KOHLER POWER SYSTEMS

PALCO

2351 MT. PLEASANT ROAD / NORVELT, PA 15674
P: 724-424-3900 F: 724-424-3910

Submittal Package

Job Name: WV National Guard in Gassaway
Quote: 0025978433
Proposal: 092413001

We are pleased to offer the following submittal for your consideration.
Thank you, Vicki Casto, Palco

PALCO
Sales & Service
#2 Wall Street
Winfield, WV 25213
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KOHLER POWER SYSTEMS

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GENERATOR SET

Model: 300REOZJ
This generator set equipped with a 4UA13 alternator operating at 120/208 volts is rated for 300 kW/375 kVA.
Output amperage: 1041

Configuration

Qty	Description
1	300REOZJ Generator Set
1	300REOZJ, 24V, 60hz
1	Nameplate Rating, Standby 130 Degree
1	Decal, UL2200 Listing (Diesel)
1	Alternator, 4UA13
1	Radiator, Unit Mounted Cooling (50C)
1	Standard Duty Air Intake
1	Accessory Inner Panel
1	Sound Enclosure, Steel
1	Block Heater, 2500W, 90/120V, 1Ph
1	Flexible Fuel Lines
1	Coolant in Genset 9 gals.
1	Battery Charger,Float w/Alarms,24V-10A
1	Warranty, 1 Year Standby
1	Voltage,60Hz,120/208V,3Ph,4W,0.8PF
1	Skid/Tank Module, 546 Gallon
1	Controller, DEC550 w/Key, 24V, 1200:3VAC
1	Control & Harness, DEC 550
1	Controller Connection
1	Inner Tank Leak Alarm
1	RSA II, Annunciator Only
1	Additional Shipping Charges Accepted
1	Dry Contacts,10SPDT,10A
1	Remote Emergency Stop Switch
1	Warranty, 2 Year Basic
1	Lit Kit, Production, 300REOZJ
1	LCB, 1000A, PGP, MICRO, GFI, 100%
1	Mtg, LCB, P-Frame 1000-1200A, 4UA
1	Neutral, P-Frame GFI 4UA
1	Covers, 4UA J-Box, M/P-Frame LCB
1	Annunciation, GF, 24V, 4UA

1	Shunt Trip, 24VDC, MG/PG/RG/RJ Frame
1	Shunt Trip Wiring, DEC550/DEC6000

AUTOMATIC TRANSFER SWITCH

4 Pole, 4 Wire,SwitchedNeutral, 2000 Amps, Kohler automatic transfer switch, Model KBS-DCVA-2000S, rated 208V, 60 Hz, complete with all standard equipment and housed in a NEMA Type 1 enclosure.

Configuration

Qty	Description
1	KBS-DCVA-2000S
1	Warranty, 1 Year Standard
1	Programmable Input/Output Module
1	Supervised Transfer Control Switch, Auto
1	Input/Output Mounting Module Assembly
1	Lit Kit, ATS Production, KBS/KBP
1	Warranty - ATS, 2 Year Basic

MISCELLANEOUS

Part Number	Qty	Description
ES	1	1ph BEP add DC light with timer

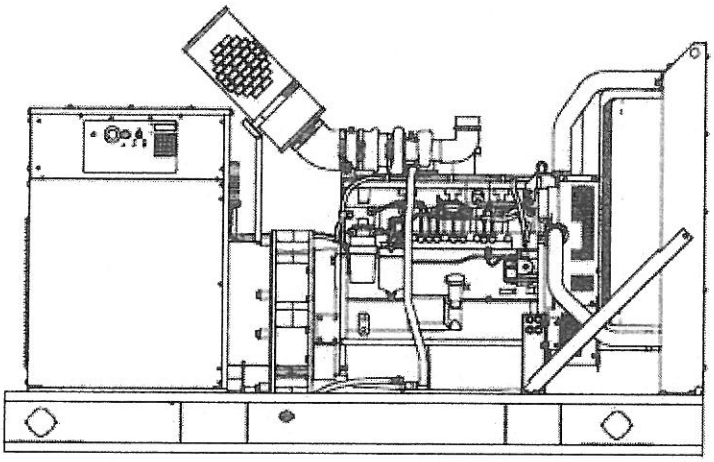
KOHLER POWER SYSTEMS

Spec Sheets

300REOZJ

Diesel

KOHLER POWER SYSTEMS



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.
- Tier 3 EPA-certified for Stationary Emergency Applications
- Alternator Features:
  - The unique Fast-Response II excitation system delivers excellent voltage response and short circuit capability using a permanent magnet (PM)-excited alternator.
  - The brushless, rotating-field alternator has broad range reconnectability.
- Other Features:
  - Controllers are available for all applications. See controller features inside.
  - The low coolant level shutdown prevents overheating (standard on radiator models only).
  - Integral vibration isolation eliminates the need for under-unit vibration spring isolators.
  - An electronic, isochronous governor delivers precise frequency regulation.
  - Multiple circuit breaker configurations.

Generator Set Ratings

				Standby130C Ratings	
Alternator	**Voltage**	**Ph**	**Hz**	**kW/kVA**	**Amps**
4UA13	120/208	3	60	300/375	1041

RATINGS: All three-phase units are rated at 0.8 power factor. Standby Ratings: Standby ratings apply to installations served by a reliable utility source. The standby rating is applicable to varying loads for the duration of a power outage. There is no overload capability for this rating. Ratings are in accordance with ISO-3046/1, BS 5514, AS 2789, and DIN 6271. Prime Power Ratings: Prime power ratings apply to installations where utility power is unavailable or unreliable. 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, overload power in accordance with ISO-3046/1, BS 5514, AS 2789, and DIN 6271. For limited running time and base load ratings, consult the factory. Obtain the technical information bulletin (TIB-101) on ratings guidelines for the complete ratings definitions. The generator set manufacturer reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever. GENERAL GUIDELINES FOR DERATION: Altitude: Derate 1.3% per 100 m (328 ft.) elevation above 762 m (2500 ft.). Temperature: Derate 1.0% per 10°C (18°F) temperature above 25°C (77°F).

Model: 300REOZJ, continued

Alternator Specifications

Specifications	Alternator
Alternator manufacturer	Kohler
Type	4-Pole, Rotating-Field
Exciter type	Brushless,Permanent-Magnet
Leads, quantity	12, Reconnectable
Voltage regulator	Solid State, Volts/Hz
Insulation	NEMA MG1
Insulation: Material	Class H
Insulation: Temperature Rise	130°C, Standby
Bearing: quantity, type	1, Sealed
Coupling	Flexible disc
Amortisseur windings	Full
Voltage regulation, no-load to full-load (with less than 0.5% drift due to temp. variation)	Controller Dependent
One-Step Load Acceptance	100% of rating
Unbalanced load capability	100% of Rated Standby Current

- 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.
- Vacuum-impregnated windings with fungus-resistant epoxy varnish for dependability and long life.
- Superior voltage waveform from a two-thirds pitch stator and skewed rotor.
- Fast-Response™ II brushless alternator with brushless exciter for excellent load response.

Engine

Engine Specifications	
Engine Manufacturer	John Deere
Engine Model	6090HFG86
Engine: type	4-Cycle, Turbocharged, Charge Air Cooled
Cylinder arrangement	6, Inline
Displacement, L (cu. in.)	9.0 (548)
Bore and stroke, mm (in.)	118.4 x 136 (4.65 x 5.35)
Compression ratio	16.0:1
Piston speed, m/min. (ft./min.)	457 (1500)
Main bearings: quantity, type	7, Replaceable Insert
Rated rpm	1800
Max. power at rated rpm, kWm (BHP)	345 (463)
Cylinder head material	Cast Iron
Crankshaft material	Forged Steel
Valve (exhaust) material Intake	Chromium-Silicon Steel
Valve (exhaust) material Exhaust	Stainless Steel
Governor: type, make/model	JDEC Electronic L14 Denso HP4
Frequency regulation, no-load to-full load	Isochronous
Frequency regulation, steady state	±0.25%
Frequency	Fixed
Air cleaner type, all models	Dry

Model: 300REOZJ, continued

Exhaust

Exhaust System	
Exhaust Manifold Type	Dry
Exhaust flow at rated kW, m³/min. (cfm)	63.6 (2246)
Exhaust temperature at rated kW, dry exhaust, °C (°F)	497 (927)
Maximum allowable back pressure, kPa (in. Hg)	Min. 4 (1.2) Max. 10 (3.0)
Exh. outlet size at eng. hookup, mm (in.)	98 (3.86)

Engine Electrical

Engine Electrical System	
Battery charging alternator:	
Ground (negative/positive)	Negative
Volts (DC)	24
Ampere rating	45
Starter motor rated voltage (DC)	24
Battery, recommended cold cranking amps (CCA):	
Qty., CCA rating each	Two, 950
Battery voltage (DC)	12

Fuel

Fuel System	
Fuel type	Diesel
Fuel supply line, min. ID, mm (in.)	11.0 (0.44)
Fuel return line, min. ID, mm (in.)	6.0 (0.25)
Max. lift, fuel pump: type, m (ft.)	Electronic, 3 (10)
Max. fuel flow, Lph (gph)	240 (63.4)
Fuel prime pump	Electronic
Fuel Filter Secondary	2 Microns@ 98% Efficiency
Fuel Filter Primary	10 Microns
Fuel Filter Water Separator	Yes
Recommended fuel	#2 Diesel

Lubrication

Lubrication System	
Type	Full Pressure
Oil pan capacity, L (qt.)	32.5 (34.4)
Oil pan capacity with filter, L (qt.)	33.4 (35.3)
Oil filter: quantity, type	1, Cartridge
Oil cooler	Water-Cooled

Model: 300REOZJ, continued

Cooling

Radiator System	
Ambient temperature, °C (°F)	50 (122)
Engine jacket water capacity, L (gal.)	16 (4.25)
Radiator system capacity, including engine, L (gal.)	36 (9.5)
Engine jacket water flow, Lpm (gpm)	265 (70)
Heat rejected to cooling water at rated kW, dry exhaust, kW (Btu/min.)	114 (6489)
Heat rejected to air charge cooler at rated kW, dry exhaust, kW (Btu/min.)	99.1 (5641)
Water pump type	Centrifugal
Fan diameter, including blades, mm (in.)	863.6 (34.0)
Fan, kWm (HP)	9 (12.1)
Max. restriction of cooling air, intake and discharge side of radiator, kPA (in. H20)	0.125 (0.5)

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

Operation Requirements

Air Requirements	
Radiator-cooled cooling air, m³/min. (scfm) *	396.4 (14000)
Combustion air, m³/min. (cfm)	26.5 (936)
Heat rejected to ambient air: Engine, kW (Btu/min.)	60.8 (3460)
Heat rejected to ambient air: Alternator, kW (Btu/min.)	23.9 (1360)

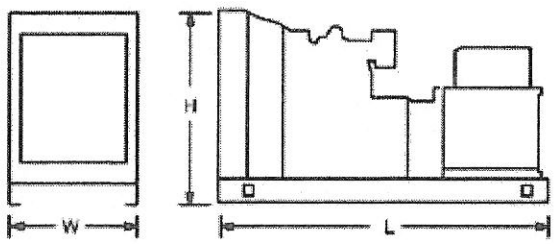
*Air density = 1.20 kg/m³ (0.075 lbm/ft³)

Fuel Consumption

Diesel, Lph (gph), at % load	Rating
Standby Fuel Consumption at 100% load	84.1 Lph (22.2 gph)
Standby Fuel Consumption at 75% load	67.7 Lph (17.9 gph)
Standby Fuel Consumption at 50% load	49.7 Lph (13.1 gph)
Standby Fuel Consumption at 25% load	26.3 Lph (7.0 gph)

Dimensions and Weights

Overall Size, L x W x H, mm (in.): Wide Skid	3100 x 1300 x 1689 (118.1 x 51.2 x 66.5)
Overall Size, L x W x H, mm (in.): Narrow Skid	2800 x 864 x 1380 (110.2 x 34.0 x 54.3)
Weight (radiator model), wet, kg (lb.):	2449 (5400)

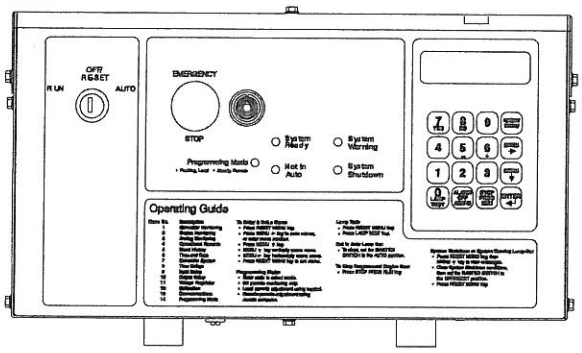


NOTE: This drawing is provided for reference only and should not be used for planning installation. Contact your local distributor for more detailed information.

KOHLER POWER SYSTEMS

Generator Set Controller

ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED



Decision-Maker® 550

Kohler® Decision-Maker® 550 Controller

General Description and Function

The Decision-Maker® 550 generator set controller provides advanced control, system monitoring, and system diagnostics for optimum performance and compatibility with selected engine Electronic Control Modules (ECM).

ECM models only: The Decision-Maker® 550 controller directly communicates with the ECM to monitor engine parameters and diagnose engine problems (see Controller Diagnostics for details).

Standard Features

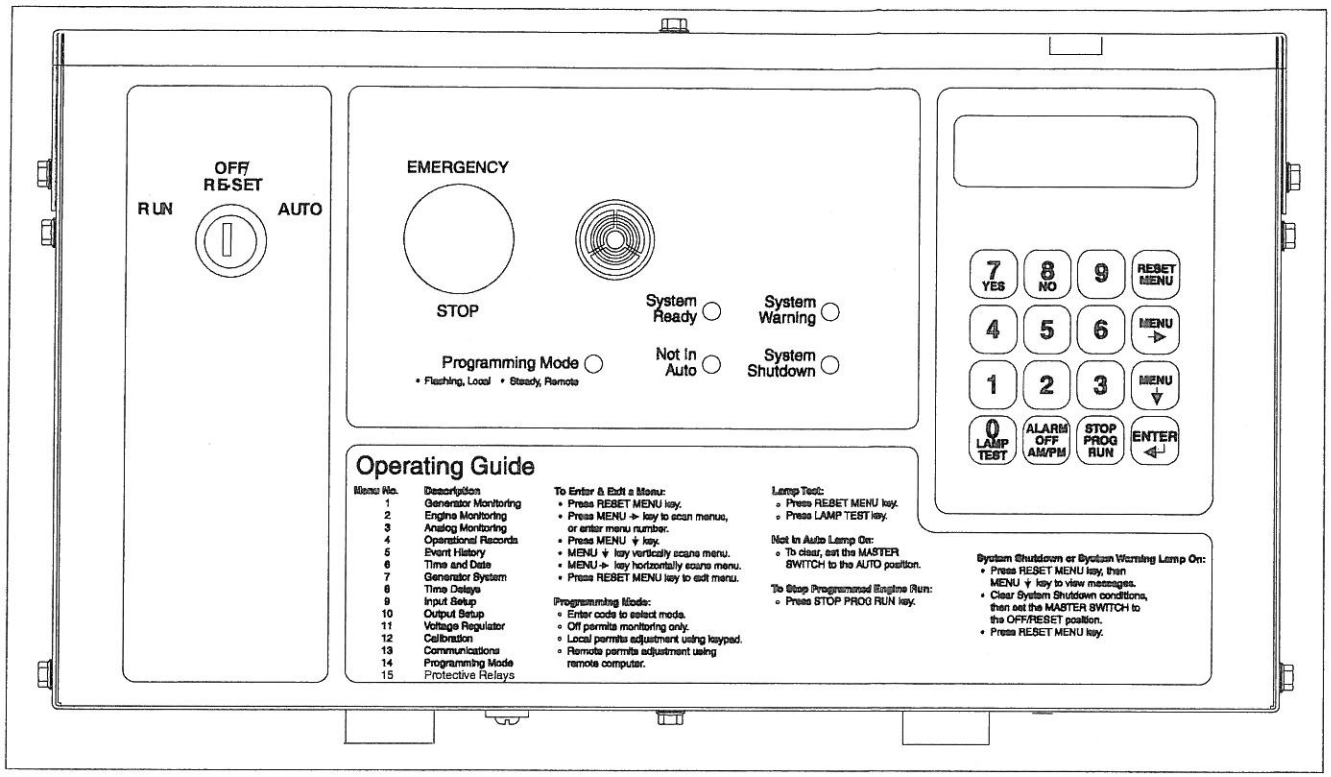
- A digital display and keypad provide access to data. The display provides complete and understandable information, and the keypad allows easy local access.
- Measurements selectable in metric or English units.
- The controller can communicate directly with a personal computer via a network or via a modem configuration.
- The controller supports Modbus® protocol. Use with serial bus or Ethernet networks.
- Integrated voltage regulator providing ±0.25% regulation.
- Built-in alternator thermal overload protection.
- A lockout keyswitch meets appropriate local code requirements.

Optional Features

- Monitor III, an optional menu-driven Windows®-based PC software, monitors engine and alternator parameters and also provides control capability. See G6-76 spec sheet for more information.
- Menu 15 (Protective Relays) is required for optional protective functions and is only available with the Kohler PD-Series switchgear.

Modbus® is a registered trademark of Schneider Electric.

Windows® is a registered trademark of Microsoft Corporation.



Decision-Maker® 550

Controller Features

Decision-Maker® 550—Software Version 2.10 or higher

Specifications

- Power source with circuit protection: 12- or 24-volt DC
- Power drain: 700 milliamps (or 400 milliamps without panel lamps)
- 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:
  - NFPA 99
  - NFPA 110, Level 1
  - UL 508

Hardware Features

- Vacuum fluorescent display
- Environmentally sealed 16-button membrane keypad
- LED status indicating lights
- Three-position (run, off/reset, auto) keyswitch
- Latch-type emergency stop switch with International Electromechanical Commission (IEC) yellow ring identification
- Alarm horn
- Fuse-protected battery circuits
- Controller mounts locally or remotely up to a distance of 12 m (40 ft.) and viewed from one of four positions
- Dimensions—W x H x D,
  460 x 275 x 291 mm (18.15 x 10.8 x 11.47 in.)

NFPA Requirements

In order to meet NFPA 110, Level 1 requirements, the generator set controller must monitor specific engine/generator functions and faults.

NFPA 110 Common Alarm

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

* Requires optional input sensors on some generator set models.

Control Functions

The control functions apply to both the ECM and non-ECM equipped models unless noted otherwise.

- **AC Output Voltage Adjustment**
  The voltage adjustment provides keypad adjustment in 0.1 volt increments of the average line-to-line AC output voltage with a maximum adjustment of ±10% of the system voltage.

- **Alternator Protection**
  The controller firmware 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 when the generator set slows to less than 390 rpm after a failed start attempt.

- **Battleswitch (Fault Shutdown Override Switch)**
  The *battleswitch* input provides the ability to override the fault shutdowns except emergency stop and overspeed shutdown in emergency situations and during generator set troubleshooting.

- **Clock and Calendar**
  Real-time clock and calendar functions time stamp shutdowns for local display and remote monitor. Also use these functions to determine the generator set start date and days of operation.

- **Cooldown Temperature Override**
  This feature provides the ability to bypass (override) the cooldown temperature shutdown and force the generator set to run for the full engine cooldown time delay. Also see Time Delay Engine Cooldown (TDEC).

- **Cyclic Cranking**
  The controller has programmable cyclic cranking. The customer selects the number of crank cycles (1-6) and the crank time from 10 to 30 seconds. The crank disconnect depends upon the speed sensor input information or the generator frequency information. The default cyclic crank setting is 15 seconds on, 15 seconds off for three cycles.

- **Digital Voltage Regulator**
  The digital voltage regulator provides ±0.25% no-load to full-load regulation.

- **Display Power Shutdown**
  To conserve battery power, the display turns off after 5 minutes of inactivity. Pressing any keypad button activates the display.

- **ECM Communication**
  The controller monitors ECM communication links and provides fault detection for oil pressure signal loss, coolant temperature signal loss, and ECM communication loss. Each of these faults provides local display, alarm horn ON, and relay driver output (RDO) on ECM models only. See Controller Diagnostics following for additional information.

- **Idle Speed Function**
  Idle speed function provides the ability to start and run the engine at idle speed for a selectable time period. The engine will go to normal speed should the temperature reach warm-up before the time delay is complete.

- **Lamp Test**
  Keypad switch verifies functionality of the indicator LEDs, alarm horn, and digital display.

- **Load Shed**
  The load shed function provides a load control output (RDO) with user-selectable load shed level.

- **Master Switch Fault**
  The generator set master switch has fault detection at four levels: 1) master switch to off, 2) master switch open, 3) master switch error, and 4) master switch not in auto. Each of these faults/ warnings provides local display, alarm horn on, and activates a relay driver output (RDO). By placing the master switch to the off/reset position, all generator set faults can be reset.

- **Modbus® Interface**
  The Modbus® interface provides industry standard open protocol for communication between the generator set controller and other devices or for network communications.

- **Number of Starts**
  Total number of generator set successful starts is recorded and displayed on the local display and remote PC monitor. This information is a resettable and total record.

- **Programming Access**
  The setup access and programming information is password protected. When locally accessing programming information, the PM (programming mode) LED flashes. When remotely accessing programming information, the PM LED is steady.

- **Programmed Run**
  The programmed run function provides user-selectable time for a one-time exercising of the generator set. The controller does not provide weekly scheduled exercise periods.

- **Remote Reset**
  The remote reset function resets faults and allows restarting of the generator set without going to the master switch off/reset position. The remote reset function is initiated via the remote reset digital input.

- **Running Time Hourmeter**
  The running time hourmeter function is available on the local display and remote monitor. The information displayed uses real time loaded and unloaded run time as an actual and resettable record.

- **Self-Test**
  The controller has memory protection and a microprocessor self-test.

- **Starting Aid**
  The starting aid feature provides control for an ether injection system. This setup has adjustable *on* time before engine crank from 0 to 10 seconds. This feature is also part of the remote communication option.

- **Time Delay Engine Cooldown (TDEC)**
  The TDEC provides a user-selectable time delay before the generator set shuts down. If the engine is *above* the preset temperature and unit is signalled to shut down, unit will continue to run for the duration of the TDEC. If the engine is *at or below* the preset temperature and unit is signalled to shut down or the TDEC is running, unit will shut down without waiting for the time delay to expire. Also see Cooldown Temperature Override.

- **Time Delay Engine Start (TDES)**
  The TDES provides a user-selectable time delay before the generator set starts.

Controller Diagnostics

The controller features warnings and shutdowns as text messages on the vacuum fluorescent display. See the table below.

Warnings show yellow LED and signal an impending problem.
Shutdowns show red LED and stop the generator set.

Note: Menu 15 features are available by purchasing the paralleling switchgear option.

Note: The available user inputs are dependent on factory reserved inputs for specific engine types, engine controls, and paralleling applications.

User-Defined Common Fault and Status. The user customizes outputs through a menu of warnings, shutdowns, and status conditions. User defines up to 31 relay driver outputs **(RDOs)** (relays not included).

	Warning Function	Shutdown Function	User-Defined	User RDOs
Engine Protection				
Air damper control, if equipped			X	X
Air damper indicator, if equipped		X	X	X
Coolant temp. signal loss		X	X	X
High battery voltage	X		X	X
High coolant temperature	X	X	X	X
High oil temp. shutdown		X	X	X
Low battery voltage	X		X	X
Low coolant level		X	X	X
Low coolant temperature	X		X	X
Low fuel level (diesel) *	X		X	X
Low fuel pressure (gas) *	X		X	X
Low oil pressure	X	X	X	X
Oil pressure signal loss		X	X	X
Overcrank		X	X	X
Overspeed		X	X	X
Speed sensor fault	X		X	X
Starting aid			X	X
Weak battery	X		X	X
General Protection				
Auxiliary inputs 0-5 VDC—up to 7 analog	X	X	X	X
Auxiliary inputs—up to 21 digital	X	X	X	X
Battery charger fault *	X		X	X
Defined common fault †			X	X
EEPROM write failure		X	X	X
Emergency stop		X	X	X
Engine cooldown delay			X	X
Engine start delay			X	X
EPS supplying load	X		X	X
Internal fault		X	X	X
Load shed kW overload	X		X	X

	Warning Function	Shutdown Function	User-Defined	User RDOs
Load shed underfrequency	X		X	X
Master switch error		X	X	X
Master switch not in auto	X		X	X
Master switch open		X	X	X
Master switch to off		X	X	X
NFPA 110 common alarm			X	X
SCRDO's 1-4 (software controlled RDOs)			X	X
System ready (status)			X	X
Alternator Protection				
AC sensing loss	X	X	X	X
Critical overvoltage		X	X	X
Generator running			X	X
Ground fault *	X		X	X
Locked rotor		X	X	X
AC Protection (includes Menu 15 Enabled Enhancements)				
Alternator protection (short circuit and overload)		X	X	X
Breaker trip			‡	X
Common protective relay output			X	X
In synchronization			‡	X
Loss of field (reverse VAR)		X	X	X
Overcurrent	X	X	X	X
Overfrequency		X	X	X
Overpower		X	X	X
Overvoltage		X	X	X
Reverse power		X	X	X
Underfrequency		X	X	X
Undervoltage		X	X	X

* Requires optional input sensors on some models.

† Factory default settings for the defined common fault are emergency stop, high coolant temperature shutdown, low oil pressure shutdown, overcrank, and overspeed.

‡ Factory set inputs that are fixed and not user changeable.

Controller Displays as Provided by the Engine ECM (availability subject to change by the engine manufacturer)						
Display	**GM**	**Doosan**	**John Deere**	**Volvo (EMS II)**	**Volvo (EDC III)**	**DD/MTU (DDEC)**
Ambient temperature		X				
Charge air pressure	X	X		X	X	X
Charge air temperature	X	X	X	X	X	
Coolant level				X	X	X
Coolant pressure				X	X	
Coolant temperature	X	X	X	X	X	X
Crankcase pressure				X	X	
ECM battery voltage	X	X				X
ECM fault codes	X	X	X	X	X	X
ECM serial number						X
Engine model number			X			X
Engine serial number			X			X
Engine speed	X	X	X	X	X	X
Fuel pressure				X	X	
Fuel rate	X	X	X	X	X	X
Fuel temperature			X	X	X	X
Lube oil temperature				X	X	X
Oil level					X	
Oil pressure	X	X	X	X	X	X
Trip fuel				X	X	X
Unit number						

Controller Monitoring

Standard Equipment and Features

- Alarm horn
- Indicators:
  - Not in auto (yellow)
  - Program mode (yellow)
  - System ready (green)
  - System shutdown (red)
  - System warning (yellow)
- Switches and standard features:
  - Keypad, 16-button multi-function sealed membrane
  - Lamp test
  - Keyswitch, auto, off/reset, run (engine start)
  - Switch, emergency stop (normally closed contacts)
- Vacuum fluorescent display with two lines of 20 characters

Displays

Some engine displays are dependent upon enhanced electronic engine control availability.

- Engine monitoring data (metric or English units):
  - Battery voltage
  - Coolant—level †
  - Coolant—pressure †
  - Coolant—temperature
  - Engine start countdown
  - Fuel—pressure †‡§‖
  - Fuel—temperature †‡§
  - Fuel rate expressed as L/hr. (gal./hr.) †
  - Fuel—used last run expressed as L (gal.) is the accumulated fuel qty. used since last reset by the DDC engine DDEC reader †
  - Oil—level and crankcase pressure †
  - Oil—pressure
  - Oil—temperature †‡§
  - Rpm
  - Temperature—ambient †
  - Temperature—intake air ‡§
- Engine setpoints
  - Coolant—high temperature shutdown and warning setpoints
  - Oil—low pressure shutdown and warning setpoints
  - Temperature—engine cooled down setpoint
  - Temperature—engine warmed up setpoint
- Generator monitoring data:
  - Current (L1, L2, L3), ±0.25% accuracy
  - Frequency, ±0.5% accuracy
  - Kilowatts, total per phase (L1, L2, L3), ±0.5% accuracy
  - KVA, total per phase (L1, L2, L3), ±0.5% accuracy
  - KVAR, total absorbing/generating per phase (L1, L2, L3), ±0.5% accuracy
  - Percent alternator duty level (actual load kW/standby kW rating)
  - Power factor per phase, leading/lagging
  - Voltage (line-to-line, line-to-neutral for all phases), ±0.25% accuracy
- Operational records:
  - Event history (stores up to 100 system events)
  - Last start date
  - Number of starts
  - Number of starts since last maintenance
  - Operating days since last maintenance
  - Operating mode—standby or prime power
  - Run time (total, loaded and unloaded hours, and total kW hours)
  - Run time since maintenance (total, loaded, and unloaded hours and total kW hours)
  - System shutdowns
  - System warnings
  - Time, date, and day of week
- Time delays—general:
  - Crank cycles for on/pause
  - Crank cycles for overcrank shutdown
  - Engine cooldown
  - Engine start
  - Load shed
  - Voltage, over- and under-
  - Starting aid
- Time delays—paralleling relays (PR) for optional switchgear applications:
  - Current—over (PR)
  - Current—over shutdown
  - Frequency—over- and under- (PR and shutdown)
  - Loss of field (PR and shutdown)
  - Loss of field shutdown (PR)
  - Power—over (PR)
  - Power—over shutdown
  - Reverse power (PR)
  - Reverse power shutdown
  - Synch matching—frequency, phase, voltage
  - Voltage—over- and under- (PR and shutdown)
- System parameters:
  - Alternator number
  - Current, rated (based on kW, voltage, connection settings)
  - ECM serial number †
  - Engine model number †
  - Engine serial number †
  - Frequency
  - Generator set model number
  - Generator set serial number
  - Generator set spec number
  - Rating, kW
  - Phase, single and three (wye or delta)
  - Unit number ‡
  - Voltage, AC
  - Voltage configuration, wye or delta

Inputs

- Customer and remote inputs:
  - Analog inputs 0-5 VDC (up to 7 user-defined analog inputs with multiple shutdown and warning levels)
  - Digital contact inputs (up to 21 user-defined digital inputs with shutdown or warning levels)
  - Ground fault detector *
  - Remote emergency stop
  - Remote reset
  - Remote 2-wire start
- Digital inputs (standard):
  - Air damper fault, if equipped
  - Air/fuel module shutdown §
  - Battery charger fault *
  - Battleswitch
  - Detonation shutdown §
  - Detonation warning §
  - Emergency stop
  - Field overvoltage (350 kW and higher)
  - High oil temperature
  - Idle mode active (ECM models only) †‡
  - Knock shutdown §
  - Low coolant level
  - Low coolant temperature
  - Low fuel warning *
  - Low fuel shutdown (standard on 125/150RZG) *
- Switchgear inputs in Menu 15 (to interface with switchgear system):
  - Circuit breaker closed
  - Enable synch
  - Lockout shutdown
  - Remote reset
  - Remote shutdown
  - VAR/PF mode selection
  - Voltage—raise/lower (or VAR/PF raise/lower in VAR/PF mode)

Outputs

See the Fault Diagnostics section for a breakdown of the available shutdown and warning functions.

- Thirty-one user-defined relay driver outputs (relays not included)
  - Fifteen NFPA 110 faults
  - Defined common faults

Communication

- RS-485 connector for Modbus® RTU communication port
- RS-232 connector for a PC or modem (optional software required)
- SAE J1939 connector for the engine ECM (engine control module)

* Requires optional input sensors on some models.
† Standard on 200-275 kW gas and 230-500 kW diesel DDC engines with DDEC only.
‡ Standard on DDC/MTU engines with MDEC/ADEC only.
§ Standard on Waukesha engines only.
‖ Standard on 150-200 kW with John Deere 6068HF275 engines only.

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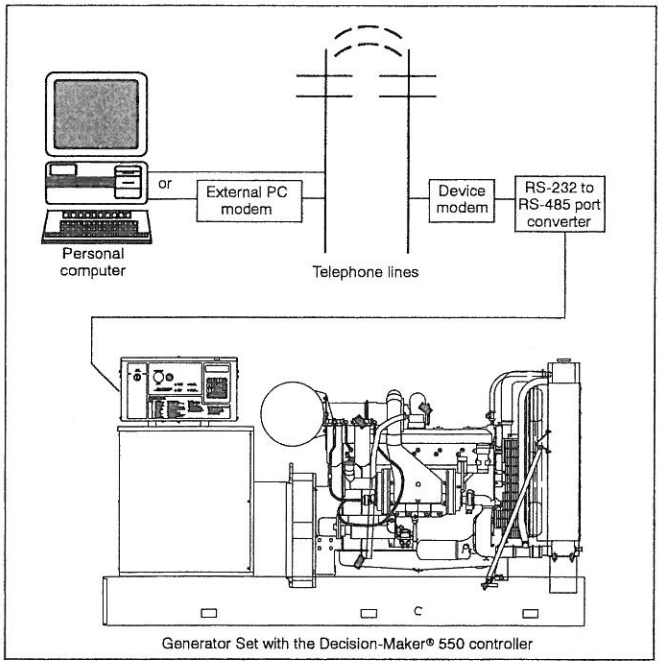
Decision-Maker®550 Controller Accessories

Communication and PC Software Accessories

Refer to spec sheet G6-76, Monitor III Software for additional communication and PC software information including Modbus® communication.

- ❑ **Local Single Connection.** A PC is connected directly to the device communication module with an RS-232 cable for applications where the PC is within 15 m (50 ft.) of the device or RS-485 cable for applications where the PC is up to 1220 m (4000 ft.) from the device.
- ❑ **Local Area Network (LAN).** A PC is connected directly to the device's local area network. A LAN is a system of connecting more than one device to a single PC.
- ❑ **Remote Network (Ethernet):** A PC with a NIC card uses an Ethernet connection to access a remotely located converter (Modbus®/Ethernet) serving a controller. Refer to G6-79 for system details.
- ❑ **Remote Network (Modem):** A PC uses a modem to connect to a remotely located device modem serving a controller. Monitoring software (Monitor III) runs on the PC to view system operation.
- ❑ **Monitor III Software for Monitoring and Control (Windows®-based user interface)**
- ❑ **Converter, Modbus®/Ethernet.** Supports a power system using a controller accessed via the Ethernet. Converter is supplied with an IP address by the site administrator. Refer to G6-79 for converter details.
- ❑ **RS-232 to RS-485 Port Converters**



Generator Set with the Decision-Maker® 550 controller

Other Accessories

- ❑ **Common Failure Relay** remotely signals auxiliary fault, emergency stop, high engine temperature, low oil pressure, overcrank, and overspeed via one single-pole, double-throw relay with 10-amp contacts at 120 VAC or 28 VDC maximum.
- ❑ **Run Relay** provides a three-pole, double-throw relay with 10-amp contacts at 120 VAC or 28 VDC maximum for indicating that the generator set is running.
- ❑ **Controller Cable** enables remote mounting of the controller with distances of up to 12 m (40 ft.) from the generator set.
- ❑ **Controller Connection Kit** provides a cable connecting the controller output terminals to a terminal strip in the junction box.
- ❑ **Dry Contact Kit** interfaces between the controller signals and customer-supplied accessories providing contact closure to activate warning devices such as lamps or horns. Kits are available with either one or ten single-pole, double-throw relays with 10-amp contacts at 120 VAC or 28 VDC maximum.
- ❑ **Float/Equalize Battery Charger with Alarm Feature** signals controller of battery charger fault.
- ❑ **Prealarm Kit for NFPA 110 (gas fuel models only)** warns the operator of low fuel pressure. Select the kit based on LP vapor or natural gas, combination dual fuel, or LP liquid withdrawal.
- ❑ **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 Audiovisual Alarm Panel** warns the operator of fault shutdowns and warning conditions. Kit includes common fault lamp and horn with silence switch.
- ❑ **Remote Emergency Stop Panel** immediately shuts the generator set down from a remote station.
- ❑ **Remote Serial Annunciator Panel** 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. Uses Modbus® protocol, an industry standard.

Modbus® is a registered trademark of Schneider Electric.

Windows® is a registered trademark of Microsoft Corporation.

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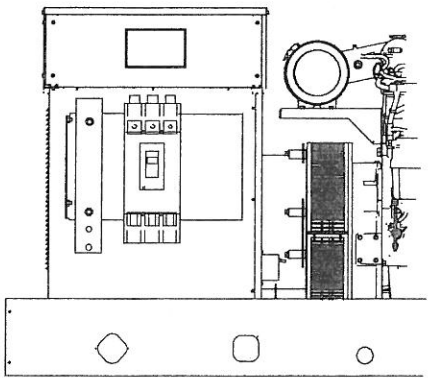
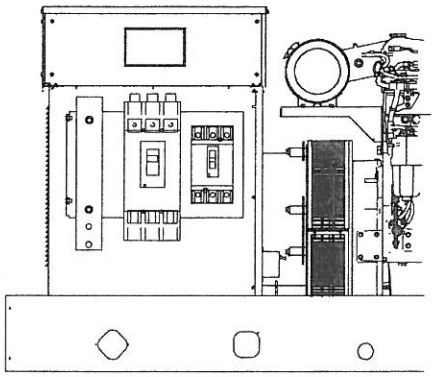
KOHLER. Power Systems

Line Circuit Breakers 20-2250 kW

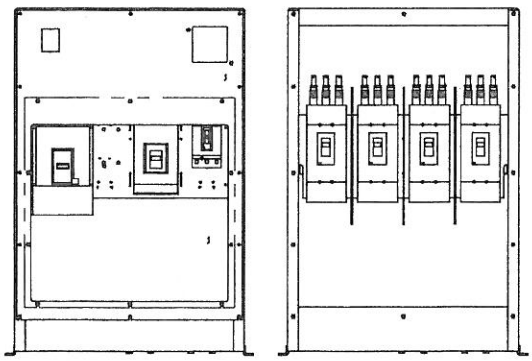
ISO 9001
KOHLER POWER SYSTEMS
NATIONALLY REGISTERED



Single Circuit Breaker Kit with Neutral Bus Bar
20-300 kW Model Shown



Dual Circuit Breaker Kit with Neutral Bus Bar
20-300 kW Model Shown



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

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 (350-2250 kW).
- 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

1000 amp Cir. Brkr.

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 (UL 1077 circuit breakers).

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 dependant 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.

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 (350-2250 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.
20-300 kW. Bus bar kits are available on alternators with leads for connection to the generator set when circuit breakers are not ordered.
350-2250 kW. A bus bar kit is provided on the right side of the unit 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.

☐ 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.

☐ Neutral Lugs

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

☐ 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.

☐ 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.

20-300 kW Line Circuit Breaker Specifications

80% Rating Circuit Breaker

Gen. Set kW	Alt. Model	Ampere Range	Trip Type	C. B. Frame Size
20-80	4P/4PX/ 4Q/4QX	30-100	Magnetic, UL 1077	E (480 V max.)
			Magnetic, UL 1077 with 12 V shunt trip	
			Magnetic, UL 1077 with 24 V shunt trip	
		15-150	Thermal magnetic	HD
		60-150	Electronic LI	
			Electronic LSIG	
		175-250	Thermal magnetic	JD
		250	Electronic LI	
			Electronic LSIG	
		300-400	Thermal magnetic	LA
60-200	4RX/4S/ 4SX/ 4TX/4V	30-100	Magnetic, UL 1077	E (480 V max.)
			Magnetic, UL 1077 with 12 V shunt trip	
			Magnetic, UL 1077 with 24 V shunt trip	
		15-150	Thermal magnetic	HD
		60-150	Electronic LI	
			Electronic LSIG	
		175-250	Thermal magnetic	JD
		250	Electronic LI	
			Electronic LSIG	
		300-400	Thermal magnetic	LA
		400-600	Electronic LI	LG
			Electronic LSIG	
		700-800	Thermal magnetic	MG
		1000-1200	Thermal magnetic	PG
		800-1200	Electronic LI	
			Electronic LSIG	
200-300	4UA/ 4M6226	15-150	Thermal magnetic	HD
		60-150	Electronic LI	
			Electronic LSIG	
		175-250	Thermal magnetic	JD
		250	Electronic LI	
			Electronic LSIG	
		300-400	Thermal magnetic	LA
		400-600	Electronic LI	LG
			Electronic LSIG	
		700-800	Thermal magnetic	MG
		1000-1200	Thermal magnetic	PG
		800-1200	Electronic LI	
			Electronic LSIG	

100% Rating Circuit Breaker

Gen. Set kW	Alt. Model	Ampere Range	Trip Type	C. B. Frame Size
20-80	4P/4PX/ 4Q/4QX	15-150	Thermal magnetic	HD
		60-150	Electronic LI	
			Electronic LSIG	
		175-250	Thermal magnetic	JD
		250	Electronic LI	
			Electronic LSIG	
		400	Electronic LI	LG
			Electronic LSIG	
60-200	4RX/4S/ 4SX/ 4TX/4V	15-150	Thermal magnetic	HD
		60-150	Electronic LI	
			Electronic LSIG	
		175-250	Thermal magnetic	JD
		250	Electronic LI	
			Electronic LSIG	
		400	Electronic LI	LG
			Electronic LSIG	
		600-1200	Electronic LI	PG
			Electronic LSIG	
→ 200-300	4UA/ 4M6226	15-150	Thermal magnetic	HD
		60-150	Electronic LI	
			Electronic LSIG	
		175-250	Thermal magnetic	JD
		250	Electronic LI	
			Electronic LSIG	
		400	Electronic LI	LG
			Electronic LSIG	
	→	600-1200	Electronic LI	PG
			Electronic LSIG	

Interrupting Ratings

Circuit Breaker Frame Size	240 Volt, kA	480 Volt, kA	600 Volt, kA
HD	25	18	14
JD			
LA	42	30	22
LG	65	35	18
MG			
PG			

Circuit Breaker Lugs Per Phase (Al/Cu)

Frame Size	Ampere Range	Wire Range
E (480 V max.)	30-100	Up to two wire terminals fitting 10-32 or 1/4-20 stud
HD (80%)	15-150	One #14 to 3/0
HD (100%)	15-150	One #14 to 2/0 Cu only
JD (80%)	175	One 1/0 to 4/0
	200-250	One 3/0 to 350 kcmil
JD (100%)	175-250	One 3/0 to 300 kcmil Cu only
LA	300-400	One #1 to 600 kcmil or Two #1 to 250 kcmil
LG	400-600	Two 2/0 to 500 kcmil
MG	700-800	Three 3/0 to 500 kcmil
PG	600-800	Three 3/0 to 500 kcmil
	1000-1200	Four 3/0 to 500 kcmil

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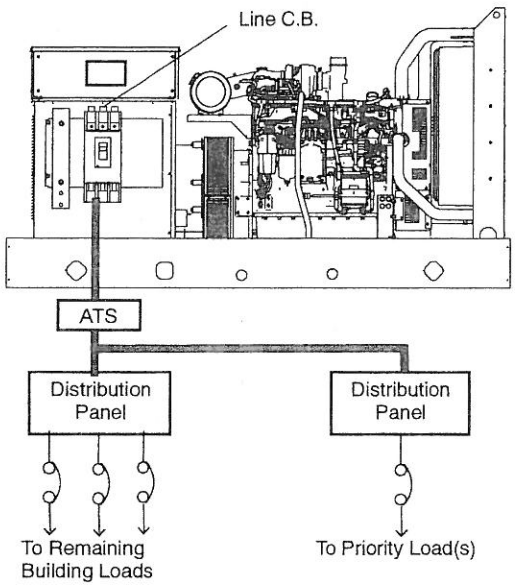
20-300 kW Line Circuit Breaker Applications

Single Circuit Breaker Installations

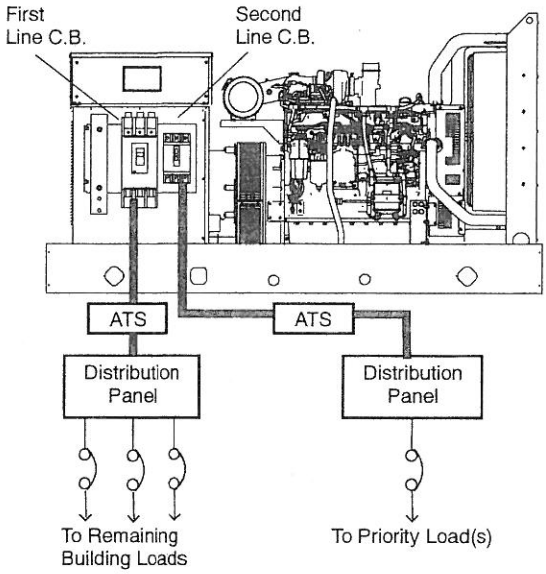
A generator set with a single circuit breaker installed typically feeds a single transfer switch and then a distribution panel. This allows protection of the entire system.



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

Dual Circuit Breaker Installations

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



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

Dual Circuit Breaker Combinations

Alternator Model	First C. B. Frame Size	Second C. B. Frame Size	Comments
All	HD	—	Standard or LSIG
	JD	—	
	LA	—	Standard only
	LG	—	Standard or LSIG
4P/4PX/4Q/ 4QX/4RX/4S/ 4SX/4TX/4V/ 4UA	HD	HD	Standard only
	JD	HD or JD	
	LA	HD or JD	
	LG	HD or JD	
	LG	LG	
4RX/4S/ 4SX/4TX/4V	MG	—	Standard only
	PG	—	Standard or LSIG
	HD	HD	Standard only
	JD	HD or JD	
	LA	HD, JD, LA	
	LG	HD, JD, LA, or LG	
	MG		
	PG		

Alternator Model	First C. B. Frame Size	Second C. B. Frame Size	Comments
4UA/4M6226	MG	—	Standard only
	PG	—	Standard or LSIG
	HD	HD	
	JD	HD or JD	
	LA	HD, JD, or LA	Standard only
	LG	HD, JD, LA, or LG	HD, JD, LG (1 or 2 may be standard or LSIG)
	MG		PG and/or HD, JD, LG may be LSIG
	PG		
	PG	PG	Standard only

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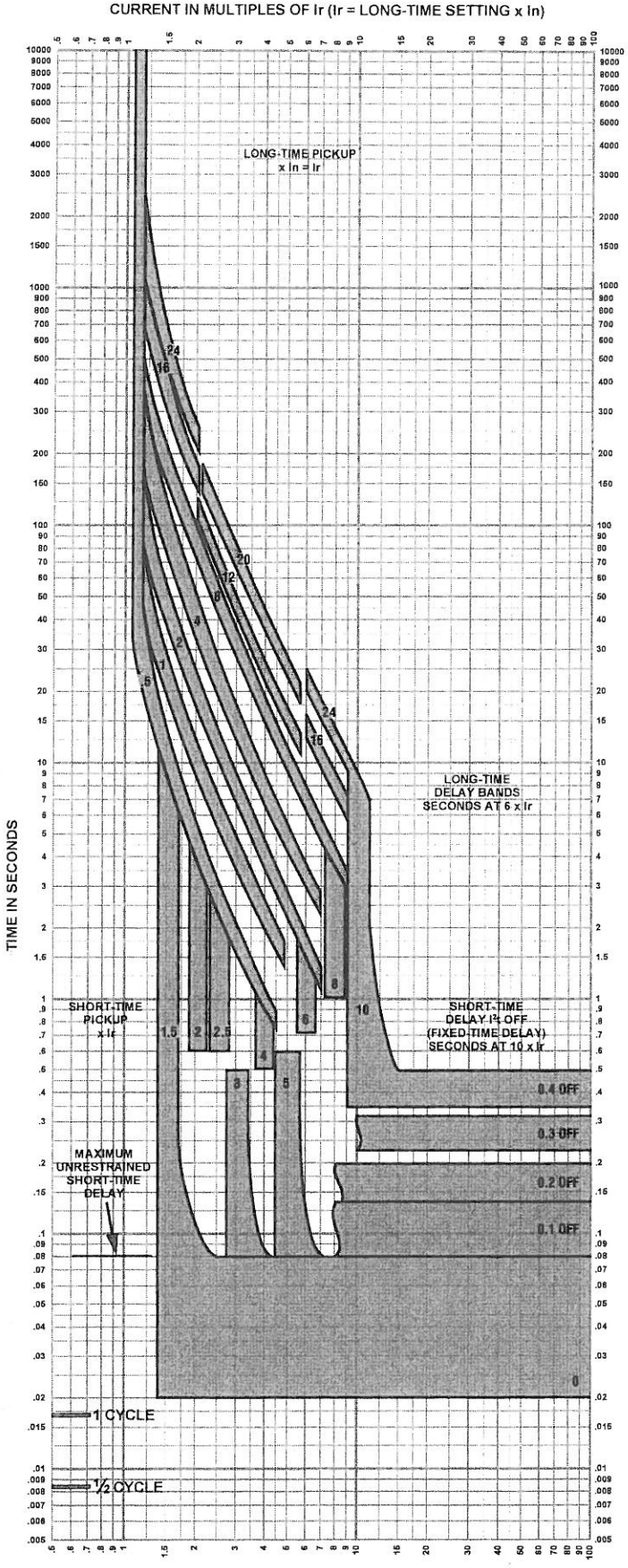
MICROLOGIC® 5.0/6.0 A/P/H TRIP UNIT CHARACTERISTIC TRIP CURVE NO. 613-4

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%.

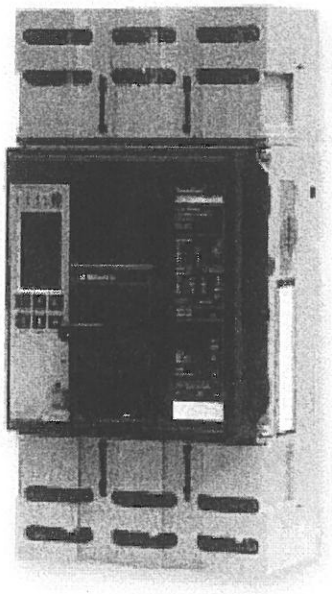
Merlin Gerin
Modicon
Square D
Telemecanique
Federal Pioneer
Federal Pacific
Schneider Electric Brands

Schneider Electric

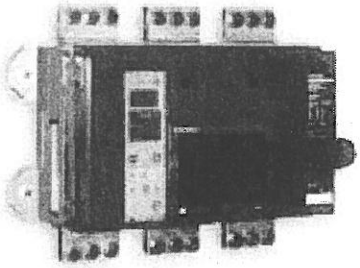
Curve No. 0613TC0004
December 2000
Drawing No. B48095-613-04

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

Merlin Gerin
Modicon
Square D
Telemecanique
Schneider Electric

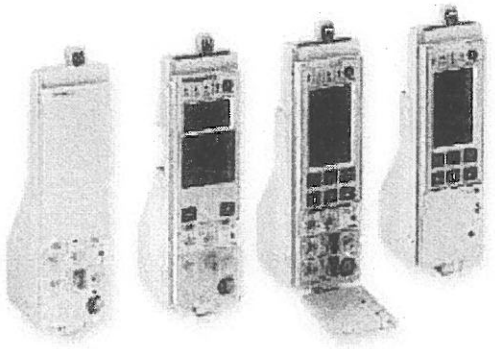
SQUARE D
Schneider Electric

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

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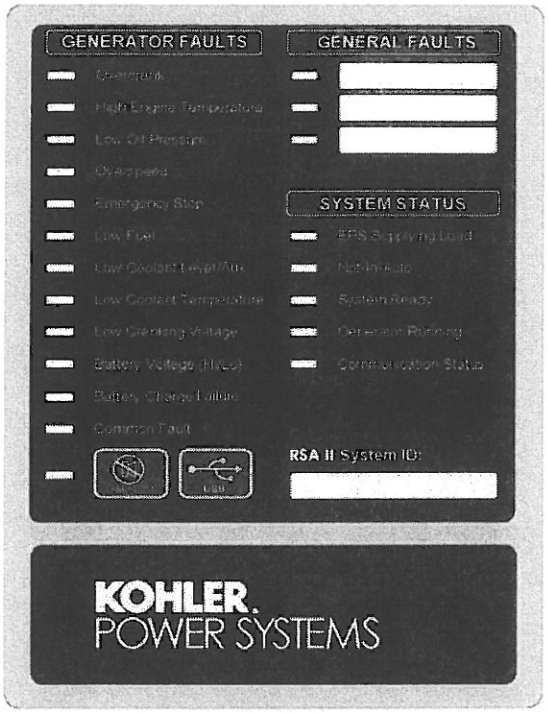
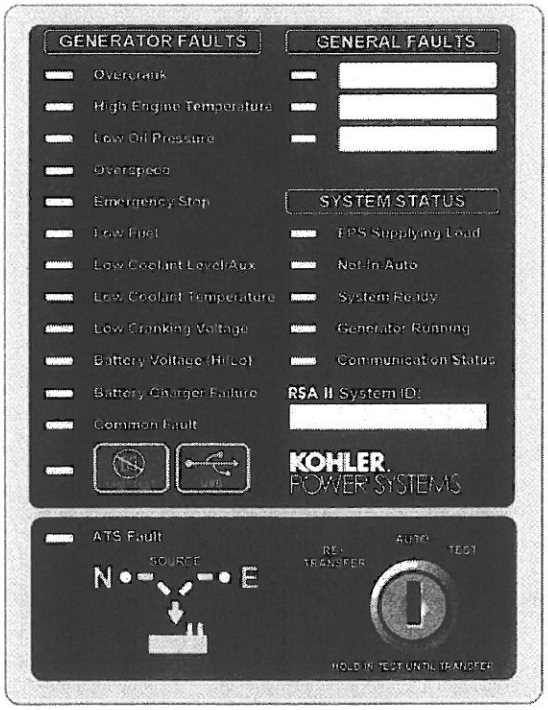
KOHLER POWER SYSTEMS Remote Serial Annunciator II (RSA II)

ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED



RSA II



RSA II with ATS Controls

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

- Monitors the generator set equipped with one of the following controllers:
  - KPC 1000
  - Decision-Maker® 3+
  - Decision-Maker® 3000
  - Decision-Maker® 550
  - Decision-Maker® 6000
- Allows monitoring of the common alarm, remote testing of the automatic transfer switch, and monitoring of the normal/emergency source with one of the following controllers:
  - MPAC™ 1000
  - MPAC™ 1500
- Configuration via a personal computer (PC) software.
- RSA II panel includes writable surfaces (four white boxes in illustration) for user-defined selections.
- Uses Modbus® protocol, an industry standard.
- Controller connections:
  - RS-485 for serial bus network
  - USB device port for PC
  - 12-/24-volt DC power supply
  - 120/208 VAC power supply (available accessory)
- Meets the National Fire Protection Association Standard NFPA 110, Level 1.

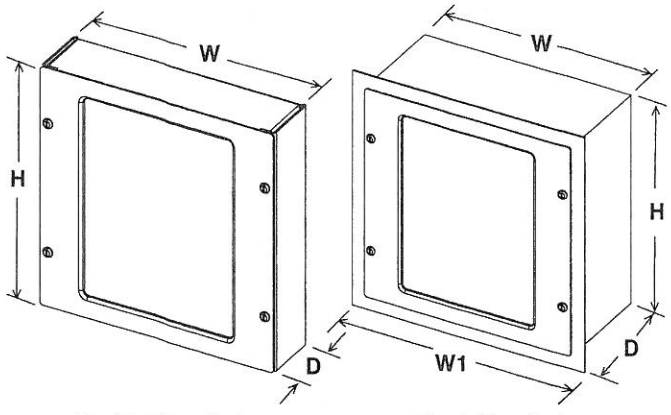
Dimensions

- Dimensions—W x H x D, mm (in.). Also fits in a standard 203 mm x 203 mm (8 in. x 8 in.) Hoffman box.

  Surface Mounted:
  203 x 203 x 56 (8.0 x 8.0 x 2.2)

  Flush Mounted:
  203 x 203 x 58 (8.0 x 8.0 x 2.3)
  Flush mounting plate W1: 229 (9.0)

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
EPS Supplying Load	Yellow	Off	Green	Green	Green
Communications Status (Fault mode)	—	Off	Green or Red	Green or Off	Red
ATS Fault (RSA II 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. See the above chart for details.
- 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
  - 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 2 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 II with ATS controls only)

- ATS position LED (normal or emergency)
- Power source indicator LED (normal or emergency)
- ATS fault LED
- Key-operated spring-loaded test switch (Re-Transfer/Auto/Test)

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 lights when alarm horn is deactivated by alarm silence switch (lamp test switch).

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

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

Aux. See Low Coolant Level/Aux.

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

(High/Low) Battery Voltage. 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.

Emergency Power System (EPS) Supplying Load. LED lights when the generator set is supplying output current (Decision-Maker® 550, 3000, and 6000 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.

(Generator Switch) Not In Auto. LED lights when generator set master switch is in RUN or OFF/RESET position.

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. 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.

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.

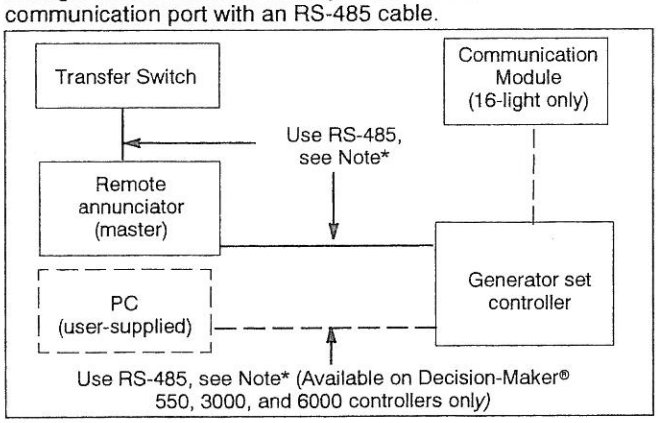
System Ready. Green LED lights when generator set master switch is in AUTO position and the system senses no faults. Red LED indicates system fault.

User-Defined Digital Inputs #1, #2, and #3. Monitors two digital auxiliary inputs (warnings or shutdowns). Individual red LEDs flash when a fault occurs or the status changes. User-defined digital input #1 and #2 are selected via the RSA II master for local or remote (generator set or ATS). The user-defined digital input can be assigned at the controller or via PC using SiteTech™ setup software.

Communications (Shown with RSA II with ATS Controls)

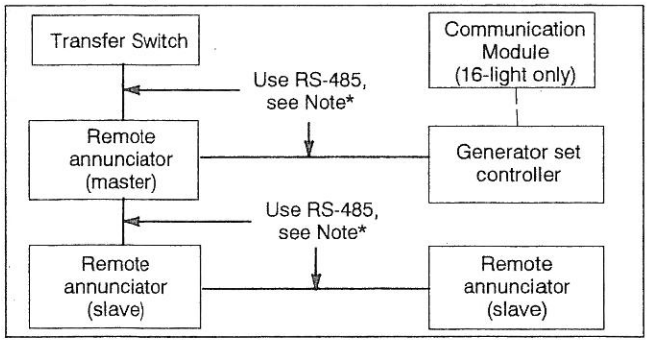
Local Single (Master) Connection

A single RSA II connects directly to the controller's communication port with an RS-485 cable.



Local Multiple (Master/Slave) Connections

A single RSA II master connects directly to the controller's communication port with an RS-485 cable. Additional RSA IIs (slaves) can connect to the single master RSA II. Status of the RSA II (master) is annunciated on the RSA II (slave) panel.



Note*: Use RS-485 for a total of up to 1220 m (4000 ft.) maximum from the first device to the last device.

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

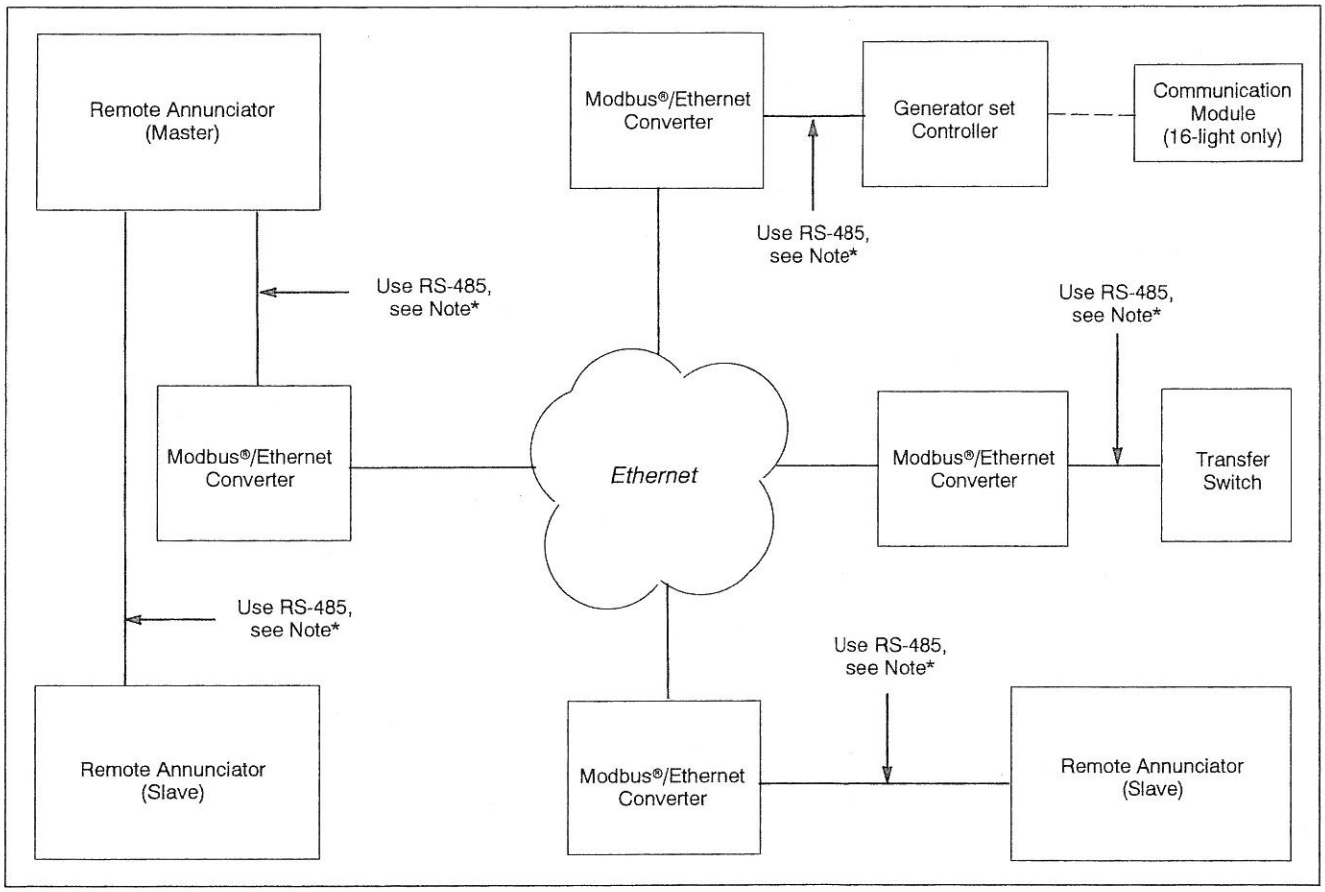
Kohler Power Systems
Asia Pacific Headquarters
7 Jurong Pier Road
Singapore 619159
Phone (65) 6264-6422, Fax (65) 6264-6455

Modbus®/Ethernet, Single Master or Multiple Master/Slave Connections (Shown with RSA II with ATS Controls)

An RSA II master communicates with a controller and RSA II slaves through an Ethernet network. A Modbus®/Ethernet converter is required for each RSA II and controller. RS-485 cable connects the RSA II to the converter. Category 5e (Cat 5e) network cable connects the Modbus®/Ethernet converter to the Ethernet.

Note: Combining RSA II remote annunciators with the RSA 1000 is permissible provided that the master remote annunciator is an RSA II remote annunciator.

Note*: Use RS-485 for a total of up to 1220 m (4000 ft.) maximum from the first device to the last device.



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.

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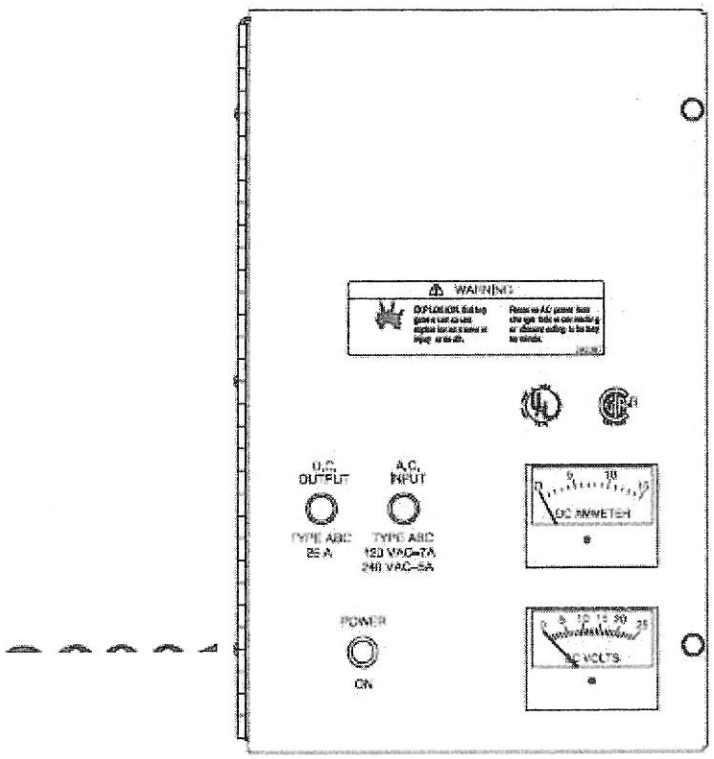
KOHLER POWER SYSTEMS

Float/Equalize Battery Charger



Standard Features

- Kohler automatic battery chargers feature two charging modes to keep lead-acid and nickel-cadmium batteries fully charged without overcharging. The battery charger automatic float-to-equalize operation maintains battery voltage with no manual intervention.
- Temperature compensation feature prevents overcharging or undercharging battery at high/low ambient temperatures.
- Current-limiting circuitry prevents battery charger from overload at low battery voltage and during a short circuit. The ten amp DC current limit allows the battery charger to remain connected to the battery during engine cranking.
- Battery charger complies with NFPA 110 code requirements when equipped with optional alarm circuit board. Alarm board features low battery voltage, high battery voltage, and battery charger malfunction alarm contacts.

Specifications

Installed Battery	NFPA 110 Alarm Outputs	Output		Number of Cells	
		Voltage	Amps	Lead Acid	Ni-Cd
PAD-292865	Yes	24	10	12	18

Battery Charger Kit	PAD-292865
Input Voltage	120/240 VAC
Input Frequency	120/240VAC, 50/60 Hz
DC Voltage Regulation	±1%
Dimensions (L x W x D)	271 x 143 x 422 mm (10.67 x 5.63 x 16.63 in.)
Weight	11.8 kg (26 lb.)

Float/Equalize Battery Charger, continued

Automatic Float to Equalize

When the battery loses its charge, the battery charger operates in the High Rate Constant Current Mode until the battery voltage rises to the preset equalize level.At the preset equalize level, the battery charger switches to the constant voltage Equalize Mode until the current required to maintain this voltage drops to 50% of the battery charger's high rate current.The battery charger then switches to the lower constant voltage Float Mode when the battery nears full charge. The battery charger continues to operate in this mode until AC input power disconnects or the current required to maintain the battery at the float voltage setting exceeds 6 amps.

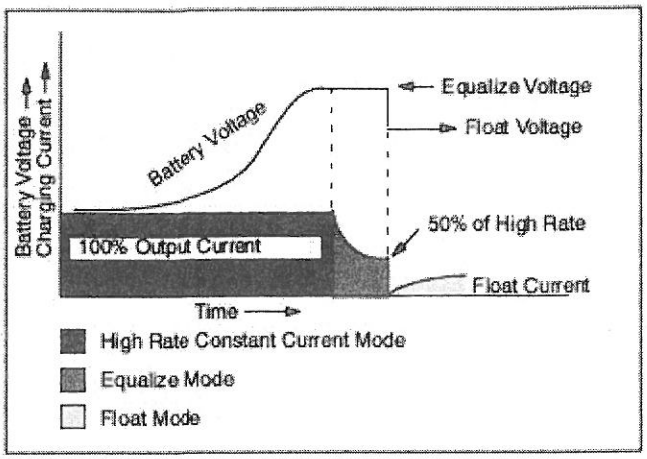


Figure 1

Temperature Compensation

The battery charger compensates for battery temperature using a negative temperature coefficient. The battery charger provides temperature compensation of -2mv/°C per cell over the ambient temperature range of -40°C up to 60°C. The temperature compensation automatically adjusts the float and equalize voltage settings to prevent the battery from overcharging at high ambient temperatures and undercharging at low ambient temperatures.

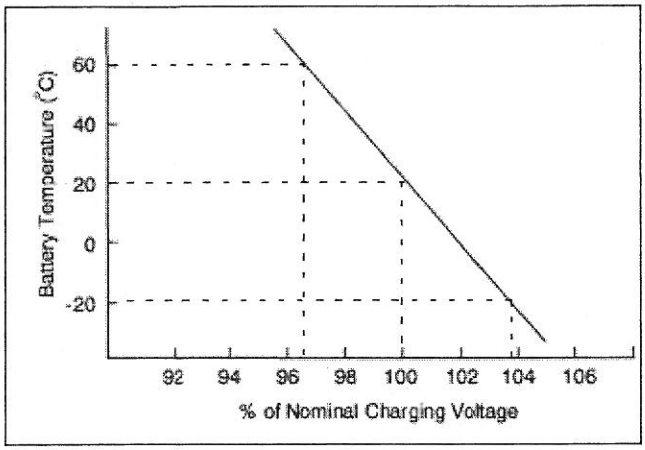


Figure 2

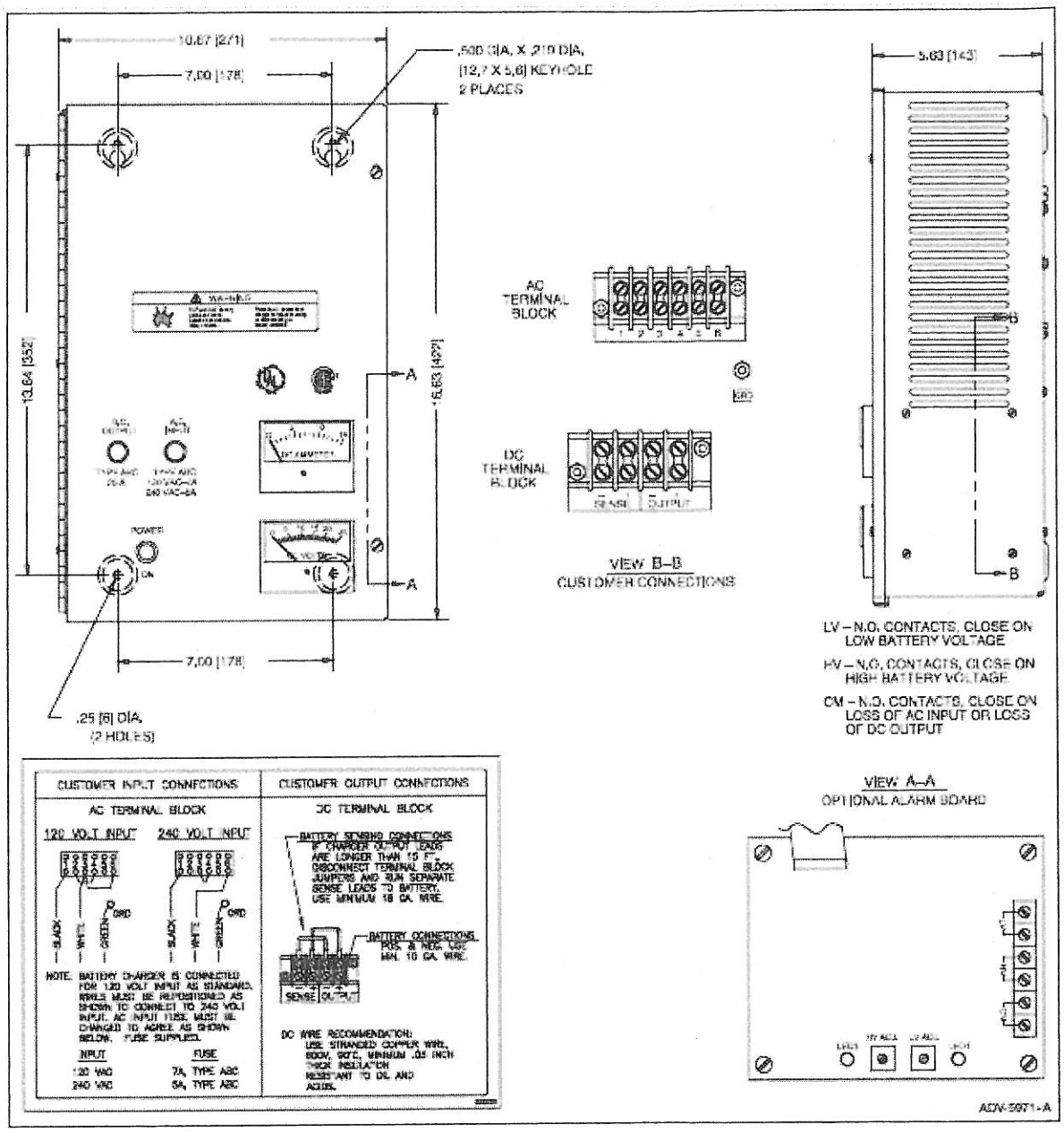
Float/Equalize Battery Charger, continued

Standard Features

- **Ammeter and voltmeter** indicate battery charging rate with 5% full-scale accuracy. POWER ON lamp indicates battery charger is operating.
- **AC input and DC output fuses** prevent battery charger damage from abnormal overload and short-circuit conditions.
- **Operational temperature range** is from 40°C (--40°F) to 60°C (140°F). Battery charger float equalize voltage automatically adjust throughout the temperature range.
- **Reverse polarity protection circuitry** prevents battery charger from energizing if improperly connected.
- **Internal terminal blocks** for AC input and DC output/ sensing lead connections.
- **DC voltage regulation** of ±1% from no load to full load and AC input line voltage variations of ±10%.
- **UL-1012** listed/**CSA** certified.
- **Wall-mount, slotted enclosure** with knockouts for customer conduit installation.
- **Reconnection blocks** allow operation at 120 or 240 volts AC, single phase, 50 or 60 hertz.
- **Battery charger circuitry protected** from AC line and DC load voltage spikes and transients.
- **Terminal block** for remote battery sensing leads.
- **Automatic float-to-equalize operation** with individual potentiometer adjustments. Charge up to 12 lead-acid or 18 nickel-cadmium battery cells.
- **No adjustments are necessary** for lead-acid or nickel-cadmium batteries.
- **Oversized transformer and SCR heatsink** allow constant current charging at 10 amps up to the equalize voltage setting for fastest battery charging.

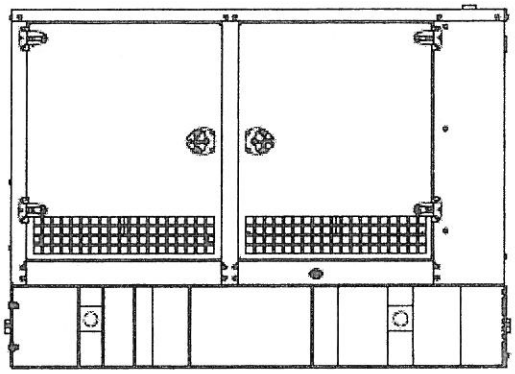
  Note: The battery charger will discharge the engine starting battery(ies) when the battery charger is connected to the battery(ies) and is not connected to an AC power supply. To prevent engine starting battery(ies) discharge, install battery charger relay kit GM39659.

Float/Equalize Battery Charger, continued

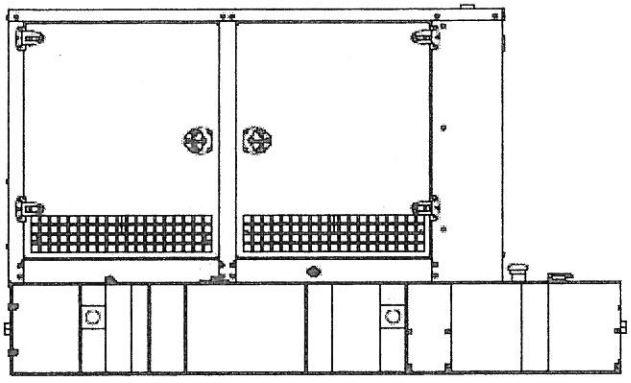


KOHLER POWER SYSTEMS

Sound Enclosure with Subbase Fuel Tank Package



Enclosure with Standard Subbase Fuel Tank



Enclosure with State Code Subbase Fuel Tank

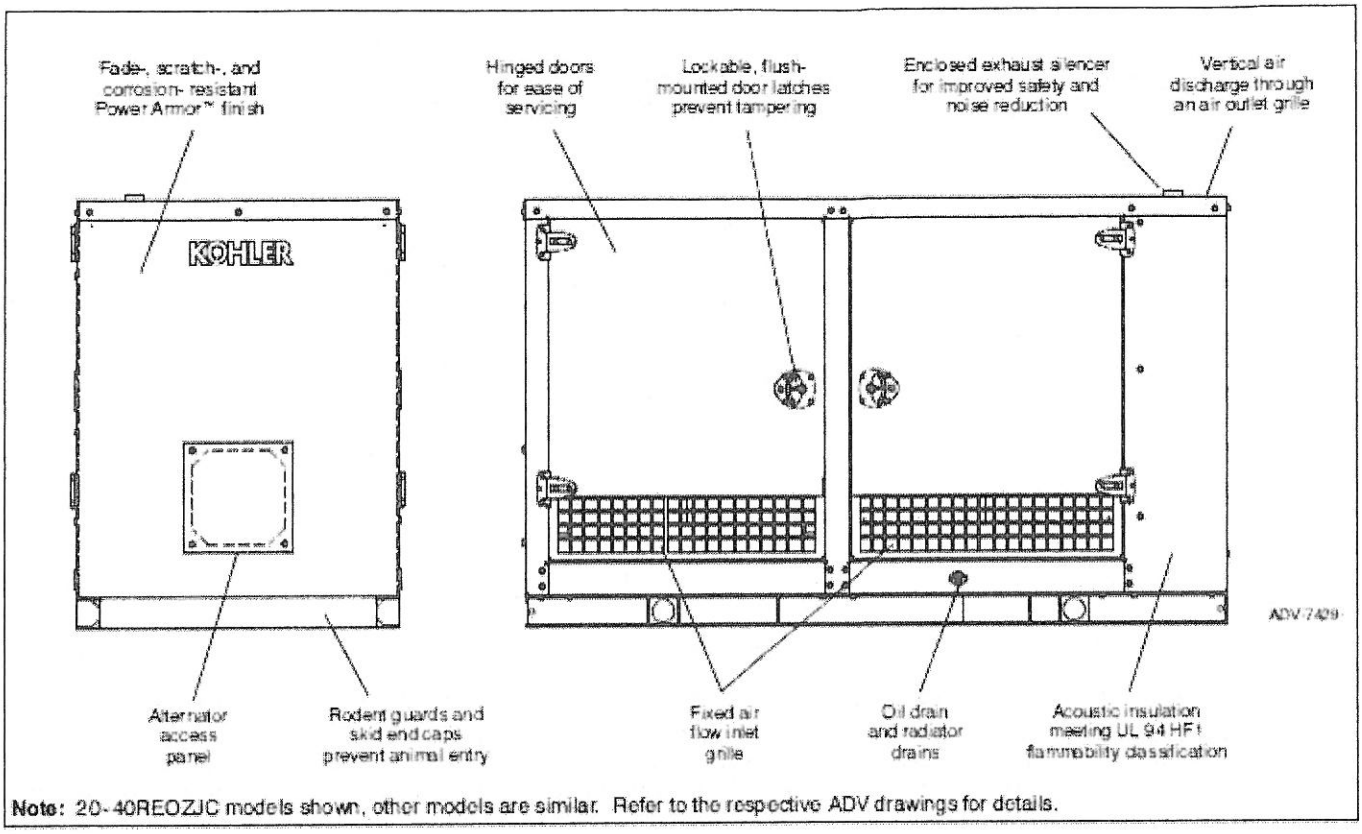
Sound Enclosure Standard Features

- Internal-mounted critical silencer and flexible exhaust connector.
- Lift base-mounted or tank mounted steel construction with hinged doors.
- Fade-, scratch-, and corrosion-resistant Kohler® Power Armor cream beige automotive-grade textureed finish.
- Enclosure has four large access doors which allow for easy maintenance.
- Lockable, flush-mounted door latches.
- Vertical air inlet and outlet discharge to redirect air and reduce noise.
- Certified to withstand 241 kph (150 mph) wind load rating.
- Lift base or tank-mounted, steel construction with hinged doors.
- Sound attentuated enclosure that uses up to 51 mm (2 in.) of acoustic insulation.

Subbase Fuel Tank Features

- The fuel tank has a Power Armor Plus textured epoxy-based rubberized coating.
- The above-ground rectangular secondary containment tank mounts directly to the generator set, below the generator set skid (subbase).
- Both the inner and outer tanks have emergency relief vents.
- Flexible fuel lines are provided with subbase fuel tank selection.
- The secondary containment generator set base tank meets UL 142 tank requirements. The inner (primary) tank is sealed inside the outer (secondary) tank. The outer tank contains the fuel if the inner tank leaks or ruptures.

Sound Enclosure with Subbase Fuel Tank Package, continued

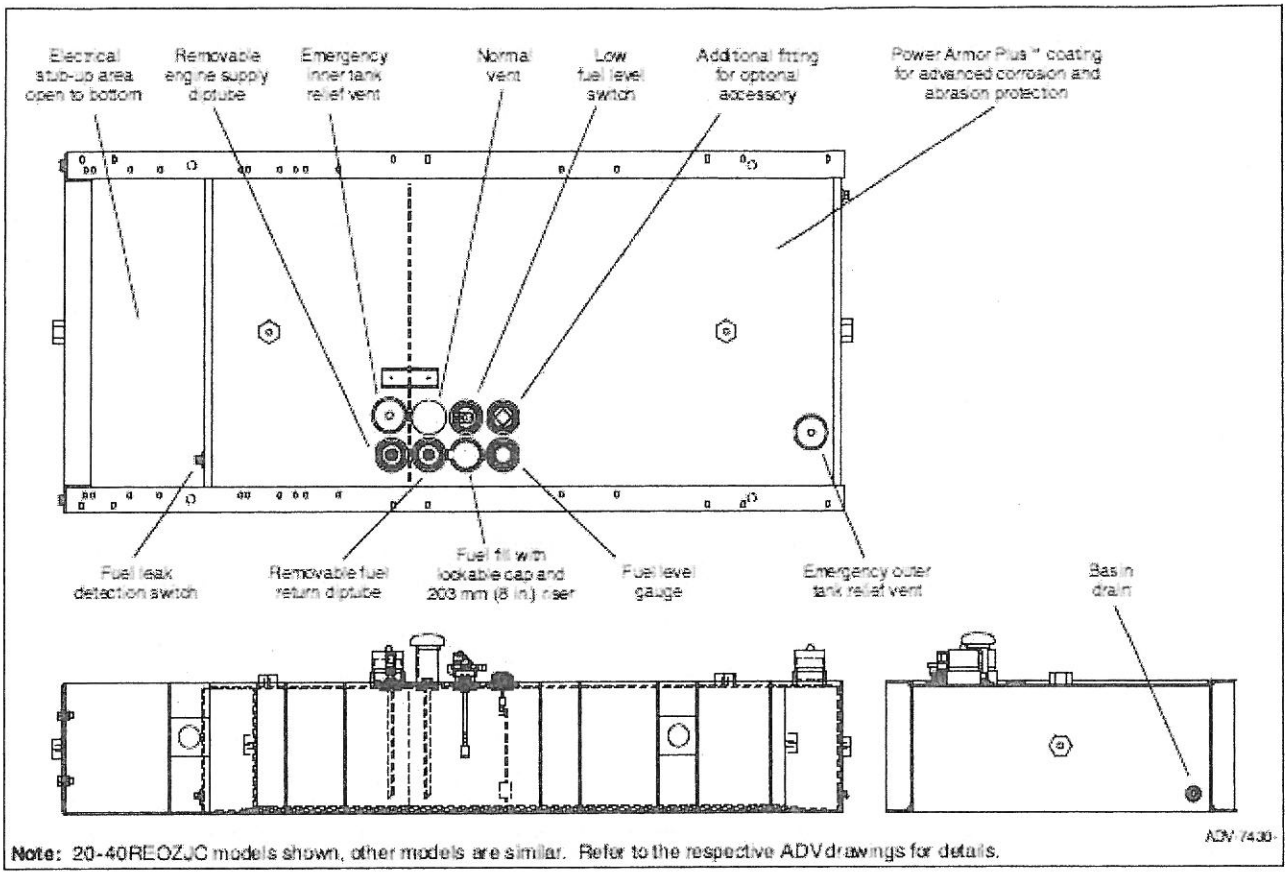


Note: 20-40REOZJC models shown, other models are similar. Refer to the respective ADV drawings for details.

Sound Enclosure Features

- Available in steel (14 gauge) formed panel, solid construction. Preassembled package offering corrosion resisitent, dent resilient structure mounting directly to lift base or fuel tank.
- Power Armor automotive-grade finish resulting in advanced corrosion and abrasion protection as well as enhanced edge coverage and color retention.
- Internal exhaust silencer offering maximum component life and operator safety.
- Interchangeable modular panel construction. Allows complete serviceability or replacement without compromising enclosure design.
- Cooling/combustion air intake with a horizontal air inlet. Sized for maximum cooling airflow.
- Service access. Multi-personnel doors for easy access to generator set control and servicing of the fuel fill, fuel gauge, oil fill and battery.
- Cooling air discharge. Weather protective design featuring vertical air discharge. Redircts cooling air up and above the enclosure to reduce ambient noise.
- Attenuated design. Acoustic insulation UL 94 HF1 listed for flame resistance offering up to 51 mm (2 in.) mechanically restrained acoustic insulation.
- Cooling air discharge. The sound enclosures include acoustic insulation with urethane film.
- Note: Installing an additional lenth of exhaust tail pipe may increase backpressure levels. Please refer to the generator set spec sheet for the maximum backpressure value.

Sound Enclosure with Subbase Fuel Tank Package, continued



Note: 20-40REOZJC models shown, other models are similar. Refer to the respective ADV drawings for details.

Subbase Fuel Tank

- Extended operation. Usable tank capacity offers full load standby operation of up to 72 hours.
- Power Armor Plus textured epoxy-based rubberized coating that creates an ultra-thick barrier between the tank and harsh environmental conditions like humidity, saltwater, and extreme temperatures, and provides an advanced corrosion and abrasion protection.
- UL listed. Secondary containment generator set base tank meeting UL 142 tank requirements.
- NFPA compliant. Designed to comply with the installation standards of NFPA 30 and NFPA 37.
- Integral external lift lugs. Enables crane with spreader-bar lifting of the complete package (empty tank, mounted generator set, and enclosure) to ensure safety.
- Emergency pressure relief vents. Vents ensure adequate venting of inner and outer tank under extreme pressure and/or emergency conditions.
- Normal vent cap. Vent is raised above lockable fuel fill.
- Low fuel level switch. Annunciates a 50% low fuel level condition at generator set control.
- Leak detection switch. Annunciates a contained primary tank fuel leak condition at generator set control.
- Electrical stub-up.

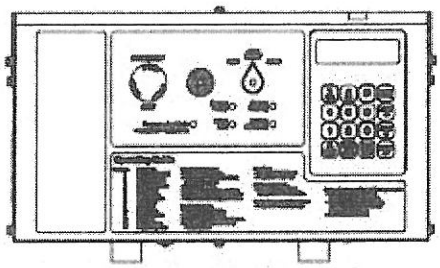
Fuel Tank Capacity, L (gal.)	Est. Fuel Supply Hours at 60 Hz with Full Load	Max. Length, mm (in.)	Max. Width, mm (in.)	Enclosure and Fuel Tank Length, mm (in.)	Enclosure and Fuel Tank Width, mm (in.)	Enclosure and Fuel Tank Weight, kg (lb.)	Enclosure and Fuel Tank Height, mm (in.)	Fuel Tank Height (H), mm (in.)	Sound Pressure with full load at 7m (23ft.), dB(A)	Max. Height, mm (in.)	Weight, kg (lb.)
2067 (546)	24/24			4121 (162.3)	1338 (52.7)	3770 (8311)	2735 (107.7)	838 (33)	75		

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 Regulator with Kohler® Decision-Maker® 550 Controller and Menu-Driven Selections (20-3250 kW Generator Set Models)



550 Controller with Menu-Driven Integral Voltage Regulator

The voltage regulator is integral to the controller and uses microprocessor logic providing ±0.25% 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.

Integral Voltage Regulator with Decision-Maker® 550 Controller

Calibration	Digital Display	Range Setting	Default Selection
Voltage Adjustment	Volt Adj.	±20% of System Voltage	System Voltage
Amplifier Gain	Regulator Gain Adj.	1-10000	100%
Underfrequency Unload or Frequency Setpoint	Frequency Setpoint	40 to 70 Hz	1 Hz Below System Frequency (ECM) 2 Hz Below System Frequency (non-ECM)
Underfrequency Unload Slope	Slope	0-10% of Rated Voltage (Volts per Cycle)	15 Volts per Cycle at 480 Volts (3.1%)
Reactive Droop	Voltage Droop	0-10% of System Voltage	4% of System Voltage
VAR Control	kVAR Adj.	-50% to 110% (DEC 6000) -35% to 100% (DEC 550)	0 kVAR
PF Adjust Control	PF Adj.	-0.50 to 1.0 to 0.50 (DEC 6000) -0.70 to 1.0 to 0.60 (DEC 550)	0.8 Lagging
VAR/PF Gain Adjustment	VAR/PF Gain Adj.	1-10000	100%

Voltage Regulators, continued

Specification/Feature	Integral 550 Controller
Generator Set Availability	20-3250 kW Models
Type	Microprocessor based
Status and Shutdown Indicators	LEDs and Digital 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-N), 50-60 Hz
Sensing Mode	RMS, Single- or 3-Phase
Input Requirements	8-36 VDC
Continuous Output	100 mA at 12 VDC
Maximum Output	100 mA at 12 VDC
Transition Frequency	50-70 Hz
Exciter Field Resistance	NA
No-Load to Full-Load Voltage Regulation	±0.25%
Thermal Drift	less than 0.5% (-40 C to 70 C range) [-40 F to 158 F]
Response Time	Less Than 5μS
Voltage Adjustment (of system voltage)	±10%
Voltage Adjustment	Controller Keypad
Remote Voltage Adjustment	Digital Input Standard/ Analog 0-5 VDC Input Optional
Paralleling Capability	Reactive Droop Standard
VAR/PF Control Input	Standard

DVR® is a registered trademark of Marathon Electric Mfg. Corp.

NA - Data not available at time of print.

Accessories

Refer to the respective generator set spec sheet and your authorized distributor for specific accessories.

Decision-Maker® 550 Controller

- Utility Paralleling, Protective Relay Functions

Integral Voltage Regulator with Decision-Maker® 550 Controller

- A digital display and keypad provide access to data. A two-line vacuum fluorescent display provides complete and concise information.
- The controller provides an interface between the generator set and switchgear for paralleling applications incorporating multiple generator set and/or utility feeds.
- The controller can communicate with a personal computer directly or on a network. See spec sheets G6-76, Monitor III Software for more information.
- Using optional menu-driven, Windows®-based PC software, an operator can monitor engine and alternator parameters and also provide control capability.
- The controller supports Modbus® RTU (Remote Terminal Unit), an industry standard open communication protocol.
- The controller provides ISO 8528-5, Class G3, compliance for transient response on some 20-300 kW generator set models. See the respective generator set spec sheet for specific applications.

Voltage Regulator Menu 11 Displays

Average voltage and voltage adjust
- Line-to-line voltage of each phase

Under frequency unload enabled, yes/no
- Frequency Setup
- Slope, volts per cycle

Reactive droop enabled, yes/no
- Voltage droop %

VAR control enabled, yes/no
- Total kVAR (running) kVAR Adjustment
- Generating/absorbing yes/no

Power factor control enabled, yes/no, droop at rated load 0.8 PF
- Average power factor (running), PF adjustment
- Lagging/leading, yes/no

Regulator gain adjustment

Utility gain adjustment

Reset regulator defaults, yes/no

Modbus® is a registered trademark of Schneider Electric.
Windows® is a registered trademark of Microsoft Corporation.

Model KBS-DCVA-2000S

KOHLER POWER SYSTEMS

Transfer Switch Standard Features

- UL 1008 listed at 480 VAC, file # E108981
- CSA certification available
- IBC seismic certification available
- Bypass/isolation switches for uninterrupted power to the load during switch maintenance and testing
- Standard-transition or programmed-transition modes of operation
- Available in 2, 3, or 4 pole configurations
- Electrically operated, mechanically held mechanism
- Double-throw, mechanically interlocked design (break-before-make power contacts)
- Solid, switched, or overlapping neutral (make-before-break)
- High withstand and close-on ratings
- Fully rated for use as a manual 3-position transfer switch
- Permanently mounted bypass and isolation handles
- Quick-make, quick-break bypass switch operation for load transfer between live sources
- Heavy duty mechanical interlocks
- Bypass switch and contactor position indicators
- Drawout contactor for ease of maintenance
- Design suitable for emergency and standby applications on all classes of load, 100% tungsten rated through 400 amps
- Standard-transition transfer time less than 100 milliseconds (6 cycles @ 60 Hz)
- Reliable, field-proven solenoid mechanism
- Switching mechanisms lubricated for life
- Main shaft auxiliary contacts
- Front-connected style available for some amperages

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 battery backup and automatic adjust for daylight saving time and leap year
- Time-stamped event log
- Fail-safe transfer for loaded test and exercise functions
- DIP switches: password disable and maintenance
- Modbus® RTU and Modbus® TCP/IP protocols (Modbus® register map available)
- RJ45 connector for 10/100 ethernet connection
- USB port with read/write compatibility
- Isolated RS-485 ports
- One-year limited warranty

Programmable Features

- Programming and monitoring methods:
  - o Monitoring and password-protected programming at the door using the keypad and display
  - o Program and monitor using a PC with Monitor III integrated generator set and ATS monitoring software
  - o Transfer files through the USB port
- System voltage and frequency
- Voltage unbalance
- 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
- Time-based and current-based† load control
- Load control outputs (load stepping)
- Selectable operating modes: utility-generator, generator-generator, or utility-utility
- Load bank control for exercise or test
- Pre/post-transfer, 9 individual time delays for selected loads
- ABC/BAC/none phase rotation selection with error detection
- Resettable historical data
- In-phase monitor
- Password protection, three security levels

† Requires current sensing kit.

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†
- 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 up to 99 time and date-stamped events on the display or on a personal computer equipped with optional Monitor III software.
- Download up to 2000 events with Monitor III software or download complete event history file to a PC or a memory device connected to the USB port.

Main Logic Board Inputs and Outputs
- Two (2) programmable inputs
- Two (2) programmable outputs, isolated form C (SPDT) contacts rated 1 amp @ 30 VDC, 500 mA @120 VAC

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 range	#12-24 AWG

Communications
- USB port with read/write capability
- Isolated RS-485 ports
- RJ-45 connector for 10/100 ethernet connection
- Modbus® RTU and Modbus® TCP/IP protocols (Modbus® register map available)
- USB Port. Upload or download files from a PC or a memory device through the USB port.
  - o Application software
  - o Event history files
  - o Language files
  - o Parameter settings
  - o Usage reports
  - o Feature configuration

USB Data Logger
- Time-stamped voltage and frequency readings
- Minimum and maximum current and voltage readings for a selected time period

Programmable Features
- System voltage, 208-600 VAC *
- System frequency, 50/60 Hz *
- Single/three-phase operation *
- Standard/programmed-transition operation *
- Preferred source selection
- Phase rotation: ABC/BAC/none 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
- 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†
- Pre/post-transfer, nine individual time delays for selected loads
- Current-based load control settings: high/low current levels and load add/remove priority for 9 separate loads†
- Prime power sequence alternates between two generator sets
- Resettable historical data

* System parameters factory-set per order

† Requires current sensing kit.

Modbus is a registered trademark of Schneider Electric.

MPAC® 1500 Controller Features, continued

Programmable Inputs

- External time delay input
- External battery fault
- External common fault
- Inhibit transfer
- Peak shave/area protection input
- External test
- Three-source system disable
- Bypass disable

Programmable Outputs

- Chicago alarm control
- Common alarm events
- Contactor position
- Exercise active
- Failure to acquire standby source
- Failure to transfer
- Generator engine start, source N and E
- I/O module faults
- Load bank control
- Load control active (pre/post transfer delay, up to 9 outputs)
- Loss of phase fault, source N and E
- External battery fault
- 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
- Synchronizing output
- Test active
- Transfer switch auxiliary contact fault
- Transfer switch auxiliary contact open
- Voltage unbalance

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 Delays	**Default**	**Adjustment Range**
Engine start, Source S2	3 sec.	0-60 sec. †
Engine start, Source S1 (gen/gen)	3 sec.	
Engine cooldown, Source S2	5 sec.	0-60 min.
Engine cooldown, S1 (gen/gen)	2 sec.	
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 duration	30 min.	1-60 min. (1 min. increments)
Prime power run duration	0 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 can be extended to 60 minutes with an External Battery Supply Module Kit.		

Application Data

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

Input and Output Connection Specifications	
Component	Wire Size Range
Main board I/O terminals	#12-24 AWG
I/O module terminals	#14-24 AWG

Auxiliary Position Indicating Contacts (rated 10 Amps @ 32 VDC/250 VAC)	
Switch Rating (Amps)	Number of Contacts Indicating Normal, Emergency
	Standard
2000	8, 8

UL-Listed Solderless Screw-Type Terminals for External Power Connections		
Normal, Emergency, and Load Terminals		
Switch Rating, amps	Max Number of Cables per Pole	Range of Wire Sizes
2000	6	1/0 AWG to 750 MCM
Use 75°C minimum Cu/Al wire for power connections.		

Codes and Standards

- Underwriters Laboratories UL 508, Standard for Industrial Control Equipment
- Underwriters Laboratories UL 1008, Standard for Automatic Transfer Switches for Use in Emergency Standby Systems, file # E108981
- CSA C22.2 No. 178 certification at 600 VAC available, file # LR58301
- NFPA 70, National Electrical Code
- NFPA 99, Essential Electrical Systems for Health Care Facilities
- NFPA 110, Emergency and Standby Power Systems
- IEEE Standard 446, IEEE Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications
- NEMA Standard IC10-1993 (formerly ICS2-447), AC Automatic Transfer Switches
- EN61000-4-4 Fast Transient Immunity Severity Level 4
- IEC 609487-6-1, Low voltage Switchgear and Control Gear; Multifunction Equipment; Automatic Transfer Switching Equipment
- EN61000-4-5 Surge Immunity Class 4 (voltage sensing and programmable inputs only)
- IEC Specifications for EMI/EMC Immunity:
  - o CISPR 11, Radiated Emissions
  - o IEC 1000-4-2, Electrostatic Discharge
  - o IEC 1000-4-3, Radiated Electronmagnetic Fields
  - o IEC 1000-4-4, Electrical Fast Transients (Bursts)
  - o IEC 1000-4-5, Surge Voltage
  - o IEC 1000-4-6, conducted RF Distrubances
  - o IEC 1000-4-8, Magnetic Fields
  - o IEC 1000-4-11, voltage Dips and Interruptions
- IEEE 472 (ANSI C37.90A) Ring Wave Test
- Seismic certification in accordance with the International Building code available*
  - o IBC 2000, referencing ASCE 7-98 and ICC AC-156
  - o IBC 2003, referencing ASCE 7-02 and ICC AC-156
  - o IBC 2006, referencing ASCE 7-05 and ICC AC-156

KBS-DCVA-2000S, continued

Withstand/Closing Ratings (WCR)

Standard Transition Model

Maximum current in RMS symmetrical amperes when coordinated with customer-supplied fuses or circuit breakers. All values are available symmetrical RMS amperes and ttestin in accordance with the withstand and close-onn requirements of UL 1008. Application requirements may permit higher withstand ratings for certain size switches. Contact Kohler Co. for assistance.

Withstand and Closing Current Ratings in RMS Symmetrical Amperes*							
Any Circuit Breaker				Current Limiting Fuses			
Switch Rating, amps	Cycles @ 60 Hz	Maximum Amps @ 480 VAC	Maximum Amps @ 600 VAC	Current-Limiting Fuses Maximum Amps	Current-Limiting Fuses Volts, Max	Current-Limiting Fuses Maximum Fuse Size, amps	Current-Limiting Fuses Type
2000	3	100,000	100,000	200,000	600	3000	L
2000	30	65,000	65,000	200,000	600	3000	L

All values are available symmetrical RMS amperes and tested in accordance with the withstand/closing requirements of UL 1008. Application requirements may permit highter withstand ratings for certain size switches. Contact Kohler Co. for assistance.

All values are available symmetrical RMS amperes and tested in accordance with the withstand/closing requirements of UL 1008. Application requirements may permit highter withstand ratings for certain size switches. Contact Kohler Co. for assistance.

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.

Module Current Draw Specification, mA	
Alarm Module	75
Standard I/O Module	75
High Power I/O Module	100

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

Supervised Transfer Control Switch

- Auto, Manual, and Transfer positions
- Automatic and non-automatic modes
- Alarm module required

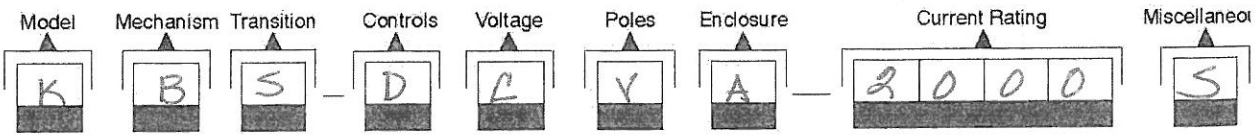
Warranty

- Warranty-1-year

Warranty

- Warranty-2-year

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: KBS-DMVA-1200S

Model
K: Kohler Transfer Switch

Mechanism
B: Bypass/Isolation

Transition
S: Standard
P: Programmed

Controls
D: MPAC™ 1500
Microprocessor Controls, Automatic

Voltage/Frequency
C: 208 Volts/60 Hz
D: 220 Volts/50 Hz
F: 240 Volts/60 Hz
G: 380 Volts/50 Hz
H: 400 Volts/50 Hz
J: 416 Volts/50 Hz
K: 440 Volts/60 Hz
M: 480 Volts/60 Hz
N: 600 Volts/60 Hz
P: 380 Volts/60 Hz
R: 220 Volts/60 Hz

Number of Poles/Wires
N: 2-pole, 3-wire, solid neutral
T: 3-pole, 4-wire, solid neutral
V: 4-pole, 4-wire, switched neutral
W: 4-pole, 4-wire, overlapping neutral
Z: 3-pole, 4-wire, integral solid neutral *

* Integral solid neutral is mounted on the contactor. Not available on all amperages.

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

† NEMA 1 enclosure is standard on all bypass models. Consult the manufacturer for the availability of other enclosures.

Current Rating: Numbers indicate the current rating of the switch in amperes:

0150	0800	2000
0225	1000	2600
0260	1200	3000
0400	1600	4000
0600		

Miscellaneous
B: 150–600 A
S: Standard connections
F: Front bus (optional on 800 A models only)

KOHLER POWER SYSTEMS

Alternator Data

KOHLER. POWER SYSTEMS

TIB-102

TECHNICAL INFORMATION BULLETIN

Alternator Data Sheet

Alternator Model: 4UA13
Frequency: 60 Hz
Speed: 1800 RPM
Leads: 12 (6 Lead, 600 Volt)

Voltage L-N/L-L	Phase	Power Factor	Connection	kW* (kVA)						
				Class B	Class F				Class H	
				80°C Continuous	90°C Lloyds	95°C ABS	105°C Continuous	130°C Standby	125°C Continuous	150°C Standby
139/240 277/480	3	0.8	Wye	275.0 (343.8)	285.0 (356.3)	290.0 (362.5)	300.0 (375.0)	300.0 (375.0)	300.0 (375.0)	300.0 (375.0)
127/220 254/440	3	0.8	Wye	272.0 (340.0)	283.0 (353.8)	288.5 (360.6)	300.0 (375.0)	300.0 (375.0)	300.0 (375.0)	300.0 (375.0)
120/208 240/416	3	0.8	Wye	272.0 (340.0)	283.0 (353.8)	288.5 (360.6)	300.0 (375.0)	300.0 (375.0)	300.0 (375.0)	300.0 (375.0)
110/190 220/380	3	0.8	Wye	245.0 (306.3)	259.0 (323.8)	266.0 (332.5)	280.0 (350.0)	280.0 (350.0)	280.0 (350.0)	280.0 (350.0)
120/240	3	0.8	Delta	264.0 (330.0)	278.0 (347.5)	285.5 (356.9)	300.0 (375.0)	300.0 (375.0)	300.0 (375.0)	300.0 (375.0)
120/240	1	1.0	Dogleg	190.0 (190.0)	198.0 (198.0)	202.0 (202.0)	210.0 (210.0)	230.0 (230.0)	226.0 (226.0)	230.0 (230.0)
120/240	1	0.8	Dogleg	140.0 (175.0)	146.0 (182.0)	150.0 (188.0)	156.0 (195.0)	185.0 (231.3)	169.0 (211.0)	185.0 (231.3)
347/600	3	0.8	Wye	275.0 (343.8)	285.0 (356.3)	290.0 (362.5)	300.0 (375.0)	300.0 (375.0)	300.0 (375.0)	300.0 (375.0)

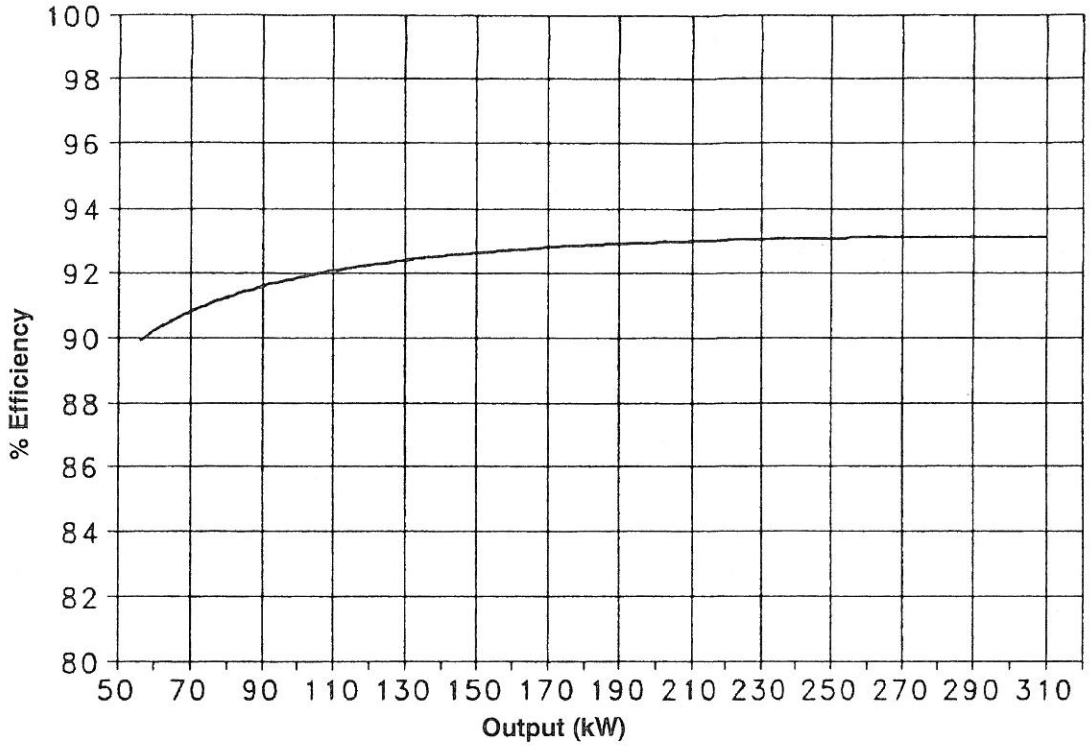
* All data tested in accordance with IEEE Standard 115. Kohler Co. reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever.

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

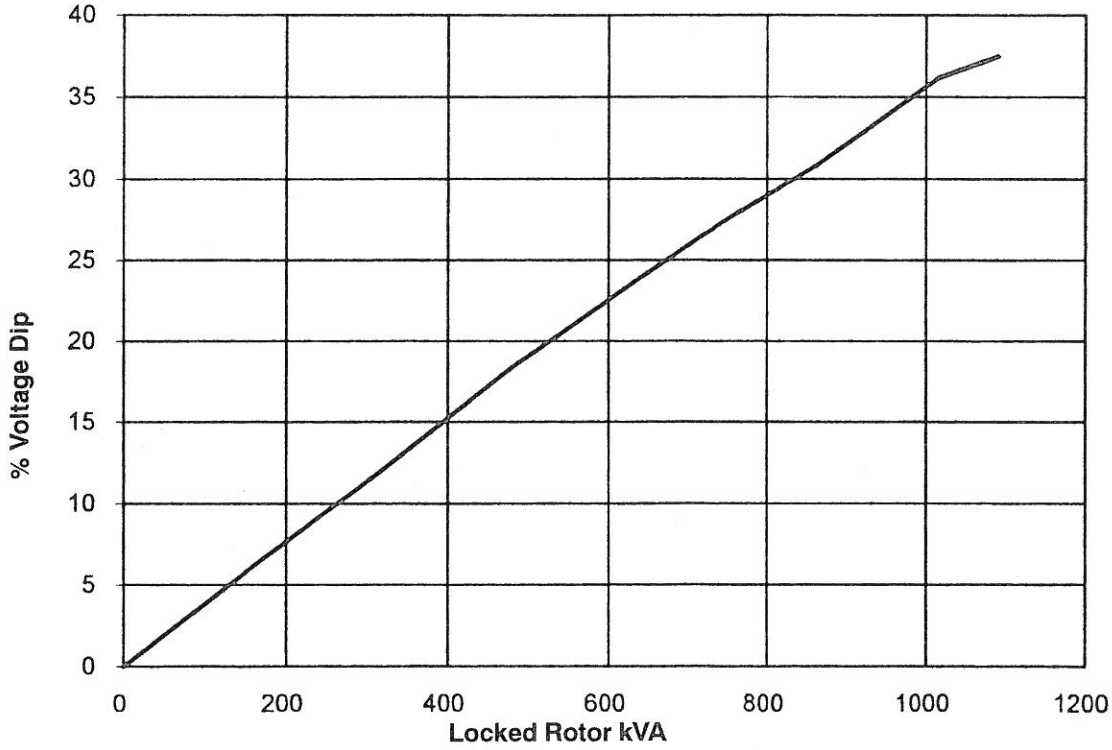
	Symbol	Per Unit	Ohms
Typical Resistances			
Phase Resistance		0.020	0.003
Rotor Resistance		13.854	2.128
Typical Reactances			
Synchronous			
Direct	X_d	3.417	0.525
Quadrature	X_q	1.178	0.273
Transient			
Unsaturated	X'_{du}	0.328	0.050
Saturated	X'_d	0.289	0.044
Subtransient			
Direct	X''_d	0.133	0.020
Quadrature	X''_q	0.139	0.021
Negative Sequence	X_2	0.136	0.021
Zero Sequence	X_0	0.011	0.002

	Symbol	Value
Typical Time Constants		
Armature Short Circuit	T_a	0.018 sec.
Transient Short Circuit	T'_d	0.185 sec.
Transient Open Circuit	T'_{do}	2.184 sec.
Typical Field Current		
Full Load	If_{FL}	29.57 amps
No Load	If_{NL}	8.3 amps
Typical Short Circuit Ratio		0.391
Harmonic Distortion		
RMS Total Harmonic Distortion		2.7%
Max. Single Harmonic		7^{th}
Deviation Factor (No Load, L-L)		4.3%
Telephone Influence Factor		<50
Insulation Material Class per NEMA MG1-1.66		H
Phase Rotation		ABC

4UA13, 60 Hz, 139/240, 277/480 Volts, Wye
TYPICAL ALTERNATOR EFFICIENCY*

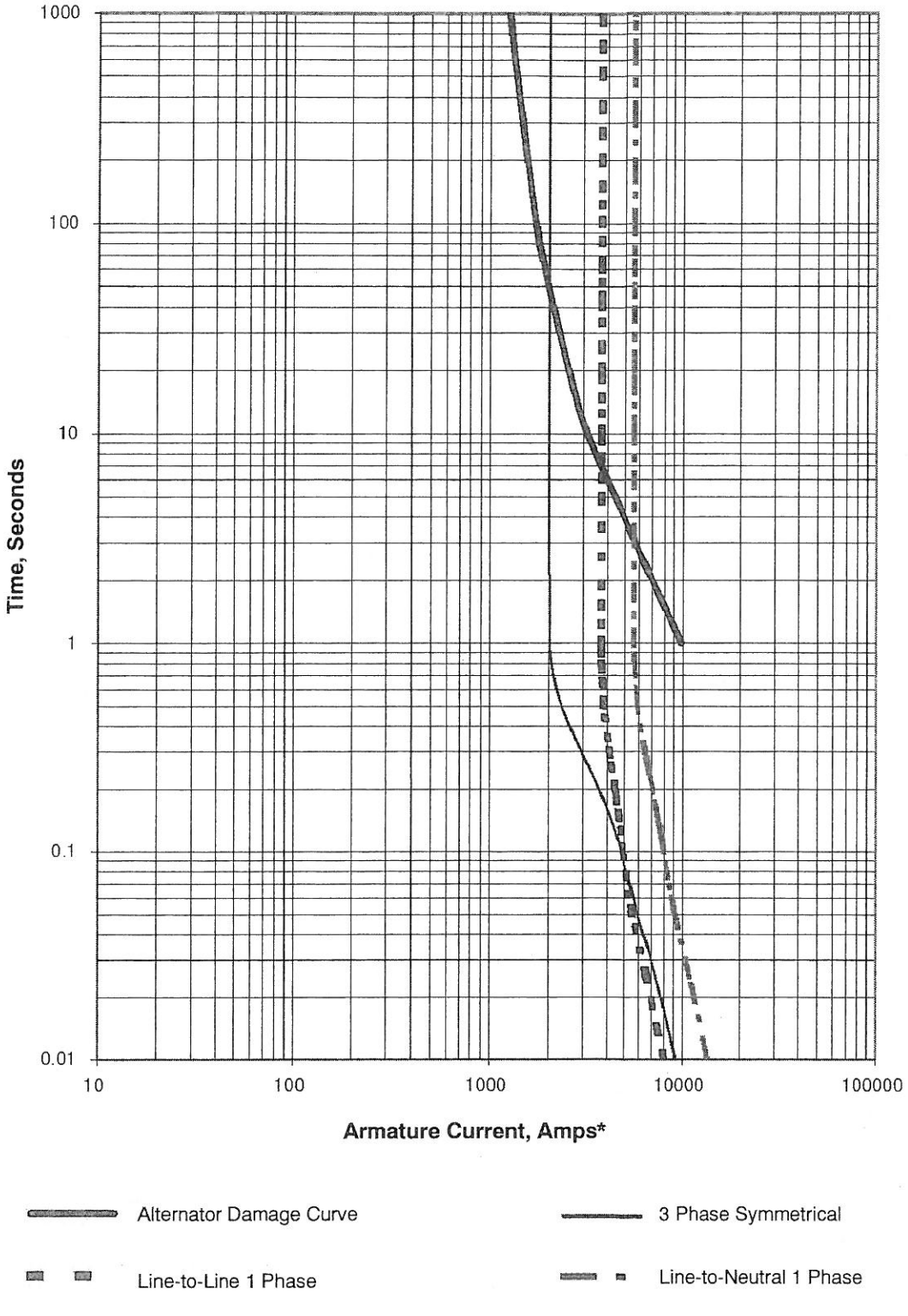


4UA13, 60 Hz, 139/240, 277/480 Volts, Wye
TYPICAL MOTOR STARTING CHARACTERISTICS*



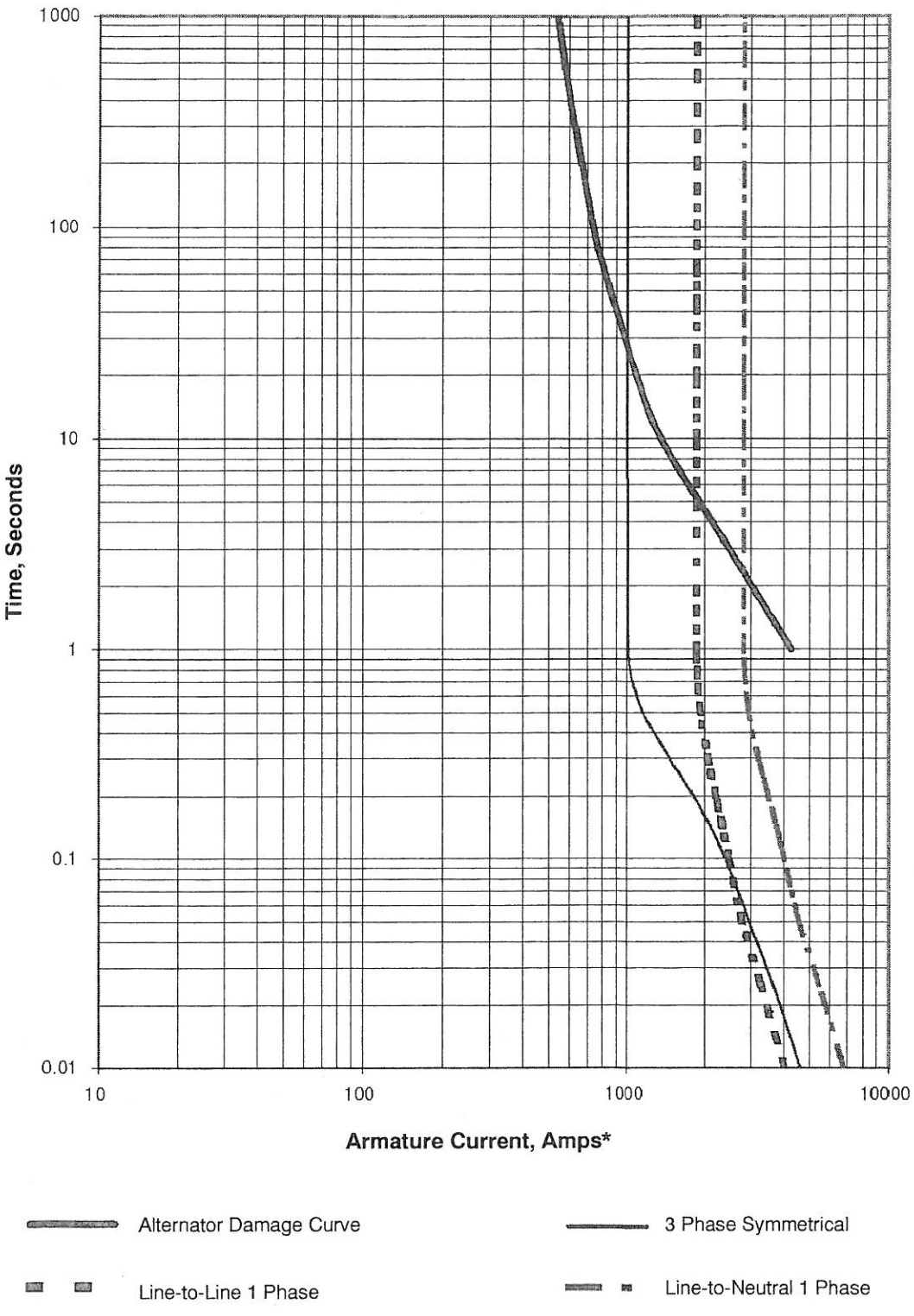
* All data tested in accordance with IEEE Standard 115. Kohler Co. reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever.

4UA13, 60 Hz, Low Wye or Delta Connection
SHORT CIRCUIT DECREMENT CURVE



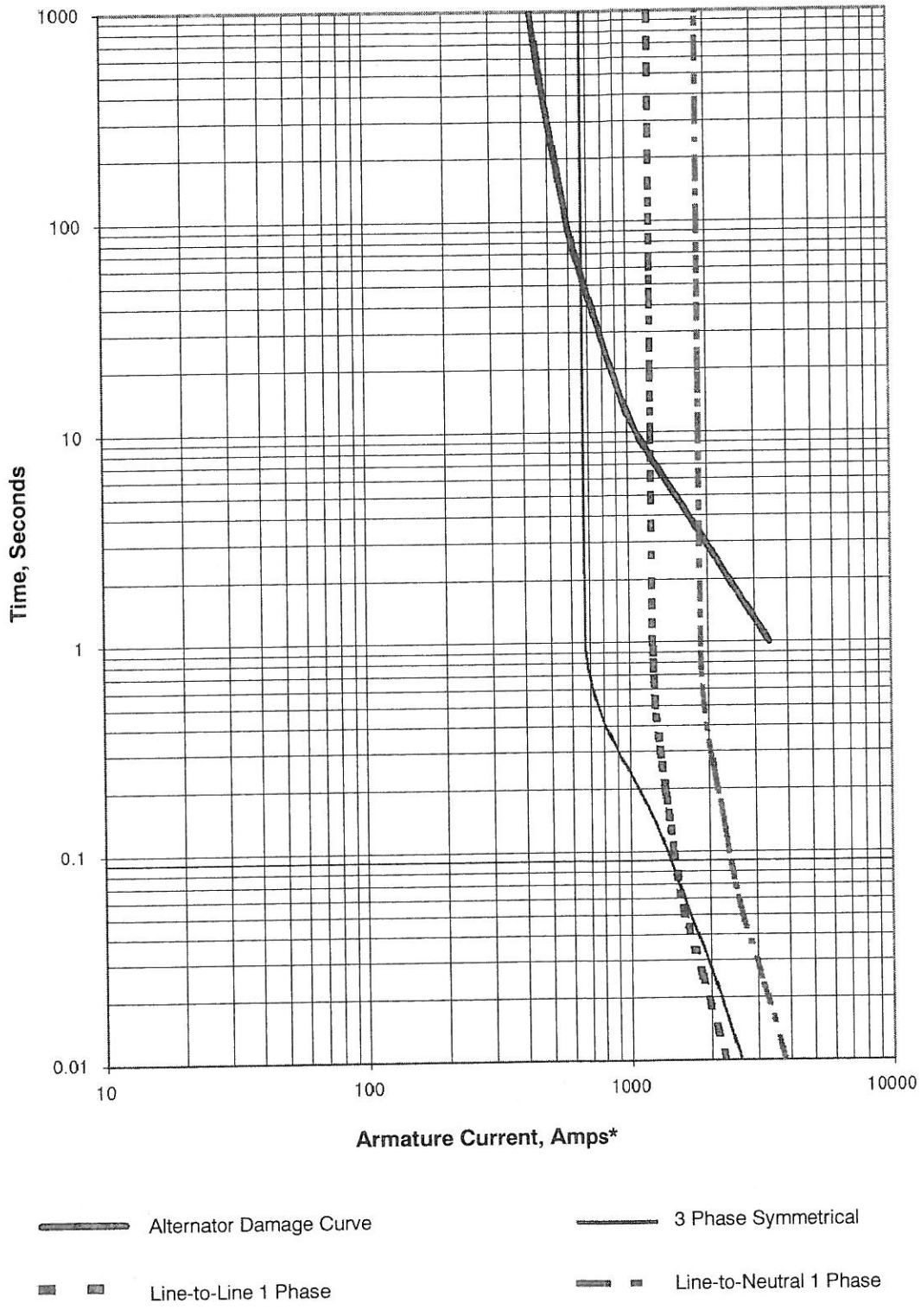
* Instantaneous current (t=0) is asymmetric. Divide by 1.732 for symmetric.

4UA13, 60 Hz, High Wye Connection
SHORT CIRCUIT DECREMENT CURVE



* Instantaneous current (t=0) is asymmetric. Divide by 1.732 for symmetric.

4UA13, 60 Hz, 600 V Connection
SHORT CIRCUIT DECREMENT CURVE



* Instantaneous current (t=0) is asymmetric. Divide by 1.732 for symmetric.

KOHLER POWER SYSTEMS

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**
300REOZJ	60	100% Load	119.1	91.4	89.5	75.8
		No Load	99.6	84.9	83.0	70.9

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.

300REOZJ | **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	55.6	64.3	71.0	69.4	65.6	68.5	65.0	65.8	76.4
			Front-Right	56.2	63.8	66.6	68.2	62.1	62.8	58.6	58.7	72.8
			Front	57.1	65.3	68.8	68.4	64.3	64.9	62.4	61.7	74.6
			Front-Left	59.5	67.4	72.9	69.7	66.6	67.3	64.4	65.0	77.2
			Left	60.0	68.5	68.1	68.1	66.2	67.4	63.2	63.1	75.5
			Back-Left	55.5	66.5	71.3	67.5	65.2	66.0	62.9	62.4	75.5
			Back	58.3	67.2	72.8	67.8	65.9	68.2	63.9	64.1	76.7
			Back-Right	58.7	68.2	68.4	69.3	67.1	69.9	64.1	65.9	76.6
			8-pos. log avg.	57.9	66.7	70.5	68.6	65.6	67.3	63.4	63.9	75.8

				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	89.2	87.9	87.3	91.4	92.5	89.7	83.4	89.4	89.5

				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	59.6	67.6	74.1	76.0	84.1	84.9	81.2	87.2	91.1
			Front-Right	56.5	70.2	75.6	82.1	82.9	84.5	81.4	80.9	89.8
			Front	59.1	71.3	76.1	80.9	84.2	83.5	80.0	78.2	89.2
			Front-Left	68.2	75.4	78.3	84.1	87.1	87.5	83.5	86.7	93.3
			Left	69.0	74.1	78.7	81.3	89.6	89.5	83.7	86.3	94.4
			Back-Left	66.2	74.7	76.5	78.0	85.6	86.1	82.4	85.2	91.6
			Back	61.4	66.1	72.2	76.9	79.4	78.8	77.5	76.8	85.3
			Back-Right	61.2	70.5	75.4	76.4	82.9	84.6	80.7	88.1	91.3
			8-pos. log avg.	64.7	72.3	76.3	80.4	85.4	85.8	81.7	85.2	91.4

			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)	97.1	102.4	108.3	114.2	115.2	109.3	115.7	98.5	119.1

300REOZJ	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	49.4	61.4	64.9	66.0	62.3	63.6	57.8	49.0	71.2
			Front-Right	45.8	56.6	61.9	64.2	59.4	57.2	48.8	40.9	67.9
			Front	49.7	59.5	63.6	62.7	60.7	57.8	52.1	43.2	68.5
			Front-Left	50.3	61.0	65.3	65.5	63.7	61.9	56.3	46.7	71.0
			Left	51.9	62.0	66.3	63.6	61.9	61.7	54.6	46.8	70.7
			Back-Left	52.4	65.5	69.1	63.3	62.4	59.8	54.9	44.9	72.3
			Back	52.1	62.9	66.5	64.8	63.7	62.4	55.7	46.0	71.5
			Back-Right	50.7	63.1	66.7	65.8	63.1	64.4	55.5	47.4	72.0
			8-pos. log avg.	50.7	62.1	66.0	64.6	62.4	61.7	55.1	46.2	70.9

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	82.8	84.5	81.1	85.2	83.0	83.3	78.6	82.5	83.0

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	52.3	62.8	71.1	72.9	81.3	79.2	75.6	67.9	84.7
			Front-Right	49.1	63.9	73.1	79.7	81.3	80.9	77.0	69.4	86.4
			Front	50.6	64.4	72.7	73.4	78.9	77.6	72.3	64.6	83.0
			Front-Left	53.4	66.5	73.6	76.1	83.6	81.8	77.1	70.4	87.1
			Left	57.0	65.0	72.1	73.9	81.2	79.8	75.0	68.1	84.9
			Back-Left	56.6	67.7	70.9	72.0	81.9	79.8	75.4	67.7	85.2
			Back	53.7	65.1	68.2	71.2	77.2	72.1	72.9	59.7	80.5
			Back-Right	52.7	65.6	71.9	75.1	80.0	79.1	75.4	67.7	84.4
			8-pos. log avg.	53.9	65.4	72.0	75.1	81.0	79.5	75.4	67.8	84.9

Load	Distance, m (ft.)	Exhaust	Sound Pressure Levels dB(A)								
			Octave Band Center Frequency (Hz)								Overall Level
			63	125	250	500	1000	2000	4000	8000	
No Load	1 (3.3)	Raw Exhaust (No Silencer)	80.0	86.4	88.8	93.3	92.8	83.7	91.4	79.9	99.6

KOHLER POWER SYSTEMS

Emissions Data

KOHLER.
POWER SYSTEMS

300REOZJ

60 HZ. DIESEL INDUSTRIAL GENERATOR SET
EMISSION DATA SHEET

ENGINE INFORMATION

Model:	John Deere, 6090HFG86A	Bore:	118.4mm (4.66 in.)
Nameplate BPH @ 1800 RPM:	463	Stroke:	136mm (5.35 in.)
Type:	4-Cycle, 6 Cylinder, Inline	Displacement:	9.0 L (548 cu. in.)
Aspiration:	Turbocharged, Charge Air-Cooled		
Compression Ratio	16.0:1	EPA Family:	DJD□L09.0114
		EPA Certificate:	DJD□L09.0114-005

PERFORMANCE DATA:

Table 1

	1/4 Standby	1/2 Standby	3/4 Standby	Full Standby
Engine bkW @ Stated Load	86.50	173.00	259.50	346.00
Fuel Consumption (g/kWh)	247.00	240.00	215.00	205.00
Exhaust Gas Flow (m^3/min)				63.60
Exhaust Temperature (°C)				497.00

E□HAUST EMISSION DATA:

Table 2

EPA CERTIFICATE DATA
0.1
3.8
0.9
0.14

HC (Total Unburned Hydrocarbons)
NOx (Oxides of Nitrogen as NO2)
CO (Carbon Monoxide)
PM (Particular Matter)

Values are in g/kWh unless otherwise noted

TEST METHODS AND CONDITIONS

The EPA Certificate Data in Table 2 is a weighted average value per ISO 8528 D2.

Data and specifications subject to change without notice
For further information, please contact Todd Loes at John Deere Power Systems, 319-292-6050

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2013 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT OF 1990

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **Deere & Company**
(U.S. Manufacturer or Importer)

Certificate Number: **DJDXL09.0114-005**

Effective Date: 10/05/2012

Expiration Date: 12/31/2013

Byron J. Bunker, Acting Division Director
Compliance Division

Issue Date: 10/05/2012

Revision Date: N/A

Model Year: 2013
Manufacturer Type: Original Engine Manufacturer
Engine Family: DJDXL09.0114

Mobile/Stationary Indicator: Stationary
Emissions Power Category: 225<=kW<450
Fuel Type: Diesel
After Treatment Devices: No After Treatment Devices Installed
Non-after Treatment Devices: Engine Design Modification, Non-standard Non-After Treatment Device Installed, Smoke Puff Limiter, Electronic Control

Pursuant to Section 111 and Section 213 of the Clean Air Act (42 U.S.C. sections 7411 and 7547) and 40 CFR Part 60, 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 engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year.

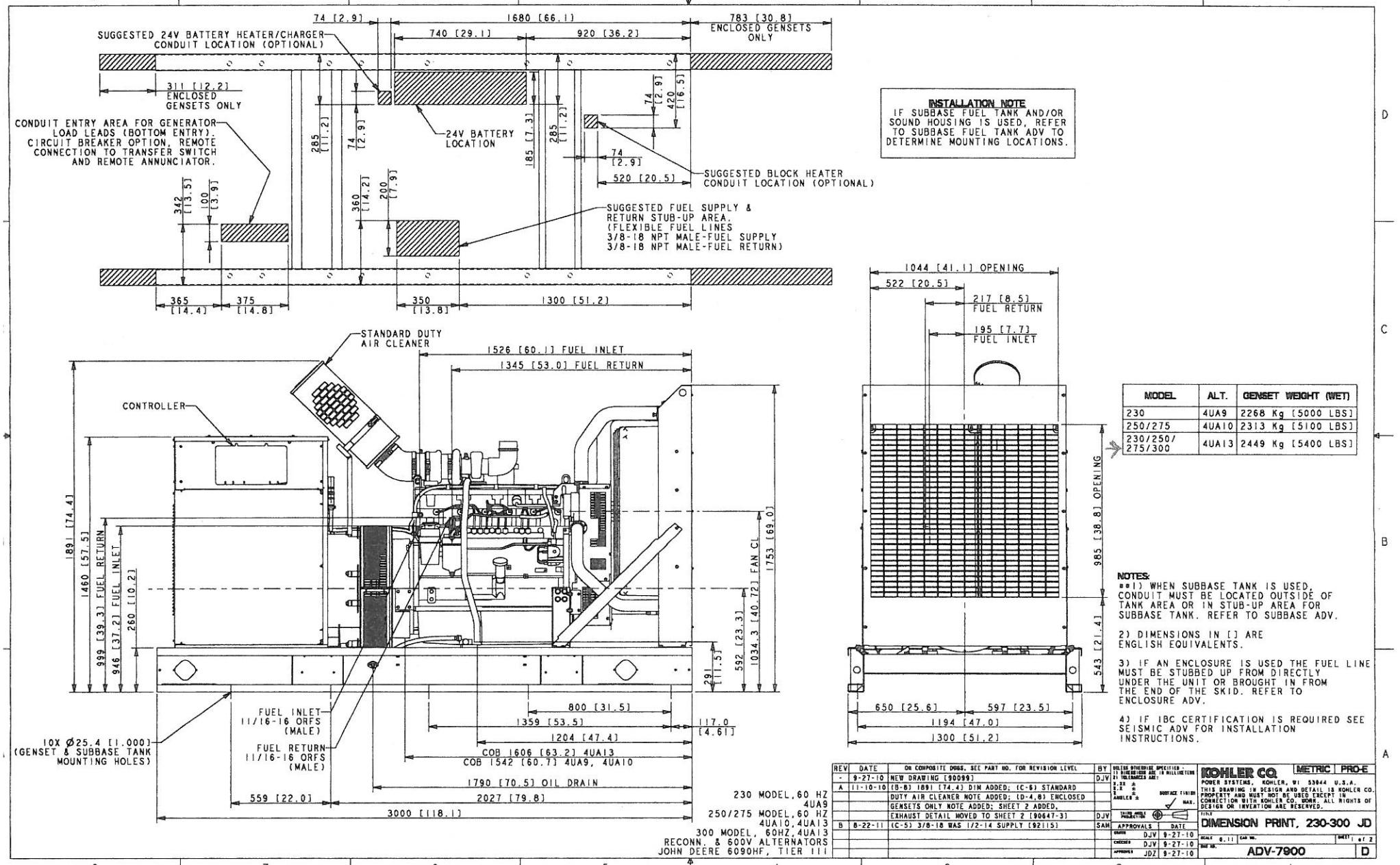
This certificate of conformity covers only those new compression-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate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

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60.

This certificate does not cover 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 POWER SYSTEMS

Dimensional Drawings



INSTALLATION NOTE
IF SUBBASE FUEL TANK AND/OR SOUND HOUSING IS USED, REFER TO SUBBASE FUEL TANK ADV TO DETERMINE MOUNTING LOCATIONS.

MODEL	ALT.	GENSET WEIGHT (WET)
230	4UA9	2268 Kg [5000 LBS]
250/275	4UA10	2313 Kg [5100 LBS]
230/250/ 275/300	4UA13	2449 Kg [5400 LBS]

NOTES:

1) WHEN SUBBASE TANK IS USED, CONDUIT MUST BE LOCATED OUTSIDE OF TANK AREA OR IN STUB-UP AREA FOR SUBBASE TANK. REFER TO SUBBASE ADV.

2) DIMENSIONS IN [] ARE ENGLISH EQUIVALENTS.

3) IF AN ENCLOSURE IS USED THE FUEL LINE MUST BE STUBBED UP FROM DIRECTLY UNDER THE UNIT OR BROUGHT IN FROM THE END OF THE SKID. REFER TO ENCLOSURE ADV.

4) IF IBC CERTIFICATION IS REQUIRED SEE SEISMIC ADV FOR INSTALLATION INSTRUCTIONS.

230 MODEL, 60 HZ
4UA9
250/275 MODEL, 60 HZ
4UA10, 4UA13
300 MODEL, 60HZ, 4UA13
RECONN. & 600V ALTERNATORS
JOHN DEERE 6090HF, TIER III

REV	DATE	ON COMPOSITE DRGS, SEE PART NO. FOR REVISION LEVEL	BY
-	9-27-10	NEW DRAWING [90099]	DJV
A	11-10-10	(B-8) 1891 [74.4] DIM ADDED; (C-6) STANDARD DUTY AIR CLEANER NOTE ADDED; (D-4,8) ENCLOSED GENSETS ONLY NOTE ADDED; SHEET 2 ADDED, EXHAUST DETAIL MOVED TO SHEET 2 [90647-3]	DJV
B	8-22-11	(C-5) 3/8-18 WAS 1/2-14 SUPPLY [92115]	SAM

UNLESS DIMENSIONS SPECIFIED - 1) DIMENSIONS ARE IN MILLIMETERS 2) TOLERANCES ARE: .X ±, .XX ±, .XXX ±, ANGLES ±. SURFACE FINISH MAX.

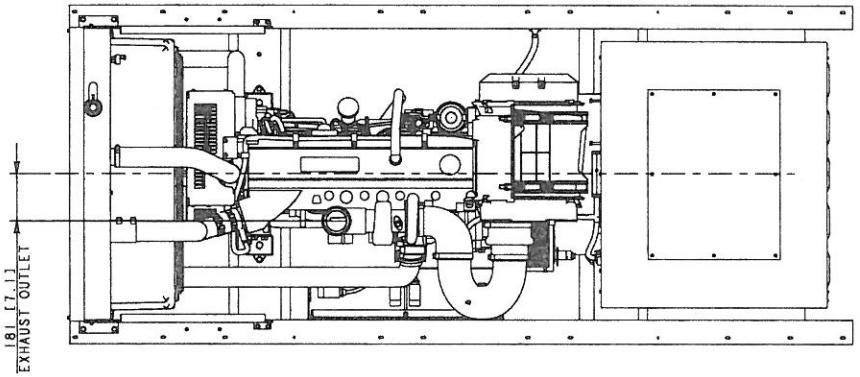
APPROVALS	DATE
DJV	9-27-10
DJV	9-27-10
JDZ	9-27-10

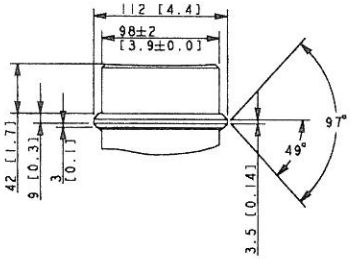
KOHLER CO. METRIC PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

TITLE: DIMENSION PRINT, 230-300 JD

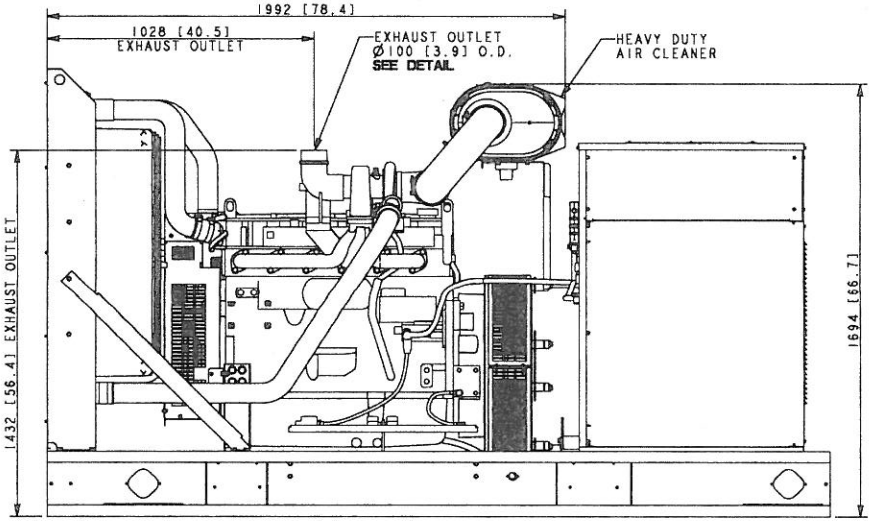
SCALE 0.11 CAD NO. SHEET 1 of 2

SIZE NO. ADV-7900 D





EXHAUST OUTLET
DETAIL



REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
A	11-10-10	SHEET 2 ADDED [90847-3]	DJV
B	8-22-11	SEE SHEET 1 [92115]	SAM

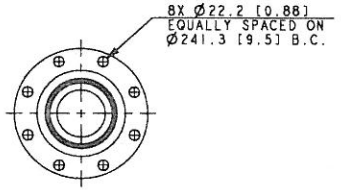
UNLESS OTHERWISE SPECIFIED:
[] DIMENSIONS ARE IN MILLIMETERS
XX TOLERANCE ARE:
0.XX ±
X.X ±
X ±
ANGLES ±
SURFACE FINISH
MAX.
THIRD ANGLE PROJECTION

APPROVALS	DATE
DRAWN DJV	11-10-10
CHECKED DJV	11-10-10
APPROVED JDZ	11-10-10

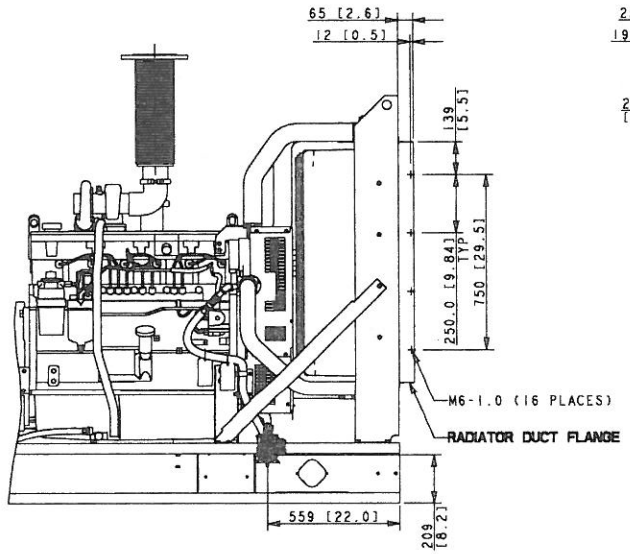
KOHLER CO. METRIC PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

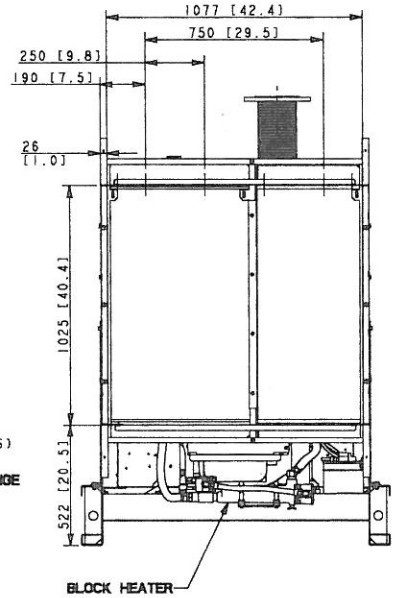
TITLE
DIMENSION PRINT, 230-300 JD

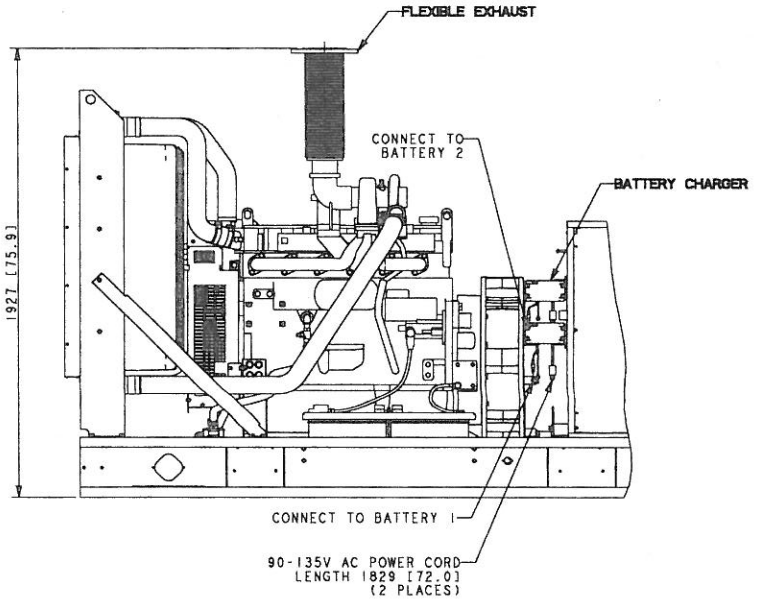
SCALE 0.11 CAD NO. SHEET 2 of 2
DWG NO. ADV-7900 D



6" ANSI FLANGE
(B16.5 CLASS 150)
SCALE 0.20







DIMENSIONS IN [ ] ARE INCH EQUIVALENTS

REV	DATE	OR COMPOSITE DOCS, SEE PART NO. FOR REVISION LEVEL	BY
-	10-15-10	NEW DRAWING [90099]	DJV

230 MODEL, 60 HZ
4UA9
250/275 MODEL, 60 HZ
4UA10, 4UA13
300 MODEL, 60HZ, 4UA13
RECONN. & 600V ALTERNATORS
JOHN DEERE 6090HF, TIER III

UNLESS OTHERWISE SPECIFIED:
- DIMENSIONS ARE IN MILLIMETERS
- TOLERANCES ARE:
  - X.XX ±
  - X.X ±
  - X ±
  - ANGLES ±

SURFACE FINISH MAX.

THIRD ANGLE PROJECTION

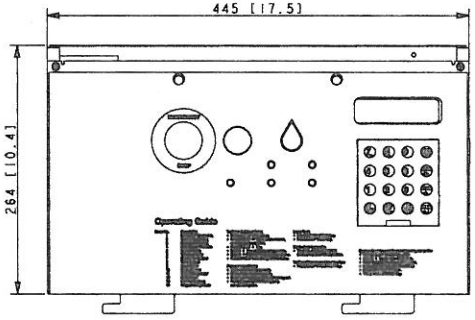
APPROVALS		DATE
DRAWN	DJV	10-15-10
CHECKED	DJV	10-15-10
APPROVED	JDZ	10-15-10

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

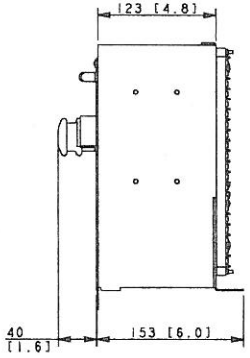
TITLE: DIMENSION PRINT, ACCESSORY, 230-300 JD

SCALE 0.10 | CAD NO. | SHEET 1 of 1

DRW NO. ADV-7890 | D



DEC 550



DIMENSIONS IN [ ] ARE ENGLISH EQUIVALENTS.

REV	DATE	CR COMPOSITE DWGS. SEE PART NO. FOR REVISION LEVEL	BY
-	10-15-10	NEW DRAWING [90099]	DJV

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

APPROVALS	DATE
DJV	10-15-10
DJV	10-15-10
JDZ	10-15-10

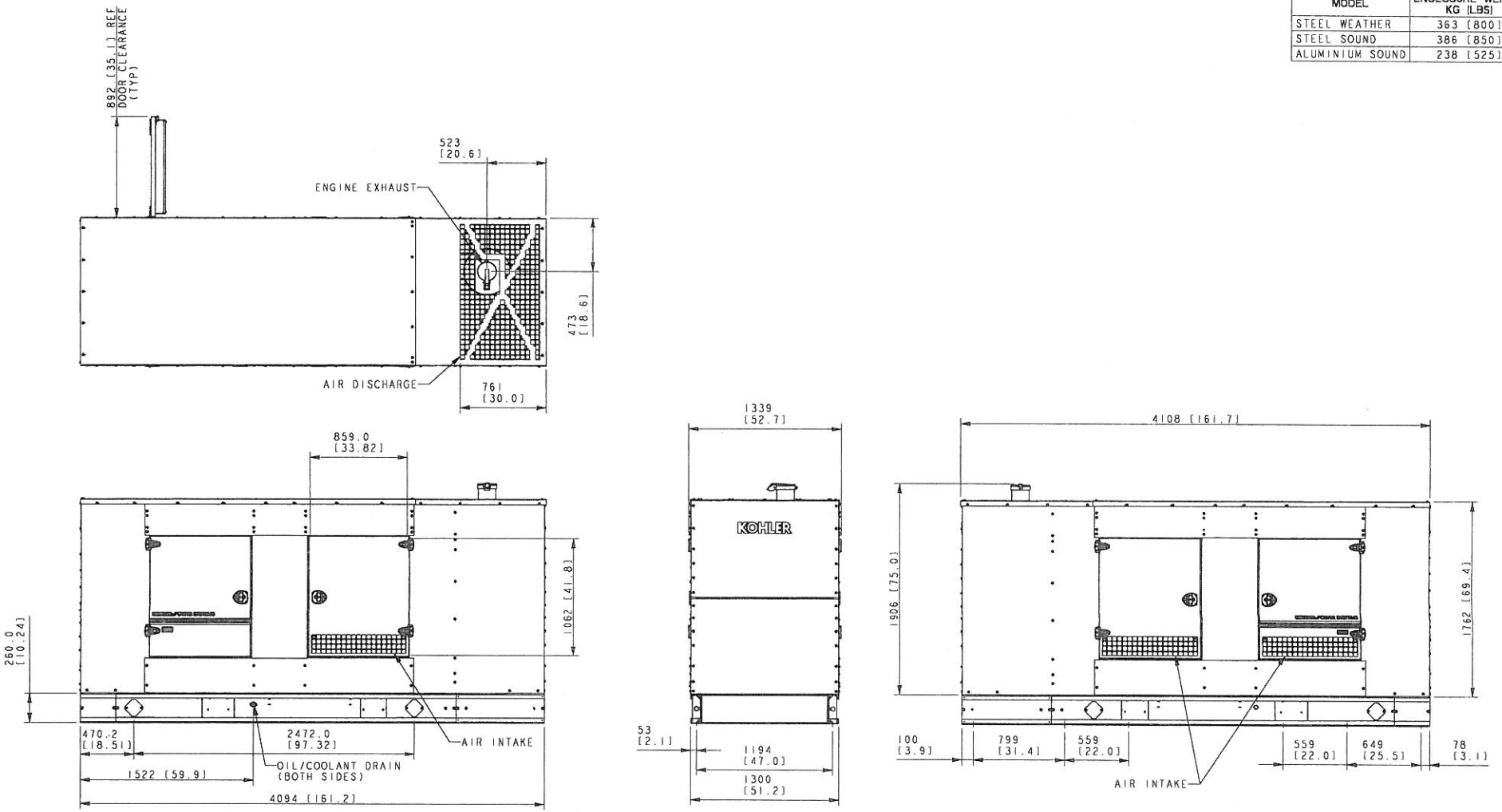
KOHLER CO. METRIC | PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

TITLE
DIMENSION PRINT, CONTROLLER

20-300KW
CONTROLLER

SCALE 0.40 | CAD NO. | SHEET 1 of 1
DWG NO. ADV-7935 | D

MODEL	ENCLOSURE WEIGHT KG (LBS)
STEEL WEATHER	363 (800)
STEEL SOUND	386 (850)
ALUMINIUM SOUND	238 (525)



NOTE:

1. IF STANDARD TANK IS ORDERED, ENCLOSURE MOUNTS DIRECTLY TO TANK
2. IF STATE TANK IS ORDERED, TANK MOUNTS BELOW SKID
3. TANK MAY EXTEND BEYOND ENCLOSURE (DISCHARGE END ONLY)
4. FOR STUB-UP ACCESS DURING INSTALLATION THE REAR ENCLOSURE PANEL SHOULD BE REMOVED.

230-300 MODEL
JOHN DEERE TIER III

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
E	10-31-12	SHEET 2 WAS SHEET1, ADDED SHEET 1 [CT28612]	CEK

UNLESS OTHERWISE SPECIFIED:
(1) DIMENSIONS ARE IN MILLIMETERS
(2) TOLERANCES ARE:
X.XX ± 0.25
X.X ± 1.0
ANGLES ± 0° 30'
SURFACE FINISH 125 MAX.
THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	DJG	10-24-08
CHECKED	CWF	10-24-08
APPROVED	SLJ	10-24-08

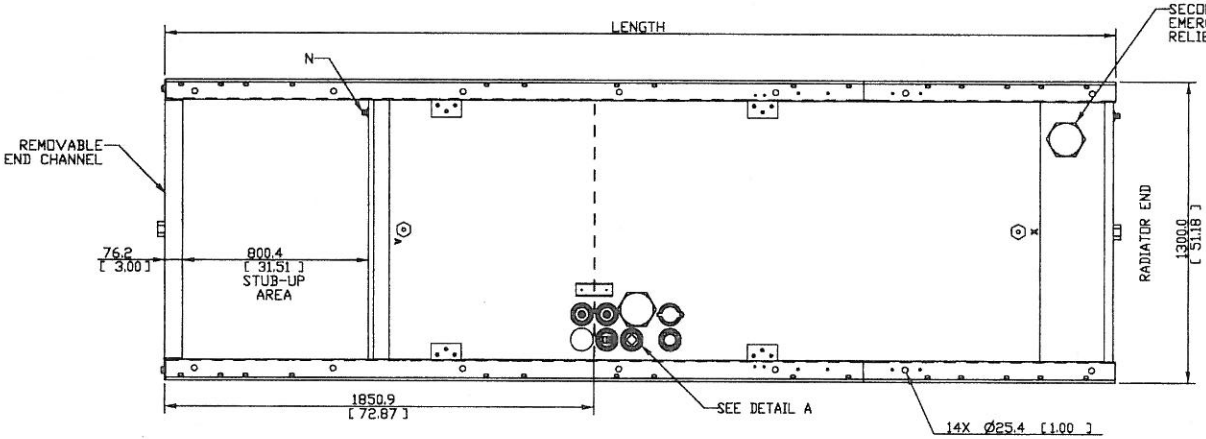
KOHLER CO. METRIC | PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

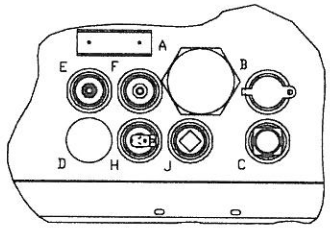
TITLE: DIMENSION PRINT 230-300KW JD

SCALE 0.06 | CAD NO. | SHEET 1 of 2

DWG NO. ADV-7644 | D

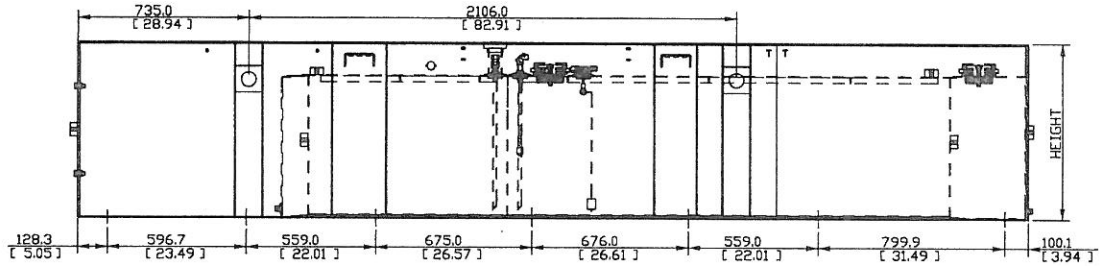
MODEL	CAPACITY L [GAL]	WEIGHT KG [LBS]	HEIGHT MM [IN]	LENGTH MM [IN]	E - VENTS SIZE (QTY)
230-275kW	1786 L [472 GAL]	911 KG [2009 LBS]	762 MM [30 IN]	4094 MM [161.2 IN]	4 (2)
300kW	2070 L [546 GAL]	939 KG [2070 LBS]	838.2 MM [33 IN]	4094 MM [161.2 IN]	4 (2)
THIS IS AN AUTOMATED TABLE. ALL CHANGES TO THIS TABLE MUST BE MADE IN THE FAMILY TABLE OF THE GENERIC MODEL.					

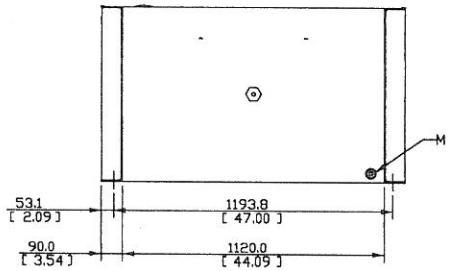




DETAIL A
SCALE 0.200

TANK FITTINGS:
A. EMERGENCY VENT FITTING PER NFPA 30 WITH VENT CAPS (QTY 2).
B. 2" NPT FUEL FILL FITTING WITH LOCKABLE CAP AND 2" RISER.
C. 2" NPT FUEL LEVEL GAUGE FITTING WITH DIRECT READING MECHANICAL GAUGE.
D. 2" NPT NORMAL VENT FITTING WITH MUSHROOM VENT CAP AND 5" RISER.
E. 2" NPT FITTING FOR REMOVABLE ENGINE SUPPLY DIP TUBE (3/8" NPT FEMALE WITH CHECK VALVE).
F. 2" NPT FITTING FOR REMOVABLE FUEL RETURN DIP TUBE (3/8" NPT FEMALE).
H. 2" NPT FOR LOW LEVEL SWITCH (SET AT 50% FULL, SILICONE PACKED).
J. 2" NPT ADDITIONAL FITTING FOR OPTIONAL ACCESSORY (INSTALL STEEL 2" NPT PIPE PLUG).
M. 1/2" NPT BASIN DRAIN (INSTALL STEEL 1/2" NPT PIPE PLUG).
N. 1/2" NPT FOR FUEL IN BASIN SWITCH (INSTALL STEEL 1/2" NPT PIPE PLUG).





NOTE:

FOR FURTHER TANK DETAIL SEE INDIVIDUAL DRAWINGS.

DIMENSIONS IN [ ] ARE ENGLISH EQUIVALENTS.

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	10-27-08	NEW DRAWING (86488-3)	JB2
A	11-17-09	SEE SHEET 2 OF 2, (C-4) 14X Ø25.4 WAS 12X (A-6) 675.0 AND 676.0 ADDED. (88481)	GFR
B	10-7-10	(D-8) STANDARD TANK TABLE ADDED (90099-6)	RJS
C	12-2-11	VIEWS UPDATED (92417-5)	SDS
D	5-8-12	SEE SHEETS 2 & 3, SHEET 3 ADDED (CT13297)	JB2

APPROVALS	DATE
DRAWN JB2	10-27-08
CHECKED DCF	10-27-08
APPROVED SLJ	10-27-08

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

TITLE: DIMENSION PRINT

SCALE 0.10 SHEET 1 of 3

ADV-7645 D

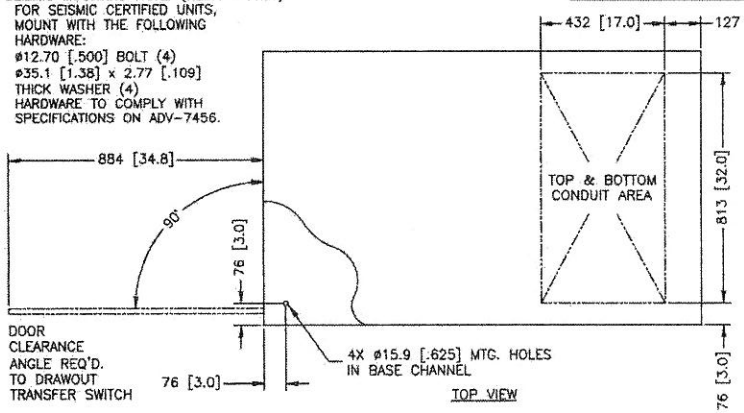
230-300KW
JOHN DEERE TIER III
STANDARD CODE TANK

AMP SIZE	CABLE ACCOMMODATIONS (PER PHASE & NEUTRAL)	TORQUE
1600–2000	SCREW TYPE – (6) 1/0 – 750 KCMIL	19 FT–LBS

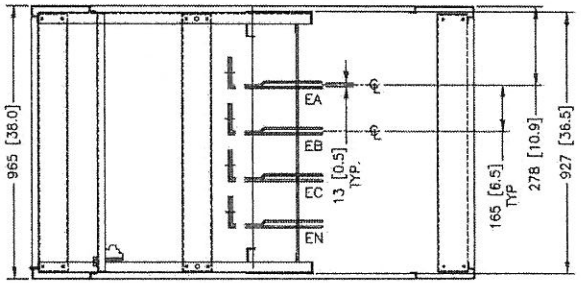
BUS LOCATION CHART	DIM.	1600/2000 A
EMER & NORM BUS TO BACK CORNER POST	A	528 [20.8]
EMER & NORM LUG TO BACK CORNER POST	B	465 [18.3]
LOAD BUS TO BACK CORNER POST	C	476 [18.8]
LOAD LUG TO BACK CORNER POST	D	413 [16.3]

REV	DATE	REVISION	BY
G	3-25-08	(A-2) ADDITIONAL NOTES UPDATED; (D-6) SEISMIC NOTES ADDED;	
		(D-5) CABLE CHART UPDATED; [83809]	BTW
H	2-22-10	(A-2) SURGE PROTECTION (OPTIONAL) ADDED; (B-5) HEATER	
		(OPTIONAL) ADDED; (C-5) HEATER (OPTIONAL) ADDED; [89095]	BTW
J	10-28-11	(B-7) METER (OPTIONAL) ADDED [92535]	WSD
K	5-4-12	DUAL DIMENSIONS ADDED [CT12987]	BTW

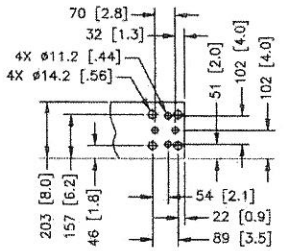
SEISMIC MOUNTING NOTE: (NEMA 1 ONLY)
FOR SEISMIC CERTIFIED UNITS, MOUNT WITH THE FOLLOWING HARDWARE:
ø12.70 [.500] BOLT (4)
ø35.1 [1.38] x 2.77 [.109] THICK WASHER (4)
HARDWARE TO COMPLY WITH SPECIFICATIONS ON ADV-7456.



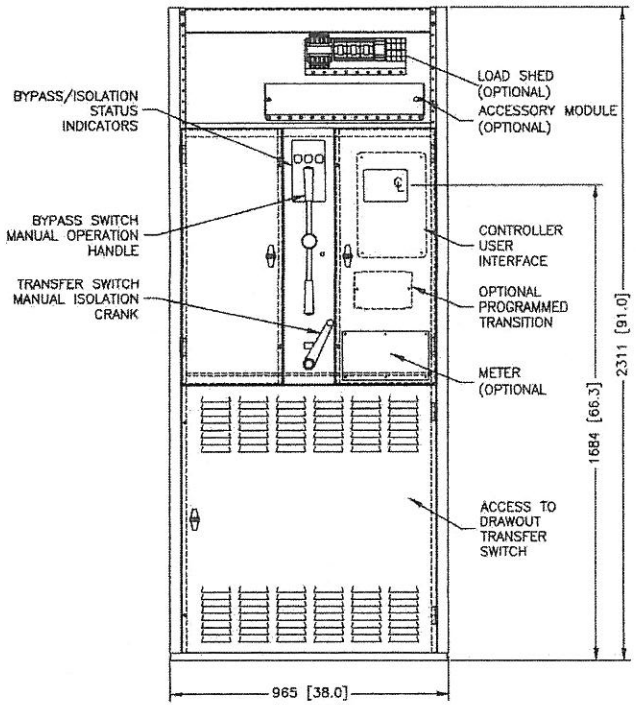
TOP VIEW



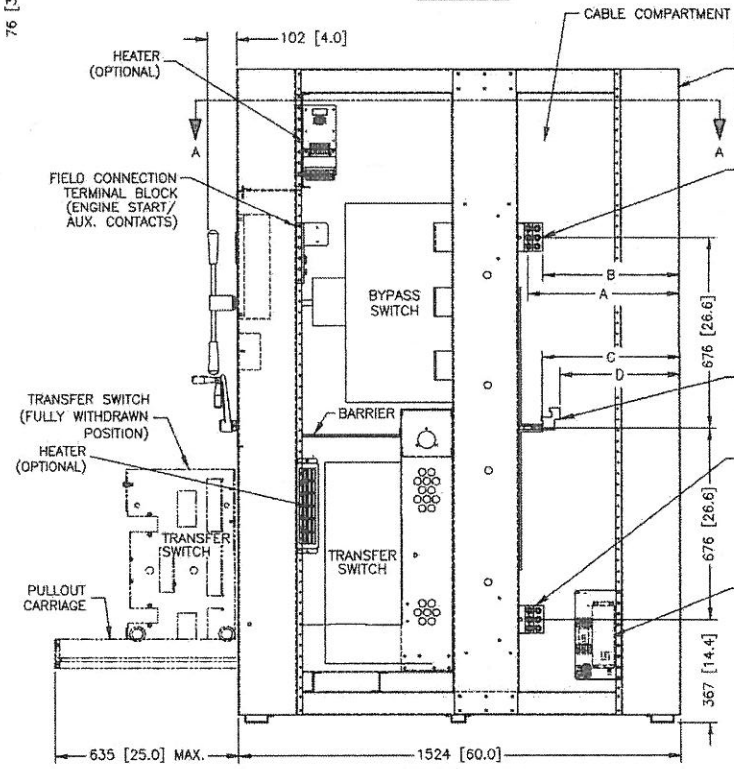
SECTION A–A



DETAIL (E & N)
1600/2000 A AVAILABLE CONTACT AREA



FRONT VIEW
UPPER COVER REMOVED FOR CLARITY



NOTE:
REFERENCE LOCAL BUILDING CODES FOR REAR ACCESS REQUIREMENTS. A MINIMUM WORKING CLEARANCE MAY BE REQUIRED.

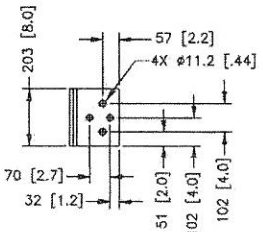
EMERGENCY PHASE & NEUTRAL TERMINATIONS SEE DETAIL (E & N) FOR HOLE PATTERNS

LOAD PHASE & NEUTRAL TERMINATIONS SEE DETAIL (LOAD) FOR HOLE PATTERN

NORMAL PHASE & NEUTRAL TERMINATIONS SEE DETAILS (E & N) FOR HOLE PATTERN

SURGE PROTECTION (OPTIONAL)

RIGHT SIDE VIEW
SIDE COVERS REMOVED FOR CLARITY



DETAIL (LOAD)
1600/2000 A AVAILABLE CONTACT AREA

NOTE:
DIMENSIONS IN [ ] ARE IN INCHES.

SEE SHEET 3 FOR NEMA 3R.

FOR SEISMIC CERTIFIED UNITS, REFER TO ADV-7456 AND INSTALLATION INSTRUCTIONS.

METRIC CAD FILE

MODEL K1
MPAC LOGIC
1600-2000A
STANDARD & PROGRAMMED TRANSITION
BYPASS ISOLATION
NEMA 1

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

APPROVALS	DATE
RAC	10-24-01
AH	10-29-01
AH	10-29-01

SCALE .13x | DWG NO. ADV6697A.DWG | SHEET 1-3
ADV-6697 | D

REV	DATE	REVISION	BY
D	8-28-03	SEE SHEET 1 [88841]	WSD
E	6-21-06	(A-2) 1600 WAS 1000 [71783]	WSD
F	4-3-06	SEE SHEET 1 [78842]	WSD
G	3-25-08	ITEMS MOVED TO SHEET 3, NOTES ADDED; [83609]	DTW
H	2-22-10	SEE SHEET 1 [89095]	RTW
J	10-26-11	SEE SHEET 1 [92535]	WSD
K	5-4-12	SEE SHEETS 1 & 3 [GT12967]	DTW

GENERAL NOTES
1. TYPE 1 ENCLOSURES. FREE STANDING. FLOOR MOUNTED. CODE GAUGE FORMED FRAME CONSTRUCTION.
2. NEC STANDARD GAUGE PAN TYPE DOORS WITH LOCKABLE HANDLES AND REMOVABLE COVERS.
3. FINISH: ANSI 61 GRAY, POLYESTER POWDER. UL RECOGNIZED.
4. CONSTRUCTION IS IN ACCORDANCE WITH UL 1008.
5. PADLOCKING PROVISIONS ARE INCLUDED.
   ISOLATION HANDLE: THE TRANSFER SWITCH ISOLATION HANDLE MAY BE PADLOCKED WITH THE TRANSFER SWITCH IN THE FULLY ISOLATED (DISCONNECTED POSITION).
6. RECOMMENDED FRONT/REAR CLEARANCE: 36 INCHES MINIMUM.
7. A 20% RATED GROUND BUS IS PROVIDED.
8. WHEN PROVIDED THE NEUTRAL IS IN ONE OF THE FOLLOWING FORMATS AS SPECIFIED BY THE CATALOG NO. NEUTRAL TYPE:

   TYPE T: SOLID (COPPER BUS) NEUTRAL
   TYPE V: SWITCHED NEUTRAL POLE
   TYPE W: OVERLAPPING NEUTRAL POLE (NOT AVAILABLE ON PROGRAMMED TRANSITION UNITS)

9. APPROXIMATE WEIGHT: (2360 LBS. 3 POLE), (2540 LBS. 4 POLE)
10. STANDARD OUTLINE FOR A FOUR POLE 1600-2000 AMP TRANSFER SWITCH WITH BYPASS/ISOLATION SWITCH SHOWN.
11. BOTH BYPASS SWITCH MANUAL OPERATION HANDLE & TRANSFER SWITCH CARRIAGE MANUAL CRANK HANDLE CAN BE REMOVED. ALSO NOTE THAT THE TRANSFER SWITCH CARRIAGE MANUAL CRANK HANDLE CAN BE LEFT IN PLACE AND FOLDED DOWN.

CABLING NOTES
1. ALL SIZES SUPPLIED STANDARD WITH MECHANICAL (SCREW TYPE) LUGS. (SEE CABLING CHART ON SHEET 1)
   A. LUG MATERIAL: ALUMINUM ALLOY 6061-T6 WITH ELECTRO TIN PLATED FINISH.
   B. SCREW MATERIAL: ALUMINUM ALLOY 6262-T9 WITH ELECTRO TIN PLATED FINISH.
   C. UL LISTED, CSA CERTIFIED.
   D. LUG MAX WIRE TIGHTENING TORQUE PER UL 486B: SEE TABLE ON SHEET 1.
   E. SUITABLE WIRE BENDING SPACE PROVIDED FOR UP TO (8) 600 KCMIL CABLES PER TERMINAL PER TABLE 373-6(b) OF NFPA 70 OF THE NEC.
2. OPTIONAL COPPER CRIMP LUGS MAY BE SUPPLIED. CONSULT FACTORY.
   A. LUG MATERIAL: HIGH CONDUCTIVITY WROUGHT COPPER FINISH, ELECTRO TIN PLATED.
   B. UL LISTED, CSA CERTIFIED.
   C. LUG MOUNTING HARDWARE TIGHTENING TORQUE: (REFER TO WITHSTAND CURRENT RATING LABEL PROVIDED ON EACH TRANSFER SWITCH).
   D. SUITABLE WIRE BENDING SPACE IS PROVIDED. FOR UP TO (4) 600 KCMIL CABLES PER TERMINAL PER TABLE373-6(b) OF NFPA 70 OF THE NEC.
3. GROUND LUGS ARE PROVIDED STANDARD AS FOLLOWS:
   (18) 750 KCMIL - 1/0 CU/AL CABLES.
4. CONSULT FACTORY FOR OTHER TERMINATION REQUIREMENTS.

METRIC CAD FILE

MODEL K1
MPAC LOGIC
1600-2000A
STANDARD & PROGRAMMED TRANSITION
BYPASS ISOLATION
NEMA 1

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 WSD	4-2-03
REVIEWED AJH	4-2-03
APPROVED AJH	4-2-03

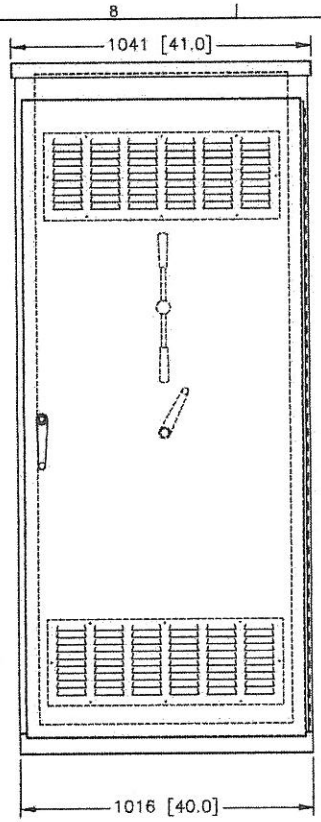
KOHLER CO.
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

TITLE: DIMENSION PRINT

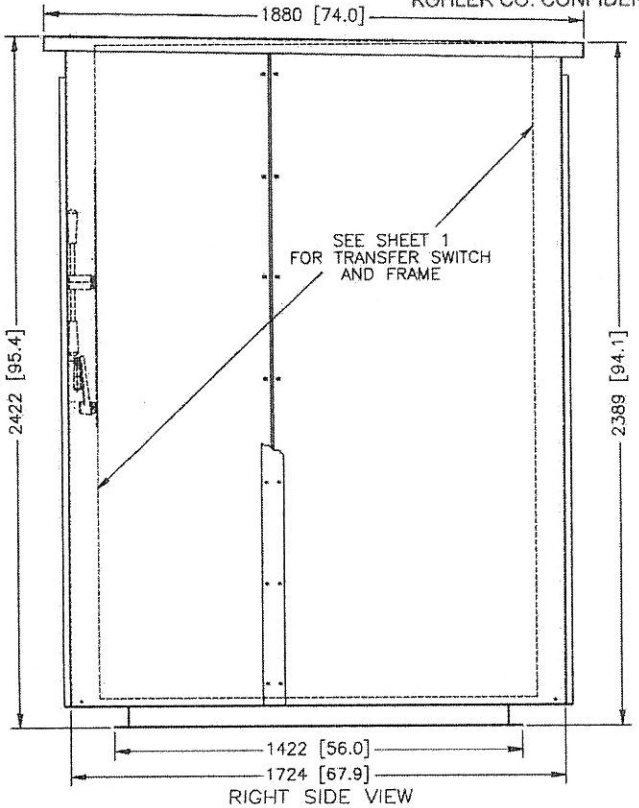
SCALE .13in | DWG NO. ADV6697B.DWG | SHEET 2-3

ORIG. NO. ADV-6697 | D

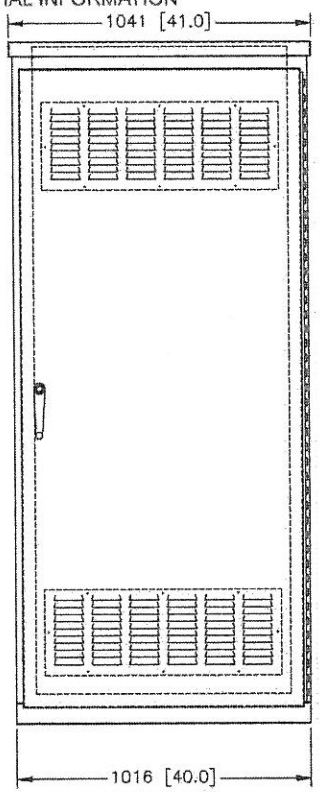
REV	DATE	REVISION	BY
G	3-25-08	ITEMS MOVED FROM SHEET 2 TO SHEET 3; (8-2) CABLE CHART ADDED; [63409]	BTW
H	2-22-10	SEE SHEET 1 [89095]	BTW
J	10-28-11	SEE SHEET 1 [92535]	WSD
K	5-4-12	DUAL DIMENSIONS ADDED; [CT12967]	BTW



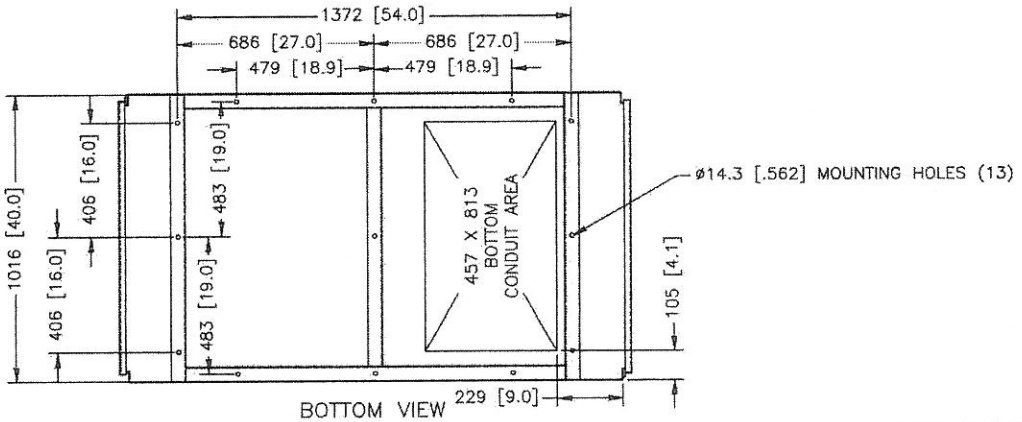
FRONT VIEW
EXTERIOR VIEW



RIGHT SIDE VIEW
EXTERIOR VIEW



REAR VIEW
EXTERIOR VIEW



BOTTOM VIEW

GENERAL NOTES
1. TYPE 3R ENCLOSURES, FREE STANDING, FLOOR MOUNTED.
   CODE GAUGE FORMED FRAME CONSTRUCTION.
2. NEC STANDARD GAUGE PAN TYPE DOORS WITH LOCKABLE HANDLES AND REMOVABLE COVERS.
3. FINISH: ANSI 61 GRAY, POLYESTER POWDER. UL RECOGNIZED.
4. CONSTRUCTION IS IN ACCORDANCE WITH UL 1008.
5. PADLOCKING PROVISIONS ARE INCLUDED.
   ISOLATION HANDLE: THE TRANSFER SWITCH ISOLATION HANDLE MAY BE PADLOCKED WITH THE TRANSFER SWITCH IN THE FULLY ISOLATED (DISCONNECTED POSITION).
6. RECOMMENDED FRONT CLEARANCE: 48 INCHES MINIMUM,
   RECOMMENDED REAR CLEARANCE: 36 INCHES MINIMUM.
7. A 20% RATED GROUND BUS IS PROVIDED.
8. WHEN PROVIDED THE NEUTRAL IS IN ONE OF THE FOLLOWING FORMATS AS SPECIFIED BY THE CATALOG NO. NEUTRAL TYPE:

   TYPE T: SOLID (COPPER BUS) NEUTRAL
   TYPE V: SWITCHED NEUTRAL POLE
   TYPE W: OVERLAPPING NEUTRAL POLE (NOT AVAILABLE ON PROGRAMMED TRANSITION UNITS)

9. APPROXIMATE WEIGHT: 2540 LBS.
10. STANDARD OUTLINE FOR A FOUR POLE 1600-2000 AMP TRANSFER SWITCH WITH BYPASS/ISOLATION SWITCH SHOWN.
11. BOTH BYPASS SWITCH MANUAL OPERATION HANDLE & TRANSFER SWITCH CARRIAGE MANUAL CRANK HANDLE CAN BE REMOVED. ALSO NOTE THAT THE TRANSFER SWITCH CARRIAGE MANUAL CRANK HANDLE CAN BE LEFT IN PLACE AND FOLDED DOWN.

CABLING NOTES
1. ALL SIZES SUPPLIED STANDARD WITH MECHANICAL (SCREW TYPE) LUGS. (SEE AMP SIZE BELOW)
   A. LUG MATERIAL: ALUMINUM ALLOY 6061-T6 WITH ELECTRO TIN PLATED FINISH.
   B. SCREW MATERIAL: ALUMINUM ALLOY 6262-T9 WITH ELECTRO TIN PLATED FINISH.
   C. UL LISTED, CSA CERTIFIED.
   D. LUG MAX WIRE TIGHTENING TORQUE PER UL 486B: SEE TABLE BELOW.
   E. SUITABLE WIRE BENDING SPACE IS PROVIDED. FOR UP TO (6) 600 KCMIL PER TERMINAL.
2. OPTIONAL COPPER CRIMP LUGS MAY BE SUPPLIED. CONSULT FACTORY.
   A. LUG MATERIAL: HIGH CONDUCTIVITY WROUGHT COPPER FINISH, ELECTRO TIN PLATED.
   B. UL LISTED, CSA CERTIFIED.
   C. LUG MOUNTING HARDWARE TIGHTENING TORQUE: (REFER TO WITHSTAND CURRENT RATING LABEL PROVIDED ON EACH TRANSFER SWITCH).
   D. SUITABLE WIRE BENDING SPACE IS PROVIDED. FOR UP TO (6) 600 KCMIL CU/AL CABLES.
3. GROUND LUGS ARE PROVIDED STANDARD AS FOLLOWS:
   (18) 700 KCMIL - 1/0 CU/AL CABLES.
4. CONSULT FACTORY FOR OTHER TERMINATION REQUIREMENTS.

AMP SIZE	CABLE ACCOMMODATIONS (PER PHASE & NEUTRAL)	TORQUE
1600-2000	SCREW TYPE - (6) 1/0 - 750 KCMIL	19 FT-LBS

NOTES:
DIMENSIONS IN [ ] ARE IN INCHES.

METRIC CAD FILE

MODEL K1
MPAC LOGIC
1600-2000A
STANDARD & PROGRAMMED TRANSITION
BYPASS ISOLATION
NEMA 3R

APPROVALS	DATE
BTW	3-25-08
BTW	3-25-08
MTL	3-25-08

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

TITLE: DIMENSION PRINT
SCALE .13x | SIZE D | DWG NO. ADV6697C.DWG | SHEET 3-3
APPROVED | MTL | 3-25-08 | DWG NO. ADV-6697 | D

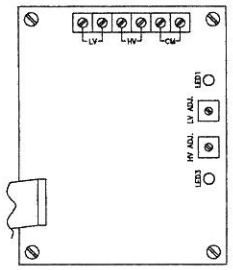
Miscellaneous

REV	DATE	REVISION	BY
A	12-8-97	(A-4) DC WIRE RECOMMENDATION NOTE REVISED [53086]	KAR

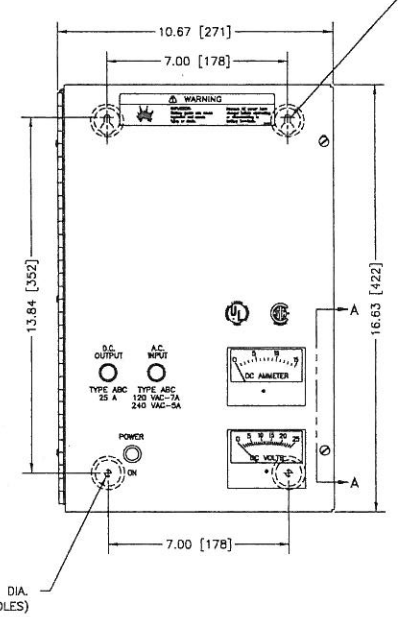
LV – N.O. CONTACTS, CLOSE ON LOW BATTERY VOLTAGE

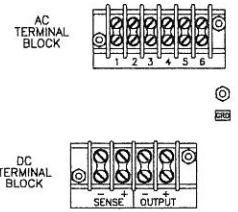
HV – N.O. CONTACTS, CLOSE ON HIGH BATTERY VOLTAGE

CM – N.O. CONTACTS, CLOSE ON LOSS OF AC INPUT OR LOSS OF DC OUTPUT

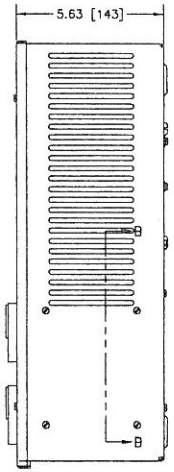


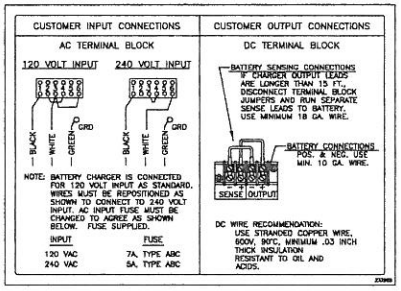
VIEW A–A
OPTIONAL ALARM BOARD





VIEW B–B
CUSTOMER CONNECTIONS





NOTE:

DIMENSIONS IN [ ] ARE MILLIMETERS.

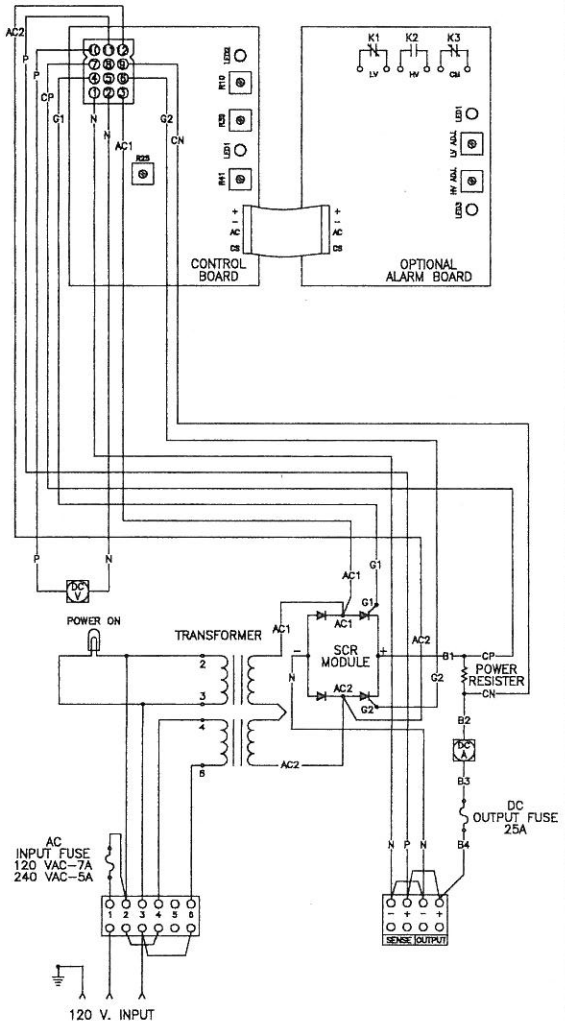
AUTO–FLOAT
12 & 24 VOLT
BATTERY CHARGER

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

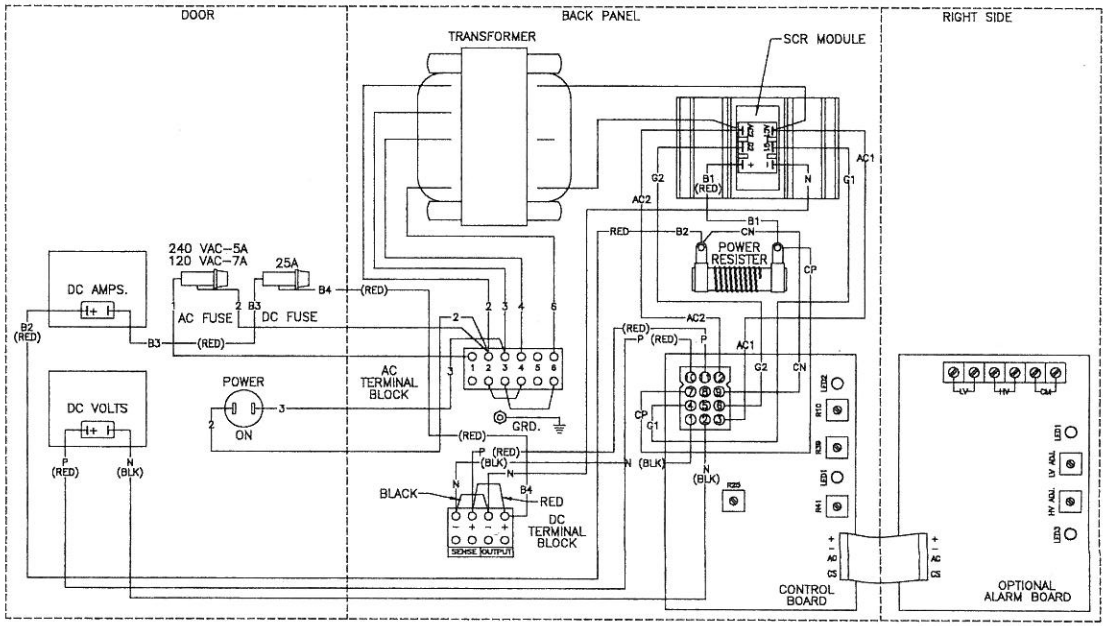
APPROVALS	DATE
LJH	6-28-94
JS	6-29-94
TJM	6-29-94

TITLE: DIMENSION PRINT
SCALE 1/2 | DWG NO. ADV5971.DWG | SHEET 1-1
PLOTTED | DWG. NO. ADV-5971 | D

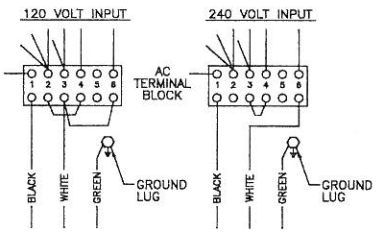
SCHEMATIC



REV	DATE	REVISION	BY
A	2-1-03	(C-5) AC & DC FUSE SYMBOLS REVISED	RSH
B	8-17-03	(BJC-3,2) "BLK" DESIGNATION REMOVED FROM "N" WIRE [703887]	SAM



CUSTOMER INPUT CONNECTIONS



NOTE:
WHEN CHANGING AC INPUT VOLTAGE, THE AC INPUT FUSE MUST BE CHANGED TO AGREE AS SHOWN BELOW.

INPUT	FUSE
120 VAC	7A, TYPE ABC
240 VAC	5A, TYPE ABC

AUTO-FLOAT
24 VOLT
BATTERY CHARGER

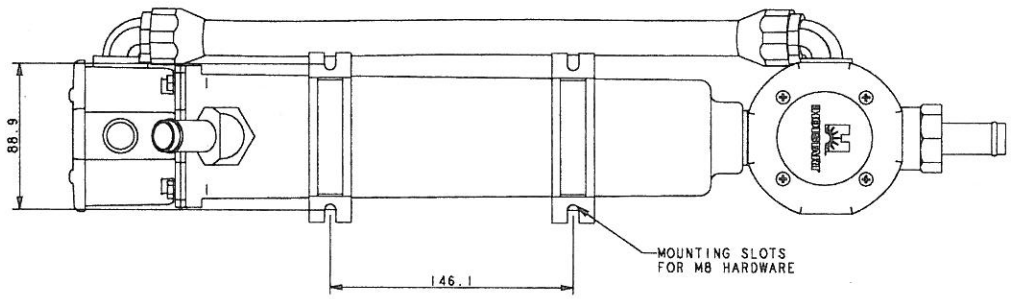
KOHLER CO.
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

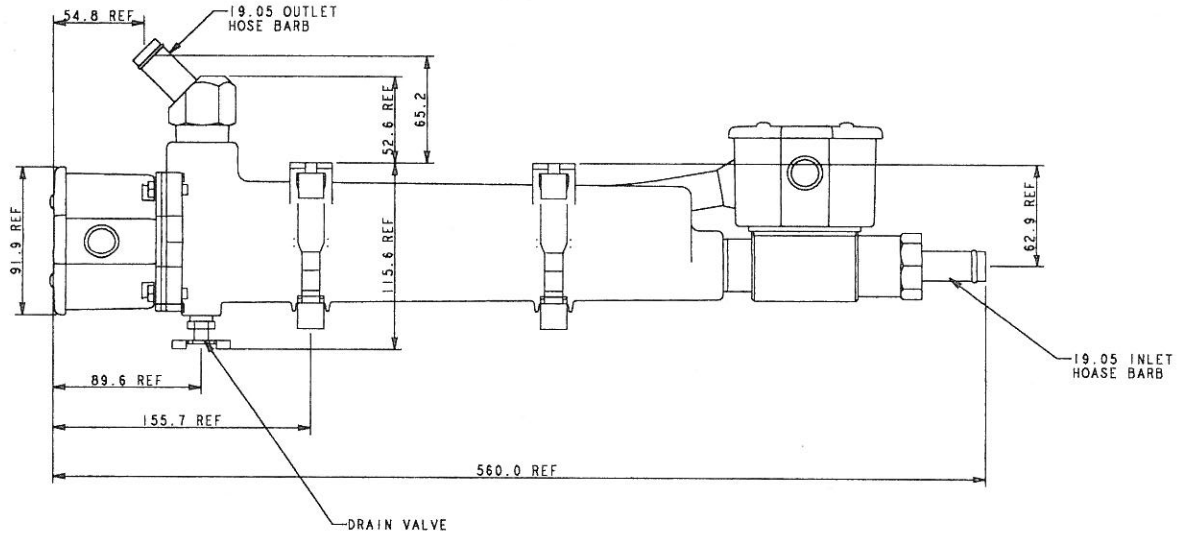
APPROVALS	DATE
VM	2-11-02
JS	3-3-02
DAH	3-11-02

DIAGRAM, WIRING

SCALE ///
233968.DWG
SHEET 1-1
233968
D

PART NO	REV	WATTS	VOLTS	AMPS	TEMP RANGE	REPLACEMENT ELEMENT
GM76113	A	2500	90/120	15.6/20.8	27/38° C [80/100° F]	GM29477
GM76114	A		190/208	11.0/12.0		GM29478
GM76115	A		210/240	9.1/10.4		GM29474
GM76116	A		380/480	4.1/5.2		GM29479
ES-75616	A		240/227	7.8/9.0		ES-75542





REV	DATE	DR COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	6-9-10	NEW DRAWING [89933-1]	SAM
A	12-9-10	(D-8) ES-75616 ADDED, GM76113: 15.6/20.8 WAS 27.8/20.8, GM76114: 11.0/12.0 WAS 13.2/12.0, GM76115: 9.1/10.4 WAS 11.9/10.4, GM76116: 4.1/5.2 WAS 6.6/5.2 [90699]	SAM

UNLESS OTHERWISE SPECIFIED - 1) DIMENSIONS ARE IN MILLIMETERS 2) TOLERANCES ARE:
X.XX ± 0.25
X.X ± 1.0
X ± 1.5
ANGLES ± 2°
SURFACE FINISH 3.8 MAX.
THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	SAM	6-9-10
CHECKED	JMS	6-9-10
APPROVED	WRD	6-9-10

TITLE: HEATER, BLOCK

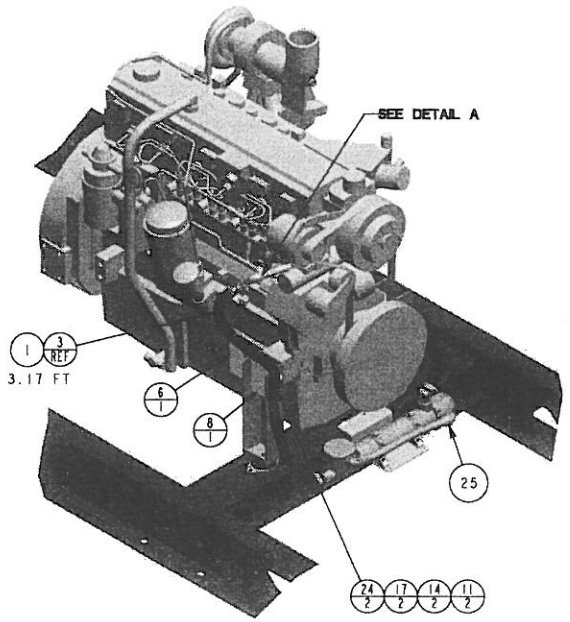
SCALE 0.76 CAD NO. SHEET 1 of 1

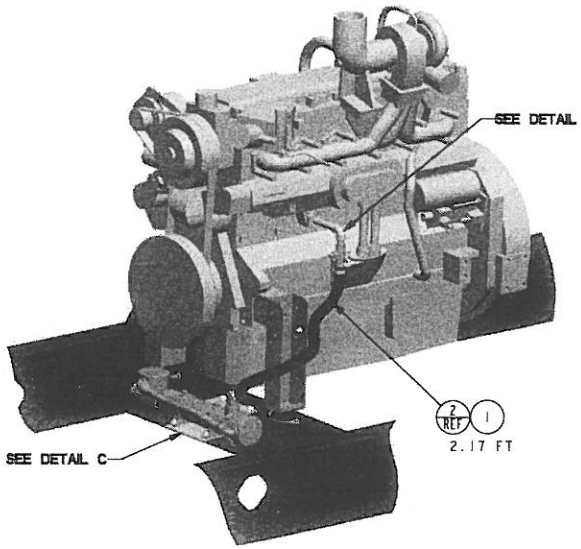
SIZE NO. GM76113 D

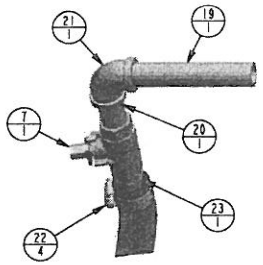
200/350 KW JD

KIT NO.	ITEM	PART NO	QTY	DESCRIPTION
GM76120-KB				BASE GRP, BLOCK HEATER
	1	25452-00075	5.34FT	HOSE, COOLANT
	2	X-6367-6 (REF)	1	HOSE, COOLANT
	3	X-6367-14 (REF)	1	HOSE,□COOLANT 29"
	4	273692	1	ADAPTER, BUSHING
	5	273693	1	O-RING (1.475" ID)
	6	279047	1	TAG, INSTRUCTION
	7	GM19670	2	VALVE, SHUTOFF (1/2-14NPT)
	8	GM39752	1	TAG, HANG
	9	GM51263	1	BRACKET, BLOCK HEATER
	10	M125A-06-80	4	WASHER, PLAIN
	11	M125A-08-80	2	WASHER, PLAIN 8.4 ID X 16.0 OD
	12	M125A-10-80	2	WASHER, PLAIN 10.5 ID X 20.0 OD
	13	M6923-06-80	4	NUT, HEX 6MM
	14	M6923-08-80	2	NUT, HEX 8MM
	15	M6923-10-80	2	NUT, HEX 10MM
	16	M933-06025-60	4	SCREW, HEX CAP
	17	M933-08025-60	2	SCREW, HEX CAP
	18	M933-10025-60	2	SCREW, HEX CAP,FULLY THRD M10 X 25MM
	19	X-209-21	2	PIPE (1/2"NPT X 4.50")
	20	X-209-5	2	PIPE (1/2"NPT X 1.50")
	21	X-215-1	2	ELBOW, PIPE (90 DEG X 1/2"NPT)
	22	X-426-12	4	CLAMP, HOSE, .69/1.25 IN.
	23	X-582-7	2	CONNECTOR, HOSE + VIBRA SEAL
	24	X-672-4	2	CLAMP, INSULATED, 1.25 IN.
GM76120-KA1				BLOCK HEATER, 2500W, 90/120V 1PH
	25	GM76113	1	BLOCK HEATER
GM76120-KA2				BLOCK HEATER, 2500W,190/208V 1PH
	25	GM76114	1	BLOCK, HEATER
GM76120-KA3				BLOCK HEATER, 2500W,210/240V 1PH
	25	GM76115	1	BLOCK,□HEATER
GM76120-KA4				BLOCK HEATER, 2500W,380/480V 1PH
	25	GM76116	1	BLOCK, HEATER

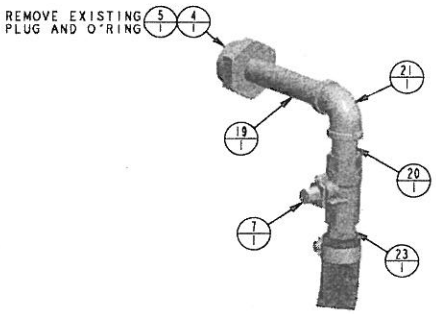
THIS IS AN AUTOMATED TABLE. ALL UPDATES MUST BE MADE IN THE ASSEMBLY.
ITEMS 1-3 & 25 ARE FIXED. ITEM 1 IS A MANUAL BALLOONS.



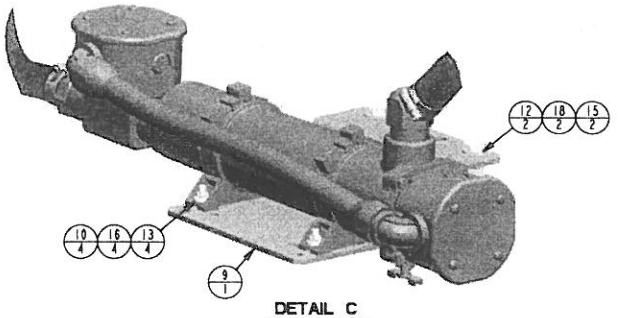




DETAIL A
SCALE 0.50



DETAIL B
SCALE 0.50



DETAIL C
SCALE 0.50

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

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	6-14-10	NEW DRAWING (85933-2)	SAM
A	9-28-10	(C-5) X-6367-14 WAS X-6367-12; (C-1)	
		X-6367-6 WAS X-6367-11; (C-8) X-209-21 (2)	
		WAS X-209-11 & X-209-18; X-6003-121 REMOVED;	
		VIEWS UPDATED (90099-3)	DJV

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS. ANGULAR TOLERANCES ARE: ± 30'. SURFACE FINISH MAX.

APPROVALS		DATE
DRAWN	SAM	6-14-10
CHECKED	JMS	6-15-10
APPROVED	WRD	6-16-10

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

TITLE: DWG, ASSY BLOCK HEATER
SCALE 0.14 | CAD NO. | SHEET 1 of 1
PART NO. GM76120 | D

BLOCK HEATER KITS
230-300 MODELS
JOHN DEERE

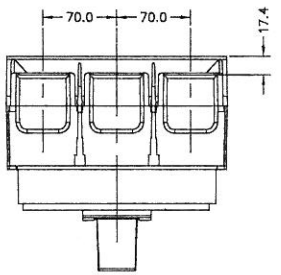
PART NO.	REV	AMPS	% RATING	GFI	VENDOR NO.
GM24181-1	C	600	100	NO	PGP36060CU33A
GM24181-2	C	600	100	YES	PGP36060CU44A
GM24181-3	C	800	80	NO	PGP36080U33A
GM24181-4	C	800	80	YES	PGP36080U44A
GM24181-5	C	800	100	NO	PGP36080CU33A
GM24181-6	C	800	100	YES	PGP36080CU44A
GM24181-7	C	1000	80	NO	PGP36100U33A
GM24181-8	C	1000	80	YES	PGP36100U44A
GM24181-9	C	1000	100	NO	PGP36100CU33A
GM24181-10	C	1000	100	YES	PGP36100CU44A
GM24181-11	C	1200	80	NO	PGP36120U33A
GM24181-12	C	1200	80	YES	PGP36120U44A
GM24181-13	C	1200	100	NO	PGP36120CU33A
GM24181-14	C	1200	100	YES	PGP36120CU44A

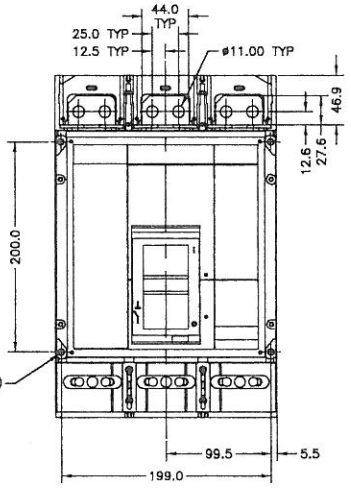
NOTE: (4) #10-32 X 4.5 INCH MOUNTING SCREWS INCLUDED.

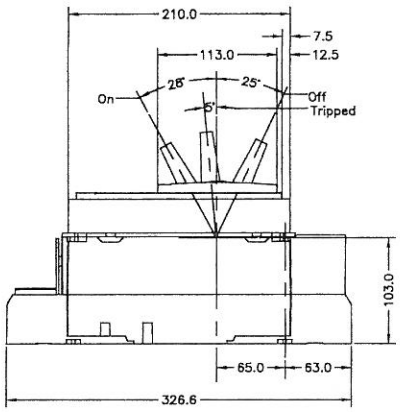
REV	DATE	REVISION	BY
--	3-22-02	NEW DRAWING [98248]	WSD
A	8-12-03	(D-4) THREADED BAR NOTE ADDED. [70020]	SRL
B	11-12-03	(D-7) GM24181-13 GFI: NO WAS YES [70065]	WSD
C	2-23-07	(D-3) KOHLER NOTE ADDED [78255]	GFR

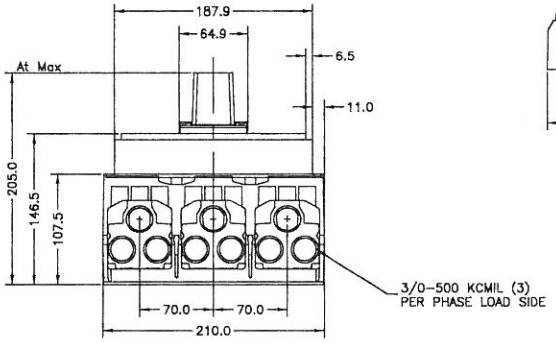
NOTE:
KOHLER PART # TO BE CLEARLY VISIBLE ON CIRCUIT BREAKER AND ON INDIVIDUAL PACKAGING.

NOTE:
THREADED BAR SUPPLIED WITH BREAKER IS USED WITH LUGS OR WHEN BUS BARS ARE INSTALLED WITH BOLTS INSERTED FROM THE FRONT. REMOVE AND DISCARD BAR WHEN BOLTS ARE INSTALLED FROM THE REAR OF BREAKER.

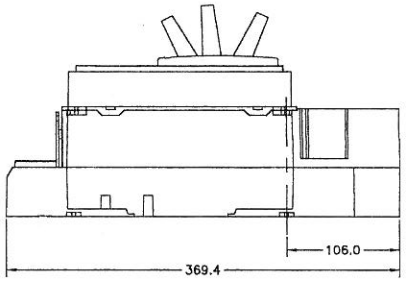


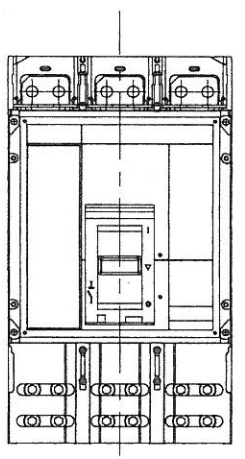


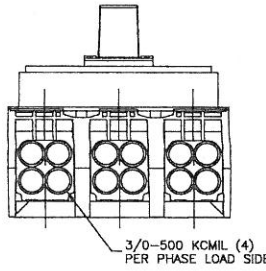




600-800A







1000-1200A
DIMENSIONS SAME AS 600-800A
EXCEPT WHERE NOTED

METRIC CAD FILE

SQUARE D P-FRAME CIRCUIT BREAKER
3 POLE ELECTRONIC TRIP

APPROVALS		DATE
DRAWN	WSD	3-22-02
ENGINEER	WSD	3-22-02
APPROVED	AJH	3-22-02

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

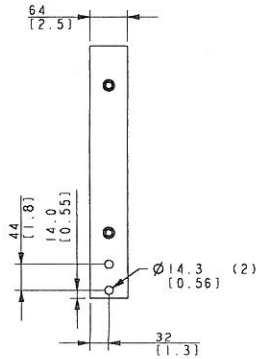
TITLE: BREAKER, CIRCUIT
SIZE: D | SCALE: .XXP | DWG NO. GM24181.DWG | REV: C | SHEET 1-1
PART NO. GM24181 | D

AL/CU MECHANICAL LOAD LUGS PER PHASE			A WIRE BENDING SPACE
BREAKER FRAME	AMPS	WIRE RANGE	
H	15-150	(1) #14 TO 3/0	530 [20.8]
H 100%	15-150	(1) #14 TO 2/0 CU ONLY	
J	175	(1) 1/0 TO 4/0	516 [20.3]
	200-250	(1) 3/0 TO 350 KCMIL	
J 100%	175-250	(1) 3/0 TO 300 KCMIL CU ONLY	
LA	300-400	(1) #1 TO 600 KCMIL OR (2) #1 TO 250 KCMIL	472 [18.6]
LG	400-600	(2) 2/0 TO 500 KCMIL AL/CU	480 [18.9]
M	700-800	(3) 3/0 TO 500 KCMIL	454 [17.9]
P	600-800		
P	1000-1200	(4) 3/0 TO 500 KCMIL	412 [16.2]

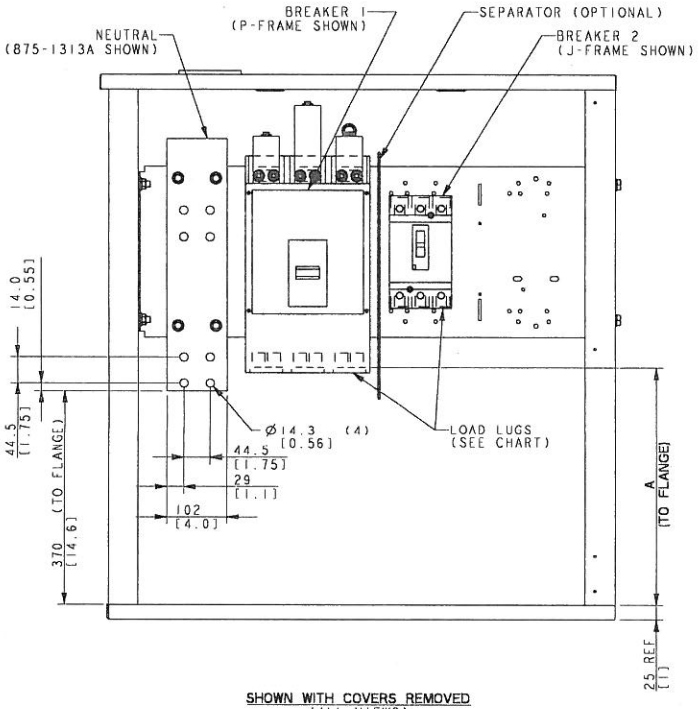
STANDARD BREAKER COMBINATIONS		
BREAKER 1	BREAKER 2	COMMENT
H	-	STD OR LSIG
J	-	STD OR LSIG
LA	-	
LG	-	STD OR LSIG
M	-	
P	-	STD OR LSIG
H	H	STD OR LSIG
J	H OR J	STD OR LSIG
LA	H, J OR LA	
LG	H, J, LA OR LG	H, J, LG (ONE OR TWO) MAY BE STD OR LSIG
M OR P	H, J, LA OR LG	P AND/OR H, J, LG MAY BE LSIG
P	P	NO LSIG

NOTES:

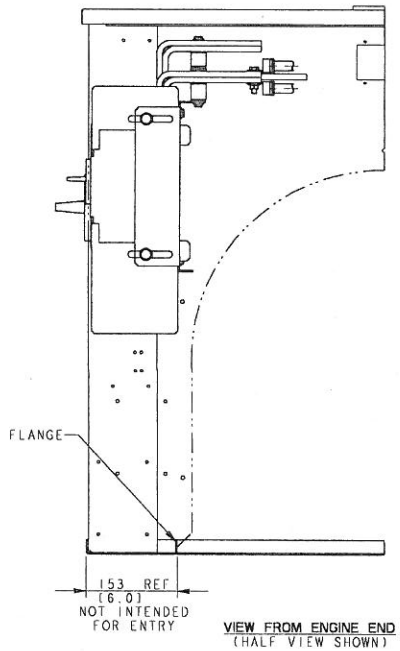
1) SEE UNIT DIMENSION PRINT (ADV-XXXX) FOR ADDITIONAL DIMENSIONS, JUNCTION BOX AND STUB-UP LOCATION.
2) ADD SKID DEPTH TO WIRE BENDING HEIGHTS ON THIS PRINT TO ARRIVE AT FULL WIRE-BENDING SPACE.
3) CONSULT FACTORY FOR BREAKER COMBINATIONS NOT SHOWN ON THIS PRINT.
4) MECHANICAL LUGS ARE AVAILABLE FOR NON-LSIG NEUTRAL. SEE ADV-7376. H, J & LG LSIG NEUTRALS INCLUDE LUGS (SEE CHART).
5) NEUTRALS ARE BONDED TO GROUND AS STANDARD. CONSULT LOCAL CODES OR SYSTEM REQUIREMENTS.
6) CIRCUIT BREAKER FRAMES REFER TO STANDARD SQUARE-D PRODUCT.
7) STANDARD NEUTRALS PROVIDED ARE SIZED FOR MAXIMUM UNIT AMPS. LSIG NEUTRALS ARE MATCHED TO THEIR CIRCUIT BREAKER AMPS.
8) DIMENSIONS IN [ ] ARE INCHES.



625A NEUTRAL



SHOWN WITH COVERS REMOVED
(ALL VIEWS)



VIEW FROM ENGINE END
(HALF VIEW SHOWN)

MECHANICAL LOAD LUGS INCLUDED WITH H, J & LG LSIG NEUTRALS		
BREAKER FRAME	AMPS	WIRE RANGE
H	60-150	(1) #14 TO 3/0 AWG AL/CU
J	250	(1) 3/0 TO 350 KCMIL AL/CU
LG	400-600	(2) 4/0 TO 500 KCMIL AL/CU

LINE CIRCUIT BREAKER (LCB) KITS
4UA, 4M6226 ALTERNATOR FRAME STYLES

REV	DATE	REVISION	BY
-	7-10-07	NEW DRAWING [79677]	WSD
A	9-5-07	(D-8) 625A WAS 500A, VIEW UPDATED [83690]	WSD
B	4-22-08	(D-8) 15-150 WAS 40-150 [84767]	WSD
C	10-19-12	UPDATED D TO LG, 100% H/J ADDED, LSIG NEUTRAL LUG CHART ADDED [CT26372]	WSD

UNLESS OTHERWISE SPECIFIED: 1) DIMENSIONS ARE IN MILLIMETERS 2) TOLERANCES ARE:

SURFACE FINISH MAX.

THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	WSD	7-10-07
CHECKED	WSD	7-10-07
APPROVED	AJH	7-10-07

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

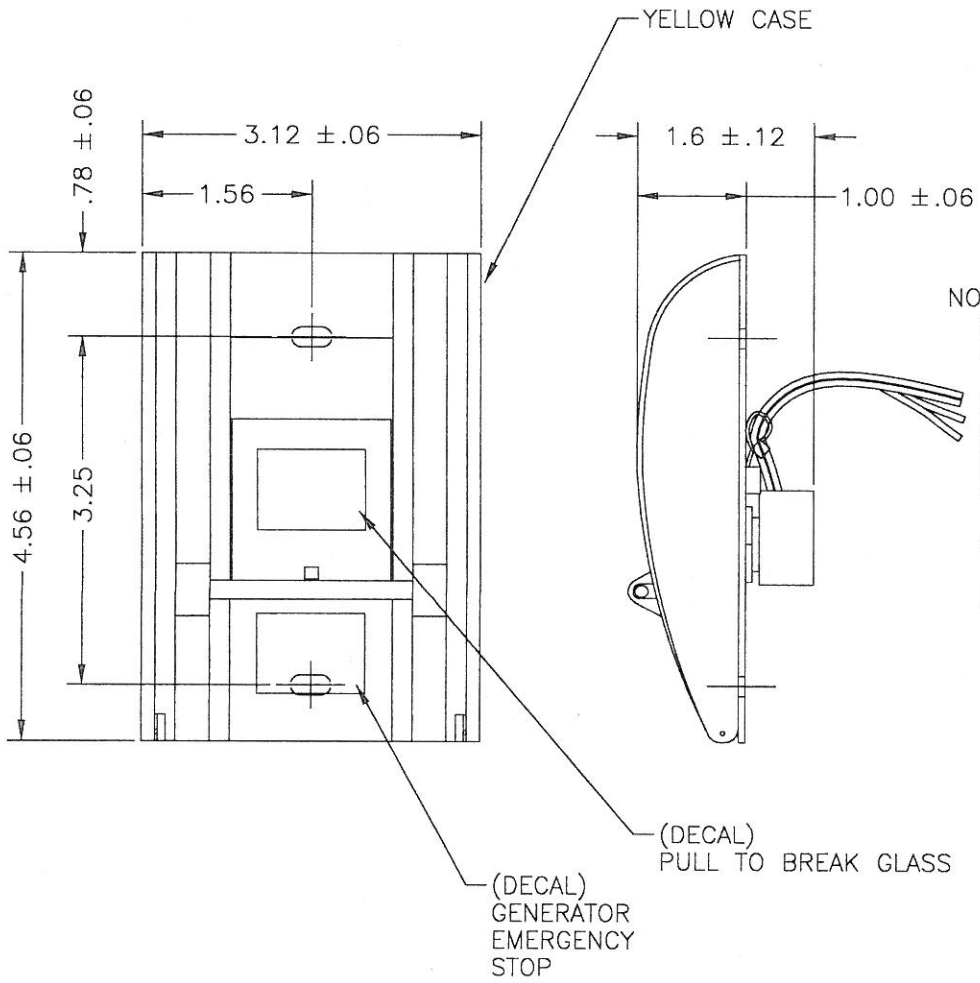
TITLE: DIMENSION PRINT

SCALE: NONE CAD NO. SHEET 1 of 1

DWG NO. ADV-7372 D

PART NO.	DESCRIPTION
222655	REPLACEMENT GLASS ROD

REV	DATE	REVISION	BY	M F
A	9-1-93	(B-2) SWITCHING NORMALLY CLOSED WAS SWITCHING		
		NORMALLY OPEN (CAN BE CONVERTED TO N.C.)	SJV	X
B	3-7-94	GENERIC TITLEBLOCK ADDED	PWH	



NOTE:
BREAKGLASS TYPE FOR CLOSED CIRCUIT OPERATION UP TO 48 VOLTS.

MOUNTING INSTRUCTIONS:
FOR WALL MOUNTING USE #6 ROUND HEAD WOOD SCREWS. FOR MOUNTING ON GEM BOX OR SINGLE GANG PLASTER COVER, USE MACHINE SCREWS IN ENVELOPE.

SWITCHING NORMALLY CLOSED.

EXTRA PIECE OF GLASS TO BE SUPPLIED WITH SWITCH.

MATERIAL: METAL (STEEL)

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

APPROVALS		DATE
DRAWN	KDW	8-12-92
CHECKED	EB	9-9-92
APPROVED	RLD	9-9-92

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

TITLE: SWITCH, EMERGENCY STOP

SCALE	CAD NO.	SHEET
FULL	A222654.dwg	1-1
PLOTTED	DWG. NO. A-222654	B G

KOHLER POWER SYSTEMS

Warranty

Transfer Switch and Bypass Isolation Transfer Switch One-Year Limited Warranty

Your Kohler product has been manufactured and inspected with care by experienced craftsmen. If you are the original consumer, Kohler Co. warrants, for the period indicated below, each product to be free from defects in materials and workmanship. Repair, replacement, or appropriate adjustment at Kohler Co.'s option will be furnished 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 representative must perform startup. This warranty does not apply to malfunctions caused by damage, unreasonable use, misuse, repair or service by unauthorized persons, or normal wear and tear.

Kohler Product	**Warranty Coverage***
Transfer Switch and Bypass Isolation Switch	One (1) year from date of startup

*Some restrictions may apply. Contact your Kohler distributor/dealer for full details.

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

1. Normal wear, periodic service, and routine adjustments.
2. Damage caused by accidents, improper installation or handling, faulty repairs not performed by an authorized service representative, or improper storage.
3. Damage caused by operation above or below rated capacity, voltage, or frequency; modifications; or installation contrary to published specifications, codes, recommendations, and accepted industry practices.
4. Original installation charges and startup costs.
5. 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 other than factory-supplied or -approved repair parts and/or procedures.
6. Rental of equipment during performance of warranty repairs.
7. Non-Kohler-authorized repair shop labor without prior approval from the Kohler Co. Warranty Department.
8. Expenses incurred investigating performance complaints unless the problem is caused by defective Kohler materials or workmanship.
9. Maintenance items such as fuses, lamps, and adjustments.

A Startup Notification form must be on file at Kohler Co. A Startup Notification form must be completed by Seller and received at Kohler Co. within 60 days after the date of initial startup. Standby systems not registered within 60 days of startup will automatically be registered by Kohler Co. using the Kohler Co. ship date as the startup date.

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

KOHLER CO. SHALL NOT BE LIABLE FOR SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OF ANY KIND including, but not limited to, incidental 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 OF 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 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 that vary from state to state.

KOHLER®
POWER SYSTEMS

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
KohlerPowerSystems.com

TP-5373 12/99d

Stationary Standby and Prime Power 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 consumer, Kohler Co. warrants, for the period indicated below, each product to be free from defects in materials and workmanship. Repair, replacement, or appropriate adjustment at Kohler Co.'s option will be furnished 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 representative must perform startup. This warranty does not apply to malfunctions caused by damage, unreasonable use, misuse, repair or service by unauthorized persons, or normal wear and tear.

Kohler Product	**Warranty Coverage***
Generator Set & Accessories	One (1) year or 2000 hours (whichever occurs first) from date of initial startup†
Prime Power Generator Set 20 kW or Larger	One (1) year or 2000 hours (whichever occurs first) from date of initial startup†

*Some restrictions may apply. Contact your Kohler distributor/dealer for full details.

†Startup must occur within 24 months of original shipment by Kohler Co.

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

1. Normal engine wear, routine tuneups, tuneup parts, adjustments, and periodic service.
2. Damage caused by accidents, improper installation or handling, faulty repairs not performed by an authorized service representative, or improper storage.
3. Damage caused by operation with improper fuel or at speeds, loads, conditions, modifications, or installation contrary to published specifications or recommendations.
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 expense related to battery service.
7. Engine coolant heaters, heater controls, and circulating pumps after the first year.
8. Rental of equipment during performance of warranty repairs.
9. Parts purchased from sources other than Kohler Co. Replacement of a failed Kohler part with a non-Kohler part voids warranty on that part.
10. Radiators replaced rather than repaired.
11. Fuel injection pumps not repaired locally by an authorized servicing dealer.
12. Non-Kohler-authorized repair shop labor without prior approval from Kohler Co. Warranty Department.
13. Engine fluids such as fuel, oil, or coolant/antifreeze.
14. Shop supplies such as adhesives, cleaning solvents, and rags.
15. Expenses incurred investigating performance complaints unless the problem is caused by defective Kohler materials or workmanship.
16. Maintenance items such as fuses, lamps, filters, spark plugs, loose or leaking clamps, and adjustments.

A Startup Notification form must be on file at Kohler Co. A Startup Notification form must be completed by Seller and received at Kohler Co. within 60 days after the date of initial startup. Standby systems not registered within 60 days of startup will automatically be registered by Kohler Co. using the Kohler Co. ship date as the startup date.

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

KOHLER CO. SHALL NOT BE LIABLE FOR SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OF ANY KIND including, but not limited to, incidental 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 OF 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 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 that vary from state to state.

KOHLER®
POWER SYSTEMS

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
KohlerPowerSystems.com

TP-5374 12/99c

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

This Kohler Standby Generator System has been manufactured and inspected with care by experienced craftsmen. If you are the original purchaser, Kohler Co. warrants for two years or two thousand (2000) hours, whichever occurs first, that the system will be free from defects in material and workmanship if properly installed, maintained, and operated in accordance with Kohler Co. instruction manuals. A Kohler distributor, dealer, or authorized representative must perform startup.

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 supervised startup.

During the warranty period, repair or replacement at Kohler Co.'s option will be furnished free of charge for parts, provided an inspection to Kohler Co.'s satisfaction discloses a defect in material and workmanship, and provided that the part or parts are returned to Kohler Co. or an authorized service station, if requested. This extended warranty expires two years after date of startup or after 2000 hours of operation, whichever occurs first.*

This warranty does not apply to malfunctions caused by damage, unreasonable use, misuse, or normal wear and tear while in your possession.

*Some restrictions may apply. Contact your Kohler distributor/dealer for full details.

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

1. Normal engine wear, routine tuneups, tuneup parts, adjustments, and periodic service.
2. Damage caused by accidents, improper installation or handling, faulty repairs not performed by an authorized service representative, or improper storage.
3. Damage caused by operation with improper fuel or at speeds, loads, conditions, modifications, or installation contrary to published specifications or recommendations.
4. Damage caused by negligent maintenance such as:
   a. Failure to provide the specified type and sufficient 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 exercise with load regularly.
5. Original installation charges and startup costs.
6. Starting batteries and the following related expenses:
   a. Labor charges related to battery service.
   b. Travel expense related to battery service.
7. Engine coolant heaters, heater controls, and circulating pumps after the first year.
8. Rental of equipment during performance of warranty repairs.
9. Parts purchased from sources other than Kohler. Replacement of a failed Kohler part with a non-Kohler part voids warranty on that part.
10. Radiators replaced rather than repaired.
11. Fuel injection pumps not repaired locally by an authorized servicing dealer.
12. Non-Kohler-authorized repair shop labor without prior approval from the Kohler Co. Warranty Department.
13. Engine fluids such as fuel, oil, or coolant/antifreeze.
14. Shop supplies such as adhesives, cleaning solvents, and rags.
15. Expenses incurred investigating performance complaints unless the problem is caused by defective Kohler materials or workmanship.
16. Maintenance items such as fuses, filters, spark plugs, loose/leaking clamps, and adjustments.

A Startup Notification form must be on file at Kohler Co. A Startup Notification form must be completed by Seller and received at Kohler Co. within 60 days after the date of initial startup. Standby systems not registered within 60 days of startup will automatically be registered by Kohler Co. using the Kohler Co. ship date as the startup date.

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

KOHLER CO. SHALL NOT BE LIABLE FOR SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OF ANY KIND including, but not limited to, incidental 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 in our behalf.

ANY IMPLIED OR STATUTORY WARRANTY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS OF PURCHASE, 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 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®
POWER SYSTEMS

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
KohlerPowerSystems.com

TP-5497 12/99c

Extended Two-Year Transfer Switch Limited Warranty

This Kohler product has been manufactured and inspected with care by experienced craftsmen. If you are the original purchaser, Kohler Co. warrants for two years that the system will be free from defects in material and workmanship if properly installed, maintained, and operated in accordance with Kohler Co. instruction manuals. A Kohler distributor, dealer, or authorized representative must perform startup.

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 supervised startup.

During the warranty period, repair or replacement at Kohler Co.'s option will be furnished free of charge for parts, provided an inspection to Kohler Co.'s satisfaction discloses a defect in material and workmanship, and provided that the part or parts are returned to Kohler Co. or an authorized service station, if requested. This extended warranty expires two years after date of startup.*

This warranty does not apply to malfunctions caused by damage, unreasonable use, misuse, or normal wear and tear while in your possession.

*Some restrictions may apply. Contact your Kohler distributor/dealer for full details.

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

1. Normal wear, periodic service, and routine adjustments.
2. Damage caused by accidents, improper installation or handling, faulty repairs not performed by an authorized service representative, or improper storage.
3. Damage caused by operation above or below rated capacity, voltage, or frequency; modifications; or installation contrary to published specifications, codes, recommendations, and accepted industry practices.
4. Original installation charges and startup costs.
5. 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 other than factory-supplied or -approved repair parts and/or procedures.
6. Rental of equipment during performance of warranty repairs.
7. Non-Kohler-authorized repair shop labor without prior approval from the Kohler Co. Warranty Department.
8. Expenses incurred investigating performance complaints unless the problem is caused by defective Kohler materials or workmanship.
9. Maintenance items such as fuses, lamps, and adjustments.
10. Transfer switch main contacts.

A Startup Notification form must be on file at Kohler Co. A Startup Notification form must be completed by Seller and received at Kohler Co. within 60 days after the date of initial startup. Product not registered within 60 days of startup will automatically be registered by Kohler Co. using the Kohler Co. ship date as the startup date.

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

KOHLER CO. SHALL NOT BE LIABLE FOR SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OF ANY KIND including, but not limited to, incidental 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 OF 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 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 that vary from state to state.

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KOHLER POWER SYSTEMS

Certification

Certificate US95/0189

The management system of

Kohler Power Systems Americas

N7650 CountyRoad LS (Known as Mosel Plant)
Sheboygan, WI, 53083, United States

has been assessed and certified as meeting the requirements of

ISO 9001:2008

For the following activities

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

Further clarifications regarding the scope of this certificate and the applicability of ISO 9001:2008 requirements may be obtained by consulting the organization

This certificate is valid from 16 November 2012 until 16 November 2015
and remains valid subject to satisfactory surveillance audits.
Recertification audit due a minimum of 60 days before the expiration date.
Issue 9 : 14 November 2012. Certified since February 1995.

Multiple certificates have been issued for this scope.
The main certificate is numbered US95/0189
This is a multi-site certification.
Additional site details are listed on subsequent page.

Authorized by

Zachary C. Pivarnik
Director of Accreditation, North America

Systems and Services Certification, a Division of SGS North America, Inc.
201 Route 17 North, Rutherford, NJ 07070, United States of America
t +1 201 508 3000 f +1 201 925 4555 www.us.sgs.com

Kohler Power Systems Americas

ISO 9001:2008

Issue 9 : 14 November 2012

Additional facilities:

300 N. Dekora Woods Blvd. (Known as Sauk)
Saukville, WI 53080, United States

Scope: Manufacturer of fuel tanks, skids, fabricated components, enclosures, and assembly of enclosures and generators

4327 County EE (Known as KWIP Warehouse)
Sheboygan, WI 53081, United States

Scope: Receiving and storage of generator components & receiving and shipping of generator sets.

Kohler Standby/Prime Generator Set Test Program

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

Prototype Testing

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

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

Production Testing

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

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

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

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

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G18-56 12/05a

Generator Set/Transfer Switch Installation Checklist

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

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

Equipment Room or Weather Housing

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

Engine and Mounting

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

Lubrication

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

Cooling and Ventilation

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

Fuel

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

Exhaust

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

AC Electrical System

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

Transfer Switch, Remote Control System, Accessories

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

Batteries and DC Electrical System

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

Special Requirements

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

Generator Set/Transfer Switch Startup Checklist

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

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

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

EXHIBIT A

DEFK14013 - Braxton Co. Armory Generator & Automatic Transfer Switch

PRICING PAGE

CONTRACT ITEM NO.	DESCRIPTION	QTY	UNIT PRICE	EXTENDED PRICE
Item No. 3.1.1	**Stationary Emergency/Standby Generator**	1	$ 67,150.00	$ 67,150.00
	Manufacturer Bid: KOHLER			
	Model No. Bid: 300REOZJ			
Item No. 3.1.2	**Automatic Transfer Switch (ATS)**	1	$ 56,650.00	$ 56,650.00
	Manufacturer Bid: KOHLER			
	Model No. Bid: KBS-DLVA-2000S			
	Unit prices to be inclusive of all freight/delivery costs **Failure to use this form may result in disqualification**	**TOTAL COST:**		$ 123,800.00

Bidder / Vendor Information:

Name: PALCO
Address: #2 Wall Street, P.O. Box 33, Winfield, WV 25213

Phone: 304-586-3838
Fax: 304-586-3843

E-mail Address: saleswv@palcogenerators.com

Authorized Signature: Vicki Casto Date: 9-26-13

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CERTIFICATION AND SIGNATURE PAGE

By signing below, I certify that I have reviewed this Solicitation in its entirety; understand the requirements, terms and conditions, and other information contained herein; that I am submitting this bid or proposal for review and consideration; that I am authorized by the bidder to execute this bid or any documents related thereto on bidder's behalf; that I am authorized to bind the bidder in a contractual relationship; and that to the best of my knowledge, the bidder has properly registered with any State agency that may require registration.

PALCO
(Company)

Vicki Casto
(Authorized Signature)

Vicki Casto, Office Manager
(Representative Name, Title)

304-586-3838 304-586-3843
(Phone Number) (Fax Number)

September 26, 2013
(Date)

000004

ADDENDUM ACKNOWLEDGEMENT FORM
SOLICITATION NO.: DEFK14013

Instructions: Please acknowledge receipt of all addenda issued with this solicitation by completing this addendum acknowledgment form. Check the box next to each addendum received and sign below. Failure to acknowledge addenda may result in bid disqualification.

Acknowledgment: I hereby acknowledge receipt of the following addenda and have made the necessary revisions to my proposal, plans and/or specification, etc.

Addendum Numbers Received:
(Check the box next to each addendum received)

[✓] Addendum No. 1	[ ] Addendum No. 6
[ ] Addendum No. 2	[ ] Addendum No. 7
[ ] Addendum No. 3	[ ] Addendum No. 8
[ ] Addendum No. 4	[ ] Addendum No. 9
[ ] Addendum No. 5	[ ] Addendum No. 10

I understand that failure to confirm the receipt of addenda may be cause for rejection of this bid. I further understand that that any verbal representation made or assumed to be made during any oral discussion held between Vendor's representatives and any state personnel is not binding. Only the information issued in writing and added to the specifications by an official addendum is binding.

PALCO
Company

Vicki Casto
Authorized Signature

9-25-13
Date

NOTE: This addendum acknowledgement should be submitted with the bid to expedite document processing.