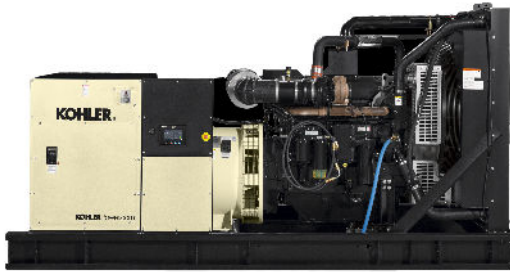

Generator



Kohler Model: 500REOZJC

This diesel generator set equipped with a 5M4027 alternator operating at 277/480 volts is rated for 505 kW/631 kVA. Output amperage: 759

Standard Features:

- Kohler Co. provides 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 60 Hz generator set offers a UL 2200 listings.
- The generator set accepts rated load in one step.
- The 60 Hz emergency generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
- A one-year limited warranty covers all systems and components. Two-and five-year extended warranties are also available.

Applications

- Tier 2 EPA-certified for Stationary Emergency
- Alternator Protection
- Battery Rack and Cables
- Customer Connection (standard with Decision-Maker 6000 controller only)
- Local Emergency Stop Switch
- Oil Drain Extension
- Operation and Installation Literature

Other Features:

- Kohler designed controllers for guaranteed system integration and remote communication.
- The low coolant level shutdown prevents overheating (standard on radiator models only). Integral vibration isolation eliminates the need for under-unit vibration spring isolators.
- An electronic, isochronous governor delivers precise frequency regulation.
- Mount up to four circuit breakers to allow circuit protection of selected priority loads.

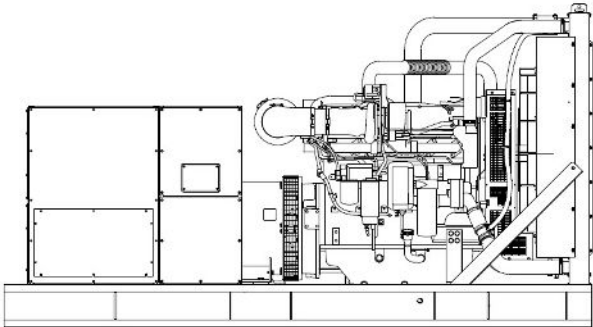
Alternator Features:

- The pilot-excited, permanent-magnet (PM) alternator provides superior short-circuit capability.
- The brushless, rotating-field alternator has broad range reconnectability.

Qty	Description	
	500REOZJC Generator System	
5	500REOZJC Generator Set	
	Includes the following:	
	Literature Languages	English
	Approvals and Listings	UL2200 Listing
	Engine	500REOZJC,24V,60HZ
	Nameplate Rating	Standby 130C Rise
	Voltage	60Hz, 277/480V, Wye, 3Ph, 4W
	Alternator	5M4027
	Cooling System	Unit Mounted Radiator, 50C
	Skid and Mounting	Skid
	Air Intake	Standard Duty
	Controller	APM603
	Enclosure Type	Sound
	Enclosure Material	Steel
	Fuel Tank Type	State
	Fuel Runtime (Approx.)	24 Hours
	Subbase Fuel Tank Capacity	894 Gallons
	Starting Aids, Installed	2500W,90-120V,1Ph,w/Valves
	Electrical Accy.,Installed	Battery, 2/12V, Wet
	Electrical Accy.,Installed	Battery Charger, 10A
	Electrical Accy.,Installed	Run Relay
	Rating, LCB 1 Right	100% Rated
	Amps, LCB 1 Right	800
	Trip Type, LCB 1 Right	Electronic, LSI
	LCB 1 Right Interrupt Rating	35kA at 480V
	Frame, LCB 1 Right	PG
	Position, LCB 1 Right	1
	Fuel Lines, Installed	Flexible Fuel Lines
	Exceeds LTL Shipping Height	Add'l Shipping Charge Accepted
	Miscellaneous Accy,Installed	Coolant in Genset
	Warranty	5 Year Comprehensive
	Testing, Additional	Power Factor Test,0.8,3Ph Only
5	Literature, Production -500REOZJC	



Spec Sheets



Standard Features

- Kohler Co. provides 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 60 Hz generator set offers a UL 2200 listings.
- The generator set accepts rated load in one step.
- The 60 Hz emergency generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
- A one-year limited warranty covers all systems and components. Two-and five-year extended warranties are also available.
- Tier 2 EPA-certified for Stationary Emergency Applications
- Alternator Protection
- Battery Rack and Cables
- Customer Connection (standard with Decision-Maker 6000 controller only)
- Local Emergency Stop Switch
- Oil Drain Extension
- Operation and Installation Literature

Alternator Features

- The pilot-excited, permanent-magnet (PM) alternator provides superior short-circuit capability.
- The brushless, rotating-field alternator has broad range reconnectability.

Other Features

- Kohler designed controllers for guaranteed system integration and remote communication.
- The low coolant level shutdown prevents overheating (standard on radiator models only).Integral vibration isolation eliminates the need for under-unit vibration spring isolators.
- An electronic, isochronous governor delivers precise frequency regulation.
- Mount up to four circuit breakers to allow circuit protection of selected priority loads.

Generator Set Rating

Standby 130C Rise Ratings

Alternator	Voltage	Ph	Hz	Peak kVA	kW/kVA	Amps
5M4027	277/480	3	60	2200	505/631	759

RATINGS: All three-phase units are rated at 0.8 power factor. All single-phase units are rated at 1.0 power factor.
Standby Ratings: The standby rating is applicable to varying loads for the duration of a power outage. There is no overload capability for this rating.
Prime Power Ratings: At varying load, the number of generator set operating hours is unlimited. A 10% overload capacity is available for one hour in twelve.
Ratings are in accordance with ISO-8528-1 and ISO-3046-1. For limited running time and continuous ratings, consult the factory.

Model: 500REOZJC, continued

Alternator Specifications

Specifications	Alternator
Alternator manufacturer	Kohler
Type	4-Pole, Rotating-Field
Exciter type	Brushless, Permanent-Magnet, Pilot Exciter
Leads, quantity	10/12, Reconnectable
Voltage regulator	Solid State, Volts/Hz
Insulation	NEMA MG1
Insulation: Material	Class H, Synthetic, Nonhydroscopic
Insulation: Temperature Rise	130 ° C, 150 ° C Standby
Coupling	Flexible Disc
Amortisseur windings	Full
Rotor balancing (50Hz)	125%
Rotor balancing (60Hz)	125%
Voltage regulation, no-load to full-load RMS	Controller Dependent
One-Step Load Acceptance	100% of rating
Unbalanced load capability	100% of Rated Standby Current
<ul style="list-style-type: none"> • NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting. • Sustained short-circuit current of up to 300% of the rated current for up to 10 seconds. • Sustained short-circuit current enabling down stream circuit breakers to trip without collapsing the alternator field. <ul style="list-style-type: none"> • Self-ventilated and drip-proof construction. • Superior voltage waveform from a two-thirds pitch stator and skewed rotor. • Brushless alternator with brushless pilot exciter for excellent load response. 	

Engine

Engine Specification

Engine Manufacturer	John Deere
Engine Model	6135HFG75
Engine: type	Turbocharged, Charge Air-Cooled
Cylinder arrangement	6, Inline
Displacement, L (cu. in.)	13.5 (824)
Bore and stroke, mm (in.)	132 x 165 (5.2 x 6.5)
Compression ratio	16.0:1
Piston speed, m/min. (ft./min.)	594 (1950)
Rated rpm	1800
Max. power at rated rpm, kWm (BHP)	563 (755)
Crankshaft material	Forged Steel
Valve (exhaust) material Intake	Nickel-Chromium Head
Valve (exhaust) material	Chromium-Silicone Stem
Governor: type, make/model	JDEC Electronic L15
Frequency regulation, no-load to-full load	Isochronous
Frequency regulation, steady state	± 0.25%
Frequency	Fixed
Air cleaner type, all models	Dry

Model: 500REOZJC, continued

Exhaust

Exhaust System

Exhaust Manifold Type	Dry
Exhaust flow at rated kW, m3/min. (cfm)	97.2 (3433)
Exhaust temperature at rated kW, dry exhaust, ° C (° F)	524 (975)
Maximum allowable back pressure, kPa (in. Hg)	Min. 4 (1.2) Max. 9.8 (2.9)
Exh. outlet size at eng. hookup, mm (in.)	See ADV Drawing

Engine Electrical

Engine Electrical System

Battery charging alternator: Ground (negative/positive)	Negative
Battery charging alternator: Volts (DC)	24
Battery charging alternator: Ampere rating	60
Starter motor rated voltage (DC)	24
Battery, recommended cold cranking amps (CCA): Qty., CCA rating each	Two, 925
Battery voltage (DC)	12

Fuel

Fuel System

Fuel type	Diesel
Fuel supply line, min. ID, mm (in.)	13 (0.50)
Fuel return line, min. ID, mm (in.)	10 (0.38)
Max. lift, fuel pump: type, m (ft.)	Electronic 2.1 (6.8)
Max. fuel flow, Lph (gph)	180.6 (47.7)
Max. return line restriction, kPa (in. Hg)	35 (10.3)
Fuel prime pump	Electronic
Fuel Filter Secondary	2 Microns @ 98% Efficiency
Fuel Filter Primary	10 Microns
Fuel Filter Water Separator	Yes
Recommended fuel	#2 Diesel

Lubrication

Lubrication System

Type	Full Pressure
Oil pan capacity, L (qt.)	40.0 (42.3)
Oil pan capacity with filter, L (qt.)	42.0 (44.4)
Oil filter: quantity, type	1, Cartridge
Oil cooler	Water-Cooled

Model: 500REOZJC, continued

Cooling

Radiator System

Ambient temperature, ° C (° F)	50 (122)
Engine jacket water capacity, L (gal.)	18 (4.8)
Radiator system capacity, including engine, L (gal.)	67.2 (17.8)
Engine jacket water flow, Lpm (gpm)	400 (106)
Heat rejected to cooling water at rated kW, dry exhaust, kW (Btu/min.)	209 (11896)
Heat rejected to charge air cooling water at rated kW, dry exhaust, Kw Btu/min.	116 (6603)
Water pump type	Centrifugal
Fan diameter, including blades, mm (in.)	965 (38)
Fan, kWm (HP)	18 (24)
Max. restriction of cooling air, intake and discharge side of radiator, kPA (in. H2O)	0.125 (0.5)
* Enclosure with internal silencer reduces ambient temperature capability by 5 ° C (9 ° F).	

Operation Requirements

Air Requirements

Radiator-cooled cooling air, m3/min. (scfm) *	435 (15400)
Cooling air required for generator set when equipped with city water cooling or remote radiator, based on 14 ° C (25 ° F) rise, m3/min. rise and ambient temp. of 29 ° C (85 ° F) m3/min. (cfm)	279 (9867)
Combustion air, m3/min. (cfm)	38 (1342)
Heat rejected to ambient air: Engine, kW (Btu/min.)	38 (2163)
Heat rejected to ambient air: Alternator, kW (Btu/min.)	40 (2277)
*Air density = 1.20 kg/m3 (0.075 lbm/ft3)	

Fuel Consumption

	Rating
Standby Fuel Consumption at 100% load	134.5 Lph (35.5 gph)
Standby Fuel Consumption at 75% load	104.6 Lph (27.6 gph)
Standby Fuel Consumption at 50% load	75.3 Lph (19.9 gph)
Standby Fuel Consumption at 25% load	38.8 (10.2)
Continuous Fuel Consumption at 0% load	** Volumetric Fuel consumption is up to 4% higher when using HVO/RC than #2 ULSC.



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.

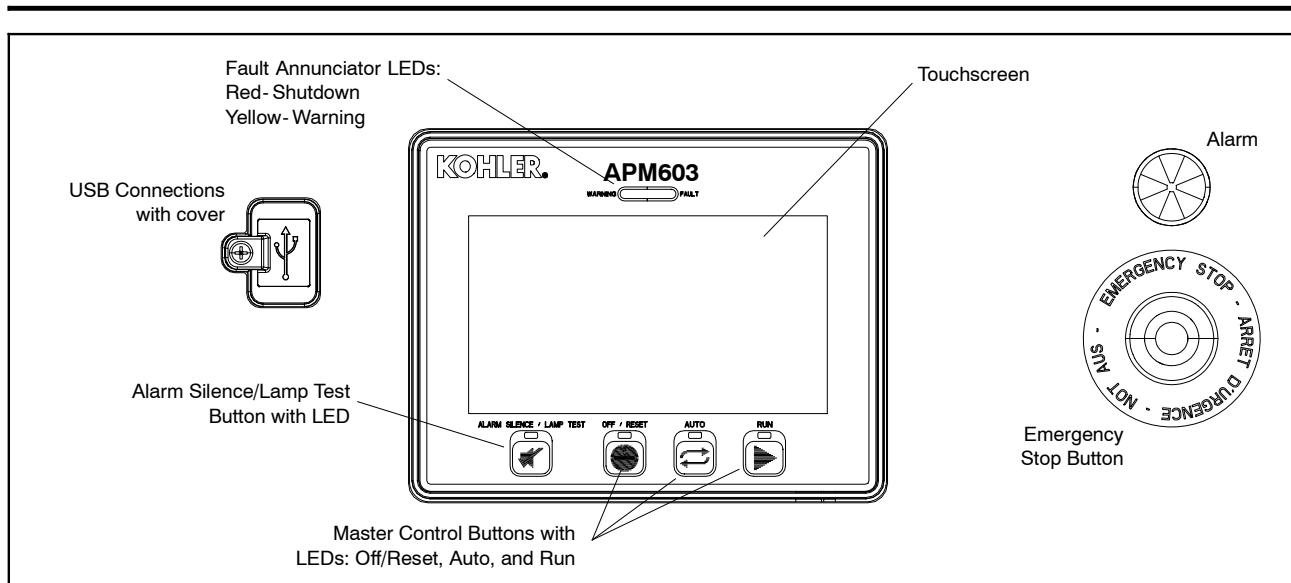
Global Support

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

On-board Diagnostics

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

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



Controller Features

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

Communication

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

Controller Specifications

Nominal voltage	12 or 24 VDC protected against reverse battery connection
Power	800 mAmps at 12 VDC 400 mAmps at 24 VDC
Operating Temperature	- 40°C to 70°C (- 40°F to 158°F)
Storage Temperature	- 40°C to 85°C (- 40°F to 185°F)
Humidity	5% to 95% non-condensing
Display Size, W x H	154 x 86 mm (6.0 x 3.4 inches)
Protection Index	IP65 Front

Paralleling Features

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

Overcurrent Protective Device

- Provides protection against line-to-line and line-to-neutral faults
- Uses thermal and instantaneous current limit settings for alternator protection
- Includes a maintenance mode for arc flash reduction per NEC 240.87

Load Management Features

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

Advanced Programmable I/O

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

Troubleshooting Features

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

NFPA 110 Requirements

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

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

* Function requires optional input sensors or kits and is engine dependent, see Engine Data.

Standards

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

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

Controller Functions

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

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

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

The controller communicates with the engine ECU and supports a large number of warning and shutdown events that are not listed here. This table highlights the items required for NFPA 110.

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

Event	Warning	Shutdown
Remote Emergency Stop Shutdown †		●
Reverse Power Shutdown †		●
Reverse VAR Shutdown †		●
Under Frequency Shutdown †		●
Under Frequency Warning	▲	
Under Voltage Shutdown (L-L, L-N, each phase) †		●
Under Voltage Warning (L-L, L-N, each phase)	▲	
Weak Cranking Battery	▲	
Status Messages		
Auto Button Pressed		
EPS Supplying Load		
Generator Running		
Generator Started		
Generator Stopped		
GFCI Warning *		
Load Shed Overload		
Load Shed Under Frequency		
Off Button Pressed		
RSA Event Programmable Digital Inputs, 1-8		
Run Button Pressed		
* Function requires optional input sensors or kits		
† Items included with common fault shutdown 10		

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 a Kohler-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

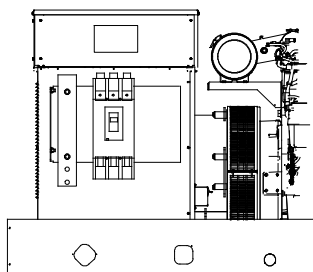
APM603 Available Options

- ☐ **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 Kohler 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 Kohler® Remote Serial Annunciator (RSA) enables the operator to monitor the status of the generator set from a remote location, which may be required for NFPA 99 and NFPA 110 installations, and up to four Automatic transfer switches.
- ☐ **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.

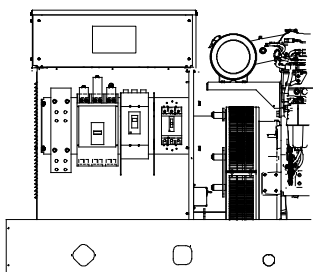
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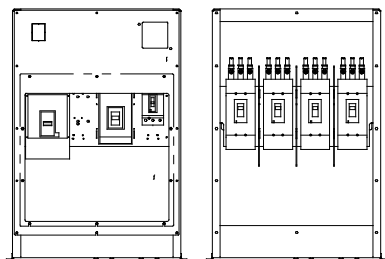
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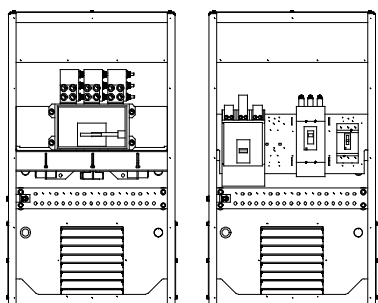
Single Circuit Breaker Kit with Neutral Bus Bar
15-300 kW Model Shown



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



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



Circuit Breaker Kits with Neutral Bus Bar
700-2500 kW KD Model Shown

Standard Features

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

Line Circuit Breaker Types

Magnetic Trip

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

Thermal Magnetic Trip

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

Electronic Trip

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

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

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

Electronic with Ground Fault Trip

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

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

80% Rated Circuit Breaker

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

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

100% Rated Circuit Breaker

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

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

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

Line Circuit Breaker Options

☐ Alarm Switch

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

☐ Auxiliary Contacts

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

☐ Breaker Separators (350- 2500 kW)

Provides adequate clearance between breaker circuits.

☐ Bus Bars

Bus bar kits offer a convenient way to connect load leads to the generator set when a circuit breaker is not present.

15- 300 kW. Bus bar kits are available on alternators with leads for connection to the generator set when circuit breakers are not ordered.

350- 2500 kW. A bus bar kit is provided when no circuit breaker is ordered. Bus bars are also available in combination with circuit breakers or other bus bars on the opposite side of the junction box. On medium voltage (3.3 kV and above) units, a bus bar kit is standard (not applicable to KD models).

☐ Field Connection Barrier

Provides installer wiring isolation from factory connections.

☐ Ground Fault Annunciation

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

☐ Lockout Device (padlock attachment)

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

☐ Lugs

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

☐ Overcurrent Trip Switch

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

☐ Shunt Trip, 12 VDC or 24 VDC

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

☐ Shunt Trip Wiring

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

☐ Undervoltage Trip, 12 VDC or 24 VDC

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

300-2250* kW Line Circuit Breaker Specifications

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

80% Rating Circuit Breaker

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

100% Rating Circuit Breaker

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

100% Rating Electrically Operated Breakers

For use as paralleling breakers.*

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

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

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

No second breakers are allowed in combination with these breakers.

Load Bus Rating

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

300- 2250* kW Line Circuit Breaker Specifications

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

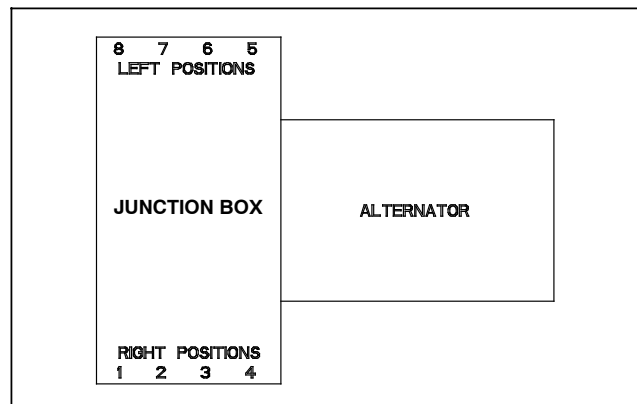
Interrupting Ratings

Circuit Breaker Frame Size	240 Volt, kA	480 Volt, kA	600 Volt, kA
HD	25	18	14
HG	65	35	18
HJ	100	65	25
JD	25	18	14
JG	65	35	18
JJ	100	65	25
LA	42	30	22
LG	65	35	18
MG			
NW	100	100	85
PG	65	35	18
PJ	100	65	25
PL	125	65	25
RJ	100	65	25

Circuit Breaker Lugs Per Phase (Al/Cu)

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

Breaker Positions



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

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

Multiple Circuit Breaker Combinations

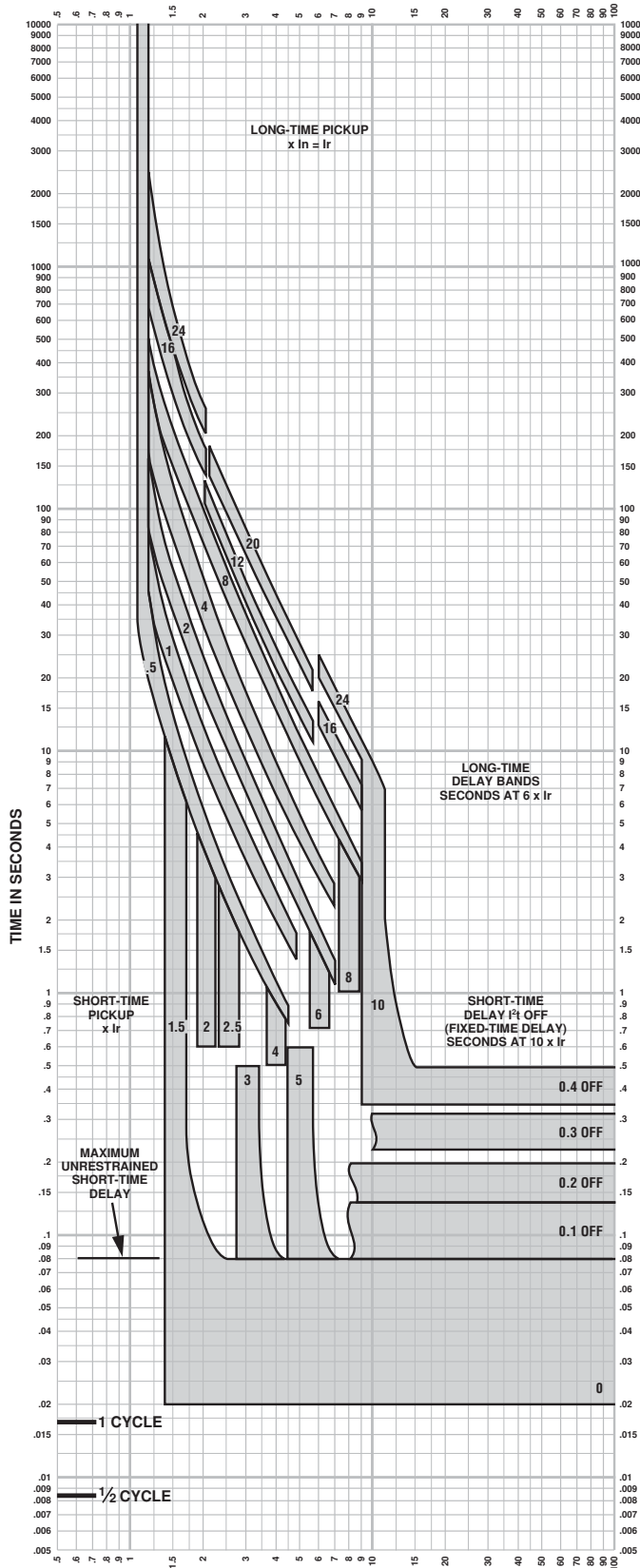
Alternator Model	Positions			
	1 or 5	2 or 6	3 or 7	4 or 8
4M/ 5M/ 7M	H/J			
	H/J	H/J		
	H/J	H/J	H/J	
	H/J	H/J	H/J	H/J
	LA			
	LA	H/J		
	LA	LA		
	LA	H/J	H/J	
	LA	LA	H/J	
	LA	H/J	H/J	H/J
	LA	LA	H/J	H/J
	LA	LA	LA	H/J
	LA	LA	LA	LA
	LG			
	LG	H/J		
	LG	LA		
	LG	LG		
	LG	H/J	H/J	
	LG	LA	H/J	
	LG	LA	LA	
	LG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

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

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

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

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



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

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

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

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

Notes:

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

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

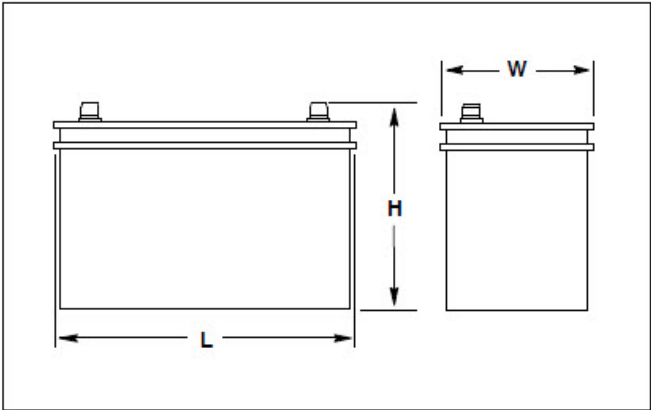
Schneider
Electric

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



Typical Overall Dimensions



Standard Features

- Kohler Co. selects batteries to meet the engine manufacturer's specifications and to comply with NFPA requirements for engine-cranking cycles.
- Heavy-duty starting batteries are the most cost-effective means of engine cranking and provide excellent reliability in generator set applications.
- Tough polypropylene cases protect against life-shortening vibration and impact damage.
- Batteries are rated according to SAE standard J-537.
- All batteries are 12-volts. Kits that contain two or four batteries are available for 24-volt systems and/or systems with redundant starters.
- Wet- and dry-charged batteries have lead-calcium or lead-antimony plates and use sulfuric acid 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 18°C (0°F) Min.	Reserve Capacity Minutes at 27° (80°F) Min.	Battery Post Layout and Style
				L	W	H			
Wet	324586	2	31	330.2 (13.0)	173.0 (6.8)	239.8 (9.4)	950	185	C/3

Battery Specifications

Battery Post Layouts (A/C/D) and Styles (1/3)

A

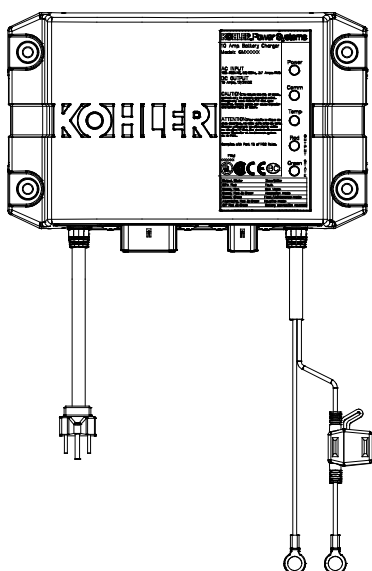
C

D

1

3

Notes: Dimensions are in mm; 25.4 mm equals 1 inch. BCI group numbers shown in italics.
Order stud kit 254427 to convert from Style 3 to Style 1.
Battery post layout letters and style numbers match drawing 244578 format.



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

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

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

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

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

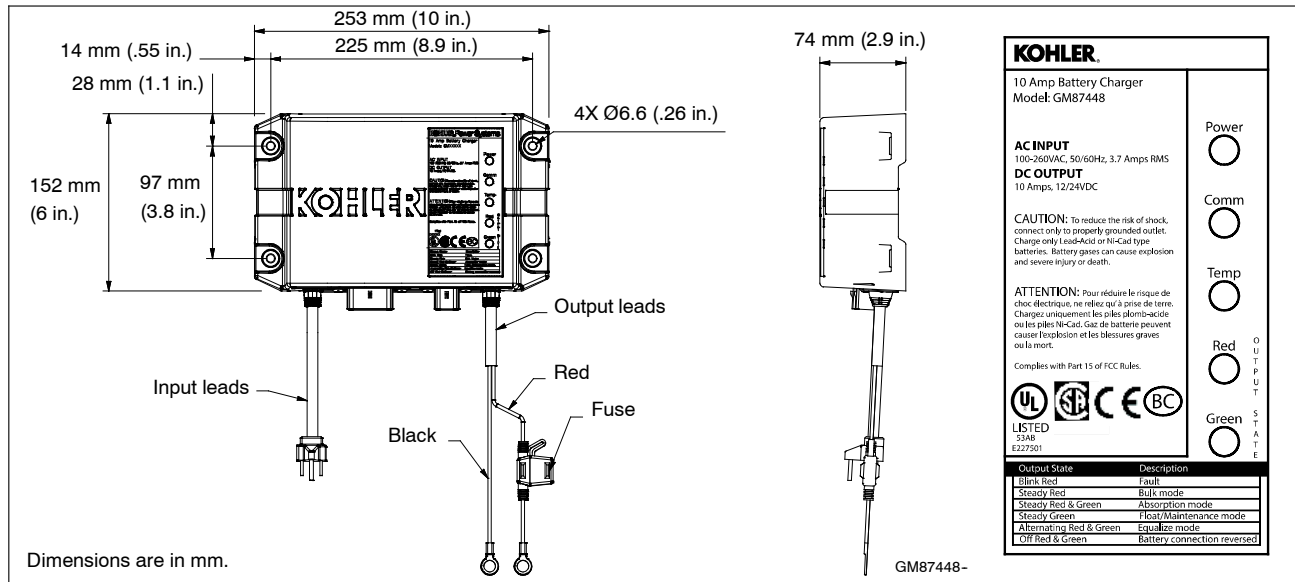
Standard Features

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

DC Output		AC Input		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



KOHLER CO., Kohler, Wisconsin 53044 USA
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For the nearest sales and service outlet in the
US and Canada, phone 1-800-544-2444
KOHLERPower.com



Specifications

AC Input	100-260 VAC
Frequency Input	50/60 Hz
DC Output	10 Amps @ 12 VDC or 10 Amps @ 24 VDC (On battery voltage regulation $\pm 1\%$; 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: <ul style="list-style-type: none">RedGreen
Environmental	
Operating	-20° to 70°C (-4° to 158° F)
Storage	-40° to 85°C (-40° to 185° F)
Relative Humidity	5 to 95% (non-condensing)
Salt Spray Testing	ASTM B117
Corrosion Resistant	From battery gases

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

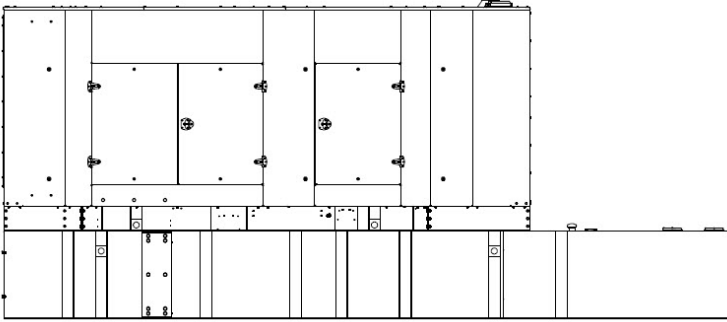
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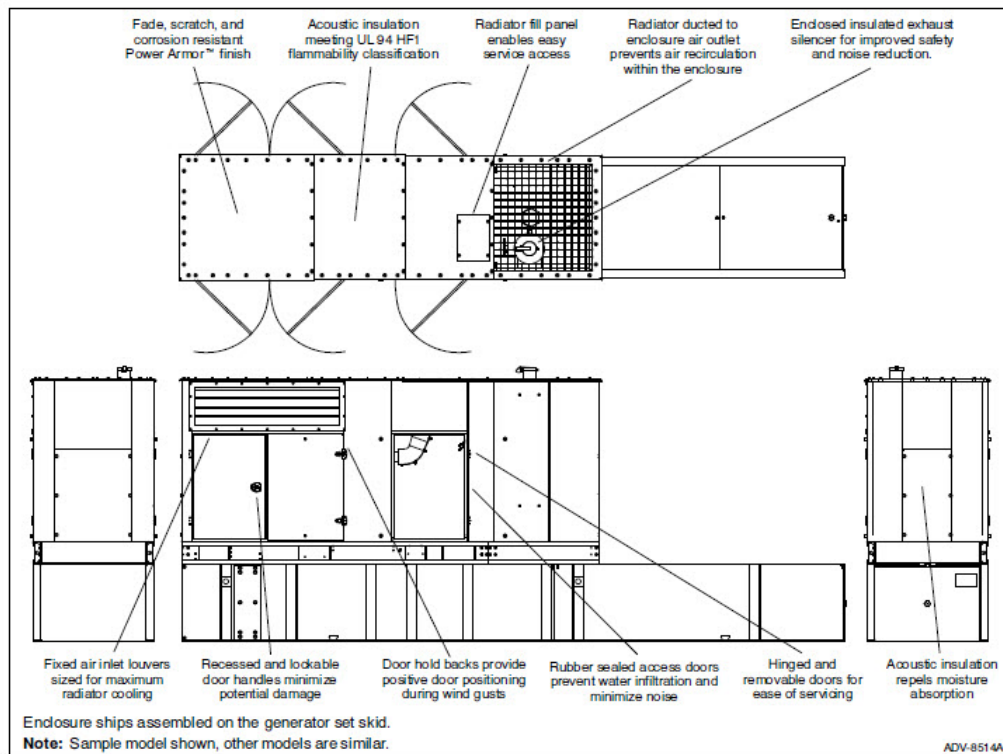


Sound Enclosure Standard Features

- Internal silencer, flexible exhaust connector and rain cap.
- Mounts to generator set skid. Steel construction with hinged and removable doors.
- Fade-, scratch-, and corrosion-resistant Kohler® Power Armor automotive-grade textured finish.
- Enclosure has six large access doors which allow for easy maintenance.
- Lockable, flush-mounted door latches.
- Air inlet louvers reduce rain entry.
- Internal vertical discharge plenum directs air up to reduce noise.
- Acoustic insulation that meets UL 94 HF1 flammability classification.
- Sound enclosure offering Level 1 or Level 2 around reduction using acoustic insulation.

Subbase Fuel Tank Features

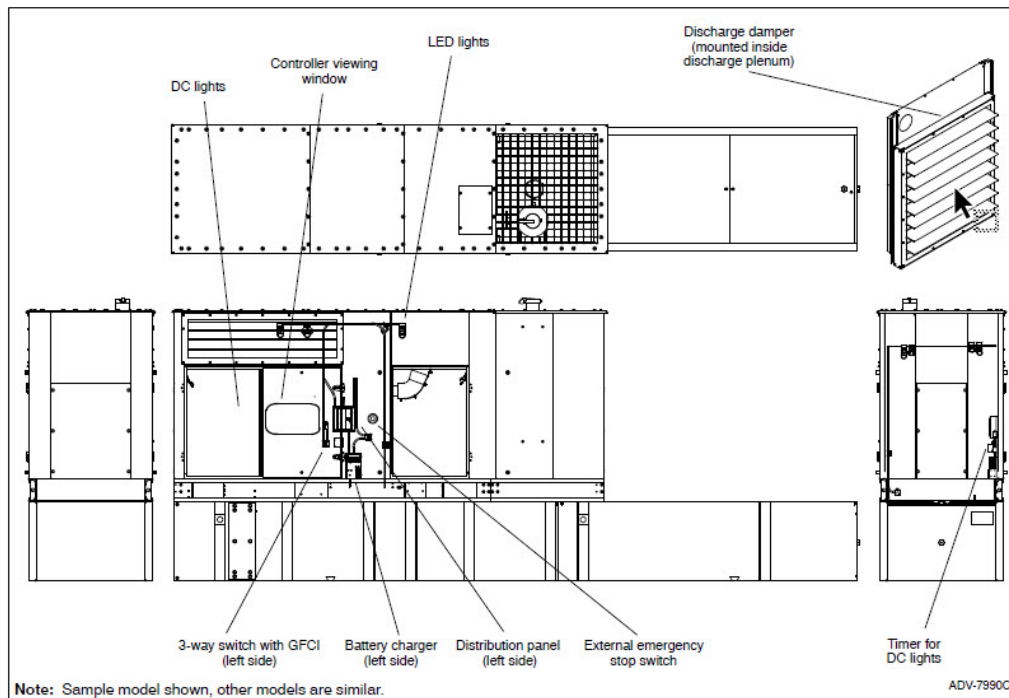
- The fuel tank has a Power Armor Plus textured epoxy-based rubberized coating.
- The above-ground rectangular secondary containment tank mounts directly to the generator set, below the generator set skid (subbase).
- Both the inner and outer tanks have emergency relief vents.
- Flexible fuel lines are provided with subbase fuel tank selection.
- The secondary containment tanks construction protects against fuel leaks or ruptures. 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

- Heavy-duty formed panels, solid construction. Preassembled package offering corrosion resistant, dent resilient structure mounting directly to the generator set skid. Available in 14 gauge steel.
- Power Armor automotive-grade finish resulting in advanced corrosion and abrasion protection as well as enhanced edge coverage and color retention.
- Internal exhaust silencer offering maximum component life and operator safety, and includes rain shield and cap.
- 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.
- Service access. Multi-personnel doors for easy access to generator set control and servicing of the fuel fill, fuel gauge, oil fill, and battery.
- Interchangeable modular panel construction allows design flexibility without compromising building standards.
- Bolted panels facilitate service, future modification upgrades, or field replacement.
- Cooling/combustion air intake. Weather protective designs using fixed air inlet louvers. Sized for maximum cooling airflow.
- Cooling air discharge. Weather protective design featuring vertical air discharge. Exhausts air through a punched air outlet grille.
- Heavy-duty formed panels, solid construction. Preassembled package offering corrosion resistant, dent resilient structure mounting directly to the generator set skid. Available in 14 gauge steel.
- Power Armor automotive-grade finish resulting in advanced corrosion and abrasion protection as well as enhanced edge coverage and color retention.
- Internal exhaust silencer offering maximum component life and operator safety.
- Note: Installing an additional length of exhaust tail pipe may increase backpressure levels. Please refer to the generator set spec sheet for the maximum backpressure value.
- Service access. Multi-personnel doors for easy access to generator set control and servicing of the fuel fill, fuel gauge, oil fill, and battery.
- Interchangeable modular panel construction. Allows complete serviceability or replacement without compromising enclosure design.
- Bolted panels facilitate service, future modification upgrades, or field replacement.
- Cooling/combustion air intake. Weather protective designs using fixed air inlet louvers. Sized for maximum cooling airflow.
- Cooling air discharge. Attenuated models offering an internal vertical discharge scoop that redirects cooling air up and above the enclosure to reduce noise.
- Attenuated design using a silencer and acoustic insulation UL 94 HF1 listed for flame resistance.

Weather and Sound Enclosure Options



- Extended operation. Usable tank capacities offers full load standby operation of up to 72 hours.
- Power Armor Plus textured epoxy-based rubberized coating that creates an ultra-thick barrier between the tank and harsh environmental conditions like humidity, saltwater, and extreme temperatures, and provides 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. Meets UL requirements; ensures adequate venting of inner and outer tank under extreme pressure and/or emergency conditions.
- Normal vent with cap. Vent is raised above lockable fuel fill.
- Fuel level sender with fuel level and low and high fuel warning annunciated through the generator set controller.
- Leak detection switch. Annunciates a contained primary tank fuel leak condition at generator set control.
- Electrical stub-up.

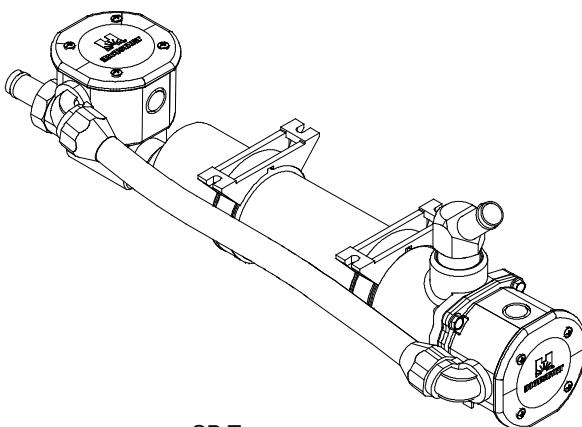
Fuel Tank Capacity, L (gal.)	Est. Fuel Supply Hours at 60 Hz with Full Load	Enclosure and Fuel Tank Length, mm (in.)	Enclosure and Fuel Tank Width, mm (in.)	Enclosure and Fuel Tank Weight, kg (lb.)	Enclosure and Fuel Tank Height, mm (in.)	Fuel Tank Height (H), mm (in.)	Sound Pressure Level, dB(A)
Lift base	0	5520 (217)	1495 (59)	4745 (10460)	2400 (94)	0 (0)	84.7
3384 (894)	24	6714 (264)	1495 (59)	6375 (14054)	3137 (123)	737 (29)	84.7
Lift base	0	5520 (217)	1495 (59)	4346 (9581)	2400 (94)	0 (0)	84.7
3384 (894)	24	6714 (264)	1495 (59)	5976 (13174)	3137 (123)	737 (29)	84.7

Note: Data in table is for reference only, refer to the respective ADV drawings for details.

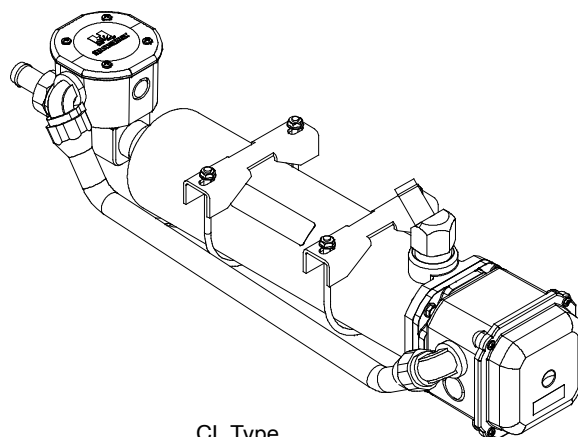
Note: Refer to TIB-114 for generator set sound data.

* Max. weight includes the generator set (wet) with largest alternator option, enclosure, silencer, and tank (no fuel).

Engine Block Heater Kits



CB Type



CL Type

Block Heater Kit, Typical

Applicable Models

- 180-200RZXB
- 180-200REZXB
- 230-275REOZJE
- 300-500REOZJ
- 350-500REOZJB
- **350-500REOZJC**
- 350-400REOZJD
- 500REOZVC
- 550-600REOZVB

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 helps to extend element life and gives a significant reduction in electrical consumption.

The engine block heater has a fixed setting thermostat that turns ON when the engine coolant temperature reaches 27°C (80°F) and turns OFF when the engine coolant temperature reaches 38°C (100°F).

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, 208 V, 240 V, and 480 V versions.

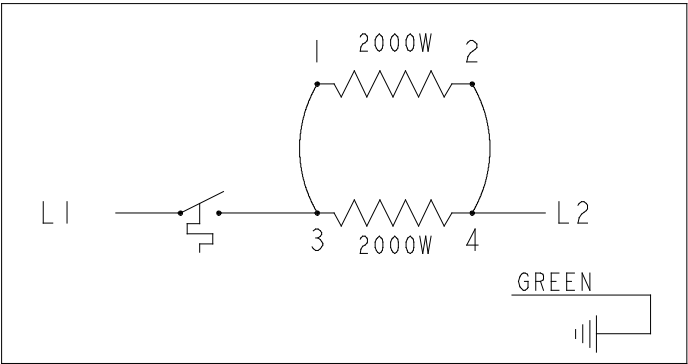
Block Heater Specifications

Heating Fluid	Water, Coolant Mix (50% Glycol/50% Water)
Thermostat Temperature Range	27° - 38° C (80° - 100° F)
Temperature High Limit	96° C (205° F)
Max. Pressure	125 psi (860 kPa)
Inlet/Outlet Plumbing	1 in. NPT
System Ingress	NEMA 4

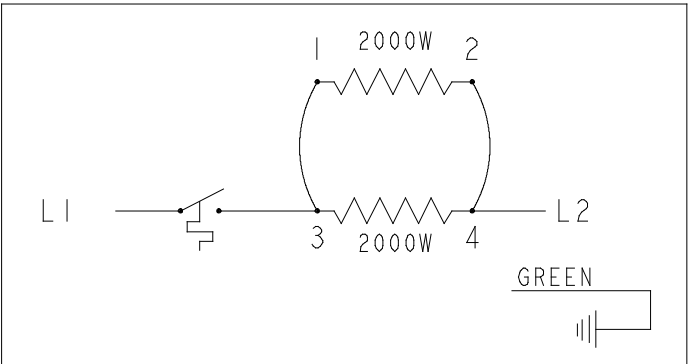
Specifications

Block Heater Kit Number	Component	Watts	Voltage	Phase
GM75809- KA1	GM76113	2500	90- 120	1
GM75809- KA2	GM76114	2500	190- 208	1
GM75809- KA3	GM76115	2500	210- 240	1
GM75809- KA4	GM76116	2500	380- 480	1
GM76120- KA1	GM76113	2500	90- 120	1
GM76120- KA2	GM76114	2500	190- 208	1
GM76120- KA3	GM76115	2500	210- 240	1
GM76120- KA4	GM76116	2500	380- 480	1
GM79186- KA1	GM79182	4000	190- 208	1
GM79186- KA2	GM79183	4000	210- 240	1
GM79186- KA3	GM79184	4000	380- 480	1
GM79186- KP1	GM79182	4000	190- 208	1
GM79186- KP2	GM79183	4000	210- 240	1
GM79186- KP3	GM79184	4000	380- 480	1
GM79187- KA1	GM79182	4000	190- 208	1
GM79187- KA2	GM79183	4000	210- 240	1
GM79187- KA3	GM79184	4000	380- 480	1
GM79187- KP1	GM79182	4000	190- 208	1
GM79187- KP2	GM79183	4000	210- 240	1
GM79187- KP3	GM79184	4000	380- 480	1
GM84820- KA1	GM76113	2500	90- 120	1
GM84820- KA2	GM76114	2500	190- 208	1
GM84820- KA3	GM76115	2500	210- 240	1
GM84820- KA4	GM76116	2500	380- 480	1

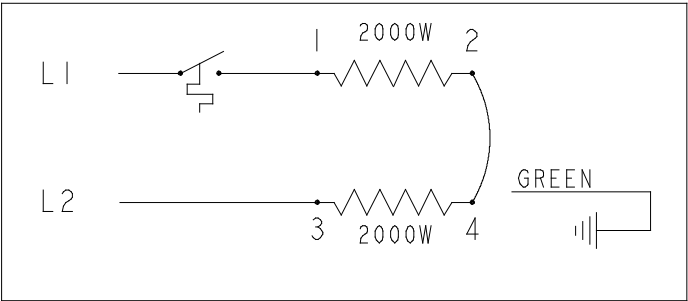
Wiring Diagram



208 VAC single phase- parallel



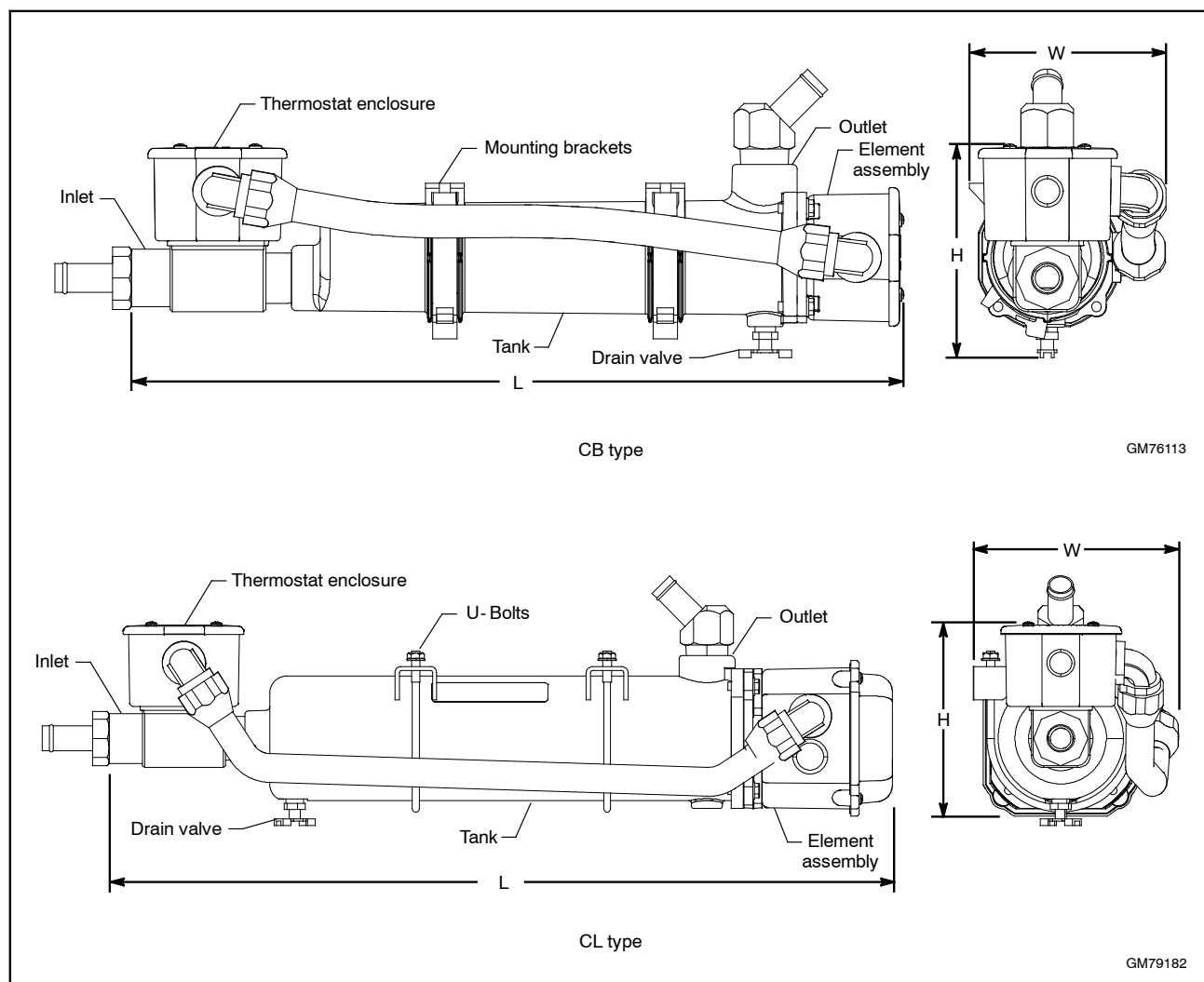
240 VAC single phase- parallel



480 VAC single phase- parallel

Dimensions and Weights

CB type block heater size, L x H x W, mm (in):	510 x 132 x 129 (20.1 x 5.2 x 5.1)
CL type block heater size, L x H x W, mm (in):	597 x 147 x 158 (23.5 x 5.8 x 6.2)
CB type block heater weight, kg (lb):	3 (6.9)
CL type block heater weight, kg (lb):	4.5 (10)



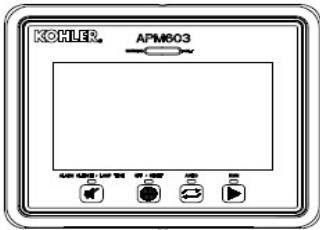
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Integral Voltage Regulator with Kohler® APM603
Controllers and Menu-Driven Selections (80-4000 kW
Generator Set Models)



APM603 Controller
with Integral Voltage Regulator

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

Voltage Regulators

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

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

Integral Voltage Regulators with APM603

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



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

Integral Voltage Regulator with APM603 Controller

- A 7.5-inch color TFT touchscreen provides access to data.
- The controller provides an interface between the generator set and switchgear for paralleling applications incorporating multiple generator set and/or utility feeds.
- The controller can control Fast Response™ II, Fast Response™ X, and PMG alternators using the GM88453 activator board.

Voltage Regulator Settings, APM603 Controller

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

Paralleling Settings, APM603

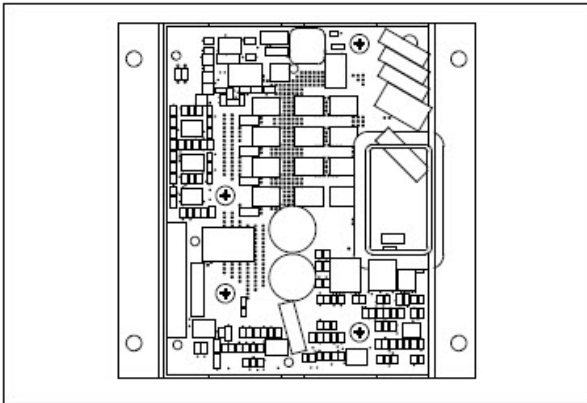
- Synchronizing parameters setup
 - Voltage matching
 - Frequency matching
 - Phase matching
 - Time delay
- Load sharing
 - kW sharing
 - kVAR sharing
 - Baseload settings
 - Droop

Paralleling Metering, APM603

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

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

Activator Board GM88453



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

Modbus® is a registered trademark of Schneider Electric.



Alternator Data

TECHNICAL INFORMATION BULLETIN

Alternator Data Sheet

Alternator Model: 5M4027

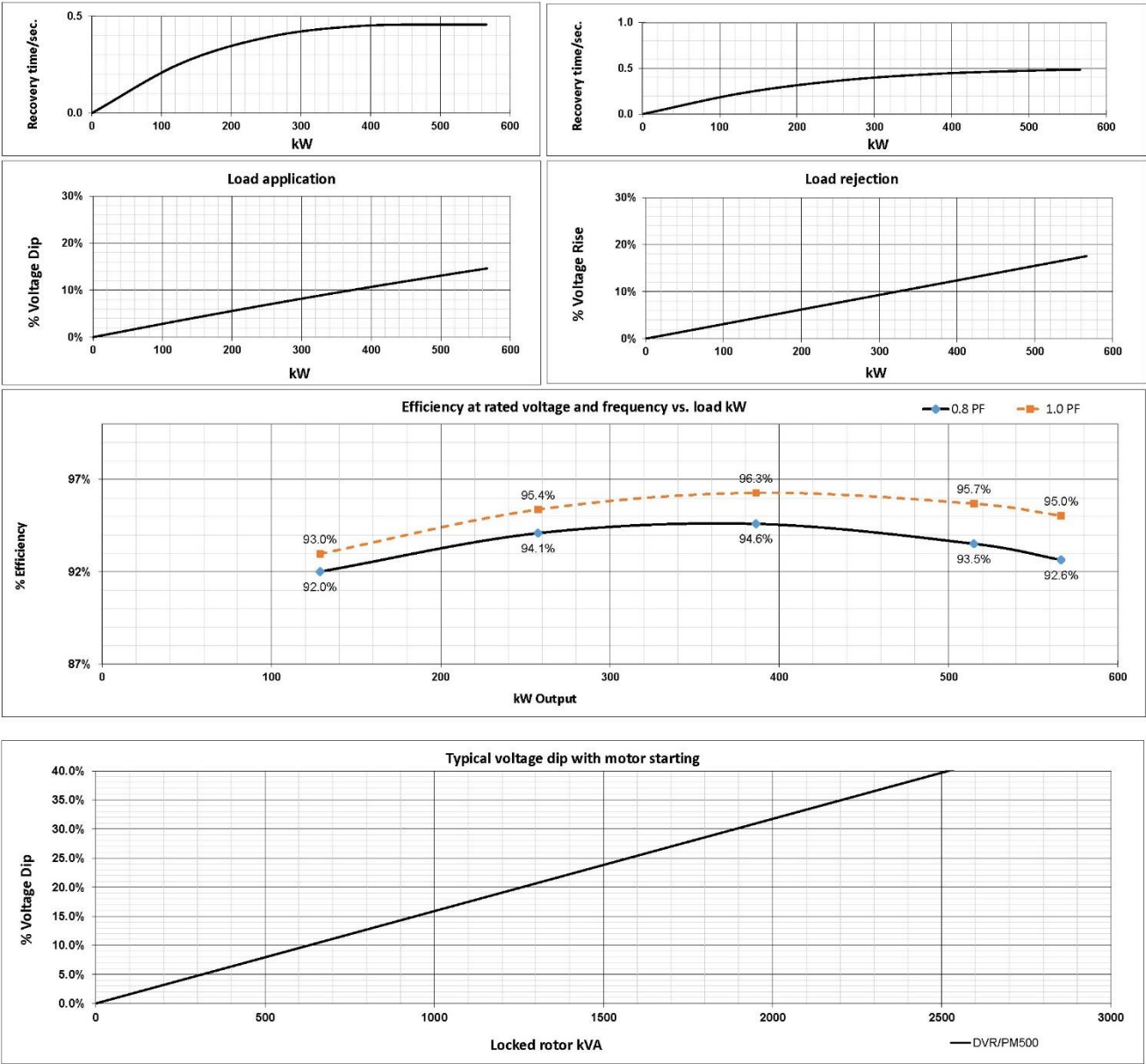
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Kilowatt ratings at		1800 RPM		60 Hertz		12 Leads	
kW (kVA)		3 Phase		0.8 Power Factor		Dripproof or Open Enclosure	
		CONTINUOUS ^{① ②}				STANDBY ^{① ②}	
Voltage*		NEMA B / 80 °C		NEMA F / 105 °C		NEMA H / 125 °C	
240/480		440 (550)		500 (625)		515 (644)	
220/440		410 (513)		460 (575)		485 (606)	
208/416		400 (500)		445 (556)		470 (588)	
200/400		382 (478)		427 (534)		441 (551)	
190/380		360 (450)		405 (506)		405 (506)	
^① Rise by resistance method, Mil-Std-705, Method 680.1b. ^② Machine rated for Max Ambient of 40 °C, Max Altitude 3300 ft							
Submittal Data: 480 Volts*, 515 kW, 644 kVA, 0.8 P.F., 1800 RPM, 60 Hz, 3 Phase						High Wye CONNECTION	
Mil-Std-705B Method	Description		Value	Units	Mil-Std-705C Method	Description	Value Units
301.1b	Insulation Resistance		>1.5 Meg	Ohms	505.3b	Overspeed	2250 RPM
302.1a	High Potential Test				507.1c	Phase Sequence CCW-ODE	ABC
	Main Stator		1960	Volts	508.1c	Voltage Balance, L-L or L-N	0.2%
	Main Rotor		1500	Volts	601.4a	L-L Harmonic Max - Total (Distortion Factor)	
	Exciter Stator		1500	Volts		5.0%	
	Exciter Rotor		1500	Volts	601.4a	L-L Harmonic Max - Single	
401.1a	PMG Stator		1500	Volts	601.1c	Deviation Factor	
	Stator Resistance, Line to Line		0.01260	Ohms	---	TIF (1960 Weightings)	
	High Wye Connection				---	THF (IEC, BS & NEMA Weightings)	
	Rotor Resistance		0.398	Ohms	Additional Prototype Mil-Std Methods are Available on Request.		
	Exciter Stator		23	Ohms			
	Exciter Rotor		0.045	Ohms			
PMG Stator		2.1	Ohms				
410.1a	No Load Exciter Field Amps at 480 Volts Line to Line		0.7	A DC			
420.1a	Short Circuit Ratio		0.591				
421.1a	Xd Synchronous Reactance		2.670	PU	--	Generator Frame	572
			0.956	Ohms	--	Type	MagnaMax
422.1a	X2 Negative Sequence React.		0.226	PU	--	Insulation	Class H
			0.081	Ohms	--	Coupling - Single Bearing	Flexible
423.1a	X0 Zero Sequence Reactance		0.056	PU	--	Amortisseur Windings	Full
			0.020	Ohms	--	Excitation	Ext. Voltage Regulated, Brushless
425.1a	X'd Transient Reactance		0.162	PU	--	Voltage Regulator	DVR2000E+
			0.058	Ohms	--	Voltage Regulation	0.25%
426.1a	X''d Subtransient Reactance		0.137	PU			
			0.049	Ohms			
--	Xq Quadrature Synchronous Reactance		1.100	PU	--	Cooling Air Volume	1520 CFM
			0.394	Ohms	--	Heat rejection rate	2033 Btu's/min
427.1a	T'd Transient Short Circuit Time Constant		0.114	Sec	--	Full load current	774.3 Amps
					--	Minimum Input hp required	738.3 HP
428.1a	T''d Subtransient Short Circuit Time Constant		0.01	Sec	--	Full load torque	2153 Lb-ft
					--	Efficiency at rated load :	93.5%
430.1a	T'do Transient Open Circuit Time Constant		1.68	Sec			
432.1a	Ta Short Circuit Time Constant of Armature Winding		0.017	Sec			
	--				--	Weight	2840 lbs

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

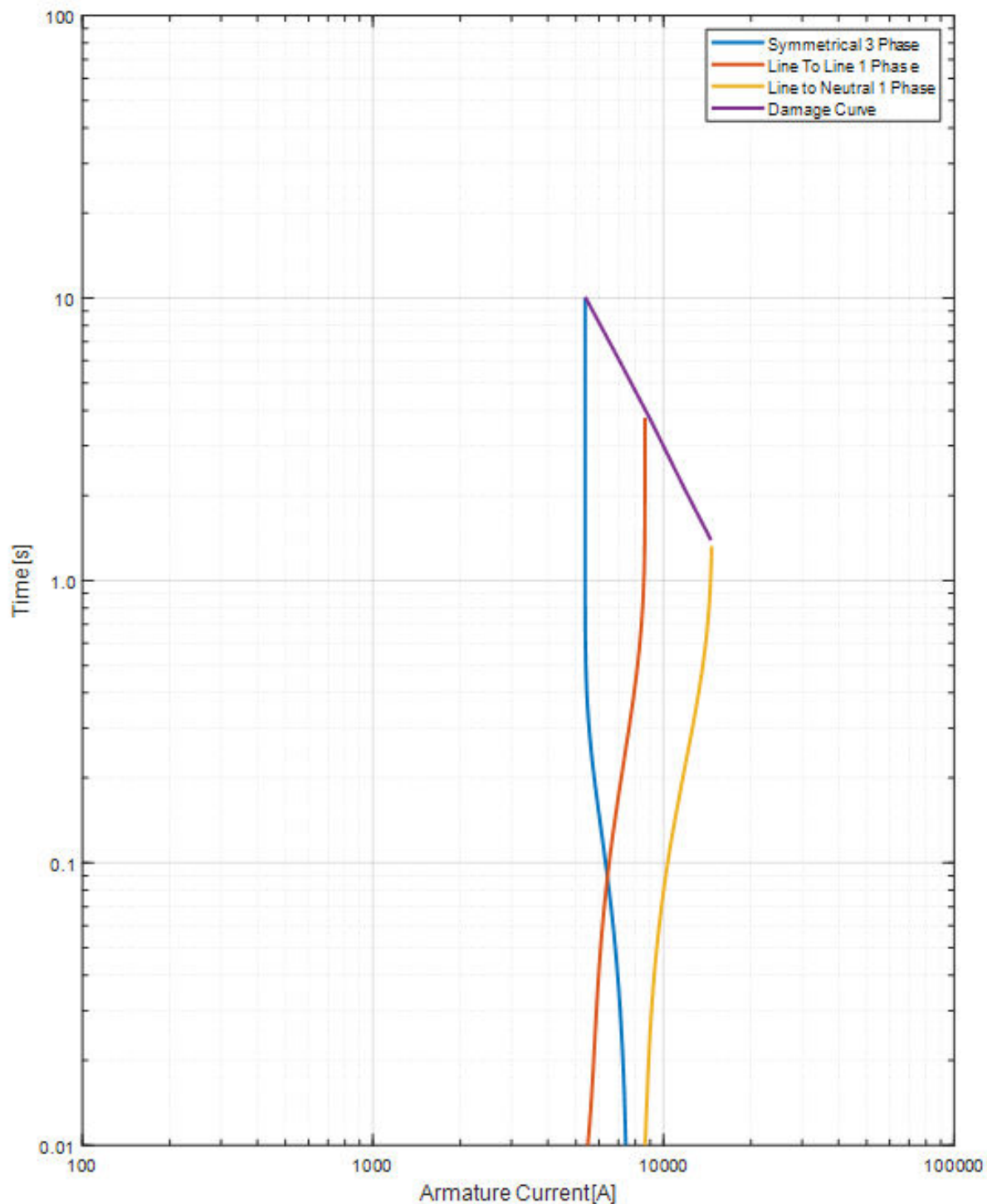
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TYPICAL DYNAMIC CHARACTERISTICS



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

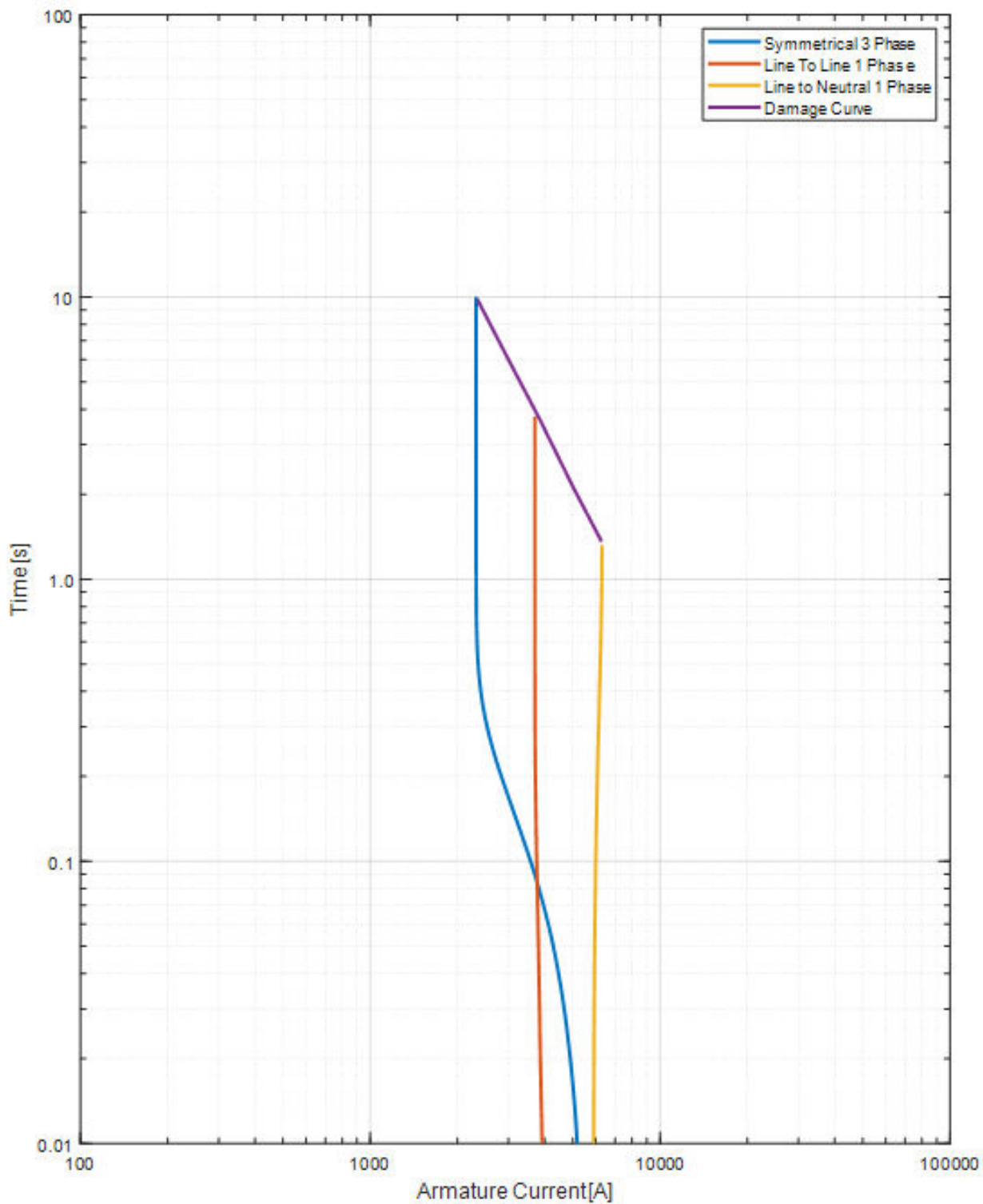
Full Load Current: 1788 Amps Steady State S.C. Current: 5364 Amps Max. 3 ph. Symm. S.C. Current: 9770 Amps



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

SHORT CIRCUIT DECREMENT CURVE 60 Hz, High Wye Connection

Full Load Current: 775 Amps Steady State S.C. Current: 2325 Amps Max. 3 ph. Symm. S.C. Current: 5657 Amps



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



Cooling Data

TECHNICAL INFORMATION BULLETIN

Generator Set Cooling System Data Sheet

500REOZJC 60Hz (Standby Duty)	50°C Ambient Temperature Cooling System								
	Total external restriction on open unit ⁷	Pa (in.H ₂ O)	0 (0)	125 (0.5)	187 (0.75)	250 (1)	312 (1.25)	375 (1.5)	Enclosed Units
	Maximum allowable ambient temperature	°C (°F)	50 (122)	47 (117)	45 (113)	43 (109)	42 (108)	NA (NA)	45 (113)
	Cooling system airflow	m ³ /min (ft ³ /min)	435 (15400)	410 (14500)	395 (13900)	380 (13400)	365 (12900)	NA (NA)	NA (NA)

1. The data shown above is the anticipated cooling performance for a typical generator set when following proper installation techniques.
2. Cooling performance is based on operation at 100 m (328 ft.) above sea level. For elevations higher than 100 m (328 ft.), typical cooling performance derate is 1°C (1.8°F) per 250 m (820 ft.).
3. For high ambient conditions, check TIB-101 for the generator set power output derate schedule.
4. Incorrect installation, improper operation, fouling of the cooling system, and other variable conditions may reduce cooling performance.
5. Kohler manufactured sound enclosed models are rated in free air with no additional restriction. Consult factory for other variants or conditions such as additional ducting or hoods.
6. Performance is based on a 50/50 water and ethylene glycol mixture.
7. Total external restriction includes restriction upstream and downstream of the unit – any ducting supplying intake air to the unit and any ducting for the discharge.



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 1 Sound Enclosure	
500REOZJC	60	100% Load	119.5	94.8	92.9	84.7	
		No Load	102.6	90.3	88.4	76.8	

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.

				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 1 Sound	3:00	62.4	72.4	68.8	74.6	75.4	74.4	71.2	64.5	81.3
			1:30	60.8	70.3	72.4	78.2	80.9	78.7	74.8	68.5	85.2
			12:00-Engine	64.8	73.1	70.3	80.1	82.8	81.1	76.9	69.9	87.1
			10:30	59.0	71.5	72.3	78.3	81.2	79.4	75.5	68.7	85.6
			9:00	63.4	73.0	72.2	76.5	79.7	77.7	74.4	67.4	84.3
			7:30	61.9	74.5	71.0	77.6	79.3	77.0	72.7	67.2	84.1
			6:00-Alternator	63.9	73.7	71.8	77.0	79.7	79.9	70.5	65.2	84.7
			4:30	62.4	74.9	72.4	75.9	76.9	75.1	70.3	63.0	82.6
			8-pos. log avg.	62.6	73.1	71.6	77.6	80.0	78.4	73.9	67.3	84.7

				Sound Pressure Levels, dB(A)								
Load	Distance, m (ft)	Enclosure	Measurement Clock Position	Octave Band Center Frequency (Hz)								Overall Level
				63	125	250	500	1000	2000	4000	8000	
No Load	7 (23)	Level 1 Sound	3:00	53.4	65.3	69.2	69.1	67.5	61.8	53.9	47.1	74.4
			1:30	53.7	66.4	70.8	69.6	71.1	63.0	55.5	49.4	76.1
			12:00-Engine	53.6	65.0	66.8	70.5	67.4	62.6	56.1	47.3	74.3
			10:30	55.4	67.2	69.6	69.8	69.5	63.9	56.5	49.8	75.6
			9:00	56.6	67.1	70.3	66.7	67.0	63.0	54.8	47.0	74.5
			7:30	54.4	68.7	71.3	69.3	71.0	66.6	59.3	53.9	76.8
			6:00-Alternator	58.2	70.8	70.6	72.3	77.5	75.0	65.2	57.7	81.2
			4:30	56.7	69.0	70.2	70.1	70.6	66.3	58.6	50.9	76.6
			8-pos. log avg.	55.6	67.8	70.0	69.9	71.7	68.0	59.2	52.1	76.8



Exhaust System Data

TECHNICAL INFORMATION BULLETIN

Enclosed Generator Set Exhaust System Data Sheet

Model	Enclosure Type	Consumed Back Pressure (in H2O)	Consumed Back Pressure (in Hg)	Back Pressure Limit(s) (in H2O)	Back Pressure Limit(s) (in Hg)	Flex Exhaust Tube(s)	Silencer	Drawing
500REOZJC	All Weather & Sound Level 1 (SL1) Enclosures	32.5	2.4	16-40	1.2-2.9	GM110933	GM110935	ADV-8189
	All Sound Level 2 (SL2) Enclosures	29.5	2.2	16-40	1.2-2.9	GM110330 Flex GM110329 Cross Tube	GM109791 & GM109792	ADV-8189

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

TECHNICAL INFORMATION BULLETIN

Enclosed Generator Set Exhaust System Data Sheet

Model	Enclosure Type	Consumed Back Pressure (in H2O)	Consumed Back Pressure (in Hg)	Back Pressure Limit(s) (in H2O)	Back Pressure Limit(s) (in Hg)	Flex Exhaust Tube(s)	Silencer	Drawing
500REOZJC	All Weather & Sound Level 1 (SL1) Enclosures	32.5	2.4	16-40	1.2-2.9	GM110933	GM110935	ADV-8189
	All Sound Level 2 (SL2) Enclosures	29.5	2.2	16-40	1.2-2.9	GM110330 Flex GM110329 Cross Tube	GM109791 & GM109792	ADV-8189

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Emissions Data

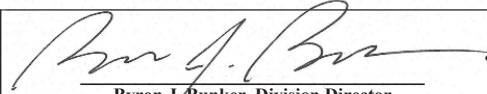


UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2023 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION
AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: Deere & Company
(U.S. Manufacturer or Importer)
Certificate Number: PJDXL13.5132-006

Effective Date:
06/16/2022
Expiration Date:
12/31/2023


Byron J. Bunker, Division Director
Compliance Division

Issue Date:
06/16/2022
Revision Date:
N/A

Model Year: 2023
Manufacturer Type: Original Engine Manufacturer
Engine Family: PJDXL13.5132

Mobile/Stationary Indicator: Stationary
Emissions Power Category: 560<kW<=2237
Fuel Type: Diesel
After Treatment Devices: No After Treatment Devices Installed
Non-after Treatment Devices: Electronic Control, Smoke Puff Limiter, Non-standard Non-After Treatment Device Installed, Engine Design Modification

Pursuant to Section 111 and Section 213 of the Clean Air Act (42 U.S.C. sections 7411 and 7547) and 40 CFR Part 60, and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year.

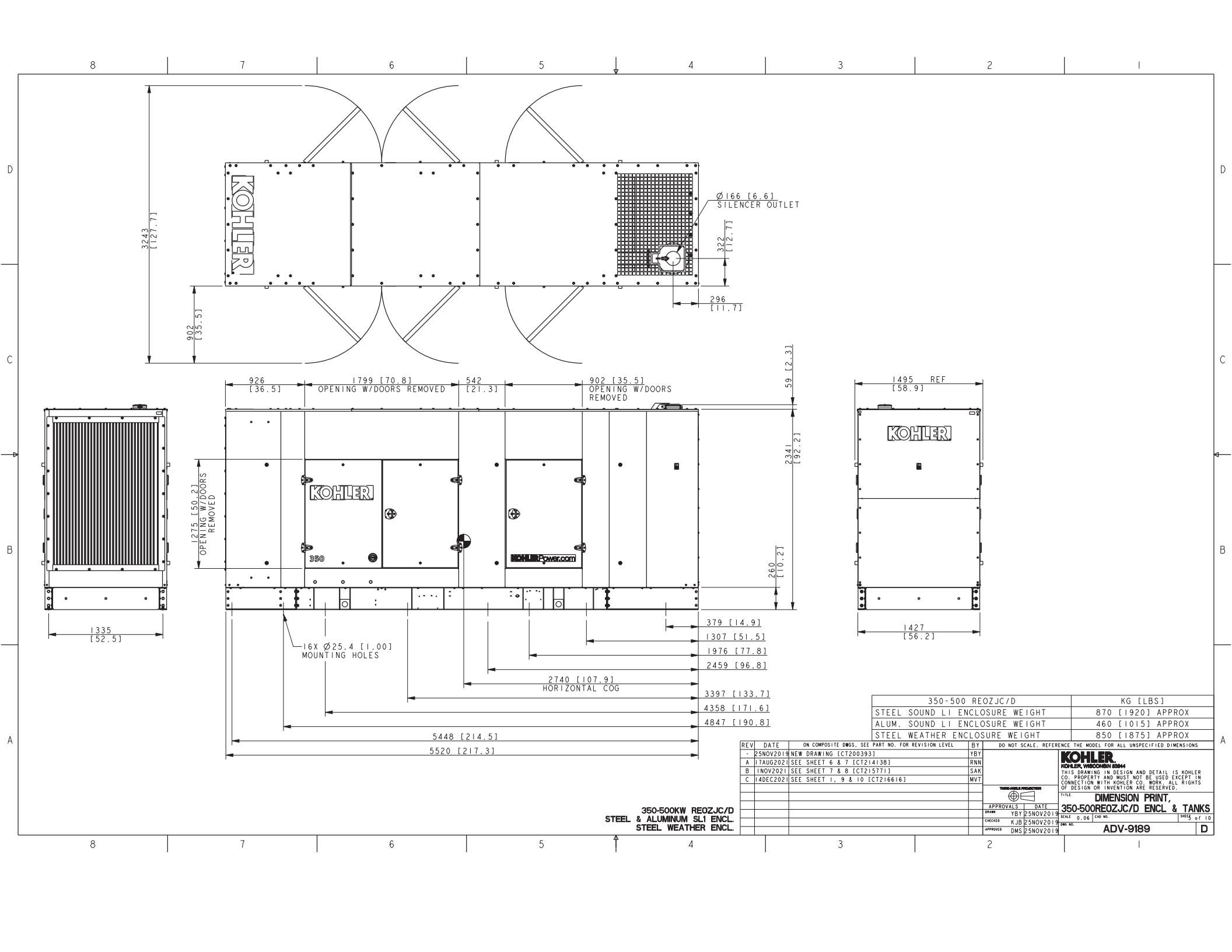
This certificate of conformity covers only those new compression-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate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

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

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



Dimensional Drawings





Wiring Schematics

REV	DATE	REVISION	BY	CHK
1	5-11-18	NEW DRAWING [C1190243]	TLK	
2	10-11-18	SEE SHEET 2 [C1191090]	TLK	
3	2-05-19	SEE SHEETS 7 & 8 [C1193517]	SMH	
4	3-18-19	(A-1,2) UPDATED TB12 CHART FOR VOLTAGE AND SPEED BMS; SEE SHEET 2 [C1194009]	SMH	

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2	10-11-18	SEE SHEET 2 [C1191090]	TLK	
3	2-05-19	SEE SHEETS 7 & 8 [C1193517]	SMH	
4	3-18-19	(A-1,2) UPDATED TB12 CHART FOR VOLTAGE AND SPEED BMS; SEE SHEET 2 [C1194009]	SMH	

REV	DATE	REVISION	BY	CHK
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2	10-11-18	SEE SHEET 2 [C1191090]	TLK	
3	2-05-19	SEE SHEETS 7 & 8 [C1193517]	SMH	
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REV	DATE	REVISION	BY	CHK
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2	10-11-18	SEE SHEET 2 [C1191090]	TLK	
3	2-05-19	SEE SHEETS 7 & 8 [C1193517]	SMH	
4	3-18-19	(A-1,2) UPDATED TB12 CHART FOR VOLTAGE AND SPEED BMS; SEE SHEET 2 [C1194009]	SMH	

REV	DATE	REVISION	BY	CHK
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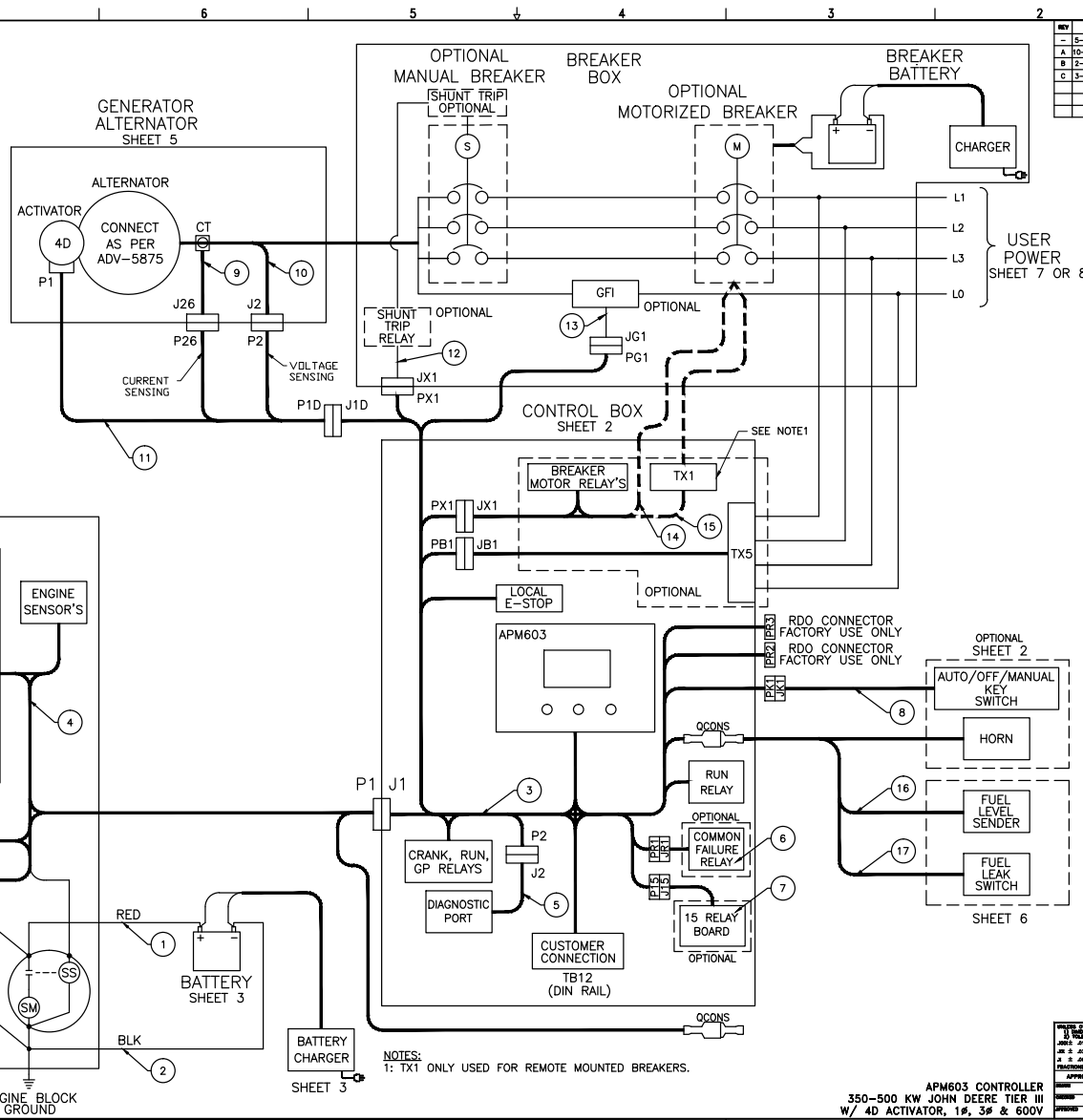
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FUNCTION	POS	SIGNAL DESCRIPTION
REMOTE E-STOP	1	REMOTE EMERGENCY STOP
REMOTE START	3	REMOTE START SIGNAL
CUSTOMER INTERFACE	5	FUSED BATTERY POWER
	6	BATT VOLTS WHEN RUNNING
	7	BATTERY NEGATIVE
CUSTOMER INTERFACE	8	A (-) ISOLATED
	9	B (+) RS-485 #2 (PGEN)
	10	SHIELD
LOW FUEL	11	LOW FUEL LEVEL SWITCH
RES IN RETURN	12	LOW FUEL LEVEL SWITCH RETURN
BAT CHRG FLT	13	BATTERY CHARGER FAULT
RES IN RETURN	14	BATTERY CHARGER FAULT RETURN
ENG START	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
	20	B (+) RS-485 #3 (MODBUS/PGEN)
	21	SHIELD
CUSTOMER INTERFACE	22	A (-) NON-ISOLATED
	23	B (+) RS-485 #4 (MODBUS RSA)
	24	SHIELD
RUN RELAY	25	COMMON CONTACT
	26	NORMALLY OPEN CONTACT
	27	NORMALLY CLOSED CONTACT
DROOP SELECT	28	ISOCHRONOUS DROOP JP2 IN JP2 OUT
ANALOG THROTTLE CONTROL	29*	+5 VDC REF
	30*	SIGNAL (+2.5 VDC NORM)
	31*	SENSOR RETURN
IDLE MODE	32	CONSULT FACTORY
	33	
SPEED	35	SPEED BIAS (+)
BIAS	36	SPEED BIAS (-)
	37	SHIELD
VOLTAGE	38	VOLTAGE BIAS (+)
BIAS	39	VOLTAGE BIAS (-)
	40	SHIELD

REV	DATE	REVISION	BY	CHK
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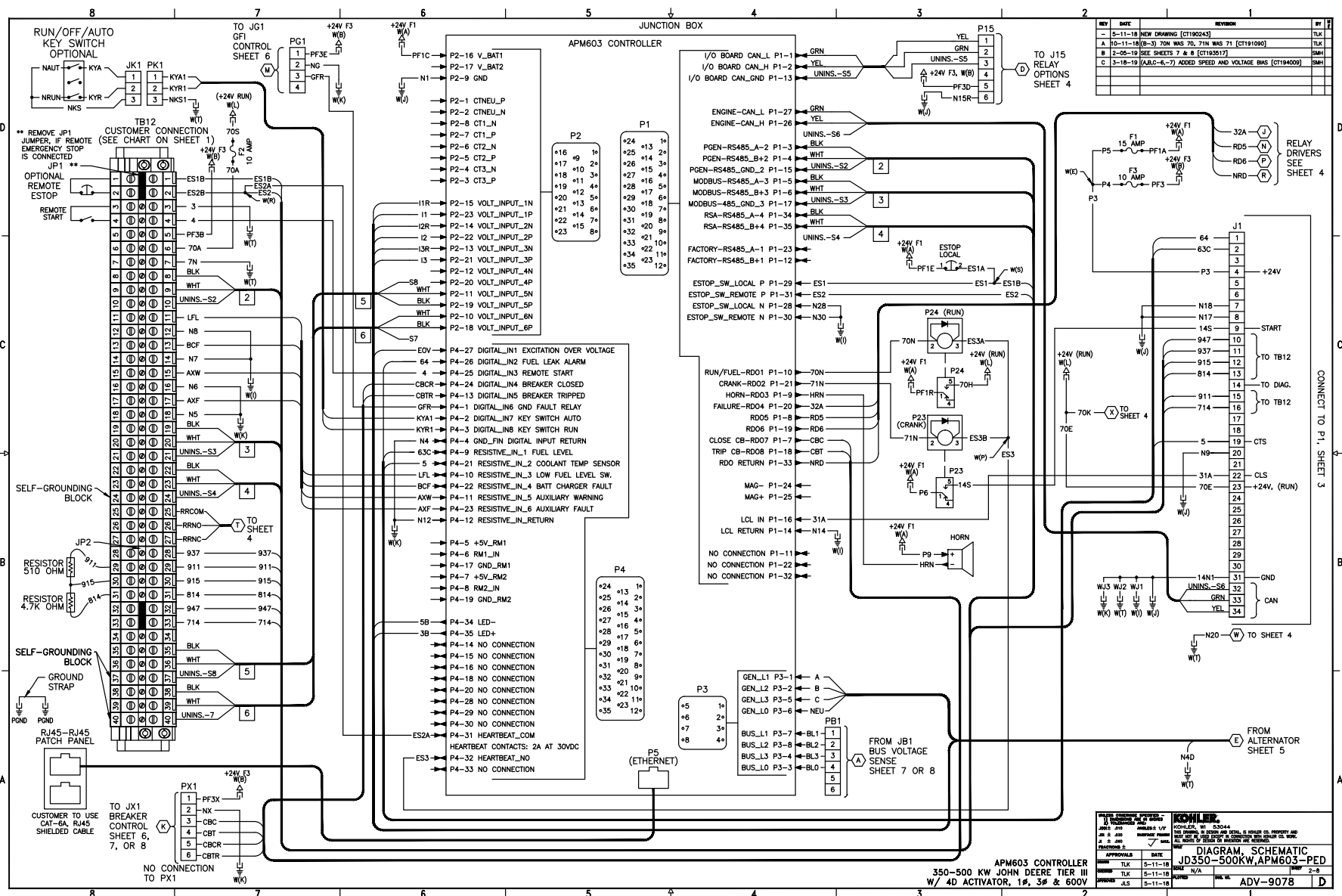
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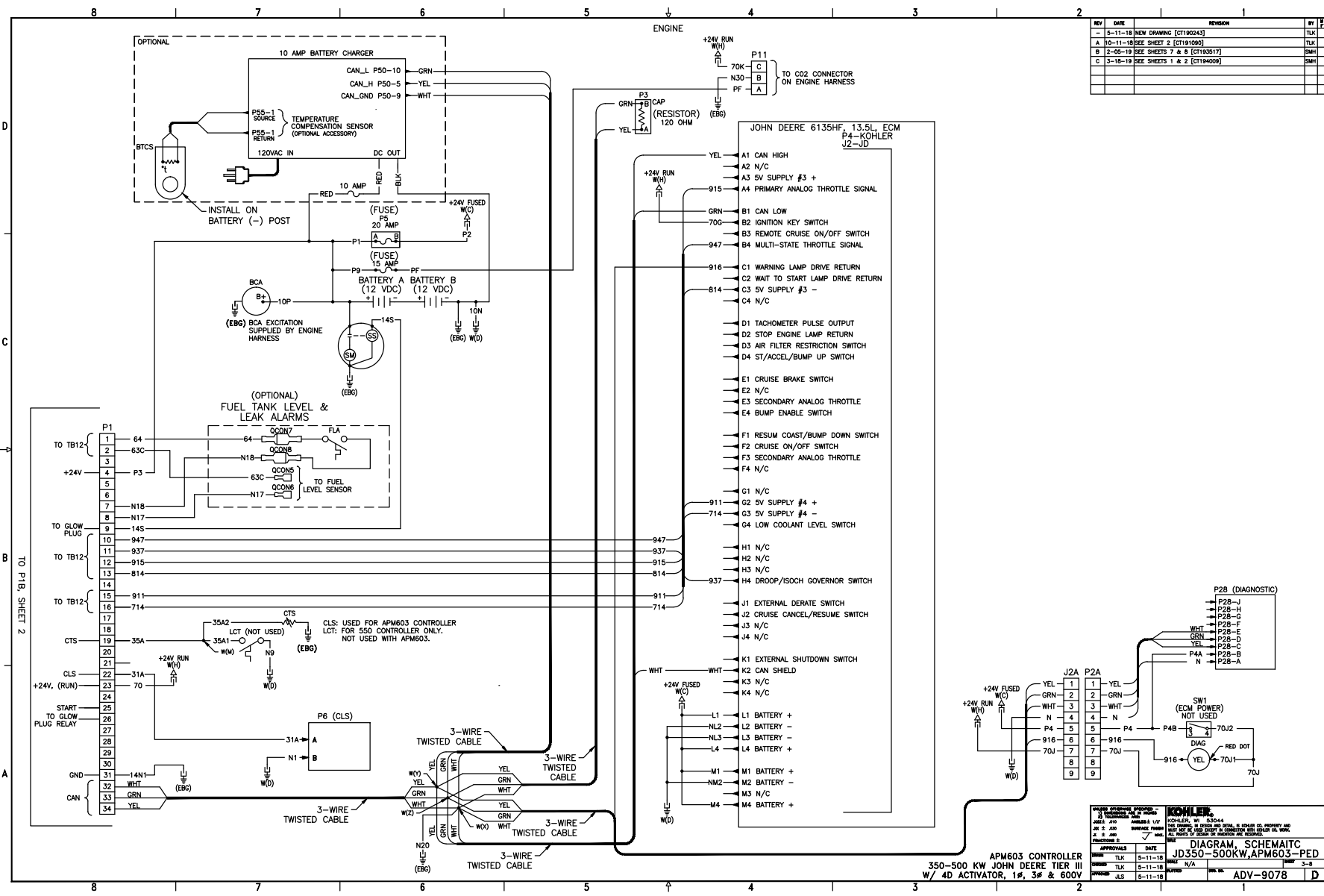
REV	DATE	REVISION	BY	CHK
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4	3-18-19	(A-1,2) UPDATED TB12 CHART FOR VOLTAGE AND SPEED BMS; SEE SHEET 2 [C1194009]	SMH	



REV	DATE	REVISION	BY
1	5-11-18	NEW DRAWING [CT190343]	TLK
2	10-11-18	(B-3) 70N WAS 70, 71N WAS 71 [CT191090]	TLK
3	2-05-19	SEE SHEETS 7 & 8 [CT193517]	SMH
4	3-18-19	(A,B,C-6-7) ADDED SPEED AND VOLTAGE BMS [CT194009]	SMH

APPROVALS		DATE	
APPROVED BY	DATE	APPROVED BY	DATE
TLK	5-11-18	TLK	5-11-18
TLK	5-11-18	TLK	5-11-18
TLK	5-11-18	TLK	5-11-18

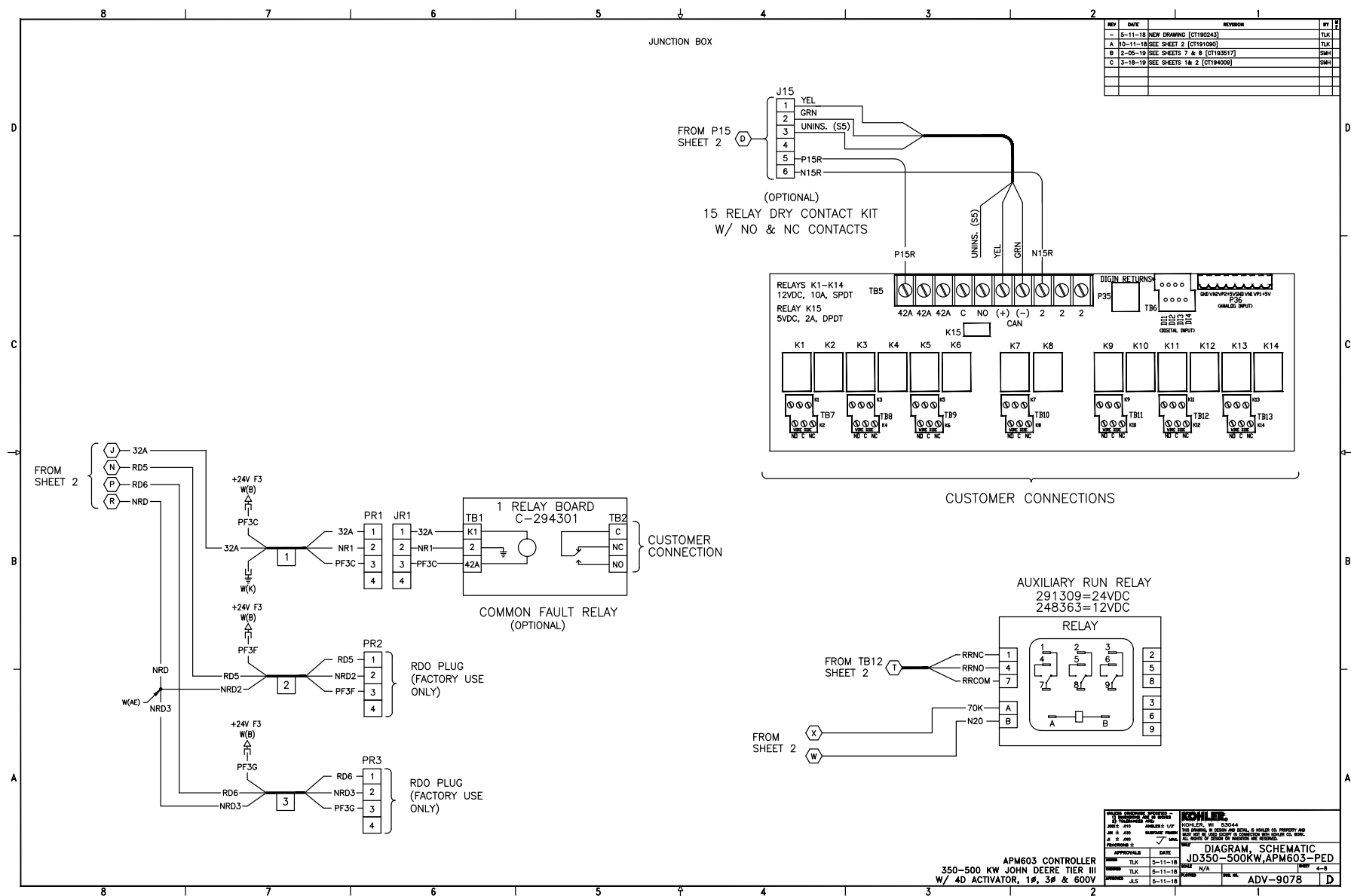
DIAGRAM, SCHEMATIC
JD350-500KW, APM603-PED
ADV-9078

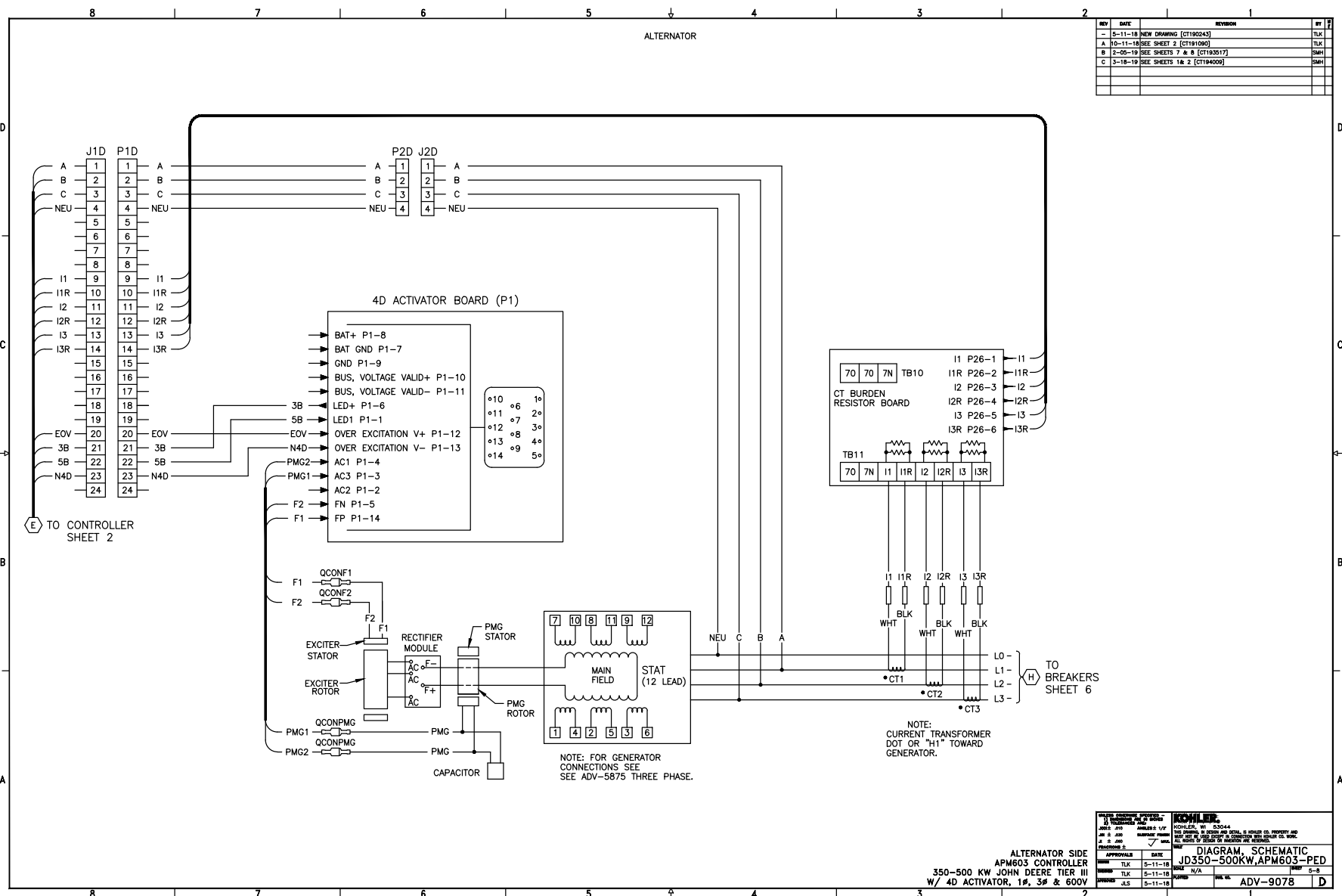


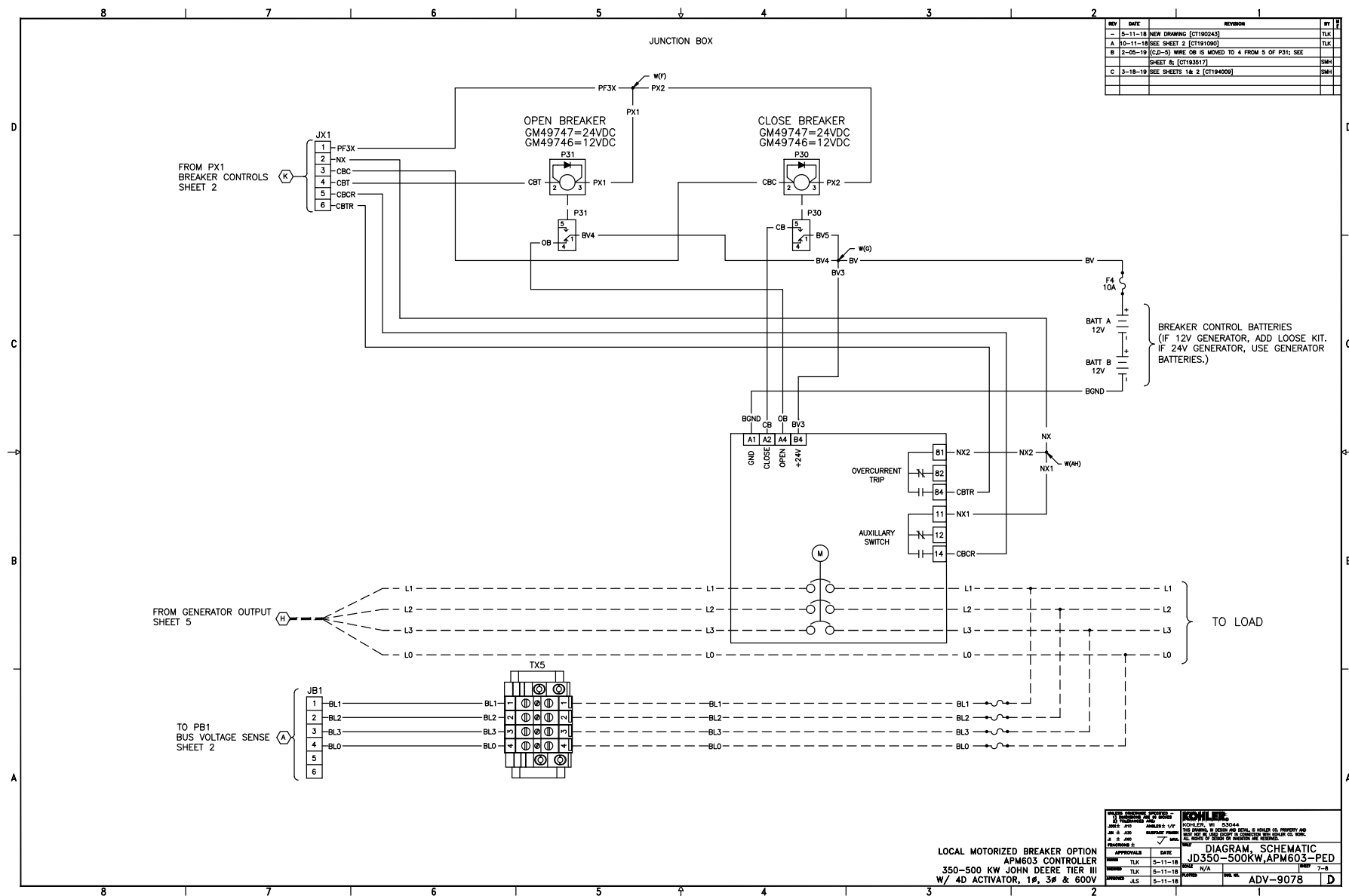
REV	DATE	REVISION	BY	APP
-	5-11-18	NEW DRAWING [CT190243]	TLK	
A	10-11-18	SEE SHEET 2 [CT191090]	TLK	
B	2-05-19	SEE SHEETS 7 & 8 [CT192517]	SMH	
C	3-18-19	SEE SHEETS 1 & 2 [CT194009]	SMH	

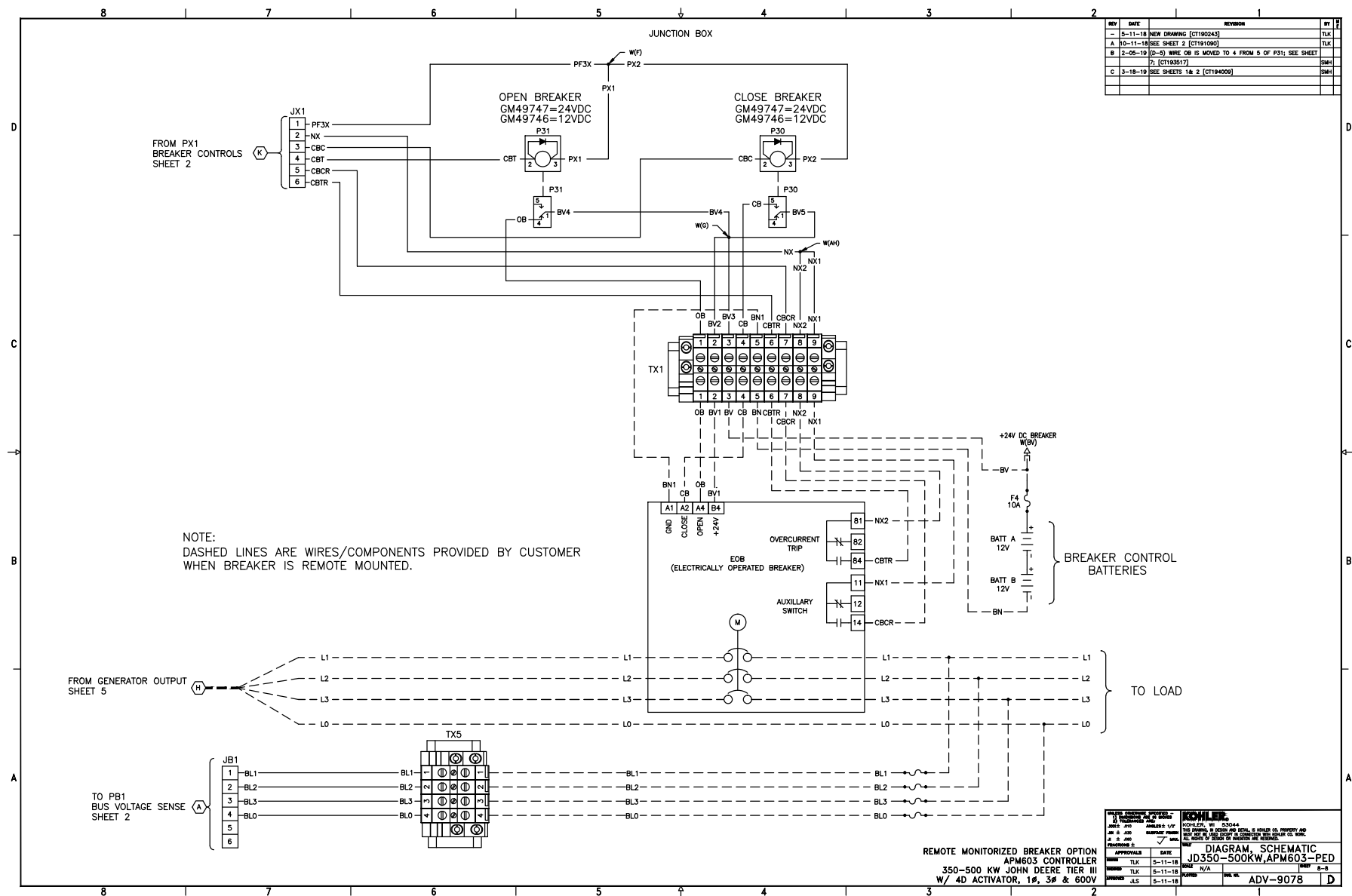
APPROVALS		DATE		REVISION		BY		APP	
DESIGNED	TLK	5-11-18	ONLY	N/A		REV	3-8		
APPROVED	JLS	5-11-18							

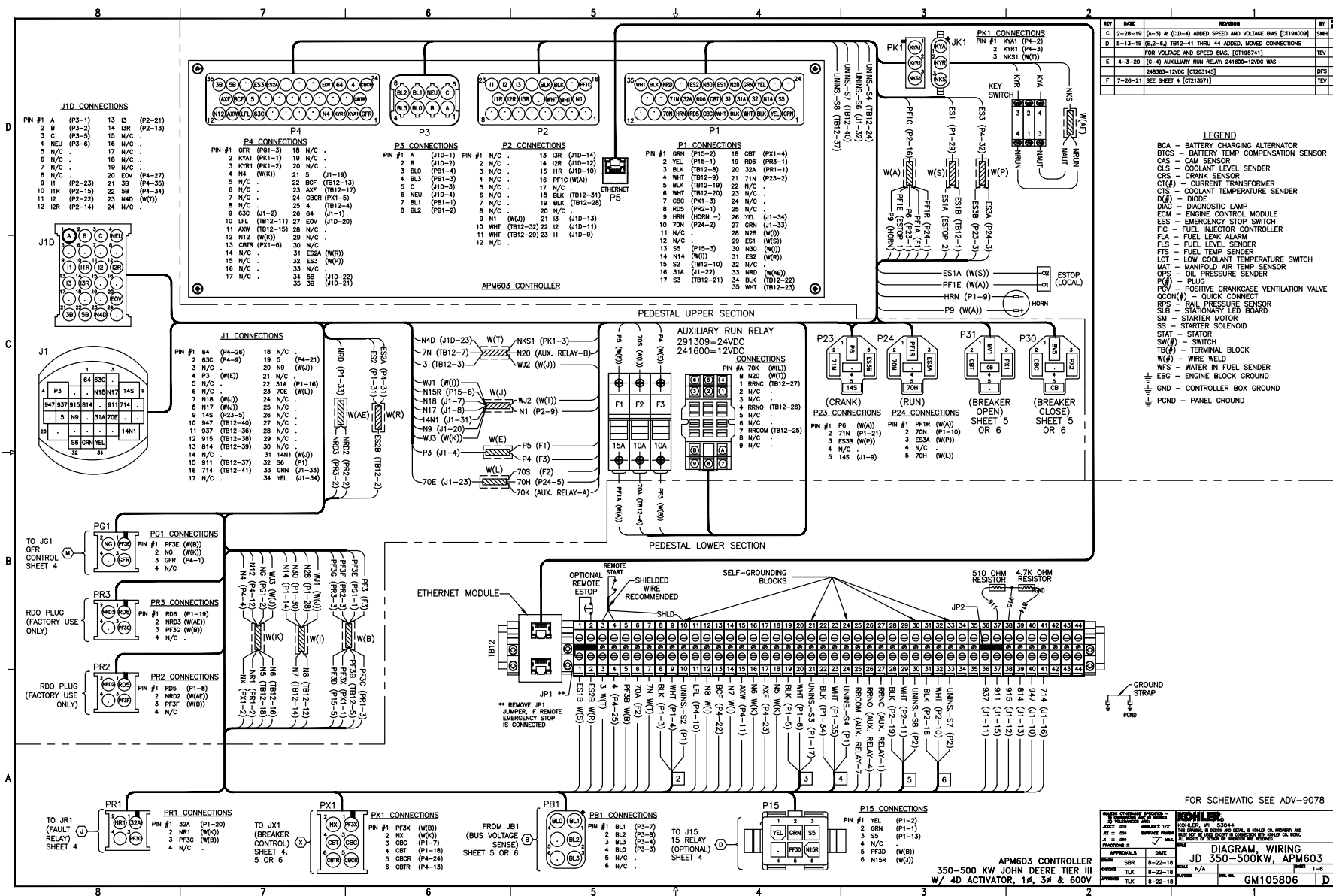
DIAGRAM, SCHEMATIC
JD350-500KW, APM603-PED
ADV-9078

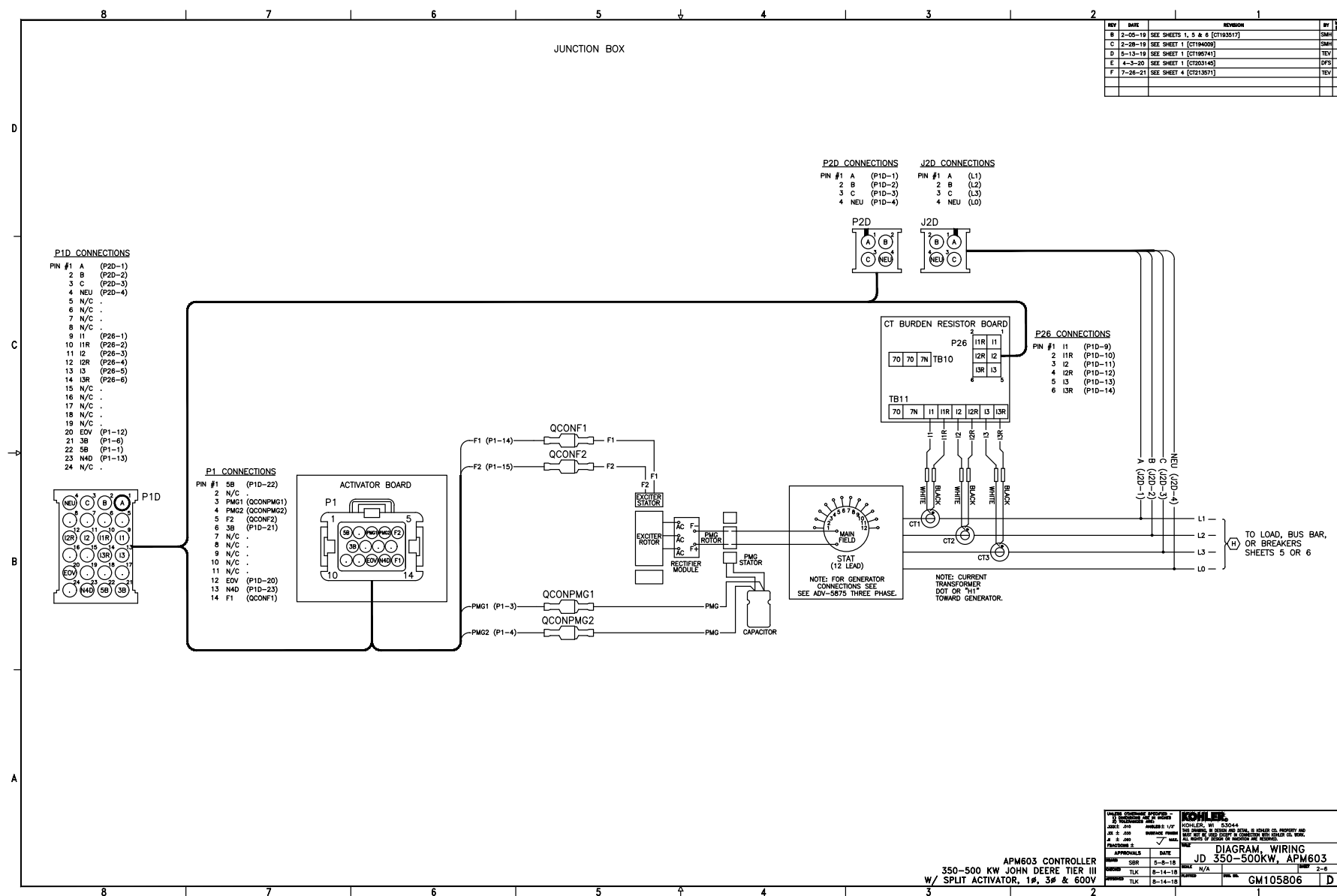


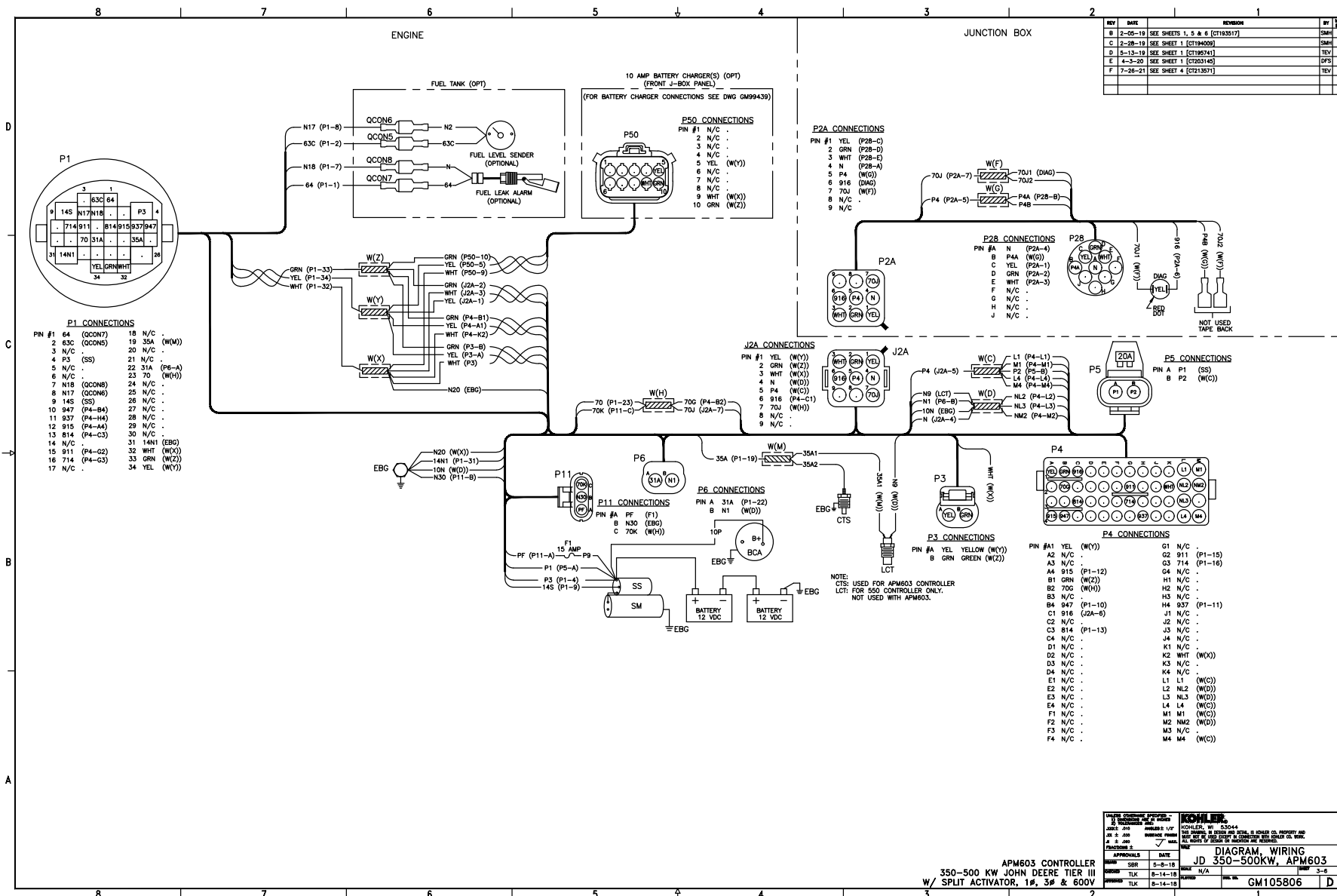


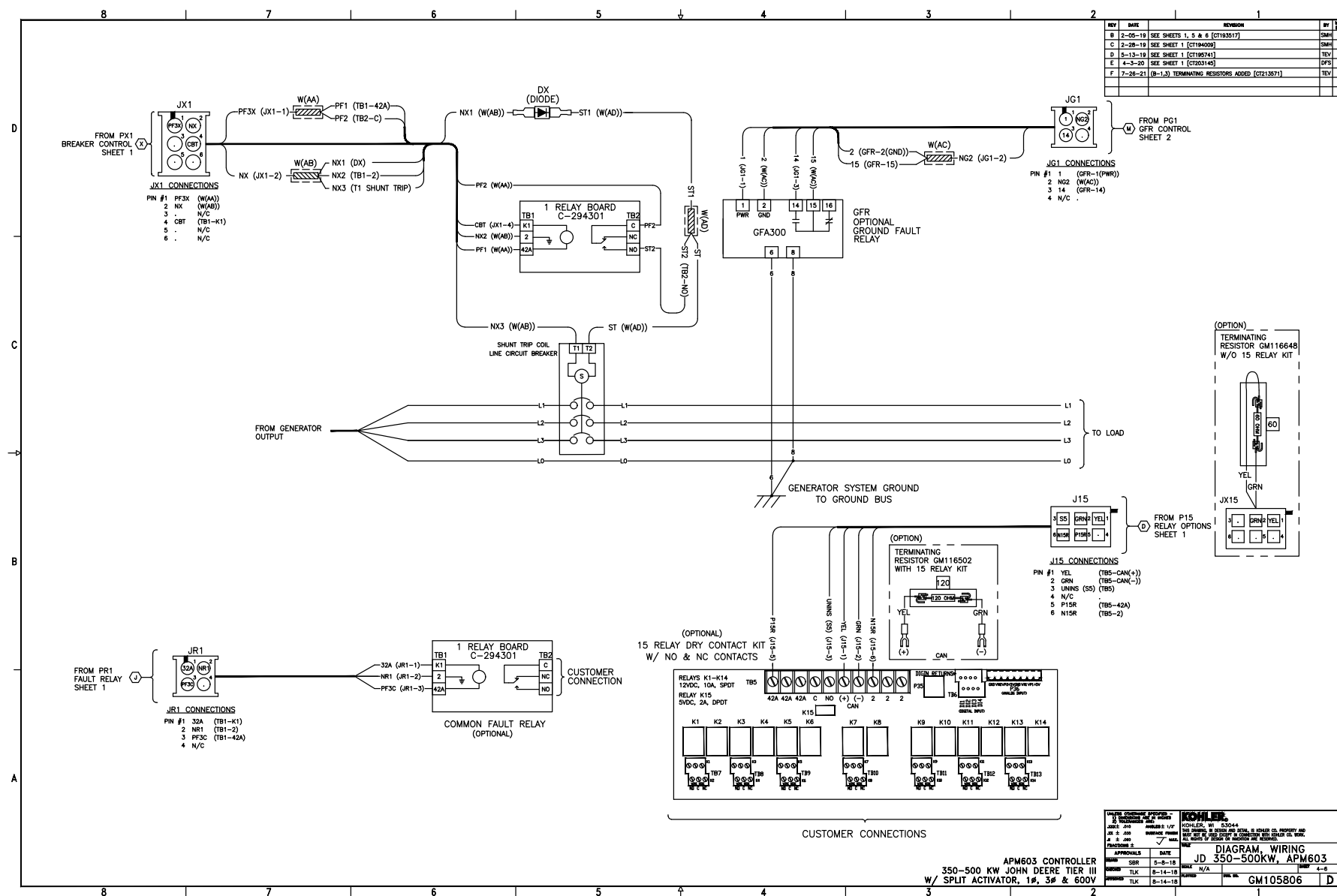


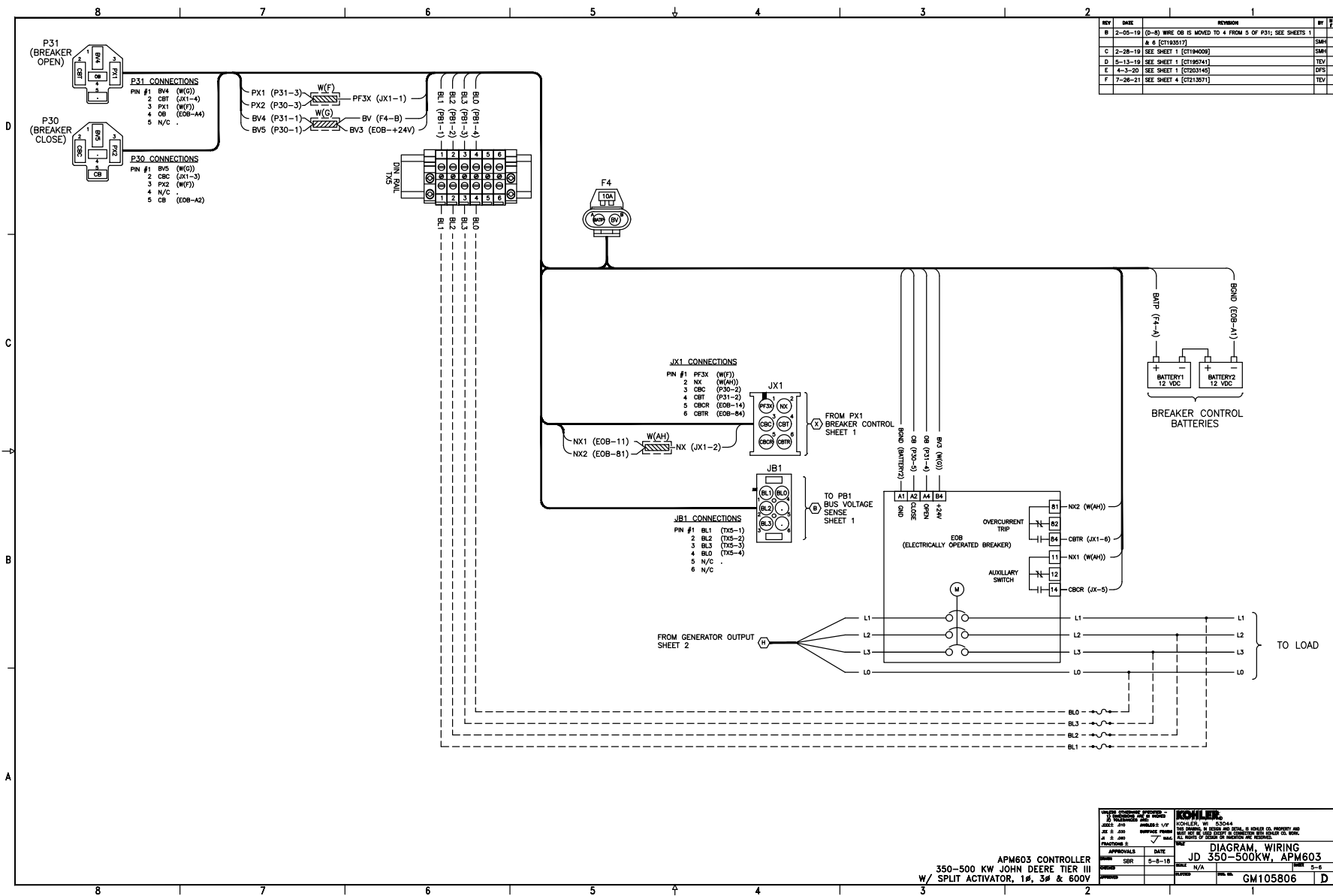








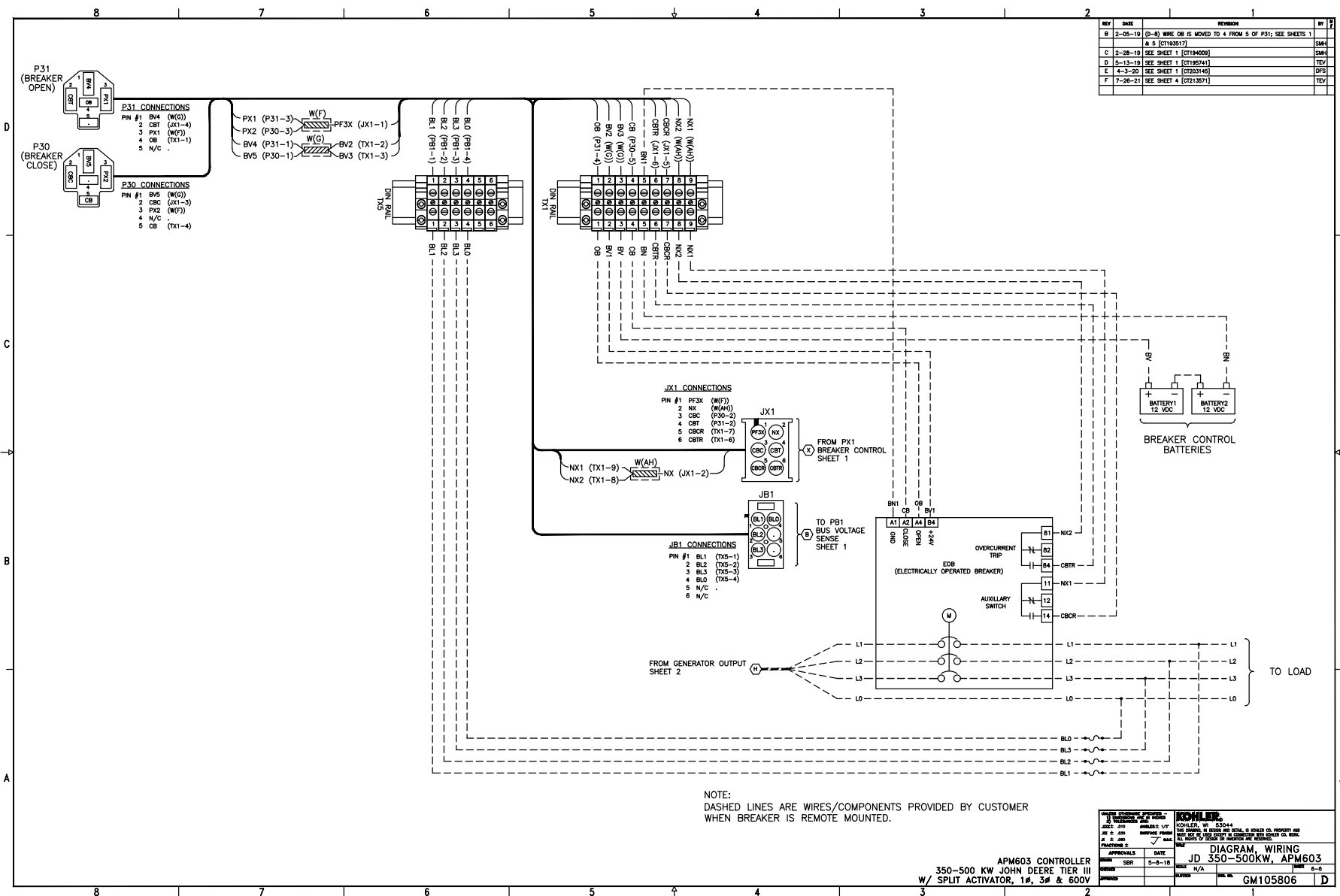




REV	DATE	REVISION	BY
B	2-05-19	(D-5) WIRE OB IS MOVED TO 4 FROM 5 OF P31; SEE SHEETS 1 & 4 [C1193517]	SMR
C	2-28-19	SEE SHEET 1 [C1194009]	SMR
D	5-13-19	SEE SHEET 1 [C1198741]	TEN
E	4-3-20	SEE SHEET 1 [C1203140]	OPS
F	7-26-21	SEE SHEET 4 [C1213071]	TEN

APM603 CONTROLLER 350-500 KW JOHN DEERE TIER III W/ SPLIT ACTIVATOR, 1#, 3# & 600V		COMET COHLETS, WI 53044 DATE: 5-8-18 DATE: N/A DATE: N/A		DIAGRAM, WIRING JD 350-500KW, APM603 GM105806	
--	--	---	--	---	--

REV	DATE	REVISION	BY
B	2-05-19	(D-5) WIRE OR IS MOVED TO 4 FROM 5 OF P31; SEE SHEETS 1 & 5 [C1193517]	SMR
C	2-28-19	SEE SHEET 1 [C1194009]	SMR
D	5-13-19	SEE SHEET 1 [C1195741]	TEV
E	4-3-20	SEE SHEET 1 [C1203140]	OPS
F	7-26-21	SEE SHEET 4 [C1213571]	TEV

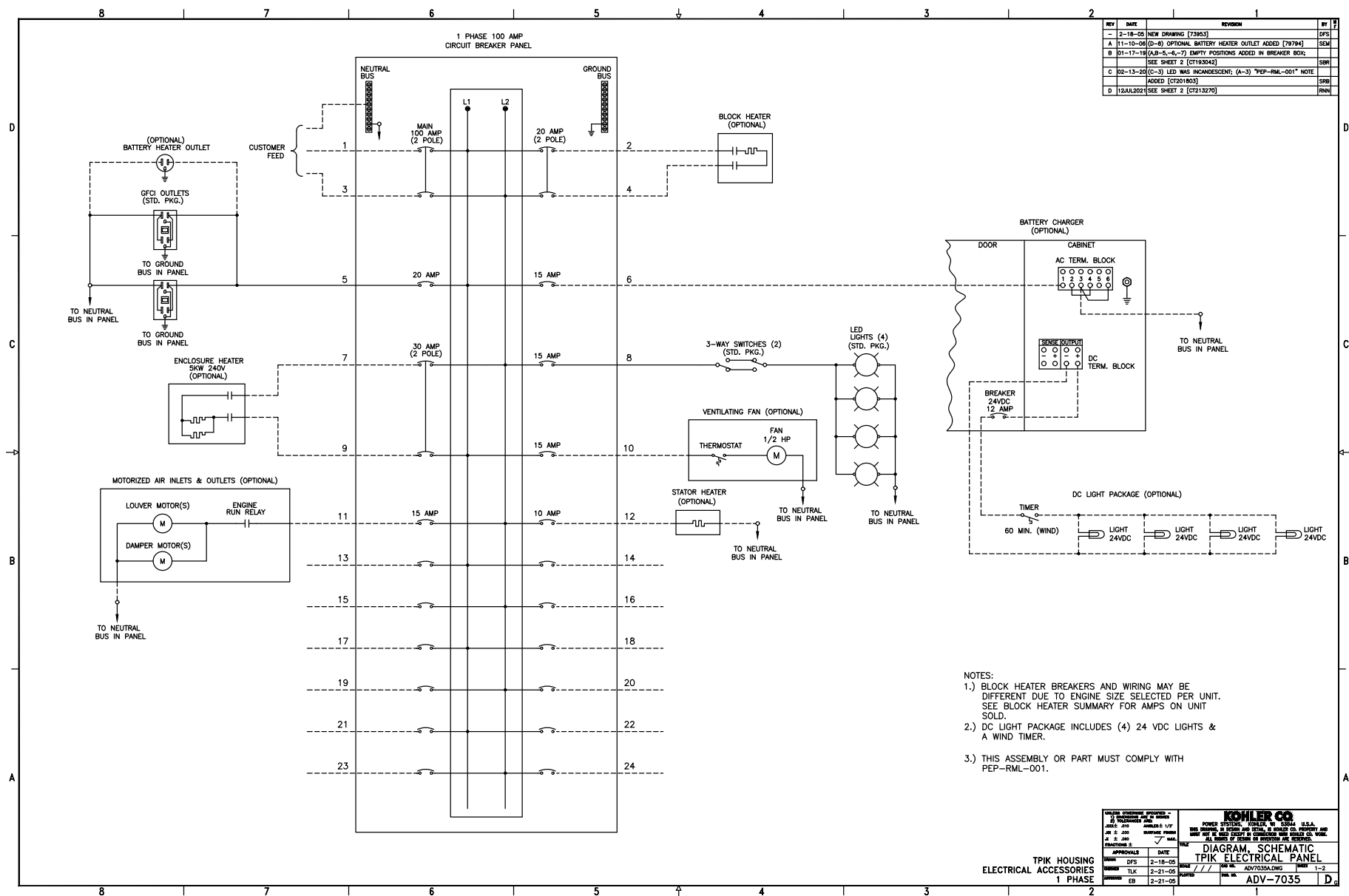


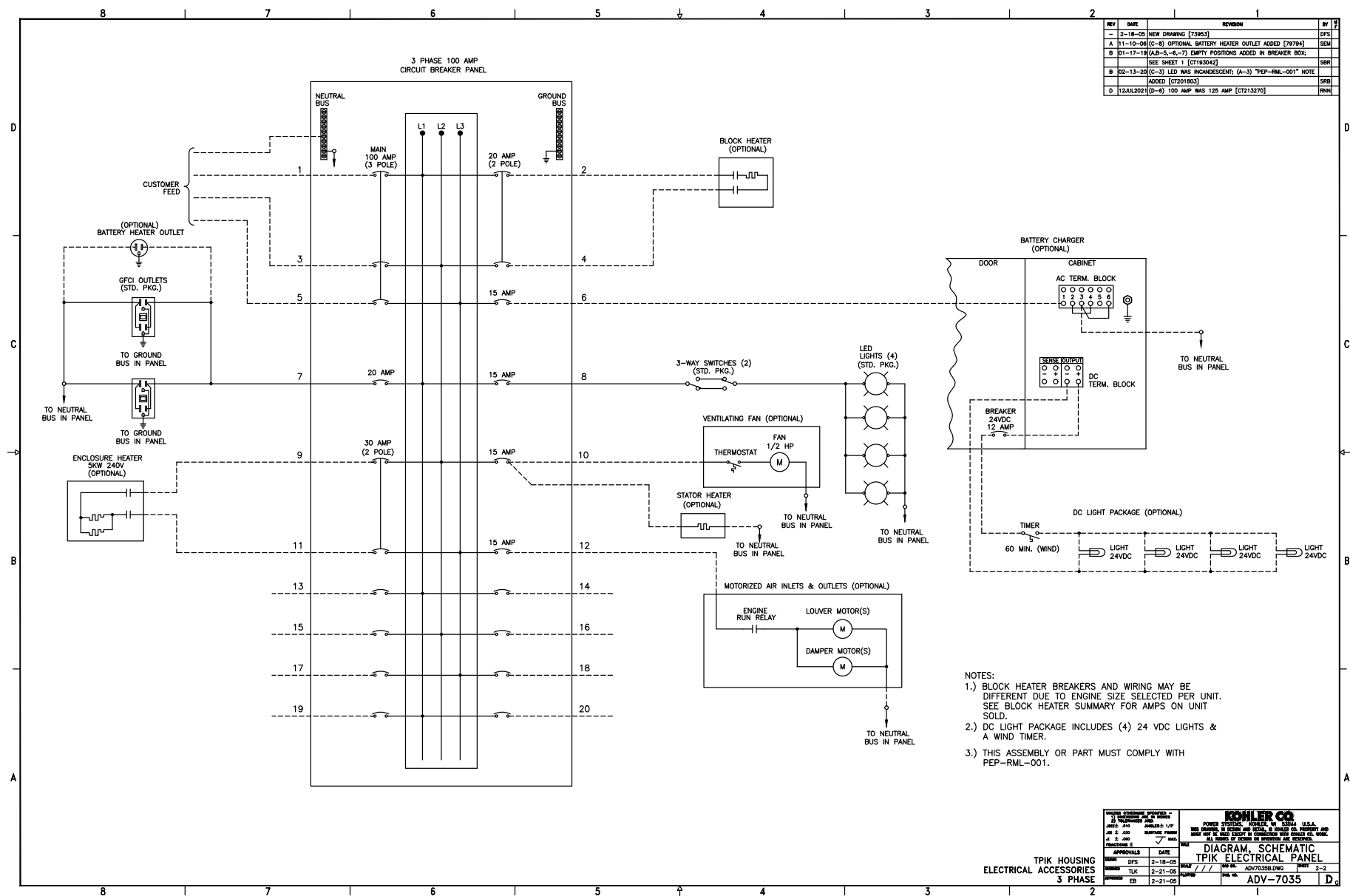
APM603 CONTROLLER
 350-500 KW JOHN DEERE TIER III
 W/ SPLIT ACTIVATOR, 1#, 3# & 600V

APPROVALS		DATE	BY
DESIGN	DATE	5-8-18	SMR
DATE	DATE	5-8-18	SMR
DATE	DATE	5-8-18	SMR

COHLER, INC.
 COHLER, WI 53044
 10000 W. WISCONSIN AVE.
 WISCONSIN, WI 53044
 262.441.1111
 WWW.COHLER.COM

DIAGRAM, WIRING
JD 350-500KW, APM603
 GM105806







Miscellaneous

87654321

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

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

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

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

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

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

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

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

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

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

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

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

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

CERTIFICATIONS (US AND CANADA):
UL1236
CSA - C22.2 NO 107.2-01
FCC- TITLE 47, PART 15 CLASS A
CE
EN 61000-6-2
CEC AND DOE
NFPA-110 LEVEL 1 (WHEN SUPPORTED WITH APPLICABLE KOHLER CONTROLLER)
IBC

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

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

WARRANTY:
2 YEAR FROM DATE OF PURCHASE FROM MANUFACTURE.

14.1253.4225.2

27.9

152.3

96.5

4X Ø6.6

MATES WITH GM99421

MATES WITH GM94422

INPUT LEADS (SEE SPECIFICATIONS)

OUTPUT LEADS (SEE SPECIFICATIONS)

RED

BLK

FUSE (SEE SPECIFICATIONS)

73.7

COM

TC

COM

TC

COM PIN

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

TC PIN

1 TC SENSOR W1
2 TC SENSOR W2

REV	DATE	ON COMPOSITE DWGS. SEE PART NO. FOR REVISION LEVEL	BY	UNLESS OTHERWISE SPECIFIED: 1) DIMENSIONS ARE IN MILLIMETERS 2) TOLERANCES ARE: X.XX ± 0.25 X.X ± 1.5 ANGLES ± 0° 30' MAX.
-	9-22-14	NEW DRAWING [CT91634]	SAM	
A	5-9-17	(C-4,2) MATING NOTE ADDED (A-2, 4) PIN CONNECTIONS ADDED [CT174256]	SAM	

APPROVALS	DATE
DESIGN	9-22-14
CHECKED	9-22-14
APPROVED	9-22-14

POWER SYSTEMS	KOHLER	METRIC	PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A. THIS DRAWING IN DESIGN AND DETAIL IS KOHLER CO. PROPERTY AND MUST NOT BE USED EXCEPT IN CONNECTION WITH KOHLER CO. WORK. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED.			
TITLE CHARGER, BATTERY 10 AMP			
SCALE	0.50	CAD NO.	SHEET 1 of 1
DWG NO.	GM87448		D



Warranty

Stationary Standby and Prime Power Industrial Generator Set One-Year or Two Thousand (2000)-Hour Limited Warranty

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

Kohler Product

Stationary Standby Generator Set & Accessories

Warranty Coverage

One (1) year from registered startup or two thousand (2000) hours (whichever occurs first). In any event, the warranty period will expire not later than thirty (30) months from the date of shipment from Kohler Co.'s factory.

Stationary Prime Power Generator Set & Accessories

One (1) year from registered startup or two thousand (2000) hours (whichever occurs first). In any event, the warranty period will expire not later than thirty (30) months from the date of shipment from Kohler Co.'s factory.

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

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

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

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

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

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

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

KOHLER®

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

TP-5374 12/15f

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

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

Kohler Product

Stationary Standby Generator Set & Accessories

Warranty Coverage

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

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

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

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

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

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

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

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

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

KOHLER®

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

TP-5561 9/23g



Certification

Certificate of Registration

QUALITY MANAGEMENT SYSTEM - ISO 9001:2015

This is to certify that:

Kohler Power Systems
N7650 Lakeshore Road
Sheboygan
Wisconsin
53083
USA


Holds Certificate No:

FM 727336

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

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

For and on behalf of BSI:


Carlos Pitanga, Chief Operating Officer Assurance – Americas

Original Registration Date: 1995-02-28

Latest Revision Date: 2021-10-29

Effective Date: 2021-11-07

Expiry Date: 2024-11-06

Page: 1 of 2



...making excellence a habit.™

Certificate No: **FM 727336**

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

Original Registration Date: 1995-02-28

Latest Revision Date: 2021-10-29

Effective Date: 2021-11-07

Expiry Date: 2024-11-06

Page: 2 of 2

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

An electronic certificate can be authenticated [online](https://www.bsigroup.com/ClientDirectory). Printed copies can be validated at www.bsigroup.com/ClientDirectory. To be read in conjunction with the scope above or the attached appendix.

Information and Contact: BSI, Kitemark Court, Davy Avenue, Knowlhill, Milton Keynes MK5 8PR. Tel: + 44 345 080 9000
BSI Assurance UK Limited, registered in England under number 7805321 at 389 Chiswick High Road, London W4 4AL, UK.
A Member of the BSI Group of Companies.

G15-152 10/21

Technical Evaluation Report

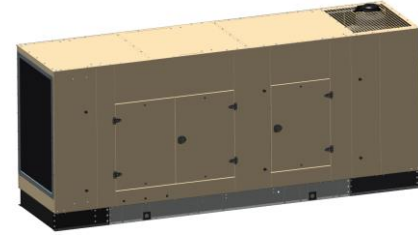
DIVISION: 48 10 00-ELECTRICAL POWER GENERATION EQUIPMENT

THIS DOCUMENT CONTAINS (7) PAGES. THE FIRST PAGE MUST BEAR AN ORIGINAL SIGNATURE & SEAL OF THE CERTIFYING PE TO BE VALID FOR USE. COPIES NOT VALID FOR PERMIT.

(Subject to Renew March 1, 2022 or next code cycle)

EVALUATION SUBJECT: 350-500REOZJC/D Sound Level 2 Aluminum Enclosure

TER-20-25965.1

REPORT HOLDER:KOHLER POWER SYSTEMS
7650 LAKESHORE ROAD
SHEBOYGAN, WI 53083 USA
(920) 457-4441 | KOHLERPOWER.COM**KOHLER®**Florida Building Code Sixth & Seventh Editions (2017 & 2020)
International Building Code (2012, 2015 & 2018)**SCOPE OF EVALUATION (compliance with the following codes):****THIS IS A STRUCTURAL (WIND) PERFORMANCE EVALUATION ONLY. NO ELECTRICAL OR TEMPERATURE PERFORMANCE RATINGS OR CERTIFICATIONS ARE OFFERED OR IMPLIED HEREIN.**

This Product Evaluation Report is being issued in accordance with the requirements of the **International Building Code (2012, 2015, & 2018)** and the **Florida Building Code Sixth & Seventh Editions (2017 & 2020)** per ASCE 7, FBC Building Ch. 16, FBC Building Sections 104.11 and 453.25.5, FBC Existing Building Sections 707.1 and 707.2, FBC Residential M1202.1 and M1301.1, FMC 301.15, and FS 471.025. The product noted on this report has been tested and/or evaluated as summarized herein.

IN ACCORDANCE WITH THESE CODES EACH OF THESE REPORTS MUST BEAR THE ORIGINAL SIGNATURE & RAISED SEAL OF THE EVALUATING ENGINEER.**SUBSTANTIATING DATA:****• Product Evaluation Documents**

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

• Structural Engineering Calculations

Structural engineering calculations have been prepared which evaluate the product based on rational analysis to qualify the following design criteria:

- Maximum rated wind pressures via Components & Cladding methodology.
- Structural component connection integrity, verified by a unity check between tension and shear.
- Anchorage integrity for unit and tank mounts.

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

INSTALLATION:

The product(s) listed above shall be installed in strict compliance with this TER & manufacturer-provided enclosure model specifications.

The product components shall be of the material specified in the manufacturer-provided product specifications. All screws, bolts and rivet must be installed in accordance with the applicable provisions & anchor manufacturer's published installation instructions.

LIMITATIONS & CONDITIONS OF USE:

Use of this product shall be in strict accordance with this TER as noted herein. Adjustment factors noted herein and the applicable codes must be considered, where applicable. Installation shall conform to the minimum standards stated in the referenced building code(s) in addition to tie-down details and limitations stated herein.

See final page for complete limitations & conditions of use.

UNIT CASING MATERIAL:

1/8" Al 5052-H32 top and side panels and 1/4" steel ASTM A36 for bottom skids, secured with 3/16" Ø SS GR. 50, M6 low carbon steel drill screws, M6 class 4.8 machine screws, 5/16" A2-70 SS bolts and M12 bolts class 8.8. (see enclosure, component drawings per manufacturer for specific locations).

TERMINOLOGY:

See list of abbreviations on the final page of this report.

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

This evaluation is valid for KOHLER 350-500REOZJC/D Sound Level 2 Aluminum Enclosures described herein.

This evaluation includes standard product only. Contact the manufacturer for Engineering Special (ES) orders. Any structural changes outside of the design as described herein would void this certification.

STRUCTURAL PERFORMANCE:

Models referenced herein are subject to the following design limitations:

Maximum Rated Wind Pressure*:**+/- 65 psf**

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

VISIT [ECALC.IO/259651](https://ecalculator.io/259651)

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**ORIGINAL SIGNATURE AND RAISED SEAL
OR DIGITAL SEAL REQUIRED TO BE VALID PER CODE:****PE SEAL REQUIRED****August 21, 2020**

Frank Bennardo, P.E., SECB

☐ If Checked, Certifying

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PRINTED DOCUMENT NOTICE: IF THIS DOCUMENT IS PRINTED & **DOES NOT CONTAIN AN ENGINEER'S ORIGINAL SIGNATURE & SEAL, THIS DOCUMENT IS VOID & NOT VALID FOR USE. PHOTOCOPIES ARE NOT PERMITTED FOR USE.**

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SECTION 1 SUMMARY

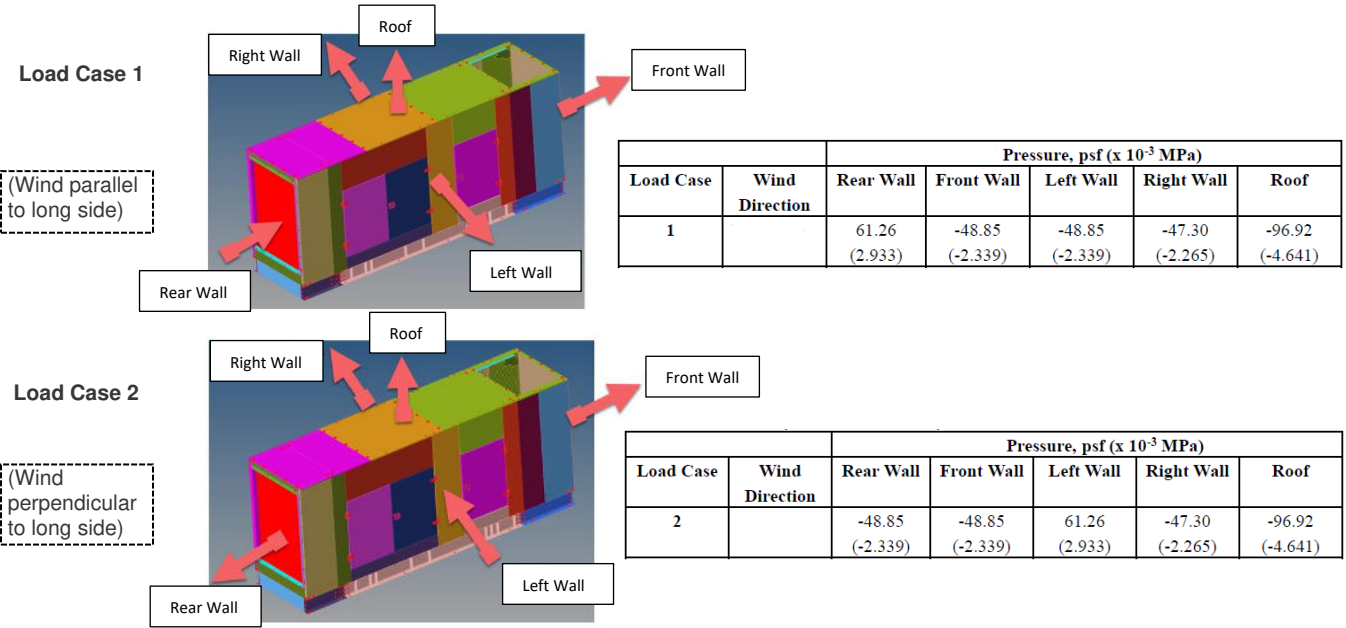
Engineering Express has reviewed the design requirements per the Florida Building Code Sixth & Seventh Editions (2017 & 2020) and ASCE 7 for the structural integrity of the Kohler aluminum housing units with steel skid to withstand the maximum rated wind pressures stated herein. This TER certifies the enclosures listed herein for maximum uniform static wind loading pressures stated herein and anchorage integrity only. Our analysis includes the unit framing and housing only and requires a permanent near-grade (non-rooftop) attachment to a concrete, metal, or wood host structure as certified/verified by others. Steel skid tie-down anchor locations shall conform to Section 3 of this TER. Additionally, the unit shall not be installed in a location susceptible to channeling effects from upwind obstacles. It shall be the installer's responsibility to ensure that the criteria for the unit housing integrity, as listed above, is applicable for use at the location of installation and the mounting method meets or exceeds the requirements of the local code and it is approved by the appropriate local authority before installation.

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

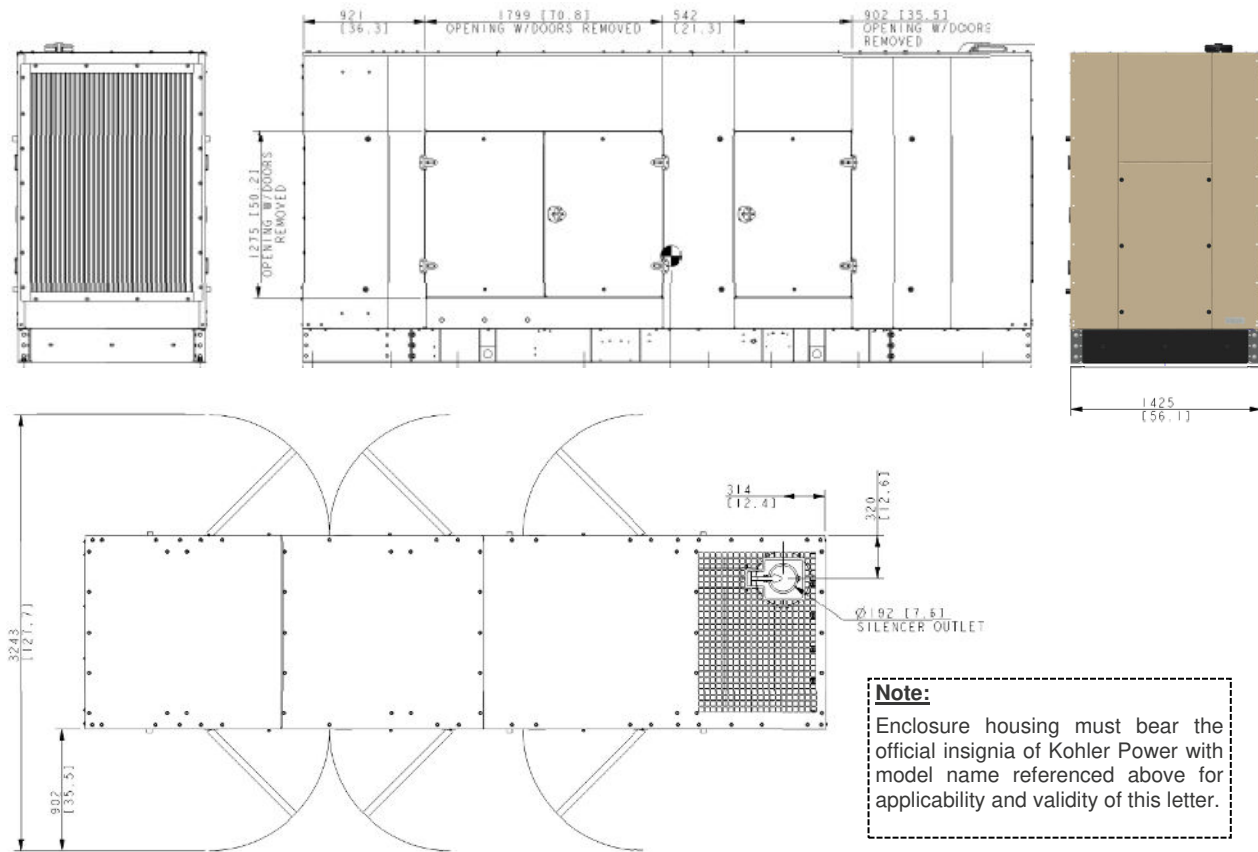
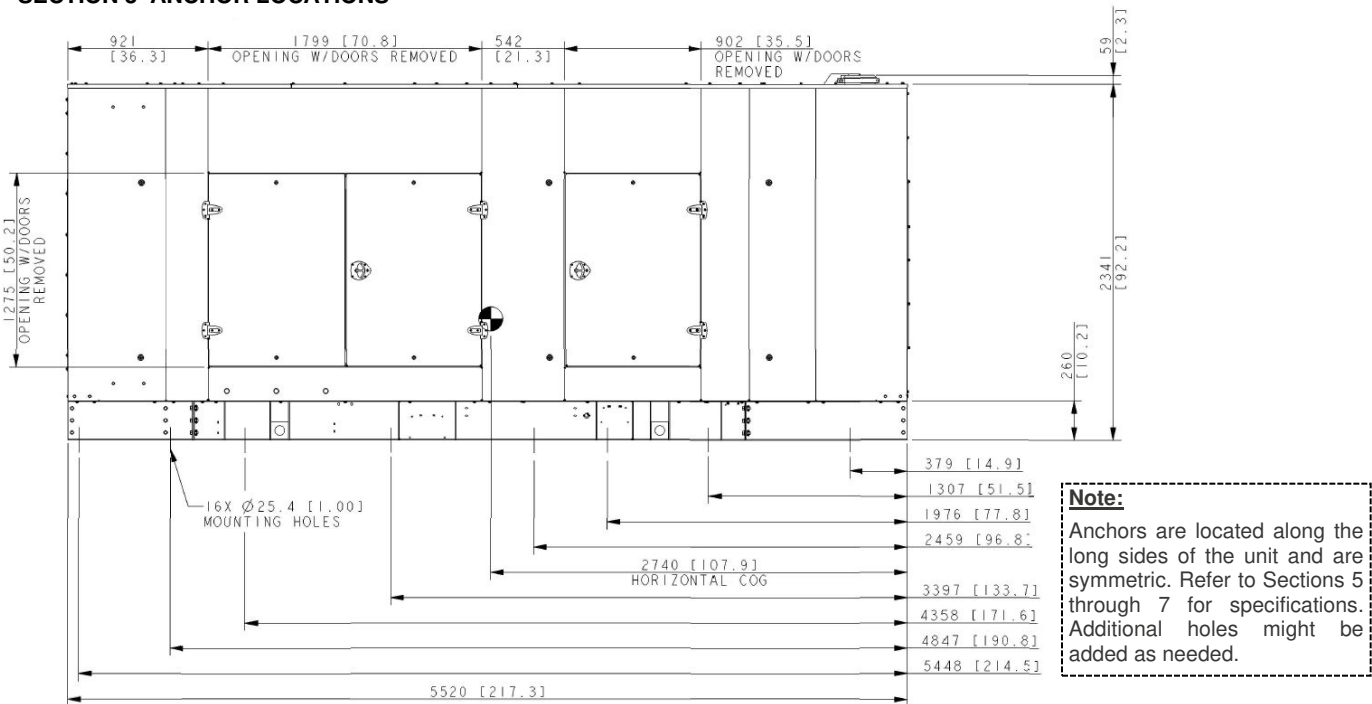
Structural Engineering Calculations

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

- 1. Maximum ultimate design pressures as evaluated below:



- 2. Supplemental FEA has been performed to evaluate the front and left walls of the enclosure to +/- 65 psf. Upon thorough review of the results, it is the opinion of this engineer that the results, coupled with the FEA above, satisfactorily indicate the enclosure and skid stresses remain below ultimate tensile stress and thus, provide adequate resistance to the maximum wind pressures stated herein.
- 3. Maximum housing unit dimensions: 218" L x 57" W x 93" H. For exact enclosure dimensions, see ADV-9189. Enclosure weight shall be between 1000 lb and 2000 lb. Weights outside of this range shall be approved by this office.
- 4. Enclosure materials have been analyzed for yield and ultimate tensile stresses using Von Mises stress criteria in accordance with the 2015 Aluminum Design Manual & AISC Steel Construction Manual 14th Edition. For both load cases, Von Mises stresses were below the ultimate tensile stresses of the respective materials; therefore, the sound aluminum enclosure will provide enough structural capacity to resist wind pressures shown.
- 5. All internal connection capacities, including bolted and welded components, have been checked for applicable tension and shear by applying a unity interaction equation where applicable and have been approved by this office.

SECTION 2 DIMENSIONS & ELEVATIONS**SECTION 3 ANCHOR LOCATIONS**

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

SECTION 4 ENCLOSURE MODELS INCLUDED

GENERATOR	ENCLOSURE TYPE	ENCLOSURE DRAWING NUMBER	REVISION & DATE	RETROFIT DRAWING NUMBER	REVISION & DATE
350-500REOZJC 350-400REOZJD	350-500REOZJC/D Sound Level 2 Aluminum Enclosure	GM110077	Rev A - 1/17/20	GM109392	Rev - 2/4/20

SECTION 5 ANCHOR DIRECTIVE

GENSET MODELS	FUEL TANK		A - ANCHOR			B - EMBEDMENT (in.)	C - MIN. EDGE DISTANCE (in.)	D - MIN. CONCRETE THICKNESS (in.)	# OF ANCHORS FOR TANK TO CONCRETE*	# OF THRU-BOLTS FOR SKID TO TANK
	LITERS	GAL	ANCHOR BRAND	MODEL	DIAMETER (IN.)					
350REOZJC/D 400REOZJC/D 500REOZJC	NO TANK		HILTI	KWIK BOLT 3 (CARBON STEEL) ESR-2302	0.75	4.75	6	8	16**	-
	1529-5047	404-1333							18	16***
	5042-9993	1332-2640							18	12****
	11602-13325	3065-3520							24	12****

ANCHOR DIRECTIVE NOTES

- Refer to ADV-9189 and Section 7 for additional specifications. NOTE: Only anchorage integrity is being certified for I-beams and tanks.

*For tank anchorage to concrete, it is allowed for ground I-beams to be used as an intermediary between tank and concrete as opposed to mounting the tank directly to concrete. See Ground I-Beam Directive below for the required minimum number of I-beams for this condition. I-beams shall have a min. spacing of 18", typ. (Note: I-beams and tank flanges shall be 3/16" min. thick and Fy = 36 ksi min. steel.

GROUND I-BEAM DIRECTIVE			
FUEL TANK		I-BEAMS REQUIRED	
LITERS	GAL	ALONG LENGTH OF ENCLOSURE	ALONG REMAINING TANK LENGTH
1529-5047	404-1333	7	1 FOR EVERY 48" IN TANK LENGTH BEYOND ENCLOSURE LENGTH
5042-9993	1332-2640	6	
11602-13325	3065-3520	5	

- For each I-beam top connection to tank, employ (2) M20 UNC GR. 8.8 steel thru-bolts with 2" min. OD washers top and bottom, (1) thru-bolt per side, typ. Position thru-bolt no more than 6" away from the end of the I-beam, typ. Provide 1.5" min. edge distance between the thru-bolt and any edge of the members in contact (tank flange and I-beam flange).

- For each I-beam bottom connection to concrete, employ (2) 3/4" Ø HILTI KWIK BOLT 3 Carbon Steel Expansion Anchors with 4-3/4" embedment and 18" min. spacing from neighboring anchors, (1) anchor per side, typ. Provide 6" min. edge distance between the anchor and any edge of the concrete, typ. Provide 1.5" min. edge distance between the anchor and any edge of I-beam flange. Position anchor no more than 6" away from the end of the I-beam, typ. Provide 8" min. thick 4 ksi concrete (concrete by others).

**For the case in which no tank is used, the genset skid shall mount directly to the concrete using the starred number of anchors with the specifications stated in the directive. Skid flange shall be 3/16" min. thick and Fy = 36 ksi min. steel.

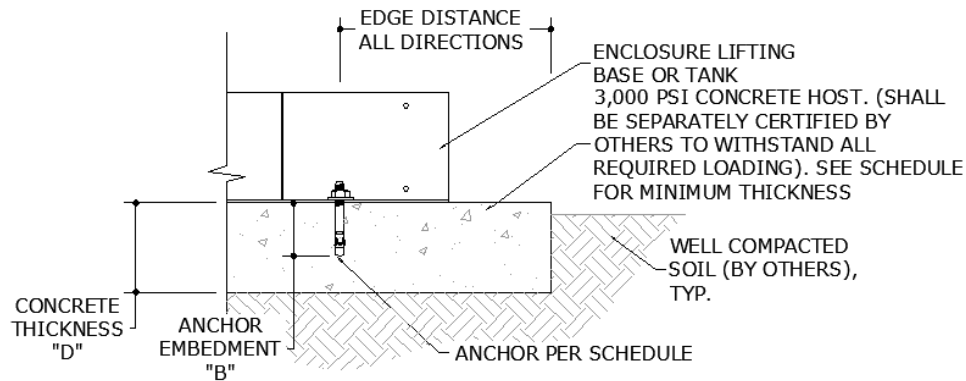
***The unit skid shall mount directly to the tank with the specified number of M20 UNC GR.8.8 thru-bolts with 2" min. OD washers top and bottom, typ. Provide 1.5" min. edge distance from edge of members in contact (skid flange and tank flange). Members in contact shall be 3/16" min. thick Fy = 36 ksi min. steel.

****For skid anchorage to tank, it is allowed for I-beams to be used as an intermediary between skid and tank as opposed to mounting the tank directly to concrete for the associated starred cases only, in which the width of the tank exceeds the width of the unit. A minimum of (6) I-beams with 18" min. spacing shall be implemented for this condition. Skid flange, tank flange, and I-beams shall be 3/16" min. thick Fy = 36 ksi min. steel.

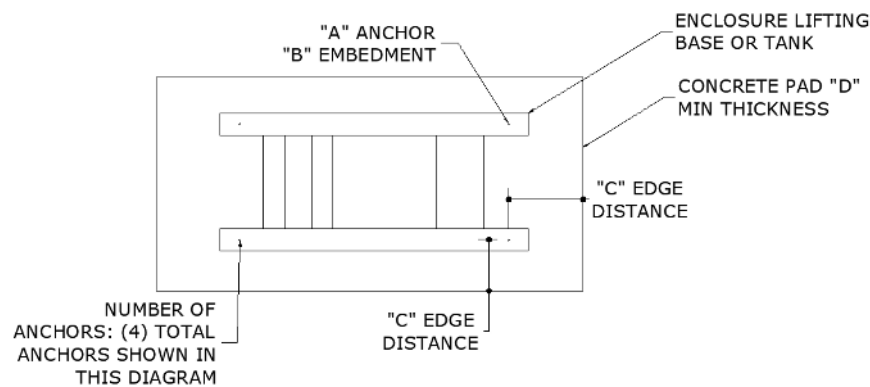
- For each I-beam top connection to skid, employ (2) M20 UNC GR. 8.8 steel thru-bolts with 2" min. OD washers top and bottom, (1) thru-bolt per side, typ. Position thru-bolt no more than 6" away from the end of the I-beam, typ. Provide 1.5" min. edge distance between the thru-bolt and any edge of the members in contact (skid flange and I-beam flange). (12) total thru-bolts min., (6) min. per long side.

- For each I-beam bottom connection to tank, employ (2) M20 UNC GR. 8.8 steel thru-bolts with 2" min. OD washers top and bottom, (1) thru-bolt per side, typ. Position thru-bolt no more than 6" away from the end of the I-beam, typ. Provide 1.5" min. edge distance between the thru-bolt and any edge of the members in contact (I-beam flange and tank flange). (12) total thru-bolts min., (6) min. per long side.

SECTION 6 ANCHOR ILLUSTRATIONS



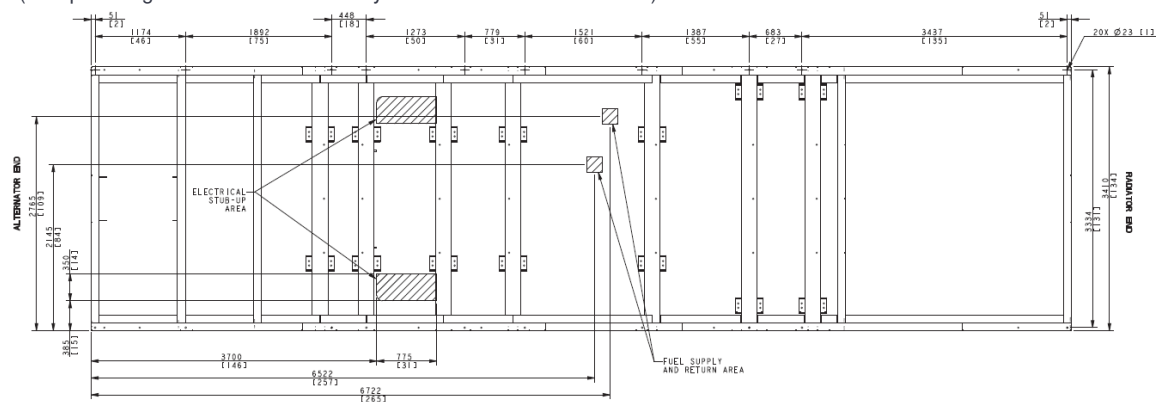
DETAIL A



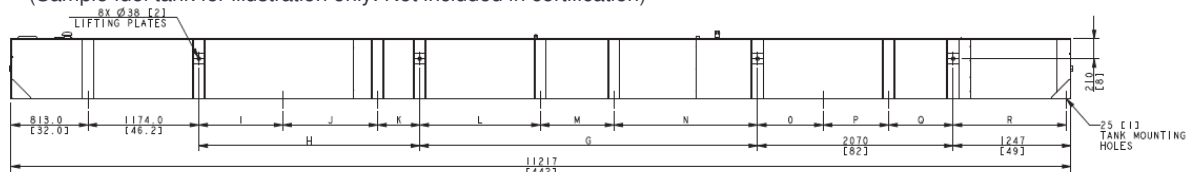
ANCHORAGE PLAN VIEW ILLUSTRATION

Instructions:

1. For enclosures anchored directly to host without fuel tank, go to ADV-9189 and place the specified anchors using the mounting locations. See below example for a sample lifting base's mounting holes:
2. (Sample lifting base for illustration only. Not included in certification)



3. For enclosures mounted on fuel tanks and anchored to host, go to ADV-9189 and place the specified anchors using the mounting locations. See below example for fuel tank's mounting holes:
(Sample fuel tank for illustration only. Not included in certification)



4. Refer to KOHLER ADV-9189 for additional installation instruction directives.

CORP. OFC: 160 SW 12TH AVENUE SUITE 106, DEERFIELD BEACH, FLORIDA 33442

Page 5 of 7

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G18-529 7/20

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SECTION 7: WIND INSTALLATION REQUIREMENTS:

The following are requirements for wind-rated installation:

1. The design of post-installed anchors in concrete used for the component anchorage has been evaluated by this engineer for wind applications in accordance with ASCE 7 as reference herein.
2. Anchors must be installed in minimum 4000 psi compressive strength normal weight concrete. Concrete aggregate must comply with ASTM C33. Installation in structural lightweight concrete is not permitted unless otherwise approved by the structural engineer of record.
3. Anchors must be installed to the torque specification as recommended by the anchor manufacturer to obtain maximum loading.
4. Anchors must be installed in the locations specified in the Kohler ADV-9189 dimension print in correlation with signed and sealed engineering herein. The more stringent requirement from either document shall apply in cases of uncertainty.
5. Anchor plates from Kohler must be installed at each anchor location between anchor head and equipment for tension load distribution.
6. Concrete floor slab and concrete housekeeping pads must be designed, and rebar reinforced for wind applications in accordance with ACI 318 and ASCE 7 as referenced herein
7. All housekeeping pad thicknesses must be designed in accordance with pre-qualification test report or a minimum of 1.5x the anchor embedment depth, whichever is largest.
8. All housekeeping pads must be doweled or cast into the building structural floor slab and designed for wind application per appropriate code requirements for the subject jurisdiction and as approved by the structural engineer of record.
9. Wall mounted equipment must be installed to a rebar reinforced structural concrete wall that is designed for wind applications and approved by the engineer of record to resist the added wind loads from the components being anchored to the wall.
10. Floor mounted equipment (with or without housekeeping pad) must be installed to a rebar reinforced structural concrete floor that is designed for wind applications and approved by the engineer of record to resist the added wind loads from components being anchored to the floor.
11. When installing to a floor, rebar interference must be considered.
12. Attaching equipment to any floor other than those constructed of structural concrete and designed to accept the wind loads from said equipment is not permitted by this specification and beyond the scope of this certification.
13. Attaching equipment to any concrete block walls or cinder block walls is not permitted by this specification and beyond the scope of this certification.
14. Rooftop installations are not permitted by this evaluation and is beyond the scope of this certification.
15. Installation upon rooftop curbs shall be coordinated with the curb manufacturer and the Structural Engineer of Record. Any curb or concrete pad that supports the RTU unit is beyond the scope of this certification.
16. Anchor locations, size, type and load requirements shall be as specified on the certified installation specification. Mounting requirements details such as brand, type, embedment depth, edge spacing, anchor spacing, concrete strength, wall bracing, and special inspection must be outlined and approved by the project Structural Engineer of Record to withstand the wind anchor loads as defined on the certified installation specification. The installing contractor is responsible for the proper installation of all anchors and mounting hardware, observing the mounting requirement details outlined by the Engineer of Record. Contact Kohler if a detailed Wind Installation Calculation Package is required.
17. Electrical wiring, piping, duct and other connections to the equipment is the responsibility of the installing contractor. It is necessary that these remain intact, functional and do not inhibit the functionality of the generator set after a wind event.
18. Concrete pad dimensions are minimum values to satisfy only the anchor bolt requirements. The pad must be designed by the project structural engineer of record.

TERMINOLOGY (CONTINUED):

The following abbreviations may appear in this report: “ASCE” for “American Society of Civil Engineers”, “ASD” for “Allowable Stress Design”, “FBC” for “Florida Building Code”, “FLCA” for “Florida Certificate of Authorization”, “FMC” for “Florida Mechanical Code”, “GR.” For “grade”, “HVAC” for “heating, ventilation, and air conditioning”, “max.” for “maximum”, “min.” for “minimum”, “NTS” for “not to scale”, “OD” for “outer diameter”, “PE” for “Professional Engineer”, “psf” for “pounds per foot squared (lb/ft2)”, “SAE” for “Society of Automotive Engineering”, “SECB” for “Structural Engineering Certification Board”, “SMS” for “sheet metal screws”, “SS” for “stainless steel”, “TER” for “Technical Evaluation Report”, “typ.” For “typical”, “U.N.O.” for “unless noted otherwise”, “w/o” for “without”, “#” for “number”, and “Ø” for “diameter”. For additional abbreviation/terminology clarifications, please contact this office.

LIMITATIONS & CONDITIONS OF USE (CONTINUED):

Host Structure:

The supporting host structure shall be designed to resist all superimposed loads as determined by others on a site-specific basis as may be required by the Authority Having Jurisdiction. No evaluation is offered for the host supporting structure by use of this document;

Production Drawings:

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

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

Drawing and Change Control:

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

Survivability:

This evaluation report is valid for a newly installed unit and does not include certification of the product beyond a design event if impacted. Inspections shall be implemented during annual equipment maintenance or after a named storm; all fasteners and cabinet components are to be verified, and all damaged, loose, corroded and/or broken fasteners and cabinet components shall be replaced to ensure structural integrity against hurricane wind forces. Contact this office for any reevaluation needs as designated by the Authority Having Jurisdiction.

Durability:

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

Extent of Certification:

As described above, this certification pertains to the structural integrity of the unit components listed herein, subject to the limitations and criteria stated herein. Operability and water infiltration are outside the bounds of this certification. No other certifications are intended. This evaluation alone does not offer any evaluation for large missile impact debris or cyclic wind requirements; see TER-20-25965.2 for these evaluations.

Remarks	Drawn	Checked	Date
Initial Issue	EPR	RWN	7/29/20
Amend Anchor Directive	EPR	RWN	8/7/20

Kohler Standby/Prime Generator Set Test Program

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

Prototype Testing

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

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

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

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

- Generator set cooling and air flow tests to verify maximum operating ambient temperature.
- Reliability tests to demonstrate product durability, followed by root cause analysis of discovered failures and defects. Corrective action is taken to improve the design, workmanship, or components.
- Acoustical noise intensity and sound attenuation effects tests.

Production Testing

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

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

KOHLER®

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