



Woodstock Power Company

4055 Richmond Street

Philadelphia, PA 19137

P: 610-658-3242

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SUBMITTAL ACCEPTANCE

I hereby authorize Woodstock Power Company to use this form as confirmation of acceptance in regard to the equipment shown on aforementioned submittal, which clearly establishes definite specifications of material presented.

Accepted by:

Company Woodstock Power Company

Print Name:

Title:

Signature:

Date:

Submittal Package

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Misc

Block Heater	GM76113
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Circuit Breaker	GM24181
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Pre-Startup Checklist

Pre-Startup Checklist	PreStartUpCheckList
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Generator

Kohler Model: KD250

This diesel generator set equipped with a KH01722TO4D alternator operating at 120/208 volts is rated for 250 kW/313 kVA.

Output amperage: 868.



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Qty

Description

KD250 Generator System

3

KD250 Generator Set

Includes the following:

Literature Languages

Engine

Nameplate Rating

Voltage

Alternator

Alt Accessories, Installed

Cooling System

Air Intake

Controller

Enclosure Type

Enclosure Material

Fuel Tank Type

Fuel Runtime (Approx.)

Subbase Fuel Tank Capacity

Fill Pipe/Spill Fill Options

Skid and Mounting

Starting Aids, Installed

Electrical Accy., Installed

Electrical Accy., Installed

Electrical Accy., Installed

Electrical Accy., Installed

Interrupt Rating All LCBs

Duty Rating, First LCB

Amps, First LCB

Trip Type, First LCB

First LCB Frame

Fuel Lines, Installed

Exceeds LTL Shipping Height

Miscellaneous Accy., Installed

Warranty

Testing, Additional

3

Lit Kit, General Maint, KD250

English

Diesel

Standby 130C Rise

60Hz, 120/208V, Wye, 3Ph, 4W

KH01722TO4D

PMG Excitation

Unit Mounted Radiator, 50C

Standard Duty

APM603

Sound

Aluminum

State

24 Hours

490 Gallons

5 Gal Spill Cont w/95% Shutoff

Skid

2500W, 120V, 1Ph

Battery, 2/12V, Wet

Batt. Rack & Cables

Battery Charger, 10A

Common Fault/Run Relay

35kA at 480V

100% Rated

1000

Electronic, LSI

PGP

Flexible Fuel Lines

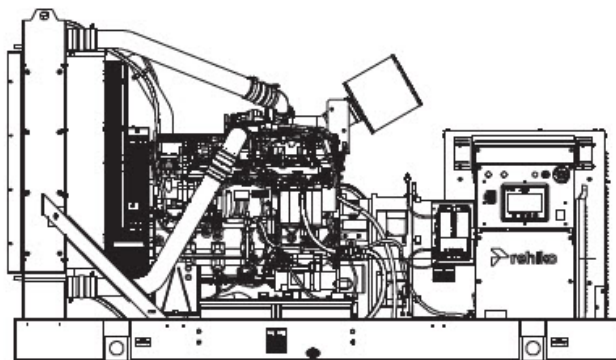
Add'l Shipping Charge Accepted

Coolant in Genset

5 Year Comprehensive

Power Factor Test, 0.8, 3Ph Only

Spec Sheets



Standard Features

- One source responsibility for the generating system and accessories.
- Approved for use with certified renewable Hydrotreated Vegetable Oil (HVO) / Renewable Diesel (RD) fuels compliant with EN15940/ASTM D975.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The generator set offers a cULus listing (UL 2200 and CSA C22.2 No. 100).
- The generator set accepts rated load in one step.
- The generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
- A 2-year, 1000-hour limited warranty covers all generator set systems and components.
- Extendable to a five-year, 2500-hour comprehensive warranty with a registered service contract through a distributor, dealer, or authorized service representative.
- Five-year basic, five-year comprehensive, and 10-year comprehensive limited warranties are also available for purchase in some jurisdictions.
- Mount up to two circuit breakers to allow circuit protection of selected priority loads.

Alternator Features

- The pilot-excited, permanent magnet (PM) alternator provides superior short-circuit capability.
- NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting.
- Sustained short-circuit current enabling downstream circuit breakers to trip without collapsing the alternator field.
- Self-ventilated and dripproof construction.
- Windings are vacuum-impregnated with epoxy varnish for dependability and long life.
- Superior voltage waveform from a two-thirds pitch stator and skewed rotor.

Generator Set Rating

Alternator	Voltage	Ph	Hz	Standby 130C Rise Ratings	
				kW/kVA	Amps
KH01722TO4D	120/208	3	60	250/313	868

RATINGS: All three-phase units are rated at 0.8 power factor. All single-phase units are rated at 1.0 power factor.

Standby Ratings: The standby rating is applicable to varying loads for the duration of a power outage. There is no overload capability for this rating.

Prime Power Ratings: At varying load, the number of generator set operating hours is unlimited.

A 10% overload capacity is available for one hour in twelve. Continuous Ratings: At constant or nonvarying load, the number of generator set operating hours is unlimited.

There is no overload capability for this rating. Ratings are in accordance with ISO-8528-1 and ISO-3046-1. For limited running time ratings, consult the factory.

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

The generator set manufacturer reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever.

Model: KD250, continued

Alternator Specifications

Specifications	Alternator
Alternator manufacturer	Rehlko
Type	4-Pole, Rotating-Field
Exciter type	Brushless, Auxiliary Winding
Voltage regulator	Solid State, Volts/Hz
Bearing: quantity, type	1, Sealed
Coupling	Flexible Disc
Unbalanced load capability	See alternator datasheet, TIB-102
• The pilot-excited, permanent magnet (PM) alternator provides superior short-circuit capability. • NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting.	
• Sustained short-circuit current enabling downstream circuit breakers to trip without collapsing the alternator filed.	

Engine

Engine Specification	
Engine Manufacturer	Rehlko
Engine Model	KD09L06T-6DDS
Engine: type	4-Cycle, Turbocharged, Charge Air Cooled
Cylinder arrangement	6 Inline
Displacement, L (cu. in.)	8.9 (543)
Bore and stroke, mm (in.)	114 x 145 (4.48 x 5.7)
Compression ratio	16.1:1
Piston speed, m/min. (ft./min.)	522 (1712)
Main bearings: quantity, type	7, Replaceable Insert
Rated rpm	1800
Max. power at rated rpm, kWm (BHP)	346 (464)
Governor: type, make/model	Electronic
Frequency regulation, no-load to-full load	Isochronous
Frequency regulation, steady state	±0.25%
Frequency	Fixed
Air cleaner type, all models	Dry

Exhaust

Exhaust System	
Exhaust Manifold Type	Dry
Exhaust flow at rated kW,m3/min. (cfm)	66 (2342)
Exhaust temperature at rated kW, dry exhaust, EPA certified, °C (°F)	525 (977)
Maximum allowable back pressure, kPa (in. Hg)	10.2 (3)

Model: KD250, continued

Engine Electrical	
Engine Electrical System	
Battery charging alternator	24
Ignition system	Compression Ignition
Battery charging alternator: Ground (negative/positive)	Negative
Battery charging alternator: Volts (DC)	24
Battery charging alternator: Ampere rating	70
Starter motor rated voltage (DC)	1 @ 8 kW
Battery, recommended cold cranking amps (CCA): Qty., CCA rating each	Two, 750
Battery voltage (DC)	12
Fuel	
Fuel System	
Fuel type	Diesel
Fuel supply line, min. ID, mm (in.)	15.9 (0.62)
Fuel return line, min. ID, mm (in.)	15.9 (0.62)
Max. fuel flow, Lph (gph)	159.0 (42.1)
Min./max. fuel pressure at engine supply connection, kPa (in. Hg)	-20 (-5.9), 69 (20.3)
Max. return line restriction, kPa (in. Hg)	34 (10)
Fuel filter: quantity, type	One
Fuel Filter Water Separator	One
Cooling	
Radiator System	
Ambient temperature, °C (°F)	50 (122)
Engine jacket water capacity, L (gal.)	11 (3)
Radiator system capacity, including engine, L (gal.)	37.0 (9.8)
Engine jacket water flow, Lpm (gpm)	273 (72)
Heat rejected to air charge cooler at rated kW, dry exhaust, kW (Btu/min.)	89 (5062)
Charge cooler air inlet temperature, °C (°F)	228 (442)
Turbocharger boost (abs) bar (psi)	376 (55)
Water pump type	Vane
Fan diameter, including blades, mm (in.)	765 (30.2)
Fan, kWm (HP)	6.5 (9)
Max. restriction of cooling air, intake and discharge side of radiator, kPa (in. H2O)	See TIB-118
* Enclosure with internal silencer reduces ambient temperature capability by 5°C (9°F).	

Model: KD250, continued

Operation Requirements

Air Requirements

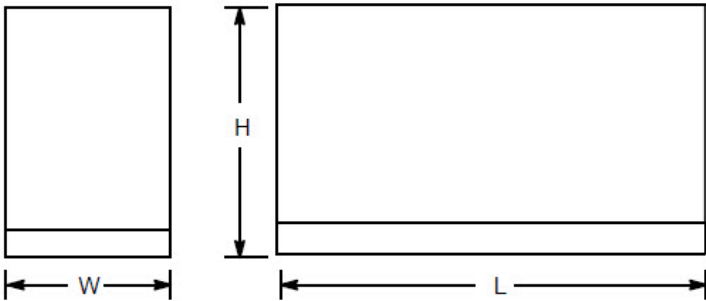
Radiator-cooled cooling air, m3/min. (scfm) *	345 (12200)
Combustion air, m3/min. (cfm)	24.6 (869)
Heat rejected to ambient air: Engine, kW (Btu/min.)	31.5 (1792)
Heat rejected to ambient air: Alternator, kW (Btu/min.)	16.1 (916)
Max. air intake restriction, kPa (in. Hg)	6.2 (25.0)
*Air density = 1.20 kg/m3 (0.075 lbm/ft3)	

Fuel Consumption

Diesel, Lph (gph), at % load	Rating
Standby Fuel Consumption at 100% load	72.5 Lph (19.2 gph)
Standby Fuel Consumption at 75% load	59.4 Lph (15.7 gph)
Standby Fuel Consumption at 50% load	43.7 Lph (11.6 gph)
Standby Fuel Consumption at 25% load	22.0 Lph (5.9 gph)
Continuous Fuel Consumption at 0% load	**Volumetric Fuel consumption is up to 4% higher when using HVO/RD than #2 ULSD

Dimensions and Weights

Dim Weight Spec	Dim Weight Value
Fuel	Diesel
Engine Manufacturer	Rehlko
Overall size, L x W x H, mm (in.), 50C Radiator	2830 x 1350 x 1633 (111.4 x 53.1 x 64.3)
Weight (radiator model), wet, kg (lb.):	2170 (4785)



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



The APM603 generator set controller provides advanced control, system monitoring, and system diagnostics for a single generator set or paralleling multiple generator sets. The APM603 interfaces the generator set to other power system equipment and network management systems using standard industry network communications. It uses a patented digital voltage regulator and unique software logic to manage alternator thermal overload protection as well as serves as an overcurrent protective relay, features normally requiring additional hardware. The APM603 controller meets NFPA 110, Level 1.

Display, Interface, and Accessibility

- A 7-inch color TFT touchscreen for easy local access to data.
 - Home screen can be customized to show critical data at a glance.
 - Create a custom favorites list for quick access to important data
- Measurements are selectable in metric or English units.
- Supports Modbus[®] protocol through serial bus and Ethernet networks, and supports SNMP and BACnet[®] through Ethernet networks.

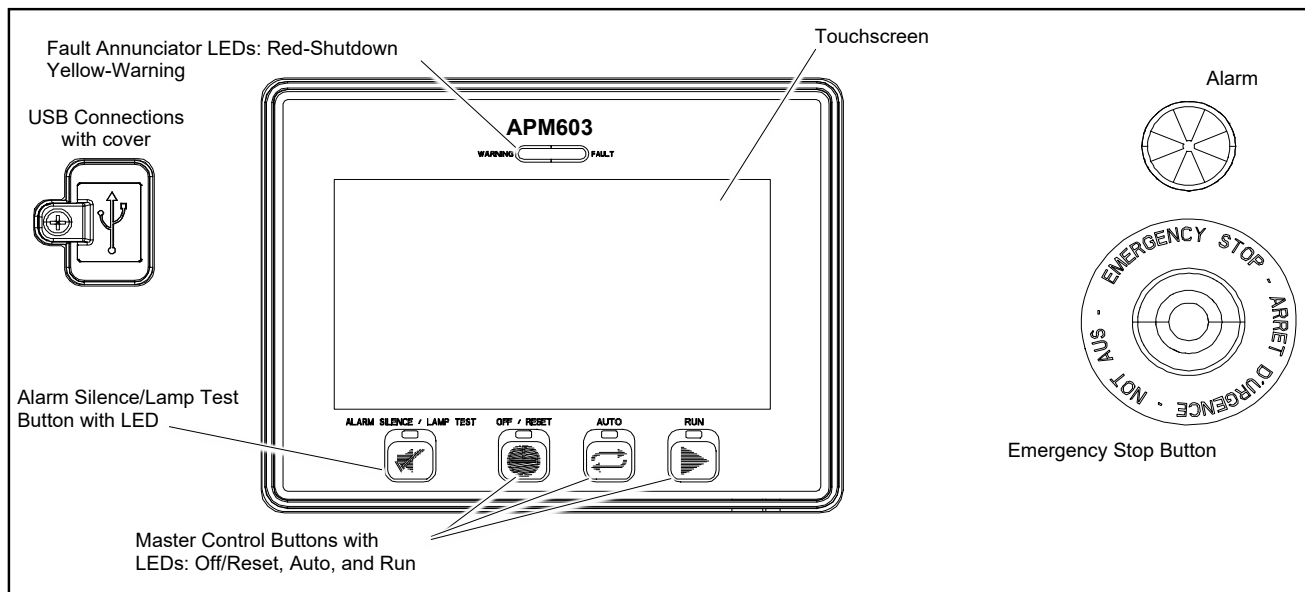
Global Support

- Sales, installation, and service support from more than 800 Rehlko and SDMO service providers around the world.

On-board Diagnostics

- Immediate visibility of warnings and faults with text description and code display.
 - 15 seconds of critical data are captured around each warning and fault
 - Critical data can be viewed on the display and downloaded
- Store up to 10,000 events locally along with historical data logging of successful starts.
 - Accurate time stamp from real-time clock
 - Event log can be downloaded
- Data logging of customized parameter list for report generation and advanced troubleshooting.
 - Store to external USB drive for easy transfer to another device

Modbus[®] is a registered trademark of Schneider Electric.
BACnet[®] is a registered trademark of ASHRAE.



Controller Features

AC Output Voltage Regulator Adjustment	Maximum of $\pm 10\%$ of the system voltage
Alarm Horn	Indicates a generator set warning or shutdown condition
Alarm Silence	For NFPA-110 application or user convenience
Alternator Protection	Generator set overload and short circuit protection
Cyclic Cranking	Provides automatic restart after a failed start attempt with programmable on/off time and number of attempts
ECU Diagnostics	Displays engine ECU fault codes and descriptions for engine troubleshooting
Emergency Stop Button	Shuts down the generator set immediately, for emergency situations
Engine Start Aid	Control for an optional engine starting aid
Environmentally Sealed Membrane Keypad	Three master control buttons with LEDs: Off/Reset, Auto, and Run
Patented High-Speed RMS Digital Voltage Regulator	$\pm 0.25\%$ no-load to full-load regulation with three-phase true RMS sensing
Lamp Test	Verifies functionality of the indicator LEDs
Real-time Clock	Includes battery back-up to retain date and time through controller power cycle
Remote Reset	Allows remote fault resets and restarting of the generator set
Remote Monitoring Panel	Compatible with the Remote Serial Annunciator
Run Time Hourmeter	Displays generator set run time
Run Relay	Indicates that the generator set is running
Time Delay Engine Cooldown (TDEC)	Time delay before the generator set shuts down
Time Delay Engine Start (TDES)	Time delay before the generator set starts

Controller Features

Emergency Battle Mode	- Allows critical emergency operation where uninterrupted power is essential. - Overrides most shutdowns and warnings except for E-Stop, Overspeed, Maintenance Mode, or shutdown faults from the ECU.
Maintenance mode	- Lowers the fault threshold which reduces fault setting times and activates a trip - Acts as a safety device like an E-Stop - Adjustable from 0-150% of rated current

Communication

USB Port	(1) Mini-USB port for PC connection (1) USB port for storage device
Serial (RS-485) Port	(1) Non-isolated for RSA III (1) Isolated for Modbus devices (1) Isolated for paralleling communication
Ethernet Port	(1) RJ45 for Modbus TCP, SNMP, and BACnet

Controller Specifications

Nominal voltage	12 or 24 VDC protected against reverse battery connection
Power	800 mAmps at 12 VDC 400 mAmps at 24 VDC
Operating Temperature	-40°C to 70°C (-40°F to 158°F)
Storage Temperature	-40°C to 85°C (-40°F to 158°F)
Humidity	5% to 95% non-condensing
Display Size, W x H	154 x 86 mm (6.0 x 3.4 inches)
Protection Index	IP65 Front

Paralleling Features

- Isochronous control with real and reactive load sharing with other APM603 controller equipped generator sets
 - Supports paralleling up to 8 generators
- Random first-on logic to prevent two or more generator sets from closing to a dead bus and provides the fastest response for a single generator online
- Automatic synchronizer with dead bus closing
- Soft loading and unloading for generator management
- Protective relay functions:
 - Synch check (25C)
 - Over current (51)
 - Over frequency (81O)
 - Over power (32O)
 - Over voltage (59)
 - Reverse power (32R)
 - Reverse reactive power (32RQ)
 - Under frequency (81U)
 - Under voltage (27)
- Generator management to allow the start and stop of generators based on load demand or state of other generators
 - Fuel level
 - Run time
 - Manual order
 - Time of day
 - Efficiency
- Simplified paralleling system view from any generator controller in the system

Overcurrent Protective Device

- Provides protection against line-to-line and line-to-neutral faults
- Uses thermal and instantaneous current limit settings for alternator protection

Load Management Features

- Programmable outputs included to command the connect and disconnect of loads based on generator or paralleling system state
 - Loads connected based on available capacity
 - Loads disconnected at system startup
 - Loads disconnected based on a maximum kW setting or underfrequency setting
- Supports up to 16 prioritized load steps per system
 - Can be used on a single generator system
 - Can be combined in a paralleling system for a total system load control capability
- Simplified load management system view from any generator controller in the system
- Requires input/output module option

Advanced Programmable I/O

- Configurable inputs and outputs can be programmed for customer specific use
- PLC-like capability for applying logic to customize generator system behavior

Troubleshooting Features

- 15 seconds of key data automatically captured around each warning and shutdown
 - Data can be exported for detailed analysis
 - Data can be viewed on controller for convenient on-site troubleshooting support
- Configurable data logger will allow you to select parameters to monitor
 - Data stored to USB device for flexibility on amount of data stored and ability to export for detailed analysis
 - Data capture controlled by user to allow capturing specific data required

NFPA 110 Requirements

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

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

Standards

The generator set controller has been tested and verified for compliance with the following standards.

- NFPA 99
- NFPA 110, Level 1
- CSA 282-09
- UL 6200
- ASTM B117 (salt spray test)

Controller Functions

The controller displays warning, shutdown, and status messages. **All functions are available as relay outputs.**

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

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

The controller communicates with the engine ECU and supports a large number of warning and shutdown events that are not listed here.

This table highlights the items required for NFPA 110.

Event	Warning	Shutdown
Alternator Thermal Protection †		•
Battery Charger Fault *	▲	
CAN Option Board1 Comm Loss	▲	
Critically Low Fuel Level (diesel) *	▲	
ECU Diagnostic Event	▲	
ECU Mismatch Shutdown †		•
Fuel Leak Alarm (diesel) *	▲	
High Battery Voltage Warning	▲	
High Coolant Temperature Shutdown †		•
High Coolant Temperature Warning	▲	
High Fuel Level Warning (diesel) *	▲	
High Oil Temperature Shutdown †		•
High Oil Temperature Warning	▲	
Local Emergency Stop Shutdown †		•
Loss ECU Comms Shutdown †		•
Loss of Signal Low Coolant Level Voltage	▲	
Low Battery Voltage Warning	▲	
Low Coolant Level Shutdown †		•
Low Coolant Temperature Warning	▲	
Low Fuel Level Shutdown (diesel) * †		•
Low Fuel Level Warning (diesel) *	▲	
Low Fuel Pressure Warning (gas) *	▲	
Low Oil Pressure Shutdown †		•
Low Oil Pressure Warning	▲	
Low RTC (clock) Battery Voltage	▲	
Maintenance Reminder1	▲	
Maintenance Reminder2	▲	
Maintenance Reminder3	▲	
Maximum Power Shutdown †		•
Maximum Power Warning	▲	
Not In Auto Alarm	▲	
Over Crank Shutdown †		•
Over Current Shutdown (L1, L2, L3) †		•
Over Current Warning (L1, L2, L3)	▲	
Over Frequency Shutdown †		•
Over Frequency Warning	▲	
Over Power Shutdown †		•
Over Power Warning	▲	
Over Speed Shutdown †		•
Over Voltage Shutdown (L-L, L-N, each phase) †		•
Over Voltage Warning (L-L, L-N, each phase)	▲	

Event	Warning	Shutdown
Remote Emergency Stop Shutdown †		•
Reverse Power Shutdown †		•
Reverse VAR Shutdown †		•
Under Frequency Shutdown †		•
Under Frequency Warning	▲	
Under Voltage Shutdown (L-L, L-N, each phase) †		•
Under Voltage Warning (L-L, L-N, each phase)	▲	
Weak Cranking Battery	▲	
Status Messages		
Auto Button Pressed		
EPS Supplying Load		
Generator Running		
Generator Started		
Generator Stopped		
GFCI Warning *		
Load Shed Overload		
Load Shed Under Frequency		
Off Button Pressed		
RSA Event Programmable Digital Inputs, 1-8		
Run Button Pressed		
* Function requires optional input sensors or kits		
† Items included with common fault shutdown 10		
‡ Shutdown overrides are designated by engine supplier and may vary between generator set models. An event, outside of Overspeed, E-stop, Maintenance Mode, and ECU-forced shutdown, may cause the generator to shutdown.		



Industrial Generator Set Accessories

Generator Set Controller

John Deere Engine-Powered Models Inputs and Outputs

Standard Dedicated User Inputs	Input Type
Auxiliary Fault (Shutdown)	Digital Input
Auxiliary Warning	
Battery Charger Fault	
Breaker Closed *	
Breaker Open *	
Excitation Over Voltage (350 kW and up)	
Fuel Leak Alarm	
Low Fuel Level Switch	
Remote Emergency Stop	
Remote Engine Start	Two-wire input
Speed Bias	Analog Voltage Input, Scalable up to +/-10 VDC
Voltage Bias	

Standard Dedicated User Outputs	Output Type
Close Breaker *	Relay Driver Output
Common Failure	
Run	
Trip Breaker/Shunt Trip *	
* Only with remote-mounted electrically operated circuit breakers.	

Optional Configurable User Inputs and Outputs	
User Configurable Inputs	2 Analog, 0-5 VDC 4 Dry Contact Digital
User Configurable Relay Outputs	14 NO/NC Relays 1 Common Fault Relay
Note: Programmable I/O is configurable by authorized technician	

JD Engine Data

The following John Deere engine data is displayed on the APM603 controller.

Parameter
Engine Model Number
Engine Serial Number
ECU Serial Number
Coolant Temperature
Engine Speed
Fuel Pressure
Fuel Consumption Rate
Oil Pressure
Run Time Hours

KD Engine-Powered Models Inputs and Outputs

Standard Dedicated User Inputs	Input Type
Auxiliary Fault (Shutdown)	Digital Input
Auxiliary Warning	
Battery Charger Fault	
Breaker Closed *	
Breaker Tripped/Open *	
Fuel Leak Alarm	
Fuel Level	
Idle Switch	
Key Switch Enable	
Low Fuel Level Switch	
Low Oil Level	
Remote Emergency Stop	
Remote Reset	
Remote Engine Start	Two-wire input
Speed Bias	Analog Voltage Input, Scalable up to +/-10 VDC
Voltage Bias	

Standard Dedicated User Outputs	Output Type
Close Breaker *	Relay Driver Output
Common Failure	
Common Warning	
EPS Supplying Load	
Generator Running	
Horn	
Low Coolant Temperature	
Not in Auto	
System Ready	
Trip Breaker/Shunt Trip *	
* Only with remote-mounted electrically operated circuit breakers.	

Optional Configurable User Inputs and Outputs	
User Configurable Inputs	16 Dry Contact Digital
User Configurable Relay Outputs	8 NO/NC Relays
Note: Programmable I/O is configurable by authorized technician.	

KD Engine Data

The following Diesel engine data is displayed on the APM603 controller.

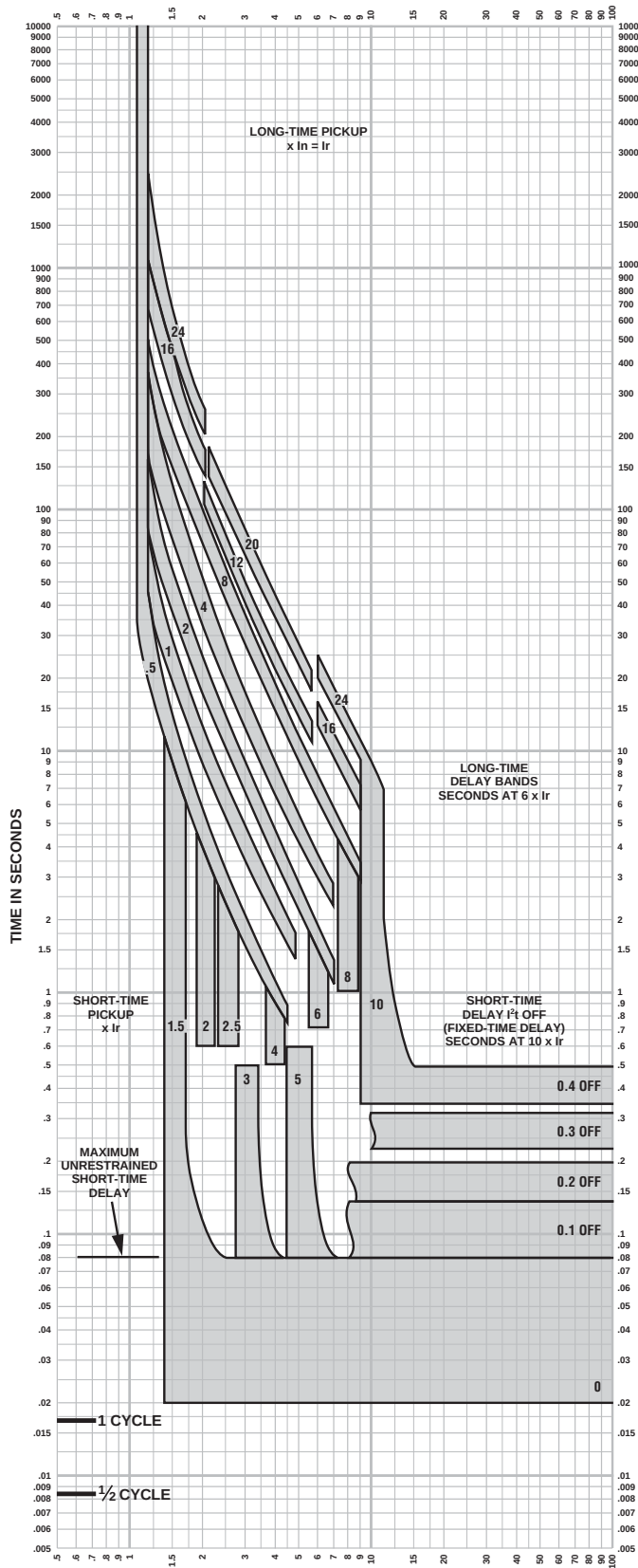
Parameter
Engine Model Number
Engine Serial Number
Ambient Temperature
Charge Air Pressure
Charge Air Temperature
Common Rail Fuel Pressure
Coolant Level
Coolant Temperature
Crankcase Pressure
Engine Speed
Fuel Consumption Rate
Fuel Pressure
Fuel Temperature
Intercooler Coolant Temperature (K175 engines only)
Oil Temperature
Oil Pressure
Run Time Hours

APM603 Available Options

- ☐ **Common Failure Relay** provides a relay output to signal a generator set fault.
- ☐ **Battery Charger** available with 6 amp, 10 amp, and 20 amp output for 12 and 24V DC voltage output. (Availability is generator model dependent.) The 10 amp and 20 amp models provide NFPA 110 charging and alarming capability.
- ☐ **Electrically Operated Circuit Breakers**
 - For paralleling systems
 - Available generator-mounted or remote-mounted
 - 24VDC
- ☐ **Ground Fault Relay** provides a relay output to signal a ground fault is detected.
- ☐ **Input/Output Module** for Diesel (KD) and Mitsubishi models provides:
 - 16 digital input connections with connection to ground
 - 8 relay output connections (Form C, rated 8A, 240 VAC or rated 0.5 A, 48 VDC)
- ☐ **Input/Output Module** for models other than KD or Mitsubishi provides:
 - 2 analog inputs (0-5 VDC)
 - 4 digital input connections with connection to ground
 - 14 relay output connections (Form C, rated 10A, 120V)
 - 1 common fault relay output (NO, rated 2A, 24VDC)
- ☐ **Key Switch** to allow selection of RUN, OFF and AUTO modes. Lockable in the AUTO position by removing the key.
- ☐ **Remote Emergency Stop Switch** available as a wall mounted panel to remotely shut down the generator set.
- ☐ **Remote Monitoring Panel.** The Remote Serial Annunciator (RSA) enables the operator to monitor the status of the generator set from a remote location, which may be required for NFPA 99 and NFPA 110 installations, and up to four Automatic transfer switches.
- ☐ **Shunt Trip Wiring provides** relay outputs to trip a shunt trip circuit breaker and to signal the common fault shutdowns. Contacts rated at 10 amps at 28 VDC or 120 VAC.

Availability is subject to change without notice. Discovery Energy, LLC and its affiliates dba Rehiko reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever. Contact your local authorized generator set distributor for availability.

CURRENT IN MULTIPLES OF I_r (I_r = LONG-TIME SETTING $\times I_n$)



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

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

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

The most compact and innovative molded case circuit breakers



P-Frame 1200 A



R-Frame

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

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

Full-Featured Performance

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

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

Onboard Intelligence

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

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



MICROLOGIC® Trip Units

Choose the Model that Meets Your Needs

MICROLOGIC 3.0 and 5.0

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

MICROLOGIC 3.0A, 5.0A and 6.0A

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

MICROLOGIC 5.0P and 6.0P

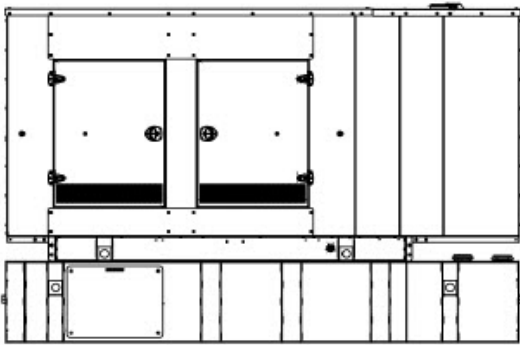
- Long-time, instantaneous and optional short-time adjustments
- Advanced relay protection (current imbalance, under/over voltage, etc.)
- Inverse Definite Minimum Time Lag (IdmtL) long-time delay curve shaping for improved coordination
- Basic power metering and monitoring functions
- Standard MODBUS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

MICROLOGIC 5.0H and 6.0H

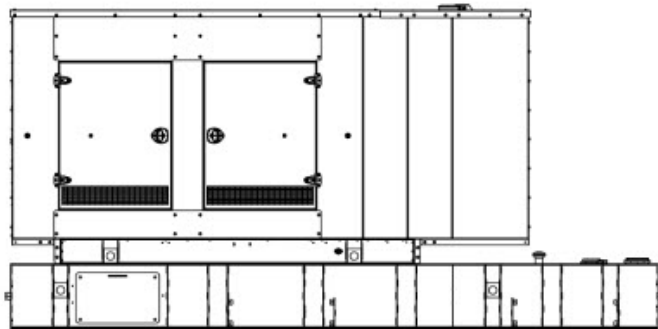
- All 5.0P and 6.0P functions
- Enhanced POWERLOGIC power metering and monitoring capabilities
- Basic power quality (harmonic) measurement
- Waveform capture

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





Enclosure with Standard Subbase Fuel Tank



Enclosure with State Code Subbase Fuel Tank

Sound Enclosure Standard Features

- Internal-mounted silencer and flexible exhaust connector.
- Skid-mounted, steel construction with hinged doors.
- Fade-, scratch-, and corrosion-resistant Power Armor automotive-grade textured finish.
- Enclosure has four access doors which allow for easy maintenance.
- Lockable, flush-mounted door latches.
- Vertical air outlet discharge to redirect air and reduce noise.
- Skid-mounted, aluminum construction with hinged doors.

Aluminum enclosures are recommended for high humidity and/or high salt/ coastal regions.

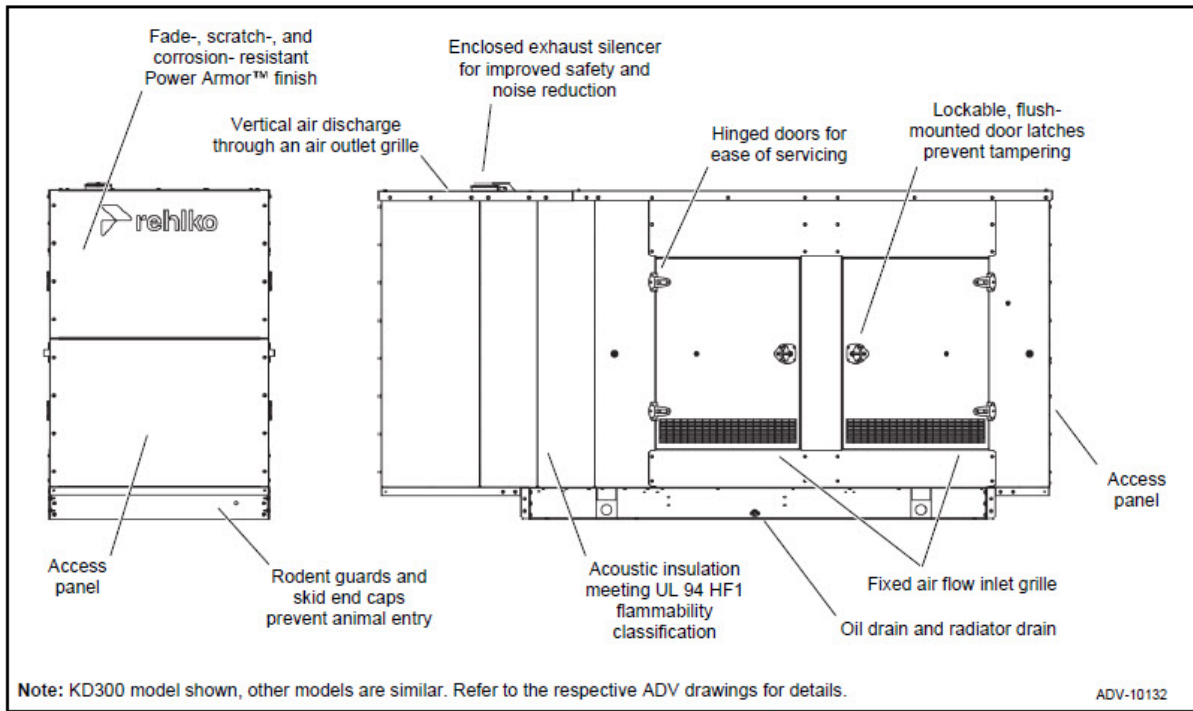
- Acoustic insulation that meets UL 94 HF1 flammability classification and repels moisture absorption.
- Sound attenuated enclosure that uses up to 51 mm (2 in.) of acoustic insulation, acoustic-lined air inlet duct, and acoustic-lined air discharge duct.
- Aluminum sound enclosure is certified to 200 mph (322 kph) wind load rating.

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.

- State tanks with varying capacities are an available option. Florida Dept. of Environmental Protection (FDEP) File No. EQ-634 approved.

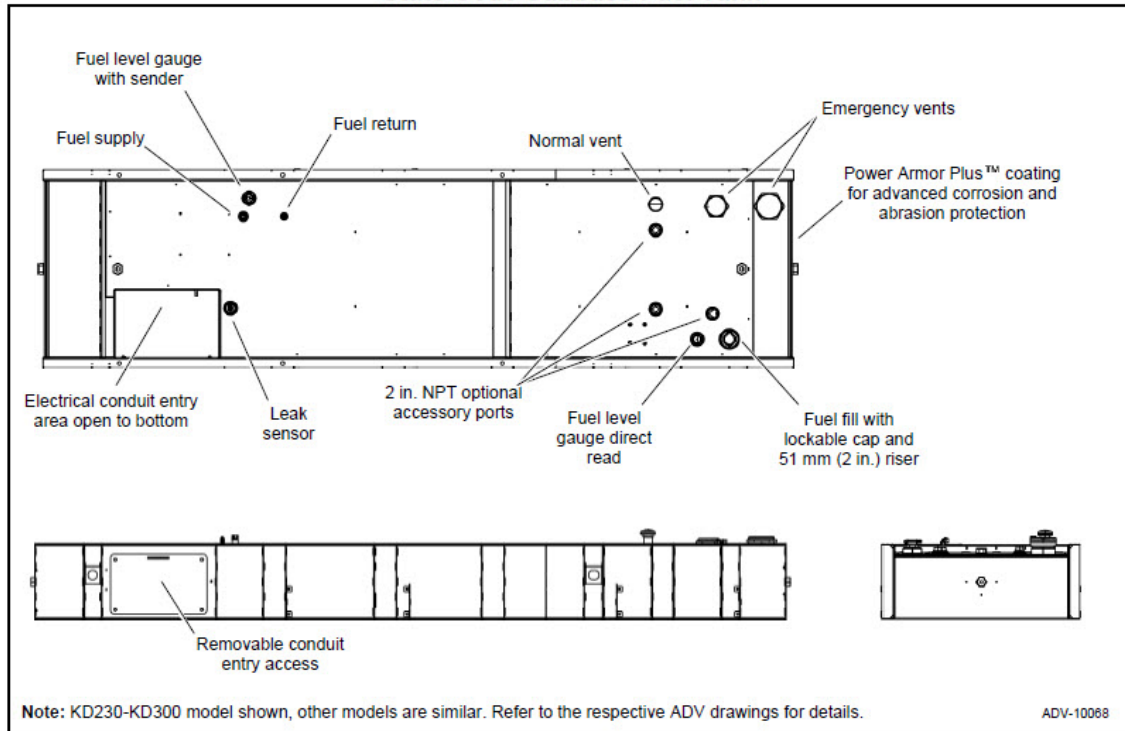
Weather and Sound Enclosure



Sound Enclosure Features

- 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.
- NOTE: Installing an additional length of exhaust tail pipe may increase backpressure levels. Please refer to the generator set spec sheet for the maximum backpressure value.
- Interchangeable modular panel construction. Allows complete serviceability or replacement without compromising enclosure design.
- Cooling/combustion air intake with a horizontal air inlet. Sized for maximum cooling airflow.
- Service access. Multi-personnel doors for easy access to generator set control and servicing of the fuel fill, fuel gauge, oil fill, and battery.
- Cooling air discharge. Weather protective design featuring a vertical air discharge outlet grille. Redirects cooling air up and above enclosure to reduce ambient noise.
- Cooling air discharge. The sound enclosures include acoustic insulation with urethane film.

State Code Subbase Fuel Tank



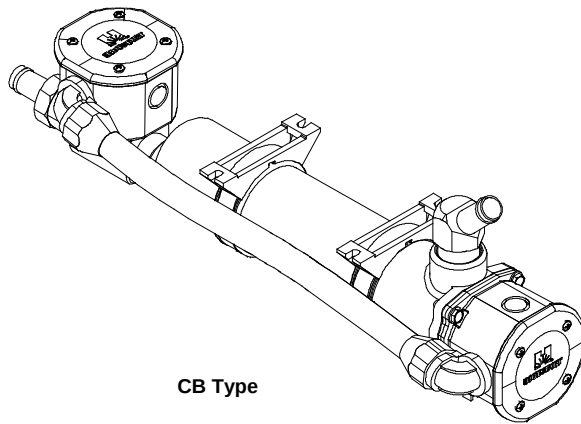
- Extended operation. Usable tank capacity offers full load standby operation of up to 24 and 48 hours.
- Power Armor Plus textured epoxy-based rubberized coating that creates an ultra-thick barrier between the tank and harsh environmental conditions like humidity, saltwater, and extreme temperatures, and provides 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.
- Leak detection switch. Annunciates a contained primary tank fuel leak condition at generator set control.
- Electrical conduit entry. NOTE: For IBC Seismic Certification and/or Calification and
- State tank designed to comply with the installation standards of the Florida Dept. of Environmental Protection (FDEP) File No. EQ-634.

Fuel Tank Capacity, L (gal.)	Est. Fuel Supply Hours at 60 Hz with Full Load	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 Level, dB(A)
Lift base	0	4121 (162.2)	1350 (53.2)	2600 (5735)	2056 (81.0)	200 (7.9)	75
1854 (490)	30/26	5131 (202.0)	1350 (53.2)	3980 (8775)	3436 (101.0)	508 (20.0)	75

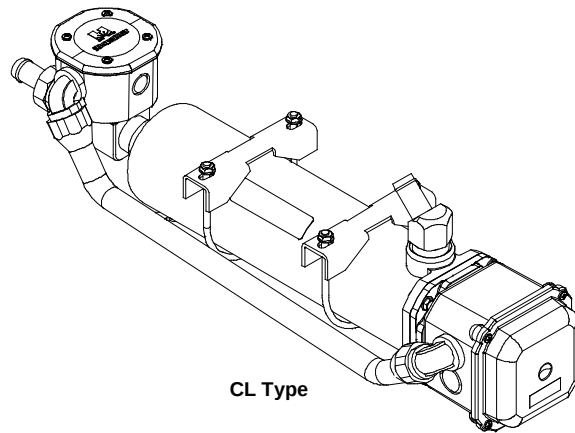
Note: Data in table is for reference only. Height includes enclosure, lift base, and tank (if equipped). Refer to your authorized Kohler distributor for enclosure and subbase fuel tank specification details.

Max. weight includes the generator set (wet), enclosure, silencer, lift base, and tank (no fuel).

Enclosed generator set sound data for these models was not available at time of print



CB Type



CL Type

Block Heater Kit, Typical

Applicable Models

- D6000D6000
- R000B
- RE00B
- RE00JE
- RE00J
- RE00JB
- RE00JC
- RE00JD
- RE00VC
- RE00VB

Standard Features

- ULCS listed
- CE compliant
- Controls for automatic operation
- Compact design
- Easy to install

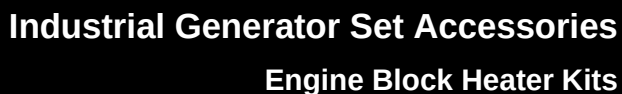
Description

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

The engine block heater has a fixed setting thermostat that turns ON when the engine coolant temperature reaches 100°C (212°F) and turns OFF when the engine coolant temperature reaches 100°C (212°F).

The engine block heater kit is recommended for ambient temperatures below 100°C (212°F).

The engine block heater kits are available in 115V, 230V, and 480V versions.



Heating Fluid	WaterCoolant Mix Glycol Water
Thermostat Temperature Range	°C °F
Temperature °C Limit	°C °F
Max Pressure	psi kPa
Inlet/Outlet Plumbing	in. PT
System Ingress	EMA

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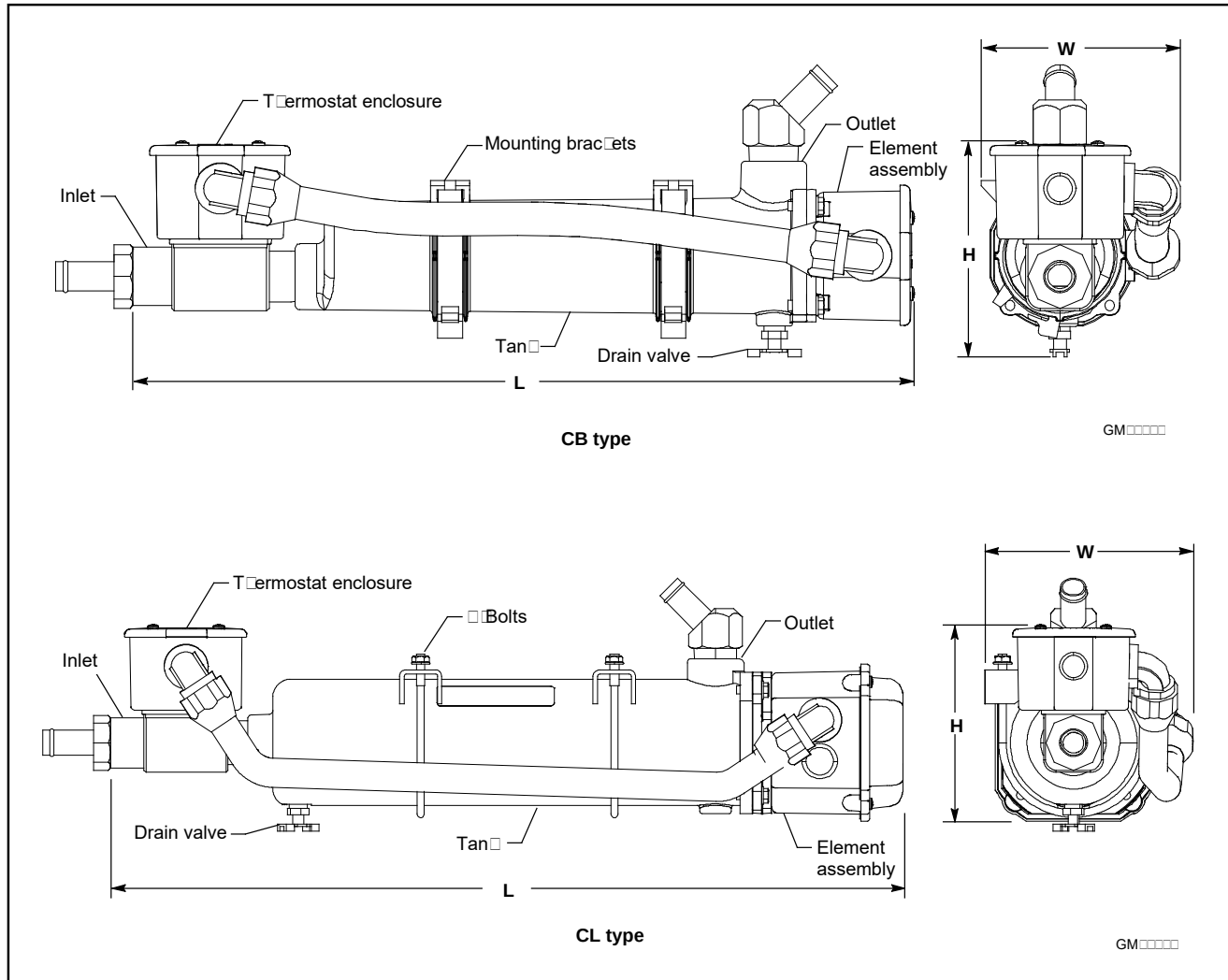
Dimensions and Weights

CB type block heater size L mm W mm H mm

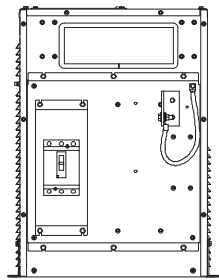
CL type block heater size L mm W mm H mm

CB type block heater weight kg lb

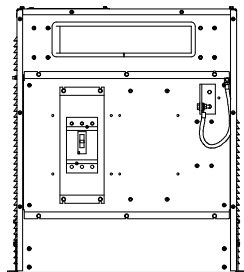
CL type block heater weight kg lb



Availability is subject to change without notice. Discovery Energy LLC and its affiliates dba Rehko reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever. Contact your local authorized generator set distributor for availability.



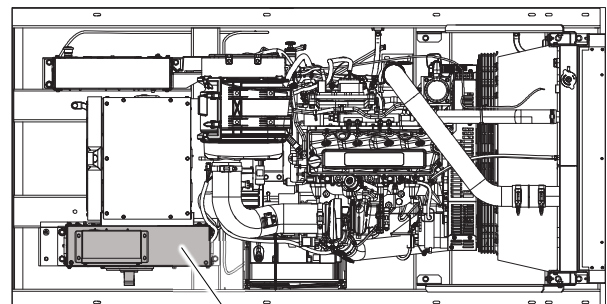
600 A Power Box
(See page 2)



1200 A Power Box
(See page 3)

Standard Features

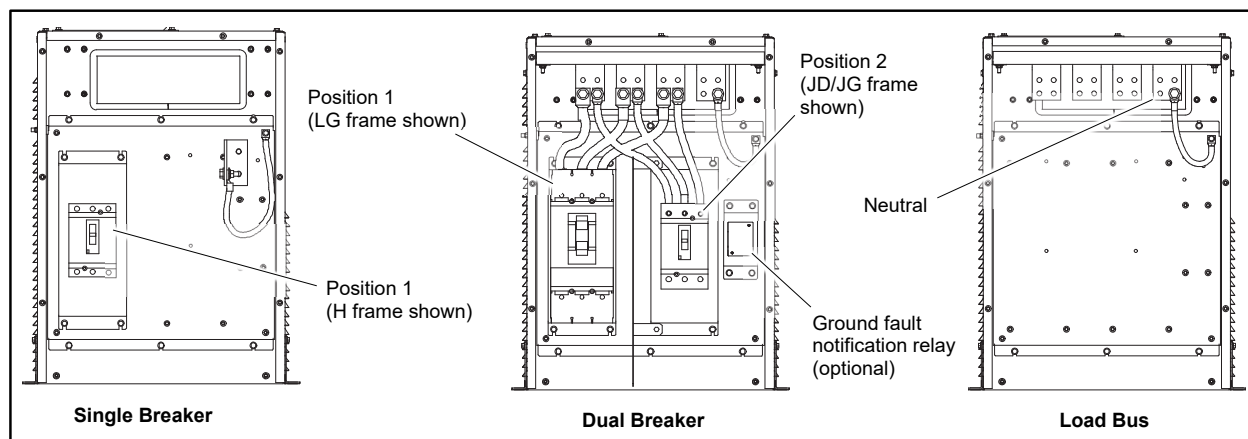
- A dedicated power box location on one side of the generator set provides easy access for load connections.
- The power box can be configured with load bus bars for connection to alternator terminals without overcurrent protection or with circuit breakers for downstream circuit protection.
- Standard circuit breakers with various sizes and ratings are available.
 - Short circuit rating
 - ◆ 600 V: 14 kA or 18 kA or 25 kA
 - ◆ 480 V: 18 kA or 35 kA or 65 kA
 - ◆ 240 V: 25 kA or 65 kA or 100 kA
 - Duty Ratings: 80% or 100%
 - Trip: Thermal magnetic or Electronic (LSI or LSIG)
- Electrically operated circuit breakers for paralleling application.
 - Short circuit rating
 - ◆ 600 V: 25 kA
 - ◆ 480 V: 65 kA or 100 kA
 - ◆ 240 V: 100 kA or 125 kA
 - Duty rating: 100%
 - Trip: Electronic (LSI)
- Available power box accessories.
 - Ground fault monitor and notification relay
 - Convenience receptacle
 - Electrically operated breaker accessory box
 - Breaker barrier for multi-breaker configuration
- Available circuit breaker accessories.
 - Auxiliary contacts
 - Alarm switch
 - Overcurrent switch
 - Shunt trip
 - Undervoltage trip
 - Padlock provision for the handle



Power Box

Location of the Power Box

600 A Power Box



Used on the Generator Set Model

KD80
KD100
KD130

600 A Powerbox Breaker Selection

Position 1: 600 A Max.

Position 2: 600 A Max.

Short Circuit Rating	Duty Cycle	Ampere Range	Trip Type	Frame	Lugs
18 kA	80%	15-150	Thermal Mag	HD	(1) #14 – #3/0
		60-150	Electronic LSI	HD	(1) #14 – #3/0
		175	Thermal Mag	JD	(1) #1/0 – #4/0
		200-250	Electronic LSI	JD	(1) #3/0 – 350 kcmil
	100%	15-150	Thermal Mag	HD	(1) #14 – 3/0
		60-150	Electronic LSI	HD	(1) #14 – 3/0
		175	Thermal Mag	JD	(1) #1/0 – #4/0
		200-250	Electronic LSI	JD	(1) #3/0 – 350 kcmil
35 kA	80%	60-150	Electronic LSI	HG	(1) #14 – #3/0
		250	Electronic LSI	JG	(1) #3/0 – 350 kcmil
		400-600	Electronic LSI	LG	(2) #2/0 – 500 kcmil
	100%	60-150	Electronic LSI	HG	(1) #14 – #3/0
		250	Electronic LSI	JG	(1) #3/0 – 350 kcmil
		400-600	Electronic LSI	LG	(2) #2/0 – 500 kcmil

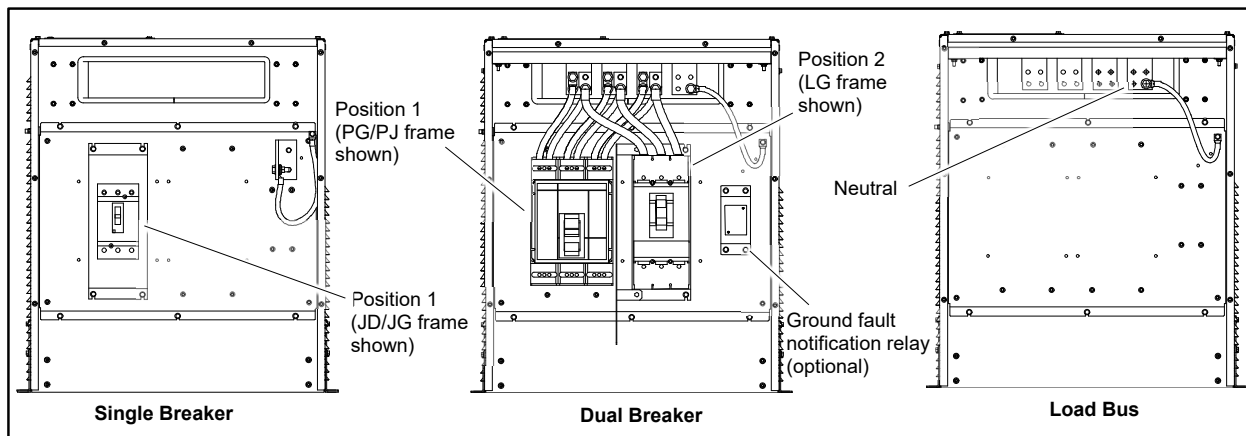
600 A Powerbox Electrically Operated Breaker Selection for Paralleling Operation

Position 1: 600 A Max.

Position 2: Not available for paralleling operation

65 kA	100%	250-600	Electronic LSI	PJ	(3) #3/0 – 500 kcmil
100 kA	100%	250-600	Electronic LSI	PL	(3) #3/0 – 500 kcmil

1200 A Power Box



Used on the Generator Set Model

KD150
KD180
KD200
KD230
KD250
KD275
KD300

1200 A Powerbox Breaker Selection

Position 1: 1200 A Max.

Position 2: 600 A Max.

Short Circuit Rating	Duty Cycle	Ampere Range	Trip Type	Frame	Lugs
18 kA	80%	15-150	Thermal Mag	HD	(1) #14 – #3/0
		60-150	Electronic LSI	HD	(1) #14 – #3/0
		175	Thermal Mag	JD	(1) #1/0 – #4/0
		200-250	Electronic LSI	JD	(1) #3/0 – 350 kcmil
	100%	15-150	Thermal Mag	HD	(1) #14 – 3/0
		60-150	Electronic LSI	HD	(1) #14 – 3/0
		175	Thermal Mag	JD	(1) #1/0 – #4/0
		200-250	Electronic LSI	JD	(1) #3/0 – 350 kcmil
35 kA	80%	60-150	Electronic LSI	HG	(1) #14 – #3/0
		250	Electronic LSI	JG	(1) #3/0 – 350 kcmil
		400-600	Electronic LSI	LG	(2) #2/0 – 500 kcmil
		1000-1200	Thermal Mag	PG	(4) #3/0 – 500 kcmil
	100%	800-1200	Electronic LSI	PG	(3) #3/0 – 500 kcmil for 800 A (4) #3/0 – 500 kcmil for 1000 A
		60-150	Electronic LSI	HG	(1) #14 – #3/0
		250	Electronic LSI	JG	(1) #3/0 – 350 kcmil
		400	Electronic LSI	LG	(2) #2/0 – 500 kcmil
		600-1200	Electronic LSI	PG	(3) #3/0 – 500 kcmil for 800 A (4) #3/0 – 500 kcmil for 1000 A
65 kA	100%	1200	Electronic LSI	PJ	(4) #3/0 – 500 kcmil

1200 A Powerbox Electrically Operated Breaker Selection for Paralleling Operation

Position 1: 1200 A Max.

Position 2: Not available for paralleling operation

65 kA	100%	250-1200	Electronic LSI	PJ	(3) #3/0 – 500 kcmil for 800 A (4) #3/0 – 500 kcmil for 1000 A
100 kA	100%	250-1200	Electronic LSI	PL	(3) #3/0 – 500 kcmil for 800 A (4) #3/0 – 500 kcmil for 1000 A



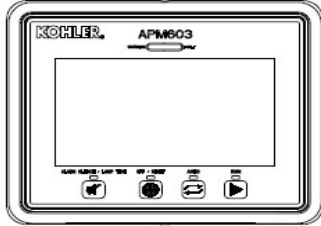
Industrial Generator Set Accessories

Power Box

Notes



Integral Voltage Regulator with Kohler® APM603 Controllers and Menu-Driven Selections (80-4000 kW Generator Set Models)



**APM603 Controller
with Integral Voltage Regulator**

The voltage regulator is integral to the controller and uses patented high speed digital voltage regulator design providing $\pm 0.25\%$ no-load to full-load regulation using root-mean-square (RMS) voltage sensing.

Voltage Regulators

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

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

Integral Voltage Regulators with APM603

Calibration	Range Settings	Default Selection
Voltage Adjustment	$\pm 10\%$ of System Voltage	System Voltage
Controller Gain	40 to 70 Hz	P: 1.3 I: 1.0 D: 0.25
Underfrequency Unload or Frequency Setpoint	40 to 70 Hz	0.5 Hz Below System Frequency (ECM)
Underfrequency Unload Scope	0-10% of System Voltage (Volts per Cycle)	15 volts per Cycle at 480 Volts (3.1%)
Reactive Droop	0-10% of System Voltage	4% of System Voltage
VAR Control	-50% to 110%	0 kVAR
PF Adjust Control	-0.50 to 1.0 to 0.50	0.8 Lagging
VAR/PF Gain Adjustment	P: 0.3 to 3.00 I: 0.3 to 3.00 D: 0.3 to 3.00	P: 1.0 I: 1.0 D: 0.25



Specification/Feature	Integral with APM603
Generator Set Availability	80-4000 kW
Type	Patented Hybrid Design
Status and Shutdown Indicators	LEDs and Text LCD Display
Operating Temperature	-40°C to 70°C (-40°F to 158°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5-95% Non-Condensing
Circuit Protection	Solid-State, Redundant Software and Fuses
Sensing, Nominal	100-600 Volts (L-L), 50-60 Hz
Sensing Mode	RMS, Single- or 3-Phase
Input Requirements	8-36 VDC
Continuous Output	5.0 ADC with GM88453 Activator Board
Maximum Output	7.8 ADC with GM88453 Activator Board
Transition Frequency	50-70 Hz
Exciter Field Resistance	4-30 Ohms with GM88453 Activator Board
No-Load to Full-Load Voltage Regulation	±0.25%
Thermal Drift	<0.5% (-40°C to 70°C) [-40°F to 158°F] Range
Response Time	3-phase: 1 mS 1-phase: 5 mS
System Voltage Adjust.	±10%
Voltage Adjustment	Controller Display
Remote Voltage Adjustment	Analog 0-5 VDC (±10%) Input Optional
Paralleling Capability	Full Load Share and Control plus Reactive Droop

Integral Voltage Regulator with APM603 Controller

- A 7.5-inch color TFT touchscreen provides access to data.
- 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 control Fast Response™ II, Fast Response™X, and PMG alternators using the GM88453 activator board.

Voltage Regulator Settings, APM603 Controller

- Voltage Regulator Configuration
 - Under Frequency Unload Settings
 - Single and Three Phase Sensing
 - Voltage Target
 - Voltage Regulator Gains

Paralleling Settings, APM603

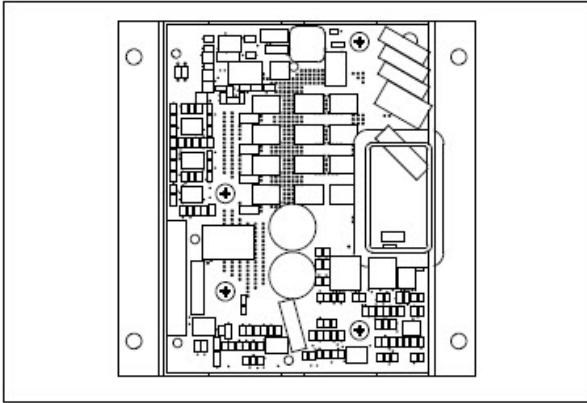
- Synchronizing parameters setup
 - Voltage matching
 - Frequency matching
 - Phase matching
 - Time delay
- Load sharing
 - kW sharing
 - kVAR sharing
 - Baseload settings
 - Droop

Paralleling Metering, APM603

- Paralleling State
- Paralleling Mode
- System Voltage
- System Frequency
- Connected Generators
- Sync Status
- Engine Speed

VAR/PF Control Input	VAR Control Mode, PF Control Mode, System VAR Control, System PF Control
----------------------	--

Activator Board GM88453



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

Modbus® is a registered trademark of Schneider Electric.

Alternator Data

DATASHEET ALTERNATOR

KH01722T

Alternator Type

KH01722TO4D



- GENERAL CHARACTERISTICS -

Voltage Type (V)	208/120	Altitude (m)	0-1000
Number of Phases	Three phase	AVR Regulation	Yes
Number of Poles	4	Indication of Protection	IP23
Winding Type	Standard		
Winding Pitch	2/3		

Capacity for Maintaining Short Circuit at 300% of Rated Current for 10 s Yes

Insulation Adapted for :

- Clean air / Humidity > 95% (excepted Seafront)
- This choice of reinforced protection can affect the nominal power for some models of alternators.

Efficiency & Power

Frequency (Hz) 60 Hz Nominal Voltage (V) 208

Insulation System	CLASS H					
Class Temp Rise	Class H				Class F	Class B
Rated Temp Rise (K) / Ambient Temp (°C)	125K / 40°C Continuous	130K / 25°C Standby (*)	150K / 40°C Standby	163K / 27°C Standby	105K / 40°C Continuous	80K / 40°C Continuous
Nominal Rating (kVA)	325	331	341	358	300	260
Nominal Rating (kW)	260	265	273	286	240	208
Efficiency 100%	94	93.9	93.9	93.7	94.3	94.6

(*) UL

- ELECTRICAL CHARACTERISTICS -

Voltage Regulation at Established Rating (+/- %)	0.5
T° Class (H/125K), Continuous 40°C	H / 125°K
T° Class (H/163K), Standby 27°C	H / 163°K
Wave Form : NEMA=TIF	<40
Unbalanced Load Acceptance Ratio (%)	8
Number of Wires	12
Total Harmonic Distortion in No-Load DHT (%)	2.6
Wave Form : CEI=FHT	<2
Total Harmonic Distortion, on Linear Load DHT (%)	3.0
Technology	Brushless
Power Factor (Cos Phi)	0.8
L-L Harmonic Maximum - Single (%)	<3
Deviation Factor (%)	6
Shaft Current	<80
Main Stator Capacitance to Ground (mF)	0.005

DATASHEET ALTERNATOR

KH01722T
KH01722TO4D



Alternator Type

Reactances

	Saturated	Unsaturated
Direct Axis Synchro Reactance (X_d) (%)	215.8	260
Direct Axis Transient Reactance (X'_d) (%)	15.9	19.1
Direct Axis Subtransient Reactance (X''_d) (%)	8.4	10.1
Quadra Axis Synchro Reactance (X_q) (%)	124.5	150
Quadra Axis Subtransient Reactance (X''_q) (%)	21.6	26
Zero Sequence Reactance (X_0) (%)	2.87	2.87
Negative Sequence Reactance (X_2) (%)	16.7	20.1
Reactance Desaturation coef	1.23	

(*) Reactances provided for Class H 125°C/40°C PRIME

Short Circuit Ratio

Short Circuit Ratio (K_{cc})	0.32
Exciter Time Constant (T_e)	0.018
Subtransient Time Constant (T''_d) (ms)	12
Short Circuit Transient Time Constant (T'_d) (ms)	91
Open Circuit Time Constant (T'_{do}) (ms)	1400
Subtransient Time Constant (T''_q) (ms)	20
Leakage Stator Reactance (X_a) (%)	4.5
Stator Resistance (R_a) (%)	0.021
Armature Time Constant (T_a) (ms)	16
No Load Excitation Current (I_o) (A)	0.4
Full Load Excitation Current (I_c) (A)	3.2
Full Load Excitation Voltage (u_c) (V)	43.1
Heat Rejected to Ambient Air (kW)	16.6
No Load Losses (W)	3520.96
Stator Resistance (for 20°C ambient) (Ω)	0.006
Rotor Resistance (for 20°C ambient) (Ω)	5.604
Exciter Resistance - Stator/Inductor (for 20° ambient) (Ω)	13.47
Exciter Resistance - Rotor/Armature (for 20° ambient) (Ω)	0.719
Recovery Time (Delta U = 20% transient) (ms)	200
Engine Start (Delta U = 20% perm. or 30% trans.) (kVA)	620.3
Transient Dip (4/4 load) - PF : 0.8 AR (%)	18.3

DATASHEET ALTERNATOR



Alternator Type

KH01722T
KH01722TO4D

- ADDITIONAL ELECTRICAL CHARACTERISTICS -

Winding X1, X2 Auxiliary Resistance (for 20° ambient) (Ω)	0.751
Auxiliary Winding X1, X2 Excitation Voltage at No Load (V)	176
Auxiliary Winding X1, X2 Excitation Voltage on Load (V)	191
Heat Rejected to Ambient Air (kW)	16.6

- MECHANICAL CHARACTERISTICS -

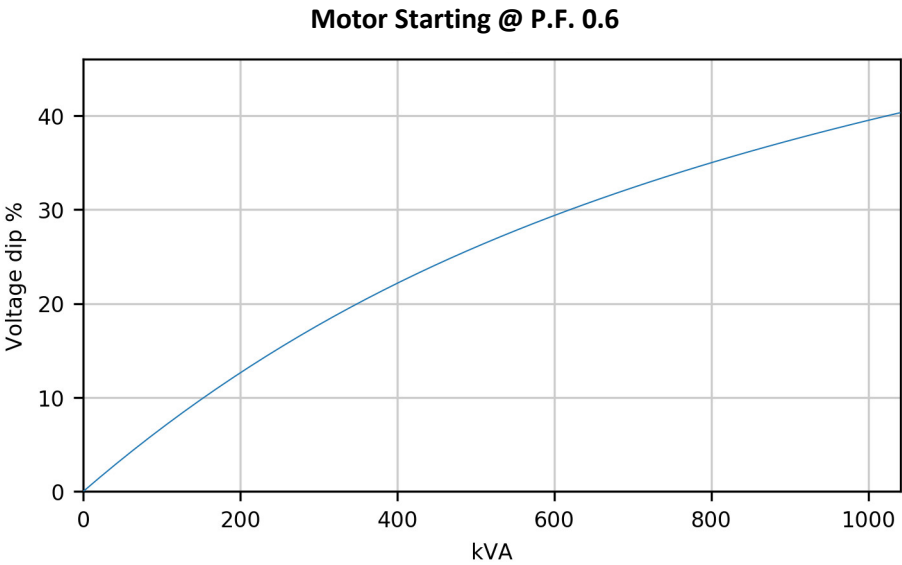
Number of Bearing	1
Overspeed (rpm)	2250
Coupling	Direct
Air Flow (m^3/s)	0.65
Heat Rejected to Ambient Air (kW)	16.6

Alternator Type

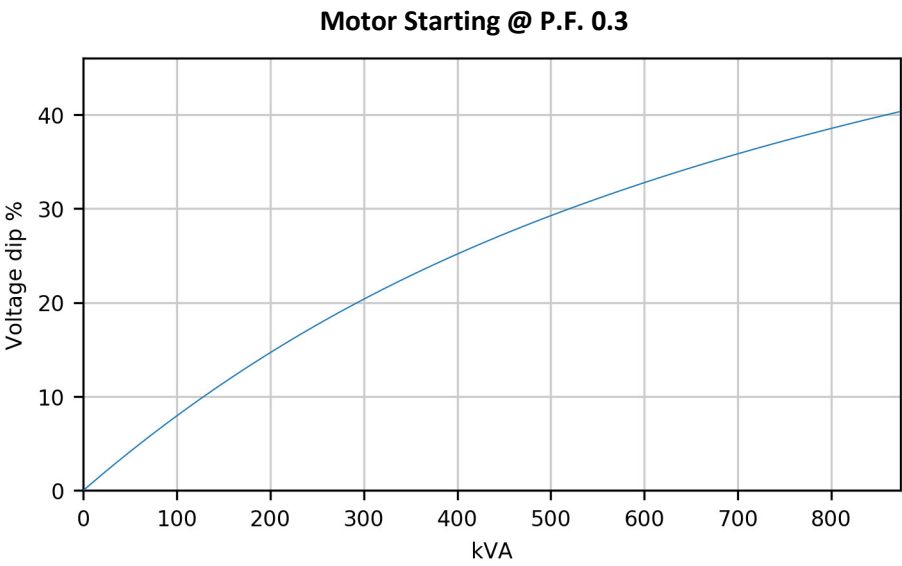
KH01722T
KH01722TO4D

- TECHNICAL CURVES -

Motor Starting Curve Locked Rotor (0.6PF)



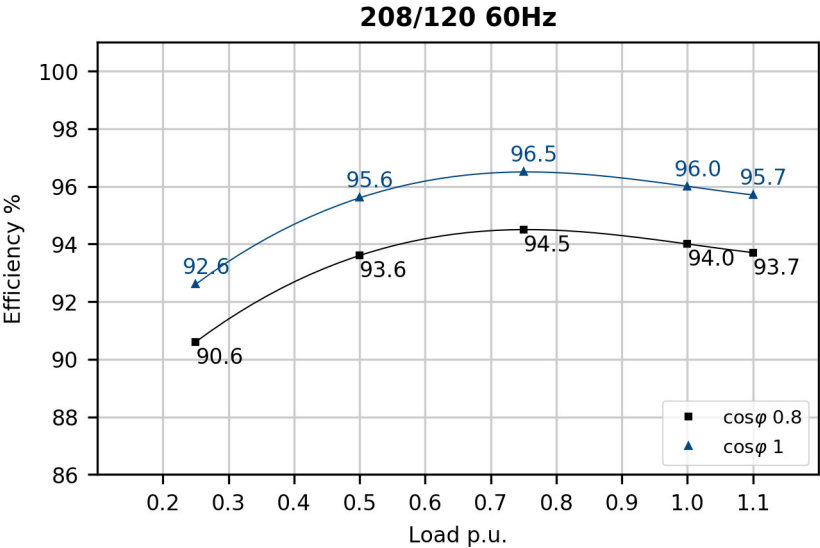
Motor Starting Curve Locked Rotor (0.3PF)



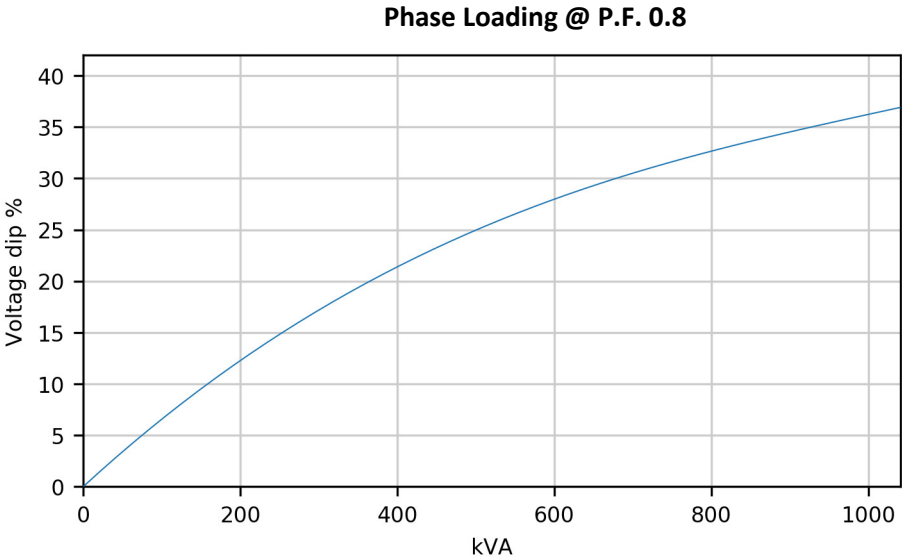
Alternator Type

KH01722T
KH01722TO4D

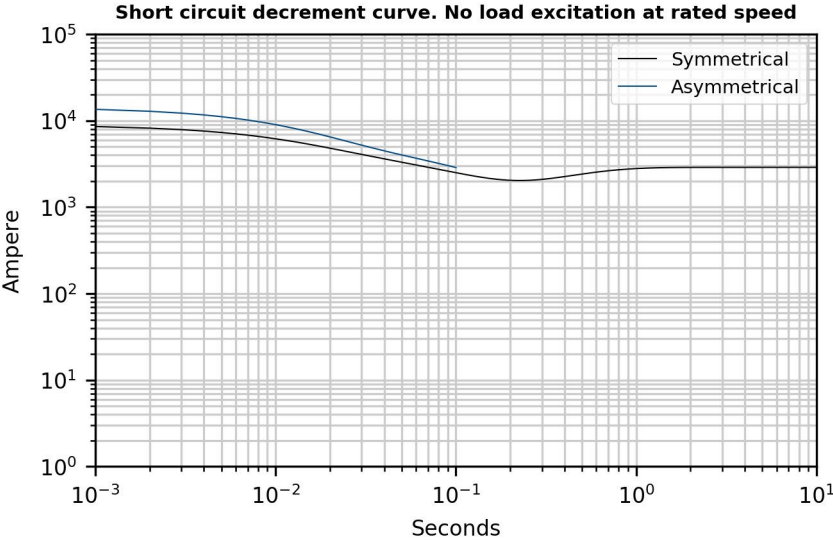
Efficiency Curve (by excitation system)



Loading Curve (by excitation system)



Short Circuit Curve at No Load and Rated Speed



Influence due to Connection

Curves shown are for star (Y) connection

For other connections, use the following multiplication factors:

- Series to Parallel star: current value x 2
- Series to Series delta: current value x 1.72
- Series star to Parallel delta: current value x 3.44

Influence due to Short-circuit

The indicated coefficient have to be used to correct the three phase short circuit curves values as a function of the type of short circuit voltage.

	3-phase	2-phase L/L	1-phase L/N
Instantaneous (max)	1x	0.87x	1.3x
Minimum	1x	1.8x	3.2x
Sustained / Permanent	1x	1.5x	2.5x
Maximum duration (*)	20 sec.	10 sec.	4 sec.

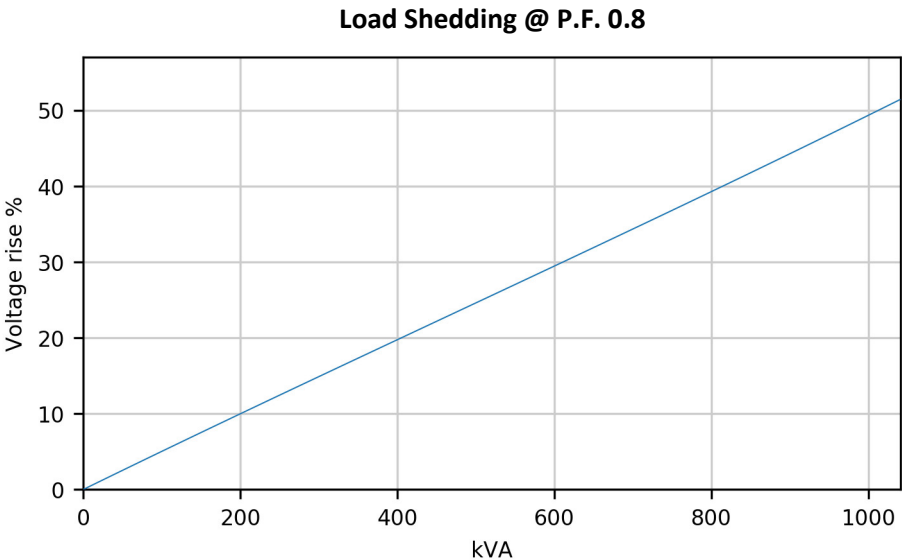
DATASHEET ALTERNATOR



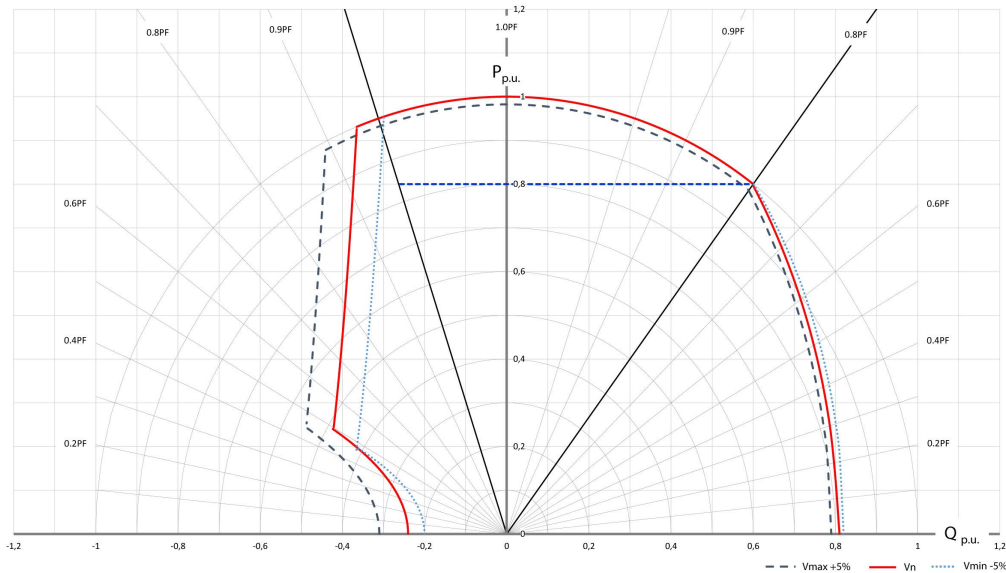
Alternator Type

KH01722T
KH01722TO4D

Rejection Curve (by excitation system)



Capability Curve (PQ Diagram)



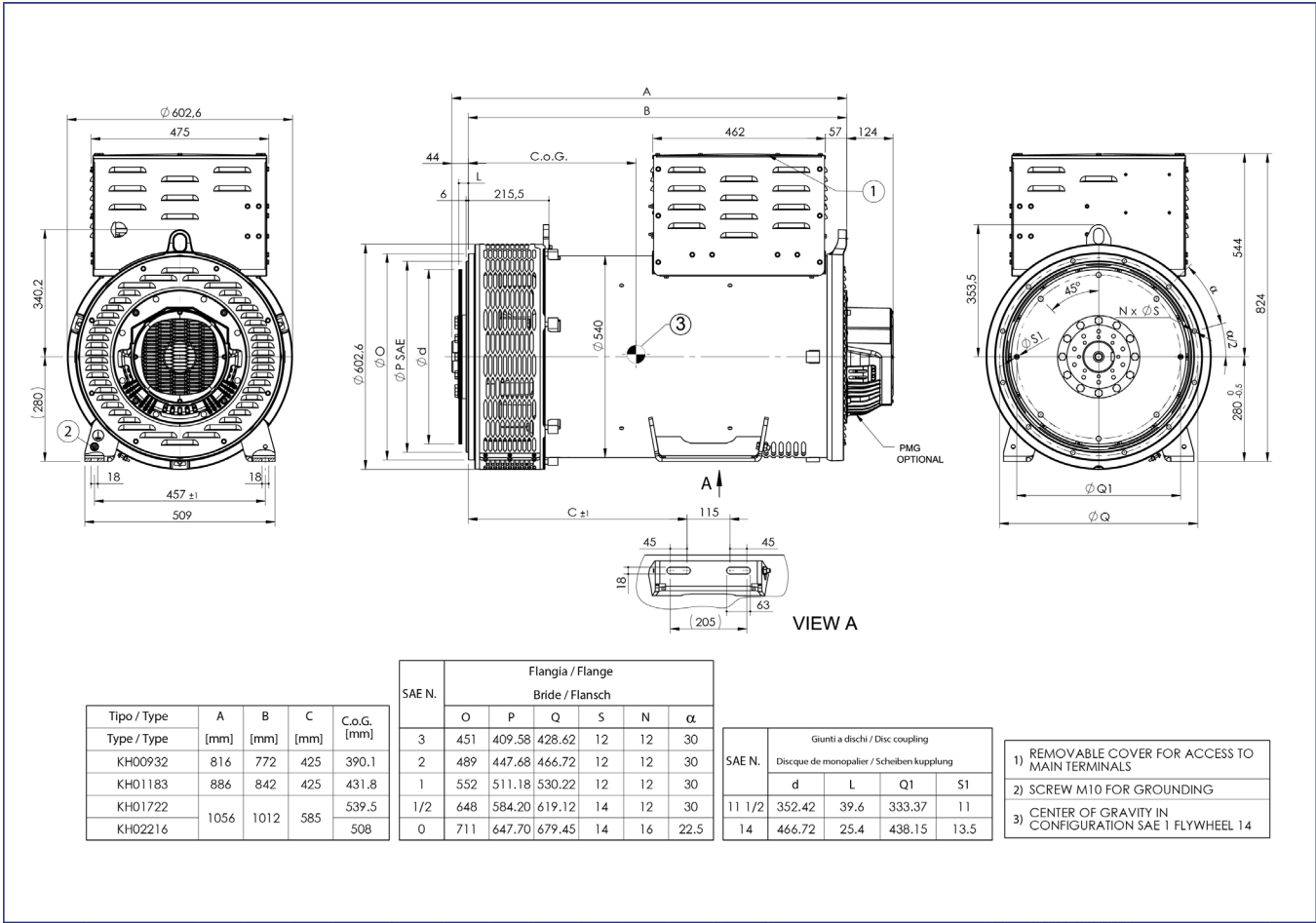
DATASHEET ALTERNATOR



Alternator Type
KH01722T
KH01722TO4D

- DIMENSIONS -

Overall Dimension Drawing (Single Bearing)

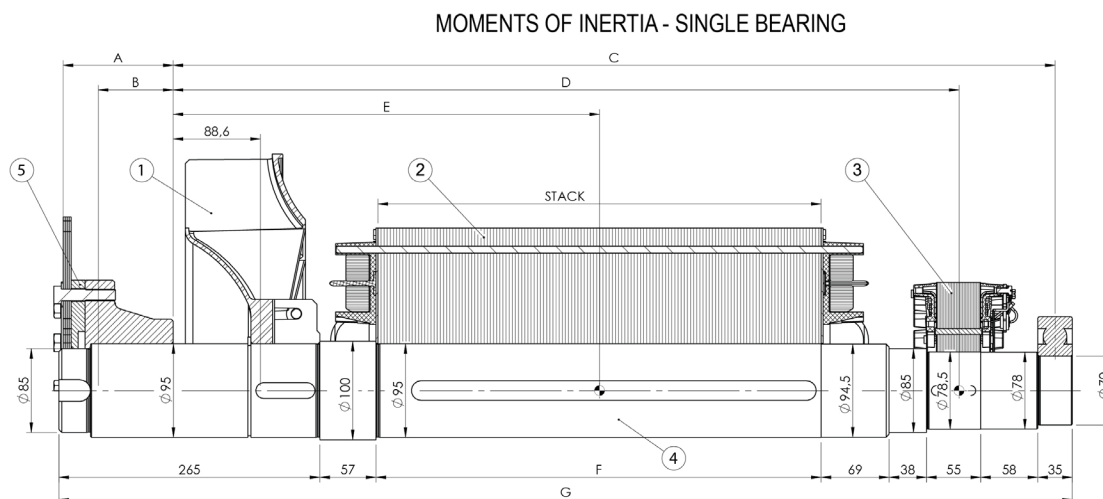


Alternator Type	KH01722T KH01722TO4D
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-TORSIONAL ANALYSIS DATA -

Rotation Part Drawing for Torsional Vibration Calculation (Single Bearing)



* Shaft mass and inertia also include rotor keys

TYPE	COMPONENT								TOTAL	
	1		2		3		4			
	FAN		MAIN ROTOR		EXCITER ROTOR		SHAFT*		Weight	J
	Weight [kg]	J [kg*m ⁻²]	Weight [kg]	J [kg*m ⁻²]	Weight [kg]	J [kg*m ⁻²]	Weight [kg]	J [kg*m ⁻²]	Weight [kg]	J [kg*m ⁻²]
KH00932	6.6	0.1633	106.4	1.4480	11.8	0.0808	40.2	0.0434	164.9	1.7355
KH01183			130.5	1.7733			44.1	0.0479	193.0	2.0653
KH01722			184.6	2.5051			53.6	0.0588	256.6	2.8080
KH02216			233.3	3.1636					305.3	3.4665

SAE N.	5)SHAFTS COUPLING FLEX PLATE			
	A	B	Weight [kg]	J[kg*m ²]
11.5	111.6	76.1	19.4	0.1802
14.0	97.4	74.6	22.6	0.3639

TYPE	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]
KH00932	655.5	558.4	323.0	212.0	789.0
KH01183			368.0		
KH01722	725.5	628.4	483.0	452.0	1029.0
KH02216			433.0		

Cooling Data

TECHNICAL INFORMATION BULLETIN

Generator Set Cooling System Data Sheet

KD250 60Hz (Standby Duty)	50°C Ambient Temperature Cooling System								
	Total external restriction on open unit ⁷	Pa (in.H ₂ O)	□ □□	□□ □□□	□□ □□□□	□□ □□□□	□□ □□□□	□□ □□□□	Enclosed Units
	Maximum allowable ambient temperature	°C (°F)	□□ □□□□	□□ □□□□	□□ □□□□	□□ □□□□	□□ □□□□	□□ □□□□	□□ □□□□
	Cooling system airflow	m ³ /min (ft ³ /min)	□□ □□□□□	□□ □□□□□	□□ □□□□□	□□ □□□□□	□□ □□□□□	□□ □□□□□	□A □□A□

- The data shown above is the anticipated cooling performance for a typical generator set when following proper installation techniques.
- Cooling performance is based on operation at □□ m □□□ ft. □ above sea level. For elevations higher than □□ m □□□ ft. □ typical cooling performance derate is □□C □□□F per □□ m □□□ ft. □
- For high ambient conditions see TIB □□□ for the generator set power output derate schedule.
- Incorrect installation □ improper operation □ fouling of the cooling system □ and other variable conditions may reduce cooling performance.
- The company □ manufactured sound □ enclosed models are rated in free air with no additional restriction. Consult factory for other variants or conditions such as additional ducting or loads.
- Performance is based on a □□□□ water and ethylene glycol mixture.
- Total external restriction includes restriction upstream and downstream of the unit – any ducting supplying intake air to the unit and any ducting for the discharge.

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	Level 2 Sound Enclosure
KD250	60	100% Load	119.4	89.5	87.6	75.1
		No Load	101.9	85.5	83.6	71.4

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.

KD250		60 Hz		Sound Pressure Levels, dB(A)								
Load	Distance, m (ft)	Enclosure	Measurement Clock Position	Octave Band Center Frequency (Hz)								Overall Level
				63	125	250	500	1000	2000	4000	8000	
100% Load	7 (23)	Level 2 Sound	3:00	53.7	69.7	70.1	69.0	63.7	64.0	65.0	63.7	75.9
			1:30	48.0	65.7	71.0	67.8	63.4	65.4	66.3	61.1	75.3
			12:00-Engine	52.2	66.9	67.7	69.0	65.6	65.0	66.8	59.5	75.0
			10:30	51.5	66.8	70.2	70.3	65.0	63.6	62.9	58.8	75.3
			9:00	52.4	67.7	66.9	66.7	61.4	59.0	59.1	59.0	72.9
			7:30	53.8	65.0	69.0	65.9	64.7	61.4	60.3	59.9	73.4
			6:00-Alternator	55.4	70.8	72.9	66.9	65.8	64.8	61.8	65.1	76.9
			4:30	52.0	68.3	71.7	65.7	65.0	62.4	60.8	60.8	75.2
			8-pos. log avg.	52.8	68.0	70.3	67.9	64.5	63.6	63.7	61.6	75.1

				Sound Pressure Levels, dB(A)								
Load	Distance, m (ft)	Enclosure	Measurement Clock Position	3:00	1:30	12:00 Eng.	10:30	9:00	7:30	6:00 Alt.	4:30	8-pos. log avg.
100% Load	7 (23)	Weather	Overall Levels	88.1	86.7	85.5	87.3	87.7	87.7	87.5	89.4	87.6

				Sound Pressure Levels, dB(A)								
Load	Distance, m (ft)		Measurement Clock Position	Octave Band Center Frequency (Hz)								Overall Level
				63	125	250	500	1000	2000	4000	8000	
100% Load	7 (23)	Open Unit, Isolated Exhaust	3:00	49.7	73.5	78.9	81.5	82.2	82.6	79.9	84.3	90.0
			1:30	45.8	74.4	80.0	78.9	79.8	78.1	77.6	84.4	88.6
			12:00-Engine	52.4	75.0	79.8	79.9	81.6	80.6	75.1	74.2	87.4
			10:30	51.1	74.0	79.8	80.2	84.5	82.5	78.1	78.9	89.2
			9:00	50.5	73.5	80.6	79.8	83.4	83.8	79.1	80.9	89.6
			7:30	49.4	74.6	81.6	80.2	82.4	83.4	77.9	82.3	89.6
			6:00-Alternator	51.7	77.2	81.5	79.1	79.7	77.4	74.0	86.2	89.4
			4:30	50.3	73.3	81.0	78.4	81.3	81.9	77.1	88.8	91.3
			8-pos. log avg.	50.5	74.6	80.5	79.8	82.1	81.8	77.7	84.2	89.5

			Sound Pressure Levels, dB(A)								
Load	Distance, m (ft)	Exhaust	Octave Band Center Frequency (Hz)								Overall Level
			63	125	250	500	1000	2000	4000	8000	
100% Load	1 (3.3)	Raw Exhaust (No Silencer)	69.8	96.6	108.7	113.6	113.0	114.1	109.9	101.1	119.4

KD250		60 Hz		Sound Pressure Levels, dB(A)								
Load	Distance, m (ft)	Enclosure	Measurement Clock Position	Octave Band Center Frequency (Hz)								Overall Level
				63	125	250	500	1000	2000	4000	8000	
No Load	(23)	Level 2 Sound	3:00	51.4	66.1	65.2	64.1	56.3	53.7	50.6	45.7	70.4
			1:30	46.3	63.9	66.9	64.7	54.2	56.6	50.5	42.5	70.5
			12:00-Engine	50.9	64.2	67.0	64.4	61.3	58.1	50.5	42.6	71.0
			10:30	50.3	65.6	65.1	66.6	59.7	57.1	50.9	43.2	71.2
			9:00	51.2	63.5	65.0	62.3	57.4	53.4	50.2	45.2	69.1
			7:30	51.7	64.3	67.2	62.5	60.4	56.2	51.4	43.3	70.6
			6:00-Alternator	54.0	71.0	70.9	63.4	61.9	59.8	55.4	48.2	74.8
			4:30	51.2	66.7	66.1	61.5	60.8	56.3	50.8	44.2	70.8
			8-pos. log avg.	51.3	66.4	67.1	64.0	59.6	56.8	51.7	44.8	71.4

				Sound Pressure Levels, dB(A)								
Load	Distance, m (ft)	Enclosure	Measurement Clock Position	3:00	1:30	12:00 Eng.	10:30	9:00	7:30	6:00 Alt.	4:30	8-pos. log avg.
No Load	7 (23)	Weather	Overall Levels	83.9	81.9	84.1	84.8	84.0	83.9	82.7	82.8	83.6

				Sound Pressure Levels, dB(A)								
Load	Distance, m (ft)		Measurement Clock Position	Octave Band Center Frequency (Hz)								Overall Level
				63	125	250	500	1000	2000	4000	8000	
No Load	7 (23)	Open Unit, Isolated Exhaust	3:00	49.5	73.5	79.0	80.2	78.6	78.4	74.1	67.8	85.8
			1:30	45.5	73.6	79.0	76.9	77.0	73.5	70.1	63.1	83.8
			12:00-Engine	52.2	75.2	79.7	78.3	79.7	79.5	71.9	63.0	86.0
			10:30	50.4	73.9	78.6	78.8	82.7	79.2	73.6	66.8	86.7
			9:00	48.6	73.7	79.2	78.6	79.9	79.1	74.0	67.1	85.9
			7:30	48.9	74.4	80.4	77.9	79.2	78.6	73.0	67.3	85.8
			6:00-Alternator	51.1	77.9	80.1	76.4	77.1	73.1	66.9	60.1	84.6
			4:30	49.5	73.1	79.5	76.5	78.1	77.7	71.7	65.2	84.7
			8-pos. log avg.	49.8	74.7	79.5	78.1	79.4	77.9	72.4	65.7	85.5

				Sound Pressure Levels, dB(A)								
Load	Distance, m (ft)		Exhaust	Octave Band Center Frequency (Hz)								Overall Level
				63	125	250	500	1000	2000	4000	8000	
No Load	1 (3.3)		Raw Exhaust (No Silencer)	55.1	92.9	95.2	94.9	95.8	92.5	90.5	86.2	101.9

Exhaust System Data

TECHNICAL INFORMATION BULLETIN

Enclosed Generator Set Exhaust System Data Sheet

Model	Drawing	Enclosure Type	Flex Exhaust Tube(s)	Silencer	Consumed Back Pressure			Back Pressure Limit(s)			Back Pressure Available		
					kPa	In. H ₂ O	In. Hg	kPa	In. H ₂ O	In. Hg	kPa	In. H ₂ O	In. Hg
KD250	ADV-10083 ADV-10132	All Weather and Sound Enclosures	10901052000	10901050616	7.3	29.5	2.2	10.2	40.8	3.0	2.8	11.3	0.8

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

Emissions Data



KD250

60Hz Diesel Generator Set

Tier 3 EPA Certified for Stationary Emergency Applications

ENGINE INFORMATION

Model:	KD09L06T-6DDS	Bore:	114 mm (4.48 in.)
Nameplate kW @ 1800 RPM:	346	Stroke:	145 mm (5.70 in.)
Type:	4-Cycle, 6 Cylinder	Displacement:	8.9 L (543 cu. in.)
Aspiration:	Turbocharged, Charge Air Cooled	EPA Family:	TCEXL0540AAB
Compression Ratio:	16.1:1	EPA Certificate:	TCEXL0540AAB-037
Emission Control Device:	Direct Diesel Injection, Engine Control Module, Turbocharger, Charge Air Cooler		

EXHAUST EMISSION DATA

NMHC	(Non-Methane Hydrocarbons)
NOx	(Oxides of Nitrogen as NO ₂)
CO	(Carbon Monoxide)
PM	(Particulate Matter)

EPA D2 5-MODE WEIGHTED

0.37 g/kWh
3.43 g/kWh
2.5 g/kWh
0.19 g/kWh

NOMINAL EMISSION DATA

Cycle Point	100% ESP	75% ESP	50% ESP	25% ESP
Power [kW]	346	260	173	87
Speed [rpm]	1800	1800	1800	1800
Exhaust Gas Flow [kg/h]	1734	1719	1588	1079
Exhaust Gas Temperature [C]	525	478	405	343
NOx [g/kWh]	4.06	1.95	1.23	0.94
CO [g/kWh]	0.22	0.54	2.36	0.81
HC [g/kWh]	0.04	0.04	0.16	0.44
PM [g/kWh]	0.03	0.04	0.13	0.19

TEST METHODS AND CONDITIONS

Test Methods:

Steady-State emissions recorded per EPA CFR 40 Part 1065, and ISO8178-1 during operation at rated engine speed (+/-2%) and stated constant load (+/-2%) with engine temperatures, pressures and emission rates stabilized using Ramped Mode Cycle.

Fuel Specification:

46.5 Cetane Number, 0.035 Wt.% Sulfur, ASTM D975 No. 2-D or 40 CFR Part 86.1313-98 Type 2-D Petroleum Diesel Fuel.

Reference Conditions:

25 °C (77 °F) Air Inlet Temperature, 37 °C (99 °F) Fuel Inlet Temperature, 100 kPa (29.6 in Hg) Barometric Pressure; 10.7 g/kg (75 grains H₂O/lb.) of dry air Humidity (required for NOx correction), 10 in H₂O Intake restriction, 2 in Hg exhaust backpressure.

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

Data and specifications subject to change without notice.

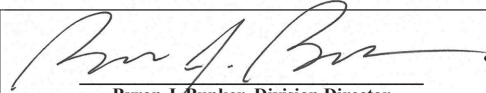


UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2026 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION
AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: Cummins Inc.
(U.S. Manufacturer or Importer)
Certificate Number: TCEXL0540AAB-037

Effective Date:
11/12/2025
Expiration Date:
12/31/2026


Byron J. Bunker, Division Director
Compliance Division

Issue Date:
11/12/2025
Revision Date:
N/A

Model Year: 2026
Manufacturer Type: Original Engine Manufacturer
Engine Family: TCEXL0540AAB

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: No Non-After Treatment Devices Installed

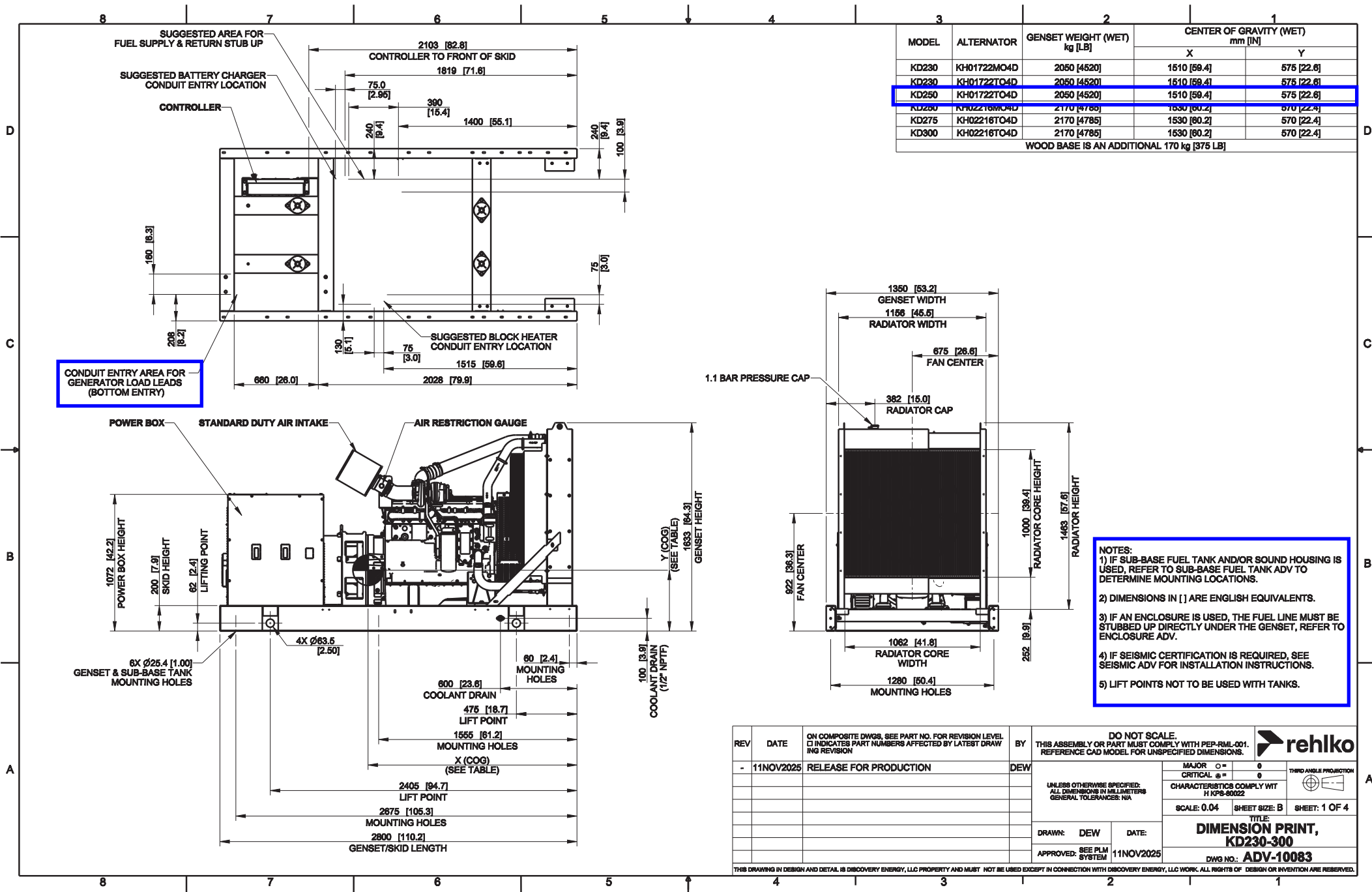
Pursuant to Section 111 and Section 213 of the Clean Air Act (42 U.S.C. sections 7411 and 7547) and 40 CFR Part 60, and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform 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.

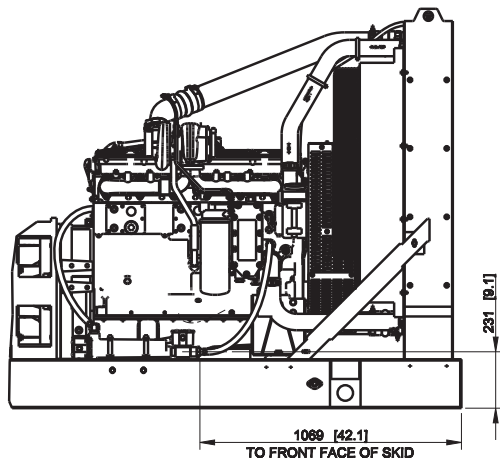
This certificate of conformity covers only those new compression-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate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

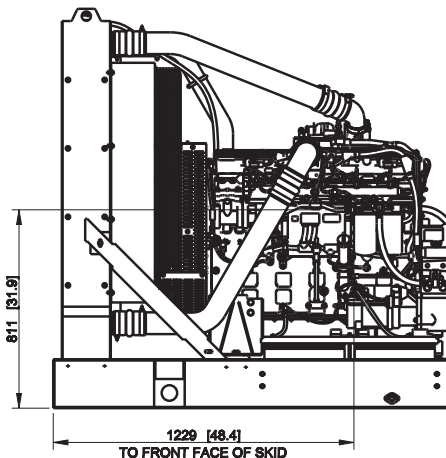
This certificate does not cover engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

Dimensional Drawings

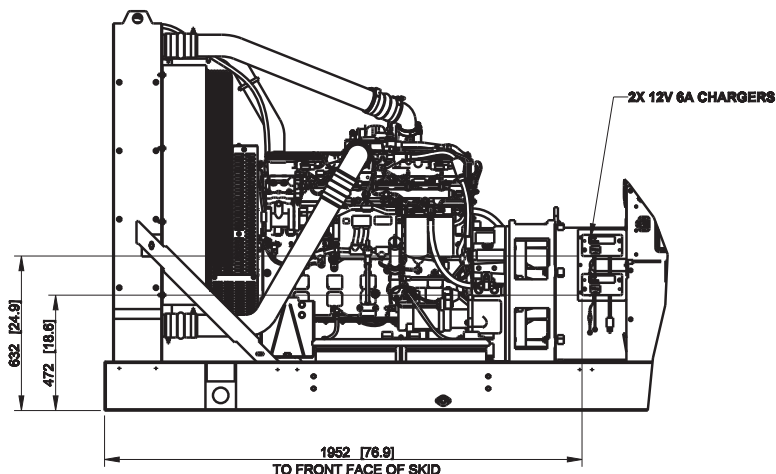
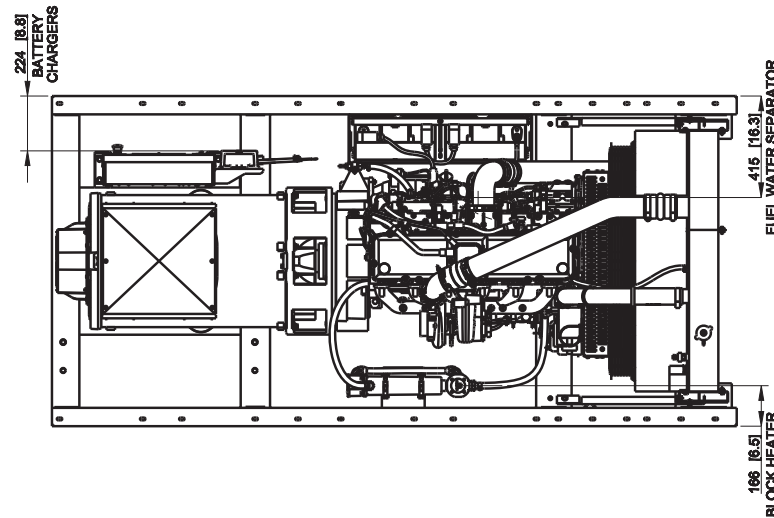




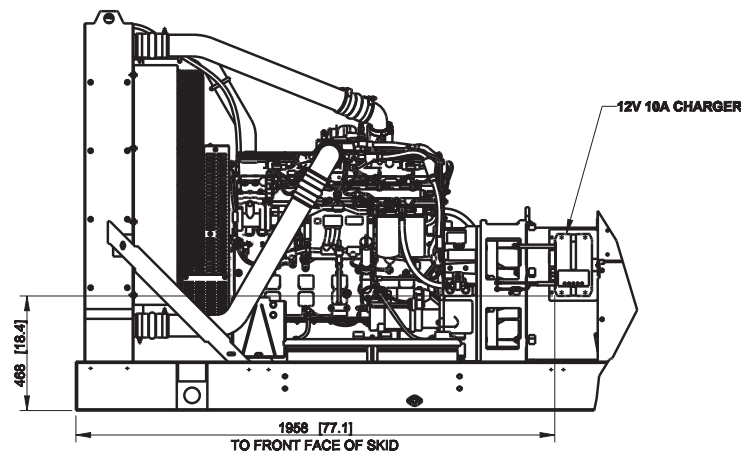
**BLOCK HEATER (OPTIONAL)
RIGHT SIDE OF GENSET**



**FUEL WATER SEPARATOR
LEFT SIDE OF GENSET**



**BATTERY CHARGERS (OPTIONAL)
LEFT SIDE OF GENSET**



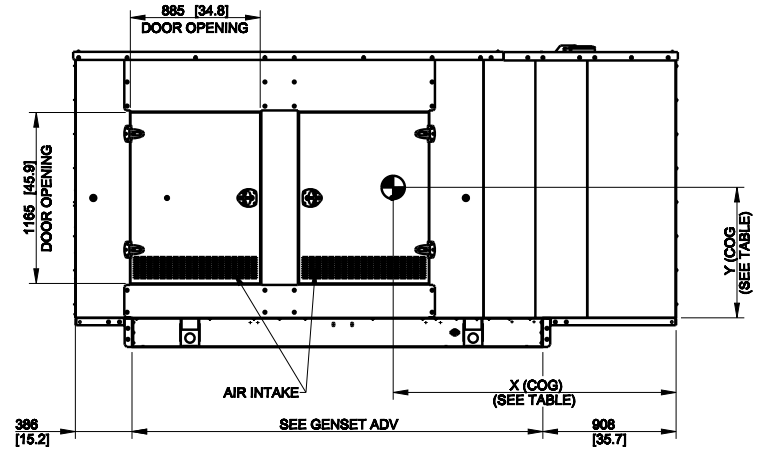
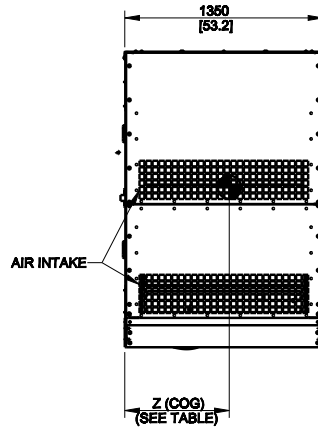
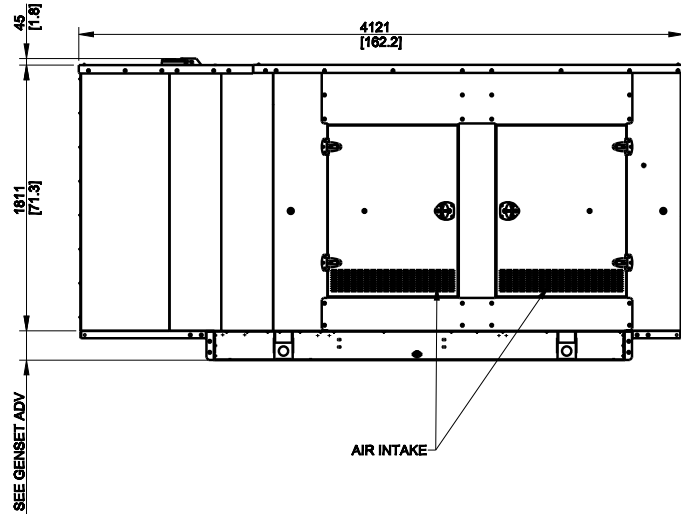
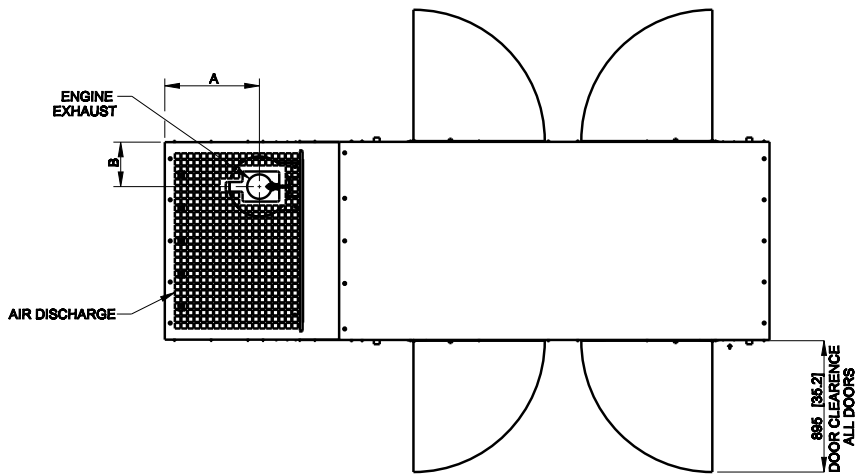
DIMENSIONS IN [] ARE ENGLISH EQUIVALENTS.

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL □ INDICATES PART NUMBERS AFFECTED BY LATEST DRAWING REVISION	BY	DO NOT SCALE. THIS ASSEMBLY OR PART MUST COMPLY WITH PEP-RML-001. REFERENCE CAD MODEL FOR UNSPECIFIED DIMENSIONS.	rehlko
-	11NOV2025	RELEASE FOR PRODUCTION	DEW		
				UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN MILLIMETERS GENERAL TOLERANCES: N/A	MAJOR ○ = 0 CRITICAL ● = 0 THIRD ANGLE PROJECTION
				DRAWN: DEW APPROVED: SEE PLM SYSTEM	SCALE: 0.05 SHEET SIZE: B SHEET: 3 OF 4
				DATE: 28AUG2025	TITLE: DIMENSION PRINT, KD230-300 DWG NO.: ADV-10083

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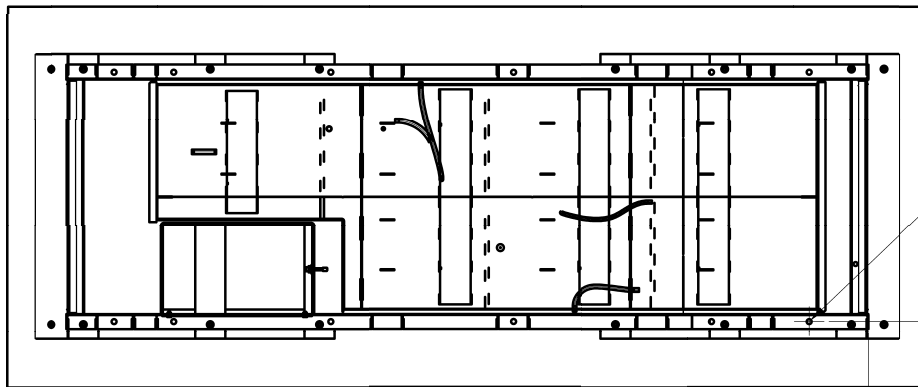
DESCRIPTION	MODELS	WEIGHT		CENTER OF GRAVITY mm [in]			EXHAUST LOCATION mm [in]		SILENCER OUTLET DIAMETER mm [in]
		kg	LB#	X	Y	Z	A	B	
SOUND, STEEL	KD230, KD250, KD275, KD300	650	1435	1905 [75.0]	930 [36.6]	705 [27.8]	644 [25.4]	303 [11.9]	152 [6.0]
WEATHER, STEEL	KD230, KD250, KD275, KD300	630	1390	1905 [75.0]	930 [36.6]	705 [27.8]	644 [25.4]	303 [11.9]	152 [6.0]
SOUND, ALUM	KD230, KD250, KD275, KD300	430	950	1950 [76.8]	945 [37.2]	720 [28.3]	644 [25.4]	303 [11.9]	152 [6.0]



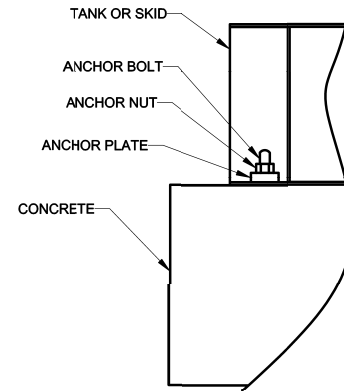
NOTE :
 1. IF SEISMIC CERTIFICATION IS APPLICABLE OR REQUIRED, SEE SEISMIC ADV FOR INSTALLATION INSTRUCTION
 2. DIMENSIONS IN [] ARE ENGLISH EQUIVALENTS
 3. ENCLOSURE WEIGHT + GENERATOR SET WEIGHT (REFERENCE FROM GENERATOR SET ADV) = TOTAL WEIGHT

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL □ INDICATES PART NUMBERS AFFECTED BY LATEST DRAWING REVISION	BY	DO NOT SCALE. THIS ASSEMBLY OR PART MUST COMPLY WITH PEP-RML-001. REFERENCE CAD MODEL FOR UNSPECIFIED DIMENSIONS.		MAJOR ○ = 0 CRITICAL ● = 0		THIRD ANGLE PROJECTION	
-	13AUG2025	RELEASE FOR PRODUCTION	AVD			CHARACTERISTICS COMPLY WITH KPS-00022		SCALE: 0.03 SHEET SIZE: B SHEET: 1 OF 1	
				UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN MILLIMETERS GENERAL TOLERANCES: NA		TITLE: DIMENSION PRINT, KD230-300		DWG NO.: ADV-10132	
				DRAWN: AVD DATE: 13AUG2025					
				APPROVED: SEE PLM SYSTEM					

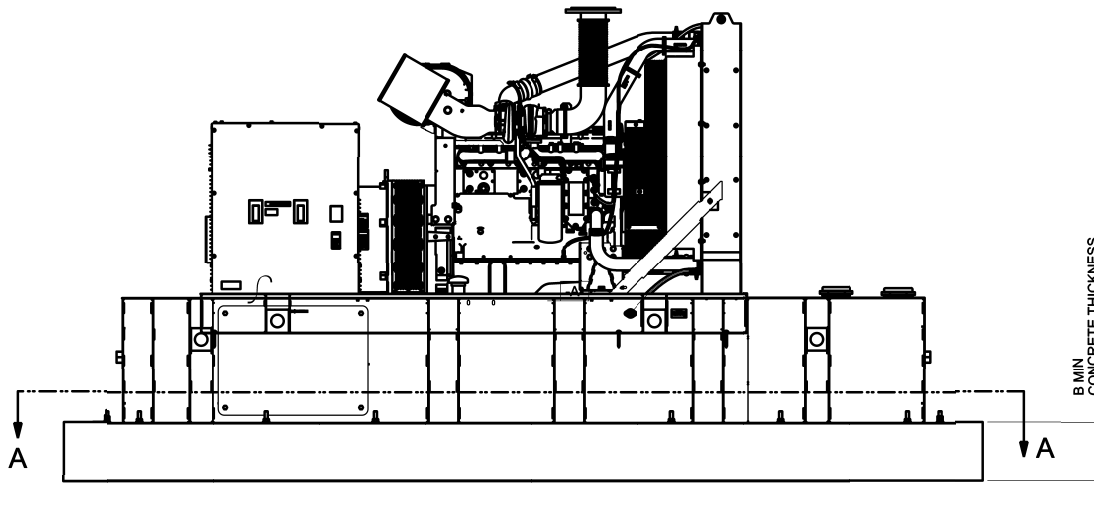
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SECTION A-A



DETAIL B



- NOTE:
- 1) SPECIAL INSPECTION PER IBC IS REQUIRED ON ALL INSTALLATIONS. ALL ANCHORS MUST BE INSTALLED TO MEET COMPLIANCE.
 - 2) NO OTHER ANCHORS ARE ALLOWED WITHIN MINIMUM SPACING DISTANCE WITHOUT ADVANCED APPROVAL OF THE STRUCTURAL PROJECT ENGINEER OF RECORD.

DIMENSIONS IN [] ARE INCH EQUIVALENT

REV	DATE	ON COMPOSITE DWGS. SEE PART NO. FOR REVISION LEVEL C INDICATES PART NUMBERS AFFECTED BY LATEST DRAWING REVISION	BY	DO NOT SCALE. THIS ASSEMBLY OR PART MUST COMPLY WITH PEP-RML-001. REFERENCE CAD MODEL FOR UNSPECIFIED DIMENSIONS.				
-	08SEP2025	RELEASE FOR PRODUCTION	MBM	UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN MILLIMETERS GENERAL TOLERANCES: N/A	MAJOR DIMENSIONS = 0	THIRD ANGLE PROJECTION 		
A	13JAN2026	UPDATED DIMENSION LETTERING AND NOTES, SEE SHEET 2 AND 3	JGG		CRITICAL DIMENSIONS = 0			
B	23JAN2026	(C-4) "A MIN EDGE DISTANCE" REFERENCES UPDATED	JGG		CHARACTERISTICS COMPLY WITH KPS-80022			
					SCALE: 0.04	SHEET SIZE: B		SHEET: 1 OF 3
					TITLE: DIMENSION PRINT, SEISMIC CERTIFICATION			
				DRAWN: MBM	DATE:			
				APPROVED: SEE PLM SYSTEM	08SEP2025	DWG NO.: ADV-10136		
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SEISMIC INSTRUCTIONS

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SEISMIC INSTALLATION REQUIREMENTS

The following are requirements for seismic installation:

- 1. The design of post-installed anchors in concrete used for the component anchorage is pre-qualified for seismic applications in accordance with ACI355.2 (mechanical anchors) or ACI355.4 (adhesive anchors) and is to be installed according to an active ICC-ES ESR.
- 2. Anchors shall be installed to a nominal embedment depth as recommended in the preceding tables.
- 3. Anchors shall be installed in normal weight concrete with a minimum compressive strength as recommended in the preceding tables.
- 4. Anchors shall be installed to the torque specification as recommended by the anchor manufacturer to obtain maximum loading.
- 5. Anchors shall be installed in the locations specified on the ADV dimension print.
- 6. Anchors are specified in the preceding tables for size, type, brand, concrete strength, embedment depth, and edge distance.
- 7. Concrete floor slab and concrete housekeeping pads shall be designed and rebar-reinforced for seismic applications in accordance with ACI 318.
- 8. All housekeeping pad thicknesses shall be designed in accordance with the preceding tables or a minimum of 1.5x the anchor embedment depth, whichever is smaller.
- 9. All housekeeping pads shall be doweled or cast into the building structural floor slab and designed for seismic application per ACI 318 and as approved by the structural engineer of record.
- 10. Floor mounted equipment (with or without housekeeping pad) shall be installed to a rebar-reinforced structural concrete floor that is seismically designed and approved by the engineer of record to resist the added seismic loads from components being anchored to the floor. Rebar interference shall be considered.
- 11. Attaching seismic certified equipment to any floor other than those constructed of structural concrete and designed to accept the seismic loads from said equipment is not permitted by this specification and beyond the scope of this certification.
- 12. Attaching seismic certified equipment to any walls is not permitted by this specification and beyond the scope of this certification.
- 13. For rooftop installations, steel dunnage shall be coordinated with the Structural Engineer of Record.
- 14. For rooftop curb installations, coordinate with the curb manufacturer and the Structural Engineer of Record.
- 15. Mounting requirements details shall be approved by the Structural Engineer of Record.
- 16. Electrical wiring, piping, ductwork, and other connections to the equipment is the responsibility of the installing contractor. It is necessary that these remain intact, functional, and do not inhibit the functionality of the generator set after a seismic event. Adequate slack shall be allowed for generator set motion during a seismic event.
- 17. Concrete pad dimensions are minimum values to satisfy only the anchor bolt requirements. The pad shall be designed by the Structural Engineer of Record.
- 18. Anchorage recommendations are for the maximum seismic design levels shown. If the specific application has a lower level, thinner concrete or alternate anchors may be acceptable.

REV	DATE	ON COMPOSITE DWGS. SEE PART NO. FOR REVISION LEVEL □ INDICATES PART NUMBERS AFFECTED BY LATEST DRAWING REVISION	BY	DO NOT SCALE. THIS ASSEMBLY OR PART MUST COMPLY WITH PEP-RML-001. REFERENCE CAD MODEL FOR UNSPECIFIED DIMENSIONS.			
-	08SEP2025	RELEASE FOR PRODUCTION	MBM	UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN MILLIMETERS GENERAL TOLERANCES: N/A	MAJOR  = 0	THIRD ANGLE PROJECTION 	
A	13JAN2026	ADDED FULL NEW SET OF NOTES, SEE SHEET 1 AND 2	JGG		CRITICAL  = 0		
B	29JAN2026	SEE SHEET 1	JGG		CHARACTERISTICS COMPLY WITH KPS-8002		
					SCALE: 0.04 SHEET SIZE: B SHEET: 3 OF 3		
				DRAWN: MBM	DATE:	TITLE: DIMENSION PRINT, SEISMIC CERTIFICATION	
				APPROVED: SEE PLM SYSTEM	08SEP2025		
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Wiring Schematics

8	7	6	5	4	3	2	1
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UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES 1/8" TOLERANCES ARE: XXX.XX .010 XXX.X .015 XXX .020 SURFACE FINISH: A .8 (30) ☒		THUNDERBOLT, FIBERGLASS AND OTHER MATERIALS ARE NOT TO BE USED UNLESS THEY ARE APPROVED BY THE DESIGNER. ALL MATERIALS MUST BE USED IN ACCORDANCE WITH THE DESIGNER'S SPECIFICATIONS.			
APPROVALS AND DATES: DESIGNER: DATE: CHECKED: DATE: IN CHARGE: DATE: PROJECT: DATE: SUBMITTER: DATE:		TITLE: KD230-300 DIAGRAM, SCHEMATIC			
SCALE: 1/1 SHEET: 1 of 12		ADV-10105			

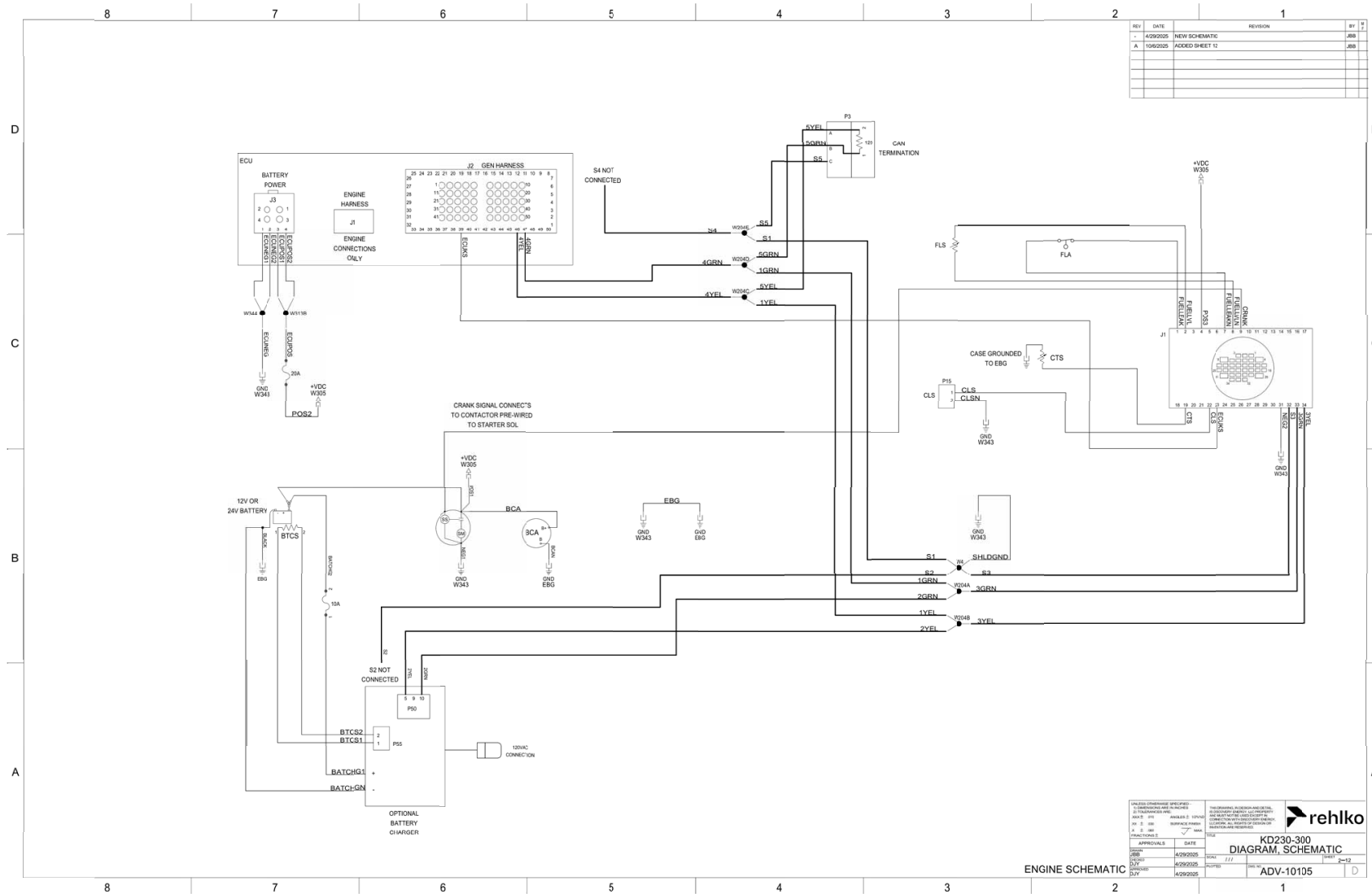
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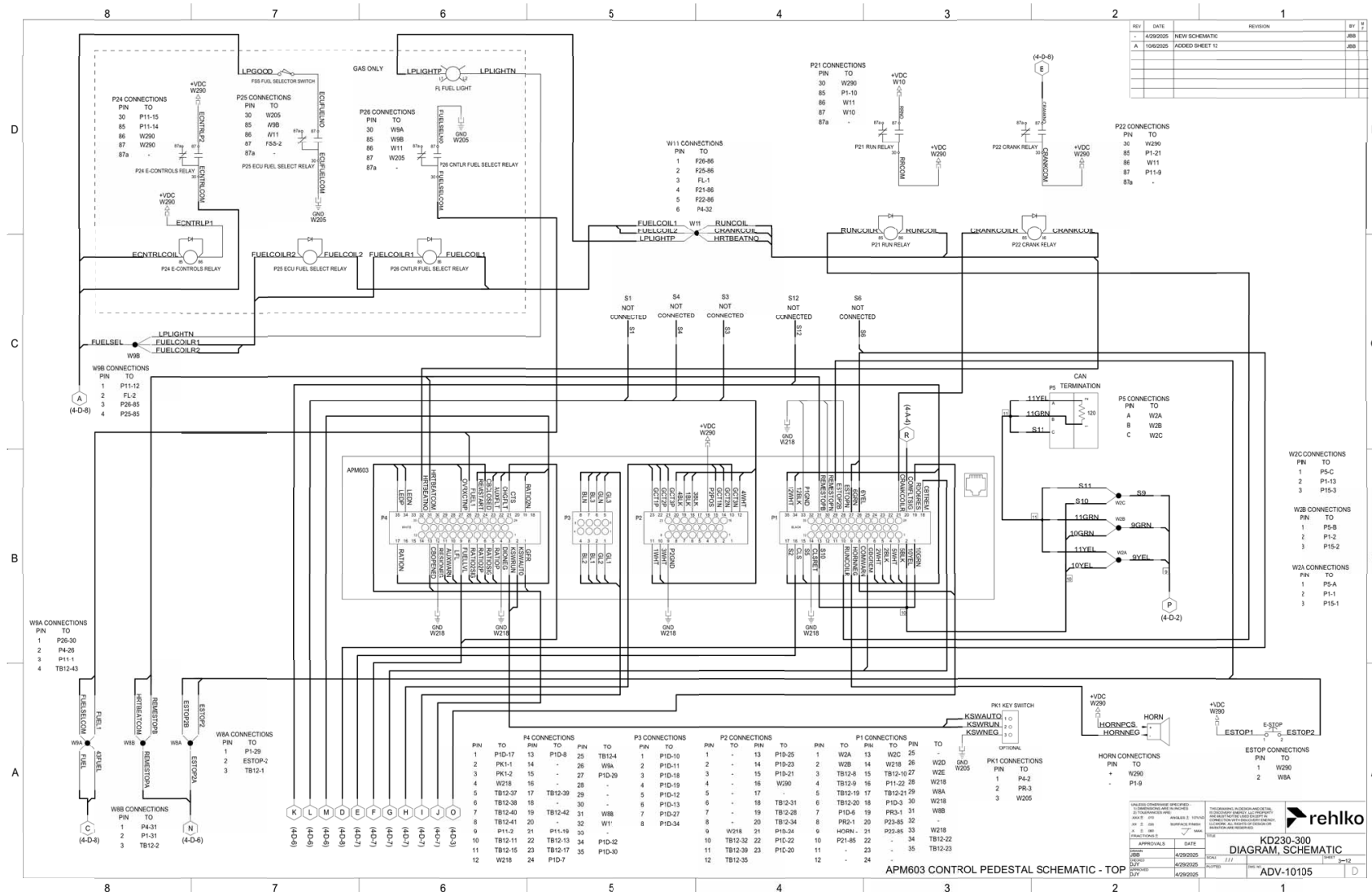
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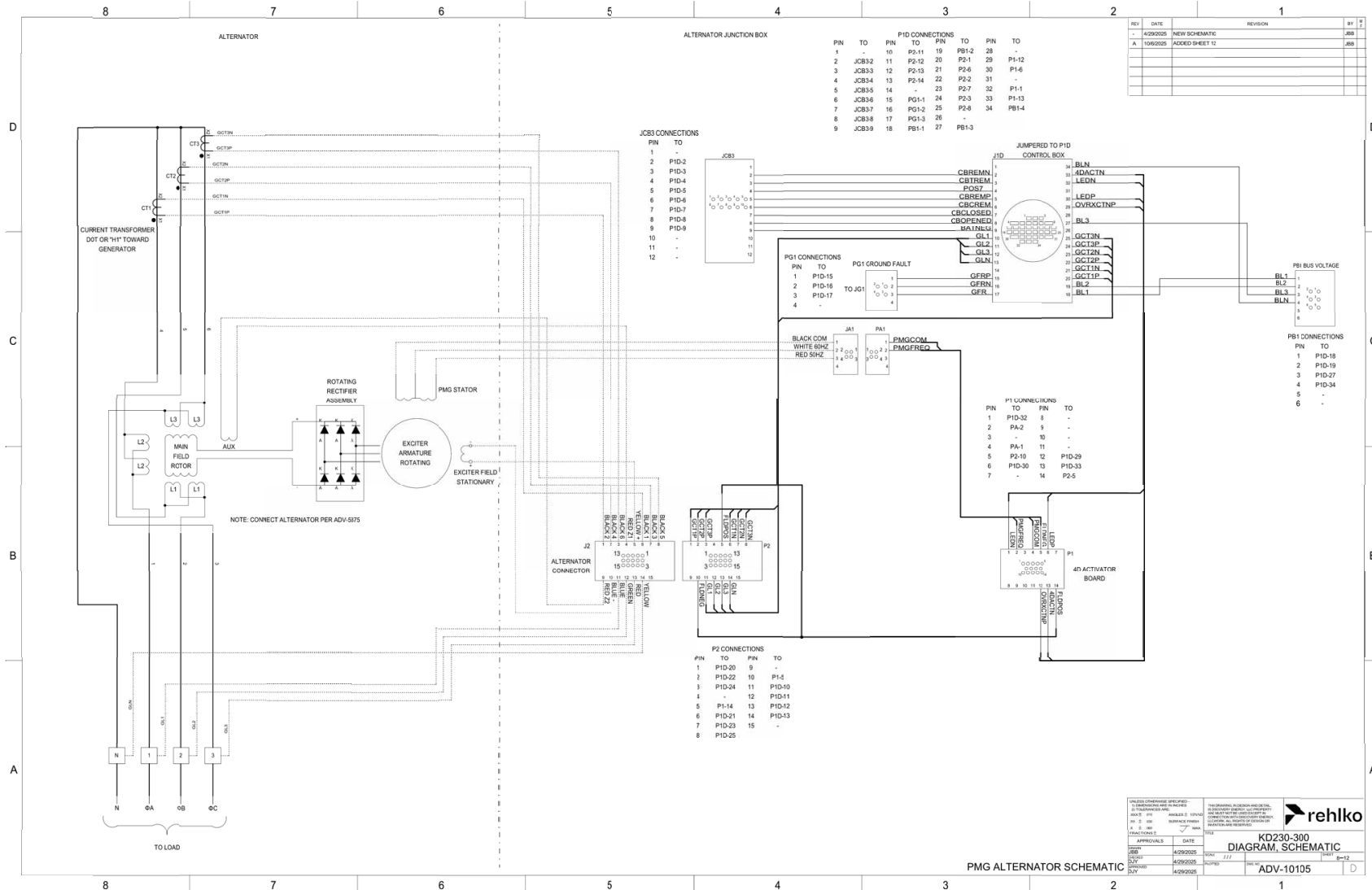
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4

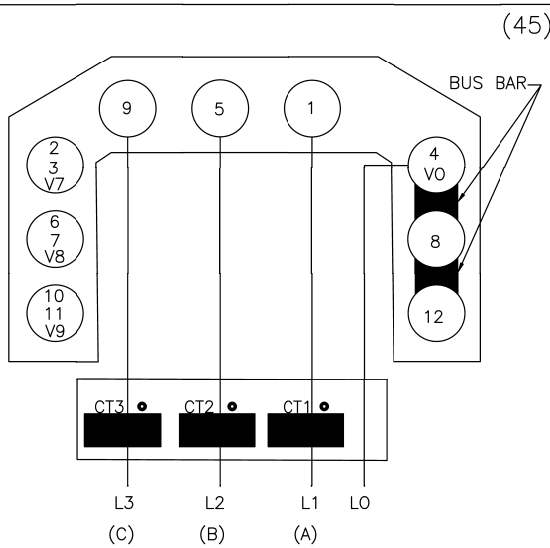
KD230-300		DIAGRAM, SCHEMATIC	
III		SHEET	1
REV	DATE	ADV-10105	





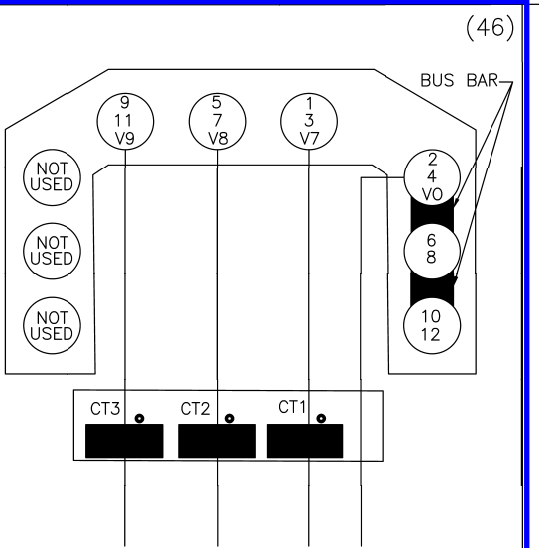
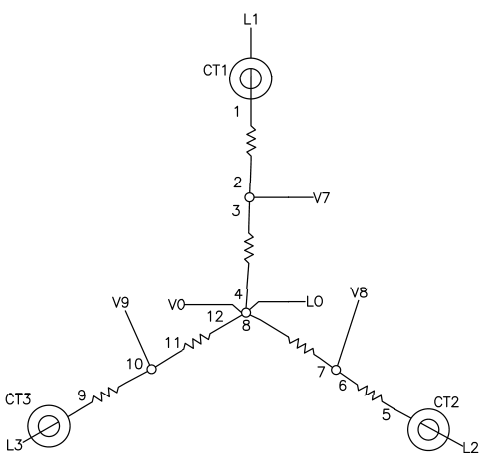


REV	DATE	REVISION	BY
AB	10-4-19	SEE SHEET 4 [CT199071]	DS
AC	02-25-20	SEE SHEET 5 [CT202143]	SBR
AD	3-30-23	(A-2-3) ADDED NOTES, SEE SHEETS 4 & 6 [CT228524]	SBR
AE	11-4-23	SEE SHEET 6 [CT231345]	SBR
AF	2-28-24	SEE SHEET 7 [CT233795]	FW
AG	70CT2024	SEE SHEET 2 [CT239467]	CJK
AH	18AUG2025	ADDED NEW ALTERNATOR DRAWING LAYOUT. [CT240078]	CJK



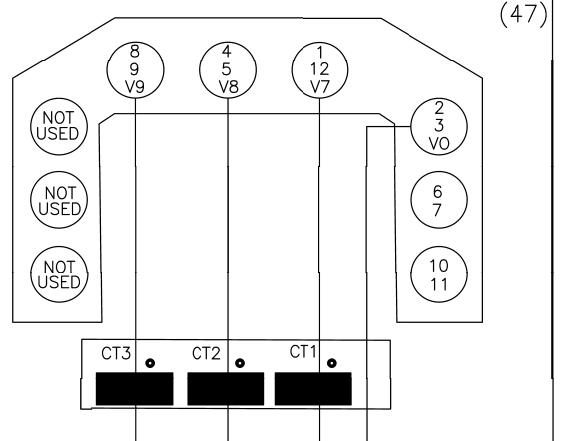
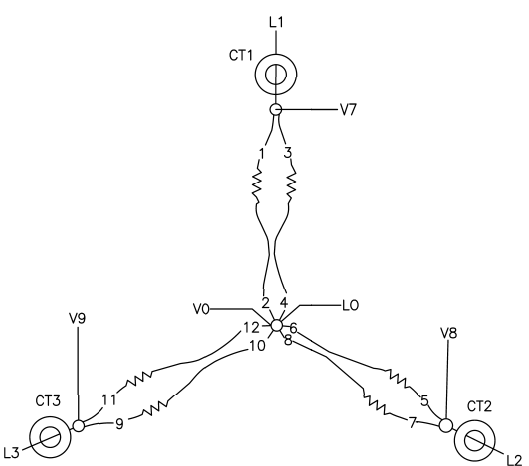
APM402

12 LEAD ALTERNATOR, 4 WIRE, HI WYE (45)
 60 HZ: 220/380V 50 HZ: 220/380V
 60 HZ: 240/416V 50 HZ: 230/400V
 60 HZ: 277/480V 50 HZ: 240/416V



APM402
APM603

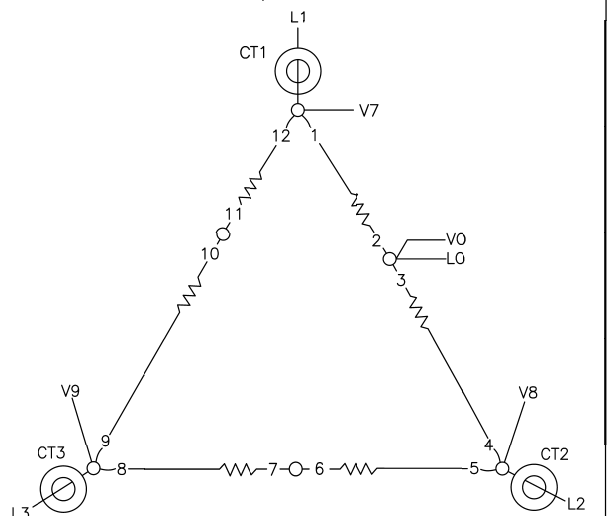
12 LEAD ALTERNATOR, 4 WIRE, LOW WYE (46)
 60 HZ: 120/208V 50 HZ: 110/190V
 60 HZ: 127/220V 50 HZ: 115/200V
 60 HZ: 139/240V 50 HZ: 120/208V



APM402
APM603

12 LEAD ALTERNATOR, 4 WIRE, DELTA (47)

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



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

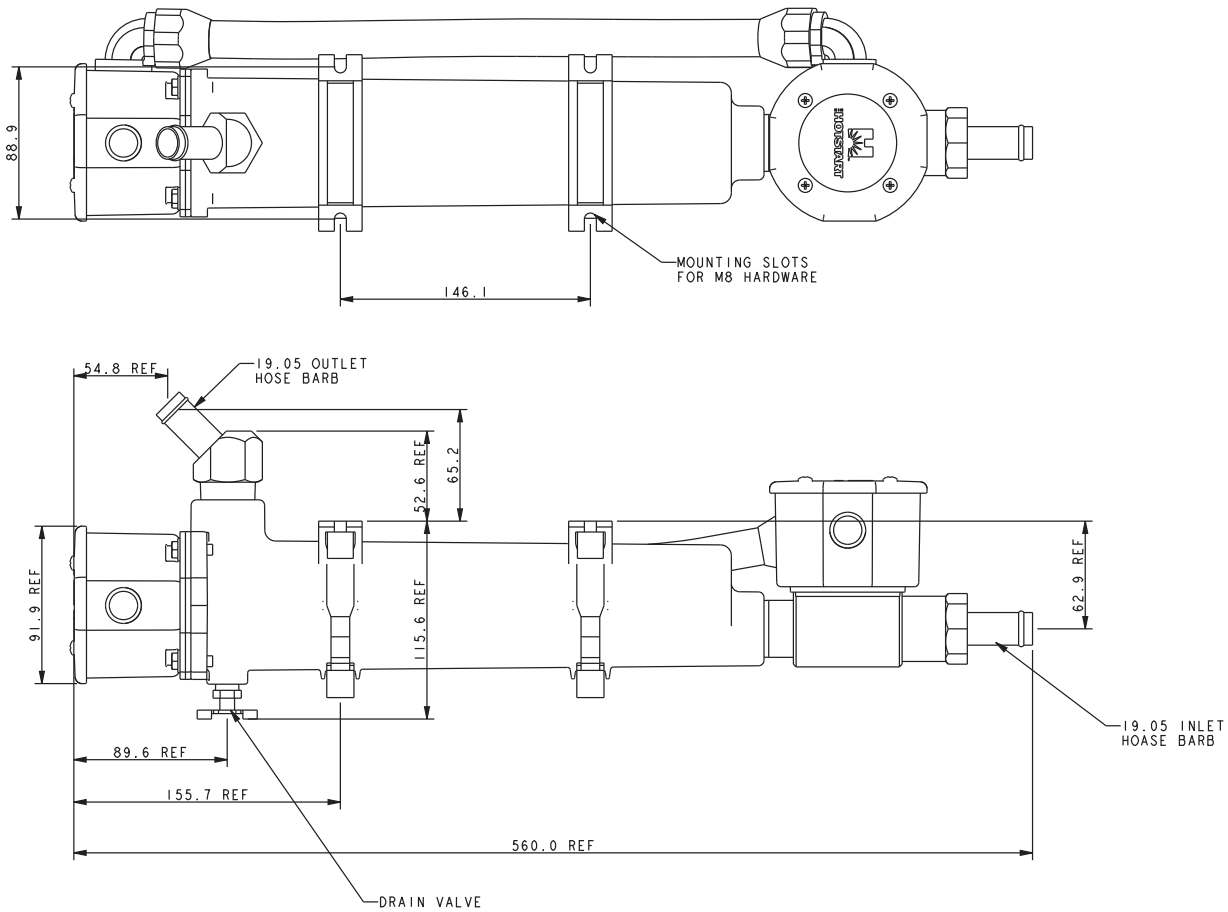
UNLESS OTHERWISE SPECIFIED - 1) DIMENSIONS ARE IN INCHES 2) TOLERANCES ARE: DIMENSIONS > 1/16" FRACTIONS ± .010 DIMENSIONS > 1/16" DECIMALS ± .005 SURFACE FINISH: 125 MATERIAL: ALUMINUM FINISH: ANODIZED		THIS DRAWING IS DESIGNED AND DETAIL BY REHLKO. IT IS THE PROPERTY OF REHLKO. IT IS NOT TO BE REPRODUCED, COPIED, OR USED IN ANY MANNER WITHOUT THE WRITTEN PERMISSION OF REHLKO. ANY VIOLATION OF THIS STATEMENT IS PROHIBITED.			
APPROVALS		DATE		TITLE	
DESIGNED	PHN	5-27-04	SCALE	NONE	13-16
CHECKED	IF	5-27-04	PLotted		
APPROVED	IF	5-27-04			

DIAGRAM,
ALTERNATOR CONNECTIONS

ADV-5875

Miscellaneous

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

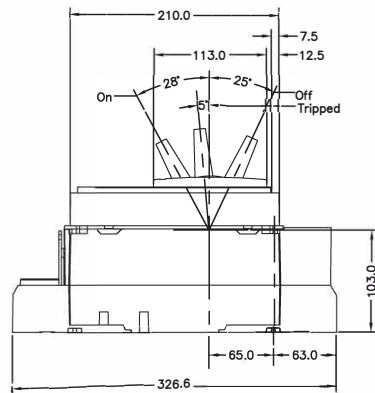


200/350 KW JD

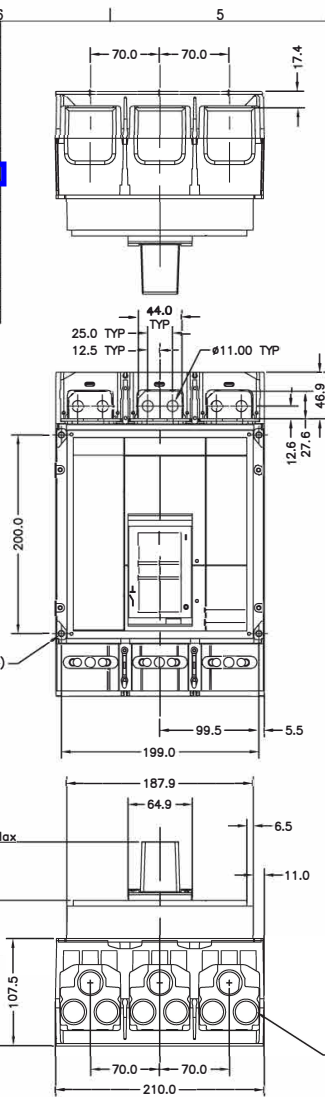
REV	DATE	ON COMPOSITE DWGS. SEE PART NO. FOR REVISION LEVEL	BY	UNLESS OTHERWISE SPECIFIED:	KOHLER CO. METRIC PRO-E
-	6-9-10	NEW DRAWING [89933-1]	SAM	1) DIMENSIONS ARE IN MILLIMETERS	
A	12-9-10	(D-8) ES-75616 ADDED. GM76113: 15.6/20.8 WAS 27.8/20.8. GM76114: 11.0/12.0 WAS 13.2/12.0. GM76115: 9.1/10.4 WAS 11.9/10.4. GM76116: 4.1/5.2 WAS 6.6/5.2 [90699]	SAM	2) XX ± 0.25 3) Y ± 0.15 4) Z ± 0.15 5) SURFACE FINISH ANGLES ± 0° 30' MAX.	THIS DRAWING IN DESIGN AND DETAIL IS KOHLER CO. PROPERTY AND MUST NOT BE USED EXCEPT IN CONNECTION WITH KOHLER CO. WORK. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED.
				APPROVALS	TITLE
				DATE	HEATER, BLOCK
				SAM	6-9-10
				JMS	6-9-10
				WRD	6-9-10
				SCALE	0.70 CAD NO.
				DWG NO.	GM76113
				SHEET	1 of 1
				DWG NO.	D

PART NO.	REV	AMPS	% RATING	GFI	INT@480V	TRIP	VENDOR NO.
GM24181-1	C	600	100	NO	35kA	5.0 LSI	PGP36060CU33A
GM24181-2	C	600	100	YES	35kA	6.0A LSIG	PGP36060CU44A
GM24181-3	C	800	80	NO	35kA	5.0 LSI	PGP36080CU33A
GM24181-4	C	800	80	YES	35kA	6.0A LSIG	PGP36080CU44A
GM24181-5	C	800	100	NO	35kA	5.0 LSI	PGP36080CU33A
GM24181-6	C	800	100	YES	35kA	6.0A LSIG	PGP36080CU44A
GM24181-7	C	1000	80	NO	35kA	5.0 LSI	PGP36100CU33A
GM24181-8	C	1000	80	YES	35kA	6.0A LSIG	PGP36100CU44A
GM24181-9	C	1000	100	NO	35kA	5.0 LSI	PGP36100CU33A
GM24181-10	C	1000	100	YES	35kA	6.0A LSIG	PGP36100CU44A
GM24181-11	C	1200	80	NO	35kA	5.0 LSI	PGP36120CU33A
GM24181-12	C	1200	80	YES	35kA	6.0A LSIG	PGP36120CU44A
GM24181-13	C	1200	100	NO	35kA	5.0 LSI	PGP36120CU33A
GM24181-14	C	1200	100	YES	35kA	6.0A LSIG	PGP36120CU44A
GM24181-15	D	1200	80	NO	65kA	5.0 LSI	PJP36120CU33A
GM24181-16	D	1200	80	YES	65kA	6.0A LSIG	PJP36120CU44A
GM24181-17	D	1200	100	NO	65kA	5.0 LSI	PJP36120CU33A
GM24181-18	D	1200	100	YES	65kA	6.0A LSIG	PJP36120CU44A

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

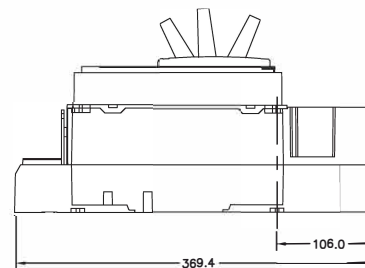


600-800A



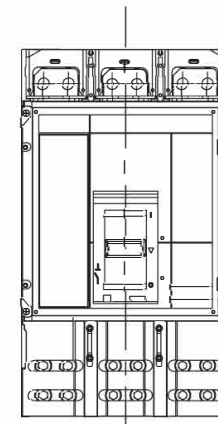
NOTE:
KOHLER PART # TO BE CLEARLY VISIBLE ON
CIRCUIT BREAKER AND ON INDIVIDUAL PACKAGING.

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.



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

REV	DATE	REVISION	BY
1	3-22-02	NEW DRAWING [86246]	WSD
2	8-12-03	(2-5) THREADED BAR NOTE ADDED. [70080]	WSD
3	11-12-03	(2-7) GM24181-13 GFI: NO WAS YES [70080]	WSD
4	2-23-07	(2-3) KOHLER NOTE ADDED [78285]	WSD
5	1-10-11	(2-5) GM24181-19 THRU -18 ADDED [80847-15]	WSD

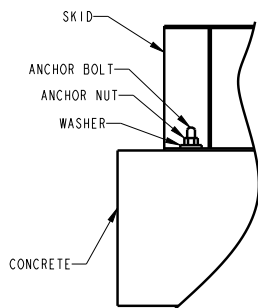


3/0-500 KCMIL (4)
PER PHASE LOAD SIDE

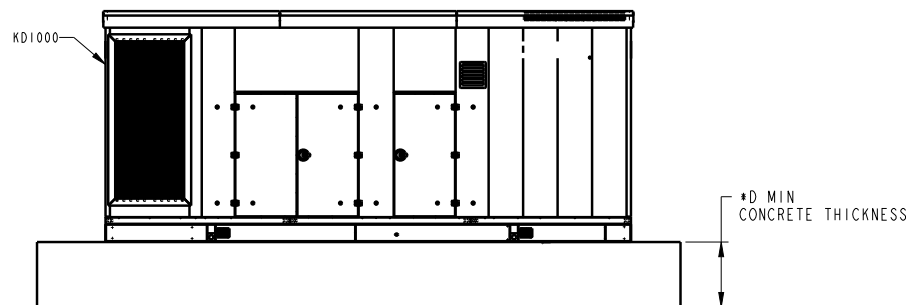
METRIC CAD FILE

SQUARE D P-FRAME CIRCUIT BREAKER
3 POLE ELECTRONIC TRIP

UNLESS OTHERWISE SPECIFIED - (1) DIMENSIONS ARE IN MILLIMETERS FRACTIONS ARE 16/1000 DECIMALS ARE 0.001 DIMENSIONS ARE TO FACE UNLESS NOTED OTHERWISE ALL DIMENSIONS OF PARTS ARE TO FACE UNLESS NOTED OTHERWISE		KOHLER CO POWER SYSTEMS, KOHLER, WI 53044 U.S.A. THE COMPANY IS NOT RESPONSIBLE FOR THE USE OF THIS DRAWING FOR ANY OTHER PURPOSE OR IN ANY OTHER MANNER. ALL RIGHTS OF INVENTION ARE RESERVED.	
TITLE: BREAKER, CIRCUIT DRAWN: WSD CHECKED: WSD APPROVED: A.H.		DATE: 3-22-02 DATE: 3-22-03 DATE: 3-22-03 PLANT: WSD	
ORDER NO.: GM24181-19 ORDER NO.: GM24181-19		ORDER NO.: GM24181-19 ORDER NO.: GM24181-19	



DETAIL A



SEE TABLE FOR UNIT SPECIFIC MOUNT INFORMATION.
UNIT SHOWN FOR REFERENCE ONLY.
REFER TO ENCLOSURE & TANKS ADV'S FOR MOUNTING LOCATIONS.

NOTE:

- 1) NO OTHER ANCHORS ARE ALLOWED WITHIN MINIMUM SPACING DISTANCE WITHOUT ADVANCED APPROVAL OF THE STRUCTURAL PROJECT ENGINEER OF RECORD.
- 2) SEE NOTES IN "WINDLOAD INSTALLATION REQUIREMENTS" SECTION.
- 3) SEISMIC CERTIFICATION ANCHORING ADV TAKES PRECEDENCE OVER WIND LOAD INSTRUCTION WHEN BOTH ARE REQUIRED

DIMENSIONS IN [] ARE INCH EQUIVALENT

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

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL [] INDICATES PART NUMBERS AFFECTED BY LATEST DRAWING REVISION	BY	DO NOT SCALE. THIS ASSEMBLY OR PART MUST COMPLY WITH PEP-RML-001. REFERENCE CAD MODEL FOR UNSPECIFIED DIMENSIONS.	MAJOR [] = [] CRITICAL [] = []	THIRD ANGLE PROJECTION
B	14APR2020	(A-1) ADDED NOTE 3; SHEET 5 WAS SHEET 4; SEE SHEET 2 [CT203349]	ZJS	UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN MILLIMETERS GENERAL TOLERANCES: N/A	CHARACTERISTICS COMPLY WITH NPS-80022	
C	03SEP2020	SEE SHEET 3 [CT206513]	RSG		SCALE: SHEET SIZE: B	SHEET: 1 OF 5
D	15JUL2022	(A-2) "PEP-RML-001" NOTE ADDED; SEE SHEET 3 [CT220994]	RVM			
E	28FEB2023	(A-1,2) "PEP-RML-001" NOTE REMOVED; SEE SHEET 3 [CT225762]	APB			
F	21NOV2025	SEE SHEET 2, 3 & 4	VSD			
THIS DRAWING IN DESIGN AND DETAIL IS DISCOVERY ENERGY, LLC PROPERTY AND MUST NOT BE USED EXCEPT IN CONNECTION WITH DISCOVERY ENERGY, LLC WORK. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED.				DRAWN: TKK APPROVED: SEE PLM SYSTEM 20DEC2018	DATE:	

WINDLOAD ANCHORAGE INSTRUCTION

reliko
TITLE:
DIMENSION PRINT,
WINDLOAD INSTRUCTION
DWG NO.: ADV-9107

GENSET MODELS		ENCLOSURE		FUEL TANK			ANCHORING SYSTEM PER ENGINEERING EXPRESS						
		TYPE	ADV	LITERS	GAL	ADV	A - ANCHOR		B - MIN IN. (EMBEDMENT)	C - MIN IN. (EDGE DISTANCE)	D - MIN IN. (CONCRETE THICKNESS)	NUMBER OF ANCHORS	
KG150-200		SOUND ALUMINUM	ADV-10131	NO TANK		ADV-10067	HILTI	KWIK BOLT TZ2 SS304 or SS316	0.75	4.5	6	6.75	
KD150-200	1155 (STANDARD)			305									
	1136 (STATE)			300									
	2423 (STANDARD)			640									
	2271 (STATE)			600									
	4656 (STATE)			1230									
230REOZJE 250REOZJE 276REOZJE		SOUND ALUMINUM	ADV-7644	NO TANK		ADV-7645	HILTI	KWIK BOLT TZ2	0.75	4.75	12	14	
	1787			472									
	2102			555									
	3573			944									
KD230-300	SOUND ALUMINUM	ADV-10132	NO TANK		ADV-10068	HILTI	KWIK BOLT TZ2 SS304 or SS316	0.75	4.5	6	6.75	12	
			1855 (STANDARD)										490
			1855 (STATE)										480
			3634 (STANDARD)										990
			3595 (STATE)										950
			7305 (STATE)										1930
300REOZJ	SOUND ALUMINUM	ADV-7644	NO TANK		ADV-7645	HILTI	KWIK BOLT TZ2	0.75	4.75	12	14	14	
			2067										546
			2102										555
			4066										1074
250REZXB 300REZXC	SOUND ALUMINUM	ADV-7718	NO TANK			HILTI	KWIK BOLT TZ2	0.75	4.75	10	12	8	
300-360REZXB	SOUND ALUMINUM	ADV-8162	NO TANK			HILTI	KWIK BOLT 3	0.75	5	12	12	8	
400-450REZXB		ADV-8163											
350REOZJB 400REOZJB 500REOZJB	SOUND LEVEL 2 ALUMINUM	ADV-8515	NO TANK		ADV-8528	HILTI	KWIK HUZ-EZ	0.75	4	6	8	14	
			1529-4394										404-1161
			5046										1333
			5765										1523
			6674										1763
			10008										2664
350REOZJ 400REOZJ 500REOZJ	SOUND LEVEL 2 ALUMINUM	ADV-7990	NO TANK		ADV-8045	HILTI	KWIK BOLT TZ2	0.75	4.75	6	8	12	
			1507										398
			1529										404
			1733										468
			1772										468
			2903										767
			2930										774
			3346										884
			3384										894
			4296										1135
			4395										1161
			4974										1314
			5046										1333
			5765										1523
			6674										1763
			10084										2664

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL. C INDICATES PART NUMBERS AFFECTED BY LATEST DRAWING REVISION	BY	THIS ASSEMBLY OR PART MUST COMPLY WITH PEP-RML-001. REFERENCE CAD MODEL FOR UNSPECIFIED DIMENSIONS.	MAJOR CRITICAL CHARACTERISTICS COMPLY WITH AP5-00022	THIRD ANGLE PROJECTION
C	03SEP2020	(C-8) 350-500REOZJC ROW ADDED [CT206513]	RSG	UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN MILLIMETERS GENERAL TOLERANCES: N/A DRAWN: TKK DATE: APPROVED: SEE PLM SYSTEM THIS DRAWING IN DESIGN DETAIL IS DISCOVERY ENERGY, LLC PROPERTY AND MUST NOT BE USED EXCEPT IN CONNECTION WITH DISCOVERY ENERGY, LLC WORK. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED.	0	
D	15JUL2022	(B-8) KD610-750 ADDED; SEE SHEET I [CT220994]	RVM		0	
E	28FEB2023	(B-8) KD700-750 WAS KD610-750; SEE SHEET I [CT225762]	APB			
F	21NOV2025	(D,C-8) KG150-200, KD150-200, KD230-300 & 300REOZJ ADDED; SEE SHEET I [CT225762]	VSD			
WINDLOAD ANCHORAGE INSTRUCTION					TITLE: DIMENSION PRINT, WINDLOAD INSTRUCTION DWG NO.: ADV-9107	

WINDLOAD ANCHORAGE INSTRUCTION

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL □ INDICATES PART NUMBERS AFFECTED BY LATEST DRAWING REVISION	BY	DO NOT SCALE. THIS ASSEMBLY OR PART MUST COMPLY WITH PEP-RML-001. REFERENCE CAD MODEL FOR UNSPECIFIED DIMENSIONS.			
C	03SEP2020	(C-8) 350-500REOZJC ROW ADDED [CT206513]	RSG	UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN MILLIMETERS GENERAL TOLERANCES: N/A	MAJOR DIMENSIONS CRITICAL DIMENSIONS		THIRD ANGLE PROJECTION 
D	15JUL2022	(B-8) KD610-750 ADDED; SEE SHEET 1 [CT220994]	RVM		CHARACTERISTICS COMPLY WITH NPS-80022		
E	28FEB2023	(B-8) KD700-750 WAS KD610-750; SEE SHEET 1 [CT225762]	APB		SCALE: SHEET SIZE: B		SHEET: 3 OF 5
F	21NOV2025	(D,C-8) KG150-200, KD150-200, KD230-300 & 300REOZJ ADDED; SEE SHEET 1 [CT225762]	VSD		DRAWN: TKK	DATE: 12DEC2018	
THIS DRAWING IN DESIGN DETAIL IS DISCOVERY ENERGY, LLC PROPERTY AND MUST NOT BE USED EXCEPT IN CONNECTION WITH DISCOVERY ENERGY, LLC WORK. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED.				APPROVED: SEE PLS SYSTEM			

WIND INSTALLATION REQUIREMENTS:

The following are requirements for wind-rated installation:

1. The design of post-installed anchors in concrete used for the component anchorage has been evaluated by this engineer for wind applications in accordance with ASCE 7 as reference herein
2. Anchors must be installed in minimum 4000 psi compressive strength normal weight concrete. Concrete aggregate must comply with ASTM C33. Installation in structural lightweight concrete is not permitted unless otherwise approved by the structural engineer of record.
3. Anchors must be installed to the torque specification as recommended by the anchor manufacturer to obtain maximum loading.
4. Anchors must be installed in the locations specified in the ADV dimension print in correlation with signed and sealed engineering herein. The more stringent requirement from either document shall apply in cases of uncertainty.
5. Anchor plates from must be installed at each anchor location between anchor head and equipment for tension load distribution.
6. Concrete floor slab and concrete housekeeping pads must be designed and rebar reinforced for wind applications in accordance with ACI 318 and ASCE 7 as referenced herein
7. All housekeeping pad thicknesses must be designed in accordance with pre-qualification test report or a minimum of 1.5x the anchor embedment depth, whichever is largest.
8. All housekeeping pads must be doweled or cast into the building structural floor slab and designed for wind application per appropriate code requirements for the subject jurisdiction and as approved by the structural engineer of record.
9. Wall mounted equipment must be installed to a rebar reinforced structural concrete wall that is designed for wind applications and approved by the engineer of record to resist the added wind loads from the components being anchored to the wall.
10. Floor mounted equipment (with or without housekeeping pad) must be installed to a rebar reinforced structural concrete floor that is designed for wind applications and approved by the engineer of record to resist the added wind loads from components being anchored to the floor.
11. When installing to a floor, rebar interference must be considered.
12. Attaching equipment to any floor other than those constructed of structural concrete and designed to accept the wind loads from said equipment is not permitted by this specification and beyond the scope of this certification.
13. Attaching equipment to any concrete block walls or cinder block walls is not permitted by this specification and beyond the scope of this certification.
14. For installations upon rooftop are not permitted by this specification and beyond the scope of this certification.
15. Installation upon only rooftop curb shall be coordinated with the curb manufacturer and the Structural Engineer of Record. Any curb or concrete pad that supports the RTU unit is beyond the scope of this certification.
16. Anchor locations, size, type and load requirements shall be as specified on the certified installation specification. Mounting requirements details such as brand, type, embedment depth, edge spacing, anchor spacing, concrete strength, wall bracing, and special inspection must be outlined and approved by the project Structural Engineer of Record to withstand the wind anchor loads as defined on the certified installation specification. The installing contractor is responsible for the proper installation of all anchors and mounting hardware, observing the mounting requirement details outlined by the Engineer of Record. Contact if a detailed Wind Installation Calculation Package is required.
17. Electrical wiring, piping, duct and other connections to the equipment is the responsibility of the installing contractor. It is necessary that these remain intact, functional and do not inhibit the functionality of the generator set after a wind event.
18. *Concrete pad dimensions are minimum values to satisfy only the anchor bolt requirements. The pad must be designed by the project structural engineer of record.
19. *Anchor bolt and concrete recommendations are for the maximum wind design levels shown. If the specific application has a lower level, thinner concrete or alternate anchors may be acceptable. Consult.

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL □ INDICATES PART NUMBERS AFFECTED BY LATEST DRAWING REVISION	BY	DO NOT SCALE. THIS ASSEMBLY OR PART MUST COMPLY WITH PEP-RML-001. REFERENCE CAD MODEL FOR UNSPECIFIED DIMENSIONS.	rehlko
-	20DEC2018	NEW DRAWING [CT192592]	TKK	UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN MILLIMETERS GENERAL TOLERANCES: N/A	MAJOR ○ = 0 CRITICAL ● = 0 THIRD ANGLE PROJECTION
A	30MAY2019	SEE SHEET 2 & 3 [CT195436]	MYT		CHARACTERISTICS COMPLY WITH KPS-80022
B	14APR2020	SEE SHEET 2 [CT203349]	ZJS		SCALE: SHEET SIZE: B SHEET: 5 OF 5
C	03SEP2020	SEE SHEET 3 [CT206513]	RSG		TITLE: DIMENSION PRINT, WINDLOAD INSTRUCTION
D	15JUL2022	SEE SHEET 1 & 3 [CT220994]	RVM		DWG NO: ADV-9107
E	28FEB2023	SEE SHEET 1 & 3 [CT225762]	APB	DRAWN: TKK DATE:	
F	21NOV2025	SEE SHEET 2,3 & 4	VSD	APPROVED: SEE PLM SYSTEM 20DEC2018	

WINDLOAD ANCHORAGE INSTRUCTION

THIS DRAWING IN DESIGN AND DETAIL IS DISCOVERY ENERGY, LLC PROPERTY AND MUST NOT BE USED EXCEPT IN CONNECTION WITH DISCOVERY ENERGY, LLC WORK. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED.

Warranty

Stationary Standby Industrial Generator Set Extended Five-Year or Three Thousand (3000)-Hour Comprehensive Limited Warranty

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

Product

Stationary Standby Generator Set & Accessories

Warranty Coverage

Five (5) years from registered startup or three thousand (3000) hours
whichever occurs first

Extended warranty purchase must take place prior to expiration of standard warranty. Extended warranty is effective upon submission of purchase order in the online warranty system.

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

- ☐ Normal wear, routine tuneups, tuneup parts, adjustments, and periodic service.
- ☐ Damage including but not limited to damage caused by accidents, improper installation or handling, faulty repairs not performed by an authorized service representative, improper storage, or acts of God.
- ☐ Damage caused by operation at speeds or with fuel loads, conditions, modifications or installation contrary to published specifications.
- ☐ 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).
- ☐ Damage to exterior or interior components resulting from extreme environmental conditions including but not limited to heat, cold, humidity, flooding, salt, and high winds.
- ☐ Damage caused by operation when emergency battle mode is enabled.
- ☐ Original installation charges and startup costs.
- ☐ Starting batteries and the following related expenses:
 - a. Labor charges related to battery service.
 - b. Travel expenses related to battery service.
- ☐ Engine coolant heaters, heater controls, and circulating pumps after the first year of the warranty period.
- ☐ Additional expenses for repairs performed after normal business hours, i.e. overtime or holiday labor rates.
- ☐ Rental of equipment during the performance of warranty repairs.
- ☐ Removal and replacement of non-Rehko supplied options and equipment.
- ☐ Non-Rehko replacement parts. Replacement of a failed part with a non-Rehko part voids the warranty on that part.
- ☐ Radiators replaced rather than repaired.
- ☐ Fuel injection pumps not repaired by an authorized service representative.
- ☐ Non-Rehko authorized repair shop labor without prior approval from the manufacturer Warranty Department.
- ☐ Engine fluids such as fuel, oil, or coolant/antifreeze.
- ☐ Shop supplies such as adhesives, cleaning solvents, and rags.
- ☐ Expenses incurred investigating performance complaints unless the problem is caused by defective materials or workmanship.
- ☐ Maintenance items such as fuses, lamps, filters, spark plugs, loose or leaking clamps, and adjustments.
- ☐ Travel time and mileage exceeding 100 miles round trip.

To obtain warranty service, call 1-800-888-8888 for your nearest authorized service representative or write the manufacturer Service Department, MS 1000, Oiler, WI 53001, USA.

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

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

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

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



Discovery Energy LLC
1000 Twin Oaks Road, Oiler, WI 53001, USA
For the nearest sales and service outlet in the
US and Canada, please call 1-800-888-8888
powersystems.rehko.com

TP 1000 1000

Stationary Standby Industrial Generator Set Five-Year or 2500-Hour Comprehensive Limited Warranty for KD Model Generator Sets (600 kW and Under) with a Service Contract

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

Product

Stationary Standby KD Model Generator Set, 600 kW and under, & Accessories

Warranty Coverage

Five (5) years from registered startup or two thousand five hundred (2500) hours (whichever occurs first).

A service contract with a Rehlko authorized distributor or dealer must be in place within 12 months of the registered start up. Extended warranty is effective upon submission of service contract documentation in the manufacturer's online warranty system.

To remain eligible for the five-year comprehensive limited warranty coverage:

- The original end user must maintain continuous enrollment in the service contract throughout the entire warranty period.
- Failure to follow scheduled service intervals, cancellation of the service contract, or non-payment may lead to suspension or termination of warranty coverage.
- All maintenance activities must utilize Genuine Rehlko parts, purchased from Rehlko authorized distributor and be performed exclusively by a Rehlko distributor or dealer following manufacturer-recommended procedures. Any unauthorized repairs, modifications, or use of non-genuine parts may result in the voiding of the warranty.

Standby rated generators may only be used in Stationary "emergency" applications, where the generator set is the secondary power source, and a dependable utility is the primary power source. Use of a standby rated generator in a stationary "non-emergency" application, or any non-stationary application, is not allowed and voids all factory warranties.

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

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

To obtain warranty service, call 1-800-544-2444 for your nearest authorized service representative.

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

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

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

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



Certification

Certificate of Registration

QUALITY MANAGEMENT SYSTEM - ISO 9001:2015

This is to certify that:

Discovery Energy
Rehko
N7650 Lakeshore Road
Sheboygan
Wisconsin
53083
USA

Holds Certificate No:

FM 727336

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

Design, manufacture, and distributor support for electrical generators, alternators, fuel tanks, automatic transfer switches and switchgear, including the manufacture of leads and harness, skids, and fabricated components with distribution of generator sets supported by warehouse operations.

For and on behalf of BSI:



Jessica Patel, Senior Vice President, Assurance Americas

Original Registration Date: 1995-02-28

Latest Revision Date: 2025-12-03

Effective Date: 2024-11-07

Expiry Date: 2027-11-06

Page: 1 of 2



...making excellence a habit.™

Certificate No: **FM 727336**

Location	Registered Activities
Discovery Energy Rehlko - GK 200 Twin Oaks Road Kohler Wisconsin 53004 USA	Manufacture of leads and harness, automatic transfer switches and switchgear. Distribution of generator sets.
Discovery Energy Rehlko N7650 Lakeshore Road Sheboygan Wisconsin 53083 USA	Design, manufacture, and distributor support for electrical generators, automatic transfer switches and switchgear.
Discovery Energy Rehlko 300 N Dekora Woods Blvd Saukville Wisconsin 53080 USA	Manufacture of fuel tanks, skids, fabricated components and generators.
Discovery Energy Rehlko Muth Warehouse 2821 Muth Court Sheboygan Wisconsin 53083 USA	The distribution of generator sets.
Discovery Energy Rehlko KWIP Warehouse 4327 County EE Sheboygan Wisconsin 53081 USA	Receiving, sequencing and warehousing of generator components.

Original Registration Date: 1995-02-28

Latest Revision Date: 2025-12-03

Effective Date: 2024-11-07

Expiry Date: 2027-11-06

Page: 2 of 2

This certificate remains the property of BSI and shall be returned immediately upon request.

An electronic certificate can be authenticated [online](https://www.bsigroup.com/ClientDirectory). Printed copies can be validated at www.bsigroup.com/ClientDirectory

To be read in conjunction with the scope above or the attached appendix.

Information and Contact: BSI, Kitemark Court, Davy Avenue, Knowlhill, Milton Keynes MK5 8PP. Tel: + 44 345 080 9000

BSI Assurance UK Limited, registered in England under number 7805321 at Seventh and Eighth Floors, The Acre, 90 Long Acre, London, WC2E 9RA, UK.

A Member of the BSI Group of Companies.

Technical Evaluation Report

DIVISION: 48 10 00–ELECTRICAL POWER GENERATION EQUIPMENT

THIS DOCUMENT CONTAINS (13) PAGES.
ENGINEER DIGITAL OR ORIGINAL HAND SEAL REQUIRED FOR USE.
COPIES ARE NOT VALID FOR PERMIT.EVALUATION SUBJECT: **KD230-300 ALUMINUM ENCLOSURES**

TER-25-89047

REPORT HOLDER:DISCOVERY ENERGY, LLC.
200 TWIN OAKS ROAD
KOHLER, WI 53044, USA**ALL CERTIFICATIONS:** STATIC WIND, MISSILE IMPACT (LEVEL E), CYCLIC WIND, & ANCHORAGE

(SEE ENCLOSURE DEPICTIONS HEREIN)

SCOPE OF EVALUATION (compliance with the following codes):

THIS IS A STRUCTURAL PERFORMANCE EVALUATION ONLY.
NO ELECTRICAL OR TEMPERATURE PERFORMANCE RATINGS OR CERTIFICATIONS ARE OFFERED OR IMPLIED HEREIN.
UNDER NO CIRCUMSTANCE DOES THIS PERFORMANCE EVALUATION GUARANTEE, IMPLY, OR STATE PERFORMANCE OF THE UNIT IS MAINTAINED DURING OR AFTER A DESIGN EVENT.

This Product Evaluation Report is being issued in accordance with the requirements of the **Florida Building Code Eighth Edition (2023)** per ASCE 7, FBC Building Ch. 16, FBC Building Sections 104.11, 453.25.5 & 1522.2, FBC Existing Building Sections 707.1 & 707.2, FBC Mechanical 301.15, FBC Residential M1202.1 & M1301.1, FS 471.025, and Broward County Administrative Provisions 107.3.4. This report is also in accordance with the **International Building & Residential Codes (2015, 2018, 2021, & 2024)**. The product noted in this report has been tested/evaluated as summarized herein. **IN ACCORDANCE WITH THESE CODES EACH OF THESE REPORTS MUST BEAR THE ORIGINAL SIGNATURE & RAISED SEAL OR DIGITAL SEAL OF THE EVALUATING ENGINEER.**

SUBSTANTIATING DATA:• **Product Evaluation Documents**

Substantiating documentation has been submitted to provide this TER and is summarized in the sections below.

Test Reports: i4190.01-109-18-r0, i4981.02-109-18-r0,
i4981.03-109-18-r1, i4981.04-109-18-r0,
i7639.01-109-18-r1, & i8180.01-109-18-r0, all tests by Intertek.

• **Structural Engineering Calculations**

Product testing and structural engineering calculations have been prepared which evaluate the product based on:

1. Rational analysis to qualify the following design criteria:
 - Max. rated allowable (ASD) lateral & uplift wind pressures
 - Max. allowable sliding forces, uplift forces, & overturning moments (see Unit Rxns. Guide on last page)
 - Tie-down configuration and anchor capacity for included unit, tank, and I-beam anchoring as specified herein (tank integrity, I-beam integrity, and host integrity by others)
 - Unit integrity via FEA on unit framing/housing & connections.
2. Comparative analysis (per FBC Building § 1709.5.1) to qualify:
 - Max. Missile Impact Rating per TAS 201 – Level “E”
 - Max. Cyclic Wind Pressures per TAS 203 & FBC Table 1625.4, as shown in the “Structural Performance” section on this page.

Calculation summary is included and appears herein.

LIMITATIONS & CONDITIONS OF USE:

Use of the product(s) listed herein shall be in strict accordance with this TER as noted herein and manufacturer-provided model specifications. Installation shall conform to the minimum standards stated in the referenced building code(s) in addition to the specifications and limitations stated herein. See herein for complete limitations & conditions of use.

OPTIONS:

This evaluation is valid for the models described herein. This evaluation includes standard product only. The critical unit designs have been determined and used in this evaluation. Enclosure and tank designs shall follow this TER's limitations and the documentation supplied to Engineering Express. Any structural changes outside of the design as described therein would void this certification. Contact Rehiko for Engineering Special (ES) orders and more information.

STRUCTURAL PERFORMANCE:

Models referenced herein are subject to the following design limitations:

Maximum-Rated ASD Static Wind Pressures*:
± 61 psf Lateral, 61 psf Uplift

Maximum pressure rating determined based on the design parameters of:
Vult = 200 mph, Exposure D, flat terrain, at-grade.

- Required design wind pressures shall be determined according to the guide provided in the Appendix (see last page of this document) or on a site-specific basis in accordance with ASCE 7 and applicable sections of the building code(s) being referenced in accordance with ASD methodology.
- Required design wind pressures shall be less than or equal to the maximum pressures listed herein.
- *Maximum-Rated ASD Static Wind Pressures indicate the maximum pressures that all units listed herein are approved for. Valid for at-grade applications only. See limitations herein.
- Valid for use inside and outside the High-Velocity Hurricane Zone (HVHZ).
- Site-specific wind analysis may produce alternate limitations provided that the maximum-rated wind pressures stated herein are not exceeded.

Maximum Allowable (ASD)
Cyclic Wind Pressures
Wall Panels/Doors/Louvers: ± 39 psf
Roof Panels: ± 60 psf

Maximum Missile
Impact Rating:
Missile Level “E”

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EVALUATION SUMMARY

Engineering Express has reviewed the design requirements per the referenced building code and ASCE 7 for the structural integrity of the Rehlko aluminum enclosure with steel skid to withstand the maximum uniform static wind pressures, Missile Level "E" large missile impacts, and maximum cyclic wind pressures stated herein. The analysis forming the basis of this certification includes the unit framing and housing only and requires a permanent near-grade (non-rooftop) attachment to a concrete, metal, or wood host structure as certified/verified by others. Steel skid tie-down anchor locations shall conform to the Rehlko documentation referenced herein. Additionally, the unit shall not be installed in a location susceptible to channeling effects from upwind obstacles. It shall be the installer's responsibility to ensure that the criteria for the unit housing integrity, as listed above, is applicable for use at the location of installation and that the mounting method meets or exceeds the requirements of the local code and it is approved by the appropriate local authority prior to installation.

This certification is intended to certify the structural capacity and integrity of the structural framing members, wall and roof sheet metal panels, generator skid, and internal structural connections only for the aluminum enclosures listed herein to resist the stated maximum ASD uniform static wind pressures, Missile Level "E" large missile impacts, and maximum ASD cyclic wind pressures stated herein. Design of the generator itself, mechanical designs, energy/electrical criteria, generator slab support, accompanying anchorage components not specified herein, and all non-structural items shall be verified by others and are outside the scope of this certification. Upon analysis of the aluminum housing unit vs. the critical ASD design loads illustrated herein, this engineer has concluded that the aluminum housing enclosure provides adequate resistance to the stated maximum ASD uniform static wind pressures. Upon review of the results shown on the referenced test reports and comparative analysis to the tested enclosures referenced in said test reports, this engineer has concluded that the aluminum housing enclosure provides adequate resistance to the specified missile impact and ASD cyclic loads.

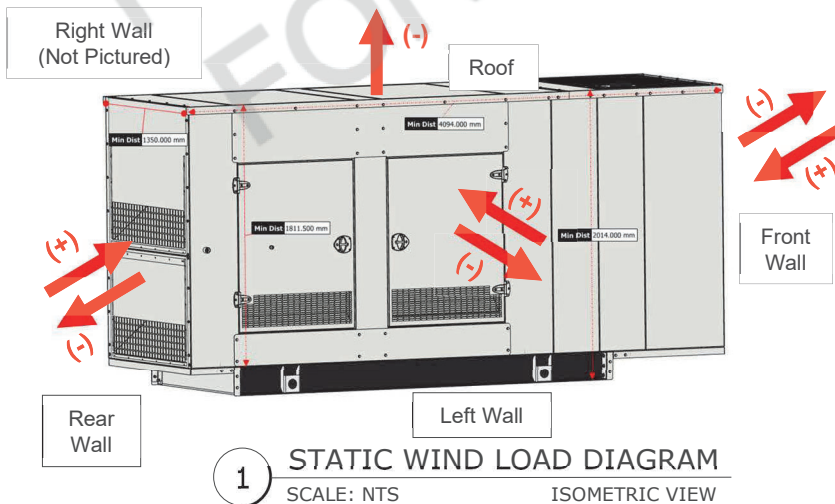
All installation work shall follow the minimum requirements of the referenced building code(s) as are applicable, in addition to any additional site-specific requirements not covered by this evaluation. Except as expressly provided herein, no additional affirmations are intended.

The enclosures' deformation after a design event is a serviceability element. Testing showed that deformations are present; however, such deformations did not cause the components to detach, dislodge, or otherwise separate from the assembly. Moreover, no critical component limit was reached due to the resultant deflection.

STRUCTURAL ENGINEERING CALCULATIONS: UNIFORM STATIC WIND LOADING (PAGE 1 OF 2)

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

1. Maximum allowable (ASD) design pressures, as evaluated below:



Load Case	ASD Wind Pressure, psf (x 10 ⁻³ MPa)	Acting On:
1	- 61 (- 2.921)	Right Wall
2	- 61 (- 2.921)	Rear Wall
3	- 61 (- 2.921)	Front Wall
4	- 61 (- 2.921)	Roof

The arrows shown in Detail 1 represent wind pressures acting on the unit. The direction of loading is shown in parentheses adjacent to the arrow. For lateral wind loading, wind pressure acts either positively, "pushing" inwards into the wall of interest, or negatively, "pulling" outwards in suction on the wall of interest. For uplift wind loading, wind pressure acts upwards, "pulling" the roof panels in suction, and are designated as negative wind loads.

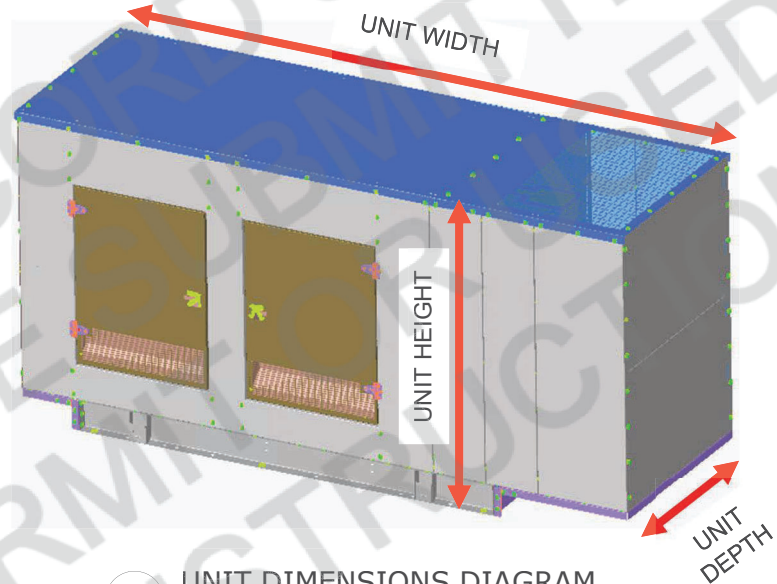
STRUCTURAL ENGINEERING CALCULATIONS: UNIFORM STATIC WIND LOADING (PAGE 2 OF 2)

FEA was performed on the structural enclosure design in accordance with ASCE 7. Multiple load cases were evaluated to consider the worst-case wind loads acting on each side of the unit to provide a collective unit integrity certification. Lateral loading on the Left Wall of the enclosure was purposefully omitted, as the Left Wall of the enclosure almost identical in design to the Right Wall, and thus, can be qualified by evaluation of the Right Wall. (The Right Wall has one solid door without grating). Acting wind pressures in each load case are tabulated in the table on the previous page. Negative wind loads were considered to govern over positive wind loads (positive loading will have the beneficial resistance of the structural framing and other non-structural interior components).

2. Maximum nominal unit dimensions:

Enclosure Models	Enclosure Dimensions, in (mm)		
	Width	Depth	Height
KD230-300	162 (4094)	54 (1350)	80 (2014)

Unit dimensions listed herein are unit net/operating dimensions (as opposed to gross/packing/shipping dimensions). Unit dimensions may be abbreviated herein as "H" for "unit height", "W" for "unit width", and "D" for "unit depth". Unit dimensions are rounded up to the next inch based on the specified millimeter dimensions. For exact enclosure assembly dimensions, consult the respective drawing/files listed in the "Units Included" section herein.



2

UNIT DIMENSIONS DIAGRAM

SCALE: NTS

ISOMETRIC VIEW

3. Permissible net weight range:

The total combined unit net weight (enclosure, skid, and genset) shall be 1,000 lb min. (454 kg min.). Tank dry weight shall be per the Fuel Tanks Included schedule table herein. Weights less than these minimum values shall be approved by this office.

4. Connection capacities:

Connection capacities, including bolted and welded components, have been checked for applicable tension and shear by applying a unity interaction equation where applicable and have been approved by this office.

5. Material capacities:

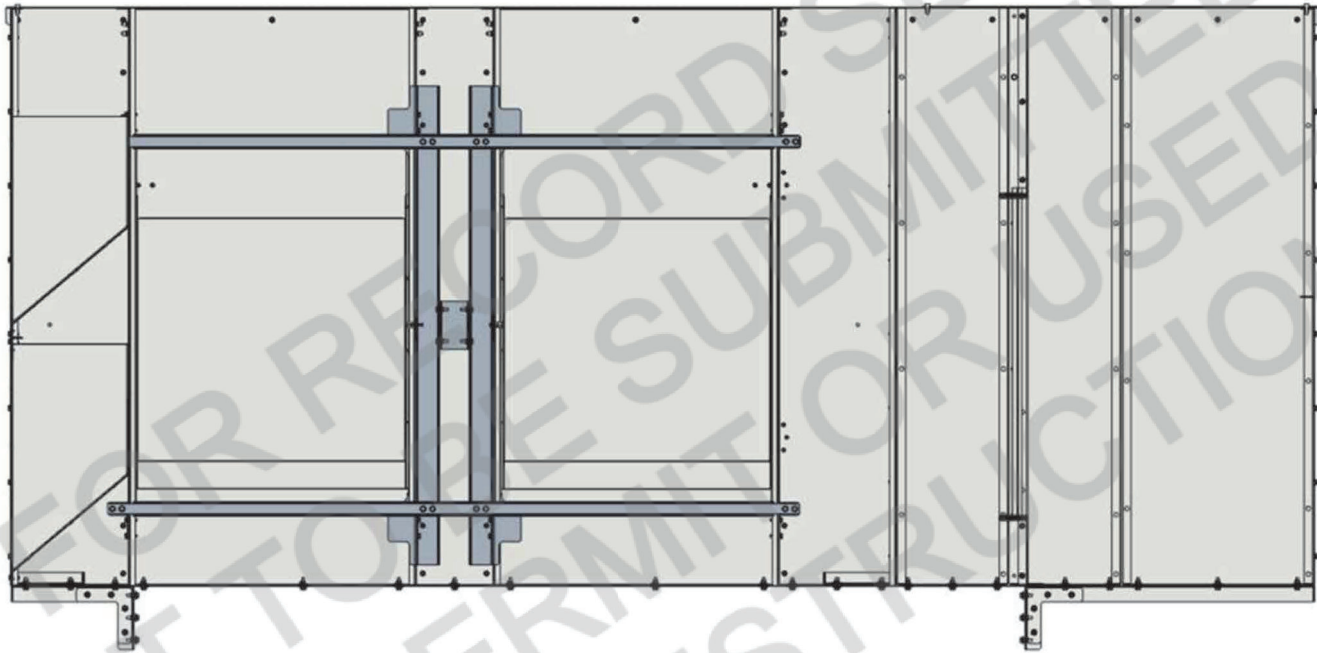
The capacities of the considered enclosure and skid components have been analyzed for yield and ultimate tensile stresses using Von Mises stress criteria in accordance with the current editions of the Aluminum Design Manual & AISC Steel Construction Manual. For all load cases, Von Mises stresses were below the ultimate tensile stresses of the respective materials; therefore, the enclosure and skid will provide enough structural capacity to resist the wind pressures shown. Upon thorough review of the results, it is the opinion of this engineer that the results satisfactorily indicate that the enclosure and skid provide adequate resistance to the maximum rated wind pressures stated herein.

UNIT CASING MATERIALS:

1/8" thick alum. 5052-H32 wall panels and doors, 1/8" thick alum. overhanging intake/discharge end supports, connected to 7 GA. thick interior steel frame. 7 GA thick HRPO steel for the bottom skid. Panel-panel and enclosure-skid connections secured with M8 Class 8.8 bolts (see Enclosure Files per Rehko for specific locations). Each enclosure door is supported by (2) A2-70 SS (equiv. to 304 SS) hinges and (1) A2-70 SS latch. Contact the Report Holder for further unit construction information.

RETROFITS TO ALUMINUM ENCLOSURE FOR IMPACT & CYCLIC CERTIFICATION

The enclosures listed herein shall be retrofitted according to the Bracing Kit Drawing # 11404056747-KA1 per Rehlko - contact Rehlko for more information and the retrofit Bill of Materials. The detail shown below is for reference only and may not depict all required retrofits/specifications.



HURRICANE BRACING KIT:
DOUBLE DOOR BRACING

SCALE: NTS INTERIOR SECTION VIEW

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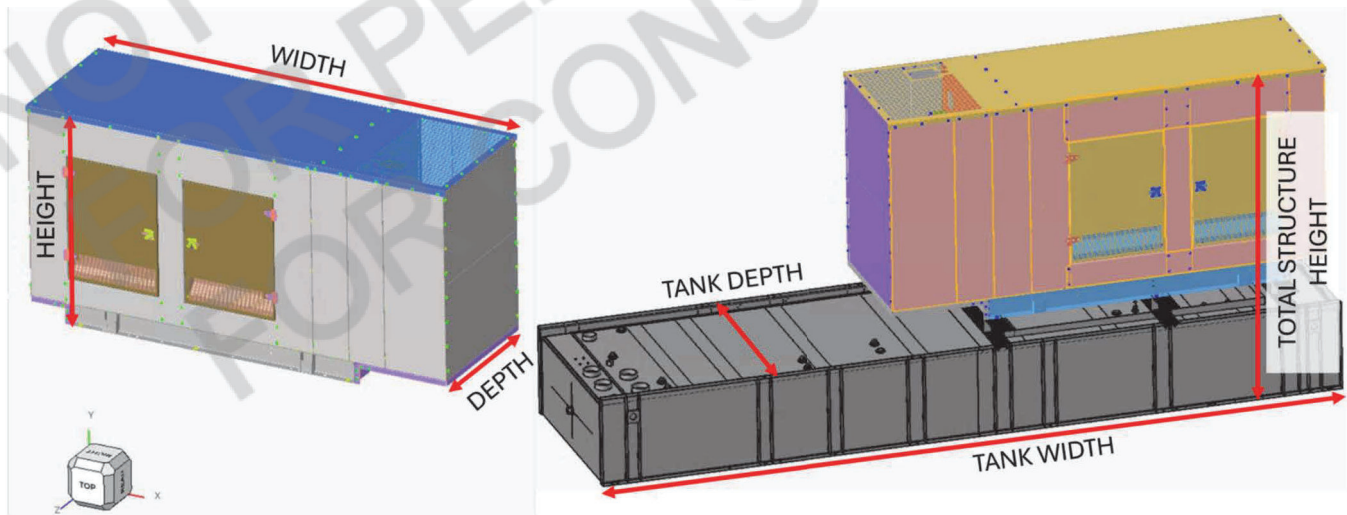
FUEL TANKS INCLUDED (ANCHORAGE CERTIFICATION ONLY)

Fuel Tank	Fuel Tank Dimensions [in] (mm)			Min. Dry Weight [lb] (kg)
	Width	Depth	Height	
24Hr. Standard	161.4 (4100)	53.1 (1350)	24.0 (610)	2936 (1332)
24Hr. State	202.0 (5131)	53.1 (1350)	18.0 (457)	2965 (1345)
48Hr. Standard	201.4 (5116)	53.1 (1350)	34.0 (864)	4070 (1846)
48Hr. State	202.0 (5131)	53.1 (1350)	33.0 (838)	3910 (1774)
96Hr State* *includes top-mounted I-beams	250.0 (6350)	74.8 (1900)	36.0 (914)	7086 (3214)

The fuel tanks listed above have not been evaluated for static wind loading. The integrity of the tank itself is by others. Only the integrity of the designed anchorage connections is certified by this evaluation. See the following sections for anchorage specifications.

*Note: 96Hr. State Fuel tank finished good assemblies include (3) top-mounted I-beams, between the enclosure bottom skid and top of the tank. (See diagram below; I-beam height is not included in the fuel tank height listed above; I-beam height shall be 12" maximum).

The I-beams have not been evaluated for static wind loading. The integrity of the I-beams themselves is by others. Only the integrity of the designed anchorage connections is certified by this evaluation. See the following sections for anchorage specifications.



3

UNIT & FUEL TANK DIAGRAMS

SCALE: NTS

ISOMETRIC VIEWS

Note: Unit and Fuel Tank Dimensions vary; see Tables herein. See previous page for unit (enclosure) dimensions. Total structure height is considered in this evaluation as the enclosure height + tank height + I-beam height (12" max).

SEE NEXT PAGE FOR ANCHORING SPECIFICATIONS

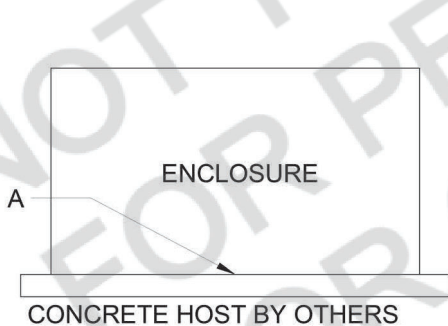
ANCHORAGE DIRECTIVE (PAGE 1 OF 3): ENCLOSURE TO CONCRETE HOST (NO FUEL TANK)

Anchor Specifications					
<u>Directive "A":</u> # of Anchors to Concrete	Anchor Brand, Name, & Type	Ø [in] (mm)	Embed. [in] (mm)	Min. Edge Dist. [in] (mm)	Min. Conc. Thick. [in] (mm)
(6)	HILTI Kwik Bolt TZ2 SS304 or SS316	3/4 (19)	4-1/2 (115)	6 (152)	6-3/4 (172)

Mounting directive specifications are listed below:

- A. For scenarios in which no fuel tank is used: The unit skid shall mount directly to the concrete using the anchor quantity specified in the Anchor Directive table. For each long side: position the anchors at the prefabricated mounting holes, 8" min. spacing, typ. Refer to the respective enclosure ADV drawing per Rehko for mounting hole locations (see Rehko for more information). Skid anchoring flange shall be $F_y = 36$ ksi min. & $F_u = 60$ ksi min. steel.

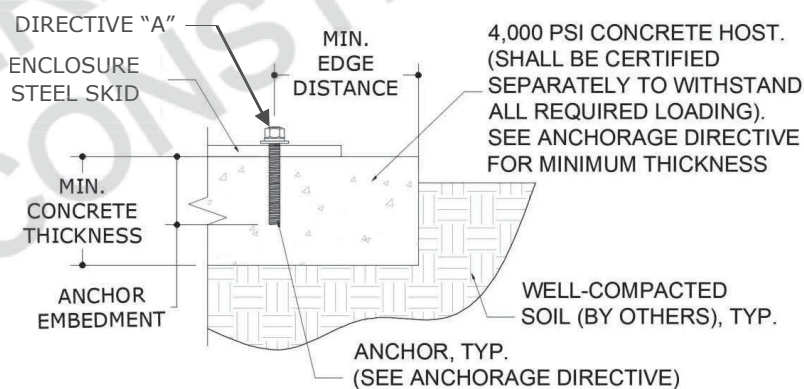
Read anchor specifications from the Anchorage Directive tables from left to right, which state: brand, name/type of anchor, nominal diameter, embedment, minimum edge distance to any edge of the concrete, minimum concrete thickness, and the total number of anchors, respectively. See sample Anchor Illustration below. Refer to Rehko's associated documentation and the "Wind Installation Requirements" section herein for additional installation instructions and directives.



ANCHORAGE DIRECTIVE "A":
ENCLOSURE ONLY (NO TANK)

SCALE: NTS

ELEVATION VIEW



ANCHOR ILLUSTRATION

SCALE: NTS

SECTION VIEW

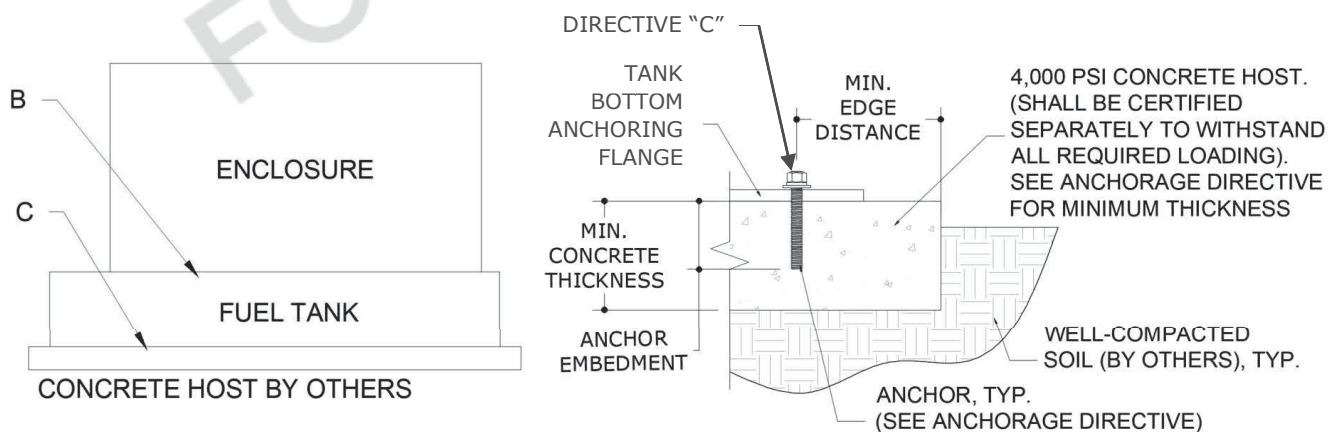
ANCHORAGE DIRECTIVE (PAGE 2 OF 3): ENCLOSURE WITH FUEL TANK (NO TOP-MOUNTED I-BEAMS)

Fuel Tank	Directive "B": # of Thru-Bolts for Skid-to-Tank Connection	Anchor Specifications					
		Directive "C": # of Anchors to Concrete	Anchor Brand, Name, & Type	Ø [in] (mm)	Embed. [in] (mm)	Min. Edge Dist. [in] (mm)	Min. Conc. Thick. [in] (mm)
24Hr. Standard	(6)	(12)	HILTI Kwik Bolt TZ2 SS304 or SS316	3/4 (19)	4-1/2 (115)	6 (152)	6-3/4 (172)
24Hr. State	(6)	(12)					
48Hr. Standard	(6)	(14)					
48Hr. State	(6)	(14)					

Mounting directive specifications are listed below:

- B. For scenarios in which the fuel tank is used without top-mounted I-Beams: The unit skid shall mount directly to the fuel tank with the specified number of thru-bolts. Thru-bolts shall be M20 UNC GR. 8.8 thru-bolts with 1.5" min. nominal OD washers (37 mm OD washers acceptable) top and bottom, typ. Provide 1.5" min. edge distance from any edge of both members in contact (skid flange and tank flange). Tank top anchoring flange shall be 3/16" min. thick, and both members in contact (i.e. bottom skid and top tank anchoring flange) shall be $F_y = 36$ ksi min. & $F_u = 60$ ksi min. steel. Refer to the associated Rehiko documentation for thru-bolt locations.
- C. The fuel tank shall be anchored to the concrete using the anchor quantity specified in the Anchor Directive table. For each long side: position the anchors at the prefabricated mounting holes, 8" min. spacing, typ. Refer to the respective fuel tank drawing per Rehiko for mounting hole locations (see Rehiko for more information). Tank bottom anchoring flange shall be 3/16" min. thick and $F_y = 36$ ksi min. & $F_u = 60$ ksi min. steel.

Read anchor specifications from the Anchorage Directive tables from left to right, which state: brand, name/type of anchor, nominal diameter, embedment, minimum edge distance to any edge of the concrete, minimum concrete thickness, and the total number of anchors, respectively. See sample Anchor Illustration below. Refer to Rehiko's associated documentation and the "Wind Installation Requirements" section herein for additional installation instructions and directives.



**ANCHORAGE DIRECTIVES "B" & "C":
ENCLOSURE W/ TANK (NO I-BEAMS)**

SCALE: NTS

ELEVATION VIEW

ANCHORAGE DIRECTIVE (PAGE 3 OF 3): ENCLOSURE WITH FUEL TANK & TOP-MOUNTED I-BEAMS

Fuel Tank	Top I-Beam Directive: # of Thru-Bolts for:		Anchor Specifications					
	D: Skid to I-Beams	E: I-Beams to Tank	Directive "F": # of Anchors to Concrete	Anchor Brand, Name, & Type	Ø [in] (mm)	Embed. [in] (mm)	Min. Edge Dist. [in] (mm)	Min. Conc. Thick. [in] (mm)
96Hr State* *includes top-mounted I-beams	(6)	(12)	(20)	HILTI Kwik Bolt TZ2 SS304 or SS316	3/4 (19)	4-1/2 (115)	6 (152)	6-3/4 (172)

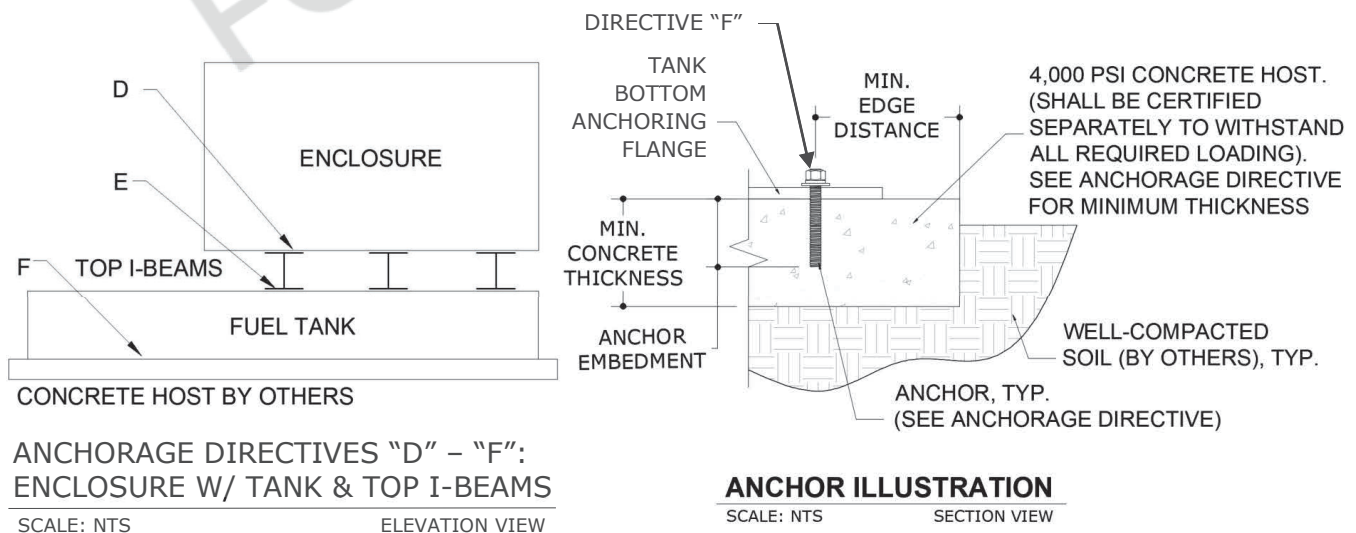
For scenarios in which the fuel tank is used with top I-Beams as an intermediary between the unit skid and tank: refer to the associated Rehlko fuel tank documentation for top I-beam positioning within each fuel tank configuration. Skid flange, tank flange, and I-beam flanges shall all be $F_y = 36$ ksi min. & $F_u = 60$ ksi min. steel. Tank flange and I-beam flanges shall be 3/16" min. thick.

Mounting directive specifications are listed below:

- D. For each top I-beam connection to the above skid, employ (2) M20 UNC GR. 8.8 steel thru-bolts with 1.5" min. nominal OD washers (37 mm OD washers acceptable) top and bottom, (1) thru-bolt per side, typ. Provide 1.5" min. edge distance between the thru-bolt and any edge of the members in contact (skid flange and I-beam flange). Refer to the associated Rehlko top I-beam configuration documentation for thru-bolt locations.
- E. For each top I-beam connection to the below tank, employ (4) M20 UNC GR. 8.8 steel thru-bolts with 1.5" min. nominal OD washers (37 mm OD washers acceptable) top and bottom, (2) thru-bolts per side, typ. Provide 1.5" min. edge distance between the thru-bolt and any edge of the members in contact (I-beam flange and tank flange). Refer to the associated Rehlko top I-beam configuration documentation for thru-bolt locations.
- F. The fuel tank shall be anchored to the concrete using the anchor quantity specified in the Anchor Directive table. For each long side: position the anchors at the prefabricated mounting holes, 8" min. spacing, typ. Refer to the respective fuel tank drawing per Rehlko for mounting hole locations (see Rehlko for more information). Tank bottom anchoring flange shall be 3/16" min. thick and $F_y = 36$ ksi min. & $F_u = 60$ ksi min. steel.

Read anchor specifications from the Anchorage Directive tables from left to right, which state: brand, name/type of anchor, nominal diameter, embedment, minimum edge distance to any edge of the concrete, minimum concrete thickness, and the total number of anchors, respectively. See sample Anchor Illustration below.

Refer to Rehlko's associated documentation and the "Wind Installation Requirements" section herein for additional installation instructions and directives.



WIND INSTALLATION REQUIREMENTS (PAGE 1 OF 2)

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

The following are requirements for wind-rated installation:

1. The design of post-installed anchors in concrete used for the component anchorage has been evaluated by this engineer for wind applications in accordance with ASCE 7 as referenced herein.
2. Anchors must be installed in minimum 4000 psi compressive strength normal-weight concrete. Concrete aggregate must comply with ASTM C33. Installation in structural lightweight concrete is not permitted unless otherwise approved by the Structural Engineer of Record
3. Anchors must be installed to the torque specification as recommended by the anchor manufacturer to obtain full capacity.
4. Anchors must be installed in the locations specified in the respective Rehlko documentation in correlation with signed and sealed engineering herein. The more stringent requirement from either document shall apply in cases of uncertainty.
5. Anchor plates from Rehlko must be installed at each anchor location between anchor head and equipment for tension load distribution.
6. Concrete floor slab and concrete housekeeping pads must be designed, and rebar reinforced, for wind applications in accordance with ACI 318 and ASCE 7 as referenced herein
7. Unless noted otherwise herein, all housekeeping pad thicknesses must be designed in accordance with pre-qualification test report or a minimum of 1.5x the anchor embedment depth, whichever is largest.
8. All housekeeping pads must be doweled or cast into the building structural floor slab and designed for wind application per appropriate code requirements for the subject jurisdiction and as approved by the Structural Engineer of Record.
9. Floor-mounted equipment (with or without housekeeping pad) must be installed to a rebar reinforced structural concrete floor that is designed for wind applications and approved by the engineer of record to resist the added wind loads from components being anchored to the floor.
10. When installing to a floor, rebar interference must be considered.
11. Attaching equipment to any floor other than those constructed of structural concrete and designed to accept the wind loads from said equipment is not permitted by this specification and beyond the scope of this certification.
12. Wall-mounted and rooftop installations are not permitted by this evaluation and are beyond the scope of this certification.
13. Installation upon curbs shall be coordinated with the curb manufacturer and the Structural Engineer of Record.
14. Anchor locations, size, type, and load requirements shall be as specified on the certified installation specification. Mounting requirements details such as brand, type, embedment depth, edge spacing, anchor spacing, concrete strength, and special inspection must be outlined and approved by the project Structural Engineer of Record to withstand the wind anchor loads as defined on the certified installation specification. The installing contractor is responsible for the proper installation of all anchors and mounting hardware, observing the mounting requirement details specified herein or outlined by the Engineer of Record. Contact Rehlko if a detailed Wind Installation Calculation Package is required.
15. Electrical wiring, piping, ductwork, and other connections to the equipment are the responsibility of the installing contractor. It is necessary that these remain intact and functional, and do not inhibit the functionality of the generator set after a wind event.
16. Concrete pad requirements specified herein are minimum values to satisfy only the anchor bolt requirements. The pad must be designed by the project structural Engineer of Record.

WIND INSTALLATION REQUIREMENTS (PAGE 2 OF 2)

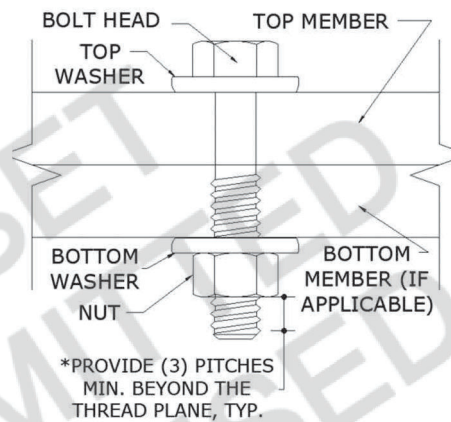
17. "Thru-Bolt" where used herein: refers to mounting thru-bolts specified in the Anchorage Directives. Thru-bolt shall be Class 8.8 min. with 1.5" min. nominal OD (37 mm OD acceptable) washers and ID sized for the bolt shank diameter at the top and bottom of the connection (under the bolt head and above the locking nut), and Class 8.8 min. locking nut at the underside of the connection, typ. See the thru-bolt diagram on the second-to-last page of this report.
18. For all fasteners specified herein: provide 3x diameter minimum spacing and 1.5x diameter minimum edge distance for all steel-to-steel and steel-to-aluminum connections, typ. Provide 2.5x diameter minimum spacing and 1.5x diameter minimum edge distance for all aluminum-to-aluminum connections.
19. Refer to fastener manufacturer's published data sheets and recommendations for fastener installation instructions. Fasteners shall be cadmium-plated or otherwise corrosion-resistant material and shall comply with "Specifications for Aluminum Structures" Section J.3.7.2 by the Aluminum Association Inc., and any applicable federal, state, and/or local codes.
20. Alternate/equivalent anchors may be used in place of the listed anchors herein so long as all of the below conditions are satisfied and are subject to the approval of the Authority Having Jurisdiction:
 - a. The equivalent anchor is demonstrated to have allowable (ASD) tension and shear capacities equal to or greater than the listed anchor's allowable tension and shear capacities as verified by a Design Professional.
 - b. All necessary reductions in capacity for edge distance, spacing, and other requirements as noted by the anchor manufacturer are considered in determining the equivalent anchor's tension and shear capacities.
 - c. The alternate anchor is of equal or greater diameter than the listed anchor and is provided with the same minimum edge distance, spacing, and any other specifications as are required for the listed anchor; AND
 - d. Anchor equivalents shall follow all requirements specified in this report in addition to the governing code(s) and allowable stress design (ASD) methodology.

Contact Engineering Express to add additional anchoring options to this report, or to certify an anchor option for special site-specific conditions needed for a particular site installation.

21. The contractor is responsible for insulating all members from dissimilar materials to prevent electrolysis.
22. Interior mechanisms and/or electrical circuitry are outside the scope of this performance evaluation. Electrical ground, when required, to be designed & installed by others. All mechanical specifications (clear space, tonnage, etc.) shall be as per manufacturer recommendations and are the express responsibility of the contractor.
23. The products and/or systems detailed herein are generic and do not provide information for a specific site. For site conditions different from the conditions listed herein, a licensed engineer or registered architect shall provide site-specific documents for use in conjunction with this evaluation report. Contact Engineering Express for site scenarios outside the bounds of this evaluation.
24. Engineering Express shall be notified and given an opportunity to reevaluate our work upon discovery of any inaccurate information prior to modification of existing field conditions and fabrication and installation of materials.
25. Alterations, additions, or other markings to this document are not permitted and invalidate this certification. Dimensions are shown to illustrate design forces and other design criteria. They may vary slightly but must remain within the limitations specified herein. Work shall be field-verified by others.
26. Engineer seal affixed hereto validates the structural design as shown only. Use of this specification by contractor, et. al. indemnifies and saves harmless this engineer for all costs and damages including legal fees and appellate fees resulting from material fabrication, system erection, and construction practices beyond that which is called for by local, state, and federal codes and from deviations of this plan.

TERMINOLOGY

The following abbreviations may appear in this report: "Addtl." for "additional", "AHJ" for "Authority Having Jurisdiction", "alum" for "aluminum", "ASCE" for "American Society of Civil Engineers", "ASD" for "Allowable Stress Design", "ASTM" for "American Society for Testing and Materials", "EA." for "each", "E.D." for "edge distance", "EDDS" for "extra deep drawing steel", "e.g." for "*exempli gratia*" or "for example", "equiv." for "equivalent", "FBC" for "Florida Building Code", "FEA" for "Finite Element Analysis", "FLCA" for "Florida Certificate of Authorization", "FS" for "Florida Statutes", "Fu" for "ultimate tensile strength" or "ultimate tensile stress", "Fy" for "yield strength" or "yield stress", "GA" for "gauge", "GR." or "Gr." for "grade", "HVAC" for "heating, ventilation, and air conditioning", "HVHZ" for "High-Velocity Hurricane Zone", "i.e." for "*id est*" or "in other words", "in" for "inch", "lb" for "pound (force)", "max." for "maximum", "min." for "minimum", "mm" for "millimeter", "NTS" for "not to scale", "O.C." for "on center", "OD" for "outer diameter", "pcf" for "pounds (force) per cubic foot", "PE" for "Professional Engineer", "qty" for "quantity", "SAE" for "Society of Automotive Engineering", "SMS" for "sheet metal screws", "SS" for "stainless steel", "TER" for "Technical Evaluation Report", "typ." for "typical", "ult" for "ultimate loads", "U.N.O." for "unless noted otherwise", "UTS" for "ultimate tensile strength" or "ultimate tensile stress", "WLL" for "working load limit", "w/o" for "without", "YS" for "yield strength" or "yield stress", "#" for "number", "&" for "and", and "Ø" for "diameter". Please visit ecalc.io/glossary for additional abbreviation clarifications.



SAMPLE THRU-BOLT

SCALE: NTS SECTION VIEW

Note: The term "Thru-Bolt" or through bolt, if used herein, refers to a bolt passing through the member(s) in contact and is fastened by a nut at the end opposite the screw head. Nut shall be equivalent to or exceed the strength of the bolt U.N.O. Nut shall be sized to accommodate the same nominal diameter as the bolt U.N.O. See diagram above-right for a sample thru-bolt configuration.

Note: For instances herein which list material specifications as "[material type] or stronger":

U.N.O. herein, the term "stronger" refers to a material with a UTS value equal to or greater than the UTS value of the stated material type. Consult appropriate literature for established material UTS values.

Note: Equivalent steel gauge thicknesses as used in this evaluation, U.N.O., are as follows: 22 GA (.030"), 20 GA (.036"), 18 GA (.048"), 16 GA (.060"), 14 GA (.075"), 12 GA (.098").

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LIMITATIONS & CONDITIONS OF USE, CONTINUED

Use of this product shall be in strict accordance with this TER as noted herein. Adjustment factors noted herein and the applicable building codes must be considered, where applicable. All supporting components which are permanently installed shall be protected against corrosion, contamination, and other such damage at all times.

Labeling: Enclosure housing must bear the official insignia of Rehlko, with the model name referenced herein, for the applicability and validity of this evaluation.

Host Structure: The supporting host structure shall be designed to resist all superimposed loads as determined by others on a site-specific basis as may be required by the Authority Having Jurisdiction. Host structure conditions that are not accounted for in this product's respective anchor schedule shall be designed for on a site-specific basis by a registered Professional Engineer. No evaluation is offered for the host supporting structure by use of this document.

Anchor & Fasteners: All fasteners and anchors shall be installed in accordance with the applicable provisions specified herein in addition to the anchor/fastener manufacturers' published installation instructions. *Fasteners must penetrate (3) pitches minimum beyond the thread plane of the connecting members in contact. For thru-bolt connections, provide (3) pitches minimum beyond end of nut. For screw connections, provide (3) pitches minimum beyond the bottom member. See Sample Thru-Bolt Detail herein.

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

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

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

Survivability: Evaluation reports are valid for a newly installed unit and do not include certification of the product beyond a design event or if impacted by any debris. Inspections shall be implemented annually by the end user and after every named storm. All fasteners and cabinet components are to be verified, and all damaged, loose, corroded and/or broken fasteners and cabinet components shall be replaced to ensure structural integrity against hurricane wind forces. Contact this office for any reevaluation needs or as designated by the Authority Having Jurisdiction.

Durability: Components or component assemblies shall not deteriorate, crack, fail, or lose functionality due to galvanic corrosion or weathering. All supporting components which are permanently installed shall be protected against corrosion, contamination, and other such damage at all times. Each component or component assembly shall be supported and oriented in its intended installation position. All exposed plastic components shall be certified to resist sunlight exposure as specified by ASTM B117, or ASTM G155 in Broward or Miami-Dade counties.

Extent of Certification: As described herein, this certification pertains to the structural integrity of the unit components listed herein, subject to the limitations and criteria stated herein. Operability during or after a design event is not included in this certification. Water infiltration is outside the bounds of this certification. No other certifications are intended other than as described herein. We do not guarantee non-structural performance during or after a design event due to other factors that could affect the operation of the unit in question without our site-specific consent.

Proj. #	Remarks	By	Checked	Date	Proj. #	Remarks	By	Checked	Date
25-89047	Initial Issue (Master Proj. 25-88013)	EPR	RWN	12/16/25					

APPENDIX A: DESIGN WIND PRESSURE GUIDE

Max. Ult. Wind Speed (V _{ult})	Max. MRH (Roof Height)	Exposure Category	Required Design Wind Pressures (ASD)	
			Lateral Pressure	Uplift Pressure
140 mph	At-Grade (0 ft)	C	± 25 psf	0* psf
		D	± 30 psf	0* psf
175 mph	At-Grade (0 ft)	C	± 39 psf	0* psf
		D	± 47 psf	0* psf
186 mph	At-Grade (0 ft)	C	± 44 psf	0* psf
		D	± 53 psf	0* psf
200 mph	At-Grade (0 ft)	C	± 51 psf	0* psf
		D	± 61 psf	0* psf

100 psf

Note: Any table values with the format shown left, if present, indicate design wind pressures and site conditions that are **not approved for use** by this evaluation. Seek additional engineering or contact this firm for design solutions.

DIRECTIVE: This design pressure guide is for reference only and shall be approved for use by the Authority Having Jurisdiction (AHJ). If the design pressures listed in this guide are not used, required design pressures shall be calculated separately. For site-specific scenarios classified as Exposure Category B, the required design pressures stated for Exposure Category C in the above guide shall be used or design pressures shall be calculated separately. For heights and parameters beyond the parameters listed in this guide, visit our Online Calculator via the website link (<https://ecalc.io/forces>) or QR Code below, or obtain calculations separately by others.

The required ASD design pressures listed in this guide were calculated per the table's listed corresponding site conditions. The project design professional or permitting contractor shall verify that the site-specific conditions are equal to or less than the approved design parameters listed in the guide. Per the note below table: any values shown as "XX psf", indicate wind pressures and corresponding site conditions that are **not valid for use** with this evaluation (exceeds the max. rated pressures).

At-Grade (0 ft MRH) Required Design Pressures:

- o ASCE 7 "Design Wind Loads: Other Structures"
- o Structure Shape = Square, flat terrain
- o Height of structure (unit + curb/stand/slab/pad) = 9 ft 2 in max.
- o Width of unit = 3 ft min., Depth of unit = 3 ft min.

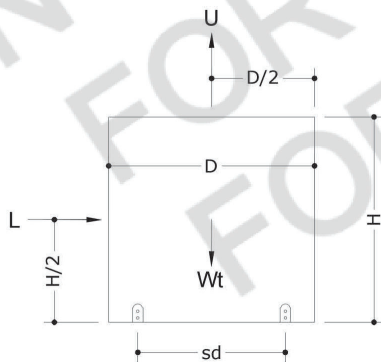
VISIT [ECALC.IO/FORCES](https://ecalc.io/forces)

FOR DESIGN AID CALCULATORS AND RESOURCES RELATED TO THIS TER & GUIDES HEREIN, OR SCAN THE QR CODE RIGHT >



UNIT REACTIONS FROM WIND GUIDE

DIRECTIVE: This guide is intended for use by a design professional. Design parameters shall abide all specifications and limitations stated in this report. Design professional shall consider all forces, including seismic and snow loads, per the governing building code. Unit reactions obtained from this guide shall be verified by a registered Professional Engineer. Reactions are applicable for unit-to-host connections only. Sample calculations are provided below.

**Design Parameters:**

- Lateral Wind Pressure, P_{lat}
- Unit Height, H
- Unit Width, W
- Support Spacing across Depth, sd
- Uplift Wind Pressure, P_{up}
- Unit Depth, D
- Unit Weight, Wt
- Support Spacing across Width, sw

Unit Reaction Equations:**Long Side (Width x Height):**

- Sliding Force, L = P_{lat} x W x H
- Uplift Force, U = P_{up} x W x D
- Total Tension per Long Side = (L x H/2 + U x sd/2 - Wt x 0.6 x sd/2) / sd

Short Side (Depth x Height):

- Sliding Force, L = P_{lat} x D x H
- Uplift Force, U = P_{up} x W x D
- Total Tension per Short Side = (L x H/2 + U x sw/2 - Wt x 0.6 x sw/2) / sw

Example: A (48" W x 36" D x 42" H), 250 lb net weight unit at wind pressures of 120 psf lateral and 95 psf uplift, on a 24" wide roof stand, shall have the following unit reactions:

Long Side (Width x Height):

1. Sliding Force, L = P_{lat} x W x H
= (120 psf) x (48 in) x (42 in) x (1 in² / 144 ft²) = **1680 lb**
2. Uplift Force, U = P_{up} x W x D
= (95 psf) x (48 in) x (36 in) x (1 in² / 144 ft²) = **1140 lb**
3. Total Tension per Long Side =
= (L x H/2 + U x sd/2 - Wt x 0.6 x sd/2) / sd
= ((1680 lb x 42/2 in) + (1140 lb x 24/2 in) - (250 lb x 0.6 x 24/2 in)) / 24 in = **1965 lb**

Short Side (Depth x Height):

1. Sliding Force, L = P_{lat} x D x H
= (120 psf) x (36 in) x (42 in) x (1 in² / 144 ft²) = **1260 lb**
2. Uplift Force, U = P_{up} x W x D
= (95 psf) x (48 in) x (36 in) x (1 in² / 144 ft²) = **1140 lb**
3. Total Tension per Short Side =
= (L x H/2 + U x sw/2 - Wt x 0.6 x sw/2) / sw
= ((1260 lb x 42/2 in) + (1140 lb x 48/2 in) - (250 lb x 0.6 x 48/2 in)) / 48 in = **1046 lb**

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

PROTOTYPE TEST REPORT



Models Covered: **KD250**
Model Tested: **KD300**
Cooling System Tested: **45C**

Alternator Tested: **KH02216TO4D**
Engine Tested: **KD09L06T-6DDS**
Voltage Tested: **208V**

GENSET

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

Meets Rated Load

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

±0.25 % Frequency Band

±0.25 % Voltage Deviation

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

Full Load Acceptance

27.7 % Voltage Dip

2.62 Seconds of Recovery Time

10.30 % Frequency Dip

2.49 Seconds of Recovery Time

Full Load Rejection

19.3 % Voltage Overshoot

0.95 Seconds of Recovery Time

6.09 % Frequency Overshoot

0.55 Seconds of Recovery Time

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

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

Complies with NFPA 110 Type 10

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

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

Complies

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

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

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

PROTOTYPE TEST REPORT



Models Covered: **KD250**
Model Tested: **KD300**
Cooling System Tested: **45C**

Alternator Tested: **KH02216TO4D**
Engine Tested: **KD09L06T-6DDS**
Voltage Tested: **208V**

ALTERNATOR

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

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

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

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

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

Kohler Standby/Prime Generator Set Test Program

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

Prototype Testing

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

- Alternator temperature rise test per NEMA MG1-32.6. Standby and prime ratings of the alternator are established during this test.
- Maximum power test to assure that the prime mover and alternator have sufficient capacity to operate within specifications.
- Alternator overload test per NEMA MG1-32.8.
- Steady-state load test to ensure voltage regulation meets or exceeds ANSI C84.1, NEMA MG1-32.17 requirements and to verify compliance with steady-state speed control specifications.
- Transient test to verify speed controls meets or exceeds specifications.
- Transient load tests per NEMA MG1-32.18, and ISO 8528 to verify specifications of transient voltage regulation, voltage dip, voltage overshoot, recovery voltage, and recovery time.
- Motor starting tests per NEMA MG1-32.18.5 to evaluate capabilities of generator, exciter, and regulator system.
- Three-phase symmetrical short-circuit test per NEMA MG1-32.13 to demonstrate short circuit performance, mechanical integrity, ability to sustain short-circuit current.
- Harmonic analysis, voltage waveform deviation per NEMA MG1-32.10 to confirm that the generator set is producing clean voltage within acceptable limits.

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.

- 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.

KOHLER®

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

O&M Manual

All O&M Manuals and warranty statements will be submitted electronically, no hard copies will be supplied unless otherwise noted. Completed O&M manuals will be supplied post start-up. All OEM manuals will not be edited and are considered generic. Job specific O&M manuals must be arranged prior to submittal approval.

REHLKO CO.

Moeller Wisconsin

Phone 414-761-1111 Fax 414-761-1112

For the nearest sales/service outlet in the

US and Canada phone 800-441-1111