Submittal Package

rehlko

TABLE OF CONTENTS

	Controller Schematic Diagram	ADV-10104
	Voltage Diagram	ADV-5875
Misc		
	Circuit Breaker	GM24181
Warranty		
	Warranty	TP-5561
	Warranty	TP-7422
	Warranty	TP-7423
Certification		
	ISO9001 Certificate	G15-152
	Prototype Test Summary	G18-607
	Prototype Test Certificate	G18-56
Pre-Startup Checklist		
	Pre-Startup Checklist	PreStartUpCheckList

Generator

Kohler Model: KD150

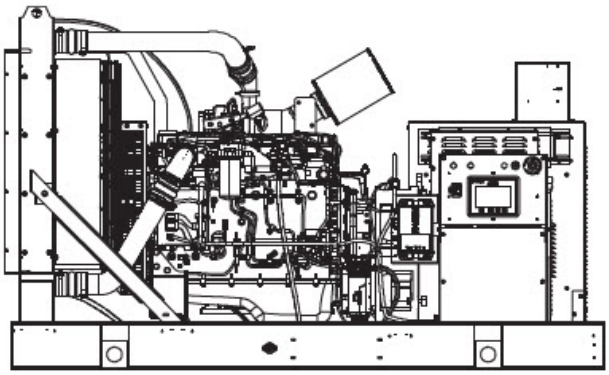
This diesel generator set equipped with a KH00932TO4D alternator operating at 120/280 volts is rated for 150 kW/188 kVA.
Output amperage: 521.

Qty	Description	
	KD150 Generator System	
3	KD150 Generator Set	
	Includes the following:	
	Literature Languages	English
	Engine	Diesel
	Nameplate Rating	Standby 130C Rise
	Voltage	60Hz, 120/208V, Wye, 3Ph, 4W
	Alternator	KH00932TO4D
	Alt Accessories, Installed	PMG Excitation
	Cooling System	Unit Mounted Radiator, 50C
	Air Intake	Standard Duty
	Controller	APM603
	Enclosure Type	Sound
	Enclosure Material	Aluminum
	Fuel Tank Type	State
	Fuel Runtime (Approx.)	24 Hours
	Subbase Fuel Tank Capacity	300 Gallons
	Fill Pipe/Spill Fill Options	5 Gal Spill Cont w/95% Shutoff
	Skid and Mounting	Skid
	Starting Aids, Installed	1800W,110-120V
	Electrical Accy.,Installed	Battery, 2/12V, Wet
	Electrical Accy.,Installed	Batt. Rack & Cables
	Electrical Accy.,Installed	Battery Charger, 10A
	Electrical Accy.,Installed	Common Fault/Run Relay
	Interrupt Rating All LCBs	35kA at 480V
	Duty Rating, First LCB	100% Rated
	Amps, First LCB	600
	Trip Type, First LCB	Electronic, LSI
	First LCB Frame	PGP
	Fuel Lines, Installed	Flexible Fuel Lines
	Miscellaneous Accy,Installed	Coolant in Genset
	Miscellaneous Accy,Installed	Oil in Genset
	Warranty	5 Year Comprehensive
	Testing, Additional	Power Factor Test,0.8,3Ph Only
3	LIT KIT, PRODUCTION, KD150	

rehlko

Spec Sheets

KD150
Diesel



Other Features

- Rehlko designed controllers for one-source system integration and remote communication. See Controllers on page 3.
- The low coolant level and high coolant temperature sensors protect the generator set form overheating.Integral vibration isolation eliminates the need for under-unit vibration spring isolations.

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

Standby 130C Rise Ratings

Alternator	Voltage	Ph	Hz	kW/kVA	Amps
KH00932TO4D	120/280	3	60	150/188	521

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: KD150, 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	KD07L06T-6DDS
Engine: type	4-Cycle, Turbocharged, Charge Air Cooled
Cylinder arrangement	6 Inline
Displacement, L (cu. in.)	6.7 (408)
Bore and stroke, mm (in.)	107 x 124 (4.21 x 4.88)
Compression ratio	17.2:1
Piston speed, m/min. (ft./min.)	446 (1464)
Main bearings: quantity, type	7, Replaceable Insert
Rated rpm	1800
Max. power at rated rpm, kWm (BHP)	242 (324)
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)	44 (1549)
Exhaust temperature at rated kW, dry exhaust, EPA certified, °C (°F)	532 (989)
Maximum allowable back pressure, kPa (in. Hg)	10.2 (3)

Model: KD150, 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 @ 5 kW
Battery, recommended cold cranking amps (CCA): Qty., CCA rating each	Two, 550
Battery voltage (DC)	12

Fuel

Fuel System

Fuel type	Diesel
Fuel supply line, min. ID, mm (in.)	10.0 (0.39)
Fuel return line, min. ID, mm (in.)	10.0 (0.39)
Max. fuel flow, Lph (gph)	106.0 (28.1)
Min./max. fuel pressure at engine supply connection, kPa (in. Hg)	-17 (-5) -34 (-10)
Max. return line restriction, kPa (in. Hg)	20 (5.9)
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.)	10.2 (2.7)
Radiator system capacity, including engine, L (gal.)	23.0 (6.1)
Engine jacket water flow, Lpm (gpm)	144 (38)
Heat rejected to air charge cooler at rated kW, dry exhaust, kW (Btu/min.)	49 (2787)
Charge cooler air inlet temperature, °C (°F)	204 (399)
Turbocharger boost (abs) bar (psi)	318 (47)
Water pump type	Vane
Fan diameter, including blades, mm (in.)	735 (29)
Fan, kWm (HP)	5 (7)
Max. restriction of cooling air, intake and discharge side of radiator, kPA (in. H20)	See TIB-118

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

Operation Requirements

Air Requirements

Radiator-cooled cooling air, m3/min. (scfm) *	335 (11900)
Combustion air, m3/min. (cfm)	15.0 (529)
Heat rejected to ambient air: Engine, kW (Btu/min.)	18.4 (1047)
Heat rejected to ambient air: Alternator, kW (Btu/min.)	See TIB-102
Max. air intake restriction, kPa (in. Hg)	6.2 (25.0)

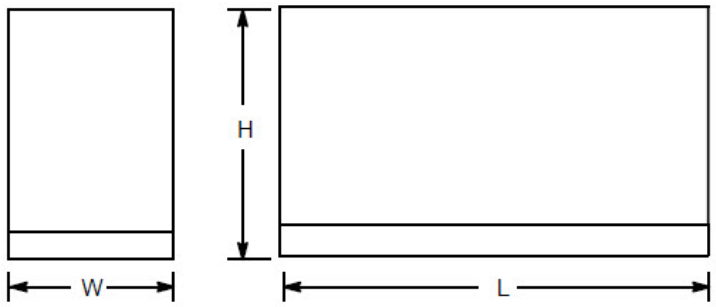
*Air density = 1.20 kg/m3 (0.075 lbm/ft3)

Fuel Consumption

Diesel, Lph (gph), at % load	Rating
Standby Fuel Consumption at 100% load	41.9 Lph (11.1 gph)
Standby Fuel Consumption at 75% load	34.6 Lph (9.2 gph)
Standby Fuel Consumption at 50% load	25.6 Lph (6.8 gph)
Standby Fuel Consumption at 25% load	12.7 Lph (3.4 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	2556 x 1350 x 1546 (100.6 x 53.1 x 60.9)
Weight (radiator model), wet, kg (lb.):	1560 (3439)



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

Industrial Generator Set Accessories

Generator Set Controller

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

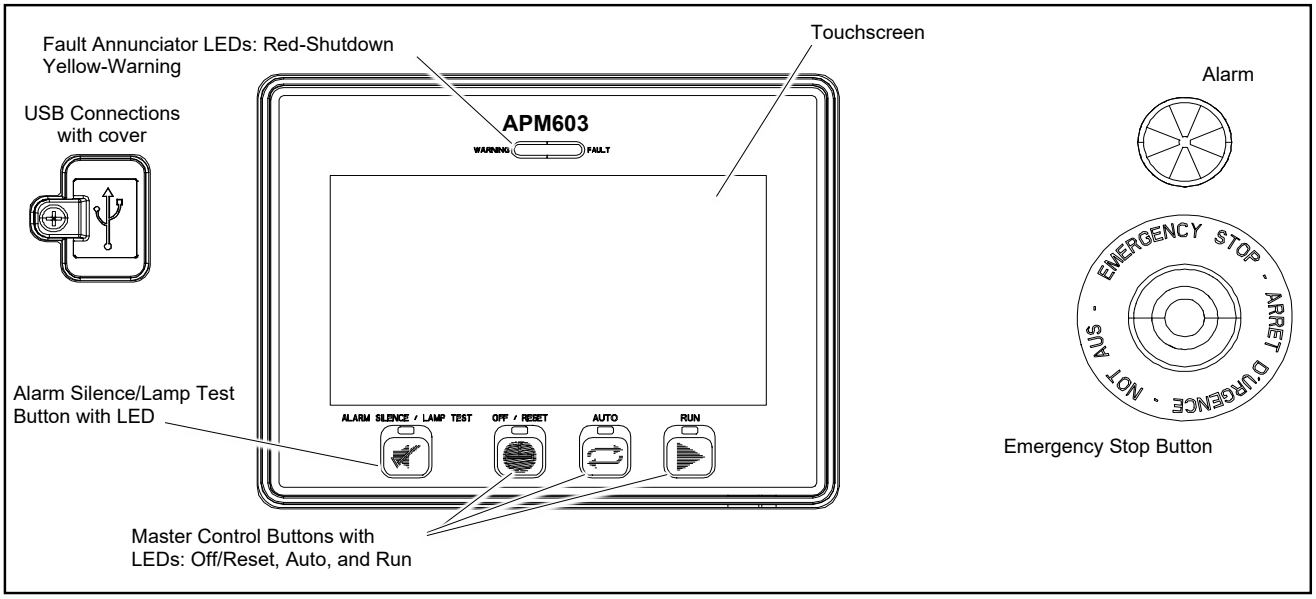
- A 7-inch color TFT touchscreen for easy local access to data.
  - Home screen can be customized to show critical data at a glance.
  - Create a custom favorites list for quick access to important data
- Measurements are selectable in metric or English units.
- Supports Modbus® protocol through serial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



Controller Features

AC Output Voltage Regulator Adjustment	Maximum of ±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	±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	-40ºC to 70ºC (-40ºF to 158ºF)
Storage Temperature	-40ºC to 85ºC (-40ºF to 158ºF)
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)	▲	
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.

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

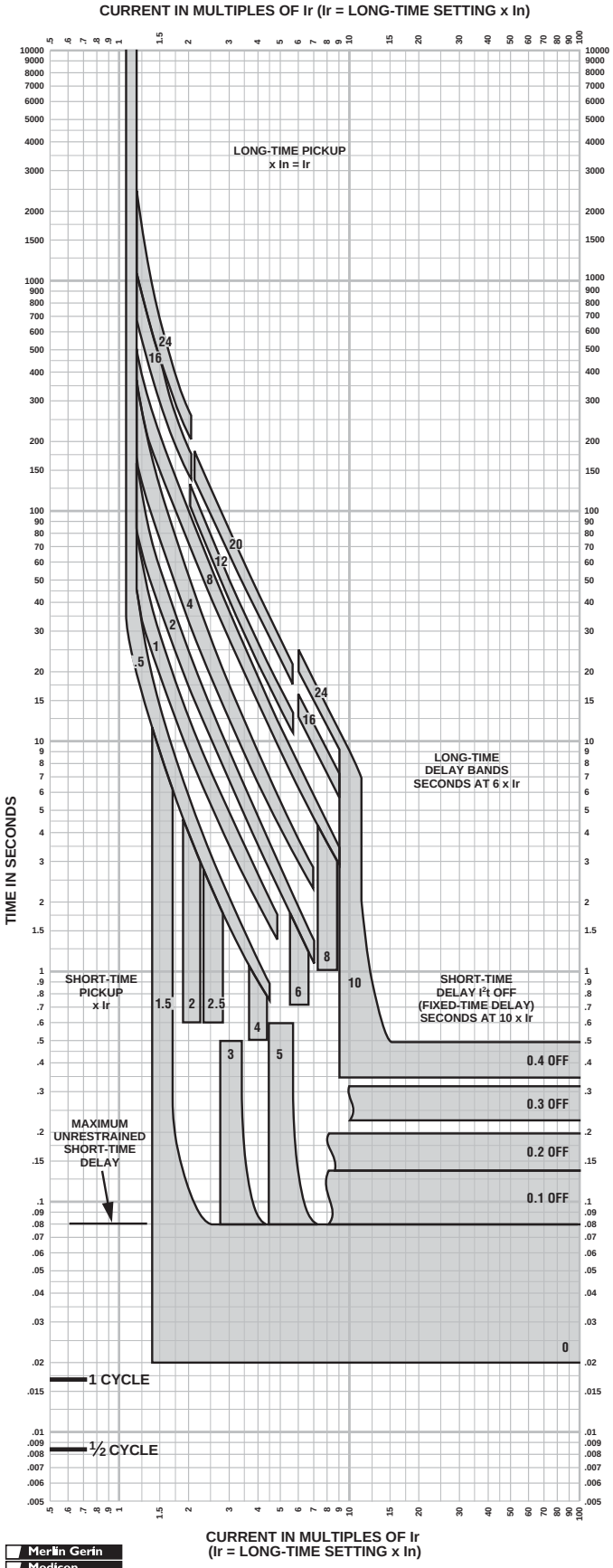
The following Diesel engine data is displayed on the APM603 controller.

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 Rehlko 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.



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

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

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

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

Notes:

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal-imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately 20 minutes is required between overloads to completely reset thermal-imaging.
2. The end of the curve is determined by the interrupting rating of the circuit breaker.
3. With zone-selective interlocking on, short-time delay utilized and no restraining signal, the maximum unrestrained short-time delay time band applies regardless of the setting.
4. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
5. For a withstand circuit breaker, instantaneous can be turned OFF. See 613-7 for instantaneous trip curve. See 613-10 for instantaneous override values.
6. Overload indicator illuminates at 100%.

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

Schneider Electric

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

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

The most compact and innovative molded case circuit breakers

P-Frame 1200 A

R-Frame

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

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

Full-Featured Performance

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

Merlin Gerin
Modicon
Square D
Telemecanique
Schneider Electric

SQUARE D
Schneider Electric

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

Onboard Intelligence

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

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

MICROLOGIC® Trip Units

Choose the Model that Meets Your Needs

MICROLOGIC 3.0 and 5.0

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

MICROLOGIC 3.0A, 5.0A and 6.0A

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

MICROLOGIC 5.0P and 6.0P

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

MICROLOGIC 5.0H and 6.0H

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

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

Order Number 0612HO0201

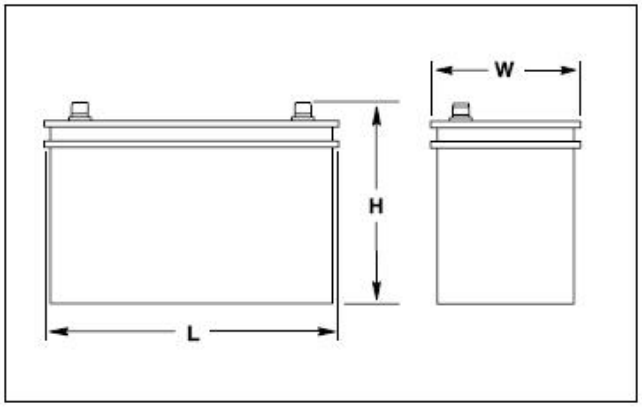
SQUARE D
Schneider Electric

rehlko

ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED

Typical Overall Dimensions

Overall Dimensions



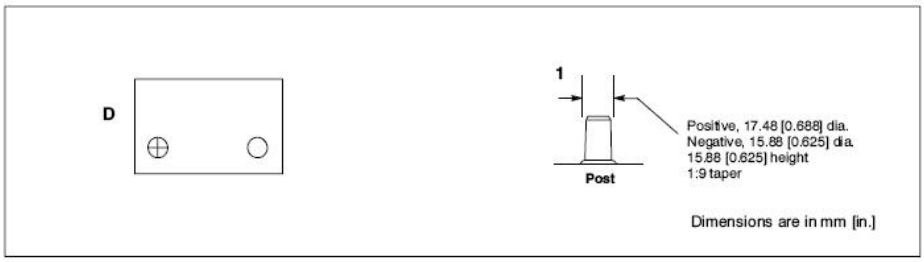
Standard Features

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

Charge Type*	Battery Part Number	Battery Qty. per Size	BCI Group Size	Battery SAE Dimension, mm (in.)			Cold Cranking Amps at 18ºC (0ºF) Min.	Reserve Capacity Minutes at 27º (80ºF) Min.	Battery Post Layout and Style
				L	W	H			
Wet	11600006201	2	24	260.0 (10.3)	171.0 (6.7)	229.0 (9.0)	550	100	D/3

Battery Specifications

Battery Post Layout and Style



Industrial Generator Set Accessories

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

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

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

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

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

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

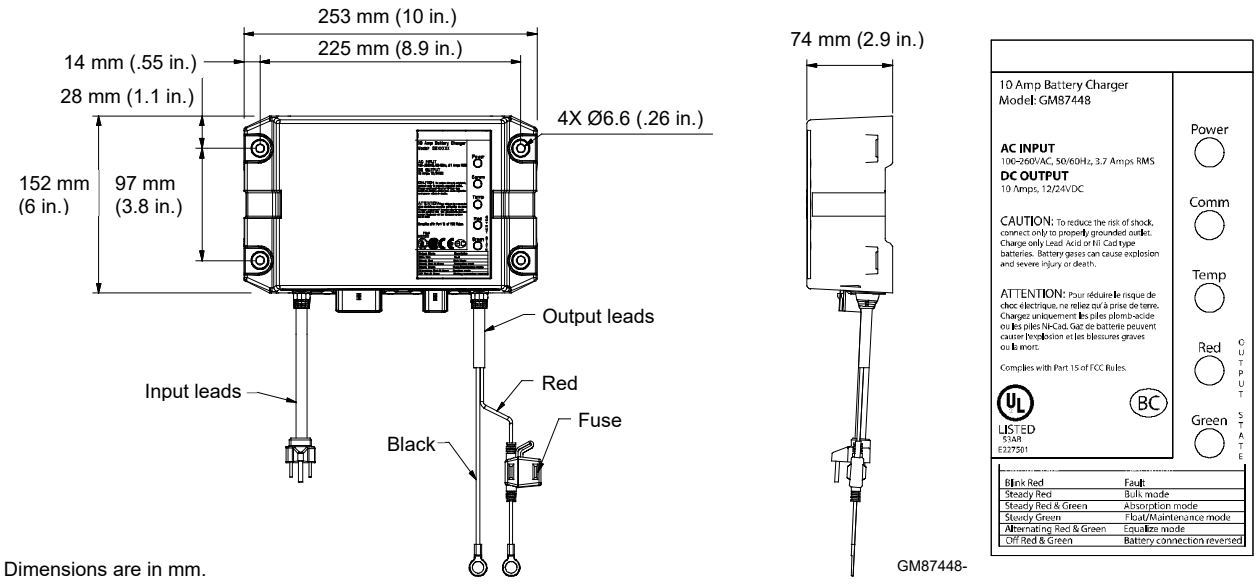
Standard Features

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

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

Industrial Generator Set Accessories

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



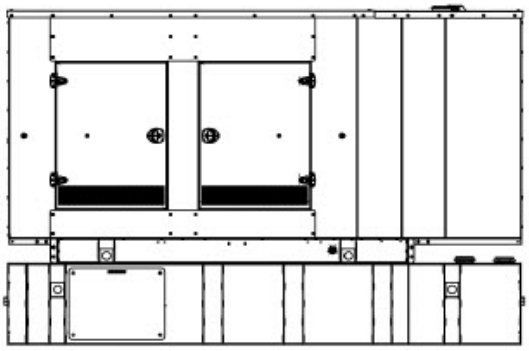
Specifications

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

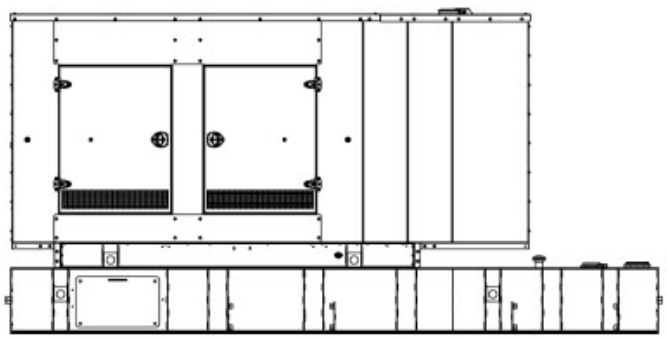
Enclosure	
Environmental Resistant	From rain, snow, dust, and dripping water (IP-64)
Battery Connections	
Lead Length	1.8 m (6 ft.) red and black leads
Battery Connections	9.5 mm (3/8 in.) ring terminals
AC Power Connections	
Lead Length	1.8 m (6 ft.)
Storage	Standard US style 3-prong AC plug
Available Options	
Temperature compensation	

Availability is subject to change without notice. Discovery Energy, LLC and its affiliates dba Rehlko 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.

Sound Enclosure with Subbase Fuel Tank Package



Enclosure with Standard Subbase Fuel Tank



Enclosure with State Code Subbase Fuel Tank

Sound Enclosure Standard Features

• Internal-mounted 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.

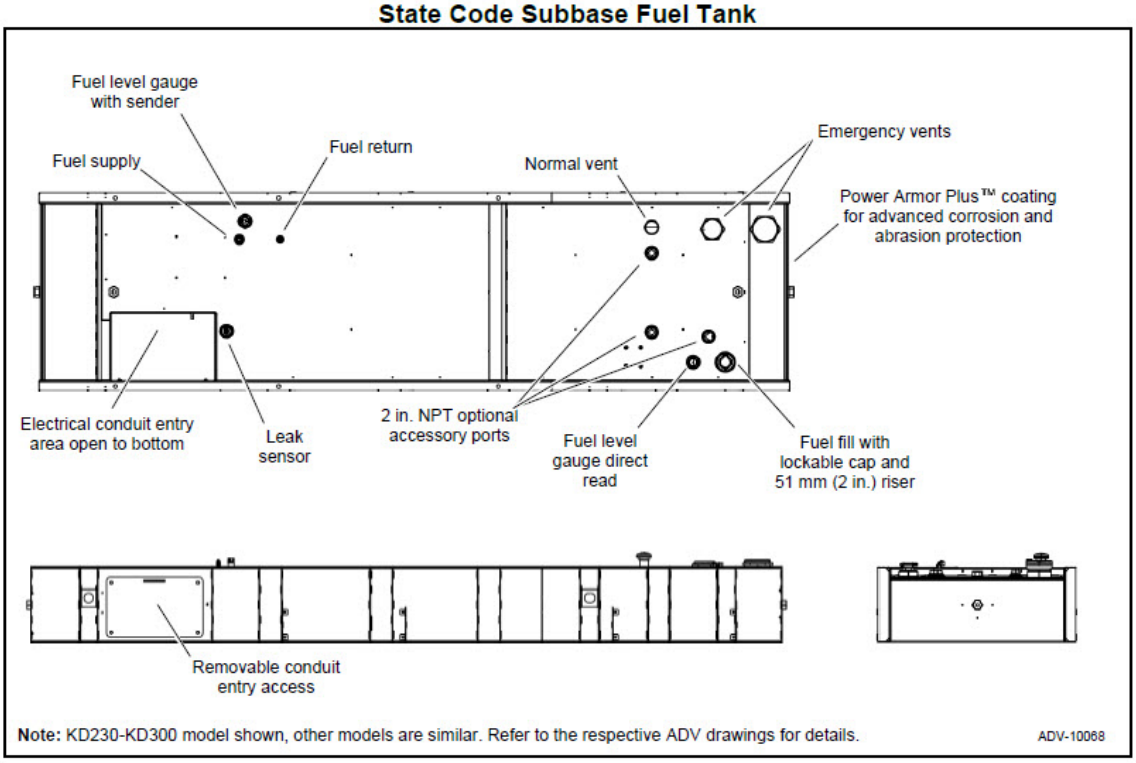
• The secondary containment generator set base tank meets UL 142 tank requirements. The inner (primary) tank is sealed inside the outer (secondary) tank. The outer tank contains the fuel if the inner tank leaks or ruptures.

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

Sound Enclosure Features

- Power Armor automotive-grade finish resulting in advanced corrosion and abrsion 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



Note: KD230-KD300 model shown, other models are similar. Refer to the respective ADV drawings for details. ADV-10068

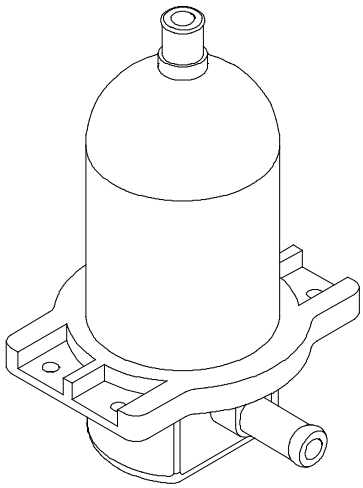
- Extended operation. Usable tank capacity offers full load standby operation of up to 24 and 48 hours.
- Power Armor Plus textured epoxy-based rubberized coating that creates an ultra-thick barrier between the tank and harsh environmental conditions like humidity, saltwater, and extreme temperatures, 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	3771 (148.5)	1350 (53.2)	1970 (4345)	2010 (79.2)	200 (7.9)	71
1135 (300)	31/27	4674 (184.0)	1350 (53.2)	3100 (6825)	2391 (94.2)	381 (15.0)	71

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).
Enclosured generator set sound data for these models was not available at time fo print

Industrial Generator Set Accessories

Engine Block Heater Kits



Block Heater Kit, typical

Applicable Models

- KD80-KD200
- KG25-KG40A
- KG40-KG125
- KG80A
- KG150-KG200
- KG150R
- 25-45REZG
- 25-60REZGB
- 50REZGC/125REZGC/150REZGC
- 50-60REOZJD
- 50REOZJE
- 80REZGD/100REZGD
- 80RZGD/100RZGD
- 80-200REOZJF
- 80-150REOZJG4
- 125RZGC/150RZGC

Standard Features

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

Description

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

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

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

Block Heater Specifications

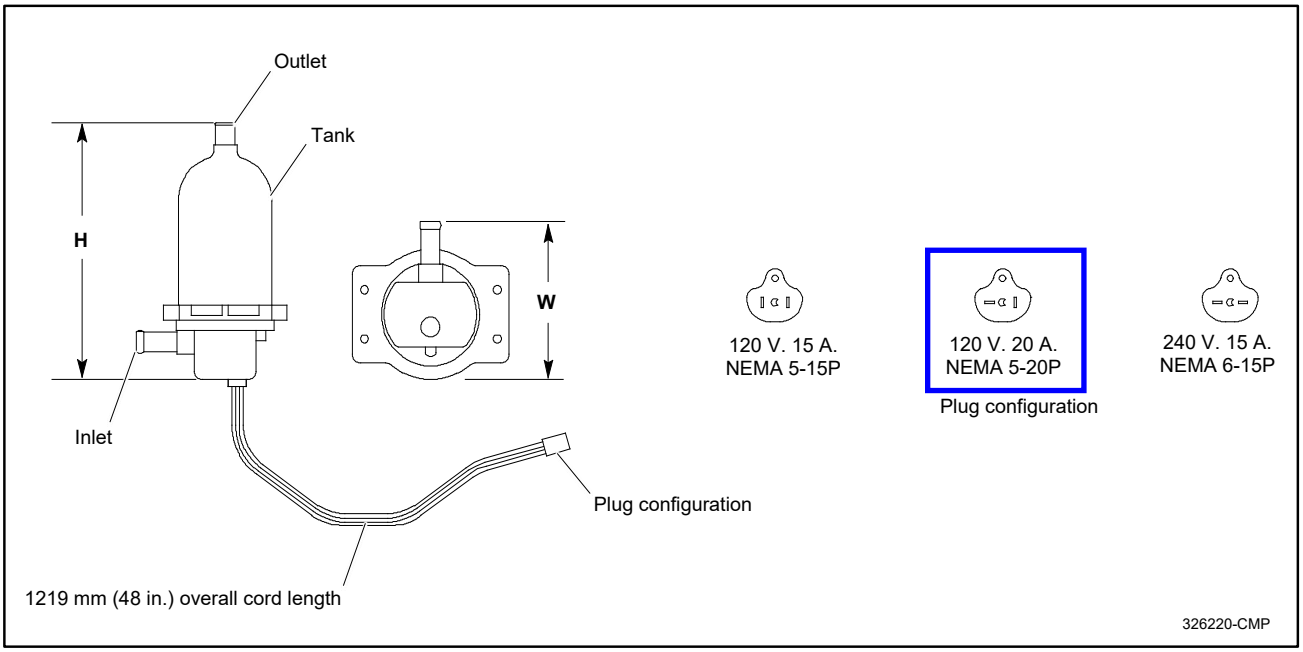
Heating Fluid	Water, Coolant Mix (50% Glycol/50% Water)
Max. Pressure	90 psi (620 kPa)
Heating Element Material	Incoloy 800
Inlet/Outlet Plumbing	0.625 in. hose barb
System Ingress	IP41
Power Connection	NEMA Plug and EURO Plug
Power Chord Length	48 in. (1219 mm)

Specifications

Block Heater Kit Number	Component	Watts	Voltage	Phase	Thermostat Temperature	
					ON	OFF
GM58098-KA1	358311	1000	120		27°C (80°F)	38°C (100°F)
GM75536-KA1	326228	1500	120		49°C (120°F)	60°C (140°F)
GM75555-KA5	GM75552	1800	120			
GM75555-KA6	GM75553	2000	240			
GM75556-KA1	352945	1500	120			
GM75557-KA1	352945	1500	120			
GM75564-KA1	358311	1000	120			
GM75565-KA1	352945	1500	120			
GM77944-KA1	352945	1500	120			
GM77944-KA2	352946	1500	240			
GM85060-KA1	GM75552	1800	120			
GM85060-KA2	GM75553	2000	240			
GM89427-KA2	GM75552	1800	120			
GM91708-KA1	352945	1500	120	1		
GM94248-KA1	352945	1500	120		27°C (80°F)	38°C (100°F)
GM104799-KA1	352945	1500	120			
GM105165-KA1	352945	1500	120			
GM105165-KA2	352946	1500	240			
GM105409-KA1	352945	1500	120			
GM105409-KA2	352946	1500	240			
GM115370-KA1	352945	1500	120			
GM115370-KA2	352946	1500	240			
10210000401-KA1	GM95436	500	120			
10305010400-KA1	352945	1500	120			
10305011301-KA1	352945	1500	120			
10305011401-KA1	GM75552	1800	120			
10305011401-KA2	GM75553	2000	240			

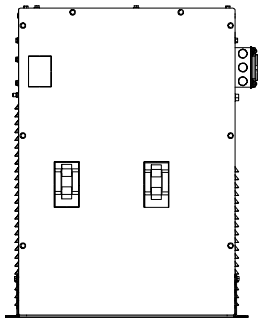
Dimensions and Weights

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

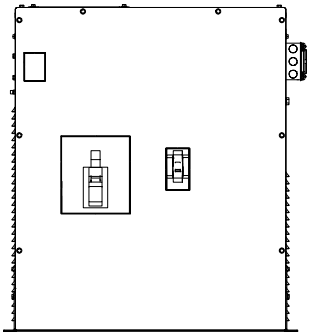


Availability is subject to change without notice. Discovery Energy, LLC and its affiliates dba Rehlko reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever. Contact your local authorized generator set distributor for availability.

Industrial Generator Set Accessories
Power Box



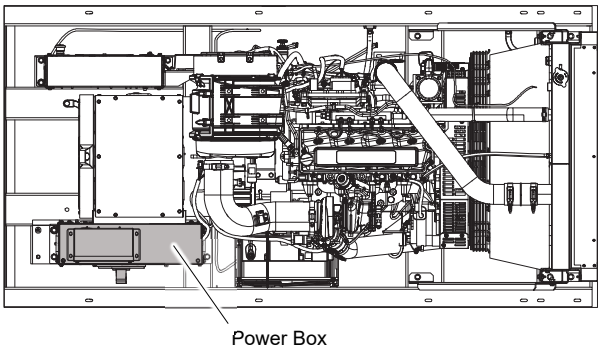
600 A Power Box
(See page 2)



1200 A Power Box
(See page 3)

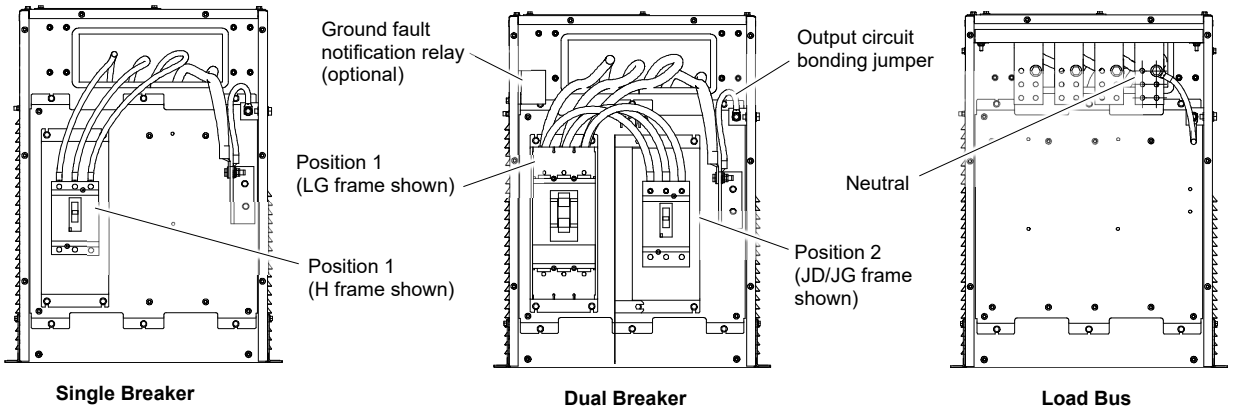
Standard Features

- 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



Location of the Power Box

600 A Power Box

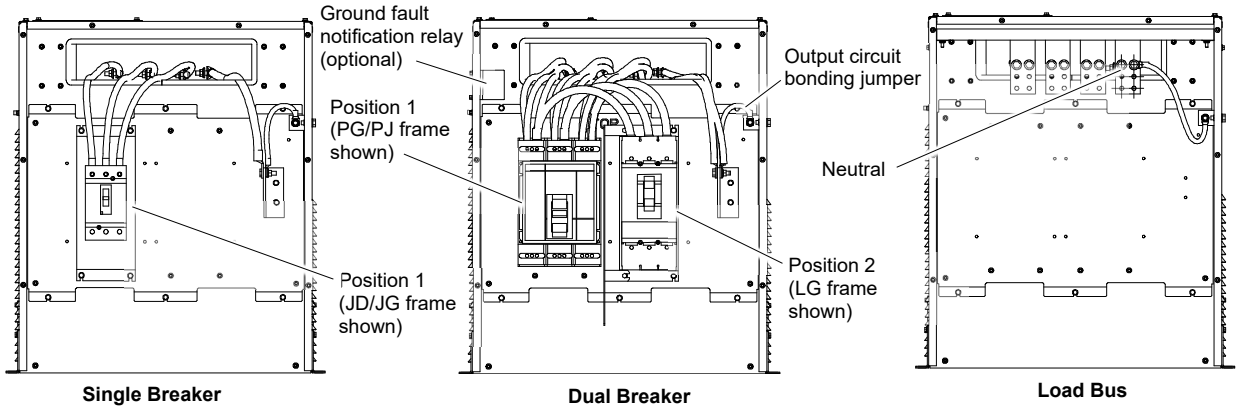


Used on the Generator Set Model	
• KD80	• KG80
• KD100	• KG80A
• KD130	• KG100
	• KG125

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	• KG150
• KD180	• KG180
• KD200	• KG200
• KD230	
• KD250	
• KD275	
• KD300	

1200 A Powerbox Breaker Selection
Position 1: 1200 A Max.
Position 2: 600 A Max.

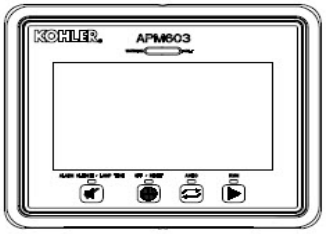
Short Circuit Rating	Duty Cycle	Ampere Range	Trip Type	Frame	Lugs
18 kA	80%	15-150	Thermal Mag	HD	(1) #14 – #3/0
		60-150	Electronic LSI	HD	(1) #14 – #3/0
		175	Thermal Mag	JD	(1) #1/0 – #4/0
		200-250	Electronic LSI	JD	(1) #3/0 – 350 kcmil
	100%	15-150	Thermal Mag	HD	(1) #14 – 3/0
		60-150	Electronic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

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 ±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	±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

rehlko

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 Responset™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

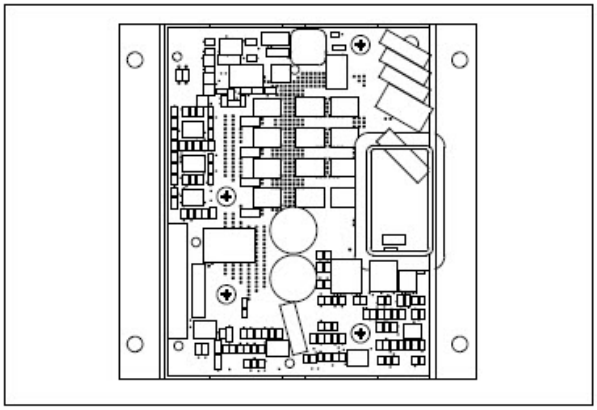
- Synchronizing parameters setup
  - Voltage matching
  - Frequency matching
  - Phase matching
  - Time delay
- Load sharing
  - kW sharing
  - kVAR sharing
  - Baseload settings
  - Droop

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.

rehlko

Alternator Data

DATASHEET ALTERNATOR

KH00932T

Alternator type KH00932TO4D

- 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)	210	214	220	225	195	168
Nominal Rating (kW)	168	171	176	180	156	134
Efficiency 100%	92.7	92.6	92.6	92.5	92.9	92.9

(*) 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 (%)	2.8
Wave Form : CEI=FHT	<2
Total Harmonic Distortion on Linear Load DHT (%)	3.1
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 (mdf)	0.005

DATASHEET ALTERNATOR

KH00932T

Alternator type KH00932TO4D

Reactances

	Saturated	Unsaturated
Direct Axis Synchro Reactance (Xd) (%)	220.1	265.2
Direct Axis Transient Reactance (X'd) (%)	10.8	13.1
Direct Axis Subtransient Reactance (X''d) (%)	6.2	7.4
Quadra Axis Synchro Reactance (Xq) (%)	108.3	130.4
Quadra Axis Subtransient Reactance (X"q) (%)	22	26.5
Zero Sequence Reactance (Xo) (%)	3.63	3.63
Negative Sequence Reactance (X_2) (%)	14.3	17.2
Reactance Desaturation Coef	1.23	

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

Short Circuit Ratio

Short Circuit Ratio (Kcc)	0.28
Exciter Time Constant (Te)	0.018
Subtransient Time Constant (T"d) (ms)	11
Short Circuit Transient Time Constant (T'd) (ms)	73
Open Circuit Time Constant (T'do) (ms)	700
Subtransient Time Constant (T"q) (ms)	10
Leakage Stator Reactance (Xa) (%)	5.1
Stator Resistance (Ra) (%)	0.016
Armature Time Constant (Ta) (ms)	15
No Load Excitation Current (Io) (A)	0.4
Full Load Excitation Current (Ic) (A)	2.7
Full Load Excitation Voltage (uc) (V)	36.4
Heat Rejected to Ambient Air (kW)	13.23
No Load Losses (W)	3084.32
Stator Resistance (for 20°C ambient) (Ω)	0.013
Rotor Resistance (for 20°C ambient) (Ω)	3.905
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)	402.4
Transient Dip (4/4 load) - PF : 0.8 AR (%)	18.2

DATASHEET ALTERNATOR

KH00932T

Alternator type KH00932TO4D

- ADDITIONAL ELECTRICAL CHARACTERISTICS -

Winding X1, X2 Auxiliary Resistance (for 20° ambient) (Ω)	0.854
Auxiliary Winding X1, X2 Excitation Voltage at No Load (V)	187
Auxiliary Winding X1, X2 Excitation Voltage on Load (V)	199
Heat Rejected to Ambient Air (kW)	13.23

- MECHANICAL CHARACTERISTICS -

Number of Bearing	1
Overspeed (rpm)	2250
Coupling	Direct
Air Flow (m^3/s)	0.65
Heat Rejected to Ambient Air (kW)	13.23

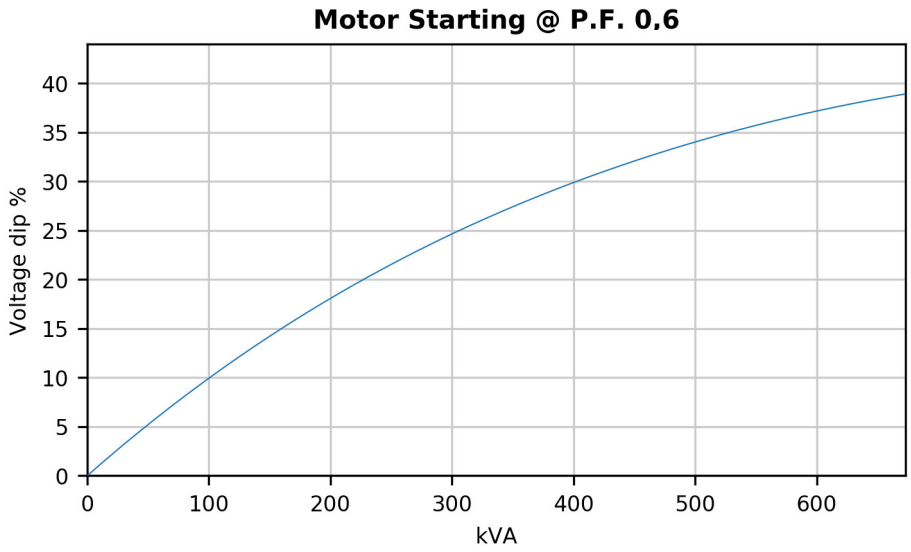
DATASHEET ALTERNATOR

KH00932T

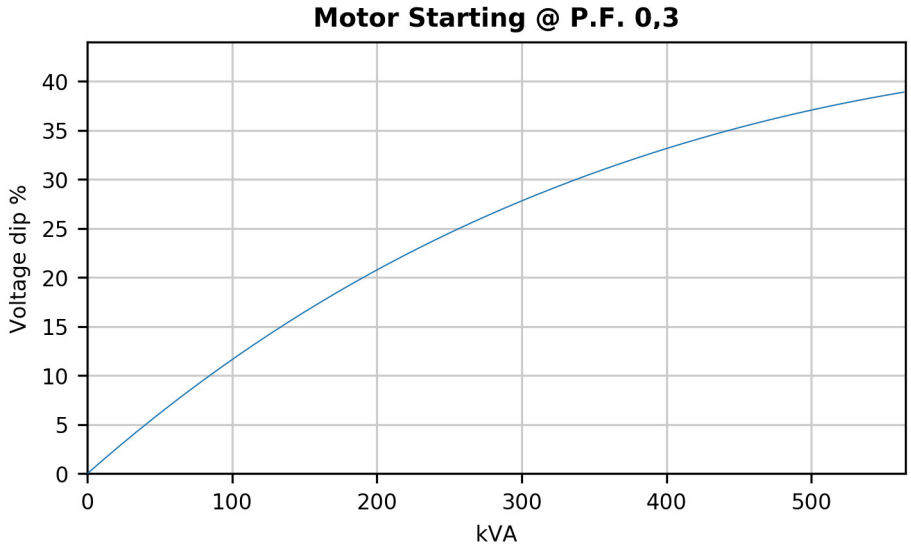
Alternator type KH00932TO4D

- TECHNICAL CURVES -

Motor Starting Curve Locked Rotor (0.6PF)



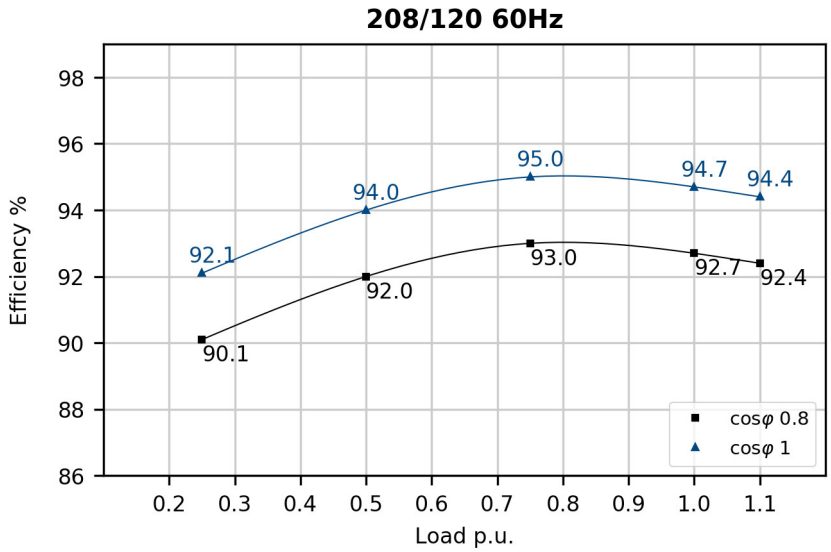
Motor Starting Curve Locked Rotor (0.3PF)



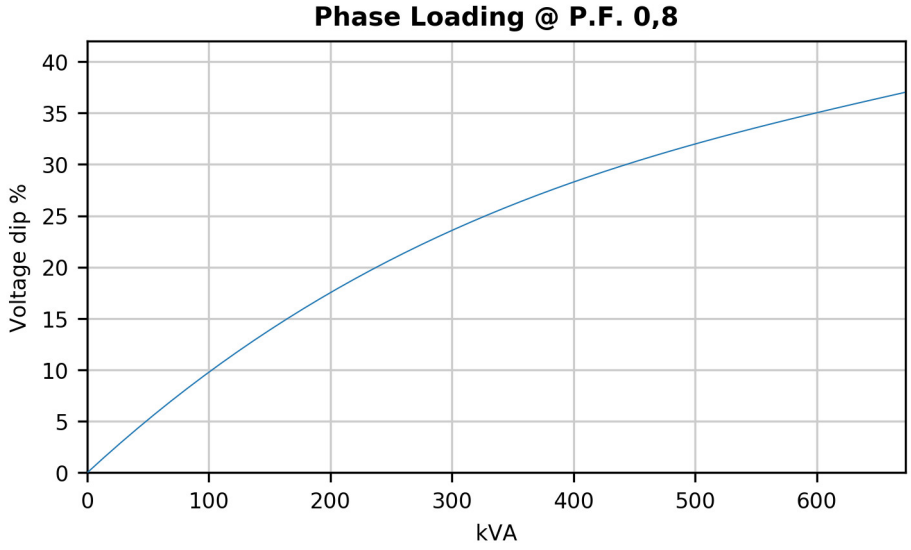
DATASHEET ALTERNATOR

Alternator type KH00932T
KH00932TO4D

Efficiency Curve (by excitation system)



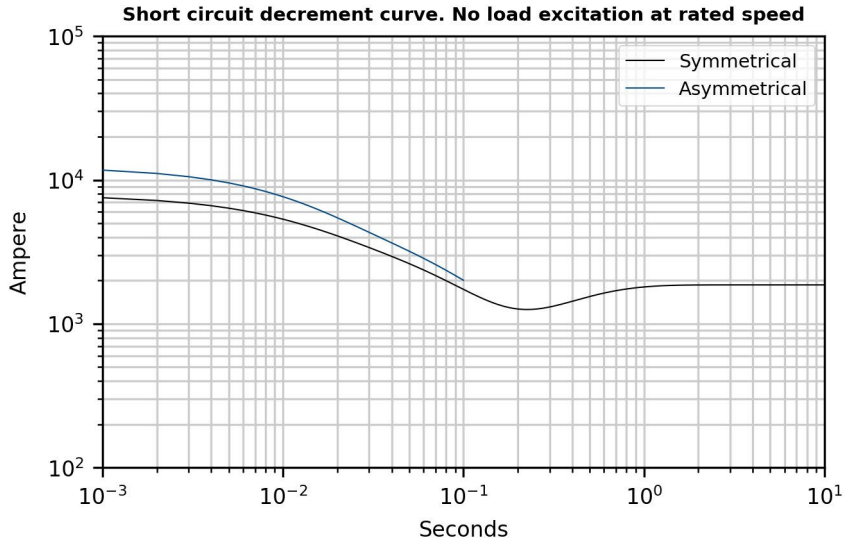
Loading Curve (by excitation system)



DATASHEET ALTERNATOR

Alternator type KH00932T
KH00932TO4D

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

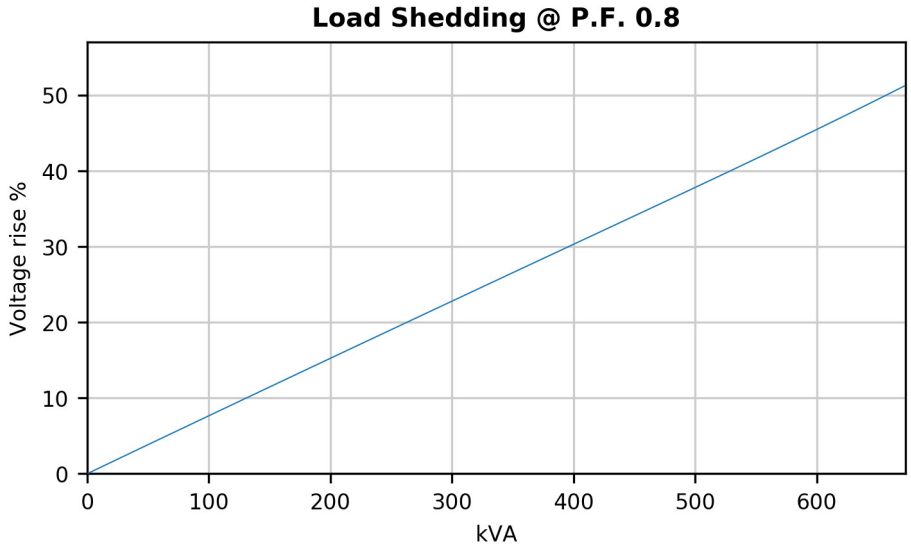
The indicated coefficient have to be used to correct the three phase short circuit curves values as a function of the type of short circuit voltage.

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

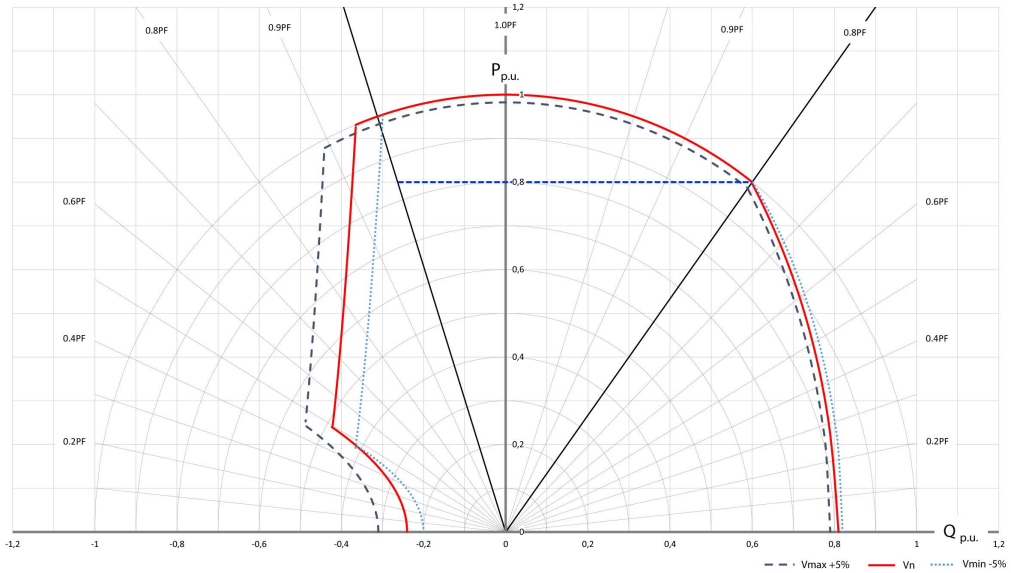
DATASHEET ALTERNATOR

	KH00932T
Alternator type	KH00932TO4D

Rejection Curve (by excitation system)



Capability Curve (PQ Diagram)

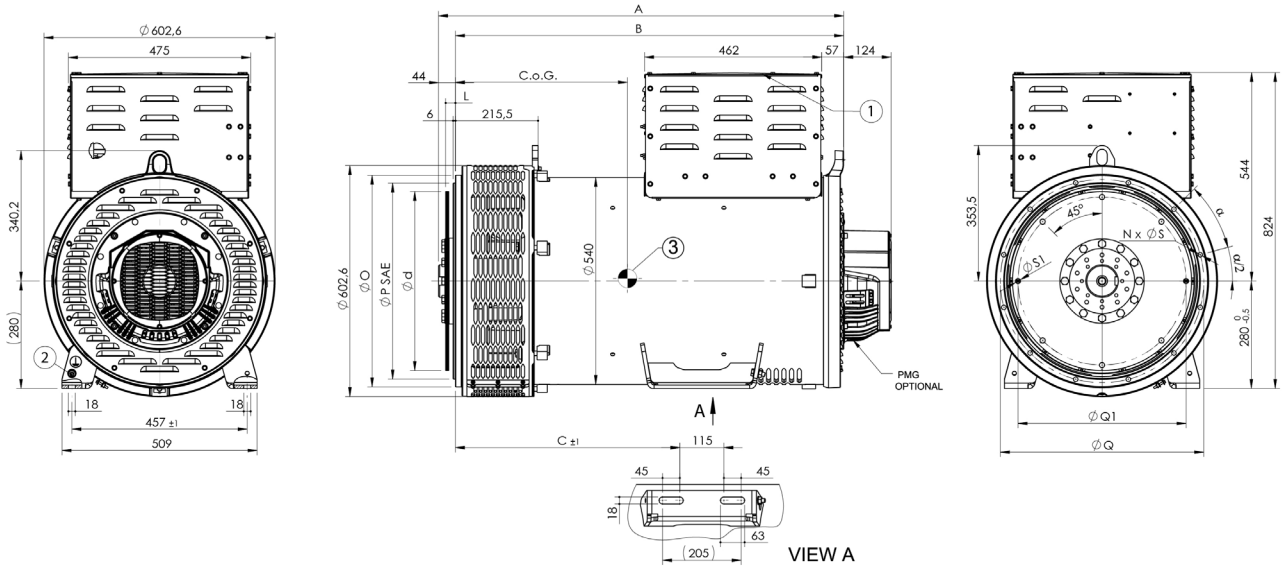


DATASHEET ALTERNATOR

Alternator type KH00932T
KH00932TO4D

- DIMENSIONS –

Overall Dimension Drawing (Single Bearing)



Tipo / Type	A	B	C	C.o.G.
Type / Type	[mm]	[mm]	[mm]	[mm]
KH00932	816	772	425	390.1
KH01183	886	842	425	431.8
KH01722	1056	1012	585	539.5
KH02216				508

SAE N.	Flangia / Flange Bride / Flansch					
	O	P	Q	S	N	α
3	451	409.58	428.62	12	12	30
2	489	447.68	466.72	12	12	30
1	552	511.18	530.22	12	12	30
1/2	648	584.20	619.12	14	12	30
0	711	647.70	679.45	14	16	22.5

SAE N.	Giunti a dischi / Disc coupling Disque de monopalier / Scheiben kupplung			
	d	L	Q1	S1
11 1/2	352.42	39.6	333.37	11
14	466.72	25.4	438.15	13.5

1)	REMOVABLE COVER FOR ACCESS TO MAIN TERMINALS
2)	SCREW M10 FOR GROUNDING
3)	CENTER OF GRAVITY IN CONFIGURATION SAE 1 FLYWHEEL 14

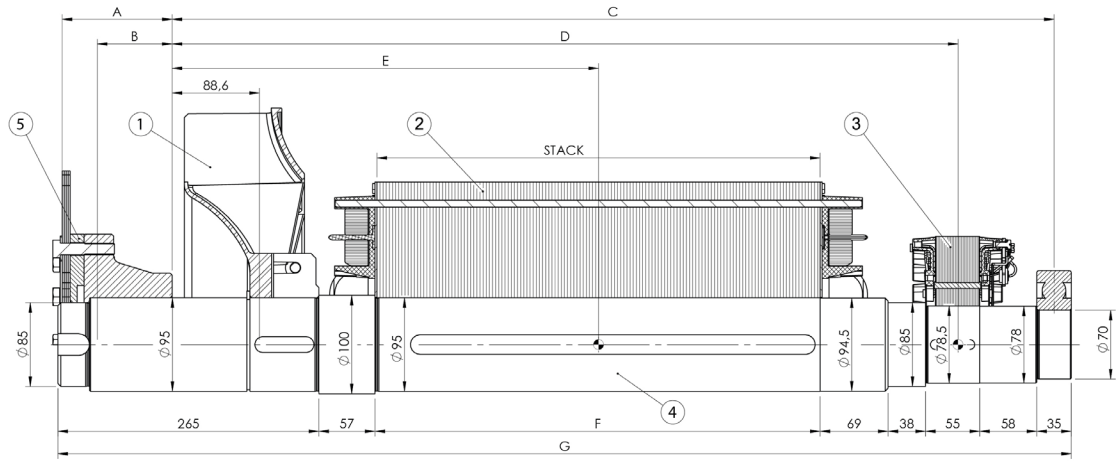
DATASHEET ALTERNATOR

Alternator type KH00932T
KH00932TO4D

- TORSIONAL ANALYSIS DATA –

Rotation Part Drawing for Torsional Vibration Calculation (Single Bearing)

MOMENTS OF INERTIA - SINGLE BEARING



* Shaft mass and inertia also include rotor keys

TYPE	COMPONENT								TOTAL	
	1 FAN		2 MAIN ROTOR		3 EXCITER ROTOR		4 SHAFT*			
	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	725.5	628.4	368.0	282.0	859.0
KH01722	895.5	798.4	483.0	452.0	1029.0
KH02216			433.0		

rehlko

Cooling Data

TECHNICAL INFORMATION BULLETIN

Generator Set Cooling System Data Sheet

	50°C Ambient Temperature Cooling System								
KD150 60Hz (Standby Duty)	**Total external restriction on open unit[7]**	Pa *(in.H_2O)*	0 (0)	125 (0.5)	187 (0.75)	250 (1)	312 (1.25)	375 (1.5)	**Enclosed Units**
	Maximum allowable ambient temperature	°C *(°F)*	60 (140)	56 (133)	54 (129)	52 (126)	49 (120)	46 (115)	55 (131)
	Cooling system airflow	m^3/min *(ft^3/min)*	335 (11800)	295 (10400)	278 (9800)	260 (9200)	240 (8500)	220 (7800)	NA (NA)

1. The data shown above is the anticipated cooling performance for a typical generator set when following proper installation techniques.
2. Cooling performance is based on operation at 100 m (328 ft.) above sea level. For elevations higher than 100 m (328 ft.), typical cooling performance derate is 1°C (1.8°F) per 250 m (820 ft.).
3. For high ambient conditions, check TIB-101 for the generator set power output derate schedule.
4. Incorrect installation, improper operation, fouling of the cooling system, and other variable conditions may reduce cooling performance.
5. 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 hoods.
6. Performance is based on a 50/50 water and ethylene glycol mixture.
7. Total external restriction includes restriction upstream and downstream of the unit – any ducting supplying intake air to the unit and any ducting for the discharge.

rehlko

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**
KD150	**60**	100% Load	113.5	82.7	80.8	71.4
		No Load	99.6	79.1	77.2	66.5

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.

KD150		**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	48.1	64.7	68.1	64.5	59.0	57.3	56.5	55.9	71.7
			1:30	45.8	60.3	68.2	63.5	57.9	59.5	56.7	50.9	70.8
			12:00-Engine	49.5	66.3	62.3	63.4	61.5	60.1	53.8	47.4	70.4
			10:30	45.7	64.3	67.5	63.8	62.1	59.5	55.4	49.5	71.4
			9:00	48.6	64.2	60.8	65.1	57.8	57.2	55.7	52.2	69.6
			7:30	49.3	61.2	63.4	64.0	61.2	59.4	58.8	60.1	71.8
			6:00-Alternator	51.0	63.4	64.6	66.1	64.4	62.1	62.0	62.3	73.0
			4:30	49.8	59.5	68.4	62.8	62.6	58.1	57.6	57.1	71.6
			8-pos. log avg.	48.8	63.5	66.2	64.3	61.4	59.4	57.8	57.1	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.
100% Load	7 (23)	Weather	Overall Levels	81.5	79.5	79.9	82.0	81.2	81.5	79.3	81.0	80.8

				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	50.6	67.5	74.1	74.5	75.4	77.8	75.3	72.6	83.4
			1:30	50.9	65.4	71.3	72.7	73.6	74.7	73.7	72.7	81.4
			12:00-Engine	55.1	67.5	71.9	73.5	76.7	75.9	72.1	66.6	81.8
			10:30	51.1	69.0	74.8	75.1	77.9	78.5	74.7	70.0	83.9
			9:00	47.3	66.9	71.5	72.7	77.2	77.4	75.1	71.2	83.1
			7:30	49.9	66.7	70.3	72.9	73.8	75.1	73.2	72.0	83.4
			6:00-Alternator	49.8	69.0	71.1	74.7	73.8	74.1	70.9	71.3	81.2
			4:30	49.4	65.0	74.9	72.0	74.3	75.7	73.6	72.8	82.9
			8-pos. log avg.	51.1	67.3	72.8	73.6	75.6	76.4	73.8	71.5	82.7

			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)	67.0	97.7	103.6	107.0	107.2	107.4	104.5	99.8	113.5

KD150		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	46.6	59.1	59.9	58.5	53.8	52.3	49.8	43.2	64.9
			1:30	42.9	55.0	62.4	57.3	51.0	52.7	47.0	39.1	64.7
			12:00-Engine	44.9	61.6	59.5	59.3	57.6	54.8	47.6	39.7	66.2
			10:30	43.2	61.4	59.9	60.5	57.0	53.6	49.4	41.4	66.4
			9:00	47.5	59.6	59.4	62.4	54.1	52.4	51.7	43.9	66.2
			7:30	47.8	56.9	60.6	62.0	58.4	55.6	53.8	48.9	66.7
			6:00-Alternator	48.5	57.7	64.2	61.9	64.1	58.1	57.8	51.5	69.4
			4:30	48.4	54.7	61.2	59.5	59.5	53.9	52.2	45.9	65.9
			8-pos. log avg.	46.7	58.9	61.2	60.5	58.6	54.6	52.6	46.2	66.5

				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	78.2	75.1	77.1	78.6	77.8	76.6	75.9	76.9	77.2

				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	45.2	63.4	74.6	72.0	72.4	73.1	70.8	67.8	80.1
			1:30	42.6	60.3	71.4	68.8	71.0	68.3	67.1	64.1	77.0
			12:00-Engine	46.4	63.9	71.2	70.3	73.6	73.0	68.7	65.6	79.0
			10:30	43.5	64.2	72.0	72.5	75.0	74.7	70.5	65.1	80.5
			9:00	44.1	63.0	69.7	69.1	74.5	74.0	71.2	68.0	79.7
			7:30	42.3	61.8	68.2	70.2	71.6	72.2	68.7	71.3	78.5
			6:00-Alternator	42.1	64.3	70.2	72.3	70.8	70.0	65.8	66.5	77.8
			4:30	43.5	61.8	71.7	69.4	72.5	71.1	68.1	71.3	78.8
			8-pos. log avg.	43.9	63.0	71.5	70.8	72.9	72.5	69.2	68.2	79.1

			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)	61.7	89.1	90.4	91.6	93.6	92.5	90.8	85.9	99.6

rehlko

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. H2O	In. Hg	kPa	In. H2O	In. Hg	kPa	In. H2O	In. Hg
KD150	ADV-10082 ADV-10131	All Weather and Sound Enclosures	10901051100	10901051316	6.3	25.3	1.9	10.2	40.8	3.0	3.9	15.5	1.1

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.

rehlko

Emissions Data

KD150

60Hz Diesel Generator Set

Tier 3 EPA Certified for Stationary Emergency Applications

ENGINE INFORMATION

Model:	KD07L06T-6DDS	Bore:	107 mm (4.48 in.)
Nameplate kW @ 1800 RPM:	242	Stroke:	124 mm (5.70 in.)
Type:	4-Cycle, 6 Cylinder	Displacement:	6.7L (408 cu. in.)
Aspiration:	Turbocharged, Charge Air Cooled	EPA Family:	TCEXL0409AAD
Compression Ratio:	17.2:1	EPA Certificate:	TCEXL0409AAD-041
Emission Control Device:	Direct Diesel Injection, Engine Control Module, Turbocharger, Charge Air Cooler		

EXHAUST EMISSION DATA		EPA D2 5-MODE WEIGHTED
NMHC	(Non-Methane Hydrocarbons)	0.15 g/kWh
NOx	(Oxides of Nitrogen as NO_2)	3.86 g/kWh
CO	(Carbon Monoxide)	1.0 g/kWh
PM	(Particulate Matter)	0.11 g/kWh

NOMINAL EMISSION DATA

Cycle Point	100% ESP	75% ESP	50% ESP	25% ESP
Power [kW]	242	182	121	60
Speed [rpm]	1800	1800	1800	1800
Exhaust Gas Flow [kg/h]	1139	1035	950	593
Exhaust Gas Temperature [C]	532	472	431	360
NOx [g/kWh]	3.43	2.21	1.45	1.37
CO [g/kWh]	0.16	0.32	0.61	1.40
HC [g/kWh]	0.05	0.03	0.09	0.22
PM [g/kWh]	0.03	0.04	0.07	0.13

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: **TCEXL0409AAD-041**

Effective Date: 11/18/2025

Expiration Date: 12/31/2026

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 11/18/2025

Revision Date: N/A

Model Year: 2026
Manufacturer Type: Original Engine Manufacturer
Engine Family: TCEXL0409AAD

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.

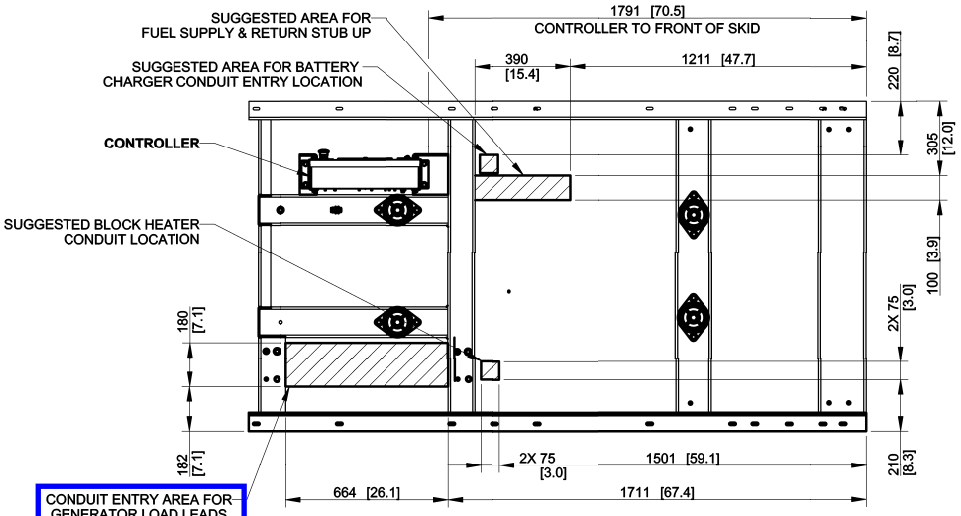
It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified 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.

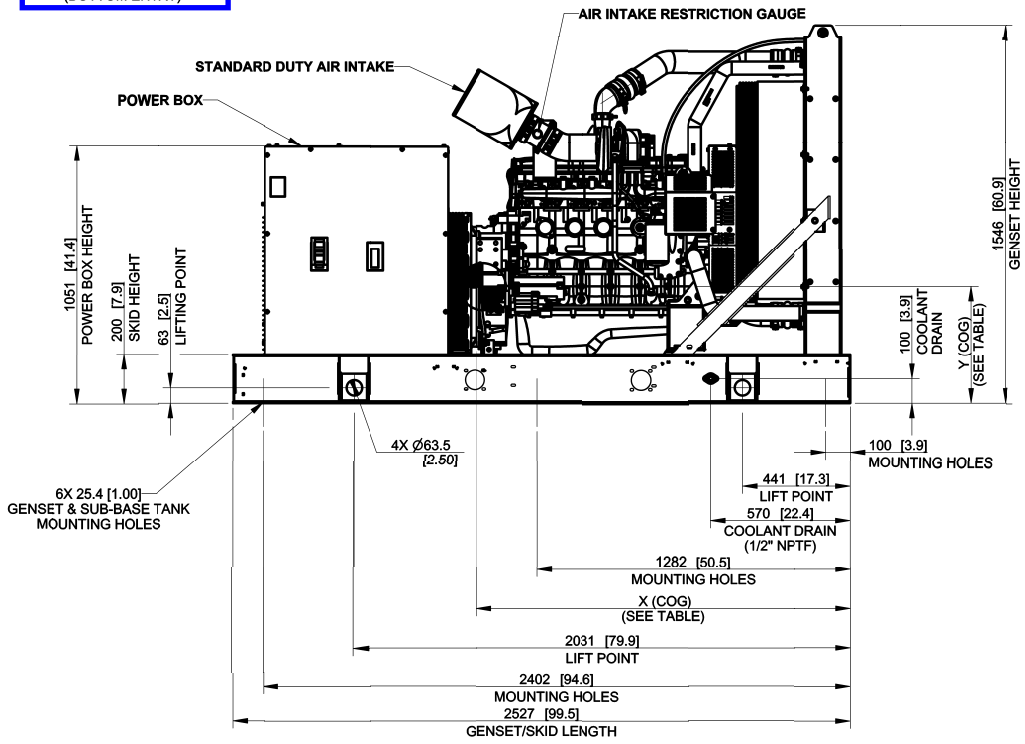
This certificate does not cover engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

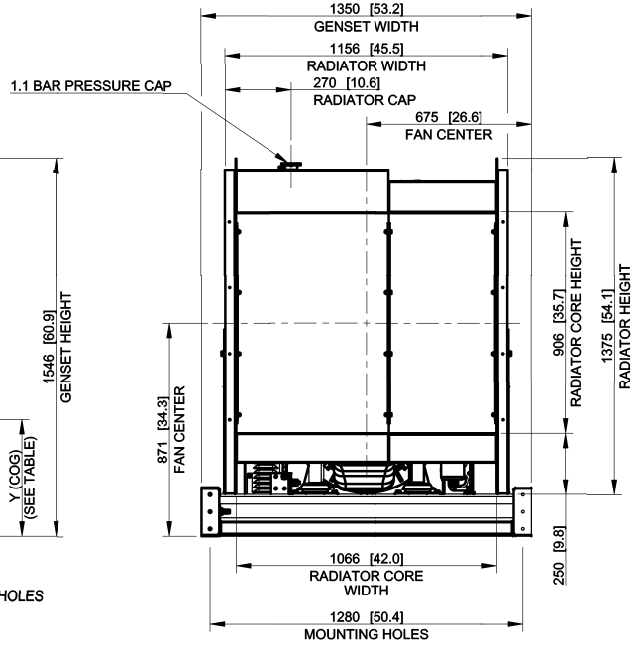
The actual engine power may lie outside the limits of the Emissions Power Category shown above. See the certificate application for details.

rehlko

Dimensional Drawings







MODEL	ALTERNATOR	GENSET WEIGHT (WET) kg [LB]	CENTER OF GRAVITY (WET) mm [IN]	
			X	Y
KD150	KH00932TO4D	1500 [3305]	1190 [46.75]	540 [21.25]
KD150	KH01183MO4D	1570 [3460]	1235 [48.50]	540 [21.25]
KD150	KH01382TO4D	1630 [3595]	1250 [49.25]	540 [21.25]
KD180	KH01382MO4D	1630 [3595]	1250 [49.25]	540 [21.25]
KD180	KH01183TO4D	1570 [3460]	1235 [48.50]	540 [21.25]
KD180	KH01382TO4D	1630 [3595]	1250 [49.25]	540 [21.25]
KD200	KH01183TO4D	1570 [3460]	1235 [48.50]	540 [21.25]
KD200	KH01382TO4D	1630 [3595]	1250 [49.25]	540 [21.25]
WOOD BASE IS AN ADDITIONAL 150kg [325LB]				

NOTES:
1) IF SUB-BASE FUEL TANK AND/OR SOUND HOUSING IS USED, REFER TO SUB-BASE FUEL TANK ADV TO DETERMINE MOUNTING LOCATIONS.

2) DIMENSIONS IN [ ] ARE ENGLISH EQUIVALENTS.

3) IF AN ENCLOSURE IS USED, THE FUEL LINE MUST BE STUBBED UP DIRECTLY UNDER THE GENSET. REFER TO ENCLOSURE ADV.

4) IF SEISMIC CERTIFICATION IS REQURED, SEE SEISMIC ADV FOR INSTALLATION INSTRUCTIONS.

5) LIFT POINTS NOT TO BE USED WITH TANKS.

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL ☐ INDICATES PART NUMBERS AFFECTED BY LATEST DRAWING REVISION	BY
-	10NOV2025	RELEASE FOR PRODUCTION	DEW
A	11MAY2026	(D-1-3) OVERSIZED ALTERNATORS ADDED	
		TO TABLE, COG VALUES UPDATED	DEW

DO NOT SCALE.
THIS ASSEMBLY OR PART MUST COMPLY WITH PEP-RML-001. REFERENCE CAD MODEL FOR UNSPECIFIED DIMENSIONS.

rehlko

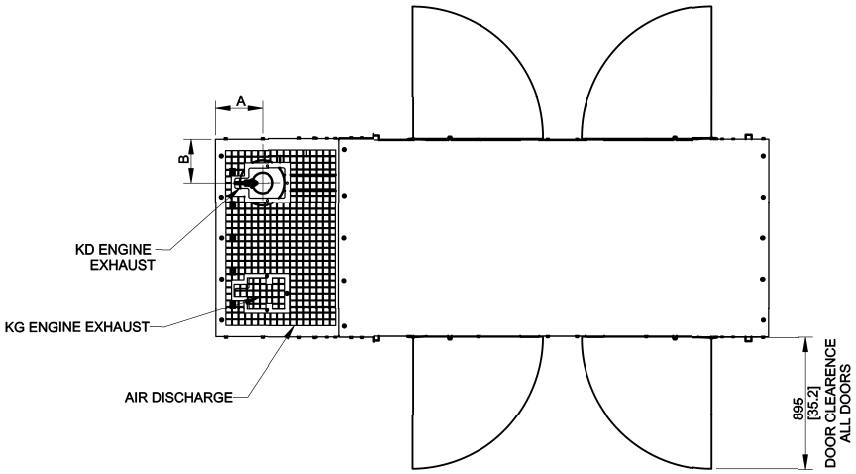
UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN MILLIMETERS GENERAL TOLERANCES: N/A

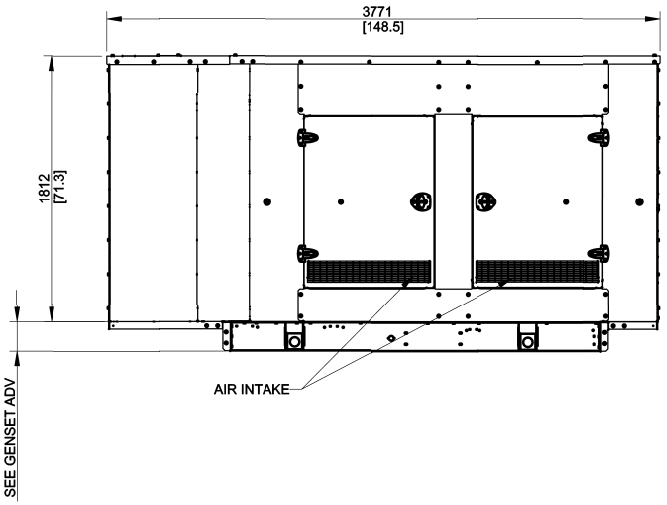
MAJOR ○ = 0
CRITICAL ⚠ = 0
CHARACTERISTICS COMPLY WITH KPS-80022
THIRD ANGLE PROJECTION
SCALE: 0.05 SHEET SIZE: B SHEET: 1 OF 4

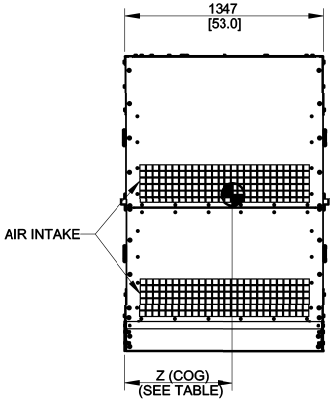
DRAWN: DEW DATE: 10NOV2025
APPROVED: SEE PLM SYSTEM

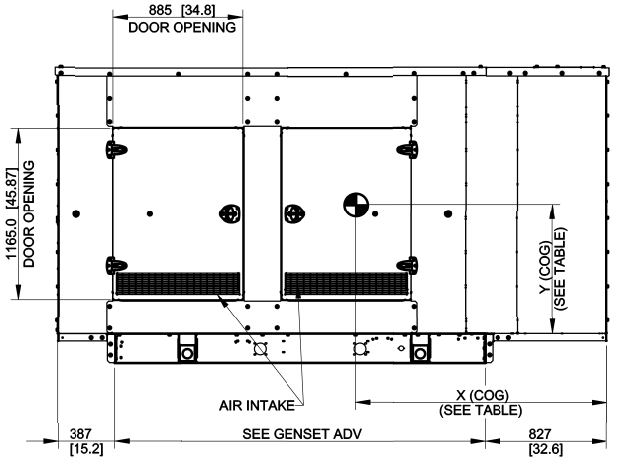
TITLE:
DIMENSION PRINT, KD150-200
DWG NO.: **ADV-10082**

DESCRIPTION	MODELS	WEIGHT		CENTER OF GRAVITY mm [in]			EXHAUST LOCATION mm [in]		SILENCER OUTLET DIAMETER mm [in]
		kg	LBS	X	Y	Z	A	B	
SOUND, STEEL	KD150, KD180, KD200	620	1355	1725 [68.00]	945 [37.50]	720 [28.25]	319 [12.56]	296 [11.65]	127 [5.00]
WEATHER, STEEL	KD150, KD180, KD200	600	1310	1725 [68.00]	945 [37.50]	720 [28.25]	319 [12.56]	296 [11.65]	127 [5.00]
SOUND, ALUM	KD150, KD180, KD200	400	880	1740 [68.75]	975 [38.25]	735 [29.00]	319 [12.56]	296 [11.65]	127 [5.00]
SOUND, STEEL	KG150, KG180, KG200	640	1400	1680 [66.00]	975 [38.25]	570 [22.75]	319 [12.56]	1049 [41.30]	127 [5.00]
WEATHER, STEEL	KG150, KG180, KG200	620	1355	1680 [66.00]	975 [38.25]	570 [22.75]	319 [12.56]	1049 [41.30]	127 [5.00]
SOUND, ALUM	KG150, KG180, KG200	430	935	1695 [66.75]	1005 [39.25]	600 [23.50]	319 [12.56]	1049 [41.30]	127 [5.00]









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
-	13AUG2025	RELEASE FOR PRODUCTION	AVD
A	21APR2026	ADDED KG MODELS	JGG

DO NOT SCALE.
THIS ASSEMBLY OR PART MUST COMPLY WITH PEP-RML-001. REFERENCE CAD MODEL FOR UNSPECIFIED DIMENSIONS.

rehlko

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

MAJOR ○ = 0
CRITICAL ⚠ = 0
CHARACTERISTICS COMPLY WITH KPS-80022

THIRD ANGLE PROJECTION

SCALE: 0.03 | SHEET SIZE: B | SHEET: 1 OF 1

DRAWN: AVD | DATE: 13AUG2025

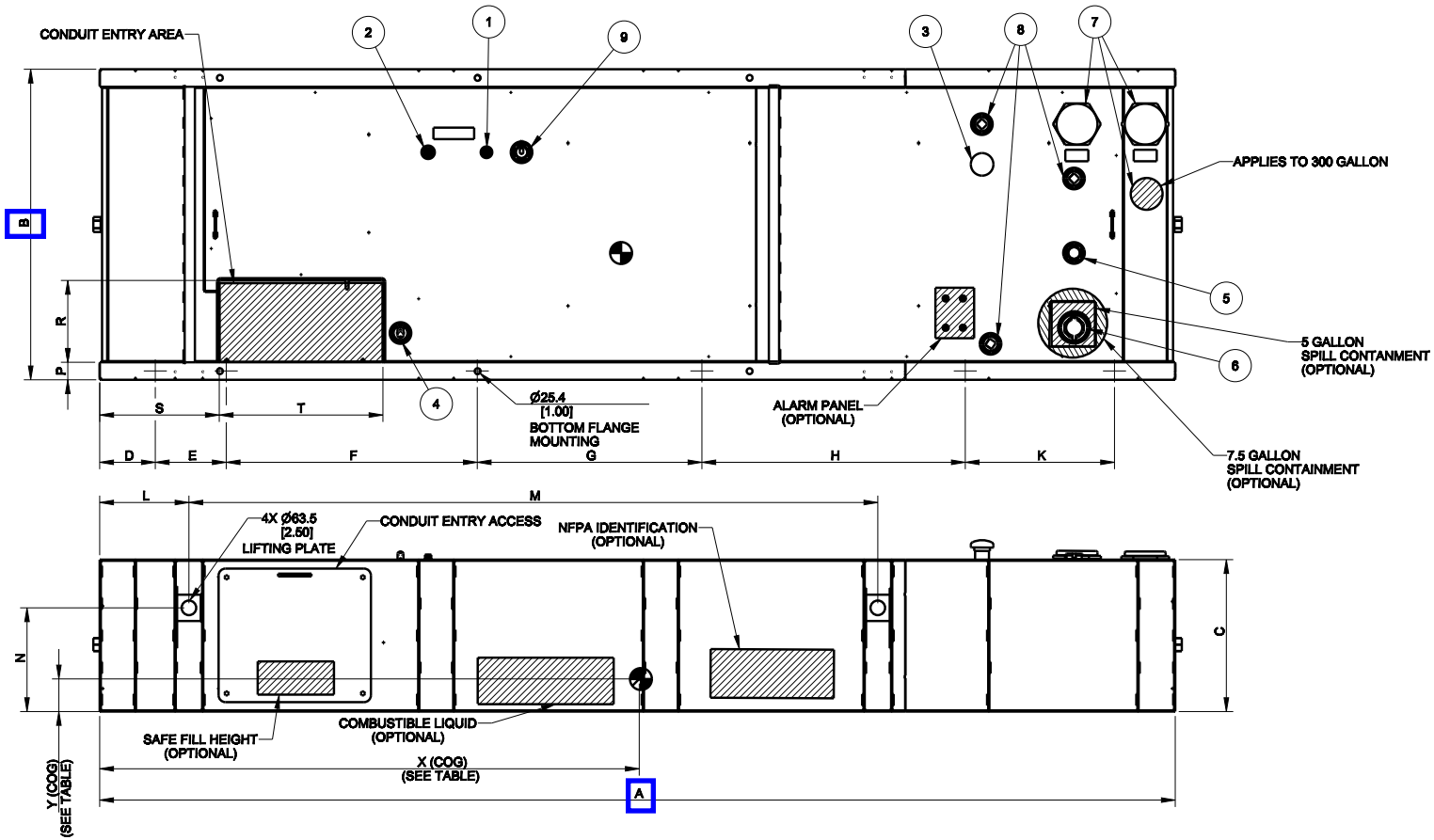
APPROVED: SEE PLM SYSTEM

TITLE:
DIMENSION PRINT, KG/KD150-200

DWG NO.: **ADV-10131**

TANK INFORMATION

LITERS [GALLONS]	MODELS	A mm [INCH]	B mm [INCH]	C mm [INCH]	TANK WEIGHT kg [LB] (NO FUEL)	BOTTOM FLANGE MOUNTING						LIFTING LOCATIONS			COG		P mm [INCH]	R mm [INCH]	S mm [INCH]	T mm [INCH]
						D	E	F	G	H	K	L	M	N	X	Y				
1136 [300]	KD150, KD180, KD200	4674 [184.0]	1350 [53.2]	381 [15.0]	1130 [2480.0]	242 [9.5]	296 [11.7]	1558 [61.3]	1330 [52.4]	819 [32.2]	-	388 [15.3]	2853 [112.3]	171 [6.7]	2475 [97.3]	150 [6.0]	76 [3.0]	356 [14.0]	519 [20.4]	711 [28.0]
2271 [600]		4674 [184.0]	1350 [53.2]	660 [26.0]	1400 [3085.0]	242 [9.5]	308 [12.1]	1091 [43.0]	976 [38.4]	1145 [45.1]	649 [25.5]	388 [15.3]	2894 [117.9]	451 [17.8]	2445 [96.0]	285 [11.5]	76 [3.0]	356 [14.0]	519 [20.4]	711 [28.0]



STATE TANK
600 GALLON SHOWN

ITEM	DESCRIPTION
1	FUEL RETURN 3/8" NPT
2	FUEL SUPPLY 1/2" NPT
3	NORMAL VENT
4	LEAK SENSOR
5	GAUGE, FUEL LEVEL, DIRECT READ
6	FILL CAP, 2" LOCKABLE W/PIPE RISER
7	EMERGENCY VENT
8	OPTIONAL ACCESSORY PORT (2" NPT)
9	GAUGE, FUEL LEVEL, W/ SENDER

NOTES:
TANK WEIGHT + ENCLOSURE WEIGHT + GENSET WREFER TO SEISMIC ADV FOR IBC/OSHPD SEISMIC MOUNTING LOCATIONS

GENSET + ENCLOSURE MOUNTS FLUSH WITH STUB-UP END OF TANK.

REFER TO SEISMIC ADV FOR IBC/OSHPD SEISMIC MOUNTING LOCATIONS

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL ☐ INDICATES PART NUMBERS AFFECTED BY LATEST DRAWING REVISION	BY
-	19NOV2025	RELEASE FOR PRODUCTION	AVD
A	09DEC2025	(C-7, 8) ADDED P, R, S, T; (D-1, 2) ADDED	
		COLUMNS P, R, S, T; SEE SHEET 1, 3	BLK

DO NOT SCALE.
THIS ASSEMBLY OR PART MUST COMPLY WITH PEP-RML-001.
REFERENCE CAD MODEL FOR UNSPECIFIED DIMENSIONS.

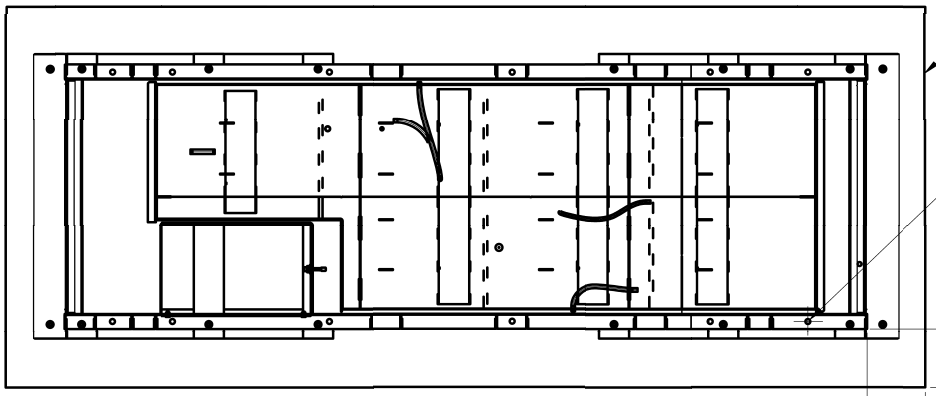
rehlko

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS IN MILLIMETERS
GENERAL TOLERANCES:
X.XX ± 0.25
X.X ± 1.0
X ± 1.0
ANGLES ±0° 30'
BEND ANGLES ± 1°
SURFACE FINISH MAX.

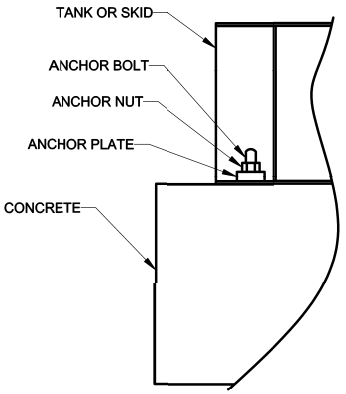
MAJOR ○ = 0
CRITICAL ◉ = 0
THIRD ANGLE PROJECTION
CHARACTERISTICS COMPLY WITH KPS-80022
SCALE: 0.04 | SHEET SIZE: B | SHEET: 2 OF 3

DRAWN: AVD | DATE:
APPROVED: SEE PLM SYSTEM | 19NOV2025

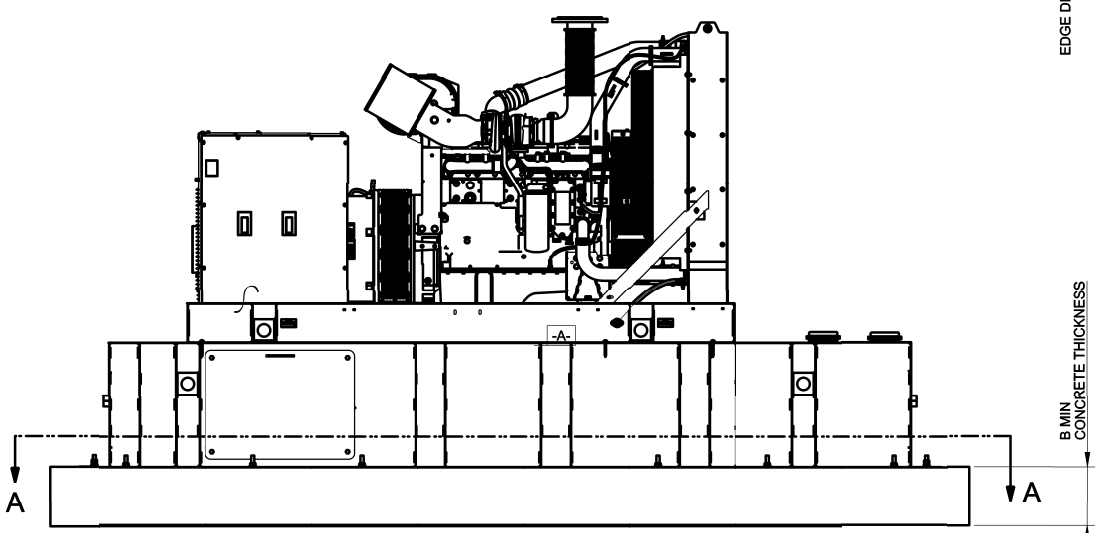
TITLE:
DIMENSION PRINT, KD150-200 TANKS
DWG NO.: **ADV-10067**



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 ☐ INDICATES PART NUMBERS AFFECTED BY LATEST DRAWING REVISION	BY
-	08SEP2025	RELEASE FOR PRODUCTION	MBM
A	13JAN2026	UPDATED DIMENSION LETTERING AND	
		NOTES, SEE SHEET 2 AND 3	JGG
B	29JAN2026	(C-4) "A MIN EDGE DISTANCE" REFERENCES	
		UPDATED	JGG
C	29APR2026	(C-4) "A MIN EDGE DISTANCE" REFERENCES	
		UPDATED; SEE SHEET 2	MBF

DO NOT SCALE.
THIS ASSEMBLY OR PART MUST COMPLY WITH PEP-RML-001. REFERENCE CAD MODEL FOR UNSPECIFIED DIMENSIONS.

rehlko

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

MAJOR ○ = 0
CRITICAL ⚠ = 0
CHARACTERISTICS COMPLY WITH KPS-80022

THIRD ANGLE PROJECTION

SCALE: 0.04 | SHEET SIZE: B | SHEET: 1 OF 3

DRAWN: MBM | DATE:
APPROVED: SEE PLM SYSTEM | 08SEP2025

TITLE:
DIMENSION PRINT, SEISMIC CERTIFICATION

DWG NO.: **ADV-10136**

SEISMIC INSTRUCTIONS

TANKS

S_{ds} = 2.0 for R_μ = 1.3 , H_f = 3.5 S_{ds} = 2.0 for R_μ = 1.0 , H_f = 1.0						IBC CODE YEAR 2024, CBC CODE YEAR 2025				
CONCRETE									STEEL	
MODELS	TANK VOLUME L [GAL]	ANCHOR QUANTITY	A MIN	B MIN	C NOMINAL	D	E ANCHOR	CONCRETE STRENGTH f_c'	D	E ANCHOR
KD80, KD100, KD130	833 [220]	10	254.0 (10.0)	203.2 (8.0)	114.3 (4.5)	19.1 [0.75]	HILTI TZ2 (ESR-4266)	4000 PSI	22.2 [0.875]	SAE J429 GRADE 8
KD80, KD100, KD130	1590 [420]	10	304.8 (12.0)	254.0 (10.0)	114.3 (4.5)	19.1 [0.75]	HILTI TZ2 (ESR-4266)	4000 PSI	22.2 [0.875]	SAE J429 GRADE 8
KD80, KD100, KD130	3179 [840]	14	304.8 (12.0)	304.8 (12.0)	203.2 (8.0)	19.1 [0.75]	HILTI-Y200 V3 + HAS-B-105 (ESR-4878)	4000 PSI	22.2 [0.875]	SAE J429 GRADE 8
KD150, KD180, KD200	1136 [300]	10	304.8 (12.0)	254.0 (10.0)	114.3 (4.5)	19.1 [0.75]	HILTI TZ2 (ESR-4266)	4000 PSI	22.2 [0.875]	SAE J429 GRADE 8
KD150, KD180, KD200	2271 [600]	12	355.6 (14.0)	304.8 (12.0)	114.3 (4.5)	19.1 [0.75]	HILTI TZ2 (ESR-4266)	4000 PSI	22.2 [0.875]	SAE J429 GRADE 8
KD150, KD180, KD200	4656 [1230]	14	355.6 (14.0)	304.8 (12.0)	203.2 (8.0)	19.1 [0.75]	HILTI-Y200 V3 + HAS-B-105 (ESR-4878)	4000 PSI	22.2 [0.875]	SAE J429 GRADE 8
KD230, KD250, KD275, KD300	1855 [490]	12	304.8 (12.0)	254.0 (10.0)	114.3 (4.5)	19.1 [0.75]	HILTI TZ2 (ESR-4266)	4000 PSI	22.2 [0.875]	SAE J429 GRADE 8
KD230, KD250, KD275, KD300	3595 [950]	14	304.8 (12.0)	304.8 (12.0)	203.2 (8.0)	19.1 [0.75]	HILTI-Y200 V3 + HAS-B-105 (ESR-4878)	4000 PSI	22.2 [0.875]	SAE J429 GRADE 8
KD230, KD250, KD275, KD300	7305 [1930]	20	406.4 (16.0)	406.4 (16.0)	203.2 (8.0)	19.1 [0.75]	HILTI-Y200 V3 + HAS-B-105 (ESR-4878)	4000 PSI	22.2 [0.875]	SAE J429 GRADE 8

OPEN UNIT

S_{ds} = 2.0 for R_μ = 1.3 , H_f = 3.5 S_{ds} = 2.0 for R_μ = 1.0 , H_f = 1.0					IBC CODE YEAR 2024, CBC CODE YEAR 2025				
CONCRETE								STEEL	
MODELS	ANCHOR QUANTITY	A MIN	B MIN	C NOMINAL	D	E ANCHOR	CONCRETE STRENGTH fc'	D	E ANCHOR
KD80, KD100, KD130	6	152.4 (6.0)	152.4 (6.0)	114.3 (4.5)	19.1 [0.75]	HILTI TZ2 (ESR-4266)	3000 PSI	22.2 [0.875]	SAE J429 GRADE 8
KD150, KD180, KD200	6	203.2 (8.0)	203.2 (8.0)	114.3 (4.5)	19.1 [0.75]	HILTI TZ2 (ESR-4266)	3000 PSI	22.2 [0.875]	SAE J429 GRADE 8
KD230, KD250, KD275, KD300	6	254.0 (10.0)	203.2 (8.0)	114.3 (4.5)	19.1 [0.75]	HILTI TZ2 (ESR-4266)	3000 PSI	22.2 [0.875]	SAE J429 GRADE 8
KG80A	6	152.4 (6.0)	152.4 (6.0)	114.3 (4.5)	19.1 [0.75]	HILTI TZ2 (ESR-4266)	3000 PSI	22.2 [0.875]	SAE J429 GRADE 8
KG80, KG100, KG125	6	152.4 (6.0)	152.4 (6.0)	114.3 (4.5)	19.1 [0.75]	HILTI TZ2 (ESR-4266)	3000 PSI	22.2 [0.875]	SAE J429 GRADE 8
KG150, KG180, KG200	6	152.4 (6.0)	152.4 (6.0)	114.3 (4.5)	19.1 [0.75]	HILTI TZ2 (ESR-4266)	3000 PSI	22.2 [0.875]	SAE J429 GRADE 8

ENCLOSED UNIT

S_{ds} = 2.0 for R_μ = 1.3 , H_f = 3.5 S_{ds} = 2.0 for R_μ = 1.0 , H_f = 1.0					IBC CODE YEAR 2024, CBC CODE YEAR 2025				
CONCRETE								STEEL	
MODELS	ANCHOR QUANTITY	A MIN	B MIN	C NOMINAL	D	E ANCHOR	CONCRETE STRENGTH fc'	D	E ANCHOR
KD80, KD100, KD130	6	152.4 (6.0)	152.4 (6.0)	114.3 (4.5)	19.1 [0.75]	HILTI TZ2 (ESR-4266)	3000 PSI	22.2 [0.875]	SAE J429 GRADE 8
KD150, KD180, KD200	6	203.2 (8.0)	203.2 (8.0)	114.3 (4.5)	19.1 [0.75]	HILTI TZ2 (ESR-4266)	3000 PSI	22.2 [0.875]	SAE J429 GRADE 8
KD230, KD250, KD275, KD300	6	254.0 (10.0)	203.2 (8.0)	114.3 (4.5)	19.1 [0.75]	HILTI TZ2 (ESR-4266)	3000 PSI	22.2 [0.875]	SAE J429 GRADE 8
KG80A	6	152.4 (6.0)	152.4 (6.0)	114.3 (4.5)	19.1 [0.75]	HILTI TZ2 (ESR-4266)	3000 PSI	22.2 [0.875]	SAE J429 GRADE 8
KG80, KG100, KG125	6	152.4 (6.0)	152.4 (6.0)	114.3 (4.5)	19.1 [0.75]	HILTI TZ2 (ESR-4266)	3000 PSI	22.2 [0.875]	SAE J429 GRADE 8
KG150, KG180, KG200	6	203.2 (8.0)	203.2 (8.0)	114.3 (4.5)	19.1 [0.75]	HILTI TZ2 (ESR-4266)	3000 PSI	22.2 [0.875]	SAE J429 GRADE 8

DIMENSIONS IN [] ARE INCH EQUIVALENT

SEISMIC INSTRUCTIONS

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL ☐ INDICATES PART NUMBERS AFFECTED BY LATEST DRAWING REVISION	BY
-	08SEP2025	RELEASE FOR PRODUCTION	MBM
A	13JAN2026	ADDED NEW TABLES, SEE SHEET 1 AND 3	JGG
B	29JAN2026	SEE SHEET 1	JGG
C	29APR2026	ADDED KG80-200 TO OPEN UNIT & ENCLOSED UNIT TABLES, SEE SHEET 1	MBF

DO NOT SCALE.
THIS ASSEMBLY OR PART MUST COMPLY WITH PEP-RML-001.
REFERENCE CAD MODEL FOR UNSPECIFIED DIMENSIONS.

rehlko

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

MAJOR ○ = 0
CRITICAL ⚠ = 0
CHARACTERISTICS COMPLY WITH KPS-80022

THIRD ANGLE PROJECTION

SCALE: 0.04 | SHEET SIZE: B | SHEET: 2 OF 3

DRAWN: MBM | DATE:
APPROVED: SEE PLM SYSTEM | 08SEP2025

TITLE:
DIMENSION PRINT, SEISMIC CERTIFICATION

DWG NO.: **ADV-10136**

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
-	08SEP2025	RELEASE FOR PRODUCTION	MBM
A	13JAN2026	ADDED FULL NEW SET OF NOTES, SEE SHEET 1 AND 2	JGG
B	29JAN2026	SEE SHEET 1	JGG
C	26APR2026	SEE SHEET 1 & 2	MBF

DO NOT SCALE.
THIS ASSEMBLY OR PART MUST COMPLY WITH PEP-RML-001. REFERENCE CAD MODEL FOR UNSPECIFIED DIMENSIONS.

rehlko

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

MAJOR ○ = 0
CRITICAL ⚠ = 0
CHARACTERISTICS COMPLY WITH KPS-80022

THIRD ANGLE PROJECTION

SCALE: 0.04 | SHEET SIZE: B | SHEET: 3 OF 3

DRAWN: MBM | DATE:
APPROVED: SEE PLM SYSTEM | 08SEP2025

TITLE:
DIMENSION PRINT, SEISMIC CERTIFICATION

DWG NO.: **ADV-10136**

rehlko

Wiring Schematics

TABLE OF CONTENTS

REV	DATE	REVISION	BY	V
-	3/26/2025	NEW SCHEMATIC	JBB	

REVISION

PAGE	TITLE	REV.	DATE	NOTE
0	Table of Contents	-	3/26/2025	NEW SCHEMATIC
1	ONE-LINE DIAGRAM	B	3/31/2026	UPDATED WIRE NAMES
2	ENGINE SCHEMATIC	B	3/31/2026	UPDATED WIRE NAMES
3	APM603 CONTROL PEDESTAL SCHEMATIC - TOP	B	3/31/2026	UDPATED WIRE NAMES
4	APM603 CONTROL PEDESTAL SCHEMATIC - BOTTOM	B	3/31/2026	UPDATED WIRE NAMES
5	APM402 CONTROL PEDESTAL SCHEMATIC - TOP	B	3/31/2026	UDPATED WIRE NAMES
6	APM402 CONTROL PEDESTAL SCHEMATIC - BOTTOM	B	3/31/2026	UPDATED WIRE NAMES AND P27 CONNECTIONS
7	ALTERNATOR SCHEMATIC	B	3/31/2026	UDPATED WIRE NAMES
8	PMG ALTERNATOR SCHEMATIC	B	3/31/2026	UDPATED WIRE NAMES
9	SHUNT TRIP BREAKER OPTION	B	3/31/2026	UDPATED WIRE NAMES
10	LOCAL MOTORIZED BREAKER OPTION	B	3/31/2026	UDPATED WIRE NAMES
11	REMOTE MOTORIZED BREAKER OPTION	B	3/31/2026	UDPATED WIRE NAMES
12	ENGINE SUPPLIER SCHEMATIC	B	3/31/2026	UPDATE WIRE NAMES

UNLESS OTHERWISE SPECIFIED -
1) DIMENSIONS ARE IN INCHES
2) TOLERANCES ARE:
.XXX ± .010 ANGLES ± 1/2°(30')
.XX ± .030 SURFACE FINISH
X ± .060 MAX.
FRACTIONS ±

APPROVALS	DATE
DRAWN JBB	3/26/2025
CHECKED DJY	3/26/2025
APPROVED GK	3/26/2025

rehlko

TITLE
KD150-200
DIAGRAM, SCHEMATIC

SCALE	SHEET
/ / /	0–12
PLOTTED	DWG NO. ADV-10104

D

PART NUMBER	DESCRIPTION	OPTION
11607055900	CONTROL PEDESTAL, KD80-300, APM603	-
11607056100	ENGINE, KD150-200	-
11607056200	CONTROL PEDESTAL, KD80-300, APM402	-
11607056300	FED TO ALT, KD80-300, APM603/APM402	-
11607056400	BREAKER ACCESSORY BOX	X
11607056500	GFI	X
11607056800	KEY SWITCH	X
11607056900	ALT, 4D ACTIVATOR, AUX WINDING	-
11607057000	ALT, 4D ACTIVATOR, PMG	X
11607057100	15 RELAY BOARD	X
11607057200	SHUNT TRIP	X
11607057300	RUN RELAY, APM402	X
11607057400	LOCAL MOTOR BREAKER	X
11607080501	SHUNT TRIP EXTENSION	X

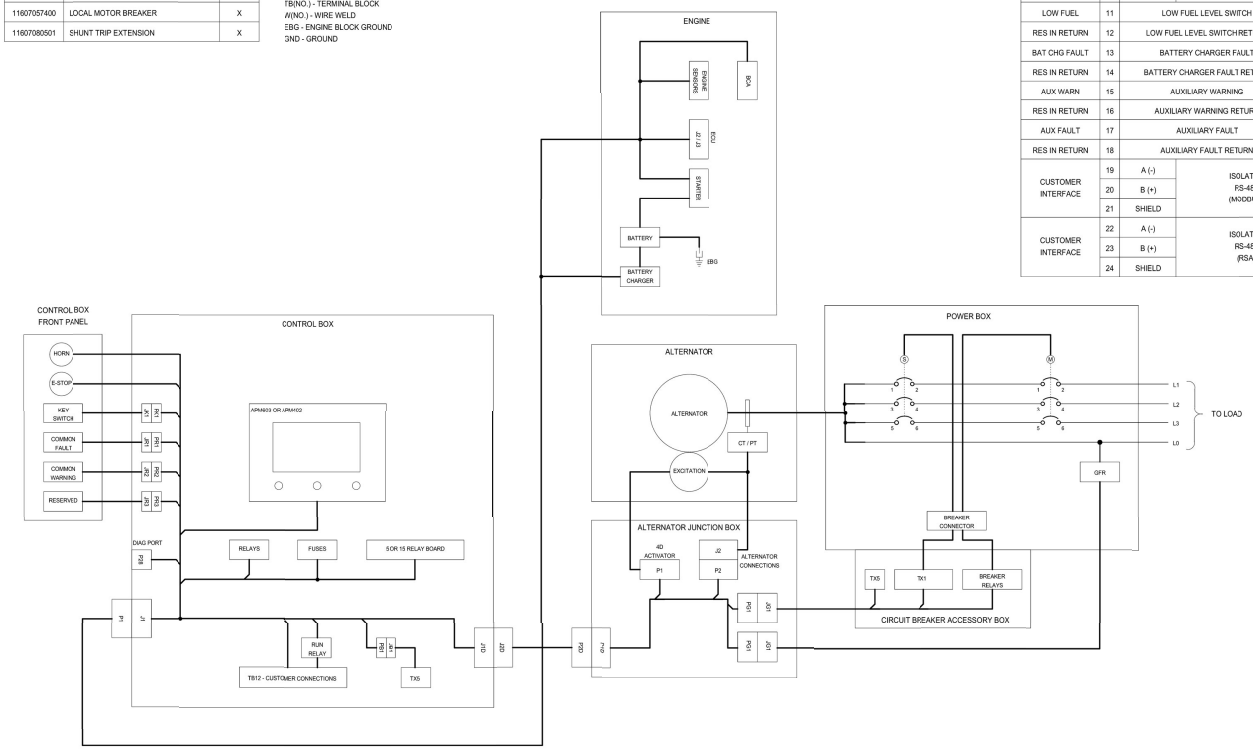
LEGEND
3CA - BATTERY CHARGING ALTERNATOR
BTCS - BATTERY TEMP COMPENSATION SENSOR
CBV - CLOSE BREAKER VOLTAGE
CLS - COOLANT LEVEL SENDER
CT(NO.) - CURRENT TRANSFORMER
CTS - COOLANT TEMPERATURE SENDER
DIAG - DIAGNOSTIC LOAMP
ECU - ENGINE CONTROL UNIT
ESS - EMERGENCY STOP SWITCH
FLA - FUEL LEAK ALARM
FLS - FUEL LEVEL SENDER
FWS - FUEL WATER SEPARATOR
LCT - LOW COOLANT TEMPERATURE SWITCH
OBV - OPEN BREAKER VOLTAGE
P(NO.) - PLUG
QCON - QUICK CONNECT
SM- STARTER MOTOR
SS - STARTER SOLENOID
STAT - STATOR
SW(NO.) - SWITCH
TB(NO.) - TERMINAL BLOCK
W(NO.) - WIRE WELD
EBG - ENGINE BLOCK GROUND
GND - GROUND

TB12 CONNECTON CHART (APM402)		
CUSTOMER INTERFACE	1	FUSED BATTERY POWER
	2	BATT VOLTS WHEN RUNNING
	3	BATTERY NEGATIVE
FUEL SELECTION	4	FUEL SELECTION
GROUND	5	FUEL SELECTION GROUND
LP FUEL	6	LP FUEL
GROUND	7	ECU FUEL SELECTION GROUND
COMMON FAULT	8	COMMON FAULT - FUSED BATTERY POWER
GROUND FAULT	8	GROUND FAULT RELAY SIGNAL

TB12 CONNECTION CHART			
FUNCTION	POS	SIGNAL DESCRIPTION	
REMOTE E-STOP	1	REMOTE EMERGENCY STOP	
	2		
REMOTE START	3	REMOTE START SIGNAL	
	4		
CUSTOMER INTERFACE	5	FUSED BATTERY POWER	
	6	BATT VOLTS WHEN RUNNING	
	7	BATTERY NEGATIVE	
CUSTOMER INTERFACE	8	A (-)	ISOLATED FS-485 (PGEN)
	9	B (+)	
	10	SHIELD	
LOW FUEL	11	LOW FUEL LEVEL SWITCH	
RES IN RETURN	12	LOW FUEL LEVEL SWITCH RETURN	
BAT CHG FAULT	13	BATTERY CHARGER FAULT	
RES IN RETURN	14	BATTERY CHARGER FAULT RETURN	
AUX WARN	15	AUXILIARY WARNING	
RES IN RETURN	16	AUXILIARY WARNING RETURN	
AUX FAULT	17	AUXILIARY FAULT	
RES IN RETURN	18	AUXILIARY FAULT RETURN	
CUSTOMER INTERFACE	19	A (-)	ISOLATED FS-485 (MODBUS)
	20	B (+)	
	21	SHIELD	
CUSTOMER INTERFACE	22	A (-)	ISOLATED RS-485 (RSA)
	23	B (+)	
	24	SHIELD	

REV	DATE	REVISION	BY	APP'D
-	8/12/2025	NEW SCHEMATIC	JBB	
A	12/20/2025	ADDED SHEET 12	JBB	
B	3/31/2026	UPDATED WIRE NAMES	RR	

TB12 CONNECTION CHART		
FUNCTION	POS	SIGNAL DESCRIPTION
RUN RELAY	25	COMMON CONTACT
	26	NORMALLY OPEN CONTACT
	27	NORMALLY CLOSED CONTACT
SPEED BIAS	28	SPEED BIAS (+)
	29	SPEED BIAS (-)
	30	SHIELD
VOLTAGE BIAS	31	VOLTAGE BIAS (+)
	32	VOLTAGE BIAS (-)
	33	SHIELD
RESERVED DIFFERENTIAL VOLTAGE	34	RESERVED DIF VOLT (+)
	35	RESERVED DIF VOLT (-)
	36	SHIELD
RATIO SIGNAL	37	RATIO POS (+5V)
	38	RATIO SIGNAL
	39	RATIO NEG (GND)
RATIO SIGNAL	40	RATIO POS (+5V)
	41	RATIO SIGNAL
	42	RATIO NEG (GND)
FUEL SELECTION	43	FUEL SELECTION
GROUND	44	FUEL GROUND
LP FUEL	45	LP FUEL
GROUND	46	ECU FUEL SELECTION GROUND
SPARE	47	SPARE
COMMON FAULT	48	COMMON FAULT - FUSED BATTERY POWER
GROUND	49	COMMON FAULT GROUND



ONE-LINE DIAGRAM

UNLESS OTHERWISE SPECIFIED -
1) DIMENSIONS ARE IN INCHES
2) TOLERANCES ARE:
.XXX ± .010 ANGLES ± 1/2°(30')
.XX ± .030 SURFACE FINISH
X ± .060 MAX.
FRACTIONS ±

APPROVALS	DATE
DRAWN JBB	8/12/2025
CHECKED JBB	8/12/2025
APPROVED GK	8/12/2025

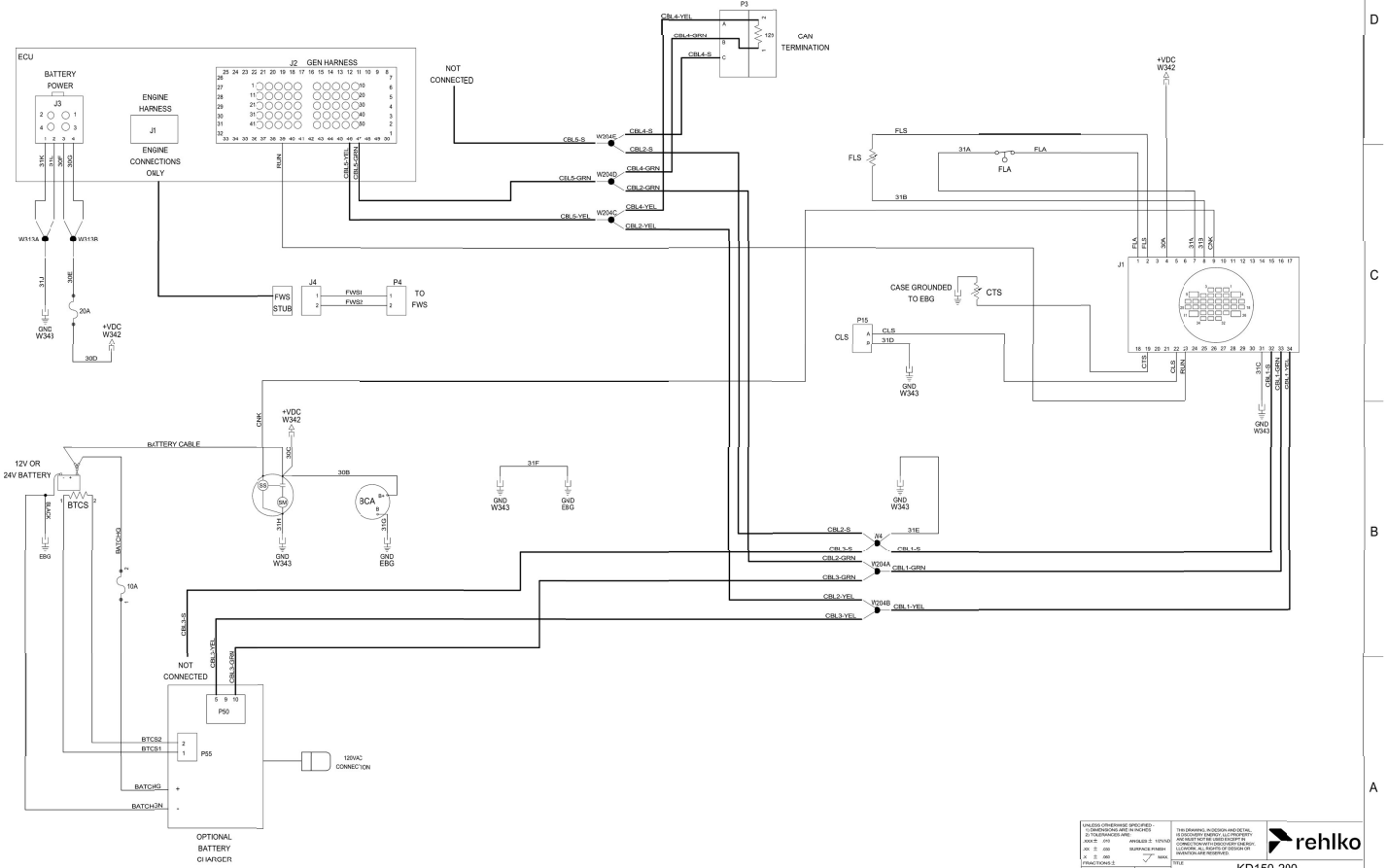
rehlko

TITLE
KD150-200
DIAGRAM, SCHEMATIC

SCALE	SHEET
/ / /	1 – 12
PLOTTED	DWG NO. ADV-10104

D

REV	DATE	REVISION	BY	M C
-	8/12/2025	NEW SCHEMATIC	JBB	
A	12/20/2025	ADDED SHEET 12	JBB	
B	3/31/2026	UPDATED WIRE NAMES	RR	



ENGINE SCHEMATIC

APPROVALS	DATE
DRAWN JBB	8/12/2025
ENGINEER JBB	8/12/2025
APPROVED DK	8/12/2025

rehlko

KD150-200
DIAGRAM, SCHEMATIC

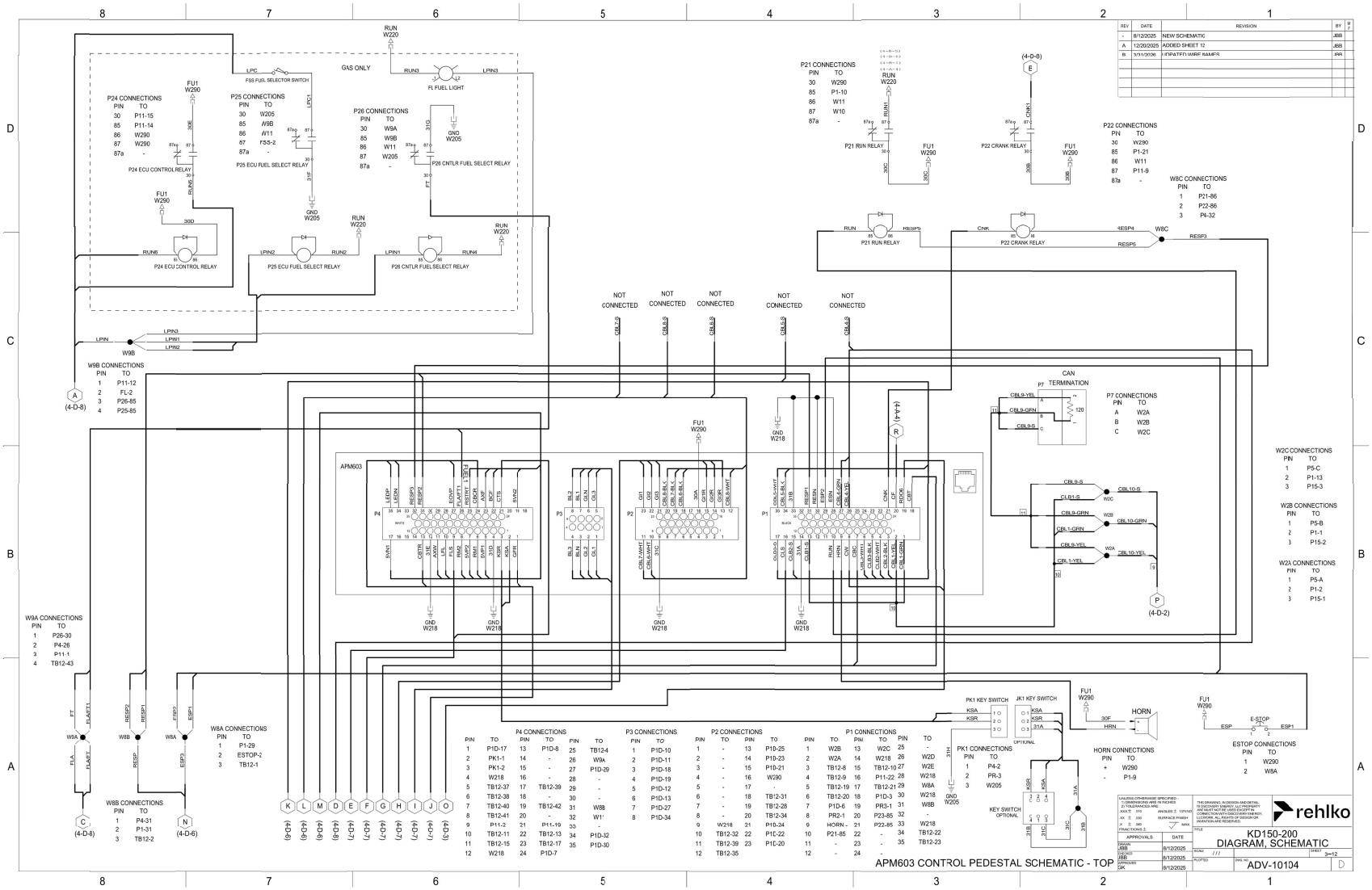
SCALE: 1 / 1

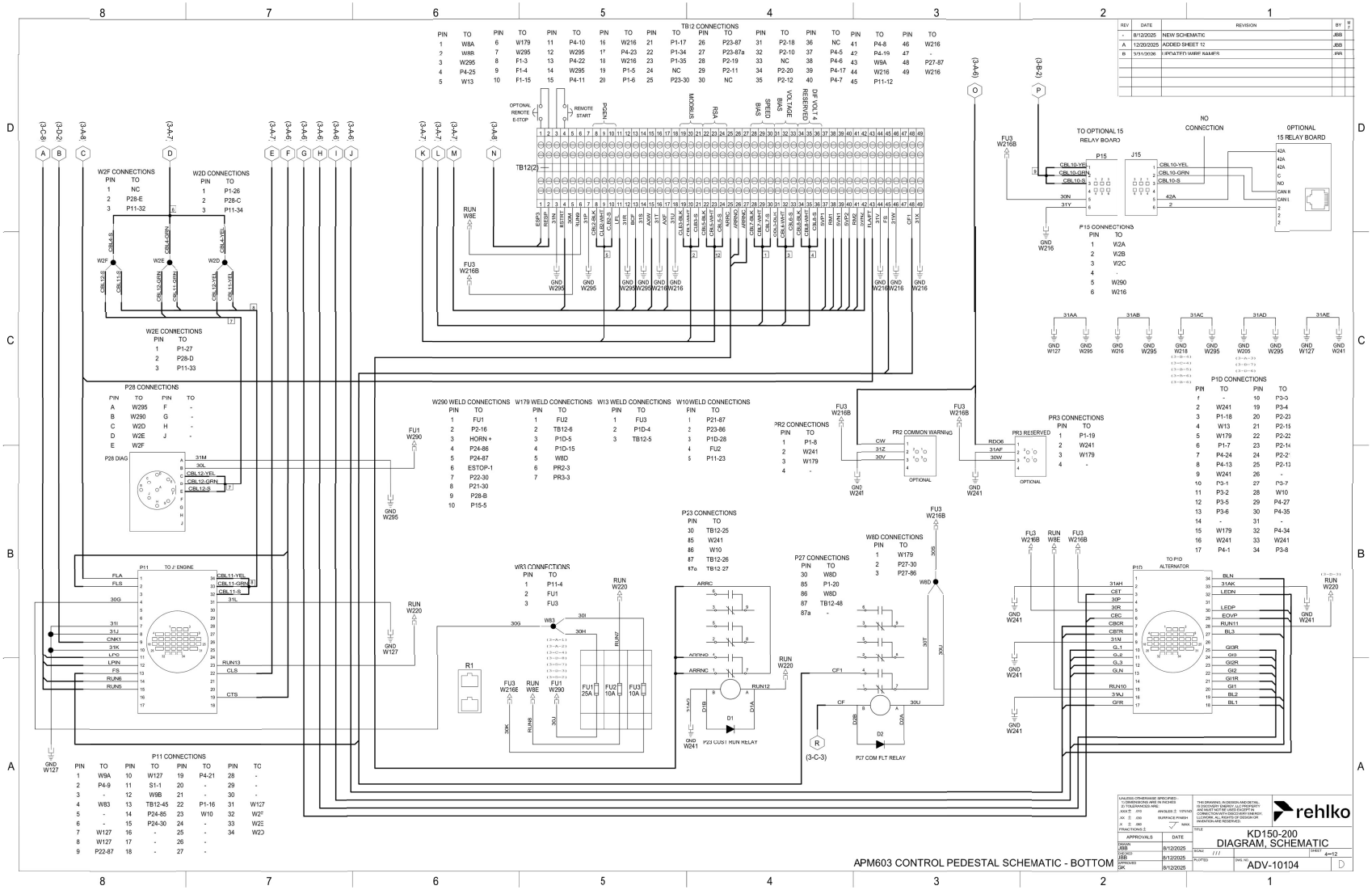
SHEET 2 OF 12

PLOTTED

DWG NO. ADV-10104

D

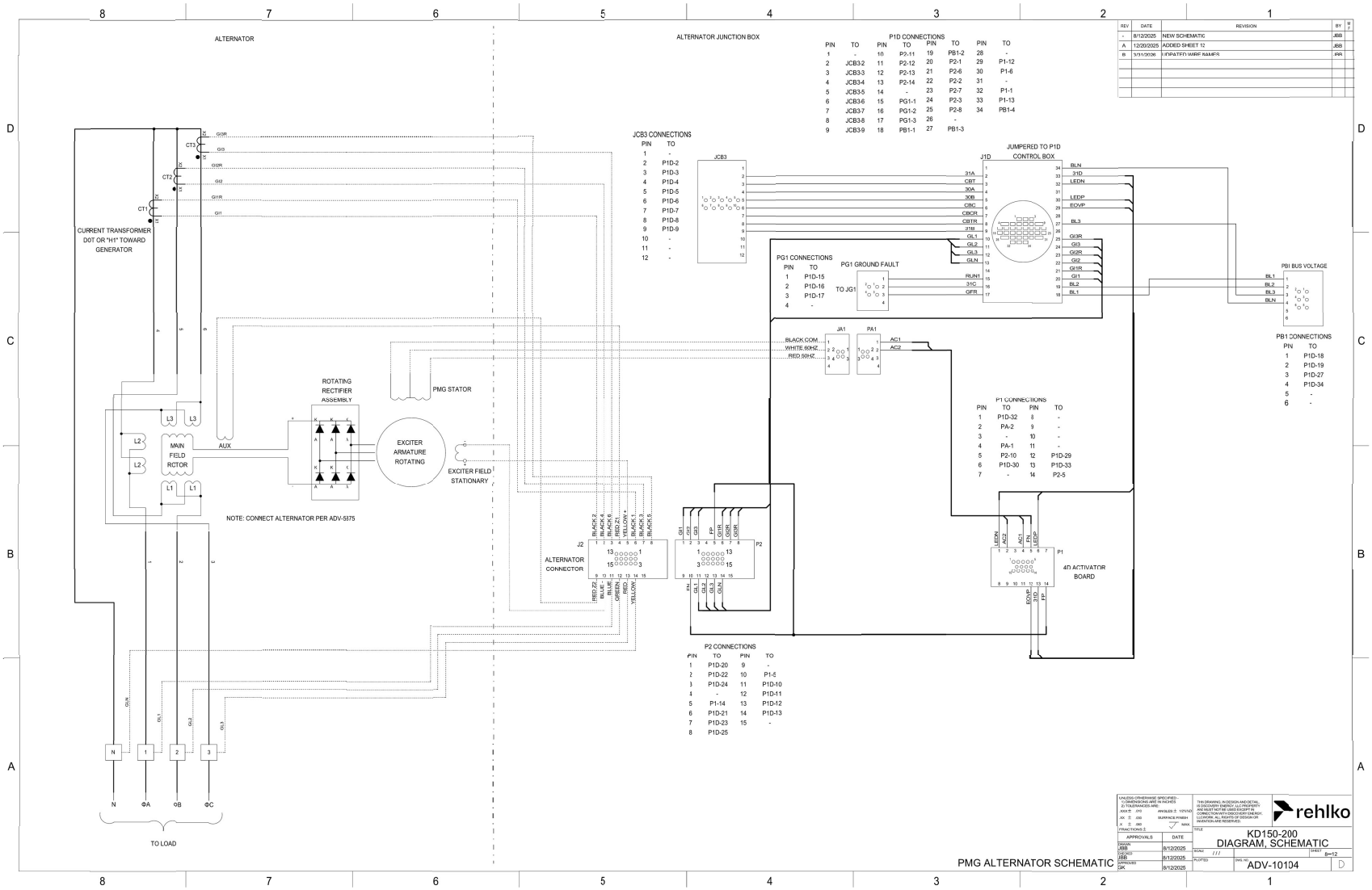

RUN W220
GAS ONLY
LPC
FSS FUEL SELECTOR SWITCH
RUN3
LPIN3
FI FUEL LIGHT
P24 CONNECTIONS
PIN TO
30 P11-15
85 P11-14
86 W290
87 W290
87a -
P24 ECU CONTROL RELAY
P25 CONNECTIONS
PIN TO
30 W205
85 W9B
86 W11
87 P35-2
87a -
P25 ECU FUEL SELECT RELAY
P26 CONNECTIONS
PIN TO
30 W9A
85 W9B
86 W11
87 W205
87a -
P26 CNTLR FUEL SELECT RELAY
FU1 W290
GND W205
P24 ECU CONTROL RELAY
P25 ECU FUEL SELECT RELAY
P26 CNTLR FUEL SELECT RELAY
P21 CONNECTIONS
PIN TO
30 W290
85 P1-10
86 W11
87 W10
87a -
P21 RUN RELAY
P22 CONNECTIONS
PIN TO
30 W290
85 P1-21
86 W11
87 P11-9
87a -
P22 CRANK RELAY
W8C CONNECTIONS
PIN TO
1 P21-86
2 P22-86
3 P4-32
W9B
W9B CONNECTIONS
PIN TO
1 P11-12
2 FL-2
3 P26-85
4 P25-85
NOT CONNECTED
CBL9-S
CBL9-GRN
CBL9-YEL
CAN TERMINATION
P7 CONNECTIONS
PIN TO
A W2A
B W2B
C W2C
APM603
P4
P3
P2
P1
GND W218
W2C CONNECTIONS
PIN TO
1 P5-C
2 P1-13
3 P15-3
W2B CONNECTIONS
PIN TO
1 P5-B
2 P1-1
3 P15-2
W2A CONNECTIONS
PIN TO
1 P5-A
2 P1-2
3 P15-1
W9A CONNECTIONS
PIN TO
1 P26-30
2 P4-26
3 P11-1
4 TB12-43
W8A CONNECTIONS
PIN TO
1 P1-29
2 ESTOP-2
3 TB12-1
W8B CONNECTIONS
PIN TO
1 P4-31
2 P1-31
3 TB12-2
P4 CONNECTIONS
PIN TO PIN TO PIN TO
1 P1D-17 13 P1D-8 25 TB12-4
2 PK1-1 14 - 26 W9A
3 PK1-2 15 - 27 P1D-29
4 W218 16 - 28 -
5 TB12-37 17 TB12-39 29 -
6 TB12-38 18 - 30 -
7 TB12-40 19 TB12-42 31 W8B
8 TB12-41 20 - 32 W1
9 P11-2 21 P11-19 33 -
10 TB12-11 22 TB12-13 34 P1D-32
11 TB12-15 23 TB12-17 35 P1D-30
12 W218 24 P1D-7
P3 CONNECTIONS
PIN TO
1 P1D-10
2 P1D-11
3 P1D-18
4 P1D-19
5 P1D-12
6 P1D-13
7 P1D-27
8 P1D-34
P2 CONNECTIONS
PIN TO PIN TO
1 - 13 P1D-25
2 - 14 P1D-23
3 - 15 P1D-21
4 - 16 W290
5 - 17 -
6 - 18 TB12-31
7 - 19 TB12-28
8 - 20 TB12-34
9 W218 21 P1D-24
10 TB12-32 22 P1C-22
11 TB12-39 23 P1C-20
12 TB12-35
P1 CONNECTIONS
PIN TO PIN TO PIN TO
1 W2B 13 W2C 25 -
2 W2A 14 W218 26 W2D
3 TB12-8 15 TB12-10 27 W2E
4 TB12-9 16 P11-22 28 W218
5 TB12-19 17 TB12-21 29 W8A
6 TB12-20 18 P1D-3 30 W218
7 P1D-6 19 PR3-1 31 W8B
8 PR2-1 20 P23-85 32 -
9 HORN - 21 P22-85 33 W218
10 P21-85 22 - 34 TB12-22
11 - 23 - 35 TB12-23
12 - 24 -
PK1 KEY SWITCH
JK1 KEY SWITCH
PK1 CONNECTIONS
PIN TO
1 P4-2
2 PR-3
3 W205
KEY SWITCH OPTIONAL
HORN
HORN CONNECTIONS
PIN TO
+ W290
- P1-9
E-STOP
ESTOP CONNECTIONS
PIN TO
1 W290
2 W8A
APM603 CONTROL PEDESTAL SCHEMATIC - TOP
REV DATE REVISION BY
- 8/12/2025 NEW SCHEMATIC JBB
A 12/20/2025 ADDED SHEET 12 JBB
B 1/31/2026 UNPATED WIRE NAMES RR
rehlko
KD150-200
DIAGRAM, SCHEMATIC
ADV-10104
APPROVALS DATE
8/12/2025
8/12/2025
8/12/2025



REV	DATE	REVISION	BY
-	8/12/2025	NEW SCHEMATIC	JBB
A	12/20/2025	ADDED SHEET 12	JBB
B	3/31/2026	UPDATED WIRE NAMES	JBB

TITLE	KD150-200 DIAGRAM, SCHEMATIC
SCALE	///
SHEET	4–12
DWG NO	ADV-10104
REV	D

rehlko



REV	DATE	REVISION	BY	V
-	8/12/2025	NEW SCHEMATIC	JBB	
A	12/20/2025	ADDED SHEET 12	JBB	
B	3/31/2026	UNPATENTABLE NAMES	RR	

PMG ALTERNATOR SCHEMATIC

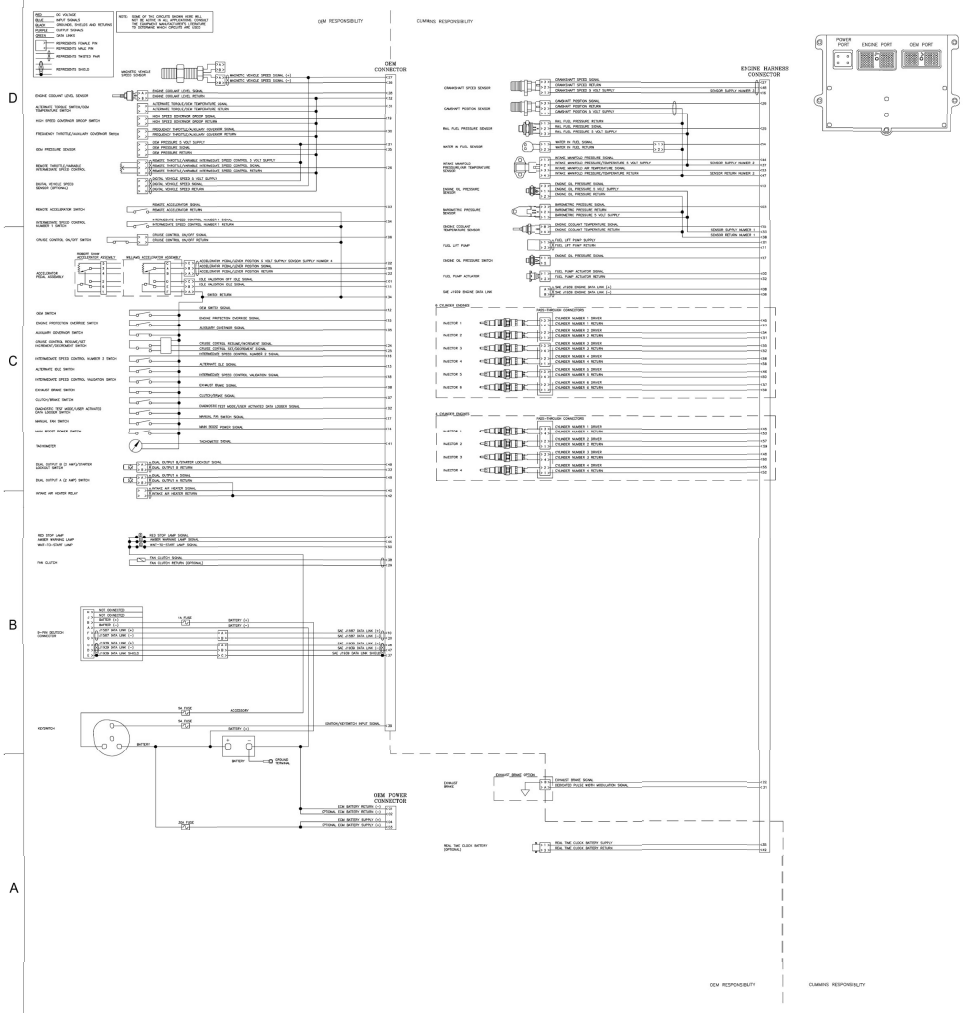
APPROVALS	DATE
DRAWN JBB	8/12/2025
CHECKED JBB	8/12/2025
APPROVED GK	8/12/2025

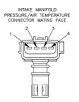
rehlko

KD150-200
DIAGRAM, SCHEMATIC

SCALE: 1/1 | SHEET: 6–12

PLOTTED | DWG NO: ADV-10104 | D





REV	DATE	REVISION	BY	V C
-	8/12/2025	NEW SCHEMATIC	JBB	
A	12/20/2025	ADDED SHEET 12	JBB	
B	3/31/2026	UPDATE WIRE NAMES	RR	

Specifications

General Information

WARNING

This diagram is provided as a diagnostic tool for trained, experienced technicians only. Troubleshooting presents the risk of equipment damage, personal injury, or death. Troubleshooting must be performed by trained, experienced technicians. see important instructions in the service manual.

Electrical Specifications

Data Link
- Positive wire to chassis ground (J1587 only) 3.5 to 5.0 VDC
- Negative wire to chassis ground (J1587 only) 0.0 to 2.5 VDC

J1939 BacBone Resistance
- Positive wire to return wire 50 to 70 Ohms
- J1939 Termination Resistance 110 to 130 Ohms

All Continuity Checks
- OK (no open circuit if less than 10 Ohms)

All Shorts to Ground
- OK (no short circuit) if more than 100k Ohms

Short Circuit to External Voltage
- OK if less than 1.5 VDC

Sensor Supply Voltage
- 8 ECM = 4.75 to 5.25 Ohms

Solenoids
- Fuel Pump Actuator (EFC) = 2.0 to 4.5 Ohms

ECM Connector
- Retaining Cap Screw Torque = 3 Nm [27 in-lb]

Sensor Specifications

NOTE: To convert to gauge pressure on all psia pressure sensors subtract the barometric pressure from the absolute pressure.

Barometric (Ambient) Air Pressure Sensor

Altitude (m)	Altitude (ft)	Pressure (psia)	Pressure (in Hg)	Voltage (VDC)
0 (sea level)	0	14.7	29.9	3.65 to 4.28
915	3000	13.2	26.9	3.06 to 3.50
1830	6000	11.8	24.0	2.52 to 2.96
2744	9000	10.5	21.4	2.01 to 2.36
3659	12000	9.35	19.0	1.57 to 1.84

Intake Manifold Pressure Sensor

Torque: 10 Nm [88 in-lb]

Pressure (mm Hg)	Pressure (in Hg)	Pressure (psia)	Voltage (VDC)
0	0	0	0.90 to 1.06
381	15	22	1.30 to 1.53
635	25	27	1.57 to 1.84
1549	61	45	2.53 to 2.96
2057	81	55	3.07 to 3.60
2540	100	65	3.63 to 4.25

Intake Manifold Temperature Sensor

Torque: 10 Nm [88 in-lb]

Temperature (C)	Temperature (F)	Resistance (Ohms)
-10	14	8.7k to 9.7k
0	32	5.5k to 6.1k
20	68	2.4k to 2.5k
40	104	1.1k to 1.2k
70	158	418 to 436

Engine Coolant Temperature Sensor

Torque: 10 Nm [88 in-lb]

Temperature (C)	Temperature (F)	Resistance (Ohms)
0	32	30k to 37k
25	77	9.3k to 10.7k
50	122	3.2k to 3.8k
80	176	1.1k to 1.3k
95	203	700 to 800

Engine Speed Sensor and Camshaft Position Sensor
- Torque = 10 Nm [88 in-lb]

Oil Pressure Switch
- Torque = 23 Nm [204 in-lb]

Accelerator Pedal (IVS, ISS, and AIS)
- Idle validation circuit resistance:
- Pre ON and OFF idle states
- IVS - Maximum closed circuit resistance less than 10 Ohms
- ISS - Maximum closed circuit resistance less than 125 Ohms
- IVS and ISS - Minimum open circuit resistance less than 100k Ohms

- Accelerator Position Coil Resistance:
- Between supply and return pins 1000 to 3000 Ohms
- Between supply and signal pins (pedal released) 1500 to 3000 Ohms
- Between supply and signal pins (pedal depressed) 290 to 1500 Ohms

NOTE: Released resistance minus depressed resistance must be 1000 Ohms.

APPROVALS	DATE
DESIGN JBB	8/12/2025
CHECKED JBB	8/12/2025
APPROVED GK	8/12/2025

rehlko

TITLE
KD150-200
DIAGRAM, SCHEMATIC

SCALE	SHEET
///	12 OF 12
PLOTTED	DWG NO. ADV-10104
	D

TABLE OF CONTENT

ALTERNATOR	CONFIGURATION	CONTROLLER(S)	SHEET	IDENTIFIER
REHLKO	SINGLE PHASE	PB3, PB5, ADC2100	2	(1) – (4)
REHLKO FRII & FRX	SINGLE & THREE PHASE	APM402, DEC3000 DEC550 & DEC6000	3	(5) – (10)
REHLKO FRII & FRX	SINGLE & THREE PHASE	APM402, DEC3000 DEC550 & DEC6000	4	(11) – (16)
MARATHON	SINGLE & THREE PHASE	APM402, DEC550 DEC6000	5	(17) – (23)
REHLKO	THREE PHASE	RDC2	6	(24) – (26)
REHLKO	SINGLE PHASE	RDC2	7	(27)
REHLKO& MARATHON	SINGLE & THREE PHASE	APM603 & DEC3500	8	(28) – (34)
REHLKO	SINGLE PHASE	APM603 & DEC3500	9	(35)
REHLKO KH	THREE PHASE	APM802 & APM603	10	(36) – (38)
REHLKO KH	7 STUD LINK BOARD	APM402 & APM603	11	(39) – (41)
REHLKO KH	7 STUD LINK BOARD	APM402 & APM603	12	(42) – (44)
REHLKO KH	9 STUD LINK BOARD	APM402 & APM603	13	(45) – (47)
REHLKO KH	9 STUD LINK BOARD	APM402 & APM603	14	(48) – (50)
REHLKO KH	7 STUD LINK BOARD	APM402 & APM603	15	(51)
REHLKO KH	9 STUD LINK BOARD	APM402 & APM603	16	(52)

REV	DATE	REVISION	BY	M F
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 [CT226524]	SBR	
AE	11-4-23	SEE SHEET 6 [CT231345]	SBR	
AF	2-26-24	SEE SHEET 7 [CT233796]	PM	
AG	7OCT2024	SEE SHEET 2 [CT239467]	CJK	
AH	18AUG2025	ADDED TABLE OF CONTENT [CT240078]	CJK	

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

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

rehlko

TITLE: DIAGRAM, ALTERNATOR CONNECTIONS

SCALE: NONE SHEET: 1-16

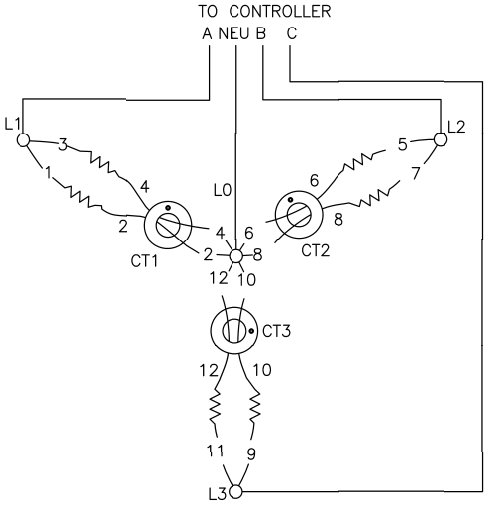
PLOTTED DWG. NO. ADV-5875 D

REV	DATE	REVISION	BY	H F
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 [CT226524]	SBR	
AE	11-4-23	SEE SHEET 6 [CT231345]	SBR	
AF	2-26-24	SEE SHEET 7 [CT233796]	PM	
AG	70CT2024	SEE SHEET 2 [CT239467]	CJK	
AH	18AUG2025	SEE SHEET 1,11,12,13,14,15,16 [CT240078]	CJK	

(36)

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

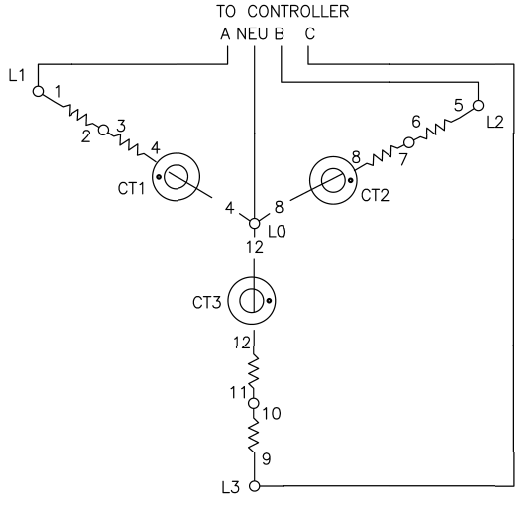
60 HZ: 120/208V
60 HZ: 127/220V
60 HZ: 139/240V
50 HZ: 110/190V
50 HZ: 115/200V
50 HZ: 120/208V



(37)

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

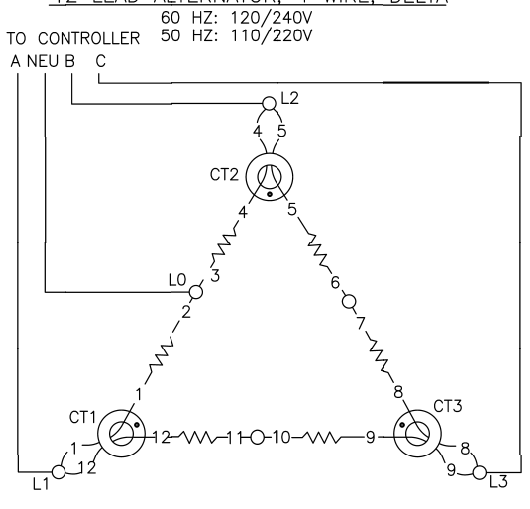
60 HZ: 220/380V
60 HZ: 240/416V
60 HZ: 277/480V
50 HZ: 220/380V
50 HZ: 230/400V
50 HZ: 240/416V



(38)

12 LEAD ALTERNATOR, 4 WIRE, DELTA

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



PHASE ROTATION

A	B	C
L1	L2	L3

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

APM802 CONTROLLER
APM603 CONTROLLER
MECC ALTE ALTERNATOR

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

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

rehlko

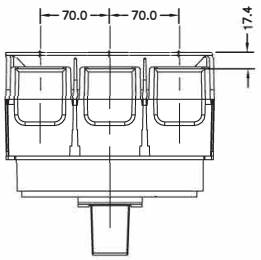
TITLE: DIAGRAM, ALTERNATOR CONNECTIONS
SCALE: NONE
SHEET: 10-16
PLOTTED
DWG. NO.: ADV-5875
D

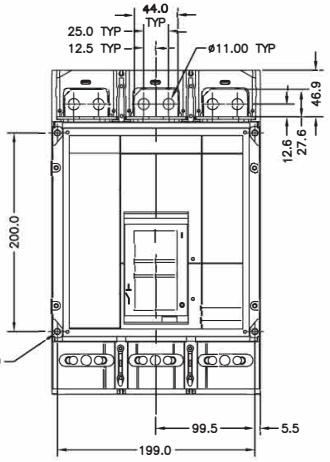
rehlko

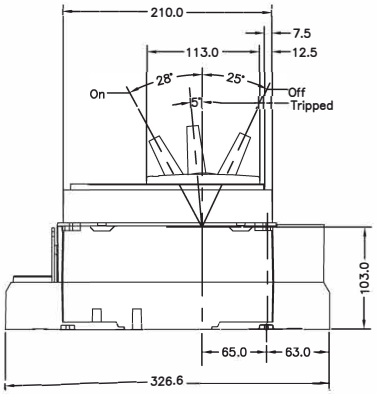
Miscellaneous

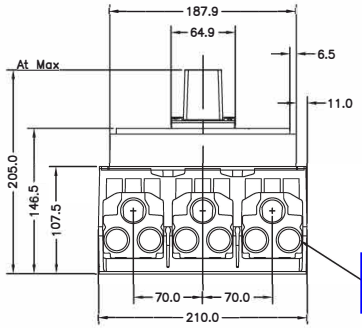
PART NO	REV	AMPS	% RATING	GFI	INT@480V	TRIP	VENDOR NO
GM24181-1	C	600	100	NO	35kA	5.0 LSI	PGP36060CU33A
GM24181-2	C	600	100	YES	35kA	6.0A LSIG	PGP36060CU44A
GM24181-3	C	800	80	NO	35kA	5.0 LSI	PGP36080U33A
GM24181-4	C	800	80	YES	35kA	6.0A LSIG	PGP36080U44A
GM24181-5	C	800	100	NO	35kA	5.0 LSI	PGP36080CU33A
GM24181-6	C	800	100	YES	35kA	6.0A LSIG	PGP36080CU44A
GM24181-7	C	1000	80	NO	35kA	5.0 LSI	PGP36100U33A
GM24181-8	C	1000	80	YES	35kA	6.0A LSIG	PGP36100U44A
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	PGP36120U33A
GM24181-12	C	1200	80	YES	35kA	6.0A LSIG	PGP36120U44A
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	PJP36120U33A
GM24181-16	D	1200	80	YES	65kA	6.0A LSIG	PJP36120U44A
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.







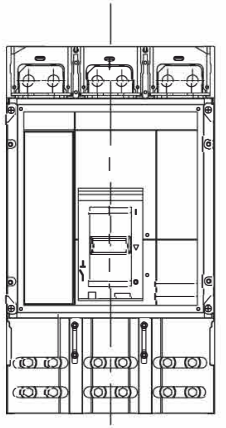


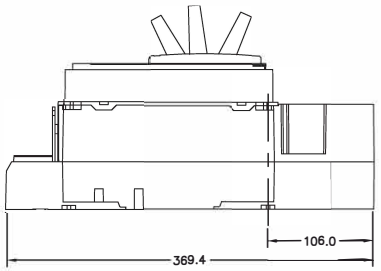
600-800A

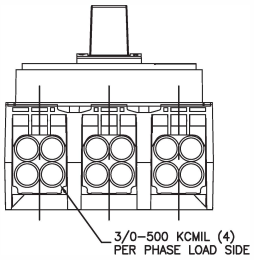
3/0-500 KCMIL (3)
PER PHASE LOAD SIDE

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

METRIC CAD FILE

REV	DATE	REVISION	BY
-	3-22-02	NEW DRAWING [68248]	WSD
A	8-12-03	(D-4) THREADED BAR NOTE ADDED. [70090]	SRL
B	11-12-03	(D-7) GM24181-13 GFI: NO WAS YES [70985]	WSD
C	2-23-07	(D-3) KOHLER NOTE ADDED [76285]	GFN
D	1-10-11	(D-8) GM24181-15 THRU -18 ADDED [80647-15]	WSD

SQUARE D P-FRAME CIRCUIT BREAKER
3 POLE ELECTRONIC TRIP

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

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

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

TITLE: BREAKER, CIRCUIT

SCALE .5XP | SIZE D | DWG NO. GM24181.DWG | SHEET 1-1

DWG NO. GM24181 | D

PLOTTED DATE

rehlko

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 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	**Warranty Coverage**
Stationary Standby Generator Set & Accessories	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:

1. Normal wear, routine tuneups, tuneup parts, adjustments, and periodic service.
2. Damage, including but not limited to damage caused by accidents, improper installation or handling, faulty repairs not performed by an authorized 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 or write the manufacturer Service Department, MS072, Kohler, WI 53044 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.

rehlko

Discovery Energy, LLC
200 Twin Oaks Road, Kohler, WI 53044 USA
For the nearest sales and service outlet in the US and Canada, phone 1-800-544-2444
powersystems.rehlko.com

TP-5561 6/25i

Stationary Standby Industrial Generator Set Two-Years or one thousand (1000) Hour Limited Warranty for KD Model Generator Sets, 600 kW and Under

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	**Warranty Coverage**
Stationary Standby KD Model Generator Set, 600 kW and under, & Accessories	Two (2) years from registered startup. If the unit is not registered within 12 months from the factory ship date the warranty will start from the date of shipment from the manufacturer's factory. Generator sets installed outside of the U.S and Canada have a maximum hour limit of 1000 hours.

To qualify for a five-year or 2500-hour comprehensive limited warranty, a service contract with a Rehlko distributor, dealer, or authorized service representative must be in place 12 months from the registered startup and meet all the requirements listed in the five-year or 2500-hour comprehensive limited 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.

rehlko

For the nearest sales and service, go to

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	**Warranty Coverage**
Stationary Standby KD Model Generator Set, 600 kW and under, & Accessories	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.

rehlko

For the nearest sales and service, go to

rehlko

Certification

Certificate of Registration

QUALITY MANAGEMENT SYSTEM - ISO 9001:2015

This is to certify that:

Discovery Energy
Rehlko
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
Effective Date: 2024-11-07
Latest Revision Date: 2025-12-03
Expiry Date: 2027-11-06

...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

Effective Date: 2024-11-07

Latest Revision Date: 2025-12-03

Expiry Date: 2027-11-06

PROTOTYPE TEST REPORT

Models Covered:	**KD150**	Alternator Tested:	**KH00932TO4D**
Model Tested:	**KD200**	Engine Tested:	**KD07L06T-6DDS**
Cooling System Tested:	**45C**	Voltage Tested:	**480V**

GENSET

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

Meets Rated Load

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

±0.25 % Frequency Band **±0.25** % Voltage Devation

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		Full Load Rejection	
23.1	% Voltage Dip	**13.3**	% Voltage Overshoot
1.15	Seconds of Recovery Time	**0.28**	Seconds of Recovery Time
10.63	% Frequency Dip	**8.81**	% Frequency Overshoot
1.15	Seconds of Recovery Time	**1.03**	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:	**KD150**	Alternator Tested:	**KH00932TO4D**
Model Tested:	**KD200**	Engine Tested:	**KD07L06T-6DDS**
Cooling System Tested:	**45C**	Voltage Tested:	**480V**

ALTERNATOR

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

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

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

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

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

Kohler Standby/Prime Generator Set Test Program

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

Prototype Testing

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

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

Production Testing

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

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

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

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

KOHLER®

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

G18-56 12/05b

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.