

Engineering Submittal



**Ridder Park
Job # 154391**

600REOZVB - Emergency Generator Set

Kohler Sales and Service Distributor:

- | | |
|--|---|
| ☒ NO EXCEPTION TAKEN | ☐ MAKE CORRECTIONS NOTED |
| ☐ REJECTED | ☐ REVISE AND RESUBMIT |
| ☐ SUBMIT SPECIFIED ITEM | |

Checking is only for general conformance with the design concept of the project and general conformance with the information given in the contract documents. Any action shown is subject to the requirements of the plans and specifications. Contractor is responsible for: dimensions which shall be confirmed and correlated at the job site; fabrication processes and techniques of construction; coordination of his work with that of all other trades; and the satisfactory performance of the work.

Alliance Engineering Consultants, Inc.

Date Apr 27 / 23 By David W. Clow

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KOHLER®
POWER SYSTEMS

Date:
12-9-2022



KOHLER®
IN POWER. SINCE 1920.

STATEMENT OF QUALIFICATIONS

Bay City Electric Works Prospective Customer,

Bay City Electric Works has been operating in California since 1932 striving to be the premier electrical stand-by power solutions provider by aggressively delivering one stop...one company support for our customer's specification writing, engineering support, permitting, new equipment sales, service, rental, fueling, transportation, and national account service.

Our commitment to after sales support is unmatched with our factory trained field technicians' 200+ years of combined experience. All technicians operate from fully equipped/stocked service trucks that are efficiently dispatched via GPS tracking and are backed up by over \$500,000 of spare parts at our service facilities. We maintain a 24-hour emergency service "hot-line" to assure a "live" response and are responsible for over 3000 installed generator systems for preventive service maintenance and trouble call support.

Our customers include electrical and general contractors, industrial plants, commercial facilities, data centers, hospitals, schools, city and county government facilities, military installations, the telecommunications industry, water and electrical utilities and our area's growing bio-technical industry.

Major product lines represented include Kohler for industrial standby, residential, and mobile generators; Honda portable generators; and we are an Authorized John Deere Engine Service Provider.

Bay City Electric Works is the premier provider of standby electrical power systems solutions in Southern California and looks forward to working with you to support your power needs.

Sincerely,

Rodney C. Lee
President & COO

Attention Contractors and End Users:

Please read the following carefully:

- An Air Quality Permit is required for ALL generators in CA over 50BHP (for a single engine/generator). There are very few other exemptions. It is imperative that you submit an application to the local air quality jurisdiction (AQMD/APCD) immediately upon approval of submittals (or sooner) to avoid any project delays or unexpected costs/complications. Generators cannot be started or commissioned prior to the issuance of your Authority to Construct (ATC) and Startup Authorization by the governing air quality district and in most cases cannot even be delivered to the site without the permit. This can delay a project schedule a great deal. Air Quality permits typically take 2-3 months but can take longer.
- A Permit from the local Fire Department or AHJ (Authority Having Jurisdiction) is required for diesel fuel tanks (with very few exemptions). Check with your local AHJ to confirm permit requirements and permit conditions. BCEW as a supplier cannot comply with any specific local AHJ requirements if a permit is not pulled and a copy of the fire permit is not provided to us. If there are requirements by the local AHJ that differ from the contract documents there may be an additional charge.
- Anchorage of the generator is typically detailed in the Structural Plans/Contract Documents. When it is not, it is the Contractors responsibility to determine the proper anchorage. When the specification dictates, we will provide anchorage calculations and details after submittal approval. Often the anchorage will need to be done at time of delivery and will require a special inspection. Please be aware of this and plan accordingly.
- Large Natural Gas and LP generators require a great deal of fuel. Correct fuel piping size and pressure are the responsibility of the installing contractor. All necessary information is provided on the generator specification sheet in this submittal.

We are here to support you and provide any assistance necessary. Please let us know if we can help with anything listed above. The purpose of this letter is to minimize the unknown installation problems and project delays for you.

KOHLER[®] Power Systems

444 Highland Drive, MS 072, Kohler, WI 53044

Phone: 920-457-4441

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Job Name: 154391 Ridder Park

Offer: 154391

Quote Number: 0026935629

Version 1.00

12-06-2022

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Generator

Kohler Model: 600REOZVB

This diesel generator set equipped with a 5M4032 alternator operating at 277/480 volts is rated for 600 kW/750 kVA. Output amperage: 903.

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Qty	Description
	600REOZVB Generator System
2	600REOZVB Generator Set
	Includes the following:
	Literature Languages English
	Approvals and Listings UL2200 Listing
	Approvals and Listings IBC Seismic Certification
	Engine 600REOZVB,24V,60Hz, EPA
	Nameplate Rating Standby 130C Rise
	Voltage 60Hz, 277/480V, Wye, 3Ph, 4W
	Alternator 5M4032
	Cooling System Unit Mounted Radiator, 50C
	Skid and Mounting Skid
	Air Intake Standard Duty
	Controller APM 603
	Enclosure Type Sound
	Enclosure Material Steel
	Enclosure Electrical Package Basic
	Enclosure Electrical Acc. Wire Block Heater
	Enclosure Electrical Acc. Wire Battery Charger
	Enclosure Heater Enclosure Heater, 240VAC
	Enclosure Silencer Internal Silencer
	Fuel Tank Type State
	Fuel Runtime (Approx.) 24 Hours
	Subbase Fuel Tank Capacity 1038 Gallons
	Fill Pipe/Spill Fill Options 5 Gal Spill Cont w/95% Shutoff
	Fuel Tank Vent Emergency Vent, 5", IBC
	High Fuel Switch High Fuel Switch
	Tank Marking Options Combust Lqds - Keep Fire Away
	Tank Marking Options NFPA 704 Identification
	Tank Marking Options Tank Number & Safe Fill Height
	Starting Aids, Installed 4000W,210-240V,1Ph,w/Valves
	Electrical Accy.,Installed Battery, 2/12V, Wet
	Electrical Accy.,Installed Battery Charger, 10A
	Electrical Accy.,Installed Run Relay
	Electrical Accy.,Installed 2 Input/5 OutputModule
	Electrical Accy.,Installed Manual Speed Adjust
	Rating, LCB 1 Right 100% Rated
	Amps, LCB 1 Right 1000

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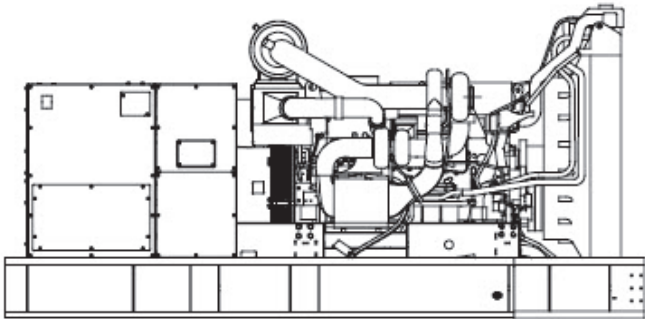
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	Trip Type, LCB 1 Right	Electronic, LSiG (GFI)
	LCB 1 Right Interrupt Rating	35kA at 480V
	Aux Contact, LCB 1 Right	Auxiliary Contact, Qty. 1
	Frame, LCB 1 Right	PG
	Position, LCB 1 Right	1
	Fuel Lines, Installed	Flexible Fuel Lines
	Fuel System Acc.,Installed	Fuel Pressure Gauge
	Exceeds LTL Shipping Height	Add'l Shipping Charge Accepted
	Miscellaneous Accy,Installed	Air Cleaner Restriction Ind.
	Miscellaneous Accy,Installed	Coolant in Genset
	Miscellaneous Accy,Installed	Oil in Genset
	Warranty	5 Year Comprehensive
	Testing, Additional	Power Factor Test,0.8,3Ph Only
2	Remote Emergency Stop Switch	
2	Lit. Kit, General Maintenance, 600REOZVB	
2	RSA III, Mult. ATS Annunciator	
2	Engine Start Integrity Module, ATS	
2	Engine Start Integrity Module, Generator	



Spec Sheets



Standard Features

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The 60 Hz generator set offers a UL 2200 listing.
- The generator set accepts rated load in one step.
- The 60 Hz generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
- A one-year limited warranty covers all systems and components. Two-, five-, and ten-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.
- Multiple circuit breaker configurations.

Generator Set Rating				Standby 130C Rise Ratings		
Alternator	Voltage	Ph	Hz	Peak kVA	kW/kVA	Amps
5M4032	277/480	3	60	2200	600/750	903

RATINGS: All three-phase units are rated at 0.8 power factor.
Standby Ratings: Standby ratings apply to installations served by a reliable utility source. The standby rating is applicable to varying loads for the duration of a power outage. There is no overload capability for this rating. Ratings are in accordance with ISO-3046/1, BS 5514, AS 2789, and DIN 6271.
Prime Power Ratings: Prime power ratings apply to installations where utility power is unavailable or unreliable. At varying load, the number of generator set operating hours is unlimited. A 10% overload capacity is available for one hour in twelve. Ratings are in accordance with ISO-8528/1, overload power in accordance with ISO-3046/1, BS 5514, AS 2789, and DIN 6271. For limited running time and base load ratings, consult the factory.
Obtain the technical information bulletin (TIB-101) on ratings guidelines for the complete ratings definitions.
The generator set manufacturer reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever.
GENERAL GUIDELINES FOR DERATION: Altitude: Derate 0.4% per 100 m (328 ft.) elevation above 1400 m (4593 ft.).

Model: 600REOZVB, continued

Alternator Specifications

Specifications	Alternator
Type	4-Pole, Rotating-Field
Exciter type	Brushless, Permanent-Magnet Pilot Exciter
Leads, quantity	10, Reconnectable
Voltage regulator	Solid State, Volts/Hz
Insulation	NEMA MG1
Insulation: Material	Class H, Synthetic, Nonhygroscopic
Insulation: Temperature Rise	130 ° C, 150 ° C Standby
Bearing: quantity, type	1, Sealed
Coupling	Flexible Disc
Amortisseur windings	Full
Rotor balancing (50Hz)	125%
Rotor balancing (60Hz)	125%
Voltage regulation, no-load to full-load RMS	Controller Dependent
One-Step Load Acceptance	100% of rating
Unbalanced load capability	100% of Rated Standby Current
• NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting. • Sustained short-circuit current of up to 300% of the rated current for up to 10 seconds. • Sustained short-circuit current enabling down stream circuit breakers to trip without collapsing the alternator field. • Self-ventilated and dripproof construction. • Superior voltage waveform from a two-thirds pitch stator and skewed rotor. • Digital solid-state, volts-per-hertz voltage regulator with +/-0.25% no-load to full-load regulation. • Brushless alternator with brushless pilot exciter for excellent load response.	

Engine

Engine Specification

Engine Manufacturer	Volvo
Engine Model	TWD1643GE (IBC Only), TWD1644GE (W/O IBC)
Engine: type	4-Cycle, Turbocharged, Charge Air Cooled
Cylinder arrangement	6, Inline
Displacement, L (cu. in.)	16.12 (984)
Bore and stroke, mm (in.)	144 x 165 (5.67 x 6.50)
Compression ratio	16.5:1 (IBC Only), 16.8:1
Piston speed, m/min. (ft./min.)	594 (1949)
Main bearings: quantity, type	7, Precision Half-Shell
Rated rpm	1800
Max. power at rated rpm, kWm (BHP)	674 (903)
Cylinder head material	Cast Iron
Piston: type, material	Swirl Chamber, Graphite-Coated Aluminum
Crankshaft material	Forged Steel
Valve (exhaust) material Intake	Nimonic
Governor: type, make/model	EMS 2.0 (IBC Only), EMS 2.3
Frequency regulation, no-load to-full load	Isochronous
Frequency regulation, steady state	± 0.25%
Frequency	Fixed
Air cleaner type, all models	Dry

Model: 600REOZVB, continued

Exhaust

Exhaust System

Exhaust Manifold Type	Dry
Exhaust flow at rated kW, m3/min. (cfm)	130 (4594) IBC Only, 114.5 (4044)
Exhaust temperature at rated kW, dry exhaust, ° C (° F)	461 (862) IBC Only, 495 (923)
Maximum allowable back pressure, kPa (in. Hg)	10 (2.95)
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)	24V, 7kW
Battery charging alternator: Ampere rating	80
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.)	10.0 (0.38)
Fuel return line, min. ID, mm (in.)	6.0 (0.25)
Max. fuel flow, Lph (gph)	210 (55.5) IBC Only, 185 (48.9)
Max. fuel pump restriction, kPa (in. Hg)	10 (3.0)
Max. return line restriction, kPa (in. Hg)	20 (5.9)
Fuel filter: quantity, type	2
Fuel Filter Secondary	5 Micron (IBC Only), 5 Micron
Fuel Filter Primary	10 Micron (IBC Only), 30 Micron
Recommended fuel	#2 Diesel

Lubrication

Lubrication System

Type	Full Pressure
Oil pan capacity, L (qt.)	42.0 (44.4)
Oil pan capacity with filter, L (qt.)	48.1 (50.8)
Oil filter: quantity, type	3, Cartridge
Oil cooler	Water-cooled

Model: 600REOZVB, continued

Cooling

Radiator System

Ambient temperature, ° C (° F)	50 (122) IBC Only, 45 (113)
Engine jacket water capacity, L (gal.)	33 (8.7) IBC Only, 25 (6.6)
Radiator system capacity, including engine, L (gal.)	166 (43.9) IBC Only, 151.1 (39.9)
Engine jacket water flow, Lpm (gpm)	360 (95.4)
Charge cooler water flow, Lpm (gpm)	150 (39.6) IBC Only, 126 (33)
Heat rejected to cooling water at rated kW, dry exhaust, kW (Btu/min.)	245 (13933) IBC Only, 246 (13990)
Heat rejected to charge air cooling water at rated kW, dry exhaust, Kw Btu/min.	216 (12284) IBC Only, 147 (8360)
Water pump type	Centrifugal
Fan diameter, including blades, mm (in.)	965 (38.0)
Fan, kWm (HP)	30 (41) IBC Only, 34 (46)
Max. restriction of cooling air, intake and discharge side of radiator, kPA (in. H2O)	0.125 (0.5)
* Weather and sound enclosures with internal silencer and weather housing with external silencer reduce ambient temperature capability by 5 ° C (9 ° F).	

Operation Requirements

Air Requirements

Radiator-cooled cooling air, m3/min. (scfm) *	760 (26839) IBC Only, 665 (23484)
Combustion air, m3/min. (cfm)	55 (1937) IBC Only, 48 (1649)
Heat rejected to ambient air: Engine, kW (Btu/min.)	29 (1649) IBC Only, 24 (1342)
Heat rejected to ambient air: Alternator, kW (Btu/min.)	45 (2560)
*Air density = 1.20 kg/m3 (0.075 lbm/ft3)	

Fuel Consumption

Diesel, Lph (gph), at % load	Rating
Standby Fuel Consumption at 100% load	161.8 Lph (42.7 gph) IBC Only, 157.0 Lph (41.5 gph)
Standby Fuel Consumption at 75% load	117.8 Lph (31.1 gph) IBC Only, 118.4 Lph (31.3 gph)
Standby Fuel Consumption at 50% load	79.3 Lph (21.0 gph) IBC Only, 80.1Lph (21.2 gph)
Standby Fuel Consumption at 25% load	43.6 Lph (11.5 gph) IBC Only, 45.0 Lph (111.9 gph)



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.

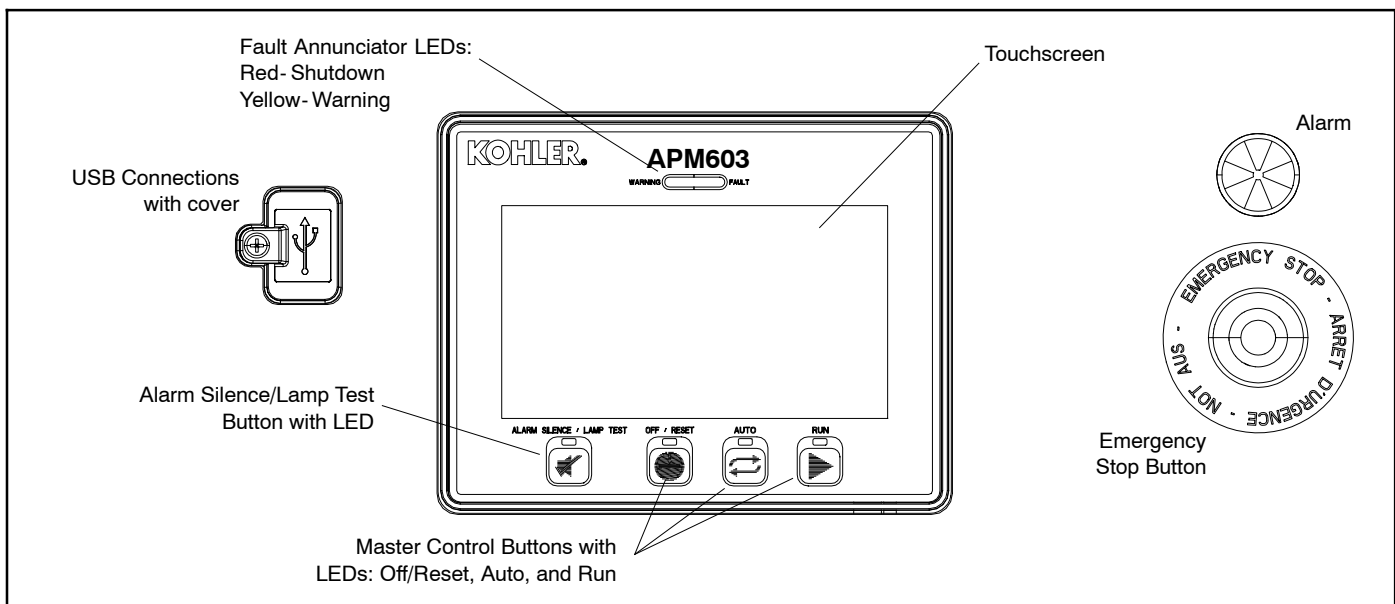
Global Support

- 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		

Volvo Engine-Powered Models

Inputs and Outputs

Standard Dedicated User Inputs	Input Type
Auxiliary Fault (Shutdown)	Digital Input
Auxiliary Warning	
Battery Charger Fault	
Breaker Closed *	
Breaker Tripped *	
Coolant Temperature	
Emergency Stop, Local	
Emergency Stop, Remote	
Excitation Over Voltage	
Fuel Leak Alarm	
Fuel Level	
Ground Fault Relay	
Key Switch Auto	
Key Switch Run	
Low Fuel Level Switch	
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	

Volvo Engine Data

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

Parameter
Air Intake Pressure
Air Intake Temperature
Ambient Temperature
Barometric Pressure
Coolant Temperature
ECU Battery Voltage
ECU Runtime Hours
Engine Speed
Fuel Consumption Rate
Fuel Pressure
Intake Manifold Pressure
Intake Manifold Temperature
Intercooler Temperature
Mechanical Engine Load
Oil Pressure
Oil Temperature

APM603 Available Options

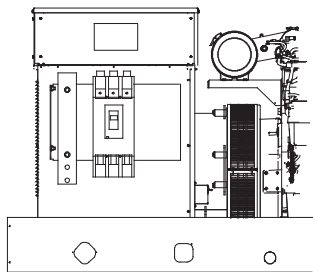
- ☐ **Common Failure Relay** provides a relay output to signal a generator set fault.
- ✓ ☒ **Battery Charger** available with 6 amp, 10 amp, and 20 amp output for 12 and 24V DC voltage output. (Availability is generator model dependent.) The 10 amp and 20 amp models provide NFPA 110 charging and alarming 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.

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

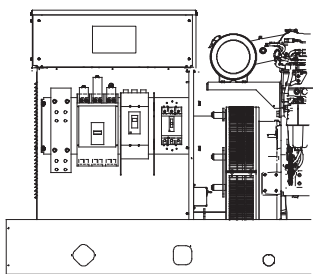
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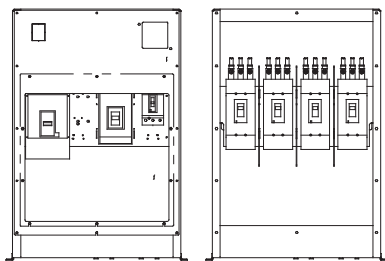
Bay City Electric Works
322 Lindbergh Avenue
Livermore, CA 94551
619-938-8200
619-938-8217 fax



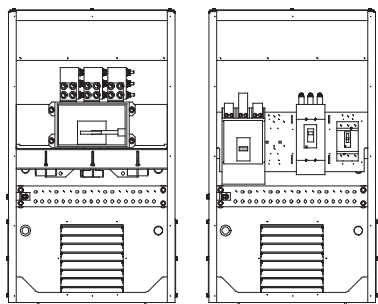
Single Circuit Breaker Kit with Neutral Bus Bar
~~15-300 kW Model Shown~~



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



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



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

Standard Features

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

Line Circuit Breaker Types

Magnetic Trip

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

Thermal Magnetic Trip

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

Electronic Trip

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

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

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	JJ
	250	684- 2500 A. Mag. Trip	
	300- 400	Thermal Magnetic	
	400	500- 1000 A. Mag. Trip	LA
		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
		Electronic LSIG	
	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
	1600, 2000, 2500, 3000	5.0 LSI	PL
		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.

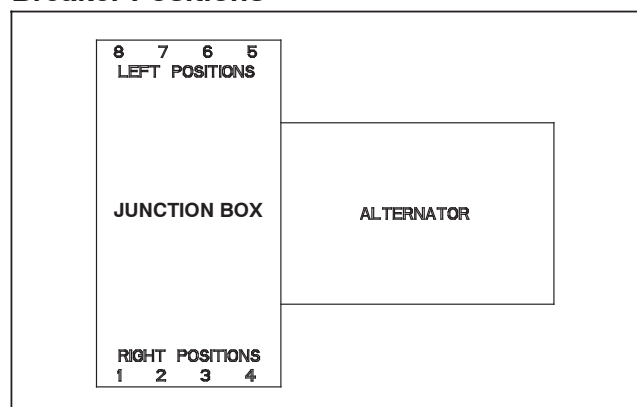
Interrupting Ratings

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	800-800	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

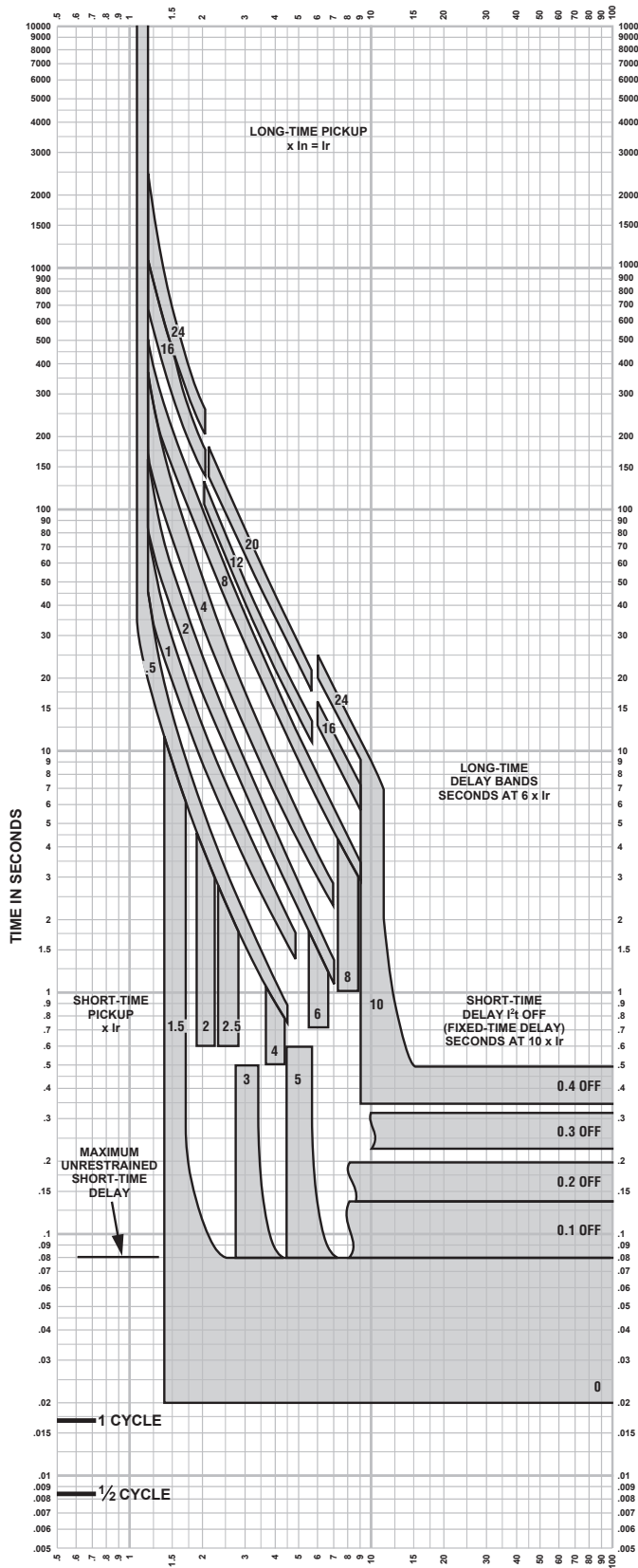
Alternator Model	Positions			
	1 or 5	2 or 6	3 or 7	4 or 8
	H/J			
	H/J	H/J		
	H/J	H/J	H/J	
	H/J	H/J	H/J	H/J
	LA			
	LA	H/J		
	LA	LA		
	LA	H/J	H/J	
	LA	LA	H/J	
	LA	H/J	H/J	H/J
	LA	LA	H/J	H/J
	LA	LA	LA	H/J
	LA	LA	LA	LA
	LG			
	LG	H/J		
	LG	LA		
	LG	LG		
	LG	H/J	H/J	
	LG	LA	H/J	
	LG	LA	LA	
	LG	LG	H/J	
	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

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

The most compact and innovative molded case circuit breakers



P-Frame 1200 A



R-Frame

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

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

Full-Featured Performance

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

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

Onboard Intelligence

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

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



MICROLOGIC® Trip Units

Choose the Model that Meets Your Needs

MICROLOGIC 3.0 and 5.0

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

MICROLOGIC 3.0A, 5.0A and 6.0A

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

MICROLOGIC 5.0P and 6.0P

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

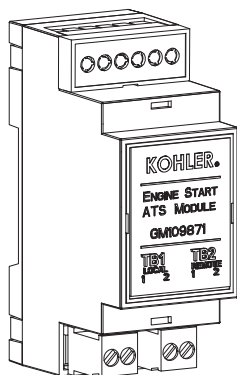
MICROLOGIC 5.0H and 6.0H

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

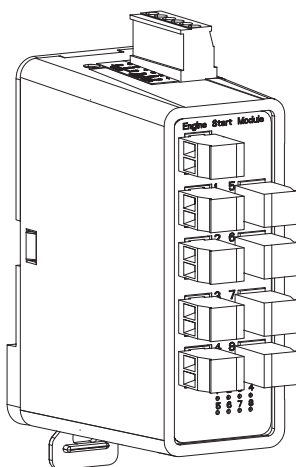
Contact your Square D sales representative for additional information. Or, visit www.SquareD.com.



Engine Start Circuit Monitoring System



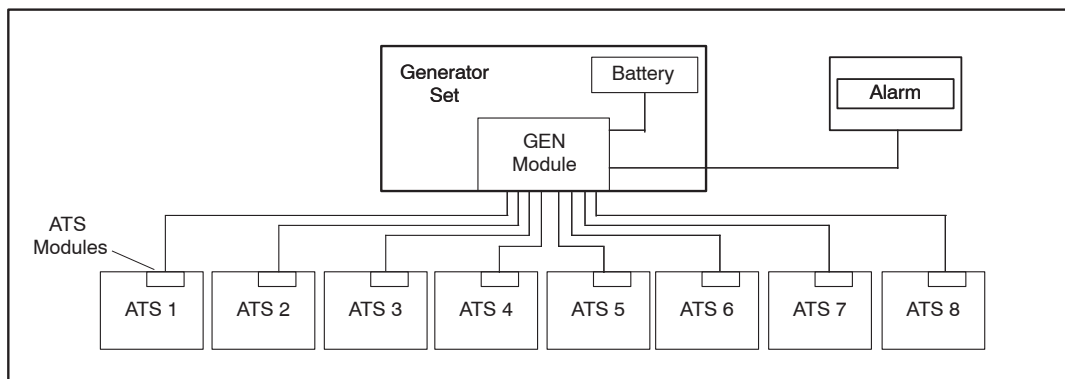
ATS Module



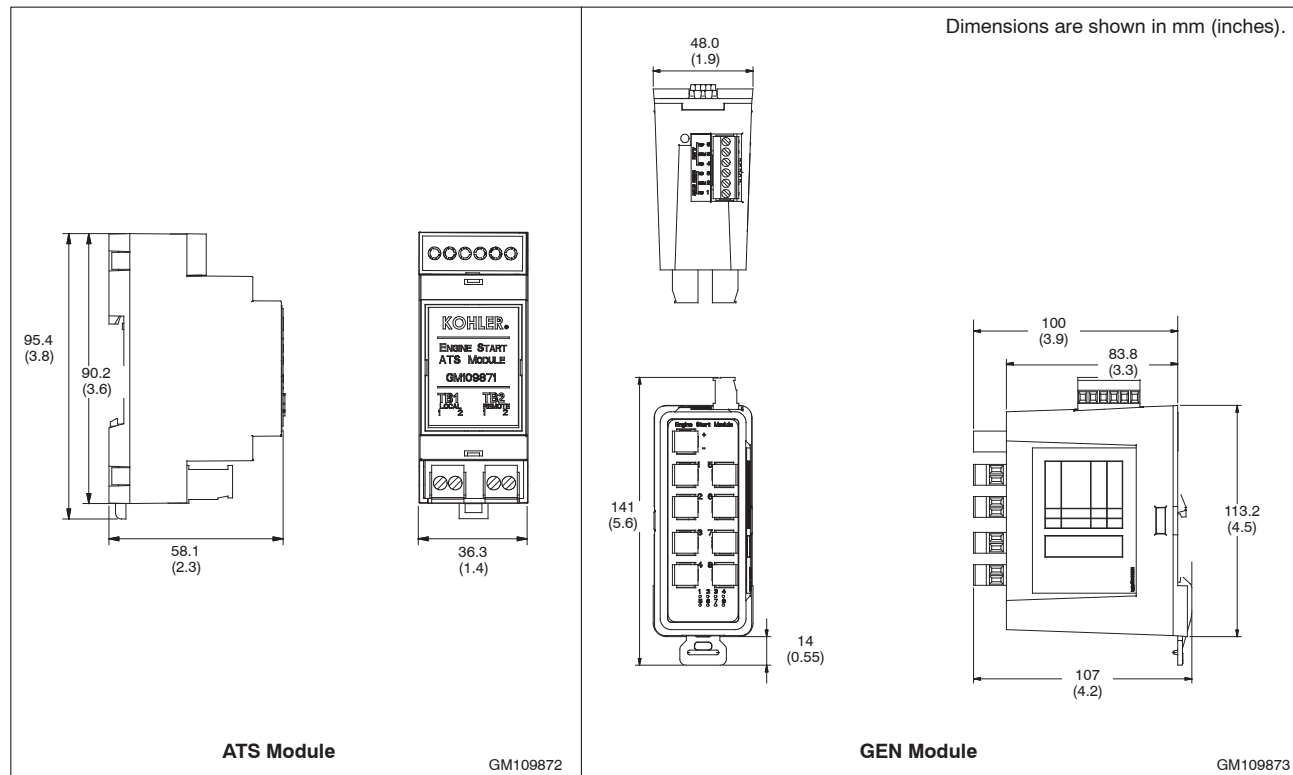
GEN Module

Standard Features

- Continually monitors the engine start circuit wiring between the generator set and automatic transfer switch (ATS) as required by NEC 2017
- UL listed
- Forwards engine start signals to the generator set during normal operation
- Detects open circuits and short circuits in the engine start wiring
- Monitors conditions, annunciates faults, and starts the generator set in accordance with Article 700.10(D)(3) of NFPA 70
 - Provides two Form C contacts, one for engine start and one for alarm
 - Communicates faults to an optional customer-supplied alarm, a Remote Serial Annunciator (RSA III), or a controller input
 - Automatically starts the generator set engine when a fault is detected
- GEN module status LEDs indicate the state of each circuit/channel:
 - Blue: Channel disabled (off)
 - Red: Wiring fault detected
 - Green: Engine start is not active, wiring is ok
 - Off: Engine start is active, wiring is ok
- Easy installation on new or existing standby power equipment
 - Use one module on the generator set
 - Use one module on each ATS, up to a maximum of 8 transfer switches per generator module
- GEN module can be powered by the generator set's engine starting battery; ATS module requires no power
- Select engine start on an open or closed contact (All Kohler® generators start on a closed contact)



Module Dimensions



Specifications

Parameter	Specification
DC Power	GEN Module: 9- 27 VDC 15W maximum ATS Module: No power source required
Internal Ride Through Power	3 seconds minimum
Mounting	35 mm DIN rail
Operating Temperature Range	- 20°C to 70°C (- 4°F to 158°F)
Maximum Distance	1000 ft. (305 m) one way (2000 ft. [610 m] Loop)
Maximum Wire Loop Resistance	Less than 100 ohms
Generator Start Module Contact	1A 30 VDC Form C
Generator Alarm Module Contact	1A 30 VDC Form C
Wire Gauge	12- 30 AWG stranded

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

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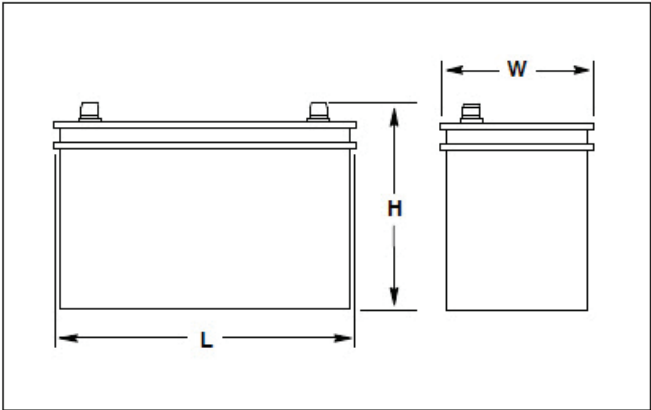


Bay City Electric Works
 322 Lindbergh Avenue
 Livermore, CA 94551
 619-938-8200
 619-938-8217 fax

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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

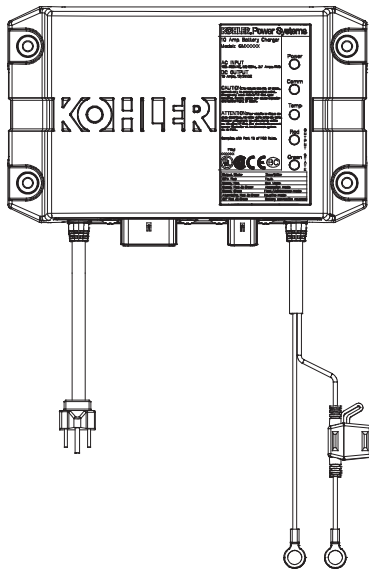
D

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.

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



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

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

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

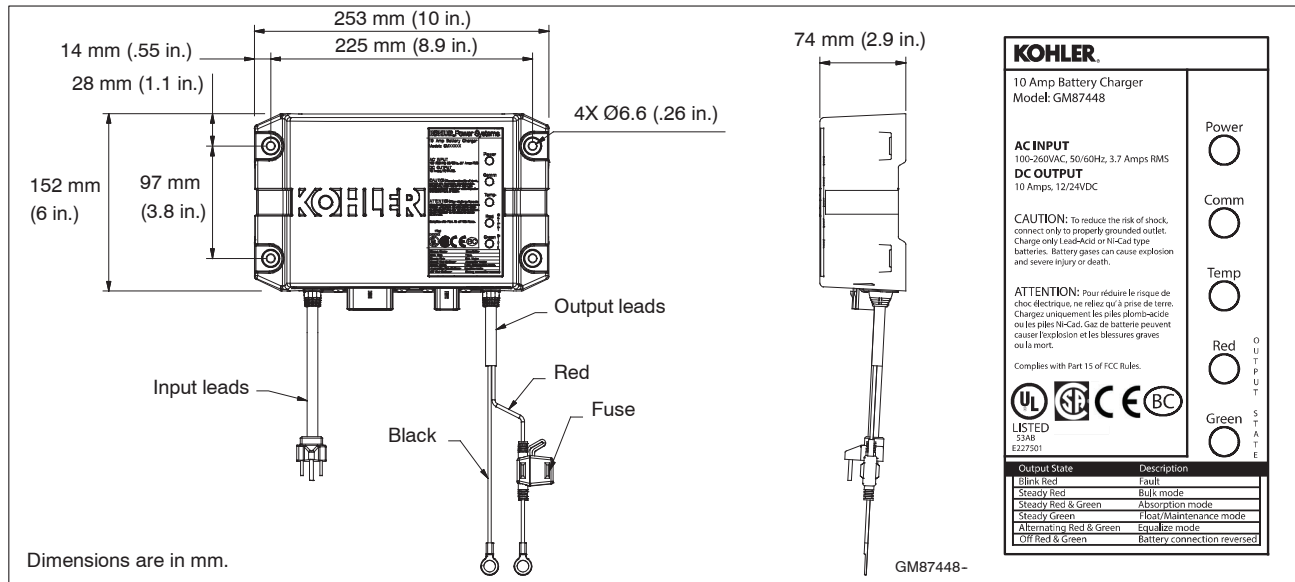
Five LED lights indicate power, communication status, temperature compensation status, charge curve, and charger status.

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

Standard Features

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

DC Output		AC Input		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



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: - Red - Green
Environmental	
Operating	-20° to 70°C (-4° to 158° F)
Storage	-40° to 85°C (-40° to 185° F)
Relative Humidity	5 to 95% (non-condensing)
Salt Spray Testing	ASTM B117
Corrosion Resistant	From battery gases

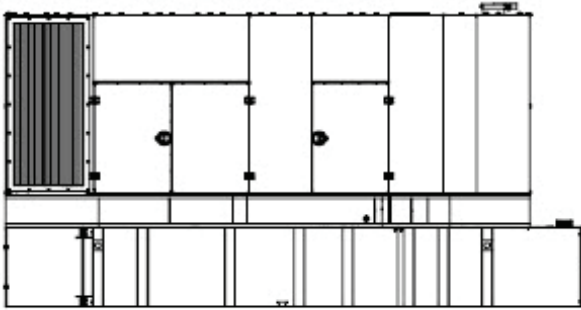
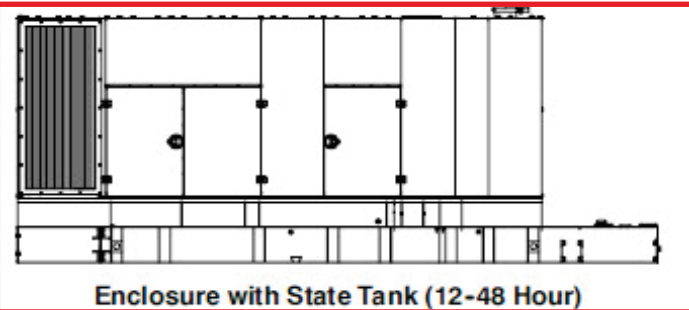
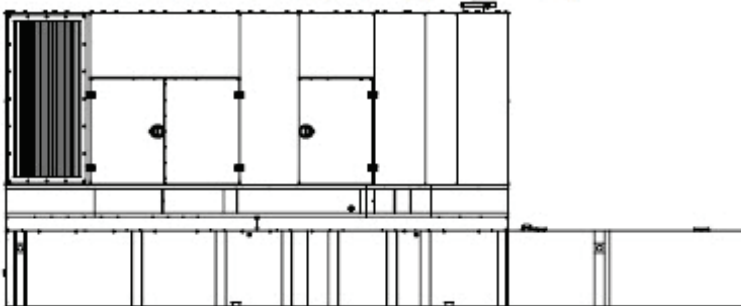
Enclosure	
Environmental Resistant	From rain, snow, dust, and dripping water
Battery Connections	
Lead Length	1.8 m (6 ft.) red and black leads
Battery Connections	9.5 mm (3/8 in.) ring terminals
AC Power Connections	
Lead Length	1.8 m (6 ft.)
Storage	Standard US style 3-prong AC plug
Available Options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

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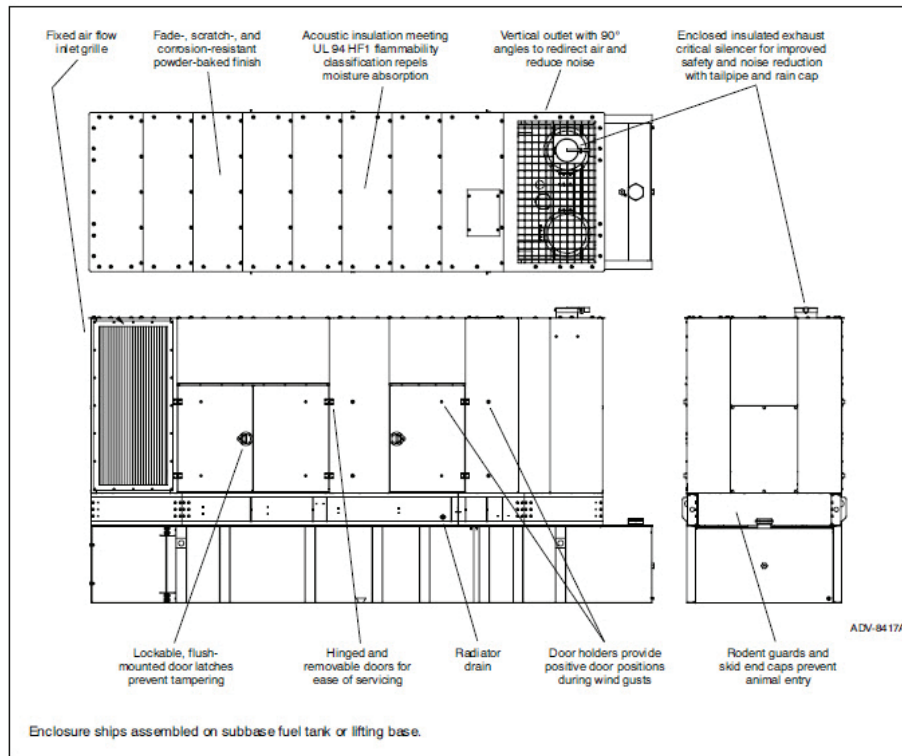

Enclosure with Standard Tank (12-48 Hour)

Enclosure with State Tank (12-48 Hour)

Enclosure with State Tank (72 Hour)

Sound Enclosure Standard Features

- Internal-mounted critical silencer, flexible exhaust connector, and rain cap.
- Skid mounted 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 and snow entry.
- Vertical air outlet with 90 degree angles to redirect air and reduce noise.
- Acoustic insulation that meets UL94 HF1 flammability classification.
- Steel sound enclosure is designed to 150 mph (241 kph) wind load rating.

Subbase Fuel Tank Features

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



Sound Enclosure Features

- Available in steel (14 gauge) formed panel, solid construction. Preassembled package offering corrosion resistant (aluminum), dent resilient structure mounting directly to the lift base or fuel tank.
 - Power Armor automotive-grade finish resulting in advanced corrosion and abrasion protection as well as advanced edge coverage and color retention.
 - Interchangeable modular panel construction. Allows complete serviceability or replacement without compromising enclosure design.
 - Internal critical exhaust silencer. Offers maximum component life, 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.
 - Attenuated design. Acoustic insulation UL 94 HF1 listed for flame resistance.
 - Service access. Multi-personnel doors for easy access to generator set control and servicing of the fuel fill, fuel gauge, oil fill, and battery.
 - Cooling/Combustion Air Intake. Attenuated models offering weather protective designs using fixed air inlet louvers.
 - Cooling Air Discharge. Attenuated models offering 90 degree vertical air outlet. Redirects cooling air up and above enclosures to reduce noise ambient
-
- Extended operation. Usable tank capacities 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.
 - Low fuel level switch. Annunciates a 50% low fuel level condition at generator set control.
 - Leak detection switch. Annunciates a contained primary tank fuel leak condition at generator set control.
 - Electrical stub-up.

Accessories

Battery Charger, Mounted.

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

Block Heater, Junction Box.

Factory-supplied block heater rewired to a junction box providing a convenient location for the customer wiring of the block heater.

Enclosure Heater

Heater, 5 kW Ceiling Mounted. Electrical utility heater rewired to load center inside the enclosure. Rated at 17100 Btu includes adjustable louvers offering down flow and horizontal air tuning, built-in thermostat with automatic fan delay controls.

Basic Electrical Package (BEP)

Prewired AC power distribution of all factory-installed features including block heater, two GFCI-protected internal 120-volt service receptacles, internal lighting, and commercial grade wall switch. Load center powered by building source power and protected by a main circuit breaker, rated for 100 amps (single phase) or 125 amps (three phase) with capacity and circuit positions for future expansion. AC power distribution installed in accordance with NEC and all wiring within EMT thin wall conduit. LED AC lights located within UL-listed fixtures.

TECHNICAL INFORMATION BULLETIN

Generator Set Sound Data

Introduction

Generator Set Sound Configurations

Refer to the descriptions below and the following illustrations for typical information on how the sound data was acquired. Some variations to the testing procedure and setup do exist as a result of generator set size.

Level 2 Sound Enclosure. The level 2 sound enclosure is the premium sound enclosure for any given generator set model. It features the lowest available sound levels of all standard production enclosures. Typical features include interior acoustic foam treatment, intake and discharge sound plenums and baffles, and required silencer for the application.

Level 1 Sound Enclosure. The level 1 sound enclosure is a mid range sound enclosure that offers significant sound level reduction from an open generator set or weather enclosure unit. Typical features include economy interior acoustic foam treatment, economy intake and discharge sound plenums and baffles, and required silencer for the application. Level 1 sound enclosures are not offered on all generator set models.

Weather Enclosure. The weather enclosure is designed primarily to protect the generator set from the elements. A silencer is included with the enclosure, but no other sound reduction components are provided inside the enclosure.

Open Unit. The open unit configuration is sold for applications where the generator set is installed indoors or intended to be enclosed or sheltered by some other means. There are loose exhaust silencer and flexible exhaust kits available that provide various levels of exhaust noise attenuation.

Raw Exhaust. Raw exhaust refer specifically, and only, to the noise emitted by the engine exhaust system when no silencer is present. It does not include noise from other sources on the generator set.

Exhaust Silencer Classifications

Silencers come in various inlet/outlet configurations and levels of sound attenuation. Exhaust silencers are

classified according to the sound performance that they offer. See Figure 1-1. Be aware that the exhaust noise reduction numbers cannot be considered absolute as other factors such as engine characteristics, exhaust system design, and silencer placement affect the end performance. The usefulness of this classification is limited to comparing the relative performance of one grade of silencer to the next.

Silencer Type	Exhaust Noise Reduction, dB(A)*	Attenuation Requirement
Hospital	32-42	Very High
Critical	25-35	High
Residential	18-25	Medium
Industrial	12-18	Low-Medium

*Listed exhaust noise reductions are typical, actual performance may vary.

Figure 1-1 Silencer Types

When enclosures are designed to meet target requirements all sources of noise are considered. Exhaust noise is only one of the sources of noise in a generator, and its intensity and contribution to the overall generator set noise varies from one unit to the next. Silencers are selected to provide optimized performance in enclosures based on noise reduction and cost with no necessary correlation to the conventional terms Hospital, Critical, Residential, or Industrial.

Sound Test Data

The following references apply:

- Sound pressure levels per ANSI S1.13, ASA 118, and ISO 6798 as applicable
- Reference sound pressure is 20 μ Pa
- Sound pressure levels are specific to hemispherical free-field test setup, and may vary depending on-site ambient noise, instrumentation used, installation methods, objects around the generator set, and generator set variations.

Enclosed Unit Sound Test. Sound data is collected at eight location surrounding the generator set according to Figure 1-2 and Figure 1-3. The enclosed unit sound data is representative of generator sets with factory installed enclosures.

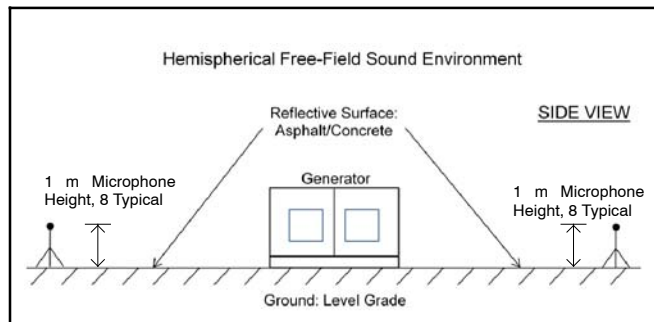


Figure 1-2 Standard Sound Test (Side View)

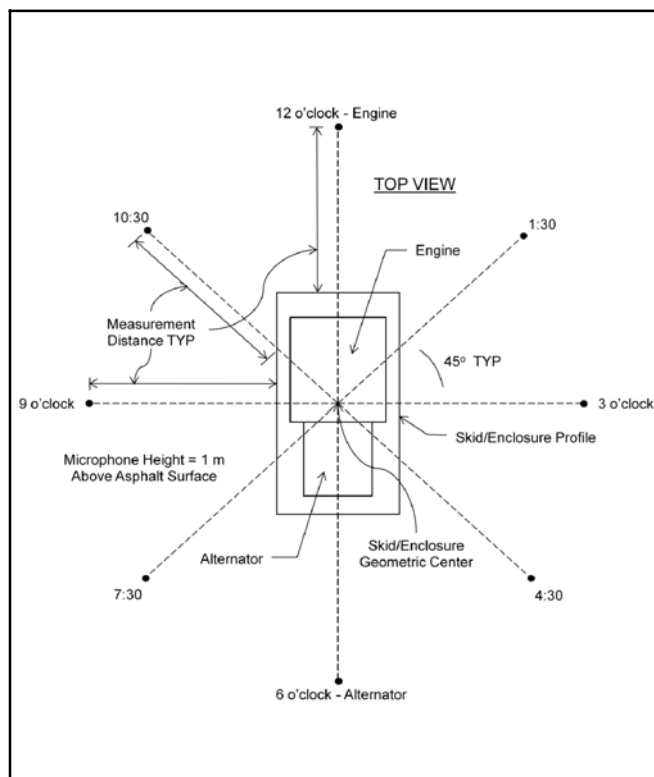


Figure 1-3 Standard Sound Test (Top View)

Open Unit, Isolated Exhaust Sound Test. Sound data is collected at eight locations surrounding the generator set similar to Figure 1-2 and Figure 1-3 while eliminating exhaust noise (and leaving all other noise) from the measurement by piping it to a remote location as indicated in Figure 1-4.

Enclosures, indoor rooms, barrier walls, shelters, and the like are devices that attenuate noise originating from all sources on a generator set, excluding the engine exhaust. The open unit, isolated exhaust data is provided as engineering data for use in sound performance design of these devices for customers purchasing an open unit generator set.

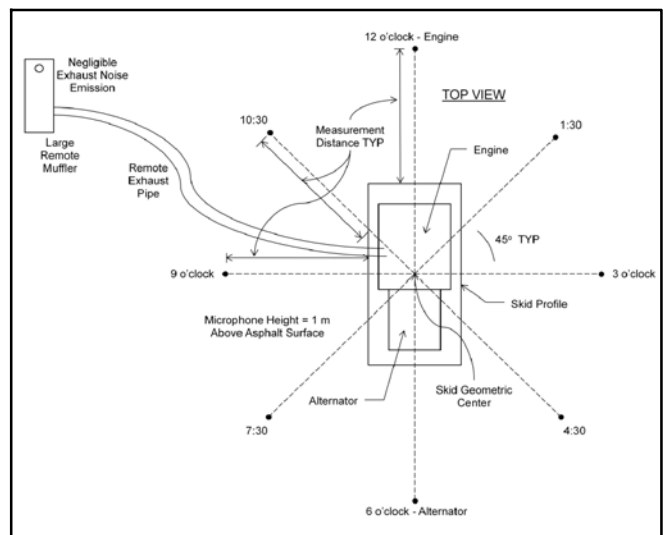


Figure 1-4 Open Unit, Isolated Exhaust Sound Test

Raw Exhaust Sound Test. Sound data is collected at one location near the mouth of a straight pipe engine exhaust as indicated in Figure 1-5. Sound data includes three-way catalyst if installed as standard equipment.

The measurement is taken at a close distance of 1 m (3.3 ft.) to ensure that only the exhaust noise is significant in the data. This measurement distance is also used because data taken at this close proximity is equally useful for design or selection of a silencer mounted near the generator set or at a remote location. The raw exhaust sound data is provided as engineering data for use in silencer design or selection for customers purchasing an open generator set.

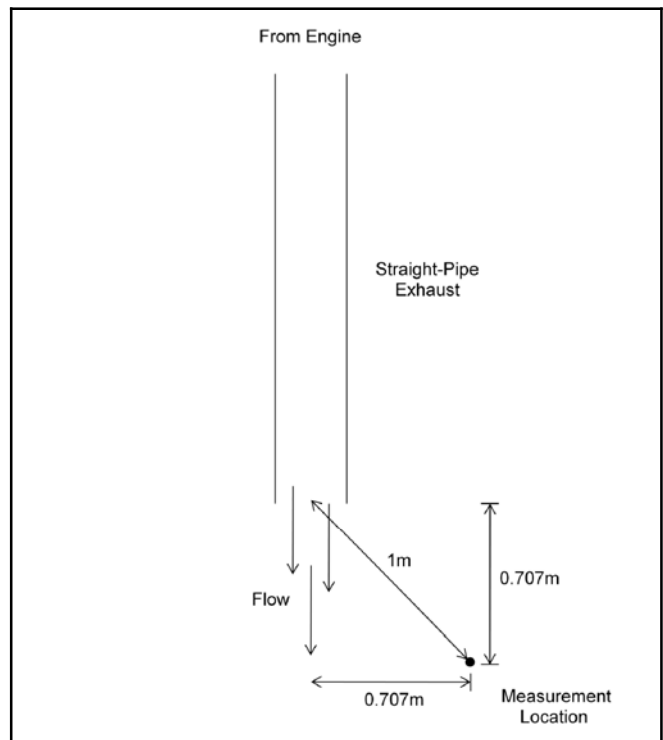


Figure 1-5 Raw Exhaust Sound Test

Load Center



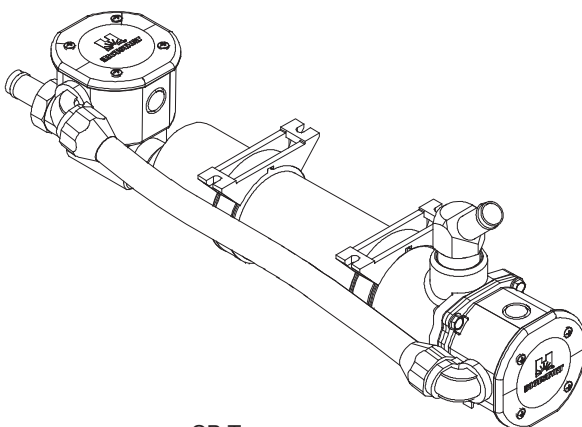
- Part Number - SA27864
- Model - QO816L100RB
- QO Load Center
- Main Lug
- 240V, 100A, 1PH, 8SP

Specifications

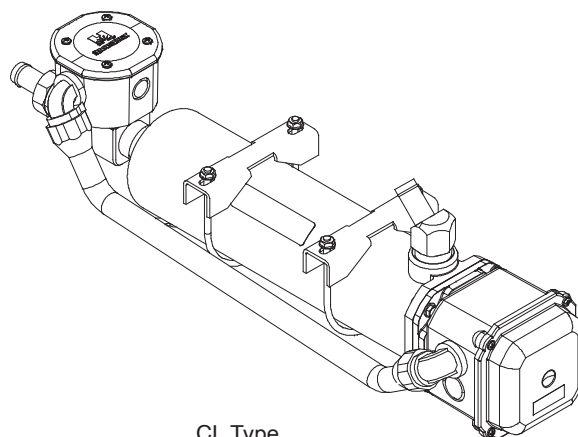
Product	Load Center
Marketing Trade Name	QO
Load Center Type	Main Lugs
Line Rated Current	100 A
Number of Spaces	8
Short Circuit Current Rating	10 kA
Maximum Number of Single Pole Circuits	16
Maximum Number of Tandem Breakers	8
Phase	1 Phase
System Voltage	120/240 VAC
Wire Size	AWG 8...AWG 1 (Aluminum/Copper)
Enclosure Rating	NEMA 3R Outdoor
Cover Type	Surface Cover
Electrical Connection	Lugs
Grounding Bar	Grounding Bar included
Wiring Configuration	3- Wire
Busbar Material	Tin Plated Aluminum Busbar
Enclosure Material	Welded Galvannealed Steel
Cover Finish	Baked Enamel Grey
Box Number	2R
Product Certifications	UL listed
Height	12.64 in (321 mm)
Width	8.9 in (226 mm)
Package Weight (Lbs)	9.8

Disclaimer: This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications.

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.

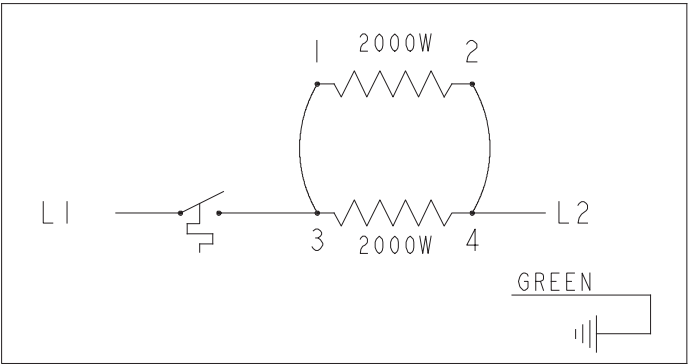
Block Heater Specifications

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

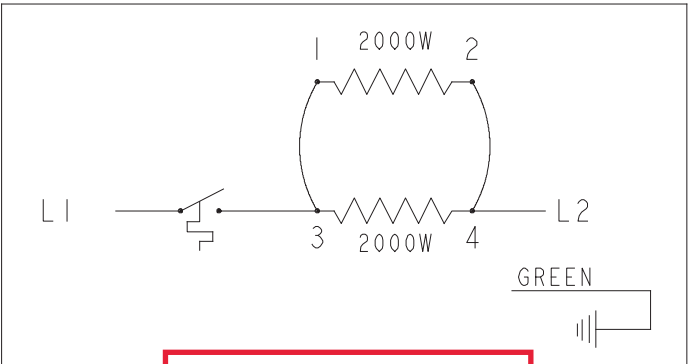
Specifications

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

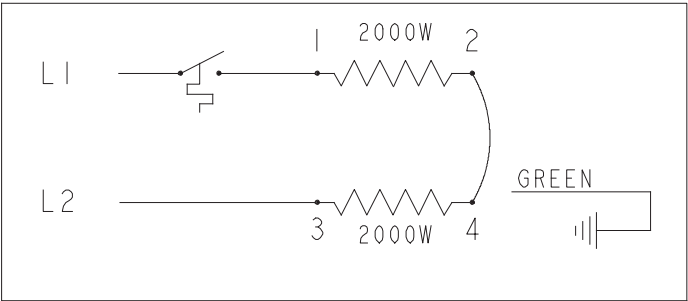
Wiring Diagram



208 VAC single phase- parallel



240 VAC single phase- parallel



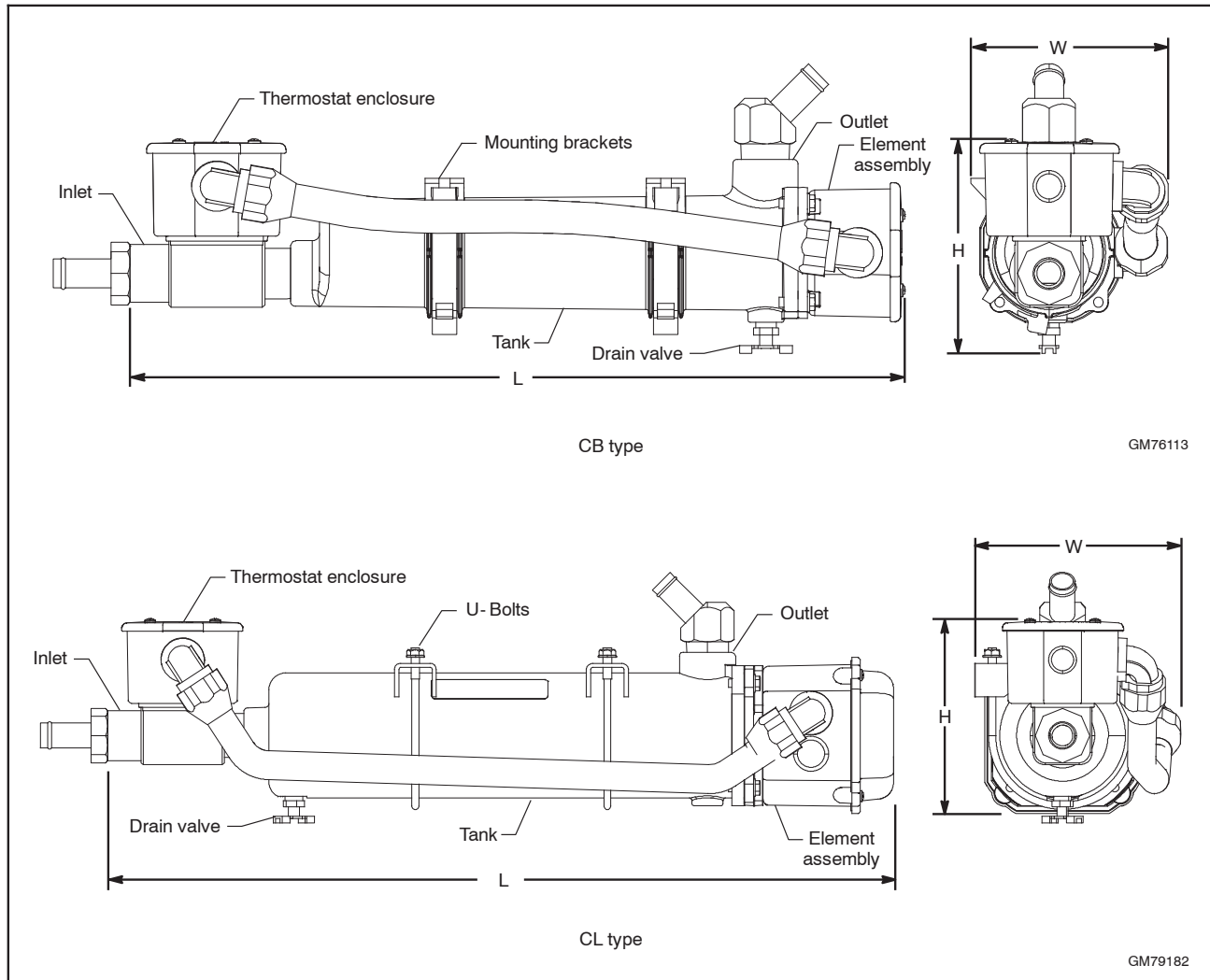
480 VAC single phase- parallel



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

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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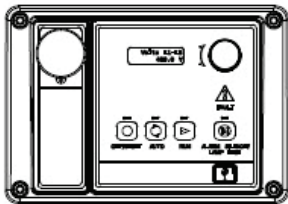


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Integral Voltage Regulator with Kohler® APM402/ Decision-Maker® 3000 and Menu-Driven Selections (15-1000 kW Generator Set Models)



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

The voltage regulator is integral to the controller and uses patented hybrid voltagae regulator design providing ±0.5% no-load to full-load regulation using root-mean-square (RMS) voltage sensing. The voltage regulator features three-phase sensing and is available for 12- or 24-volt engine electrical systems.

Voltage Regulators

The following information provides general features, specifications, and functions of available voltage regulators. This information generally applies to a single generator set and multiple generator sets with paralleling applications. Refer to the respective generator set specification sheet and see your authorized distributor for information regarding specific voltage regulator applications and availability.

Integral Voltage Regulators with APM402/Decision-Maker® 3000 Controllers

Calibration	Digital Display	Range Settings	Default Selection
Voltage Adjustment	Volt Adj	± 10% of System Voltage	System Voltage
Underfrequency Unload or Frequency Setpoint	Frequency Setpoint	42 to 62 Hz	2.5 Hz Below Nominal Frequency
Underfrequency Unload Scope	Slope	0-10% of System Voltage (Volts per Cycle)	5% of System Voltage



Specification/Feature	Integral with APM402/Decision-Maker® 3000
Generator Set Availability	15-1000 kW
Type	Patented Hybrid Design
Status and Shutdown Indicators	LEDs and Text LCD Display
Operating Temperature	-40 ° C to 70 ° C (-40 ° F to 158 ° F)
Storage Temperature	-40 ° C to 85 ° C (-40 ° F to 185 ° F)
Humidity	5-95% Non-Condensing
Circuit Protection	Solid-State, Redundant Software and Fuses
Sensing, Nominal	100-240 Volts (L-L), 50-60 Hz
Sensing Mode	RMS, Single- or 3-Phase
Input Requirements	8-36 VDC
Continuous Output	5 VDC @ 100mA max. 5.0 ADC with GM88453 Activator Board
Maximum Output	5 VDC @ 100mA max. 5.0 ADC with GM88453 Activator Board
Transition Frequency	42.0-62.0Hz
Exciter Field Resistance	4-30 Ohms with GM88453 Activator Board
No-Load to Full-Load Voltage Regulation	± 0.5%
Thermal Drift	<0.5% (-40 ° C to 70 ° C) [-40 ° F to 158 ° F] Range
Response Time	Less than 5µS
System Voltage Adjust.	± 10%
Voltage Adjustment	Controller Menu Knob
Remote Voltage Adjustment	not available
Paralleling Capability	not available
VAR/PF Control Input	not available

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

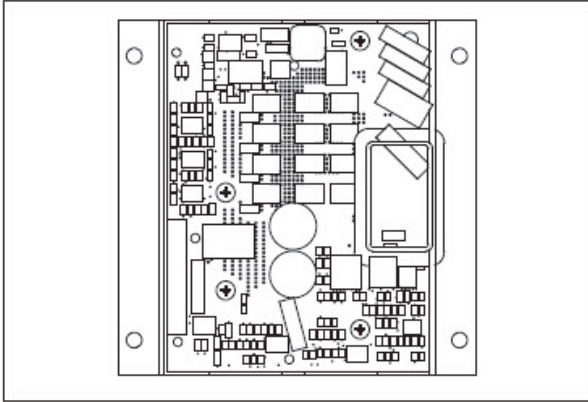
- The APM402/Decision-Maker® 3000 digital display and pushbutton/rotary dial provide access to data. A two-line LCD display provides complete and concise information. A two-line vacuum fluorescent display provides complete and concise information.
- The Decision-Maker® 3000 graphical display and pushbutton/rotary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

Voltage Regulator Menu

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

Jumpers

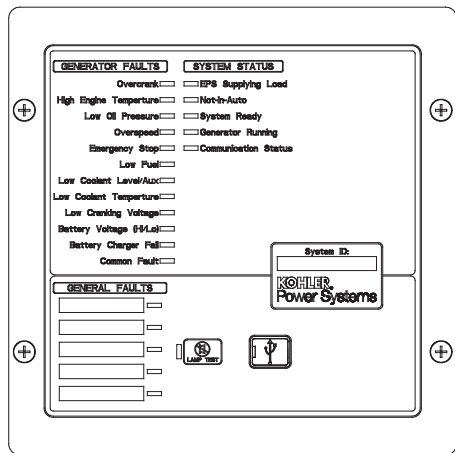
- L1-L2 volts
- L2-L3 volts (3-phase)
- L3-L1 volts (3-phase)
- L1-N volts
- L2-N volts
- L3-N volts (3-phase)



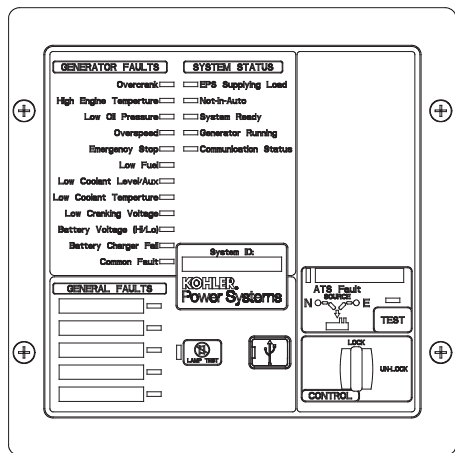
- Interfaces between the controller and alternator assembly using rotor field leads, auxiliary power windings, and optic board leads.
- Allows the Decision-Maker® controllers the ability to control a wound-field alternator using the same control signal as Fast Response™ alternator.
- Permits the generator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

Modbus® is a registered trademark of Schneider Electric.

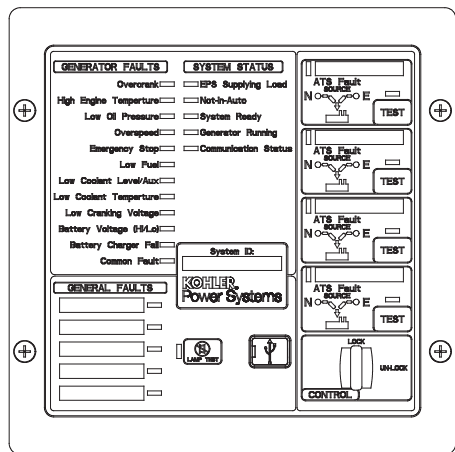
Remote Serial Annunciator III (RSA III)



RSA III



RSA III with a Single ATS Control



RSA III with Four ATS Controls

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

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

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

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

Decision-Maker® MPAC® 750, 1200, and 1500
MPAC® 1000 and 1500

- Configuration via a personal computer (PC) software.
- Writable surfaces (white boxes in illustrations) for user-defined selections.
- Uses Modbus® RTU protocol.
- Controller connections:
 - RS-485 for serial bus network
 - USB port. Connect a personal computer and use Kohler® SiteTech™ software to view events and adjust settings. *
 - 12-/24-volt DC power supply
 - 120/208 VAC power supply (available accessory)
- Meets the National Fire Protection Association Standard NFPA 110, Level 1.

Dimensions

- Dimensions—W x H x D, mm (in.).

Surface Mounted:

203 x 203 x 83 (8.0 x 8.0 x 3.3)

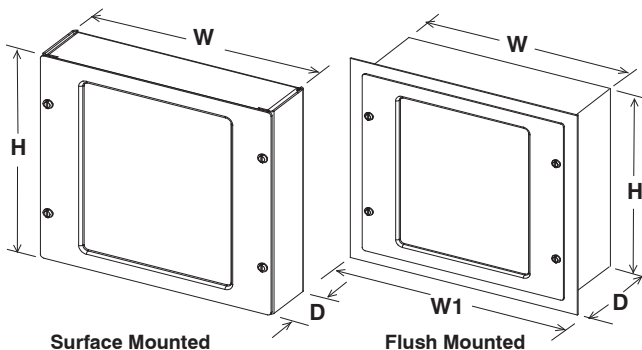
Flush Mounted (Inside Wall):

203 x 203 x 76 (8.0 x 8.0 x 3.0)

Flush mounting plate W1: 254 (10.0)

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

Modbus® is a registered trademark of Schneider Electric.



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

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

Specifications

- LED indicating lights for status, warning, and/or shutdown.
- Power source with circuit protection: 12- or 24-volt DC
- Power source with 120/208 VAC, 50/60 Hz adapter (option)
- Power draw: 200 mA
- Humidity range: 0% to 95% noncondensing
- Operating temperature range: -20°C to +70°C (-4°F to +158°F)
- Storage temperature range: -40°C to +85°C (-40°F to +185°F)
- Standards:
 - NFPA 110, level 1
 - UL 508 recognized
 - CE directive
 - NFPA 99
 - ENS 61000-4-4
 - EN611-4-4 fast transient immunity
- RS-485 Modbus® isolated port @ 9.6/19.2/38.4/57.6 kbps (default is 19.2 kbps)
- USB device port
- NEMA 1 enclosure

(1) All generator set controllers except Decision-Maker® 3+ controller.

(2) Decision-Maker® 3+ controller only.

* May require optional kit or user-provided device to enable function and LED indication.

† Digital input #3 is factory-set for high battery voltage on the Decision-Maker® 3+ controller.

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ATS Controls (RSA III with ATS controls only)

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

NFPA Requirements

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

Fault and Status LEDs and Lamp Test Switch

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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



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

Accessories

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

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

DISTRIBUTED BY:



Bay City Electric Works
322 Lindbergh Avenue
Livermore, CA 94551
619-938-8200
619-938-8217 fax

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Alternator Data

TECHNICAL INFORMATION BULLETIN

Alternator Data Sheet

Alternator Model: 5M4032

22-AUG-11

Kilowatt ratings at		1800 RPM		60 Hertz		10 LEADS		Standard 3 phase	
kW (kVA)		3 Phase		0.8 Power Factor		Dripproof or Open Enclosure			
Voltage*	Class B	Class F					Class H		
	80° C @ Continuous	90° C @ Lloyds	95° C @ ABS	105° C @ British Standard	105° C @ Continuous	130° C @ Standby	125° C @ British Standard	125° C @ Continuous	150° C @ Standby
480/240	570 (713)	625 (781)	645 (806)	680 (850)	680 (850)	700 (875)	695 (869)	700 (875)	765 (956)
460/230	595 (744)	645 (806)	655 (819)	700 (875)	700 (875)	730 (913)	715 (894)	730 (913)	785 (981)
440/220	595 (744)	635 (794)	640 (800)	680 (850)	680 (850)	730 (913)	715 (894)	725 (906)	765 (956)
416/208	570 (713)	600 (750)	610 (763)	645 (806)	650 (813)	700 (875)	685 (856)	685 (856)	725 (906)
380/190	525 (656)	555 (694)	560 (700)	595 (744)	595 (744)	595 (744)	595 (744)	595 (744)	595 (744)

① Rise by resistance method, Mil-Std-705, Method 680.1b.

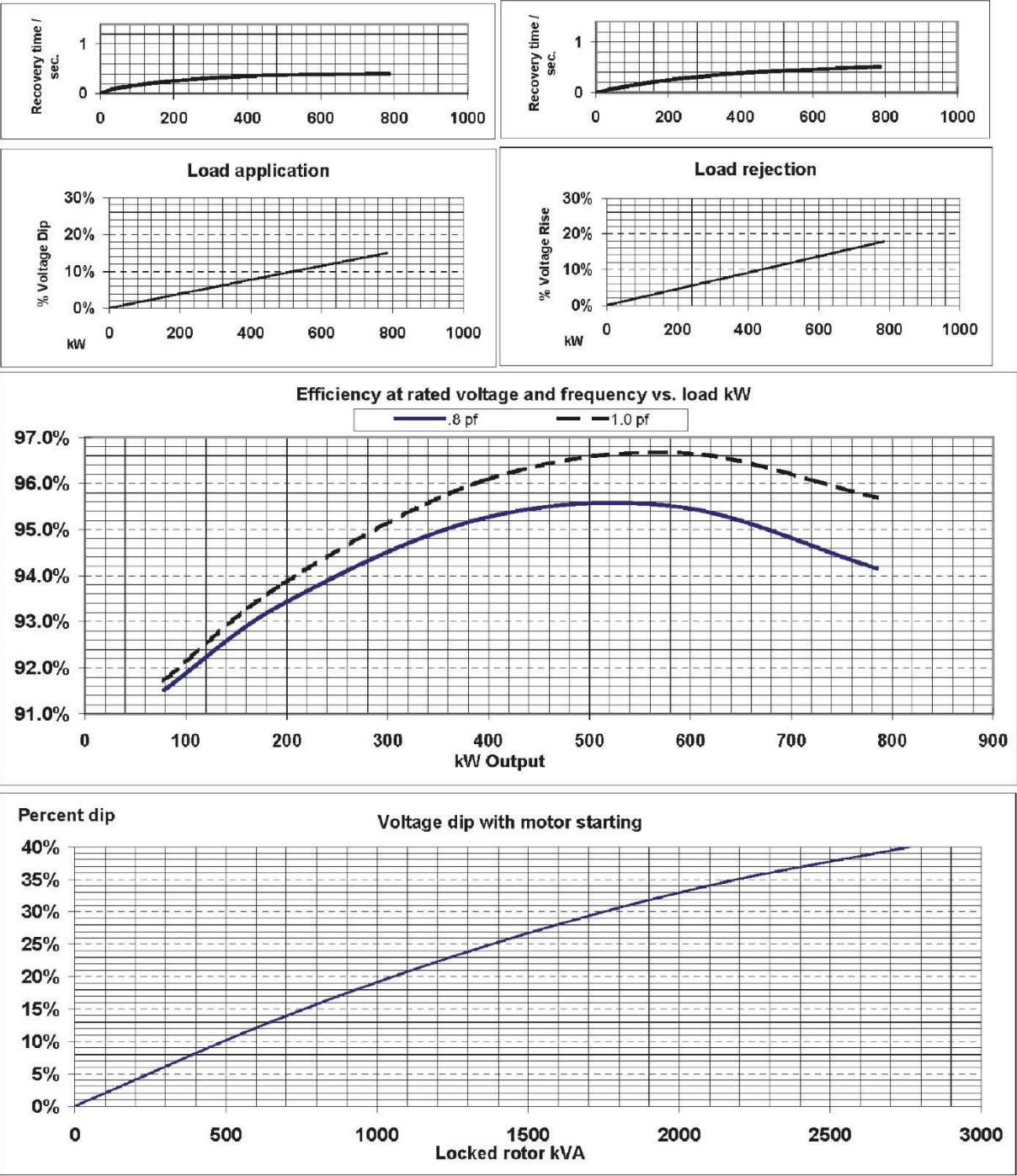
② British Standard Rating per BS 5000

Submittal Data: 480 Volts*, 700 kW, 875 kVA, 0.8 P.F., 1800 RPM, 60 Hz, 3 Phase						STD. CONNECTION	
MII-Std-705B			MII-Std-705B				
Method	Description	Value	Method	Description	Value		
301.1b	Insulation Resistance	>1.5 Meg	505.3b	Overspeed	2250 RPM		
302.1a	High Potential Test		507.1c	Phase Sequence CCW-ODE	ABC		
	Main Stator	2000 Volts	508.1c	Voltage Balance, L-L or L-N	0.20%		
	Main Rotor	1500 Volts	601.4a	L-L Harmonic Maximum - Total	5.0%		
	Exciter Stator	1500 Volts		(Distortion Factor)			
	Exciter Rotor	1500 Volts	601.4a	L-L Harmonic Maximum - Single	3.0%		
	PMG Stator	1500 Volts	601.1c	Deviation Factor	5.0%		
401.1a	Stator Resistance, Line to Line		---	TIF (1960 Weightings)	< 50		
	High Wye Connection	0.0074 Ohms	---	THF (IEC, BS & NEMA Weightings)	< 2 %		
	Rotor Resistance	0.472 Ohms	652.1a	Shaft Current	< 0.1 ma		
	Exciter Stator	23 Ohms					
	Exciter Rotor	0.045 Ohms	---	Main Stator Capacitance to ground	0.03 mfd		
	PMG Stator	2.1 Ohms					
410.1a	No Load Exciter Field Amps	0.65 A DC					
	at 240/480 Volts Line to Line						
420.1a	Short Circuit Ratio	0.489					
421.1a	Xd Synchronous Reactance	3.09 pu					
		0.814 ohms					
422.1a	X2 Negative Sequence React.	0.217 pu					
		0.057 ohms					
423.1a	X0 Zero Sequence Reactance	0.058 pu					
		0.015 ohms					
425.1a	X'd Transient Reactance	0.153 pu					
		0.04 ohms					
426.1a	X"d Subtransient Reactance	0.132 pu					
		0.035 ohms					
---	Xq Quadrature Synchronous	1.25 pu					
		0.329 ohms					
427.1a	T'd Transient Short Circuit						
	Time Constant	0.127 sec.					
428.1a	T"d Subtransient Short Circuit						
	Time Constant	0.009 sec.					
430.1a	T'do Transient Open Circuit						
	Time Constant	1.67 sec.					
432.1a	Ta Short Circuit Time						
	Constant of Armature Winding	0.015 sec.					

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

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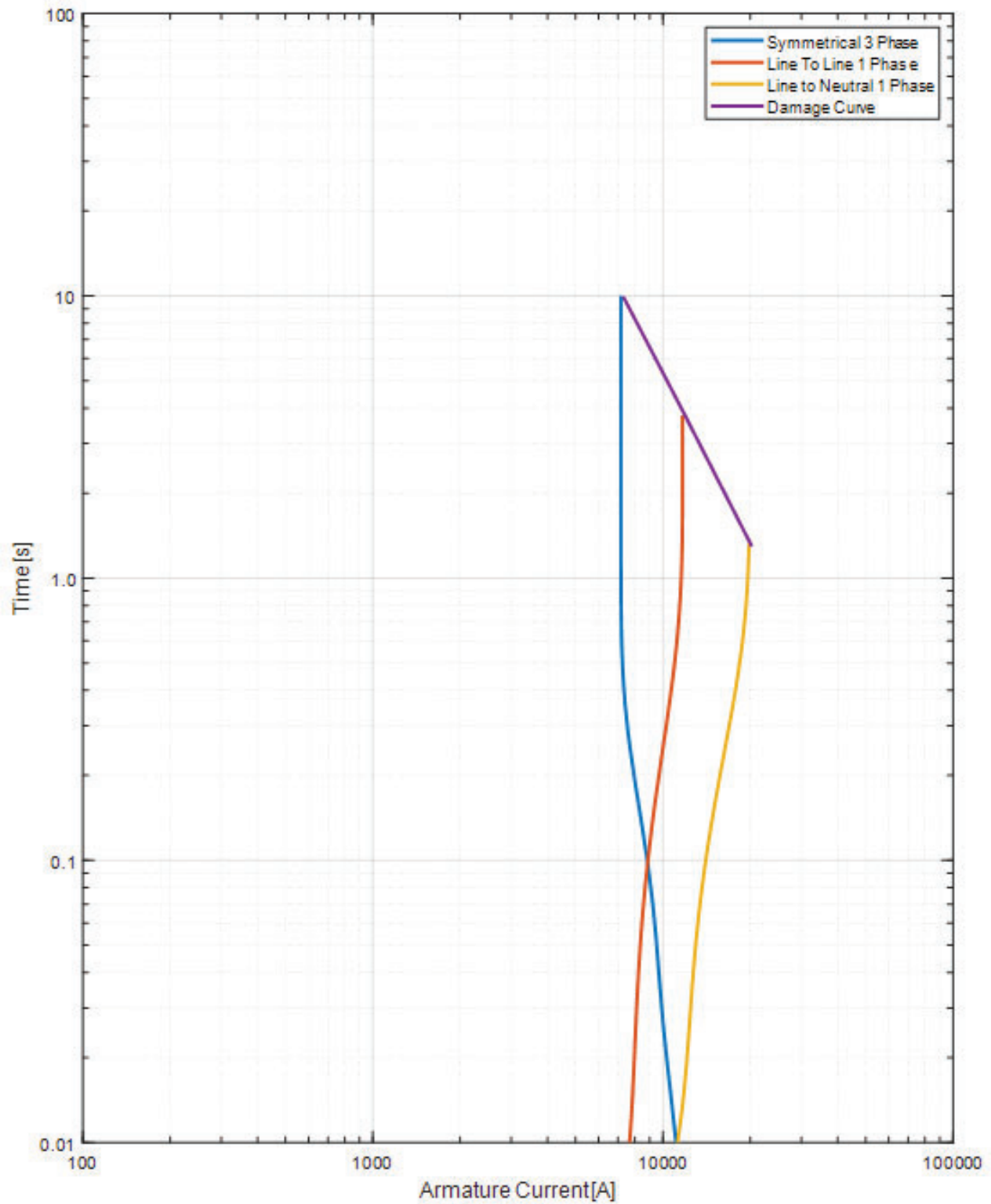
TYPICAL DYNAMIC CHARACTERISTICS



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

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

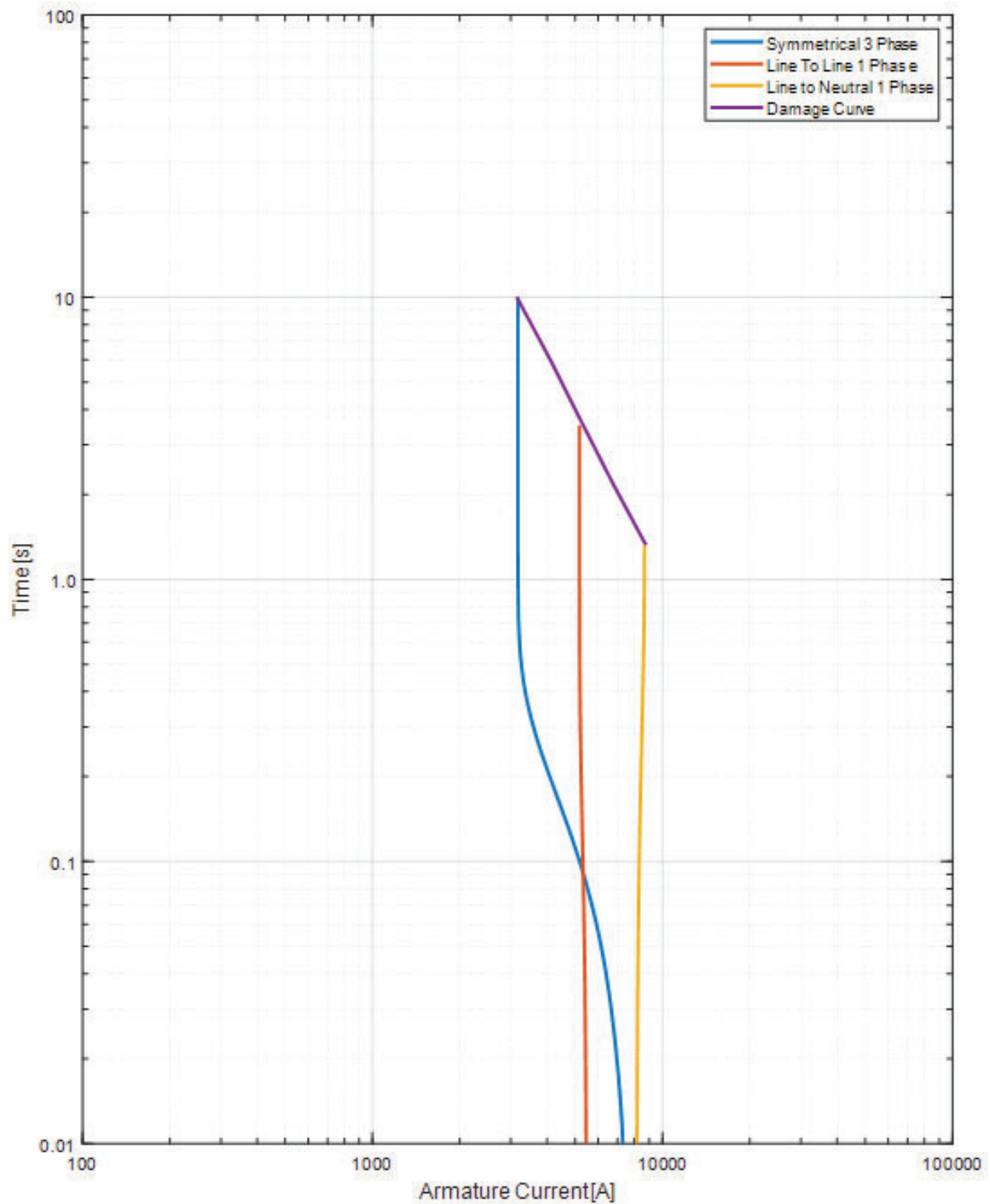
Full Load Current: 2429 Amps **Steady State S.C. Current:** 7287 Amps **Max. 3 ph. Symm. S.C. Current:** 13723 Amps



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: 1052 Amps **Steady State S.C. Current:** 3156 Amps **Max. 3 ph. Symm. S.C. Current:** 7970 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

600REOZVB 60Hz, TWD1643GE (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)	53 (127)	50 (122)	49 (120)	48 (118)	46 (115)	NA (NA)	45 (113)
	Cooling system airflow	m ³ /min (ft ³ /min)	790 (27900)	750 (26500)	730 (25800)	715 (25200)	700 (24700)	NA (NA)	NA (NA)

600REOZVB 60Hz, TWD1644GE (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)	55 (131)	54 (129)	53 (127)	52 (126)	50 (122)	49 (120)	49 (120)
	Cooling system airflow	m ³ /min (ft ³ /min)	798 (28200)	780 (27500)	768 (27100)	752 (26600)	735 (26000)	717 (25300)	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	Sound Enclosure
600REOZVB	60	100% Load	122.4	93.8	91.9	76.0
		No Load	107.8	90.9	89.0	73.8

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.

600REOZVB		60 Hz		Sound Pressure Levels dB(A)								
Load	Distance, m (ft.)	Enclosure	Measurement Position	Octave Band Center Frequency (Hz)								Overall Level
				63	125	250	500	1000	2000	4000	8000	
100% Load	7 (23)	Sound	Right	57.1	66.9	70.6	71.0	66.4	64.5	60.7	55.3	75.8
			Front-Right	59.5	69.9	68.2	67.9	67.5	64.7	58.9	52.8	75.2
			Front	56.6	66.5	69.8	69.8	68.3	64.3	59.9	52.3	75.4
			Front-Left	58.5	66.8	73.0	72.7	69.1	65.9	58.7	55.1	77.6
			Left	58.0	67.4	70.3	71.1	67.3	66.3	59.6	58.5	76.1
			Back-Left	54.1	65.6	72.1	72.3	70.0	67.2	60.1	55.5	77.3
			Back	59.3	64.7	68.5	66.9	64.8	63.3	57.0	48.6	73.3
			Back-Right	56.3	68.3	70.1	68.5	68.4	66.1	58.6	57.5	75.7
			8-pos. log avg.	57.7	67.3	70.6	70.5	68.0	65.5	59.3	55.3	76.0

				Sound Pressure Levels dB(A)								
Load	Distance, m (ft.)	Enclosure	Measurement Position	Right	Front-Right	Front	Front-Left	Left	Back-Left	Back	Back-Right	8-pos. log avg.
100% Load	7 (23)	Weather	Overall Levels	93.1	92.7	84.3	90.9	92.1	91.5	91.1	94.4	91.9

				Sound Pressure Levels dB(A)								
Load	Distance, m (ft.)		Measurement Position	Octave Band Center Frequency (Hz)								Overall Level
				63	125	250	500	1000	2000	4000	8000	
100% Load	7 (23)	Open Unit, Isolated Exhaust	Right	71.3	76.6	87.5	83.7	86.5	87.6	85.0	89.6	95.0
			Front-Right	68.1	72.2	80.2	82.3	86.0	88.0	86.4	90.3	94.6
			Front	61.9	68.5	80.3	75.7	78.9	79.7	77.2	75.5	86.2
			Front-Left	60.1	71.2	80.5	82.3	87.9	88.0	84.0	80.2	92.8
			Left	66.3	73.0	84.4	82.7	87.3	89.8	85.8	81.7	94.0
			Back-Left	65.9	73.6	84.4	83.1	87.2	88.2	84.6	81.9	93.4
			Back	71.7	76.9	88.9	81.4	83.6	85.3	83.5	82.8	93.0
			Back-Right	62.3	75.9	86.4	83.1	88.1	89.5	87.5	91.1	96.3
			8-pos. log avg.	67.7	74.3	85.2	82.3	86.4	87.8	85.0	86.9	93.8

				Sound Pressure Levels dB(A)								
Load	Distance, m (ft.)		Exhaust	Octave Band Center Frequency (Hz)								Overall Level
				63	125	250	500	1000	2000	4000	8000	
100% Load	1 (3.3)		Raw Exhaust (No Silencer)	99.3	106.9	110.7	111.1	113.6	116.4	115.3	115.3	122.4

600REOZVB	60 Hz
------------------	--------------

				Sound Pressure Levels dB(A)								
Load	Distance, m (ft.)	Enclosure	Measurement Position	Octave Band Center Frequency (Hz)								Overall Level
				63	125	250	500	1000	2000	4000	8000	
No Load	7 (23)	Sound	Right	55.3	62.0	67.3	69.4	66.5	61.9	55.4	46.8	73.5
			Front-Right	51.4	65.0	66.2	66.3	67.2	61.5	56.3	46.5	72.8
			Front	52.7	65.1	68.3	68.8	68.3	62.7	57.4	48.8	74.3
			Front-Left	54.2	63.4	70.3	70.6	68.3	63.1	55.9	47.1	75.3
			Left	52.2	61.7	69.3	69.6	66.4	63.8	55.8	47.8	74.2
			Back-Left	48.2	61.7	69.2	70.0	68.5	65.2	54.9	45.9	74.9
			Back	56.2	63.1	64.7	65.1	64.5	58.4	51.6	41.5	70.9
			Back-Right	50.7	63.3	66.8	67.8	67.6	63.3	53.5	45.1	73.3
			8-pos. log avg.	53.3	63.4	68.1	68.8	67.3	62.8	55.4	46.6	73.8

				Sound Pressure Levels dB(A)								
Load	Distance, m (ft.)	Enclosure	Measurement Position	Right	Front- Right	Front	Front- Left	Left	Back- Left	Back	Back- Right	8-pos. log avg.
No Load	7 (23)	Weather	Overall Levels	89.5	88.5	86.7	89.3	90.6	88.8	87.7	89.9	89.0

				Sound Pressure Levels dB(A)								
Load	Distance, m (ft.)		Measurement Position	Octave Band Center Frequency (Hz)								Overall Level
				63	125	250	500	1000	2000	4000	8000	
No Load	7 (23)	Open Unit, Isolated Exhaust	Right	54.7	71.4	85.2	81.8	85.9	85.8	80.0	73.8	91.4
			Front-Right	58.8	65.1	80.2	78.9	84.3	86.9	80.7	73.5	90.4
			Front	56.4	65.6	82.4	78.6	83.0	82.6	79.0	71.6	88.6
			Front-Left	52.6	69.3	82.8	79.1	86.2	86.7	81.5	73.6	91.2
			Left	55.7	70.5	86.3	81.3	86.0	87.3	83.6	75.2	92.5
			Back-Left	63.6	71.2	84.3	80.4	85.6	84.8	80.3	72.7	90.7
			Back	62.3	70.1	87.5	78.9	79.3	81.5	74.1	66.9	89.6
			Back-Right	57.3	71.8	86.4	80.3	85.6	86.5	81.0	74.9	91.8
			8-pos. log avg.	59.1	69.9	84.9	80.1	84.9	85.7	80.6	73.3	90.9

				Sound Pressure Levels dB(A)								
Load	Distance, m (ft.)	Exhaust		Octave Band Center Frequency (Hz)								Overall Level
				63	125	250	500	1000	2000	4000	8000	
No Load	1 (3.3)	Raw Exhaust (No Silencer)		94.8	100.6	102.3	96.1	99.2	100.5	95.9	90.4	107.8



Emissions Data



600REOZVB

60 Hz. Diesel Generator Set

Tier 2 EPA Certified for Stationary Emergency Applications

EMISSION DATA SHEET

ENGINE INFORMATION

Model:	TWD1643GE, TWD1644GE	Bore:	144mm (5.67 in.)
Nameplate kW @ 1800 RPM:	674	Stroke:	165mm (6.50 in.)
Type:	4-Cycle, 6 Cylinder, Inline	Displacement:	16.12 L (984 cu. in.)
Aspiration:	Turbocharged, Charge Air-Cooled	EPA Family:	NVPXL16.1ACW
Compression Ratio:	16.5:1	EPA Certificate:	NVPXL16.1ACW-021
Emission Control Device:	Electronic Control		

EXHAUST EMISSION DATA (g/kWh):

EPA D2 Cycle 5-mode weighted

	<u>TWD1643GE</u>	<u>TWD1644GE</u>
HC	0.11	0.11
NOx (Oxides of Nitrogen as NO ₂)	5.63	5.59
CO (Carbon Monoxide)	0.41	0.39
PM (Particulate Matter)	0.076	0.04

TEST METHODS AND CONDITIONS

The emission data listed is measured from a laboratory test engine according to the test procedures of 40 CFR 89 or 40 CFR 1039, as applicable. The test engine is intended to represent nominal production hardware, and there is no guarantee that every production engine will have identical test results. Emission results may vary due to engine manufacturing tolerances, engine operating conditions, fuels used, alternate test methods, or other conditions.

Data and specifications subject to change without notice.

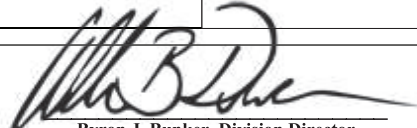


UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2022 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION
AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: AB Volvo Penta
(U.S. Manufacturer or Importer)
Certificate Number: NVPXL16.1ACW-021

Effective Date:
12/30/2021
Expiration Date:
12/31/2022


Byron J. Bunker, Division Director
Compliance Division

Issue Date:
12/30/2021
Revision Date:
N/A

Model Year: 2022
Manufacturer Type: Original Engine Manufacturer
Engine Family: NVPXL16.1ACW

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

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.

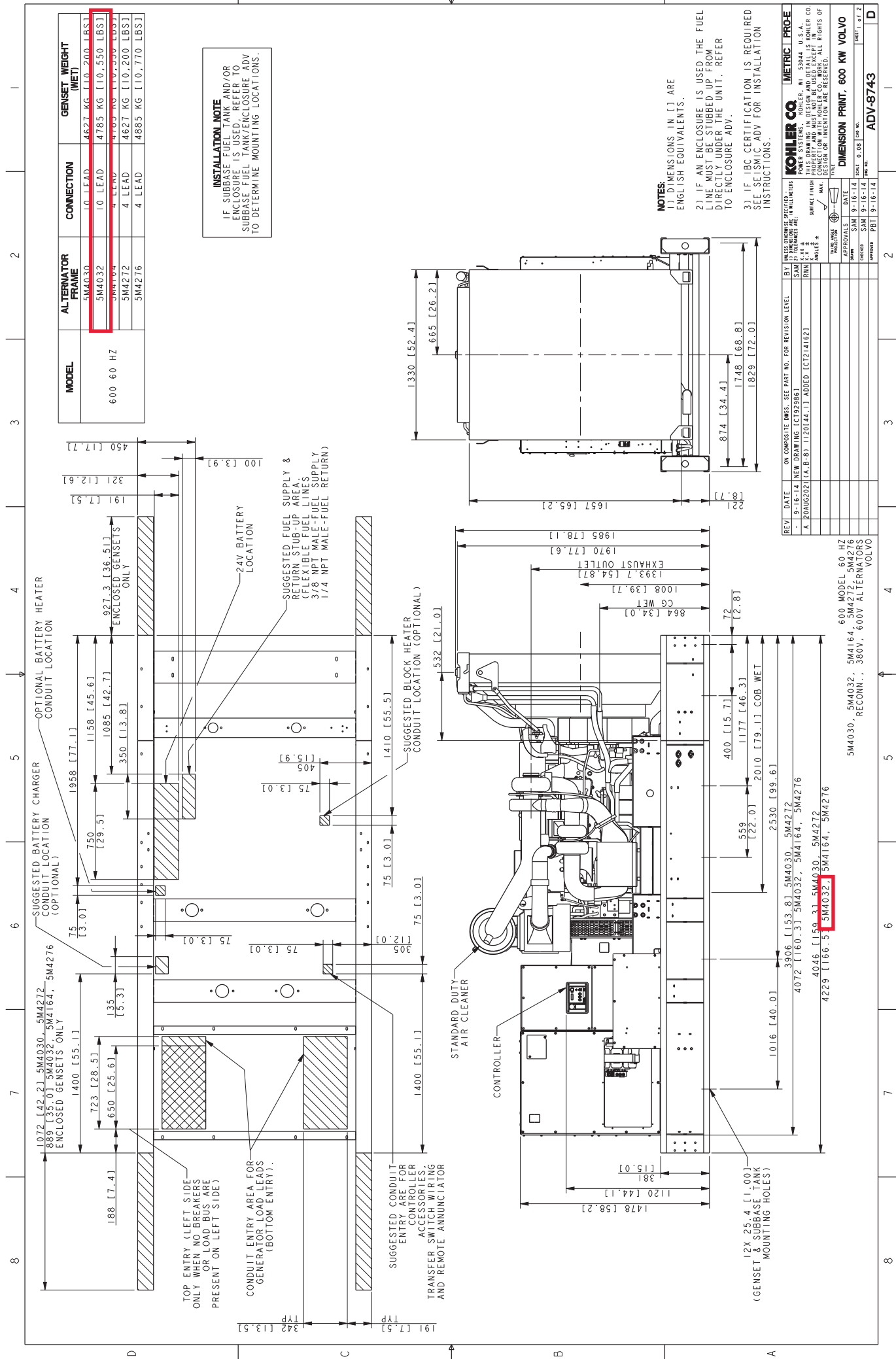
This certificate of conformity covers only those new compression-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate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

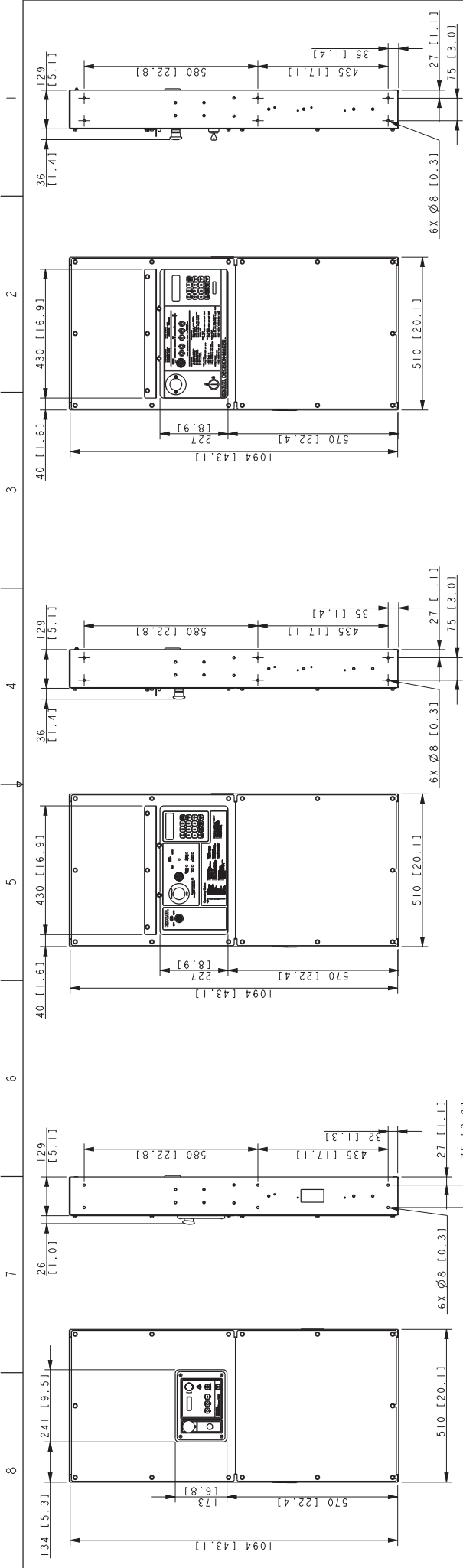
[illegible]

Block Heater
4000W 240V

Battery Charger 24V-10Amp

[illegible]

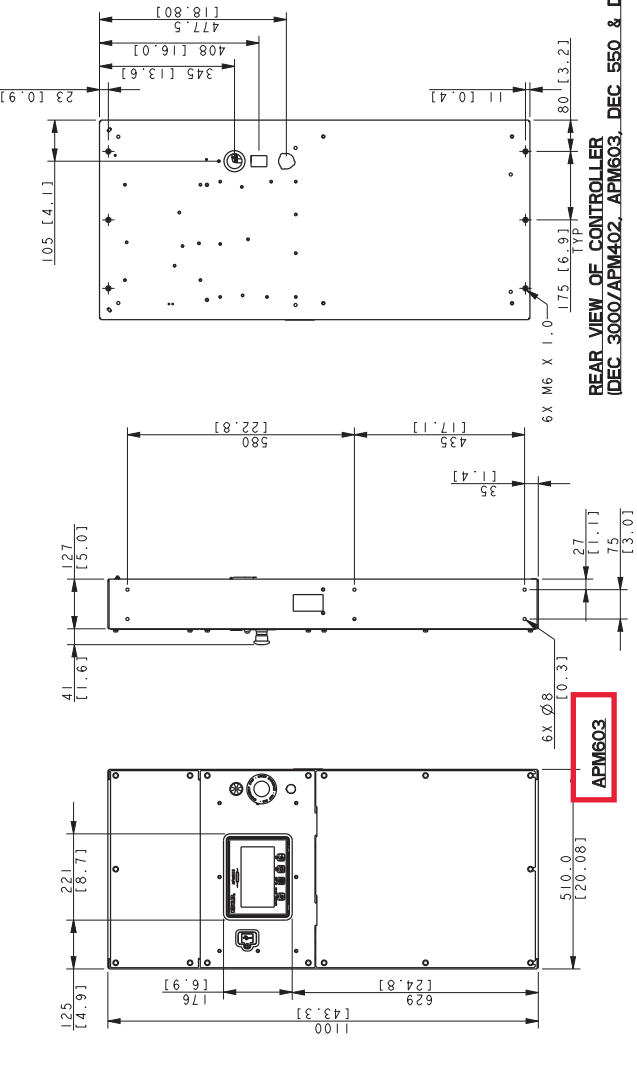
600 VOLVO MODEL
RECONNECTABLE
380V & 600V ALTERNATORS



DEC 6000

DEC 550

DEC 3000/APM402



REAR VIEW OF CONTROLLER
(DEC 3000/APM402, APM603, DEC 550 & DEC 6000)

APM603

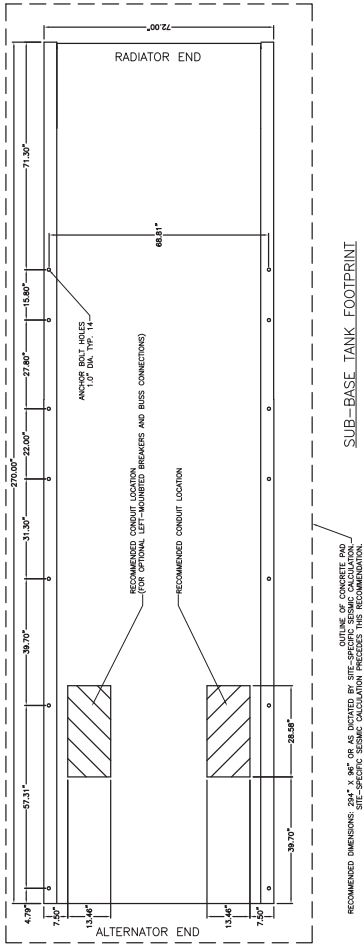
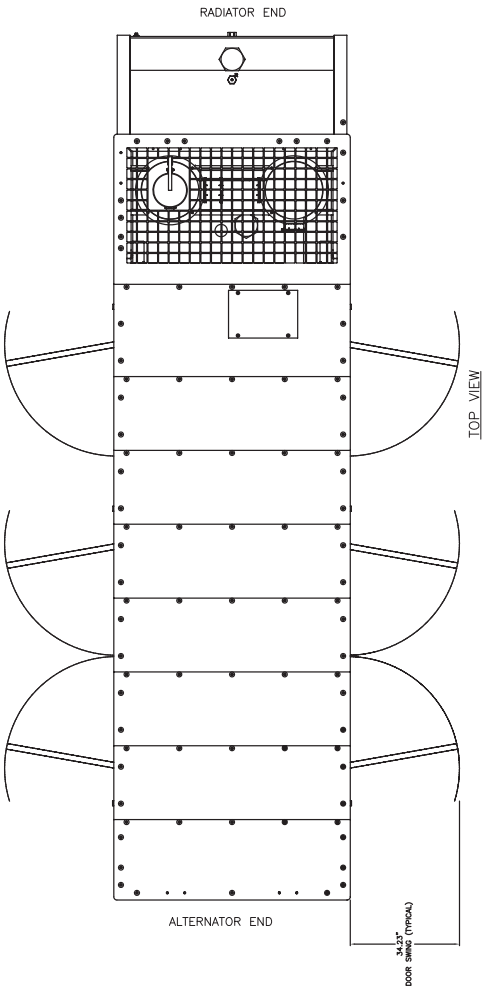
REV.	DATE	ON COMPOSITE DIMS. SEE PART NO. FOR REVISION LEVEL	BY	DO NOT SCALE. REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS
1	26-11	NEW DRAWING [30647-3]	D/J	UNLESS OTHERWISE INDICATED, DIMENSIONS ARE IN MILLIMETERS.
2	22-12	WAS 33 [1.3], 430 [16.9] WAS 445 [17.5], 40 [1.6]	A	THIS DRAWING IS DESIGN AND DETAIL 15 KOHLER PROPERTY AND MUST NOT BE REPRODUCED OR USED FOR ANY OTHER PROJECT WITHOUT THE WRITTEN PERMISSION OF KOHLER.
3	15-71	WAS 33 [1.3], 430 [16.9] WAS 55 [2.2] [CT0721]	MJB	MAX. SURFACE FINISH: 2.5 μm
4	10-30-18	(B-7) DEC 3000/APM402 WAS DEC 3000.		MAX. SURFACE FINISH: 2.5 μm
5		(B-8,7,6) VIEW ADDED: (B-6) DEC 3000/APM402.		
6		APM603, DEC 550 & DEC 6000 WAS DEC 3000, DEC 550 & DEC 6000 [C191496]		
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300-2250FW
CONTROLLER

ADV-7985

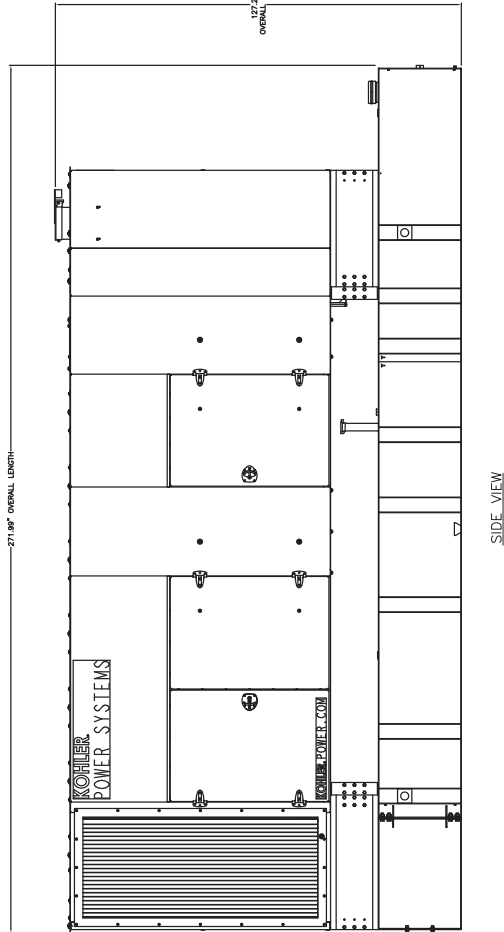
ADV-7985

ADV-7985

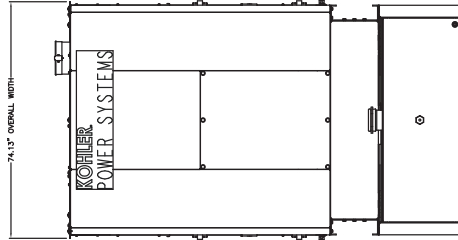


SUB-BASE TANK FOOTPRINT

RECOMMENDED DIMENSIONS: 24\"/>



SIDE VIEW



RADIATOR END VIEW

MAJOR COMPONENTS:

GENERATOR:	600RE0ZVB	WIEGHT:	DRY	10550 LBS.	WET	10550 LBS.
ENCLOSURE:	SOUND L2 STEEL ENCLOSURE	GENERATOR:	10550 LBS.	3270 LBS.	ENCLOSURE:	3270 LBS.
TANK:	1038g SUBBASE STATE TANK	TANK:	4173 LBS.	11958 LBS.	TOTAL:	17993 LBS.
						25778 LBS.

INT. REF.	ADV-8743 REV. - SHT(1/2)
GENERATOR:	5M4032
ALTERNATOR:	ADV-8417 REV. C SHT(1/7)
ENCLOSURE:	ADV-8417 REV. C SHT(5/7)

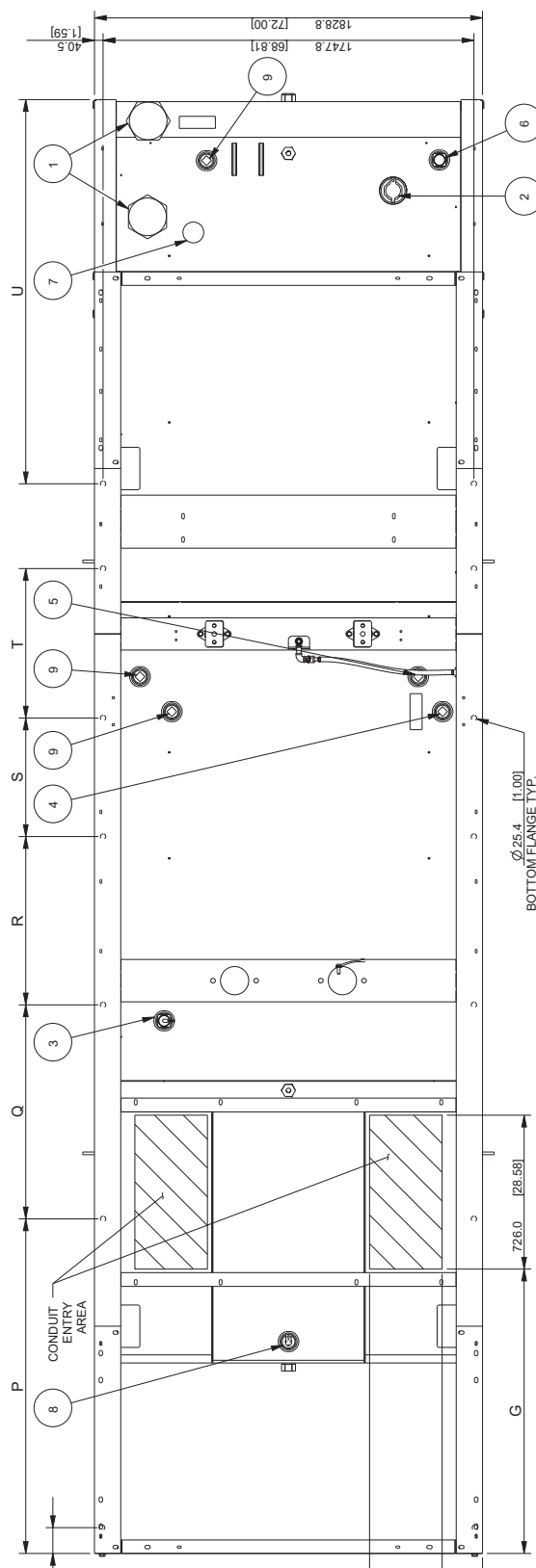


KOHLER
IN POWER SINCE 1920.

EMERGENCY GENERATOR 600RE0ZVB

SIZE	DWG NO.	REV
B	600RE0ZVB-5M4032-SAE12-1038GST	00
SCALE	DATE	SHEET
NONE	10/01/2019	1 OF 1

STATE TANK



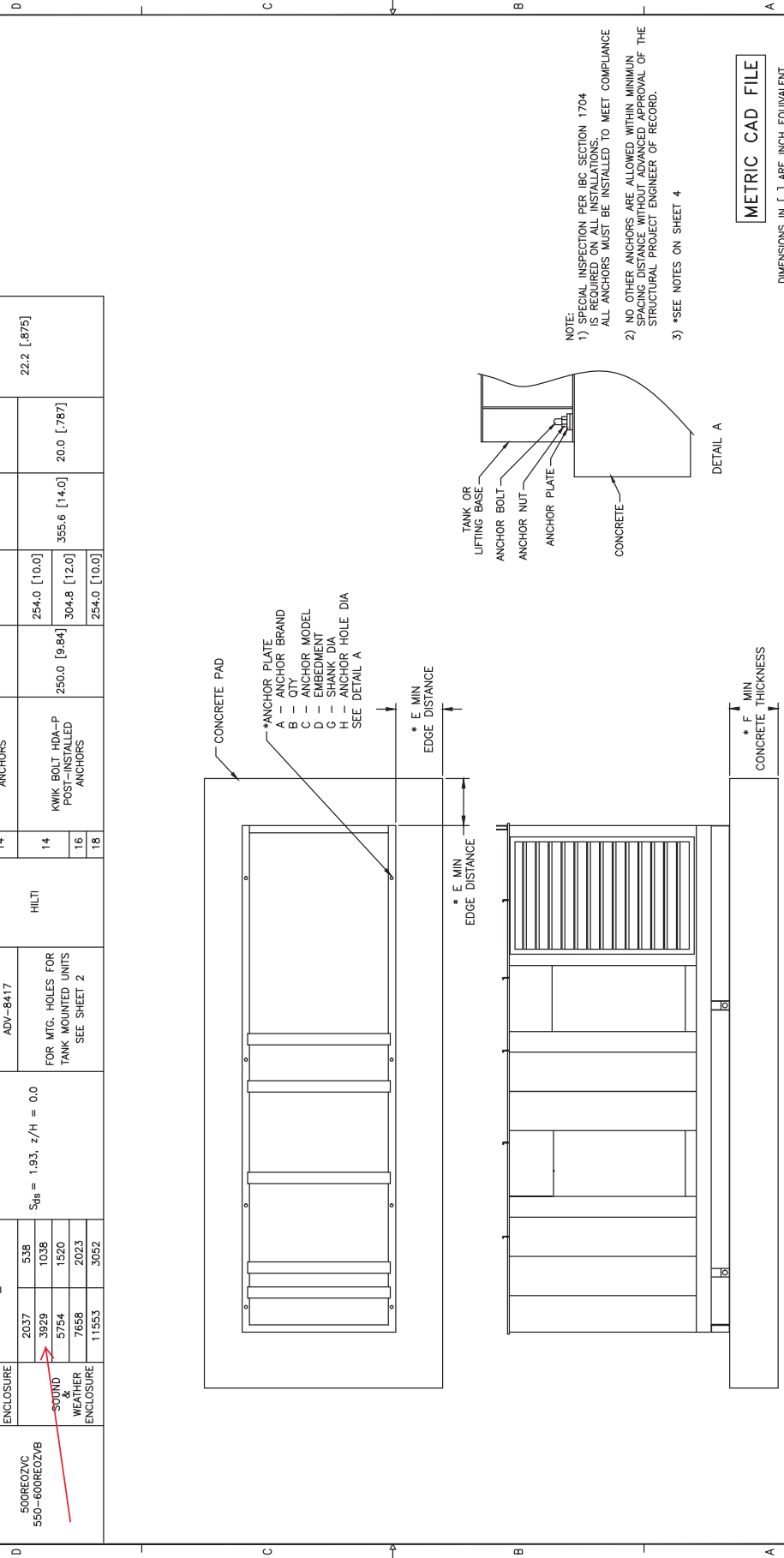
12 HOUR STATE TANK SHOWN

2039 L [538 GAL.] 12 HOUR TANK SHOWN.

9	PLUG, PIPE (2" NPT)
8	SWITCH, FUEL IN BASIN TOP MTD, 2"
7	VENT, NORMAL
6	GAUGE, FUEL LEVEL, DIRECT READ
5	RETURN, FUEL
4	SUPPLY, FUEL
3	GAUGE, FUEL LEVEL, W/ SENDER
2	FILL CAP, 2" LOCKABLE W/PIPE RISER
1	CAP, EMERGENCY VENT

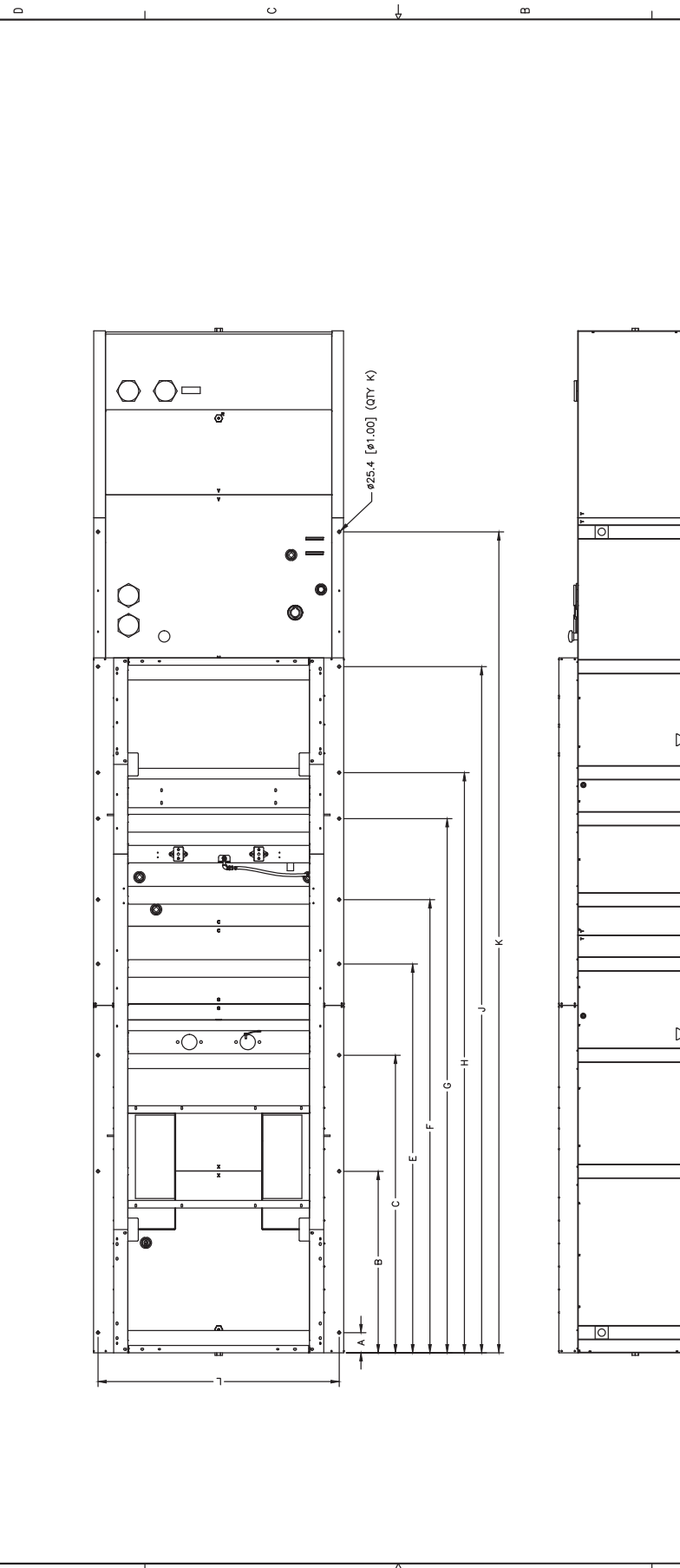
REV	DATE	DESCRIPTION	BY	CHKD	APP'D	DATE	DESCRIPTION	BY	CHKD	APP'D	DATE	DESCRIPTION
-	6-29-11	NEW DRAWING (B1023-12)	ABJ	ST	DAK	6-29-11	NEW DRAWING (B1023-12)	ABJ	ST	DAK	6-29-11	NEW DRAWING (B1023-12)
A	3-19-12	(A-B) SEE ISMIC NOTE ADDED (C708748)	DJA	ST	DAK	3-19-12	(A-B) SEE ISMIC NOTE ADDED (C708748)	DJA	ST	DAK	3-19-12	(A-B) SEE ISMIC NOTE ADDED (C708748)
B	1-10-13	SEE SHEET 1 (C734883)	SDS	ST	DAK	1-10-13	SEE SHEET 1 (C734883)	SDS	ST	DAK	1-10-13	SEE SHEET 1 (C734883)
C	8-10-17	(B-5) ADD NOTE, SEE SHEET 1, 2, 4, 8 (C1717496)	RML	ST	DAK	8-10-17	(B-5) ADD NOTE, SEE SHEET 1, 2, 4, 8 (C1717496)	RML	ST	DAK	8-10-17	(B-5) ADD NOTE, SEE SHEET 1, 2, 4, 8 (C1717496)
D	11-25-19	SEE SHEET 1 & 3 (C198135)	RML	ST	DAK	11-25-19	SEE SHEET 1 & 3 (C198135)	RML	ST	DAK	11-25-19	SEE SHEET 1 & 3 (C198135)
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MAXIMUM SEISMIC DESIGN RATING APPLIES AS A SYSTEM TO GENSET, TANKS, ENCLOSURES AND ACCESSORIES						MAXIMUM IBC SEMIC DESIGN ACCELERATION FOR ANCHORING SYSTEM			ANCHORING SYSTEM			ANCHORING SYSTEM			ANCHORING SYSTEM			REVISION					
GENSET MODELS	ENCLOSURE		LITERS	FUEL TANK CAPACITY		GAL	LOCATIONS	ANCHOR BRAND	QTY	ANCHOR MODEL	EMBEDMENT	E MIN	F MIN.	G	H	REV	DATE	BY	CHK	APP	DATE		
	WEATHER ENCLOSURE			SOUND ENCLOSURE																		ANCHOR HOLE DIA	SHAFT DIA
500RE02VC 550-600RE02VB			2037				FOR MTG. HOLES ON LIFTING BASE UNITS SEE SHEET 7 ON ADV-8417	HILTI	14	KWIK BOLT TZ-CS POST-INSTALLED ANCHORS	95.3 [3.75]	254.0 [10.0]	152.4 [6.0]	19.05 [.75]	22.2 [.875]	A	6-28-12	NEW DRAWING [C08749]	D	DAY	SAM		
			3929						14		250.0 [9.84]	355.6 [14.0]	20.0 [.787]										
			5754				FOR MTG. HOLES FOR TANK MOUNTED UNITS SEE SHEET 2		16	KWIK BOLT HDA-P POST-INSTALLED ANCHORS													
			7658						18														
			11553																				



KOHLER CO.		2000/2003/2006/2009/2012		500-600 VOLVO	
SEISMIC INSTRUCTION		ADV-8488		1-3	
REVISION		DATE		BY	
1		3-14-12		D	
2		3-14-12		D	
3		3-14-12		D	
4		3-14-12		D	
5		3-14-12		D	
6		3-14-12		D	
7		3-14-12		D	
8		3-14-12		D	

GENSET MODELS	FUEL TANK CAPACITY		L	A	B	C	E	F	G	H	J	K	M QTY	REV	DATE	REVISION
	LITERS	GAL														
500-600 REC2V8/C	2037	538	1747.52 [68.80]	689.1 [27.13]	1698.5 [66.87]	2492.5 [96.13]	3051.3 [120.13]	3756.4 [147.89]	4157.0 [163.66]	4762.5 [187.50]	-	-	14	1	3-14-12	NEW DRAWING [C00248]
	3929	1038												2	3-14-12	SEE SHEET 1 [C11680]
	5754	1520												3	3-14-12	VIEW REPAIRED WITH NEW TANK, TANK UPGRADE ACCORDINGLY [C11680]
	7658	2023												4	3-14-12	VIEW REPAIRED WITH NEW TANK, TANK UPGRADE ACCORDINGLY [C11680]
	11553	3052	2098.04 [82.60]	175.0 [6.89]	1578.1 [62.13]	2587.5 [101.87]	3381.5 [133.13]	3940.6 [155.14]	4645.7 [182.90]	5046.0 [198.66]	5867.4 [231.00]	7137.4 [281.00]	16			
													18			



METRIC CAD FILE

- NOTE:
- SPECIAL INSPECTION PER IBC SECTION 1704 IS REQUIRED ON ALL INSTALLATIONS. ALL ANCHORS MUST BE INSTALLED TO MEET COMPLIANCE
 - NO OTHER ANCHORS ARE ALLOWED WITHIN MINIMUM SPACING DISTANCE WITHOUT ADVANCED APPROVAL OF THE STRUCTURAL PROJECT ENGINEER OF RECORD.
 - *SEE NOTES ON SHEET 3

KOHLER CO.
 THE KOHLER COMPANY, 1400 N. LINCOLN AVENUE, KOHLER, WI 53045
 DIMENSION PRINT
 SEISMIC INSTRUCTION
 2000/2003/2006/2009/2012
 SEISMIC INSTRUCTION
 500-600 VOLVO
 ADV-8488

The following are requirements for seismic installation:

- METRIC CAD FILE

[illegible]



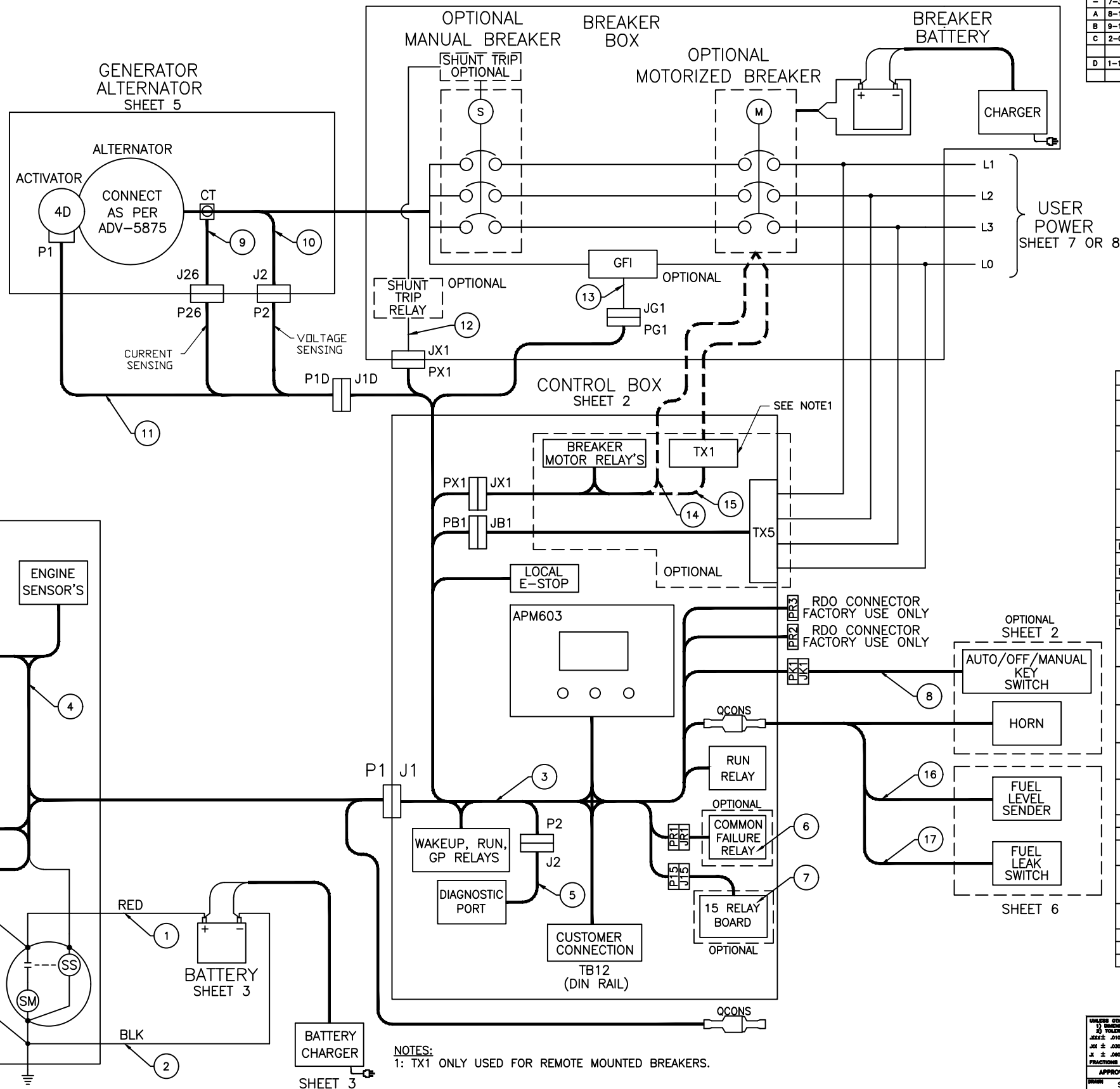
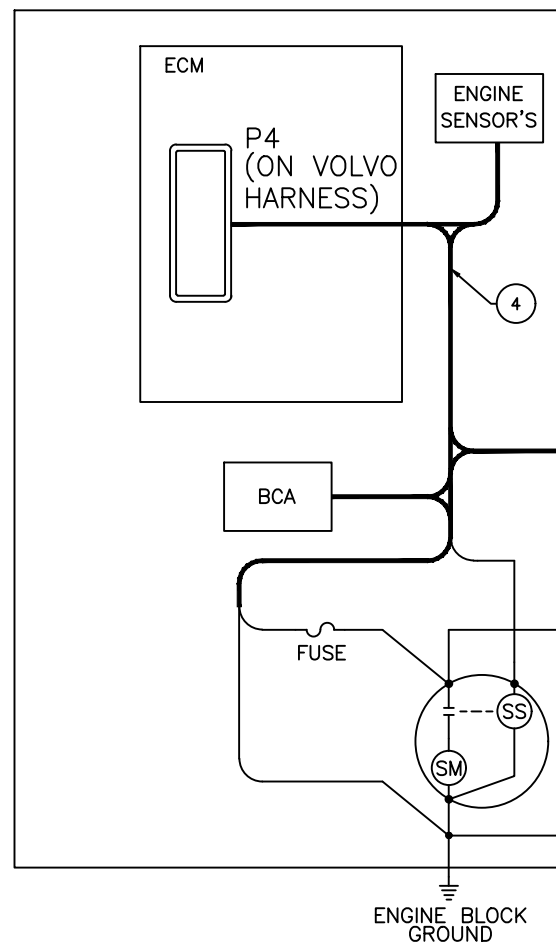
Wiring Schematics

LEGEND

BCA – BATTERY CHARGING ALTERNATOR
BTCS – BATTERY TERM COMPENSATION SENSOR
CLS – COOLANT LEVEL SENDER
CT(#) – CURRENT TRANSFORMER
CTS – COOLANT TEMPERATURE SENDER
DIAG – DIAGNOSTIC LAMP
ECM – ENGINE CONTROL MODULE
ESS – EMERGENCY STOP SWITCH
FLS – FUEL LEAK ALARM
FLS – FUEL LEVEL SENDER
LCT – LOW COOLANT TEMPERATURE SWITCH
P(#) – PLUG
QCON(#) – QUICK CONNECT
SM – STARTER MOTOR
SS – STARTER SOLENOID
STAT – STATOR
SW(#) – SWITCH
TB(#) – TERMINAL BLOCK
W(#) – WIRE WELD

 EBG - ENGINE BLOCK GROUND
 GND - CONTROLLER BOX GROUND
 PGND - PANEL GROUND

VOLVO ENGINE
SHEET 3



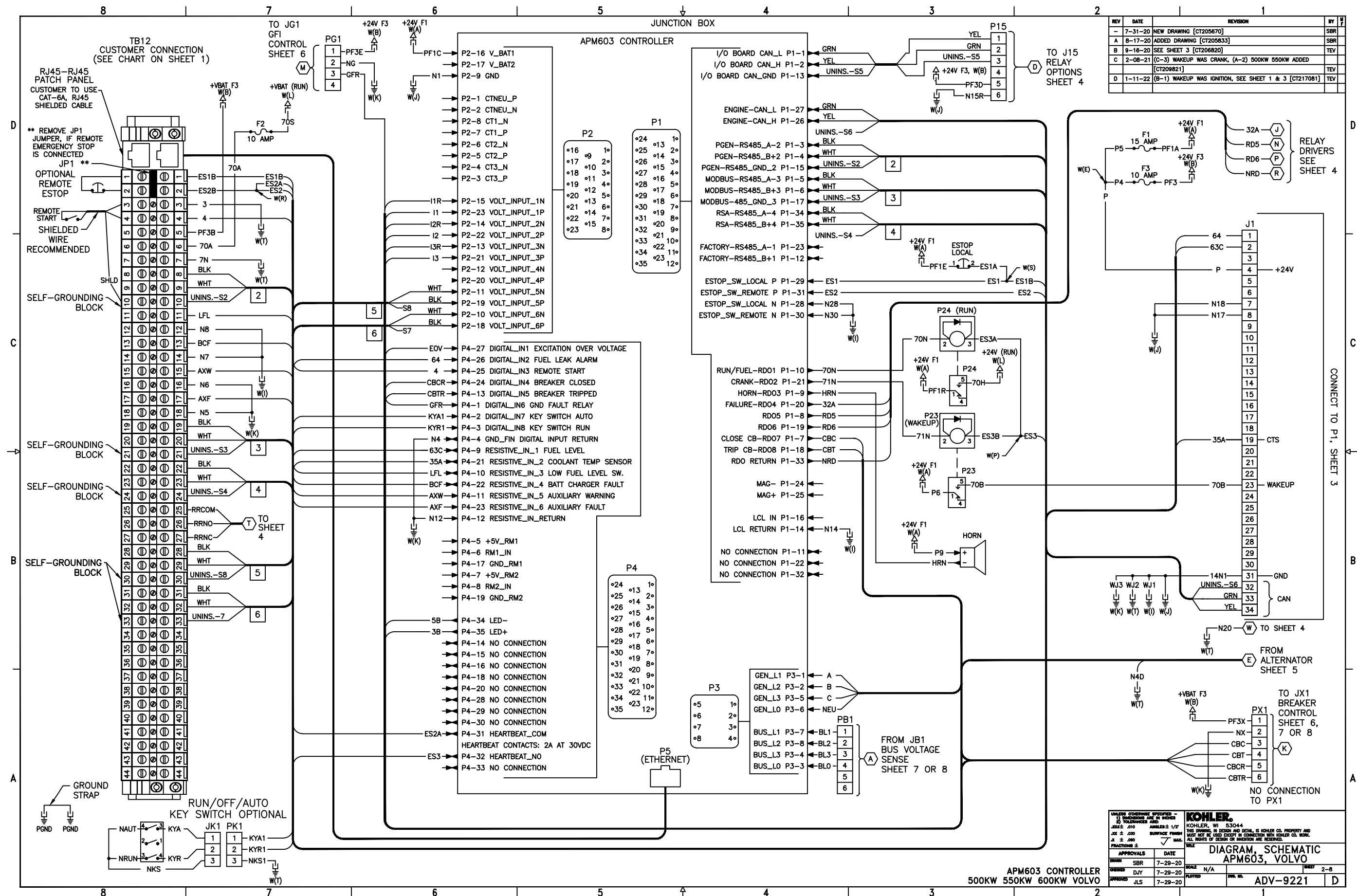
REV	DATE	REVISION	BY
-	7-31-20	NEW DRAWING [CT205670]	SFR
A	8-17-20	ADDED DRAWING [CT205633]	SFR
B	9-16-20	SEE SHEET 3 [CT206820]	TEV
C	2-08-21	(A-5) WAKEUP WAS CRANK, (A-2) 500KW 550KW ADDED [CT209821]	TEV
D	1-11-22	(B-7) ON VOLVO HARNESS WAS ON J.D. HARNESS, SEE SHEETS 2 & 3 [CT217081]	TEV

TB12 CONNECTION CHART			
FUNCTION	POS	SIGNAL DESCRIPTION	
REMOTE E-STOP	1	REMOTE EMERGENCY STOP	
	2		
REMOTE START	3	REMOTE START SIGNAL	
	4		
CUSTOMER INTERFACE	5	FUSED BATTERY POWER	
	6	BATT VOLTS WHEN RUNNING	
	7	BATTERY NEGATIVE	
CUSTOMER INTERFACE	8	A (-)	ISOLATED RS-485 #2 (PGEN)
	9	B (+)	
	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	
AUX WARNING	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 RS-485 #3 (MODBUS/PGEN)
	20	B (+)	
	21	SHIELD	
CUSTOMER INTERFACE	22	A (-)	NON-ISOLATED RS-485 #4 (MODBUS RSA)
	23	B (+)	
	24	SHIELD	
RUN RELAY	25	COMMON CONTACT	
	26	NORMALLY OPEN CONTACT	
	27	NORMALLY CLOSED CONTACT	
SPEED BIAS	28	SPEED BIAS (+)	
	29	SPEED BIAS (-)	
	30	SHIELD	
VOLTAGE BIAS	31	VOLTAGE BIAS (+)	
	32	VOLTAGE BIAS (-)	
	33	SHIELD	
SPARE	34	SPARE	
SPARE	35	SPARE	
DROOP SELECT	36	SPARE	
	37	SPARE	
ANALOG THROTTLE CONTROL	38	SPARE	
	39	SPARE	
IDLE MODE	40	SPARE	
	41		
SPARE	42	SPARE	
SPARE	43	SPARE	
SPARE	44	SPARE	

* REMOVE RESISTORS IF PARALLELING

UNLESS OTHERWISE SPECIFIED - 1) DIMENSIONS ARE IN INCHES 2) TOLERANCES ARE: FRACTIONS .010 DECIMALS .005 HOLE .010 SURFACE FINISH .000		KOHLER. HIL 53044 THIS DRAWING, IN DESIGN AND DETAIL, IS KOHLER CO. PROPERTY AND MUST NOT BE USED EXCEPT IN CONNECTION WITH KOHLER CO. WORK. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED.	
APPROVALS		TITLE	
DATE		DIAGRAM, SCHEMATIC APM603, VOLVO	
DESIGN	SBR 7-29-20	SCALE	N/A
CHECKED	DJS 7-29-20	PLATTED	
APPROVED	DJS 7-29-20	PUR. NO.	ADV-9221
		PRICE	1-8

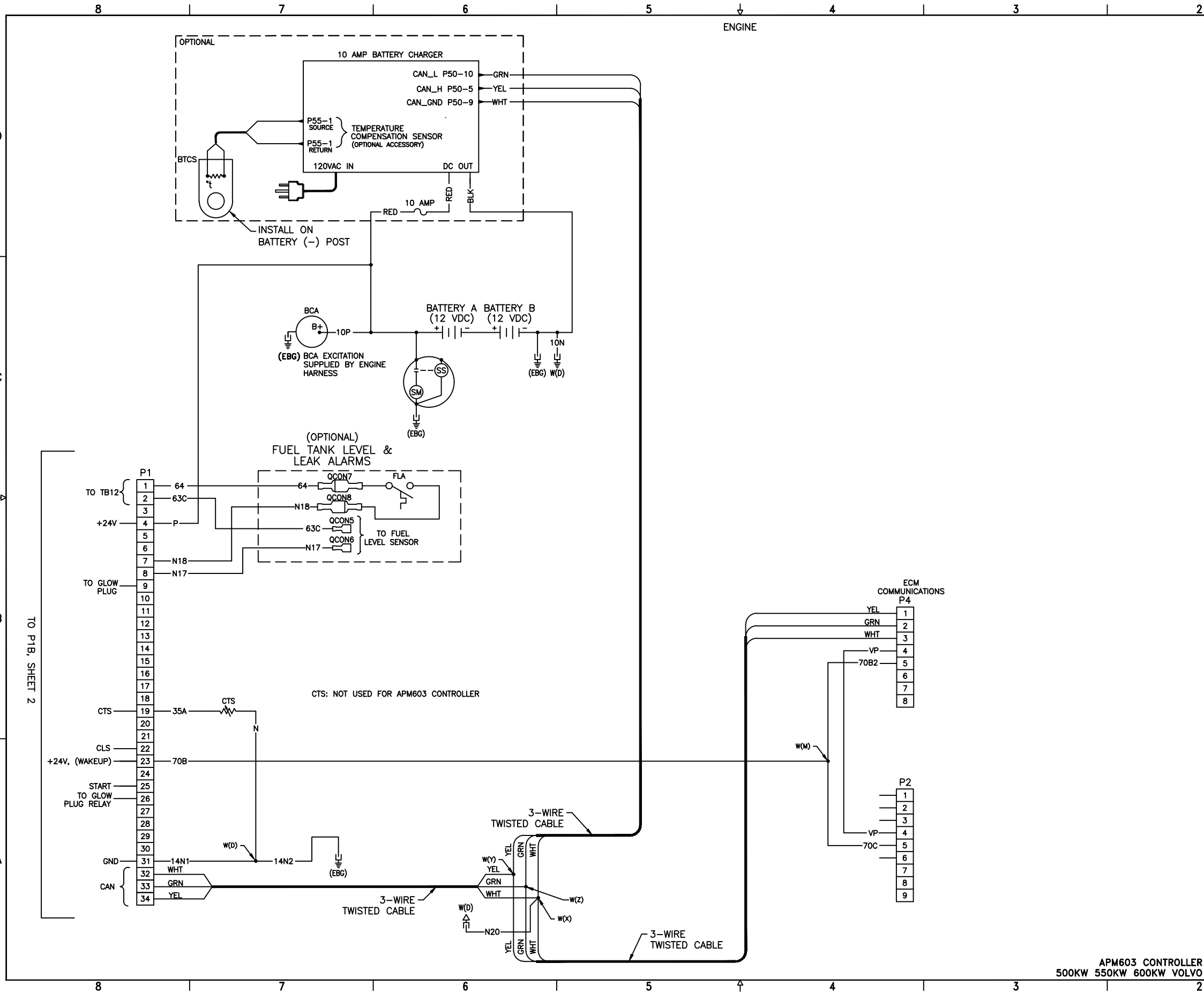
APM603 CONTROLLER
500KW, 550KW, 600KW VOLVO



REV	DATE	REVISION	BY	CHK
-	7-31-20	NEW DRAWING [CT205670]	SBR	
A	8-17-20	ADDED DRAWING [CT205833]	SBR	
B	9-16-20	(C-6) FUSE P5 DELETED [CT206820]	TEV	
C	2-08-21	(C-5) P22 DELETED (A-2) 500KW 550KW ADDED [CT209821]	TEV	
D	1-11-22	(A-7,C-4) W(X) DELETED (C-4) W(M) ADDED, SEE SHEETS 1 AND 2 [CT217081]	TEV	

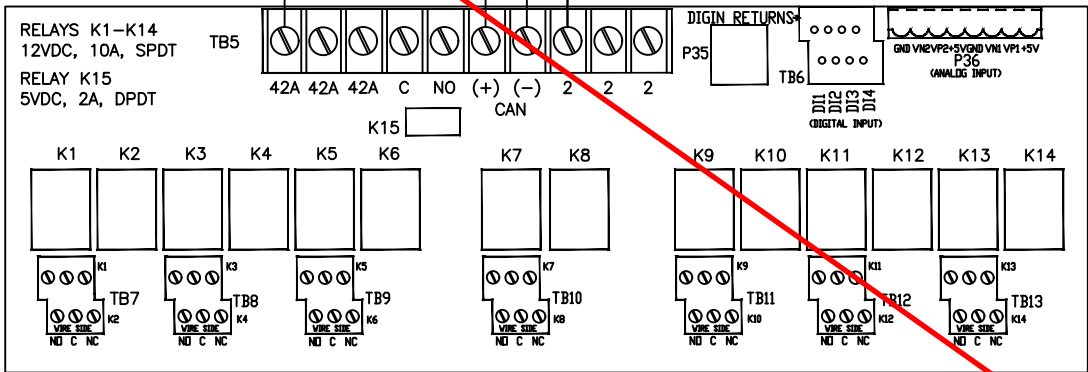
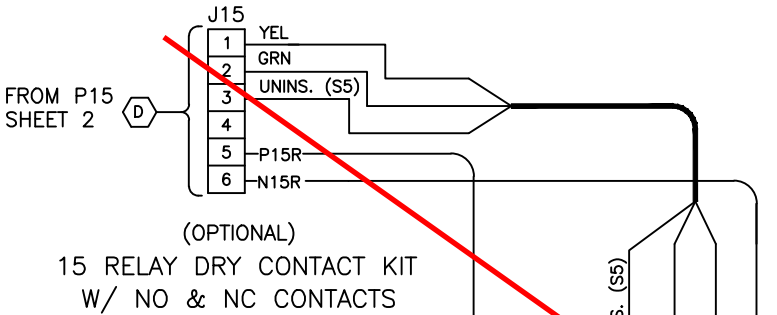
UNLESS OTHERWISE SPECIFIED -		KOHLER.	
1) DIMENSIONS ARE IN INCHES	2) DIMENSIONS ARE IN MILLIMETERS	KOHLER, WI 53044	
3) TOLERANCES ARE:	4) SURFACE FINISH:	THIS DRAWING, IN DESIGN AND DETAIL, IS KOHLER CO. PROPERTY AND MUST NOT BE USED EXCEPT IN CONNECTION WITH KOHLER CO. WORK. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED.	
± .010	± .000	SURFACE FINISH	
± .000	± .000	MAX	
FRACTIONS ±		✓	
APPROVALS	DATE	TITLE	
DESIGN SBR	7-29-20	DIAGRAM, SCHEMATIC	
CHECKED DJY	7-29-20	APM603, VOLVO	
APPROVED JLS	7-29-20	PLOTED	
		SCALE N/A	SHEET 3-8
		DWG. NO. ADV-9221	D

APM603 CONTROLLER
500KW 550KW 600KW VOLVO

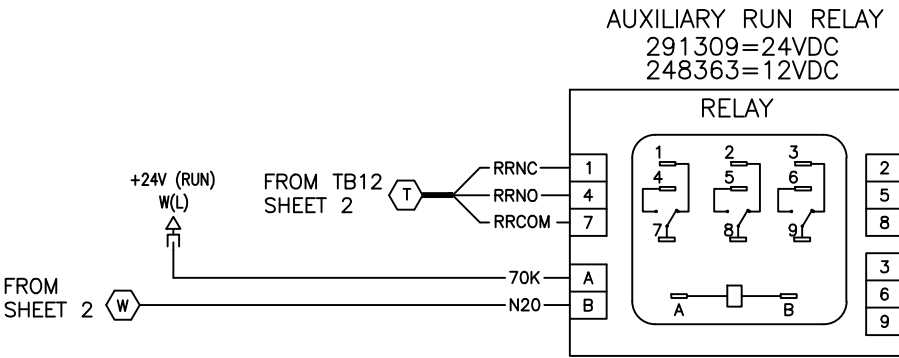
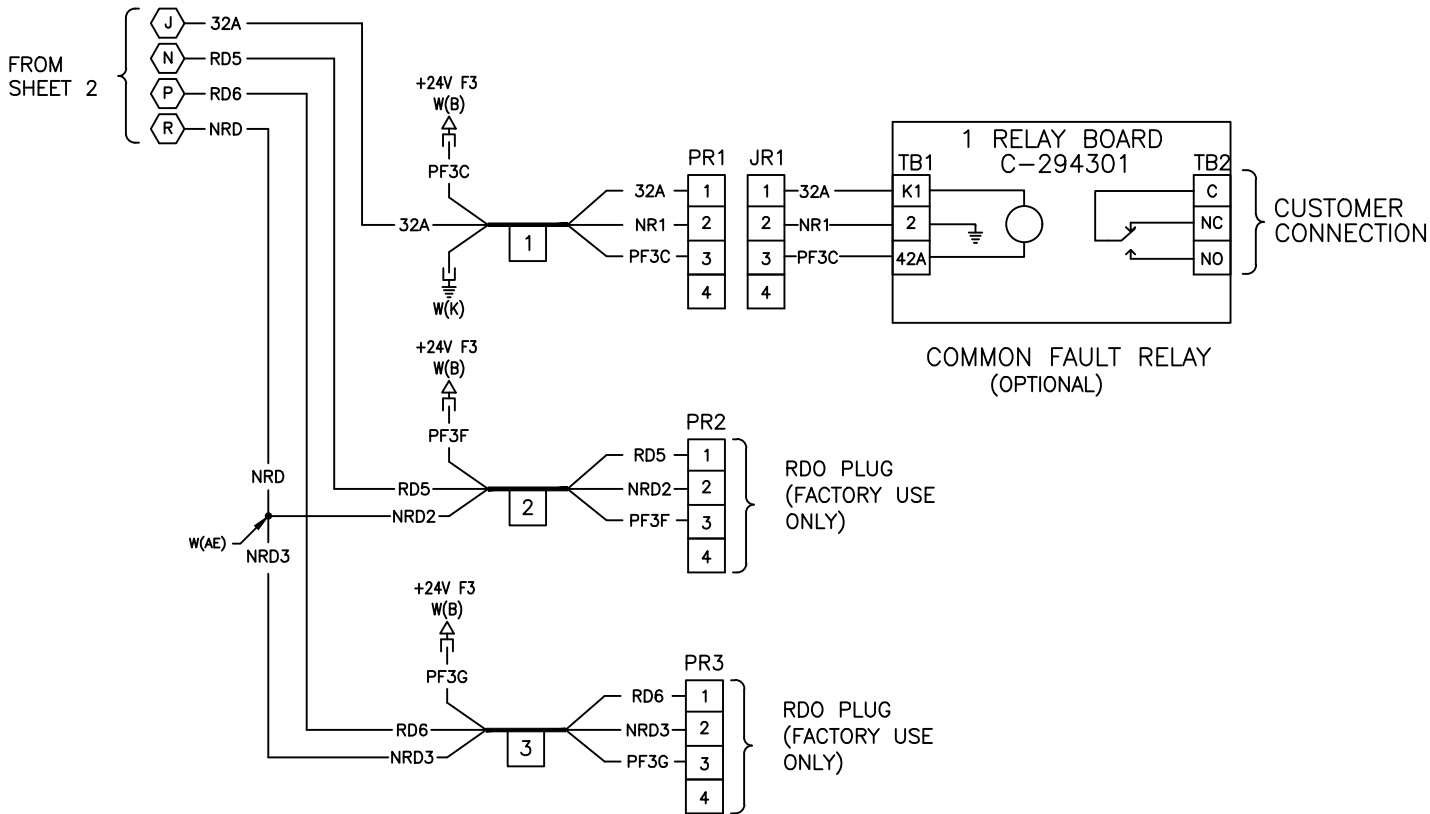


REV	DATE	REVISION	BY	W
-	7-31-20	NEW DRAWING [CT205670]	SBR	
A	8-17-20	ADDED DRAWING [CT205833]	SBR	
B	9-16-20	SEE SHEET 3 [CT206820]	TEV	
C	2-08-21	(A-2) 500KW 550KW ADDED [CT209821]	TEV	
D	1-11-22	SEE SHEETS 1,2 & 3 [CT217081]	TEV	

JUNCTION BOX



CUSTOMER CONNECTIONS



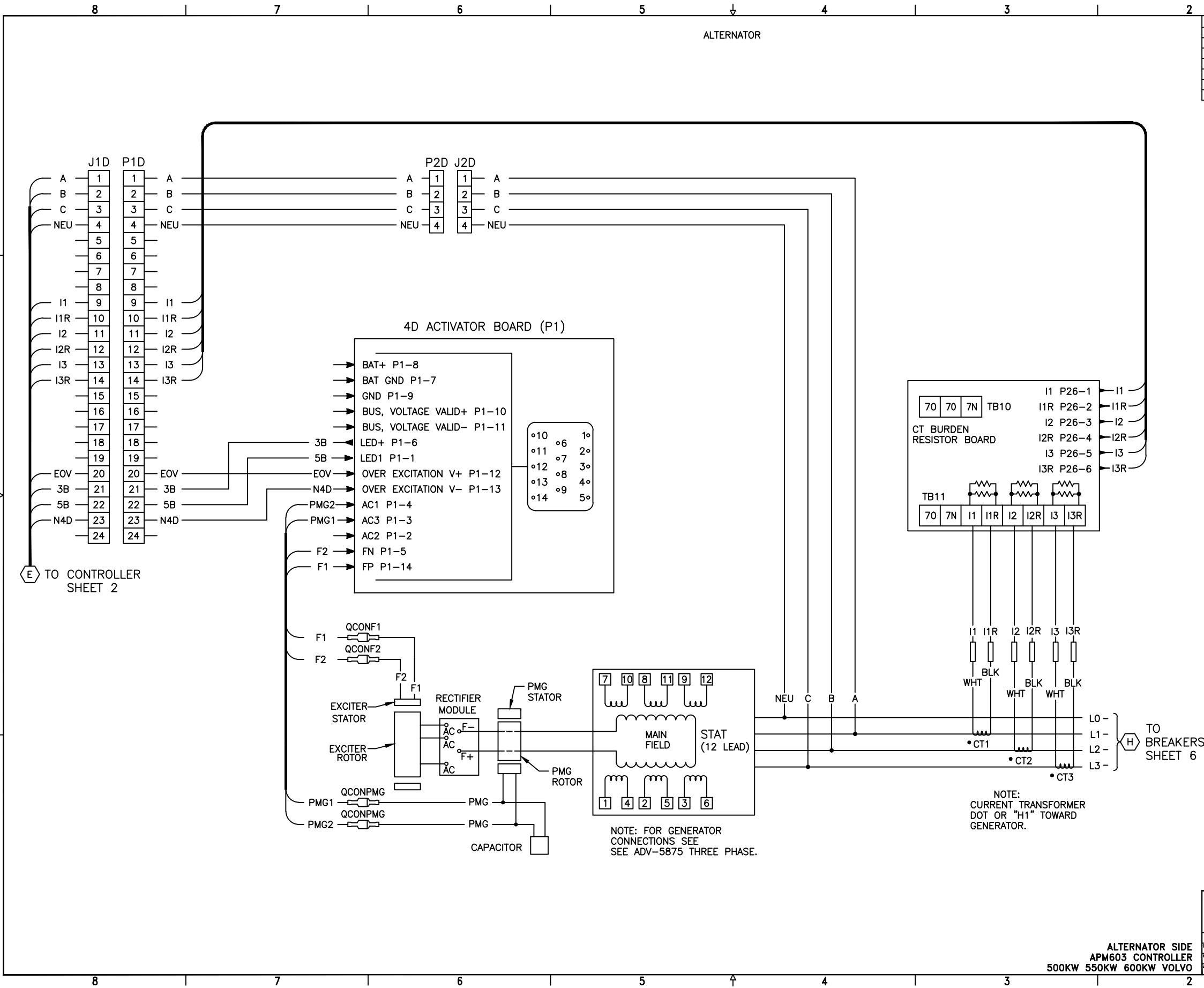
UNLESS OTHERWISE SPECIFIED - 1) DIMENSIONS ARE IN INCHES 2) TOLERANCES ARE: FRACTIONS ± DECIMALS ± SURFACE FINISH: MAX. APPROVALS: SBR 7-29-20 DESIGNED: DJY 7-29-20 APPROVED: JLS 7-29-20				KOHLER. KOHLER, WI 53044 THIS DRAWING, IN DESIGN AND DETAIL, IS KOHLER CO. PROPERTY AND MUST NOT BE USED EXCEPT IN CONNECTION WITH KOHLER CO. WORK. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED. DIAGRAM, SCHEMATIC APM603, VOLVO SCALE: N/A PLOT: ADV-9221 SHEET: 4-8			
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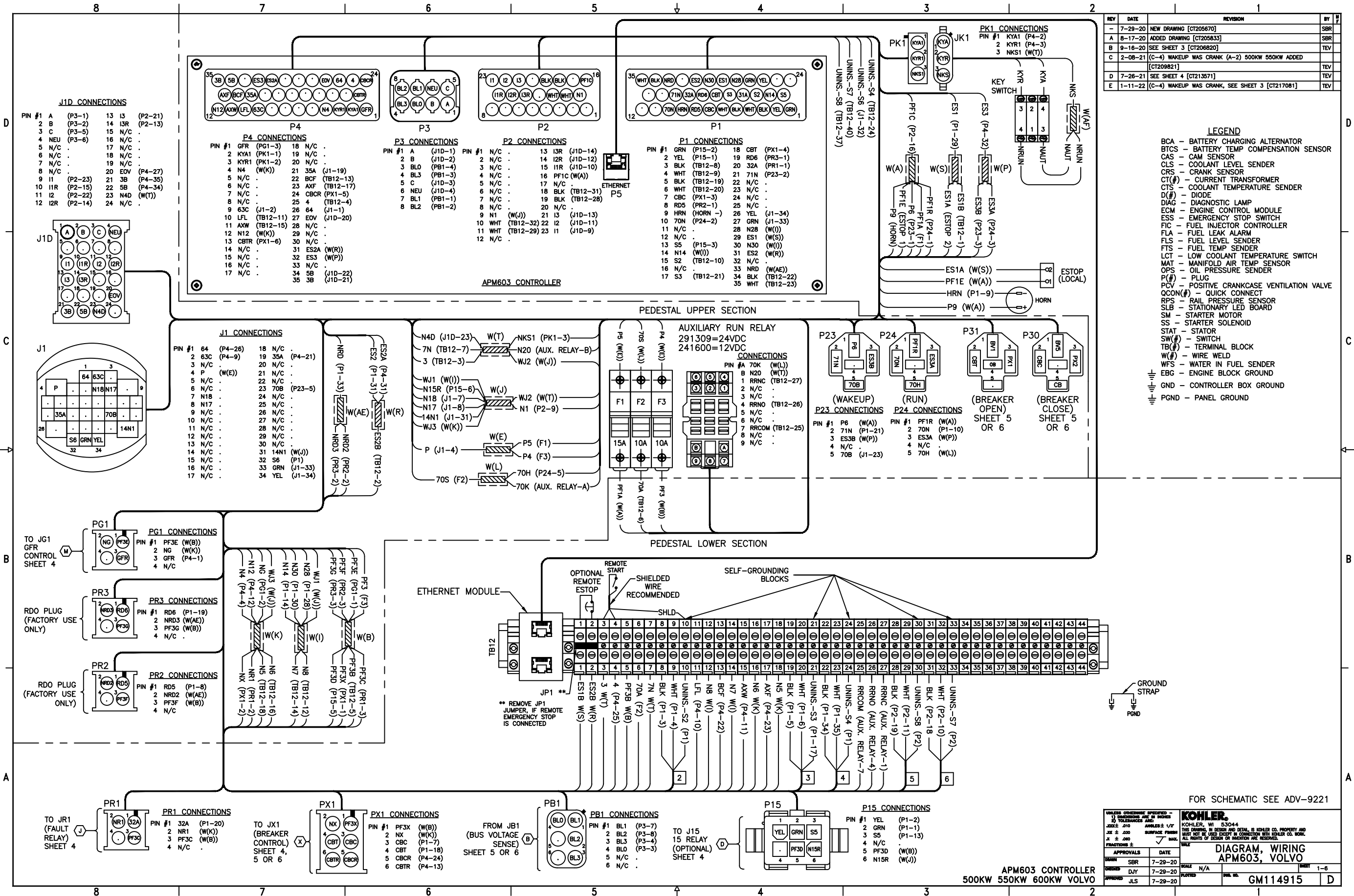
APM603 CONTROLLER
500KW 550KW 600KW VOLVO

REV	DATE	REVISION	BY	W
-	7-31-20	NEW DRAWING [CT205670]	SBR	
A	8-17-20	ADDED DRAWING [CT205833]	SBR	
B	9-16-20	SEE SHEET 3 [CT206820]	TEV	
C	2-08-21	(A-2) 500KW 550KW ADDED [CT209821]	TEV	
D	1-11-22	SEE SHEETS 1,2 & 3 [CT217081]	TEV	

UNLESS OTHERWISE SPECIFIED - 1) DIMENSIONS ARE IN INCHES 2) TOLERANCES ARE: FRACTIONS ± DECIMAL ± ANGLES ± SURFACE FINISH: MAX. APPROVALS: SBR DATE: 7-29-20 DESIGNED: DJY DATE: 7-29-20 APPROVED: JLS DATE: 7-29-20		KOHLER, WI 53044 THIS DRAWING, IN DESIGN AND DETAIL, IS KOHLER CO. PROPERTY AND MAY NOT BE USED EXCEPT IN CONNECTION WITH KOHLER CO. WORK. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED. TITLE: DIAGRAM, SCHEMATIC APM603, VOLVO SCALE: N/A PLOT: ADV-9221 SHEET: 5-8	
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ALTERNATOR SIDE APM603 CONTROLLER 500KW 550KW 600KW VOLVO		ADV-9221		D
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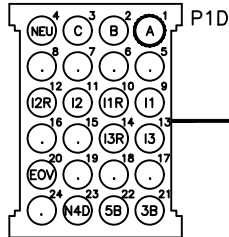


REV	DATE	REVISION	BY	CHK
-	7-29-20	NEW DRAWING [CT205670]	SBR	
A	8-17-20	ADDED DRAWING [CT205833]	SBR	
B	9-16-20	SEE SHEET 3 [CT206820]	TEV	
C	2-08-21	(A-2) 500KW 550KW ADDED [CT209821]	TEV	
D	7-26-21	SEE SHEET 4 [CT213571]	TEV	
E	1-11-22	SEE SHEET 1 & 3 [CT217081]	TEV	

JUNCTION BOX

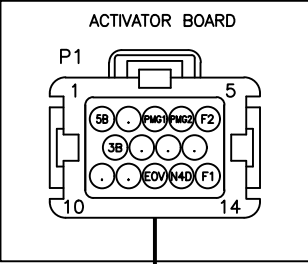
P1D CONNECTIONS

PIN #1	A	(P2D-1)
2	B	(P2D-2)
3	C	(P2D-3)
4	NEU	(P2D-4)
5	N/C	.
6	N/C	.
7	N/C	.
8	N/C	.
9	I1	(P26-1)
10	I1R	(P26-2)
11	I2	(P26-3)
12	I2R	(P26-4)
13	I3	(P26-5)
14	I3R	(P26-6)
15	N/C	.
16	N/C	.
17	N/C	.
18	N/C	.
19	N/C	.
20	EOV	(P1-12)
21	3B	(P1-6)
22	5B	(P1-1)
23	N4D	(P1-13)
24	N/C	.



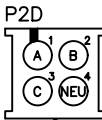
P1 CONNECTIONS

PIN #1	5B	(P1D-22)
2	N/C	.
3	PMG1	(QCONPMG1)
4	PMG2	(QCONPMG2)
5	F2	(QCONF2)
6	3B	(P1D-21)
7	N/C	.
8	N/C	.
9	N/C	.
10	N/C	.
11	N/C	.
12	EOV	(P1D-20)
13	N4D	(P1D-23)
14	F1	(QCONF1)



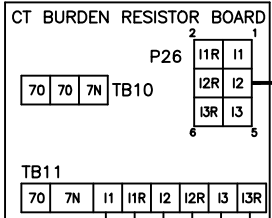
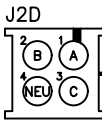
P2D CONNECTIONS

PIN #1	A	(P1D-1)
2	B	(P1D-2)
3	C	(P1D-3)
4	NEU	(P1D-4)



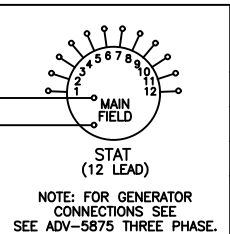
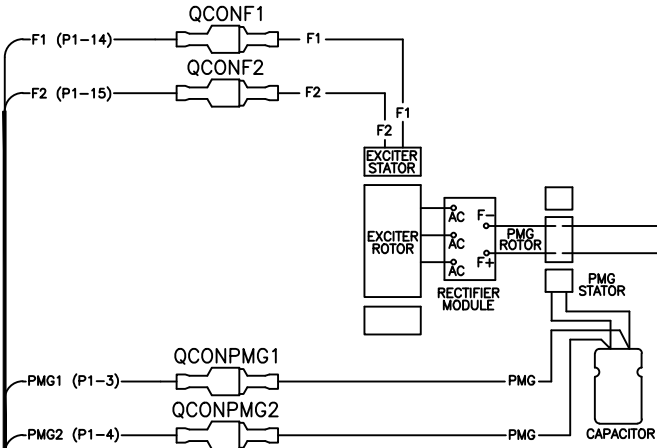
J2D CONNECTIONS

PIN #1	A	(L1)
2	B	(L2)
3	C	(L3)
4	NEU	(L0)



P26 CONNECTIONS

PIN #1	I1	(P1D-9)
2	I1R	(P1D-10)
3	I2	(P1D-11)
4	I2R	(P1D-12)
5	I3	(P1D-13)
6	I3R	(P1D-14)

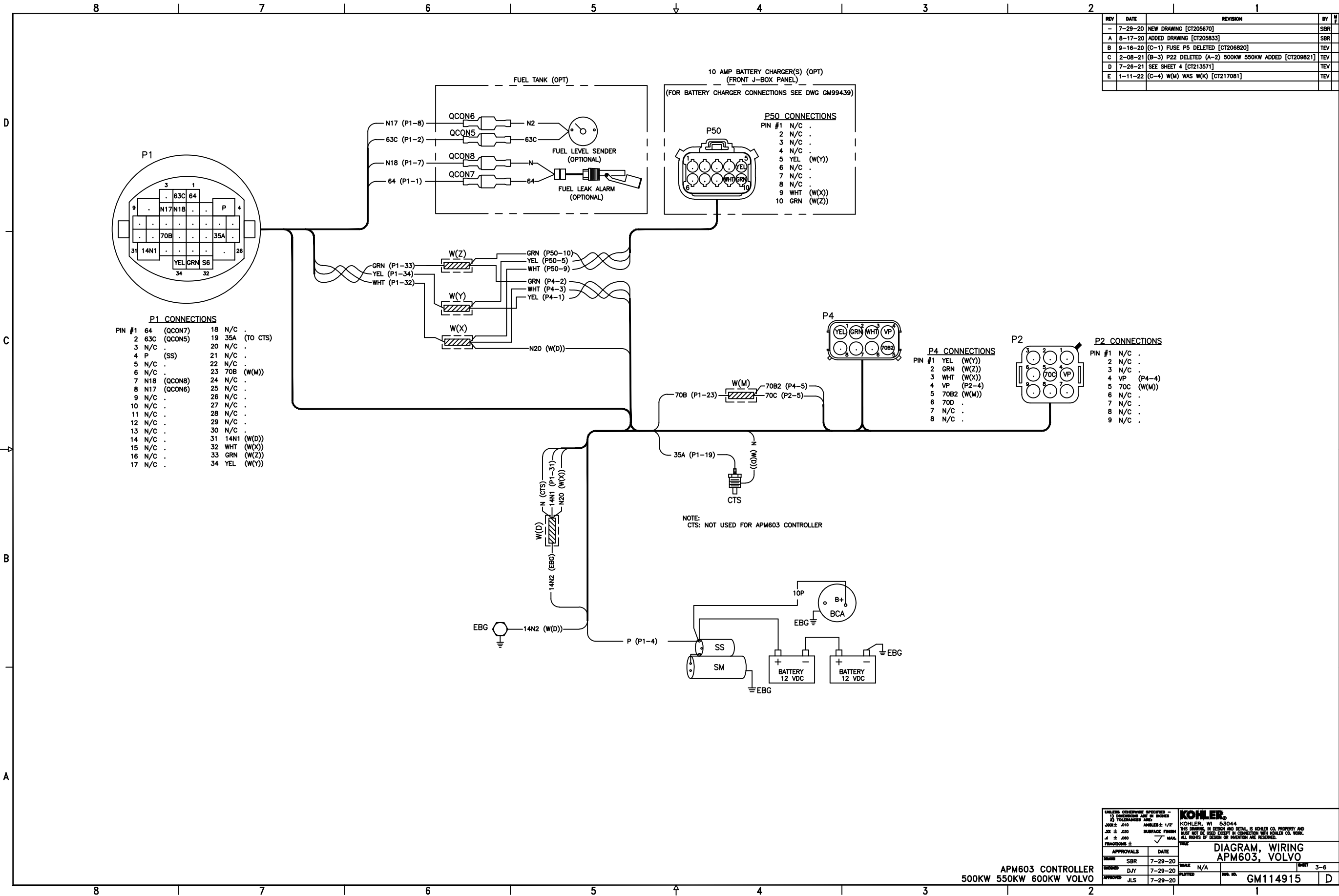


NOTE: CURRENT TRANSFORMER DOT OR "H" TOWARD GENERATOR.

TO LOAD, BUS BAR, OR BREAKERS SHEETS 5 OR 6

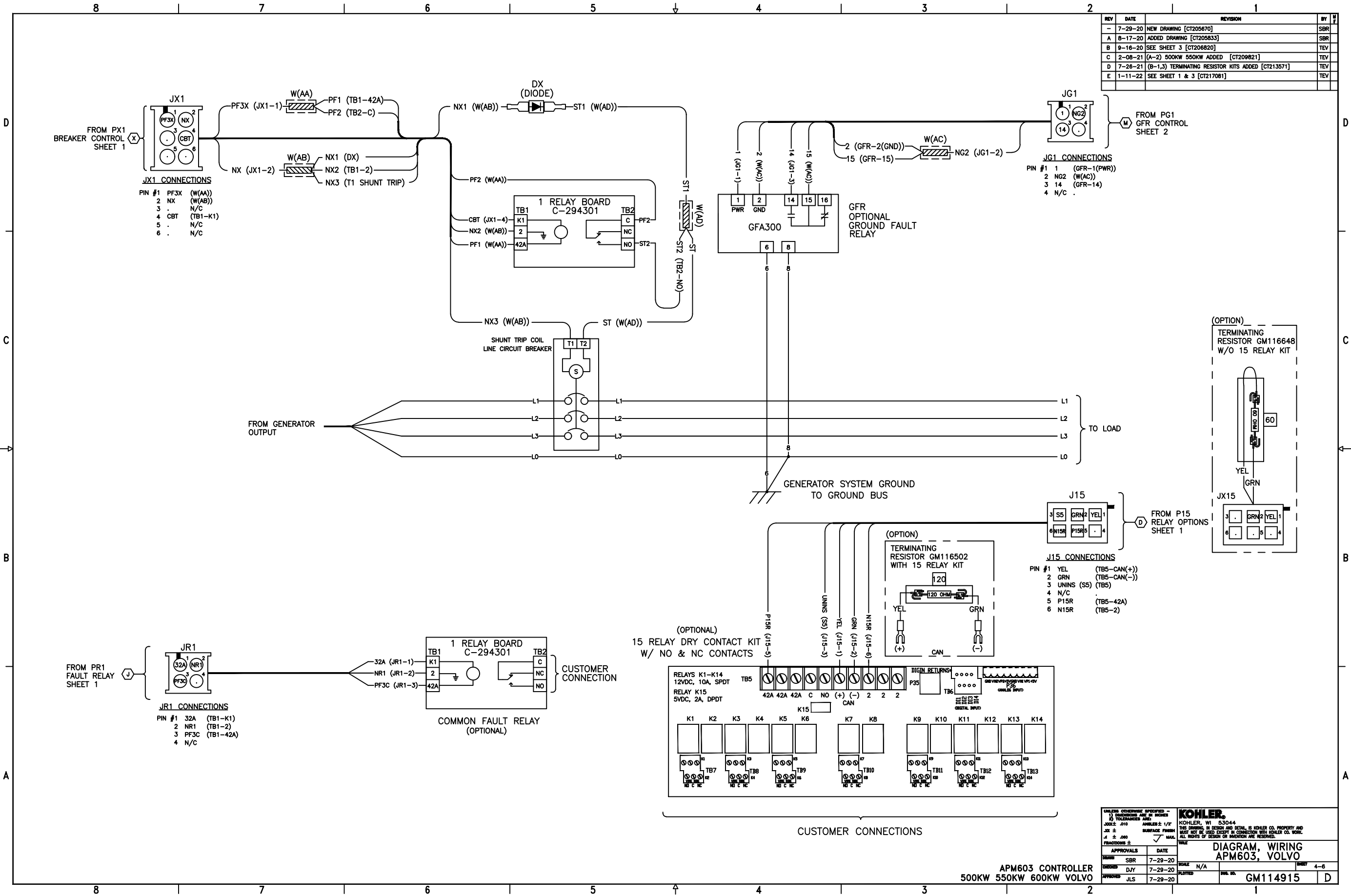
UNLESS OTHERWISE SPECIFIED - 1) DIMENSIONS ARE IN INCHES 2) TOLERANCES ARE: .005 ± .010 .010 ± .010 .015 ± .010 FRACTIONS ±		KOHLER KOHLER, WI 53044 THIS DRAWING, IN DESIGN AND DETAIL, IS KOHLER CO. PROPERTY AND MAY NOT BE USED EXCEPT IN CONNECTION WITH KOHLER CO. WORK. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED.	
APPROVALS		DATE	
DESIGN	SBR	7-29-20	
CHECKED	DJY	7-29-20	
APPROVED	JLS	7-29-20	
SCALE		N/A	
PLOTTER		N/A	
SHEET		2-6	
PWA NO.		GM114915	
D			

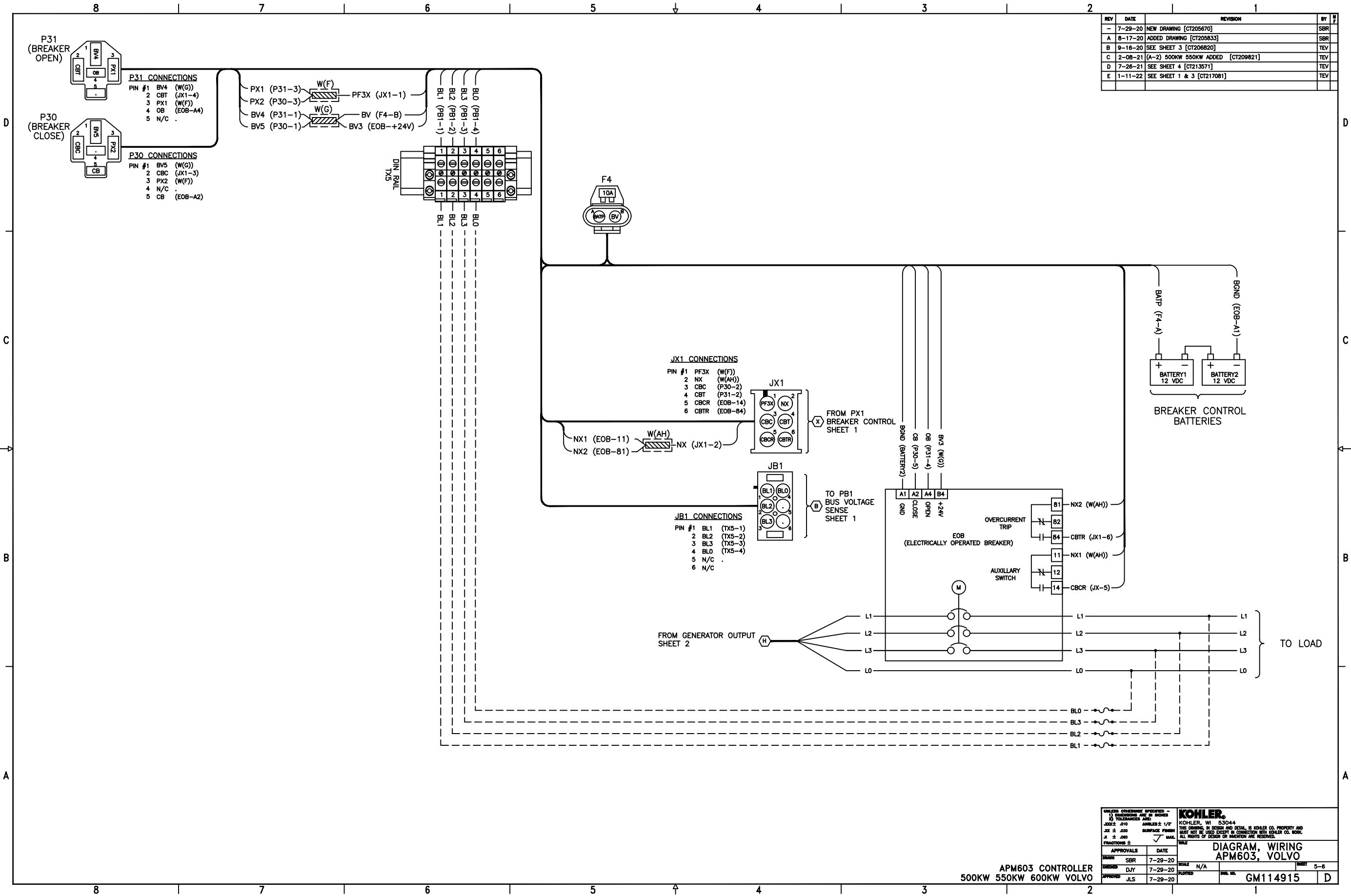
APM603 CONTROLLER
500KW 550KW 600KW VOLVO



REV	DATE	REVISION	BY	CHK
-	7-29-20	NEW DRAWING [CT205670]	SBR	
A	8-17-20	ADDED DRAWING [CT205833]	SBR	
B	9-16-20	[C-1] FUSE P5 DELETED [CT206820]	TEV	
C	2-08-21	[B-3] P22 DELETED (A-2) 500KW 550KW ADDED [CT209821]	TEV	
D	7-26-21	SEE SHEET 4 [CT213571]	TEV	
E	1-11-22	[C-4] W(M) WAS W(K) [CT217081]	TEV	

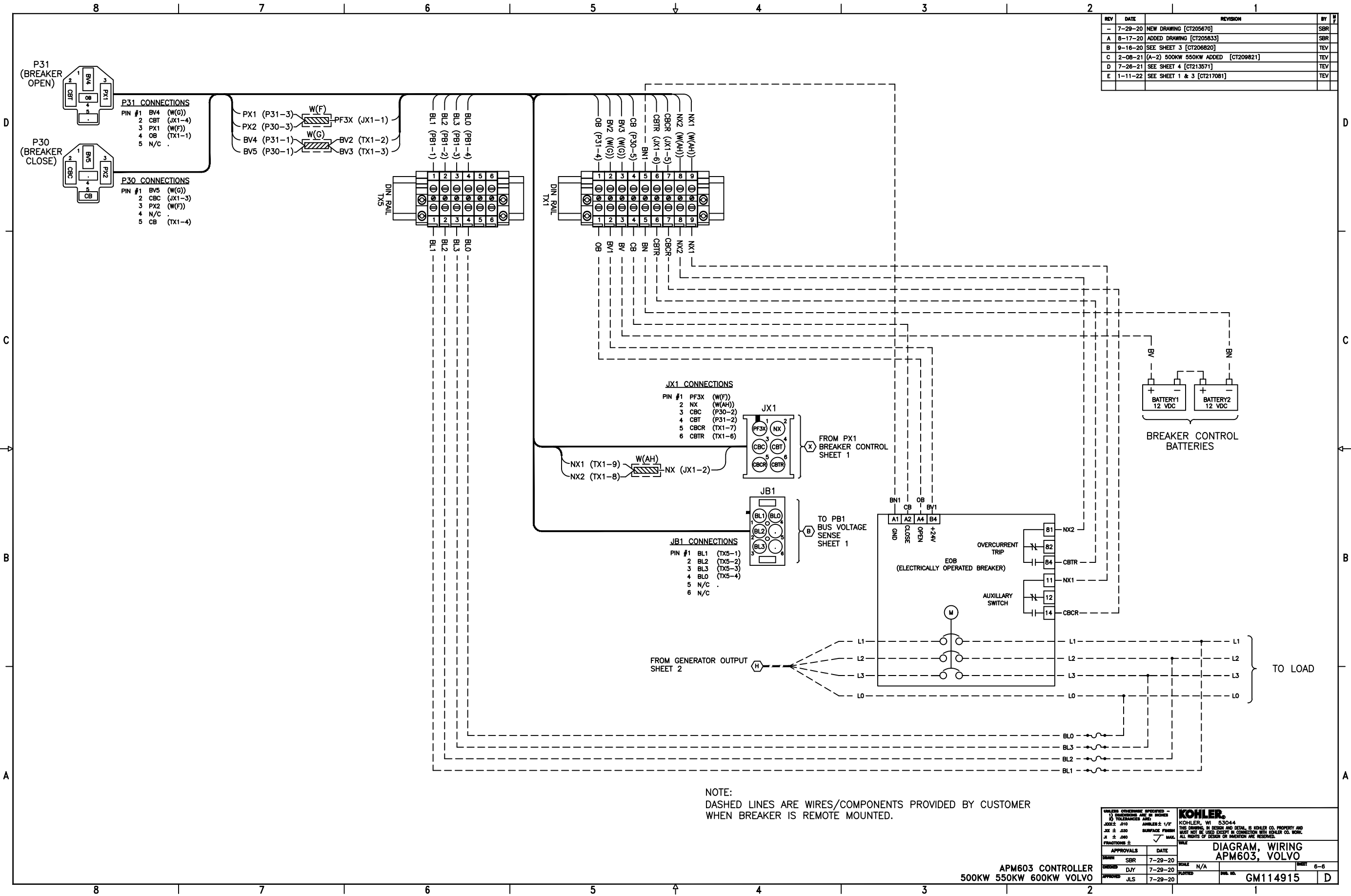
UNLESS OTHERWISE SPECIFIED - 1) DIMENSIONS ARE IN INCHES TOLERANCES ARE: .005 ± .010 .010 ± .020 FRACTIONS ±		KOHLER, KOHLER, WI 53044 THIS DRAWING, IN DESIGN AND DETAIL, IS KOHLER CO. PROPERTY AND WAS NOT BE USED EXCEPT IN CONNECTION WITH KOHLER CO. WORK. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED.	
APPROVALS	DATE	SCALE	SHEET
DESIGN SBR	7-29-20	N/A	3-6
CHECKS DJY	7-29-20	PLATTED	
APPROVED JLS	7-29-20		
APM603 CONTROLLER 500KW 550KW 600KW VOLVO		DIAGRAM, WIRING APM603, VOLVO	
		PWA NO. GM114915	





APM603 CONTROLLER
500KW 550KW 600KW VOLVO

UNLESS OTHERWISE SPECIFIED - 1) DIMENSIONS ARE IN INCHES 2) TOLERANCES ARE: FRACTIONS ± DECIMALS ± .010 ANGLES ± 1/2° SURFACE FINISH X ± .000 ✓ MAN.		KOHLER. KOHLER, WI 53044 THIS DRAWING, IN DESIGN AND DETAIL, IS KOHLER CO. PROPERTY AND WILL NOT BE USED EXCEPT IN CONNECTION WITH KOHLER CO. WORK. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED.	
APPROVALS		DATE	
DESIGN SBR	7-29-20	SCALE N/A	SHEET 5-6
CHECKS DJY	7-29-20	PLOTTED	FILE NO. GM114915
APPROVED JLS	7-29-20		D

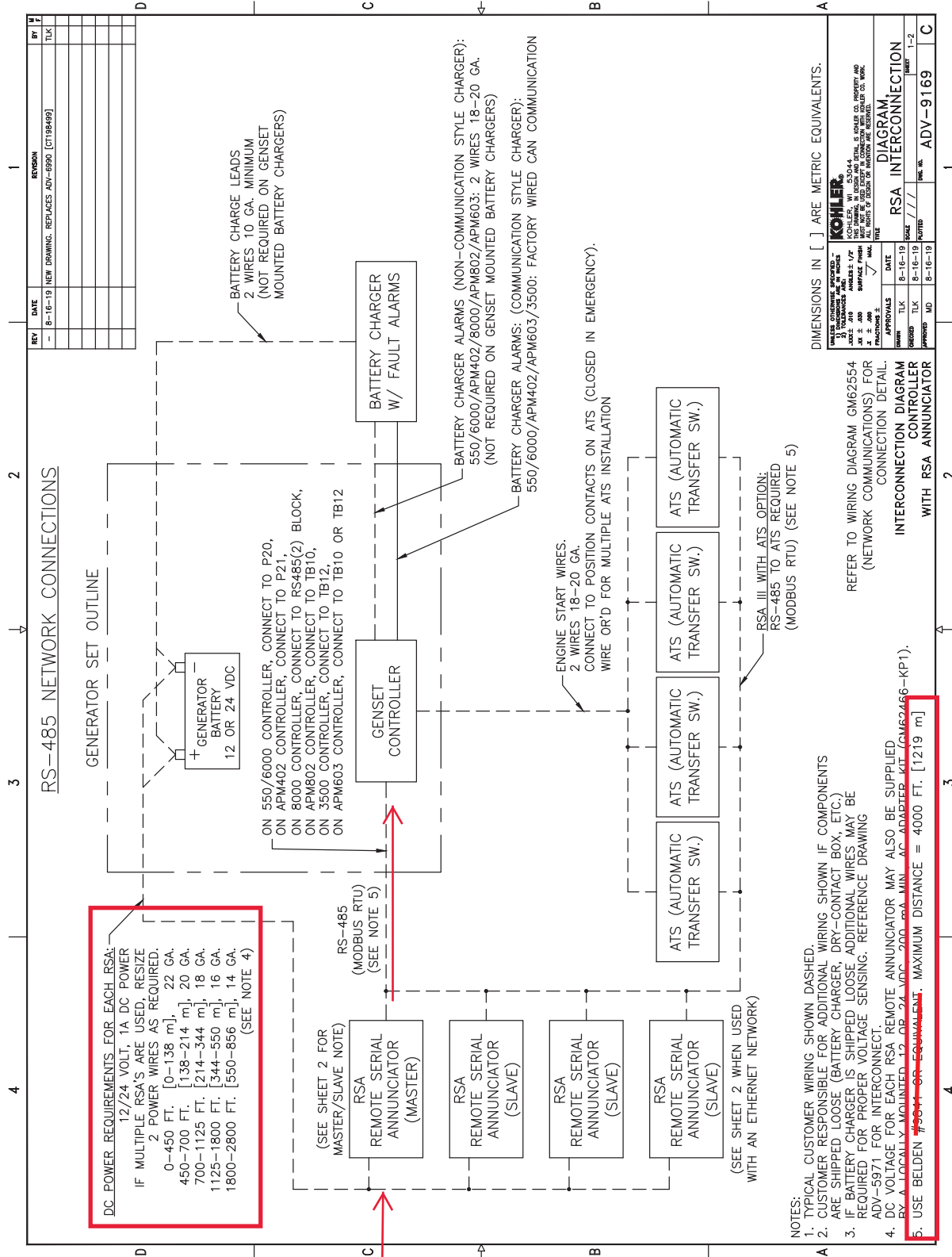


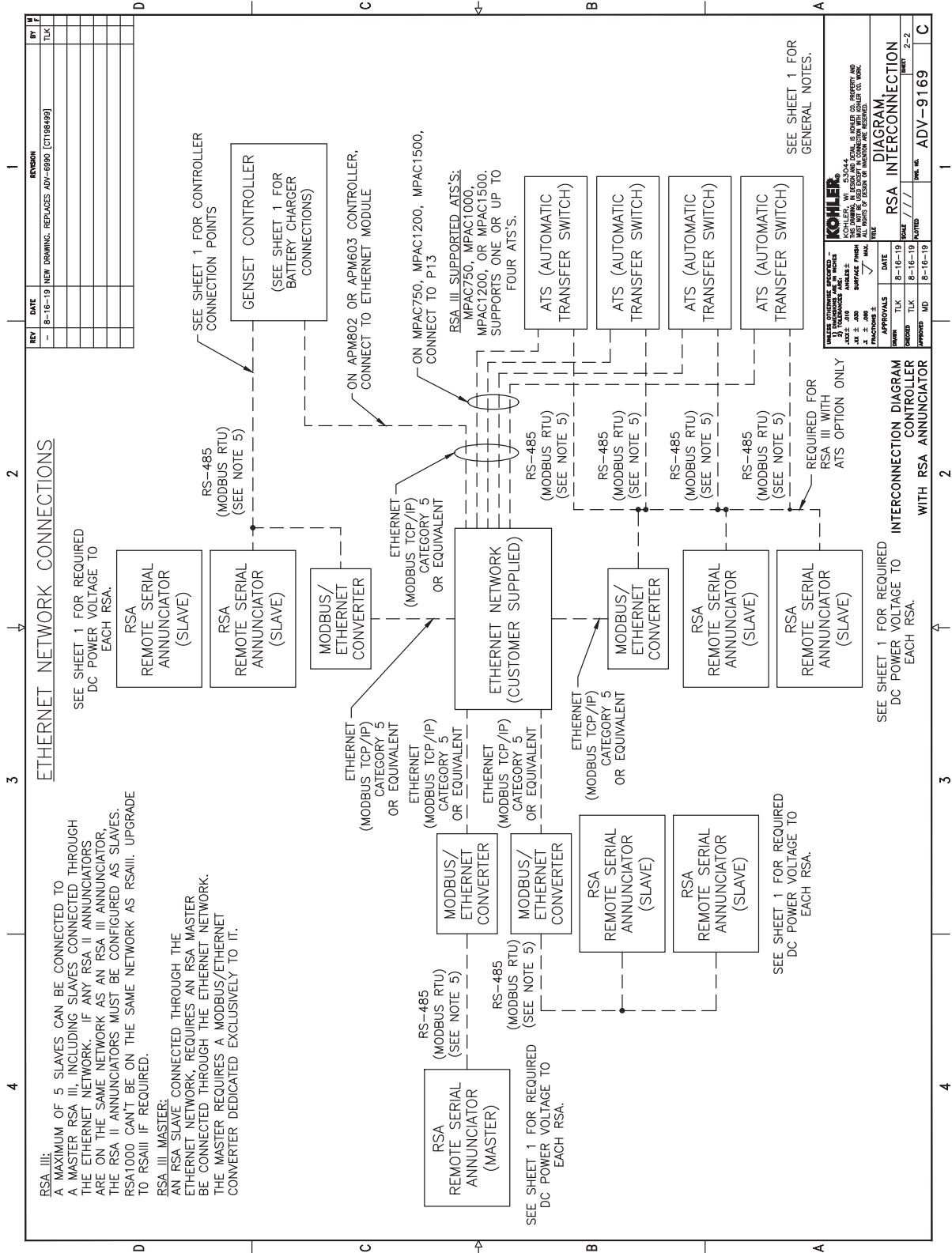
REV	DATE	REVISION	BY	APP
-	7-29-20	NEW DRAWING [CT205670]	SBR	
A	8-17-20	ADDED DRAWING [CT205833]	SBR	
B	9-16-20	SEE SHEET 3 [CT206820]	TEV	
C	2-08-21	(A-2) 500KW 550KW ADDED [CT209821]	TEV	
D	7-26-21	SEE SHEET 4 [CT213571]	TEV	
E	1-11-22	SEE SHEET 1 & 3 [CT217081]	TEV	

UNLESS OTHERWISE SPECIFIED - 1) DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS ± DECIMALS ± .015 ANGLES ± 1/2° SURFACE FINISH X ± .000 MACH. ✓		KOHLER. KOHLER, WI 53044 THIS DRAWING, IN DESIGN AND DETAIL, IS KOHLER CO. PROPERTY AND WILL NOT BE USED EXCEPT IN CONNECTION WITH KOHLER CO. WORK. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED.	
APPROVALS		DATE	SCALE
DESIGN SBR	7-29-20	7-29-20	N/A
CHECKS DJY	7-29-20	7-29-20	6-6
APPROVED JLS	7-29-20	7-29-20	
PROJECT NO.		SHEET	
GM114915		6-6	

APM603 CONTROLLER
500KW 550KW 600KW VOLVO

NOTE:
DASHED LINES ARE WIRES/COMPONENTS PROVIDED BY CUSTOMER
WHEN BREAKER IS REMOTE MOUNTED.





REVISION		DATE	BY
-	8-16-19	NEW DRAWING REPLACES ADV-6990 [C1198499]	TLK

APPROVALS		DATE	SCALE	SHEET
DESIGNED	TLK	8-16-19	1	2-2
CHECKED				
APPROVED				
PROJECT NO.		ADV-9169		

KOHLER	
DESIGNED	TLK
CHECKED	
APPROVED	
PROJECT NO.	
ADV-9169	

KOHLER	
DESIGNED	TLK
CHECKED	
APPROVED	
PROJECT NO.	
ADV-9169	

KOHLER	
DESIGNED	TLK
CHECKED	
APPROVED	
PROJECT NO.	
ADV-9169	

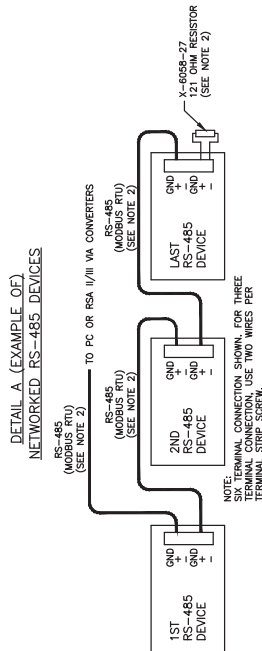
KOHLER	
DESIGNED	TLK
CHECKED	
APPROVED	
PROJECT NO.	
ADV-9169	

KOHLER	
DESIGNED	TLK
CHECKED	
APPROVED	
PROJECT NO.	
ADV-9169	

Sheet	6	7	Drawing Sheet Reference	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	1222	1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Controller/Annunciator Compatibility Chart			RS2A	RS2B
	Monitor III	Silo Tech		
550 Genset	X	X	X	X
16-1ight Genset			X	X
DFC 3000 / AP4M82 Genset	X	X	X	X
KPC 1000 Genset			X	X
6000 Genset	X	X	X	X
8000 Genset				4
APM802				
APM103		X		X
DEC-3500 Genset		X		X
MPAC 1500	X		X	X
MPAC-DW 750, 1200, 1500		X		X
Series 1000 ATS	X		X	X
340 ATS				
340 Power Monitor	X			

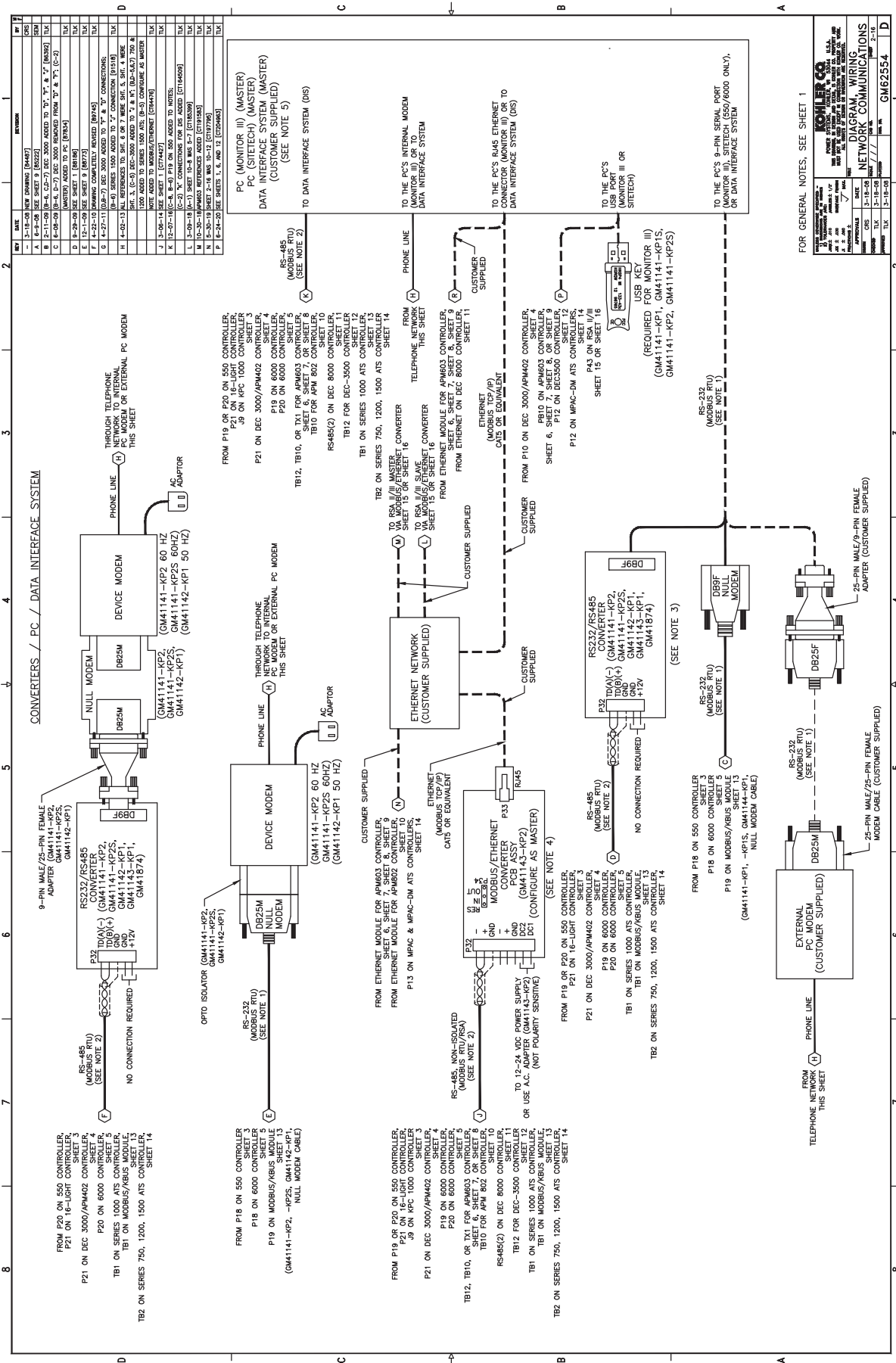
¹⁰⁰X¹⁰⁰ Designates supported devices. ¹⁰¹4th Designates RS-485 Only.



NOTE: SIX TERMINAL CONNECTION SHOWN. FOR THREE TERMINAL CONNECTION, USE TWO WIRES PER TERMINAL STRIP SCREW.

- 1.) MAXIMUM CABLE LENGTH FOR RS-232C IS 50 FEET. USE RS-485 IF LONGER THAN 50 FEET IS REQ'D.
- 2.) CUSTOMER SUPPLIED WIRE. USE BELDEN #9841, OR EQUIVALENT CABLE. USE A MAXIMUM CABLE LENGTH OF 121' (37.8 M). IF THE WIRE IS NOT THE CORRECT TYPE, CONVERT THE CABLE TO THE "NETWORK" TYPE. (72' (21.9 M) IS THE LONGEST CABLE LENGTH THAT THE CONTROLLER CAN HANDLE.)
- 3.) CONNECT THE CABLE SHIELD TO "GND" AT ONE END OF THE CABLE ONLY. LEAVE OTHER END DISCONNECTED.
- 4.) IF OPERATING OVER 19.2 K BAUD RATE AND WIRE LENGTH > 305 METERS (1000 FT.), CONNECT 121 OHM TERMINATING RESISTOR (X-6058-27) TO "+", AND "-" ON THE LAST DEVICE ON THE NETWORK. IF ONLY ONE DEVICE IS USED, IT IS THE LAST DEVICE. THE TERMINATING RESISTOR IS SELECTABLE INSIDE THE MODBUS/ETHERNET DEVICE USING THE MODBUS/ETHERNET CONVERTER. RS42 OR RS43 IS THE FIRST AND RS44 OR RS45 IS THE LAST. PLACE THE P34 JUMPER ON THE "OUT" PINS.
- 5.) THE 550 & 6000 CONTROLLER CAN BE USED AS A RS-232C/RS-485 CONVERTER. CONNECT THE 9-PIN SERIAL PORT ON THE PC TO P18 ON THE 550 OR 6000 CONTROLLER AS SHOWN. THEN CONNECT P20 ON THE 550 OR 6000 CONTROLLER TO THE OTHER RS-485 DEVICES IN THE NETWORK.
- 6.) EACH MODBUS/ETHERNET CONVERTER CAN COMMUNICATE WITH UP TO A ETHERNET NETWORK DEVICES MULTIANALOUSLY. IF A MODBUS/ETHERNET CONVERTER IS ATTACHED TO A SLAVE REMOTE SERIAL ANNUNCIATOR, A MODBUS/ETHERNET CONVERTER CONNECTED TO A MASTER REMOTE SERIAL ANNUNCIATOR IS REQUIRED. SEE NOTE 2 FOR P34 (TERMINATING RESISTOR) SETTING.
- 7.) ONLY ONE MASTER IS ALLOWED PER RS-485 NETWORK. ANY COMBINATION OF MASTERS IS ALLOWED IF COMMUNICATING VIA MODBUS/ETHERNET CONVERTERS.

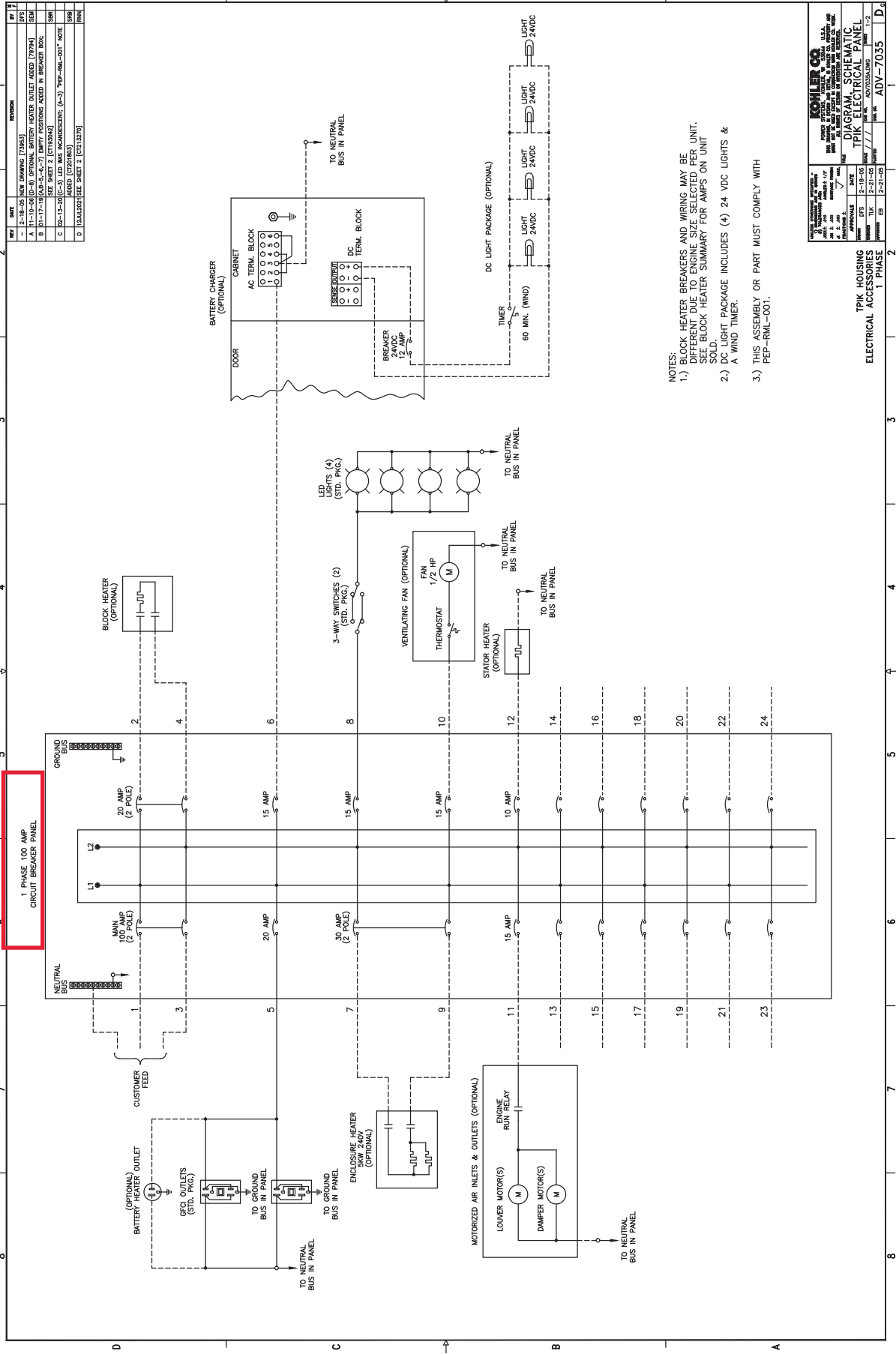
[illegible][illegible]



FOR GENERAL NOTES: SEE SHEET 1

KOMLER CO. POWER SUPPLIES, CABLES, WIRE, U.S.A. 1000 W. 10TH STREET, SUITE 100, DENVER, CO. 80202 NEW YORK, N.Y. 10036 • TEL. 212-512-1100 ALL TYPES OF CABLES AND ACCESSORIES AVAILABLE		DIAGRAM, WIRING NETWORK COMMUNICATIONS		U.S. NO. _____ DATE _____ TIME _____ PAGE 2-16	D GM62554
1. ☒ STANDARD 2. ☐ NON-STANDARD 3. ☐ REVISION 4. ☐ REWORK 5. ☐ REPAIR 6. ☐ REPLACE 7. ☐ REUSE 8. ☐ RECYCLE 9. ☐ RECYCLE 10. ☐ RECYCLE 11. ☐ RECYCLE 12. ☐ RECYCLE 13. ☐ RECYCLE 14. ☐ RECYCLE 15. ☐ RECYCLE 16. ☐ RECYCLE 17. ☐ RECYCLE 18. ☐ RECYCLE 19. ☐ RECYCLE 20. ☐ RECYCLE 21. ☐ RECYCLE 22. ☐ RECYCLE 23. ☐ RECYCLE 24. ☐ RECYCLE 25. ☐ RECYCLE 26. ☐ RECYCLE 27. ☐ RECYCLE 28. ☐ RECYCLE 29. ☐ RECYCLE 30. ☐ RECYCLE 31. ☐ RECYCLE 32. ☐ RECYCLE 33. ☐ RECYCLE 34. ☐ RECYCLE 35. ☐ RECYCLE 36. ☐ RECYCLE 37. ☐ RECYCLE 38. ☐ RECYCLE 39. ☐ RECYCLE 40. ☐ RECYCLE 41. ☐ RECYCLE 42. ☐ RECYCLE 43. ☐ RECYCLE 44. ☐ RECYCLE 45. ☐ RECYCLE 46. ☐ RECYCLE 47. ☐ RECYCLE 48. ☐ RECYCLE 49. ☐ RECYCLE 50. ☐ RECYCLE 51. ☐ RECYCLE 52. ☐ RECYCLE 53. ☐ RECYCLE 54. ☐ RECYCLE 55. ☐ RECYCLE 56. ☐ RECYCLE 57. ☐ RECYCLE 58. ☐ RECYCLE 59. ☐ RECYCLE 60. ☐ RECYCLE 61. ☐ RECYCLE 62. ☐ RECYCLE 63. ☐ RECYCLE 64. ☐ RECYCLE 65. ☐ RECYCLE 66. ☐ RECYCLE 67. ☐ RECYCLE 68. ☐ RECYCLE 69. ☐ RECYCLE 70. ☐ RECYCLE 71. ☐ RECYCLE 72. ☐ RECYCLE 73. ☐ RECYCLE 74. ☐ RECYCLE 75. ☐ RECYCLE 76. ☐ RECYCLE 77. ☐ RECYCLE 78. ☐ RECYCLE 79. ☐ RECYCLE 80. ☐ RECYCLE 81. ☐ RECYCLE 82. ☐ RECYCLE 83. ☐ RECYCLE 84. ☐ RECYCLE 85. ☐ RECYCLE 86. ☐ RECYCLE 87. ☐ RECYCLE 88. ☐ RECYCLE 89. ☐ RECYCLE 90. ☐ RECYCLE 91. ☐ RECYCLE 92. ☐ RECYCLE 93. ☐ RECYCLE 94. ☐ RECYCLE 95. ☐ RECYCLE 96. ☐ RECYCLE 97. ☐ RECYCLE 98. ☐ RECYCLE 99. ☐ RECYCLE 100. ☐ RECYCLE		DATE _____ TIME _____ PAGE _____		D GM62554	

[illegible][illegible]

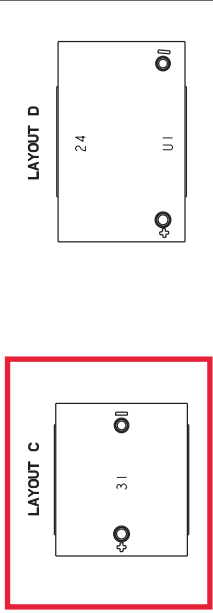
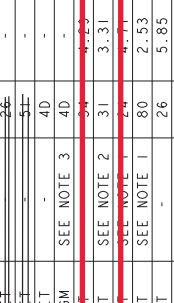
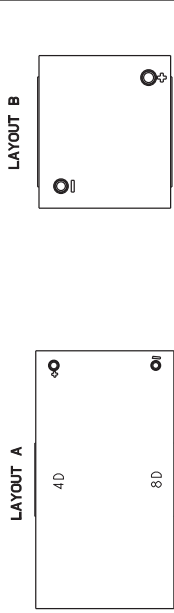


Miscellaneous

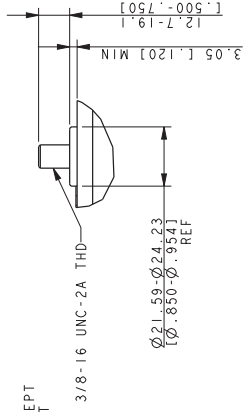
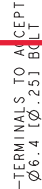
PART NO.	REV	SAE DIMENSION		VOLTAGE	COLD CRANKING AMPS AT 0°F MINIMUM	RESERVE CAP MINUTES AT 80°F MINIMUM	POST LAYOUT /STYLE	CHARGE TYPE	BATTERY CONSTRUCTION	BCI GROUP	INTERNAL RESISTANCE mΩ	ALTERNATE CONSTRUCTION ON BOTTOM OF BATTERIES ACCEPTABLE		
		L	W									L	H	W
244578	01	333.5 [13.13]	181.1 [7.13]	6	700	275	D/I	DRY	SEE NOTE 1	-	-			
244750	00	342.9 [13.50]	173.2 [6.82]	12	600	165	D/I	DRY	SEE NOTE 1	-	-			
239002	00	198.1 [7.80]	133.4 [5.25]	12	200	32	D/2	DRY	SEE NOTE 1	-	-			
239016	00	539.0 [21.21]	292.7 [11.53]	12	1150	450	A/I	DRY	SEE NOTE 1	-	-			
239108	00	333.2 [13.12]	173.0 [6.81]	12	700	150	C/3	WET	SEE NOTE 1	-	-			
239981	00	333.2 [13.12]	173.0 [6.81]	12	700	150	C/3	DRY	SEE NOTE 1	-	-			
254425	00	333.2 [13.12]	173.0 [6.81]	12	1000	200	C/3	WET	SEE NOTE 1	-	-			
239982	00	333.2 [13.12]	173.0 [6.81]	12	950	200	C/3	DRY	SEE NOTE 1	-	-			
324387	00	208.0 [8.19]	179.4 [7.06]	12	675	90	C/I	WET	SEE NOTE 1	-	-			
324388	00	208.0 [8.19]	166.9 [6.57]	12	675	90	C/I	DRY	SEE NOTE 1	-	-			
324886	00	330.2 [13.00]	173.0 [6.81]	12	950	185	C/3	WET	SEE NOTE 2	31	-			
324887	00	330.2 [13.00]	173.0 [6.81]	12	950	200	C/3	DRY	SEE NOTE 2	31	-			
239984	01	273.0 [10.75]	173.0 [6.81]	12	650	120	D/I	WET	SEE NOTE 1	24	-			
225289	00	273.0 [10.75]	173.0 [6.81]	12	650	130	D/I	DRY	SEE NOTE 1	24	-			
354147	01	330.2 [13.00]	173.0 [6.81]	12	510	80	C/3	WET	SEE NOTE 2	24F	-			
354148	01	330.2 [13.00]	173.0 [6.81]	12	700	170	C/3	WET	SEE NOTE 2	31	-			
345309	00	219.2 [8.63]	153.9 [6.06]	12	525	-	E/I	WET	SEE NOTE 1	55	-			
GM223468	00	525.3 [20.68]	220.5 [8.68]	12	1400	320	A/I	DRY	SEE NOTE 1	-	-			
GM223469	00	527.1 [20.75]	282.4 [11.12]	12	1150	400	A/I	DRY	SEE NOTE 1	80	-			
GM343909	01	527.1 [20.75]	282.4 [11.12]	12	1400	430	A/I	WET	SEE NOTE 1	80	-			
GM46784	01	200.0 [7.87]	173.0 [6.81]	12	525	70	D/I	WET	SEE NOTE 1	26	-			
GM75832	01	238.0 [9.38]	129.0 [5.08]	12	500	85	D/I	WET	SEE NOTE 1	51	-			
10702000701	A	527.1 [20.75]	216.0 [8.50]	12	1050	290	A/I	WET	-	40	-			
10702001800	A	527.1 [20.75]	216.0 [8.50]	12	1110	380	A/I	AGM	SEE NOTE 3	40	-			
GM063377	-	527.1 [20.75]	216.0 [8.50]	12	925	180	C/3	WET	SEE NOTE 2	31	3.31			
GM063375	-	527.1 [20.75]	216.0 [8.50]	12	925	180	C/3	WET	SEE NOTE 2	31	3.31			
GM063373	-	527.1 [20.75]	216.0 [8.50]	12	925	180	C/3	WET	SEE NOTE 2	31	3.31			
GM063377	-	527.1 [20.75]	216.0 [8.50]	12	1400	380	A/I	WET	SEE NOTE 1	80	2.53			
GM063369	-	208.0 [8.19]	172.0 [6.77]	12	500	95	D/I	WET	-	26	5.85			
GM063374	-	237.0 [9.32]	125.0 [4.94]	12	500	70	D/I	WET	-	51	5.00			

NOTE: DIMENSIONS IN [] ARE ENGLISH EQUIVALENTS.

□ INDICATES PART NUMBERS AFFECTED BY LATEST DRAWING REVISION



REV.	DATE	BY	ON COMPOSITE DIMS. SEE PART NO. FOR REVISION LEVEL	DO NOT SCALE. REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS		
B1	5-6-16	CA	(C-6) 10702001800; COLD CRANKING AMPS 1110	UNLESS OTHERWISE INDICATED: DIMENSIONS IN MILLIMETERS: 2.5 4 6 8 10 12 15 18 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300 310 320 330 340 350 360 370 380 390 400 410 420 430 440 450 460 470 480 490 500 510 520 530 540 550 560 570 580 590 600 610 620 630 640 650 660 670 680 690 700 710 720 730 740 750 760 770 780 790 800 810 820 830 840 850 860 870 880 890 900 910 920 930 940 950 960 970 980 990 1000 1010 1020 1030 1040 1050 1060 1070 1080 1090 1100 1110 1120 1130 1140 1150 1160 1170 1180 1190 1200 1210 1220 1230 1240 1250 1260 1270 1280 1290 1300 1310 1320 1330 1340 1350 1360 1370 1380 1390 1400 1410 1420 1430 1440 1450 1460 1470 1480 1490 1500 1510 1520 1530 1540 1550 1560 1570 1580 1590 1600 1610 1620 1630 1640 1650 1660 1670 1680 1690 1700 1710 1720 1730 1740 1750 1760 1770 1780 1790 1800 1810 1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060 2070 2080 2090 2100 2110 2120 2130 2140 2150 2160 2170 2180 2190 2200 2210 2220 2230 2240 2250 2260 2270 2280 2290 2300 2310 2320 2330 2340 2350 2360 2370 2380 2390 2400 2410 2420 2430 2440 2450 2460 2470 2480 2490 2500 2510 2520 2530 2540 2550 2560 2570 2580 2590 2600 2610 2620 2630 2640 2650 2660 2670 2680 2690 2700 2710 2720 2730 2740 2750 2760 2770 2780 2790 2800 2810 2820 2830 2840 2850 2860 2870 2880 2890 2900 2910 2920 2930 2940 2950 2960 2970 2980 2990 3000 3010 3020 3030 3040 3050 3060 3070 3080 3090 3100 3110 3120 3130 3140 3150 3160 3170 3180 3190 3200 3210 3220 3230 3240 3250 3260 3270 3280 3290 3300 3310 3320 3330 3340 3350 3360 3370 3380 3390 3400 3410 3420 3430 3440 3450 3460 3470 3480 3490 3500 3510 3520 3530 3540 3550 3560 3570 3580 3590 3600 3610 3620 3630 3640 3650 3660 3670 3680 3690 3700 3710 3720 3730 3740 3750 3760 3770 3780 3790 3800 3810 3820 3830 3840 3850 3860 3870 3880 3890 3900 3910 3920 3930 3940 3950 3960 3970 3980 3990 4000 4010 4020 4030 4040 4050 4060 4070 4080 4090 4100 4110 4120 4130 4140 4150 4160 4170 4180 4190 4200 4210 4220 4230 4240 4250 4260 4270 4280 4290 4300 4310 4320 4330 4340 4350 4360 4370 4380 4390 4400 4410 4420 4430 4440 4450 4460 4470 4480 4490 4500 4510 4520 4530 4540 4550 4560 4570 4580 4590 4600 4610 4620 4630 4640 4650 4660 4670 4680 4690 4700 4710 4720 4730 4740 4750 4760 4770 4780 4790 4800 4810 4820 4830 4840 4850 4860 4870 4880 4890 4900 4910 4920 4930 4940 4950 4960 4970 4980 4990 5000 5010 5020 5030 5040 5050 5060 5070 5080 5090 5100 5110 5120 5130 5140 5150 5160 5170 5180 5190 5200 5210 5220 5230 5240 5250 5260 5270 5280 5290 5300 5310 5320 5330 5340 5350 5360 5370 5380 5390 5400 5410 5420 5430 5440 5450 5460 5470 5480 5490 5500 5510 5520 5530 5540 5550 5560 5570 5580 5590 5600 5610 5620 5630 5640 5650 5660 5670 5680 5690 5700 5710 5720 5730 5740 5750 5760 5770 5780 5790 5800 5810 5820 5830 5840 5850 5860 5870 5880 5890 5900 5910 5920 5930 5940 5950 5960 5970 5980 5990 6000 6010 6020 6030 6040 6050 6060 6070 6080 6090 6100 6110 6120 6130 6140 6150 6160 6170 6180 6190 6200 6210 6220 6230 6240 6250 6260 6270 6280 6290 6300 6310 6320 6330 6340 6350 6360 6370 6380 6390 6400 6410 6420 6430 6440 6450 6460 6470 6480 6490 6500 6510 6520 6530 6540 6550 6560 6570 6580 6590 6600 6610 6620 6630 6640 6650 6660 6670 6680 6690 6700 6710 6720 6730 6740 6750 6760 6770 6780 6790 6800 6810 6820 6830 6840 6850 6860 6870 6880 6890 6900 6910 6920 6930 6940 6950 6960 6970 6980 6990 7000 7010 7020 7030 7040 7050 7060 7070 7080 7090 7100 7110 7120 7130 7140 7150 7160 7170 7180 7190 7200 7210 7220 7230 7240 7250 7260 7270 7280 7290 7300 7310 7320 7330 7340 7350 7360 7370 7380 7390 7400 7410 7420 7430 7440 7450 7460 7470 7480 7490 7500 7510 7520 7530 7540 7550 7560 7570 7580 7590 7600 7610 7620 7630 7640 7650 7660 7670 7680 7690 7700 7710 7720 7730 7740 7750 7760 7770 7780 7790 7800 7810 7820 7830 7840 7850 7860 7870 7880 7890 7900 7910 7920 7930 7940 7950 7960 7970 7980 7990 8000 8010 8020 8030 8040 8050 8060 8070 8080 8090 8100 8110 8120 8130 8140 8150 8160 8170 8180 8190 8200 8210 8220 8230 8240 8250 8260 8270 8280 8290 8300 8310 8320 8330 8340 8350 8360 8370 8380 8390 8400 8410 8420 8430 8440 8450 8460 8470 8480 8490 8500 8510 8520 8530 8540 8550 8560 8570 8580 8590 8600 8610 8620 8630 8640 8650 8660 8670 8680 8690 8700 8710 8720 8730 8740 8750 8760 8770 8780 8790 8800 8810 8820 8830 8840 8850 8860 8870 8880 8890 8900 8910 8920 8930 8940 8950 8960 8970 8980 8990 9000 9010 9020 9030 9040 9050 9060 9070 9080 9090 9100 9110 9120 9130 9140 9150 9160 9170 9180 9190 9200 9210 9220 9230 9240 9250 9260 9270 9280 9290 9300 9310 9320 9330 9340 9350 9360 9370 9380 9390 9400 9410 9420 9430 9440 9450 9460 9470 9480 9490 9500 9510 9520 9530 9540 9550 9560 9570 9580 9590 9600 9610 9620 9630 9640 9650 9660 9670 9680 9690 9700 9710 9720 9730 9740 9750 9760 9770 9780 9790 9800 9810 9820 9830 9840 9850 9860 9870 9880 9890 9900 9910 9920 9930 9940 9950 9960 9970 9980 9990 10000	1110	BGM
B2	4-15-19	CA	(C-8) GM10681, GM106375, GM106373; (C-8) GM106377, GM106369 & GM106374 ADDED: (D-3) INTERNAL RESISTANCE (mΩ) COLUMN ADDED: (D-8) 324586 & 256984 VOIDED: (C-8) GM34399, GM48784, GM75512 VOIDED: (A, B, 7, 8, 5, 4) VIEWS & NOTES MOVED TO SHEET 2; SHEET 2 ADDED [C119425]	THIS DRAWING IS THE PROPERTY OF KOHLER. IT IS TO BE USED ONLY FOR THE PROJECT AND NOT BE REPRODUCED OR COPIED FOR ANY OTHER PROJECT WITHOUT THE WRITTEN PERMISSION OF KOHLER. THIS DRAWING IS THE PROPERTY OF KOHLER. IT IS TO BE USED ONLY FOR THE PROJECT AND NOT BE REPRODUCED OR COPIED FOR ANY OTHER PROJECT WITHOUT THE WRITTEN PERMISSION OF KOHLER.		
DWG. BATTERY, DRY CHARGED						
SHEET 1 OF 2						
244578-CMP						



NOTES:

- 1) STYLE 3 CAN BE CONVERTED TO STYLE 1 BY INSTALLATION OF 25427 STUD CONVERSION KIT.
- 2) BATTERIES USING "STYLE 3" STUDS MUST HAVE EITHER THE "POS" OR "NEG" STUD CLEARLY IDENTIFIED.
- 3) STYLE 3 TERMINAL TORQUE 10 Nm (115 FT LBS).
- 4) "POS" & "NEG" IDENTIFICATION MUST BE MARKED AS SHOWN ON THE PART LAYOUT AND WITHIN 5mm OF THE STUD.

NOTES: (APPLIES TO ALL BATTERIES)
SAE J537 DIMENSIONS ARE MAX ALLOWABLE DIMENSIONS.
COLD CRANKING AMPS ARE MINIMUM ACCEPTABLE VALUES.
HOLD DOWN DESIGN IN COMPLIANCE WITH SAE STANDARDS.
BATTERY WARNING LABEL TO BE LOCATED ON TOP OF BATTERY. (BETWEEN TERMINALS ON LAYOUT D)
MANUFACTURER MUST PROVIDE CERTIFICATE CONTAINING: MANUFACTURER'S NAME, MICROGRAVITY NUMBER,
SERIAL NUMBER, DATE OF MANUFACTURE, DATE OF TESTING, TEST RESULTS, AND SIGNATURE OF QUALITY CONTROL.
SEE N.P.A. 110 FOR SPECIFIC DETAILS. CERTIFICATE REQUIRED ONLY ONCE PER BATTERY PART NUMBER.
MAY NOT BE CALCULUM-CALCULUPE.

NOTES: (CHARGE TYPE)
ALL DRY CHARGED BATTERIES MUST BE SUPPLIED WITH ACTIVATION INSTRUCTIONS ADHERED TO BATTERY AND LOOSE. BATTERY MUST ALSO BE IDENTIFIED ON TOP AS: "DRY CHARGED, MUST ADD BATTERY GRADE ELECTROLYTE, SEE ACTIVATION INSTRUCTIONS".
BATTERIES SHOULD BE RECEIVED APPROPRIATELY MARKED AS DRYCHARGED OR WET STORAGE.
ONE OF THE BATTERY POSTS MUST BE SHIELDED WHEN BATTERIES ARE WET CHARGED.
BATTERIES WHEN SHIPPED DRY - DO NOT REQUIRE POST PROTECTORS.

NOTES: (BATTERY CONSTRUCTION)
1) MUST BE LEAD-CALCIUM HYBRID OR LEAD-ANTIMONY TYPE.
2) LEAD-CALCIUM GRID.
3) ABSORBED GLASS MAT. (AGM)

REV	DATE	ON COMPOSITE DWG. SEE PART NO. FOR REVISION LEVEL	BY	DO NOT SCALE. REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS
CA	4-15-19	NEW DRAWING; SEE SHEET 1 (C194423)	DS	
1. ALL DIMENSIONS UNLESS OTHERWISE SPECIFIED ARE IN INCHES. 2. 1/8" = 1'-0" SURFACE FINISH 3. 1/8" = 1'-0" MAX. 4. 1/8" = 1'-0" MAX. KOHLER MANUFACTURING DESIGN AND DETAIL IS KOHLER PROPERTY AND MUST NOT BE REPRODUCED OR USED FOR ANY OTHER PROJECT WITHOUT THE WRITTEN PERMISSION OF KOHLER. ALL RIGHTS ARE RESERVED.				
APPROVALS DATE DESIGNED BY CHECKED BY DATE DATE TITLE DWG. BATTERY, DRY CHARGED				
SCALE: 0-30" (4:1) DATE: 4-15-19 DESIGNED BY: GEP CHECKED BY: GEP DATE: 4-15-19 DATE: 4-15-19 DESIGNED BY: AMM CHECKED BY: AMM			SHEET 2 OF 2 2445578-CMP	

PART NO	REV	WATTS	VOLTS	AMPS	TEMP RANGE	REPLACEMENT ELEMENT
GM79183	-	4000	208	19.2	27/38° C	GM29480
GM79183	-	4000	240	14.4	[80/100° F]	GM29481
GM79183	-	4000	480	8.3		GM29482

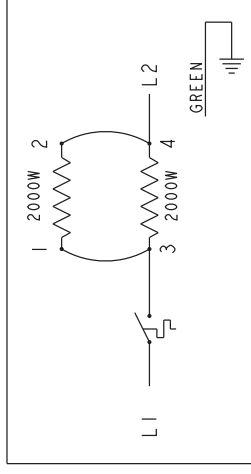
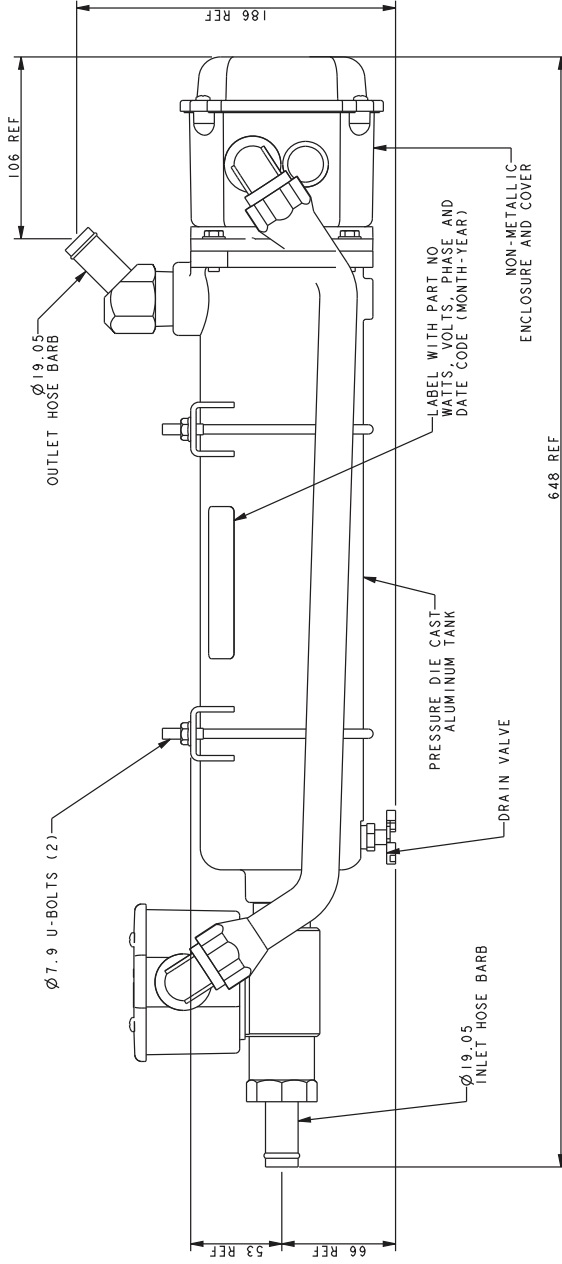
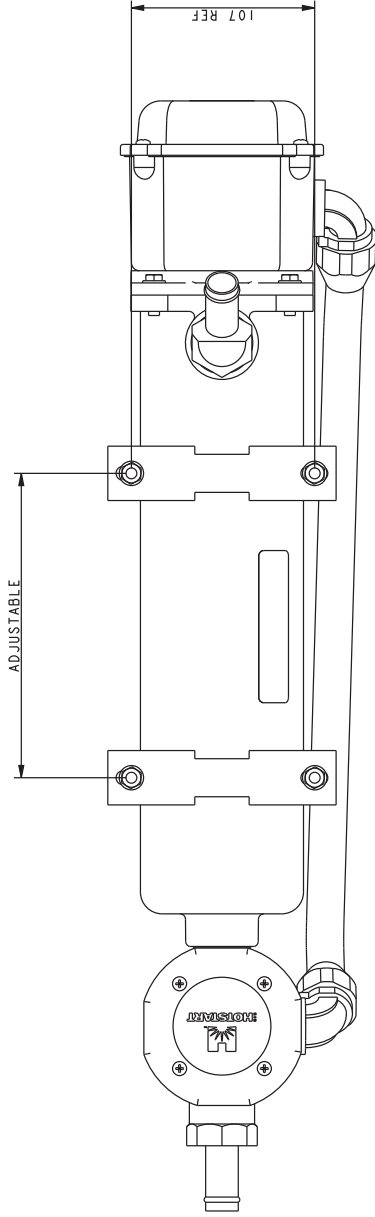


DIAGRAM ``A``
(208VAC SINGLE PHASE - PARALLEL)

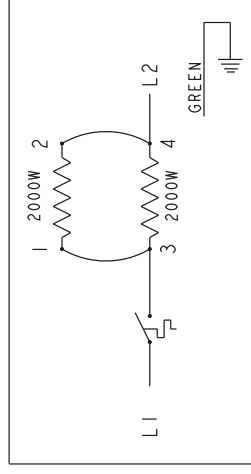


DIAGRAM ``B``
(240VAC SINGLE PHASE - PARALLEL)

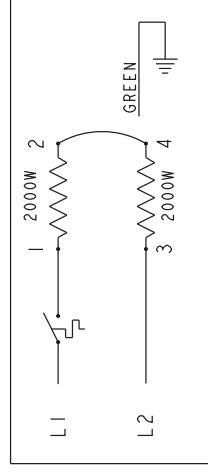


DIAGRAM ``C``
(480VAC SINGLE PHASE - SERIES)

REV	DATE	ON COMPOSITE DWGS. SEE PART NO. FOR REVISION LEVEL	BY	DATE	APPROVED	SCALE	UNIT	PROJ.
1	1-5-11	NEW DRAWING [90801-11]	SVN	1-5-11	SVN	0.70	IN	GM79182
2	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
3	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
4	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
5	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
6	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
7	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
8	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
9	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
10	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
11	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
12	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
13	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
14	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
15	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
16	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
17	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
18	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
19	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
20	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
21	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
22	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
23	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
24	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
25	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
26	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
27	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
28	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
29	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
30	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
31	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
32	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
33	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
34	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
35	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
36	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
37	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
38	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
39	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
40	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
41	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
42	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
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44	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
45	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
46	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
47	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
48	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
49	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
50	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
51	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
52	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
53	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
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55	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
56	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
57	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
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60	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
61	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
62	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
63	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
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98	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
99	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
100	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182

NOTES:
1. BYPASS VALVE IS LOCATED INTERNALLY
2. MOUNTING HDW (U-BOLTS) ARE SHIPPED LOOSE

REV	DATE	ON COMPOSITE DWGS. SEE PART NO. FOR REVISION LEVEL	BY	DATE	APPROVED	SCALE	UNIT	PROJ.
1	1-5-11	NEW DRAWING [90801-11]	SVN	1-5-11	SVN	0.70	IN	GM79182
2	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
3	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
4	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
5	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
6	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
7	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
8	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
9	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
10	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
11	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
12	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
13	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
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17	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
18	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
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28	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
29	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
30	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
31	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
32	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
33	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
34	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
35	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
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39	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
40	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
41	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
42	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182
43	1-5-11		SVN	1-5-11	SVN	0.70	IN	GM79182

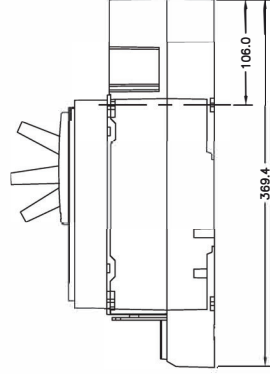
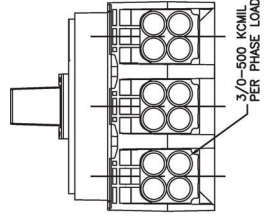
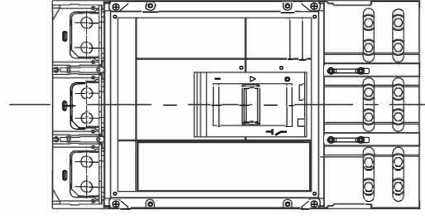
PART NO.	REV	AMPS	% RATING	GF1	INT@480V	TRIP	VENDOR NO.
GM24181-1	C	600	100	NO	35KA	5.0 LSI	PGP36080CU33A
GM24181-2	C	600	100	YES	35KA	6.0A LSI6	PGP36080CU44A
GM24181-3	C	800	80	NO	35KA	5.0 LSI	PGP36080CU33A
GM24181-4	C	800	80	YES	35KA	6.0A LSI6	PGP36080CU44A
GM24181-5	C	800	100	NO	35KA	5.0 LSI	PGP36080CU33A
GM24181-6	C	800	100	YES	35KA	6.0A LSI6	PGP36080CU44A
GM24181-7	C	1000	80	NO	35KA	5.0 LSI	PGP36100CU33A
GM24181-8	C	1000	80	YES	35KA	6.0A LSI6	PGP36100CU44A
GM24181-9	C	1000	100	NO	35KA	5.0 LSI	PGP36120CU33A
GM24181-10	C	1000	100	YES	35KA	6.0A LSI6	PGP36120CU44A
GM24181-11	C	1200	80	NO	35KA	5.0 LSI	PGP36120CU33A
GM24181-12	C	1200	80	YES	35KA	6.0A LSI6	PGP36120CU44A
GM24181-13	C	1200	100	NO	35KA	5.0 LSI	PGP36120CU33A
GM24181-14	C	1200	100	YES	35KA	6.0A LSI6	PGP36120CU44A
GM24181-15	D	1200	80	NO	35KA	5.0 LSI	PGP36120CU33A
GM24181-16	D	1200	80	YES	35KA	6.0A LSI6	PGP36120CU44A
GM24181-17	D	1200	100	NO	35KA	5.0 LSI	PGP36120CU33A
GM24181-18	D	1200	100	YES	35KA	6.0A LSI6	PGP36120CU44A

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

REV	DATE	BY	CHKD	DESCRIPTION
A	10-10-03	04-1	THROATED BAR NOTE ADDED. [70000]	
B	11-12-03	04-1	THROATED BAR NOTE ADDED. [70000]	
C	12-23-07	04-1	KOHLER NOTE ADDED. [70000]	
D	11-10-11	04-1	KOHLER NOTE ADDED. [70000]	

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

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



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

METRIC CAD FILE

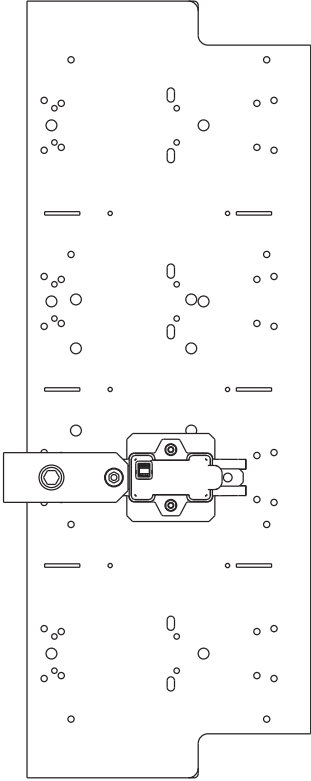
KOHLER CO. POWER SYSTEMS, KANSAS CITY, MO, USA 1000-1200A 3 POLE 3/0-500 KCMIL (4) PER PHASE LOAD SIDE	
BREAKER, CIRCUIT	
PART NO. GM24181-10	REV NO. 04-1
DATE 11-10-11	BY 04-1
CHKD 04-1	DESCRIPTION KOHLER NOTE ADDED. [70000]

SQUARE D P-FRAME CIRCUIT BREAKER
3 POLE ELECTRONIC TRIP
GM24181

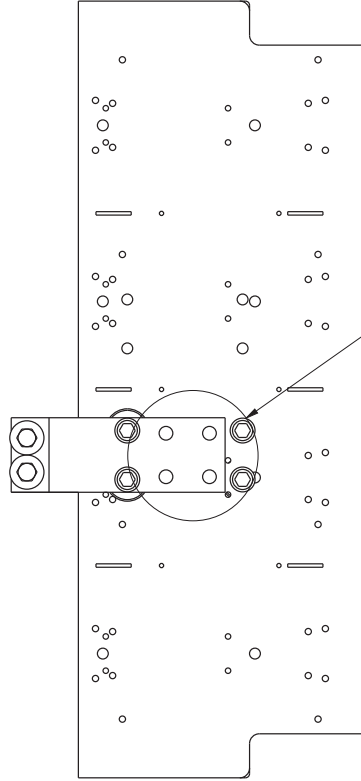
500-800A

[illegible]

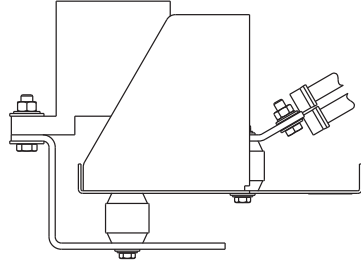
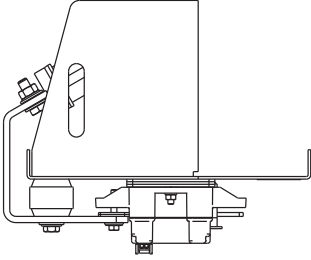
NOTE: H, J TRIP FOR E NEUTR ARE CHART



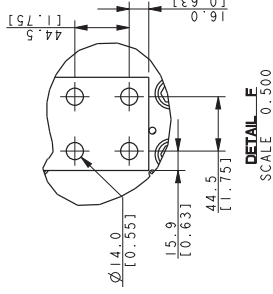
H, J OR LG-FRAME LSG NEUTRAL
250A J SHOWN
POSITION VARIES BASED ON CONFIGURATION



P-FRAME LSG NEUTRAL
POSITION VARIES BASED ON CONFIGURATION



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

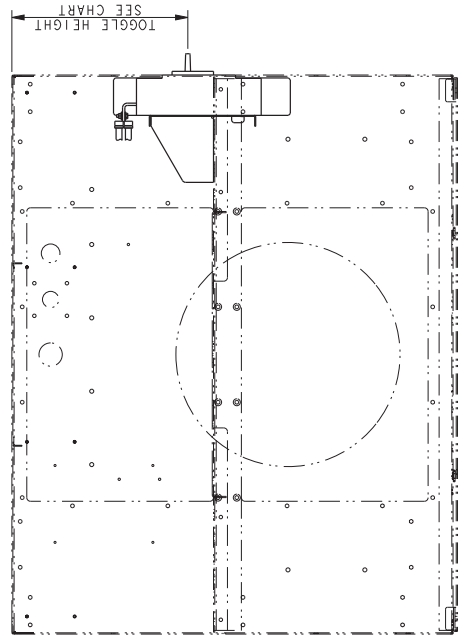


REV.	DATE	ON COMPOSITE DIMS. SEE PART NO. FOR REVISION LEVEL	BY	DO NOT SCALE. REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS
-	4-29-11	NEW DRAWING 1917321	MSD	
A	12-12-11	SEE SHEETS 1 & 5 [C000461]	MSD	
B	10-3-12	SEE SHEETS 1 & 3 [CT26372]	MSD	
C	11-7-12	SEE OTHER SHEETS [CT28128]	MSD	
D	11-2-16	SEE SHEETS 1 & 2 [CT114236]	MSD	
E	4-26-18	SEE SHEET 1 [CT186966]	MSD	
F	3-25-19	SEE SHEET 1 [CT194577]	MSD	
G	11-11-19	SEE SHEETS 1 & 3 [CT198840]	MSD	
H	6-23-21	SEE SHEET 1 [CT1212831]	MSD	

APPROVALS	DATE	SCALE	SHEET # OF 6
MSD	4-29-11	0.500	1
MSD	4-29-11	0.500	2
MSD	4-29-11	0.500	3
MSD	4-29-11	0.500	4
MSD	4-29-11	0.500	5
MSD	4-29-11	0.500	6
MSD	4-29-11	0.500	7
MSD	4-29-11	0.500	8

ADV-8030	1
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BREAKER AND LOAD BUS PHASING			
RIGHT			
A	B	C	
LEFT			
C	B	A	



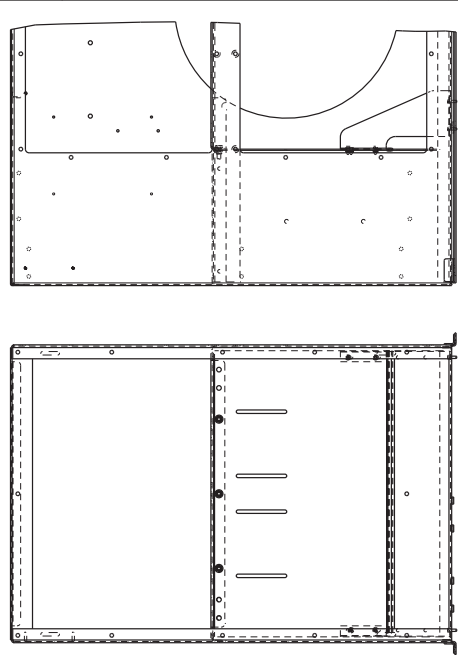
(ALTERNATOR)

TOP ENTRY (LEFT SIDE ONLY WHEN NO BREAKERS OR LOAD BUS ARE PRESENT ON LEFT SIDE)
SEE UNIT ADV FOR RELATION TO GENSET FOOTPRINT

BREAKER	TOGGLE HEIGHT
J/H	453 [17.8]
LA	527 [20.7]
LA	480 [18.9]
P/M	555 [21.8]
NW	550 [21.7]
NW	228 [9.0]

NOTE: TOGGLE HEIGHTS ARE FROM TOP OF 980MM CENTER POSITION. NW DIMENSION IS TO TOP OF CHARGING HANDLE TO CALCULATE HEIGHT FROM FLOOR. USE THESE HEIGHTS IN COMBINATION WITH DIMENSIONS FROM UNIT ADV'S.

SMALL CIRCUIT BREAKERS
(4) LG-FRAMES SHOWN WITH SEPARATORS
RIGHT-FACING SHOWN, LEFT FACING AVAILABLE
SEE CHARTS ON PAGE 1 FOR LUGS AND BENDING SPACE



OPTIONAL GF RELAY LOCATION

BARRIER PANEL

CLOSURE PANEL
(SHOWN PHANTOMED)

LOWER COMPARTMENT SEPARATOR
SHOWN ON LEFT SIDE, EITHER SIDE OR BOTH AVAILABLE

REV.	DATE	ON COMPOSITE DIMS. SEE PART NO. FOR REVISION LEVEL	BY	DO NOT SCALE. REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS
A	12-12-11	NEW DRAWING [91732]	WSD	
B	10-3-12	SEE SHEETS 1 & 3 [CT26372]	WSD	
C	11-7-12	SEE SHEETS 1 & 2 [CT114236]	WSD	
D	11-7-12	SEE SHEETS 1 & 2 [CT114236]	WSD	
E	4-26-18	SEE SHEET 1 [CT188966]	WSD	
F	3-25-19	SEE SHEET 1 [CT194571]	WSD	
G	11-11-19	SEE SHEETS 1 & 3 [CT198840]	WSD	
H	8-23-21	SEE SHEET 1 [CT218571]	WSD	

SMALL CIRCUIT BREAKERS
P & J-FRAMES SHOWN
RIGHT-FACING SHOWN, LEFT FACING AVAILABLE
SEE CHARTS ON PAGE 1 FOR LUGS AND BENDING SPACE

REV.	DATE	ON COMPOSITE DIMS. SEE PART NO. FOR REVISION LEVEL	BY	DO NOT SCALE. REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS
A	12-12-11	NEW DRAWING [91732]	WSD	
B	10-3-12	SEE SHEETS 1 & 3 [CT26372]	WSD	
C	11-7-12	SEE SHEETS 1 & 2 [CT114236]	WSD	
D	11-7-12	SEE SHEETS 1 & 2 [CT114236]	WSD	
E	4-26-18	SEE SHEET 1 [CT188966]	WSD	
F	3-25-19	SEE SHEET 1 [CT194571]	WSD	
G	11-11-19	SEE SHEETS 1 & 3 [CT198840]	WSD	
H	8-23-21	SEE SHEET 1 [CT218571]	WSD	

4M/5M/7M GENSETS

ADV-8030	Sheet 6 of 6
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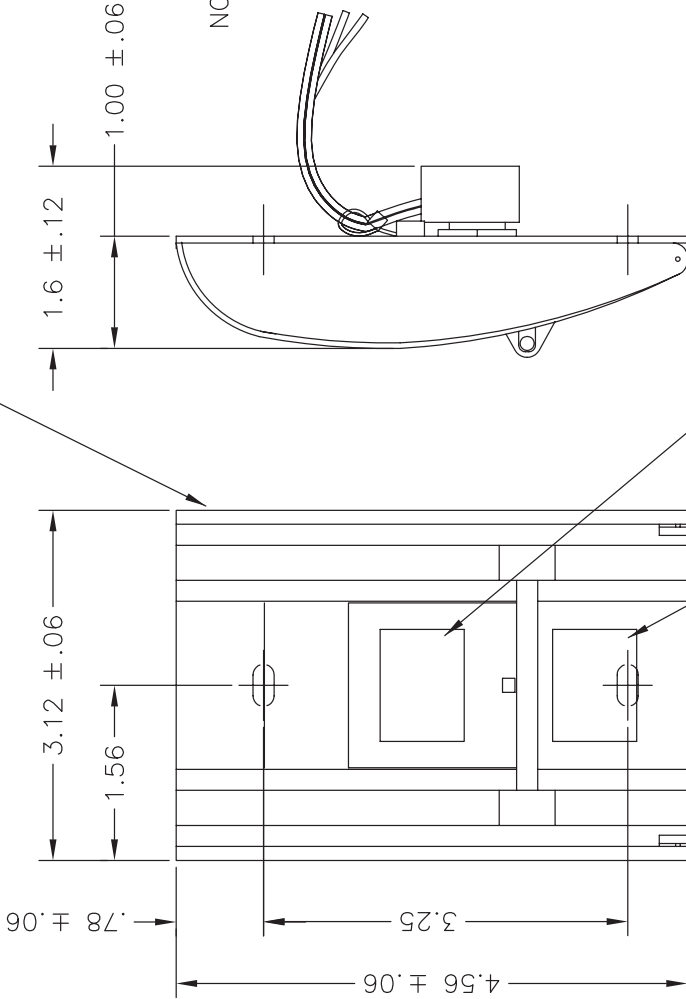
4 3 2 1

PART NO.	DESCRIPTION
222655	REPLACEMENT GLASS ROD

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

D C B A

YELLOW CASE



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

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

SWITCHING NORMALLY CLOSED.

EXTRA PIECE OF GLASS TO BE SUPPLIED WITH SWITCH.

MATERIAL: METAL (STEEL)

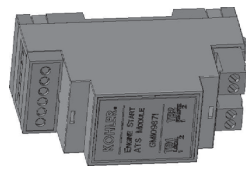
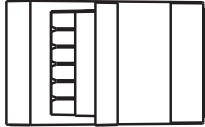
UNLESS OTHERWISE SPECIFIED - 1) DIMENSIONS ARE IN INCHES 2) TOLERANCES ARE: .XXX ± .010 .XX ± .030 X ± .060 FRACTIONS ± MAX.		APPROVALS		DATE		TITLE		POWER SYSTEMS, KOHLER, WI 53044 U.S.A. THIS DRAWING IS THE PROPERTY OF KOHLER CO. AND MUST NOT BE USED EXCEPT IN CONNECTION WITH KOHLER CO. WORK. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED.	
DRAWN KDW		8-12-92		SCALE FULL		CAD NO. A222654.dwg		SHEET 1-1	
CHECKED EB		9-9-92		PLOTTED		DWG. NO.		A-222654	
APPROVED RLD		9-9-92						B	

(DECAL)
PULL TO BREAK GLASS

(DECAL)
GENERATOR
EMERGENCY
STOP

4 3 2 1

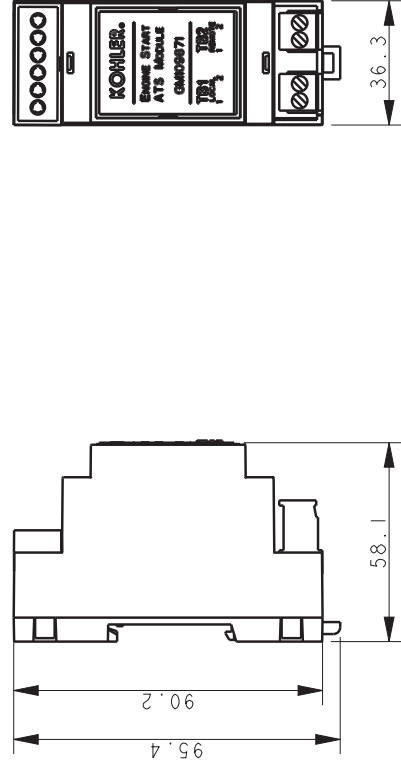
4 3 2 1



SCALE 0.50

NOTES:

- 1) OPERATING TEMP: -20°C TO 70°C
- 2) STORAGE TEMP: -40°C TO 85°C
- 3) MOUNTING: 35mm DIN RAIL
- 4) WIRE GAUGE: 12 - 30 AWG STRANDED
- 5) MAX DISTANCE: CONNECTION BETWEEN ATS MODULE AND GEN MODULE SHALL NOT EXCEED 1000'
- 6) MAX RESISTANCE DROP: 100Ω (COMPLETE LOOP)
- 7) THIS PART TO BE USED ON A LISTED MODEL AND CANNOT BE CHANGED WITHOUT PRIOR LISTING SERVICE APPROVAL, UL LISTED
- 8) PRODUCT MUST ADHERE TO KOHLER PRODUCT ENVIRONMENTAL POLICY PEP-RML-001
- 9) SEE SHEET 2 FOR KOHLER BRAND LABEL ARTWORK



WEIGHT: .07kg [.15 LB.]

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY	DO NOT SCALE. REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS
-	12-4-19	NEW DRAWING [CT199085]	ZHK	KOHLER. KOHLER WISCONSIN 53044 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. THIRD ANGLE PROJECTION APPROVALS DATE DRAWN ZHK 9-27-19 CHECKED MTL 9-27-19 APPROVED MTL 9-27-19
				UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN MILLIMETERS GENERAL TOLERANCES: X.XX ± 0.25 X.X ± 1.0 X ± 1.5 ANGLES ± 0°30' MAX.
				ENGINE START INTEGRITY, ATS MODULE SCALE 0.70 CAD NO. SHEET 1 of 2
				DWG NO. GMIO9871 B

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KOHLER BRANDING

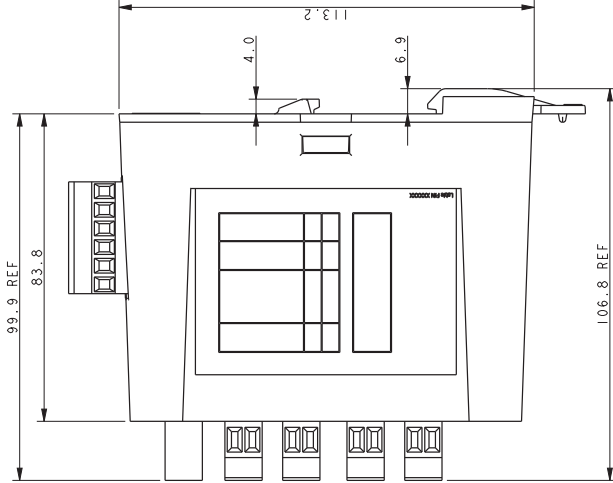
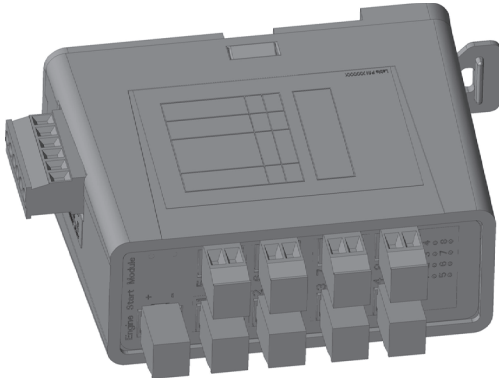
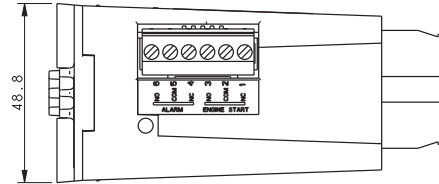
REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY	DO NOT SCALE. REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS												
-	12-4-19	NEW DRAWING [CT199085]	ZHK	KOHLER. KOHLER, WISCONSIN 53044 THIS DRAWING IN DESIGN AND DETAIL IS KOHLER CO. PROPERTY AND MUST NOT BE USED EXCEPT IN CONNECTION WITH KOHLER CO. WORK. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED. ENGINE START INTEGRITY, ATS MODULE												
				THIRD ANGLE PROJECTION <table><tr><th colspan="2">APPROVALS</th><th>DATE</th></tr><tr><td>DRAWN</td><td>ZHK</td><td>9-27-19</td></tr><tr><td>CHECKED</td><td>MTL</td><td>9-27-19</td></tr><tr><td>APPROVED</td><td>MTL</td><td>9-27-19</td></tr></table>	APPROVALS		DATE	DRAWN	ZHK	9-27-19	CHECKED	MTL	9-27-19	APPROVED	MTL	9-27-19
APPROVALS		DATE														
DRAWN	ZHK	9-27-19														
CHECKED	MTL	9-27-19														
APPROVED	MTL	9-27-19														
				<table><tr><td>SCALE</td><td>0.70</td><td>CAD NO.</td><td rowspan="2">SHEET 2 of 2</td></tr><tr><td>DWG NO.</td><td colspan="3">GM109871</td></tr></table>	SCALE	0.70	CAD NO.	SHEET 2 of 2	DWG NO.	GM109871						
SCALE	0.70	CAD NO.	SHEET 2 of 2													
DWG NO.	GM109871															
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SCALE 150

NOTES:

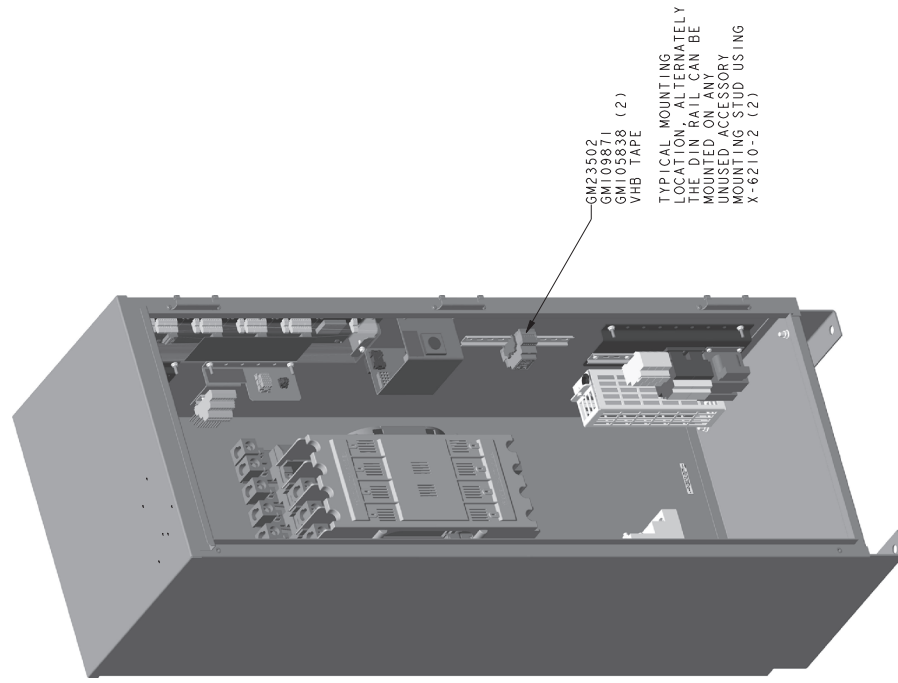
- 1) INPUT: 9 - 27V DC, 15W (MAX 33W)
- 2) OPERATING TEMP: -20°C TO 70°C
- 3) STORAGE TEMP: -40°C TO 85°C
- 4) MOUNTING: 35mm DIN RAIL
- 5) WIRE GAUGE: 12 - 30 AWG STRANDED
- 6) ENGINE START RELAY CONTACT:
1A 30VDC (FORM C)
- 7) ALARM RELAY CONTACT:
1A 30VDC (FORM C)
- 8) MAX DISTANCE: CONNECTION BETWEEN
A15 MODULE AND GEN MODULE SHALL
NOT EXCEED 1000
- 9) MAX RESISTANCE DROP: 100Ω (COMPLETE LOOP)
- 10) THIS PART TO BE USED ON A LISTED MODEL
AND CANNOT BE CHANGED WITHOUT PRIOR
LISTING SERVICE APPROVAL, UL LISTED
- 11) PRODUCT MUST ADHERE TO KOHLER PRODUCT
ENVIRONMENTAL POLICY PEP-RML-001
- 12) SEE SHEET 2 FOR KOHLER BRAND LABEL ARTWORK

WEIGHT: .2kg [.45 LB.]

REV	DATE	ON COMPOSITE DIMS. SEE PART NO. FOR REVISION LEVEL	BY	DATE	DESCRIPTION	SCALE	PROJ.
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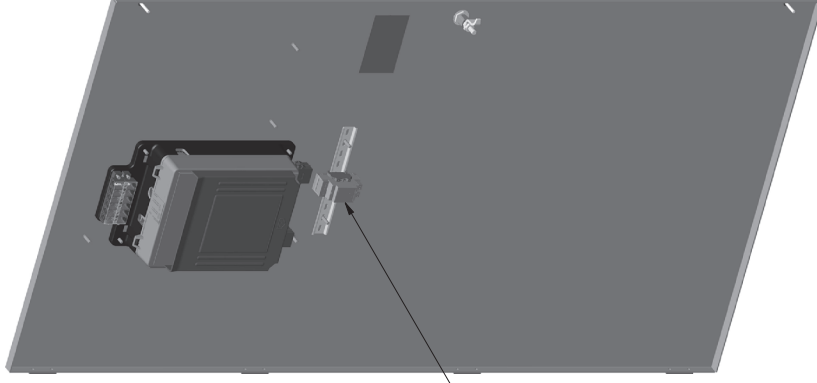


GM109872	D
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—GM23502
GM109871
GM105838 (2)
VHB TAPE

TYPICAL MOUNTING LOCATION, ALTERNATELY THE DIN RAIL CAN BE MOUNTED ON ANY UNUSED ACCESSORY MOUNTING STUD USING X-6210-2 (2)



GM23502-
GM109871
GM105838 (2)
X-6210-2 (2) OR
VHB TAPE

ALTERNATE MOUNTING LOCATION ON DOOR

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

[illegible]



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).

This warranty is effective only upon Kohler Co.'s receipt of an extended warranty registration form and warranty fee within one year of registered startup. The comprehensive limited warranty start date is determined by the standard limited warranty requirements and runs concurrent with the standard limited warranty during the first year. To receive extended comprehensive limited warranty coverage, the provisions of the standard limited warranty registration must be met.

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

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

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

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

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

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

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

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 8/16f



Certification



THE VMC GROUP

The Power of Together™

KOHLER
Power Systems

CERTIFICATE OF COMPLIANCE

SEISMIC DESIGN OF NONSTRUCTURAL COMPONENTS AND SYSTEMS



Certification No.

VMA-47444-01C (REVISION 04)

Expiration Date: 04/30/2021

Certification Parameters:

The nonstructural products (mechanical and/or electrical components) listed on this certificate are **CERTIFIED¹** FOR SEISMIC APPLICATIONS in accordance with the following building code² releases.

IBC 2006, 2009, 2012, 2015

The following model designations, options, and accessories are included in this certification. Reference report number **VMA-47444-01** as issued by The VMC Group for a complete list of certified models, included accessories/options, and certified installation methods.

Kohler Diesel Generator Sets REOZVC and REOZVB Series 500-600 kW

The above referenced equipment is **APPROVED** for seismic application when properly installed³, used as intended, and contains a Seismic Certification Label referencing this Certificate of Compliance⁴. As limited by the tabulated values, below grade, grade, and roof-level installations, installations in essential facilities, for life safety applications, and/or of equipment containing hazardous contents are permitted and included in this certification with an Equipment Importance Factor assigned as $I_p=1.5$. The equipment is qualified by code compliant comparative analysis based off of successful shake table testing at the nationally recognized University of California, Berkeley Pacific Earthquake Engineering Research Center under the witness of the ISO Accredited Product Certification Agency, The VMC Group.

Certified Seismic Design Levels				
Certified IBC	Importance $I_p \leq 1.5$ Soil Classes A-E Risk Categories I-IV Design Categories A-F	$S_{DS} \leq 1.930 \text{ g}$ $z/h = 0.0$		$S_{DS} \leq .643 \text{ g}$ $z/h \leq 1.0$
		Horizontal Design ⁵ $\frac{F_p}{W_p} = 0.4 S_{DS} I_p \frac{a_p}{R_p} \left(1 + 2 \frac{z}{h}\right) \leq$		1.447 g
Analysis Datum AC156	Code Compliant Comparative Analysis ISO 17025 Laboratory Pre/Post-Shake Functionality Tri-axial, 5% Damping SRS	$A_{FLEX-H} \leq 1.930 \text{ g}$		$A_{FLEX-V} \leq 1.287 \text{ g}$
		$A_{RIG-H} \leq 0.772 \text{ g}$		$A_{RIG-V} \leq 0.515 \text{ g}$
		$ZPA_H \leq 0.695 \text{ g}$		$ZPA_V \leq 0.463 \text{ g}$

Certified Seismic Installation Methods

Rigid mounting from fuel tank to rigid structure	External isolation mounting from unit base to rigid structure
--	---



THE VMC GROUP

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Power Systems

CERTIFICATE OF COMPLIANCE

SEISMIC DESIGN OF NONSTRUCTURAL COMPONENTS AND SYSTEMS

Certified Product Table:

Model	Max. Rating [kW]	Max. Dimensions [in]			Max. Weight [lbs.]	Enclosure Options	Fuel Tank Capacities [gal]
		Length	Width	Height			
500REOZVC	515	350	86	137	21,540	Aluminum or Steel Weather Aluminum or Steel Sound Level 2	538-3052
550REOZVB	550	350	86	137	22,240		538-3052
600REOZVB	600	350	86	137	23,310		538-3052

This certification **includes** the generator installed with or without an enclosure and fuel tank as limited by the table above. The generator and any included options shall be a catalogue design and factory supplied. The generator and applicable options shall be installed and attached to the building structure per the manufacturer supplied seismic installation instructions. This certificate **excludes** all non-factory supplied accessories, including but not limited to mufflers, isolation/restraint devices and electrical components.



VMA-47444-01C (Revision 04)
Issue Date: February 07, 2012
Revision Date: April 09, 2018
Expiration Date: April 30, 2021



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CERTIFICATE OF COMPLIANCE

SEISMIC DESIGN OF NONSTRUCTURAL COMPONENTS AND SYSTEMS

Notes and Comments:

1. All equipment listed herein has been comparatively analyzed to similar models that successfully passed the seismic acceptance criteria for shake testing non-structural components and systems as set forth in the ICC AC-156. The Test Response Spectrum (TRS) enveloped the Required Response Spectrum (RRS) for all units tested. The units cited in this certification were comparatively analyzed to representative sample(s) of a contingent of models that remained captive and structurally sound after the seismic shake simulation. The tested units also remained functionally operational after the simulation testing as functional testing was completed by the equipment manufacturer before and after the seismic simulations. Although a seismic qualified unit inherently contains some wind resisting capacity, that capacity is undetermined and is excluded from this certification. Snow/Ice loads have been neglected and thus limit the unit to be installed both indoors (covered by an independent protective structure) and out of doors (exposed to accumulating snow/ice) for ground snow loads no greater than 30 psf for all applications.
2. The following building codes are addressed under this certification:
IBC 2015 – referencing ASCE7-10 and ICC AC-156
IBC 2012 – referencing ASCE7-10 and ICC AC-156
IBC 2009 – referencing ASCE7-05 and ICC AC-156
IBC 2006 – referencing ASCE7-05 and ICC AC-156
3. Refer to the manufacturer supplied installation drawings for anchor requirements and mounting considerations for seismic applications. Required anchor locations, size, style, and load capacities (tension and shear) may be specified on the installation drawings or specified by a 3rd party. Mounting requirement details such as anchor brand, type, embedment depth, edge spacing, anchor-to-anchor spacing, concrete strength, special inspection, wall design, and attachment to non-building structures must be outlined and approved by the Engineer of Record for the project or building. Structural walls, structural floors, and housekeeping pads must also be seismically designed and approved by the project or building Structural Engineer of Record to withstand the seismic anchor loads as defined on the installation drawings. The installing contractor is responsible for observing the installation detailed in the seismic installation drawings and the proper installation of all anchors and mounting hardware.
4. For this certificate and certification to remain valid, this certificate must correspond to the "Seismic Certification Label" found affixed to the unit by the factory. The label ensures the manufacturer built the unit in conformance to the IBC seismic design criteria set forth by the Certified Seismic Qualification Agency, The VMC Group, and meets the seismic design levels claimed by this certificate.
5. Mechanical, Electrical, and Plumbing connections to the equipment must be flexibly attached as to not transfer load through the connection. The structural integrity of any conduit, cable trays, piping, ductwork and/or flexible connections is the responsibility of others. This certification does not guarantee the equipment will remain compliant to NEMA, IP, UL, or CSA standards after a seismic event.
6. This certificate applies to units manufactured at:
Kohler Power Systems, N7650 Lakeshore Road, Sheboygan, WI 53083
7. This project follows The VMC Group's ISO-17065 Scheme for Product Certification of Nonstructural Components.



John P. Giuliano, PE
President, The VMC Group

VMA-47444-01C (Revision 04)
Issue Date: February 07, 2012
Revision Date: April 09, 2018
Expiration Date: April 30, 2021



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 8PP. 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

PROTOTYPE TEST REPORT



Models Covered: **600REOZVB**
Model Tested: **600REOZVB**
Cooling System Tested: **50C**

Alternator Tested: **5M4030**
Engine Tested: **TWD1643GE**
Voltage Tested: **480V**

GENSET

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

Meets Rated Load

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

± 0.25 % Frequency Band

± 0.50 % Voltage Deviation

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

Full Load Acceptance

36.5 % Voltage Dip

2.60 Seconds of Recovery Time

22.5 % Frequency Dip

3.70 Seconds of Recovery Time

Full Load Rejection

18.3 % Voltage Overshoot

1.00 Seconds of Recovery Time

6.40 % Frequency Overshoot

0.70 Seconds of Recovery Time

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

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

Complies with NFPA 110 Type 10

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

Complies

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

Complies

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

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

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

PROTOTYPE TEST REPORT



Models Covered: **600REOZVB**
Model Tested: **600REOZVB**
Cooling System Tested: **50C**

Alternator Tested: **5M4030**
Engine Tested: **TWD1643GE**
Voltage Tested: **480V**

ALTERNATOR

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

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

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

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

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

Kohler Standby/Prime Generator Set Test Program

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

Prototype Testing

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

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

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

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

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

Production Testing

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

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

KOHLER®

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



PreStartup Checklist



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OPERATING INSTRUCTIONS

SAFETY PRECAUTIONS

Safety is built into every engine driven generator; however, like any other electro-mechanical device it can present serious threat to life and limb if imprudently operated and maintained. Remember that the best safeguards against accidents are to keep ever mindful of the potential dangers and to always use good common sense. In the interest of safety, some general precautions are presented below - keep these in mind!

Warning - High Voltage: Remember that the function of a generator set is to produce electricity and wherever electrical energy is present, there is the potential danger of electrocution. Keep everyone, especially children, away from the set while it is running and take precautions to prevent unqualified personnel from tampering with or attempting to operate your generator set. Have the set and electrical circuits serviced only by qualified technicians. Wiring should be inspected frequently - replace leads that are frayed or in poor condition. Be especially careful not to come in contact with electrical equipment when standing in water or on wet ground or when your hands are wet.

Warning - Lethal Exhaust Gas: The engine powering your generator discharges deadly carbon monoxide as part of the exhaust gas when operating. Carbon monoxide is particularly dangerous in that it is odorless but keep in mind that it can cause death if inhaled for even a short period of time. Never operate the generator set inside a building unless the exhaust gas is piped safely outside or operate in any area where exhaust gas could accumulate and seep back inside an occupied building. Avoid breathing exhaust fumes when working on or near the generator set.

Warning - Dangerous Fuels: Use extreme caution when handling, storing and using fuels - they are highly volatile and explosive in vapor state.

Warning - Automatic Transfer Switch: This system is equipped with an automatic transfer switch and will start automatically. Before working on the generator, or equipment connected to generator, the generator must be disabled. Move the generator control switch to the "Off" position; open the generator line circuit breaker; and move the automatic transfer switch operator disconnect switch to the "Off" position.

OPERATING INSTRUCTIONS

1. Check all fluid levels of engine coolant and lubricating oil. (Caution: Do not remove radiator cap while system is hot.)
2. If any failure lights are lit, correct problem and reset by moving the generator control switch to the “Off/Reset” position.
3. **Automatic Operation:** With the generator control switch in the “Auto” position the system will respond to remote start/stop signals from the automatic transfer switch.
4. **Test - without load transfer:** Placing the generator control switch in the “Run” position will cause the engine generator to start and run unloaded. To stop the unit, move the control switch to either the “Off/Reset” or the “Auto” position.
5. **Test - with load transfer:** With the generator control switch in the “Auto” position, push and hold the automatic transfer switch “Test” switch for a period exceeding the setting for “Time Delay Engine Start” time delay (normally set at 3 seconds). The generator set will start, reach operating speed, and the load will transfer to emergency. The system will operate on emergency for the time period of the “Time Delay Return to Normal” time delay (normally set at 15 minutes). At the end of this time period, the load will automatically transfer to “Normal” and the generator set will run approximately 5 minutes unloaded for a cool-down period and then automatically stop.

Caution: Always reset the generator control switch to the “Auto” position at the completion of testing or maintenance work. For further information, refer to the detailed Operating Instructions provided with the system.



STARTUP REQUEST AND CHECKLIST FORM

Generator system startups are typically quoted for Normal working hours and are limited to a single trip to the job site. Please help us avoid the need to invoice for supplemental visits by insuring that the system is ready for startup on the initial trip. **BCEW is not an installation Contractor. Any wiring, terminations or other additional work will be billed at our current labor rate in full 1 hour increments.**

Please allow at least 10 working days for scheduling of onsite startup and training services. Please fax completed checklist to BCEW at (619) 938-8217 or email it to startupgroup@bcew.com. Dispatch will call you to schedule the startup after this form is received. If you need startup sooner than the next 2 weeks, please call Dispatch at 866-938-8200 to make arrangements.

PROJECT NAME:	STARTUP CONTACT NAME/PHONE NUMBER:
JOB SITE ADDRESS:	BCEW JOB #:
PRINT NAME:	SIGNATURE:

ELECTRICAL:

- ☐ The AC circuit for the battery charger is installed and terminated. (DO NOT ENERGIZE).
- ☐ The AC circuit for block heater is installed and terminated. (DO NOT ENERGIZE).
- ☐ The engine start signal wires are pulled and terminated from the generator controller to each ATS(s).
- ☐ If applicable, the remote annunciator is installed and wires are pulled and terminated.
- ☐ If applicable, the remote emergency stop switch is installed and wires are pulled and terminated.
- ☐ All AC power cables are properly terminated at the generator and ATS.

NOTE: AC and DC wires must be in separate conduits. The control wiring should be stranded. BCEW technician can help identify the wires and terminate to our generator controller only. Please ensure that the wires are pulled, properly labeled, and that there is enough slack to reach the terminals. Please contact your BCEW PM if you need assistance identifying and terminating wires to our controller prior to startup.

FUEL:

- ☐ All fuel lines are connected. (Ignore this question if the generator is equipped with only diesel sub-base tank).
- ☐ The fire inspection was completed.
- ☐ The fire extinguishers and required placards were installed at locations approved by the fire inspector.
- ☐ The sub-base tank has been filled with fuel.
- ☐ For NG or LPG only: Fuel source is available and all required pressure regulators are installed. Ignore if you have diesel fuel.

NOTE: If required, the fire extinguishers and required placards are provided by others. If you want BCEW to provide these items, please let us know so that we can provide you with a quote.

AIR QUALITY PERMIT:

- ☐ The local Air Quality District (AQMD/APCD) has approved startup of the generator. (Please provide a copy of the approval with this request to ensure startup on requested date).

NOTE: For certain jurisdictions, this approval document is in the form of a permit to operate (PTO) or authority to construct (ATC). Certain jurisdictions (like SDAPCD) also require a construction completion notice (CCN) sent to them prior to startup.

ACCESS:

How close can our technician and testing equipment get to the generator? Keep in mind that our testing equipment may include oversized/trailerized load bank and may be limited by the length of cables available for the technician (typically 100' total length).

Will there be ongoing activities that may be in the way of our technician during startup (road paving, tree cutting, etc.) _____

Are there any requirements for access? _____

Is this an indoor or outdoor installation? _____

Is the generator located on the ground level? If not, provide floor location _____

NOTE: Any extreme access restriction not reported or not anticipated during startup may cause multiple trips to the job site. Unless previously arranged, additional trips will be billed at our current labor rate in 1-hour increments.

TRANSFER SWITCH:

- ☐ Utility power is energized at the new ATS(s).
- ☐ The power can be shut down for power transfers for testing. (Please verify and ensure that facility personnel are aware of the transfer).
- ☐ I want the generator to automatically exercise per setting below:

ATS Exerciser Time and Duration – Please complete the section below ONLY if you want the generator system to exercise automatically. Leave blank for manual exercise.	
Day of week:	
Time of day to start:	
Duration:	
With load (transfer) or without load (run engine only):	

NOTE: The section above must be completed prior to startup. If left blank, the startup technician will not program the ATS exerciser. Unless previously arranged, a separate trip to program the ATS will be billed at our current labor rate in 1 hour increments.

TRAINING:

- ☐ Personnel will need to be trained. (Please ensure that all personnel requiring training are available for training on startup date)

NOTE: Unless previously arranged, training is provided on the same day as startup, otherwise additional trip for the training will be billed at our current labor rate in 1-hour increments.

GENERAL STARTUP POLICY:

1. It is the installing contractor or owner's responsibility to complete the checklist. Items that are not completed, but reported completed will result in additional charges to our customer. Any overtime or additional trips required to finish the startup due to incomplete installation will be billed at our current labor rates in 1 hour increments.
2. Additional charges will apply to services that will need to be performed outside BCEW's normal working hours. BCEW's normal working hours are Monday through Friday from 7am to 4pm.
3. Service work performed on other equipment not supplied by BCEW will be billed accordingly.
4. It is the installing contractor or owner's responsibility to comply with all applicable codes and standards.

BY INITIALLING BELOW, YOU INDICATE THAT YOU UNDERSTAND AND AGREE TO THE ABOVE STATEMENTS AND ACCEPT RESPONSIBILITY FOR ADDITIONAL CHARGES THAT MAY ARISE FROM ITEMS MENTIONED ON THIS FORM. _____

NOTES:

Generator Set/Transfer Switch Installation Checklist

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

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

Equipment Room or Weather Housing			Does Not Apply
		Yes	No
☐	☐ 1.	Is the equipment installed in a fire-resistant room (made of non-combustible material) or in an outdoor weather housing?	☐
☐	☐ 2.	Is there adequate clearance between the engine and floor for service maintenance?	☐
☐	☐ 3.	Is there emergency lighting available at the equipment room or weather housing?	☐
☐	☐ 4.	Is there adequate heating for the equipment room or outdoor weather housing?	☐
☐	☐ 5.	Is the equipment room clean with all materials not related to the emergency power supply system removed?	☐
☐	☐ 6.	Is the equipment room protected with a fire protection system?	☐
Engine and Mounting			
☐	☐ 7.	Is the mounting surface(s) properly constructed and leveled?	☐
☐	☐ 8.	Is the mounting surface made from non-combustible material?	☐
☐	☐ 9.	Was the generator-to-engine alignment performed after attaching the skid to the mounting base? Generator sets with two-bearing generators require alignment.	☐
Lubrication			
☐	☐ 10.	Is the engine crankcase filled with the specified oil?	☐
Cooling and Ventilation			
☐	☐ 11.	Is the cooling system filled with the manufacturer's specified coolant/antifreeze and purged of air?	☐
☐	☐ 12.	Is there adequate inlet and outlet air flow (electric louvers adjusted and ventilation fan motor(s) connected to the corresponding voltage)?	☐
☐	☐ 13.	Is the radiator duct properly sized and connected to the air vent or louver?	☐
☐	☐ 14.	Are flexible sections installed in the cooling water lines?	☐
Fuel			
☐	☐ 15.	Is there an adequate/dedicated fuel supply?	☐
☐	☐ 16.	Are the fuel filters installed?	☐
☐	☐ 17.	Are the fuel tanks and piping installed in accordance with applicable codes and standards?	☐
☐	☐ 18.	Is there adequate fuel transfer tank pump lift capacity and is the pump motor connected to the corresponding voltage?	☐
☐	☐ 19.	Is the fuel transfer tank pump connected to the emergency power source?	☐
☐	☐ 20.	Are flexible fuel lines installed between the engine fuel inlet and fuel piping?	☐
☐	☐ 21.	Is the specified gas pressure available at the fuel regulator inlet?	☐
☐	☐ 22.	Does the gas solenoid valve function?	☐
☐	☐ 23.	Are the manually operated fuel and cooling water valves installed allowing manual operation or bypass of the solenoid valves?	☐
Exhaust			
☐	☐ 24.	Is the exhaust line sized per guidelines and does it have flexible connector(s)? Is the flexible connector(s) straight?	☐
☐	☐ 25.	Is there an exhaust line condensate trap with a drain installed?	☐
☐	☐ 26.	Is the specified silencer installed and are the hanger and mounting hardware tightened?	☐
☐	☐ 27.	Is a heat-isolating thimble(s) installed at points where exhaust lines pass through combustible wall(s) or partition(s)?	☐
☐	☐ 28.	Is the exhaust line free of excessive bends and restrictions? Is the backpressure within specifications?	☐
☐	☐ 29.	Is the exhaust line installed with a downward pitch toward the outside of the building?	☐
☐	☐ 30.	Is the exhaust line protected from entry by rain, snow, and animals?	☐
☐	☐ 31.	Does the exhaust system outlet location prevent entry of exhaust gases into buildings or structures?	☐
☐	☐ 32.	Are individuals protected from exposure to high temperature exhaust parts and are hot parts safety decals present?	☐
AC Electrical System			
☐	☐ 33.	Does the nameplate voltage/frequency of the generator set and transfer switch match normal/utility source ratings?	☐
☐	☐ 34.	Do the generator set load conductors have adequate ampacity and are they correctly connected to the circuit breakers and/or the emergency side of the transfer switch?	☐
☐	☐ 35.	Are the load conductors, engine starting cables, battery charger cables, and remote annunciator leads installed in separate conduits?	☐
☐	☐ 36.	Is the battery charger AC circuit connected to the corresponding voltage?	☐
Transfer Switch, Remote Control System, Accessories			
☐	☐ 37.	Is the transfer switch mechanism free of binding? Note: Disconnect all AC sources and operate the transfer switch manually.	☐
☐	☐ 38.	Are the transfer switch AC conductors correctly connected? Verify lead designations using the appropriate wiring diagrams.	☐
☐	☐ 39.	Is all other wiring connected, as required?	☐
Batteries and DC Electrical System			
☐	☐ 40.	Does the battery(ies) have the specified CCA rating and voltage?	☐
☐	☐ 41.	Is the battery(ies) filled with electrolyte and connected to the battery charger?	☐
☐	☐ 42.	Are the engine starting cables connected to the battery(ies)?	☐
☐	☐ 43.	Do the engine starting cables have adequate length and gauge?	☐
☐	☐ 44.	Is the battery(ies) installed with adequate air ventilation?	☐
☐	☐ 45.	Are the ends of all spark plug wires properly seated onto the coil/distributor and the spark plug?	☐
Special Requirements			
☐	☐ 46.	Is the earthquake protection adequate for the equipment and support systems?	☐
☐	☐ 47.	Is the equipment protected from lightning damage?	☐

Generator Set/Transfer Switch Startup Checklist

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

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

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



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Generator and ATS Training

Duration:	1-2 hours (Approx.).
Format:	Informal, hands-on training.
Location:	Ideal location is at the Generator and ATS.
Date and Time:	Typically performed during generator startup unless previously arranged.
Training Materials:	None required/provided unless specifically requested.
NOTE:	1.) Video service is not provided, however, the end user may chose to videotape the training using their own equipment and operator. 2.) If applicable, training outline for the switchgear is provided separately.

1. **Equipment Familiarization: 15-30 minutes**
 - Brief overview of major components of the generator.
 - Overview of the generator control panel primary features.
 - Overview of the fuel tank/system.
 - Demonstrate how to lock/unlock the doors (if equipped with enclosure).
 - Locate:
 1. Batteries.
 2. Radiator fill.
 3. Oil dipstick and fill.
 4. Fuel fill.
 5. Fuel gauge.
 6. Locate emergency stop (if equipped).
 7. Circuit breaker.
2. **Safety: 15-30 minutes**
 - Review safety shutdowns and alarms (and annunciator if equipped).
 - Discuss precautions and safety measures when operating the unit.
3. **Operation: 15-30 minutes**
 - Demonstrate how to start and stop the unit.
 - Overview of ATS operation.
 - Automatic transfer
 - Manual transfer
 - Exercise timer
4. **Preventive Maintenance: 15-30 minutes**
 - Overview of recommended maintenance and common easily fixed problems.
5. **Q & A**