Tested: **50C**

Alternator Tested: **4UA13**
Engine Tested: **D146L**
Voltage Tested: **480V**

GENSET

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

Complies with NFPA 110 Type 10

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

Complies

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

Complies

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

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

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

ALTERNATOR

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

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

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

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

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

Kohler Standby/Prime Generator Set Test Program

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

Prototype Testing

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

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

Production Testing

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

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

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

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

KOHLER®

KOHLER CO. Kohler, Wisconsin 53044
Phone 920-565-3381, Fax 920-459-1646
For the nearest sales/service outlet in the US and Canada, phone 1-800-544-2444
KohlerPowerSystemscom

G18-56 12/05b

KOHLER®

Prestartup Checklist

6.6 Pipe Size Requirements for Gas Fuel Systems

The type of fuel, the distance it must travel from gas meter/tank to fuel shutoff solenoid, and the amount consumed by the engine must be considered when determining fuel line pipe size.

To find the correction necessary for the different specific gravity of the particular fuel used, refer to Figure 6-10.

Figure 6-11 is based on gas pressures of 3.4 kPa (0.5 psi, 13.8 in. water column) or less and a pressure drop of 0.12 kPa (0.018 psi, 0.5 in. water column) with a 0.60 specific gravity and with a normal amount of restriction from fittings. To calculate the correct pipe size for a specific installation, refer to the chart and follow the procedure outlined below.

Fuel	Specific Gravity	Correction Factor
Sewage Gas	0.55	1.040
Natural Gas	0.65	0.962
Air	1.00	0.775
Propane (LP)	1.50	0.633
Butane	2.10	0.535

Figure 6-10 Fuel Correction Factors

Nominal Iron Pipe Size (IPS), In.	Internal IPS Diameter, mm (in.)	Length of Pipe, m (ft.)													
		3.0 (10)		6.1 (20)		9.1 (30)		12.2 (40)		15.2 (50)		18.3 (60)		21.3 (70)	
		Fuel Consumption Value, m^3/hr. (ft^3/hr.)													
1/4	9.25 (0.364)	1.2	(43)	0.82	(29)	0.68	(24)	0.57	(20)	0.51	(18)	0.45	(16)	0.42	(15)
3/8	12.52 (0.493)	2.7	(95)	1.8	(65)	1.5	(52)	1.3	(45)	1.1	(40)	1.0	(36)	0.93	(33)
1/2	15.80 (0.622)	5.0	(175)	3.4	(120)	2.7	(97)	2.3	(82)	2.1	(73)	1.9	(66)	1.7	(61)
3/4	20.93 (0.824)	10.2	(360)	7.1	(250)	5.7	(200)	4.8	(170)	4.3	(151)	3.9	(138)	3.5	(125)
1	26.64 (1.049)	19.3	(680)	13.2	(465)	10.6	(375)	9.1	(320)	8.1	(285)	7.4	(260)	6.8	(240)
1 1/4	35.05 (1.380)	39.6	(1400)	26.9	(950)	21.8	(770)	18.7	(660)	16.4	(580)	13.9	(490)	13.0	(460)
1 1/2	40.89 (1.610)	59.5	(2100)	41.3	(1460)	33.4	(1180)	28.0	(990)	25.5	(900)	22.9	(810)	21.2	(750)
2	52.50 (2.067)	111.9	(3950)	77.9	(2750)	62.3	(2200)	53.8	(1900)	47.6	(1680)	43.0	(1520)	39.6	(1400)
2 1/2	62.71 (2.469)	178.4	(6300)	123.2	(4350)	99.7	(3520)	85.0	(3000)	75.0	(2650)	68.0	(2400)	63.7	(2250)
3	77.93 (3.068)	311.5	(11000)	218.0	(7700)	177.0	(6250)	150.0	(5300)	134.6	(4750)	121.8	(4300)	110.4	(3900)
4	102.26 (4.026)	651.2	(23000)	447.4	(15800)	362.5	(12800)	308.7	(10900)	274.7	(9700)	249.1	(8800)	229.4	(8100)

Nominal Iron Pipe Size (IPS), In.	Internal IPS Diameter, mm (in.)	Length of Pipe, m (ft.)													
		24.4 (80)		27.4 (90)		30.5 (100)		38.1 (125)		45.7 (150)		53.3 (175)		61.0 (200)	
		Fuel Consumption Value, m^3/hr. (ft^3/hr.)													
1/4	9.25 (0.364)	0.39	(14)	0.37	(13)	0.34	(12)	0.31	(11)	0.28	(10)	0.25	(9)	0.23	(8)
3/8	12.52 (0.493)	0.88	(31)	0.82	(29)	0.76	(27)	0.68	(24)	0.62	(22)	0.57	(20)	0.54	(19)
1/2	15.80 (0.622)	1.6	(57)	1.5	(53)	1.4	(50)	1.2	(44)	1.1	(40)	1.0	(37)	0.99	(35)
3/4	20.93 (0.824)	3.3	(118)	3.1	(110)	2.9	(103)	2.6	(93)	2.4	(84)	2.2	(77)	2.0	(72)
1	26.64 (1.049)	6.2	(220)	5.8	(205)	5.5	(195)	5.0	(175)	4.5	(160)	4.1	(145)	3.8	(135)
1 1/4	35.05 (1.380)	13.0	(460)	12.2	(430)	11.3	(400)	10.2	(360)	9.2	(325)	8.5	(300)	7.9	(280)
1 1/2	40.89 (1.610)	19.5	(690)	18.4	(650)	17.6	(620)	15.6	(550)	14.2	(500)	13.0	(460)	12.2	(430)
2	52.50 (2.067)	36.8	(1300)	34.5	(1220)	32.6	(1150)	28.9	(1020)	26.9	(950)	24.1	(850)	22.7	(800)
2 1/2	62.71 (2.469)	58.1	(2050)	55.2	(1950)	52.4	(1850)	46.7	(1650)	42.5	(1500)	38.8	(1370)	36.2	(1280)
3	77.93 (3.068)	104.8	(3700)	97.7	(3450)	92.0	(3250)	83.5	(2950)	75.0	(2650)	69.4	(2450)	64.6	(2280)
4	102.26 (4.026)	212.4	(7500)	203.9	(7200)	189.7	(6700)	169.9	(6000)	155.7	(5500)	141.6	(5000)	130.3	(4600)

Note: When the fuel has a specific gravity of 0.7 or less no correction factor is necessary—use this table without a correction factor.

Figure 6-11 Maximum Flow Capacity of Pipe in Cubic Meters (Cubic Feet) of Gas per Hour

1. Refer to the fuel consumption on the generator set specification sheet. Note type of fuel used, generator set application rating, and the m^3/hr. (ft^3/hr.) consumption at 100% load.

   Example:
   80 kW, propane gas, 60 Hz standby rating = 12.0 m^3/hr. (425 ft^3/hr.).

2. Refer to the Fuel Correction Factors in Figure 6-10. Locate the correction factor for specific gravity of the selected fuel.

   When the fuel has a specific gravity of 0.7 or less no correction factor is necessary—use Figure 6-11 without a correction factor.

   Example:
   propane gas specific gravity = 1.50
   fuel correction factor = 0.633.

3. Divide the consumption value from step 1 by the correction factor from step 2.

   Example:
   12.0 m^3/hr. (425 ft^3/hr.) divided by 0.633 = 19.0 m^3/hr. (671 ft^3/hr.).

4. Determine the length of pipe between the gas meter/tank and the fuel shutoff solenoid at the generator set.

   Example:
   34.7 m (114 ft.).

5. Find the value closest to pipe length in the Length of Pipe column in Figure 6-11.

   Example:
   38.1 m (125 ft.).

   Example:
   At 28.9 m^3/hr. (1020 ft^3/hr.) the pipe size = 2 in. IPS.

6. Move vertically down the table in Figure 6-11 from the determined value in Length of Pipe column.

   Example:
   38.1 m (125 ft.)

   Stop at the value that is equal to or greater than corrected consumption value from step 3.

   Example:
   28.9m^3/hr. (1020 ft.^{3}/hr.).

7. Move to the left column from the value in step 6 to determine the correct pipe size.

EMERGENCY LIGHTING (AHCA)

GENERATOR

ENGINE

GENERATOR CONTROL PANEL

GENERATOR STRIP HEATER

ENGINE STARTER

BATTERY WARMER

LOAD CENTER

BLOCK HEATER

2- # 10 AWG
SEE MANUAL IF MORE THAN 25 FT

BATTERY CHARGER

3- # 14 AWG

4- # 14 AWG

DAYTANK

ATS

BELDIN 9841 OR EQUAL (SEE MANUAL FOR MULTIPLE ATS APPLICATION)

5 #14 AWG AND BELDIN 9841 OR EQUAL

TO LOAD CENTER

_____AMP_____/_____/_____PHASE

3- # 14 AWG 120VAC

_____AMP_____/_____/_____PHASE

_____AMP_____/_____/_____PHASE

_____AMP_____/_____/_____PHASE

_____WATTS_____/_____/_____PHASE

_____/_____/_____PHASE

8- # 14 AWG (PER ATS)

3- # 14 AWG (PER DEVICE)
(SERIES CONNECTED)

BELDIN 9841 OR EQUAL
AND 5- #14 AWG

2- #14 AWG

2- #14 AWG

2-#14 AWG

ENCLOSURE ELECTRICAL ITEMS

- ☐ INTERIOR LIGHTS
- ☐ GFI RECEPTICLE
- ☐ EXHAUST FAN
- ☐ DAYTANK
- ☐ OTHER_____

- ☐ PRE-WIRED LOAD CENTER
- ☐ EMERGENCY LIGHT KIT (AHCA)
- ☐ ENGINE BLOCK HEATER_____WATTS
- ☐ BATTERY WARMER _____WATTS
- ☐ BATTERY CHARGER
- ☐ GENERATOR STRIP HEATER
- ☐ DAYTANK (SEE MFG. MANUAL)
- ☐ AUTOMATIC TRANSFER SWITCH
- ☐ EMERGENCY STOP (BREAK GLASS)
- ☐ REMOTE SERIAL ANNUNCIATOR
- ☐ REMOTE SHUNT TRIP
- ☐ REMOTE FUEL SOLENOID
- ☐ REMOTE START/STOP
- ☐ RSA WITH ATS CONTROLS

NOTE: 1) Per NFPA 110 section 7.12.4.1 Stranded wire of adequate size shall be used to minimize breakage due to vibration.

REVISION	DESCRIPTION			
DRAWN	PRELIMINARY–WIRING	Conduit & Wire Run		
DATE				
REVISION A	DESCRIPTION Modify original		SCALE	DRAWN FJD 01/18/10 CHECKED APPROVED REV A
DRAWN FD				
DATE 18 Jan 2010			DRAWING SIZE	DRAWING NO